



**PROJECT:** INDOOR PRACTICE FACILITY  
EAST CAROLINA UNIVERSITY  
**SCO #** 23-26345-01A  
**AIM#** 1752  
**CRA PROJECT #:** 2122  
**DATE:** 04/09/2025

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**MODIFICATIONS TO THE CONTRACT DOCUMENTS FOR THE ABOVE-NAMED PROJECT SHALL BE MADE AS DESCRIBED BELOW AND SHALL BE INCLUDED IN THE BID AMOUNTS:**

**A PRE-BID CONFERENCE**

- 1) Hamel Builders conducted a Pre-Bid Meeting on March 28, 2025 from 11:00 am to 12:00 pm. Included as appendixes are a summarization of the meeting and the attendance sheet.

**B RFI Responses**

- 1) See attached RFI Log for Designer Responses.

**C SPECIFICATIONS**

- 1) Specification 051200 – Structural Steel Framing: Strike through Article 1.8 Paragraph A.
- 2) Specification 074213.19 –
  - a) 2.2.-B.1 Provides a definition of Insulated Metal Panel -1
  - b) 2.2.-B.1.f Revises Panel coverage to “As indicated on drawings.” See provided drawings, designer responses for more information.
  - c) 2.2-B Add subsection 2. that provides a definition of Insulated Metal Panel -2
- 3) Specification 083323 –
  - a) Under Section 2.3-H: Revise Locking device to a Masterkeyable cylinder located in the bottom bar operable from both sides of door. Provide three keys for each cylinder.
  - b) Under Section 2.3-K Remove baked enamel.
  - c) Under Section 2.6-A: Revise paragraph to reflect requirements of Locking device Assembly.
- 4) Specification 083613-2.3-L: Remove Baked Enamel Finish. Pricing to be based on Powder-Coat Finish.
- 5) Specification 116623.53:
  - a) Add Fieldwallpads/SportsGraphics as an acceptable manufacturer.
  - b) In Section 2.2 D.3 replace the requirement for a 96 inch length with 80 inches.





- c) 2.2.-E. Update minimum size requirement from 1-1/4 inch to 2 inch
- d) 2.2.-F Update minimum size requirement from 1-1/4 inch to 2 inch
- e) Added Section 2.2-H: requiring pads to meet requirements of ASTM 2440-18.
- 6) Specification 133419
  - a) Section 1.6-B.2 Add subsection a. requiring provisions of attachment for additional items
  - b) Section 2.2-B.1.a Strike through, replace with " Provide additional steel at Video Display Board, Exterior Conventional Steel Canopy, Vertical Lift Doors and Overhead Coiling Doors
  - c) Section 2.3-B.2.a,,c,d: Revised structural requirements.
- 7) Specification 230924: Trane has been added to Spec 230924
- 8) Section 237400 – Packaged Rooftop Units: Deleted paragraph 2.1-L-3
- 9) Section 260543 – Underground Ducts and Raceways for Electrical Systems: Revised paragraph 1.6-B to require warranty beginning at date of final acceptance.
- 10) Section 265668 – Athletic Lighting:
  - a) Revised paragraph 1.5-B to better describe electrical source and load for this project
  - b) Added paragraph 2.6, addressing applicable electrical requirements for the athletic lighting scope of work.
- 11) Section 271100 – Communications Equipment Room Fittings: Added a Preferred Brand Alternate for Cable Runway in Paragraph 2.1.A.12.
- 12) Section 283116 – Multiplexed Fire Detection and Alarm Systems:
  - a) Revised paragraph 2.6-B-1 to indicate acknowledge, silence and reset keys should be accessible with cover open
  - b) 2.20-H to require photoelectric smoke detectors.
- 13) Specification 321293.10
  - a) Section 1.1 – C.1; strike through "shock pad and"
  - b) Section 1.6 – E.3: Strike through 125 and replace with 175 G as target GMAX value playing surface is not to exceed for life of warranty.
  - c) Section 1.6 – E.3: Strike through language reference Brock Powerbase Pro 125 G warranty.
  - d) Section 2.1-A: Strike through line referencing Shock/Drainage Pad

**D CIVIL and LANDSCAPE DRAWINGS**

- 1) See Designer Responses in RFI Log





- 2) C100: Add notation to remove existing water line assembly, cap and abandon in place.
- 3) C200: Revised sidewalk to coordinate with architectural plans.
- 4) C300: Revised backgrounds showing new sewer alignment
- 5) C301: Revised backgrounds showing new sewer alignment.
- 6) C302: Shows temporary construction entrance.
- 7) C303: Shows temporary construction entrance.
- 8) C400: Revised sanitary sewer line.
- 9) C400: Close ,and remove existing irrigation service. Provide RPZ, meter to ECU – cap and abandon in place.
- 10) C401: Added note calling out new fire hydrant and hydrant leg valve.
- 11) C503: Added BFP notes.
- 12) C507: Added note regarding proposed emergency drive load capacity.

**E ARCHITECTURAL DRAWINGS**

- 1) Where applicable across drawing set, increase height of perimeter curb around Pre-Engineered Metal Building from 4 inches to 6 inches. Adjust other elements accordingly.
- 2) 2/A101: Updated size of Finish Stones from 0.5 inches to 1.5 inches. Removed mention of NCDOT Size #78.
- 3) 3/A112: Updated base condition to reflect use of typical base flashing condition of single-ply roof to wall.
- 4) A200: Adjust size of Horizontal Panels from 38.5 inches to 24 inches at the base of the wall followed by three 30 inch panels above to a height of 10'-0" A.F.F. on all Exterior Elevations
- 5) A200: Added dimension string at each exterior elevation to describe dimensions of insulated metal panels.
- 6) 1/A200,2/A200,4/A200: Changed note from "4" curb at perimeter of PEMB" to "Curb at perimeter of PEMB."
- 7) A500: Updated Door schedule to call out Head and Jamb details for Vertical Lift Doors.
- 8) A500: Remove Slide Bolt Lock and Dimension from Overhead Coiling Door elevation
- 9) A501: Added Detail H4/A501 - Head Detail at Vertical Lift Door
- 10) A501: Added Detail J4/A501 – Jamb Detail at Vertical Lift Door
- 11) A501: Updated Detail number 2/A501" to "LS 1"





- 12) A501: Updated title of detail LS-1/A501 to "Louver Sill Detail".
- 13) 1/A502: Revised upturned concrete curb from 4" inches to 6" inches
- 14) A504: Updated Detail 2/A504 to reflect newly provided jamb detail.

## **F STRUCTURAL DRAWINGS**

- 1) Sheet S001: Removed Structural Steel note pertaining to fabricator AISC quality certification requirements. Updated subsequent note numbers accordingly.
- 2) Sheet S002: Revised Metal Building System Notes number 3 to include specific equipment weights. Revised notation and layout of Metal Building System Notes number 10.
- 3) Sheet S113: Updated concrete curb from 4" to 6" tall. Updated keynote 105 accordingly.
- 4) Sheet S114: Updated concrete curb from 4" to 6" tall. Updated keynote 105 accordingly.
- 5) Sheet S301: Updated concrete curb graphics to reflect change in curb height.

## **G ELECTRICAL DRAWINGS**

- 1) Sheet E001:
  - a) Added "BL" definition for breaker lock accessory
- 2) Sheet EL201:
  - a) Revised circuit for light in room 120 to Emergency circuit #9
- 3) Sheet EL202:
  - a) Revised circuit for light in room 121 to Emergency circuit #2
- 4) Sheet E300:
  - a) Added two wall mounted duplex receptacles in room 109
  - b) Added one rack mounted quad receptacle on new circuit in room 109
  - c) Added ten wall mounted duplex receptacles with new dedicated circuits in room 107. Added keynote #32 for coordination of device locations with Owner and AV installer.
- 5) Sheet E602:
  - a) Revised panel schedules as indicated to align with adjustments above.

## **H TELECOM DRAWINGS**





- 1) Sheet T102:
  - a) No design changes. Graphical updates only for more clarity.
- 2) Sheet T103:
  - a) No design changes. Graphical updates only for more clarity.
- 3) Sheet T201:
  - a) Telecom conduits are keynoted individually.
  - b) Keynotes 118, 136 & 138 added or updated accordingly.
  - c) General note no. 6 added.
  - d) Data outlet removed from VB Closet 120.
- 4) Sheet T202:
  - a) Telecom conduits are keynoted individually.
  - b) Telecom Grounding Busbar (TGB) added in A/V Server Room 107.
  - c) Added 3" conduits for Speakers & Audio Remote Interface Enclosure cables.
  - d) Keynotes 118, 119, 120, 135, 136, 137, 139 & 140 added / updated accordingly.
  - e) Modified the Telecom Junction box size accordingly (Keynoted as 117).
  - f) Added the OFOI Audio Remote Interface Enclosure location, near the OFOI Scoreboard Control Console, along with keynote 141.
  - g) General note no. 6 added.
- 5) Sheet T400:
  - a) Updated the Telecommunications Grounding Riser Diagram to show a TGB in the A/V Server Room 107 and a Secondary Bonding Conductor (SBC) from the Telecom Bonding Backbone (TBB).

## END OF ADDENDUM

### Attachments:

1. Pre-Bid Conference Meeting Notes
2. Pre-Bid Conference Attendance Sheet
3. Pre-bid RFI Log
4. Revised Specifications
5. Revised Sheets



## Transcript Notes

### Tom Wahl

- Construction of a new indoor practice facility located in place of an existing multi-purpose field.
- Remove the existing field and tennis courts.
- 85,000 sqft pre-engineered metal building enclosing a synthetic turf field.
- Multi-purpose field for football, soccer, and lacrosse
- Additional space at each end for lobby, restrooms, storage, and mechanical areas
- No concrete slab under the field but will have a concrete slab at each end.
- The primary mechanical equipment for the enclosed field will be two air rotation units at each end of the building.
- The pre engineered metal building will have a standing seam roof and a mix on the façade of insulated metal panels, brick veneer, and translucent panels.

### Perry Jenkins

- Invitation to bid sent on March 24<sup>th</sup> and a follow up email sent the next day.
- Click on the job in Building Connected, you will see three tabs labelled overview, files, and messages.
- Overview tab will cover the basic information and important dates for the job.
- Files tab contains all documents related to the job.
- The first document you will see is the instructions to bidders and the form of proposal.
- #2, 3, 4, and 5 will be the plans, specifications, geotechnical report, and as-built drawings
- The final file will be labeled with your bid package name and contains a detailed scope of work you are expected to include.
- RFI's are due April 2<sup>nd</sup> by 5pm

### Tom Wahl

- Indicate the bid package, company name, and date on the cover page of the form of proposal.
- At the bottom of page one you will see "All for the Sum of," this is where you will write in your total bid amount.
- Page 2 is a worksheet for you to write all values included in your bid.



- Base bid will be your initial bid amount including material, labor, overhead and profit.
- On the next line you will indicate the amount of gift in kind you would like to give back to the university
- Tiered subcontractors or suppliers can also participate in gift in kind under you. Their names and amounts should be listed under your gift in kind on the Vendor lines.
- Gifts in kind relate back to the Pirate Club credit
- Add your gift in kind together with tiered subcontractor and supplier gifts in kind, subtract this amount from your base bid. This will be your final bid amount.
- Subcontractor must also include a detailed proposal on company letterhead.
- Alternates must be completed on the form of proposal if they apply to your trade.
- Unit prices must be completed on the form of proposal if they apply to your trade. This is mostly for site contractors.
- On the last page of the form of proposal, you will sign the bid with a witness to the signature, include required company information, and acknowledge all addenda that have been issued for the project.

#### Perry Jenkins

- Paper copies of bids must be received by 1pm April 17<sup>th</sup> at Towne Bank Tower
- The bid must be in a sealed envelope with all required documentation.
- The envelope must be labeled with the project name, General Contractor, Bid Package, Contactor Name, Sealed Due April 17, 2025, at 1:00 PM
- If you are mailing your bid, mail to Hamel Builders Office, 215 W. 9th Street, Greenville, NC 27834
- Bids submitted through mail must arrive at Hamel Builders Office by 10 AM on the day of the bid.

#### Scott Andrews

- On the day of the bid, we will have representatives at the bottom of both elevators accepting bids. This will help with last minute bids being accepted on time. At 1 PM, the representatives will package all bids up and head up the elevator.

#### Perry Jenkins

- Bid package envelopes should include the completed form of proposal, completed applicable alternates and unit prices, acknowledgment of addenda, and a detailed scope of work on company letterhead.



- Incomplete proposals will not be accepted.
- Electronic bids through Building Connected will not be accepted.
- Bid opening schedule is listed on page two of the instructions to bidders.

Tom Wahl

- Bid bonds will not be required.
- If you are bidding two separate bid packages, you will have to submit separate proposals for each. The packages will be opened separately, and you are not guaranteed to be awarded both packages.
- BIM is not required.
- Primary lay down area is below the building pad. There will likely be a roadway up to access the building pad.

Scott Andrews

- Contractor parking will be in Lower Minges and Stratford lots.
- Parking passes will be required during construction but not on bid day.
- Lay down area will be fenced off.
- We can accommodate contractors that cannot make it to the site walk. Let our team know and we can facilitate access to the site.

Tom Wahl

- Seeing the location of the bid before the bid day is recommended. We don't want you to miss the bid deadline due to a wrong turn.
- This project will have MBE/WMBE requirements, include forms with bid.



## ECU Indoor Practice Facility - Attendee's

1. Adam Langley – C&C Industrial
2. Adam Rodrigues -
3. Al Pitts – SPC Mechanical
4. Alex Pape - CRA
5. Alex Taylor – Sports Field
6. Andy Cruickshank – CRA
7. Billie Poulton – K.H. Smith Communications
8. Boyd Brittle – Custom Building Company
9. Brett Herrlinger - Bonitz
10. Brett Marcoux – WS&M Site Services
11. Bryan Gedbaw – SE&M Constructors
12. Buddy Laws – Capital Sign Solutions
13. Mark Celenza - Sprinturf
14. Chad Farmer – Sears Contract
15. Charles Lewis – E.R. Lewis Construction Company
16. Chris Orton - Strickland Waterproofing
17. Clay Griffin – Pitt Electric
18. Courtney Johnson – Fred Adams Paving Company
19. David Herman – Pitt Electric
20. Davis Beeman – East Coast Access
21. Dylan Witherspoon – Wildcat Contractors
22. Eli Rowe – Netting Professionals
23. LL Everett - ECU
24. Garth Flannigan – Carolina Conduit Systems
25. Gary Starkweather – L.L. Vann Electric
26. Jason Peterson – J.P. Ross and Co.
27. Jason Reams – C&C Industrial
28. Jay Gunter – East Bound Mechanical
29. Jay Sherrer – Carolina Sport Court
30. Jim Boulanger – Infinity Contractors
31. JJ Daugherty – National Coatings
32. Joe Mobley – Curtis Construction Co.
33. Joel Garrison III – MH Mechanical
34. Joey Saccavino – Raleigh East Concrete
35. Kent Warren – Jackson Builders
36. Kevin Skinner – L.R. Griffin & Associates



37. Louis Santospago - Environamics
38. Mario Perez – Air Solution
39. Mark Tiernan – Fred Adams Paving Company
40. JJ McLamb - ECU
41. Mike Bunting – Carolina Green Corp
42. Mike Ladrie – Custom Door & Gate
43. Olivia Narron - ECU
44. Nick DeCarlo – Jenns Hardscape Construction
45. Phil Nichols – Hudson Brothers
46. Richard Denney – Warren Technology
47. Richard Treen – Carolina Conduit Systems
48. Russel Richter – L.L. Vann Electric
49. Ryan Nielsen – W.S. Nielsen Co.
50. Gina Shoemaker - ECU
51. Carlos Silva – Hellas Construction
52. Stanley Bacon – Stone Creek Masonry
53. Tanya Baker – Sears Contract
54. Thomas Jones –
55. Kenneth Thomas – Butler Buildings
56. Tim Randal – Farrior & Sons
57. Tom Riginos – Netting Professionals
58. Tommy Smith – Keen Plumbing
59. Tony Morris – Allred Mechanical Services
60. Tracey Florence – Advance Concrete
61. Trent Morrow - Bonitz
62. Triston Arwood – North State Steel
63. Tyler Hicks – C&C Industrial
64. Tyler Turner – The Motz Group
65. Wade Hobbs – Steel Worx Solutions
66. Will Hollowell – GlassTech Commercial Glazing Services





ECU INDOOR PRACTICE FACILITY | PRE-BID REQUEST FOR INFORMATION LOG

RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
DIVISION 05 – METALS				
5.1		051200-3	The structural steel specs require the fabricator to be, "A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172)." (Division 051200 – 3). Can this be waived? We would include costs in our bid for us to hire a licensed structural engineer or a third-party inspector (Terracon) to perform a shop inspection and oversee our quality control procedures during fabrication. We have done this on several occasions and the EOR accepted this inspection in lieu of the certification/accreditation.	<b>LM Response:</b> The requirement for AISC Quality Certification by the steel fabricator has been waived. The structural steel specifications and general notes have been revised accordingly. The shop must be inspected by a third party in accordance with the Schedule of Special Inspections. Per Section 1704.2 of the North Carolina State Building Code, <b>Special Inspections services must be procured by the owner.</b>
DIVISION 06 – WOOD, PLASTICS AND COMPOSITES				
6.1			Can Detail 5/A502 be changed to a brick rowlock at the top of the brick veneer in lieu of treated wood blocking installed on top of the veneer? Installing the two pieces shown will be difficult to fasten securely. Hamel includes brick rowlock in GMP.	No.
DIVISION 07 – THERMAL AND MOISTURE PROTECTION				
7.1		77253	Can Snow Guards be eliminated? Most PEMB Contractors are questioning the need for these in this region and do not typically include them. We will need to obtain separate pricing for these upon completion of the roof. Concern for roof warranty has also been expressed if they are added by others.	No. Snow Guards should be aquired from compatible vendors to ensure the maintenance of roof warranty.
DIVISION 08 – OPENINGS				
8.1		083613-2.3-L	Section 083613-2.3-L and section 083323-2.3-K both call for baked enamel or powder coat finish. Baked enamel finish offers smaller range of colors. Powder coated finish offers wider choice of colors but is much more expensive. The spec lists them as if they are equal choices. Can we provide base price in Baked Enamel with an Add Alternate for Powder Coated Finish?	Use Powder Coat finish as basis of design.
		083323-2.3-K		



ECU INDOOR PRACTICE FACILITY | PRE-BID REQUEST FOR INFORMATION LOG

RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
8.2	A500		Mounting the Slide Bolt Lock at 3'-6" AFF for OCD is not an option for the specified doors. Can lock be mounted on bottom rail?	Revise lock location to bottom bar of overhead door. Revise lock type to cylinder
DIVISION 11 – EQUIPMENT				
11.1	A400		Fieldwallpads/SportsGraphic is not listed as an acceptable pad manufacturer. We would like to request that Fieldwallpads/SportsGraphic be added as an approved	Fieldwallpads/SportsGraphic has been added to the specification.
11.2	A400		The specification page calls for 24" wide pads—would it be acceptable to use 48" wide pads instead?	No. Use 24" wide pads.
11.3	A400	116623.53; 2.2, D.-3	The specs call for 8'-0" high pads, but the plans indicate 6'8" high pads. For an indoor football facility, 8' pads are typical - please confirm the desired height.	Pads should be 6'-8"long with the resulting top of pad at 7'-0" above finish floor.
DIVISION 13 – SPECIAL CONSTRUCTION				
13.1	S002		<p>1. The deflection limitations are per Kirby recommendations on S002 nor DIV 13 specs. Can we design around the following criteria to get the frames and secondary steel to support the exterior cladding:</p> <p>a. Frame sidesway horizontal deflection limitation for the entire building supporting panels and masonry (North to South): H/100 (Note: this would also apply to the end wall to end wall movement of the frames / East to West). Plans call for H/120 supporting panels in the North to South direction and H/400 in the East to West direction. The plans mention H/600 supporting masonry. Kirby can look at H/120 total if needed vs. H/100, but it will affect the MAX straight dimension as noted under #3 below. Please advise.</p> <p>b. Frame vertical deflection limitation: L/180 – specs mention L/360</p> <p>c. Purlin (roof) deflection limitation: L/150 – specs mention L/360</p> <p>d. Girts supporting IMP panels deflection limitation: L/180 – specs mention L/240</p> <p>e. Girts (structural channel) supporting masonry deflection limitation: L/240 – no mention of the masonry support in the specs</p>	<p>LM Response:</p> <p>a.The lateral movement permitted at the BEJ interface is H/400 (N-S AND E-W directions due to BEJ layout). The code-specified allowable drift for frames and girts supporting masonry = H/600. Per note C.1, this is only required for the extents of the masonry interface. All other instances may be designed to horizontal deflections of H/120.</p> <p>b. Per Table 1604.3 of the 2018 NCBC, the vertical deflection limit for roof members supporting nonplaster ceiling under live load, dead + live, and dead+snow (or wind) are Span/240, Span/180, and Span/240, respectively. These values are shown on S002, and the DIV 13 specs will be updated to match.</p> <p>c. See "b." response above. The purlin framing does not qualify for L/150 deflection per footnote (a) of Table 1604.3.</p> <p>d.Deflection limits for girts supporting wall panels to be Span/120 in accordance with Table 1604.3 and architectural product selection.</p> <p>e. Girts supporting masonry must not exceed Span/600 or 3/8" per the requirements set forth in TMS 402.</p>
13.2	3/A300		On A300 detail #3, there is shown a MAX column depth of 3'-0" straight up to 12'. We are going to be around 3'-5" at the H/100 deflection limitation. There is also mention of 5'-0" MAX depth at the rafter which could vary based on the loading. What Kirby would recommend is allowing the rafters to design economical and provide a clearance requirement at incremental locations which will be a separate RFI. This information will dictate your low eave height which is referenced at the intersection where the walls girts intersect with the roof purlins.	Max Column depth will remain 3'-0" for the straight section. We agree that rafters should be deisgned economically. They need to provide a clearance at the sidelines of 42' - 8 3/4" and a centerline clearance of 67' - 11 1/2".
13.3			The eave height location on the drawings is not shown in the correct location which this note goes along with note 3. The clear height requirement would ultimately dictate the eave height.	Noted
13.4	4/A210		It is noted on A210 detail #4 a clear requirement at the haunch of 36'-9 1/8". Are there any sideline clearance requirements? Are there any clearance requirements	Use the sideline clearance and centerline clearnace in response to RFI 13.2



## ECU INDOOR PRACTICE FACILITY | PRE-BID REQUEST FOR INFORMATION LOG

RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
13.5			The drawings note 10" secondary members on the wall sections. As a clarification, KBS secondary sizes for this project would be 9.5" for roof and wall to meet the design intent and spans.	Wall secondary members are to remain 10". It is acceptable for roofing members at 9.5".
13.6			The soffit/overhang dimension on some of the wall sections are referenced from face of column and should be referenced from face of exterior wall. This is especially important with the various girt member sizes in the industry. Please provide the overhang dimensions from face of exterior wall for all areas.	a. Over hang along Plan South and North edge of PEMB is 2'-0" from exterior face.
				b. Over hang along Plan East and West edge of PEMB is 3'-0" from exterior face.
				c. Overhang at ARU Chimney on East and West ends to be 1'-0" from exterior face
13.7			The sizes of the gutters and downspouts are noted in the drawings. The sizes of these members and quantity of downspouts will be determined by the PEMB manufacture to handle the volume of water for this building size.	The Quantity of Downspouts is to remain as is. Sizing of gutters and downspouts given in documents will be the minimum required. Increasing the size to accommodate volume of water is acceptable, and we'll defer that to the PEMB.
13.8		074213.19; 2.3-C.	KBS will propose a 26GA, Reverse R-Panel soffit that is 36" wide from lap to lap. This comes standard with a 2-Coat PVDF standard color finish. Please confirm if	Reverse R-Panel is acceptable. It should come with a 3-Coat finish to match Insulated Metal Panel as called out on sheet A200.
13.9	A200	074213.19; 2.2, B.	The specs only mention (1) IMP panel type, but the drawings reference an IMP 1 and IMP 2. During the budget phase, there was a striated panel profile for the vertical and a Sante Fe (Metl-Span version of Azteco) for the horizontal. Are all the panels now a Sante Fe exterior profile?	There are two distinct styles of panel to be used.
				(i) IMP-1 Basis-of-design "Kingspan Azteco" 22 gauge. 3-coat finish
				(ii) IMP-2 Basis-of-design "Kingspan Shadowline" Non-embossed 22 gauge. 3-coat finish. 36 inch wide panel to be used.
13.1	A200	074213.19; 2.2, B.	The specs reference a 3-Coat PVDF (Polyvinylidene Fluoride) finish on the IMP wall panels. Standard is a 2-Coat PVDF finish. Please clarify if a 3-Coat finish is required or if a standard 2-Coat PVDF finish standard color is acceptable.	3- Coat finish is required.
13.11	A200	074213.19; 2.2-B. 3.	The plans and specs reference a 38.5" panel coverage on IMP-1 horizontal panels. The closest standard panel with is 42". Next would be 36" which is an upcharge for the smaller width. What is required panel width?	See updated plans and specs in Addendum #1
13.12			The drawings and specs reference a 2" standing seam panel, but a 24" wide trapezoidal roof panels is technically a 3" tall seam. Also, please clarify that the gauge of the roof is 24GA which is the standard.	A 3" tall seam is acceptable to use on a 24" wide panel. 24 gauge roof panel is to be used.
13.13			It is recommended by insulation suppliers to fill the insulation cavity of the roof purlins for the insulation liner system. With the roof purlins most likely going to a taller size, the R-30 insulation thickness will need to be adjusted. Kirby would recommend for a standard 8" purlin, a minimum of 6" (R-19) cavity filled and 4" (R-13) overtop with a thermal block which is R-32. For the proposed 9.5" purlin, it is recommended to use an 8" (R-25) cavity filled and a 4" (R-13) overtop with a thermal block which is R-38. To adequately insulate the roof correctly, a R-38 insulation liner system is recommended in lieu of the R-30.	R-30 is the minimum required insulation value at the roof. That value can be exceeded as necessary to work with purlin depths proposed.



ECU INDOOR PRACTICE FACILITY   PRE-BID REQUEST FOR INFORMATION LOG				
RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
13.14	2/A304 3/A304		A304 details #2 and #3 show steel support of a canopy by the PEMB supplier. Please provide PSF weight allowance for this canopy.	<b>LM Response:</b> In addition to environmental loads, Live Roof loads, and its selfweight, the canopy must be designed for 10 PSF of superimposed dead load per the Metal Building System Notes. Refer to S001 and S002.
13.15	A200		Building Elevations on A200 indicate the use of 3 Equal Panels approximately 38.5" for IMP-1, horizontal Insulated Metal Panels installed on top of 4" concrete curb to finish at 10'-0". These custom sizes are not available in the specified product. Standard panel sizes could be used starting at a 6" tall curb if 24" starter panel was used and then install 3 Equal 30" panels above. Please advise.	This is acceptable. Elevations have been updated to reflect this change.
				i. 4" concrete curb height to be increased to 6"
				ii.Utilize a starter panel of 24" height, followed by a series of 3 equal 30" panels to achieve a top of panel at 10'-0" above finish floor.
DIVISION 22 – PLUMBING				
22.1	C400 & C401		Can four water connections in Charles Boulevard be changed back to one single 8" tap and then branched out to sizes for specific use connections (FH, Fire Service, 2.5" Domestic, 2" Irrigation) behind the curb, in the vicinity of the proposed new fire hydrant?	The method for performing the tap shall be bid as designed and required by GUC. Contractor to coordinate with GUC regarding installation.
22.2	C400		Will existing 1" water service at SW corner of building still require new piping, meter, and backflow preventer if new 2.5" domestic service is being added at NW corner of building? Existing 1" service is not shown on C100, Existing Conditions and it is not clear where this service extends to and if it will interfere with proposed building foundations. Detail 1/C504 does not indicate anything except what typical service connections would require. Which existing building is served by this line? Nothing could be located on As-Built Survey or MP Fields Record Drawings.	Sheet C100 Add notation to remove existing water line assembly, cap and abandon on plan sheet.
				Sheet C 400: Close, and remove existing irrigation service. Provide RPZ, meter to ECU - cap and abandon in place.
22.3	C400		Page turn meeting modified sanitary sewer exiting east end of building to be a straight run from a cleanout 5'-0" outside building to the existing manhole on SE corner of tennis courts. This was made possible because steam manhole was removed. Civil engineer should make this modification and determine if additional cleanouts or manholes are required in this straight run.	Suggested realignment of sanitary sewer leading from new building has been indicated on plan sheet.
DIVISION 23 –HEATING, VENTILATION AND AIR CONDITIONING				
23.1		230924	Section 230924 States current existing system is JCI. Please add Trane Ensemble BAS Web server to specification. Trane Ensemble BAS Web server it is existing and monitors 30+ buildings.	AEI RESPONSE: Trane has been added to Spec 230924 in Addendum 1.



## ECU INDOOR PRACTICE FACILITY | PRE-BID REQUEST FOR INFORMATION LOG

RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
<b>DIVISION 26 – ELECTRICAL</b>				
26.1	C400		Utility Plans indicate a telecom vault that is a larger footprint (24.33' x 13.33') than discussed initially. Besides being heavier than need be, it creates additional coordination with storm piping and existing duct banks in this vicinity. Can vault size be modified to interior dimensions of 7'-0" wide x 24'-0" long x 7'-0" high? Grades for existing Quazite boxes are also indicated differently on As-Built Survey of Existing Practice Fields so they must be field verified. Elevations of existing duct banks may actually be higher than proposed bottom of vault.	The entire team worked for <u>months</u> to coordinate the issue of how to address the fiber lines so that they would not have to be relocated in that area. What is depicted on the Civil plans is the result of that coordination and direction from the owner with respect to the size of the vault. <u>Contractor to bid the project based on plans indicated.</u> We don't think, from the data we had, that 7' width is enough and accessible. The contractor <u>may</u> elect to provide an alternate vault during submittal for consideration. The team has also acknowledged that field verification of elevations is critical to the success of this task – and will depend heavily on the field crew and careful coordination. The plan data we have right now has been incorporated into the plan.
26.2	C100, C200		The existing generator servicing the Ward Building is called to be relocated. When observing overlaid drawings there appears to be no conflict between the new structures and the existing generator. Can the existing generator remain in its existing location?	The design team, during the months long design phase and through the evolution of the design feel like the generator will need to be relocated in order to construct the walls and the footings below the walls. That is why we have indicated on the plan as per SCO approved drawings. Bid the project as planned. This will be explored post-bidding. It is recommended that bidders provide a deduct-alternate for not relocating the generator. Work would still include; demolition of existing generator enclosure, rebuilding of enclosure, relocation of dumpster location with new enclosure.
<b>DIVISION 32 – EXTERIOR IMPROVEMENTS</b>				
32.1		321293.10, 1.1, C.	Specs indicate Shock Pad and Drainage System under Synthetic Turf. Prior direction and plan details do not indicate this requirement. Can these references be removed from the Specifications?	References removed. See updated specificaiton  The emergency drive and area of synthetic turf extending out from the dripline and tied to the playing surface on the inside of the building seamlessly and un-noticeably from the naked eye view, shall not require a shock pad. See Sheet C507 – detail 7 “Emergency Service Drive”
32.2			Will supplier standard colors be accepted or will supplier need to match ECU specific pantones?	Suppliers shall match ECU Pantone Color codes.
32.3			Please verify what field markings are desired? Will it be only football or will the additional markings in the endzones of existing practice field be inlaid as well?	"Pirate State of Mind" graphic at center field, similar to existing practice field. Standard NCAA Football markings only. No additional endzone markings.
32.4	2 / A101 and 7 / C507		Concern has been raised about the 1/2" thickness of Fine Stone indicated on 2/A101 while 7/C507 shows 1". Finishing with 1-1/2" is generally recommended under synthetic grass and we would like to get a ruling on this thickness. Nothing less than 1" is recommended.	For Indoor Synthetic field all Fine Stone will be revised to 1-1/2"  Detail 7 Sheet C507 for Emergency drive and area of field exterior of building shall be 1" thickness.
32.5	2 / A101	321293.1, 2.5, B	Specs call for #8 Choker Stone for Fine Course and #57 for Base Stone. Section 2/A101 indicates #78 for base stone which appears to be incorrect since it is the equivalent of #8 Choker Stone. Please confirm that the Specifications will dictate.	Specification will dictate. #8 for fine stone and #57 for case stone.



## ECU INDOOR PRACTICE FACILITY | PRE-BID REQUEST FOR INFORMATION LOG

RFI #	Drawing #	Specification	Comment	DESIGNERS RESPONSE
32.6		321293.10; 1.6 - E. and 3.18	The System Performance Characteristics section calls for GMAX values for the life of the surface below 125G's, which matches the Brock Powerbase Pro warranty. If the system is not to have a shock pad, will this be adjusted?	Yes. The GMAX value for the life of the warranty is $x \leq 175$ . See updated Specification.
32.7			There are a total of 45 trees to be dug up on site in July of 2025 and stock piled until a fall of 2026 installation. The ideal time to dig a tree is during the fall and winter months. Summer digging often causes a tree to die. It is our belief that it is more economical to replace the trees than to provide labor and equipment to dig the trees, burlap the rootball, install wire basket to keep root system intact, set up a temporary nursery, maintain the trees for over a year, and replant at a later date, with the expectation of replacing a large percentage of them.	This matter is a part of a larger agreement relating to the sustainability policies of ECU. ECU has waived a requirement for reclaimed storm water, as well as mitigation for the large mature stand of trees being demolished on this project in lieu of the described activity on the plan utilizing the specimen mature ornamental material already growing on site. It is very common to move plant material in the summer although preparation and care must be given and it must be done with the proper equipment and by experts. Further - no equivalent material was found that could be considered equal to the health habit and vigor of the existing material on the site.
32.8			Is the landscape contractor expected to warranty the trees that are relocated?	The contractor is required to provide due care and prosecute his/her work in a manner will provide the best opportunity for a successful transplant and replacement in the landscape. The warranty for trees shall be provided as with any of the other ornamental material provided from other sources.
32.9			Have any underground utilities been located under the existing trees to be relocated? (Overhead utilities shown on existing conditions)	Every effort has been made to identify utilities during planning and design. The contractor shall be responsible to identify underground utilities and locate them on the site clearly. In the event of what appears to be a conflict the contractor shall report this to the designer of record right away – who will then provide direction.
32.10			Is an irrigation system as built available?	Existing irrigation system plans are not available. However, there may be some additional information and ECU staff may be able to indicate some parts of the system. The existing system is not attached to the new design nor is sufficient to supply adequate irrigation to the ornamental planning and turf. Some parts of the system to be demolished per plan, may be turned over as salvage for ECU subject to their requests.
32.11			In regards to the relocated plant material, would we have provide a one year warranty on the relocated material after it has been relocated to the temporary nursery area? And would we have to provide an additional one year warranty on the relocated material once it has been planted in its final location? If so, this would essentially be a two year warranty on the existing plant material. Please confirm.	The ornamental planting material, from the time the contractor takes control of the site, shall be, and remain in the care of the contractor until such time as the plants are relocated alongside plants purchased and brought in from other sites. Plants shall all receive the same warranties according to the specification. This warranty shall begin upon beneficial occupancy or final acceptance which ever comes first.
32.12			Can Tif Tuff Bermuda sod be used in lieu of Tifway 419 Bermuda sod?	TIF TUF hybrid Bermuda sod may be used as an acceptable equal to tifway 419.



## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Structural-steel materials.
  - 2. Shrinkage-resistant grout.

#### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

#### 1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.5 PREINSTALLATION MEETINGS

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

#### 1.6 ACTION SUBMITTALS

- A. Product Data:
  - 1. Structural-steel materials.
  - 2. Anchor rods.
  - 3. Shop primer.
  - 4. Galvanized-steel primer.
  - 5. Etching cleaner.



6. Galvanized repair paint.
7. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members not to be shop primed.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand-critical welds.

D. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation. In addition, the professional engineer responsible for connection design shall review the shop drawings prior to submittal to verify that the connections detailed comply with the calculations provided as well as the design requirements. A review letter, signed and sealed by the professional engineer responsible for connection design, shall be provided with the shop drawings and calculations submittal stating that this review and verification has been completed.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
  1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control reports.



## 1.8 QUALITY ASSURANCE

- ~~A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).~~
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
1. Welders and welding operators performing work on bottom-flange, demand-critical welds are to pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are to be considered separate processes for welding personnel qualification.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
1. ANSI/AISC 303.
  2. ANSI/AISC 341.
  3. ANSI/AISC 360.
  4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:



1. Option 1: Connection designs have been completed and connections indicated on the Drawings.

## 2.2 STRUCTURAL-STEEL MATERIALS

- A. Plate and Bar: ASTM A36/A36M
- B. Cold-Formed Hollow Structural Sections: ASTM A500/A550M, Grade C structural tubing.
- C. Welding Electrodes: Comply with AWS requirements.

## 2.3 RODS

- A. Headed Anchor Rods: ASTM F1554, Grade 36, straight.
  1. Nuts: ASTM A563 (ASTM A563M) heavy-hex carbon steel.
  2. Plate Washers: ASTM A36/A36M carbon steel.
  3. Washers: ASTM F436 (ASTM F436M), Type 1, hardened carbon steel.
  4. Finish: Plain

## 2.4 PRIMER

- A. Steel Primer:
  1. Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
  2. SSPC-Paint 23, latex primer.
  3. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanized-Steel Primer: MPI#134.
  1. Etching Cleaner: MPI#25, for galvanized steel.
  2. Galvanizing Repair Paint: ASTM A780/A780M.

## 2.5 SHRINKAGE-RESISTANT GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.



## 2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
  - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

## 2.8 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).



2. Surfaces to be field welded.
  3. Surfaces of high-strength bolted, slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  5. Galvanized surfaces unless indicated to be painted.
  6. Corrosion-resisting (weathering) steel surfaces.
  7. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
1. SSPC-SP 2.
  2. SSPC-SP 3.
  3. SSPC-SP 7 (WAB)/NACE WAB-4.
  4. SSPC-SP 14 (WAB)/NACE WAB-8.
  5. SSPC-SP 11.
  6. SSPC-SP 6 (WAB)/NACE WAB-3.
  7. SSPC-SP 10 (WAB)/NACE WAB-2.
  8. SSPC-SP 5 (WAB)/NACE WAB-1.
  9. SSPC-SP 8.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
  2. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E165/E165M.
    - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    - c. Ultrasonic Inspection: ASTM E164.
    - d. Radiographic Inspection: ASTM E94/E94M.



3. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  1. Set plates for structural members on wedges, shims, or setting nuts as required.
  2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.



- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

### 3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
  - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting."
- C. specified in Section 099600 "High-Performance Coatings."



### 3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
  - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
    - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
      - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      - 3) Ultrasonic Inspection: ASTM E164.
      - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200



## SECTION 13 34 19 - METAL BUILDING SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Structural-steel framing.
  - 2. Thermal insulation.
  - 3. Accessories.

- B. Related Sections:

- 1. Division 01 Section "Alternates" for Bid Alternates
  - 2. Division 03 Section "Cast-in-Place Concrete" for concrete slab and foundations.
  - 3. Division 04 Section "Unit Masonry" for masonry knee wall at metal building systems.
  - 4. Division 07 Section "Standing-Seam Metal Roof Panel System" for metal roof panels at metal building systems.
  - 5. Division 07 Section "Insulated Metal Wall Panels" for metal wall panels at metal building systems.
  - 6. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and trim at metal building systems.
  - 7. Division 07 Section "Joint Sealants" for sealants and caulking.
  - 8. Division 08 Section "Hollow Metal Doors and Frames" for hollow metal doors and frames in metal building systems.
  - 9. Division 08 Section "Overhead Coiling Doors" for overhead coiling doors in metal building systems.

#### 1.3 DEFINITIONS

- A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

#### 1.4 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."



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

## 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Review methods and procedures related to metal building systems including, but not limited to, the following:
    - a. Condition of foundations and other preparatory work performed by other trades.
    - b. Structural load limitations.
    - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
    - d. Required tests, inspections, and certifications.
    - e. Unfavorable weather and forecasted weather conditions.
  2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
    - b. Structural limitations of purlins and rafters during and after roofing.
    - c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
    - d. Temporary protection requirements for metal roof panel assembly during and after installation.
    - e. Roof observation and repair after metal roof panel installation.
  3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    - b. Structural limitations of girts and columns during and after wall panel installation.
    - c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    - d. Temporary protection requirements for metal wall panel assembly during and after installation.
    - e. Wall observation and repair after metal wall panel installation.



## 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
1. Metal roof panels.
  2. Metal wall panels.
  3. Insulation and vapor-retarder facings.
  4. Flashing and trim.
  5. Accessories.
- B. Shop Drawings: Indicate components by others. Include plans, elevations, sections, details, attachments to other work, and the following:
1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
  2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections. Coordinate with the Photovoltaic panel system to be installed on the Training Facility roof top.
    - a. Show provisions for attaching Video Display Board, Exterior conventional steel canopy, and overhead coiling doors.
  3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
    - a. Show wall-mounted items including doors, windows, louvers, and lighting fixtures.
    - b. Coordinate with the Photovoltaic panel supplier for roof mounted photovoltaic panels
  4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):
    - a. Flashing and trim.
  5. Include details for and locations of connections, attachments and anchorages for insulation system.
- C. Samples for Initial Selection: For units with factory-applied color finish.



- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
  2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
  3. Vapor-Retarder Facings: Nominal 6-inch-(150-mm) square Samples.
  4. Accessories: Nominal 12-inch-(300-mm-) long Samples for each type of accessory.
  5. Insulation: For each finish product specified, two samples, and minimum 6 inches square or long.
- E. Door Schedule: For doors and frames. Use designations indicated on Drawings. Include details of reinforcement.
- F. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, **licensed in the State of North Carolina**, responsible for their preparation.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified erector and manufacturer.
- B. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.
- C. Welding certificates.
- D. Metal Building System Certificates: For each type of metal building system, from manufacturer.
1. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the State of North Carolina: Include the following:
    - a. Name and location of Project.
    - b. Order number.
    - c. Name of manufacturer.
    - d. Name of Contractor.
    - e. Building dimensions including width, length, height, and roof slope.
    - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    - g. Governing building code and year of edition.



- h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, vertical deflection, complete wind and seismic design criteria including building lateral drift under wind and seismic loads.
  - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
  - j. Risk Category: Indicate category of building use and its effect on load importance factors.
  - k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- E. Erector Certificates: For each product, from manufacturer.
- F. Manufacturer Certificates: For each product, from the manufacturer.
- G. Material Test Reports: For each of the following products:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shop primers.
  - 5. Nonshrink grout.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- I. Warranties: Sample of special warranties.

## 1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

## 1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
  - 1. Accreditation: According to the International Accreditation Service's AC472.
  - 2. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
  - 3. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.



- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Store insulation products in manufacturer's unopened packaging. Store insulation products indoors and protect from moisture and damage.

#### 1.11 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements:
  - 1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
  - 2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.



## 1.12 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Final Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
  - 1. Warranty Period: 20 years from date of Final Completion.

## 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. American Buildings Company; a Nucor Company.
  - 2. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
  - 3. Ceko Building Systems; an NCI company.

### 2.2 METAL BUILDING SYSTEMS

- A. Description: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
  - 1. Provide metal building system of size and with bay spacings, roof slopes, and spans indicated.
- B. Primary-Frame Type:
  - 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
    - a. ~~Provide additional steel at overhead coiling door locations.~~ Provide additional steel at Video Display Board, Exterior Conventional Steel Canopy, Vertical Lift Doors and Overhead Coiling Doors



- b. See Structural Drawings for additional requirements, including reactions on building columns.
- C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
- D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
- E. Eave Height: As indicated on Drawings.
- F. Bay Spacing: As indicated on Drawings.
- G. Roof Slope: As indicated on Drawings.
- H. Roof System: Provide metal roof panels as indicated in Division 07 41 13.16 Section "Standing-Seam Metal Roof Panel System."
- I. Exterior Wall System: Provide metal wall panels as indicated in Division 07 42 13.19 Section "Insulated Metal Wall Panels."

## 2.3 METAL BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, licensed in the State of North Carolina, using performance requirements and design criteria indicated.
- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
  - 1. Design Loads: As indicated on Drawings.
  - 2. Deflection Limits: Design metal building system assemblies to withstand design loads with total load deflections no greater than the following:
    - a. Purlins and Rafters: Vertical live load deflection of ~~1/360~~ 1/240 of the span. Total vertical live load plus dead load deflection of ~~1/240~~ 1/180 of the span. Wind load deflection of 1/240 of the span under 10 year MRI wind loading.
    - b. Girts: Horizontal deflection of 1/240 of the span for girts supporting only metal wall panels, horizontal deflection of 1/400 of the span for 10 year MRI wind loading.
    - c. Metal Roof Panels: Vertical deflection of ~~1/240~~ 1/180 of the span for total vertical live load plus dead load and 1/240 of the span for 10 year MRI wind loading.



- d. Metal Wall Panels: Horizontal deflection of ~~1/240~~ 1/180 of the span under 10 year MRI wind loading.
  - e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
  - f. Design of force transfer from the building column to the top of the concrete foundation must be by the PEMB. All columns shall be designed for pinned connections to the foundations.
- 3. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the limits indicated on the construction documents.
- 4. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-10/2018 North Carolina State Building Code.
- D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of roof area when tested according to ASTM E1680 at negative test-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
- F. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E283 at static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
- G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 at test-pressure difference 2.86 lbf/sq. ft. (137 Pa).
- H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at a wind-load design pressure of not less than 2.86 lbf/sq. ft. (137 Pa).
- I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  - 1. Uplift Rating: UL 90.
- J. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C1363 or ASTM C518:



1. Storage Shed Metal Roof Panel Assemblies:
  - a. U-Factor: 0.037.
  - b. R-Value: R-19 + R-11 Liner System.
2. Storage Shed Metal Wall Panel Assemblies:
  - a. U-Factor: 0.060.
  - b. R-Value: R-0 + R-15.8 Continuous Insulation.

## 2.4 STRUCTURAL-STEEL FRAMING

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
  1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
    - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
  2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
  3. Exterior Column Type: Tapered.
  4. Rafter Type: Tapered.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
  1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
- C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from cold-formed, structural-steel sheet, shop primed for field painting, to comply with the following:
  1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch-(64-mm) wide flanges.
    - a. Depth: As needed to comply with system performance requirements.
  2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch-(64-mm) wide flanges.



- a. Depth: As required to comply with system performance requirements.
  3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
  4. Flange Bracing: Minimum 2-by-2-by-1/8-inch (51-by-51-by-3-mm) structural-steel angles or 1-inch-(25-mm) diameter, cold-formed structural tubing to stiffen primary-frame flanges.
  5. Sag Bracing: Minimum 1-by-1-by-1/8-inch (25-by-25-by-3-mm) structural-steel angles.
  6. Base or Sill Angles: Minimum 3-by-2-inch (76-by-51-mm) zinc-coated (galvanized) steel sheet.
  7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
  8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from zinc-coated (galvanized) steel sheet.
  9. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
  10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- D. Storage Shed Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade (50) 345; or ASTM A529/A529M, Grade 50 (345); minimum 1/2-inch-(13-mm) diameter steel; threaded full length or threaded a minimum of 6 inches (152 mm) at each end.
  2. Cable: ASTM A475, 1/4-inch-(6-mm) diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
  3. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.
- E. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated or hot-dip galvanized bolts for structural-framing components that are galvanized.
- F. Materials:
1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade (50 or 55) 345 or 380; or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).



2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade (50 or 55) 345 or 380; or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade (50 or 55) 345 or 380; or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
4. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480).
5. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades (33 through 80) 230 through 550, or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
6. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades (33 through 80) 230 through 550, or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.
  - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade (50 or 80) 340 or 550; with Class AZ50 (AZM150) coating.
7. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 (ASTM A563M) carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.
  - a. Finish: Plain.
8. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
  - a. Finish: Plain.
9. Headed Anchor Rods: ASTM F 1554, Grade 55, or better.
  - a. Configuration: Straight.
  - b. Nuts: ASTM A 563 heavy-hex carbon steel.
  - c. Plate Washers: ASTM A 36 carbon steel.
  - d. Washers: ASTM F 436 hardened carbon steel.
  - e. Finish: Plain.



- G. Finish: Primary and secondary roof framing members to be factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
  2. Apply primer to primary and secondary roof framing to a minimum dry film thickness of 1 mil (0.025 mm).
    - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil (0.013 mm) on each side.

## 2.5 METAL WALL PANELS

- A. See Specification Section 07 42 13.19 for information on Insulated Metal Wall Panels

## 2.6 THERMAL INSULATION

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Simple Saver System by Thermal Design, Inc. or comparable product by, but not limited to, the following:
1. Therm All.
- B. Unfaced Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch-(51-mm-)wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
1. Thickness: Thickness required to meet thermal performance requirements specified elsewhere in this section.
  2. Width: Equal to purlin/girt spacing by manufacturer's standard lengths.
- C. Retainer Strips: 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.
- D. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.
1. Composition: White woven, reinforced, high-density polyethylene yarns coated on both sides with continuous polyethylene coatings.
    - a. Comply with ASTM C1136, Types I through VI.
    - b. Flame-spread index: 25 or less in accordance with ASTM E84.
    - c. Smoke-developed index: 50 or less in accordance with ASTM E84.
    - d. Ultraviolet radiation inhibitor to minimum UVMAX rating of 8.
    - e. Size and seaming: Fabricate to fit with minimum job site sealing.
    - f. Provide factory triple, extrusion welded seams.
    - g. Factory-folded.
- E. Vapor-Retarder Lap Sealant: Sealant of type recommended by vapor-retarder manufacturer.



- F. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- G. Vapor-Retarder Patch Tape: Tape of the same material as vapor-retarder facing and of type recommended by vapor-retarder manufacturer.
- H. Thermal Blocks: R-3.5 closed cell polyethylene foam with pre-applied adhesive film and peel off backing at girts. R-3.5 polystyrene thermal blocks at purlins.
- I. Straps: Galvanized, unpainted to match fabric liner color on the exposed side.
- J. Fasteners: Screws with sealing washers of type recommended by insulation system manufacturer.
- K. Wall Insulation Hangers: Preformed rigid hangers, 32-inch-long galvanized steel strips with barbed arrows every 8 inches along length.

## 2.7 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to the greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fascia, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
  - 2. Clips: Manufacturer's standard, formed from steel or stainless-steel sheet, designed to withstand negative-load requirements.
  - 3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel **or** stainless-steel sheet.
  - 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-(25-mm-)thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.



6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fascia, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
  2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-(25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  3. Thermal Spacer Blocks: Specified elsewhere in this Section.
- D. Flashing and Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
  2. Opening Trim: Formed from 0.034-inch (0.86-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
    - a. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
    - b. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head.
    - c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    - d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.



2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Metal Panel Sealants:
  - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanent elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
  - b. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

## 2.8 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
  1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
  1. Make shop connections by welding or by using high-strength bolts.
  2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
  3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
  4. Weld clips to frames for attaching secondary framing.
  5. Shop Priming of Roof Members: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.



1. Make shop connections by welding or by using non-high-strength bolts.
  2. Shop Priming of Roof Members: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
  1. Engage land surveyor to perform surveying.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.
- D. Verify metal building system is completed prior to installing insulation system.
- E. Proceed with insulation system installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

#### 3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.



- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base Plates and Bearing Plates: Clean concrete-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. PEMB frames must have base plates with leveling nuts.
  - 2. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 3. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
    - a. Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.



- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  - 1. Tighten rod and cable bracing to avoid sag.
  - 2. Locate end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

### 3.4 METAL PANEL INSTALLATION, GENERAL

- A. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
  - 1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  - 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
  - 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
  - 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.



- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### 3.5 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
  2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Install clips to supports with self-drilling or self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
  5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
  6. Provide metal closures at peaks, rake edges, and rake walls on each side of ridge caps.
- C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.



### 3.6 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  2. Shim or otherwise plumb substrates receiving metal wall panels.
  3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.
  4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
  6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  7. Install screw fasteners in predrilled holes.
  8. Install flashing and trim as metal wall panel work proceeds.
  9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
  10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
  11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
- C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

### 3.7 THERMAL INSULATION INSTALLATION

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Prepare surfaces using methods recommended by insulation manufacturer.



2. Install insulation without gaps or voids. Do not compress insulation.
3. Trim insulation to fit spaces, neatly. Insulate miscellaneous gaps and voids.
4. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.
5. Completely seal all seams.
6. Seal wall fabric to roof fabric, base angle and up columns to provide a continuous vapor retarder.
7. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
8. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
9. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
  - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.8 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.



2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

### 3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform tests and inspections.

B. Tests and Inspections:

3. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
4. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
  - a. Liquid Penetrant Inspection: ASTM E 165.
  - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - c. Ultrasonic Inspection: ASTM E 164.
  - d. Radiographic Inspection: ASTM E 94.



- C. Product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.9 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
  - 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
  - 1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Clean dirt or exposed sealant from the exposed vapor retarder fabric.
- F. Protect insulation system until interior finishes installation is complete. Repair or replace damaged products before completion of insulation system installation.

END OF SECTION 133419



## SECTION 074213.19 - INSULATED METAL WALL PANELS

### 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. Foamed-insulation-core metal wall panels.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
  - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
  - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.



## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockup of typical metal panel assembly as shown on Drawings, including corner, soffits, supports, attachments, and accessories.
  - 2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.



## 1.9 FIELD CONDITIONS

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

## 1.10 COORDINATION

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

## 1.11 WARRANTY

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

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.

- 2. Warranty Period: Two years from date of Acceptance.

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

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

- 2. Finish Warranty Period: 20 years from date of Acceptance.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E72:

- 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.



3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.01 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
  1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  1. Test-Pressure Difference: 15 lbf/sq. ft. (718 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
  1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E119.
  2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
  3. Radiant Heat Exposure: No ignition when tested according to NFPA 268.
  4. Potential Heat: Acceptable level when tested according to NFPA 259.
  5. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E84.

## 2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
  1. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.



- a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
  - b. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D1622.
  - c. Compressive Strength: Minimum 20 psi (140 kPa) when tested according to ASTM D1621.
  - d. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C273/C273M.
- B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. Insulated Metal Panel-1

- a. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan Insulated Panels; Quadcore KS Series Azteco or a comparable product by one of the following:
  - 1) CENTRIA Architectural Systems.
  - 2) MBCI.
  - 3) Metl-Span.
- b. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
- c. Nominal Thickness: 0.034 inch (0.86 mm).
- d. Exterior Finish: Three-coat fluoropolymer, with embossing.
  - 1) Color: As indicated by manufacturer's designations
    - a) Basis-of-Design Color: As selected by Architect from manufacturers full range of colors.
- e. Interior Finish: Acrylic color coat.
- f. Panel Coverage: ~~38.5 inches (1016 mm) nominal.~~ As indicated on drawings.
- g. Panel Reveal: 3/8"
- h. Panel Thickness 3.0 inches (51 mm).
- i. Thermal-Resistance Value (R-Value): R-8 per inch according to ASTM C518.

2. Insulated Metal Panel-2

- a. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan Insulated Panels; Quadcore KS Series Shadowline or a comparable product by one of the following:
  - 1) CENTRIA Architectural Systems.
  - 2) MBCI.
  - 3) Metl-Span.



- b. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
- c. Nominal Thickness: 0.034 inch (0.86 mm).
- d. Exterior Finish: Three-coat fluoropolymer, non-embossed.
  - 1) Color: As indicated by manufacturer's designations
    - a) Basis-of-Design Color: As selected by Architect from manufacturers full range of colors.
- e. Interior Finish: Acrylic color coat.
- f. Panel Coverage: 36 inch wide.
- g. Panel Reveal: 3/8"
- h. Panel Thickness 3.0 inches (51 mm).
- i. Thermal-Resistance Value (R-Value): R-8 per inch according to ASTM C518.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.



- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.



- a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
  1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- D. Aluminum Panels and Accessories:
  1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
  1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.



2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
  - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.3 METAL PANEL INSTALLATION

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



- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.
  - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### 3.4 INSULATED METAL WALL PANEL INSTALLATION

- A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
  - 1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
  - 2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
  - 3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
  - 4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  - 5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
  - 6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
- B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
  - 1. Install clips to supports with self-tapping fasteners.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners



where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Metal wall panels will be considered defective if they do not pass test and inspections.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

### 3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.19



## SECTION 083323 - OVERHEAD COILING DOORS

### 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. Service doors.
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.
  - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
  - 5. Show locations of controls, locking devices, and other accessories.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
  - 1. Include similar Samples of accessories involving color selection.



- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats.
2. Bottom bar with sensor edge.
3. Guides.
4. Brackets.
5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Regulatory Requirements: Comply with applicable provisions in ICC A117.1.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
1. Obtain operators and controls from overhead coiling door manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor: 1.0.



## 2.3 DOOR ASSEMBLY 'OCD'

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Alpine Overhead Doors, Inc.
    - b. Cookson Company.
    - c. Cornell Iron Works, Inc.
    - d. Overhead Door Corporation.
    - e. Wayne-Dalton Corp.
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Door Curtain Material: Galvanized steel.
- D. Door Curtain Slats: Flat profile slats of between 1-7/8-inch (48-mm) and 3-1/4-inch (83-mm) center-to-center height.
  - 1. Insulated-Slat Interior Facing: Metal.
- E. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from hot-dip galvanized steel and finished to match door.
- F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- G. Hood: Galvanized steel.
  - 1. Shape: Square.
  - 2. Mounting: As shown on Drawings.
- H. Locking Devices: ~~Equip door with slide bolt for padlock~~ Masterkeyable cylinder in bottom bar operable from both sides of door.
  - 1. Provide three keys for each cylinder.
- I. Manual Door Operator: Chain-hoist operator.
- J. Curtain Accessories: Equip door with astragal and pull-down strap.
- K. Door Finish:
  - 1. ~~Baked Enamel~~ or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
  - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.



## 2.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm); and as required.
  2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
  3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch (0.25 mm).
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

## 2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.

## 2.6 LOCKING DEVICES

- ~~A. Slide Bolt: Fabricate with side locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.~~
- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks operable from both sides of curtain.



## 2.7 CURTAIN ACCESSORIES

- A. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- C. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches (2130 mm) high.

## 2.8 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.9 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.10 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.



### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

#### 3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

#### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323



## SECTION 083613 - SECTIONAL DOORS

### 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. Sectional-door assemblies.
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
  - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
- B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.
- D. Samples for Initial Selection: For units with factory-applied finishes.
  - 1. Include Samples of accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish and for each color and texture required on the following components, in manufacturer's standard sizes:



1. Metal for door sections.
2. Hardware.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For manufacturer's warranty and finish warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors to include in maintenance manuals.
- B. Manufacturer's warranty.
- A. Finish warranty.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Regulatory Requirements: Comply with provisions in the ICC A117.1 applicable to sectional doors.

#### 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Failure of components or operators before reaching required number of operation cycles.
    - c. Faulty operation of hardware.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
    - e. Delamination of exterior or interior facing materials.
  2. Warranty Period: Two years from date of Substantial Completion.
- B. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.



1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: As noted on drawings.
  2. Testing: In accordance with ASTM E330/E330M or DASMA 108 for garage doors and complying with DASMA 108 acceptance criteria.
  3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
    - a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.
    - b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.
  4. Operability under Wind Load: Design sectional doors to remain operable under design wind load, acting inward and outward.

- C. Seismic Performance: Provide sectional doors that withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Component Importance Factor: 1.0.

### 2.3 SECTIONAL-DOOR ASSEMBLY

- A. Steel Sectional Door: Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Amarr Garage Doors.



- b. Arm-R-Lite.
  - c. Clopay Building Products Company; a Griffon Company.
  - d. Fimbel Door Corporation.
  - e. General American Door Company.
  - f. Haas Door; a Nofziger Company.
  - g. Martin Door Manufacturing.
  - h. Overhead Door Corp.
  - i. Raynor.
  - j. Wayne-Dalton Corp.
  - k. Windsor Door; a MAGNATRAX Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. (2.03 L/s per sq. m) when tested in accordance with ASTM E283 or DASMA 105.
- D. U-Value: 0.019 Btu/sq. ft. x h x deg F (0.295 W/sq. m x K).
- E. Steel Door Sections: ASTM A653/A653M, zinc-coated (galvanized), cold-rolled, commercial steel sheet with G60 (Z180) zinc coating.
- 1. Door-Section Thickness: 2 inches (51 mm).
  - 2. Section Faces:
    - a. Thermal-Break Construction: Provide sections with continuous thermal-break construction separating the exterior and interior faces of door.
    - b. Exterior Face: Fabricated from single sheets, not more than 24 inches (610 mm) high; with horizontal meeting edges rolled to continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove, weather- and pinch-resistant seals and reinforcing flange return.
      - 1) Steel Sheet Thickness: 20 GA, or 0.0359-inch (0.911-mm) nominal coated thickness.
      - 2) Surface: Manufacturer's standard, flush panel with stucco embossment.
    - c. Interior Face: Enclose insulation completely within steel exterior facing and interior facing material, with no exposed insulation. Provide the following interior-facing material:
      - 1) Zinc-Coated (Galvanized) Steel Sheet: With minimum nominal coated thickness of 0.0164 inch (0.48 mm).
  - 3. End Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.0785-inch (1.63-mm) nominal coated thickness and welded to door section.



4. Intermediate Stiles: Provide intermediate stiles formed from not less than 0.064-inch- (1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
  5. Section Reinforcing: Horizontal and diagonal reinforcement as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.
    - a. Bottom Section: Reinforce section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal (weatherseal).
    - b. Hardware Locations: Provide reinforcement for hardware attachment.
  6. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free insulation of type indicated below:
    - a. Foamed-in-Place Insulation: Polyurethane, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load.
- F. Track: Manufacturer's standard, galvanized-steel, vertical lift track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.
1. Material: Galvanized steel, ASTM A653/A653M, minimum G60 (Z180) zinc coating.
  2. Size: As recommended in writing by manufacturer for door size, weight, track configuration and door clearances indicated on Drawings.
  3. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device.
    - a. Vertical Track: Incline vertical track to ensure weathertight closure at jambs. Provide continuous reverse angle attached to track and wall.
- G. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom, top and jambs of door. Provide combination bottom weatherseal and sensor edge for bottom seal.
- H. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.
1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch (2.01-mm) nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.
    - a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.



2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.
    - a. Roller-Tire Material: Case-hardened steel.
  3. Push/Pull Handles: Equip each door with galvanized-steel lifting handles on each side of door, finished to match door.
- I. Locking Device:
1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
- J. Counterbalance Mechanism:
1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated, mounted on torsion shaft.
  2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.
    - a. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.
    - b. Provide one additional midpoint bracket for shafts up to 16 ft. (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 ft. (4.88 m) long unless closer spacing is recommended in writing by door manufacturer.
  3. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 7 to 1.
  4. Cable Safety Device: Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
  5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
  6. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.
- K. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer. Operator shall meet UL325-2010 requirements for continuous monitoring of safety devices.
1. Primary Monitored Entrapment Protection (required for momentary contact including radio control operation)
    - a. Electric sensing edge monitored to meet UL 325-2010
    - b. Photoelectric sensors monitored to meet UL 325-2010/
  2. Ancillary Entrapment Protection
  3. Pneumatic Sensing Edge up to 22'
  4. Retro-Reflective photo sensor
  5. Operator Control Mounting: Flush Mount.



6. Operator Control Operation:
  - a. Key operated control stations with open, close, and stop buttons.
7. Operator Control Location:
  - a. Interior

L. Metal Finish: Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

1. ~~Baked Enamel~~ or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
  - a. Color and Gloss: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions.
- B. Anchor assembly to wall construction and building framing without distortion.
- C. Tracks:
  1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches (610 mm) apart.
- D. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.



3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

3.5 CLEANING

- A. Clean doors, frames and glass.
- B. Remove labels and visible markings.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Final Completion.

END OF SECTION 083613



## SECTION 116623.53 – WALL PADDING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Safety pads.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For gymnasium equipment.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each item and color specified.

D. Samples for Verification: For the following products:

1. Pad Fabric: Wall padding not less than 3 inches (76 mm) square, and corner and column Samples not less than 3 inches (76 mm) long, with specified treatments applied. Mark face of material.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of gymnasium equipment.

C. Sample Warranty: For special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

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

#### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.



- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
  - 1. Build mockup of typical wall area 72 inches wide by full height. Include intersection of wall and corners, as well as an example of finishing for cutouts within the padding.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not install gymnasium equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify position and elevation of wall inserts and layout for gymnasium equipment.

#### 1.7 COORDINATION

- A. Coordinate installation of floor inserts with structural floors and finish flooring installation and with court layout and game lines and markers on finish flooring.
- B. Coordinate layout and installation of overhead-supported gymnasium equipment and suspension-system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Final Completion or Beneficial Occupancy.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain wall padding from single source from single manufacturer.



## 2.2 SAFETY PADS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AALCO Manufacturing.
  2. ADP Lemco.
  3. Draper Inc.
  4. Jaypro Sports, LLC.
  5. Performance Sports Systems.
  6. Porter Athletic Equipment Company.
  7. Promats Athletics.
  8. Spalding Equipment.
  9. Fieldpro/SportsGraphic
- B. Safety Pad Surface-Burning Characteristics: ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 450 or less.
- C. Pad Coverings: Provide safety pad fabric covering that is fabricated from puncture- and tear-resistant, PVC-coated polyester or nylon-reinforced PVC fabric, not less than 14-oz./sq. yd (475-g/sq. m) and treated with fungicide for mildew resistance; with surface-burning characteristics indicated, and lined with fire-retardant liner.
- D. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.
1. Backer Board: Not less than 3/8-inch- (9.5-mm-) thick plywood, mat formed, or composite panel.
  2. Fire-Resistive Fill: Multiple-impact-resistant foam not less than 2-inch- (50-mm-) thick, fire-resistive neoprene, polychloroprene, or urethane; 6.0-lb/cu. ft. (96-kg/cu. m) density.
  3. Size: Each panel section, 24 inches (600 mm) wide by not less than 80 inches (2032 mm) long.
  4. Number of Modular Panel Sections: As indicated.
  5. Installation Method: Concealed mounting Z-clips.
  6. Fabric Covering Color(s): Match school colors for one color(s).
    - a. Color: East Carolina University Official Purple (PMS 268C)
- E. Corner Wall Safety Pads: Wall corner pad consisting of not less than ~~1-1/4 inch-(32-mm-) thick~~ 2-inch- (51-mm-) thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with backer board and manufacturer's standard anchorage to wall.
1. Length: Each pad matching length of wall safety pads.



2. Fabric Covering Color(s): Match color of wall safety pads.
- F. Column Safety Pads: Pads covering exposed flange of columns to height indicated, consisting of not less than ~~1-1/4 inch (32-mm) thick~~ 2-inch (51-mm) thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with backer board and manufacturer's standard anchorage to column.
1. Length: Each pad matching length of wall safety pads.
  2. Fabric Covering Color(s): Match color of wall safety pads.
- G. Cut-out Trim: Provide manufacturer's standard flanged cut-out trim kits for fitting pads around switches, receptacles, and other obstructions.
1. Color: As selected by Architect from manufacturers full range of colors.
- H. Performance: Pads shall meet all requirements of ASTM 2440-18, or latest applicable version of standard.

## 2.3 MATERIALS

- A. Castings and Hangers: Malleable iron, complying with ASTM A 47/A 47M; grade required for structural loading.
- B. Softwood Plywood: DOC PS 1, exterior.
- C. Particleboard: ANSI A208.1; made with binder containing no urea formaldehyde.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, and other conditions affecting performance of the Work.
  1. Verify critical dimensions.
  2. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions. Complete equipment field assembly where required.



- B. Wall, Corner, and Column Safety Pads: Mount with bottom edge at dimension indicated on Drawings above finished floor.
- C. Cut-out Trim: Limit cuts in face of padding from trim unit's corner-to-corner outside dimensions. Install with ends of cuts concealed behind trim flange.

### 3.3 CLEANING

- A. After completing wall padding installation, inspect components. Remove spots, dirt, and debris according to manufacturer's written instructions.
- B. Replace wall padding that cannot be cleaned and repaired, in a manner approved by Architect, before time of Final Acceptance.

END OF SECTION 116623



## SECTION 230924 - GRAPHICAL USER INTERFACE INTEGRATION

### PART 1 - GENERAL

#### 1.1 SYSTEMS DESCRIPTION

- A. Building Automation System (BAS) Graphical User Interface (GUI) shall be accomplished via a web-server environment.
- B. BAS web server shall communicate with individual Building Systems via BACnet/IP protocol on the Owner provided Enterprise Ethernet network.
- C. Provide remote alarm paging via text message, alphanumeric message and email integral to web server software.
- D. Operator workstations connected to building Ethernet network shall be able to access information as determined by Graphical User Interface (GUI) software through standard web browsing software (Microsoft Edge, Mozilla Firefox, Safari or Google Chrome). GUI software shall allow transparent access to each connected building and building component/system for control and/or monitoring.
- E. Building Campus currently has an existing ~~JCI~~ JCI and Trane Ensemble BAS Web server which provides system monitoring, alarming, scheduling, reporting and historical trend functions via graphical user interface.
- F. Contractor shall integrate the new BAS provided under Section 230923 - Direct Digital Controllers and Networks to the existing BAS Web Application Server.

#### 1.2 REFERENCE

- A. Work under this section is subject to requirements of Contract Documents including General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements.
- B. This section specifies a system or a component of a system being commissioned as defined in Section 01 9100 Commissioning. Testing of these systems is required, in cooperation with Owner and Commissioning Authority. Refer to Section 01 9100 Commissioning for detailed commissioning requirements.

#### 1.3 SUBMITTALS

- A. Refer to Section 230901 - Control Systems Integration.

#### 1.4 OPERATION AND MAINTENANCE MANUALS

- A. Refer to Section 230901 - Control Systems Integration.

#### 1.5 RECORD DRAWINGS

- A. Refer to Section 230901 - Control Systems Integration.



## 1.6 OWNERSHIP OF PROPRIETARY MATERIAL

- A. Refer to Section 230901 - Control Systems Integration.

## 1.7 WARRANTY

- A. Refer to Section 230901 - Control Systems Integration.

## PART 2 - PRODUCTS

### 2.1 USER INTERFACE WEB SERVER - SOFTWARE

- A. Web server shall provide dynamic, real-time graphical control/monitoring interface for all HVAC, plumbing, lighting control and electrical systems shown on System Diagrams or included in Control Sequences. Refer Section 230901 - Control Systems Integration.
- B. Graphics shall be HTML based. The use of JAVA is not allowed.
- C. Graphics shall auto-size based on accessing device (Workstation, Laptop, Cell Phone, Tablet) providing similar user experience across device platforms.
- D. Graphical displays shall also include alarm displays, scheduling displays and trending displays. Data associated with an active display shall be no more than 5 seconds out-of-date.
- E. BAS web server shall be provided with all software applications and licenses required to provide web access to minimum of 3 simultaneous clients.
- F. Operator web access Graphical User Interface (GUI) shall be interactive, fully prompted, menu driven and shall provide the following functionality as a minimum:
  - 1. HVAC, Plumbing and Electrical Systems:
    - a. GUI shall allow for hierarchical graphical navigation between individual buildings and building control systems within individual buildings, graphical representations of systems, access to real-time data for each system, ability to override points in a system, and access to all supervisory monitoring and control functions including building/equipment schedules.
    - b. Each system display shall clearly distinguish between the following point data types and information: Real-time data, User-entered data, Overridden or operator-disabled points, Devices in alarm (unacknowledged), and Out-of-range, bad or missing data.
    - c. Graphical displays shall be provided with software "links" to equipment/instrumentation manufacturer cutsheets and system control sequences.
    - d. Software shall allow the user to create, modify, and delete displays and graphic symbols.
    - e. Operator shall be able to monitor/control all data points, setpoints and calculated values as listed in DDC/BAS Point Schedules, Control Sequences and shown on flow diagrams via graphic displays.
    - f. Operator shall be able to view and modify all Occupied/Unoccupied schedules.
  - 2. Alarm and Event Management:



- a. Web interface shall provide audible, visual, and printed means of alarm indication. The alarm dialog box shall always become the top dialog box regardless of the application(s) currently running.
  - b. Web interface shall provide log of alarm messages. Alarm log shall be archived to the hard disk of the web server. Each entry shall include the follow as a minimum:
    - 1) Point Tag
    - 2) Point Description
    - 3) Description of the event-initiating object generating the alarm. Description shall be an alarm message of at least 256 characters in length.
    - 4) Time and date of alarm occurrence. time and date of object state return to normal time and date of alarm acknowledgment and identification of operator acknowledging alarm.
    - 5) Time and date of object state return to normal time.
    - 6) Time and date of alarm acknowledgment and identification of operator acknowledging alarm.
  - c. Alarm Notification and Routing: Software shall perform alarm notification and routing functions. Upon receipt or generation of an alarm, software shall immediately perform alarm notification and routing according to an assigned routing for that alarm. Software shall support at least 100 alarm routes; an alarm route shall be a unique combination of any of the following activities:
    - 1) Generate a pop-up up display on designated workstation monitors. The pop-up display shall include identification of the alarm, date and time of the alarm, alarm message, and current value/status of the alarm point. Alarms shall be capable of being acknowledged from the pop-up display by operators with sufficient permissions. Pop-up displays shall be displayed until acknowledged.
    - 2) Send a text message to user cell phone. The text message shall contain a scripted message and all alarm data. The text message recipient and scripted message shall be user configurable for each alarm route.
    - 3) Send an e-mail message via simple mail transfer protocol (SMTP; RFC 821). The e-mail shall contain a scripted message and all alarm data. The e-mail recipient and scripted message shall be user configurable for each alarm route.
    - 4) Print alarms to designated alarm printers. The printed message shall be the same as the pop-up message.
    - 5) Alarm Notification Escalation: Software shall notify sequential devices on a predetermined list, at a configurable time interval (15 minutes initially) if prior contacts do not acknowledge receipt of notification. Software shall begin resending alarms if not acknowledged within 30 minutes.
3. Scheduling:
- a. Web interface shall show all information in easy-to-read daily format including calendar of current month and next. All schedules shall show actual ON/OFF times for day based on scheduling priority.
  - b. All schedules shall reside on BACnet Building Controllers. BAS server shall house master schedules which are to be exported to respective building controllers.
  - c. Schedules shall be provided for individual HVAC system Occupied/Unoccupied operation.



- d. Lighting control schedule shall provide the following minimum building schedules: Occupied/Unoccupied, holiday, special events, Building Sweep All On & All Off (multiple sweep times).
  - e. Operator shall be able to change all information for a given schedule if logged on with the appropriate security access.
- 4. Trending & Data Archiving:
  - a. Trend logs are not to be server based using polling. Trend logs are to be initially stored at the BAS controller and periodically uploaded to the Web Server data historian for long-term storage.
  - b. Users logged into the system shall not have direct access to any of the raw trend data located in the BAS controllers or Web Server data historian.
  - c. Trend log files shall be appended with new sample data, allowing samples to be accumulated. Systems that write over archived data shall not be allowed, unless limited file size is specified.
  - d. Web interface shall provide ability to graphically view trend data using two-axis (x,y) graphs that display up to ten object types at the same time in different colors. Graphs shall show object values relative to time.
  - e. Operator shall be able to change trend log setup information if logged on with the appropriate security access. This includes the information to be logged as well as the interval at which it is to be logged. All input, output, and value object types in the system may be logged.
- 5. Report Generating:
  - a. Web Server Software shall be provided with commands to generate and format reports for displaying on current Workstation, printing, and storing on disk.
  - b. Reports shall be stored by type, date, and time. The destination of each report shall be selectable by the operator.
  - c. Dynamic operation of system shall not be interrupted to generate a report. The report generation mode, either automatic or requested, shall be operator assignable. The report shall contain the time and date when the samples were taken, and the time and date when the report was generated.
  - d. Software shall be capable of saving reports to a file. If the file format is not in a format compatible with standard Microsoft Office software, Control Contractor shall provide a means to export or convert the file to a compatible format.
  - e. Software shall allow for automatic or manual generation of reports. For automatic reports, the operator shall be able to specify the time the initial report is to be generated, the time interval between reports, end of period, and the output format for the report. The operator shall be able to modify, or inhibit a periodic report.
  - f. Manual report generation shall allow for operator to request at any time the output of any report.
- 6. Activity Logging:
  - a. System shall maintain a historical file logging all activity of the system.
  - b. This file shall maintain, as a minimum, a record of all operators logged onto the system, alarm acknowledgments, commands issued and all database modifications. Passwords shall not be logged.



- c. Activity log shall be maintained at the web application server hardware. System shall automatically provide a mechanism for archiving the log files for long term record storage.
- d. System shall maintain a minimum of 2 years of log files.

G. User Access Permissions:

1. Web Application Server Software shall manage user information and shall recognize at least 100 separate users and have at least 3 levels of user permissions. User permission levels (from most restrictive to most permissive) shall include:
  - a. Guest (View-only) access level shall have the ability to perform the following tasks:
    - 1) View Data
    - 2) View Trends
  - b. Operator access level shall have the ability to perform the following tasks:
    - 1) View Data
    - 2) Acknowledge Alarms
    - 3) View Reports
    - 4) Override Points
    - 5) Change Setpoints
    - 6) View Trends
    - 7) Edit Schedules
  - c. Engineer access level shall have the same access as Operator level with the ability to perform the following additional tasks:
    - 1) Add Devices
    - 2) Address Changes
    - 3) Create Applications
    - 4) Download Applications
    - 5) Configure ASCs
    - 6) Setup Trends
    - 7) Setup Reports
    - 8) Modify Alarm Settings
    - 9) Create and modify System Graphic Displays
2. Passwords shall not be displayed.
3. System shall provide an Auto Logout Feature that shall automatically logout user when there has been no keyboard or mouse activity for 5 minutes. Time period shall be adjustable by system administrator. Auto Logout may be enabled and disabled by system administrator. Operator terminal shall display message on screen that user is logged out after Auto Logout occurs.

H. Graphics and Controls:

1. Graphics shall be configured for “point-and-click” operation to allow user to navigate through the building systems with ease. The user shall be able to define the action of control buttons configured on the graphics.



2. Building systems and equipment drawings can be created from built-in image library or may be imported from a scanner, the Internet, CAD drawing, or other files such as bitmap (.BMP), JPEGs or Icon files.
3. All symbols used by the Contractor in the creation of graphic pages shall be saved to a library file for use by the Owner. Provide additional copy of library file on CD.
4. Graphic Editor: The graphic editor shall enable the user to create, modify, and delete displays and graphic symbols. The primary use shall be for adding and modifying graphic displays, status displays, system summaries, and system directories, as new controllers, points, data, and other necessary changes are made.

## 2.2 DATA HISTORIAN – DATA ARCHIVING

- A. Data historian software may reside on the same physical server as the BAS software or on a separate server. The data historian shall seamlessly integrate to the BAS software without the need for a 3rd party application.
- B. System shall provide a means to gather, archive and retrieve trend, alarm, and operatorsystem activity records. Archived information shall be available for the life of the system.
- C. Historian shall have minimum of five (5) simultaneous user licenses.
- D. Historian database shall be Microsoft SQL Server. Microsoft Access databases are not allowed.
- E. System shall allow archival to/from a mass storage device.
- F. System shall provide means to export historical data to Excel compatible file. Operator shall have the ability to define points to export, start time of export and duration of export via graphical interface.
- G. Historian shall homogeneously combine historical data from multiple collection intervals for a given point (e.g., 15 minute and change of value trends shall be blended into a common view).
- H. System shall be able to perform exception reporting (e.g., show all values below or above a certain value).
- I. System shall be able to perform advanced analysis of BAS alarms to include the following information:
  1. Number of alarms for a given period
  2. Detailed alarm information; initial alarm, alarm cleared, duration, and highest level achieved during alarm.
  3. Statistical information: longest alarm duration, average duration, and total duration.
- J. Archived data shall be maintained for a minimum of 5 years.

## 2.3 FAULT DETECTION AND DIAGNOSTICS (FDD) SOFTWARE:

- A. Provide an FDD rule execution engine either integral to BAS Web Server software or 3<sup>rd</sup> software application, which can monitor all available monitored data and alarms, and execute user defined logic to determine or predict equipment operational or efficiency faults.



- B. FDD software shall monitor equipment parameters in real-time and read historical data and data derivations, via any or all open data connectivity methods.
- C. FDD software shall provide for the organization of all equipment as a hierarchical structure of assets, representing all structure and equipment. Multiple rules, or fault detection logic will be supported for each asset.
- D. FDD software shall provide default conditional logic for fault detection. The user shall be able to modify the logic and inputs of any fault rule. The user shall be able to add any number of new faults rules, including all fault analysis logic, to any asset.
- E. FDD software shall continuously monitor all referenced input values, input states, historical derivations, and determine if a fault condition has occurred. On occurrence of a Fault condition, the system shall display, and issue alert notifications. On occurrence of a fault the system shall analyze all referenced inputs continuously and calculate all possible causes and calculate the probability of all possible causes.
- F. FDD software shall use tagging to model and describe data and shall support the use of the open source tagging standard developed by Project-Haystack: <http://project-haystack.org/>. The Haystack naming convention is the current standard for tagging locations and equipment.

#### 2.4 BAS WEB APPLICATION SERVER – HARDWARE INTEGRATION INTO EXISTING SERVER

- A. Provide all hardware required to integrate the BAS into the existing Campus BAS Web Application Server for operator control/monitoring of building control systems.

#### 2.5 BAS WEB SERVER – SOFTWARE INTEGRATION INTO EXISTING SERVER

- A. Provide all necessary software upgrades or additional licenses to accommodate the additional point capacity required to integrate all BAS monitoring and controls points. Refer to specifications 230905 - Instrument Point List and 230993 - Control Sequences.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Install all control equipment in neat and workmanlike manner to satisfaction of Architect and Engineer.
- B. Coordinate timely delivery of materials and supervise installation of control devices.

#### 3.2 SOFTWARE

- A. Software shall be permanently stored on compact disk and on Web Application Server. Provide auto re-boot feature on power up from system failure. System failures shall not necessitate manual reprogramming to restore normal system function.



- B. Provide the latest version of all software, including, operating system and application software. Provide all software updates, and hardware updates associated with such software updates, for period of one year coinciding with warranty period. No beta released software shall be used.

### 3.3 BAS WEB SERVER – SOFTWARE PROGRAMMING

#### A. User Access Permissions:

- 1. Coordinate Users and access levels with Owner and setup in software.

#### B. Alarm and Event Management:

- 1. Web Server Software shall be programmed to receive BACnet alarm event notifications from individual controllers and manage system alarm/event notification and routing.
- 2. Web Server Software shall be programmed to monitor status of each controller and provide alarms on loss of communication/status.
- 3. Operator shall be able to adjust alarm limits if logged on with the appropriate security access.
- 4. Configure routing for all alarms. Coordinate alarm routing with Owner.
- 5. Alarm logs shall be maintained for a minimum of 1 year.

#### C. Scheduling:

- 1. Web Server Software shall be programmed to provide scheduling interface for individual HVAC system, space and lighting Occupied/Unoccupied operation as indicated in Control Sequences.

#### D. Trending & Data Archiving:

- 1. Web Server shall provide data archiving for all inputs, outputs, setpoints, integration points and calculated values.
- 2. Archived data shall be maintained for a minimum of 2 years.
- 3. All trend log information shall be displayed in standard engineering units.
- 4. Data points indicated to as “LEED” in the DDC Point Schedules shall be have a sampling time of 1 minute and averaged over 15 minutes.

#### E. Report Generating: Software shall have a report generation utility programmed for generating the following standard reports:

- 1. Energy usage Report: An energy usage summary, operator selectable, for a unit and building. Report shall be divided by utility, and shall be capable of reporting on at least four separate utilities. Report shall include the following information:
  - a. Beginning and ending dates and times
  - b. Total energy usage for each utility for the current and previous day
  - c. Total energy usage for each utility for the current and previous month
  - d. Maximum 15-minute interval average rate of consumption for each utility for the current and previous day and current and previous month



- e. Average Outside air (OA) temperature and OA relative humidity (rh) for current and previous month and current and previous day
- f. Calculated degree days
- 2. Chiller plant energy and efficiency: Daily, monthly and annual reports.
- 3. Current Alarm Summary Report: Current alarms by building or unit, including time of occurrence.
- 4. Daily Alarm Summary Report: Current alarms by building or unit, including time of occurrence for a user specified day.
- 5. Daily Room Summary Report: Average, high & low values for temperature, humidity and air change rate for a user specified day.
- 6. Device Failure Report: Failed devices including instruments, points, controllers and network hardware, including time of failure, and identification of operator acknowledging failure alarm.
- 7. Override Report: Points overridden, including time overridden, and identification of operator overriding the point.
- 8. Lockout Report: Points locked-out, including time locked-out, and identification of operator locking-out the point.
- 9. Run Time Reports: A report totalizing the accumulated run time of individual pieces of equipment. The operator shall be able define equipment groupings and shall be able to generate reports based on these groupings.
- 10. Provide allowance for ten (10) additional Owner defined custom reports.

### 3.4 GRAPHICS PROGRAMMING

- A. Graphics shall be designed to match graphic displays on the existing system following existing campus graphics standards and utilizing owner furnished templates. Transition from existing graphics to new graphics shall be seamless transition for operator in look, functionality, and operation.
- B. Navigation Scheme: System graphic displays of HVAC, plumbing and electrical systems and points shall be hierarchical displays using a building-to-equipment point-and-click navigation scheme. Each display shall show the building/Area name and number.
- C. Program color graphic displays for each system as described herein. Graphic displays shall consist of pictorial presentations with text description, system schematic, or picture; alarm fields; and database fields for associated points, including dynamic input values, output values, set points, gains, time schedules, etc.
- D. Make use of color to highlight system components.
  - 1. Color and texture meanings shall be consistent across all displays. Components of similar type shall be of same color for graphics (example: dampers shall be purple, valves yellow, etc.). Alarm fields shall be flashing black letters on red background. Affected component shall also turn red whenever alarm status is indicated. Database fields shall be dynamically updated and re-displayed on screen by periodically polling database points not less than once every 5 seconds. Each display shall clearly distinguish between the following point data types and information:
    - a. Real-time data



- b. User-entered data (setpoints)
    - c. Overridden or operator-disabled points
    - d. Devices in alarm (unacknowledged)
    - e. Out-of-range, bad, or missing data
  - 2. State indication shall be determined by status indicating equipment such as current sensing switches, auxiliary contacts, or position switches. Commands to field devices shall be shown separately.
- E. Graphics shall be configured to automatically update values without any action by the operator.
- F. All standard graphic features, such as title block, navigation buttons, etc., shall always be located in the same general area on each Graphic. For example, the navigation buttons shall always start at the left frame of the graphic. The Home, Charts and Alarm buttons shall always start in the upper right corner of the graphic.
- G. A description of a point shall be included on the Graphic next to the object's value whenever there is any ambiguity about the value's meaning. For example, when status and command points are both shown on a Graphic, they shall both be labeled with separate identifying descriptions. If a description of a point in a point block is not adequate, then a separate note may be added to the Graphic Background near the point block clarifying function or purpose. This shall prevent any confusion about what a value represents.
- H. Graphical displays shall be provided with software "links" to As-Built Control System submittal documents.
- I. Display all control loop and alarm setpoints on respective system graphic. Provide ability to change control loop setpoints, alarm setpoints and start/stop equipment from system graphic, provided user has appropriate access. If system graphic seems too cluttered, provide separate, text-based, System Overview page.
- J. Display time, date, outside temperature and humidity on each display in same location on each graphic. Provide command to direct specific displays without accessing main menu. Provide means of displaying directory of screens. Arrange displays by group and type.
- K. Graphic displays shall be designed to be easily understood. When display screen is too cluttered due to size, limit information to important monitoring data. Provide sub-graphic(s) to display data not displayed on main display.
- L. Each graphic shall have a shortcut to the main menu graphic and to previous graphic.
- M. Main menu graphic shall be automatically displayed when user logs on to system.
- N. Graphics shall include, but not be limited to:
- 1. Site Plans, including each building, building name, and status of exterior points such as lighting, etc.
  - 2. Overall building plan. Indicate location of mechanical rooms and areas served by each air handling unit.
    - a. Provide link from building plan to individual building floors and mechanical rooms.



3. Overall HVAC floor plan of each Area/Floor with indication of individual space temperatures, humidity, occupancy status, equipment status, equipment locations and alarm status for displayed values. Include room names and numbers for all spaces on floor plan graphics.
  - a. Provide link from displayed values and equipment to associated equipment graphic.
  - b. Provide link to overall building plan.
  - c. Label equipment and displayed values according to mechanical floor plans and BAS program.
  - d. Provide links to individual room/zone control graphics.
  - e. Identify HVAC zones served by specific air handling units.
4. Overall Lighting Control System floor plan of each floor with indication of individual light status and outline of lighting zones.
  - a. Provide link from floor graphic to manual control graphic for each space/zone. Operator shall be able to select individual offices, conference rooms and open office zones from floor graphic and initiate manual control graphic.
  - b. Manual control graphic shall provide lighting status indication and one-touch ON/OFF override control for respective room/zone.
5. Overall Fire Alarm System floor plan of each floor with status of individual Fire Alarm/Control Zone. Zone status shall be indicated as follows:
  - a. Red: Alarm
  - b. Yellow: Warning
  - c. Magenta: Supervisor
6. Schematic type graphics for:
  - a. Site Main Menu, with background digital picture of site, showing each building, shall have direct links to each individual building Main Menu.
  - b. Individual Building Main Menu, with background digital picture of building, shall have direct links to each of the following, as applicable:
    - 1) Overall Building Plan
    - 2) Heating Hot Water System
    - 3) Each Air Handling Unit (AH)
    - 4) Each Exhaust Air System
    - 5) Air Handling Unit Summary
    - 6) Power Monitoring System
    - 7) Each HVAC Floor Plan
    - 8) BAS Network Architecture
  - c. Each Air Handling Unit (AH)
    - 1) Supply fan control loops
    - 2) Return fan control loops
    - 3) Cooling coil control loops
    - 4) Heating coil control loops
    - 5) Heat recovery coil control loops
    - 6) Humidifier control loops



- 7) Damper control loops
- d. Fan Coil Units
- e. Exhaust Air Systems
  - 1) Exhaust fan control loops
- f. Space Temperature Control (Air Terminals)
  - 1) Each air terminal serving space
  - 2) Space environmental information
  - 3) Provide link to associated air handling unit graphic
- g. Space Specific Control & Monitoring
- h. Heating hot water system showing all components
  - 1) Individual Boilers
  - 2) Temperature control loops
  - 3) Pump control loops
  - 4) Individual Pump VFDs
- i. Each Plumbing System
- j. Each Packaged System/Equipment
- k. BAS Network Architecture indicating status of all devices/controllers
- l. HVAC Schedules
- m. Fire Alarm System
  - 1) Each Floor Plan
- n. HVAC Trends
- 7. Submit sample graphics (one per type) for review and approval by Owner prior to starting graphics programming.
- 8. Provide allowance for five (5) additional Owner defined custom graphics.

### 3.5 FAULT DETECTION AND DIAGNOSTICS (FDD) SOFTWARE:

- A. The software shall be programmed to generate the following values and faults:
  - 1. Air Handling Units:
    - a. Damper failure
    - b. Simultaneous Heating and Cooling
    - c. Heating Coil Valve Leaking
    - d. Determine the stability of control devices (valves/actuators/VFDs).
    - e. Compare sensor readings to setpoint and flag out-of-range, drift and offset errors from faulty sensors.
    - f. Compare outputs (controllers) setpoints to actual conditions to find failed devices.
    - g. Diagnose flow measurement systems to ensure readings are in range of expectations.
    - h. Ensure ventilation rates are adequate (testing minimum outdoor air volume settings).
  - 2. Air Terminal Unit:
    - a. Damper Failure
    - b. VAV Unstable Air Flow



- c. VAV Heating Water Valve Failure
- d. Simultaneous Heating and Cooling
- e. Overheating
- f. Overcooling
- g. Determine the stability of control devices (valves/actuators).
- h. Compare sensor readings to setpoint and flag out-of-range, drift or offset errors from faulty sensors.
- i. Compare outputs (controllers) setpoints to actual conditions to find failed devices.
- j. Diagnose flow measurement systems to ensure readings are in range of expectations.

### 3.6 STARTUP

- A. Major equipment and system startup and operational tests shall be scheduled and documented in accordance with Section 01 9100 Commissioning.

### 3.7 FUNCTIONAL PERFORMANCE TESTS

- A. System functional performance testing is part of the Commissioning Process as specified in Section 01 9100. Functional performance testing shall be performed by contractor and witnessed and documented by Commissioning Authority.

END OF SECTION 230924



## SECTION 237400 - PACKAGED ROOFTOP UNITS

### PART 1 - GENERAL

#### 1.1 SUBMITTALS

- A. Shop Drawings including, but not limited to, the following:
  - 1. Manufacturer's name and model number
  - 2. Identification as referenced in the documents
  - 3. Capacities/ratings
  - 4. Materials of construction
  - 5. Filters; size, efficiency
  - 6. Fans; type, drives
  - 7. Motor data (refer to Section 230513 - Motors for Mechanical Equipment)
  - 8. Power and control wiring diagrams
  - 9. Vibration isolation furnished with units
  - 10. Dimensions and weights
  - 11. Manufacturer's installation instructions
  - 12. Other appropriate data
- B. Fan curves shall include a series of curves indicating relationship of airflowcfm and static pressure for various rpm and fan brake power curves. Indicate design operating point clearly on fan curves.

#### 1.2 DESIGN CRITERIA

- A. Design units specifically for outdoor rooftop application.
- B. Units to be completely factory assembled and run tested, piped, internally wired, fully charged with refrigerant and compressor oil when specified, and shipped in one piece.
- C. Units shall be factory run tested to check cooling operation, fan and blower rotation and control sequence.
- D. Furnish units with components, accessories, and operating and safety controls to provide the intended performance as specified in this section, as shown on Drawings and/or as scheduled.
- E. Insulation and liners to meet NFPA 90A requirements.
- F. Unit shall be UL Listed and carry UL Label.
- G. V-belt drives shall be designed for 150% of motor rating.
- H. Cooling and/or heating coils shall be rated in accordance with AHRI 410.
- I. Heating system on gas-fired units shall be certified by AGA.



- J. Each fan and motor combination shall be capable of meeting both of the following conditions while maintaining stable fan performance:
  - 1. Deliver 110% of air quantity scheduled at scheduled static pressure.
  - 2. Unit static pressure shall take into consideration actual static pressure loss of components furnished within unit.
- K. Fan motor shall not operate into motor service factor in any case. Drive efficiency shall be considered in motor selection according to manufacturer's published recommendation, or according to AMCA Publication 203, Appendix L.
- L. Where inlet and outlet ductwork at any fan is changed from that shown on drawings, submit scaled layout of the change and system effect factor calculations, indicating increased static pressure requirement as described in AMCA Publication 201. Contractor shall be responsible for any motor, drive and/or wiring changes required as result of duct configuration changes at fan.

### 1.3 TEST REPORTS

- A. Manufacturer or manufacturer's representative shall field check, test and start units after they have been properly installed. Component systems to be run and adjusted to perform quietly and efficiently at capacities scheduled.
- B. Manufacturer or its representative shall provide services to field instruct and check unit operation and control of complete system. Instruction shall not take place until HVAC system has been field checked, tested, started and balanced. Manufacturer shall establish instruction dates, and give Engineer and Owner 10 days' written notice of the time. Instruction shall be deemed completed when affidavit of instruction has been signed by representative of manufacturer and Owner.

### 1.4 OPERATION AND MAINTENANCE DATA

- A. Refer to Section 230000 - General Mechanical Requirements.

### 1.5 GUARANTEE

- A. Manufacturer and Contractor shall provide warranty on rooftop units for a period of 1 yr after acceptance by Owner.
- B. Warranty shall include cost of parts and labor for work necessary to repair malfunctioning unit or piece of equipment furnished by unit manufacturer. Warranty need not cover normal maintenance such as changing of filters, cleaning of coils, replacement of belts and lubrication of bearings.
- C. Provide additional 4 yr warranty for refrigeration compressors.
- D. Provide additional 4 yr warranty for stainless steel heat exchangers.



## PART 2 - PRODUCTS

### 2.1 ROOFTOP UNITS (5 TONS AND SMALLER)

#### A. Manufacturers:

1. Captiveaire, AAON, Carrier, Daikin, or Trane
2. Equal to manufacturer's model with capacity and operating characteristics as scheduled

#### B. Casings:

1. Weatherproof and constructed of heavy gauge galvanized steel phosphatized with baked enamel finish. Insulate interior surfaces of cabinet with minimum of 1/2" glass fiber insulation.
2. Access doors shall be heavy gauge galvanized or phosphatized zinc coated steel complete with hinges to secure door. Access doors and removable panels shall have neoprene gaskets.
3. Cabinet base shall be constructed so as to mate and seal with roof mounting curb. Furnish sealing gasket for positive, waterproof seal when unit is installed on curb.

#### C. Supply Air Fans:

1. Double width, double inlet centrifugal type with adjustable V-belt drives, statically and dynamically balanced and tested in factory.
2. Entire fan and drive assemblies to be mounted on common base and be isolated from unit by factory mounted vibration isolators .

#### D. Return-Exhaust Air Section:

1. Furnish exhaust hood with rain gutter to protect exhaust air openings.
2. Provide baffle in return air stream entering filter section to balance pressure drop between return air and outside air entering supply fan.

#### E. Filters:

1. Filter racks shall be integral part within unit and easily accessible from both sides of unit via hinged access doors.
2. Furnish units with 2" glass fiber throwaway filters in commercially available sizes with low velocity V bank type filter casing.
3. In addition, furnish a set of 2" glass fiber throwaway filters to be used during construction and initial start-up periods and a set to be handed over to the owner.

#### F. Electric Heating Section:

1. Furnish unit with factory assembled and wired electric resistance type heating coils. Heating element shall be heavy-duty nickel chromium. Provide distribution baffle to ensure even air distribution across coil.
2. Heater circuit current shall be 48 amps or less, each individually fused in accordance with National Electrical Code. Capacity control shall use SCR control for electric heating.
3. Provide main disconnect switch in main control panel for electric heating..



4. Provide safety and operating controls including manual reset thermal cutouts on each bank of electric heating element and flow switch.

G. Heat Pump Section:

1. Provide reversing type heat pump system with capacities indicated on schedules.
2. Provide outdoor coil defrost system to remove frost accumulation during heating cycle.
3. Defrost system shall activate reverse cycle defrost time and temperature initiated, temperature termination.
4. Defrost system shall have integral time override to limit defrost cycle to maximum of 5 minutes.

H. Cooling System:

1. Direct Expansion Cooling:

- a. Factory charged with refrigerant and fully tested. System shall include refrigeration compressor(s), evaporator coil, air cooled condenser assembly, thermal expansion valves, liquid line valves, sight glass, filter drier, liquid and suction line service valves, and insulated interconnecting refrigerant piping.
- b. Evaporator coils to be of non-ferrous construction with 5/8" OD seamless copper tubes mechanically bonded to configured aluminum fins.
- c. Provide fully insulated drain pan fabricated from zinc-coated steel with additional coat of insulating sealer.
- d. Compressor shall be hermetic type with spring isolators.
- e. Provide compressor with internal thermal overloads, crankcase sight glass and crankcase heater. Provide capacitor start kit for single phase units.
- f. Condenser coils shall be seamless copper tubing mechanically bonded to heavy duty configured aluminum fins. Condenser coils of aluminum tubes and aluminum fins constructed with Microchannel coil technology will be acceptable.
- g. Refrigeration safety controls shall include high and low pressure cutout, oil pressure cutout, compressor overload protections, magnetic contactors and low voltage control transformer.
- h. Provide system with necessary controls to maintain head pressure at ambient to 0°F.
- i. System shall be fully charged with refrigerant as scheduled on Drawings, ready for operation.

I. Condenser Fan:

1. Condenser fans to shall be direct drive propeller type with exposed fan and shaft surfaces suitably weatherproofed. Fan motors to shall be furnished with normal and current overload protection and permanently lubricated motor bearings.

J. Electrical:

1. Furnish each unit with factory mounted disconnect device with short circuit and over current protection, motor starter and contactor.
2. Each unit shall include low voltage control transformer.
3. Motor power and voltages shall be as scheduled.

K. Remote Control and Monitoring Panels:



1. Panels shall include system operation switches and indicator lights for supply fan operating, filter media dirty, heating malfunction, and cooling malfunction.
2. Unit manufacturer shall provide at panels 24 h, 7 day time clocks with night setback override. Arrange time clocks so individual units or group of units as shown on Drawings have independent night setback control.

L. Unit Controls:

1. Controls for unit temperature control system shall be provided by Control Contractor in accordance with requirements of 230901 - Control Systems Integration and 230993 - Control Sequences. Coordinate unit controls and temperature control systems to ensure efficient and safe operation.
2. Contractor shall provide temperature control and interlocking devices necessary to perform the specified control sequence.
3. ~~Provide low voltage space thermostat to control stages of heating, cooling, automatic changeover and fan control. Provide matching heat cool/fan on-off auto sub base.~~

2.2 ROOF MOUNTING CURBS:

- A. Manufacturers: Mason, Type RSC-db, RPS, or fabricated by Contractor
- B. Construct roof mounting curb to mate and seal with unit casing base. Curb to have minimum height of 12".
- C. Construct curb to support perimeter of entire unit. Form cross section of curb members to accept wood nailing strips and insulation. Form top curb members to provide counter flashing.
- D. Curbs Serving Units 7-1/2 tons and larger:
  1. Curb mounted roof top equipment shall be flexibly ducted. Units shall be supported by spring isolation curb, lower member of which is rigid steel tube or specially formed steel section containing adjustable and removable steel springs that support upper floating section. Upper frame must provide continuous support for equipment and must remain captive when resiliently resisting wind and seismic forces. Directional neoprene snubber bushings must be minimum of 1/4" (6 mm) thick. Steel springs shall rest on 1/4" (6 mm) neoprene acoustical pads. Hardware must be cadmium or zinc electroplated and springs similarly plated or provided with approved rust resistant finish.
  2. Curb waterproofing shall consist of continuous galvanized flexible counterflashing nailed over lower curb's waterproofing and joined at corners by EPDM bellows. Spring locations shall have access ports with removable waterproof covers. Lower curbs shall have provision for 2" insulation.
  3. Floating member of roof curb shall have perimeter angle and cross members to support 2 layers of 5/8" waterproof sheetrock laid on with staggered joints. Sheetrock must surround ducts to provide continuous sound break. This acoustical barrier shall be caulked to minimize sound transmission. Where mechanical arrangement makes attachment to the floating member unfeasible, barrier shall be attached at highest practical elevation of fixed curb with provision for 1" thick closed cell neoprene flexible seals around the ductwork. 4" layer of 1.5 lb/cubic foot density fiberglass shall cover entire solid roof surface under the unit. Complete instructions shall be provided by spring isolation curb manufacturer.



### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install units as indicated on Drawings and according to unit manufacturer's instructions.
- B. Provide roof mounting curbs and set and install units on curbs.
- C. Install ductwork, electrical and piping connections to unit as shown on Drawings for complete installation.
- D. Coordinate with controls contractor for wiring between rooftop units, remote panels, time clocks and other temperature control devices.
- E. Manufacturer and/or manufacturer's representative shall calibrate control devices and adjust unit automatic dampers to ensure proper operation of system.
- F. Install space thermostats approximately 5 ft-0" above floor and as shown on drawings.
- G. Install remote control panels as indicated on Drawings.

END OF SECTION 237400



## SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Section includes conduits, ducts, and duct accessories for concrete encased underground distribution for electrical power and communications.
- B. The terms duct and duct bank, as used in this Section, are defined as follows:
  - 1. Duct: A single underground conduit, encased in concrete or direct buried.
  - 2. Duct Bank: Two or more ducts run together.

#### 1.2 REFERENCE STANDARDS

- A. ANSI C2 – National Electrical Safety Code
- B. ANSI C80.1 – Rigid Steel Conduit-Zinc Coated (GRC)
- C. ASTM F512 – Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduits and Fittings for Underground Installation
- D. ETL PVC-001 – PVC Coated Conduit
- E. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- F. NEMA TC 2 – Electrical Polyvinylchloride (PVC) Conduit
- G. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
- H. NEMA TC 6&8 – PVC Plastic Utilities Duct for Underground Installation
- I. NEMA TC 9 – Fittings for PVC Plastic Utility Duct for Underground Installation
- J. NFPA 70 – National Electrical Code
- K. UL 651 – Schedule 40 and 80 Rigid PVC Conduit
- L. UL 651A – Type EB and A Rigid PVC Conduit and HDPE Conduit
- M. UL E53373 – Underground Fiber Reinforced Epoxy Conduit (FRE)
- N. UL 6 – Electrical Rigid Metallic Conduit-Steel

#### 1.3 SUBMITTALS

- A. Product data for the following:
  - 1. Duct bank materials, including spacers and miscellaneous components
  - 2. Ducts and conduits and their accessories, including elbows, end bells, bushings, seals, bends, fittings, plugs, pull tape, and solvent cement



3. Warning tape

B. Manufacturer's Installation Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Closeout Submittals:

1. Project Record Documents:
  - a. Record actual routing of conduits and duct banks.
2. Operation and Maintenance Data:
  - a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.
  - b. Include spare parts data listing, source, and current prices of replacement parts and supplies.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with NFPA 70
2. Comply with ANSI C2
3. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect from dirt, water, construction debris, and traffic.
- B. Deliver ducts to project site with end capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

1.6 WARRANTY

- A. Refer to Division 01 and Section 260000 - General Electrical Requirements for general warranty requirements.
- B. Manufacturer shall provide standard 1 yr written warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of ~~substantial completion~~ final acceptance.

PART 2 - PRODUCTS

2.1 CONDUITS

- A. Rigid Steel Conduit (RSC): ANSI C80.1, UL 6, heavy wall, hot dipped, galvanized steel .



- B. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer, complying with NEMA TC 3 and UL 651, listed for underground use, concrete encased.

C. Size:

- 1. As indicated on drawings

## 2.2 DUCT ACCESSORIES

A. Duct Spacers:

- 1. Rigid PVC interlocking spacers.
- 2. Factory-fabricated, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling. Horizontal and vertical locking separation of 3" between ducts as shown on drawings.

- B. Elbows: Material to match conduit; minimum bend radius of 36".

- C. Bell Ends: Manufactured bell ends of appropriate sizes at each end of conduit; pre-manufactured system for PVC with conduit seals, provisions for roughing into the concrete pour and waste stops, when entering a new building or a new manhole.

- D. Bushings: Groundable steel bushings of appropriate sizes on all metal conduits where bell ends are not used; pre-manufactured system for PVC with conduit seals, provisions for roughing into concrete pour and water stops, when entering a new or existing building or a new or existing handhole.

- E. Seals: Mechanical interlocking assembly seal of modular synthetic rubber links properly sized to fit the pipe and tightened in place, in accordance with manufacturer's instructions, when entering an existing building or handhole below grade and concrete shall be core drilled for the appropriate size conduit and seal.

- F. Plugs: Closure plugs or caps of same material as conduit at ends of unused sections.

- G. Pull Tape: Nylon pull tape with measurement markings in uniform lengths in each empty duct.

H. Grounding:

- 1. Steel grounding bushings, where bell ends are not used.
- 2. Bonding fitting with bonding strap on steel conduit with end bells.

- I. Warning Tape: Underground line warning tape specified in Section 260553 - Electrical Systems Identification .

- J. Concrete Dye Color: Red dye for electrical duct bank and orange dye for communications duct bank added to top of concrete immediately after pour.

- K. Solvent Cement: Recommended by conduit manufacturer.



### PART 3 - EXECUTION

#### 3.1 COORDINATION

- A. Coordinate layout and installation of ducts with final arrangement of other utilities, site grading, and surface features as determined in the field.
- B. Coordinate elevations of ducts and duct bank entrances into generator, pad-mounted exterior electrical equipment, handholes, and manholes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, away from the building and as approved by Architect. For manholes and handholes construction, refer to Section 260543.19 - Manholes and Hardware.
- C. Adjust the depth of electrical utilities to avoid existing utilities with no change to contract price.
- D. Utility Coordination: When duct lines are being constructed for use by a utility serving the project, consult with them for duct size and quantity, minimum bending radii, maximum distance between pulling points, grounding details, termination arrangement, and other criteria.
- E. Duct Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
  - 1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
  - 2. Drawings shall be signed and sealed by a qualified professional engineer.

#### 3.2 EXISTING UTILITIES

- A. The existing utilities shown on contract drawings have been plotted from available records. No guarantee is made as to accuracy of locations indicated, and is shown for the benefit of Contractor.
- B. Contact all serving utility companies and have them locate their lines prior to commencing work. Telephone "Call Before You Dig" prior to commencing work. Coordinate with Owner all existing utility lines prior to commencing work.
- C. Protect shown, visible and located utilities from damage. Promptly repair all active shown, visible and located utilities damaged by construction. This repair shall be made solely at the expense of the Contractor.
- D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

#### 3.3 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:



1. Notify Owner no fewer than 10 business days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without written permission from the Owner.

### 3.4 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends, both horizontally and vertically, at other locations, unless otherwise indicated. All 90-degree sweeps with radius 10 ft or less shall be rigid steel conduit.
- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane. Do not use conduit that requires the use of couplings for straight runs. Use acceptable PVC terminal adapters when joining PVC conduit to metallic fittings or rigid metal conduit.
- D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10" o.c. for 5" ducts, and vary proportionately for other duct sizes.
  1. Begin change from regular spacing to end-bell spacing 10 ft from the end bell without reducing duct line slope and without forming a trap in the line.
  2. Direct Buried Duct Banks: Install an expansion and deflection fitting in each conduit in area of disturbed earth adjacent to manhole or handhole.
  3. Concrete Enclosed Duct Banks: Install watertight expansion fitting in each conduit, with internal bonding jumper to allow for 3/4" movement in any direction.
  4. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 5 ft outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260533 - Raceway and Boxes for Electrical Systems .
- F. Expansion Fittings: Provide suitable expansion fittings or other suitable means to compensate for expansion and contraction for raceways crossing expansion joints in structures or concrete slabs between two adjacent structures and between a duct bank and structure. Provide for the high rate of thermal expansion and contraction of PVC conduit by providing PVC expansion joints as recommended by manufacturer and as required. Refer to structural drawings for location of expansion joints in structures.
- G. Sealing: Provide temporary closure at termination of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand minimum of 15 psig hydrostatic pressure. Provide watertight entrance sealing device where an underground conduit enters a structure through a concrete roof or membrane waterproofed wall or floor.



- H. Fire Stops: Provide fire stop openings around electrical penetrations to maintain fire-resistance rating, where underground raceways penetrate fire-rated walls or floors.
- I. Pulling Cord: Install 100 lb test nylon cord in ducts, including spares. Identify with tags at each end and at any intermediate pull point the origin and destination of each spare duct. Provide a removable permanent cap over each end of each spare duct.
- J. Concrete Encased Ducts: Support ducts on duct spacers.
  - 1. Spacer Installation:
    - a. Provide spacers close enough to prevent sagging and deforming of ducts, with not less than 5 spacers per 20 ft of duct. Secure spacers to earth and to ducts to prevent floating during concreting. Stagger spacers approximately 6" between tiers. Tie entire assembly together using tie wires and reinforcing steel. Install base and intermediate spacers at every coupling point of each duct line for a separation horizontally and vertically per NEC.
  - 2. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
    - a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
    - b. Terminate each pour in a vertical plane if more than one pour is necessary, and install 3/4" reinforcing rod dowels extending 18" into concrete on both sides of joint near corners of envelope. Obtain Architect's approval for the number and location of dowels.
  - 3. Pouring Concrete: Space concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct bank application.
  - 4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing bars and ties without forming conductive or magnetic loops around ducts or duct groups. Size reinforcing bars and wire ties as indicated on drawings. Provide rebars with minimum of 2" of concrete on sides, top and bottom. Reinforcing bars shown in sections are required throughout.
  - 5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms of materials and in a manner acceptable to Architect.
  - 6. Minimum Space between Ducts: 3" between ducts and exterior envelope wall, 2" between ducts for like services, and 4" between power and signal ducts.
  - 7. Depth: Install top of duct bank at least 24" below finished grade in areas not subject to deliberate traffic, and at least 30" below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.
  - 8. Maintain a grade of at least 4" per 100 ft, either from one manhole or pull box to the next, or from a high point between them, depending on surface contour.



9. Warning Tape: Bury warning tape approximately 12" above all concrete-encased ducts and duct banks. Align tape parallel to and within 3" of the centerline of duct bank. Provide an additional warning tape for each 12" increment of duct bank width over a nominal 18". Space additional tapes 12" apart, horizontally.
10. Place duct banks on an undisturbed soil base if possible. Where concrete encased duct bank is installed over an extensive area of disturbed earth such that within the periphery of a building, provide a separate concrete base under the duct bank to ensure stability of raceways during installation. Allow this base to set before duct bank is installed.

K. Stub-Ups:

1. Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase couplings with 3" of concrete. Concrete encasement applies to concrete encased ducts.
  - b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete pads, extend steel conduit horizontally a minimum of 5 ft from edge of equipment pad or foundation. Encase in concrete for concrete encased ducts. Install insulated grounding bushings on terminations at equipment.

L. Arrangement and Routing:

1. Arrange multiple duct runs substantially in accordance with details shown on drawings. Locate underground ducts where indicated on drawings and grade to the elevations shown on civil drawings.
2. Make minor changes in location or cross-section as necessary to avoid obstructions or conflicts. Where duct runs cannot be installed substantially as shown because of conditions not discoverable prior to digging of trenches, refer the condition to the Architect for written instructions before further work is done.
3. Maintain a 12" minimum vertical separation between ducts and other systems at crossings where other utility piping systems are encountered or being installed along a raceway route. Maintain a 12" minimum separation between ducts and other systems in parallel runs. Do not place ducts over valves or couplings in other piping systems. Refer conflicts with these requirements to the Construction Manager for written instructions before further work is done.
4. Provide markers at grade to indicate direction of underground conduits provided under this contract. Provide markers consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction. Provide markers at all bends and at intervals not exceeding 100 ft in straight runs. Use markers made of sheet bronze not less than 1/4" thick embedded in and secured to the top of concrete posts. Use markers not less than 10" long and 3/4" wide and marked ELECTRIC CABLES in letters 1/4" high incised into the bronze to a depth of 3/32".
5. Enter manholes and structures with ducts at right angles.

### 3.5 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Feeders 600V and Less: RNC, NEMA Type EPC-40-PVC, in concrete encased duct bank, unless otherwise indicated.



- B. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct buried duct bank, unless otherwise indicated.
- C. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: RNC, NEMA Type EPC-40-PVC, installed in concrete encased duct bank, unless otherwise indicated.

### 3.6 EARTHWORK

- A. Excavation and Backfill: Comply with Section 260543.13 - Excavation and Backfill, do not use heavy-duty, hydraulic-operated compaction equipment.

### 3.7 CONCRETE

- A. Concrete: 3000 psi, 28-day strength, complying with Division 03 – Concrete, where concrete encased.

### 3.8 GROUNDING

- A. Ground underground ducts according to Section 260526 - Grounding and Bonding for Electrical Systems.

### 3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts.
  - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80% fill of duct. If obstructions are indicated, remove obstructions and retest.
- B. Preparation for pulling in conductors:
  - 1. Do not install crushed or deformed raceways. Avoid traps in raceways where possible. Take care to prevent the lodging of plaster, concrete, dirt, or trash in raceways, boxes, fittings, and equipment during the course of construction. Make raceways entirely free of obstructions or replace them. Ream all raceways, remove burrs, and clean raceway interior before introducing conductors or pull wires.
  - 2. Immediately after installation, plug or cap all raceway ends with watertight and dust-tight seals until the time for pulling in conductors.
- C. Do not backfill underground direct buried and concrete encased ducts until the Designer and the State Construction Office Electrical Inspector has inspected them. Notify designer a minimum of .



3.10 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION 260543



## SECTION 265668 - ATHLETIC LIGHTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes lighting for fields used for one or more multi-directional aerial sports such as soccer, lacrosse, and football.
- B. Portions of this specification are specific to exterior lighting, such as pole and base requirements. Only criteria which could be applicable to interior lighting shall apply for interior applications.

#### 1.3 REFERENCES

- A. Illumination Engineering Society Recommended Practice for Sports and Recreational Area Lighting, current edition. (IES RP-6-15)

#### 1.4 DEFINITIONS

- A. Illuminance: The metric most commonly used to evaluate lighting systems. It is the density of luminous flux, or flow of light, reaching a surface divided by the area of that surface.
  - 1. Horizontal Illuminance: Measurement in foot-candles, on a horizontal surface, 36 inches above ground unless otherwise indicated.
  - 2. Target Illuminance: Average maintained illuminance level, calculated by multiplying initial illuminance by LLF.
  - 3. Vertical Illuminance: Measurement in foot-candles, in multiple directions on a vertical surface, at an elevation coinciding with plane height of horizontal measurements.
- B. Light Trespass: Light spill into areas and properties outside the playing areas, which is either annoying or unwanted.
- C. Lamp lumen depreciation (LLD): the decrease in lamp output as the lamp ages.
- D. Light loss factor (LLF): the product of all factors that contribute to light loss in the system.
- E. Luminaire: all components of a light-producing assembly to include the housing, source, heat sink, optics, accessories, and any integrated electronics required to condition the supplied power.
- F. Coefficient of Variation (CV): the statistical weighted average of all relevant illuminances.
- G. Uniformity gradient (UG): the rate of change of illuminance on the playing field, expressed as a ratio between the illuminances of adjacent measuring points on a uniform grid.



- H. Uniformity Ratio: ( $E_{max}/E_{min}$ ) A ratio of the highest to lowest calculated or measured illumination value at a given surface.
- I. Primary playing area: an area including the playing field and extending 15 feet beyond the boundaries of the playing field in all directions.

## 1.5 ELECTRICAL DESIGN REQUIREMENTS

- A. Provide complete turnkey design and installation of electrical systems to support sports lighting system.
- B. Successful bidder to provide electrical design drawings (wire, conduit, breakers, contactors, etc.) detailing all electrical components between the ~~multi-wire branch circuits~~electrical distribution panelboard indicated for ~~each pole assembly~~athletic lighting (0NPH2) and individual components within the athletic light assembly.
- C. Application is an indoor practice facility within an engineered metal building. Provide supports for fixtures, coordinate all attachments with building structure.
- D. Turnkey installation includes:
  - 1. Balance load between phases.
  - 2. Include required overcurrent protective devices for each luminaire and individual lighting control for each sports field or venue.

## 1.6 LIGHTING SYSTEM DESIGN REQUIREMENTS

- A. The maintained illuminance level shall be calculated using the published lumen output of the luminaire with a combined light loss factor (to account for lamp lumen depreciation at 50,000 hours and projected luminaire dirt depreciation) of not greater than 0.90.
- B. Glare and spill light control:
  - 1. Glare control may be achieved by internal and/or external hardware. Glare shall be minimized from the lamp and the reflector when standing in front of the lighting assembly beyond the property line and when standing 90-degrees perpendicular to the lighting assembly beyond the property line.
  - 2. Minimize spill light for each playing area on adjacent and nearby areas. Prevent light trespass on properties near Project as defined by the Town of Chapel Hill, NC. Calculate the horizontal and vertical illuminance due to spill light for points at the playing area boundary (fence) and 20-ft beyond.
- C. Illumination Calculations: Computer-analyzed point method complying with IESNA RP-6-15 to optimize selection, location, and aiming of luminaires.
  - 1. Grid Pattern Dimensions: For playing areas of each sport and areas of concern for spill-light control, correlate and reference calculated parameters to the grid areas. Each grid point represents the center of the grid area defined by the length and width of the grid spacing.
  - 2. Luminaire Mounting Height: Comply with IESNA RP-6-15, with consideration given to minimize spill light and glare.



3. Luminaire Placement: Luminaire shall be outside the glare zones defined by IES RP-6-15.

## 1.7 LIGHTING SYSTEM PERFORMANCE REQUIREMENTS

### A. Facility Type: Collegiate

1. Class II – Maximum CV = 0.21, Maximum Uniformity Ratio = 2.5 except where more stringent criteria is outlined in these or other construction documents
2. Moderate to Fast speed of play as viewed by spectators

### B. Illumination Criteria:

1. All criteria shall meet or exceed criteria of IES RP-6-15 for the given sport, class, and speed of play except where more stringent criteria are given herein. Such criteria may include:
  - a. Minimum average target illuminance level at 3-ft above the surface of play
  - b. CV, UG, and Uniformity Ratios

### C. Illumination Criteria: Practice field for Soccer or Football (indoor/outdoor)

1. Minimum Average Target Illumination: 75 FC
2. Uniformity Ratio: ??? 2.0

### D. The lighting design is to be based on counts, setbacks, and mounting heights consistent with IES RP-6-15.

### E. Lighting Control shall be automated by astronomic timeclock with manual override capability providing the following functions, integrated into a single control station, with multiple sub-control stations as required:

1. Control Station: Key-operated master switch, manual push-button controls, and system status indicator lights.
2. Soccer, lacrosse, football, field-hockey, and track in-field light levels: 2 levels at 100% and 50% of specified illumination

### F. Lighting Control shall incorporate web-based functionality to allow control by University Staff from cell phones, either via App or through web-based portal.

## 1.8 SUBMITTALS

### A. Alternate suppliers must submit the following information 14 days prior to bid for consideration:

1. Photometric design layout for specified light level showing point by point “maintained” foot-candle levels for each field meeting requirements of these specifications.
2. Photometric IES Files for fixtures being offered.
3. Letter on light system manufacturer’s letterhead guaranteeing light levels will be met.
4. Letter on light system manufacturer’s letterhead guaranteeing control system meets specification.
5. Letter on light system manufacturer’s letterhead guaranteeing warranty and financial reserves.



6. Letter on light system manufacturer's letterhead guaranteeing energy consumption will not increase over time.
  7. Descriptive literature on all proposed lighting equipment.
  8. Exceptions: Statement of exceptions and discrepancies to bid specifications if any.
- B. Product Data: For each type of lighting product indicated. Include the following:
1. Luminaires: Housing materials and construction, electronics, output and energy use data.
  2. Source data certified by NVLAP or NRTL; comply with IES LM-79.
  3. Projected lumen maintenance at 50,000 hours based on IES LM-80 and TM-21 standards.
  4. Control equipment
  5. Warranty details: provide sample warranty document without dates to demonstrate compliance with warranty requirements included in this section. Product data and shop drawings will not be approved without warranty details.
- C. Shop Drawings:
1. Mounting Details:
    - a. Site-specific details for supporting fixtures from structure provided.
  2. Electrical system design:
    - a. Wiring requirements, including required conductors and cables and wiring methods.
    - b. Total connected and estimated peak-demand electrical load, in kilowatts, of lighting system.
    - c. Capacity of service and feeders required to supply lighting system.
  3. Lighting calculations: Computer-derived lighting plan showing the point-by-point horizontal maintained illuminance levels on a 30 x 30-ft square grid with criteria as follows:
    - a. Grid shall be oriented such that one of the calculation points is offset fifteen feet in each direction from a point at the midpoint of the playing field.
    - b. Manufacturer's determination of LLF used in design calculations.
    - c. Uniformity ratio (EMAX:EMIN) of each playing area.
    - d. CV of each playing area.
    - e. Maximum UG of each playing area.
    - f. Point calculations of horizontal and vertical illuminance in areas of concern for spill light.
  4. Additional lighting system criteria: The following information may be provided in drawing or tabular format:
    - a. Number of luminaires used at each location.
    - b. Mounting height.
    - c. Energy consumption of the lighting system in kW.
    - d. Luminaire lumens (delivered) used in the calculations.
    - e. Light aiming point plan: The contractor shall submit an aiming plan indicating the horizontal degree setting and the vertical degree setting of each fixture on each of the pole assemblies.



5. Following designer review and approval, but before installation commences, complete submittal (shop drawings, product data, etc) must be submitted to the State Construction Office for review and approval. Submitted shop drawings must be stamped by a PE licensed in the state of North Carolina.

#### 1.9 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. Drivers: Equal to 1% of amount installed for each size indicated, but no fewer than 2 units.
  2. Fuses: Equal to 2% of amount installed for each size indicated, but no fewer than 5 units.

#### 1.10 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: emergency, operation, and maintenance manuals for sports lighting system components.
- B. Successful bidder to perform final light tests with Owner and make any adjustments necessary to meet specifications. A typed photometric report of actual light levels on each field must then be submitted prior to final payment being released.

#### 1.11 QUALITY ASSURANCE

- A. All materials furnished under this Contract shall be new, free from defects of any kind, of the quality and design hereinafter specified, and shall conform to the standards of Underwriter's Laboratories Inc.
- B. The Sports Lighting Supplier shall be dedicated to sports lighting with in-house engineering, sales and support personnel. Supplier shall maintain inventory and personnel who are qualified to supervise the installation, to be responsible that the system is installed as submitted, to conduct system start up, instruct the Owners representatives in the proper operation of the system and provide service throughout the warranty period.
- C. Installer Qualifications:
  1. Trained and authorized by the manufacturer for installation of units required for this Project.
  2. Installer shall have been in business at least five consecutive years under the same name and shall have installed, under that name, at least ten sports lighting systems similar to this project.
  3. Installer shall be fully experienced in the installation of the lighting systems as herein specified, and shall furnish with the bid an itemized list of the installations of this type. The list shall include the name of the project, date of completion, the amount of the contract, the name, and telephone number of the person to contact for reference.



- D. The ability of any bidder to obtain plans and provide a performance bond shall not be regarded as the sole qualification of such bidder's competency and responsibility to meet the requirements and obligations of the contract. Before using the bid of a subcontractor as part of his bid, the General Contractor shall satisfy himself that the proposed subcontractor can satisfy all of the requirements expressed above. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that the bidder and/or any subcontractor he proposes can properly qualify to carry out the obligation of any part of the contract, and to complete the work contemplated therein.

#### 1.12 WARRANTY

- A. Lighting Manufacturer must maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty must cover the cost for labor, shipping expenses, lifts (or other equipment rentals) and material for repairs.
- B. Lighting Manufacturer must repair or replace any part of the sports lighting luminaires, wiring, alignment products, and structural components that proves to be defective for a period of 10 years from the date of final acceptance.
- C. Warranty must guarantee light levels, aiming, and energy consumption. Energy consumption must not increase as the system ages. Manufacturer agrees to correct misalignment that occurs subsequent to successful acceptance tests.
- D. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, and unauthorized repairs and alterations from warranty coverage.

#### 1.13 MAINTENANCE SERVICE

- A. Make available to the Owner, in the form of a standard maintenance agreement, a proposal for an extended warranty period from the original 10 years to 25 years from the date of substantial completion. Services, obligations, conditions, and terms must include at a minimum the terms of the original warranty period.
- B. During the warranty period, services shall include periodic illumination maintenance testing, monitoring of on/off status and hours of usage relative to commissioned control system, and repair or replacement of all lighting, alignment, and structural components of the system which may be affected by conditions excluded from the warranty.
- C. The owner agrees to check fuses in the event of a luminaire outage.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Musco
- B. Ephesus
- C. WiLL



## 2.2 SPORTS LIGHTING – INTERIOR ROOF STRUCTURE MOUNTED

- A. The interior sports lighting system shall consist of steel galvanized or painted clamps or bolted connections to the building roof structure with a factory pre-wired luminaire support assembly. All wiring and connections should be factory assembled from the fixture mounting location to the connection to the structure. Strain relief devices must be factory installed in pre-wired cross-arm assembly to ensure no weight or tension is placed on electrical connections.
- B. Sports Lighting vendor shall provide all required information to coordinate with the steel roof designer and shall design lighting connections to accommodate the steel roof design.
- C. Connections to the building structure shall be designed and sealed by a licensed engineer in the State of North Carolina.
- D. Remote drivers are acceptable. Should they be employed by the sports lighting vendor, installation and all wiring, conduit and other electrical work between the remote ballasts and all luminaires shall be provided as part of this contract.

## 2.3 LUMINAIRES

- A. Lighting performance criteria:
  - 1. Luminaire shall have a Correlated Color Temperature (CCT) of 5700K with a tolerance of  $\pm 300K$ , and a minimum CRI of  $\geq 68$ .
  - 2. Luminaire shall be third-party verified to be flicker free at super slow-motion speeds up to 2400 FPS and use pulse width modulation greater than 18 KHz with a flicker index rating of less than 0.06.
  - 3. Luminaire shall have lumen depreciation, L90 rating, greater than 50,000 hours as determined in accordance with IES TM-21-11 or L70 rating greater than 100,000 hours certified through CREE Tempo-24 Testing or equivalent.
- B. Construction:
  - 1. Luminaire must be UL Classified for wet locations at an operating temperature range rating between  $-40^{\circ}C$  and  $+65^{\circ}C$ .
  - 2. Luminaire must be 3rd party NEMA 4X rated based on NEMA 250 standards for external icing, hose-down, and 200-hours salt spray test.
  - 3. Luminaire shall have an EPA of 1.4 sq feet or less.
  - 4. Aluminum shall be multi-stage powder coated for long term resistance to corrosion and UV exposure.
- C. Electrical requirements:
  - 1. Manufacturer will supply all drivers and supporting electrical equipment.
  - 2. Remote electrical equipment, if provided, must be mounted a minimum of 10ft above grade in aluminum NEMA 3R enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be in the enclosure.
  - 3. Luminaire shall have a power factor greater than 0.98 @ 277VAC and 0.97 @ 480VAC



4. Luminaire shall have a THD (Total Harmonic Distortion) Less than 10% at 240VAC with full load and less than 14% at 480VAC at full load.

D. Integrated power supply shall have the following features:

1. Efficiency - Greater than 95% from 240VAC to 480VAC with full load applied
2. Hold Up Time – Greater than 25ms
3. Restrike Time - Less than 3.0s to meet UL924 Emergency Lighting requirements

## 2.4 CONTROL SYSTEM

- A. Provide a wired or wireless control system with the capability to link to external devices such as smartphones and tablets as well as desktop and laptop systems via Bluetooth, Wi-Fi, LAN, or cellular connection to switch lights on/off as well as dimming the system to specified levels via the wireless control hub.
- B. Provide control and monitoring of the LED fixtures via a secure network.
- C. System shall be capable of storing power data, behaviors, alarms and critical events for maintenance and troubleshooting.
- D. Performance criteria:
  1. Allow individual addressing of luminaires to be grouped into zones and scenes for facility scheduling
  2. Zoned into groups to facilitate use of individual athletic venue at the site.
  3. Capable of smooth- or step-dimming with presets for high, medium, low, and off control points.
  4. Provide emergency illumination by means of a low dimming setpoint or specially zoned luminaires to serve this additional purpose or a combination thereof.
- E. System shall be FCC/IC certified
- F. Data shall be secured by dual-layer password protection accessible to the Owner.
- G. Manufacturer shall include any communication costs for monitoring of the system for the entire warranty period.
- H. Remote Monitoring: Control component status (switch position, contactor status, etc.) and lighting performance shall be monitored by the system to notify manufacturer and owner if individual outage is detected so that appropriate maintenance can be scheduled.
- I. Scheduling: Controller shall accept and store 7-day schedules in non-volatile memory and be able to execute curfews and early-off commands.
- J. Management Tools: Manufacturer shall provide software for management of lighting system. At a minimum, the following parameters should be accessible.
  1. Operating hours
  2. Cumulative burn hours
  3. Cumulative Watt-hours



4. Average Current
5. Peak Current
6. Input Voltage
7. Peak Input Voltage
8. Average Power

## 2.5 SURGE PROTECTION

- A. Surge Protection: Comply with requirements in Section 264300 "Surge Protective Devices" and include surge suppressors on all electrical distribution equipment serving the sports lighting system.

## 2.6 ELECTRICAL DISTRIBUTION EQUIPMENT

- A. Refer to other Division 26 sections for acceptable materials and installation methods for this project.
- B. Coordinate with electrical equipment supplier to provide branch circuit / feeder circuit breakers necessary to support athletic lighting electrical design. Provide any circuit breakers, disconnects and other miscellaneous components necessary to support athletic lighting installation.

## PART 3 - EXECUTION

### 3.1 DELIVERY

- A. The entire sports lighting system shall be delivered to the jobsite by the sports lighting supplier. All material (fixtures, cross-arm assemblies, etc.) shall arrive the same day. The supplier shall off-load all material and stage required material at each pole location to eliminate possibility of lost or damaged material. Delivery shall be made within 21 days after notice to proceed.

### 3.2 INSTALLATION

- A. Erection of structural members and installation of luminaires shall be in accordance with the manufacturer's written instructions. Instructions of this specification may be used only to supplement the manufacturer's instructions with written consent.
- B. Use web fabric slings (not chain or cable) or other protective means to raise and set structural members to protect equipment from corrosion during installation.
- C. Install poles and other structural units level, plumb, and square.
- D. Except for embedded structural members, grout voids where they exist between pole base and foundation. Use non-shrinking or expanding concrete grout firmly packed in entire void space. Use a short piece of 1/2-inch-diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Install controls and driver housings in cabinets mounted on support structure at least 10 feet above finished grade.



### 3.3 FIELD QUALITY CONTROL

- A. After installing sports lighting system and after electrical circuits have been energized, Sports Lighting Supplier shall perform proof-of-performance field measurements and analysis for compliance with requirements in accordance with applicable provisions of IES RP-6-15.
- B. Test procedures:
  - 1. Test methods, instruments, and test intervals shall meet the approval of the Owners representative prior to testing.
  - 2. Testing equipment for measurement of foot-candle levels shall be performed using a Konica Minolta T-10 Illuminance Meter (or equal). Supplier must show proof of calibration prior to testing as required by the manufacturer. Accuracy shall be  $\pm 4\%$  or less of recording. Measuring functions shall be in foot-candles.
  - 3. The contractor shall take voltage and current readings at each pole base during the time of the test for ascertaining the approximate fixture operating condition. Voltage at the pole base shall be adjusted within  $\pm 5\%$  of rated ballast voltage.
  - 4. The contractor shall provide stakes or other identifiable markings at all test points on the field at the time of the test. The supplier shall aid the contractor in locating these test points to correspond (same quantity and relative location) with the calculated values approved in the shop drawings.
  - 5. Readings shall be recorded for each point and the results confirmed by Owner and/or Engineer.
  - 6. Measurements shall be taken at 36" inches above grade, with meter held horizontally. Dark clothing shall be worn by individuals performing test.
  - 7. Make horizontal and vertical field measurements at established test points in areas of concern for spill light and glare.
- C. Acceptance Criteria:
  - 1. The measured values shall be within  $\pm 10\%$  of the calculated values indicated on the approved shop drawings.
  - 2. Perform analysis to demonstrate correlation of field measurements with submittal drawings and submit a report of the analysis.
- D. Failure to meet acceptance criteria shall require Correction of Illumination Deficiencies:
  - 1. Add or replace luminaires, or change mounting height, revise aiming, or install louvers, shields, or baffles.
  - 2. If luminaires are added or mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
  - 3. Do not replace luminaires with units of higher or lower wattage without Engineer's approval.
  - 4. Retest as specified above after repairs, adjustments, or replacements are made and submit revised report.
- E. Any expense associated with Correction of Illumination Deficiencies, if any, shall be borne by the supplier with no additional cost to the Owner or Engineer.



### 3.4 ADJUSTING

- A. Apparent "hot spots" or "dark spots" shall be eliminated by further fixture adjustment as required.
- B. If in the judgment of the Owner's Representative, the manufacturers computed results cannot be obtained, this contractor shall furnish and install additional fixtures, wire, conduit, breakers, etc., as required to achieve the manufacturers predicted results at no additional cost to the Owner or Engineer.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain exterior athletic lighting system in accordance with terms of warranty and any accepted maintenance contract.

END OF SECTION 265668



## SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. This section details product and execution requirements for Communications Equipment Room Fittings for Communications Systems.

#### 1.2 DESCRIPTION

- A. Communications Equipment Room Fittings include:
  - 1. Cabinets, Racks, Frames and Enclosures
  - 2. Cable Runway
  - 3. Termination Blocks
  - 4. Patch Panels
  - 5. Entrance Protection
- B. Refer to Project Drawings for Equipment Room layout and equipment placement.

### PART 2 - PRODUCTS

#### 2.1 ALTERNATES

- A. Under preferred brand alternate, provide the following items:
  - 1. Equipment Racks: CPI 55053-503
  - 2. Horizontal Cable Management: Panduit WMP1E
  - 3. Vertical Cable Management: Panduit PR2VD6 / PR2VD10
  - 4. Termination Blocks: ADC KRONE
  - 5. Modular Patch Panels: Siemon UltraMAX UP6A-F2-48L-RS
  - 6. Fiber Optic Housing: Corning CCH-01U / 02U / 03U / 04U
  - 7. Fiber Splice Housing: Corning CSH-03U / 04U
  - 8. Fiber Splice Tray: Corning M67-078
  - 9. Heat Shrink Protectors: Corning P322467 Qty50
  - 10. Fiber SC SM Module: Corning CCH-CS12-59-P00RE
  - 11. Fiber SC MM Module: Corning CCH-CS12-91- P00KE w/Pigtails
  - 12. Cable Runway (Ladder Rack): CPI - UL Classified Cable Runway 11275-712
- B. Under base bid, provide equal products from manufacturers listed and as described in sections below.

#### 2.2 CABINETS, RACKS, FRAMES AND ENCLOSURES

- A. Manufacturers: Rittal, CPI, Ortronics, Wrightline, Panduit, Damac or Siemon.



- B. Equipment racks shall be:
  - 1. Constructed of painted aluminum
  - 2. Clear Coated
  - 3. Supplied with ground bar (19" wide by 1" high) and #6 AWG (16 mm<sup>2</sup>) ground lugs
  - 4. Supplied with minimum of 12 releasable cable support ties (e.g. "hook and loop")
  - 5. Supplied with spare screws (minimum of 50)
  - 6. Configured with Channel uprights spaced to accommodate industry standard 19" mounting
- C. Free Standing Equipment Rack shall comply with general requirements above and shall:
  - 1. Be 84" in height
    - a. Have minimum of 45 usable rack mounting units (RU)
  - 2. Be self-supporting
  - 3. Have Minimum base footprint of 15" x 20"
  - 4. Be double-sided drilled and tapped to accept 12-24 screws
    - a. Uprights shall be drilled on back to accept cable brackets, clamps, power strip(s).
    - b. Hole pattern on rack front and back shall be per EIA/TIA specifications (5/8" – 5/8" – 1/2").
- D. Cable Management
  - 1. Manufacturers: Rittal, CPI, Wrightline, CommScope, Ortronics, Panduit or Simon.
  - 2. Horizontal Cable Management Panels shall:
    - a. Be painted steel
    - b. Be 3.5" high
    - c. Have minimum of 5 distribution rings (3.75" x 3.75" minimum dimension)
      - 1) Distribution rings shall be plastic
  - 3. Vertical Cable Management shall:
    - a. Provide for cable routing on front and rear of each rack
    - b. Be 10" wide (minimum) when installed between two racks
    - c. Be 6" wide when installed at end of rack row
    - d. Mount on spacers attached to rack uprights and not on upright
    - e. Be accessible from front and rear of rack
    - f. Be designed to space slots/fingers at 1 RU intervals to align with rack-mounted equipment
- E. Equipment Rack Ground Busbar
  - 1. Material: Copper
  - 2. Mounts horizontally in rack
  - 3. Mounting configuration EIA universal mounting hole pattern , tapped #12-24.
- F. Miscellaneous
  - 1. Releasable Cable Support Ties shall be:
    - a. Hook & Loop type



- b. Individual units with latch
  - 1) Roll of hook & loop material is not acceptable.

## 2.3 CABLE RUNWAY

- A. Manufacturers: CPI, B-Line or Hoffman.
- B. Cable Runway shall:
  - 1. Be constructed of 0.065" thick steel
  - 2. Utilize tubular stringers to support rungs.
    - a. Stringers shall be 1-1/2" high.
    - b. Rungs shall be welded to stringers and shall be spaced 9" on center.
  - 3. Be painted with black epoxy.
- C. Runway width(s) shall be as shown on drawings.

## 2.4 TERMINATION BLOCKS

- A. Manufacturers: ADC, Siemon, Ortronics or Panduit.
- B. Blocks shall be 110-style high-density cross-connect blocks with lightning protection attached to the plywood backboard for OSP copper cabling.
- C. Each horizontal row of block shall be capable of terminating one 25 pair binder group of Backbone Copper Cable, or six 4 pair Copper Cables.
- D. Mechanical termination on blocks shall:
  - 1. Have ability to terminate 22-26 AWG plastic insulated, solid and stranded copper conductors.
  - 2. Provide direct connection between horizontal or backbone cable and jumper wires.
  - 3. Be designed to maintain cable pair twists as closely as possible to point of mechanical termination.
- E. Blocks for Horizontal Cabling shall use 4-pair connecting blocks; blocks for backbone cabling shall use 5-pair connecting blocks.
  - 1. Blocks shall identify pair position by color designation.
    - a. Colors shall be Blue, Orange, Green and Brown for Horizontal Cables.
    - b. Colors shall be Blue, Orange, Green, Brown and Slate for Backbone Cables.
    - c. Markings shall designate Tip and Ring conductors.
- F. Horizontal Voice Blocks shall:
  - 1. Be rack-mounted with no legs
  - 2. Meet or exceed TIA Category 6A performance criteria
  - 3. Terminate up to 100 pairs (each block)
- G. Backbone Voice Blocks shall:
  - 1. Be rack-mounted with no legs



2. Meet or exceed TIA Category 5e performance criteria
  3. Terminate up to 100 pairs (each block)
- H. Horizontal Cable Managers (Jumper Troughs) designed for use with blocks shall be:
1. Manufactured with high-strength, flame-retardant thermoplastic
  2. Designed for easy cable insertion or withdrawal
  3. 2 RUs high
  4. Rack- or wall-mountable (with legs) to match block configuration
- I. Horizontal Cable Managers designed for use at top of column of blocks shall be 188B type. 188B type cable manager shall:
1. Be constructed of metal with two plastic distribution rings
  2. Have legs to allow space for routing cables behind Backboard
  3. Have dimensions 6.5" high x 10.7" wide
- J. Vertical Cable Managers for wall-mounted Termination Blocks shall utilize distributing rings.
1. Rings shall be metal and be split to facilitate passage of jumper wires.
  2. Minimum Dimension of each ring shall be 5" square (minimum).

## 2.5 MODULAR PATCH PANELS

- A. Manufacturers: Siemon, Ortronics or Panduit.
- B. Panels shall:
1. Consist of Modular-to-IDC connector system
  2. Be rack-mountable in standard EIA 19" equipment racks
  3. Be 2 RUs high
  4. Accommodate 48-port modular jacks in two rows of 24-ports
  5. Be designed to terminate 4-pair, 100-Ohm UTP cables
  6. Have ability to terminate 22-26 AWG plastic insulated, solid and stranded copper conductors.
  7. Be designed to maintain cable's pair twists as closely as possible to point of mechanical termination.
  8. Have cable support and strain relief devices to secure cables at IDC connector.
    - a. Panel and cable support hardware shall ensure that cabling minimum bend radius requirements are satisfied.
  9. Have port identification numbers on both front and rear of panel.
  10. Have color-coded pair designations on rear of panel.
- C. Modular Jacks in Panel shall:
1. Be non-keyed, 8 position, 8-conductor (8P8C)
- D. Panels shall meet or exceed TIA Category 6A performance criteria.



## 2.6 FIBER OPTIC PATCH PANELS

- A. Manufacturers: Corning, Siemon, Panduit or Ortronics.
- B. Patch Panels shall:
  - 1. Be enclosed assemblies
  - 2. Incorporate hinged or retractable front cover
  - 3. Be rack mountable on standard TIA 19" equipment racks
  - 4. Provide for strain relief of incoming cables
  - 5. Incorporate radius control mechanisms to limit bending of fiber to manufacturer's recommended minimums of 1.2", whichever is larger
  - 6. Provide protection to both "facilities" and "user" sides of couplings.
  - 7. Be configured to require only front access when patching
  - 8. Incorporate patch cable routing space internal to patch panel enclosure.
    - a. Routing space shall be front-accessible.
  - 9. Include provisions for permanent labeling of fiber optic cables.
    - a. Labeling shall be accessible from front of patch panel and shall not require disassembly of patch panel enclosure or removal of front cover.
- C. Couplings shall be mounted on assembly that snaps into patch panel enclosure.
  - 1. This assembly shall be designed to accept variety of coupler types including, ST, SC, duplex SC and high-density mini-connectors.
  - 2. Coupling type shall be duplex SC
  - 3. Coupling Color shall be as follows:
    - a. Multimode: BEIGE
      - 1) Exception: LASER-optimized 50/125 Multimode couplings shall be AQUA
    - b. Single-mode: BLUE
- D. Access to inside of panel enclosure during installation shall be from front and rear.
  - 1. Panels that require disassembly of cabinet to gain entry will not be accepted.
- E. Incoming cables shall not be accessible from patching area of panel.
  - 1. Enclosure shall provide physical barrier to access of such cables.
  - 2. Where factory-terminated cable assemblies ("pigtailed") are spliced to cable, enclosure shall incorporate hardware for securing of splice tray and required cable, buffer tube and pigtail slack.

## 2.7 ENTRANCE PROTECTION

- A. Manufacturers: Corning, Porta Systems, CommScope or Circa.
- B. Interface on Protection devices shall be as follows:
  - 1. Input: 110-type block
  - 2. Output: 110-type block



- C. Entrance protection shall:
  - 1. Be listed primary protector
  - 2. Accommodate industry standard 5 pin protection modules
  - 3. Be provided with grounding lug
- D. Covers on protector housing are required as follows:
  - 1. On input side
- E. Protection modules shall:
  - 1. Be Solid-State type
  - 2. Have nominal DC Breakdown voltage of 230 V
  - 3. Be self-resetting
  - 4. Provide effective protection against “sneak current” events
  - 5. Have fail-safe design to protect personnel and equipment from exposure to sustained high voltages and currents

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Refer to project Drawings for communications equipment room layout and equipment placement.
- B. New communications equipment rooms must be free from dust, dirt, and other foreign materials before installation of any termination hardware or termination of copper or fiber optic cables.
  - 1. Door to room must be closed during termination if area outside room is not dust-free.
- C. Follow manufacturer’s recommended installation and termination practices.
- D. Provide necessary assistance to allow Owner or Carrier personnel to establish service on new cable system.
  - 1. Includes general wiring overview, cable pair identification, and cross connect documentation (if applicable).

### 3.2 EQUIPMENT RACKS AND CABLE MANAGEMENT

- A. Provide equipment racks as shown on project Drawings.
- B. Assemble racks per manufacturer’s recommendations. Remove paint at the point(s) of contact of assembly hardware or use internal-external tooth lock washers to pierce paint to maintain ground continuity.
- C. Bolt racks to floor.
- D. Secure racks to cable runway as described below.



- E. Provide Horizontal and Vertical Cable Management in equipment racks as per project Drawings and as follows.
  - 1. Provide horizontal cable management above and below each rack mounted patch panel.
  - 2. Provide vertical cable management between adjacent equipment racks and at rack row ends.
- F. Provide each rack with:
  - 1. Ground bar and #6 AWG Ground lug,
  - 2. Minimum of fifty (50) 12/24 mounting screws,
  - 3. Minimum of twelve (12) releasable (e.g. "hook & loop") cable support ties.
- G. Bond each rack mounted ground bar to telecommunications ground bus bar (TGB).
  - 1. Use #6 AWG or larger copper conductor (green jacket).

### 3.3 CABLE RUNWAY

- A. Provide cable runway and accessories necessary for complete system.
- B. Size and layout of cable runway shall be as shown on project Drawings.
- C. Install above equipment racks as shown on drawings.
- D. Align with equipment racks as follows:
  - 1. Where parallel to rack row, align center of runway with center of rack.
  - 2. Where at right-angle to rack, align center of runway with center of rack.
- E. Brace to racks with support brackets made by runway or rack manufacturer intended for this purpose.
- F. Use radius drops where cables drop from tray to rack and at elevation changes of 6" or more.
- G. Maximum allowable deviation of runway from level horizontal plane measured across length of cable runway shall be 1/2", with tray loaded to capacity.
- H. Where cable runway is supported from building structure:
  - 1. Provide 3/8" threaded rods for support of 12" wide or smaller runway.
  - 2. Provide 1/2" threaded rods for support of runway greater than 12" in width.
- I. Bond runway components together using manufacturer's standard accessories.
- J. Fasten cables to runway at intervals not to exceed 4 ft.

### 3.4 TERMINATION BLOCKS

- A. Provide blocks to accommodate an additional 20% growth at each location.
- B. Terminate Backbone Voice Cables and Horizontal Voice Cables on rack-mounted patch panels.
  - 1. Strip lengths & termination of all cabling to be per manufacturers recommendations.



- C. Provide 110 blocks as follows:
  - 1. Terminate OSP cabling from the existing Brody Server Room (MDF) on wall mounted 110-style wiring blocks
  - 2. All other voice cabling is to terminate on rack mounted patch panels.
- D. Install Blocks:
  - 1. No higher than 72" AFF to top-most block
  - 2. Top to bottom, left to right beginning no closer than 12" from left wall
- E. Provide horizontal troughs between each termination block.
- F. Provide horizontal troughs at top of each block column.
- G. Provide vertical managers to right and left of each block column.
- H. Cabling entering and exiting fields shall be neatly laced, dressed and supported.
- I. Contractor shall be responsible for jumper wiring between horizontal and backbone cabling.
- J. Provide System Terminal Blocks as shown on drawings.
  - 1. Contractor shall not be responsible for jumper wiring between System Terminal Blocks and Backbone Voice Cable Blocks.
  - 2. Contractor shall not be responsible for connection of 50-pin telco connectors to Owner furnished telephone equipment.
- K. Provide Feed Blocks as shown on drawings.
  - 1. Connect Feed Blocks to Carrier Demarcation (DEMARC).

### 3.5 MODULAR PATCH PANELS

- A. Provide panels to accommodate an additional 20% growth at each location.
- B. Mount patch panels in 19" equipment racks.
- C. Position cables in sequence of:
  - 1. Telecommunications Outlet ID for horizontal cabling
  - 2. Pair number for backbone cabling
- D. Terminate cables using 568A wiring standard.
- E. Provide horizontal management above and below each patch panel.
- F. Provide minimum of 4 screws to secure each patch panel onto rack.

### 3.6 FIBER OPTIC PATCH PANELS

- A. Provide Fiber Optic Patch Panels and coupling assemblies at horizontal and main cross-connect locations.
  - 1. Provide minimum of 4 screws to secure each patch panel onto rack.



- B. Provide couplings in coupling assemblies and mount coupling assemblies and blank covers in patch panels.
- C. Position fibers consecutively - starting with lowest number - and mapped "position for position" between patch panels.
  - 1. There shall be no transpositions in cabling.
- D. Keyways on duplex couplings shall be oriented to establish "cross-over" in cabling system.
  - 1. Convention defined by TIA-568.0 (Annex B, Section B.3.2) shall be used.
  - 2. Reverse-pair positioning shall not be used.
- E. Provide blank covers for unused coupling assembly spaces in panels.
- F. Follow manufacturer's guidelines for connector type(s) provided.
  - 1. Clean connectors with specialized dry-cleaning product from Fluke or Cletop.
- G. Provide dust caps for couplings.
- H. Where factory-terminated cable assemblies ("pigtailed") are spliced to cable, prepare and splice cables and fibers per manufacturers' guidelines.

### 3.7 ENTRANCE PROTECTION

- A. Provide protector at each end on inter-building backbone copper pairs.
  - 1. Position protector as close as possible to building entrance.
- B. Install per manufacturers recommendations.
- C. Ground protector assemblies to Telecommunications Grounding Busbar via #6 AWG (minimum) conductors.
- D. Provide Protector Modules for all pairs terminated.
- E. If special tool is required to open protector housing, provide 2 such tools to Owner at completion of work.

### 3.8 FIELD TESTING

- A. General
  - 1. Refer to Section 270000 - General Communications Requirements and 271000 - Structured Cabling for guidelines regarding documentation requirements.
  - 2. Refer to referenced technical sections for detailed requirements to testing of each cable sub-system.

### 3.9 DOCUMENTATION

- A. General



INDOOR PRACTICE FACILITY  
EAST CAROLINA UNIVERSITY, GREENVILLE, NC  
SCO ID# 23-26345-01A  
AIM #1752

ADDENDUM (REVISION) #1  
ISSUED: 04/09/2025

1. Refer to Sections 270000 - General Communications Requirements and 271000 - Structured Cabling for guidelines regarding documentation requirements.

END OF SECTION 271100



## SECTION 283116 - MULTIPLEXED FIRE DETECTION AND ALARM SYSTEMS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. In general, work consists of:
  - 1. Provide complete Multiplexed Fire Alarm System as shown on plans.
  - 2. System shall:
    - a. Be an intelligent analog system
    - b. Allow for loading and editing special instructions and operating sequences as required
    - c. Be capable of on-site programming to accommodate system expansion and facilitate changes in operation
    - d. Be wired, connected, and left in operating condition
    - e. Support signaling interconnection to existing Fire Alarm System Existing in the existing portion of the building.
  - 3. System includes:
    - a. Control Panel(s)
    - b. Annunciator Panel(s)
    - c. Manual Stations
    - d. Heat Detectors
    - e. Smoke Detectors
    - f. Alarm Indicating Devices
    - g. Terminations
    - h. Other necessary material for complete operating systems
  - 4. Software operations shall be stored in non-volatile programmable memory within fire alarm control panel. Loss of primary and secondary power shall not erase instructions stored in memory.

#### 1.2 REFERENCE STANDARDS

- A. IBC - 2000 - International Building Code
- B. ICC (IFC) - 2000 - International Fire Code
- C. NECA 305 - Standard for Fire Alarm System Job Practices
- D. NFPA 72 - National Fire Alarm Code
- E. NFPA 101 - Life Safety Code
- F. UL 268 - Smoke Detectors for Fire Protective Signaling Systems
- G. UL 497B - Protectors for Communications and Fire Alarm Circuits
- H. UL 521 - Heat Detectors for Fire Protective Signaling Systems



- I. UL 864 - Control Units for Fire Protective Signaling Systems
- J. UL 1480 - Speakers for Fire Protective Signaling Systems
- K. UL 1481 - Power Supplies for Fire Protective Signaling Systems
- L. UL 1711 - Amplifiers for Fire Protective Signaling Systems

### 1.3 QUALIFICATIONS

- A. Equipment shall be supplied by company specializing in fire alarm and smoke detection systems with 5 yrs documented experience
- B. Work shall be performed by licensed Contractor, regularly engaged in installation and servicing of fire alarm systems.
- C. Furnish proof of 5 yrs documented experience and factory authorization to provide equipment proposed.
- D. Contractor shall be located within 100 miles of Project site.
- E. On-site supervisor shall be NICET Level II certified. Personnel implementing any programming shall be NICET Level III certified.

### 1.4 SUBMITTALS

- A. Submit bill of materials listing part number and quantity of components and devices.
- B. Submit general catalog cutsheets of all devices that are to be provided as part of system. Mark cutsheets with items specific to the project when multiple items are identified.
- C. Submit block diagrams showing layout and operation of entire system.
- D. Submit schematic diagrams, of circuits from field devices to terminal strip(s) associated with control panel.
  - 1. Diagrams shall show schematic wiring of equipment; and connections to be made to devices.
  - 2. Terminal connections in equipment shall be numbered to correspond to diagrams.
  - 3. Wiring diagrams shall be coordinated so that terminal numbering, circuit designation and equipment or device designations are same on drawings.
- E. Submit standby battery power calculations.
- F. Submit sound amplifier and strobe power supply calculations showing current draws for every device and module during standby, alarm and trouble conditions.
- G. Submit voltage drop calculations for both initiating and alarming circuits.
- H. Submit list of device addresses with location labeling as they will appear in 2 line, 40 character display of fire alarm panel and remote annunciator.



- I. A minimum of 7 business days prior to requested start of acceptance testing, Submit the following to the Designer. If deficiencies are found, contractor must allow time for corrections to be made prior to the start of acceptance testing. Discrepancies between submitted documents and field conditions during acceptance testing will be sufficient grounds for a failed inspection and re-start of this review process.
  1. Copy of as-built shop drawings as required to show component locations, device addresses, etc.
  2. Completed system test record and report
  3. Completed audible notification verification survey report
  4. Device sensitivity report
  5. Completed NFPA 72 record of completion form (acceptable to submit without signatures)
  6. Programming report showing all devices and the program description for each device.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Simplex
- B. Notifier
- C. Honeywell

### 2.2 SYSTEM OPERATIONS

- A. Alarm Initiation
  1. System alarm operation after activation of any manual station, automatic detection device, or sprinkler flow switch shall be:
    - a. Appropriate initiating device circuit red LED shall flash on Control Panel and remote annunciator until the alarm has been acknowledged at Control Panel or remote annunciator.
    - b. Once acknowledged, this same LED shall latch on.
    - c. Subsequent alarm received after acknowledging shall flash subsequent zone alarm LED on Control Panel and remote annunciator.
    - d. Acknowledgment of alarm shall not reset activated device.
    - e. Pulsing alarm tone shall occur within Control Panel and remote annunciator until event has been acknowledged and remote annunciator.
    - f. Alarm audible-indicating devices shall sound in three pulse temporal pattern until silenced by alarm silence switch at Control Panel or remote annunciator.
    - g. Visual alarm indicating devices shall operate in continuous flashing pattern until system is reset.
    - h. Signal to notify the supervising station in the Fire Command Center shall be activated. Signal shall also be passed to Head End of existing building system equipment to facilitate actionable sequence(s) in that portion of the building.
    - i. Doors held open by door control devices shall close.



- j. Mechanical controls shall activate air handling systems as specified by Division 23.
  - 2. System shall have single key to allow operator to display alarms, troubles, and supervisory service conditions, including time and date of each occurrence.
  - 3. Alarm shall be displayed on an 80-character LCD display as follows:
    - a. 40 characters for:
      - 1) Point address and loop number
      - 2) Type of device
      - 3) Point status
    - b. 40 characters for:
      - 1) Custom location label
- B. Silencing
- 1. Alarm audible indicating devices shall be silenced by operating alarm silence switch or by use of key operated switch at remote annunciator.
  - 2. Strobes shall remain active until system is reset.
  - 3. Subsequent zone alarm shall reactivate alarm signals.
- C. Reset
- 1. SYSTEM RESET button shall return system to its normal state after an alarm condition has been remedied.
- D. Supervision
- 1. System shall independently supervise:
    - a. Initiating device circuits
    - b. Sprinkler flow and tamper switches
    - c. Independently fused indicating appliance circuits for alarm horn/strobe units
    - d. Auxiliary manual controls. "Off normal" position of any switch shall cause an "off normal" system trouble
    - e. Auxiliary circuits for addressable relays. Blown fuse or open in circuit shall be visibly and audibly annunciated.
    - f. Remote annunciator panel. Any ground, short, or open in the wiring to fire alarm Control Panel, as well as malfunction of the annunciator panel, shall be annunciated at control panel.
    - g. Incoming power. Power failure shall be audibly and visually indicated at Control Panel and remote annunciator. Green "power on" LED shall be displayed continuously while incoming power is present.
    - h. System Modules for module placement. Should modules become disconnected, system trouble indicator shall illuminate and audible trouble signal shall sound.
    - i. System batteries. Low battery condition or disconnection of battery shall be audibly and visually indicated at Control Panel and remote annunciator.
  - 2. Device activation shall be annunciated at Control Panel and remote annunciator.
  - 3. Independently supervised circuits shall include visible amber "Trouble" LED to indicate disarrangement conditions per circuit.
  - 4. Disarrangement conditions of any circuit shall not affect operation of other circuits.



5. Alarm activation of any initiation circuit shall not prevent subsequent alarm operation of any other initiation circuit.
6. System shall have provisions for disabling and enabling circuits individually for maintenance or testing purposes.

E. Power Requirements

1. Provide 120 VAC power via dedicated branch circuit in emergency panel.
2. Branch circuit shall have "breaker lock" to prevent accidentally de-energizing of power to fire alarm panel.
3. Circuit breaker shall be painted red and labeled "FIRE ALARM."
4. Provide disconnect switch for AC power near panel or within Fire Alarm Control Panel itself. Switch shall be labeled "Fire Alarm Power Disconnect."
5. Where new Control Panel is to remain at same location as existing panel, Contractor may use existing branch circuit, if it meets requirements stated above.
6. Provide power surge and transient protection.
7. Provide back-up battery capacity to operate entire system in normal supervisory mode for period of 24 h with 10 minutes of alarm operation at end of period.
8. System shall automatically transfer to standby batteries upon power failure.
  - a. Battery charging and recharging operations shall be automatic.
9. Provide power limited, filtered and regulated battery charger.
  - a. Charger shall:
    - 1) Be combination high rate/float maintenance type
    - 2) Charge fully discharged battery to 70% in 12 h
    - 3) Monitor for AC fail/disconnect, low/no battery, and high battery level
    - 4) Include switches and associated LEDs for high rate and AC disconnect
    - 5) Provide 5 amps of regulated 24 VDC for peripheral devices requiring  $\pm 5\%$  regulation and 8 amps at 24 VDC for standard peripheral devices.
    - 6) Be compatible with lead acid batteries
10. External circuits requiring system operating power shall be 24 VDC and shall be individually supervised and fused at Control Panel.

F. Smoke Detection Operation

1. Smoke detector alarms shall be processed and reported immediately.
2. Upon building completion, alarm verification shall be added to detector(s) as directed by project engineer.
3. Control Panel shall:
  - a. Be capable of displaying number of times (tally) detector has gone into verification mode from the system history
  - b. Download alarm set point to detector
  - c. Determine condition of each detector by comparing detector's value to stored values.
  - d. Maintain moving average of detectors' smoke chamber value to automatically compensate for dust and dirty conditions
  - e. Continuously perform an automatic self-test routine on each detector



- f. Have capability of being programmed for pre-alarm or two-stage function
    - g. Clear “detector dirty” trouble after detector has been removed from its base cleaned and replaced
  - 4. System shall maintain constant smoke obscuration sensitivity for each detector by compensating for environmental factors.
  - 5. Photoelectric detector's smoke obscuration sensitivity shall be adjustable to within 0.3% of either limit of UL window (0.5% to 4.0%) to compensate for any environment.
  - 6. System shall indicate when individual detector needs cleaning. When detector's average value reaches predetermined level, trouble MESSAGE shall be audible and visibly indicated at Control Panel. LED on detector base shall glow steady giving visible indication.
  - 7. For scheduling of maintenance, Control Panel shall generate MESSAGE indication for any detector approaching trouble condition due to dirt or contamination.
  - 8. Operator shall have capability to manually access the following information for each detector:
    - a. Primary status
    - b. Device type
    - c. Present average value
    - d. Present sensitivity value selected
    - e. Detector range (normal, dirty, etc.)
  - 9. Values at Control Panel shall be in “percent of smoke obscuration” format, so that no interpretation is required by operator.
  - 10. Operator shall be able to manually control following for each detector:
    - a. Enable or disable detector
    - b. Establish alarm sensitivity
    - c. Control detector's relay driver output
  - 11. It shall be possible to program Control Panel to automatically change sensitivity settings of each detector based on time-of-day and day-of-week. There shall be 3 sensitivity settings available for each detector.
- G. System Response
- 1. Maximum elapsed time from sensing fire at non-smoke detector initiating device or second smoke detector until it is recorded at Control Panel shall not exceed 5 seconds, and not exceed 15 seconds for remote station reporting.
- H. Air Handling Unit System Operation/Interface
- 1. Control Panel shall provide alarm interface to air handling/energy management system controllers, which shall perform automatic functions as specified in Division 23.
  - 2. Fire Alarm Control Panel shall provide manual control mode to override fire alarm panel's signal so that air handling units can be restarted.
- I. Sprinkler System Operation/Interface



1. Activation of any standpipe or sprinkler system tamper or water flow switch shall activate system supervisory service audible signal and illuminate LED at Control Panel and remote annunciator.
  2. Control Panel shall provide differentiation between switch operation and opens and/or grounds on initiation circuit wiring.
  3. Pressing acknowledge key will silence audible signal while maintaining supervisory service LED "on" indicating off-normal condition.
  4. Restoring valve to normal position shall cause supervisory service audible signal to pulse indicating restoration to normal position.
  5. Acknowledge key shall silence audible signal.
- J. Manual Evacuation (Drill) Operation
1. Manual evacuation (drill) switch shall be provided to operate alarm indicating appliances without causing other control circuits to be activated.
  2. Should true alarm occur, alarm functions would occur.
- K. LED and LCD Test Operation
1. Activation of Lamp Test switch shall turn on all LED indicators, LCD display, and the local sounder and then return to previous condition.
- L. System Diagnosis
1. System shall include special software to detect, diagnose and report failures and isolate such failures to printed circuit board level.
- M. Watch-Dog Timers
1. System shall include independent "Watch-Dog" timers to detect and report failure of any microprocessor circuit, memory, or software.
- N. Walk Test Operation
1. Actuation of "Walk Test" switch/program at Control Panel shall activate "Walk Test" mode of system, which shall cause following to occur:
    - a. Supervising station circuit connection shall be bypassed.
    - b. Control relay functions shall be bypassed, such as \_\_\_\_\_, door holders, elevator capture, and fan shut down, etc.
    - c. Audio and visual circuits shall be bypassed.
    - d. Control Panel shall show trouble condition.
    - e. Alarm activation of initiation device shall cause audible signals to sound for 2 seconds.
    - f. Control Panel shall automatically reset itself after signaling is complete.
    - g. Momentary opening of initiating or indicating appliance circuit wiring shall cause audible signals to sound for 2 seconds indicating trouble condition.
    - h. If system becomes inactive for period of longer than 10 minutes, Control Panel shall default to normal fire alarm functions.
    - i. Activation of any initiation device shall be silently logged as an alarm condition in historical data file.



2. Panel shall have capability of dividing system into distinctive walk test groups, minimum of 8 groups.

O. One-Way Voice Communications

1. Automatic voice evacuation sequence shall be as follows:
  - a. Audio alarm signal shall consist of alarm tone for maximum of 2 seconds followed by temporal code-three. Temporal code-three shall sound until alarm silence switch at Fire Alarm Control Panel or the remote annunciator has been operated.
  - b. Audio alarm operations of speaker circuit selection and alarm tone timing variations shall be activated by system software so that required future changes to evacuation sequence or re-arrangements of audio circuits can be facilitated by authorized personnel without additional components or rewiring.
  - c. System shall be configured to allow for "All Call" and selective voice paging from the main Control Panel.
2. Selective Paging:
  - a. Upon activation of any speaker manual control switch(es), 2 seconds of tone shall sound over selected speakers. At end of this tone, operator shall be able to make announcements via push-to-talk paging microphone over pre-selected speakers.
  - b. Strobes shall flash only in selected area(s) or floor(s).
  - c. Each floor, stairwell and elevator car shall be separate selectable zones.
3. All Call:
  - a. Upon activation of "All Call" switch, 2 seconds of tone shall sound over all speakers in system. At end of this tone, the operator shall be able to make announcements via push-to-talk paging microphone over all system speakers.
  - b. Strobes shall flash in all areas or floors.
  - c. System shall default to normal operations if the microphone becomes inactive for more than 1 minute.

2.3 ENCLOSURE

- A. Provide cabinets of sufficient size to accommodate equipment.
- B. Cabinet shall be equipped with door, with lock and transparent door panel, providing tamper proof enclosure and allowing full view of various lights and controls.
- C. Provide documentation cabinet for drawings and other system documentation, located adjacent to fire alarm control cabinet.

2.4 CONTROL PANEL

- A. Control Panel shall be modular, expandable with solid state, microprocessor based electronics.
- B. Control Panel shall provide the following features:
  1. Support intelligent (analog) detection devices.
  2. Number of initiating device loops required for specified quantity of initiating devices, plus 1 spare loop for each 5 active loops. Each active loop shall include 5% spare capacity.



3. Number of indicating device (horn/speaker) circuits required for quantity of horns/speakers alarm, plus 1 spare circuit for each 10 active circuits. Each active circuit shall include 25% spare capacity.
  4. Number of indicating device (strobe) circuits required for specified quantity of strobes plus one (1) spare circuit for each 10 active circuits. Each active circuit shall include 25% spare capacity.
  5. 80-character liquid crystal display
  6. Printer interface
  7. History log file with minimum of 600 events
  8. Field programmable
  9. Drift compensation
  10. Sensitivity display in %
  11. Sensitivity adjustment
  12. Day/night sensitivity adjustment
  13. Auto detector test
  14. Silent walk test
  15. Maintenance alerts
- C. System shall provide ability to recall alarms and trouble conditions in chronological order.
- D. Under normal condition viewing window shall display "System is Normal" message and current time and date.
- E. When an abnormal condition occurs appropriate LED (Alarm, Supervisory or Trouble) shall flash.
- F. Audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.
- G. Panel shall display the following information relative to abnormal condition of a point in system prior to acknowledgement:
1. 40 characters for:
    - a. Point address and loop number
    - b. Type of device (i.e. smoke, pull station, water-flow)
    - c. Point status (i.e. alarm, trouble)
  2. 40 characters for:
    - a. Custom location label (i.e. 4th Floor - Room 444)
- H. Keyboards or keypads shall not be required to operate the system during fire alarm conditions.
- I. Following software functions shall be provided:
1. Setting of time and date
  2. LED testing
  3. Alarm, trouble, and abnormal condition listing
  4. Enabling and disabling of each monitor point separately



5. Activation and deactivation of each control point separately
  6. Changing operator access levels
  7. Walk Test enable
  8. Running diagnostic functions
  9. Displaying historical logs
  10. Point listing
- J. Following hardware functions shall be provided:
1. Acknowledge alarm or trouble
  2. Silence alarm or trouble
  3. Reset system after alarm
  4. Provide manual evacuation (drill)
  5. Bypass elevator recall and shunt trip operation
  6. Bypass door holders
  7. Allow computer interface

## 2.5 STATUS INDICATORS AND DISPLAYS

- A. Audible device shall sound during Alarm, Trouble or Supervisory conditions.
- B. Audible device shall sound during each key-press.
- C. Visual display shall distinguish between alarm, trouble and supervisory conditions.
- D. Indicators and displays to be visible:
1. One red system alarm LED
  2. One yellow supervisory service LED
  3. One yellow trouble LED
  4. Green "power on" LED
  5. Eighty-character LCD
- E. 2-line by 40-character LCD shall be backlit.
- F. Cursor shall be visible on LCD when entering information.
- G. Scrolling through menu options shall be in self-directing manner in which prompting messages shall direct user.
- H. Controls shall be located behind an access door.
- I. Status data to be available on display:
1. Initiating device circuits
  2. Indicating device circuits
  3. Auxiliary relays
  4. Primary State of point
  5. Zone information



6. Class "A" Status
7. Current priority of outputs
8. Disable/Enable status
9. Automatic/Manual Control Status of output points
10. Acknowledge status

## 2.6 CONTROLS

- A. Controls (one switch per function per system) visible through front viewing window:
  1. Alarm Acknowledge key
  2. Trouble Acknowledge key
  3. Alarm Silence key
  4. System Reset key
- B. Controls accessible with front door open:
  1. supervising station Acknowledge, Silence and Reset keys
  2. Manual evacuation (drill)
  3. Key pad for data input and microprocessor control

## 2.7 LED SUPERVISION

- A. Slave module LEDs shall be supervised. When problem occurs, LCD shall display module and LED location.

## 2.8 ACKNOWLEDGMENT

- A. Two methods of acknowledgment for each abnormal condition shall be provided:
  1. Acknowledge one event at a time from an unacknowledged list of events.
  2. Pressing acknowledge button shall display first unacknowledged condition in list (either alarm, supervisory or trouble), and require another acknowledge button. Press to acknowledge only displayed point.
- B. After all points have been acknowledged, LEDs shall glow steadily and alarm will be silenced. Total number of alarms, supervisory and trouble conditions shall be displayed.
- C. Pressing appropriate acknowledge button shall acknowledge all points
- D. Acknowledge functions shall be behind locked door or pass-code protected.

## 2.9 SILENCING

- A. If an alarm condition exists and "Alarm Silence" button is pressed, all alarm signals shall cease operation. Strobes shall remain active until system is reset.
- B. If trouble conditions exist in system and "Trouble Silence" button has been pressed, audible trouble signal shall cease, but shall resound at timed intervals to act as reminder that fire alarm system is not in normal operating mode.



## 2.10 RESET

- A. SYSTEM RESET button shall be used to return system to normal state after alarm condition has been remedied.
- B. Should an alarm condition continue to exist, system shall provide indications that resetting can not be completed and shall remain in an abnormal state.
- C. Sonalert and Alarm LED shall remain activated.
- D. Display shall indicate total number of alarms and troubles present in system along with prompt to use ACK keys to review points.
- E. Points shall not require acknowledgment if they were previously acknowledged.
- F. Should Alarm Silence Inhibit function be active, system shall ignore all key presses. An indication of enabling and disabling inhibit state shall be provided as feedback to operator.

## 2.11 ACCESS LEVELS

- A. Provide 4 access levels with level 4 being highest level. Level 1 actions shall not require pass-code.
- B. Pass-codes shall consist of up to 5 digits.
- C. Pass-code digits entered shall be displayed as an X to indicate that digit has been accepted.
- D. Key presses shall be acknowledged by local audible sound.
- E. When correct pass-code is entered, system shall indicate to operator "Access Granted."
- F. Access level shall be in effect until operator manually logs out or keypad has been inactive for 5 minutes.
- G. Operator entering invalid code shall be notified with message "Incorrect Pass- Code" and shall be allowed three chances to enter valid code. After three unsuccessful tries, the message "Access Denied" shall be displayed.
- H. Following keys/switches shall have associated access levels:
  - 1. Alarm Silence
  - 2. System Reset
  - 3. Set Time/Date
  - 4. Manual Control
  - 5. On/Off/Auto Control
  - 6. Disable/Enable
  - 7. Programming functions
  - 8. Clear Historical Alarm Log
  - 9. Clear Historical Trouble Log
  - 10. Walk Test



- I. Acknowledge keys shall require pass code access to acknowledge points. If operator presses an (ACK) key with insufficient access, an error message shall be displayed.

## 2.12 POINT LISTING

- A. Point list menu includes:
  1. All points list by address
  2. Monitor point list
  3. Signal/speaker list
  4. Auxiliary control list
  5. Feedback point list

## 2.13 HISTORY LOGGING

- A. System shall be capable of logging and storing the last 400 events (alarm and trouble) in history log. These events shall be stored in battery protected random access memory.
- B. Following historical alarm log events shall be stored:
  1. Alarms
  2. Alarm Acknowledgment
  3. Alarm Silence
  4. System Reset
  5. Alarm Historical log cleared
- C. Following historical trouble log events shall be stored:
  1. Trouble conditions
  2. Supervisory alarms
  3. Trouble acknowledgment
  4. Supervisory acknowledgment
  5. Walk Test results
  6. Trouble Historical log cleared

## 2.14 COMPUTER INTERFACE

- A. Control Panel shall operate as proprietary local system with capability of sending status data to and receiving control data from Central Processing Unit (CPU).
- B. CPU shall monitor all alarms and troubles and control selected functions of Control Panel.
- C. CPU shall supervise all data communication wiring between CPU and Control Panel for opens, shorts and grounds.

## 2.15 FIELD PROGRAMMING

- A. System shall be fully programmable, configurable, and expandable in field and shall not require replacement of memory IC's.



- B. Programming may be accomplished through Control Panel keyboard or keyboard at printer, or use of PC.
- C. Programs shall be stored in non-volatile memory.
- D. Programming or reprogramming shall be done by supplier at no charge until system is accepted by Owner.

## 2.16 TERMINAL/PRINTER INTERFACE

- A. Control Panel shall be capable of operating remote monitors and/or printers.
- B. Output shall be ASCII from RS-232-C connection with an adjustable baud rate.
- C. Each RS-232-C port shall be capable of supporting and supervising up to 4 remote CRTs and Printers.
- D. Data amplifiers shall be used to increase CRT or printer line distance.

## 2.17 INTELLIGENT NETWORK

- A. System shall provide communications with intelligent initiating and control devices individually.
- B. Devices shall be individually annunciated at control panel.
- C. Annunciation shall include the following conditions for each point:
  - 1. Alarm
  - 2. Trouble
  - 3. Open
  - 4. Short
  - 5. Device missing/failed
- D. Devices shall have capability of being disabled or enabled individually.
- E. There shall be no limit to number of detectors, stations, or addressable modules, which may be activated or "in alarm" simultaneously.
- F. Multiple intelligent devices shall be connected to a single pair of wires.
- G. Provide the Digital Alarm Communications Transmitter (DACT), to communicate with existing campus public safety systems. All components must be compatible with fire alarm system supplied and existing campus receiving station
  - 1. Provide Bosch D9068 DACT and C900V2 capture module.
  - 2. Provide Altronix VR3T power conversion module.
  - 3. Refer to drawings for additional details.

## 2.18 ONE-WAY VOICE COMMUNICATION SYSTEM

- A. Provide central audio control module for:



1. Alarm message/tone generation
  2. Main and remote microphone connections
  3. Mixer/pre-amplifier circuits
  4. Continuous supervision shall be provided for all circuits, amplifiers and modules.
- B. Hand-held, push-to-talk microphone:
1. Recessed in panel-mounted enclosure
  2. Dynamic communication type with frequency range of 200 Hz to 4000 Hz
  3. Equipped with self-winding 5 ft coiled cable
  4. LED indicator shall be provided to indicate microphone push-to-talk button has been pressed and speaker circuits are ready for transmission.
  5. Supervised for disconnection
- C. Audio control switch module:
1. Provide manual access to audio operations personnel.
  2. Include "All circuits" switch, "Aux Tone" switch and tone generator stop switch
  3. Switches and LED indicators shall be supervised for disarrangement on failure.
- D. Automatic message player:
1. Provide a pre-recorded digitized voice message to building occupants during alarm conditions
  2. Not rely on tape or other mechanical means of transmitting evacuation message
  3. Be capable of transmitting a custom message of up to 3 minutes long
- E. Self-contained speaker and switching arrangement shall provide testing of message(s) without disturbing occupants of the facility.
- F. Provide standard message, approved by Authority Having Jurisdiction.
- G. Audio power amplifiers:
1. Be furnished with self-contained filtered 24 VDC power supply, transformer and amplifier monitoring circuits
  2. Provide 25 or 75 VRMS output with frequency response of 100 Hz to 7000 Hz
  3. Be constantly monitored
  4. Be current limited or disconnected from circuit should a short develop on speaker circuit
  5. Individual speaker circuits shall not be loaded more than 70% of rated amplifier power output.
- H. Provide amplifiers to operate system speakers at 1-watt tap simultaneously plus 50% reserve capacity.
- I. Provide at least one back-up amplifier capable of automatically replacing any failed amplifier. Stand-by amplifier shall be rated at same output capacity as the largest amplifier in evacuation system.



- J. Speaker and strobe circuits shall be zoned by floor or as noted on plans, with isolating module on each circuit.
- K. Audio Evacuation Supervision:
  - 1. Each speaker zone, amplifier, preamplifier, and power supply shall be supervised for component or circuit failure.
  - 2. Detection of amplifier failure shall automatically cause substitution of stand-by amplifier and shall activate trouble light and audible signal at console and initiate trouble alarm on fire alarm system.
  - 3. Provide minimum of one circuit for each zone or area of distinct communication.
- L. Manual Voice Paging Sequence
  - 1. System shall allow selective voice paging.
  - 2. An "All Call" switch shall be provided to allow for activation of all speakers.
  - 3. Control Panel shall provide a method for remote fire fighters telephone patch-in to one-way voice communication speakers.
  - 4. Manual operation shall be controlled at Fire Alarm Control Panel, or remote microphone; if provided.
- M. Tones
  - 1. Main evacuating tone shall be temporal code-three.
  - 2. Optional tones shall include:
    - a. Hi/Lo
      - 1) Free running tone with high frequency of 544 Hz and low frequency of 440 Hz
      - 2) "On time" (Hi) shall be 100 milliseconds while the "off time" (Lo) is 400 milliseconds.
    - b. Slow whoop
      - 1) Slowly ascending tone from 200 to 830 Hz in 2.5 seconds
  - 3. One primary and one secondary tone generator shall be furnished.
    - a. Automatic transfer to secondary unit should primary unit fail
    - b. Trouble signals shall indicate a failure of either primary or secondary unit.

## 2.19 REMOTE ANNUNCIATOR PANEL

- A. Provide 80-character LCD remote annunciator panel.
  - 1. LED annunciators will not be accepted.
- B. Annunciator shall provide:
  - 1. Control push-button switches for; alarm silence, trouble silence, system reset and LED and LCD test.
  - 2. Tone Alert - Duplicates Control Panel tone alert during alarm and trouble conditions
  - 3. System trouble LED
  - 4. System alarm LED
  - 5. Power on LED



- C. Annunciator shall communicate to Control Panel over one shielded twisted pair cable.
- D. Operating power shall be 24 VDC and be fused at control panel.
- E. Annunciator shall have red finish.
- F. Wiring between annunciator panel and Control Panel shall be supervised for opens, grounds and shorts.
- G. Under normal operating conditions, LCD shall indicate time, date and "SYSTEM IS NORMAL" label.
- H. During abnormal conditions, LCD shall indicate type and number of abnormal conditions, such as alarms, troubles, and supervisory services.

## 2.20 MULTIPLEXED PERIPHERAL DEVICES

- A. Devices shall be supervised for trouble conditions.
- B. Failure of device shall not hinder operation of other system devices.
- C. Device Identification
  - 1. Each intelligent device shall be identified by an address code.
  - 2. Location of end-of-line device shall be indicated on device that containing same.
  - 3. System must verify that proper type device is in place and matches software configuration.
- D. Intelligent Detector Bases
  - 1. Either base or head shall contain electronic circuits that communicate detector's status (normal, alarm, sensitivity status, trouble) to Control Panel over two wires. Same two wires shall also provide power to base and detector.
  - 2. Contacts between base and head shall be of bifurcated type using spring-type, self-wiping contacts.
  - 3. Base shall have locking capability. Locking feature must be field removable when not required.
  - 4. Upon removal of detector's head, trouble signal shall be transmitted to Control Panel.
  - 5. Detector base or head shall contain LED(s) that flash when detector is being scanned by Control Panel.
  - 6. LED(s) shall turn on steady when detector is in alarm condition.
- E. Intelligent Detector Heads - General
  - 1. Intelligent detector heads shall be low-profile type.
  - 2. Heads shall be plug-in units, which mount to common base.
  - 3. Heads shall be 24 VDC type.
  - 4. Heads may be reset by actuating Control Panel reset switch.
  - 5. To minimize false alarms, voltage and RF transient suppression techniques shall be employed.
  - 6. Smoke detectors:



- a. Listed for sensitivity testing from Control Panel. Sensitivity test results shall be logged and downloaded to printer.
- b. Include an insect screen.
- c. Communicate actual smoke chamber values to Control Panel.
- d. Covered with plastic bags after installation to maintain cleanliness. Bags shall be red for quick visual identification for removal at time of occupancy.

F. Intelligent Photoelectric Smoke Detectors

1. Detectors:
  - a. Contain no radioactive material
  - b. Be of solid state photoelectric type and shall operate on light scattering photodiode principle using pulsed infrared LED light.

G. Intelligent Heat Detectors

1. Detectors:
  - a. Be a combination rate-of-rise and fixed temperature (135°F unless noted).
  - b. Sense within temperature range of 32° to 158°F. The control panel shall be capable of sensing either a set point of 135 °F, or a rate-of-rise of 20°F per minute for fire sensing.

H. Intelligent Duct Smoke Detectors:

1. Duct detectors shall be of photoelectric ~~ionization~~ type.
2. Detectors shall be rated for air velocity to be expected.
3. It shall be possible to alarm duct detector by using remote or local test switch.
4. It shall be possible to clean sampling tubes by access through duct housings front cover.
5. Provide relays adjacent to motor controller, and remote keyed test switch and alarm LED indicator.
6. In mechanical rooms, alarm LED indicators shall be grouped on a stainless steel cover plate.
  - a. Mount adjacent to main mechanical room door.
  - b. Each LED shall be labeled with detectors loop and address.
  - c. Floor plan of room showing detectors and addresses shall be located adjacent to cover plate.
  - d. Provide Plexiglas cover over plan.

I. Air Sampling Smoke detection:

1. Air-sampling early smoke detection systems shall be provided to cover detection requirements in select areas of the building, as indicated on the drawings. The system(s) shall consist of highly sensitive laser-based smoke detectors with aspirators connected to networks of sampling pipes. The detector will be able to identify which pipe (zone) is carrying smoke. A display unit shall be provided to monitor each detector, and a programmer shall be supplied to configure the system. The fire alarm system shall monitor the air-sampling smoke detection system for trouble and alarm conditions.

J. Manual Stations



1. Manual stations:
  - a. Double action
  - b. Constructed of high impact, red Lexan with raised white lettering and smooth high gloss finish
  - c. Contain circuits that communicate station's status (alarm, normal) to Control Panel over two wires
  - d. Mechanically latch upon operation and remain so until manually reset. Stations that use Allen wrenches or special tools to reset shall not be accepted.
  - e. Fitted with screw terminals for field wire attachment
2. Address shall be field programmable on station.

K. Interface Modules - General

1. Interface Modules:
  - a. Receive 24 VDC power from separate two wire circuit
  - b. Available in either Class B or Class A supervision version
  - c. Supervised and identified by Control Panel
  - d. Capable of being programmed for its "address" location
  - e. Compatible with addressable manual stations and intelligent detectors on same intelligent initiating circuit
2. Class A wiring shall be looped back and connected to module.
3. Class B wiring shall be supervised by an end-of-line device.
4. Should interface module become non-operational or removed, trouble signal shall be transmitted to Control Panel.
5. Interface module LED's shall be clearly visible on the face of the trim plate.

L. Interface Modules - Supervised Control

1. Interface Modules shall be used for control of indicating appliances, door holders, and AHU systems.
2. For signals, speakers, fire fighter phone jacks and other device control interface module shall provide double-pole/double-throw relay switching that can connect any of the following through 2 amp fuses:
  - a. Zone of signals to power source
  - b. Speakers to audio source
  - c. Fire fighter phone jacks to communications channel
  - d. Variety of controlled devices to appropriate controlling circuits.
3. Interface modules:
  - a. Communicate supervised wiring status (normal, trouble) to fire alarm control panel.
  - b. Receive from fire alarm control panel command to transfer relay.

M. Interface Modules - Supervised Monitoring

1. Interface Modules:
  - a. Suited for monitoring of water-flow, valve tamper, and non-intelligent detectors.



- b. Addressable interface module shall be provided for interfacing normally open direct-contact devices to an intelligent initiating circuit.
  - c. Provide power to and monitor status of zone consisting of conventional 2-wire smoke or heat detectors and N/O contact devices.
  - d. Communicate zone's status (normal, alarm, trouble) to Control Panel.
2. Supervision of zone wiring shall be Class B or Class A.

N. Interface Modules - Non-Supervised Control

- 1. Interface module shall provide double-pole/double-throw relay switching for loads up to 120VAC. It shall contain 2 amp fuses, one on each common leg of relay.

2.21 SPEAKER/STROBE DEVICES

A. Combination Speaker/Strobe Devices

- 1. Speakers:
  - a. Operate on 24 V DC circuit
  - b. Include separate wire leads for in/out wiring for each leg of associated signal circuit. Tappings of signal device conductors shall not be acceptable.
  - c. Be suitable for rear mounting behind audio-visual assemblies, which shall be flush or semi-flush mounted, with manufacturer back boxes and flush trim ring.
  - d. Have field adjustable output taps, 3 taps minimum.
  - e. Provide minimum sound pressure level of 85.7 dBA at 10' using 1-watt tap.
  - f. Speakers located in mechanical room shall have 3 taps minimum with 8W being the highest.
  - g. Provide a minimum sound pressure level of 90 dBA at 10' using the 2-watt tap.
  - h. Include a blocking capacitor for line supervision and screw terminal for in-out wiring.
- 2. Strobes shall be:
  - a. Multi-tap units with taps at 15, 30, 75, and 110 cd.
  - b. Tapped at 15-candela peak power or as noted on drawings.
  - c. Have flash synchronization module on circuit when more than one strobe is visible at a time.
  - d. On separate supervised circuit from speaker circuit.
- 3. White Lexan lens shall have "FIRE" in red lettering visible from a 180° field of view.
- 4. Have off-white semi flush housing.
- 5. Strobe circuit loading shall be calculated at 75 cd tap for all devices, except in mechanical, interstitial spaces where circuit loading shall be calculated at 110 cd tap

B. Speaker Devices

- 1. Speakers without strobe units:
  - a. Include above-listed features
  - b. Flush ceiling mounted white baffle and recessed back box for installation in suspended ceiling system.
  - c. Red baffle with surface mounted back box, furnished by speaker manufacturer, where installed in areas with exposed structure.



- d. Cast metal grille and back box where installed in mechanical/interstitial spaces.

## 2.22 CONVENTIONAL PERIPHERAL DEVICES

### A. Sprinkler Waterflow Switches - Wet Systems

- 1. To be furnished and installed by Fire Protection Contractor under Division 21.
- 2. To prevent false alarms, flow switch shall incorporate adjustable time delay mechanism between the paddle-operated stem and alarm initiating contacts.
- 3. Tapped 1/2" conduit connection

### B. Sprinkler Valve Tamper Switches - Wet Systems

- 1. Sprinkler valve tamper switches shall be furnished and installed by Fire Protection Contractor under Division 21.
- 2. Switch shall be provided with either 1 or 2 sets of S.P.D.T. micro switches as required.

### C. Door Holders

- 1. Magnetic door holders:
  - a. Provided by the General Contractor. Refer to Section 08 7110 - Door Hardware.
  - b. Capable of being surface, flush, or semi-flush mounted as required
- 2. Power for door holders shall be 24 V.

### D. Fault Isolator Module

- 1. Provide Fault Isolator Module (FIM) on initiating device circuits in following situations:
  - a. Loop extends to another floor
  - b. Loop extends to another building
  - c. For each 25 devices on a loop
- 2. Fault Isolator Module shall:
  - a. Automatically re-connect isolated section of loop upon correction of fault conditions.
  - b. Not require any address setting
  - c. Operations shall be totally automatic. It shall not be necessary to replace or reset FIM after its normal operation.
  - d. Include LED, which shall flash under normal operation and illuminate steady to indicate short circuit.

## 2.23 ISOLATED LOOP CIRCUIT PROTECTORS (ILCP)

### A. Fire Alarm Control Panel shall include Isolated Loop Circuit Protector (ILCP) on circuits which extend beyond building. Circuits include, initiating device circuits, alarm notification appliance circuits, and signaling line circuits.

### B. ILCP shall:

- 1. Be located as close as practical to point where circuits leave or enter building.
- 2. Have line-to-line response time of less than 1 nanosecond.
- 3. Have #12 AWG grounding conductor with maximum length of 25'. It shall be run in straight line and connected to building grounding electrode system.



- C. Spark gap devices or devices incorporated in or installed within control panel in lieu of ILCP are not acceptable.

## 2.24 SURGE PROTECTION

- A. Provide power surge and transient protection on AC input to all fire alarm components:
  - 1. Feed-through (not a shunt-type), branch circuit surge protection such as DiTech DTK-DF120S1, EFI 75LC120V20S, Leviton 51020-WM-DN or an equivalent UL listed device submitted for approval by the Engineer and Owner.
- B. On DC Circuits Extending Outside Building (Including wiring to PIV, tamper switches and similar devices located outside the building):
  - 1. Provide "pi" type filter on each leg, consisting of a primary arrestor, a series impedance, and a fast acting secondary arrestor which clamps at 30v to 40v. Some acceptable models: Simplex 2081-9027, Simplex 2081-9028, Transtector TSP8601, Ditek DTK 2MHLP24B series, Citel America B280-24V, and Northern Technologies DLP-42. Submit detailed specifications for any proposed equals to the engineer for approval. UL 497B listing is a prerequisite for alternate device consideration. Devices using only MOV active elements are not acceptable.

## 2.25 PRINTERS AND TERMINALS

- A. Multiplex/intelligent systems shall be provided with printer and terminal (keyboard and CRT).
- B. Printer
  - 1. Desktop 80-column, impact dot matrix printer.
  - 2. Printer shall receive English language text from Control Panel in standard ASCII format via RS-232-C connection.
  - 3. Printed information shall include time, date, status, point number, label, and device type identifier.
  - 4. Printer shall have the following features:
    - a. 120 VAC input power
    - b. 180 characters per second printing speed
    - c. 3 kilobytes buffer capacity
    - d. Cartridge type ribbon
    - e. Friction feed for cut forms
    - f. Tractor feed for continuous 9-1/2" wide pin-to-pin fanfold paper
- C. Terminal
  - 1. Desktop terminal (monitor with detachable keyboard) with English language and display of time and date of system events.
  - 2. Monitor shall be tilt/swivel, with 14", green phosphor, non-glare CRT.
  - 3. Displayed information shall include time, date, status, point number, label, and device type identifier.
  - 4. Information on screen shall not scroll off until an acknowledge key is pressed.



5. Terminal shall include composite video output to drive slave monitors.
6. Terminals shall provide and control the following:
  - a. Acknowledgment of alarms, troubles and supervisory conditions
  - b. Alarm silence
  - c. System Reset
  - d. Time and Date
  - e. Alarm, Trouble and Supervisory service conditions summary screens

## 2.26 ADDRESSABLE TEXTUAL NOTIFICATION APPLIANCE (MESSAGE BOARD)

- A. Textual Notification Appliance is to operate on a compatible Signaling Line Circuit (SLC) and is to provide a high visibility, multi-color LED text message display.
  1. Textual Notification Appliance shall be listed to UL 1638 Visual Signaling Appliances.
  2. Appliance shall be capable of up to thirty two (32) pre-programmed message selections that can be activated in response to pre-defined emergency situations or linked to specific system point status conditions.
  3. Textual Notification Appliance shall be capable of displaying single line emergency instructions. Instructions can show as static, flashing, or scrolling with a variety of appearance/transition options. Instructions shall be capable of displaying using multi-colors to emphasize instructions content.
  4. Textual Notification Appliance shall be capable of providing non-emergency information during non-emergency conditions. Emergency conditions will override non-emergency message/instructions and display emergency instructions.
  5. Textual Notification Appliance shall be capable of scrolling instructions of at least 512 characters in length.
  6. Textual Notification Appliance shall be viewable from a distance of up to 200 feet, wide area viewing (140deg). (Single line 4.7" high message)
  7. Textual Notification Appliance shall be powered by a listed fire alarm power supply providing 24VDC with battery back-up.
  8. Textual Notification Appliance shall be capable of wall or ceiling mounting options.
- B. The contractor shall furnish the necessary accessories required for a complete listed system.

## 2.27 LOUDSPEAKERS

- A. Weather resistant and constructed of heavy gauge, treated aluminum. and constructed of heavy gauge, treated aluminum.
- B. Able to operate within any ambient temperature environment ranging from 66 degrees C (150°F) to -35 degrees C (-30°F)
- C. Double reentrant type with a 15 watt RMS audio power rated compression driver producing a UL rated 102 dB measured at 15 watts at 10 feet.
- D. Impedance selection via a 7 position switch of 5000, 2500, 1300, 666, 333, 89 & 45.



- E. Power taps shall be available at 2.0, 4.0, 7.5 & 15 watts for the 100 volt line, .9, 1.8, 3.8, 7.5 & 15 watts for the 70 volt line and .48, .94, 1.8, 7.5 & 15 watts for the 25 volt line.
- F. Each power tap shall have a 3dB incremental rating. The frequency response range shall be 400 - 14000 Hz.
- G. Dispersion of 70 degrees.
- H. Furnished with a mounting bracket that allows adjustment on either a vertical or horizontal plane with a single locking pin and include provisions for mounting, banding or strapping.
- I. Wiring terminals shall be fully enclosed and a vandal-resistant adapter cover shall provide connection protection for cable or conduit.
- J. The horn shall be 7.875" W x 8.75" H x 9.313" D (200 x 222 x 237 mm).
- K. The horn shall be finished in gray baked epoxy.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Class A circuiting shall be used for initiating circuits.
- B. Class B circuiting shall be used for notification circuits.
- C. Installation shall be done in neat, workmanlike manner in accordance with manufacturer's recommendations.
- D. Smoke detectors shall not be mounted until construction is completed.

#### 3.2 RACEWAYS

- A. Fire Alarm Panel risers shall be in conduit system separate from other building wiring.
- B. Wiring shall be in conduit system separate from other building wiring. See Section 260533 - Raceway and Boxes for Electrical Systems.
- C. Minimum 3/4" steel raceway.
- D. Contractor shall size conduit and boxes by circular mil size of cable in conduit or box.
- E. Surface access to existing alarm initiating circuits in public areas shall be via surface metal raceways (minimum equivalent to 3/4" conduit) and box extensions.
- F. Existing conduit and surface metal raceway that are not 3/4" size may be reused if found to have adequate space for existing and new conductors.

#### 3.3 CONDUCTORS

- A. Cables and wires shall be provided per manufacturer shop drawings.



- B. Conductors shall be color-coded. Coding shall be consistent through out facility.
- C. Green wire shall be used only for equipment ground.
- D. Control Panel power wiring shall be #12 AWG.
- E. Control Panel shall have #12 AWG equipment ground wire.
- F. Where fire alarm circuits enter or leave building, additional transient 75 to 90 V gas tube protection shall be provided for each conductor.
- G. Cable Detector Loops shall be twisted pair with shield jacket. Shield shall be connected to earth ground only at control panel.
- H. Detector wiring shall not be in same conduit with 120/240 VAC wiring or other high current circuits.
- I. T-taps are not allowed for any wiring.
- J. Leave 8" wire tails at each device box and 36" wire tails at Control Panel.
- K. Cable for RS 232-c devices (CRT, PRINTER) shall be two, shielded twisted pair.
- L. Cable for RS 485 devices (Remote Annunciators) shall be shielded-twisted pair for data signal.
- M. Wiring of initiating device circuits shall be #14 AWG minimum.
- N. Wiring of horn and strobe notification circuits shall be #12 AWG minimum.
- O. Fire alarm cable shall be held in place at device box by means of 2-screw connector, (do not use squeeze or crimp type connectors).
- P. Connections shall be made at device terminals, terminal cabinets, etc. Splices are not allowed within junction boxes - splices are only allowed within labeled terminal cabinets.
- Q. Boxes shall be red and labeled "FIRE ALARM SYSTEM" by decal or other approved markings.
- R. Horn and strobe circuits shall have separate conductors, and shall operate independently of each other.
- S. Install surge protection devices securely within a listed metal enclosure adjacent to the electrical panelboard where circuits originate. Conductors between panelboard and surge suppressor are to be as short as is practical to maximize effectiveness of surge protection device.
  - 1. Provide #10 ground conductor from ground bus of panelboard to bond enclosure and all surge protection device ground terminals.
  - 2. Provide small coil in phase conductor wound 5-10 turns in 1" diameter and securely tie-wrapped. Coil is to be located on Load side of surge suppressor in the phase conductor (not neutral or ground conductors)



- T. Adjacent to FACP and near the point of entry to any outdoor devices or outlying building, provide DC surge protection .
  - 1. Provide #10 ground conductor from ground bus of panelboard to bond enclosure and all surge protection device ground terminals.

### 3.4 DEVICE MOUNTING

- A. Recommended mounting heights, and requirements are as follows:
  - 1. Fire Alarm Control Panels
    - a. Mount control panel so visual indicators and controls at 60" above floor level.
  - 2. Remote Annunciators
    - a. Mount panel so visual indicators and controls at 60" above floor level.
    - b. Install multi-gang box as required by manufacturer, flush or surface mounted.
  - 3. Audio-Visual Devices
    - a. Install flush or semi-flush 6" below finished ceiling or 80" from bottom of device to finished floor.
    - b. No devices protruding 4" or more shall be installed lower than 80".
    - c. Audio/visual devices may be installed on the ceilings in accordance with NFPA 72 - Table 2-A.
    - d. For surface mounting, use manufacture-supplied backboxes and trim plates.
    - e. Mark each device with its circuit number.
  - 4. Manual Stations
    - a. Operable part of manual stations shall be installed not less than 42" and not more than 4-1/2' 54" above finished floor.
    - b. Manual stations shall be in unobstructed locations.
    - c. For surface mounting, use manufacturers supplied backboxes and trim plates
    - d. Mark unit's address on inside and outside of housing.
  - 5. Heat and Smoke Detectors
    - a. Location of detectors shown on plans is schematic only. Detectors must be located according to code requirements.
    - b. Surface mounted detectors shall be installed using back boxes equal to base size. Standard octagon and square boxes are not acceptable.
    - c. Detectors shall be located on the highest part of smooth ceiling so that edge of detector is no closer than 4" from sidewall.
    - d. Ceilings with beams, joists or soffits that exceed 8" in depth require special planning and closer spacing.
    - e. Mount detectors on sidewalls with top of detector no closer than 4" from ceiling and no further away than 12".
    - f. Smoke detectors shall not be installed closer than 3' from air supply diffusers.
    - g. No detectors shall be installed in direct airflow.
    - h. Heat and smoke detectors should be located near center of open area, which they protect.



- i. Mark zone number and ranking of each detector on its base.
- j. For intelligent systems, mark address and loop number on each detector's base.

### 3.5 IDENTIFICATION LABELS

- A. Junction boxes shall be painted red and labeled "Fire Alarm."
- B. Circuits must be labeled with name of circuit and area being served by circuit.
- C. Labels shall be permanent, and be machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS SHALL BE ALLOWED.
- D. Labels shall be self-laminating, white/transparent vinyl and be wrapped around cable.
- E. Flag type labels are not allowed.
- F. Labels shall be of adequate size to accommodate circumference of cable being labeled and properly self-laminate over full extent of printed area of label.
- G. Adhesive type labels not permitted except for phase and wire identification.
- H. Wiring color code shall be maintained throughout installation.
- I. Green wire shall be used only for equipment ground.

### 3.6 MANUFACTURER'S SERVICES

- A. Supervision of installation shall be provided by trained service technician from manufacturer of fire alarm equipment.
- B. Technician shall be US certified and have had minimum of 2 yrs of service experience in fire alarm industry.
- C. Technician's name shall appear on equipment submittals, and letter of certification from fire alarm manufacturer shall be sent to project engineer.
- D. Manufacturer's service technician shall be responsible for following items:
  - 1. Pre-installation visit to job site to review equipment submittals and verify method by which system shall be wired.
  - 2. Make periodic job site visits to verify installation and wiring of system.
  - 3. Upon completion of wiring, final connections shall be made under supervision of technician.
  - 4. At time of final checkout, technician shall give operational instructions to Owner and/or his representative.
  - 5. Job site visits shall be dated and documented in writing and signed by Electrical contractor.
  - 6. Discrepancy shall be noted on document and copy kept in system job folder, which shall be available to project Engineer any time during project.



### 3.7 TESTING

- A. Manufacturer's authorized representative shall perform complete test of each system and each device and submit written report to Contractor attesting to proper operation of completed system prior to final inspection.
  - 1. Testing of smoke detectors is to be accomplished by introducing simulated smoke into the sampling chamber of the detector. Utilizing magnetic test switches to demonstrate system operation will not be acceptable until all device operations have been demonstrated using smoke.
- B. Contractor shall perform audible notification verification survey and submit a report documenting the ambient and alarm sound levels for each space within the building
  - 1. Sound pressure level shall be measured with sound level meter meeting ANSI S1.4a, Specifications for Sound Level Meters, Type 2 requirements. Levels throughout protected area shall be measured and recorded. The sound level meter shall be set in accordance with ANSI S3.41, American National Standard Audible Evacuation Signal, using the time-weighted characteristic F (FAST). Record the maximum output when the audible emergency evacuation signal is on.
- C. Contractor shall demonstrate system operation, including 100% device test, in presence of Designer. Any deficiencies will be documented by Designer for correction by Contractor.
- D. Contractor shall demonstrate system operation, including 100% device test, in presence of Owner. Owner may elect to participate in Designer demonstration instead of a separate inspection, but this is only at Owner's discretion.
- E. Note that Designer is responsible for signing the NFPA 72 record of completion as the AHJ (per responsibility delegated to the Designer by the NC Office of State Construction). Designer will not sign record of completion until all fire alarm related punch list items have been corrected, device and system operation has been verified, and all documentation is in place. A signed NFPA 72 form is required for final inspection by the NC Office of State Construction.
- F. The NC Office of State Construction will perform additional testing during the project final inspections, up to 100% of the system if deemed necessary by the inspector.
- G. The Contractor will be responsible for supporting all required inspections with appropriate staff and materials to facilitate efficient completion of testing.

### 3.8 WARRANTY

- A. Warranty completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a minimum period of 1 yr from the date of final acceptance.
- B. Post warranty period along with company's name and telephone number inside fire alarm panel.
- C. Warranty service for equipment shall be provided by system supplier's factory trained representative.



- D. Warranty shall include parts, labor, and necessary travel.
- E. Occupied facility shall not be without UL and NFPA approved and fully operational fire alarm system for period longer than 2 h. Emergency response shall be provided within 2 h of notification, to Contractor, of failure of system to perform operationally per UL and NFPA standards.
- F. Non-emergency service calls shall be responded to within 24 h of notification to Contractor.
- G. Repairs and/or replacement shall be completed within 72 h of time of notification. Other than emergency, actual repairs and/or replacement shall be provided during normal working hours, Monday through Friday, excluding holidays.
- H. If repair and/or replacement cannot be made within prescribed time, other means and methods of protection shall be provided to ensure safety of building occupants during which time system is not in compliance with standards. This may involve up to and include hiring Owner approved qualified personnel to stand fire watch, at Contractor's expense.

### 3.9 TRAINING

- A. Contractor shall provide minimum of 4 h system operation training for Owner, Architect/Engineer, and fire department personnel.
- B. Training session shall be at a time to be stipulated by Owner.
- C. Training shall be completed prior to final inspection.

### 3.10 MAINTENANCE CONTRACT

- A. Equipment manufacturer shall make available to Owner, maintenance contract proposal to provide minimum of 2 inspections and tests per year in compliance with NFPA-72 Codes.

### 3.11 SPARE PARTS

- A. Contractor shall provide the following spare parts in quantities shown, with a minimum of 1/item:

Quantity	Type of Device Present
10%	Photoelectric smoke detectors
10%	Heat detectors
10%	Smoke and heat detector bases
10%	Monitor Modules
10%	Control Modules
10%	Duct detectors with housing and sample tubes
5%	Isolation Modules
10%	Each alarm notification device type
5%	Manual Stations



INDOOR PRACTICE FACILITY  
EAST CAROLINA UNIVERSITY, GREENVILLE, NC  
SCO ID# 23-26345-01A  
AIM #1752

ADDENDUM (REVISION) #1  
ISSUED: 04/09/2025

2 (ea size)	Fuses
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END OF SECTION 283116



## SECTION 321293.1 – SYNTHETIC GRASS SURFACING

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. This specification is for synthetic turf for a multisport Indoor Performance Facility to be located at East Carolina University. Scope of work to include all labor, material, equipment, transportation and services to install complete new vertical draining rubber and sand in-filled synthetic turf surfacing system for both the indoor and outdoor practice fields.
- B. It is the intent that the bidding general contractor employ one of the sports field manufacturers (see B.2) and a qualified sport field contractor to coordinate the installation of the synthetic turf. It is the general contractor's contract responsibility to furnish all labor, materials testing, tools and equipment necessary to install, in place, all synthetic turf as indicated on the drawings and specified herein.
  - 1. Turf Systems: Hybrid Slit Film/Monofilament Turf System – 2.25 inch pile height with SBR Rubber and Sand Infull.
  - 2. Approved Manufacturers Sport Turf manufacturers:
    - a. Shaw Sports Turf
    - b. Field Turf
    - c. Astro Turf
    - d. Sprinturf
    - e. Hellas
  - 3. The installation of all new materials shall be performed in strict accordance with the manufacturer's written instructions and in accordance with approved shop drawings.
  - 4. The Sports Field Contractor shall be responsible for the turf base and final grade. Sports Field Contractor Installer shall be a single source responsible for both sub-grade and turf.
  - 5. Bidding contractor must submit solicited pricing sheers for all turf systems for owner review.
  - 6. Additional requirements can be found within this specification/
- C. PRICING PACKAGE
  - 1. Base Bid – Provide a 2.25" synthetic turf field system as defined in specifications installed on an aggregate base with ~~shock pad and~~ associated drainage.
- D. Provide equipment and materials, and do work necessary to construct the synthetic field system, as indicated on the Drawings and as specified. Work shall include but shall not be limited to:



1. Base Construction
  - a. Subgrade will be delivered by the building general contractor within  $\pm 0.1$  of the finished subgrade.
  - b. Excavation, trenching, grading, backfilling, compaction to achieve subgrade as needed.
  - c. Laser grading
  - d. Disposal of spoil materials off site.
  - e. Grade elevation verification of Finish Subgrade and acceptance prior to gravel install.
2. Panel and Collector Drainage System Filter Fabric
  - a. Gravel drainage trench fill material.
  - b. Panel drain pipe, collector pipe and fittings
  - c. Drainage Stone Base
  - d. Clean outs and inline structures/manholes
  - e. Grade elevation certification of finished stone base installation
3. Curbing
  - a. Installation of perimeter curb/nailer system.
  - b. Installation of concrete curb edge
4. Synthetic Turf Field
  - a. Rubber and Sand Infill material
  - b. Related finish work.
5. Asbuilt Drawings
  - a. Complete set of construction as built in CAD.

## 1.2 RELATED WORK

- A. Review all Construction Documents for the following work-related items to be included in the project.

## 1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  1. Drawings and the general provisions of the contract, including General and Supplementary Conditions and other Division I Specification Sections, apply to this section.
  2. Installation shall comply with rules and/or regulations for field play set forth by the NCAA where applicable. Contractor to provide shop drawing striping plans for all fields prior to construction to ensure compliance.
  3. American Society for Testing and Materials (ASTM): Latest standard test methods for the products used for the synthetic turf product system, RCRA testing approved by the EPA, And, European Committee for Standardization of International Playing Surfaces EN 1177 for Head injury Criteria.
    - a. Rubber Property – Compression Test (D 395)
    - b. Pile Yarn Floor Covering Construction 9D 418)



- c. Breaking Load (Strength) and Elongation of Yarn by the Single-Strand Method (D 2256)
- d. Mass Per Unit Area ( Weight) of Woven Fabric ( D 3776)
- e. Hydraulic Bursting Strength of Knitted Goods and Non-woven Fabrics: Diaphragm Bursting Strength Tester Method (D 3786)
- f. Water Permeability of Geotextiles ( D 4533)
- g. Trapezoid Tearing Strength of Geotextiles ( Grab Method) (D 4632)
- h. Break Load and Elongation of Geotextiles, Geomembranes, & Related Products (D 4833)
- i. Index Puncture Resistance of Geotextiles, Geomembranes,, & Related products ( D 4833)
- j. Shock Absorbing Properties of Playing Surface Systems and Materials ( F355, F1936)
- k. Corrugated Polyethylene (PE) Tubing and Fittings ( F 405)
- l. Subsurface Installation for Agricultural Drainage or Water Table Control 9 F 449)
- m. Corrugated Polyethylene Tubing and Fittings ( F 667)
- n. Wheel Chair Accessibility – ( F1951-0)
- o. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (D 1557)
- p. Testing for Water Permeability of Synthetic Turf Systems and Permeable Bases ( F1551)
- q. Additional Testing Required as per Section 2.1 for Synthetic Turf Product Requirements.

#### 1.4 SUBMITTALS

- A. Provide any perimeter edge / sideline drain detail / any sub drainage details, concrete curb border and turf nailer details, and sub-base recommendations as detailed and recommended by the manufacturer that vary from the details/specifications provided. All details shall be CAD drawn at a scale 1"=20 or larger. All recommendations for approval by the Owner/Engineer/Architect
- B. Two (2) 12" x 12" sample of proposed synthetic turf carpet, physical color samples of all color inlays requested, and one (1) 12" x 12" boxed turf sample including infill representative of finished synthetic turf system.
- C. Main and Inlay Seams: One sample of both sewn and glued inlays per vendors/manufacturers instructions including written specifications.
- D. One (1) 12"x12" sample of Geotextile fabric.
- E. One (1) full width sample of panel drain 24" long
- F. All drainage gravel written specifications.
- G. Signed public welfare and safety affidavit of heavy metal and containment free synthetic turf system



- H. Digital .pdf copies of all third-party ASTM product data and testing documents stated in the specifications section demonstrating that proposed system meets or exceed all specified requirements Submit to Owner for approval. All testing shall be paid for by the Contractor.
- I. List of all company litigation in the last 10 years pertaining to synthetic turf construction. Includes litigation history for all associated subcontractors.
- J. Affidavit signed by an authorized representative of the Synthetic Turf Manufacturer attesting that the Sports Field Contractor is accepted and certified by the STM.
- K. Copy of standard eight (8) year warranty against workmanship and materials on the proposed synthetic turf.
- L. Prior to the beginning of installation, the manufacturer/installer of the synthetic turf shall inspect the sub base, nailer and supply a Certificate of Subbase Acceptance for the purpose of obtaining manufacturer's warranty for the finished synthetic playing surface. Any discrepancies, other issues or if none are found this should be noted in the statement. This accepted certification will be added to all warranty information for validation purposes. All information to be reviewed by the Owner/Engineer/Architect. Items to include;
  - 1. Permeability Rates
  - 2. Grade
  - 3. Compaction
  - 4. Statement of Suitability for turf installation
  - 5. Signed by the base contractor, turf manufacturer and turf installer.
  - 6. All testing shall be performed by a certified third party independent lab and paid for by the Contractor.
- M. Submit a list of all material providers, including relevant contact information.
- N. Provide both a delivery and installation schedule.
- O. Provide a list and contact information of all subcontractors.
- P. Submit written statement signed by general contractor, synthetic turf manufacturer and installer that all drawings and specifications are in compliance with warranty requirements and are appropriate for the project at hand.
- Q. Subgrade, gravel drainage layer and field surface grades to verified by a North Carolina licensed surveyor.
- R. The turf manufacturer shall submit a signed statement for the safety of their product regarding lead, heavy metals and other chemicals used in manufacturing of the product.
- S. Submit all compaction test results of the subgrade and gravel layer to conform with drawings and specification requirements.



- T. Prior to Final Acceptance, the Contractor shall submit to the Owner three (3) hard copies and one (1) digital .pdf copy of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.
- U. All required submittals listed within this specification. Please refer to each section for specific requirements.

#### 1.5 SHOP DRAWINGS

- A. Shop drawings shall be prepared and contain all pertinent information regarding installation. These drawings shall be submitted to the Owner for approval prior to the manufacturing and shipment of materials.
- B. Submit drawings for;
  - 1. Seaming plan
  - 2. Manufacture installation details
  - 3. Details that may deviate from plan documents.

#### 1.6 QUALITY ASSURANCE AND WARRANTY

- A. Manufacturer/Installer's Experience;
  - 1. The Sports Field Base Contractor/Installer must have installed and/or provided a minimum of five (5) full size synthetic turf football fields in the last three (3) years. The Contractor shall employ only qualified, experienced supervisors and technicians skilled in the installation of this system.
  - 2. Any Sport Turf Manufactures that have not been approved and wish to seek approval for comparable products must meet the requirement of having supplied a minimum of seven (7) Division 1A (FBS) NCAA Full Size Football Field installs in the last five (5) years on University/College campus sites in the United States. The manufacturer must also submit the following items
    - a. Product samples
    - b. Product specifications
    - c. Product performance data
    - d. Proof of local representation
    - e. Proof of post installation experience
    - f. Five (5) References
    - g. List and description of the seven (7) full size FBS NCAA Division 1 Football Fields on University/College Campus sites in the United States in the last five (5) years.
- B. Hold Harmless Clause



1. The turf manufacture and sport field contractor shall indemnify the University and design team consultants from any potential patent and/or trademark infringements, litigation and or trade secret issues identified during the bid and construction process.

C. Warranty

1. The Contractor shall submit its Manufacturer's Warranty that guarantees the usability and playability of the synthetic turf system for its intended uses for a minimum eight (8) year period commencing with the date of Final Acceptance. The warranty coverage shall not be prorated nor limited to the amount of the usage. The warranty submitted must have the following characteristics:
  - a. Must provide full coverage for eight (8) years from the date of Final Acceptance.
  - b. Must warrant materials and workmanship.
  - c. Must warrant that the materials installed meet or exceed the product specifications.
  - d. Must have a provision to repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
  - e. Must be a warranty from a single source covering workmanship and all self-manufactured or procured materials.
  - f. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.
  - g. The Sports Field Contractor may be required, upon the request of the Owner, to provide a list of three (3) clients for which they have completed after-the-sale warranty work.
  - h. Any issues with type of shoe requirements for multi-sport play must be stated in the Warranty.
  - i. The 8-year warranty must also be supported by a 3<sup>rd</sup> party insured warranty from an A-rated domestic insurance carrier. The value of the policy shall be no less than \$5,000,000 per occurrence, no deductibles allowed, with a total annual policy aggregate of \$10,000,000 renewed per each year of use. Only true 3<sup>rd</sup> party policies will be accepted. Companies submitting policies that are actually letters of credit or not truly a 3<sup>rd</sup> party insurance policy will not be accepted. Submit three (3) copies of the actual insurance policy.
  - j. The 8-year warranty shall cover the following designated uses and associated wear characteristics for each sport use below
    - 1) NCAA Football
    - 2) Lacrosse
    - 3) Sport Camps
    - 4) General Recreation
    - 5) Special Events
    - 6) Pneumatic tire vehicle access
    - 7) Maintenance in accordance with manufacture recommendations.

D. Maintenance

1. The Contractor shall supply the Owner with a written maintenance manual for proper care of the finished product. The maintenance manual shall specify any use limitations for the field (e.g. heavy vehicle traffic, etc.)



E. System Performance Characteristics

1. G-Max (shock attenuation) must test below 125 at installation.
2. The various Gmax Values should not vary each year by more than 10% above or below the average at time of installation for any individual drop.
3. Lifecycle Gmax Values: The maximum Gmax Value throughout the warranted lifecycle of the synthetic turf playing surface is not to exceed ~~125~~ 175G ~~which matches the Brock Powerbase Pro 125G warranty.~~
4. The depth of the infill material shall be measured at each test location
5. All testing shall be performed by a certified third party independent lab and paid for by the Contractor.
6. After the Contractor installs the system, he must guarantee that the field will meet the following performance criteria;
  - a. Permeability (to ASTM D4491). The system shall allow a minimum percolation rate of 30 inches per hour.
  - b. Relative Abrasiveness (to ASTM F 1015). The system has an Abrasiveness Index of 20.2
  - c. Shock Absorbency (to ASTM F355, ASTM F 1936) Less than 175 G-Max for 8-year warranty.
  - d. Flammability ( to ASTM D 2859)

1.7 COMPLETION AND ACCEPTANCE

- A. Punch list shall be scheduled at least 10 days before the Substantial Completion Date.
- B. Owner shall be notified of the Punch list date 10 days before planned occurrence in writing.
- C. All items to be installed and in working order prior to Punch List request.
- D. After Punch List items are corrected, the contractor shall notify the owner for “Substantial Completion” 10 days prior.

1.8 PREINSTALLATION MEETINGS

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



## PART 2 - PRODUCTS

### 2.1 SYNTHETIC TURF PRODUCT

- A. Base Bid product to be a rubber and sand infilled 2.25" fiber slit-film/monofilament synthetic synthetic grass system. Provide all ASTM/EIN/EPA tests as applicable with the turf submittal.

<b><u>Turf Requirements:</u></b>	<b><u>Description</u></b>	<b><u>Tests</u></b>
Turf Type:	Dual Fiber (Slit Tape/Mono Hybrid)	
Base Turf Color	Field Green	
Pile Height	2.25" min.	ASTM D 5823
Pile Yarn	UV Resistant Polyethylene	
Slit Tape Fiber	XP Blade + or Equal	
Mono Fiber Type	Ridged	
Face/Pile Weight	50 oz per SY Min.	ASTM D 5848
Primary Backing	8 oz/SY Min.	ASTM D 5848
Primary Backing UV Stabilizer	1000 hours of QUV A testing	
Secondary Backing	20 oz/SY Min.	ASTM D 5848
Total Carpet Weight	78 oz/SY Min.	ASTM D 5848
Machine Gauge	1/2" to 3/4" centers	ASTM D 5793
Single Needle Tufting	Required for 1/2" stitch gauge to prevent corn rows	
Tuft Bind	Min. 8lbs without infill, 10lbs with infill	ASTM D 1335
Grab Strength	> 200 lbs avg.	ASTM D 5034
Grab Tear Width	> 200 lbs avg.	ASTM D 5034
Pill Burn Test	Pass	ASTM D 2859
<del>Shock/Drainage Pad</del>	<del>Brook Power Base Gen 2 Pro</del>	<del>ASTM F 355</del>
Infill Mix	70% Sand 30% Black SBR	
Infill Rubber Granule Comp	Black SBR Rubber	
Infill Rubber Granule Shape	Spherical, Moderate, Angular	EN 14955
Infill Rubber Granule Spec. Gravity	1.1 min to 1.2 max	ASTM D 297
Infill Rubber Ash Content	Between 5% and 15%	ASTM D 297
Infill Rubber Sieve Analysis	10 / 20 Mesh (2.0mm - 0.85mm)	ASTM D 5644
Infill Sand Granule Shape	Semi-rounded to rounded angularity	ASTM F 1632
Infill Sand Sieve Analysis	20 / 40 Mesh (0.85mm - 0.425 mm)	ASTM E 1632
Infill per SF	Min. 7 lbs per SF (may be higher per manuf. requirements)	
Fabric Width	15'-0	ASTM D 5793
Yard Denier Slit Film	5,000 Min.	ASTM D 1577
Yard Denier Mono	10,000 Min.	ASTM D 1577
Breaking Strength	18 lbs/sf	ASTM D 2256
Yarn Melting Point	246 digress	ASTM D 789
Fiber Reveal	Per Manuf. Standards	
Turf with Infill Permeability	20 inches per hour	ASTM D 4491
Wheel Chair Accessibility	Accessibility	ASTM F 1951
HIC Head Injury Criteria	HIC Testing	EN 1177
GMAX Testing	GMAX	ASTM F 355
Fiber Lead Testing	Lead Content Testing in the Fiber	ASTM F 2765



- B. The Secondary Backing of high-grade polyurethane shall be applied to the Primary Backing. The tuft bind shall be a minimum average of 8 lbs. without infill and 10 lbs. with infill.
- C. Tuft products with permeable backing do not require perforations.
- D. All perforations shall be unobstructed.
- E. Tuft products with a coated or non-drain thru backing must include perforations in the backing.
- F. All turf carpet and infill material shall be provided by a single source and documented accordingly.
- G. All inlaid lines will be tufted in the factory to the extent practical. All widths of lines per NCAA rules.
- H. All seams shall be flat, tight, and permanent with no separation or fraying.
- I. Carpet rolls shall be 15-foot widths.
- J. The finished surface shall function as a grass field with similar natural playing grass field characteristics.
- K. The use of all conventional athletic shoes shall be allowed and identified in the warranty specifications.
- L. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.
- M. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use.
- N. Sew seam turf as recommended by the synthetic turf manufacturer.
- O. Glue seams as recommended by the synthetic turf manufacturer.

## 2.2 INFILL

- A. Infill should be a combination of 30% SBR Rubber and 70% Sand.
  - 1. Infill Rubber Granule Comp SBR (Ambient or Cryogenic)
  - 2. Infill Rubber Granule Shape Spherical, Moderate, Angular
  - 3. Infill Rubber Spec. Gravity 1.1 min to 1.2 max



- |    |                              |                                    |
|----|------------------------------|------------------------------------|
| 4. | Infill Rubber Ash Content    | Between 5% and 15%                 |
| 5. | Infill Rubber Sieve Analysis | 10/20 Mesh (2.0mm-0.85mm)          |
| 6. | Infill Sand Granule Shape    | Semi-rounded to rounded angularity |
| 7. | Infill Sand Sieve Analysis   | 20/40 Mesh *0.85mm – 0.425 mm)     |

## 2.3 GEOTEXTILE

- A. Geotextile Filter Fabric for the Subgrade and Collector Drainage: Non-woven polypropylene geotextile fabric shall be chemically and biologically inert. The subgrade shall be covered in its entirety with a geotextile fabric meeting the following specifications. The geotextile shall be woven from high-tenacity long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyesters and pass a minimum of 135 gpm. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages
- B. Geotextile for the subgrade shall have minimums:
1. Mass/Weight of 4.5 oz /yd<sup>2</sup>
  2. Flow rate 135 gal/min/ft<sup>2</sup>
  3. Permivity 1.8 cm/sec
  4. Tensile Strength 120 lbs
  5. Elongation 50%
  6. Trapezoid Tear Strength 40lbs
  7. Apparent Opening Size 50 US Sieve
  8. Geotextile for the stone base shall be approved by the Drainage Pad manufacturer to confirm compatibility.
- C. Provide geotextile on field subgrade, top of finished stone layer and collector drainage trenches.
- D. Secure geotextile to subgrade with staples as recommended by the manufacturer.

## 2.4 DRAINAGE PIPE, PANEL DRAIN AND COLLECTOR PIPE.

- A. Drainage Pipe: A network of perforated HDPE highway grade drainage pipe (1" x 12" flat panel pipe) shall be installed under an 8" layer of free draining base aggregate. The drainage pipe and perimeter collector lines will be sized and installed per manufacturer recommendations.
- B. Perforated pipe shall be double wall high-density polyethylene pipe (HDPE) and shall conform to all associated AASHTO requirements.
- C. HDPE Perforated pipe shall Class have 2 slotted perforations in accordance with associated AASHTO requirements.
- D. Solid wall pipe shall be high-density polyethylene pipe (HDPE) and shall conform to associated AASHTO requirements.



- E. Underdrain panel Drains and Fittings shall be 1" x 12" wide flat panel composite pipe
  - 1. Advandeg 12" width
  - 2. Multiflow 12" width
  - 3. Approved Equal
- F. The panel drain core shall have a minimum in-plane flow rate of 170 gpm/ft width at 3600 psf and a hydraulic gradient of 1.0, per ASTM D-4716. The core shall have a minimum compressive strength of 7,500 psf.
- G. Corrugated panel drain shall conform to the requirements for Class B Geocomposite as defined in ASTM D7001-06.
- H. Provide panel drain complete with all fittings such as bends, reducers, adapters, couplings, collars, and joint materials. All fittings shall be supplied by the same manufacturer as the panel drain.
- I. Inline structures only are to be used for collector drains. Risers with fittings are not allowed.
- J. Collector basins/cleanouts to be Nyloplast or approved equal with solid grates.

## 2.5 STONE BASE COURSE FOR OUTDOOR FIELD

- A. Stone Base Course: The following gradation of stone is typical and recommended specification. The synthetic turf base contractor is required to focus on achieving the planarity, porosity and compaction requirements to provide a sound crushed stone base for synthetic turf installation. The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate. Material shall conform to the AASHTO #57 #8 classification. The stone base shall conform to the turf vendor's standard specifications subject to the Engineer's approval and meet the following requirements using ASTM Method C136: the open graded aggregate material shall conform to the following criteria:

B.

AASHTO #8 Choker Stone	
Sieve Size	% Passing by Weight
1/2"	100
3/8"	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5
No. 100	0-3
No. 200	0-2



AASHTO #57 Free Draining Base Stone	
Sieve Size	% Passing by Weight
1-1/2"	100
3/4"	95-100
1/2"	25-60
No. 4	0-10
No. 8	0-5

- C. All stone shall be angular. Rounded or river stone is not acceptable.
- D. In no instance, shall multiple quarry sources be used within a single playing field area. Bridging Characteristics:
- |  |   |
|--|---|
| <p>a)    3&lt;                      D50   base                      &lt;6</p> <hr style="width: 100%;"/> <p>   D50   top</p> <p>   stone</p> | <p>b)                      D85   top                      &lt;2</p> <hr style="width: 100%;"/> <p>                                 D15   base</p> <p>                                 stone</p> |
|--|---|
- E. All stone shall be angular. Rounded will not be acceptable.
- F. The stone material shall be AASHTO#57 and #8. Material must be clean. Subject to architectural approval, local or regional stone specifications that meet compaction and porosity requirements are permitted.
- G. In no instance, shall multiple quarry sources be used within a single playing field area.



- H. Permeability for base stone shall be greater than 40"/hr. 3<sup>rd</sup> Party Testing Required. (ASTM F 1551-6)
- I. Permeability for combined stone sections shall be greater than 30"/hr. 3<sup>rd</sup> Party Testing Required. (ASTM F 1551-6)

## 2.6 COMPOSITE NAILER

- A. A composite synthetic 2" x 4", TREX, PolyTuf HDPE or equivalent nailing strip shall be used.

## 2.7 EARTHMOVING MATERIALS.

- A. Refer to Earthmoving specifications for subgrade and site work.
- B. Refer to Geotechnical report for suitable soil specifications and structural fill requirements.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only factory-trained technicians skilled in the installation of synthetic turf systems shall undertake the placement of the system.
- C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- D. The turf system shall be fibrillated only after the infill material is installed with a machine specifically designed to do so. All contractors shall be familiar and understand all drawings and specifications for the work prior to beginning construction.
- E. All work shall be protected from inclement weather conditions.
- F. Verification of Conditions: Examine areas and conditions under which all work of this Section is being performed. Do not proceed with any work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.
- G. Site shall be secure to limit unauthorized personnel access and measures taken to protect all workers.
- H. Unanticipated Conditions: Notify the Engineer immediately upon finding evidence of previous structures, filled materials that penetrate below designated excavation levels, or other conditions



which are not shown or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the Engineer's instruction before proceeding with further work in such areas.

- I. The Project Superintendent shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

### 3.2 INSTALLATION LIMITATIONS.

- A. Installation shall not proceed when: Ambient air temperature is below 50 degrees F. material temperature is below 50 degrees F. and when rain is falling or pending, unless acceptable to qualified installers.
- B. Site conditions exist, or are pending, that will be unsuitable for the installation of the system.

### 3.3 SUBGRADE AND EARTHMOVING

- A. Establish required lines, levels, contours and datum. Contractor responsible for work shall coordinate and ensure that the final grades of subgrade, stone base and playing surface meet the established design requirements.
- B. Maintain all benchmarks and other elevation control points. Re-establish, if disturbed or destroyed, at no additional cost to the Owner.
- C. Locate all utilities before grading. Coordinate with the Owner.
- D. If groundwater levels are sufficiently high, provide pumps in sumps as required maintaining groundwater at a minimum depth of two feet below excavation bottom at all times. Maintain dry conditions until completion and acceptance of the base, prior to synthetic turf placement.
- E. Monitor groundwater during construction
- F. Prevent surface water from infiltrating and damaging the subgrade and stone base.
- G. There shall be no ponding on site at anytime.
- H. For all excavation requirements procedures refer to geotechnical report and Earthmoving specification.
- I. For all structural fill requirements and procedures refer to geotechnical report and Earthmoving specification.



### 3.4 SUBGRADE SLOPES AND FINAL GRADES

- A. Final subgrades shall conform to the lines and grades shown on the drawings. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.04 feet in 25 feet in any direction. Laser grading is required.
- B. Subgrade shall mirror the final finish elevation of the field surface in regards to slope except where noted on the drawings.
- C. All surfaces shall be graded to drain to drainage structures with no ponding. Grading tolerances given above do not relieve the Contractor from this requirement.
- D. All subgrade grades shown on the drawings shall be completed by the Contractor and inspected. If survey is required for finish grades all testing and special inspections shall be by the contractor
- E. The aggregate subbase will need to be inspected and accepted by the Engineer and Synthetic Turf Installer prior to synthetic turf installation.
- F. Playing Field Subgrade elevation verification: A certified survey by a State licensed land surveyor shall be performed at 25-foot centers for each field to verify grade and elevation of the subgrade. The survey shall indicate spot elevations and tenth of foot contours.

### 3.5 SUBSURFACE DRAINAGE

- A. All subsurface laterals shall be designed by contractor's engineer, and installed per manufacture recommendations.
- B. Only perform trenching, drainage pipe installation and backfilling operations that can be completed in one day. Exposed trenches that collapse due to rain or other occurrences shall be widened and filled as specified or refilled with subgrade materials, compacted, and retrenched.
- C. Lay perforated collector pipe in accordance with pipe manufacturer's recommendations. Provide collars and couplings as required for installation of this line and for connection with panel drains.
- D. Lateral drain lines size to be determined by manufacture recommendations
- E. Laterals shall be buried in a pea gravel like materials
- F. Laterals shall have a minimum of 3" of clean materials below the pipe, above subgrade materials.
- G. Lateral lines shall NOT, be covered by a geotextile fabric. If geotextile is required by permitting, it shall only be on sides, and bottom of lateral line trench. Covering of top of lateral drainage trench shall not be permitted.



- H. Connect panel drains to collector/header piping using panel drain manufacturer provided fittings, per manufacturer instructions and as shown on drawings.
- I. All panel drains shall be attached to form a continuous drain. Refer to manufacture specifications regarding connection procedures and requirements for panel drain field connections.
- J. Collector drains shall be installed per the slopes designed by the contractors' engineer. Pipes shall be installed, connected and fully mudded into any and all catch basins, or drop boxes designed.
- K. All pipes shall be installed per slopes and grades shown on contractors approved plans, shop drawings, and permitted drawings.
- L. Remove all spoils associated with trenching offsite at contractor's expense.

### 3.6 TURF NAILER

- A. A composite synthetic 2" x 4", TREX, PolyTuf HDPE or equivalent nailing strip shall be used.
- B. Specifications and shop drawings for nailer and anchors shall be submitted Synthetic Turf Manufacturer (STM) for review and approval prior to contractor installation.
- C.

### 3.7 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- C. After installation of the concrete curbing the contractor shall install the nailer, prior to final placement of the top stone rock for synthetic turf base.
- D. Nailer shall be installed using concrete anchors as specified by the Synthetic Turf Manufacturer (STM)
- E. Nailer shall be anchored at both end of board, and every 2' along entire length of product installed.
- F. Nailer shall be installed to an approved dimension below grade, as specified by the synthetic turf carpet supplier. Contractor shall verify finish grade of nailer with turf contractor.



- G. Any anchors that do not fully drive into concrete shall be removed and new anchor installed adjacent on either side of the previous anchor that failed to install fully

### 3.8 CONCRETE CURBING

- A. Clean existing concrete surfaces thoroughly before placing abutting fresh concrete.
- B. Concrete curbing for synthetic turf shall be per plan details. Finish shall be medium broom.
- C. Concrete curbing shall have appropriate control, expansion and construction joints installed per details.
- D. All curbing adjacent to walls and buildings shall have expansion joints.

### 3.9 GEOTEXTILE FABRIC

- A. The geotextile shall be laid smooth without wrinkles or folds on the prepared subgrade in the direction of construction traffic.
- B. Adjacent geotextile rolls shall be overlapped. Overlaps shall be in the direction as shown on the plans and in accordance with the manufacturer's requirements. The lateral seam shall have a minimum overlap of 24"
- C. Dimensions to be a minimum width of 10' and minimum continuous length of 150'
- D. Attached to subgrade per manufacture specifications/recommendation.

### 3.10 SUBGRADE ESTABLISHMENT

- A. The subgrade shall be excavated to create a positive slope towards the subsurface drainpipes at greater than .5% for the outdoor field.
- B. No work shall be completed in this section until subgrade is 100% completed and accepted by the Civil Engineer and Owner or their representative.
- C. Following rough grading of the subgrade, the exposed soil shall be moisture conditioned to near the optimum moisture content and compacted to at least 90 percent relative compaction (modified proctor) to produce a firm non-yielding surface.
- D. Subgrade after compaction and inspection shall be covered with an approved geotextile fabric between all drain line locations. Fabric shall be non-woven, and be approved.
- E. Loaded trucks shall not be permitted to drive over fabric surface until the base aggregate has been placed accordingly.



- F. All aggregate layers to compacted to a minimum 95% of maximum dry density compaction rates.

### 3.11 SITE PREPARATION

- A. The Contractor shall strip all debris and organic matter from areas to be graded for the synthetic turf base.
- B. All drain line spoils shall be removed from subgrade and all subgrade areas shall be rolled and compacted to 90% and compaction test results submitted to Synthetic Turf Contractor, Owner and Civil Engineer for approval and for the records.

### 3.12 COMPACTED FILL

- A. Place and compact approved fill material in accordance with the specifications and drawings.
- B. No fill shall be compacted during periods of rain or on ground that is saturated or has standing water. Soil that has been over-saturated by rain or any other means shall not be used until the moisture content is within limits required by the Owner and Engineer

### 3.13 PERMEABLE BASE AND TOP STONE

- A. The specified base stone shall be carefully placed and compacted over the subgrade and/or drainpipe to the grades and elevations shown on the drawings. If the thickness of the planned base stone exceeds 6 inches, the stone shall be placed in horizontal layers not to exceed 6 inches and each layer proof rolled to 95 percent relative compaction (modified proctor) with vibratory smooth drum roller. Testing shall be done using the nuclear method.
- B. Moisture Content of the stone shall be 4% - 7% of dry weight to ensure no migration of fines during transport and installation. Installation of base stone shall not be permitted during periods of heavy rainfall or moisture. Segregation of fines during transport and stockpiling. will not be acceptable. Field specialty contractor is to apply water during construction to keep proper moisture content. In case of inclement weather contractor is to protect stone already on site and in place to ensure fines do not wash out of materials. This means covering all work with visquine and sandbags or other means to keep visquine in place during weather.
- C. Each layer of materials shall be uniformly spread and not move more than 10' from location of import onto site. Any rock materials that are seen to have been worked more than once with equipment shall be removed.
- D. Base stone for the synthetic field shall be placed to a 6" compacted thickness. Unless otherwise indicated on drawings.



- E. Top stone for the synthetic turf field to be 2" compacted depth. Approval of the subgrade fill materials shall be completed and tested for compaction prior to any work being done in this area.
- F. Finished surface shall be proof rolled with a vibratory smooth double drum roller to provide a non-yielding, smooth, flat surface. Compaction must be to 95%-modified proctor. Modified proctor testing per current ASTM standards is required. Submit testing procedure to geotechnical engineer for approval.
- G. Final crushed rock base grades shall conform to the lines and grades shown on the drawings. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.04 feet in 25 feet in any direction. Laser grading is required.
- H. The top surface of the base stone shall be flat from the centerline toward the sideline as shown on the drawings.
- I. All base stone grades shown on the drawings shall be completed by the Contractor and inspected by the Civil Engineer and synthetic turf representative prior to commencing with the subsequent work items.
- J. Both base stone and finish stone is subject to Testing for Water Permeability of Synthetic Turf Systems and Permeable Bases (ASTM F1551) at six (6) locations on the outdoor field.

### 3.14 PERMEABILITY REQUIREMENTS

- A. All systems collectively shall drain vertically a minimum of 30" rain per hour with no signs of visible ponding.

### 3.15 SYNTHETIC TURF

- A. Synthetic turf shall be loose laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation.
- B. Turf panels shall either be glued or sewn together.
- C. Glued Seams: Panels glued together at the seams using the latest state of the art procedures approve by the manufacturer. Seams shall be adhered using reinforcing tape and high-grade adhesive approved by the manufacturer. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field. Seams shall be flat, tight, and permanent with no separation or fraying.
- D. Sewn Seams: Utilizing standard state of the art sewing procedures, each roll shall be attached to the next. Each seam will be stitched using cord as approved by the manufacturer. When all of the rolls of the playing surface have been installed, the sideline areas may be installed at right angles to the playing field turf



3.16 REPAIR MATERIALS, GROOMER AND SWEEPER

- A. Upon Final Acceptance, the turf Contractor shall provide to the Owner the Following items in the minimum quantities specified:
- B. 1 Super Sack (3,000 lbs) of SBR Rubber Infill
- C. 1 Super Sack (3,000 lbs) of Sand Infill
- D. 500 SF of attic stock of base field green turf.
- E. 200 LF of seaming tape and epoxy
- F. **Supply one (1) REDEXIM VERTI TOP 1800 with Vacuum Attachment.** Prior to ordering confirm that this machine is acceptable to the selected sport field manufacturer's specifications and recommendations for turf maintenance and warranty requirements.
- G. Provide specifications for type of field utility vehicle tires allowed on the field. Includes this provision in the warranty.

3.17 MAINTENANCE TRAINING

- A. The Sports Field Manufacturer will be responsible for training the Owners selected personnel regarding the maintenance and upkeep of the field upon completion. The Sports Field Contractor is responsible for scheduling this event and obtaining written confirmation and acceptance of the scheduled time from the owner.

3.18 REQUIRED PERFORMANCE G-MAX AND HIC TESTING

- A. At Final Acceptance and 1 year after, 3 years after, 5 years after, 7 years after and 8 years after the Final Acceptance date, the Sports Field Manufacturer shall, as specified, hire an independent testing laboratory to perform G-max testing 9ASTM 355, 1936 method, and HIC EN 1177 testing at a minimum of 8 locations per field, including heavy wear areas to verify that the chock attenuation properties of the field meet the requirements set forth in this specification.
- B. The Owner reserves the right to have the field tested for shock attenuation at its own cost at anytime it deems necessary. If at anytime the G-max ranges reach unacceptable levels, it is the responsibility of the Sports Field Contractor to bring the field back into the required ranges at no cost to the Owner.
- C. At any time, should the Sports Field Contractor fail to provide an independent third party Gmax test that confirms an average G-max value of 125G or lower, then the Sports Field Contractor will be solely responsible for the remove and dispose of the existing field surface, and the full installation of a new synthetic turf playing surface that meets all the specifications of the original bid documents and is independently tested to be safe by the original Gmax-Shock Attenuation requires as listed within this section.



INDOOR PRACTICE FACILITY  
EAST CAROLINA UNIVERSITY, GREENVILLE, NC  
SCO ID# 23-26345-01A  
AIM # 1752

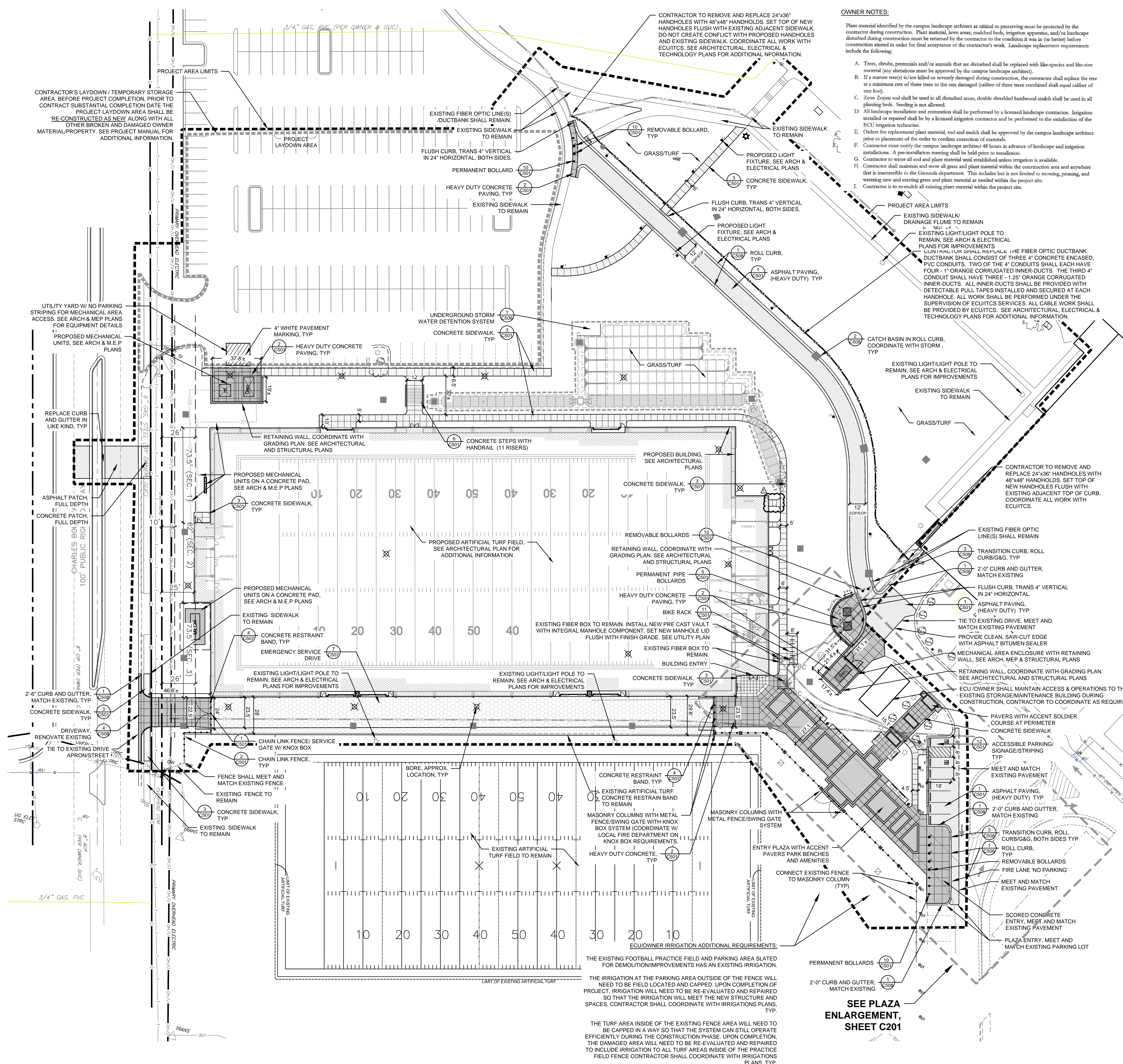
- D. Submit three (3) copies of the test report findings to the Owner at the completion of each test.

END SECTION 32 18 23.19









- GENERAL NOTES**
- SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
  - SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.

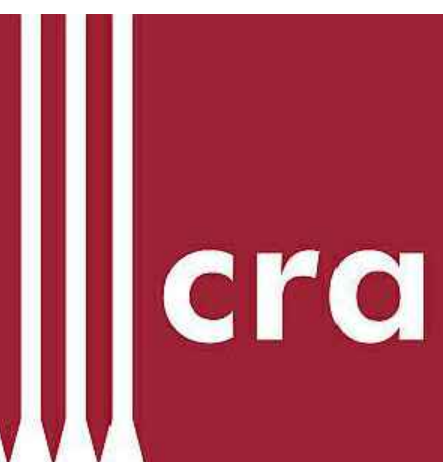
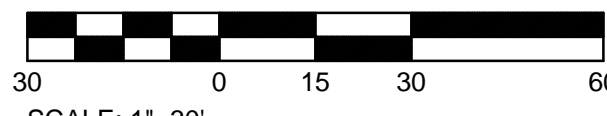
- OWNER NOTES:**
- Plant material identified by the campus landscape architect as critical to preserving must be protected by the contractor during construction. Plant material, lawn areas, mulched beds, irrigation apparatus, and/or landscape disturbed during construction must be returned by the contractor to the condition it was in (or better) before construction started in order for final acceptance of the contractor's work. Landscape replacement requirements include the following:
- Trees, shrubs, perennials and/or annuals that are disturbed shall be replaced with like-species and like-size material (any alterations must be approved by the campus landscape architect).
  - If a mature tree(s) is/are killed or severely damaged during construction, the contractor shall replace the tree at a minimum rate of three trees to the one damaged (either of three trees combined shall equal caliber of tree lost).
  - Zeon Zoysia sod shall be used in all disturbed areas, double shredded hardwood mulch shall be used in all planting beds. Seeding is not allowed.
  - All landscape installation and restoration shall be performed by a licensed landscape contractor. Irrigation installed or repaired shall be by a licensed irrigation contractor and be performed to the satisfaction of the ECU irrigation technician.
  - Orders for replacement plant material, sod and mulch shall be approved by the campus landscape architect prior to placement of the order to correct correction of materials.
  - Contractor must notify the campus landscape architect 48 hours in advance of landscape and irrigation installations. A pre-installation meeting shall be held prior to installation.
  - Contractor to water all sod and plant material until established unless irrigation is available.
  - Contractor shall maintain and mow all grass and plant material within the construction area and anywhere that is accessible to the Grounds department. This includes but is not limited to mowing, pruning, and watering new and existing grass and plant material as needed within the project site.
  - Contractor is to re-much all existing plant material within the project site.

- SITE NOTES:**
- DIMENSIONS AND COORDINATE POINTS ARE TO FACE OF CURB, EDGE OF PAVEMENT, OR CORNER OF BUILDING UNLESS OTHERWISE NOTED.
  - ALL IMPROVEMENTS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH STATE AND LOCAL STANDARDS.
  - ANY DISCREPANCIES FOUND IN THE FIELD SHALL BE CALLED TO THE ATTENTION OF THE OWNER OR ENGINEER PRIOR TO PROCEEDING WITH WORK.
  - PRIOR TO BEGINNING CONSTRUCTION, UNLESS OTHERWISE PROVIDED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS (BOTH SITE AND BUILDING RELATED) INCLUDING BUT NOT LIMITED TO REGULATORY FEES, LICENSES, AND INSPECTIONS NECESSARY FOR PROPER EXECUTION AND COMPLETION OF THE WORK.
  - THE GENERAL CONTRACTOR SHALL CONTACT ALL OWNERS OF EASEMENTS, UTILITIES, AND RIGHT-OF-WAYS, PUBLIC AND PRIVATE, PRIOR TO WORKING IN THESE AREAS.
  - GENERAL CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKMEN AND THE PUBLIC SHALL BE PROTECTED FROM INJURY.
  - SIGHT TRIANGLES SHOWN ARE THE MINIMUM REQUIRED.
  - USE CAUTION WHEN REPRODUCING COPIES OF THE CONSTRUCTION DRAWINGS. COPIES ARE SUBJECT TO DISTORTION AND INACCURACY IN THE SCALE OF DRAWINGS. VERIFY ANY DISCREPANCIES WITH SITE SOLUTIONS.
  - ALL SIGNS, PAVEMENT MARKINGS, AND OTHER TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST EDITION AS AMENDED.
  - ALL PAVEMENT MARKINGS SHALL BE FOUR (4) INCHES WIDE UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
  - CONTRACTOR SHALL FURNISH AND INSTALL ALL PAVEMENT MARKINGS AS SHOWN ON THE PLANS.
  - CONTRACTOR SHALL SAW-CUT EXISTING ASPHALT PAVEMENT AREAS TO TIE IN SMOOTHLY TO PROPOSED PAVEMENT AT DRIVEWAY ENTRANCES.
  - THE ENGINEER WILL PROVIDE THE CONTRACTOR WITH AN ELECTRONIC FILE OF THESE DRAWINGS IF REQUESTED. GENERAL CONTRACTOR MUST EXECUTE RELEASE FOR BENESCH. DISTRIBUTION OF ELECTRONIC FILES TO SUPPLIERS AND SUB CONTRACTORS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.
  - SITE INSPECTOR MAY REQUIRE ADDITIONAL VEGETATION TO SCREEN PARKING IF UPON SITE VISIT IF IT IS DETERMINED THAT EXISTING VEGETATION AND TOPOGRAPHY DO NOT ADEQUATELY SCREEN PARKING.
  - GENERAL CONTRACTOR TO CONTACT THE UTILITY COMPANY TO RELOCATE ANY EXISTING UTILITY POLES. ALL EXISTING FACILITIES WHICH CONFLICT WITH THE IMPROVEMENTS UNDER THE SCOPE OF THIS PROJECT MUST BE RELOCATED AT THE EXPENSE OF THE CONTRACTOR.
  - STOP BEFORE YOU DIG. CALL 811. IT'S THE LAW.
  - HEAVY DUTY PAVEMENT SHOWN ON THIS PLAN IS CAPABLE OF SUPPORTING AN 80,000 LB FIRE TRUCK.

- SITE DATA:**
- PARCEL ID:  
P1) 16151  
P2) 28890  
P3) 37970
  - PROJECT ADDRESS:  
1803 CHARLES BLVD  
GREENVILLE, NC 27858
  - OWNER:  
EAST CAROLINA UNIVERSITY  
200 E FIRST STREET  
GREENVILLE, NC 27858
  - ZONING - OR: OFFICE-RESIDENTIAL
  - PARCEL ACREAGE: 57.33 AC TOTAL  
P1) 2.3 AC  
P2) 36.57 AC  
P3) 18.46 AC
  - BUILDING SETBACKS:  
(ALL OTHER USES)  
FRONT: 10' (AND PER ARTICLE G  
SIDE: PER ARTICLE G  
REAR: PER ARTICLE G
  - MAX BUILDING HEIGHT:  
(ALL OTHER USES)  
MAX. HEIGHT: 90 FEET  
PROP. HEIGHT: 74 FEET (+/-)
  - BUILDING SIZE:  
90,170 SF FOOTPRINT
  - PARKING:  
LOCALITY OF GREENVILLE PARKING SCHEDULE, SECTION 9-4-252  
USE: ATHLETIC, SPORTS, RECREATION, OR SIMILAR  
1 SPC PER 300 STORAGE FEET OF NON-STORAGE AREA, PLUS 1  
SPACE PER EMPLOYEE, PLUS REQUIRED SPC FOR ASSOCIATED USES  
SUCH AS LOUNGES, RESTAURANTS AND A LIKE.  
BUILDING AREA 90,170 SF  
STORAGE AREA 5,200 SF  
FULL TIME EMPLOYEE N/A  
ASSOCIATED USES N/A  
84,970 SF @ 1 PER 300 = 283 SPC  
REQUIRED: 283 SPC  
PROVIDED: 283 SPC (LOCATED ON CAMPUS ADJACENT TO THE FACILITY)
  - BUFFERYARD REQUIREMENTS:  
BUFFERYARD A - 10 FEET MINIMUM, OR BUFFERYARD FORMULA, WHICHEVER IS GREATER  
FOR STRUCTURES GREATER THAN 35 FEET IN HEIGHT:  
(BUFFERYARD FORMULA)  
USE  $D = 6 + 2(S) + L/10$   
(S = # OF STORIES OR 12)  
(L = LENGTH OF WALL)  
SECTION 1:  
 $D = 6 + 2(74/12) + L / 73.5'$   
D = 25.68'  
BUFFERYARD = 26 FEET  
PROVIDED: 37.5 FEET  
SECTION 2:  
 $D = 6 + 2(74/12) + L / 62'$   
D = 24.53'  
BUFFERYARD = 25 FEET  
PROVIDED: 25 FEET  
SECTION 3:  
 $D = 6 + 2(74/12) + L / 73.5'$   
D = 25.68'  
BUFFERYARD = 26 FEET  
PROVIDED: 37.5 FEET  
10. CITY OF GREENVILLE SITE PLAN SUBMITTAL REQUIRED.



Know what's below.  
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Alfred Benesch & Company  
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Wilmington, NC 28403  
www.benesch.com  
P: 910.344.0143

BENESCH PROJECT #17000586  
Corp. NC License: F-1320



BID SET  
NOT FOR CONSTRUCTION

New Indoor  
Training Facility  
East Carolina University  
Greenville, NC

SCO ID# 23-26345-01A



REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/09/2025

The use of these plans and specifications shall be restricted to the original and purpose for which they were prepared and no reproduction, modification, or publication by any method, in whole or in part, is permitted without the express written consent of the engineer. The user of these plans and specifications shall constitute prima facie evidence of the acceptance of the foregoing.

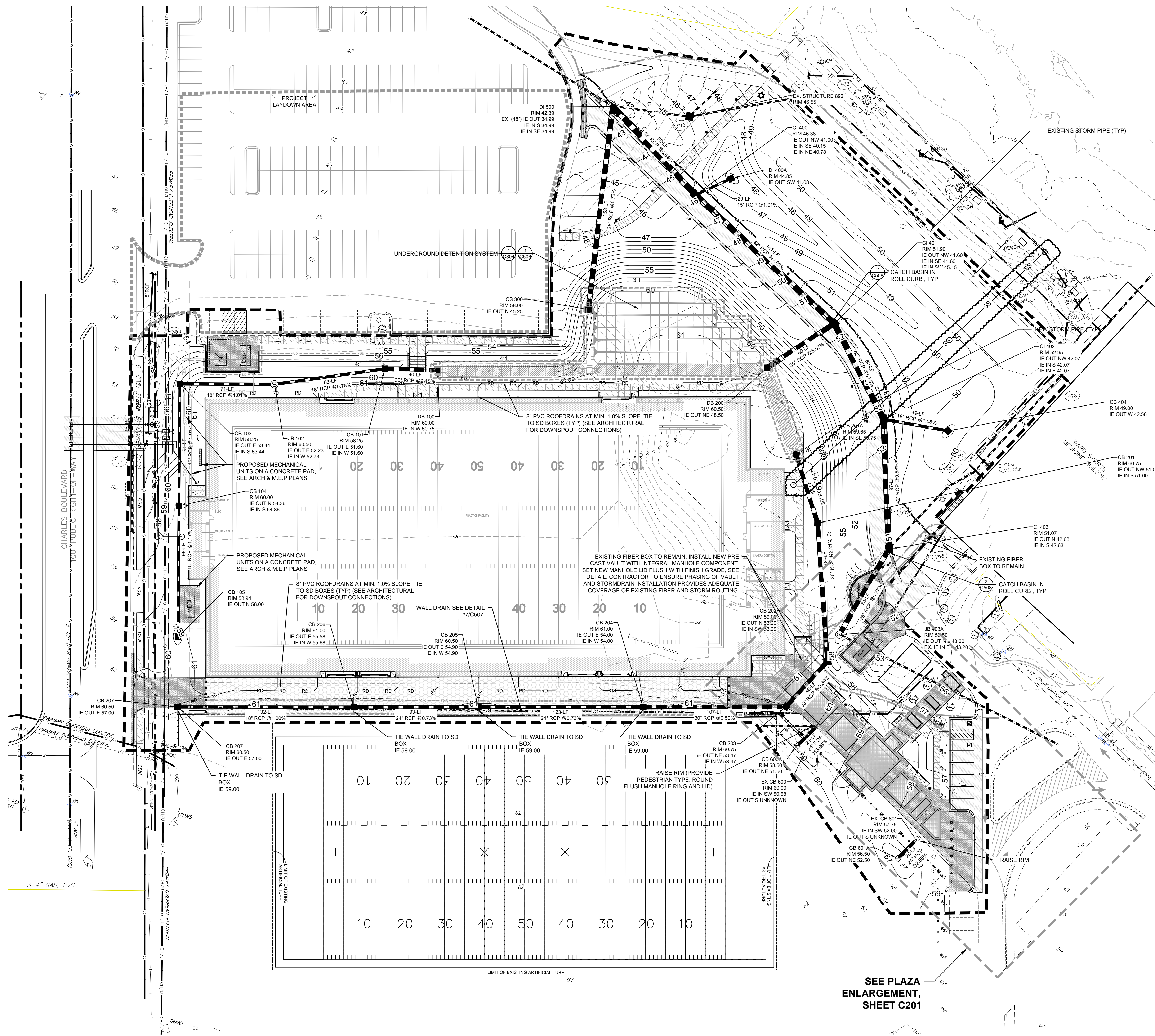
SITE PLAN

SHEET

C200

DATE 01/10/2025 PROJECT NO. 2228





#### GENERAL NOTES

1. SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
2. SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.

#### STORMWATER NOTES

1. WATERSHED: TAR-PAMLICO
2. RECEIVING STREAM: GREENS MILL RUN TO TAR RIVER
3. STREAM CLASS: C, NSW
4. STREAM INDEX: 28-96
5. THERE ARE NO KNOWN WETLANDS OR SURFACE WATERS WITHIN THE PROJECT AREA.

#### PRE-DEVELOPMENT IMPERVIOUS AREA

BUILDINGS: 1,046 SF (0.03 AC)  
PARKING/DRIVES: 9,565 SF (0.18 AC)  
SIDEWALKS: 13,144 SF (0.21 AC)  
TURF: 88,304 SF (2.06 AC)  
COURTS: 49,395 SF (1.13 AC)

**TOTAL:** 161,454 SF (3.71 AC)  
**TOTAL PROP. AREA:** 276,418 SF (6.35 AC)  
**% IMPERVIOUS:** 58.4%

#### POST-DEVELOPMENT IMPERVIOUS AREA

BUILDINGS: 88,507 SF (2.03 AC)  
PARKING/DRIVES: 24,606 SF (0.57 AC)  
SIDEWALKS: 24,323 SF (0.56 AC)  
TURF: 20,082 SF (0.46 AC)

**TOTAL:** 157,518 SF (3.62 AC)  
**TOTAL PROP. AREA:** 276,418 SF (6.35 AC)  
**% IMPERVIOUS:** 57.0%

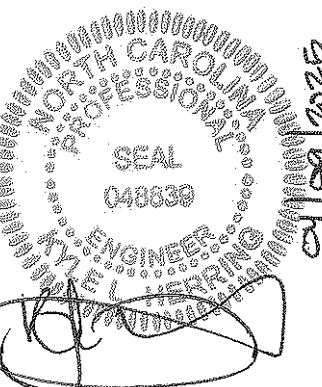


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BENESCH PROJECT #17000586  
Corp. NC License: F-1320



BID SET  
NOT FOR CONSTRUCTION

**New Indoor Training Facility**  
East Carolina University  
Greenville, NC

SCO ID# 23-26345-01A

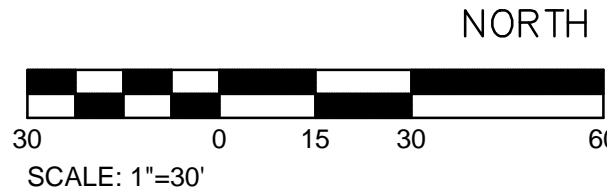


REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/09/2025

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STORMDRAIN  
PLAN

SHEET

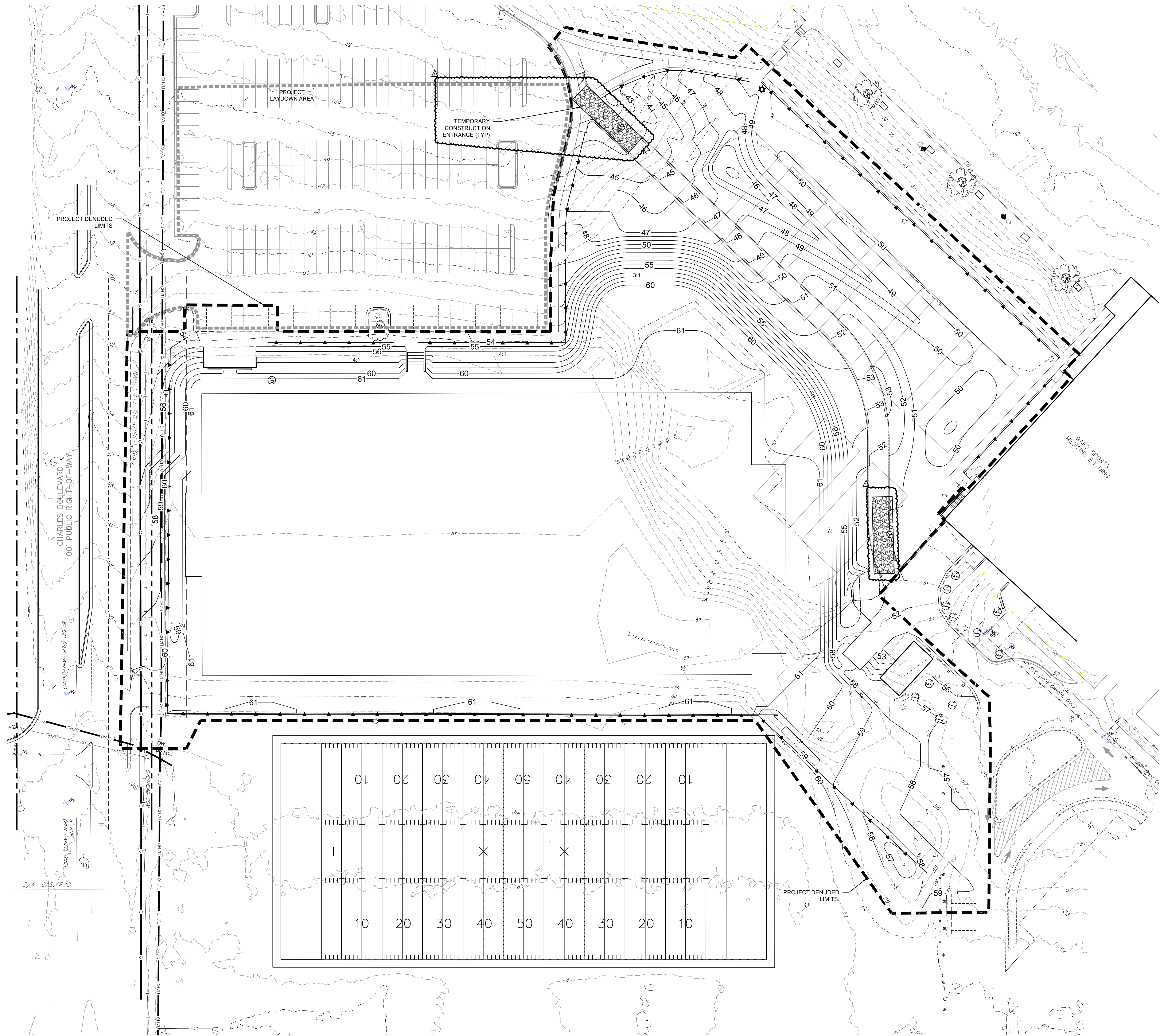
C300

DATE: 01/10/2025 PROJECT NO.: 2228









GENERAL NOTES

- SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
- SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.

LIMITS OF DISTURBANCE: 6.0 AC

CONSTRUCTION SEQUENCE

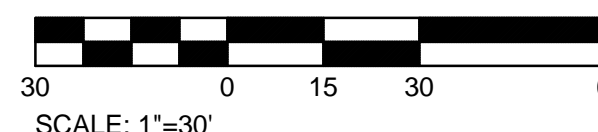
- OBTAIN GRADING/EROSION CONTROL PLAN APPROVAL FROM NCDEQ.
- CONTRACTOR TO SET UP A ON-SITE PRE-CONSTRUCTION CONFERENCE AND PROVIDE MIN 72 HOURS NOTICE OF THE MEETING TO THE ENGINEER AND NCDEQ.
- FLAG LIMITS OF LAND DISTURBANCE.
- INSTALL SILT FENCE, INLET PROTECTION, SEDIMENT TRAPS, DIVERSION DITCHES, TREE PROTECTION, AND OTHER MEASURES AS SHOWN ON PLANS, CLEARING ONLY AS NECESSARY TO INSTALL THESE DEVICES.
- ROUGH GRADE SITE, STOCKPILE TOPSOIL, INSTALL DRAINAGE PIPE, INSTALL INLET AND OUTLET PROTECTION, AND CONSTRUCT DITCHES AS SHOWN.
- THE CONTRACTOR SHALL DILIGENTLY AND CONTINUOUSLY MAINTAIN ALL EROSION CONTROL DEVICES AND STRUCTURES.
- STABILIZE SITE AS AREAS ARE BROUGHT TO FINISHED GRADE.
- INSTALL ANY ADDITIONAL SILT FENCE THAT MAY NOT BE SHOWN BUT MAY BE NEEDED.
- FINE GRADE SITE. PLACE TOPSOIL. IMMEDIATELY PROVIDE PERMANENT VEGETATION AS SHOWN IN THE SPECIFICATIONS OR ON THE DRAWINGS.
- REMOVE ANY REMAINING SEDIMENT FROM THE PROJECT SITE AND DISPOSE OF IN ACCORDANCE WITH ALL LOCAL STATE AND FEDERAL REGULATIONS.
- COORDINATE WITH EROSION CONTROL INSPECTOR PRIOR TO REMOVAL OF EROSION CONTROL MEASURES.
- ALL EROSION CONTROL MEASURES SHALL BE CONSTRUCTED WITH THE N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL AND U.S. DEPT. OF AGRICULTURE.

INSPECTION REQUIREMENTS:

- ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES, INCLUDING SEDIMENTATION CONTROL BASINS, SEDIMENTATION TRAPS, SEDIMENTATION PONDS, ROCK DAMS, TEMPORARY DIVERSIONS, TEMPORARY SLOPE DRAINS, ROCK CHECK DAMS, SEDIMENT FENCE OR BARRIERS, ALL FORMS OF INLET PROTECTION, STORM DRAINAGE FACILITIES, ENERGY DISSIPATORS, STABILIZATION METHODS OF OPEN CHANNELS, AND GROUND COVER SHALL BE INSPECTED BY THE OWNER OR DESIGNATED REPRESENTATIVE.
- THE DIMENSIONS OF THE BASINS SHALL BE CHECKED AND COMPARED TO THE DIMENSIONS ON THE APPROVED SEDIMENTATION AND EROSION CONTROL PLAN. NOTIFY SITE SOLUTIONS IF THE DIMENSIONS OF ANY OF THE EROSION CONTROL MEASURES DEVIATE FROM THE PLANS.
- A 'SELF-INSPECTION REPORT FORM FOR LAND DISTURBING ACTIVITY' (AS REQUIRED BY NCGS 113A-54.1) IS PROVIDED WITHIN THE SPECS. ALTERNATIVELY THE OWNER OR DESIGNATED REPRESENTATIVE COMPLETING TRY MAKE NOTATIONS ON THE COPY OF THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN THAT IS KEPT ON THE PROJECT SITE. DOCUMENTATION SHALL BE ACCOMPLISHED BY INITIALING AND DATING EACH MEASURE OR PRACTICE SHOWN ON A COPY OF THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN OR BY COMPLETING, DATING AND SIGNING AN INSPECTION REPORT THAT LISTS EACH MEASURE, PRACTICE OR DEVICE SHOWN ON THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN. ALL DOCUMENTATION AND/OR REPORTS OF INSPECTIONS MUST BE MADE AVAILABLE ON THE SITE.
- THE SELF-INSPECTION REPORT IS TO BE COMPLETED AFTER EACH PHASE OF THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN IS COMPLETE. THESE PHASES APPLY FOR THIS PROJECT:
  - INSTALLATION OF PERIMETER EROSION AND SEDIMENT CONTROL MEASURES;
  - CLEARING AND GRUBBING OF EXISTING GROUND COVER;
  - COMPLETION OF ANY PHASE OF GRADING OF SLOPES OR FILLS;
  - INSTALLATION OF STORM DRAINAGE FACILITIES;
  - COMPLETION OF CONSTRUCTION OR DEVELOPMENT;
  - ESTABLISHMENT OF PERMANENT GROUND COVER SUFFICIENT TO RESTRAIN EROSION.

EROSION CONTROL NOTES:

- SOIL STABILIZATION SHALL BE IMPLEMENTED PER THE CONSTRUCTION SEQUENCE NOTES.
- ADDITIONAL MEASURES TO CONTROL EROSION AND SEDIMENT MAY BE REQUIRED BY A REPRESENTATIVE OF NCDENR STAFF. ANY LAND-DISTURBING ACTIVITY >1 ACRE REQUIRES COMPLIANCE WITH ALL CONDITIONS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (PERMIT NO.NC0010000). ANY PERMIT NONCOMPLIANCE IS A VIOLATION OF THE CLEAN WATER ACT AND MAY REQUIRE ENFORCEMENT ACTION BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES.
- ANY OFF-SITE BORROW AND WASTE REQUIRED FOR THIS PROJECT MUST COME FROM A SITE WITH AN APPROVED EROSION CONTROL PLAN, A SITE REGULATED UNDER THE MINING ACT OF 1971, OR A LANDFILL REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT. TRASH/DEBRIS FROM DEMOLITION ACTIVITIES OR GENERATED BY ANY ACTIVITIES ON SITE MUST BE DISPOSED OF AT A FACILITY REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT OR PER DIVISION OF SOLID WASTE MANAGEMENT OR DIVISION OF WATER RESOURCES RULES AND REGULATIONS. (15A NCAC 4B .0110)
- DISTURBED AREAS DRAINING GREATER THAN ONE ACRE MUST HAVE AN EROSION CONTROL MEASURE THAT DRAINS FROM THE WATER SURFACE ELEVATION.
- REQUIRED ARMY CORPS 404 PERMIT AND WATER QUALITY 401 CERTIFICATION MUST BE OBTAINED FOR STREAM DISTURBANCES OVER 150 LINEAR FEET.
- ANY BORROW OR WASTE MATERIAL SHALL BE TAKEN/PLACED ON A SITE THAT HAS AN ACTIVE APPROVED EROSION & SEDIMENTATION CONTROL PERMIT. IF THIS IS NOT OBTAINABLE, THEN CONTRACTOR MAY SUBMIT PLAN FOR APPROVAL TO NCDENR PRIOR TO ANY OFF-SITE BORROW/WASTE AREAS BEING DENUDED AND ANY GRADING OPERATIONS STARTING ON THIS SITE.
- ANY GRADING BEYOND THE DENUDED LIMITS SHOWN ON THE PLAN IS A VIOLATION OF THE NCDENR EROSION CONTROL ORDINANCE AND IS SUBJECT TO A FINE.
- GRADING MORE THAN ONE ACRE WITHOUT AN APPROVED EROSION CONTROL PLAN IS A VIOLATION OF THE NCDENR EROSION CONTROL ORDINANCE AND IS SUBJECT TO A FINE.
- SLOPES SHALL BE GRADED NO STEEPER THAN 2:1. FILL SLOPES GREATER THAN 10' REQUIRE ADEQUATE TERRACING.
- TEMPORARY DRIVEWAY PERMIT FOR CONSTRUCTION ENTRANCES IN NCDOT RIGHT OF WAY MUST BE PRESENTED AT PRE-CONSTRUCTION MEETING.
- TOTAL DENUDED AREA: 5.88 ACRES
- SOIL TYPES: BIBB COMPLEX (Bb), CRAVEN FINE LOAMY SAND (C1c), OCILLA LOAMY FINE SAND (OcB), WAGRAM LOAMY SAND (WaB)
- NAME OF RECEIVING STREAM: GREENS MILL RUN
- CLASSIFICATION OF RECEIVING STREAM: C:NSW
- RIVER BASIN: TAR-PANILICO
- ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES AND ALL SLOPES STEEPER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1) SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 7 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY. ALL OTHER DISTURBED AREAS SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 14 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.

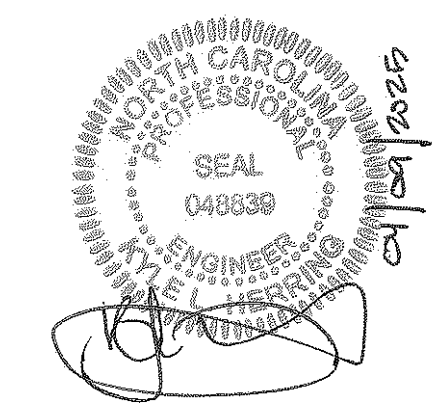


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New Indoor  
Training Facility  
East Carolina University  
Greenville, NC  
SCO ID# 23-26345-01A



REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/03/2025

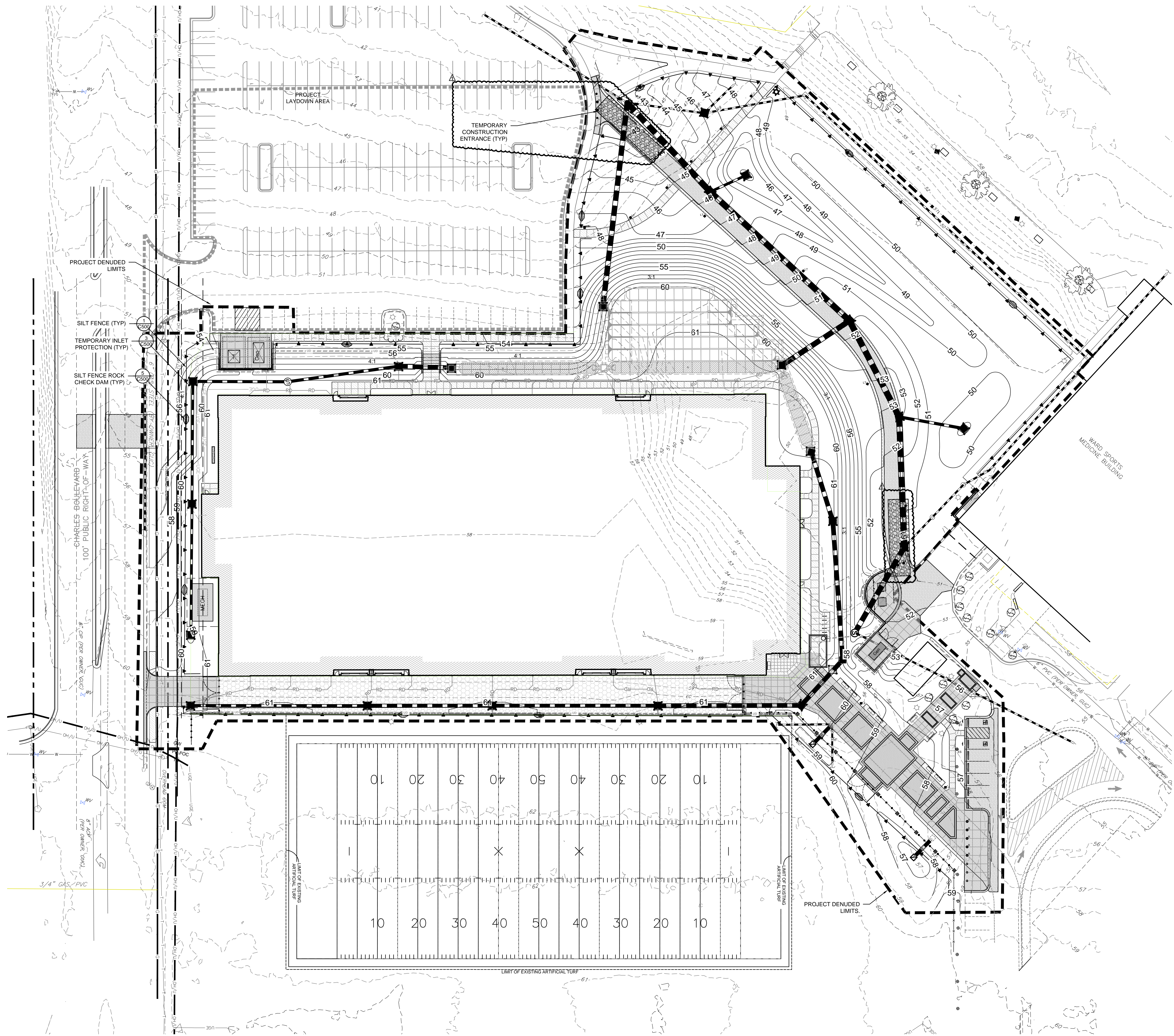
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EROSION  
CONTROL PLAN  
INITIAL

SHEET  
C302

DATE  
01/10/2025  
PROJECT NO.  
2228





GENERAL NOTES

- SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
- SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.

LIMITS OF DISTURBANCE: 2.8 AC

CONSTRUCTION SEQUENCE:

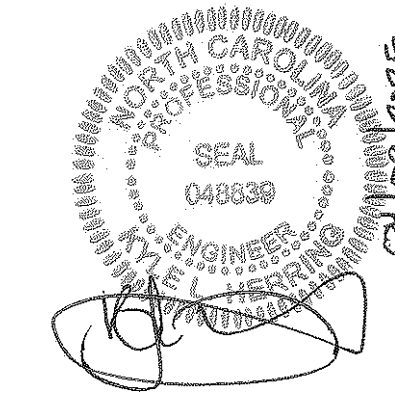
- OBTAIN GRADING/EROSION CONTROL PLAN APPROVAL FROM NCDEQ.
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- ROUGH GRADE SITE, STOCKPILE TOPSOIL, INSTALL DRAINAGE PIPE, INSTALL INLET AND OUTLET PROTECTION, AND CONSTRUCT DITCHES AS SHOWN.
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New Indoor  
Training Facility  
East Carolina University  
Greenville, NC  
SCO ID# 23-26345-01A



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No.	Description	Date
1	ADDENDUM #1	04/09/2025

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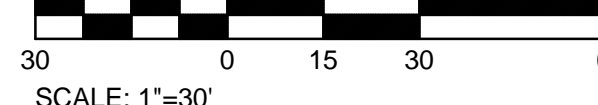
EROSION  
CONTROL PLAN  
POST

SHEET  
C303

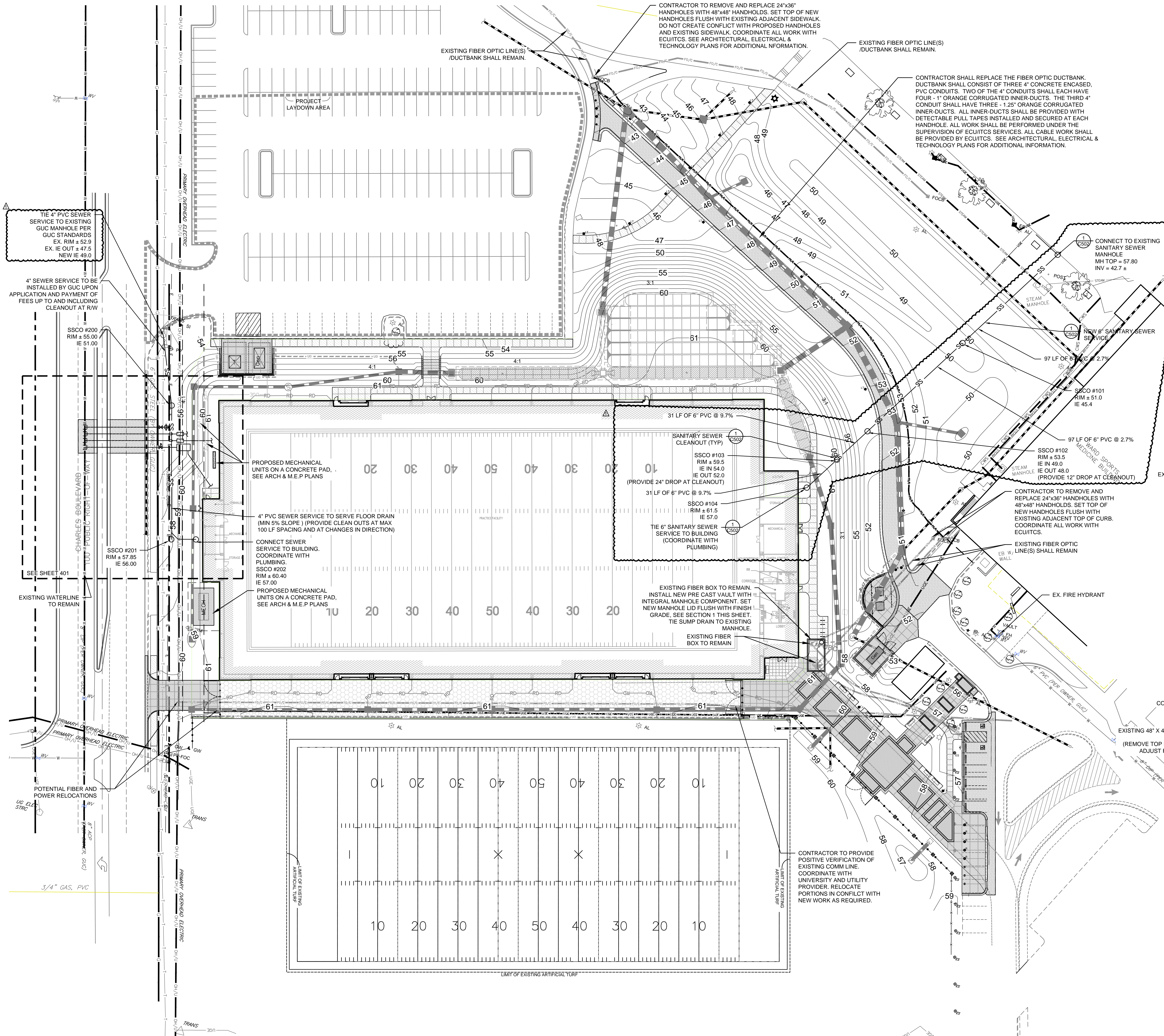
DATE  
01/10/2025  
PROJECT NO.  
2228



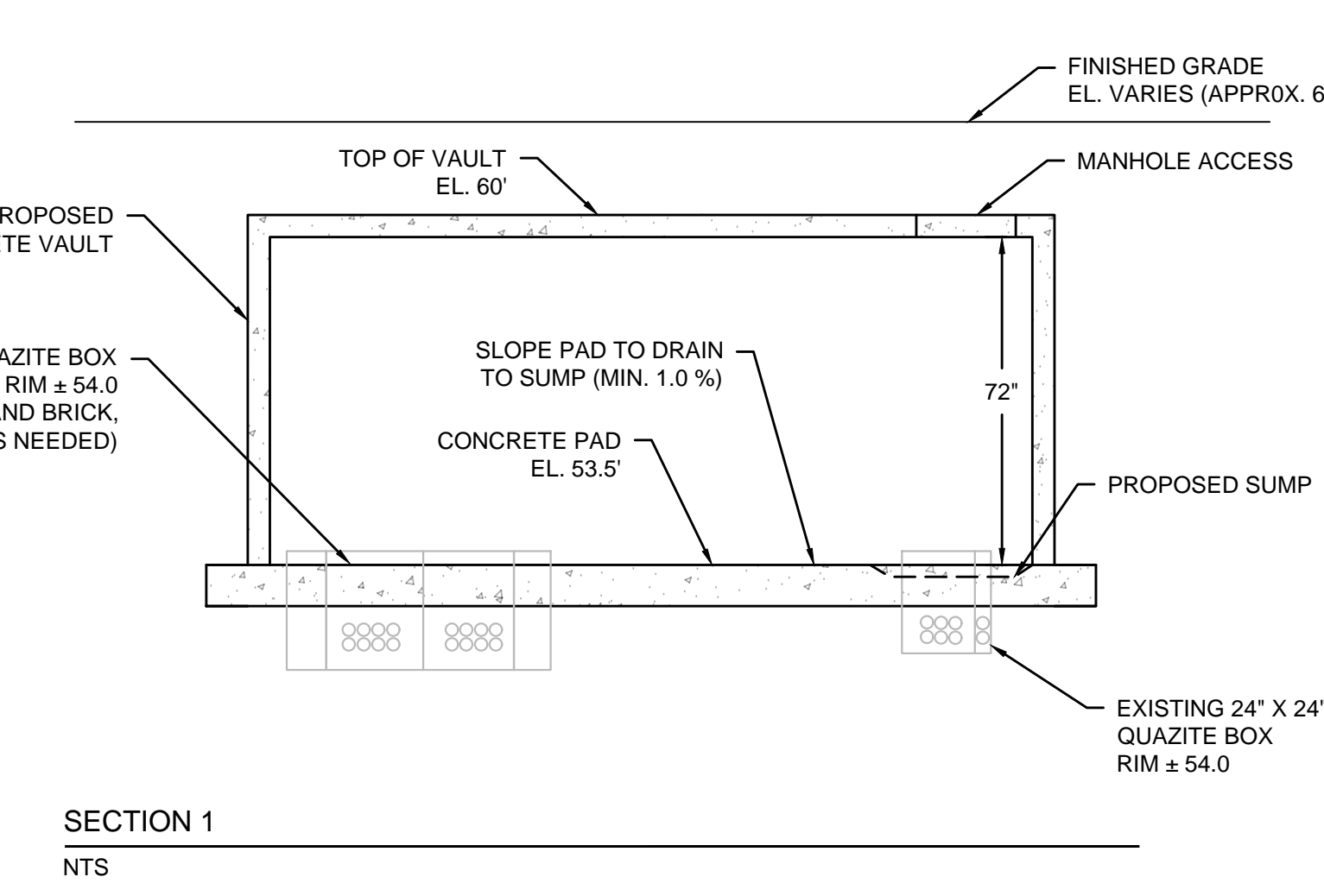
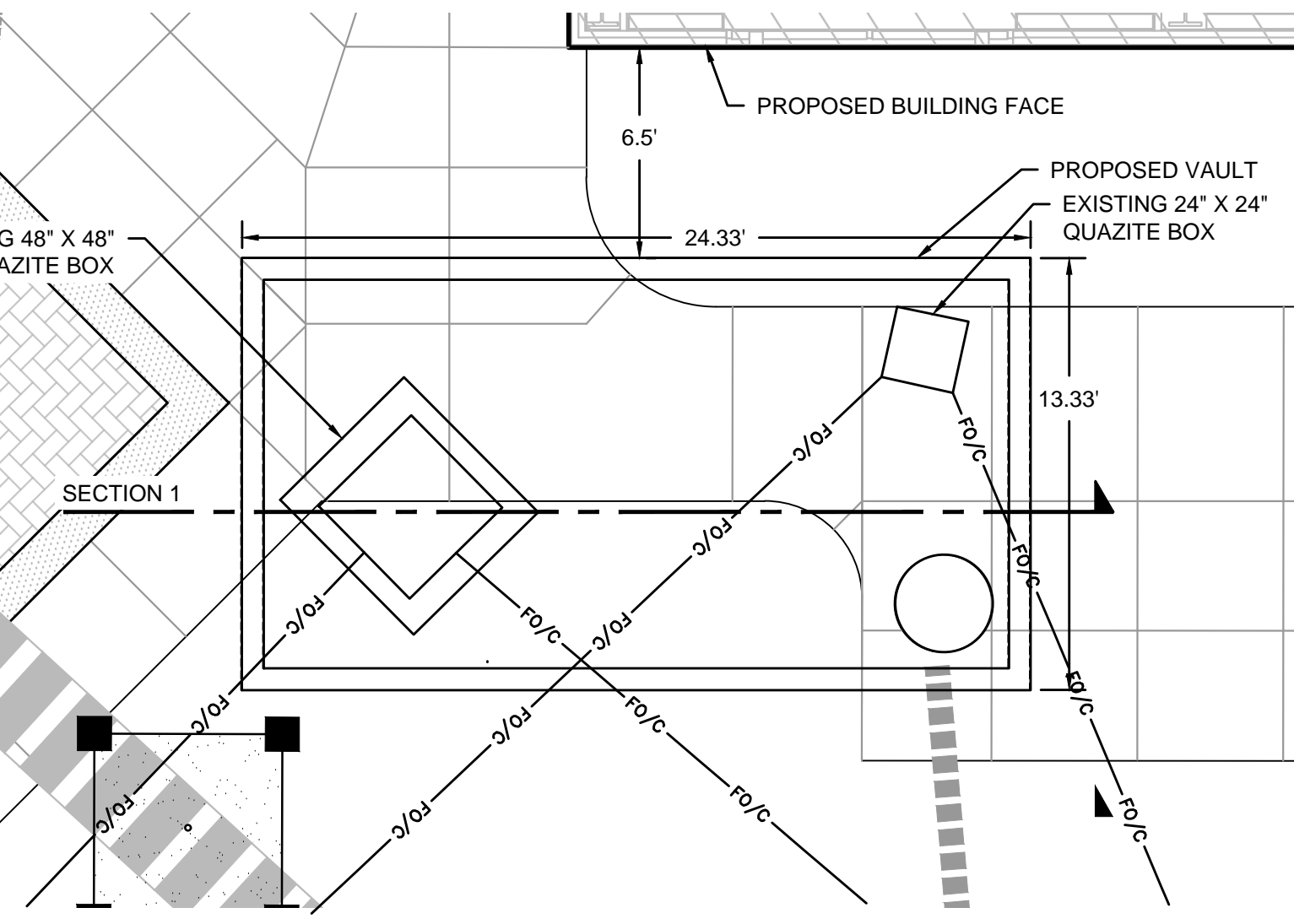
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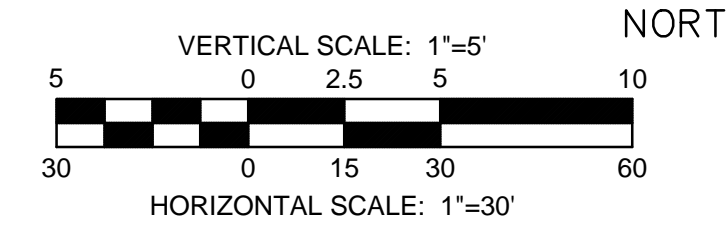




- UTILITY NOTES:**
- UTILITY CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL AND STATE CODE REQUIREMENTS.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES (STORM DRAINAGE, ELECTRIC, GAS, TELEPHONE, ETC.) PRIOR TO CONSTRUCTION. INFORMATION SHOWN ON THIS PLAN IS FOR REFERENCE ONLY AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
  - THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IMMEDIATELY IF ANY DISCREPANCIES BETWEEN THE CONSTRUCTION PLANS AND ACTUAL FIELD CONDITIONS ARE FOUND.
  - MINIMUM COVER FOR ALL SANITARY SEWER MAINS SHALL BE 3'-0". DUCTILE IRON PIPE WILL BE SUBSTITUTED WHEN MINIMUM COVER CAN NOT BE MAINTAINED.
  - SANITARY SEWER CLEANOUT (MAN) SEPARATION BETWEEN SHALL BE NO MORE THAN 75 LINEAR FEET FOR 4" PIPE AND 100 LINEAR FEET FOR 6" PIPE.
  - ANY SANITARY SEWER CLEANOUT THAT FALLS WITHIN PAVEMENT SHALL HAVE A CAST IRON CLEANOUT BOX PER GUC DETAIL S-3 (EJW 8555).
  - ALL GUC OWNED UTILITY LINES (ELEC, WATER, SANITARY, STORM) REQUIRE THE USE OF TRACER TAPE AND TRACER WIRE INSTALLED ABOVE THE PIPE AT 30" BELOW FINISH GRADE AND WARNING TAPE LOCATED AT 12" ABOVE THE PIPE. SEE SPECIFICATIONS FOR MORE INFORMATION.
  - THE STANDARD DEPTH OF COVER FOR WATER MAINS SHALL BE 3'-0" MIN. EXCEPT AT VALVE OR HYDRANT LOCATIONS, OR OTHER SPECIAL CONDITIONS.
  - THE CONNECTION TO EXISTING WATER MAINS SHALL BE PERFORMED ONLY AFTER ALL PRESSURE TESTING AND CHLORINATION ARE SUCCESSFULLY COMPLETED AND THE LOCAL REVIEW AUTHORITY HAS APPROVED THE CONNECTION. THE CONTRACTOR SHALL AVOID DISRUPTION OF EXISTING SERVICE.
  - REFER TO PLUMBING DRAWING SERIES FOR THE LOCATION OF WATER AND SANITARY SEWER SERVICE CONNECTIONS AT THE BUILDING.
  - UNLESS OTHERWISE NOTED, THE PHYSICAL CONNECTION BETWEEN THE SITE UTILITY LINES AND THE PIPE INSTALLED BY THE PLUMBING CONTRACTOR SHALL BE MADE BY THE SITE UTILITY CONTRACTOR.
  - PIPE LENGTHS SHOWN ON PLAN ARE THE ENGINEER'S ESTIMATE USED TO COMPUTE PIPE SLOPES AND INVERTS AND SHALL NOT BE CONSTRUED BY THE CONTRACTOR TO REPRESENT THE ACTUAL QUANTITY OF PIPE REQUIRED.
  - IF WATER LINE CROSSES OVER SANITARY SEWER WITH LESS THAN 18 INCHES VERTICAL CLEARANCE BOTH PIPES SHALL BE DUCTILE IRON 10" EACH SIDE. IF WATER CROSSES UNDER THE SEWER REGARDLESS OF CLEARANCE, BOTH PIPES SHALL BE DUCTILE IRON 10" EACH SIDE. IF WATER LINE RUNS PARALLEL TO SEWER LINE WITH LESS THAN 18" VERTICAL CLEARANCE AND LESS THAN 10' SIDE CLEARANCE BOTH PIPES SHALL BE DUCTILE IRON.
  - IF REQUIRED BY NUMBER 10 ABOVE, REPLACE EXISTING SEWER WITH DUCTILE IRON PIPE, CLASS 350 WORKING PRESSURE WITH GASKETED JOINTS, 10' EACH SIDE OF WATER MAIN.
  - ALL UNDERGROUND LINES OUTSIDE THE BUILDING FOOTPRINT, EXCEPT LAWN IRRIGATION LINES, SHALL BE REQUIRED TO HAVE A WARNING TAPE INSTALLED IN THE BACKFILL BETWEEN 6 AND 24 INCHES BELOW FINISHED GRADE DIRECTLY OVER PIPING.
  - METALLIC LINES SHALL BE IDENTIFIED WITH DURABLE PRINTED PLASTIC WARNING TAPES, MINIMUM 3 INCHES WIDE WITH LETTERING TO IDENTIFY BURIED LINE BELOW.
  - NONMETALLIC PIPES, OTHER THAN GAS LINES, SHALL BE IDENTIFIED BY DETECTABLE WARNING TAPE, MINIMUM 2 INCHES WIDE, WITH LETTERING TO IDENTIFY BURIED LINE BELOW.
  - 2018 NC FUEL GAS CODE, SECTION 404.17.3 TRACER: AN INSULATED COPPER TRACER WIRE OR OTHER APPROVED CONDUCTOR SHALL BE INSTALLED ADJACENT TO UNDERGROUND NON-METALLIC PIPING. ACCESS SHALL BE PROVIDED TO THE TRACER WIRE OR THE TRACER WIRE SHALL TERMINATE ABOVE GROUND AT THE END OF THE NON-METALLIC PIPING. THE TRACER WIRE SIZE SHALL NOT BE LESS THAN 18AWG AND THE INSULATION TYPE SUITABLE FOR DIRECT BURIAL.
  - THERE SHALL BE NO TAPS, PIPING BRANCHES, UNAPPROVED BYPASS PIPING, HYDRANTS, FIRE DEPT. CONNECTION POINTS, OR OTHER WATER USING APPURTENANCES CONNECTED TO THE SUPPLY LINE BETWEEN ANY WATER METER AND ITS CITY OF GREENVILLE REQUIRED BACKFLOW PREVENTER.
  - WATER MAIN TESTING AND DISINFECTING SHALL FOLLOW GUC GUIDELINES AND PROCEDURES PRIOR TO PLACING THE WATER SYSTEM IN SERVICE.
  - WATER LINES SHALL BE CONSTRUCTED USING DUCTILE IRON PIPE WHERE THE CLEARANCE BETWEEN IT AND THE STORM PIPE IS LESS THAN 18".
  - TEMPORARY CHLORINATION TAPS AND BACTERIOLOGICAL SAMPLE POINTS (BSP) SHALL BE CONSTRUCTED OF THE SAME MATERIALS AS THE MAIN LINES. TEMPORARY APPURTENANCES SUCH THAT THE ANGLE BALL VALVE IS SECURELY LOCATED MIN. 36" ABOVE FINISH GRADE. UPON APPROVAL OF FINAL BACTERIOLOGICAL SAMPLE, THE TUBING AND ANGLE BALL VALVE SHALL BE REMOVED, THE CORPORATION STOP CLOSED, AND A CAP PLACED ON THE CORPORATION STOP.



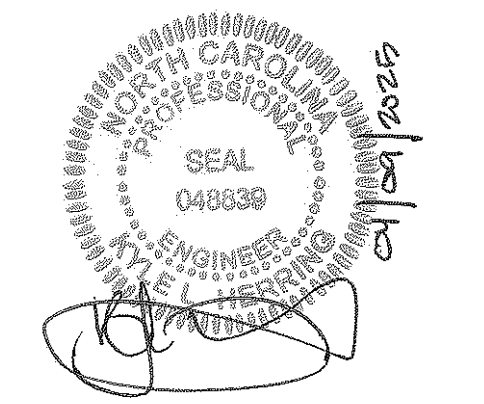
- GENERAL NOTES**
- SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
  - SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.



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SCO ID# 23-26345-01A

**New Indoor Training Facility**  
East Carolina University  
Greenville, NC



REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/03/2025

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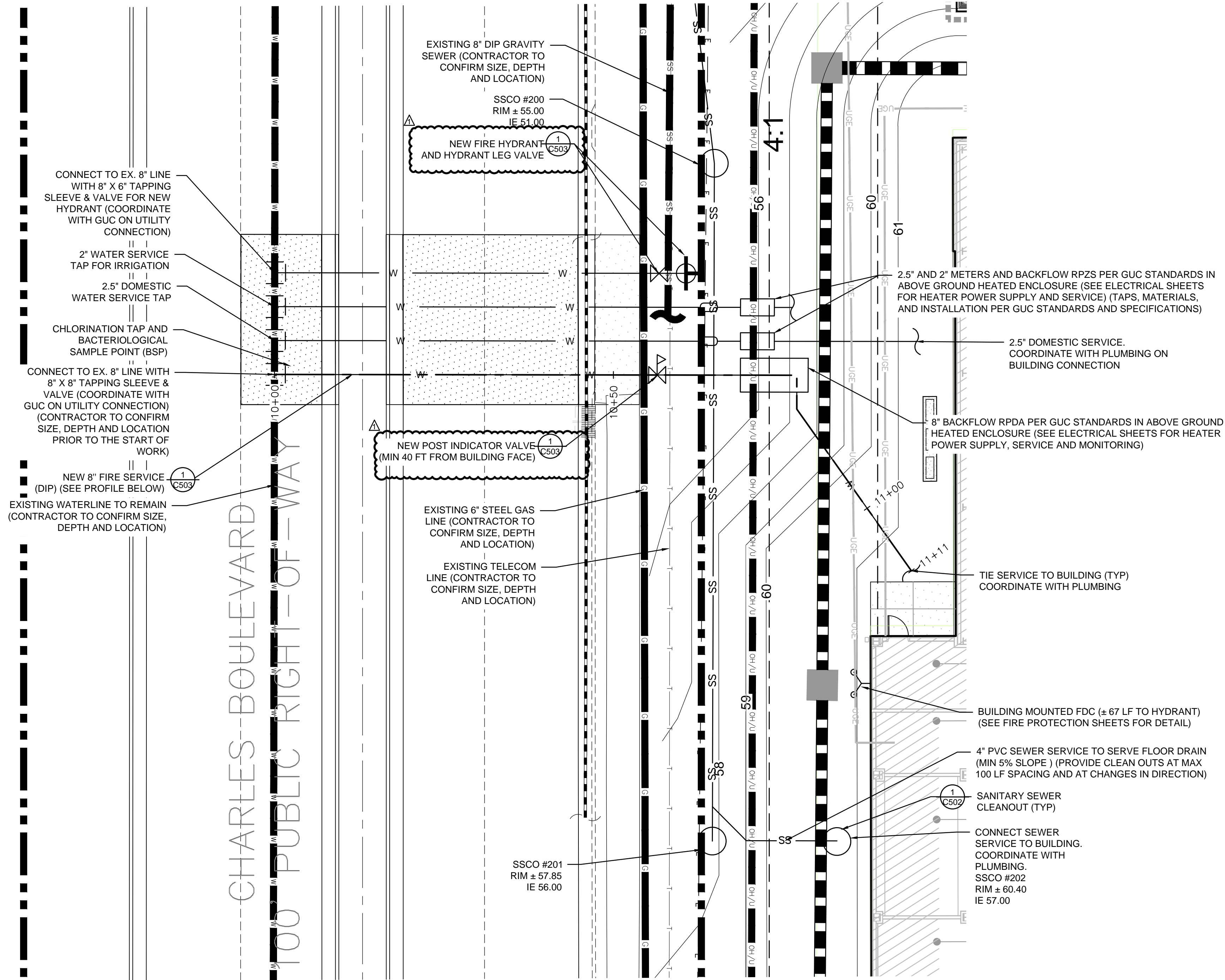
UTILITY PLAN

SHEET

C400

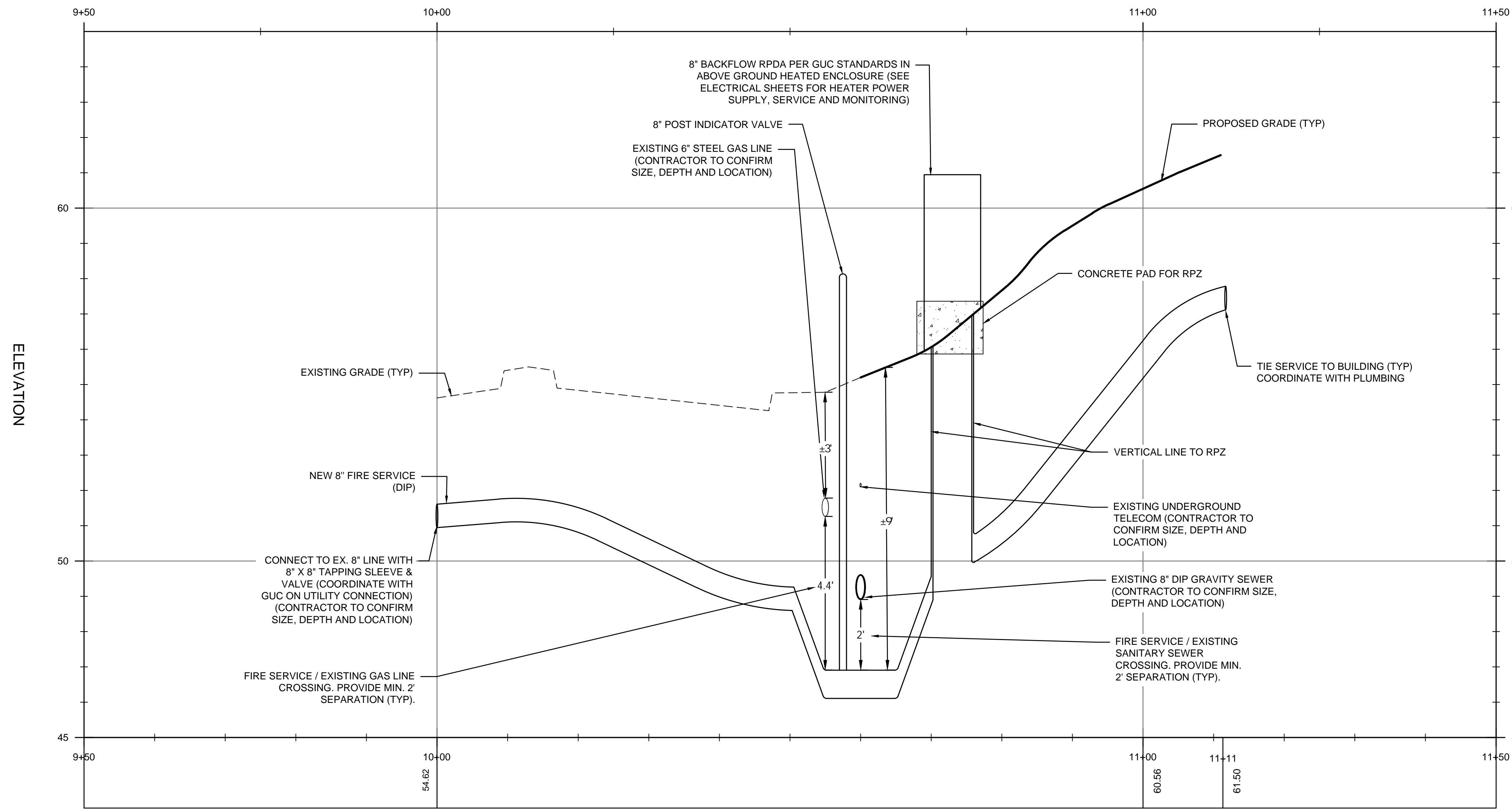
DATE: 01/10/2025 PROJECT NO.: 2228





FIRE SERVICE PROFILE

STATION



NOTE: PROPOSED UTILITIES SHOWN TO BE INSTALLED BY OPEN CUT AND TRENCHING.

1 FIRE SERVICE PROFILE  
VERTICAL SCALE: 1"=2' HORIZONTAL SCALE: 1"=10'

UTILITY NOTES:

- UTILITY CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL AND STATE CODE REQUIREMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES (STORM DRAINAGE, ELECTRIC, GAS, TELEPHONE, ETC.) PRIOR TO CONSTRUCTION. INFORMATION SHOWN ON THIS PLAN IS FOR REFERENCE ONLY AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IMMEDIATELY IF ANY DISCREPANCIES BETWEEN THE CONSTRUCTION PLANS AND ACTUAL FIELD CONDITIONS ARE FOUND.
- MINIMUM COVER FOR ALL SANITARY SEWER MAINS SHALL BE 3'-0". DUCTILE IRON PIPE WILL BE SUBSTITUTED WHEN MINIMUM COVER CAN NOT BE MAINTAINED.
- SANITARY SEWER CLEANOUT (MAX) SEPARATION BETWEEN SHALL BE NO MORE THAN 75 LINEAR FEET FOR 4" PIPE AND 100 LINEAR FEET FOR 6" PIPE.
- ANY SANITARY SEWER CLEANOUT THAT FALLS WITHIN PAVEMENT SHALL HAVE A CAST IRON CLEANOUT BOX PER GUC DETAIL S-3 (EJW 8555).
- ALL GUC OWNED UTILITY LINES (ELEC, WATER, SANITARY, STORM) REQUIRE THE USE OF TRACER TAPE AND TRACER WIRE INSTALLED ABOVE THE PIPE AT 30" BELOW FINISH GRADE AND WARNING TAPE LOCATED AT 12" ABOVE THE PIPE. SEE SPECIFICATIONS FOR MORE INFORMATION.
- THE STANDARD DEPTH OF COVER FOR WATER MAINS SHALL BE 3'-0" MIN. EXCEPT AT VALVE OR HYDRANT LOCATIONS, OR OTHER SPECIAL CONDITIONS.
- THE CONNECTION TO EXISTING WATER MAINS SHALL BE PERFORMED ONLY AFTER ALL PRESSURE TESTING AND CHLORINATION ARE SUCCESSFULLY COMPLETED AND THE LOCAL REVIEW AUTHORITY HAS APPROVED THE CONNECTION. THE CONTRACTOR SHALL AVOID DISRUPTION OF EXISTING SERVICE.
- REFER TO PLUMBING DRAWING SERIES FOR THE LOCATION OF WATER AND SANITARY SEWER SERVICE CONNECTIONS AT THE BUILDING.
- UNLESS OTHERWISE NOTED, THE PHYSICAL CONNECTION BETWEEN THE SITE UTILITY LINES AND THE PIPE INSTALLED BY THE PLUMBING CONTRACTOR SHALL BE MADE BY THE SITE UTILITY CONTRACTOR.
- PIPE LENGTHS SHOWN ON PLAN ARE THE ENGINEER'S ESTIMATE USED TO COMPUTE PIPE SLOPES AND INVERTS AND SHALL NOT BE CONSTRUED BY THE CONTRACTOR TO REPRESENT THE ACTUAL QUANTITY OF PIPE REQUIRED.
- IF WATER LINE CROSSES OVER SANITARY SEWER WITH LESS THAN 18 INCHES VERTICAL CLEARANCE BOTH PIPES SHALL BE DUCTILE IRON 10" EACH SIDE. IF WATER CROSSES UNDER THE SEWER REGARDLESS OF CLEARANCE, BOTH PIPES SHALL BE DUCTILE IRON 10" EACH SIDE. IF WATER LINE RUNS PARALLEL TO SEWER LINE WITH LESS THAN 18" VERTICAL CLEARANCE AND LESS THAN 10' SIDE CLEARANCE BOTH PIPES SHALL BE DUCTILE IRON.
- IF REQUIRED BY NUMBER 10 ABOVE, REPLACE EXISTING SEWER WITH DUCTILE IRON PIPE, CLASS 350 WORKING PRESSURE WITH GASKETED JOINTS, 10' EACH SIDE OF WATER MAIN.
- ALL UNDERGROUND LINES OUTSIDE THE BUILDING FOOTPRINT, EXCEPT LAWN IRRIGATION LINES, SHALL BE REQUIRED TO HAVE A WARNING TAPE INSTALLED IN THE BACKFILL BETWEEN 6 AND 24 INCHES BELOW FINISHED GRADE DIRECTLY OVER PIPING.
- METALLIC LINES SHALL BE IDENTIFIED WITH DURABLE PRINTED PLASTIC WARNING TAPES, MINIMUM 3 INCHES WIDE WITH LETTERING TO IDENTIFY BURIED LINE BELOW.
- NONMETALLIC PIPES, OTHER THAN GAS LINES, SHALL BE IDENTIFIED BY DETECTABLE WARNING TAPE, MINIMUM 2 INCHES WIDE, WITH LETTERING TO IDENTIFY BURIED LINE BELOW.
- 2018 NC FUEL GAS CODE, SECTION 404.17.3 TRACER: AN INSULATED COPPER TRACER WIRE OR OTHER APPROVED CONDUCTOR SHALL BE INSTALLED ADJACENT TO UNDERGROUND NON-METALLIC PIPING. ACCESS SHALL BE PROVIDED TO THE TRACER WIRE OR THE TRACER WIRE SHALL TERMINATE ABOVE GROUND AT THE END OF THE NON-METALLIC PIPING. THE TRACER WIRE SIZE SHALL NOT BE LESS THAN 18AWG AND THE INSULATION TYPE SUITABLE FOR DIRECT BURIAL.
- THERE SHALL BE NO TAPS, PIPING BRANCHES, UNAPPROVED BYPASS PIPING, HYDRANTS, FIRE DEPT. CONNECTION POINTS, OR OTHER WATER-USING APPURTENANCES CONNECTED TO THE SUPPLY LINE BETWEEN ANY WATER METER AND ITS CITY OF GREENVILLE REQUIRED BACKFLOW PREVENTER.
- WATER MAIN TESTING AND DISINFECTING SHALL FOLLOW GUC GUIDELINES AND PROCEDURES PRIOR TO PLACING THE WATER SYSTEM IN SERVICE.
- WATER LINES SHALL BE CONSTRUCTED USING DUCTILE IRON PIPE WHERE THE CLEARANCE BETWEEN IT AND THE STORM PIPE IS LESS THAN 18".
- TEMPORARY CHLORINATION TAPS AND BACTERIOLOGICAL SAMPLE POINTS (BSP) SHALL BE CONSTRUCTED OF THE SAME MATERIALS AS ONE INCH WATER SERVICES. TEMPORARY APPURTENANCES SUCH THAT THE ANGLE BALL VALVE IS SECURELY LOCATED MIN. 36" ABOVE FINISH GRADE. UPON APPROVAL OF FINAL BACTERIOLOGICAL SAMPLE, THE TUBING AND ANGLE BALL VALVE SHALL BE REMOVED, THE CORPORATION STOP CLOSED, AND A CAP PLACED ON THE CORPORATION STOP.

GENERAL NOTES

- SEE SHEET C100 FOR EXISTING CONDITIONS AND DEMOLITION PLAN.
- SEE SHEET C002 FOR GENERAL NOTES AND LEGEND.
- ALL WORK WITHIN THE RIGHT OF WAY TO BE IN ACCORDANCE W/ NCDOT STANDARDS & SPECIFICATIONS AND IN ACCORDANCE W/ APPROVED NCDOT ENCROACHMENT AGREEMENT.
- CONTRACTOR TO HOST ONSITE PRECONSTRUCTION MEETING W/ THE ENGINEER AND NCDOT PRIOR TO THE START OF ANY WORK WITHIN THE RIGHT OF WAY.
- CONTRACTOR TO PREPARE AND SUBMIT A TRAFFIC CONTROL PLAN TO NCDOT PRIOR TO NCDOT PRECON.

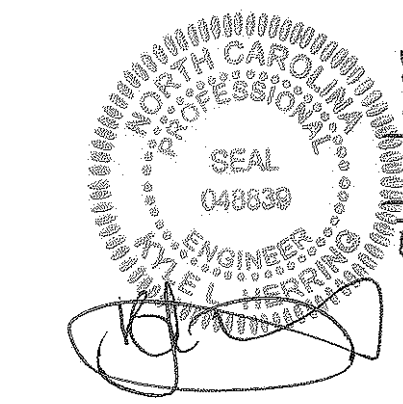


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New Indoor  
Training Facility  
East Carolina University  
Greenville, NC  
SCO ID# 23-26345-01A

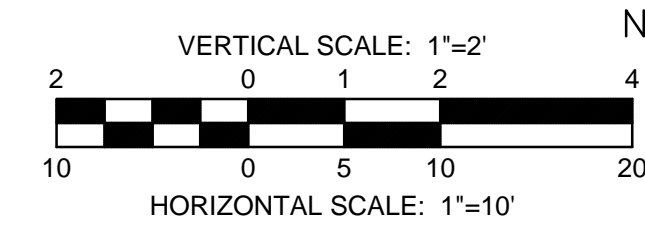


REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/09/2025

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Know what's below.  
Call before you dig.



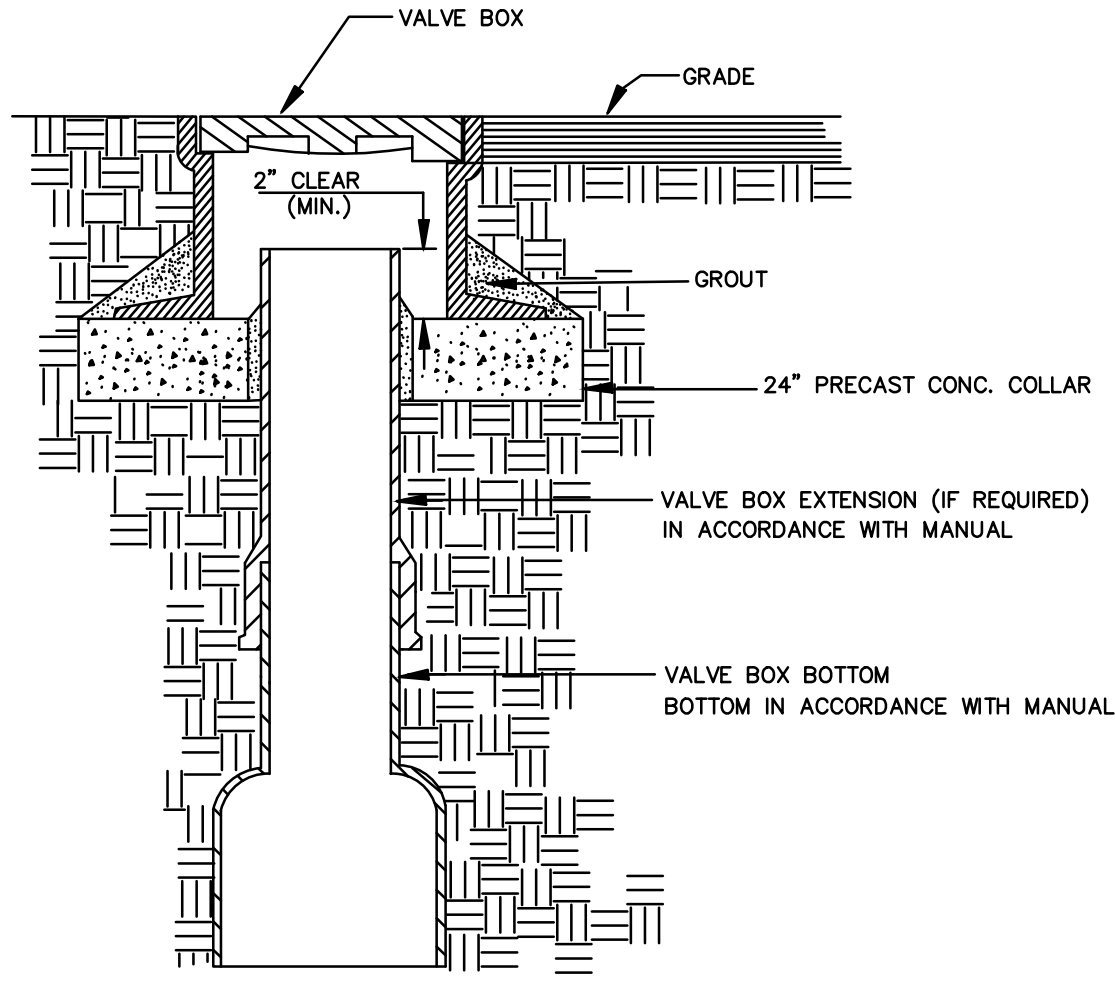
UTILITY PLAN & PROFILE


SHEET

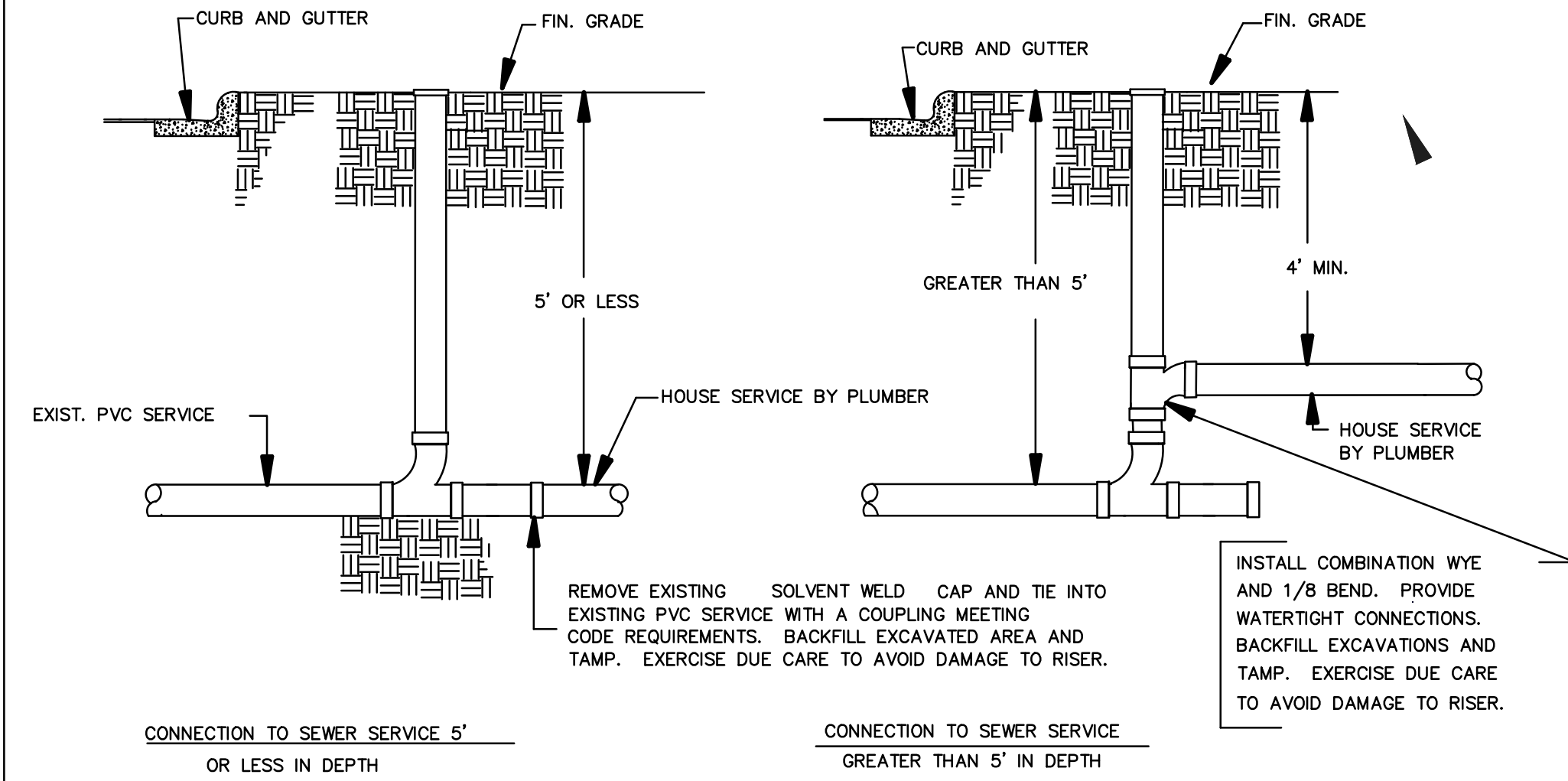
C401


DATE 01/10/2025 PROJECT NO. 2228

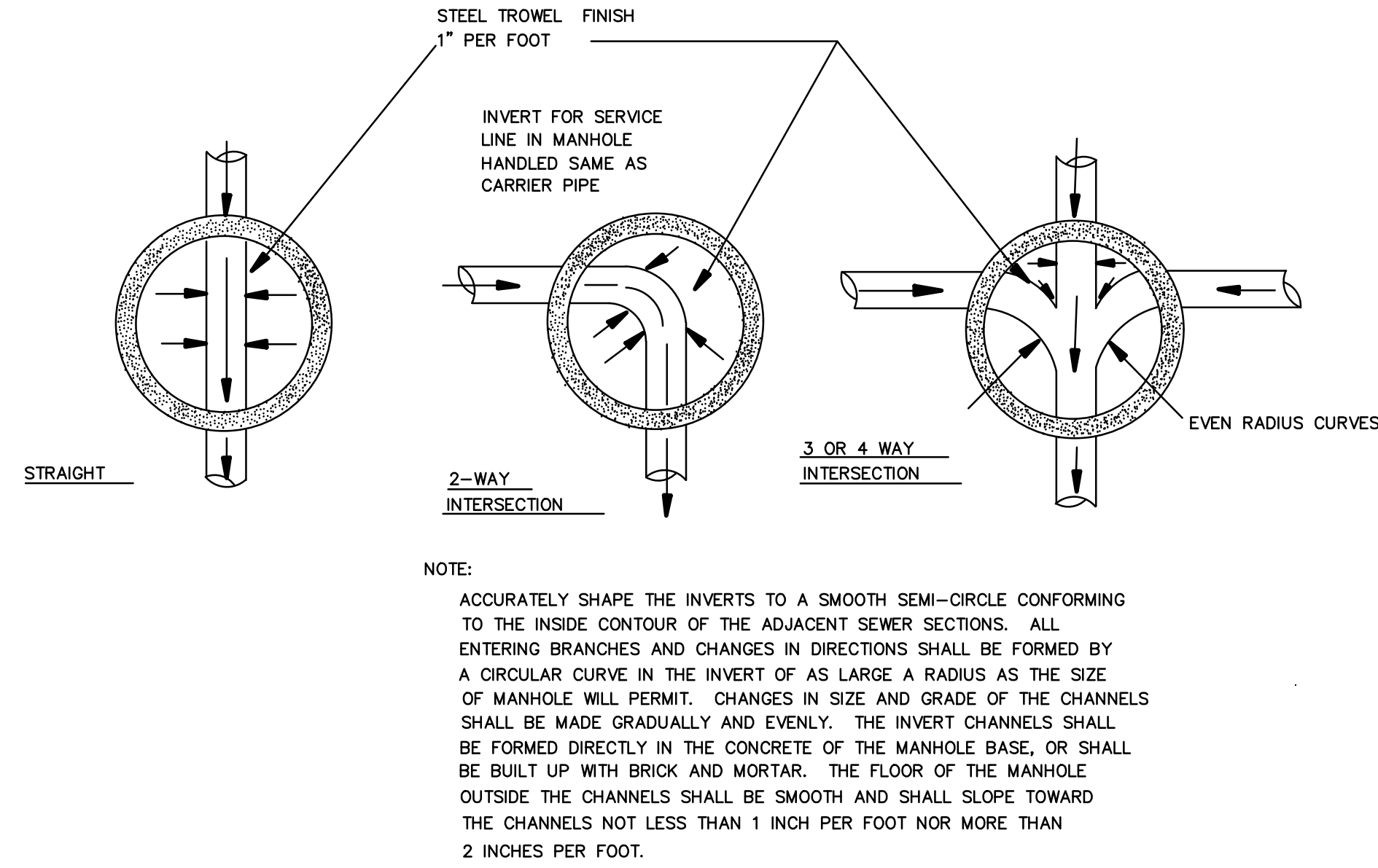





VALVE BOX DETAIL FOR VALVES 12" AND LARGER			GREENVILLE UTILITIES GREENVILLE, N.C.		 Greenville Utilities	NO.	DATE	DESCRIPTION
SHEET	DWG. NO. W-6	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING					
1 OF 1	DATE 3-12-99	APP H. COREY	GREENVILLE, N.C.					



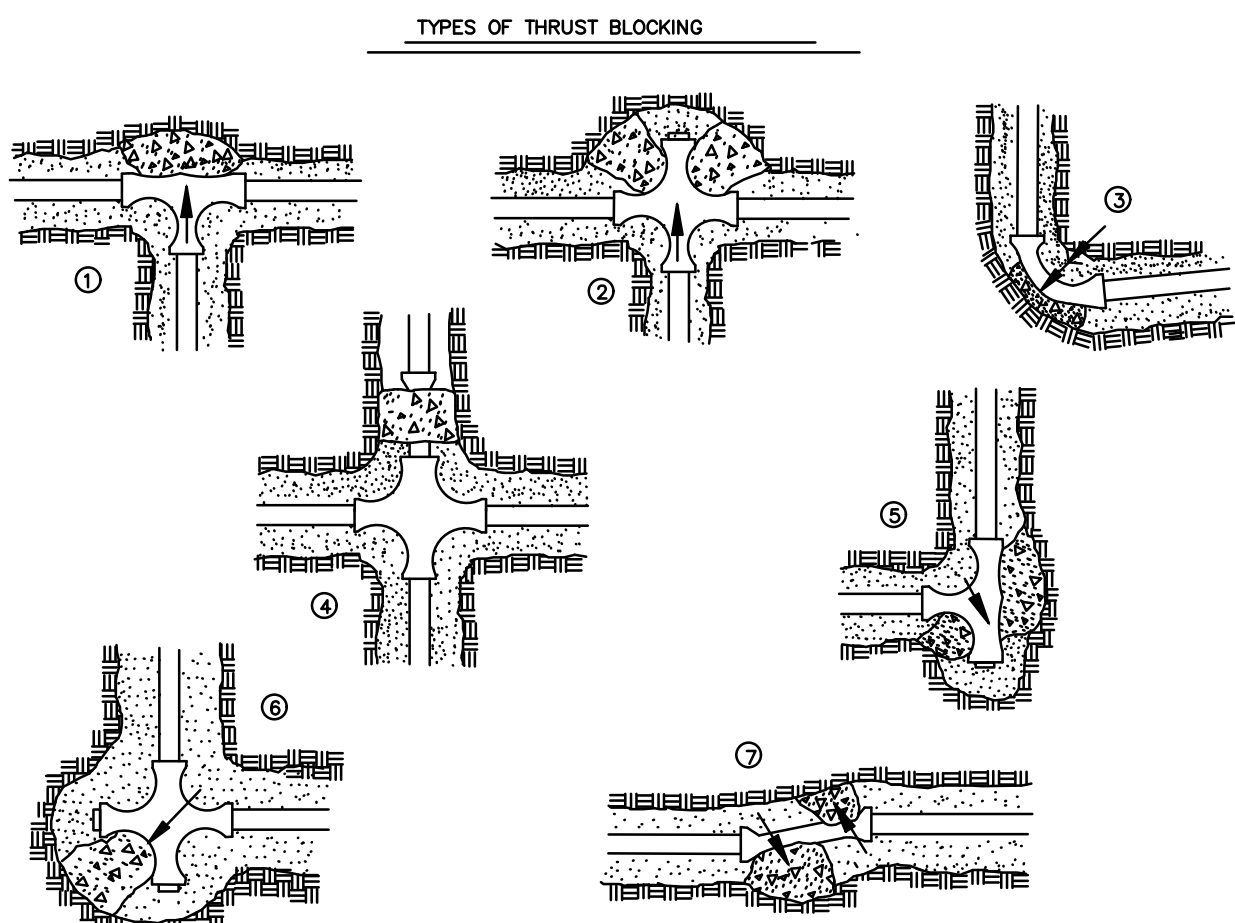
PVC SEWER SERVICE CONNECTION			GREENVILLE UTILITIES GREENVILLE, N.C.		 <i>Greenville Utilities</i>	NO.	DATE	DESCRIPTION
SHEET	DWG. NO.	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING					
1 OF 1	DATE	APP H. COREY	GREENVILLE, N.C.					



MANHOLE INVERTS			GREENVILLE UTILITIES GREENVILLE, N.C.		 <i>Greenville Utilities</i>	NO.	DATE	DESCRIPTION
SHEET 1 OF 1	DWG. NO.	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING GREENVILLE, N.C.					
	DATE	3-12-99	APP	H. COREY				


RESULTANT THRUST AT FITTING AT 150 PSI WATER PRESSURE

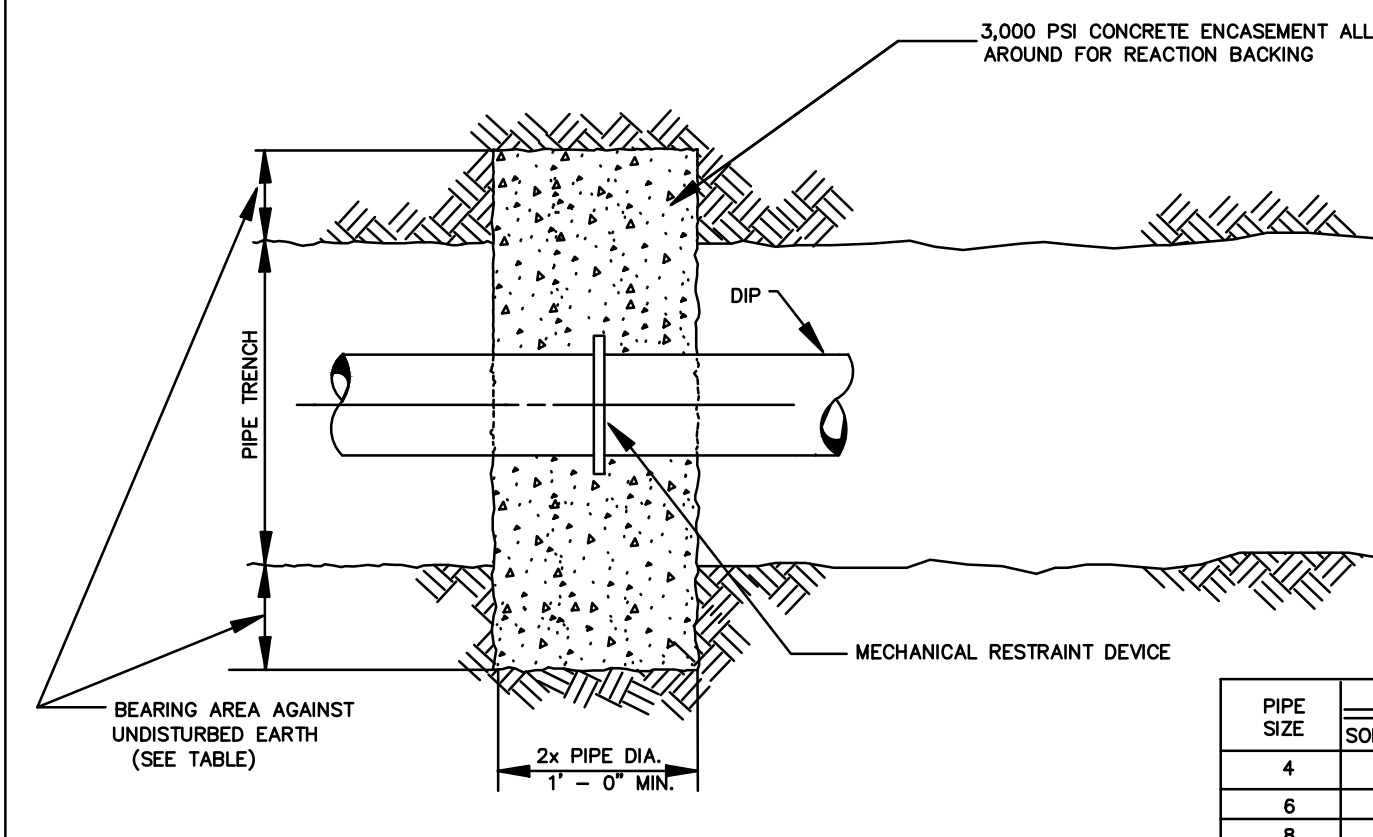
NOM PIPE DIA.	TOTAL POUNDS				
	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	530
4"	2,700	3,800	2,100	1,100	
6"	5,600	8,000	4,300	2,200	1,100
8"	9,700	13,600	7,400	3,800	1,900
10"	14,500	20,500	11,100	5,700	2,900
12"	20,500	29,000	15,700	8,000	4,000
14"	27,600	39,000	21,100	11,000	5,400
16"	35,700	50,400	27,300	14,000	7,000
18"	44,800	63,400	34,400	17,500	8,800
20"	55,000	77,000	42,100	21,500	10,800
24"	78,500	110,000	60,000	31,600	15,400
30"	120,600	170,600	92,300	47,100	23,600
36"	172,800	244,400	132,300	67,500	33,900
42"	233,300	330,000	178,600	91,000	45,700
48"	304,000	430,000	232,700	118,600	59,600
54"	384,100	543,200	294,000	149,000	75,300



SOL	BEARING LOAD (LB./SQ. FT.)
MUCK	0
SOFT CLAY	1,000
SILT	1,500
SANDY SILT	3,000
SAND	4,000
SANDY CLAY	6,000
HARD CLAY	9,000


1. THRU LINE CONNECTION, TEE
2. THRU LINE CONNECTION, TEE CROSS USED AS TEE
3. DIRECTION CHANGE, ELBOW
4. CHANGE LINE SIZE, REDUCER
5. DIRECTION CHANGE, TEE USED AS ELBOW
6. DIRECTION CHANGE, CROSS USED AS ELBOW
7. DIRECTION CHANGE

THRUST BLOCKING DETAIL			GREENVILLE UTILITIES GREENVILLE, N.C.		 <i>Greenville Utilities</i>	NO.	DATE	DESCRIPTION
SHEET	DWG. NO.	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING					
1 OF 1	DATE	3-12-99	APP	H. COREY				
			GREENVILLE, N.C.					

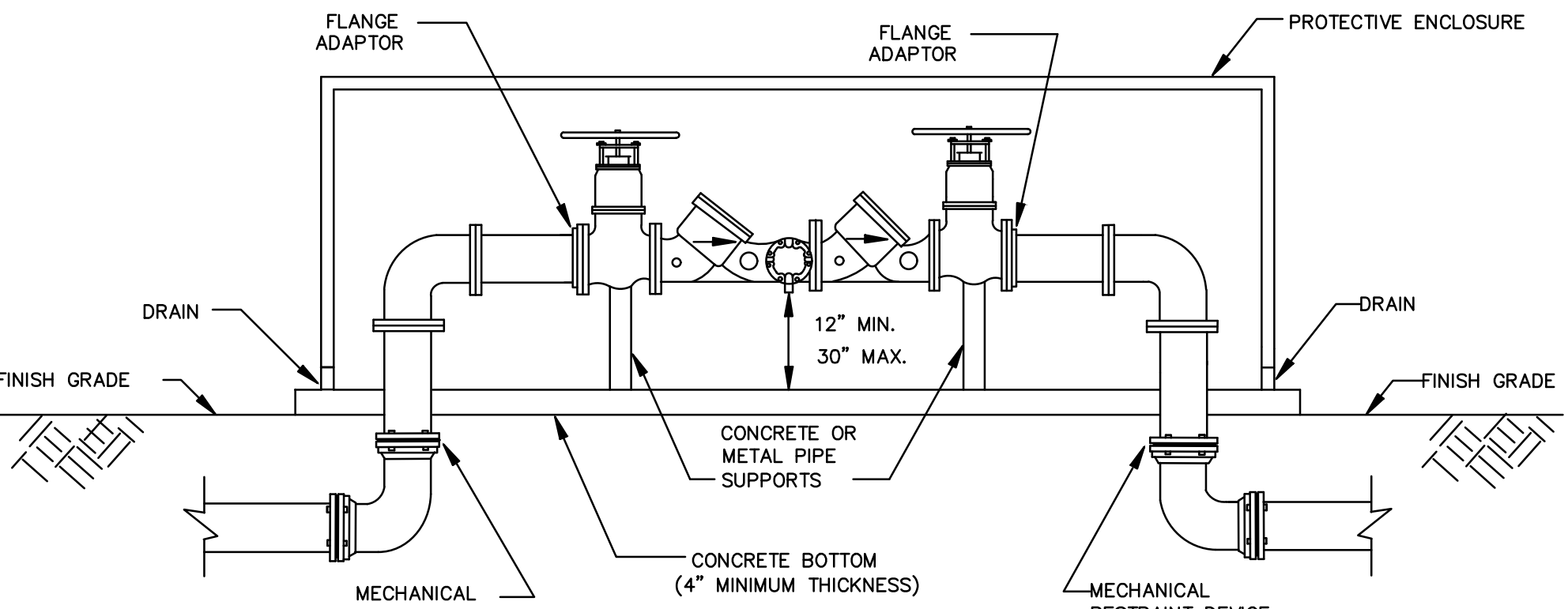



PIPE SIZE	MIN. BEARING AREA (SQ. FT.)					
	SOFT CLAY	SILT	SANDY SILT	SAND	SAND CLAY	HARD CLAY
4	2.7	1.8	1.0	1.0	1.0	1.0
6	5.6	3.7	1.9	1.4	1.0	1.0
8	9.7	6.4	3.2	2.4	1.6	1.1
10	15	10	4.8	3.6	2.4	1.6
12	21	14	6.8	5.1	3.4	2.3
14	28	18	9.2	6.9	4.6	3.1
16	36	24	12	8.9	5.9	4.0
18	45	30	15	11	7.4	5.0
20	55	37	18	14	9.2	6.1
24	78	52	26	20	13	8.7
30	121	81	40	30	20	13
36	173	115	56	43	28	19

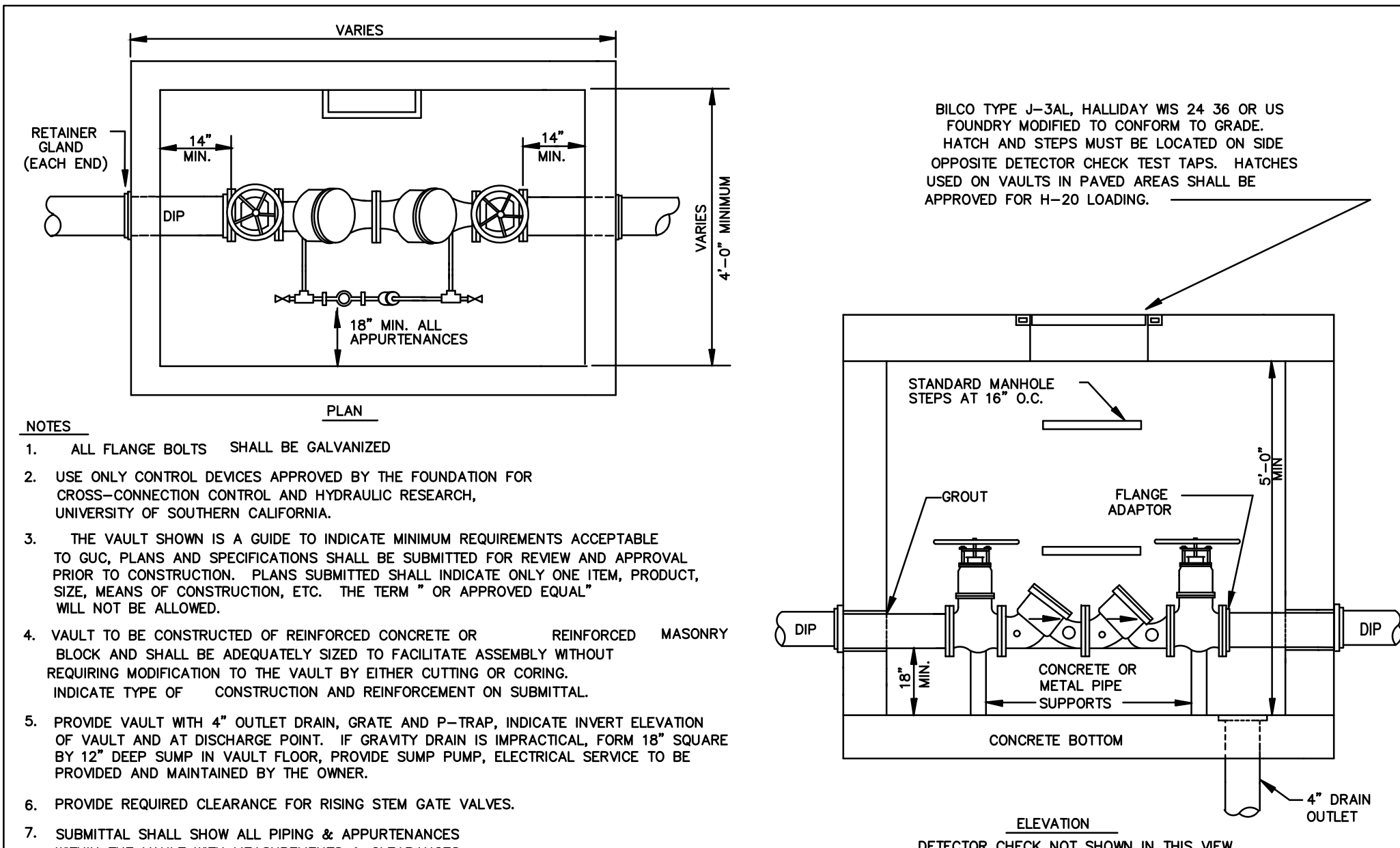
NOTE: MIN. BEARING AREAS ARE BASED UPON THE TABLE ABOVE. FOR SOILS HAVING BEARING CAPACITIES DIFFERENT THAN THAT SHOWN ADJUST AREA AS NECESSARY TO PROVIDE EQUIVALENT RESTRAINT.


THRUST RESTRAINT WITH ANCHOR RING			GREENVILLE UTILITIES GREENVILLE, N.C.		 <i>Greenville Utilities</i>	NO.	DATE	DESCRIPTION
SHEET	DWG. NO.	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING					
1 OF 1	DATE	3-12-99	APP	H. COREY				

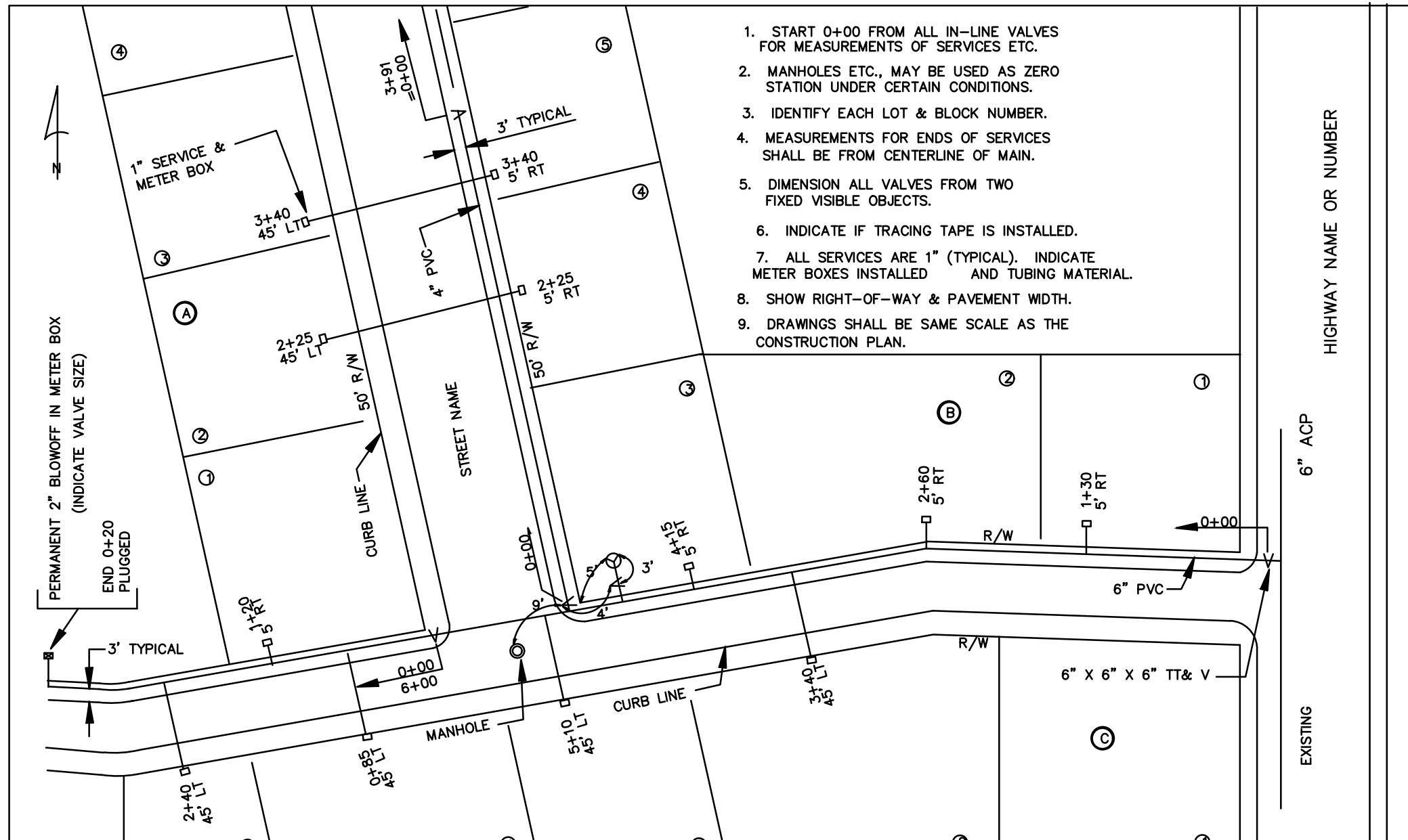
1. ALL FLANGE BOLTS SHALL BE GALVANIZED.
2. USE ONLY CONTROL DEVICES APPROVED BY GUC AND THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH, UNIVERSITY OF SOUTHERN CALIFORNIA.
3. SUBMITTAL SHALL SHOW ALL PIPING & APPURTENANCES WITHIN THE PROTECTIVE ENCLOSURE WITH MEASUREMENTS & CLEARANCES CLEARLY LABELED.
4. ENCLOSURE MUST BE SIZED TO ALLOW ADEQUATE ROOM FOR TESTING, MAINTENANCE AND OPERATION.
5. DRAIN OPENINGS SHALL BE SIZED TO ADEQUATELY RELIEVE MAXIMUM DISCHARGE OF APPROPRIATE DEVICE.
6. REDUCED PRESSURE PRINCIPLE ASSEMBLIES (RP2) SHALL REQUIRE AN ABOVE GROUND INSTALLATION.
7. IT IS RECOMMENDED THAT THE CUSTOMER PROVIDE ADEQUATE FREEZE PROTECTION.
8. REFER TO DETAIL W-12 FOR REACTION BLOCKING.




ABOVE GROUND INSTALLATION FOR RP ASSEMBLY (ALTERNATIVE INSTALLATION FOR DCVA)			GREENVILLE UTILITIES GREENVILLE, N.C.		 Greenville Utilities	NO.	DATE	DESCRIPTION
SHEET	DWG. NO. W-17	DWG. N. WOOTEN	WATER RESOURCES ENGINEERING GREENVILLE, N.C.					
1 OF 1	DATE 5-14-99	APP H. COREY						



DOUBLE CHECK / DETECTOR CHECK VAULT FOR 6" AND LARGER SERVICES				GREENVILLE UTILITIES GREENVILLE, N.C.			NO.	DATE	DESCRIPTION
SHEET	DWG. NO. W-16	DWG N. WOOTEN	WATER RESOURCES ENGINEERING GREENVILLE, N.C.						
1 OF 1	DATE	3-12-99	APP	H. COREY					



TYPICAL WATER SYSTEM AS-BUILT				GREENVILLE UTILITIES GREENVILLE, N.C.			NO.	DATE	DESCRIPTION
SHEET	DWG. NO.	W-18	DWG N. WOOTEN	WATER RESOURCES ENGINEERING					
1 OF 1	DATE	3-12-99	APP H. COREY	GREENVILLE, N.C.					

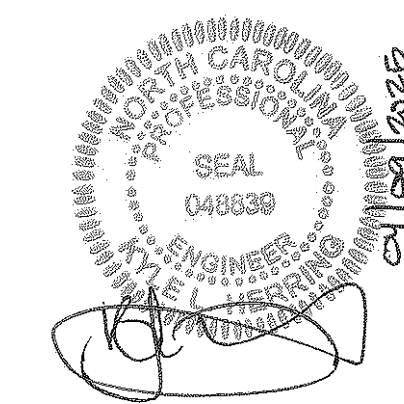
1. PROVIDED POWER SERVICE AND ELECTRICAL HEATER LISTED FOR USE IN WET/DAMP CONDITIONS. HEAT TAPE IS NOT ACCEPTABLE UNLESS LISTED FOR USE IN FIRE PROTECTION SYSTEMS AND MONITORED BY THE BUILDING FIRE ALARM SYSTEM.
2. PROVIDE LOW TEMPERATURE HEAT DETECTOR CONNECTED TO THE BUILDING ALARM.
3. A TAMPER SWITCH SHALL BE PROVIDED FOR ALL SHUTOFF VALVES AND CONNECTED TO THE BUILDING FIRE ALARM SYSTEM.



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New Indoor Training Facility  
East Carolina University  
Greenville, NC

SCO ID# 23-26345-01A



REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/09/2005

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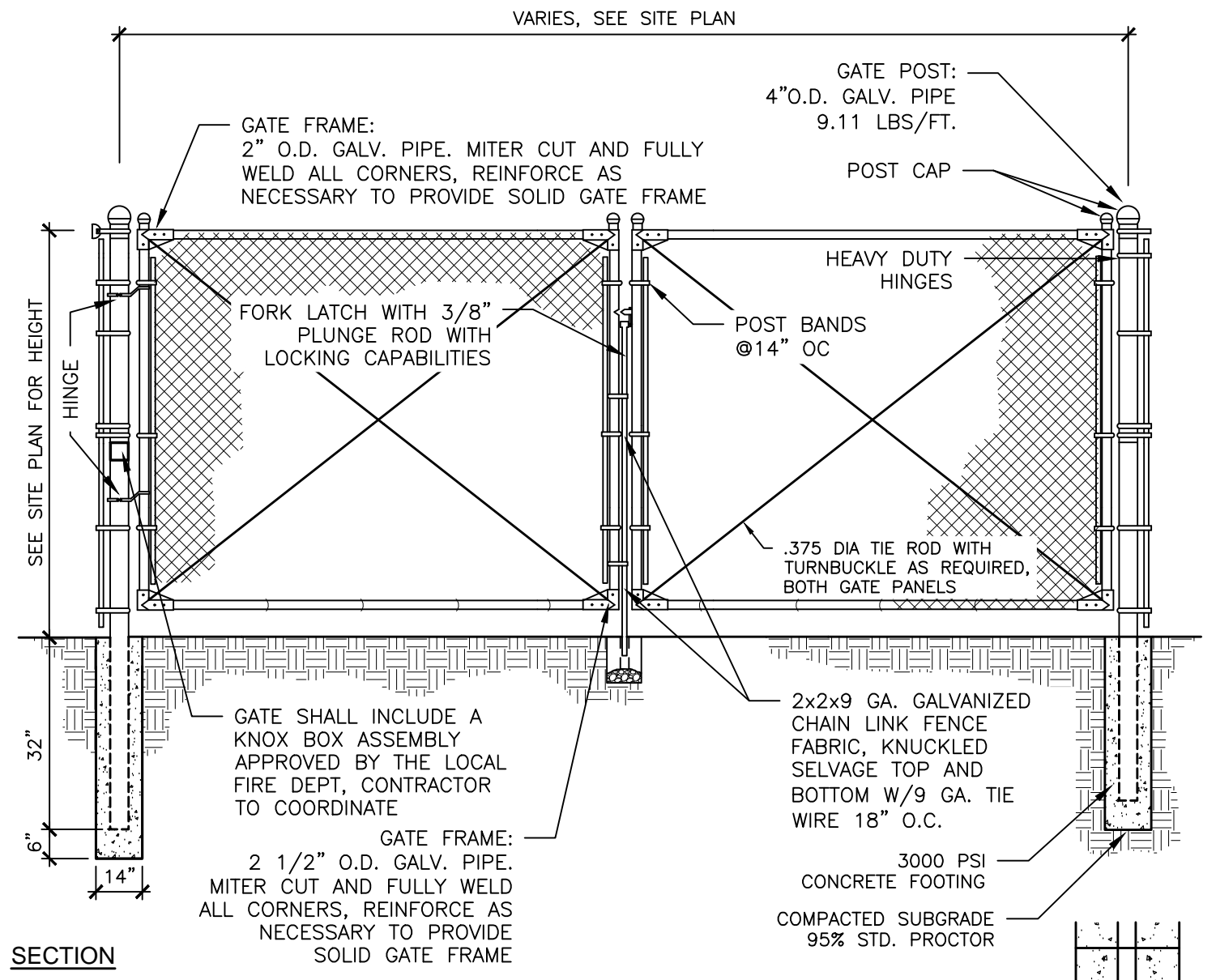
UTILITY DETAILS

SHEET

C503

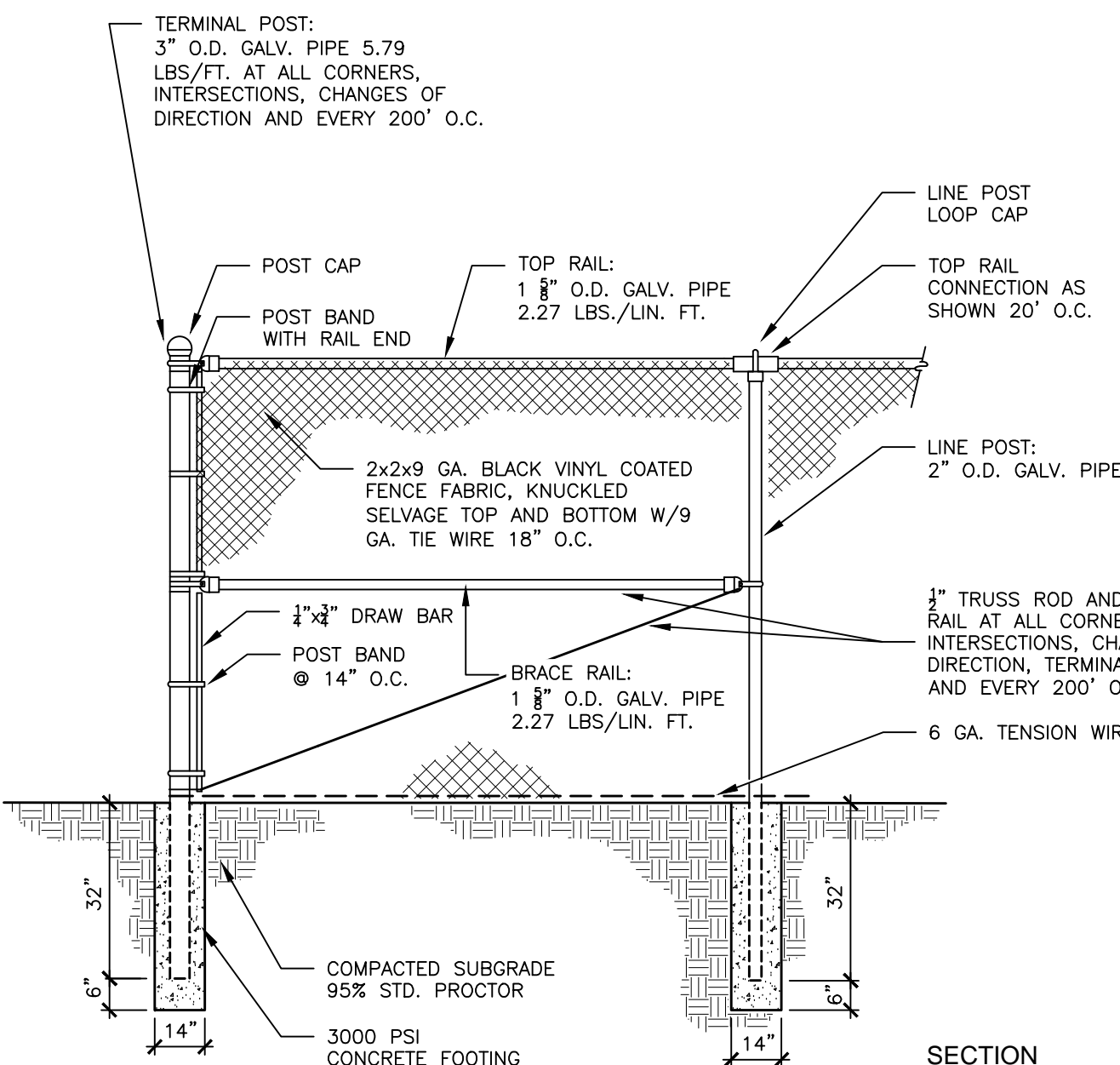
DATE 01/10/2025 PROJECT NO. 2228





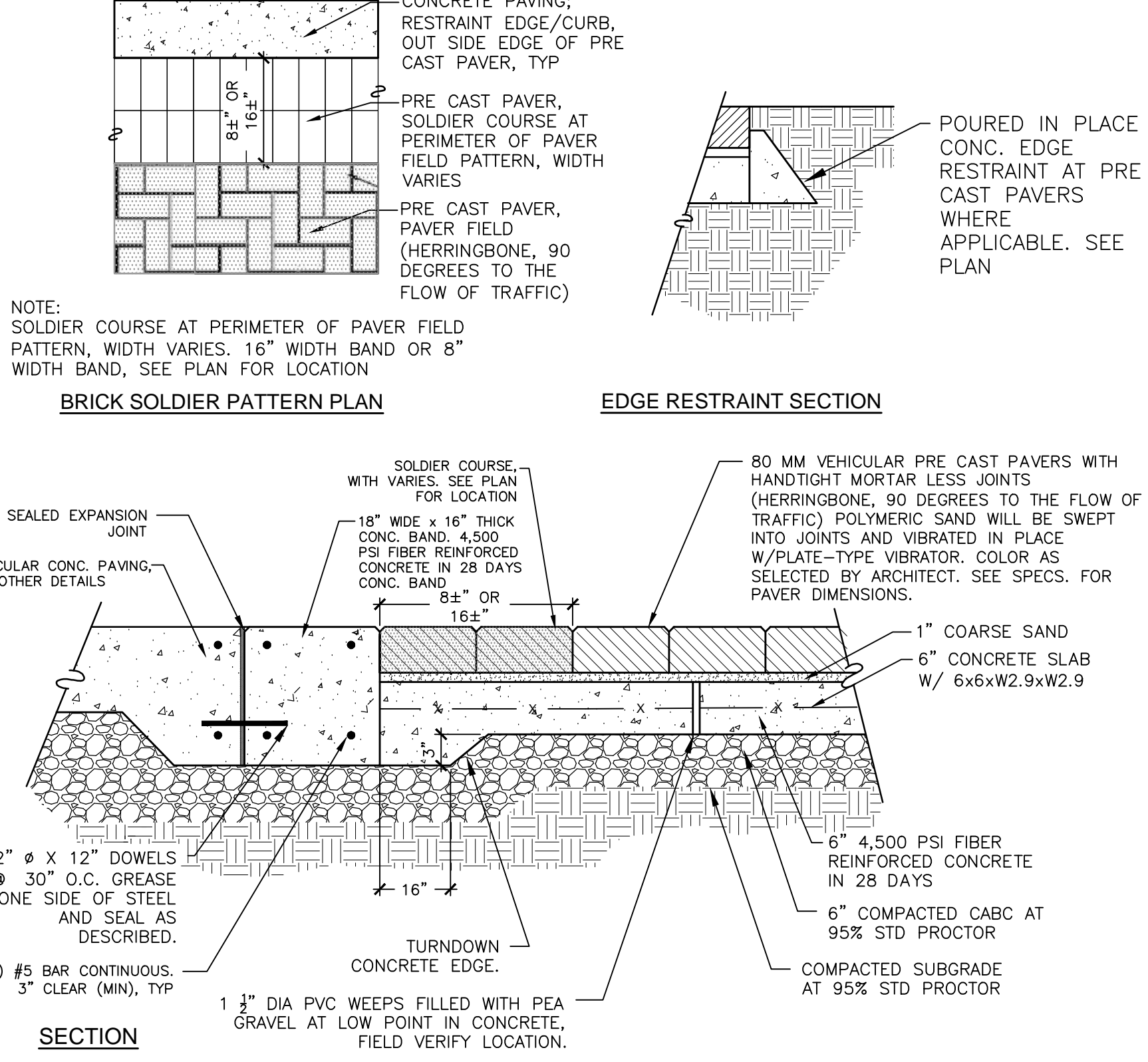
- NOTES:
1. FABRIC, POSTS, RAILS AND FITTINGS SHALL BE HOT DIP GALVANIZED.
  2. FABRIC, POSTS, RAILS AND FITTINGS SHALL BE POLY COATED, SEE SPECIFICATIONS.
  3. GATE SHALL BE COMPLETE WITH BALL AND SOCKET HINGES OR APPROVED EQUAL.
  4. GATE SHALL INCLUDE A KNOX BOX APPROVED BY THE LOCAL FIRE DEPT, CONTRACTOR TO COORDINATE.
  5. ALL GATES SHALL BE DOUBLE ACTING.
  6. SEE SPECIFICATIONS FOR FURTHER MATERIAL AND INSTALLATION REQUIREMENTS.
  7. FENCE FABRIC SHALL BE INSTALLED ON THE OUTSIDE OF THE FRAME WORK, TYP

1 Chain Link Fence, Service Gate

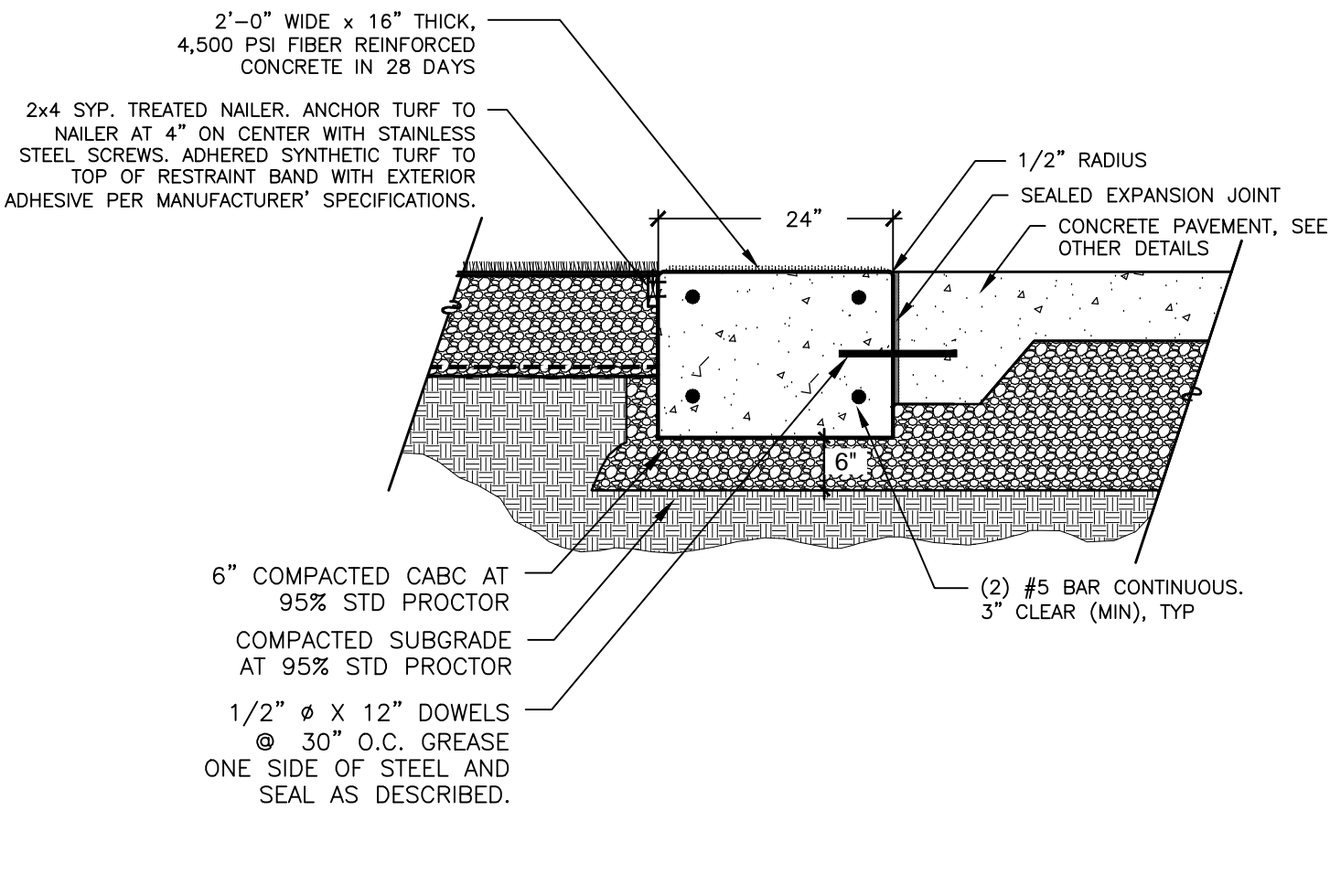


- NOTES:
1. FABRIC, POSTS, RAILS AND FITTINGS SHALL BE HOT DIP GALVANIZED.
  2. FABRIC, POSTS, RAILS AND FITTINGS SHALL BE POLY COATED, SEE SPECIFICATIONS.
  3. SEE SPECIFICATIONS FOR FURTHER MATERIAL AND INSTALLATION REQUIREMENTS.
  4. SEE PLANS FOR LOCATION IN LAWN AREA OR CONCRETE.
  5. FENCE FABRIC SHALL BE INSTALLED ON THE OUTSIDE OF THE FRAME WORK, TYP

2 Chain Link Fence - Height to Match Existing

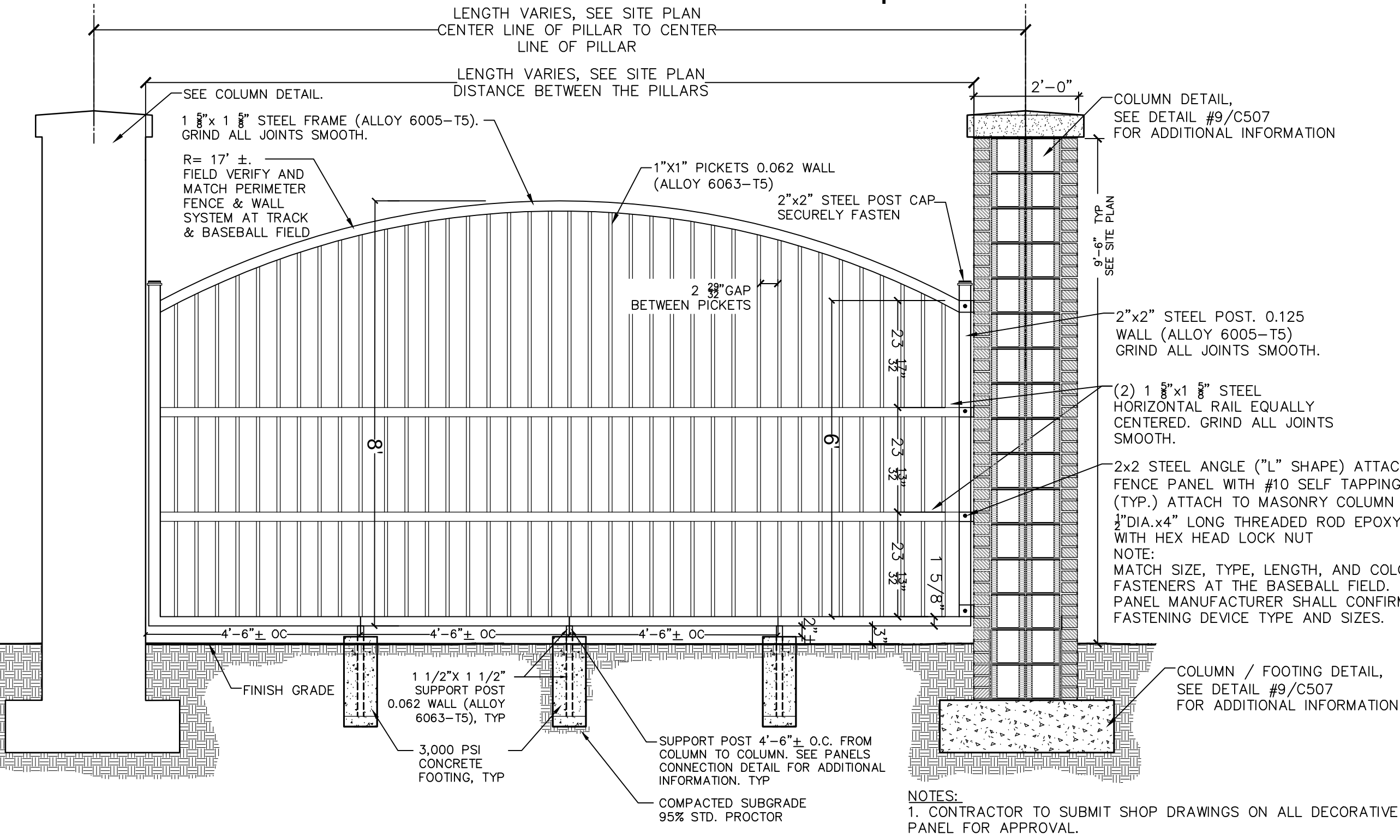


3 Pre Cast Pavers Pavers with Soldier Course

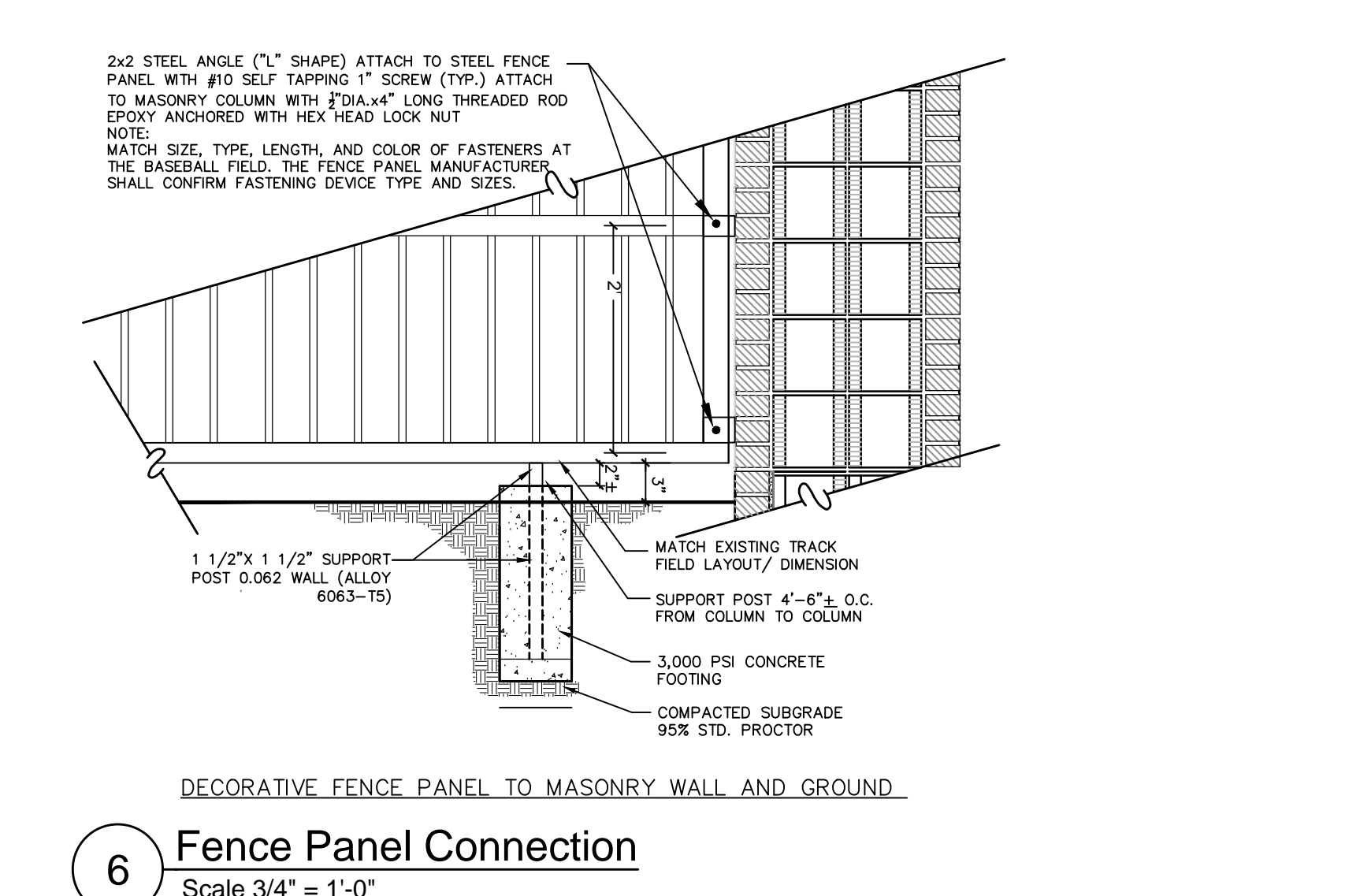


- NOTES:
1. SEE SITE PLAN FOR SPECIFIC LOCATIONS.

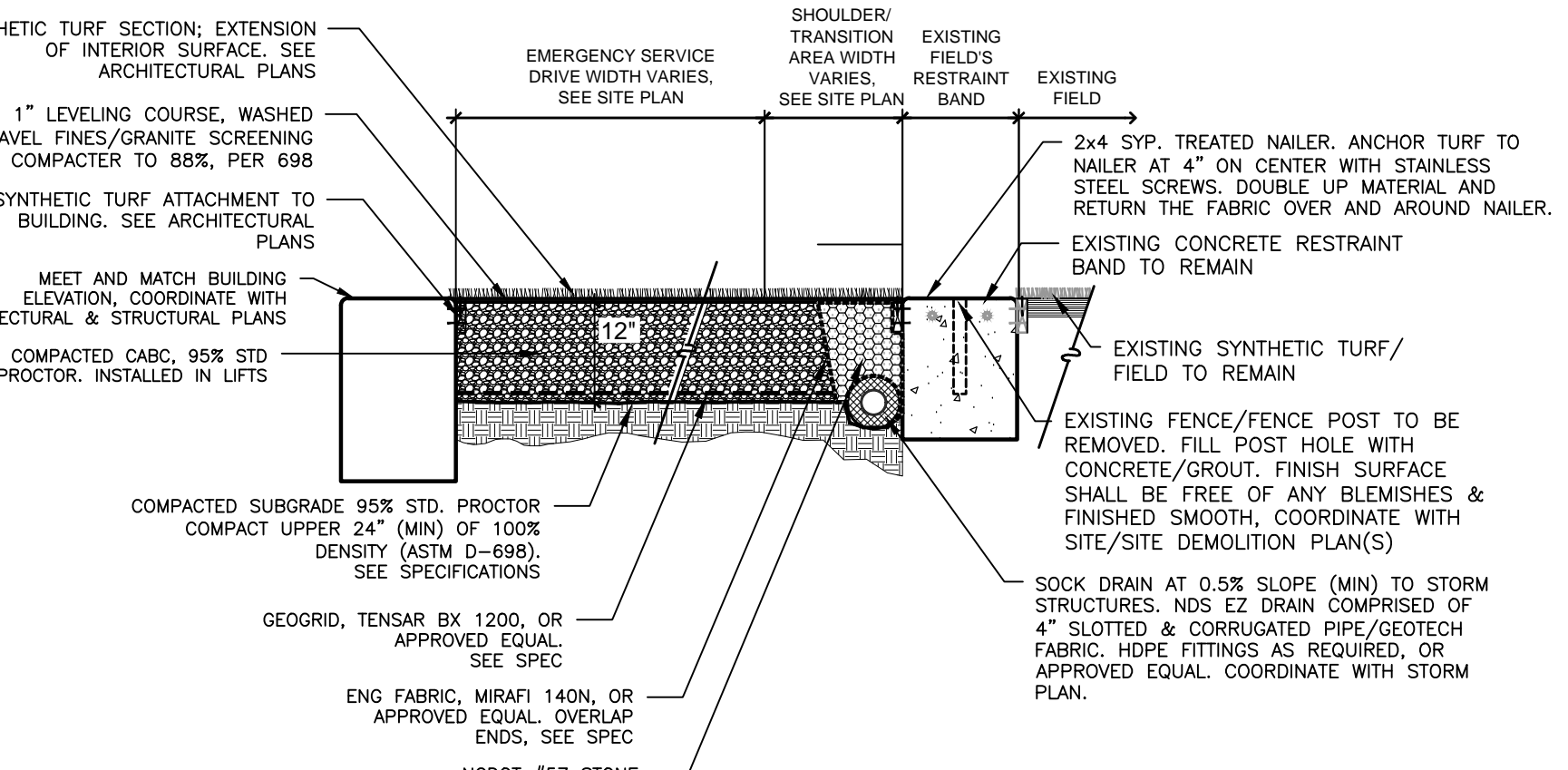
4 Concrete Restraint Band



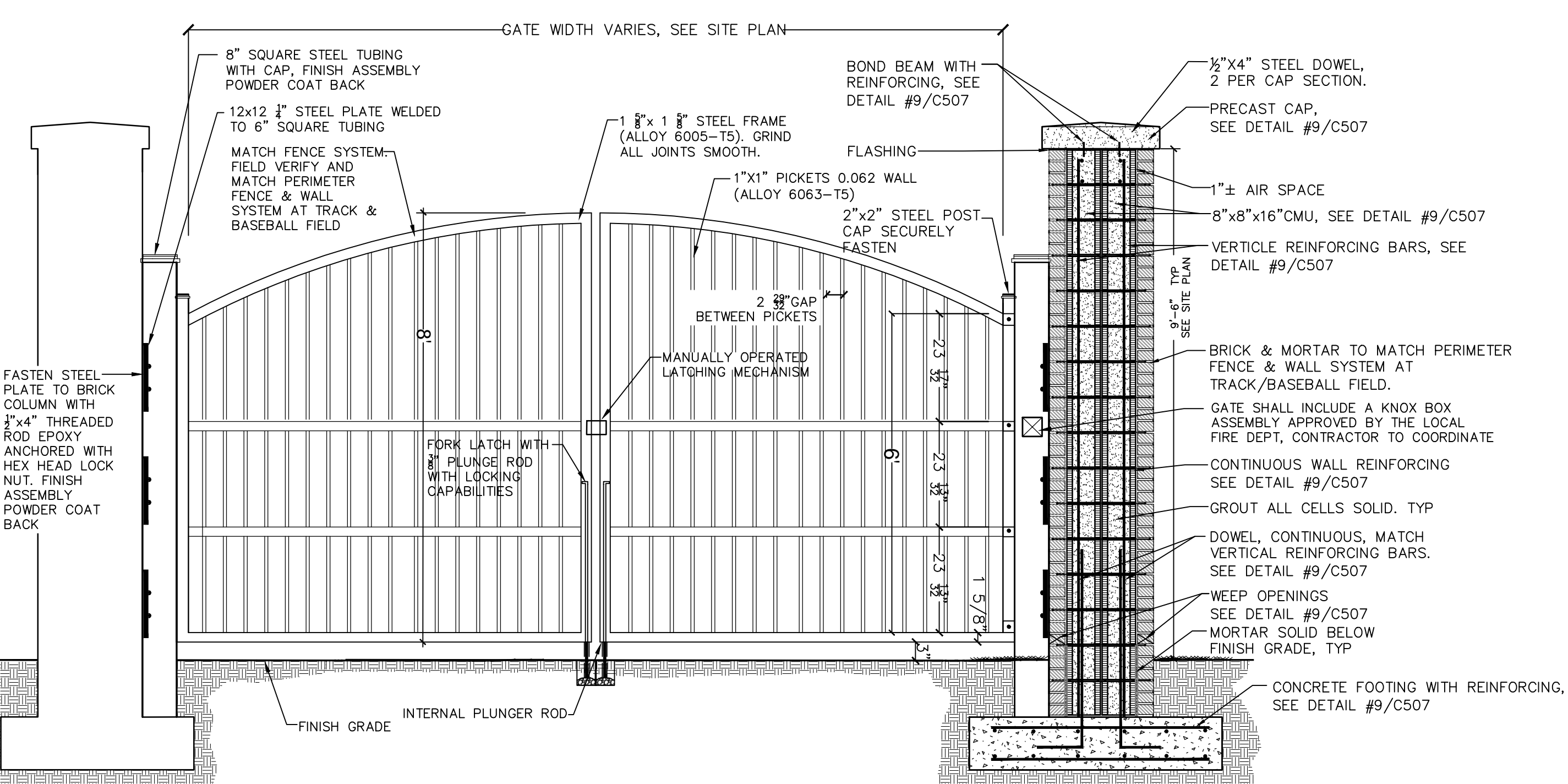
5 Decorative Metal Fence at Ground Condition  
Scale 1/2" = 1'-0"



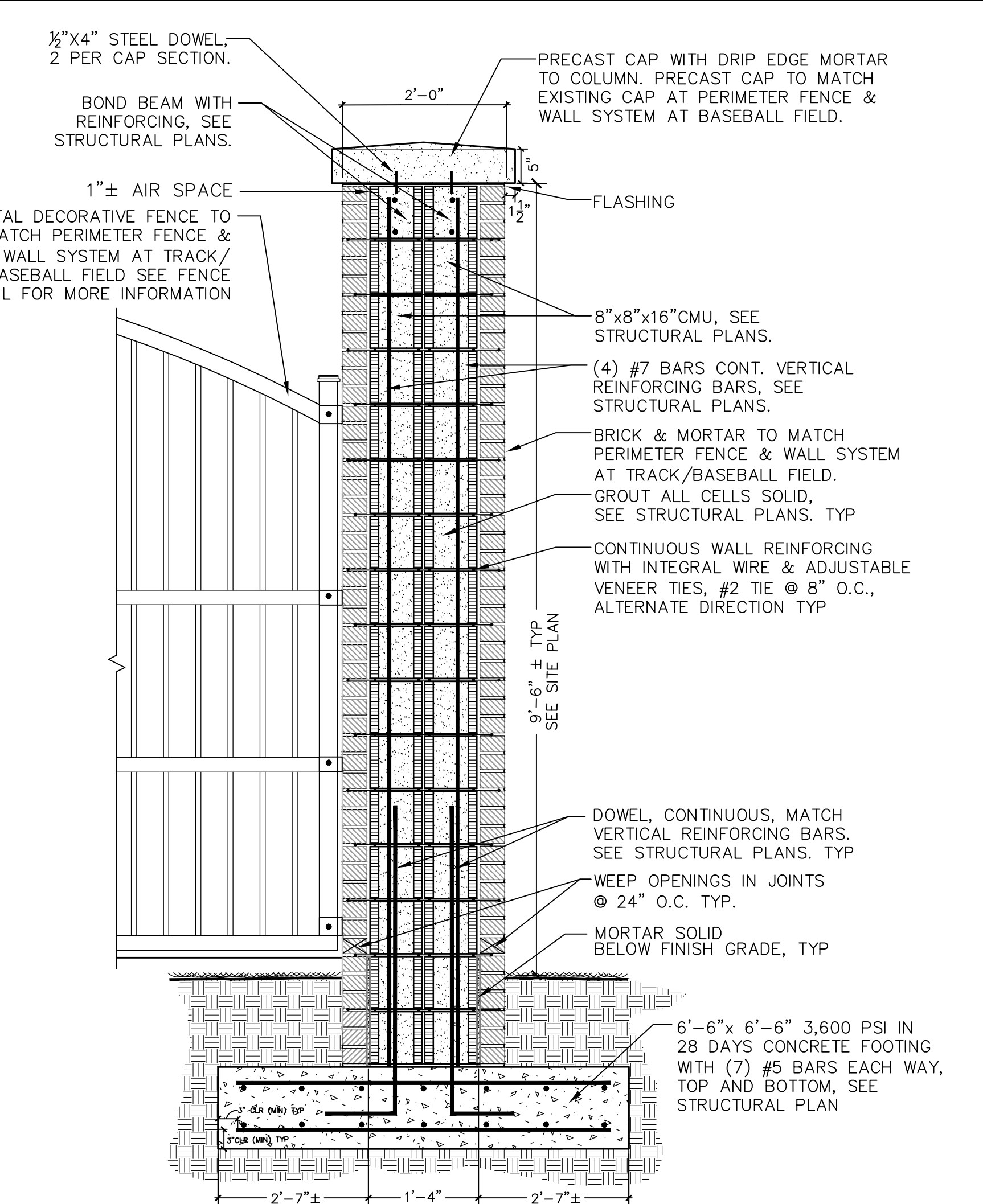
6 Fence Panel Connection  
Scale 3/4" = 1'-0"



7 Emergency Service Drive



8 Decorative Metal Gate with Brick Column  
Scale 1/2" = 1'-0"



9 Brick Column at Grade  
Scale 3/4" = 1'-0"



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New Indoor Training Facility  
East Carolina University  
Greenville, NC  
SCO ID# 23-26345-01A



REVISIONS		
No.	Description	Date
1	ADDENDUM #1	04/09/2025

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SITE DETAILS

SHEET

C507

DATE 01/10/2025 PROJECT NO. 2228





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## Indoor Practice Facility

East Carolina University  
950 Blackboards Alley  
Greenville, NC 27834

SCO ID#23-26345-01A AM # 1752



### REVISIONS

No.	Description	Date
1	Addendum # 1	04/09/25

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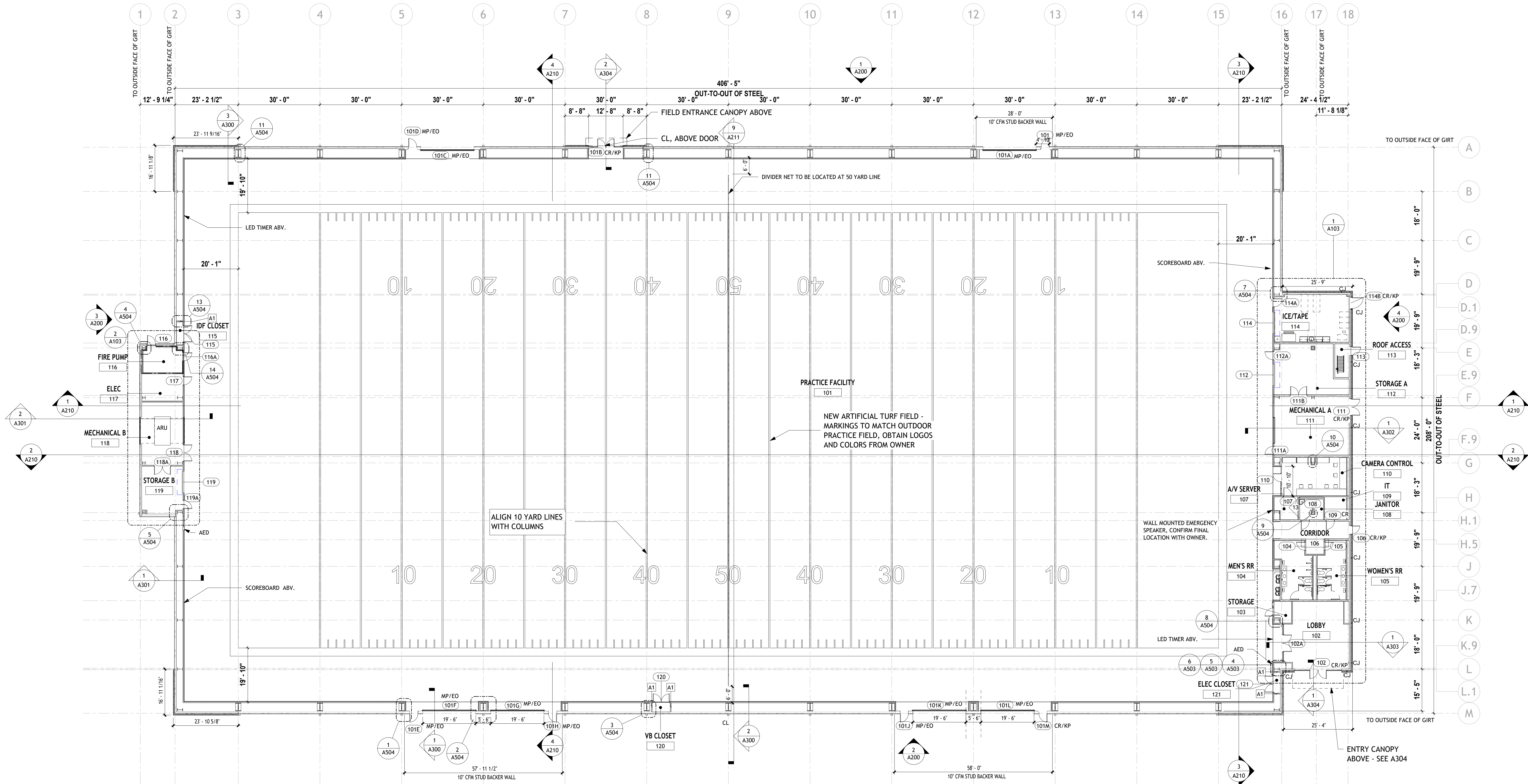
### FLOOR PLAN

SHEET

A101

DATE  
03/14/2025

PROJECT NO.  
2228

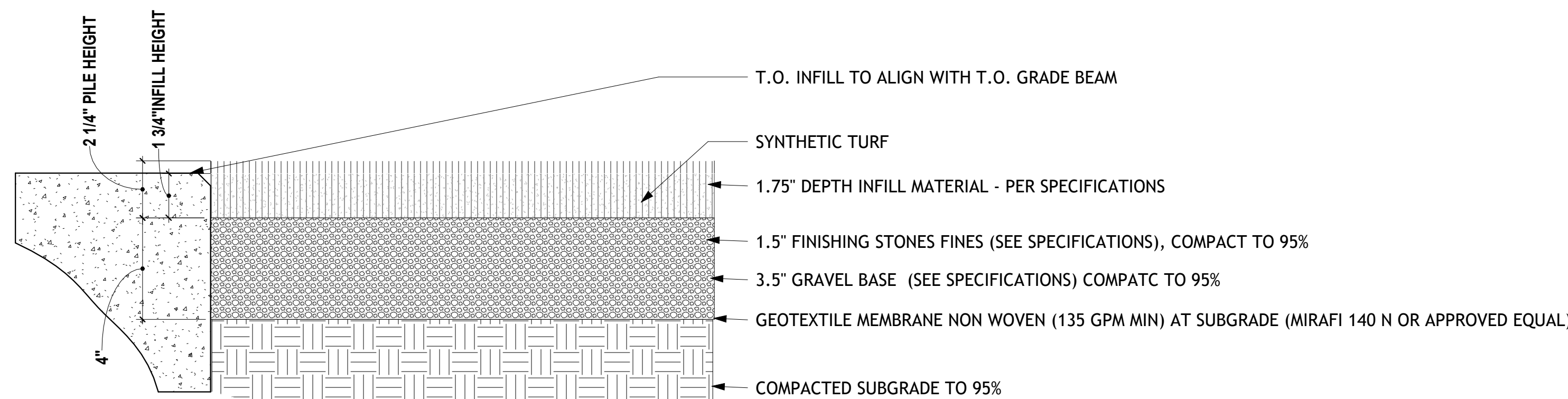


### 1 LEVEL 1 - FLOOR PLAN

SCALE: 1/16" = 1'-0"

### SYNTHETIC TURF LAYOUT NOTES

- SHOULD ANY DISCREPANCIES BE FOUND IN THE FIELD THE CONTRACTOR SHALL CONTACT THE OWNER, ARCHITECT AND CIVIL ENGINEER PRIOR TO PROCEEDING.
- PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED FROM ALL REGULATING AUTHORITIES.
- THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO ANY EXISTING ITEM AND/OR MATERIAL INSIDE OR OUTSIDE THE CONSTRUCTION LIMITS.
- ALL PAPER DRAWINGS AND PDFS ARE REPRODUCTIONS AND ARE SUBJECT TO DISTORTION.
- CONTRACTOR SHALL MAINTAIN THE SITE IN A SAFE AND CLEAN MANNER.
- STAKE LAYOUT OF FIELD PRIOR TO CONSTRUCTION. VERIFY LOCATIONS OF CORNERS AND FIELD MIDPOINT WITH ARCHITECT OR OWNER.
- REFER TO SPECIFICATIONS FOR DETAILED SHOP DRAWING/SUBMITTAL PROCEDURES.
- ALL FIELD CORNERS EXTENTS, PLAY FIELD CORNERS AND PLAY LINE MIDPOINTS SHALL BE SURVEYED AND MARKED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND INSTALLATION OF SYNTHETIC TURF.
- GRADING - PROVIDE ELEVATION SURVEY CERTIFICATE FOR THE SYNTHETIC TURF FIELD SUBGRADE, 25' ON CENTER GRID.
- GRADING - PROVIDE ELEVATION SURVEY CERTIFICATE FOR THE SYNTHETIC TURF FIELD TOP OF FINISH STONE, 25' ON CENTER GRID.
- CONTRACTOR TO INSTALL ALL NECESSARY TRIM TO BE IN COMPLIANCE WITH ADA STANDARDS.



### 2 INDOOR SYNTHETIC FIELD PROFILE

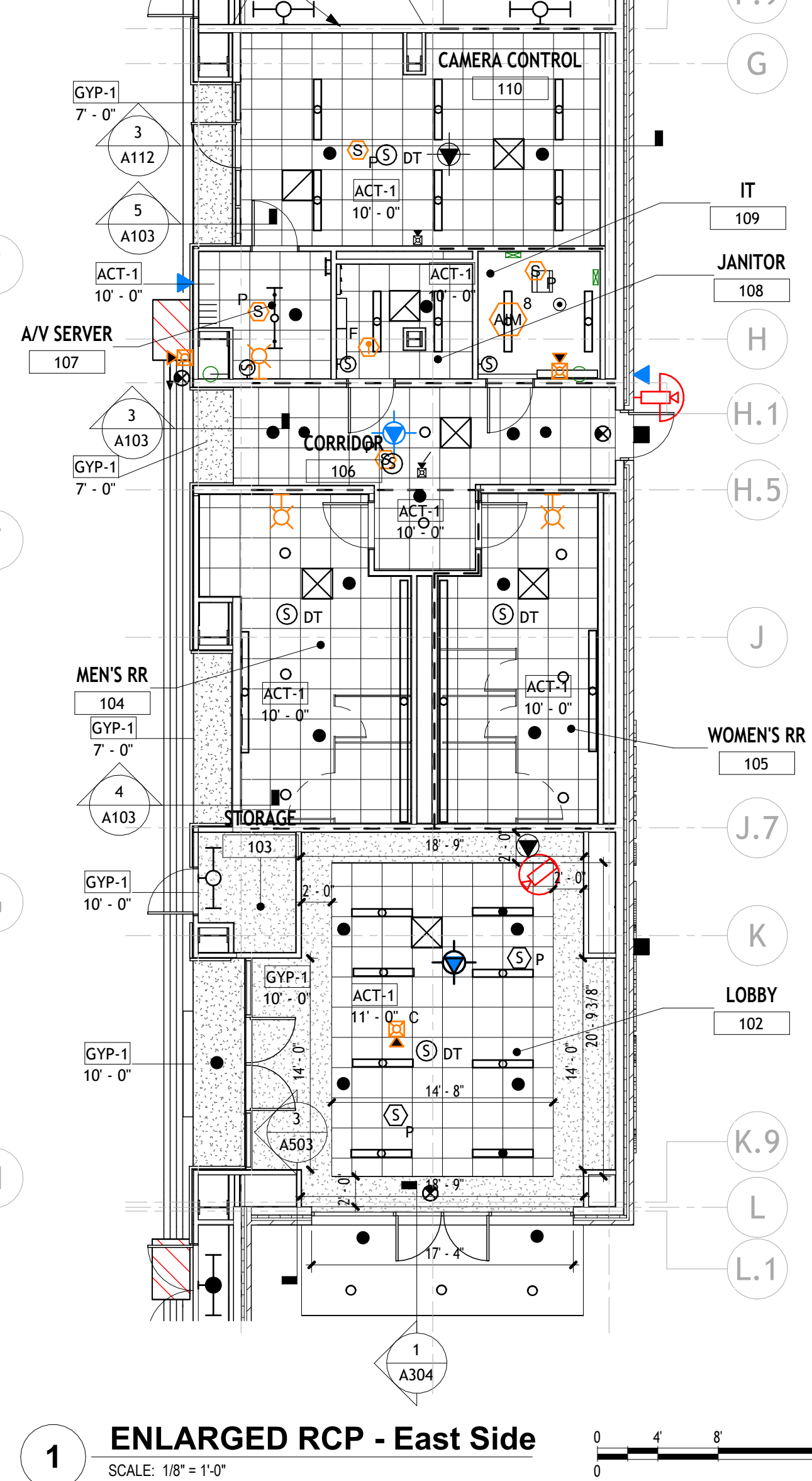
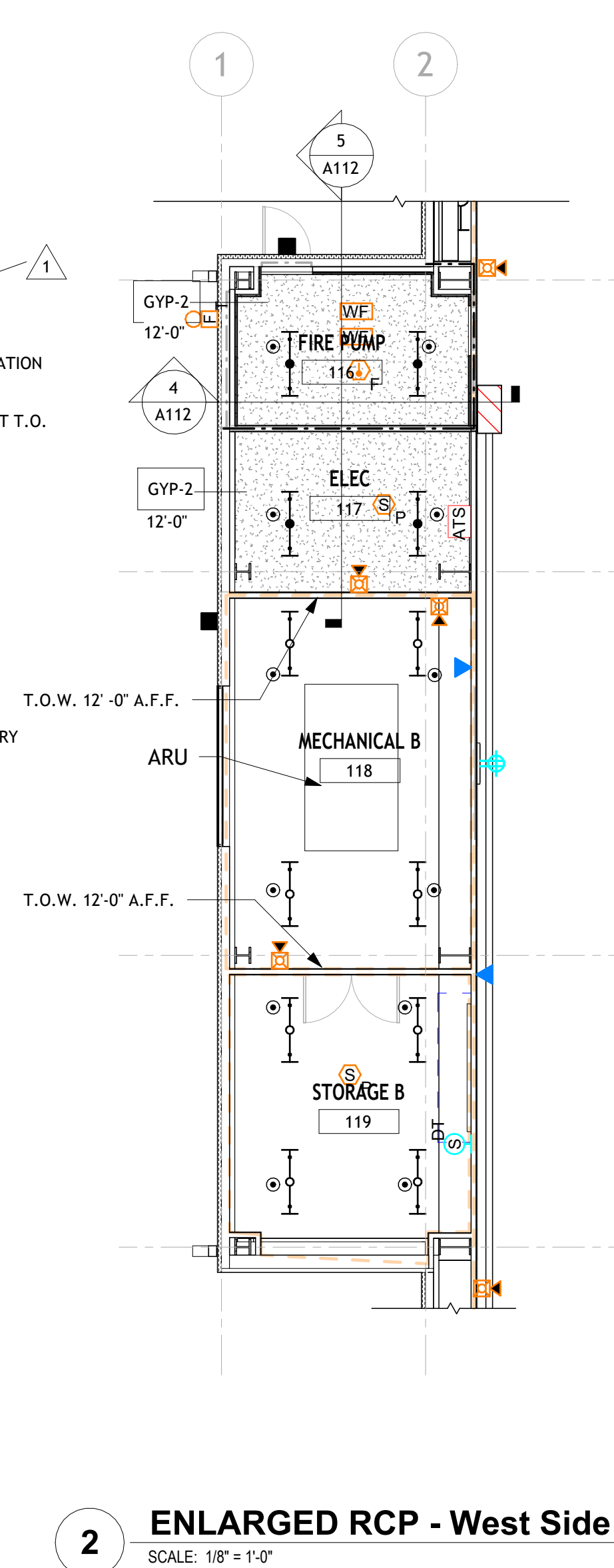
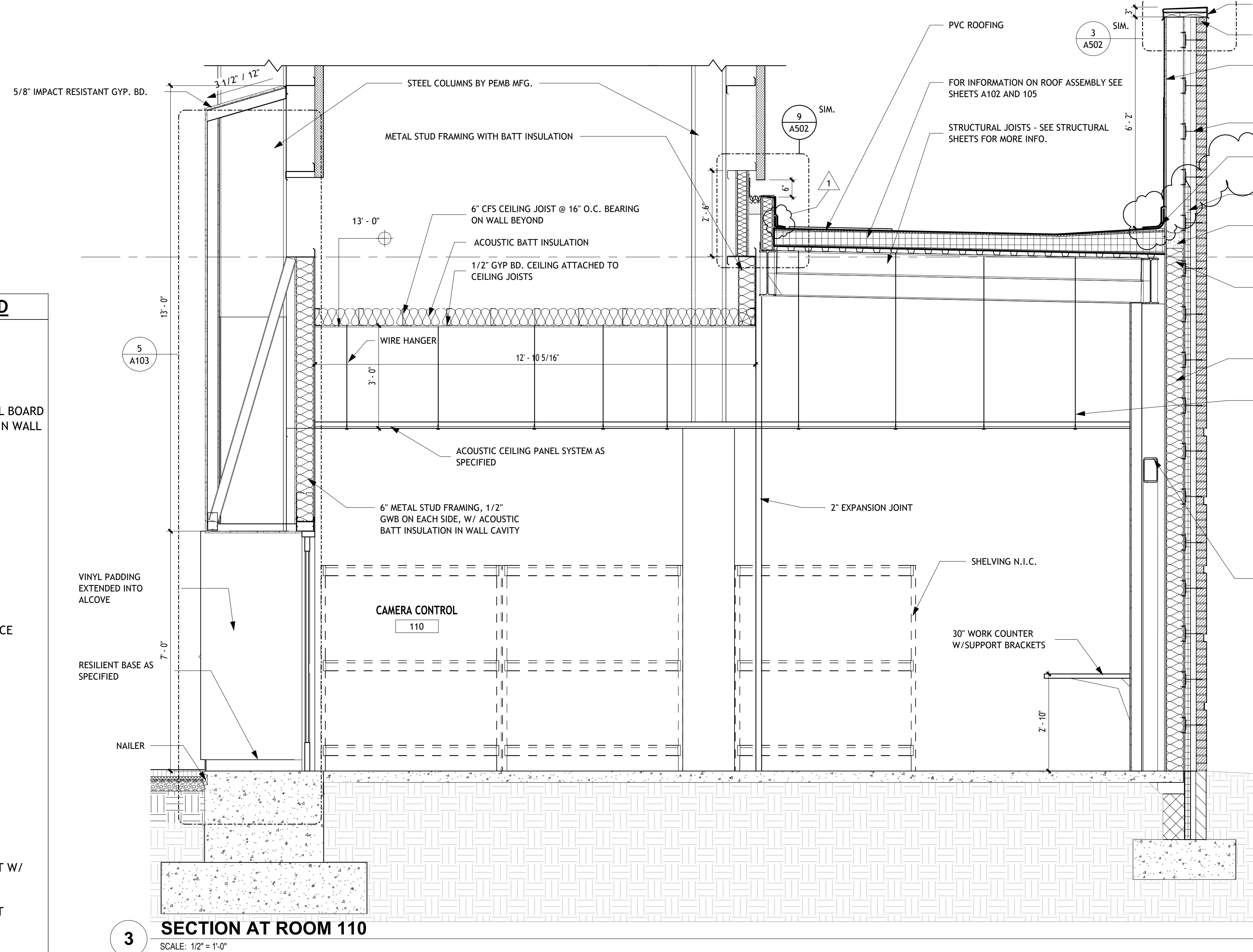
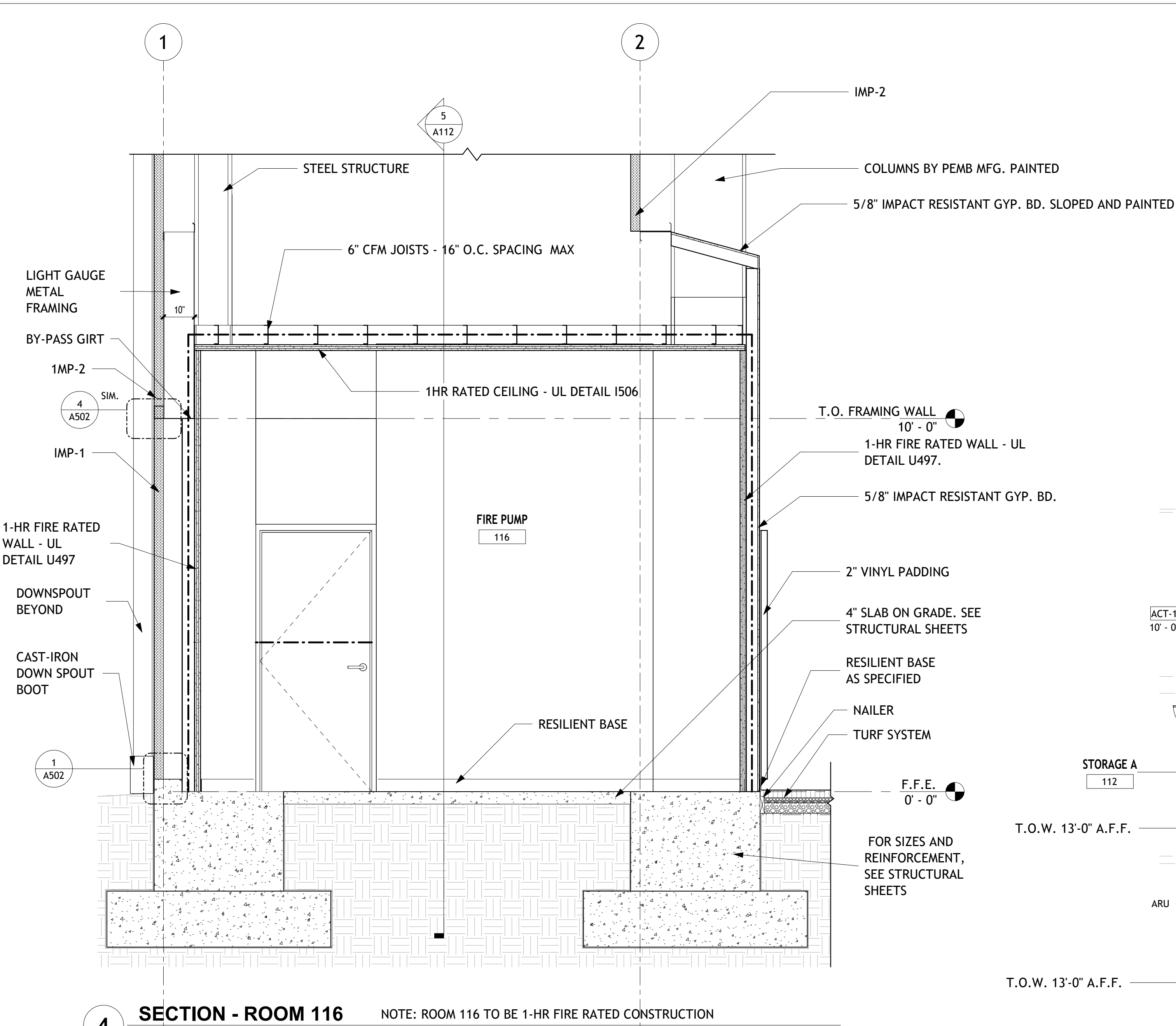
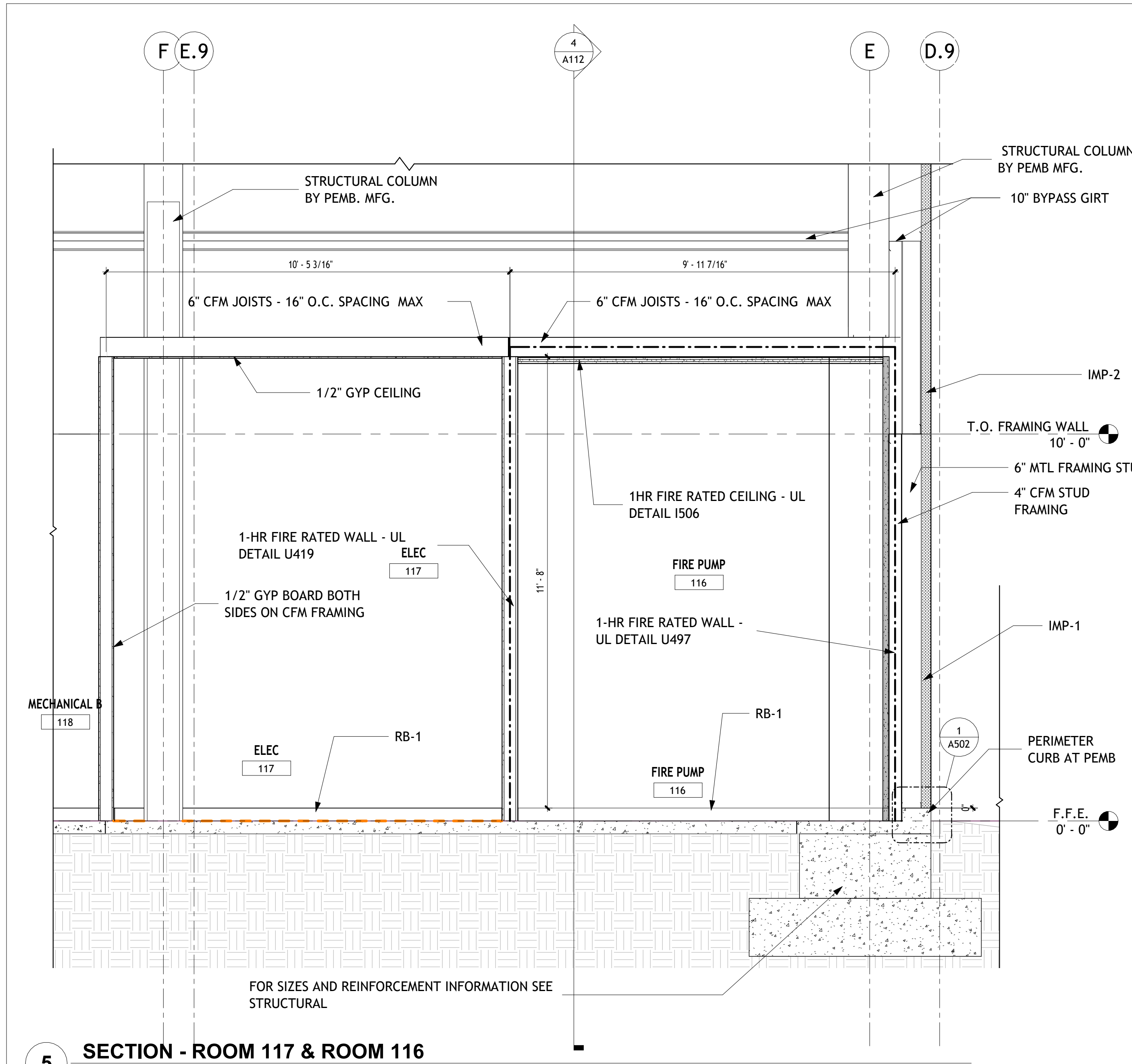
NOT TO SCALE

### ACCESS CONTROL ABBREVIATIONS

FOR MORE DETAILED INFORMATION REFER TO ELECTRIC AND TELECOMMUNICATION SHEETS, AS WELL AS DOOR AND DOOR HARDWARE SCHEDULES.

CR/KP CARD READER AND KEYPAD  
MP/EO MONITOR POINT/ EXIT ONLY









East Carolina University  
9950 Blackbeards Alley  
Greenville, NC 27834



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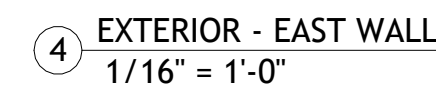
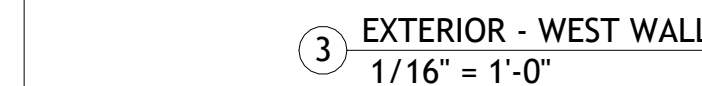
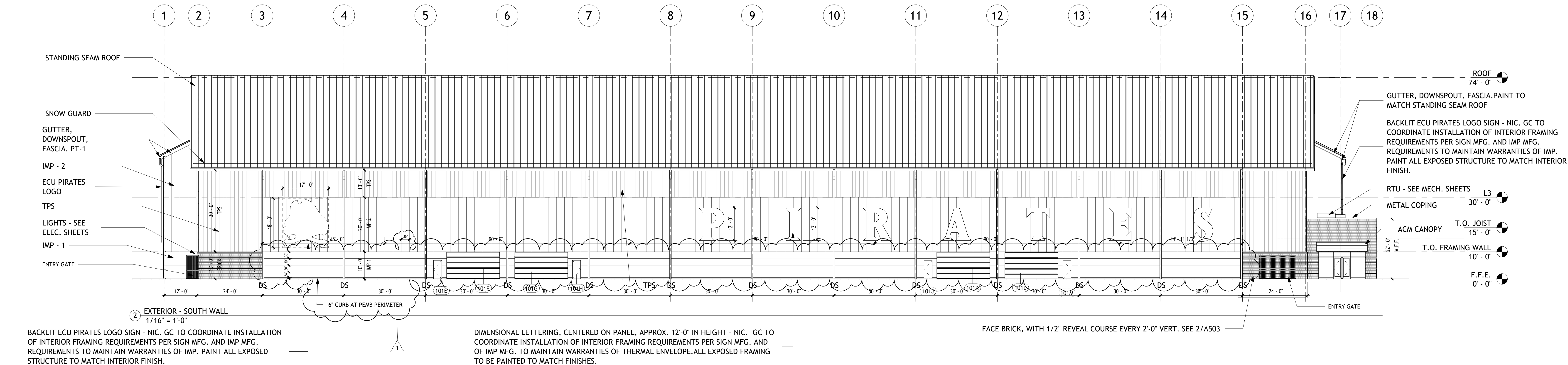
## EXTERIOR ELEVATIONS

SHEET

## A200

DATE  
03/14/2025

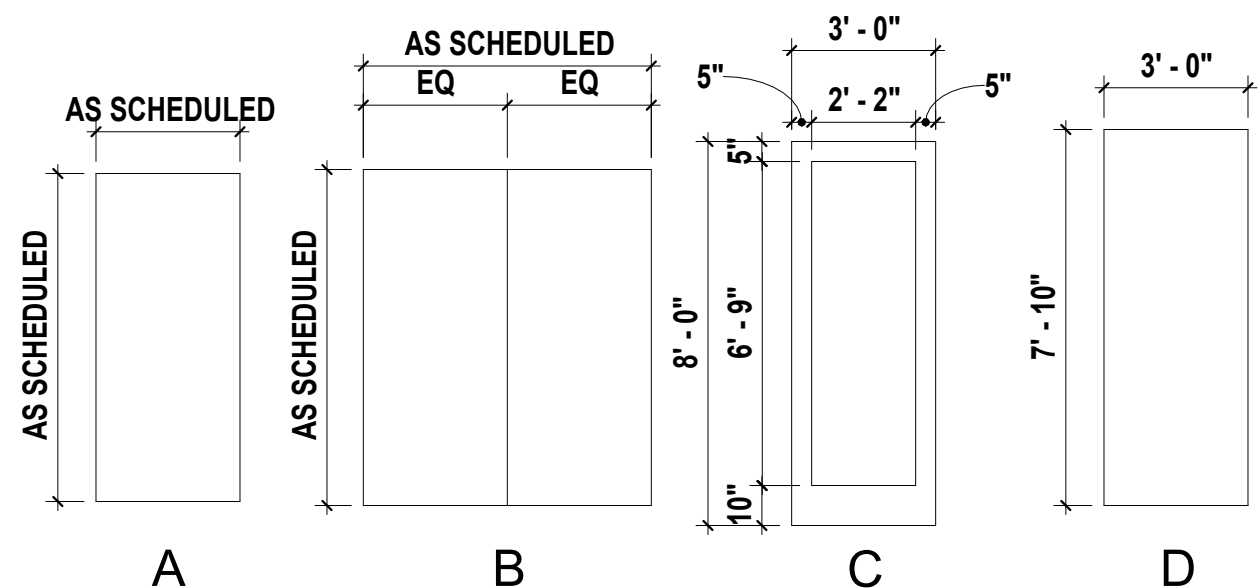
PROJECT NO.  
2228



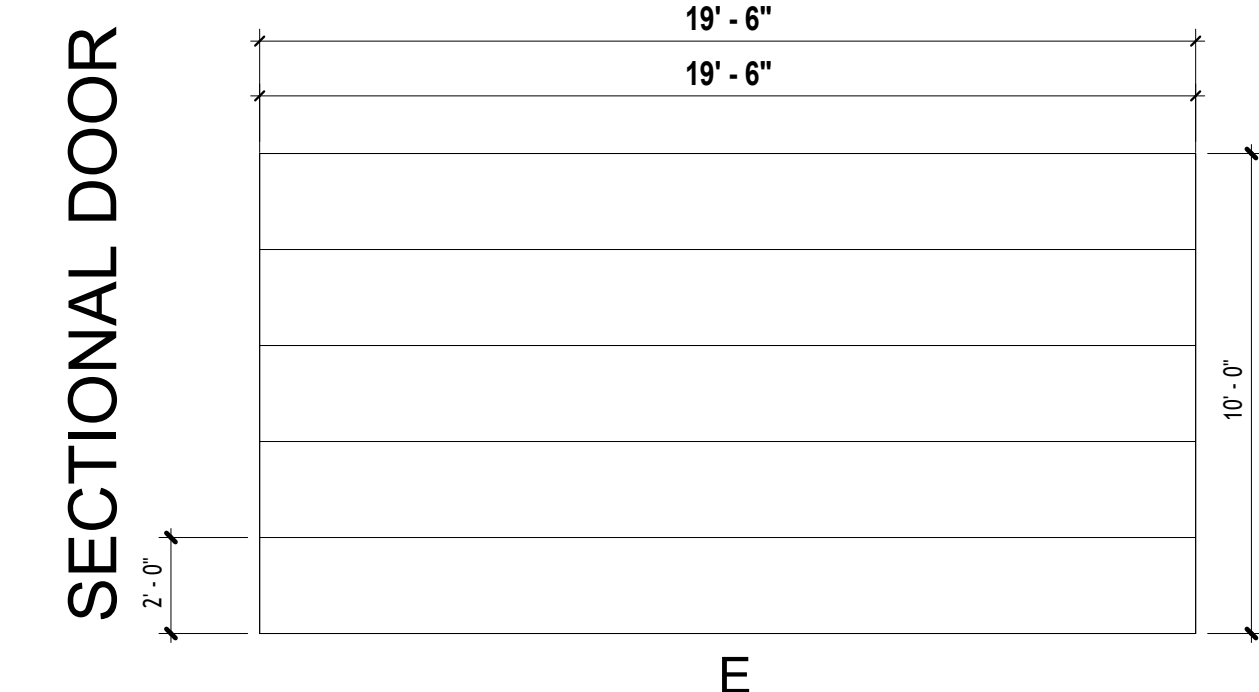
1. IMP - 1: INSULATED METAL PANEL TO BE INSTALLED HORIZONTALLY. COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURERS STANDARD COLORS. SEE SPECIFICATION SECTION 074213.19 FOR MORE INFORMATION.
2. IMP - 2: INSULATE METAL PANEL TO BE INSTALLED VERTICALLY. COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURERS STANDARD COLORS. SEE SPECIFICATION SECTION 074213.19 FOR MORE INFORMATION.
3. TPS - TRANSLUCENT PANEL SYSTEM. COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURERS STANDARD COLORS. SEE SPECIFICATION SECTION 084500 FOR MORE INFORMATION.
4. STANDING SEAM ROOF - COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURERS STANDARD COLORS. SEE SPECIFICATION SECTION 07413.16 FOR MORE INFORMATION.
5. FACE BRICK - SEE SPECIFICATION SECTION 042613 FOR MORE INFORMATION.
6. ALL FASCIA, GUTTERS, SOFFITS, RAKE TRIM, TO BE PAINTED TO MATCH IMP-1.
7. ALL NON-ADA COMPLIANT SIGNAGE, I.E. JOLLY RODGER HEADS, NAMING DIMENSIONAL LETTERING, INTERIOR GRAPHICS, ARE NOT PART OF THE CONTRACT. CONTRACTOR TO PROVIDE NECESSARY BLOCKING AND SUPPORTS FOR EXPOSED. COORDINATE FINAL DESIGN OF EXTERIOR SIGNAGE WITH OWNER, OWNERS GRAPHIC DESIGNER, AND OWNERS SIGNAGE VENDOR. MAINTAIN ALL WARRANTIES OF AFFECTED AREAS. PAINT ALL EXPOSED STRUCTURE TO MATCH ADJACENT INTERIOR FINISHES.
8. LANDSCAPING NOT SHOWN ON DRAWINGS - FOR INFORMATION ON LANDSCAPING ELEMENTS SEE LANDSCAPE DRAWINGS



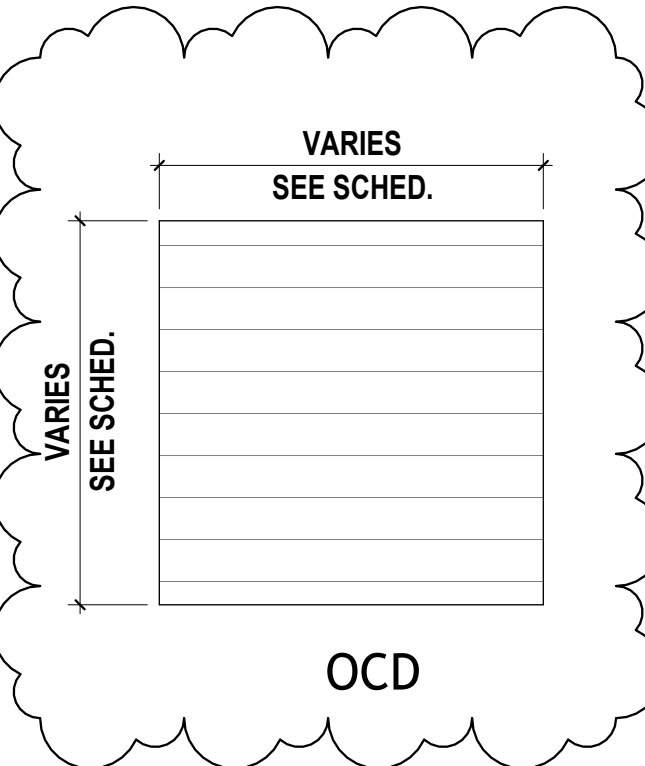
PANEL TYPES



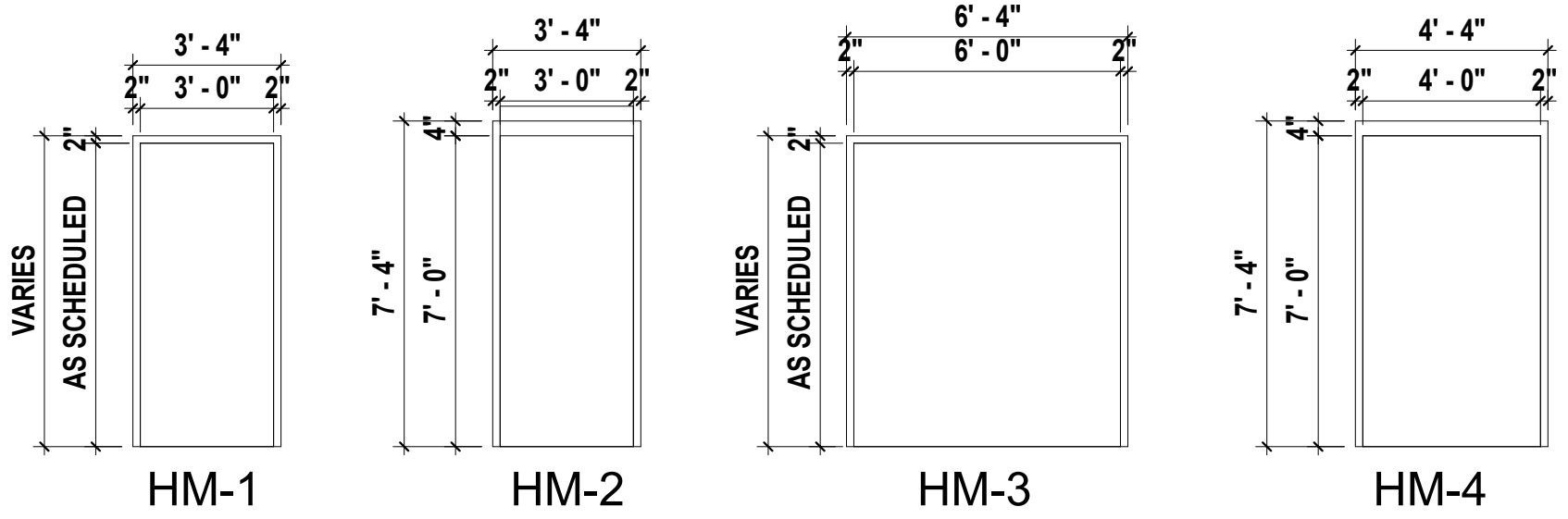
SECTIONAL DOOR



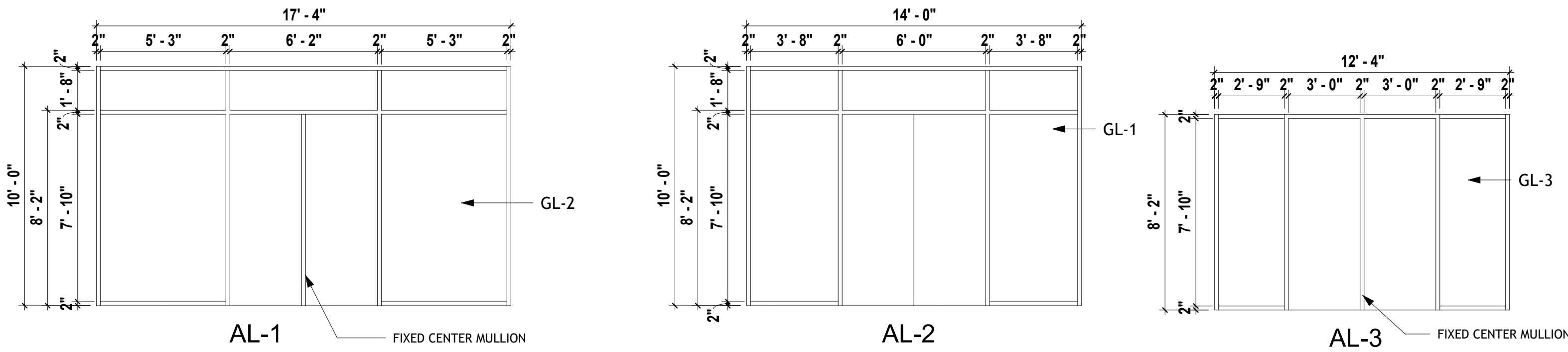
OVERHEAD COILING DOOR



HOLLOW METAL FRAMES



ALUMINUM STOREFRONT WALL FRAMES



Door and Frame Schedule

Mark	Height	Width	Panel Type	Panel Material	Panel Finish	Frame Type	Frame Finish	Head Detail	Jamb Detail	Glazing Type	Hardware Set	Fire Rating	Comments
101	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	3.0	--	Exit Only, Position Switch, Power Supply
101A	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101B	8' - 0'	3' - 0'	C	Aluminum	Prefinished	AL-3	Prefinished	SH1	SH2	GL-3	18.0	--	Card Reader, Motorized Access Switch
101C	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101D	6' - 10'	3' - 0'	D	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	3.0	--	Exit Only, Position Switch, Power Supply
101E	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	2.0	--	Exit Only, Position Switch, Power Supply
101F	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101G	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101H	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	2.0	--	Exit Only, Position Switch, Power Supply
101J	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	2.0	--	Exit Only, Position Switch, Power Supply
101K	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101L	10' - 0'	19' - 6'	E	Steel	Prefinished	--	Prefinished	H4	J4	--	--	--	Vertical Lift Sectional Door
101M	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H3	J3	--	1.0	--	Card Reader/Keypad, Position Switch
102	8' - 0'	3' - 0'	C	Glass/Aluminum	Prefinished	AL-1	Prefinished	SH1	SJ1	GL-2	18.0	--	Card Reader/Keypad,Power Supply, Position switch, Automatic Opener, ADA push button
102A	8' - 0'	3' - 0'	C	Glass/Aluminum	Prefinished	AL-2	Prefinished	SH2	GL-1	12.	--	--	
103	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H1	J1	--	17.0	--	Vinyl Padding Attached to Face
104	7' - 0'	3' - 0'	A	Solid Core Wood	Stained	HM-1	Paint	H1	J1	--	14.0	--	
105	7' - 0'	3' - 0'	A	Solid Core Wood	Stained	HM-1	Paint	H1	J1	--	14.0	--	
106	7' - 0'	3' - 0'	A	Hollow Metal	Paint	HM-2	Paint	H2	J2	--	4.0	--	Card Reader/Keypad,Position Switch, Power Supply, Thermally Broken
107	7' - 0'	3' - 0'	A	Solid Core Wood	Stained	HM-1	Paint	H1	J1	--	20.0	--	
108	7' - 0'	3' - 0'	A	Solid Core Wood	Stained	HM-1	Paint	H1	J1	--	9.0	--	
109	7' - 0'	3' - 0'	A	Solid Core Wood	Stained	HM-1	Paint	H1	J1	--	8.0	--	Card Reader/Keypad, Power Supply, Position Switch
110	6' - 10'	3' - 0'	C	Glass/Aluminum	Prefinished	AL-4	Prefinished	SH2	GL-1	10.0	--	--	
111	7' - 0'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H2	J2	--	21.0	--	Card Reader/Keypad,Position Switch, Power Supply, Thermally Broken
111A	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H1	J1	--	17.0	--	Vinyl Padding Attached to Face
111B	7' - 0'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	11.0	--	
112	7' - 0'	8' - 0'	OCD	--	--	--	--	--	--	--	--	--	Manual Overhead Coiling Door
112A	6' - 10'	3' - 0'	A	Hollow Metal	Painted	HM-1	Paint	H1	J1	--	17.0	--	Vinyl Padding Attached to Face
113	7' - 0'	3' - 0'	A	Hollow Metal	Paint	HM-2	Paint	H2	J2	--	5.0	--	Position Switch, Power Supply, Thermally Broken
114	7' - 0'	8' - 0'	OCD	--	--	--	--	--	--	--	--	--	Overhead Coiling Door
114A	6' - 10'	3' - 0'	C	Hollow Metal	Paint	HM-1	Paint	H1	J1	GL-1	16.00	--	
114B	7' - 0'	4' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H2	J2	4.0	--	--	Thermally Broken,Card Reader/Keypad, Position Switch, Power supply, Position Switch
115	6' - 10'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	11.0	--	Vinyl Padding Attached to Face Power Supply, Position Switch, Card Reader
116	7' - 0'	3' - 0'	A	Hollow Metal	Paint	HM-2	Paint	H3	J3	--	5.0	1-hour	Thermally Broken
116A	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H1	J1	--	7.0	1-hour	
117	6' - 10'	3' - 0'	A	Hollow Metal	Paint	HM-1	Paint	H1	J1	--	7.0	--	Vinyl Padding Attached to Face,
118	6' - 10'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	11.0	--	Vinyl Padding attached to Face
118A	7' - 0'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	11.0	--	
119	7' - 0'	8' - 0'	OCD	--	--	--	--	--	--	--	--	--	Overhead Coiling Door
119A	6' - 10'	3' - 0'	A	Hollow metal	Paint	HM-1	Paint	H1	J1	--	17.0	--	Vinyl Padding Attached to Face
120	6' - 10'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	9.0	--	Vinyl Padding Attached to Face
121	6' - 10'	6' - 0'	B	Hollow Metal	Paint	HM-3	Paint	H1	J1	--	9.0	--	Vinyl Padding Attached to Face, Power Supply, Position Switch
201	1' - 0'	2' - 6'	--	--	--	--	--	--	--	--\	--	n/a	Single Leaf Roof Hatch - See A-105 for more information

GENERAL DOOR NOTES:  
1. SEE SPECIFICATION 10 43 10 FOR INTERIOR SIGN SCHEDULE.

GLAZING SCHEDULE  
GL-1: Fully Tempered Float Glass  
GL-2: Low-E, Tinted Insulating Glass  
GL-3: Low-E coated, with Decorative Film Overlay

OWNER PROVIDED ACCESS CONTROL HARDWARE:  
1. Door Position Switches  
2. Sounder  
3. Card Reader/Key Pad  
4. Cable from each door to access control panel. Contractor to install.

Indoor Practice Facility

East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834

SCO ID#23-26345-01A

AM # 1752



REVISIONS

No.	Description	Date
1	Addendum # 1	04/09/25

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DOOR AND WINDOW SCHEDULES

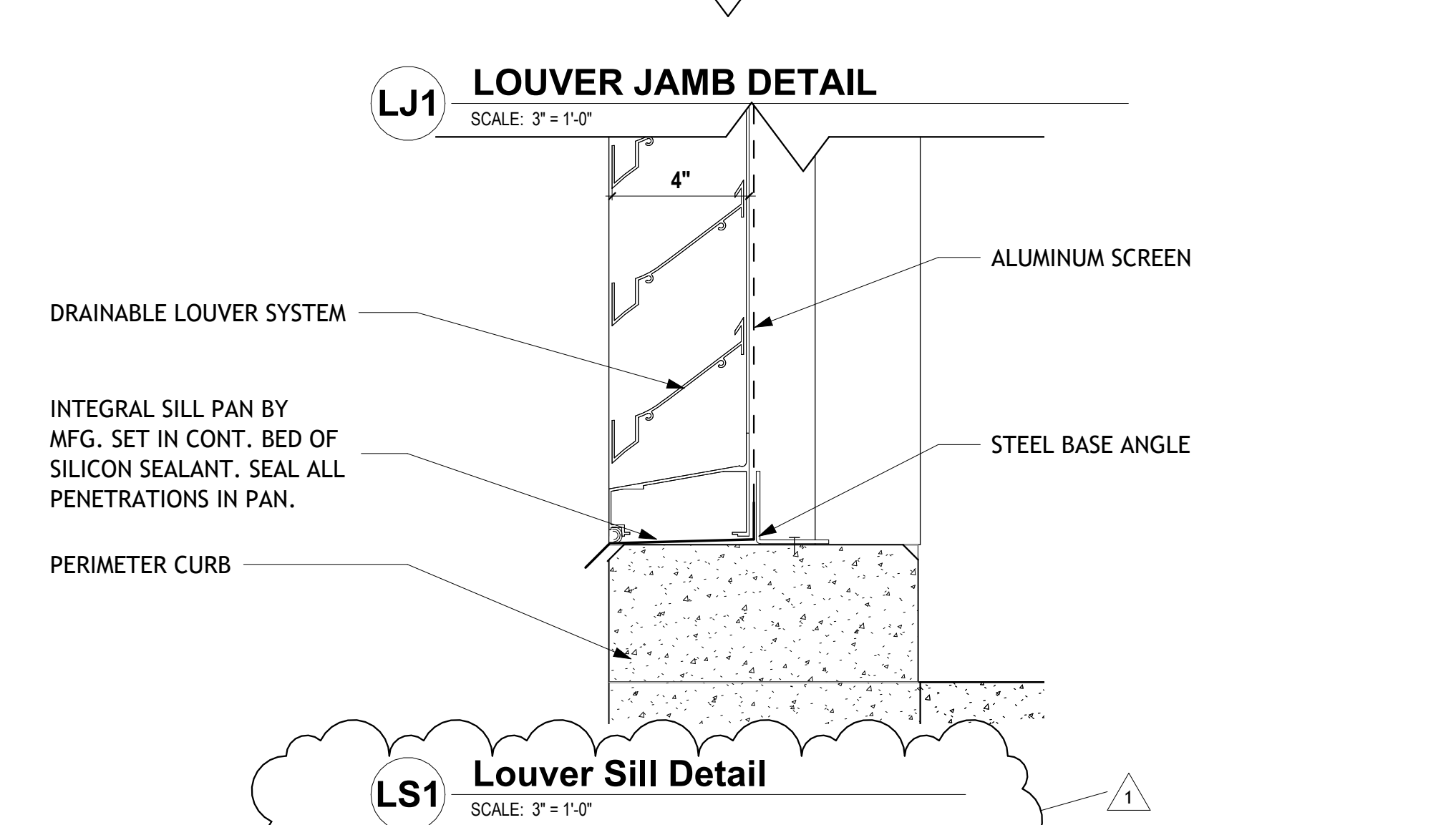
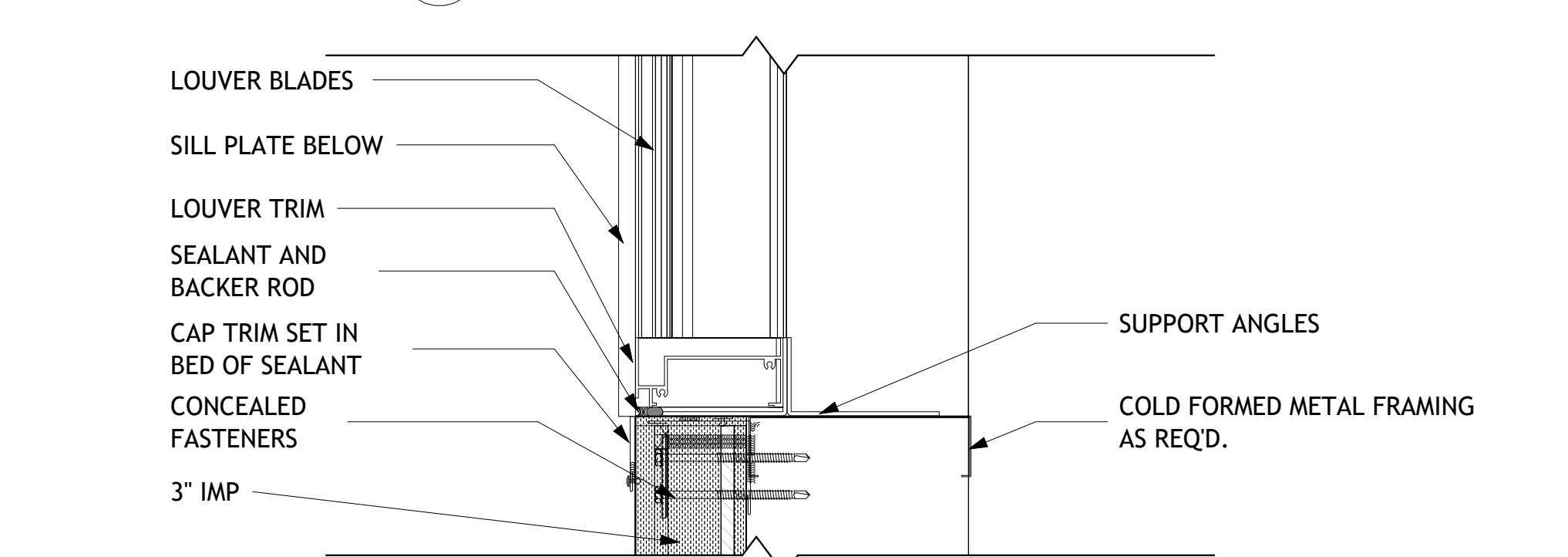
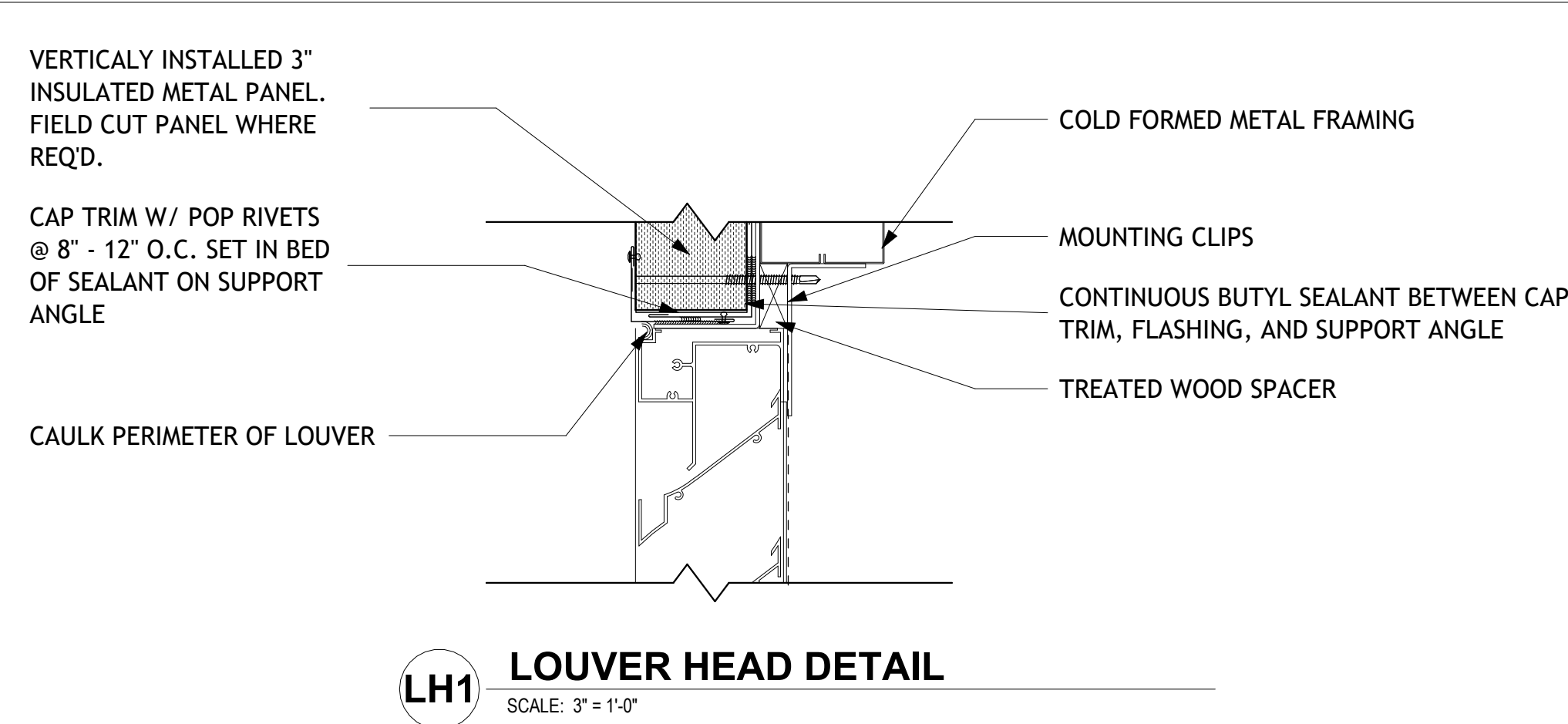
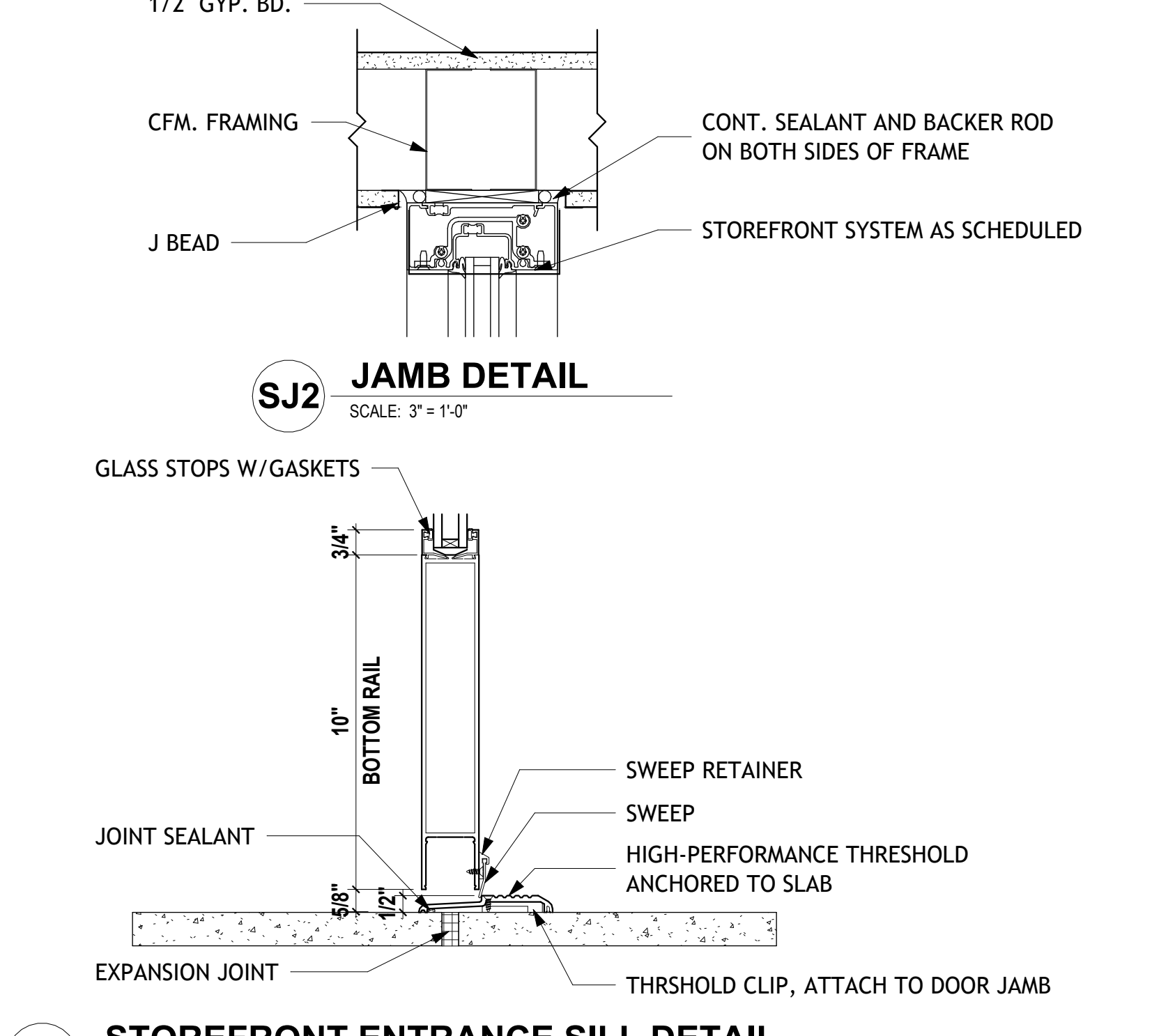
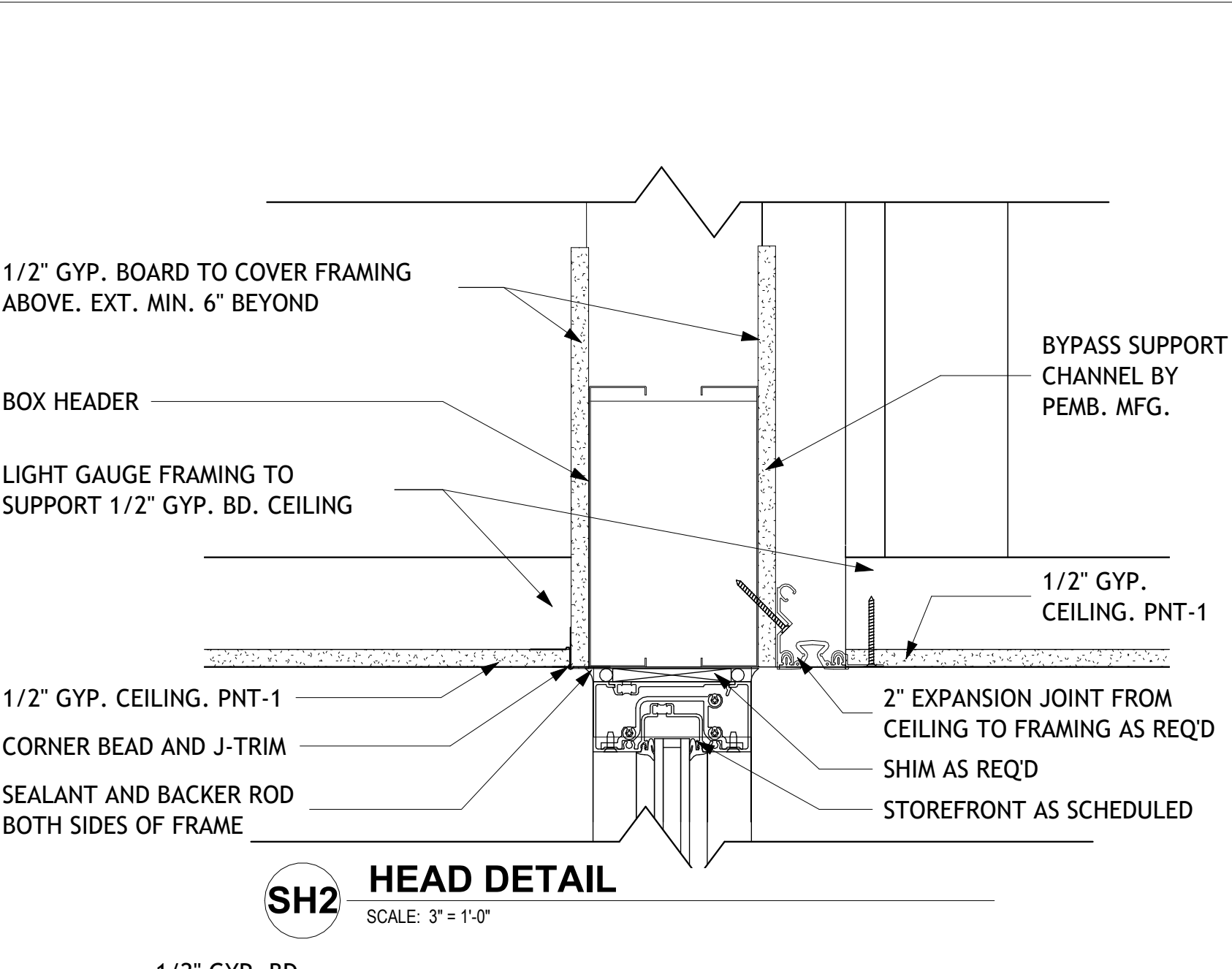
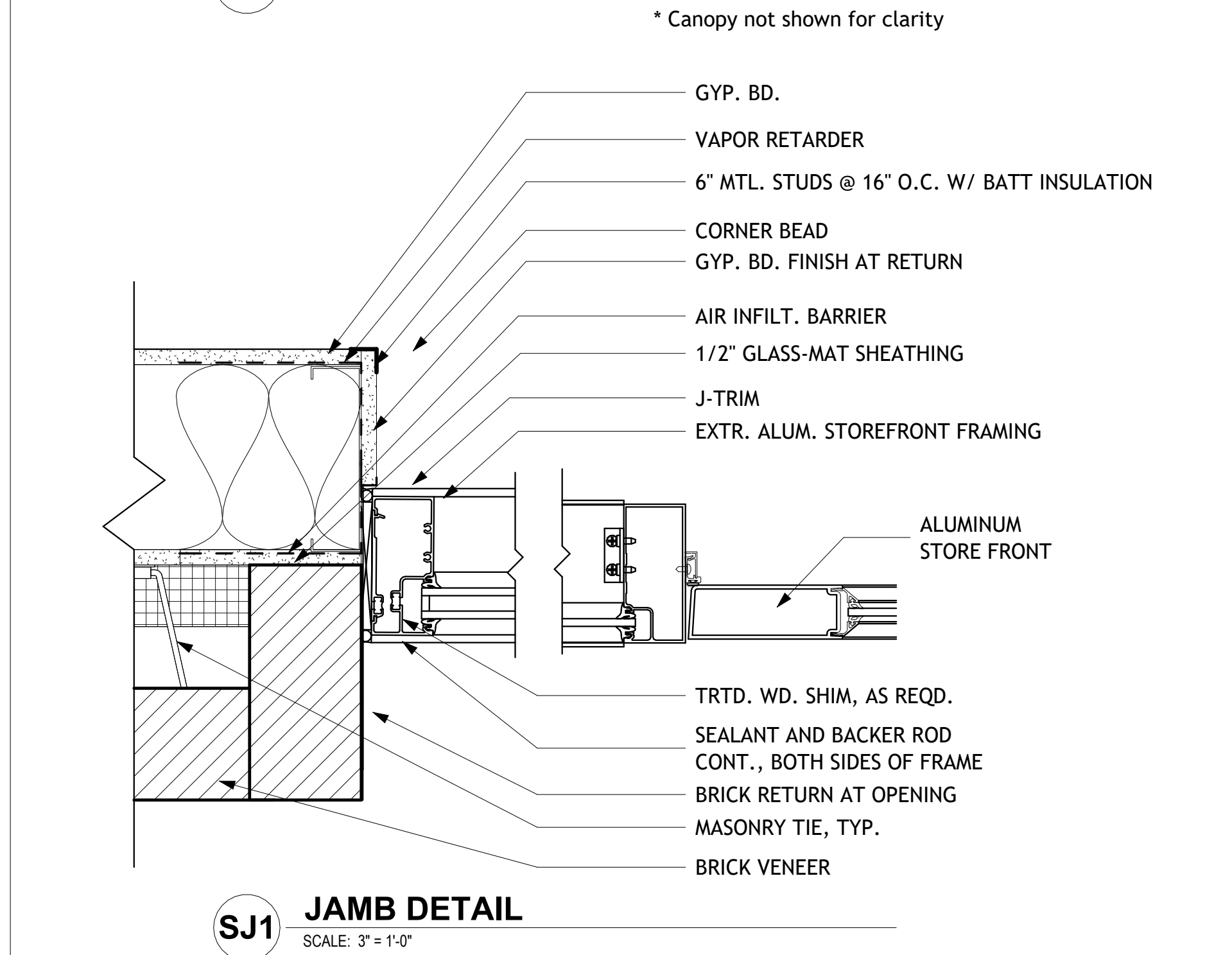
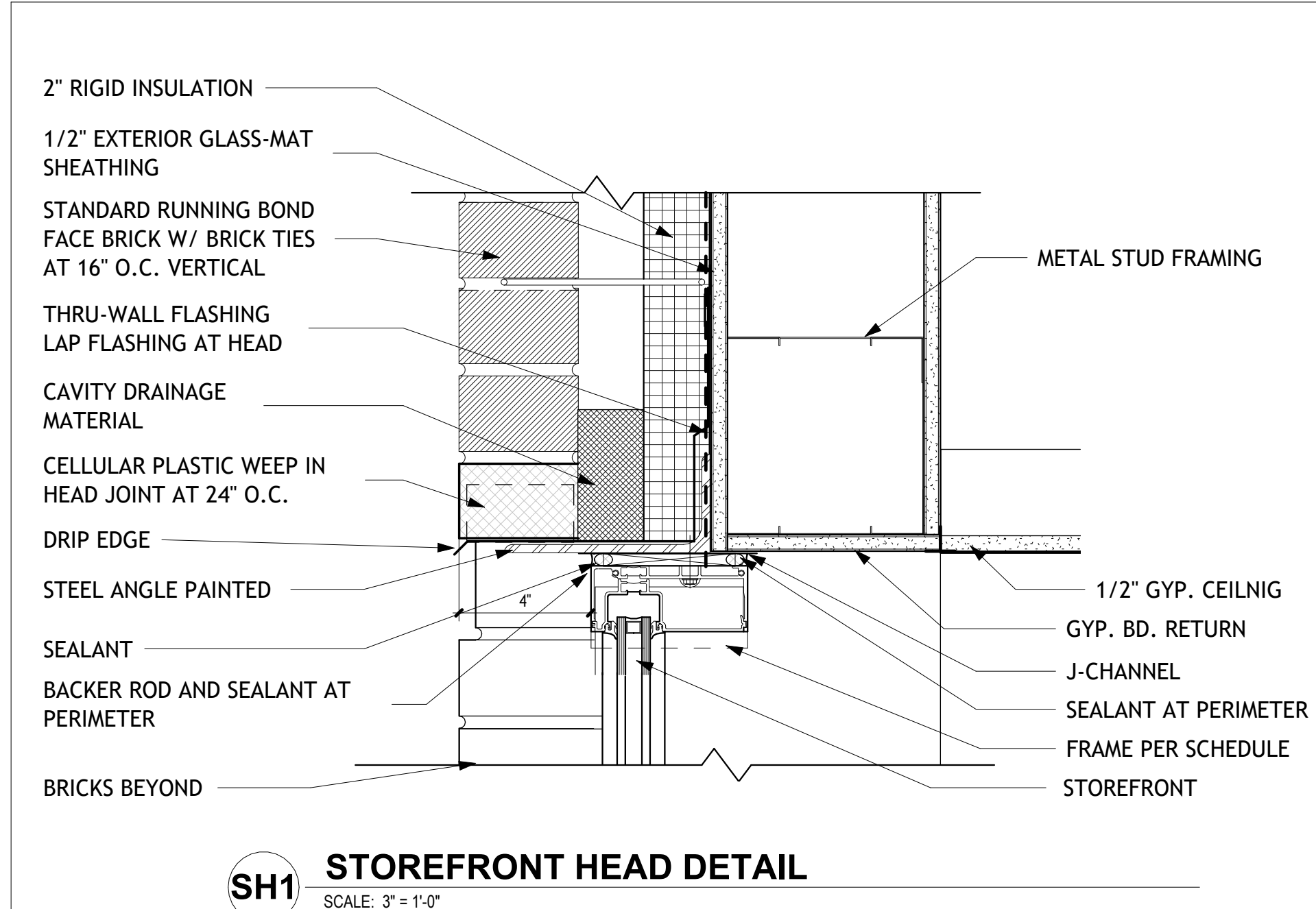
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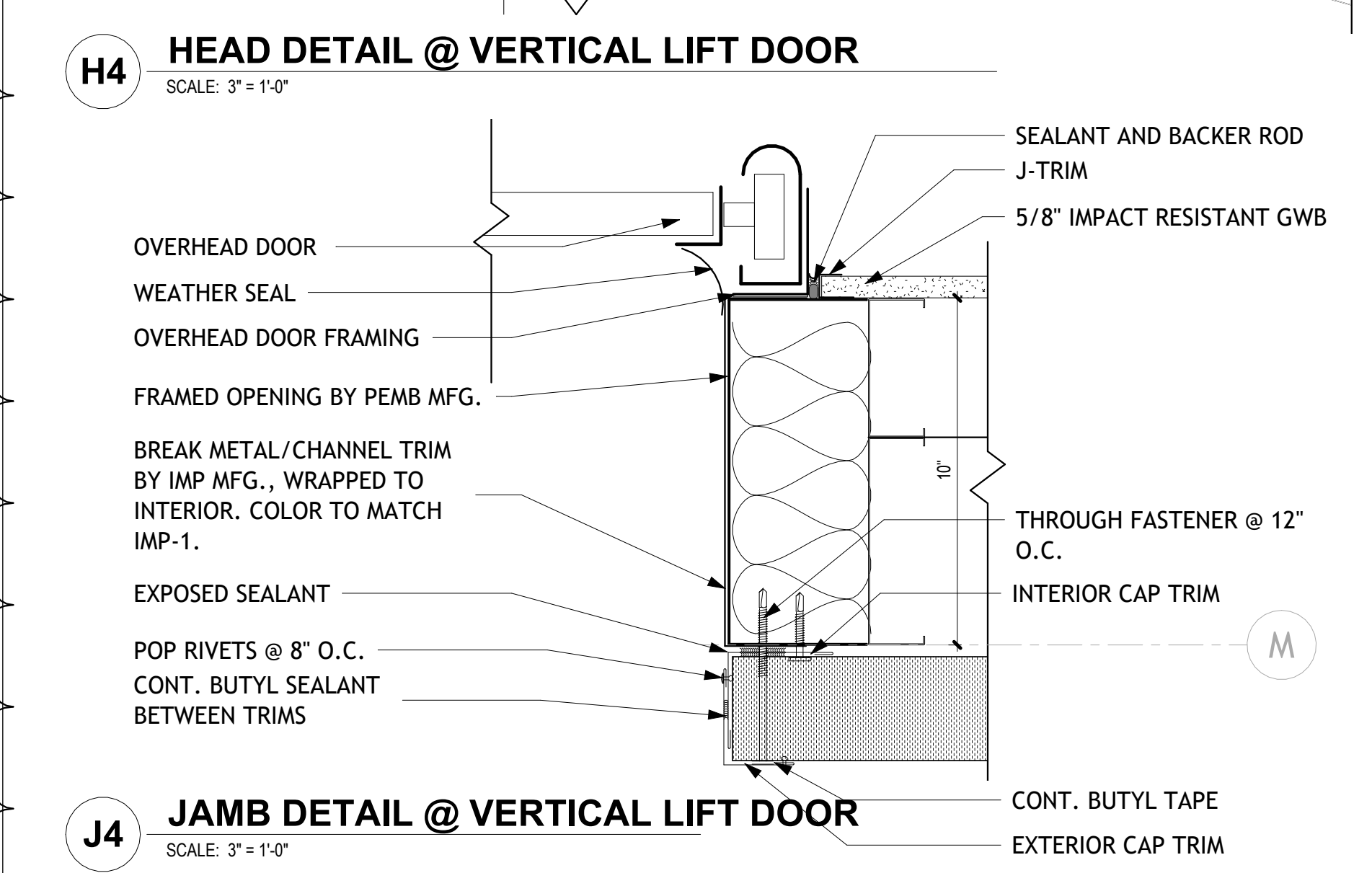
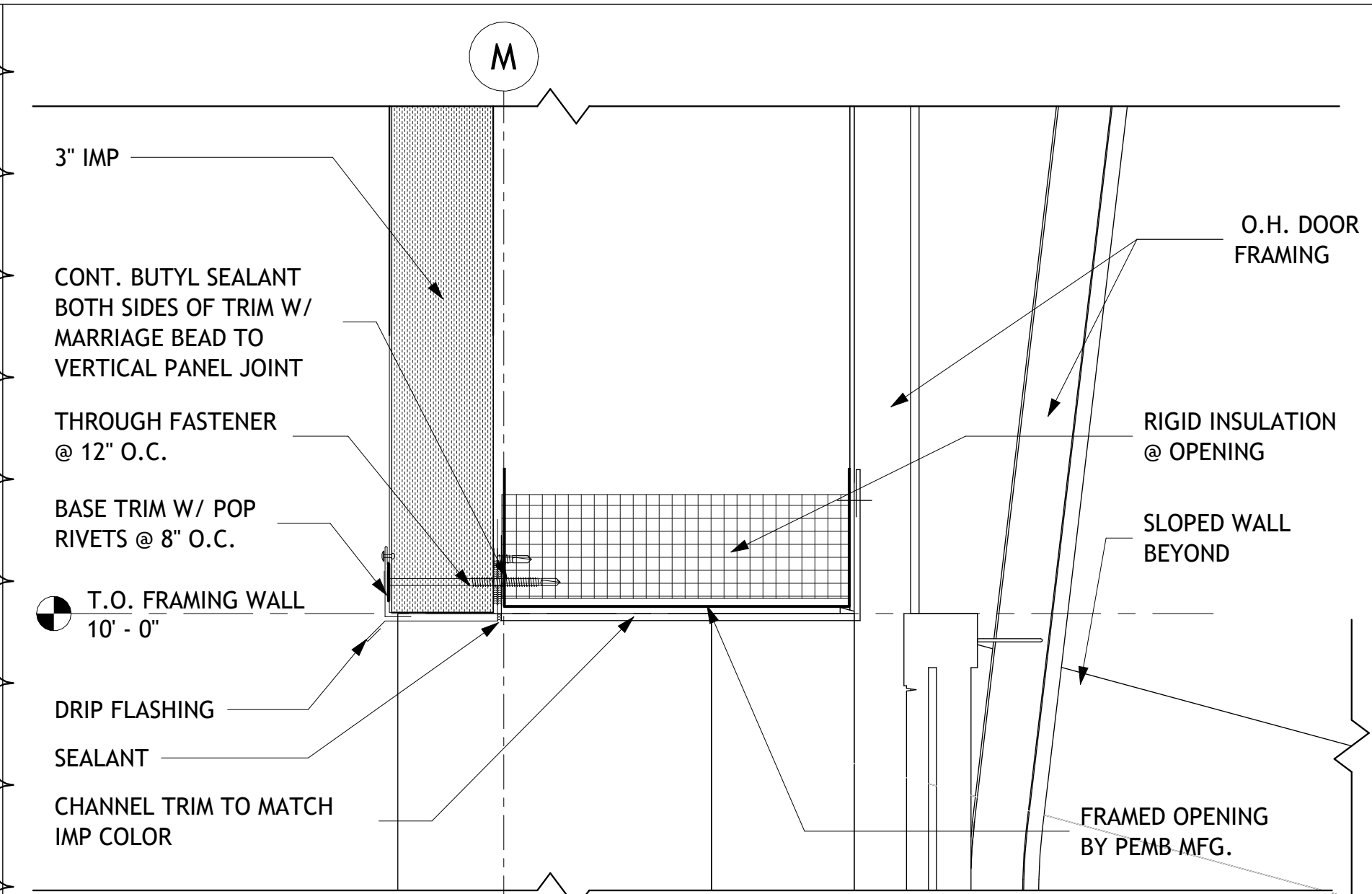
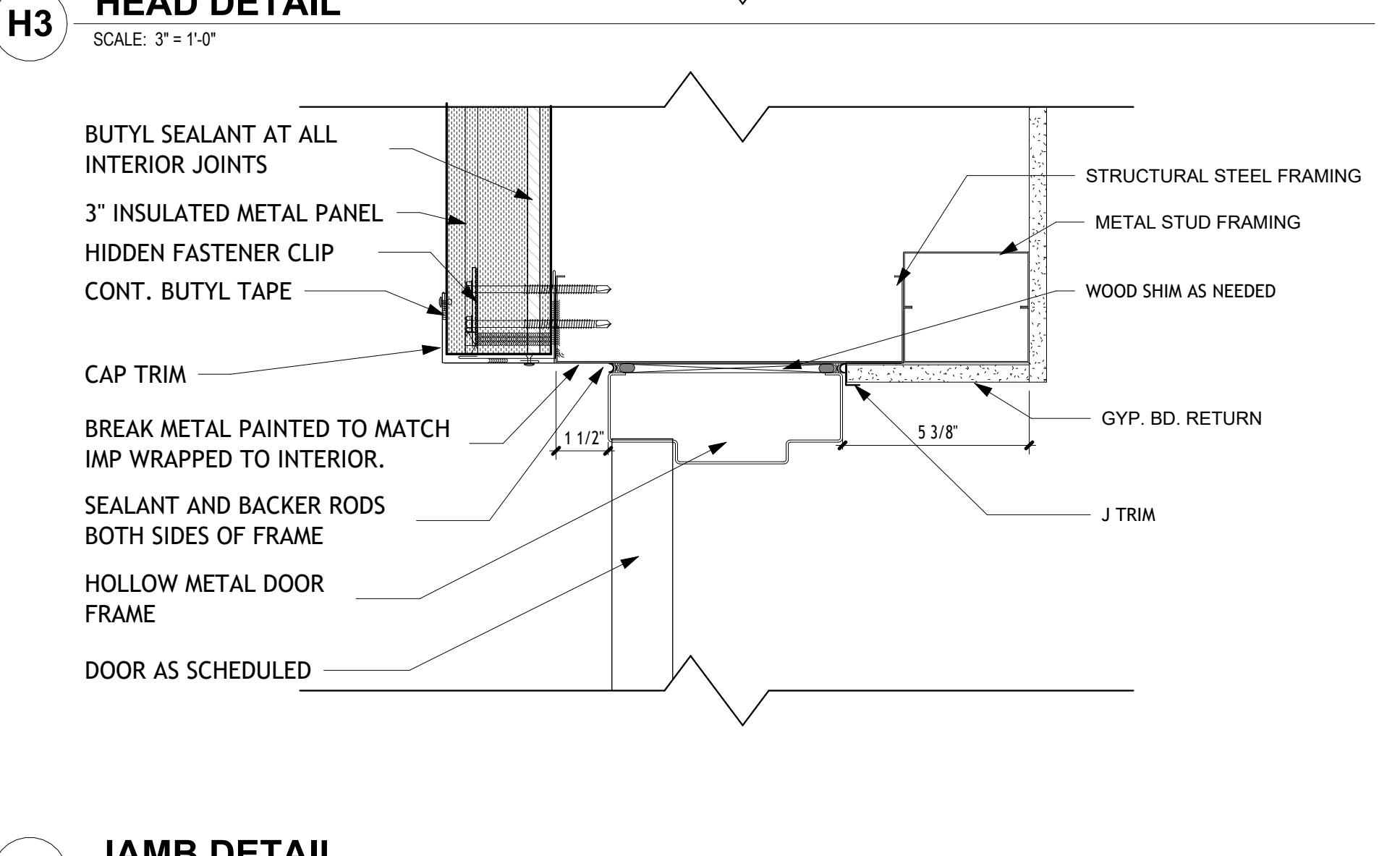
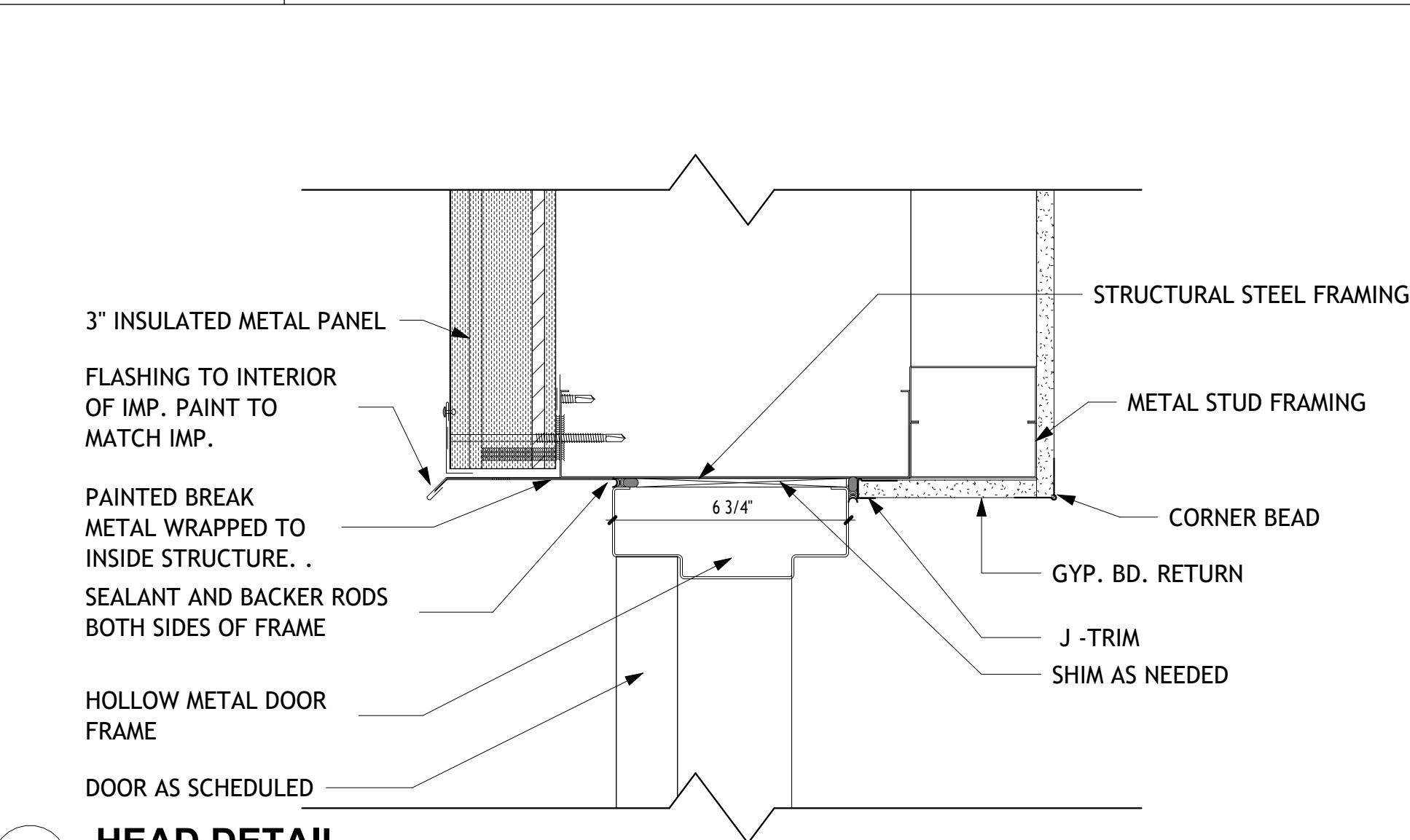
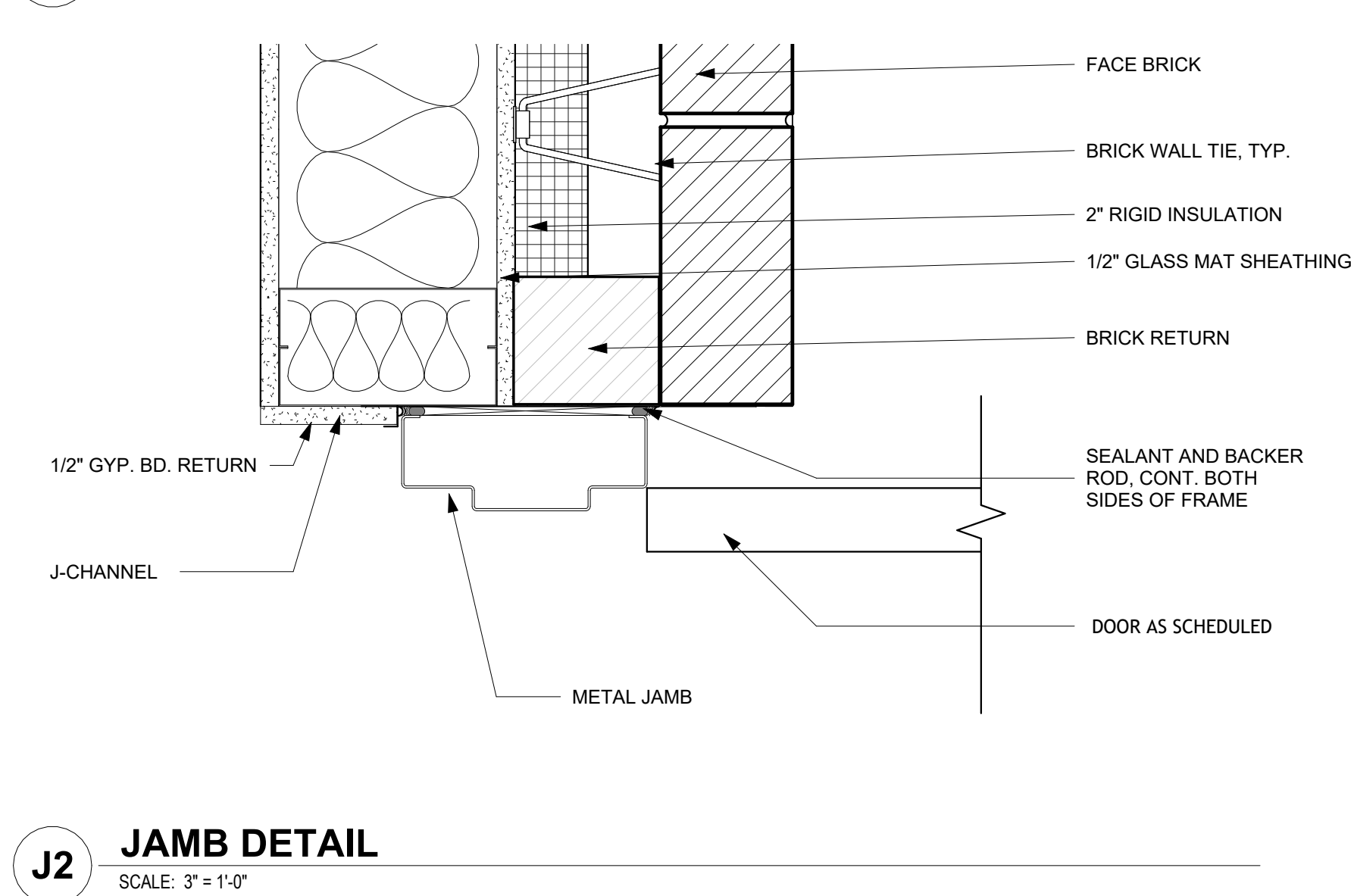
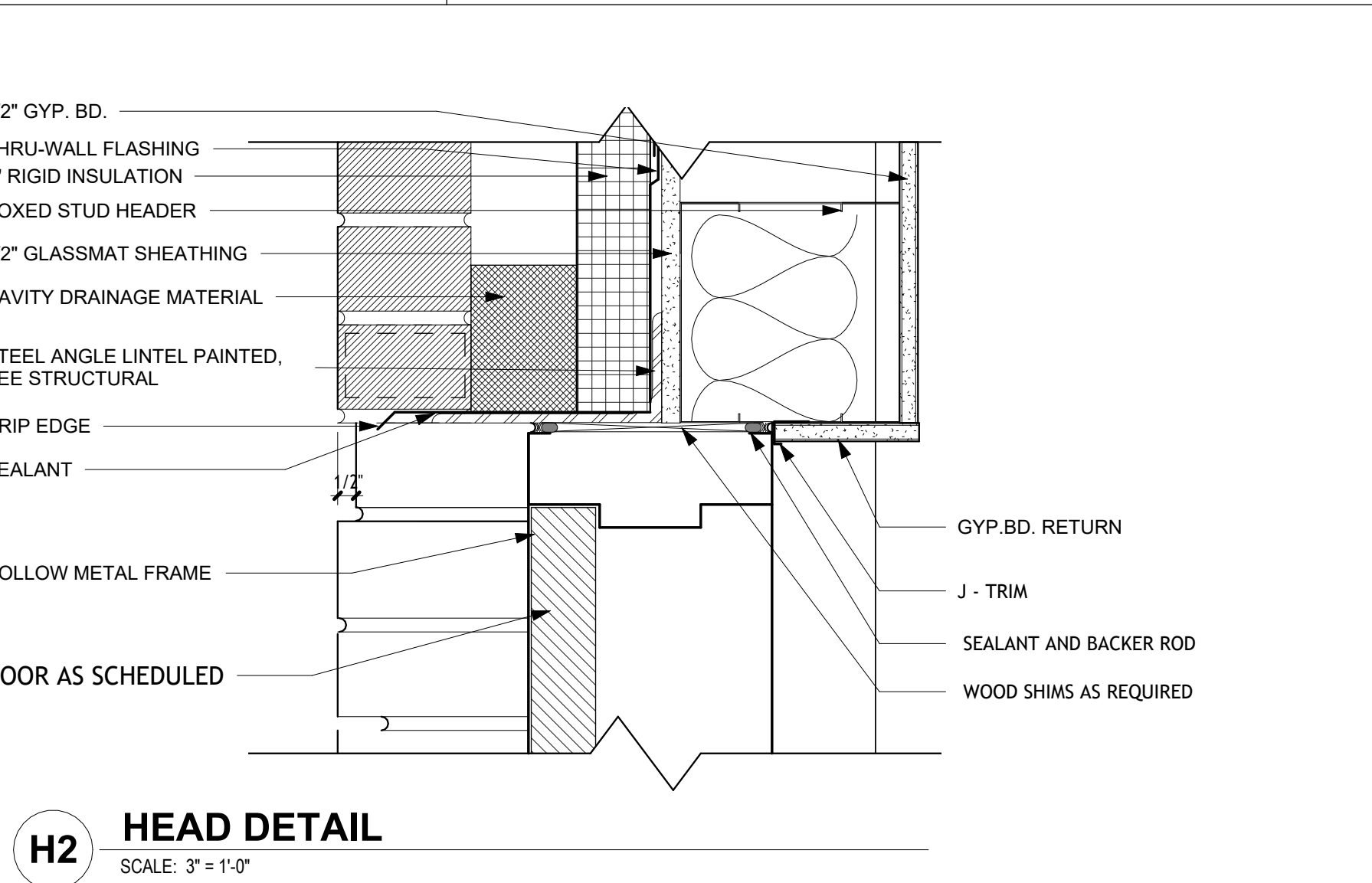
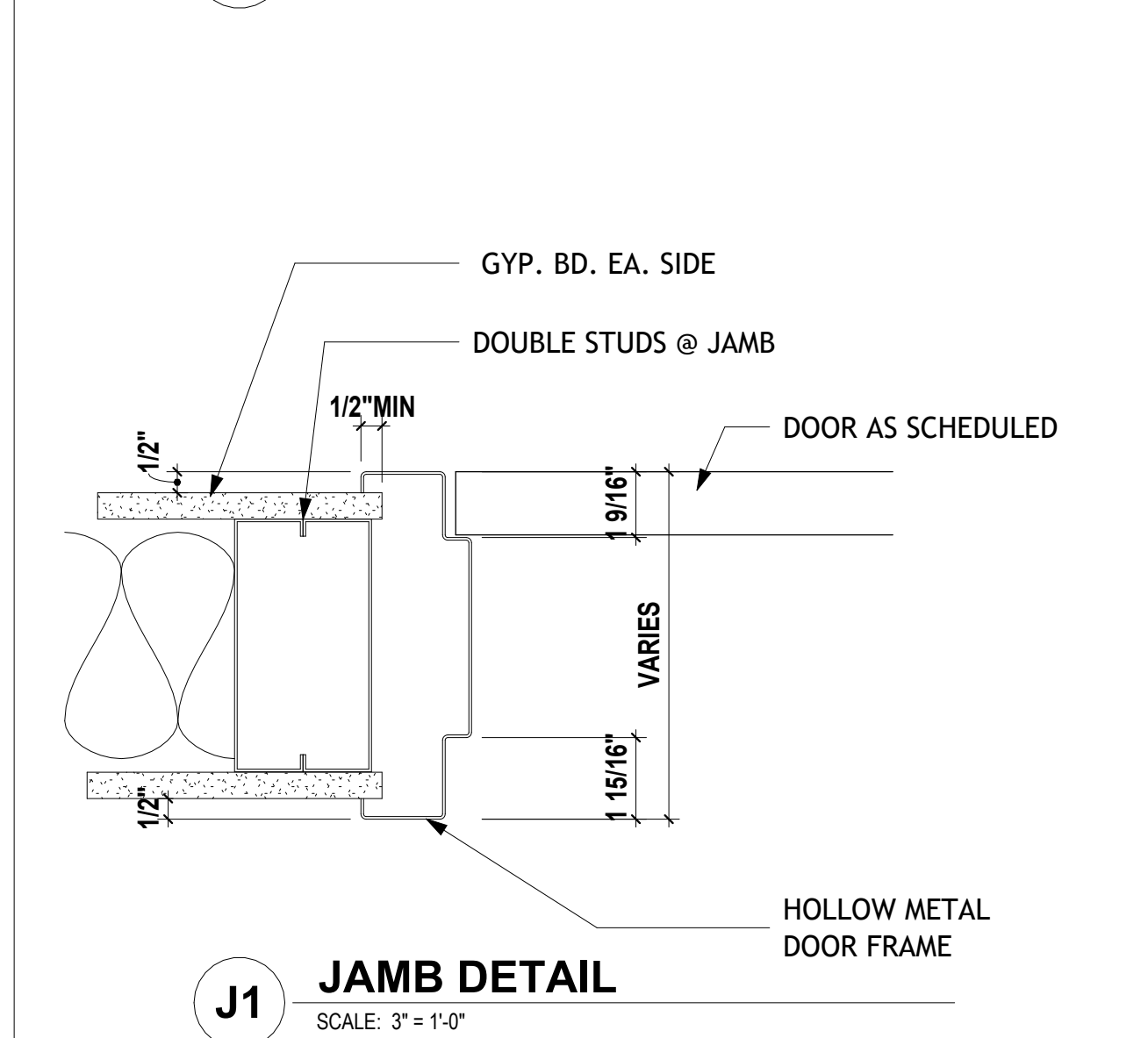
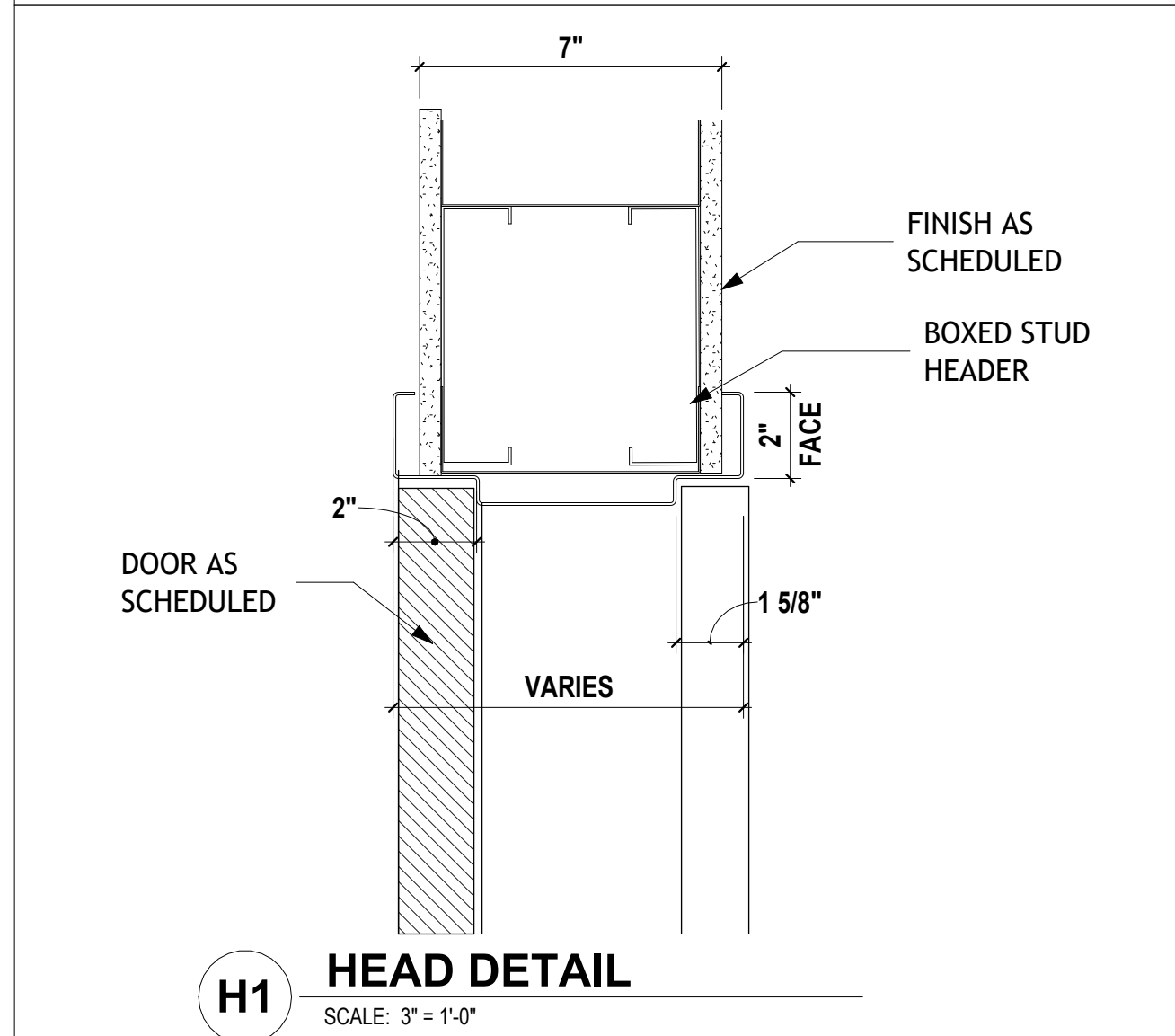
DATE  
03/14/2025

PROJECT NO.  
2228





- GENERAL OPENING NOTES**
- EXTERIOR WALLS:**
    - EXTERIOR SIDE OF FRAMES SHALL HAVE CONTINUOUS BEAD OF SEALANT(CAULK) WITH BACKER ROD ENTIRE PERIMETER. THE SEALANT SYSTEM SHALL ENGAGE THE SELF-ADHERED MEMBRANE FORMING A COMPLETE, TIGHT ASSEMBLY.
    - INTERIOR SIDE OF FRAMES SHALL HAVE CONTINUOUS BEAD OF SEALANT(CAULK) AROUND ENTIRE FRAME FORMING A COMPLETE, TIGHT ASSEMBLY. USE BACKER ROD AS DIRECTED BY ARCHITECT WHERE GAPS ARE TOO LARGE FOR SEALANT ONLY.
    - SELF-ADHERED MEMBRANE SHALL EXTEND FROM BEHIND RIGID FOAM INSULATION ON EXTERIOR SHEATHING, OVER FIRE RETARDANT TREATED WOOD BLOCKING AND INTO OPENING OF THE WALL CAVITY FORMING A COMPLETE, TIGHT ASSEMBLY. LAP DISSIMILAR MATERIAL JOINTS 3" MINIMUM. CONSULT ARCHITECT WHERE STEEL LINTELS PROHIBIT SELF-ADHERED MEMBRANE FROM EXTENDING INTO OPENING. SAMPLE ASSEMBLY SHALL BE PART OF MOCK-UP TO BE APPROVED BY ARCHITECT PRIOR TO CONSTRUCTION.
  - INTERIOR WALLS:**
    - FRAMES SHALL HAVE CONTINUOUS BEAD OF SEALANT(CAULK) AROUND ENTIRE FRAME BOTH SIDES OF WALL.



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**Indoor Practice Facility**  
East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834  
SCO ID#23-26345-01A AM # 1752

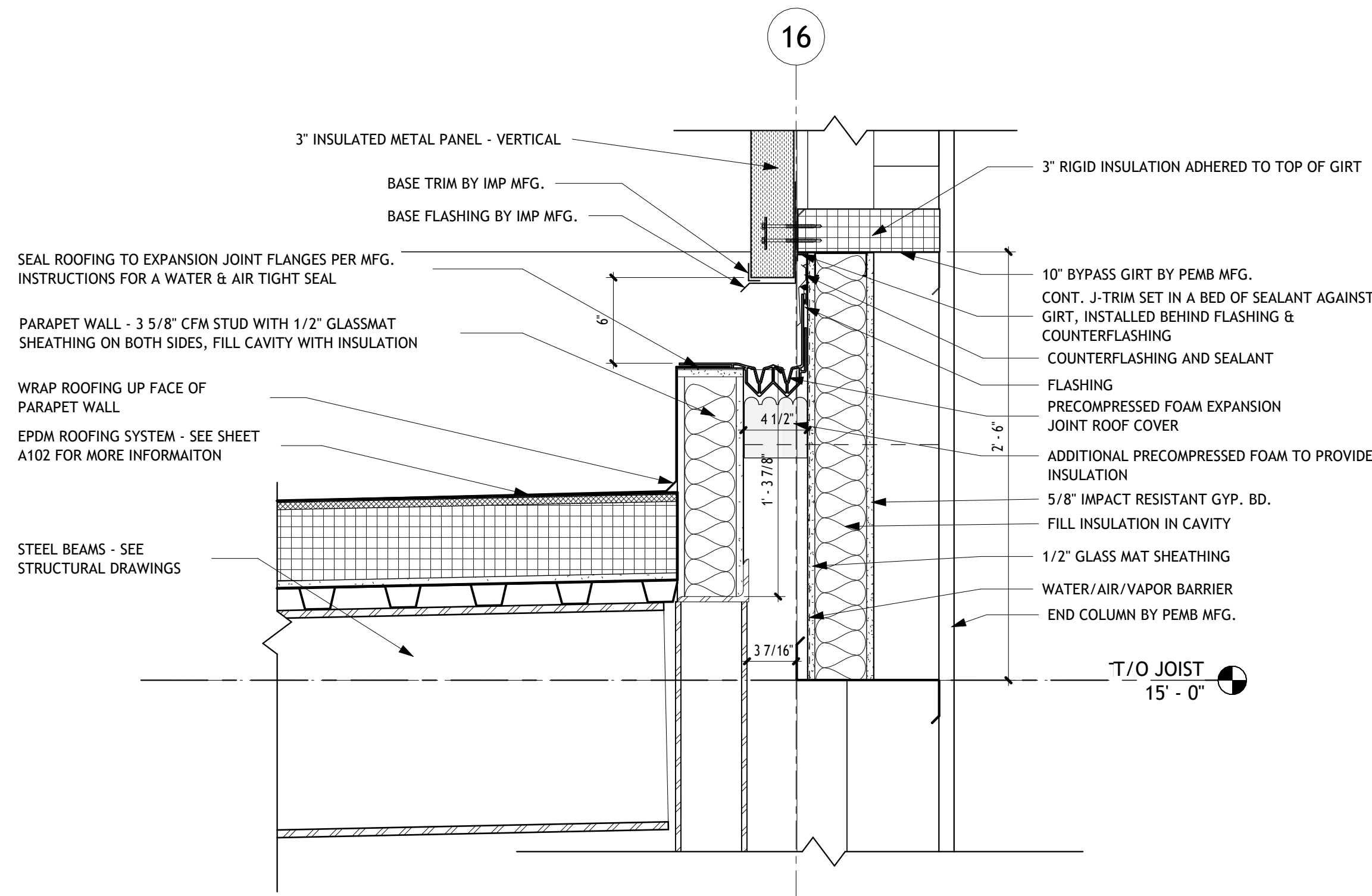


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Rev	Description	Date
1	Addendum # 1	04/09/25

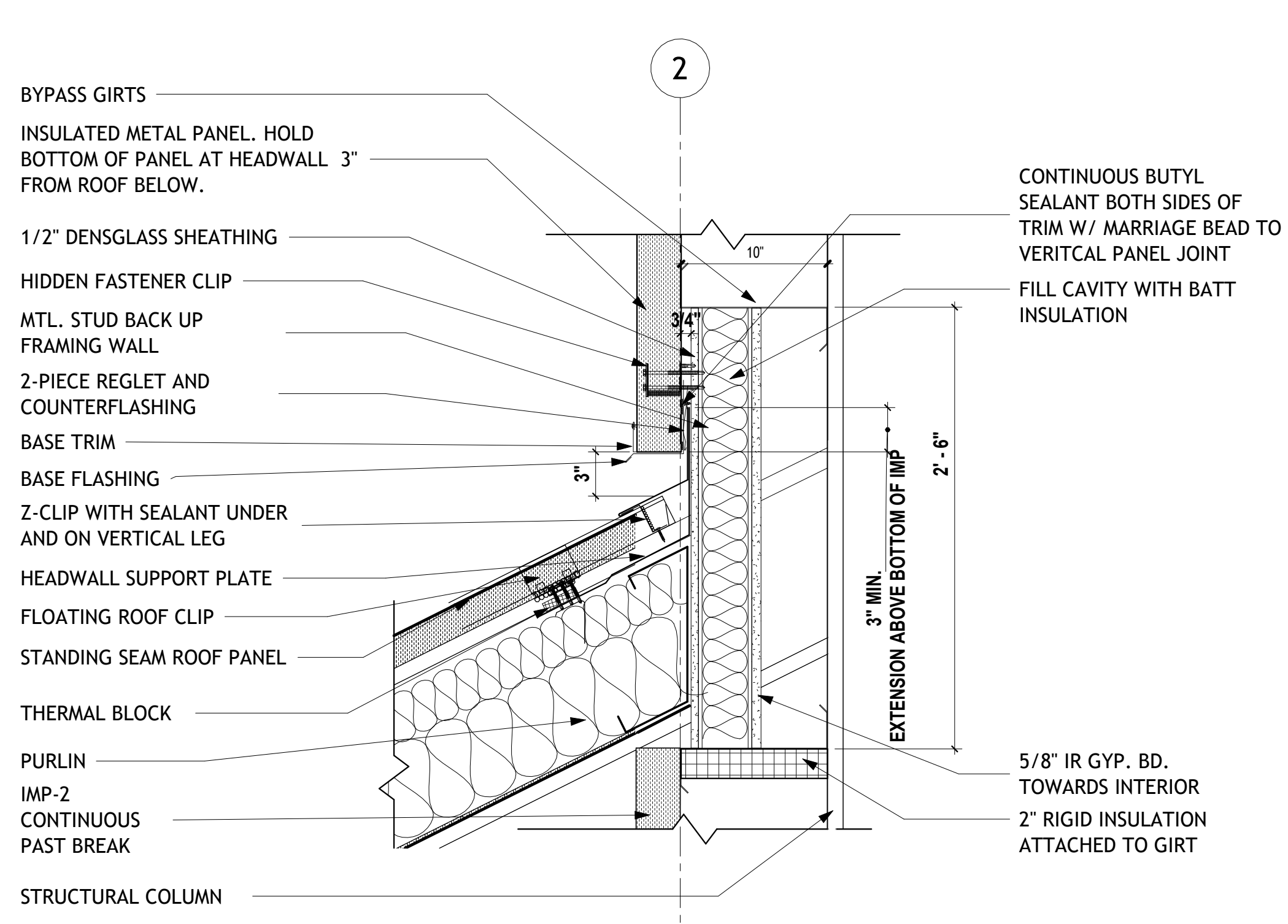
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**DOOR DETAILS**  
SHEET  
**A501**  
DATE 03/14/2025 PROJECT NO. 2228

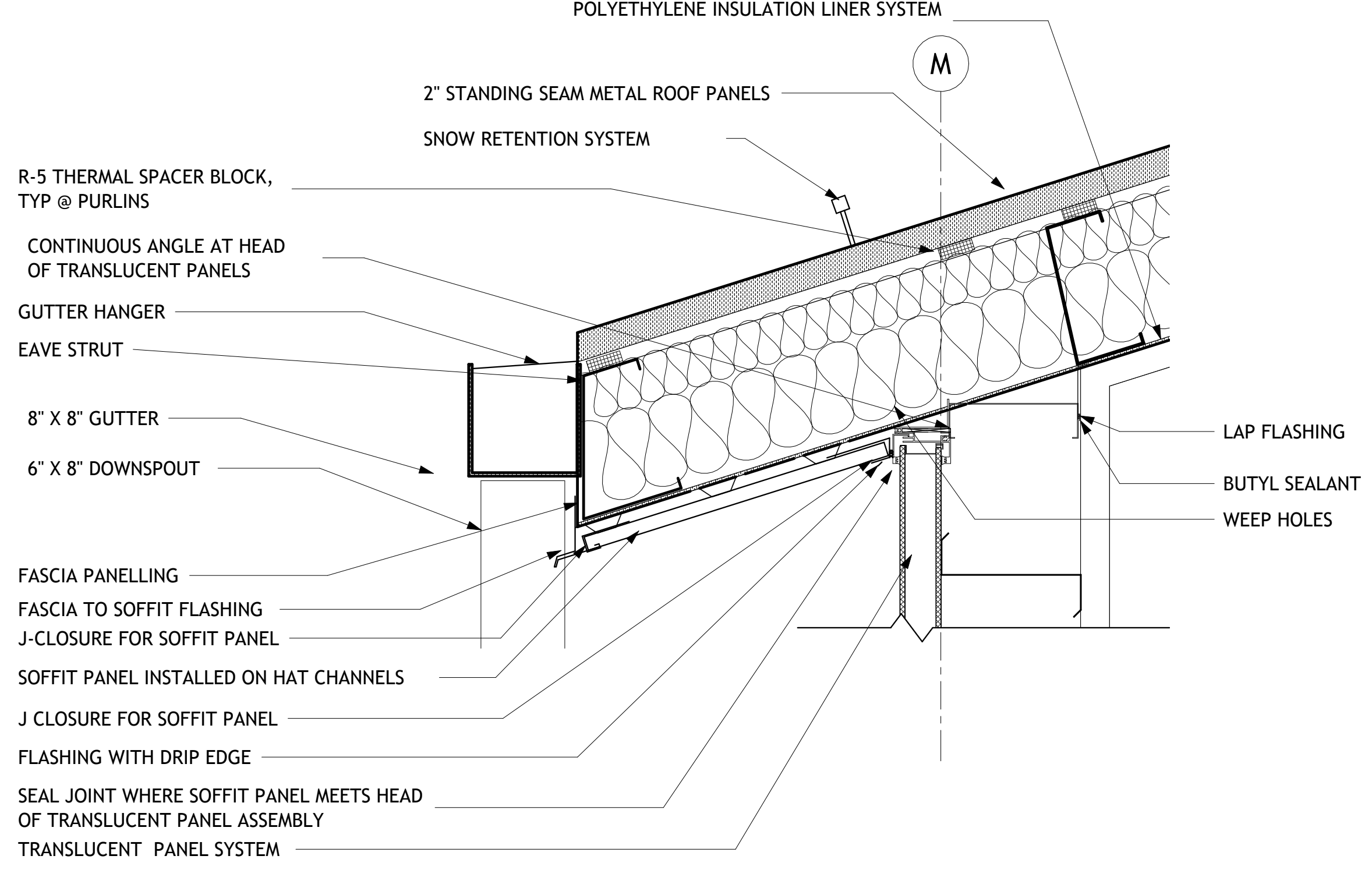




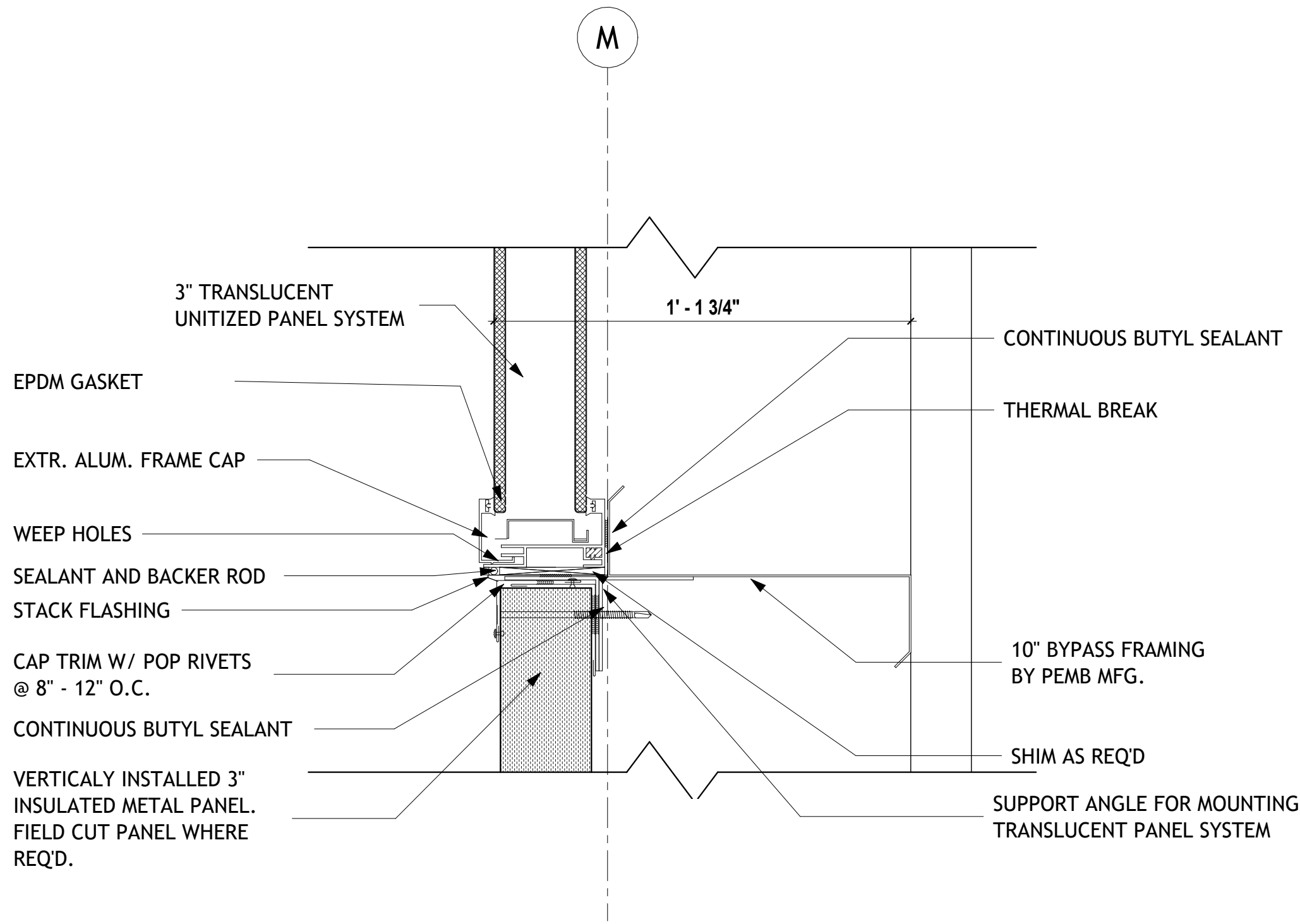
**9 TYP. EXPANSION JOINT AT ROOF PARAPET TO IMP. WALL**  
SCALE: 1 1/2" = 1'-0"



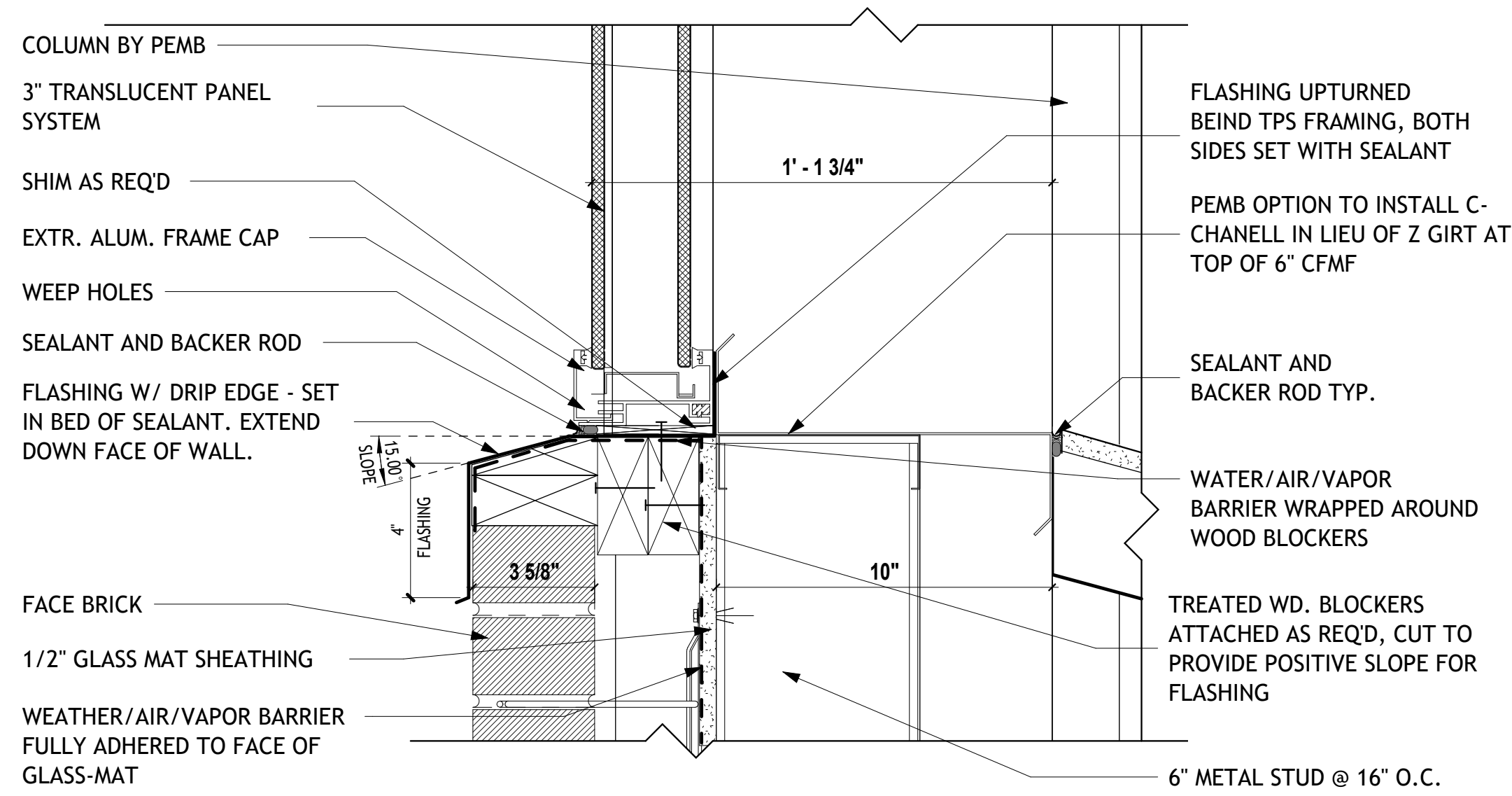
**8 TYP. HEAD WALL FLASHING**  
SCALE: 1 1/2" = 1'-0"



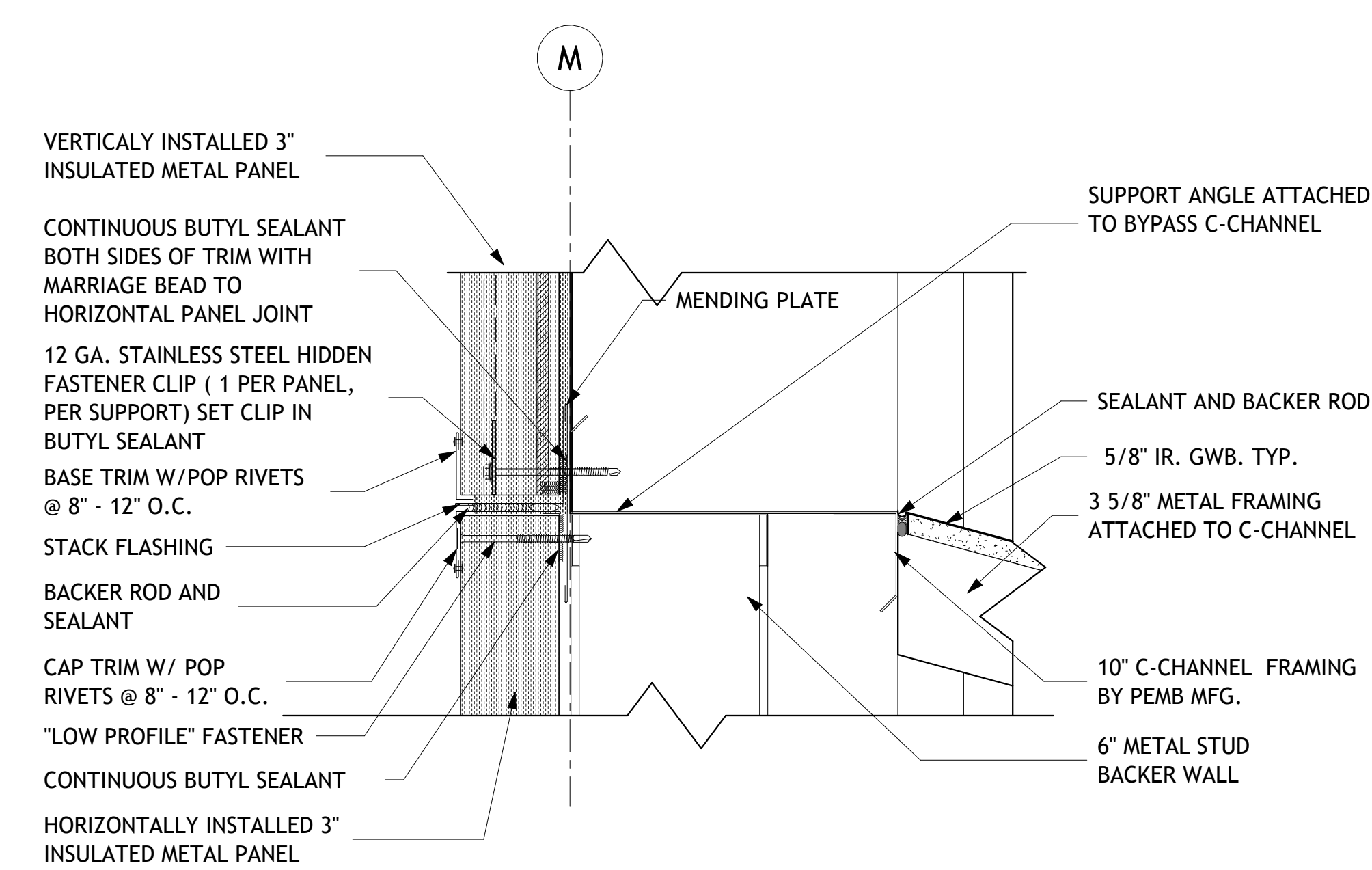
**7 TYP. LOW EAVE DETAIL**  
SCALE: 1 1/2" = 1'-0"



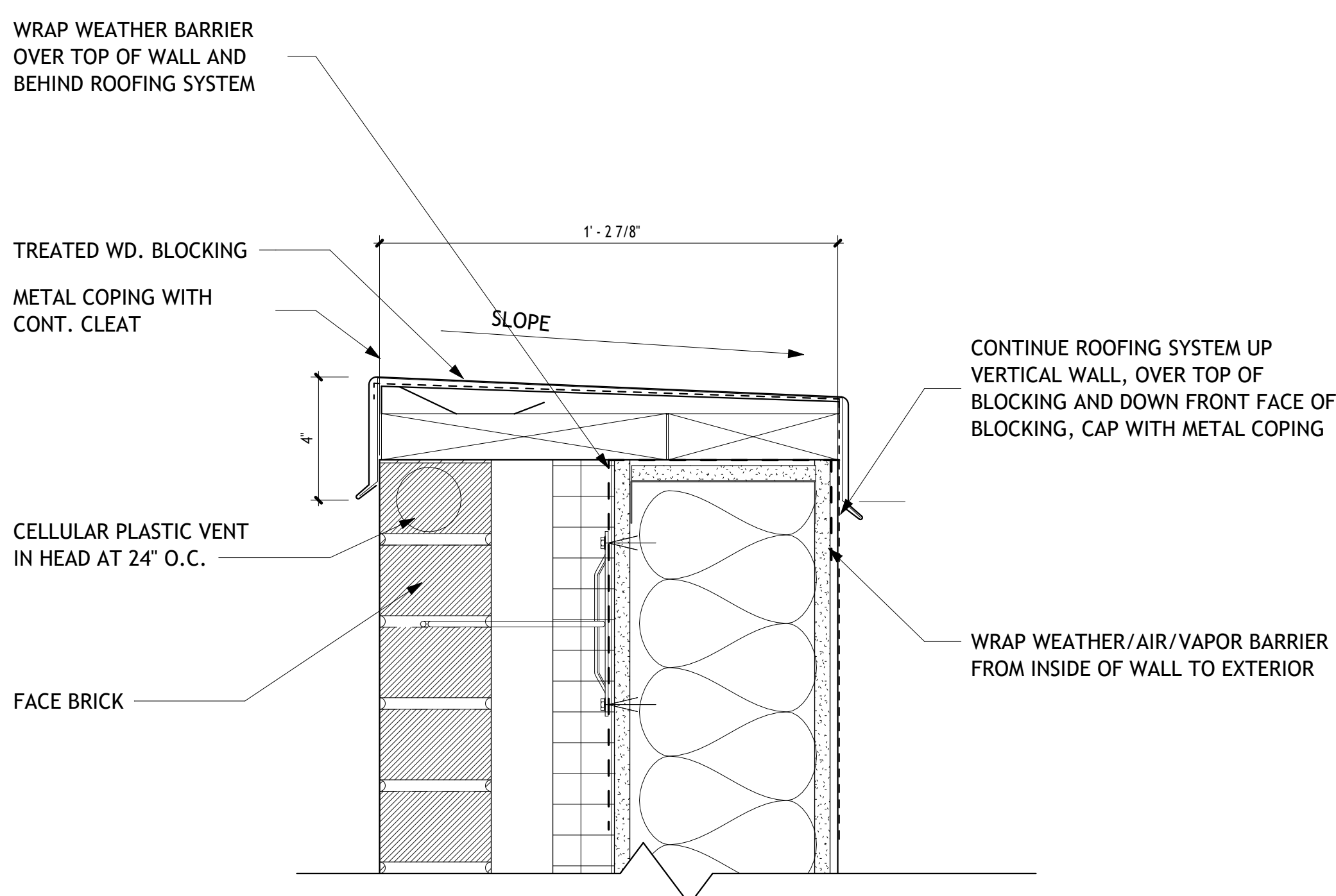
**6 TYP. VERTICAL INSULATED PANEL - TRANSLUCENT PANEL SYSTEM BASE JOINT**  
SCALE: 3" = 1'-0"



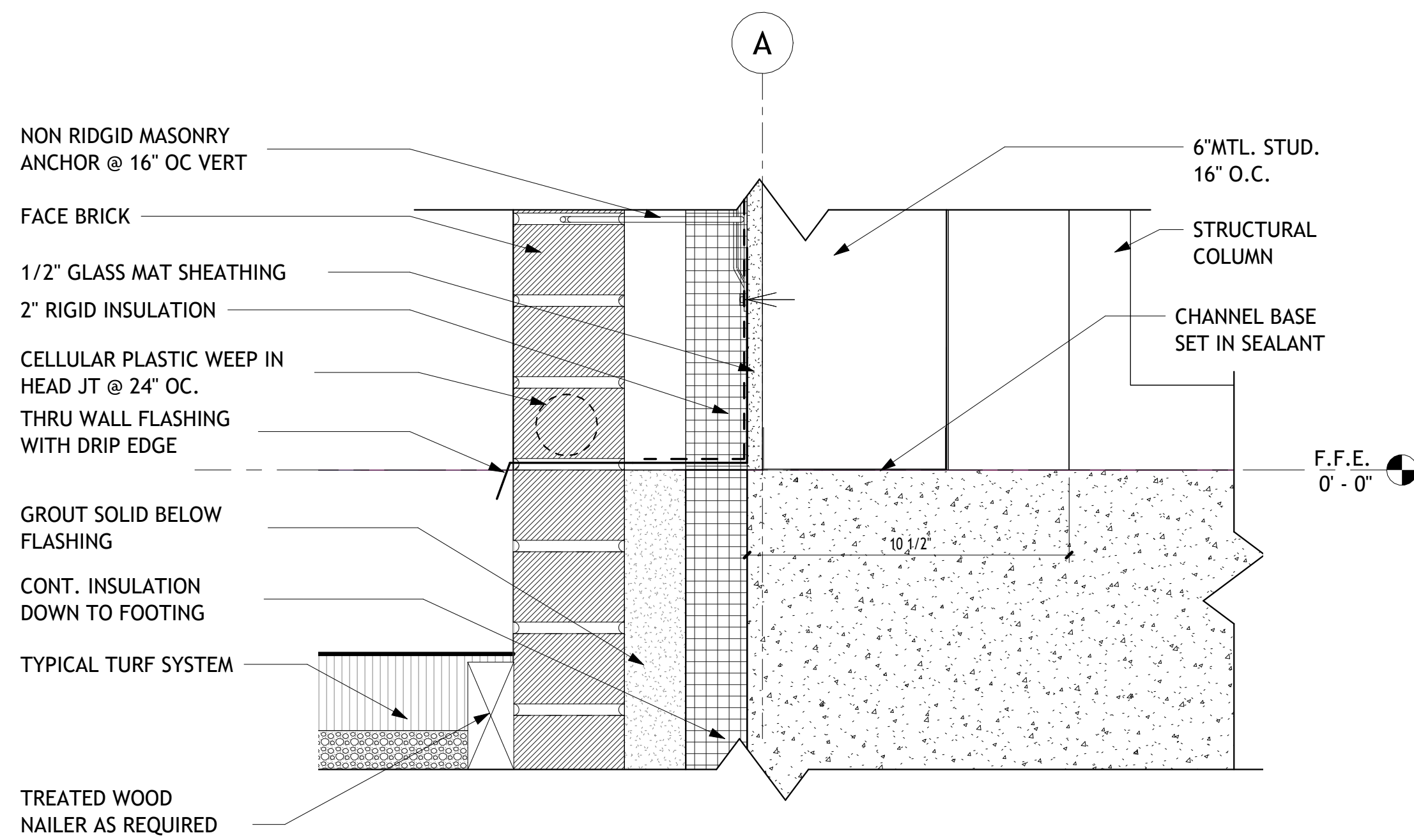
**5 TYP. BRICK - TRANSLUCENT PANEL JOINT**  
SCALE: 3" = 1'-0"



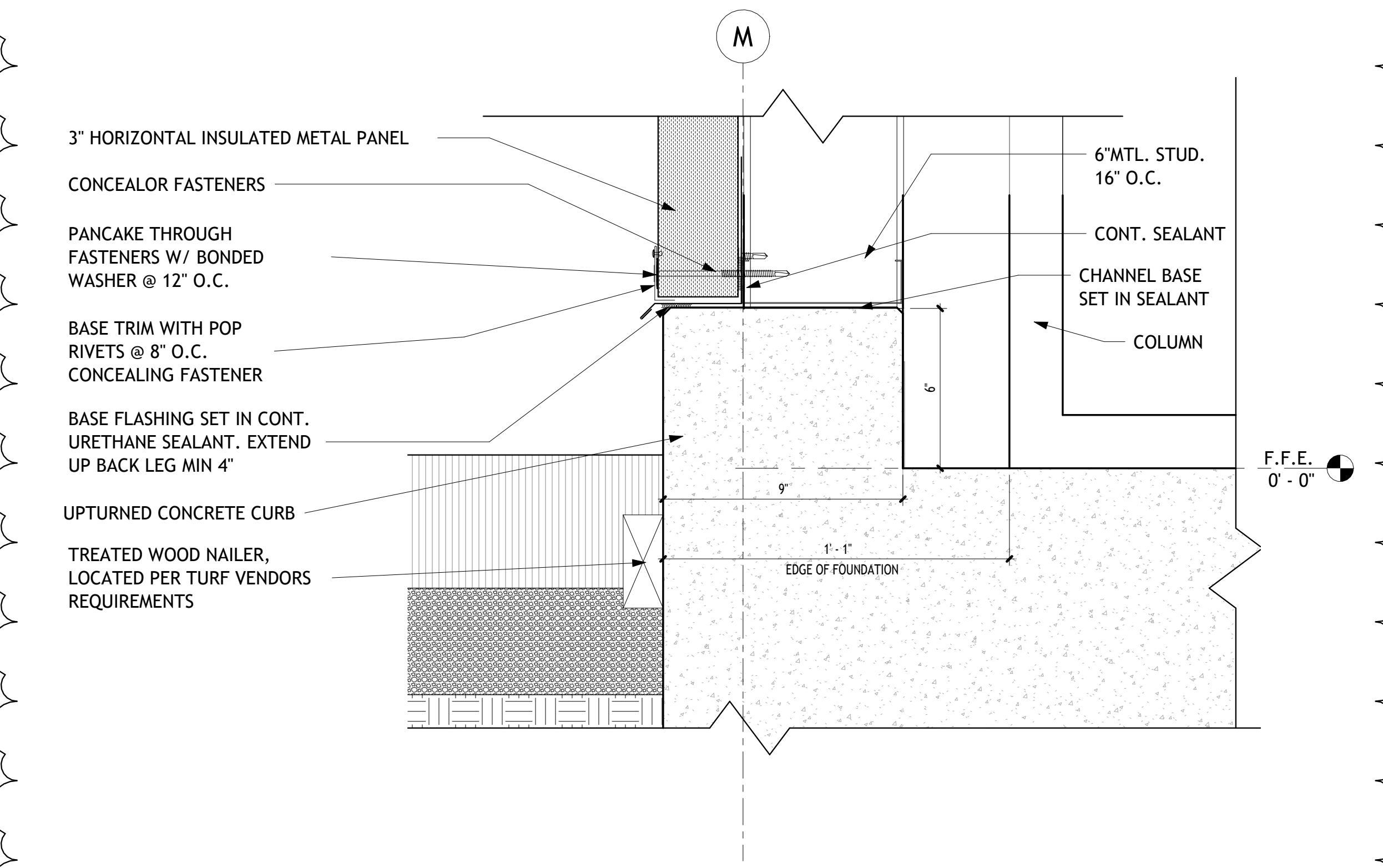
**4 TYP. HORIZONTAL - VERTICAL INSULATED PANEL JOINT**  
SCALE: 3" = 1'-0"



**3 TYPICAL PARAPET DETAIL**  
SCALE: 3" = 1'-0"



**2 TYP BASE CONDITION -BRICK CAVITY WALL AT PEMB**  
SCALE: 3" = 1'-0"



**1 TYP. PEMB BASE CONDITION - INSULATED METAL PANEL FINISH**  
SCALE: 3" = 1'-0"



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## Indoor Practice Facility

East Carolina University  
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Greenville, NC 27834  
SCO ID#23-26345-01A

AM # 1752



### REVISIONS

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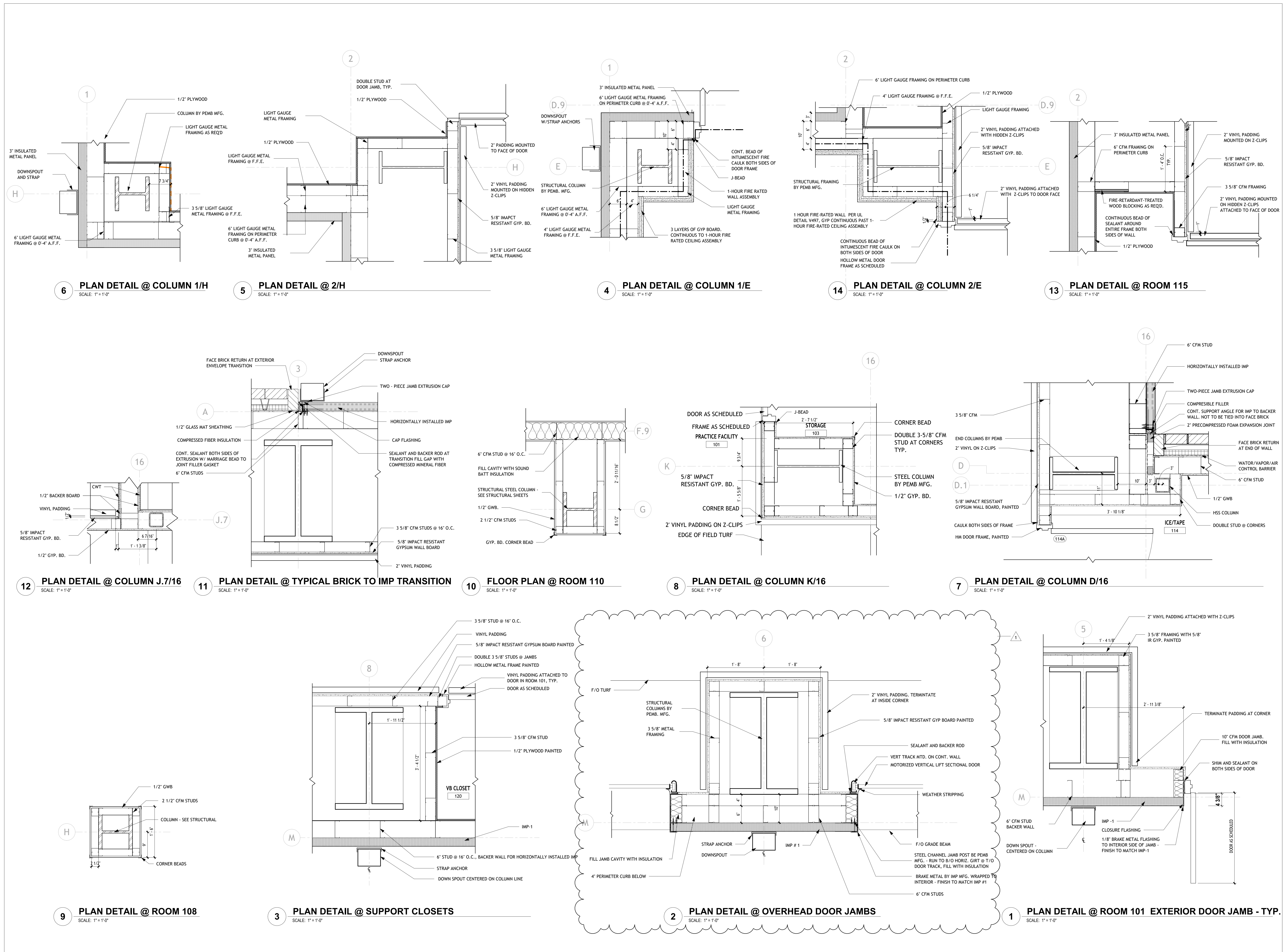
### BUILDING ENVELOPE DETAILS

SHEET

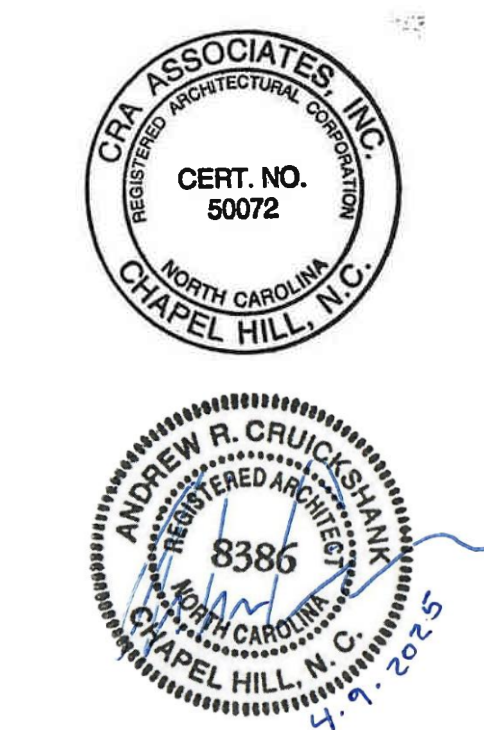
**A502**

DATE 03/14/2025 PROJECT NO. 2228





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**Indoor Practice Facility**  
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Greenville, NC 27834  
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**PLAN DETAILS**

SHEET

**A504**

DATE 03/14/2025 PROJECT NO. 2228



GENERAL NOTES:

1. THE STRUCTURAL DRAWINGS MUST BE USED IN CONJUNCTION WITH THE ARCHITECTURAL, CIVIL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS, AND THE SPECIFICATIONS. THE CONTRACTOR MUST VERIFY THE REQUIREMENTS OF OTHER TRADES AS TO SLEEVES, CHASES, HANGERS, INSERTS, ANCHORS, HOLES, AND ADDITIONAL ITEMS TO BE PLACED OR SET IN THE STRUCTURAL WORK.
2. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE PROVISIONS OF THE NORTH CAROLINA STATE BUILDING CODE, 2018 EDITION.
3. THE WORK OUTLINED IN SPECIFICATION SECTION 014100 IS SUBJECT TO SPECIAL INSPECTIONS AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR MUST PROVIDE TEMPORARY SHORING AND BRACING REQUIRED TO ERECT AND HOLD THE STRUCTURE IN PROPER ALIGNMENT UNTIL PERMANENT SUPPORTS AND LATERAL BRACING ARE IN PLACE.
5. THESE STRUCTURAL DRAWINGS ARE ISSUED ON THE DATE INDICATED FOR THE PURPOSE DESIGNATED. THESE DRAWINGS MUST NOT BE ISSUED OR RELEASED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN AUTHORIZATION OF THE STRUCTURAL ENGINEER OF RECORD.
6. DETAILS LABELED "TYPICAL DETAIL" WITHIN THE DOCUMENTS APPLY TO SITUATIONS ON THE PROJECT THAT MAY OCCUR THROUGHOUT THE PROJECT. SUCH DETAILS APPLY WHETHER OR NOT THE DETAIL IS SPECIFICALLY REFERENCED AT EACH INSTANCE. NOTIFY ENGINEER IF CLARIFICATIONS ARE REQUIRED REGARDING THE APPLICABILITY OF THE "TYPICAL DETAIL".
7. DESIGN CRITERIA:

CLASSIFICATION OF BUILDING	
RISK CATEGORY	III
LIVE LOADS - UNIFORM:	
SLAB ON GRADE	100 PSF
ROOF	20 PSF
LIVE LOADS - CONCENTRATED:	
FLOORS	1,000#
UNLESS OTHERWISE NOTED, CONCENTRATED LOADS ARE APPLIED UNIFORMLY OVER 2'-6" x 2'-6" AREA.	
RAIN LOADS:	
RAIN INTENSITY (15 MINUTE)	7.71 IN/HR
SNOW LOADS:	
GROUND SNOW LOAD (Pg)	10 PSF
FLAT ROOF LOAD (Pf)	11 PSF
IMPORTANCE FACTOR (Is)	1.1
THERMAL FACTOR (Ct)	1.0
EXPOSURE FACTOR (Ce)	1.0
DRIFT SURCHARGE (Pd)	REF TABLE
BALANCED SNOW LOAD (BAL)	7 PSF

SNOW DRIFT SCHEDULE			
Pd #	BAL PSF	DRIFT VALUES	
W		W	Pd
①		21'-0"	80 PSF
②		3'-6"	20 PSF
③		6'-0"	30 PSF
④		8'-6"	33 PSF

NOTE: SNOW DRIFT LOADS ARE IN ADDITION TO BALANCED LOADS.  
SNOW DRIFT LOAD LOCATIONS ARE SHOWN ON THE ENLARGED ROOF DECK PLANS REF SHEET S402.

WIND LOADS:	
BASIC WIND SPEED (Vult)	129 MPH
ALLOWABLE STRESS DESIGN WIND SPEED (Vasd)	100 MPH
EXPOSURE CATEGORY	C
INTERNAL PRESSURE COEFFICIENT	+0.18
COMPONENT AND CLADDING PRESSURES:	
WALLS, ZONE 5 (10 SF) (EAST AUX BLDG)	45 PSF
ROOF, ZONE 3 (10 SF) (EAST AUX BLDG)	61 PSF
PARAPET, END CORNER (10 PSF) (EAST AUX BLDG)	94 PSF
WALLS, ZONE 5 (10 SF) (PEMB)	64 PSF
ROOF, ZONE 3 (10 SF) (PEMB)	75 PSF
ULTIMATE WIND BASE SHEARS (FOR MWFRS):	
VE-W (EAST AUX BLDG)	75 KIPS
VN-S (EAST AUX BLDG)	20 KIPS
SEISMIC LOADS:	
SITE CLASSIFICATION	D
SEISMIC DESIGN CATEGORY	B
IMPORTANCE FACTOR (IE)	1.25
SPECTRAL RESPONSE ACCELERATIONS:	
Ss	0.124
S1s	0.062
Sms	0.198
S1m	0.15
Sps	0.132
S1p	0.1
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE
LATERAL FORCE RESISTING SYSTEM	STEEL SYSTEMS NOT SPECIFICALLY DESIGNED FOR SEISMIC RESISTANCE
RESPONSE MODIFICATION COEFFICIENT (R)	3.0
SEISMIC RESPONSE COEFFICIENT (Cs)	0.055
ULTIMATE SEISMIC BASE SHEAR (V)	
V (EAST AUX BLDG)	10 KIPS
LATERAL DESIGN CONTROL	
EAST AUX BLDG	WIND

SHOP DRAWINGS AND SUBMITTALS:

1. THESE DRAWINGS SHALL BE CHECKED AND COORDINATED WITH OTHER MATERIALS AND CONTRACTS BY THE GENERAL CONTRACTOR. SHOP DRAWINGS AND SUBMITTALS MUST BEAR THE CONTRACTOR'S REVIEW STAMP WITH CHECKER'S INITIALS BEFORE BEING SUBMITTED TO THE ARCHITECT FOR APPROVAL.
2. WHEN THE FABRICATOR HAS BEEN AUTHORIZED TO USE THE ARCHITECT'S AND / OR ENGINEER'S DRAWINGS AS ERECTION DRAWINGS, THE FABRICATOR MUST REMOVE ALL TITLE BLOCKS, PROFESSIONAL SEALS, AND ANY OTHER REFERENCE TO THE ARCHITECT AND / OR ENGINEER FROM THAT ERECTION DRAWING.
3. WHERE DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION COULD AFFECT THE NEW CONSTRUCTION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE FIELD MEASUREMENTS REQUIRED FOR INCORPORATION IN THE SHOP DRAWING AND PRIOR TO FABRICATION.

SITE PREPARATION, CONTROLLED FILL AND SURCHARGE NOTES:

1. OBTAIN AND BECOME THOROUGHLY FAMILIAR WITH THE CONDITIONS AND RECOMMENDATIONS DESCRIBED IN THE SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT. THIS REPORT IS NOT A PART OF THE CONTRACT DOCUMENTS, AND MAY NOT BE REPRESENTATIVE OF ALL SITE CONDITIONS WHICH MAY BE ENCOUNTERED.
2. REMOVE ALL VEGETATION, ROOT MAT, TOPSOIL, ASPHALT PAVING AND AGGREGATE BASE MATERIAL. BASE BID ON 10 INCHES AVERAGE DEPTH.
3. THE EXPOSED SUBGRADE MUST BE PROOFROLLED WITH A LARGE RUBBER-TIRED ROLLER OR LOADED DUMP TRUCK. PERFORM AT LEAST TWO PASSES IN EACH OF TWO PERPENDICULAR DIRECTIONS.
4. EXCAVATE SOFT SPOTS REVEALED BY PROOFROLLING AS DIRECTED.
5. PRIOR TO PLACEMENT OF ANY FILL MATERIAL, SETTLEMENT PLATES MUST BE INSTALLED ON THE PREPARED SUBGRADE. A MINIMUM OF THREE SETTLEMENT PLATES MUST BE INSTALLED, TWO AT THE EAST SIDE OF THE BUILDING WITHIN THE FOOTPRINT OF THE FOUNDATION WALL AND ONE TO THE NORTHEAST OF THE BUILDING.
6. FILL WITH SATISFACTORY STRUCTURAL FILL MATERIALS TO THE SPECIFIED ELEVATIONS.
7. FILL MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 9 INCHES WHEN MECHANICAL COMPACTION EQUIPMENT IS USED OR 4 INCHES WHEN HAND COMPACTION EQUIPMENT IS USED. FILL MUST BE COMPACTED TO AT LEAST 95 PERCENT OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698).
8. PLACE SURCHARGE FILL IN ONE FOOT LOOSE LIFTS, UP TO THE SPECIFIED ELEVATION. THE DEPTH OF SURCHARGE IS BASED ON A SOIL UNIT WEIGHT OF 120 POUNDS PER CUBIC FOOT. FOR LESS DENSE MATERIALS, PROVIDE ADDITIONAL SURCHARGE OR PROVIDE COMPACTION AS REQUIRED TO YIELD THE EQUIVALENT TOTAL WEIGHT OF SURCHARGE.
9. OWNER WILL SECURE AND PAY FOR THE SERVICES OF A LICENSED LAND SURVEYOR TO MONITOR THE SETTLEMENT PLATES. ELEVATION READINGS MUST BE TAKEN ON THE SURFACE OF THE PLATE AND THE TOP OF THE BAR AT THE TIME OF INSTALLATION. SUBSEQUENT READINGS MUST BE TAKEN TWICE A WEEK FOR A PERIOD OF FOUR WEEKS AND RECORDED TO THE NEAREST 100TH OF A FOOT AFTER INSTALLATION AND AT THE ONSET OF PLACING FILL.
10. DURATION OF THE READINGS MUST BE ASSUMED TO BE 90 DAYS AFTER COMPLETION OF THE FILL. SUBMIT ELEVATION READINGS TO THE ARCHITECT ON A WEEKLY BASIS.

FOUNDATION NOTES:

1. FOUNDATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RECOMMENDATIONS IN THE SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT PREPARED BY TERRACON, DATED DECEMBER 13, 2024.
2. FOUNDATIONS HAVE BEEN DESIGNED FOR A NET ALLOWABLE SOIL BEARING PRESSURE OF 2,500 PSF.
3. TOP OF FOOTING ELEVATIONS MUST BE A MINIMUM DEPTH OF 1'-4" BELOW LOWEST ADJACENT SOIL GRADE.
4. PRIOR TO PLACING FOUNDATION CONCRETE, ALL FOUNDATION EXCAVATIONS MUST BE INSPECTED BY THE OWNER'S GEOTECHNICAL TESTING AGENCY SPECIAL INSPECTOR TO EXPLORE THE EXTENT OF LOOSE, SOFT, EXPANSIVE, OR OTHERWISE UNSATISFACTORY SOIL MATERIAL AND TO VERIFY DESIGN BEARING PRESSURE. DIRECTION FOR CORRECTIVE ACTION WILL BE PROVIDED BY THE OWNER'S GEOTECHNICAL TESTING AGENCY SPECIAL INSPECTOR WHERE UNSATISFACTORY SOILS ARE PRESENT.
5. NO UNBALANCED BACKFILLING OF GREATER THAN 16" MAY BE DONE AGAINST MASONRY OR CONCRETE BUILDING FOUNDATION WALLS UNLESS WALLS ARE SECURELY BRACED AGAINST OVERTURNING, EITHER BY TEMPORARY CONSTRUCTION BRACING OR BY PERMANENT CONSTRUCTION.
6. CONTROL GROUNDWATER AND SURFACE RUNOFF THROUGHOUT THE CONSTRUCTION PROCESS. INUNDATION AND LONG TERM EXPOSURE OF BEARING SURFACES WHICH RESULT IN DETERIORATION OF BEARING MUST BE PREVENTED.
7. RETAINING WALLS HAVE BEEN DESIGNED FOR THE FOLLOWING LATERAL LOAD CRITERIA:
- PASSIVE SOIL PRESSURE.....364 PCF
- ACTIVE SOIL PRESSURE.....40 PSF
- SOIL DENSITY.....120 PCF
- SOIL COEFFICIENT OF FRICTION.....0.35
- ALLOWABLE BEARING PRESSURE.....2,500 PSF

CAST-IN-PLACE CONCRETE NOTES:

1. CONCRETE MUST BE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301 AND 318.
2. CONCRETE MUST BE NORMAL WEIGHT AND MUST OBTAIN 28 DAY COMPRESSIVE STRENGTHS AS FOLLOWS:
- A. SLAB-ON-GRADE.....3,500 PSI
- B. WALLS AND PEDESTALS.....4,500 PSI
- C. FOOTINGS AND GRADE BEAMS.....3,500 PSI
- D. CONCRETE NOT OTHERWISE NOTED.....3,000 PSI
3. REINFORCING MATERIALS MUST BE AS FOLLOWS:
- A. REINFORCING BARS - ASTM A615, GRADE 60, DEFORMED.
- B. WELDED REINFORCING BARS - ASTM A706, GRADE 60.
- C. WELDED WIRE REINFORCEMENT - ASTM A1064, WELDED STEEL WIRE REINFORCEMENT; PROVIDE SHEET TYPE, ROLL TYPE IS NOT ACCEPTABLE.
4. ALL REINFORCING STEEL AND EMBEDDED ITEMS SUCH AS ANCHOR RODS AND WELD PLATES MUST BE ACCURATELY PLACED AND ADEQUATELY TIED AND SUPPORTED BEFORE CONCRETE IS PLACED TO PREVENT DISPLACEMENT BEYOND PERMITTED TOLERANCES.
5. CONCRETE COVER TO REINFORCING STEEL MUST CONFORM TO THE MINIMUM COVER RECOMMENDATIONS IN ACI 318, UNLESS THE DRAWINGS SHOW GREATER COVER REQUIREMENTS.
6. LAP CONTINUOUS REINFORCING STEEL PER SCHEDULES AND TYPICAL DETAILS.

CONCRETE MIX DESIGN NOTES:

1. MIX DESIGNS COMPRESSIVE STRENGTHS (f'c) BASED ON 28 DAY DESIGN STRENGTH, UNLESS OTHERWISE NOTED.
2. FOOTINGS AND GRADE BEAMS:
- A. EXPOSURE CLASS = ACI 318 F0, S0, W0, C1
- B. MINIMUM COMPRESSIVE STRENGTH (f'c) = 3,500PSI
- C. MAXIMUM W/C/M = 0.5
- D. BLENDED HYDRAULIC CEMENT = ASTM C595 TYPE 1L
- E. SLUMP = 5" MAX PLUS OR MINUS 1", OR 8" MAX, PLUS OR MINUS 1" FOR CONCRETE WITH A VERIFIED SLUMP OF 3" PLUS OR MINUS 1" BEFORE ADDING HIGH-RANGE WATER-REDUCING OR PLASTICIZING ADMIXURE
- F. AIR CONTENT = 5.5% PLUS OR MINUS 1.5% AT POINT OF DELIVERY
- G. AGGREGATE = NORMAL WEIGHT, 1" NOMINAL
- H. LIMIT WATER-SOLUBLE, CHLORIDE-ION CONTENT IN HARDENED CONCRETE TO 0.30 PERCENT BY WEIGHT OF CEMENT
3. INTERIOR FLOOR SLAB-ON-GRADE:
- A. EXPOSURE CLASS = ACI 318 F0, S0, W0, C0
- B. MINIMUM COMPRESSIVE STRENGTH (f'c) = 3,500PSI
- C. MAXIMUM W/C/M = 0.5
- D. BLENDED HYDRAULIC CEMENT = ASTM C595 TYPE 1L
- E. SLUMP = 5" MAX PLUS OR MINUS 1", OR 8" MAX, PLUS OR MINUS 1" FOR CONCRETE WITH A VERIFIED SLUMP OF 3" PLUS OR MINUS 1" BEFORE ADDING HIGH-RANGE WATER-REDUCING OR PLASTICIZING ADMIXURE
- F. AIR CONTENT = DO NOT ALLOW AIR CONTENT IN TROWEL FINISHED FLOORS TO EXCEED 3%
- G. AGGREGATE = NORMAL WEIGHT, ¾" NOMINAL
- H. LIMIT WATER-SOLUBLE, CHLORIDE-ION CONTENT IN HARDENED CONCRETE TO 1.00 PERCENT BY WEIGHT OF CEMENT
4. WALLS AND PEDESTALS:
- A. EXPOSURE CLASS = ACI 318 F2, S0, W0, C0
- B. MINIMUM COMPRESSIVE STRENGTH (f'c) = 4,500PSI
- C. MAXIMUM W/C/M = 0.45
- D. BLENDED HYDRAULIC CEMENT = ASTM C595 TYPE 1L SLUMP = 5" MAX PLUS OR MINUS 1", OR 8" MAX, PLUS OR MINUS 1" FOR CONCRETE WITH A VERIFIED SLUMP OF 3" PLUS OR MINUS 1" BEFORE ADDING HIGH-RANGE WATER-REDUCING OR PLASTICIZING ADMIXURE
- E. AIR CONTENT = 5.5% PLUS OR MINUS 1.5% AT POINT OF DELIVERY
- F. AGGREGATE = NORMAL WEIGHT, ¾" NOMINAL
- G. LIMIT WATER-SOLUBLE, CHLORIDE-ION CONTENT IN HARDENED CONCRETE TO 0.30 PERCENT BY WEIGHT OF CEMENT
5. CONCRETE NOT OTHERWISE NOTED:
- A. EXPOSURE CLASS = ACI 318 F0, S0, W0, C1
- B. MINIMUM COMPRESSIVE STRENGTH (f'c) = 3,000PSI
- C. MAXIMUM W/C/M = 0.5
- D. BLENDED HYDRAULIC CEMENT = ASTM C595 TYPE 1L
- E. SLUMP = 5" MAX PLUS OR MINUS 1", OR 8" MAX, PLUS OR MINUS 1" FOR CONCRETE WITH A VERIFIED SLUMP OF 3" PLUS OR MINUS 1" BEFORE ADDING HIGH-RANGE WATER-REDUCING OR PLASTICIZING ADMIXURE
- F. AIR CONTENT = NO REQUIREMENTS
- G. AGGREGATE = NORMAL WEIGHT, ¾" NOMINAL
- H. LIMIT WATER-SOLUBLE, CHLORIDE-ION CONTENT IN HARDENED CONCRETE TO 0.30 PERCENT BY WEIGHT OF CEMENT

CONCRETE MASONRY NOTES:

1. CONCRETE MASONRY MATERIALS AND CONSTRUCTION MUST CONFORM TO THE AMERICAN CONCRETE INSTITUTE (ACI) 530.
2. CONCRETE MASONRY UNITS MUST CONFORM TO ASTM C90 AND MUST BE MADE WITH LIGHTWEIGHT AGGREGATE. MINIMUM NET AREA COMPRESSIVE STRENGTH OF MASONRY UNITS MUST BE 2,100 PSI AT 28 DAYS.
3. COMPRESSIVE STRENGTH OF MASONRY MUST BE DETERMINED BY THE UNIT STRENGTH METHOD AS SET FORTH IN ACI 530.1. THE NET AREA COMPRESSIVE STRENGTH OF MASONRY, fm, MUST BE 2,000 PSI AT 28 DAYS.
4. MORTAR MUST BE TYPE 'M' OR 'S' AND MUST COMPLY WITH ASTM C270, PROPORTIONS OR PROPERTIES SPECIFICATION.
5. GROUT MUST COMPLY WITH EITHER THE PROPORTIONS OR PROPERTIES SPECIFICATION OF ASTM C476 AND AS FOLLOWS:
- A. PROPORTIONS SPECIFICATION: THIS MIX CANNOT CONTAIN ADMIXTURES. WATER MUST BE ADDED IN THE FIELD IN ORDER TO ACHIEVE A SLUMP OF 8-11 INCHES WHEN PLACED IN THE CONCRETE MASONRY UNITS. MORTAR, PEA-GRAVEL CONCRETE, OR "CHAT" MIXES ARE NOT ACCEPTABLE SUBSTITUTES FOR THE SPECIFIED GROUT.
- B. PROPERTIES SPECIFICATION: THIS MIX MUST BE PROPORTIONED TO OBTAIN A DOCUMENTED 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI, WITH AN 8-11 INCH SLUMP WHEN PLACED IN THE CONCRETE MASONRY UNITS.
6. REINFORCING STEEL MUST COMPLY WITH ASTM A615, GRADE 60. SHOP FABRICATE REINFORCING BARS WHICH ARE SHOWN TO BE BENT OR HOOKED.
7. ALL BOND BEAMS, REINFORCED CELLS AND CELLS WITH EXPANSION BOLTS, EMBED PLATES OR OTHER ANCHORS AND ALL CELLS BELOW GRADE MUST BE GROUTED SOLID. GROUT PROCEDURE MUST COMPLY WITH ACI 530.1.
8. ALL CMU WALLS MUST BE REINFORCED CONTINUOUSLY FROM FOUNDATION TO TOP OF WALL. WHERE REINFORCING IS INTERRUPTED, OFFSET AND LAP ADDITIONAL BARS PER THE "TYPICAL OFFSET SPLICE AT MASONRY WALL DETAILS."
9. LAP ALL REINFORCING PER SCHEDULE BELOW, TYPICAL UNLESS OTHERWISE NOTED.

MASONRY LAP SCHEDULE	
REINF. SIZE	52 x BAR DIAMETER
#4	26"
#5	33"
#6	39"
#7	46"
#8	52"

CONT. CONCRETE MASONRY NOTES:

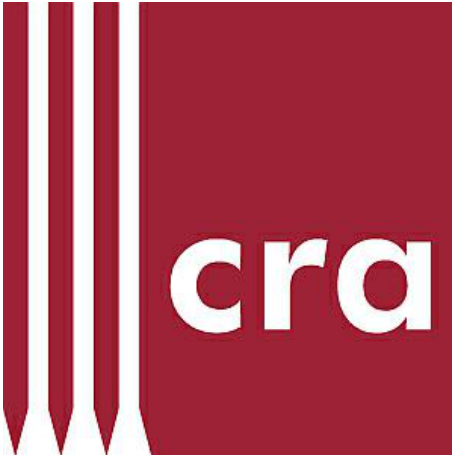
10. PROVIDE TWO VERTICAL BARS EACH SIDE OF ALL OPENINGS AND CONTROL JOINTS, AND AT CORNERS AND INTERSECTIONS OF ALL MASONRY WALLS, BOTH BEARING AND NON-BEARING WALLS. SHOW CONTROL JOINT LOCATIONS ON THE REINFORCING STEEL SHOP DRAWINGS.
11. PROVIDE REINFORCING STEEL DOWELS OF THE SAME SIZE AND SPACING AS VERTICAL REINFORCING FROM THE SUPPORTING STRUCTURE. DOWELS MUST HAVE STANDARD ACI HOOKS.
12. PROVIDE STANDARD 9 GAGE LADDER TYPE HORIZONTAL JOINT REINFORCING IN CMU WALLS AT 16 INCHES ON CENTER AND IN TWO JOINTS IMMEDIATELY ABOVE AND BELOW ALL OPENINGS, EXTENDING A MINIMUM OF 2 FEET BEYOND THE JAMB ON EACH SIDE OF THE OPENING, EXCEPT AT CONTROL JOINTS.
13. PROVIDE HORIZONTAL BOND BEAMS WITH CONTINUOUS REINFORCING AS SHOWN IN THE SECTIONS AND DETAILS. DISCONTINUE ALL HORIZONTAL REINFORCING AT CONTROL JOINTS EXCEPT FOR THE BOND BEAMS AT BEARING ELEVATIONS.
14. DO NOT LOCATE CONTROL JOINTS WITHIN TWO FEET OF STEEL BEAM BEARING LOCATIONS.

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL MUST BE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) 360.
2. STRUCTURAL STEEL INSTALLER MUST PARTICIPATE IN THE AISC QUALITY CERTIFICATION PROGRAM AND BE A DESIGNATED AISC-CERTIFIED ERECTOR.
3. STRUCTURAL STEEL MUST COMPLY WITH THE FOLLOWING SPECIFICATIONS:
- A. STRUCTURAL STEEL SHAPES, PLATES AND BARS UNLESS OTHERWISE NOTED - ASTM A572, Fy = 50 KSI
- B. STRUCTURAL STEEL W-SHAPES - ASTM A992, Fy = 50 KSI
- C. HOLLOW STRUCTURAL SECTIONS (HSS):
- a. SQUARE & RECTANGULAR - ASTM A500, GRADE C, Fy = 50 KSI
- F. ANCHOR RODS - ASTM F1554, GRADE 36
- G. HIGH STRENGTH BOLTS - ASTM F436 (TYPICAL UON)
- F. FULLY PRETENSIONED BOLTS - ASTM F1852 (TWIST-OFF TYPE)
- G. WASHERS - ASTM F436
- H. NUTS - ASTM A563
4. UNLESS OTHERWISE NOTED, ALL REQUIRED DESIGN STRENGTHS AND REACTIONS INDICATED ARE BASED ON THE LOADING COMBINATIONS USING STRENGTH DESIGN OR LOAD AND RESISTANCE FACTOR DESIGN" PER SECTION 1605.2 OF THE BUILDING CODE.
5. STRUCTURAL STEEL FRAME IS CONSIDERED AS UNRESTRAINED FOR FIRE PROTECTION PURPOSES.
6. ALL STEEL CONNECTIONS AND MEMBER REINFORCEMENT MUST BE DESIGNED BY FABRICATOR'S QUALIFIED PROFESSIONAL ENGINEER FOR LOADS INDICATED ON THE DRAWINGS, PER OPTION 3B OF ANSI/AISC 303 AND COMPLETE THE FOLLOWING:
- A. SUBMIT STRUCTURAL CALCULATIONS SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA RESPONSIBLE FOR THEIR PREPARATION.
- B. THE PROFESSIONAL ENGINEER RESPONSIBLE FOR CONNECTION DESIGN MUST REVIEW THE SHOP DRAWINGS PRIOR TO SUBMITTAL TO VERIFY THAT THE CONNECTIONS AS DETAILED ON THE SHOP DRAWINGS COMPLY WITH THE CONNECTION DESIGN REQUIREMENTS OF THE FINAL CALCULATIONS.
- C. A REVIEW LETTER, SIGNED AND SEALED BY THE PROFESSIONAL ENGINEER RESPONSIBLE FOR CONNECTION DESIGN MUST BE PROVIDED WITH THE SHOP DRAWINGS AND CALCULATION SUBMITTAL STATING THAT THIS REVIEW AND VERIFICATION HAS BEEN COMPLETED.
7. HIGH STRENGTH BOLTS MAY BE TIGHTENED TO THE "SNUG TIGHT" CONDITION, UNLESS OTHERWISE NOTED.
8. BOLTED CONNECTIONS MAY USE NON-STANDARD HOLES, EXCEPT IN THE FOLLOWING LOCATIONS:
- A. AXIAL CONNECTIONS IDENTIFIED ON PLAN.
- B. ALL FRAMING CONNECTIONS AT BRACED FRAMES AND MOMENT FRAMES.
- C. CONNECTIONS IDENTIFIED ON PLAN WITH FULL DEPTH STIFFENER PLATES.
9. PROVIDE ANGLE FRAMING AROUND OPENINGS LARGER THAN 6 INCHES IN ANY DIMENSION (INCLUDING ROOF DRAINS) TO SUPPORT STEEL DECK. REFERENCE PLANS AND TYPICAL DETAILS FOR SIZING REQUIREMENTS.
10. WELDING MUST BE IN ACCORDANCE WITH AWS D1.1. "STRUCTURAL WELDING CODE - STEEL." WELD ELECTRODES MUST BE E70XX LOW HYDROGEN. UNLESS OTHERWISE NOTED, PROVIDE CONTINUOUS FILLET WELDS WITH MINIMUM SIZE REQUIRED BY TABLE J2.4 AISC 360.
11. COORDINATE ALL MEMBER LOCATIONS, UNIT WEIGHTS, OPENING SIZES, AND CURB DIMENSIONS FOR MECHANICAL EQUIPMENT WITH THE ACTUAL EQUIPMENT FURNISHED.
12. SHOP PRIME STEEL SURFACES, EXCEPT THE FOLLOWING:
- A. SURFACES EMBEDDED IN CONCRETE OR MORTAR. EXTEND PRIMING OF PARTIALLY EMBEDDED MEMBERS TO A DEPTH OF 2 INCHES.
- B. SURFACES TO BE WELDED.
- C. SURFACES TO RECEIVE SPRAYED FIRE-RESISTIVE MATERIALS.
- D. GALVANIZED SURFACES.
- E. SURFACES ENCLOSED IN INTERIOR CONSTRUCTION.
13. CLEAN ALL STEEL SURFACES TO BE PAINTED. REMOVE LOOSE RUST, MILL SCALE, SPATTER, SLAG, OR FLUX DEPOSITS. PREPARE SURFACES IN ACCORDANCE WITH SSPC-SP3 SPECIFICATION AND STANDARD.
14. HOT-DIP GALVANIZE AFTER FABRICATION THE FOLLOWING:
- A. ANGLES AND PLATES SUPPORTING MASONRY IN EXTERIOR WALLS.
- B. LINTELS AND LINTEL ASSEMBLIES SUPPORTING MASONRY IN EXTERIOR WALLS.
- C. ALL STEEL EXPOSED TO WEATHER IN THE FINAL CONSTRUCTION.
- D. ITEMS IDENTIFIED AS GALVANIZED ON ARCHITECTURAL OR STRUCTURAL DRAWINGS.
15. ALL MEMBERS EXPOSED TO VIEW IN THE FINISHED CONSTRUCTION MUST BE CONSIDERED ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS).
16. STEEL MEMBERS MUST BE SPLICED ONLY WHERE INDICATED. CONTINUOUS MEMBERS MUST BE SPLICED OVER SUPPORTS, UNLESS OTHERWISE NOTED.

STEEL DECK NOTES:

1. STEEL DECK MUST BE IN ACCORDANCE WITH THE AMERICAN IRON AND STEEL INSTITUTE (AISI), "NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS" AND THE STEEL DECK INSTITUTE (SDI), "DESIGN MANUAL FOR COMPOSITE DECKS, FORM DECKS, AND ROOF DECKS."
2. STEEL DECK INSTALLATION MUST COMPLY WITH THE FOLLOWING:
- A. ROOF DECK: 1 1/2" x 20 GAGE TYPE 'B' GALVANIZED, UNLESS OTHERWISE NOTED. ATTACH DECK TO SUPPORTS WITH 5/8 INCH DIAMETER PUDDLE WELDS IN ALL RIBS WHERE END LAPS OCCUR AND AT 12 INCHES ON CENTER ALONG SUPPORTS WITH A 36/4 PATTERN. FASTEN SIDE LAPS WITH #10 SELF-TAPPING HEX HEAD SCREWS AT 1/3 POINTS BETWEEN SUPPORTS. FASTEN EDGE/MOST DECK PANEL TO STEEL FRAMING WITH 5/8 INCH DIAMETER PUDDLE WELDS AT SAME SPACING AS SIDELAP FASTENERS.
3. STEEL DECK MUST BE INSTALLED PERPENDICULAR TO SUPPORTS AND MUST HAVE A MINIMUM OF THREE CONTINUOUS SPANS. ENDLAPS MUST ONLY OCCUR AT SUPPORTS.
4. WELDING MUST BE IN ACCORDANCE WITH AWS D1.3 "STRUCTURAL WELDING CODE - SHEET STEEL".
5. PERMANENT SUSPENDED LOADS MUST NOT BE SUPPORTED BY STEEL ROOF DECK.
6. STEEL DECK SCHEDULED TO RECEIVE SPRAYED-ON FIREPROOFING MUST BE GALVANIZED.



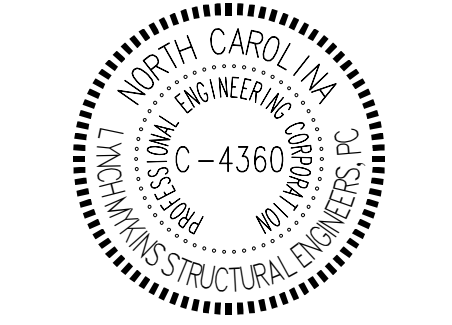
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04/09/2025



Indoor Practice Facility  
East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834  
SCO ID# 23-26345-01A    AIM # 1752



REVISIONS		
No.	Description	Date
1	ADDENDUM No. 1	04/09/2025

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GENERAL NOTES

SHEET

S001

DATE 03/14/2025 PROJECT NO. 2228



METAL BUILDING SYSTEM NOTES:

1. METAL BUILDING SYSTEM MUST BE IN ACCORDANCE WITH THE METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA) "DESIGN PRACTICES MANUAL."

2. SUBMIT SHOP DRAWINGS SIGNED AND SEALED BY A NORTH CAROLINA LICENSED PROFESSIONAL ENGINEER RESPONSIBLE FOR THE DESIGN OF METAL BUILDING SYSTEMS. SHOP DRAWINGS MUST INCLUDE DESIGN LOADINGS AND REACTIONS APPLIED TO THE SUPPORTING STRUCTURE. INCLUDE A SUMMARY OF CONTROLLING LOAD CASE FOR EACH LOCATION.

3. METAL BUILDING SYSTEMS MUST BE DESIGNED FOR THE LOAD INDICATED IN THE GENERAL NOTES AND AS FOLLOWS:

A. DEAD LOADS.....WEIGHT OF ALL SUPPORTED EQUIPMENT (5 PSF. MIN), PLUS WEIGHT OF THE BUILDING.

B. SUPPORTED EQUIPMENT

B.1 DIVIDER CURTAIN .....0.5 PSF

B.2 VIDEO BOARD .....5,150 #

B.3 LED TIMER .....65 #

B.4 SCOREBOARD.....820#

B.5 SUSPENDED GOLF POST.....280#

B.6 TIME OF DAY DISPLAY.....60#

C. COORDINATE EQUIPMENT LOADS, LOCATIONS, AND CONNECTION REQUIREMENTS WITH ARCHITECTURAL DRAWINGS AND EQUIPMENT PURCHASED.

D. COLLATERAL LOADS.....5 PSF
- | GRID                     | 1            | 2              | 3 TO 15         | 16             | 17           |
|--------------------------|--------------|----------------|-----------------|----------------|--------------|
| LOAD CASE                |              |                |                 |                |              |
| 1.0 D + 1.0 L (x,y)      | 5K, 10K      | 5K, 15K        | 70K, 110K       | 5K, 15K        | 5K, 10 K     |
| 1.0 D +/- 0.6 W (x,y)    | 5K/-2K, -10K | 25K/-20K, -90K | 75K/-25 K, -25K | 25K/-20K, -90K | 5K/-2K, -10K |
| 0.6D +/- 0.6W (x,y)      | 5K/-2K, -10K | 25K/-20K, -90K | 65K/-35K, -45K  | 25K/-20K, -90K | 5K/-2K, -10K |
| 1.0 D+ 75L + 0.45W (x,y) | 10K, 20K     | 15K, 105K      | 95K, 80K        | 15K, 105K      | 10K, 20K     |
5. THE CONTRACTOR MUST BE RESPONSIBLE FOR THE COORDINATION AND COSTS ASSOCIATED WITH A CONTRACTOR INITIATED CHANGE IN BUILDING MODEL OR MANUFACTURER, INCLUDING CONSTRUCTION COSTS AND RE-ENGINEERING COSTS.

6. METAL BUILDING SYSTEM HAS BEEN DESIGN BY OTHERS.

7. FOUNDATIONS HAVE BEEN DESIGNED USING THE REACTIONS PROVIDED BY THE METAL BUILDING MANUFACTURER. ANY INCREASE IN REACTION LOAD WILL RENDER THE DESIGNS HEREIN NULL AND VOID.

8. DESIGN OF THE ANCHOR RODS AND BASE PLATE FOR SUPPORT OF THE METAL BUILDING IS THE RESPONSIBILITY OF THE METAL BUILDING MANUFACTURER.

9. METAL BUILDING FRAMES AND COLUMNS MUST BE DESIGNED FOR PINNED BASE CONNECTIONS (NO MOMENT TRANSFER).

10. METAL BUILDING DESIGN SERVICEABILITY CRITERIA ARE AS FOLLOWS:

DEFLECTION:

A. LIVE:.....SPAN/240

B. DEAD+LIVE.....SPAN/180

C. DEAD + SNOW (OR WIND) - ROOF MEMBERS:.....SPAN/240

D. DEAD + SNOW (OR WIND) - WALL MEMBERS:.....SPAN/120

E. MEMBERS SUPPORTING MASONRY.....SPAN/600 OR 3/8" MAX.

E.1 APPLICABLE FOR EXTENTS OF MASONRY INTERFACE

DRIFT LIMITS: (10 YEAR SERVICIABILTY FOR WIND)

A. WIND/SEISMIC AT TYPICAL FRAME: H/120

B. WIND/SEISMIC IN DIRECTION PERPENDICULAR TO EAST AUXILIARY BUILDING EXPANSION JOINT: H/400

B.1 APPLICABLE AT INTERFACE BETWEEN PEMB AND EAST AUXILIARY BUILDING

C. WIND/SEISMIC IN ANY DIRECTION SUPPORTING MASONRY: H/600

C.1 APPLICABLE FOR EXTENTS OF MASONRY INTERFACE

STRUCTURAL DELEGATED DESIGN ELEMENT NOTES:

1. THE FOLLOWING BUILDING ELEMENTS REQUIRE DELEGATED DESIGN AND ENGINEERING BY A SPECIALTY STRUCTURAL ENGINEER:

A. METAL STAIRS

B. STRUCTURAL CONNECTIONS

C. COLD-FORMED METAL FRAMING (CFMF)

D. GLAZING ASSEMBLY CONNECTIONS TO THE STRUCTURE

E. PRE-FABRICATED CANOPIES AND AWNINGS

F. PRE-ENGINEERED METAL BUILDINGS (PEMB)

G. TEMPORARY SHORING AND/OR EXCAVATION SUPPORT

H. MECHANICAL, ELECTRICAL, AND PLUMBING SUPPORTS AND DISTRIBUTIONS SYSTEMS, INCLUDING BRACING AND ATTACHMENTS

I. ARCHITECTURAL PRECAST CONCRETE

REFERENCE SPECIFICATIONS FOR COMPLETE REQUIREMENTS

2. SUBMIT COMPLETE CALCULATIONS AND SHOP DRAWINGS, SIGNED AND SEALED BY THE PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA RESPONSIBLE FOR THE DESIGN, INCLUDING DESIGN LOADINGS AND REACTIONS APPLIED TO THE SUPPORTING STRUCTURE. INCLUDE A SUMMARY OF THE CONTROLLING LOAD CASES FOR EACH LOCATION.

3. IN ADDITION TO THEIR OWN DEAD WEIGHT AND THE DEAD LOADS SHOWN OR INDICATED IN THE DRAWINGS, MEMBERS MUST BE DESIGNED TO SUPPORT THE LOADS INDICATED IN THE GENERAL NOTES.

4. CONNECTION DETAILS SHOWN ARE SCHEMATIC ONLY. ALL CONNECTIONS MUST BE DESIGNED AND DETAILED BY THE MANUFACTURER TO SUIT THE SPECIFIED LOADS. CONNECTIONS MUST ACCOUNT FOR THERMAL MOVEMENT, DEFLECTION, CREEP, MANUFACTURING TOLERANCES, AND ERECTION TOLERANCES. DETAIL ALL CONNECTIONS ON SHOP DRAWINGS.

5. THE CONTRACTOR MUST BE RESPONSIBLE FOR THE COORDINATION OF ALL SPECIALTY STRUCTURAL ELEMENTS AND COST ASSOCIATED WITH A CONTRACTOR INITIATED CHANGE IN BUILDING STRUCTURE, INCLUDING CONSTRUCTION COSTS AND RE-ENGINEERING COSTS.

POST-INSTALLED ANCHOR NOTES:

1. ALL POST INSTALLED ANCHORS INDICATED ON THE DRAWINGS ARE BY HILTI, INC. AND MUST BE CONSIDERED THE BASIS OF DESIGN PRODUCT. WHERE NOT EXPLICITLY INDICATED IN THE DRAWINGS, THE FOLLOWING ANCHORS/ADHESIVES MUST BE USED:

A. ANCHORAGE TO CONCRETE

1. ADHESIVE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:

a. HILTI HIT-HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT (TE-CD OR TE-YD) AND VC 20/40 VACUUM SYSTEM (VC 20-U OR VC40U) WITH STEEL THREADED ROD PER ICC ESR-3187.

2. SCREW ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:

a. HILTI KWIK HUS EZ SCREW ANCHORS PER ICC ESR-3027.

B. REBAR DOWELING INTO CONCRETE

1. ADHESIVE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:

a. HILTI HIT-HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT (TE-CD OR TE-YD) AND VC 20/40 VACUUM SYSTEM (VC 20-U OR VC 40-U) WITH CONTINUOUSLY DEFORMED REBAR PER ICC ESR-3187.

C. ANCHORAGE TO SOLID GROUTED MASONRY

1. ADHESIVE ANCHORS USE:

a. HILTI HIT-HY 270 MASONRY ADHESIVE ANCHORING SYSTEM (ICC PENDING).

b. STEEL ANCHOR ELEMENT MUST BE HILTI HAS-E CONTINUOUSLY THREADED ROD.

2. MECHANICAL ANCHORS USE:

a. HILTI KWIK HUS EZ SCREW ANCHORS PER ICC ESR 3056.

D. ANCHORAGE TO HOLLOW / MULT-PLYTHE MASONRY

1. ADHESIVE ANCHORS USE:

a. HILTI HIT-HY 270 MASONRY ADHESIVE ANCHORING SYSTEM PER ICCESR-3342.

b. STEEL ANCHOR ELEMENT MUST BE HILTI HAS-E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR.

c. THE APPROPRIATE SIZE SCREEN TUBE MUST BE USED PER ADHESIVE MANUFACTURER'S RECOMMENDATION.

2. ALTERNATE POST INSTALLED ANCHOR PRODUCTS MAY BE SUBMITTED TO THE ENGINEER FOR REVIEW AND POSSIBLE APPROVAL. ALL SUBSTITUTION REQUESTS MUST BE ACCOMPANIED BY AN ICC ESR SHOWING COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN-SERVICE TEMPERATURE AND INSTALLATION TEMPERATURE. ALTERNATE PRODUCTS MAY REQUIRE MODIFICATIONS TO ANCHOR DIAMETER, SPACING, AND EMBEDMENT.

3. INSTALL ANCHORS PER THE MANUFACTURER INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.

4. THE CONTRACTOR MUST ARRANGE FOR AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. THE STRUCTURAL ENGINEER OF RECORD MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF ANCHOR INSTALLATION.

5. ANCHOR CAPACITY IS DEPENDANT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

6. EXISTING REINFORCING BARS IN THE CONCRETE STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. UNLESS NOTED ON THE DRAWINGS THAT THE BARS CAN BE CUT, THE CONTRACTOR MUST LOCATE THE POSITION OF THE REINFORCING BARS AT THE LOCATIONS OF THE CONCRETE ANCHORS, BY FERROSCAN OR GPR.

7. ALL POST INSTALLED ANCHORS REQUIRE CONTINUOUS SPECIAL INSPECTIONS TO VERIFY INSTALLATION HAS BEEN PERFORMED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS. REFERENCE THE STATEMENT AND SCHEDULE OF SPECIAL INSPECTIONS FOR ADDITIONAL INFORMATION.

8. ALL POST INSTALLED ANCHORS REQUIRE CONTINUOUS INSPECTIONS BY THE OWNER'S MATERIALS TESTING AGENCY TO VERIFY INSTALLATION HAS BEEN PERFORMED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

COLD-FORMED METAL FRAMING NOTES:

1. COLD-FORMED METAL FRAMING MUST BE IN ACCORDANCE WITH THE AMERICAN IRON AND STEEL INSTITUTE (AISI) "NORTH AMERICAN STANDARD FOR COLD-FORMED STEEL FRAMING - GENERAL PROVISIONS".

2. SUBMIT SHOP DRAWINGS AND CALCULATIONS SIGNED AND SEALED BY A NORTH CAROLINA LICENSED PROFESSIONAL ENGINEER RESPONSIBLE FOR THE DESIGN OF COLD-FORMED METAL FRAMING. SHOP DRAWINGS MUST INCLUDE DESIGN LOADINGS AND REACTIONS APPLIED TO THE SUPPORTING STRUCTURE. INCLUDE PLACING DRAWINGS FOR FRAMING MEMBERS SHOWING SIZE AND GAGE DESIGNATIONS, NUMBER, TYPE, LOCATION AND SPACING. INDICATE CONNECTIONS, SUPPLEMENTAL STRAPPING, BRACING, SPLICES, BRIDGING, ACCESSORIES AND DETAILS AND CONSTRUCTION SEQUENCE REQUIRED FOR PROPER AND SAFE INSTALLATION.

3. WELDING MUST BE IN ACCORDANCE WITH AWS D1.3, "STRUCTURAL WELDING CODE - SHEET STEEL". TOUCH UP ALL WELDS WITH SPECIFIED COATING SYSTEMS.

4. COLD-FORMED METAL FRAMING MEMBERS MUST CONFORM TO ASTM C955, AND BE FORMED OF CORROSION-RESISTANT STEEL CONFORMING TO ASTM A653 AND ASTM C955 WITH A MINIMUM YIELD STRENGTH OF 33 KSI FOR 43 MIL AND THINNER MEMBERS AND 50 KSI FOR ALL OTHER MEMBERS.

5. MEMBER SECTION PROPERTIES MUST CONFORM TO PART 'I' OF THE "COLD-FORMED STEEL DESIGN MANUAL."

6. COLD-FORMED METAL FRAMING DESIGN LOADS MUST BE AS INDICATED IN THE "GENERAL NOTES".

7. COLD-FORMED METAL FRAMING MEMBERS, HEADERS AND CONNECTIONS SHOWN ON STRUCTURAL AND ARCHITECTURAL DRAWINGS ARE SCHEMATIC ONLY AND MUST BE DESIGNED TO MEET PERFORMANCE SPECIFICATION REQUIREMENTS.

8. PROVIDE BRIDGING LINES AT 4'-0" MAXIMUM ON CENTER IN ALL WALLS UNLESS OTHERWISE INDICATED. BRIDGING MUST BE FULLY INSTALLED AND ANCHORED AT ENDS BEFORE SUPERIMPOSING LOADS ONTO THE STUDS.

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LM Project Number: R22.297  
Corporation No. C-4360

04/09/2025

Indoor Practice Facility  
East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834  
SCO ID# 23-26345-01A AIM # 1752

REVISIONS		
No.	Description	Date
1	ADDENDUM No. 1	04/09/2025

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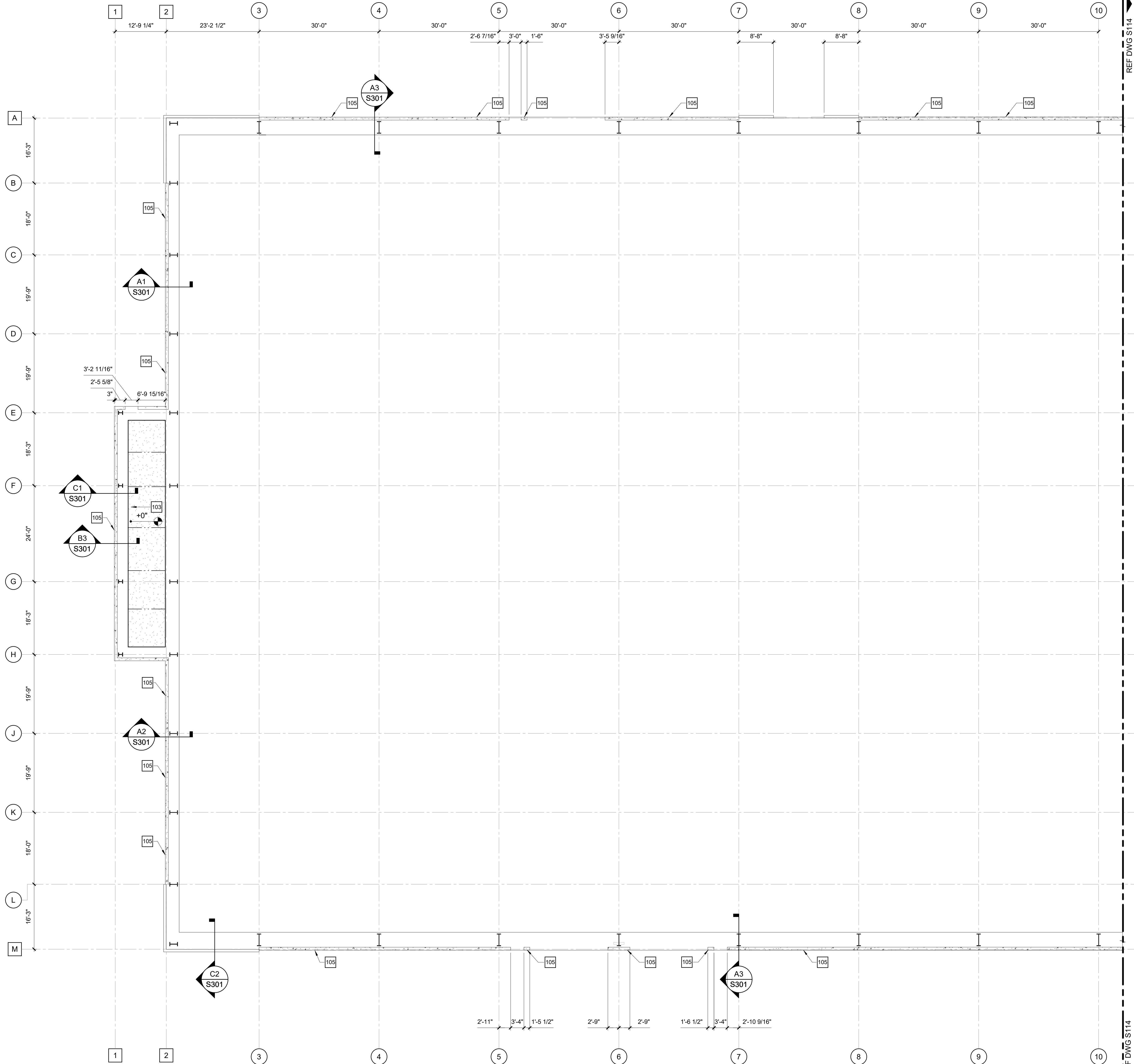
GENERAL NOTES

SHEET

S002

DATE 03/14/2025 PROJECT NO. 2228





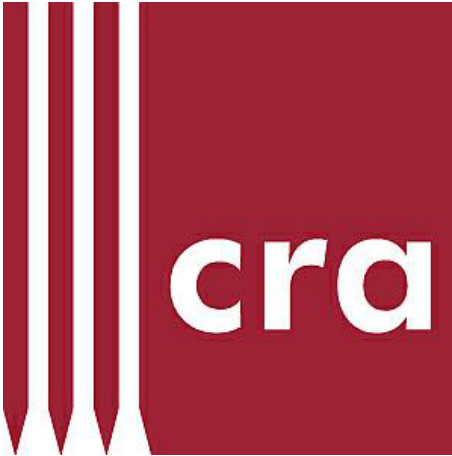
**A1** SLAB PLAN - WEST  
3/32" = 1'-0"

SLAB PLAN NOTES

- A. DISTRIBUTE BARS EQUALLY BETWEEN POINTS OF KNOWN DIMENSIONS UNLESS OTHERWISE NOTED.
- B. REFERENCE ARCHITECTURAL DRAWINGS FOR EXACT LIMITS OF SLAB DEPRESSIONS AND OMITTED SLABS.
- C. FLOOR SINKS AND DRAINS ARE NOT SHOWN ON PLAN. REFERENCE PME DRAWINGS FOR LOCATIONS.
- D. REFERENCE CIVIL AND LANDSCAPE DRAWINGS FOR EXTERIOR CONCRETE SLABS AND PAVING.
- E. SLAB-ON-GRADE JOINTS MUST BE SAWED JOINTS OR KEYED CONSTRUCTION JOINTS. UNLESS OTHERWISE NOTED. CONTRACTOR MUST COORDINATE ALL SLAB JOINTS WITH JOINTS IN BONDED FLOOR FINISHES. REFERENCE ARCHITECTURAL DRAWINGS FOR FLOOR FINISH JOINT LOCATIONS.
- F. PLACE (1) #4 x 3'-0" IN MIDDEPTH OF SLAB AT RE-ENTRANT CORNERS WHERE A SLAB JOINT DOES NOT OCCUR.

KEY NOTES

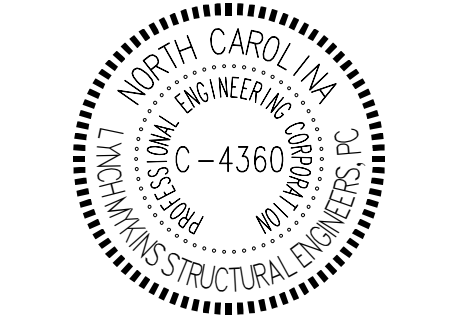
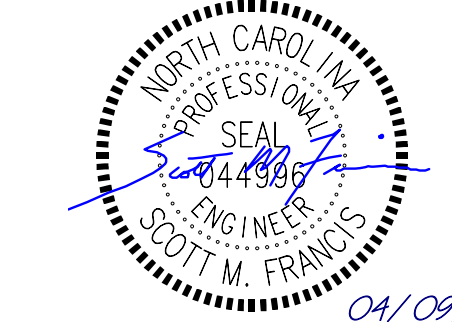
- 103 4" CONCRETE SLAB-ON-GRADE OVER VAPOR RETARDER AND 4" DEPTH OF POROUS FILL UNLESS OTHERWISE INDICATED. REINFORCE SLAB WITH 6"x6"-W2.1XW2.1 WELDED WIRE REINFORCING PLACED 1 1/2" CLEAR BELOW TOP OF SLAB. MAINTAIN REINFORCEMENT IN POSITION OF BOLSTERS, CHAIRS OR SPACERS DURING CONCRETE PLACEMENT.
- 105 6" TALL X 9" WIDE CONCRETE CURB. REINFORCE WITH (2) #4 CONTINUOUS AND #4 DOWELS AT 24" ON CENTER. ALIGN EXTERIOR FACE OF CURB WITH EXTERIOR FACE OF CONCRETE WALL.



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CONCRETE CURB  
AND SLAB PLAN -  
WEST

SHEET

S113

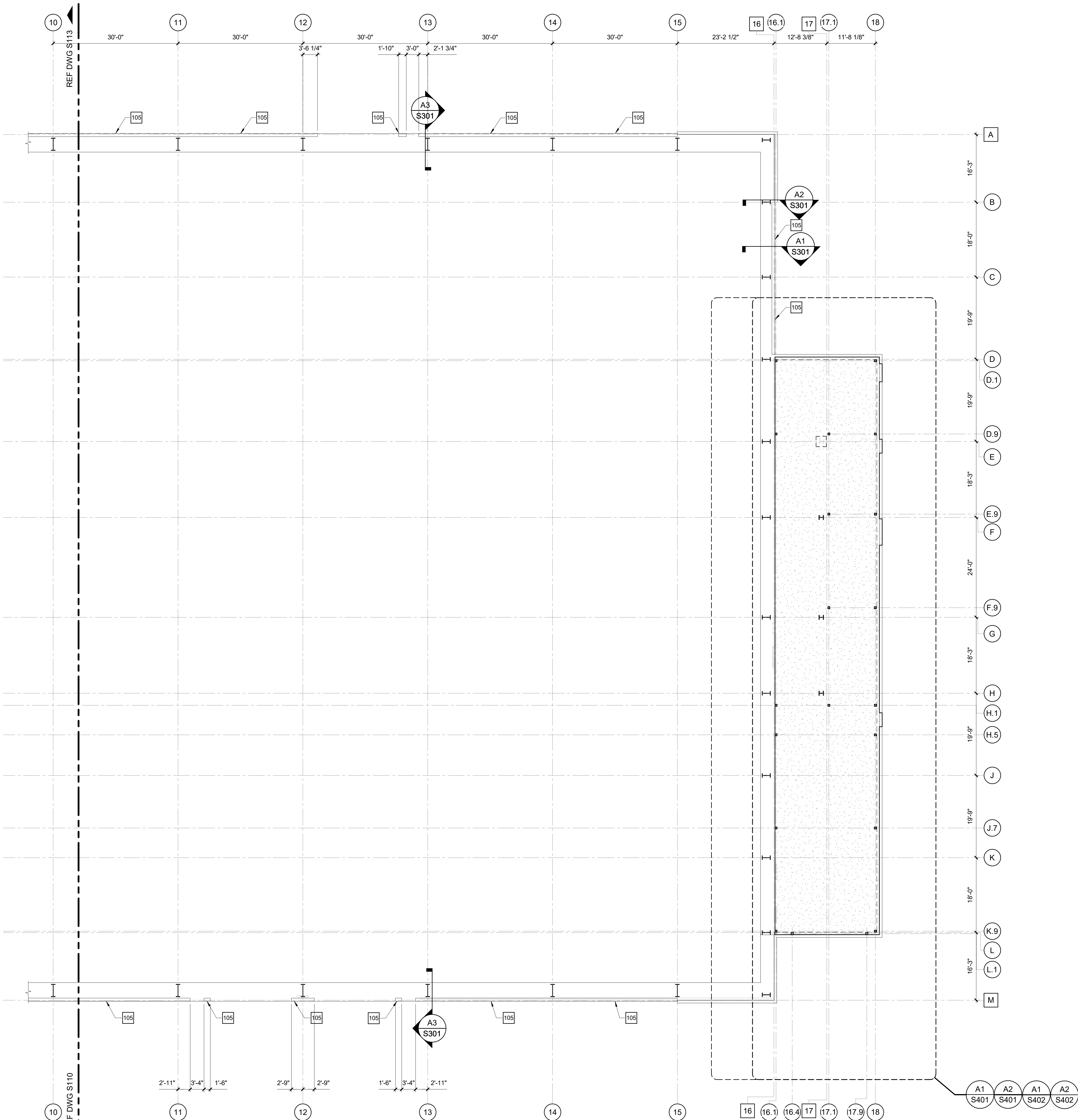
DATE  
03/14/2025

PROJECT NO.  
2228



A1 SLAB PLAN - EAST

3/32" = 1'-0"



SLAB PLAN NOTES

- A. DISTRIBUTE BARS EQUALLY BETWEEN POINTS OF KNOWN DIMENSIONS UNLESS OTHERWISE NOTED.
- B. REFERENCE ARCHITECTURAL DRAWINGS FOR EXACT LIMITS OF SLAB DEPRESSIONS AND OMITTED SLABS.
- C. FLOOR SINKS AND DRAINS ARE NOT SHOWN ON PLAN. REFERENCE PME DRAWINGS FOR LOCATIONS.
- D. REFERENCE CIVIL AND LANDSCAPE DRAWINGS FOR EXTERIOR CONCRETE SLABS AND PAVING.
- E. SLAB-ON-GRADE JOINTS MUST BE SAWED JOINTS OR KEYED CONSTRUCTION JOINTS. UNLESS OTHERWISE NOTED. CONTRACTOR MUST COORDINATE ALL SLAB JOINTS WITH JOINTS IN BONDED FLOOR FINISHES. REFERENCE ARCHITECTURAL DRAWINGS FOR FLOOR FINISH JOINT LOCATIONS.
- F. PLACE (1) #4 x 3'-0" IN MIDDEPTH OF SLAB AT RE-ENTRANT CORNERS WHERE A SLAB JOINT DOES NOT OCCUR.

KEY NOTES

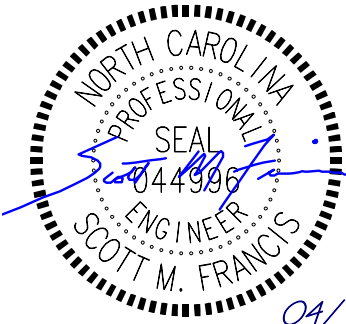
- 105 6" TALL X 8" WIDE CONCRETE CURB. REINFORCE WITH (2) #4 CONTINUOUS AND #4 DOWELS AT 24" ON CENTER. ALIGN EXTERIOR FACE OF CURB WITH EXTERIOR FACE OF CONCRETE WALL.



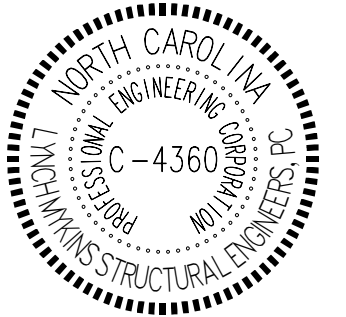
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04/09/2025



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CONCRETE CURB  
AND SLAB PLAN -  
EAST

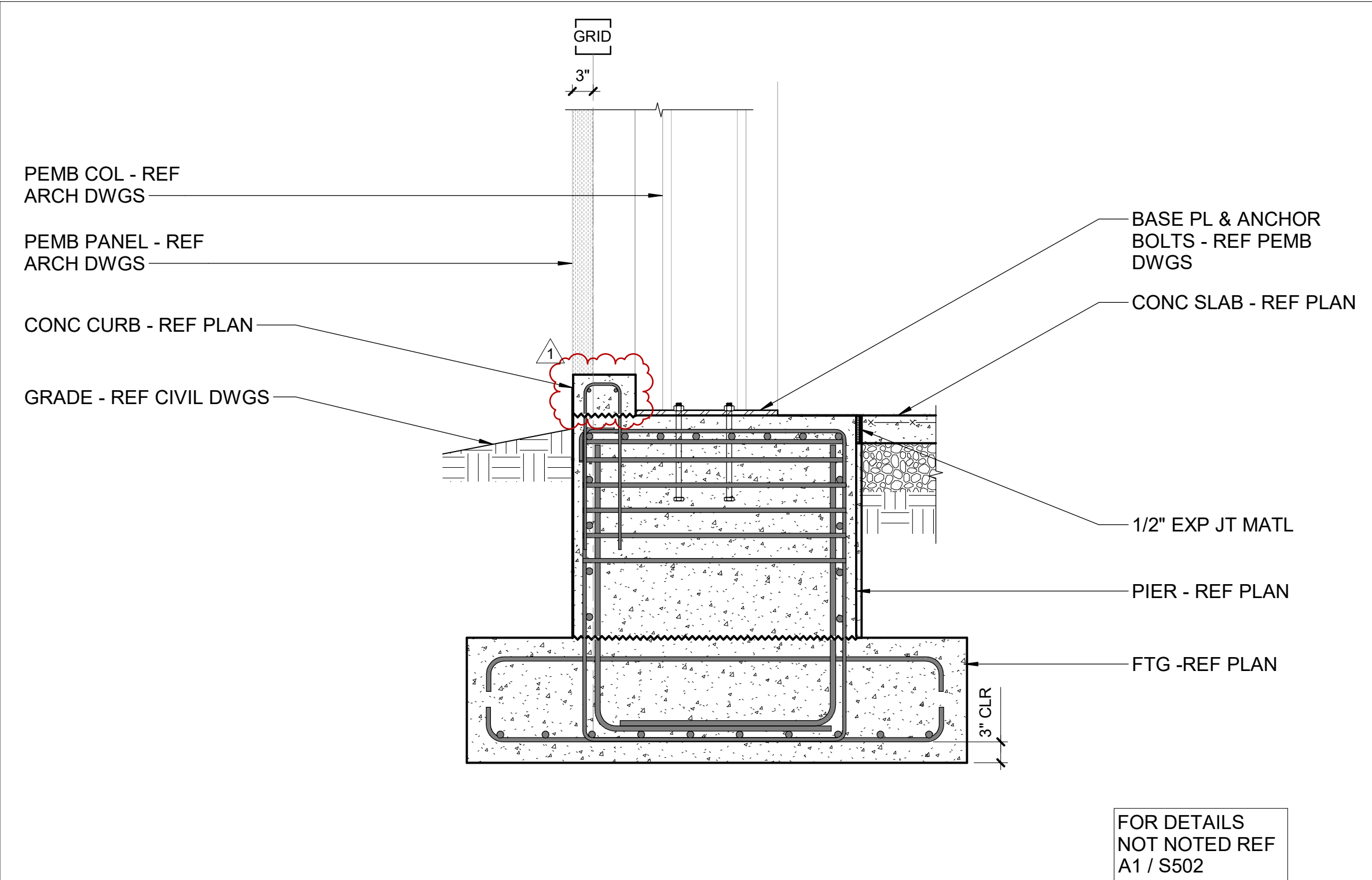
SHEET

S114

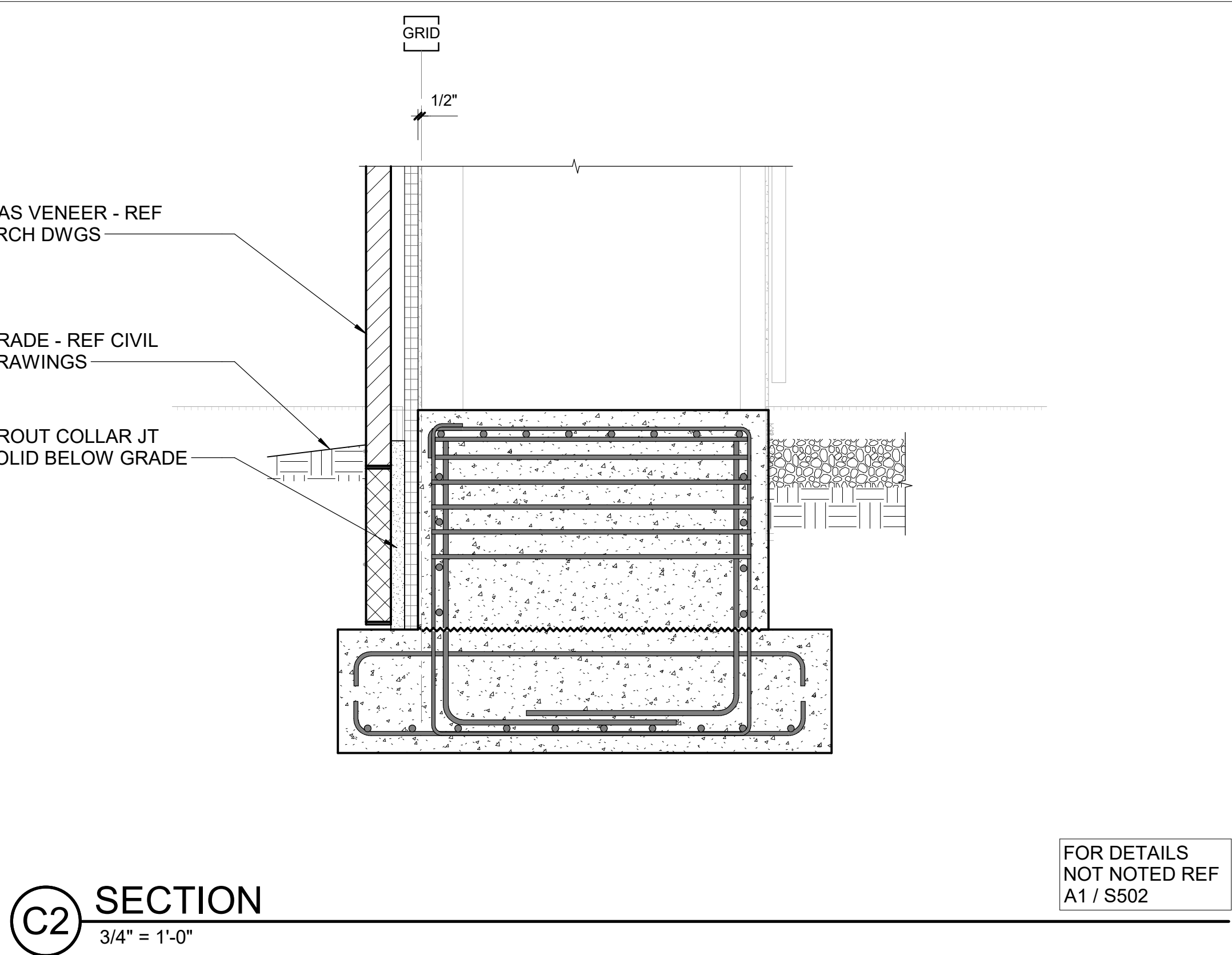
DATE  
03/14/2025

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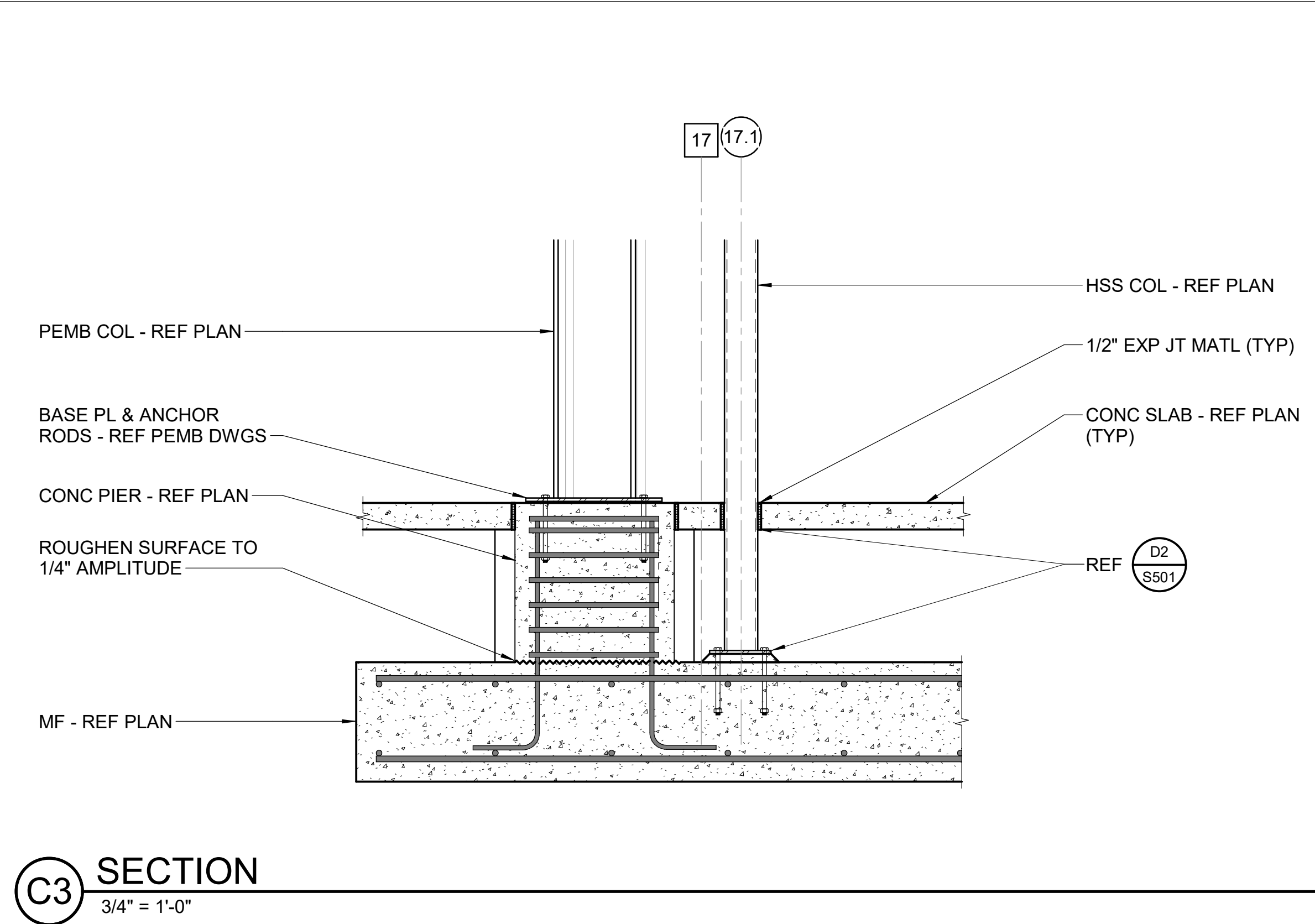




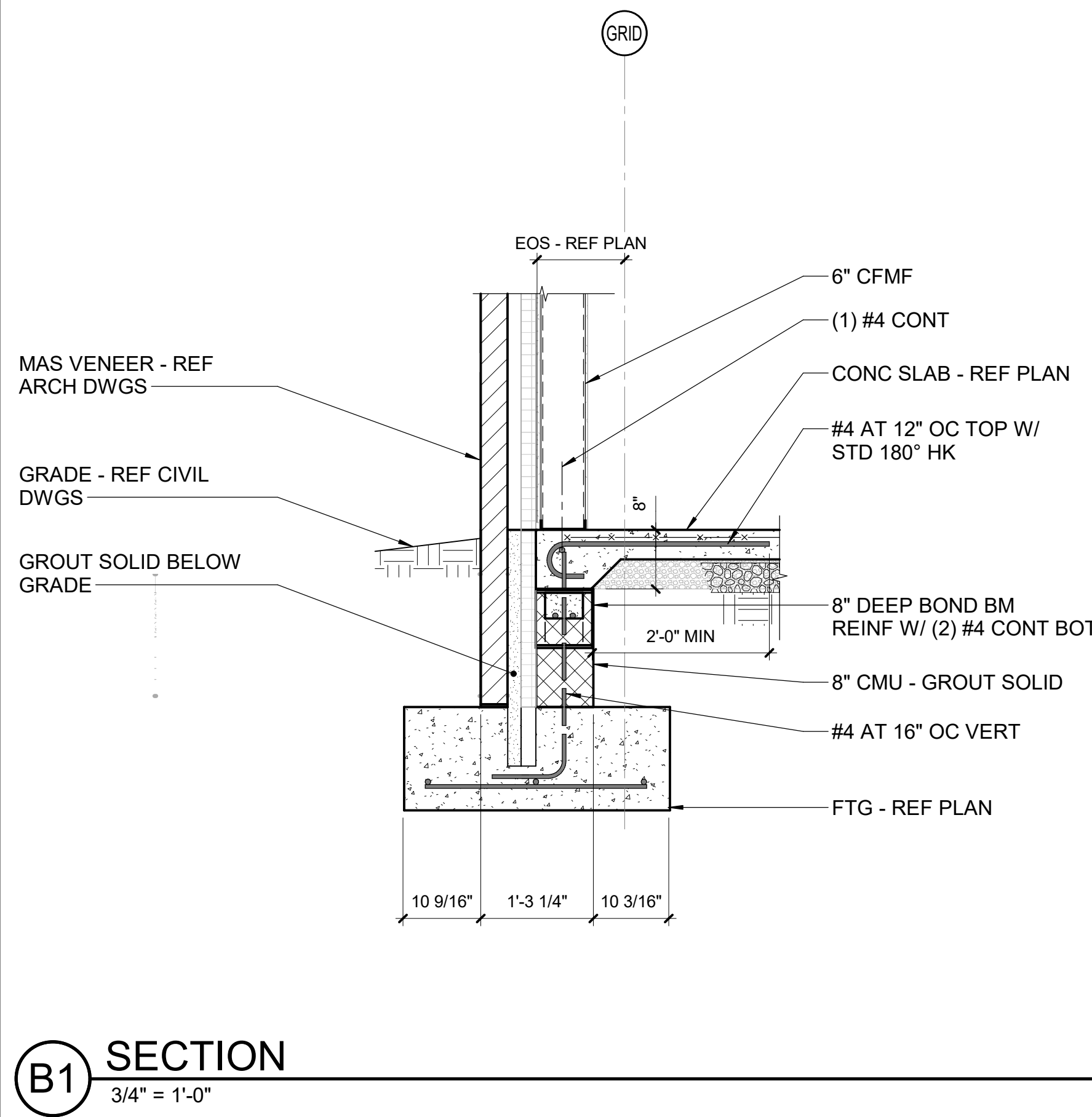
**C1** SECTION  
3/4" = 1'-0"



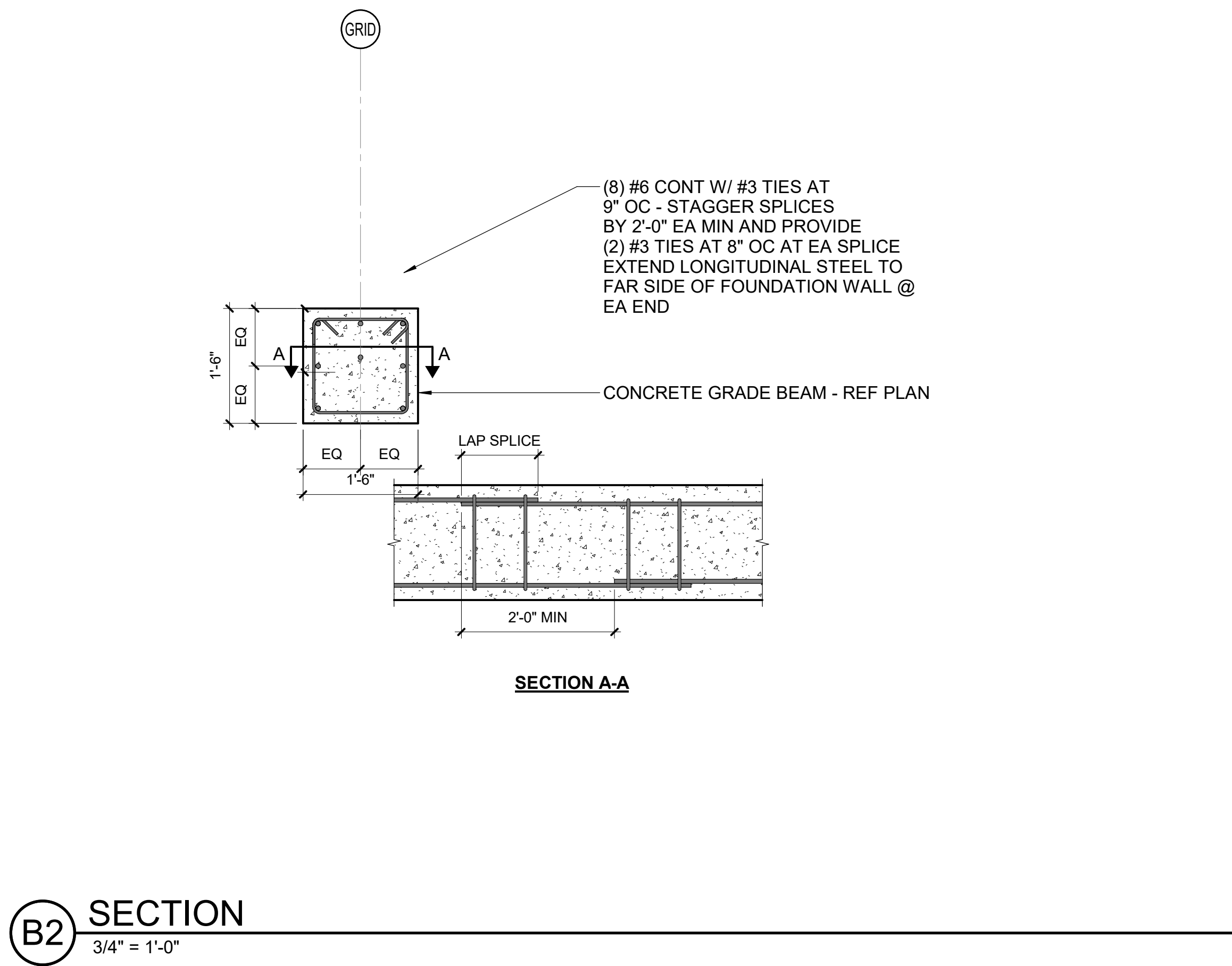
**C2** SECTION  
3/4" = 1'-0"



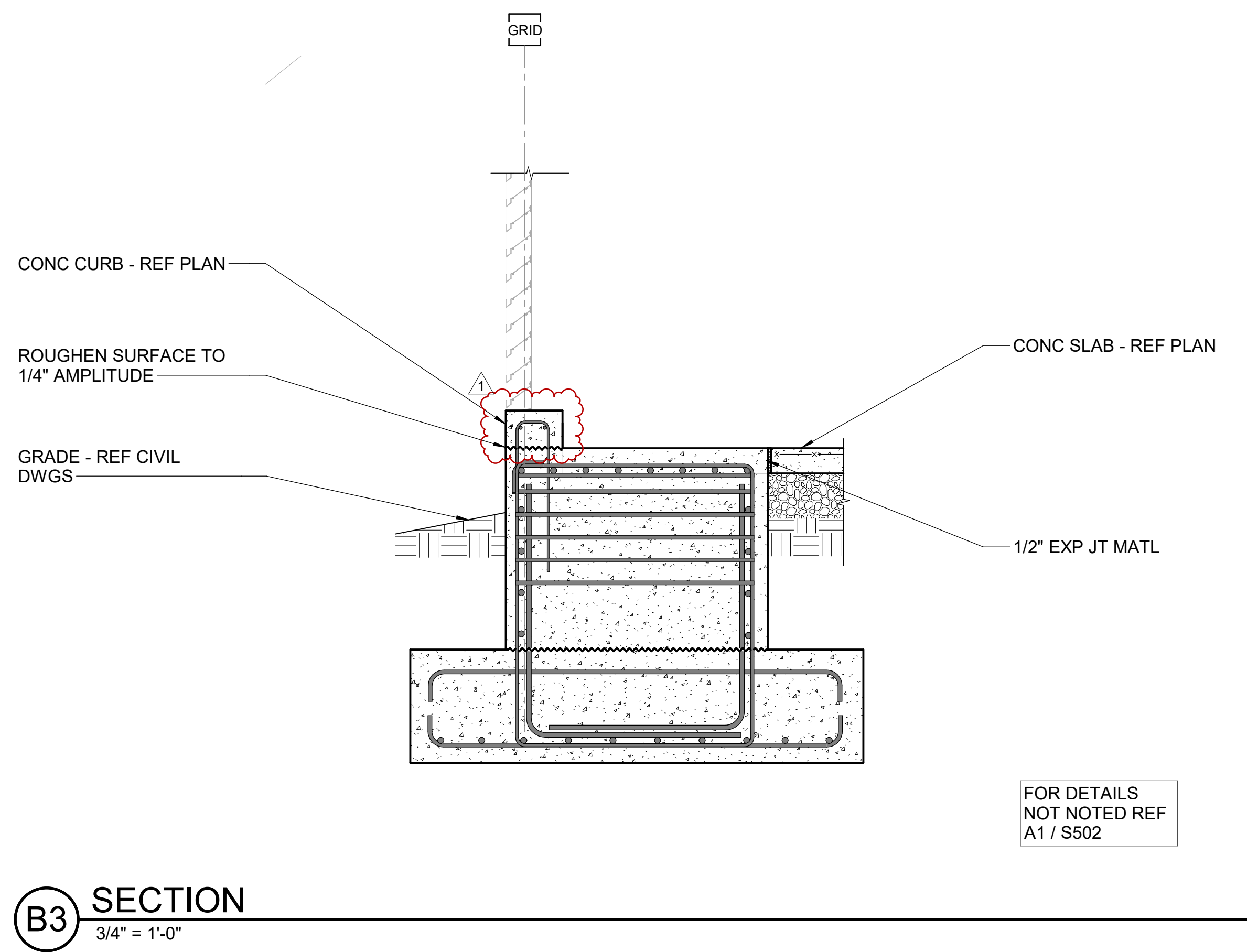
**C3** SECTION  
3/4" = 1'-0"



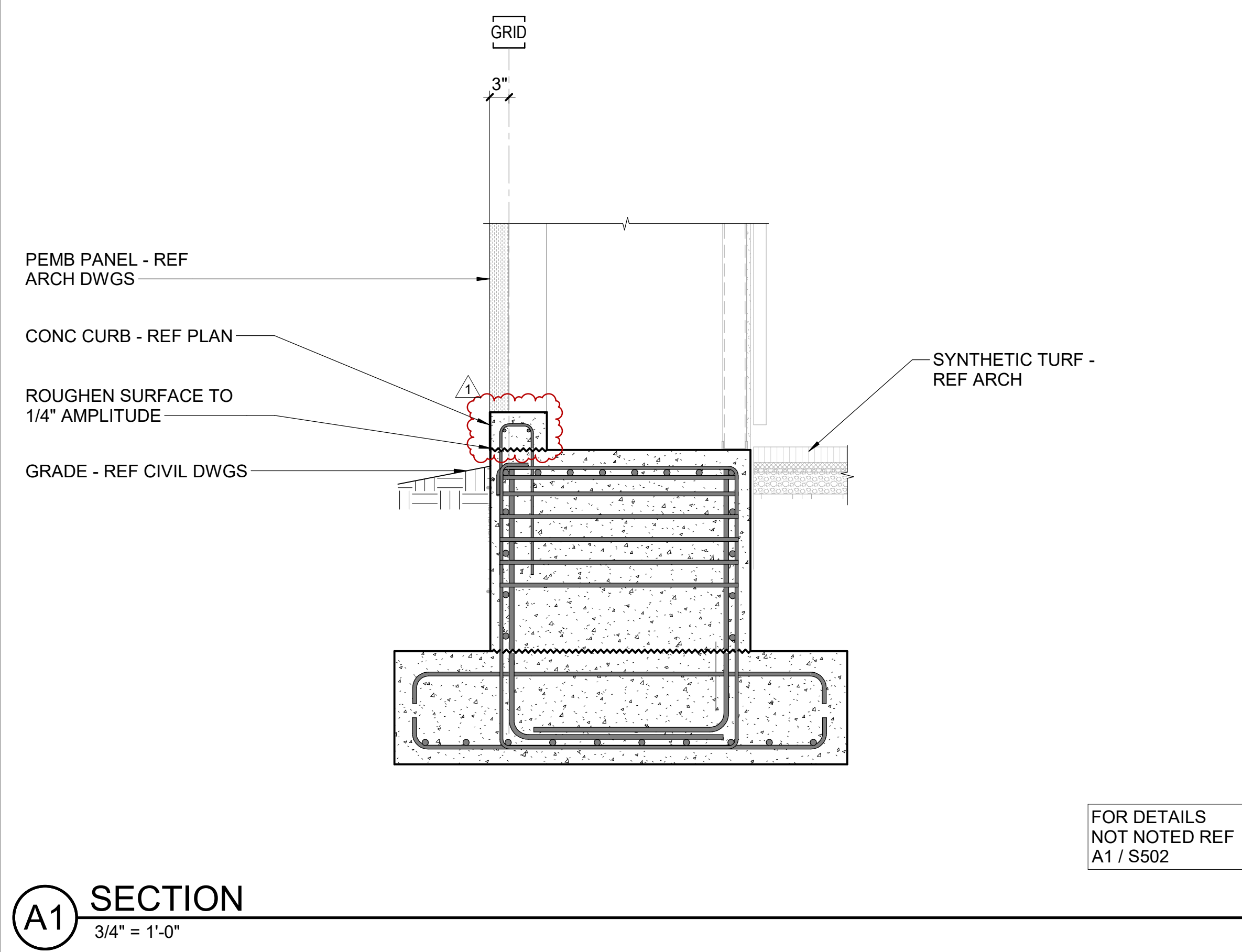
**B1** SECTION  
3/4" = 1'-0"



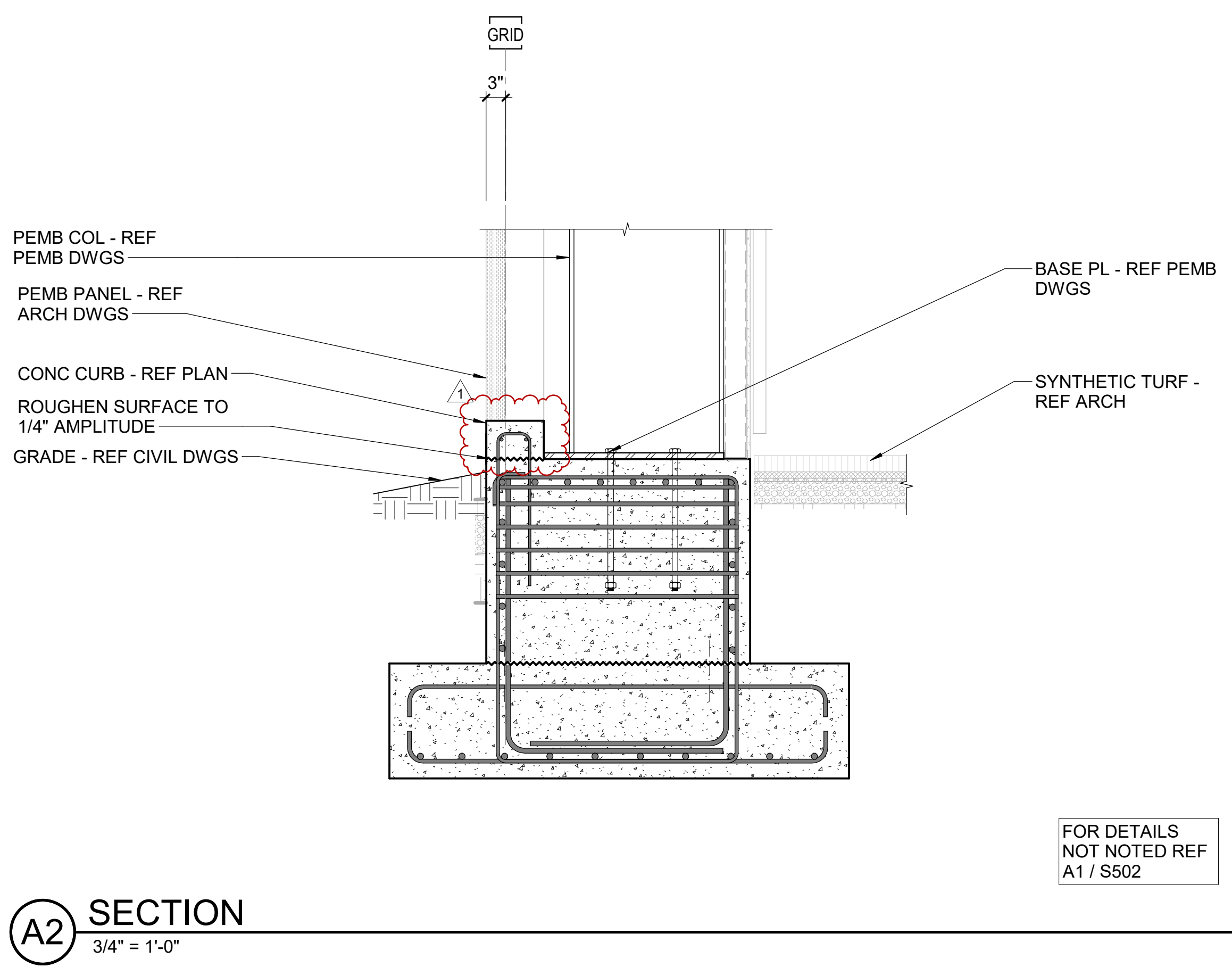
**B2** SECTION  
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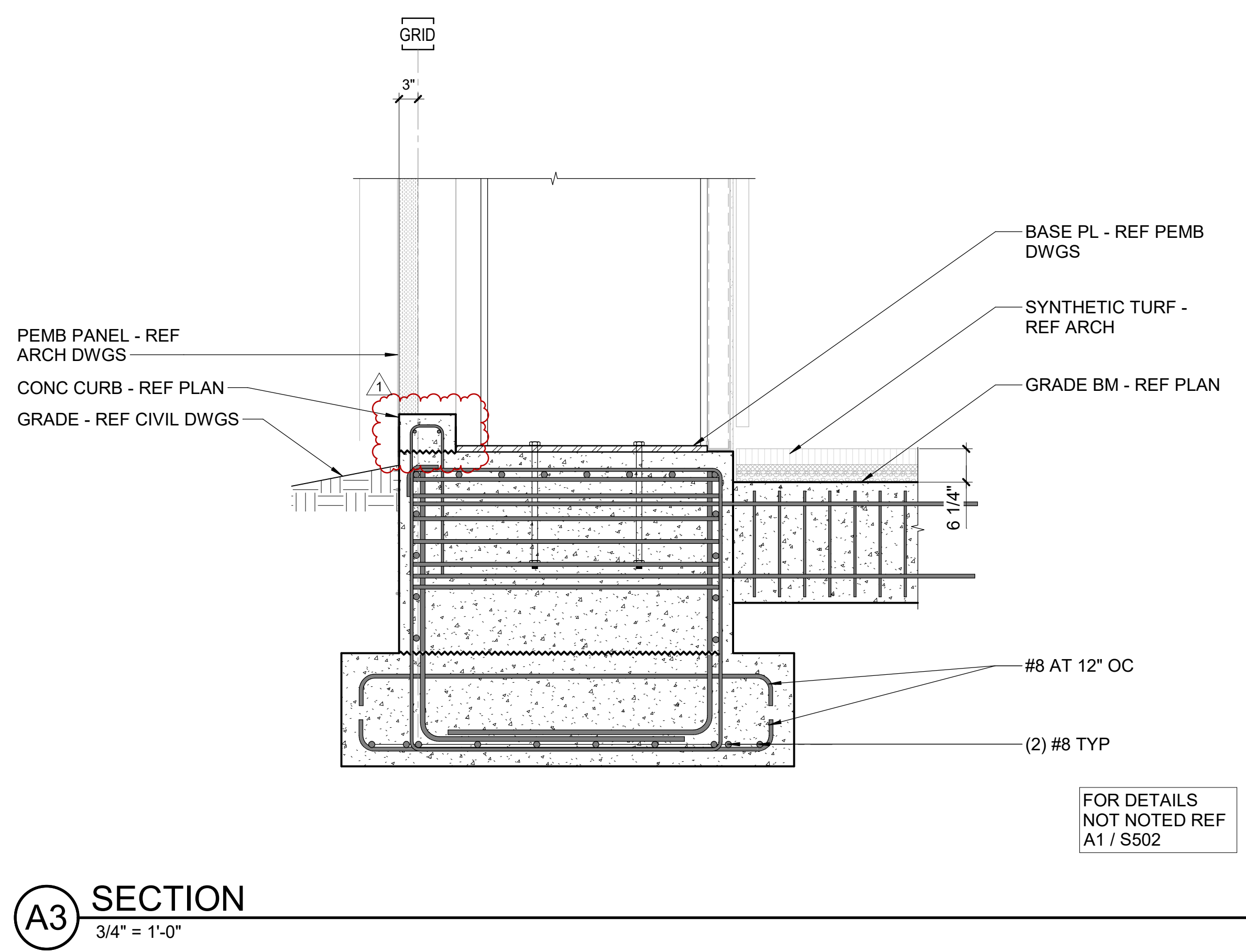
**B3** SECTION  
3/4" = 1'-0"



**A1** SECTION  
3/4" = 1'-0"



**A2** SECTION  
3/4" = 1'-0"



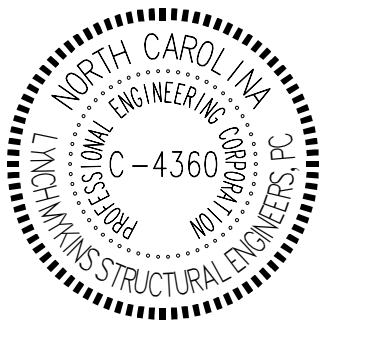
**A3** SECTION  
3/4" = 1'-0"



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SECTIONS

SHEET

**S301**

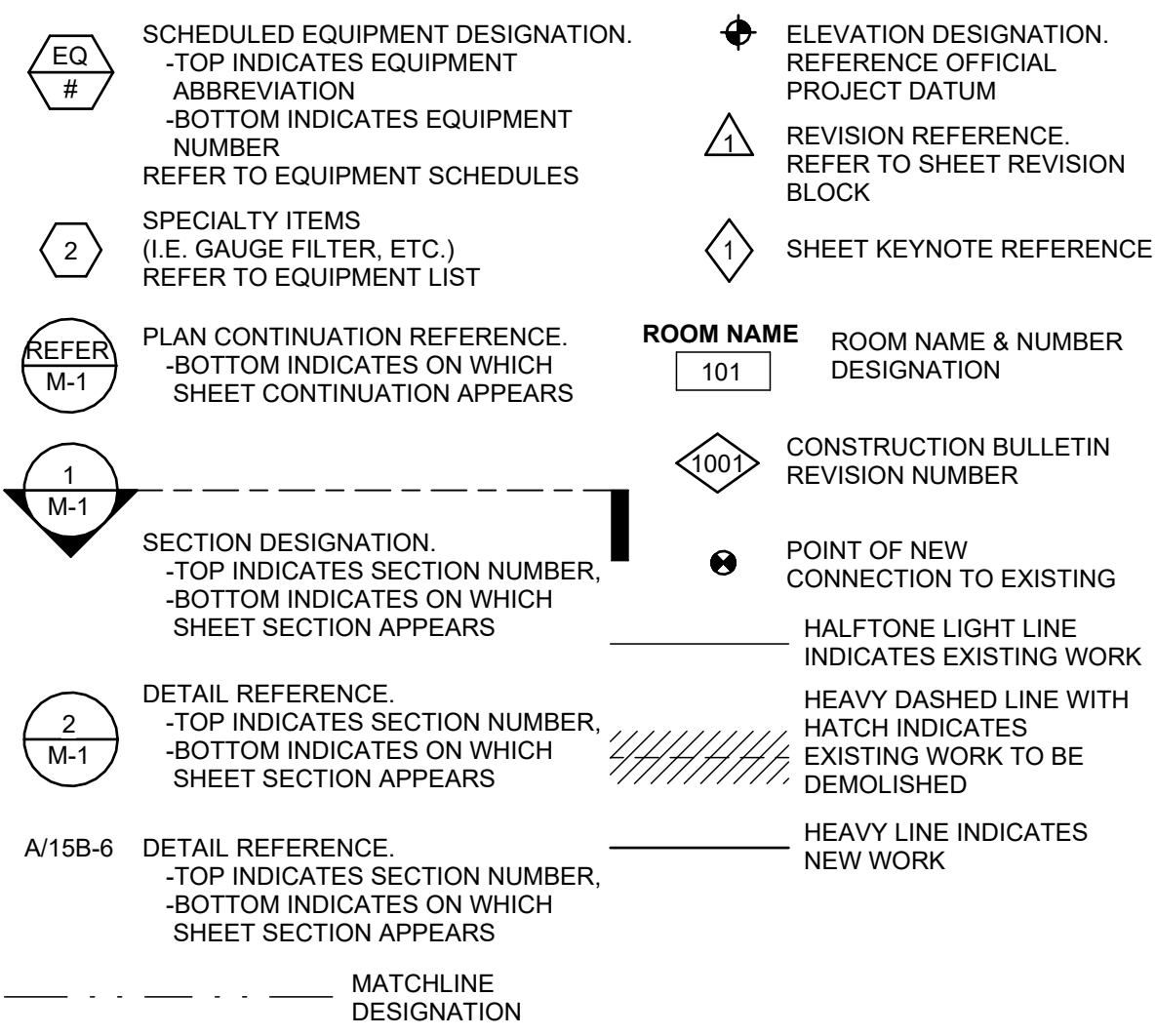
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ELECTRICAL SYMBOLS AND ABBREVIATIONS

SHEET SYMBOLS



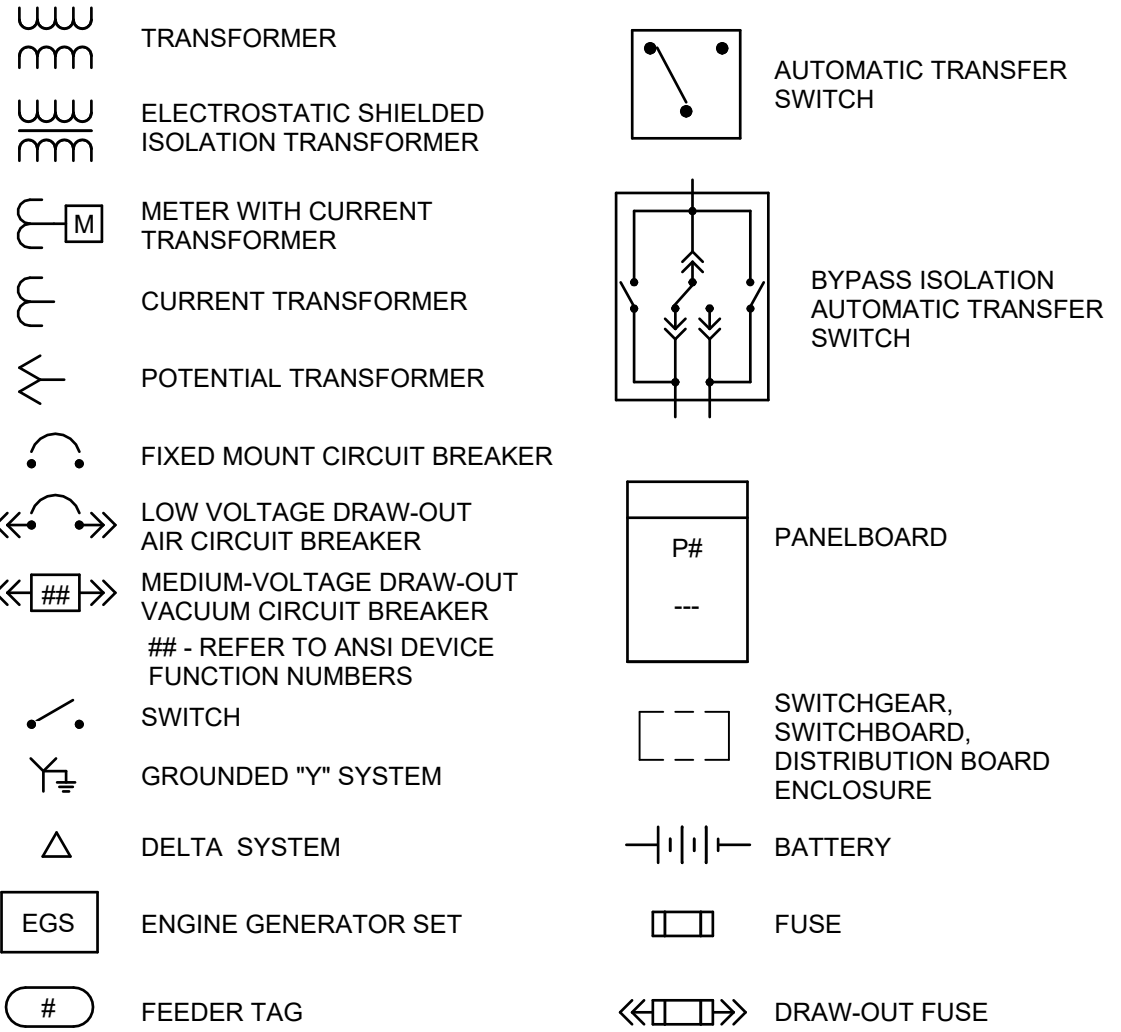
STANDARD MOUNTING REQUIREMENTS

WALL DEVICES	MOUNTING HEIGHT
RECEPTACLE	1'-6"
POWER OUTLET	1'-6"
SURFACE MOUNTED RACEWAY	3'-6"
ABOVE COUNTERTOP/CASEWORK RECEPTACLE	2" ABOVE COUNTERTOP BACKSPLASH OR ABOVE CASEWORK - FIELD VERIFY
PUSHBUTTONS	3'-6"
FIRE ALARM PULL STATIONS	4'-0" AFF TO TOP OF OPERABLE DEVICE
FIREMAN'S PHONE	4'-6"
FIRE ALARM NOTIFICATION DEVICES	80" AFF TO BOTTOM OF FACEPLATE OR 6" FROM TOP OF FACEPLATE TO CEILING, WHICHEVER IS LOWER
LIGHTING CONTROL STATIONS	3'-6"
LIGHTING CONTROL SENSORS	8'-0"
DISCONNECT SWITCHES	MIN. 3'-6" - MAX. 6'-6"
PANELS/CABINETS	TOP BREAKER HANDLE - MAX 6'-6"
ENCLOSED CIRCUIT BREAKERS	MIN. 3'-6" - MAX. 6'-6"

- NOTES:
1. ALL DIMENSIONS FOR WALL MOUNTED DEVICES ARE CENTERLINE MEASURED FROM FINISHED FLOOR UNLESS OTHERWISE NOTED.
  2. ALL MOUNTING HEIGHTS SHALL BE CONFIRMED WITH ARCHITECTURAL DRAWINGS AND REQUIREMENTS. IN CASE OF CONFLICT - ARCHITECTURAL INFORMATION SHALL BE FOLLOWED.
  3. REFER TO ARCHITECTURAL RCPS FOR CEILING HEIGHTS.

- CEILING MOUNTED DEVICES:
1. ALL CEILING MOUNTED DEVICES ON ACOUSTICAL CEILING TILE SHALL BE CENTERED ON TILE UNLESS OTHERWISE NOTED.
  2. ALL CEILING MOUNTED DEVICES IN HARD LID CEILING SHALL BE CENTER ALIGNED WITH OTHER NEARBY CEILING EQUIPMENT UNLESS OTHERWISE NOTED.
  3. REFER TO ARCHITECTURAL RCPS FOR CEILING HEIGHTS.

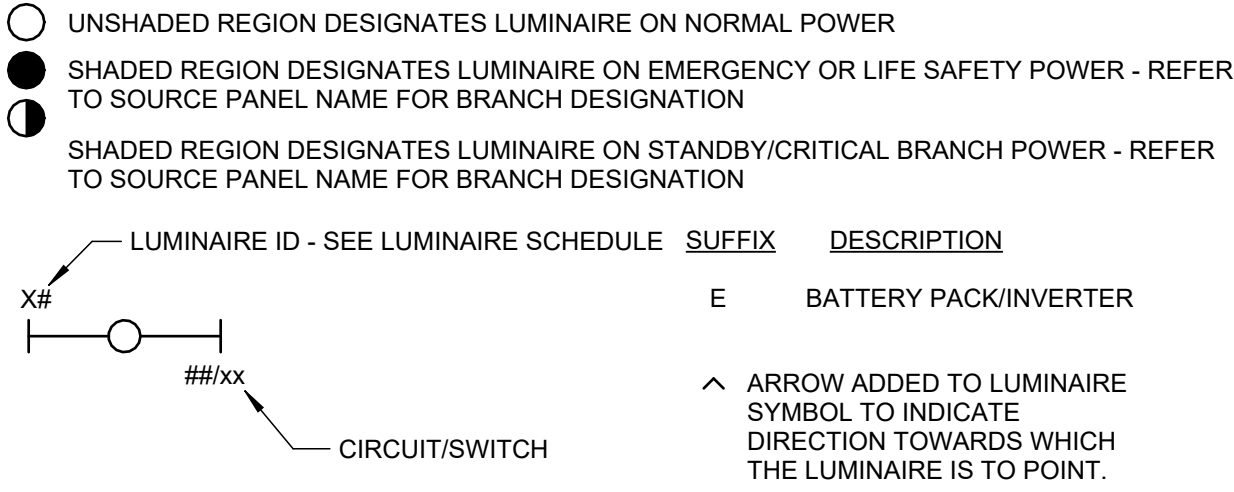
ONE LINE DIAGRAM



ANSI DEVICE FUNCTION NUMBERS

25 = SYNC CHECK	51N = NEUTRAL TIME OVERCURRENT
26 = LIQUID THERMAL RELAY	52 = GROUND TIME OVERCURRENT
27 = UNDERVOLTAGE	52 = CIRCUIT BREAKER
32 = REVERSE POWER	59 = OVERVOLTAGE
47 = PHASE SEQUENCE	63 = SUDDEN PRESSURE RELAY
49 = WINDING THERMAL RELAY	71 = LIQUID LEVEL RELAY
50 = INSTANTANEOUS OVERCURRENT	81U = UNDER-FREQUENCY
50N = NEUTRAL INSTANTANEOUS OVERCURRENT	81O = OVER-FREQUENCY
51G = GROUND INSTANTANEOUS OVERCURRENT	83 = CONTROL POWER AUTO-TRANSFER
51 = TIME OVERCURRENT	86 = LOCKOUT RELAY
	87 = DIFFERENTIAL

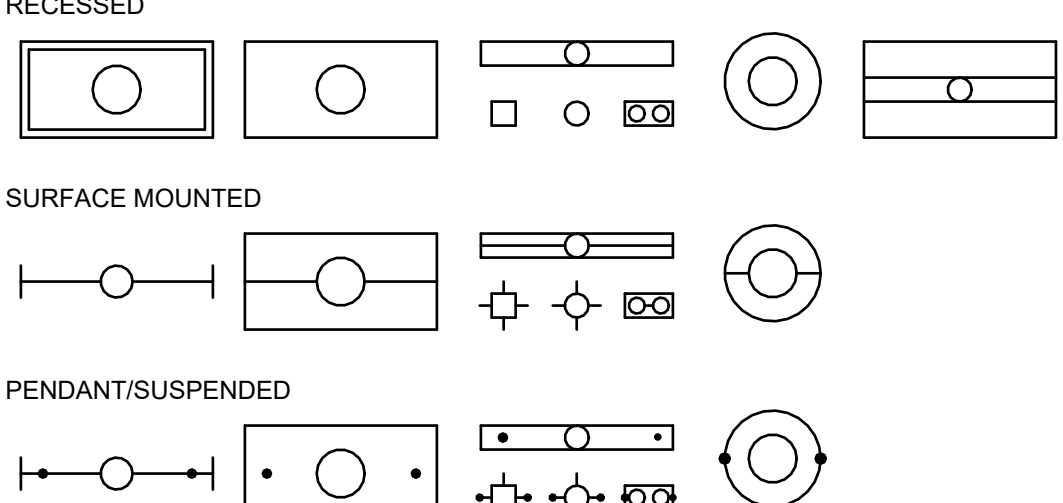
LIGHTING



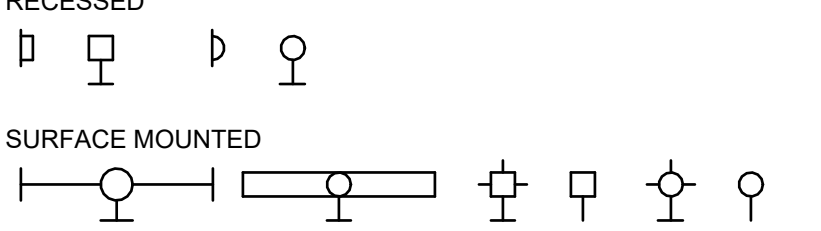
LUMINAIRE SYMBOLS - REFER TO LUMINAIRE SCHEDULE FOR MORE INFORMATION

SMALL PROFILE LUMINAIRE LIGHTING TRACK

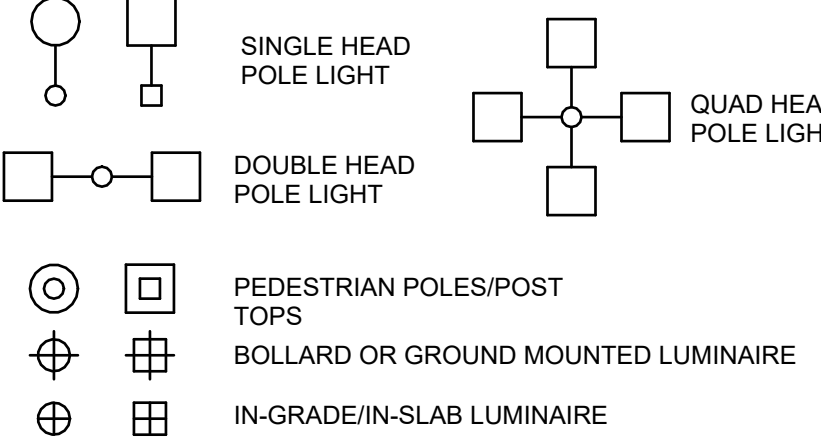
CEILING MOUNTED LUMINAIRES



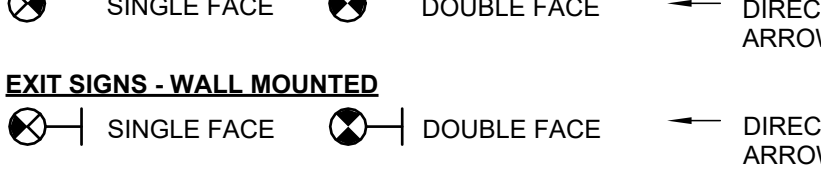
WALL MOUNTED LUMINAIRES



FLOOR OR GRADE MOUNTED LIGHTS



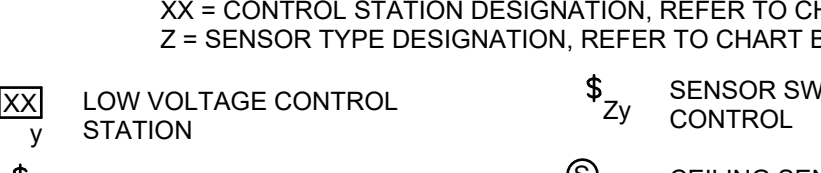
EXIT SIGNS - CEILING MOUNTED



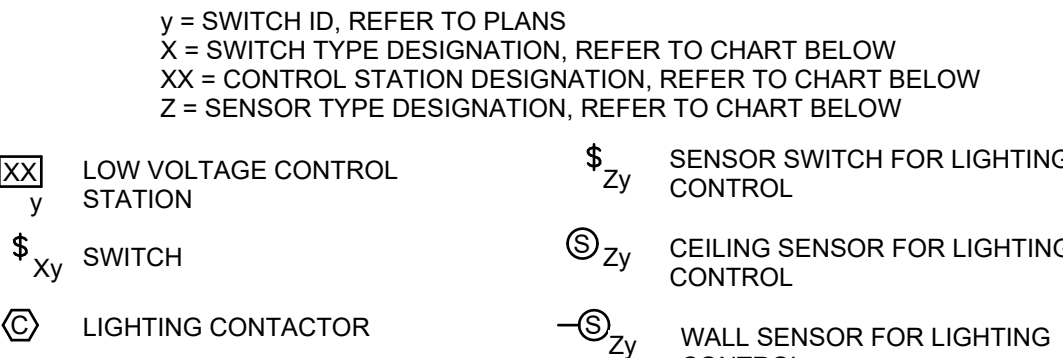
EXIT SIGNS - WALL MOUNTED



EMERGENCY FIXTURE WITH BATTERY PACK



LIGHTING CONTROL



SWITCH TYPE DESIGNATION CHART

X=TYPE DEFINITION	SENSOR TYPE DESIGNATION CHART
3 = SINGLE POLE	Z = SENSOR TYPE DESIGNATION
4 = THREE-WAY SWITCH	PIR = PASSIVE INFRARED
5 = FOUR-WAY SWITCH	PIRD = PASSIVE INFRARED WITH DIMMER
6 = TWO POLE SWITCH	PIRA = PASSIVE INFRARED WITH AMBIENT LIGHT
7 = TWO POLE, DUAL RELAY	2P = 2 POLE, DUAL RELAY
8 = INDICATOR	U = ULTRASONIC
9 = KEY SWITCH	DT = DUAL TECHNOLOGY
MC = MOMENTARY CONTACT	AL = AMBIENT LIGHT SENSOR
D = DIMMER	PC = PHOTOCELL
P = SWITCH WITH PILOT LIGHT	
TS = TIMER SWITCH	
LV, LV# = LOW VOLTAGE	
LV-M = LOW VOLTAGE "M" MASTER SWITCH	
DM = REMOTE CONTROL FOR MOTORIZED DAMPER	

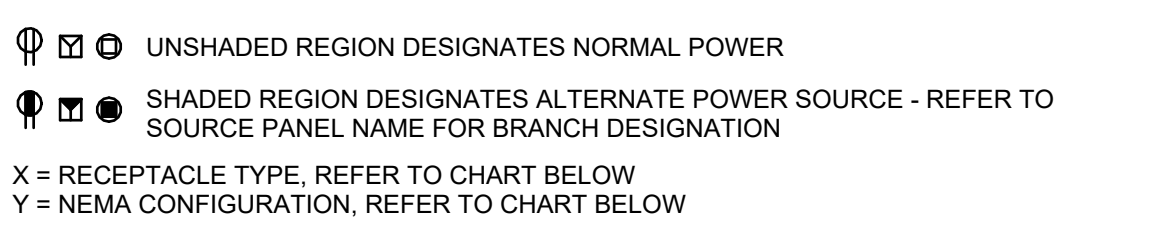
CONTROL STATION DESIGNATION CHART

XX = CONTROL STATION DESIGNATION	TC = TIMECLOCK
PC = PHOTOCELL	LC = LIGHTING CONTROL STATION
RP = RELAY PANEL	

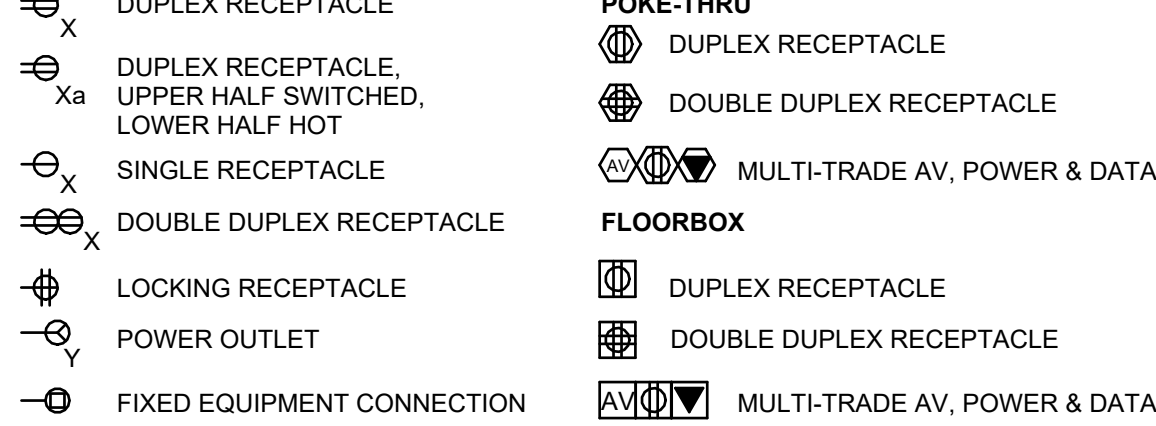
DAYLIGHT ZONES



RECEPTACLES



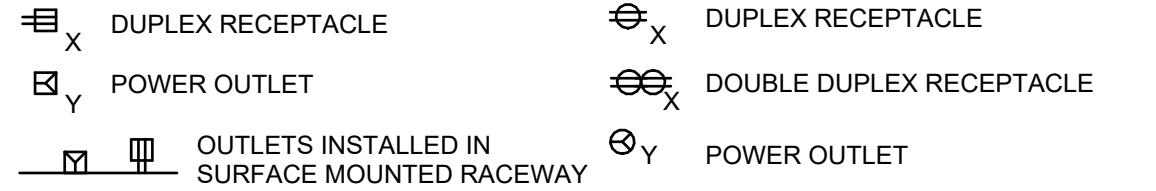
MOUNTING LOCATION: WALL



MOUNTING LOCATION: WALL ABOVE CASEWORK/COUNTERTOP



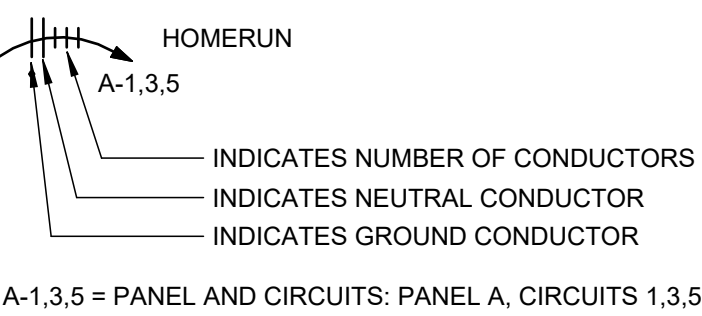
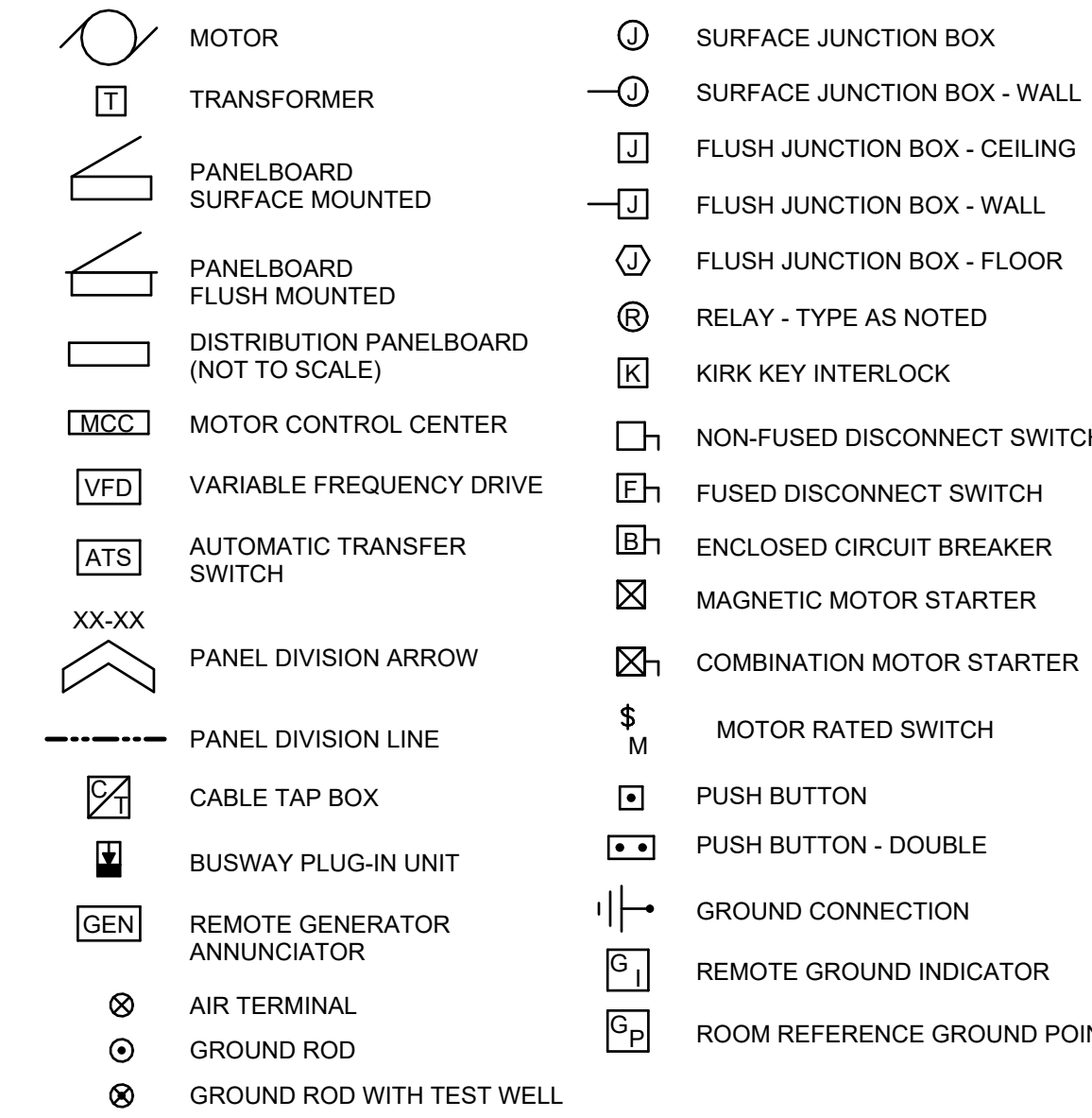
MOUNTING LOCATION: SURFACE MOUNTED RACEWAY



NEMA CONFIGURATION CHART

Y = NEMA CONFIGURATION	X = TYPE
A = 20A, 125V, NEMA 5-20R	AF = AFCI RECEPTACLE
B = 20A, 125V, NEMA 5-20R	CR = CONTROLLED RECEPTACLE
C = 30A, 125V, NEMA 5-30R	DR = DEDICATED RECEPTACLE
D = 30A, 125V, NEMA 5-30R	IG = ISOLATED GROUND RECEPTACLE
E = 50A, 125V, NEMA 5-60R	GF = GFCI RECEPTACLE
F = 50A, 125V, NEMA 5-60R	GFB = GFCI BREAKER
G = 20A, 250V, NEMA 6-20R	SP = SURGE PROTECTION RECEPTACLE
H = 20A, 250V, NEMA 6-20R	SR = SPECIAL PURPOSE RECEPTACLE
J = 30A, 250V, NEMA 6-30R	TR = TAMPER RESISTANT RECEPTACLE
K = 30A, 250V, NEMA 6-30R	US = USB RECEPTACLE
L = 50A, 250V, NEMA 6-60R	WC = WEATHERPROOF COVER ONLY
M = 50A, 250V, NEMA 6-60R	WP = WEATHERPROOF COVER, GFCI RECEPTACLE
N = 20A, 250V, NEMA 15-20R	WR = WEATHERPROOF COVER, WEATHER RESISTANT RECEPTACLE
P = 20A, 250V, NEMA 15-20R	
R = 30A, 277V, NEMA 7-30R	
S = 20A, 125/250V, NEMA 14-20R	
T = 20A, 125/250V, NEMA 14-20R	
U = 30A, 125/250V, NEMA 14-30R	
V = 30A, 125/250V, NEMA 14-30R	
W = 50A, 125/208V, NEMA 18-50R	
Y = 30A, 125/250V, NEMA 15-30R	

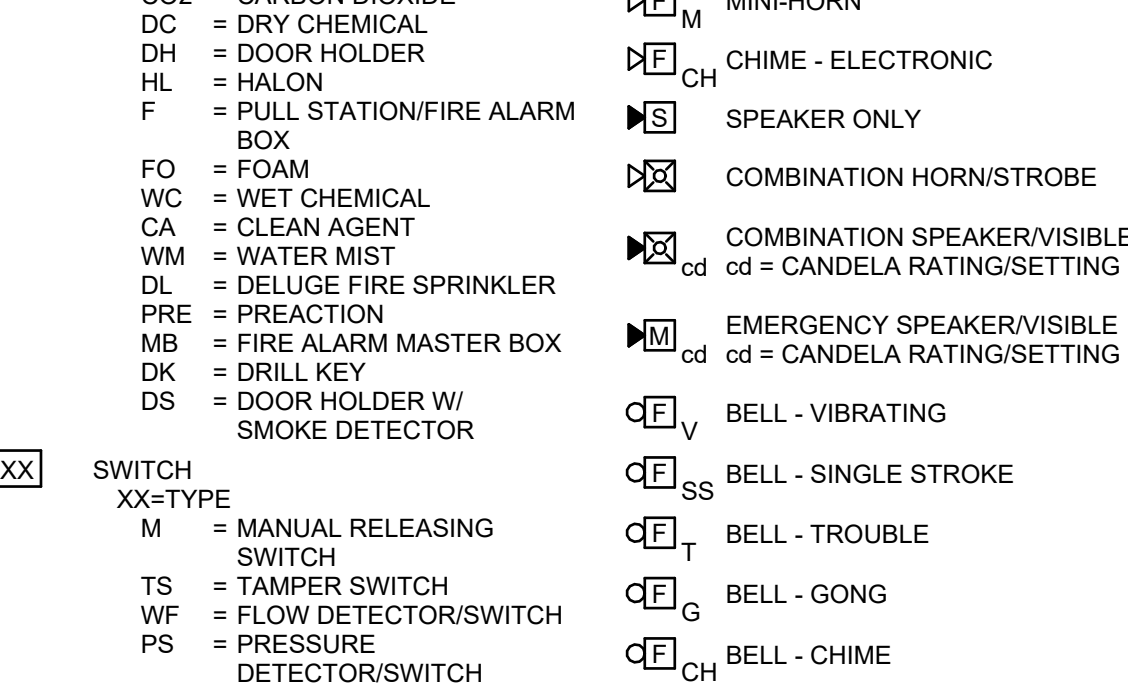
EQUIPMENT AND WIRING



FIRE ALARM

- NOTES:
1. WALL MOUNTED NOTIFICATION DEVICES MOUNTING HEIGHT: 80" AFF TO BOTTOM OF FACEPLATE OR 6" FROM TOP OF FACEPLATE TO CEILING, WHICHEVER IS LOWER.
  2. ALL CEILING MOUNTED DEVICES MOUNTED ON ACOUSTICAL CEILING TILE TO BE CENTERED ON TILE, UNO.
  3. ALL CEILING MOUNTED DEVICES MOUNTED IN HARD LID CEILING TO BE CENTER ALIGNED WITH OTHER NEARBY CEILING EQUIPMENT, UNO.
  4. PULL STATIONS TO BE MOUNTED 4'-0" AFF, UNO.

MANUAL FIRE ALARM BOX TYPES



FOR THE ABOVE SYMBOLS: C=CEILING MOUNTED W=WALL MOUNTED

VISIBLE ONLY (STROBE) CEILING MOUNT cd = CANDELA RATING/SETTING

VISIBLE ONLY (STROBE) CEILING MOUNT cd = CANDELA RATING/SETTING

EMERGENCY VISIBLE ONLY (STROBE) CEILING MOUNT cd = CANDELA RATING/SETTING

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CEILING MOUNT INDICATOR

ROTATING BEACON

REMOTE ALARM INDICATING AND TEST SWITCH

FIRE SERVICE OR EMERGENCY PHONE STATION - ACCESSIBLE

FIRE SERVICE OR EMERGENCY PHONE STATION - BASIC SHAPE

FIRE SERVICE OR EMERGENCY PHONE STATION - HANDSET

FIRE SERVICE OR EMERGENCY PHONE STATION - JACK

FIRE WARD STATION

CONTROL PANELS/UNITS

XXXX=TYPE

FAA = FIRE ALARM ANNUNCIATOR

FACU = FIRE ALARM CONTROL UNIT

FATC = FIRE ALARM TERMINAL CABINET

ECU = EMERGENCY COMMUNICATIONS CONTROL UNIT

FSCP = FIRE SUPPRESSION CONTROL PANEL

FSCU = FIRE SUPPRESSION CONTROL UNIT

FAC = FIRE ALARM COMMUNICATOR

SAP = SPRINKLER ALARM PANEL

WCU = WIRELESS CONTROL UNIT

MFACU = MASTER FIRE ALARM CONTROL UNIT

BATT = BATTERY CABINET

EVAC = VOICE EVACUATION CONTROL UNIT

NPS = NOTIFICATION POWER SUPPLY

GAP = GRAPHIC ANNUNCIATOR

ARCM = AREA OF REFUGE MASTER UNIT

ARCR = AREA OF REFUGE REMOTE UNIT

ASD = ASPIRATING SMOKE DETECTOR

# DENOTES NUMBER OF INPUTS/OUTPUTS

ELECTRICAL EQUIPMENT DESIGNATION CODE

LEVEL:

0G - GROUND

01 - LEVEL 1

02 - LEVEL 2

03 - LEVEL 3

04 - LEVEL 4

05 - LEVEL 5

0R - ROOF

APPLICATION:

N - NORMAL BRANCH

Z - EQUIPMENT BRANCH - PRIORITY "0"

C - CRITICAL BRANCH - PRIORITY "1"

S - LIFE SAFETY BRANCH - PRIORITY "1"

E - EQUIPMENT BRANCH - PRIORITY "2"

O - OPTIONAL EQUIPMENT BRANCH - PRIORITY "3"

U - UNINTERRUPTIBLE POWER SUPPLY (UPS)

G - GENERATOR (NON-TRANSFER SWITCH)

M - MEDIA VOLTAGE GEAR

G - SWITCHGEAR

S - SWITCHBOARD

D - DISTRIBUTION PANEL

P - BRANCH CIRCUIT PANELBOARD

A - AUTOMATIC TRANSFER SWITCH

T - TRANSFORMER

B - BUSWAY

LCP - LIGHTING CONTROL PANEL

U - UNINTERRUPTIBLE POWER SUPPLY

I - ISOLATION POWER PANEL

ELECTRICAL ABBREVIATIONS

A	- AMPERES	LAN	- LOCAL AREA NETWORK
AC	- ABOVE CEILING / ALTERNATING CURRENT	LED	- LIGHT EMITTING DIODE
ADO	- AUTOMATIC DOOR OPENER	LI	- LONG-TIME/INSTANTANEOUS
AF	- AMPERE FRAME	LSI	- LONG-TIME/SHORT-TIME
AFCI	- ARC FAULT CIRCUIT INTERRUPTER	LSIA	- INSTANTANEOUS
AFF	- ABOVE FINISHED FLOOR	LSIG	- INSTANTANEOUS/GROUND
AO	- AMP INTERRUPTING CAPACITY	ALARM	- LONG-TIME/SHORT-TIME/INSTANTANEOUS/GROUND
ALT	- ALTERNATE	LSIG	- LONG-TIME/SHORT-TIME/INSTANTANEOUS/GROUND
ARCH	- ARCHITECTURAL	LTCP	- LOCAL TEMPERATURE
ASC	- ABOVE SUSPENDED CEILING	LTG	- LIGHTING
AT	- AMPERE TRIP	LTS	- LIGHTS
ATC	- ASTRONOMIC TIME CLOCK	LV	- LOW VOLTAGE
ATS	- AUTOMATIC TRANSFER SWITCH	MC	- MECHANICAL CONTRACTOR
AUTO	- AUTOMATIC	MCP	- MOTOR CIRCUIT PROTECTOR
BC	- BARE COPPER	MCC	- MECHANICAL EQUIPMENT ROOM
BFC	- BELOW FINISH CEILING	MCP	- MECHANICAL EQUIPMENT ROOM
BFL	- BELOW FLOOR LEVEL	MH	- MANHOLE
BL	- BREAKER LOCK ACCESSORY	MLO	- MAIN LUGS ONLY
BIP	- BOILER PLANT	MPB	- MUSIC & PAGE TERMINAL BOX
BRKR	- BREAKER	MTD	- MOUNTED
C	- CONDUIT	MTG	- MOUNTING
CB	- CIRCUIT BREAKER	MTG HGT	- MOUNTING HEIGHT
CCTV	- CLOSED CIRCUIT TELEVISION	MTR	- MOTOR / METER
CFCI	- CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	MV	- MEDIUM VOLTAGE
CGL	- CEILING	NA	- NOT APPLICABLE
CKT	- CIRCUIT	NAC	- NOTIFICATION APPLIANCE
CON	- CONDUIT ONLY	NC	- NORMALLY CLOSED
CONTR	- CONTRACTOR	NCE	- NATIONAL ELECTRICAL CODE
CORR	- CORRIDOR	NIC	- NOT IN CONTRACT
CR	- CURRENT TRANSFORMER	NO	- NORMALLY OPEN
CT	- CURRENT TRANSFORMER	NTS	- NOT TO SCALE
DB	- DIRECT BURIAL	OC	- ON CENTER
DC	- DIRECT CURRENT	OFCI	- OWNER FURNISHED, CONTRACTOR INSTALLED
DED	- DEDICATED	OFOW	- OWNER FURNISHED, OWNER INSTALLED
DET	- DETAIL	P	- POLE
DIA	- DIAMETER	PA	- PUBLIC ADDRESS
DISC	- DISCONNECT	PB	- PULL BOX / PUSHBUTTON
DN	- DOWN	PCU	- PLUMBING CONTRACTOR / PHOTOCELL
DP	- DISTRIBUTION PANEL	PD	- POWER DISTRIBUTION UNIT
DS	- DISCONNECT SWITCH	PF	- POWER FACTOR
EC	- ELECTRICAL CONTRACTOR	PHASE	- PHASE
EDB	- ELECTRIC DUCT BANK	PLBG	- PLUMBING
EGC	- EQUIPMENT GROUND	PNL	- PANEL
ENG	- ENGINE GENERATOR SET	PO	- POWER OPERATED DAMPER
EJ	- EXPANSION JOINT	PS	- POWER SUPPLY
ELEC	- ELECTRIC / ELECTRICAL	PT	- POTENTIAL TRANSFORMER
ELL	- EMERGENCY LIFE SAFETY LIGHTING	PTRV	- POTENTIAL ROOF VENTILATOR
ELP	- EMERGENCY LIFE SAFETY POWER	PWR	- POWER
EMER	- EMERGENCY	REC	- RECESSED
EMEM	- ELECTROMAGNETIC INTERFERENCE	RECEP	- RECEPTACLE
EMT	- ELECTRICAL METALLIC TUBING	RELOCATE	- RELOCATE
EQUIP	- EQUIPMENT	REQD	- REQUIRED
ESM	- ELECTRIC STRIP MOLD	RMC	- RIGID METAL CONDUIT
ETR	- EXISTING TO REMAIN	RVAT	- REDUCED VOLTAGE AUTO TRANSFORMER
EWC	- ELECTRIC WATER COOLER	SCOR	- SHORT CIRCUIT CURRENT
FA	- FIRE ALARM	RATING	- RATING
FACP	- FIRE ALARM CONTROL PANEL	SHT	- SHEET
FCU	- FAN COIL UNIT	SIG	- SIGNAL
FDR	- FEEDER	SIM	- SIMILAR
FDS	- FUSED DISCONNECT SWITCH	SPD	- SURGE PROTECTIVE DEVICE
FIXT	- FIXTURE	SPEC	- SPECIFICATION
FL	- AT FLOOR LINE	SS	- SAFETY SWITCH
FLA	- FULL LOAD AMPERES	SSBJ	- SUPPLY SIDE BONDING JUMPER
FLEX	- FLEXIBLE	STA	- STATION
FLR	- FLOOR	STR	- STARTER
FLUOR	- FLUORESCENT	SW	- SWITCH
FS	- FLOW SWITCH	SWBD	- SWITCHBOARD
FSCP	- FLAME SAFEGUARD CONTROL PANEL	SWGR	- SWITCHGEAR
FVNR	- FULL VOLTAGE NON-REVERSING	TEL	- TELEPHONE
GC	- GENERAL CONTRACTOR	TFA	- TO FLOOR ABOVE
GEN	- GENERATOR	TFB	- TO FLOOR BELOW
GFI	- GROUND FAULT INTERRUPTER	TS	- TAMPER SWITCH / TIME SWITCH
GPI	- GROUND FAULT INTERRUPTER	TV	- TELEVISION
GND	- GROUND	TYTC	- TELEVISION TERMINAL CABINET
GTB	- GROUND TERMINAL BOX	TYP	- TYPICAL
HH	- HANDHOLE	UC	- UNDER COUNTER
HOA	- HAND OFF AUTOMATIC	UG	- UNDERGROUND
HORSE	- HORSE POWER	UH	- UNIT HEATER
HT	- HEIGHT / HEAT TRACE	UNO	- UNLESS NOTED OTHERWISE
HV	- HIGH VOLTAGE	UPS	- UNINTERRUPTIBLE POWER SUPPLY
IMC	- INTERMEDIATE METAL CONDUIT	V	- VOLTAGE
INV	- INVERTER	VFD	- VARIABLE FREQUENCY DRIVE
J or JB	- JUNCTION BOX	VP	- VAPOR PROOF
KV	- KILOVOLT	W	- WIRE
KVA	- KILOVOLT-AMPERES	WP	- WEATHERPROOF
KW	- KILOWATTS	WS	- WALL SURFACE
KWH	- KILOWATT HOURS	WT	- WATER TIGHT
		XFMR	- TRANSFORMER
		XP	- EXPLOSION PROOF

EMERGENCY VISIBLE ONLY (STROBE) CEILING MOUNT cd = CANDELA RATING/SETTING

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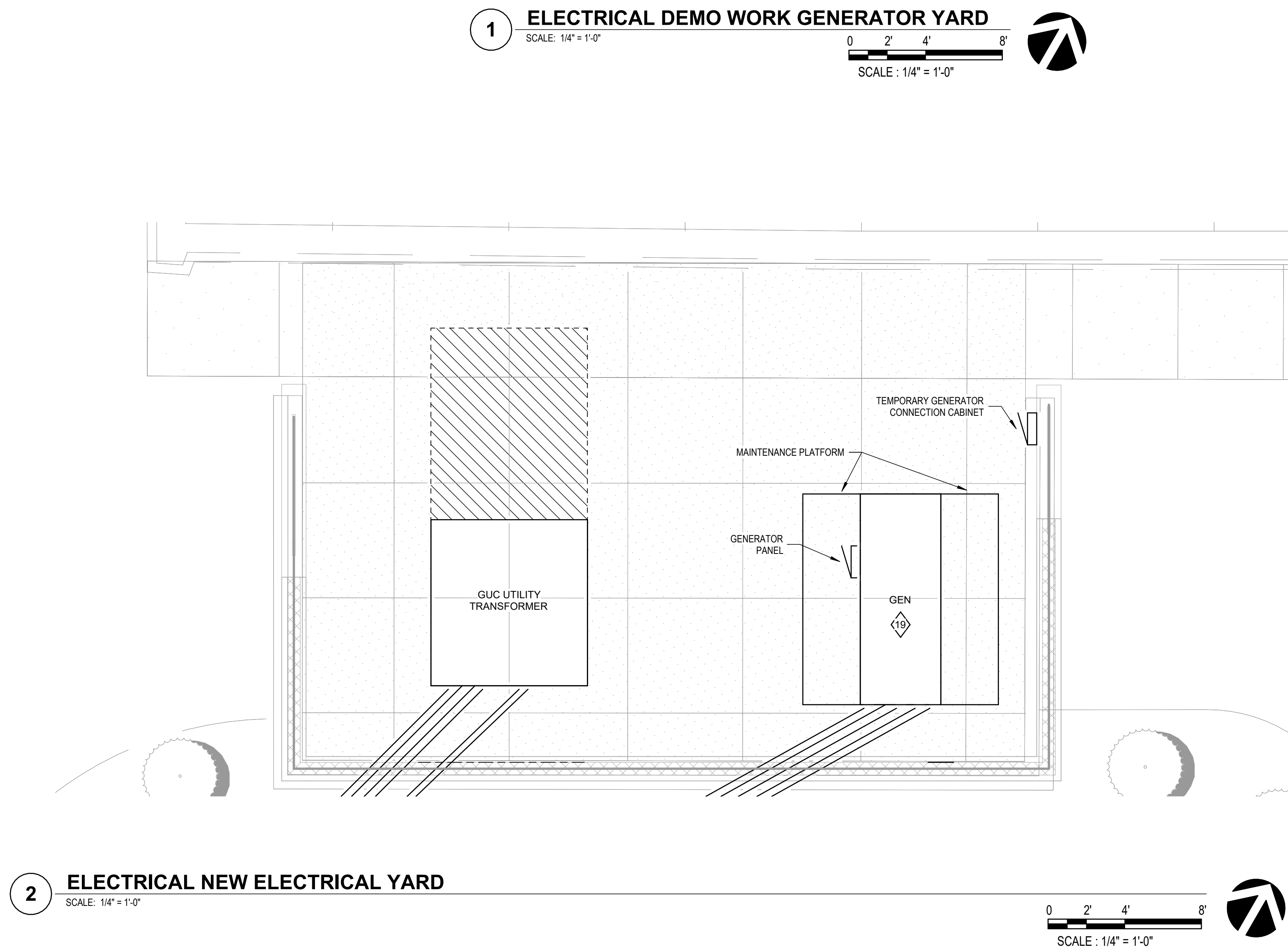
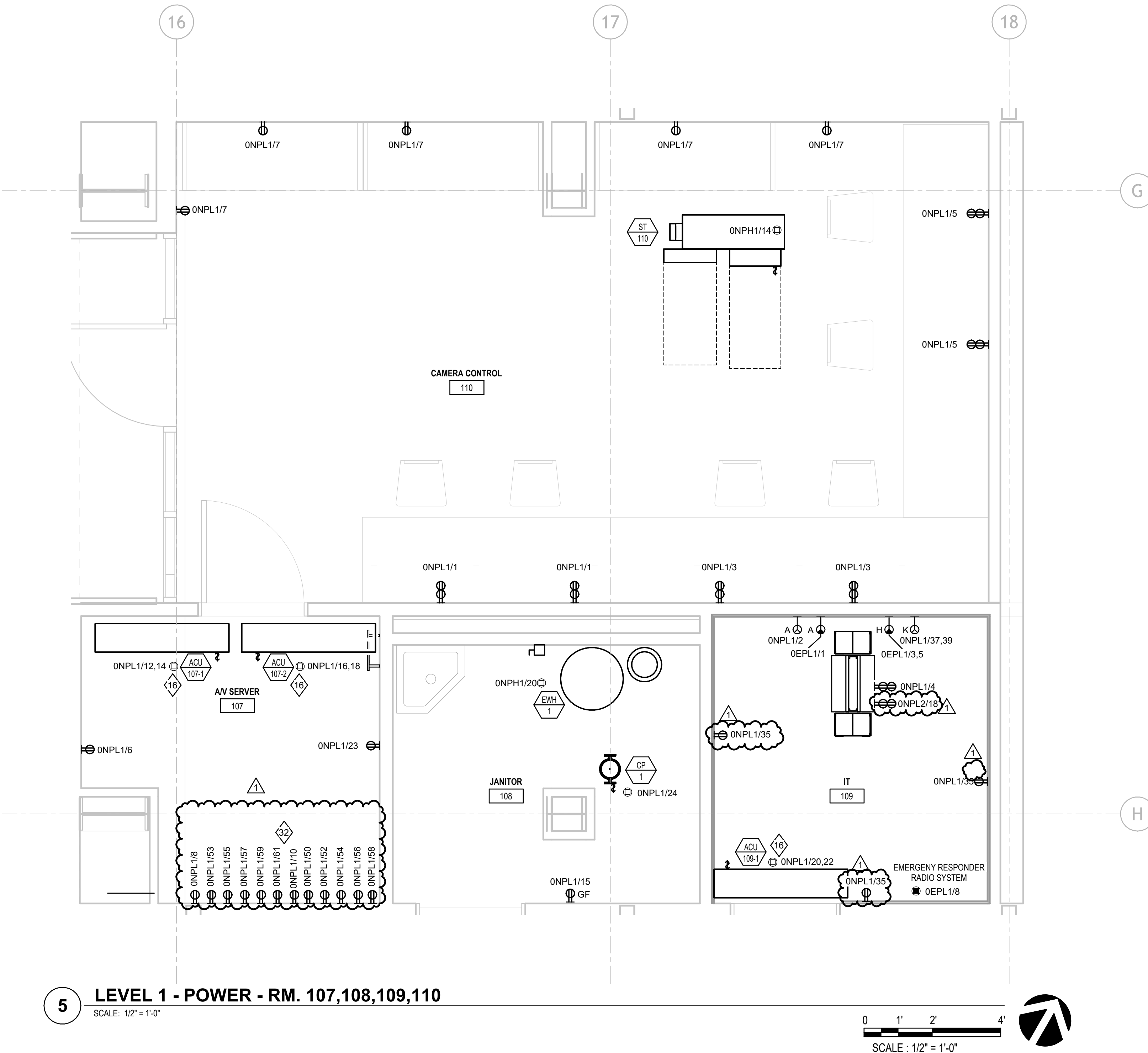
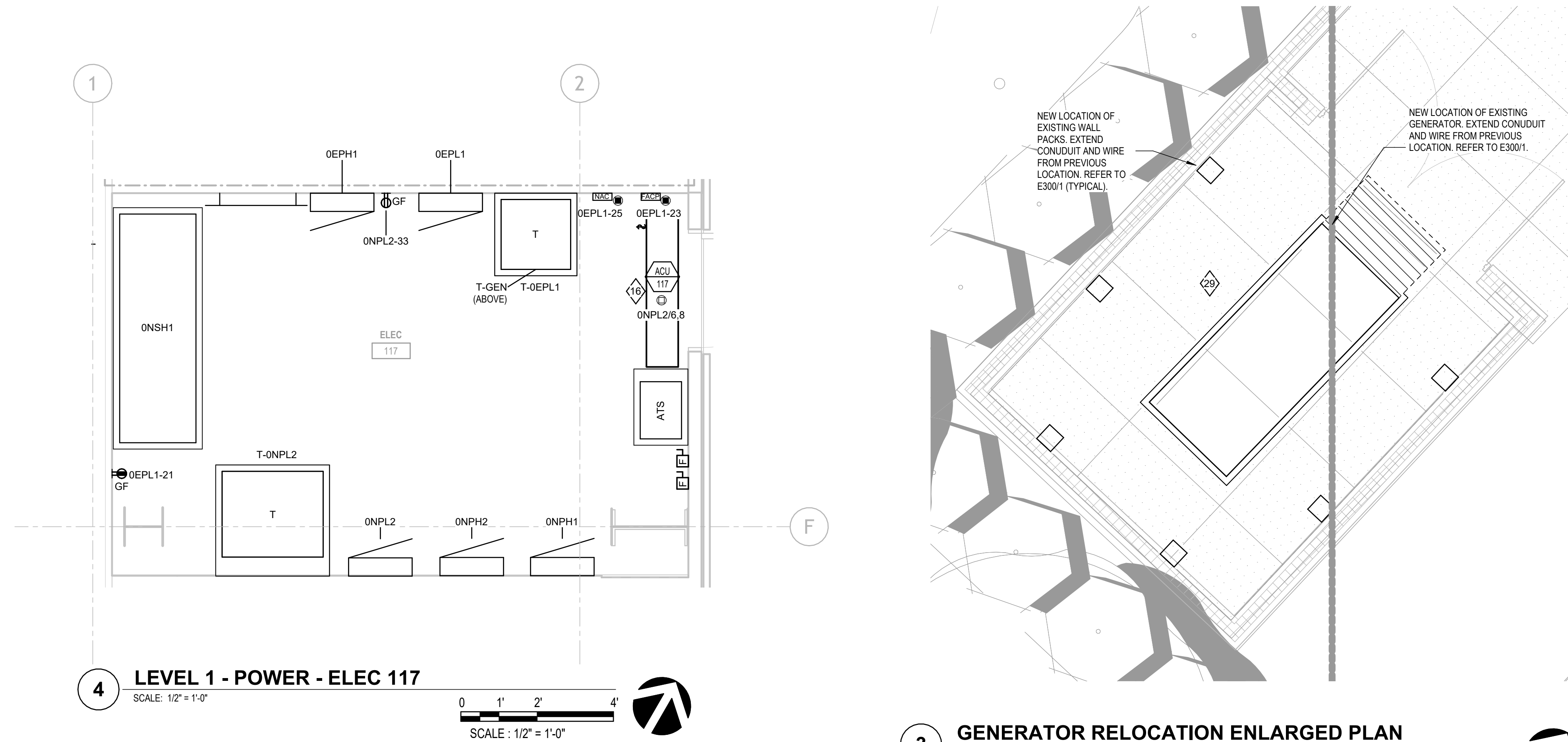
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ARCM = AREA OF REFUGE MASTER UNIT



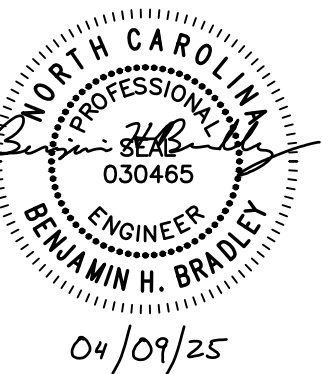


- SHEET KEYNOTES:**
- INDOOR UNIT IS POWERED FROM OUTDOOR UNIT.
  - PROVIDE 4#14 STRANDED CONTROL CONDUCTORS FROM GENERATOR CONTROL CABINET TO JUNCTION BOX ADJACENT TO GENERATOR ANNUNCIATOR. PROVIDE TWO RED, TWO BLACK CONDUCTORS. CONDUCTORS WILL BE USED BY OWNER TO CONNECT GENERATOR RUN AND FAULT CONTRACTS TO OPGI MONITORING SYSTEM.
  - CONTRACTOR TO VERIFY EXISTING CONDITIONS BEFORE STARTING DEMO WORK. ALL LIGHT FIXTURES, RECEPTACLES, ETC. TO BE RELOCATED TO NEW EXISTING GENERATOR YARD LOCATION.
  - CONTRACTOR TO COORDINATE LOCATION OF ALL LIGHT FIXTURES, RECEPTACLES, ETC. WITH DESIGN TEAM BEFORE STARTING NEW WORK.
  - COORDINATE PRECISE LOCATION OF POWER RECEPTACLES WITH OWNER AND AN INSTALLER PRIOR TO ROUGH-IN.

**cra**

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AEI PROJECT NO. 24776-00



**Indoor Practice Facility**  
East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834  
SCO ID# 23-26345-01A AIM # 1752



REVISIONS		
No.	Description	Date
1	Addendum #1	04/09/25

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**ELECTRICAL ENLARGED PLANS**

SHEET

**E300**

DATE 03/14/2025 PROJECT NO. 2228

**LIFE SAFETY/ FIRE PROTECTION LEGEND**

--- 1-HR FIRE BARRIER



ONPL2

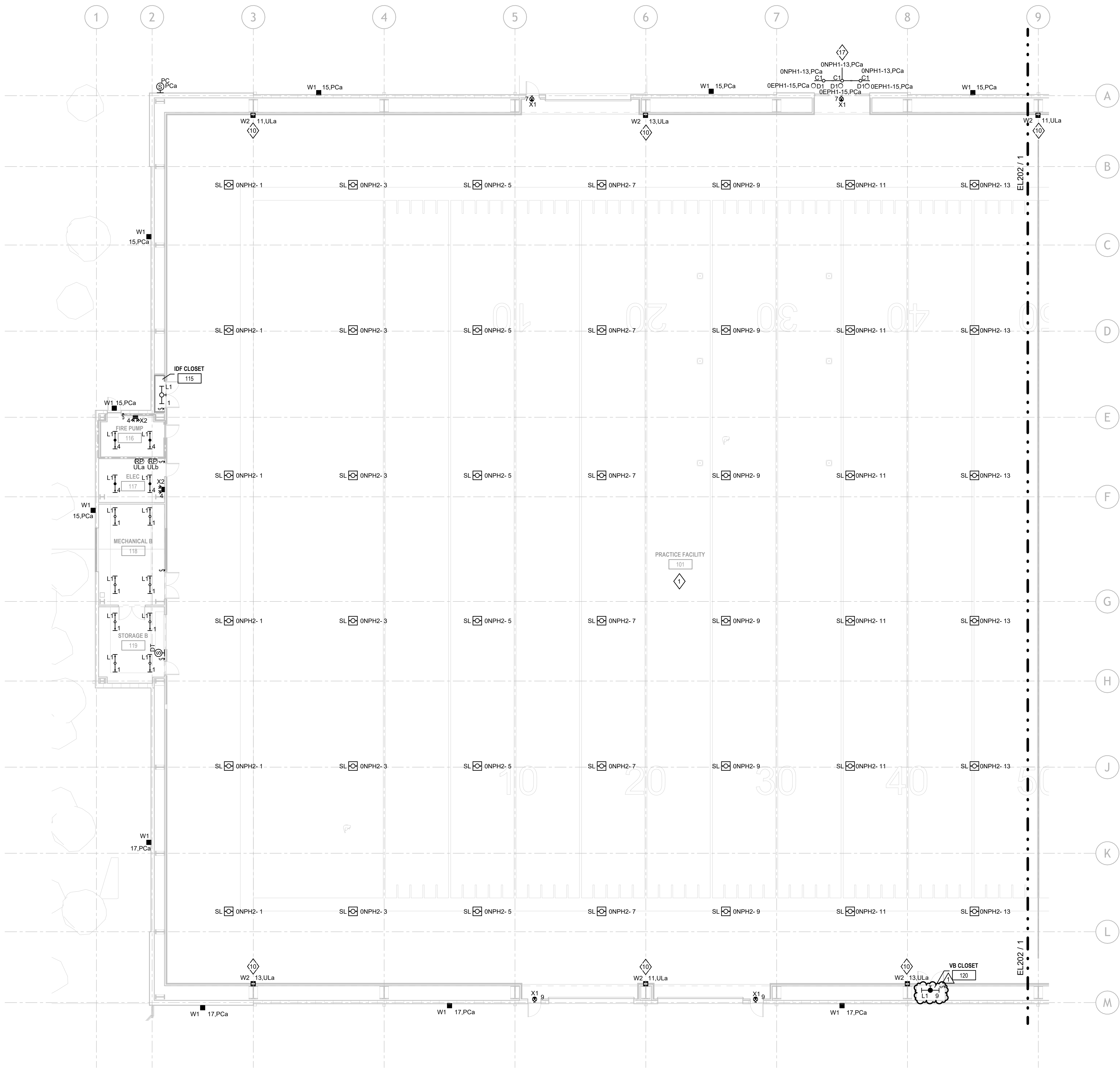
<b>MAIN TYPE</b> MCB <b>MAIN RATING</b> 250 A <b>BUS RATING</b> 250 A	<b>VOLTAGE</b> 120/208 Wye <b>3 PHASE</b> 4 WIRE <b>ENCLOSURE</b> Surface Type 1	<b>LOCATION</b> F.F.E. ELEC 117 <b>FED FROM</b> SCR <b>SCCR</b> 10 KA <b>CALCULATED AVAILABLE FAULT...</b> 8.83 KA	
---	---	---	--

**REMARKS:**

LEFT SIDE KVA															RIGHT SIDE KVA														
DESCRIPTION	BRKR NOTES	BRKR AMP. POLES	CKT NO	A	B	C	A	B	C	CKT NO	BRKR AMP. POLES	BRKR NOTES	DESCRIPTION																
RECP. RM 119		20 A	1	0.54		1.52				2	2	15 A	CU-116																
RECP. RM 118	GFCI	20 A	1	3	0.72			1.52	4	--	--	--																	
RECP. RM 116	GFCI	20 A	1	5		0.36			1.52	6	2	15 A	CU-117																
RECP. SCOREBOARD		20 A	1	7	0.54			1.52	8	--	--	--																	
OVERHEAD COILING DOOR		20 A	1	9		1.00			10	2	15 A	CU-119																	
OVERHEAD COILING DOOR		20 A	1	11		1.00			1.52	12	--	--																	
OVERHEAD COILING DOOR		20 A	1	13	1.00			1.08	14	1	20 A	RECP. ATHLETIC CAMERAS																	
OVERHEAD COILING DOOR		20 A	1	15		1.00		1.08	16	1	20 A	RECP. ATHLETIC CAMERAS																	
OVERHEAD COILING DOOR		20 A	1	17		1.00			0.18	18	1	20 A	RECP. RACK RM 109																
OVERHEAD COILING DOOR		20 A	1	19	1.00					20	1	20 A	SPARE																
RECP. TIME OF DAY DISPLAY		20 A	1	21		0.54		0.00		22	1	20 A	SPARE																
DOOR OPERATOR		20 A	1	23		0.18			0.00	24	1	20 A	SPARE																
RECP. SOUTH WALL		20 A	1	25	0.36		0.36			26	2	20 A	RECP. IDF CLOSET RM 115																
RECP. PANEL CLOSETS	GFCI	20 A	1	27		0.36		0.18		28	2	20 A	RECP. IDF CLOSET RM 115																
RECP. NORTH WALL		20 A	1	29		0.36			0.18	30	--	--																	
RECP. COUNTDOWN TIMER		20 A	1	31	0.54			0.00		32	1	20 A	IRRIGATION HOT BOX																
RECP. RM 117		20 A	1	33		0.18		0.00	34	1	20 A	ILLUMINATED SIGNAGE																	
HEAT TRACE RM 118		20 A	2	35		0.00		10.76	36	36	1	20 A	GFCI RECP. EXTERIOR WALL HYDRANT																
	--	--	37	0.00					38	3	100 A	--	ONPL1																
HEAT TRACE RM 118		20 A	2	39		0.00		10.56	40	--	--	--																	
--	--	--	41		0.00				10.81	42	--	--	--																
<b>PHASE SUBTOTAL (KVA)</b>				<b>A</b>	<b>B</b>	<b>C</b>																							
				19.22 KVA	18.66 KVA	18.19 KVA																							
<b>PHASE SUBTOTAL (AMPS)</b>				161 A	156 A	152 A																							

LOAD CLASSIFICATION	CONNECTED (KVA)	DEMAND FACTOR	DEMAND (KVA)
POWER	0.00 KVA	100%	0.00 KVA
LIGHTING	0.00 KVA	100%	0.00 KVA
MOTOR	31.06 KVA	125% LARGEST 100% OTHER	32.10 KVA
RECEPTACLE	25.02 KVA	100% FIRST 10KVA, 50% OTHER	17.51 KVA
HEATING	0.00 KVA	100%	0.00 KVA
<b>TOTAL LOAD</b>	<b>56.08 KVA</b>		<b>49.61 KVA</b>
<b>TOTAL AMPS</b>	<b>156 A</b>		<b>138 A</b>





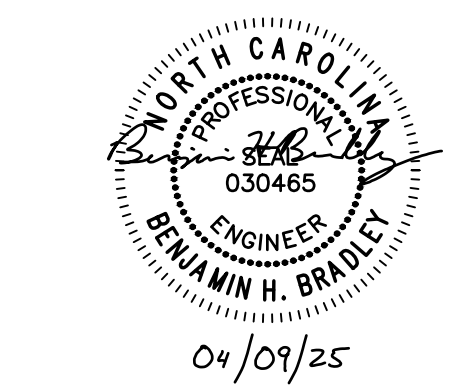
1 LEVEL 1 - LIGHTING - SECTION A  
SCALE: 3/32" = 1'-0"  
0 8' 16' 24'  
SCALE: 3/32" = 1'-0"

- SHEET KEYNOTES:**
1. DELEGATED DESIGN FOR SL FIXTURE SELECTION AND LAYOUT BY FIXTURE MANUFACTURER, REFER TO SPEC SECTION 286666.
  10. TYPE W2 FIXTURES ARE INTENDED TO BE OFF DURING NORMAL OPERATION. PROVIDE UL 924 RELAY TO ENERGIIZE FIXTURES UPON POWER LOSS TO NORMAL POWER CIRCUIT SERVING AREA OR DURING FIRE ALARM EVENTS. MOUNT FIXTURES AT 25FT AFF.
  17. C1 FIXTURES ILLUMINATING ECU LETTERS TO BE MOUNTED ON TOP OF ENTRANCE CANOPY.
- GENERAL NOTES**
1. ALL NORMAL POWER LIGHTING CIRCUITS SHOWN FED FROM PANEL 0NPH1 UNO.
  2. ALL EMERGENCY LIGHTING CIRCUITS FED FROM PANEL 0EPH1 UNO.
  3. ALL EXTERIOR LIGHTING FED FROM PANEL 0EPH1 VIA CONTACTOR / PHOTOCCELL CONTROL UNO.



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NC LIC. NO. C-2982  
AEI PROJECT NO. 24776-00



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SCO ID# 23-26345-01A AIM # 1752



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LEVEL 1 - FLOOR  
PLAN - SECTION A -  
LIGHTING

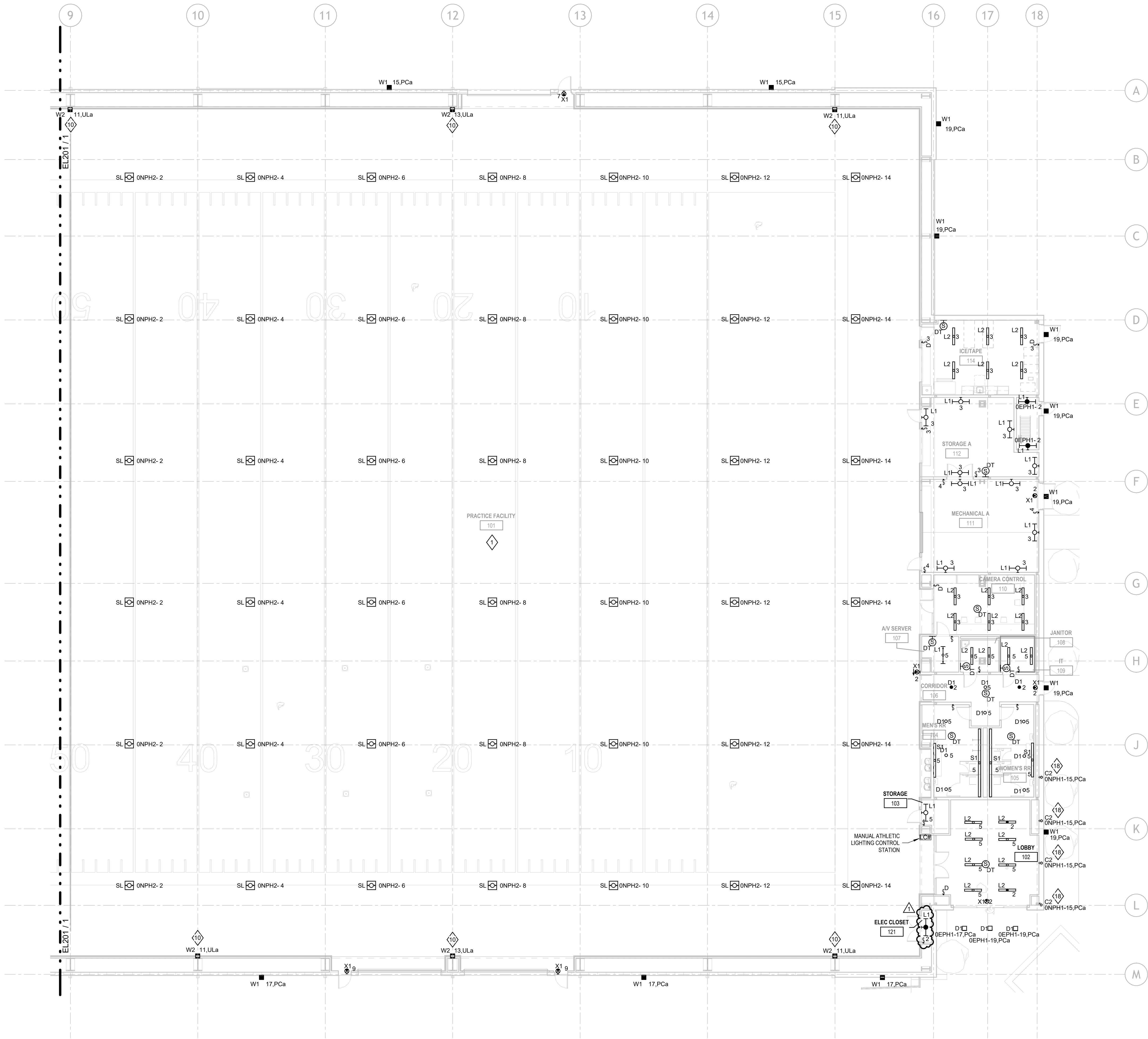
SHEET

EL201

**LIFE SAFETY/ FIRE PROTECTION LEGEND**  
--- 1-HR FIRE BARRIER

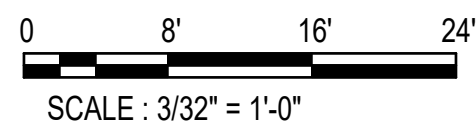
DATE 03/14/2025 PROJECT NO. 2228



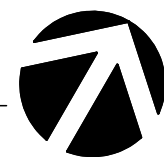


1 LEVEL 1 - LIGHTING - SECTION B

SCALE: 3/32" = 1'-0"



SCALE: 3/32" = 1'-0"



LIFE SAFETY/ FIRE PROTECTION LEGEND

1-HR FIRE BARRIER

SHEET KEYNOTES:

1. DELEGATED DESIGN FOR SL FIXTURE SELECTION AND LAYOUT BY FIXTURE MANUFACTURER, REFER TO SPEC SECTION 286666.
  10. TYPE W2 FIXTURES ARE INTENDED TO BE OFF DURING NORMAL OPERATION. PROVIDE UL 824 RELAY TO ENERGIZE FIXTURES UPON POWER LOSS TO NORMAL POWER CIRCUIT SERVING AREA OR DURING FIRE ALARM EVENTS. MOUNT FIXTURES AT 25FT AFF.
  18. C2 FIXTURES ILLUMINATING EXTERIOR SIGN TO BE MOUNTED ON TOP OF ROOF PARAPET.
- GENERAL NOTES:
1. ALL LIGHTING CIRCUITS SHOWN FED FROM PANEL ONPH1 UNO.
  2. ALL EMERGENCY LIGHTING CIRCUITS FED FROM PANEL DEPH1 UNO.
  3. ALL EXTERIOR LIGHTING FED FROM PANEL DEPH1 VIA CONTACTOR / PHOTOCELL CONTROL. REFER TO SHEET EL201 FOR PHOTOCELL LOCATION.



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AEI PROJECT NO. 24776-00



**Indoor Practice Facility**  
East Carolina University  
950 Blackbeards Alley  
Greenville, NC 27834  
SCO ID# 23-26345-01A AIM # 1752



REVISIONS

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1	Addendum #1	04/09/25

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LEVEL 1 - FLOOR  
PLAN - SECTION B -  
LIGHTING

SHEET

EL202

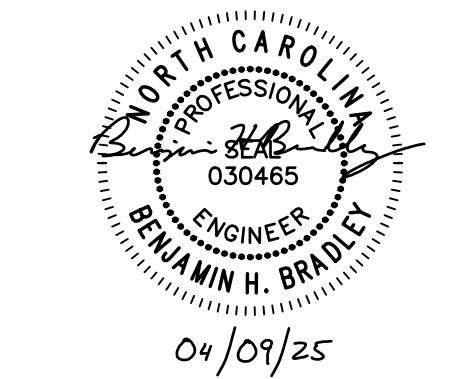
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TELECOM OSP  
CABLING DIAGRAM -  
1 OF 2

SHEET

T102

DATE 03/14/2025 PROJECT NO. 2228

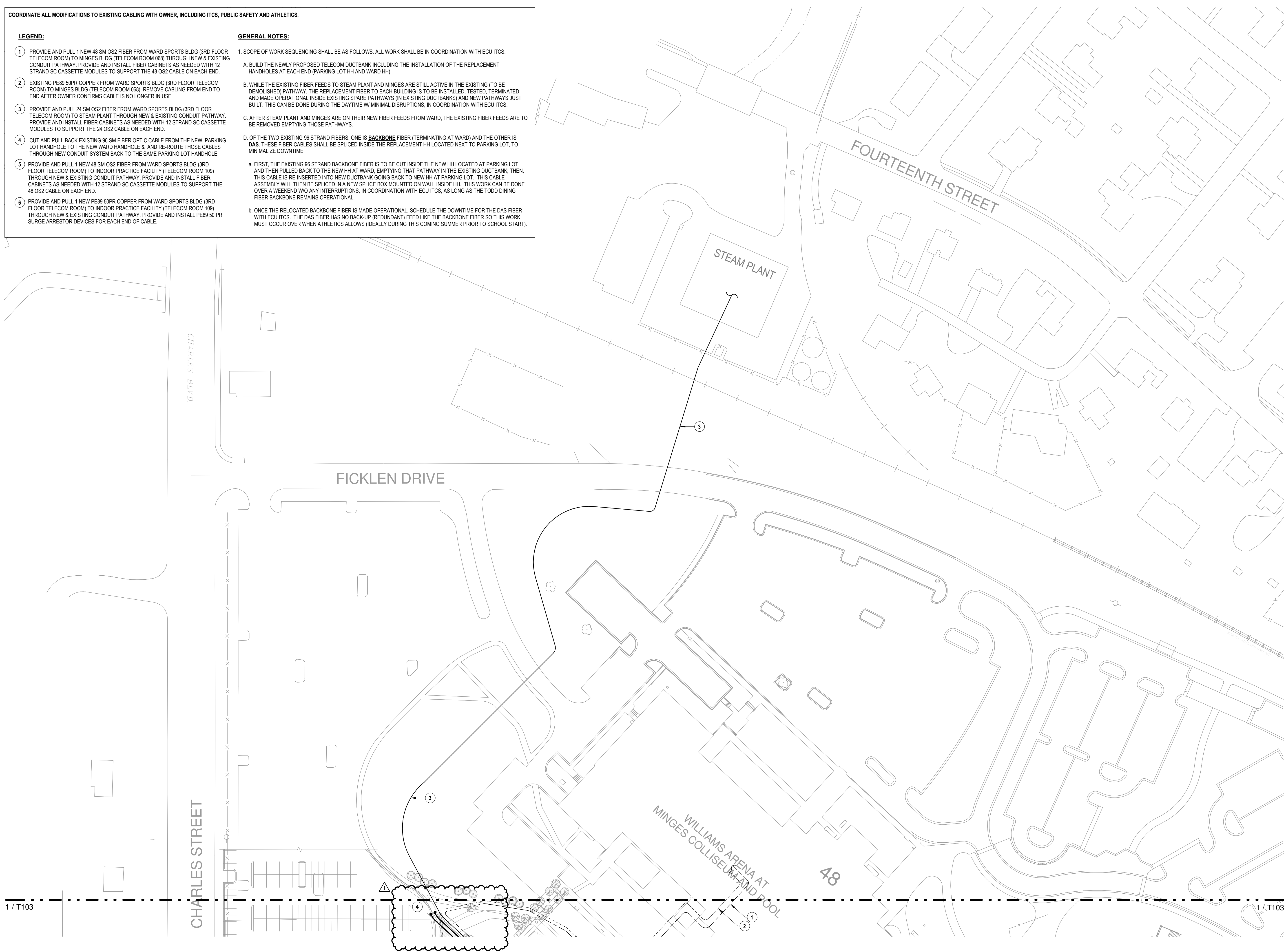
COORDINATE ALL MODIFICATIONS TO EXISTING CABLING WITH OWNER, INCLUDING ITCS, PUBLIC SAFETY AND ATHLETICS.

**LEGEND:**

- 1 PROVIDE AND PULL 1 NEW 48 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO MINGES BLDG (TELECOM ROOM 068) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 48 OS2 CABLE ON EACH END.
- 2 EXISTING PE89 50PR COPPER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO MINGES BLDG (TELECOM ROOM 068). REMOVE CABLING FROM END TO END AFTER OWNER CONFIRMS CABLE IS NO LONGER IN USE.
- 3 PROVIDE AND PULL 24 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO STEAM PLANT THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 24 OS2 CABLE ON EACH END.
- 4 CUT AND PULL BACK EXISTING 96 SM FIBER OPTIC CABLE FROM THE NEW PARKING LOT HANDHOLE TO THE NEW WARD HANDHOLE & AND RE-ROUTE THOSE CABLES THROUGH NEW CONDUIT SYSTEM BACK TO THE SAME PARKING LOT HANDHOLE.
- 5 PROVIDE AND PULL 1 NEW 48 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO INDOOR PRACTICE FACILITY (TELECOM ROOM 109) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 48 OS2 CABLE ON EACH END.
- 6 PROVIDE AND PULL 1 NEW PE89 50PR COPPER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO INDOOR PRACTICE FACILITY (TELECOM ROOM 109) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL PE89 50 PR SURGE ARRESTOR DEVICES FOR EACH END OF CABLE.

**GENERAL NOTES:**

1. SCOPE OF WORK SEQUENCING SHALL BE AS FOLLOWS. ALL WORK SHALL BE IN COORDINATION WITH ECU ITCS.
  - A. BUILD THE NEWLY PROPOSED TELECOM DUCTBANK INCLUDING THE INSTALLATION OF THE REPLACEMENT HANDHOLES AT EACH END (PARKING LOT HH AND WARD HH).
  - B. WHILE THE EXISTING FIBER FEEDS TO STEAM PLANT AND MINGES ARE STILL ACTIVE IN THE EXISTING (TO BE DEMOLISHED) PATHWAY, THE REPLACEMENT FIBER TO EACH BUILDING IS TO BE INSTALLED, TESTED, TERMINATED AND MADE OPERATIONAL INSIDE EXISTING SPARE PATHWAYS (IN EXISTING DUCTBANKS) AND NEW PATHWAYS JUST BUILT. THIS CAN BE DONE DURING THE DAYTIME W/ MINIMAL DISRUPTIONS. IN COORDINATION WITH ECU ITCS.
  - C. AFTER STEAM PLANT AND MINGES ARE ON THEIR NEW FIBER FEEDS FROM WARD, THE EXISTING FIBER FEEDS ARE TO BE REMOVED EMPTYING THOSE PATHWAYS.
  - D. OF THE TWO EXISTING 96 STRAND FIBERS, ONE IS **BACKBONE** FIBER (TERMINATING AT WARD) AND THE OTHER IS **DAS**. THESE FIBER CABLES SHALL BE SPLICED INSIDE THE REPLACEMENT HH LOCATED NEXT TO PARKING LOT, TO MINIMIZE DOWNTIME.
    - a. FIRST, THE EXISTING 96 STRAND BACKBONE FIBER IS TO BE CUT INSIDE THE NEW HH LOCATED AT PARKING LOT AND THEN PULLED BACK TO THE NEW HH AT WARD, EMPTYING THAT PATHWAY IN THE EXISTING DUCTBANK. THEN, THIS CABLE IS RE-INSERTED INTO NEW DUCTBANK GOING BACK TO NEW HH AT PARKING LOT. THIS CABLE ASSEMBLY WILL THEN BE SPLICED IN A NEW SPLICER BOX MOUNTED ON WALL INSIDE HH. THIS WORK CAN BE DONE OVER A WEEKEND W/IO ANY INTERRUPTIONS. IN COORDINATION WITH ECU ITCS, AS LONG AS THE TODD DINING FIBER BACKBONE REMAINS OPERATIONAL.
    - b. ONCE THE RELOCATED BACKBONE FIBER IS MADE OPERATIONAL, SCHEDULE THE DOWNTIME FOR THE DAS FIBER WITH ECU ITCS. THE DAS FIBER HAS NO BACKUP (REDUNDANT) FEED LIKE THE BACKBONE FIBER SO THIS WORK MUST OCCUR OVER WHEN ATHLETICS ALLOWS (IDEALLY DURING THIS COMING SUMMER PRIOR TO SCHOOL START).



**1 TELECOM OSP CABLING DIAGRAM - 1 OF 2**  
SCALE: 1" = 60'-0"  
0 60' 120'  
SCALE: 1" = 60'-0"



1 / T102

1 / T102

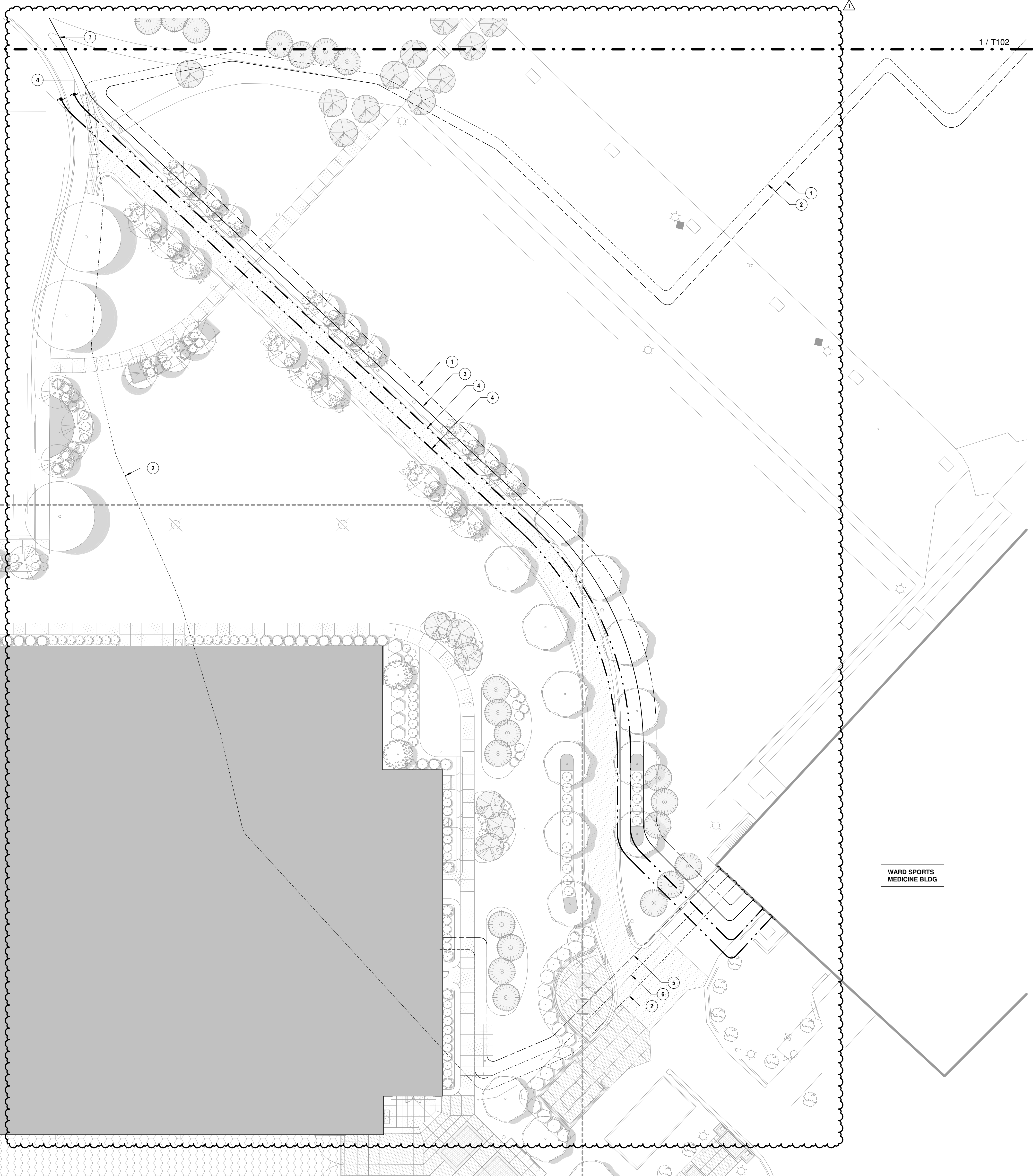
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**LEGEND:**

- 1 PROVIDE AND PULL 1 NEW 48 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO MINGES BLDG (TELECOM ROOM 188) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 48 OS2 CABLE ON EACH END.
- 2 EXISTING PE89 50PR COPPER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO MINGES BLDG (TELECOM ROOM 188). REMOVE CABLING FROM END TO END AFTER OWNER CONFIRMS CABLE IS NO LONGER IN USE.
- 3 PROVIDE AND PULL 24 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO STEAM PLANT THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 24 OS2 CABLE ON EACH END.
- 4 CUT AND PULL BACK EXISTING 96 SM FIBER OPTIC CABLE FROM THE NEW PARKING LOT HANDHOLE TO THE NEW WARD HANDHOLE & AND RE-ROUTE THOSE CABLES THROUGH NEW CONDUIT SYSTEM BACK TO THE SAME PARKING LOT HANDHOLE.
- 5 PROVIDE AND PULL 1 NEW 48 SM OS2 FIBER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO INDOOR PRACTICE FACILITY (TELECOM ROOM 109) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL FIBER CABINETS AS NEEDED WITH 12 STRAND SC CASSETTE MODULES TO SUPPORT THE 48 OS2 CABLE ON EACH END.
- 6 PROVIDE AND PULL 1 NEW PE89 50PR COPPER FROM WARD SPORTS BLDG (3RD FLOOR TELECOM ROOM) TO INDOOR PRACTICE FACILITY (TELECOM ROOM 109) THROUGH NEW & EXISTING CONDUIT PATHWAY. PROVIDE AND INSTALL PE89 50 PR SURGE ARRESTOR DEVICES FOR EACH END OF CABLE.

**GENERAL NOTES:**

1. SCOPE OF WORK SEQUENCING SHALL BE AS FOLLOWS. ALL WORK SHALL BE IN COORDINATION WITH ECU ITCS.
  - A. BUILD THE NEWLY PROPOSED TELECOM DUCTBANK INCLUDING THE INSTALLATION OF THE REPLACEMENT HANDHOLES AT EACH END (PARKING LOT HH AND WARD HH).
  - B. WHILE THE EXISTING FIBER FEEDS TO STEAM PLANT AND MINGES ARE STILL ACTIVE IN THE EXISTING (TO BE DEMOLISHED) PATHWAY, THE REPLACEMENT FIBER TO EACH BUILDING IS TO BE INSTALLED, TESTED, TERMINATED AND MADE OPERATIONAL INSIDE EXISTING SPARE PATHWAYS (IN EXISTING DUCTBANKS) AND NEW PATHWAYS JUST BUILT. THIS CAN BE DONE DURING THE DAYTIME W/ MINIMAL DISRUPTIONS. IN COORDINATION WITH ECU ITCS.
  - C. AFTER STEAM PLANT AND MINGES ARE ON THEIR NEW FIBER FEEDS FROM WARD, THE EXISTING FIBER FEEDS ARE TO BE REMOVED EMPTYING THOSE PATHWAYS.
  - D. OF THE TWO EXISTING 96 STRAND FIBERS, ONE IS **BACKBONE** FIBER (TERMINATING AT WARD) AND THE OTHER IS **DAS**. THESE FIBER CABLES SHALL BE SPLICED INSIDE THE REPLACEMENT HH LOCATED NEXT TO PARKING LOT, TO MINIMIZE DOWNTIME.
    - a. FIRST, THE EXISTING 96 STRAND BACKBONE FIBER IS TO BE CUT INSIDE THE NEW HH LOCATED AT PARKING LOT AND THEN PULLED BACK TO THE NEW HH AT WARD, EMPTYING THAT PATHWAY IN THE EXISTING DUCTBANK. THEN, THIS CABLE IS RE-INSERTED INTO NEW DUCTBANK GOING BACK TO NEW HH AT PARKING LOT. THIS CABLE ASSEMBLY WILL THEN BE SPLICED IN A NEW SPLICE BOX MOUNTED ON WALL INSIDE HH. THIS WORK CAN BE DONE OVER A WEEKEND W/O ANY INTERRUPTIONS. IN COORDINATION WITH ECU ITCS, AS LONG AS THE TODD DINING FIBER BACKBONE REMAINS OPERATIONAL.
    - b. ONCE THE RELOCATED BACKBONE FIBER IS MADE OPERATIONAL, SCHEDULE THE DOWNTIME FOR THE DAS FIBER WITH ECU ITCS. THE DAS FIBER HAS NO BACK-UP (REDUNDANT) FEED LIKE THE BACKBONE FIBER SO THIS WORK MUST OCCUR OVER WHEN ATHLETICS ALLOWS (IDEALLY DURING THIS COMING SUMMER PRIOR TO SCHOOL START).

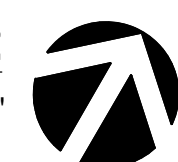


1

**TELECOM OSP CABLING DIAGRAM - 2 OF 2**

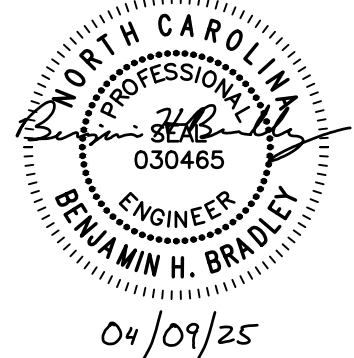
SCALE: 1" = 20'-0"

0 10' 20' 40'  
SCALE: 1" = 20'-0"



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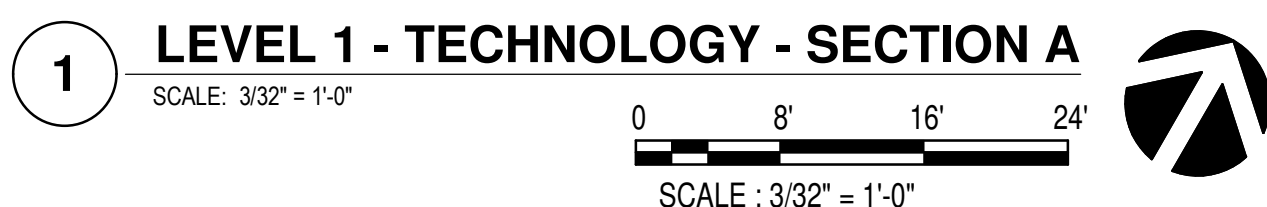
TELECOM OSP  
CABLING DIAGRAM -  
2 OF 2

SHEET

T103

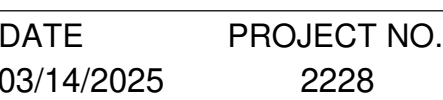
DATE PROJECT NO.  
03/14/2025 2228



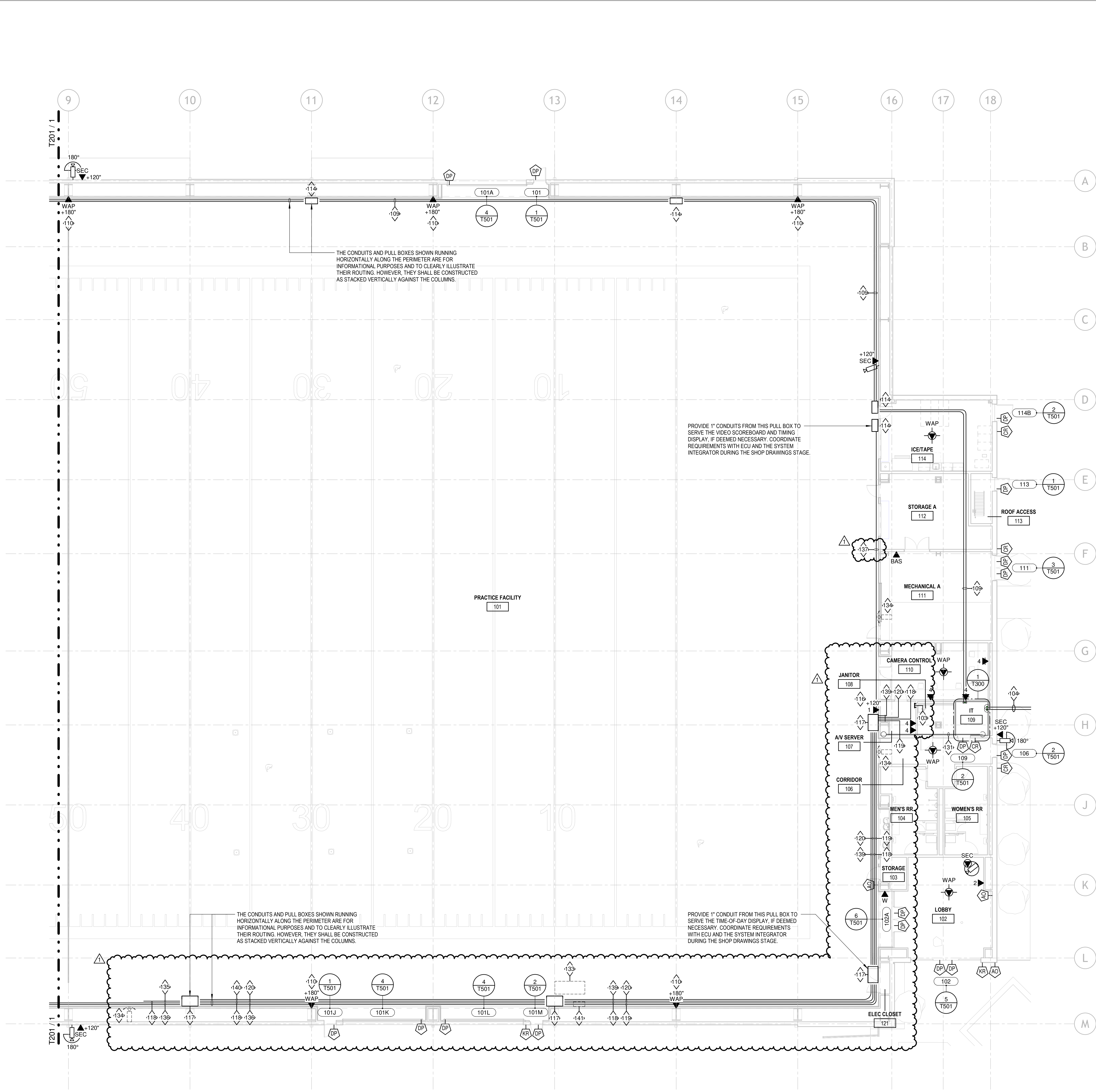


**LIFE SAFETY/ FIRE PROTECTION LEGEND**

----- 1-HR FIRE BARRIER







- GENERAL NOTES**
- THE FOLLOWING ACCESS CONTROL FIELD DEVICES ARE FURNISHED & INSTALLED BY ECU:  
A. SECURITY ACCESS CONTROL PANEL  
B. CARD READER / KEYPAD  
C. DOOR POSITION SWITCH  
D. SOUNDER
  - THE FOLLOWING ACCESS CONTROL FIELD DEVICES ARE FURNISHED BY ECU & INSTALLED BY CONTRACTOR:  
A. SECURITY ACCESS CONTROL CABLES FROM EACH DOOR TO THE ACCESS CONTROL PANEL  
B. CONTRACTOR SHALL PROVIDE THE SECURITY INFRASTRUCTURE, INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: ALL SECURITY ROUTINGS, POWER & DATA REQUIREMENTS, JUNCTION BOXES, CONDUITS, AND PULL STRINGS IN COORDINATION WITH ECU SECURITY
  - ALL DATA OUTLETS SHALL HAVE A 1" CONDUIT HOMERUN TO THE CORRESPONDING TELECOM ROOM PER ZONING SHOWN ON DWG. 1201
  - THE CONDUITS AND PULL BOXES SHOWN RUNNING HORIZONTALLY ALONG THE PERIMETER ARE FOR INFORMATIONAL PURPOSES AND TO CLEARLY ILLUSTRATE THEIR ROUTING. HOWEVER, THEY SHALL BE CONSTRUCTED AS STACKED VERTICALLY AGAINST THE COLUMNS
  - PROVIDE RACEWAYS FROM THE PROPOSED PULL BOXES TO SERVE SCOREBOARDS, DISPLAYS, ATHLETIC CAMERAS, SPEAKERS, CONTROL CONSOLE & AUDIO REMOTE INTERFACE ENCLOSURE AS NEEDED, IN COORDINATION WITH OWNER, DESIGNER AND SYSTEM(S) INTEGRATOR(S)
- SHEET KEYNOTES:**
- TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)
  - 2 x 4" UNDERGROUND CONDUITS ENCASED IN CONCRETE FOR FIBER & COPPER TELECOM ENTRANCE CABLING. CONDUITS STUB UP INTO IT 109. CONDUIT SEALS SHOULD BE AIR/GAS-TIGHT, WATER-TIGHT, CABLE COMPATIBLE, UL AND ROBUST
  - 2 x 2" CONDUITS FOR TELECOM INTRABUILDING BACKBONE CABLING. FIRESTOP PER NC BUILDING CODE AND DIVISION 07 REQUIREMENTS
  - PROVIDE DATA INFRASTRUCTURE (BOXES, RACEWAYS, CAT6A CABLES, ETC.) AND STRUCTURAL SUPPORT FOR BRACKET MOUNTED OUTDOOR RATED WIRELESS ACCESS POINT AROUND THE FIELD, IN COORDINATION WITH ECU ITCS. WIRELESS ACCESS POINTS WILL BE OFOI
  - 36" (L) x 18" (W) x 4" (D) TELECOM PULL BOX
  - DATA OUTLET FOR OFOI WALL MOUNTED SPEAKER
  - 48" (L) x 30" (W) x 5" (D) TELECOM PULL BOX
  - 2" CONDUIT FOR ATHLETIC CAMERAS CABLING
  - 2" CONDUIT FOR VIDEOBOARD CABLING
  - 1-1/2" CONDUIT WITH WEATHER-HEAD UP TO THE ROOF FOR EMERGENCY RESPONDERS RADIO REINFORCEMENT SYSTEM (ERRRS) ANTENNA CABLING
  - OFOI SCOREBOARD CONTROL CONSOLE. COORDINATE FINAL LOCATION WITH OWNER, DESIGNER & SYSTEM INTEGRATOR. PROVIDE 1" CONDUIT FROM THE NEAREST TELECOM PULL BOX TO EMPTY BOX AT 18" FOR COMMUNICATIONS CABLING
  - OFOI ATHLETIC CAMERA. FINAL MOUNTING LOCATION & ELEVATION TBD. PROVIDE 20" (L) x 20" (W) x 8" (D) WALL-MOUNT WEATHER-PROOF ENCLOSURE DIRECTLY BELOW THE CAMERA AT SERVICEABLE HEIGHT, AND A 1-1/4" CONDUIT & PULL STRING FROM THE ENCLOSURE TO STUB-OUT AT CAMERA ELEVATION (CAMERA BACK BOX NOT REQUIRED). PROVIDE A 1-1/4" CONDUIT & PULL STRING FROM THE ENCLOSURE TO THE NEAREST TELECOM PULL-BOX. COORDINATE MOUNTING LOCATIONS, ELEVATIONS & PATHWAYS WITH ECU AND ATHLETICS CAMERA VENDOR DURING THE SHOP DRAWINGS STAGE
  - 2" CONDUIT FOR VIDEOBOARD CABLING. ADJUST RACEWAY PER VIDEOBOARD INSTALLATION DETAILS DURING THE SHOP DRAWINGS STAGE
  - 2" CONDUIT FOR TIME-OF-DAY DISPLAY, VIDEO SCOREBOARD, AND TIMING DISPLAY CABLING
  - 2" CONDUIT FOR VIDEO SCOREBOARD AND TIMING DISPLAY CABLING
  - 3" CONDUIT FOR SPEAKERS AUDIO CABLES AND AUDIO REMOTE INTERFACE ENCLOSURE CABLES
  - 3" CONDUIT FOR SPEAKERS AUDIO CABLES
  - OFOI AUDIO REMOTE INTERFACE ENCLOSURE. COORDINATE FINAL LOCATION WITH OWNER, DESIGNER & SYSTEM INTEGRATOR

**1 LEVEL 1 - TECHNOLOGY - SECTION B**  
SCALE: 3/32" = 1'-0"

0 8' 16' 24'  
SCALE: 3/32" = 1'-0"

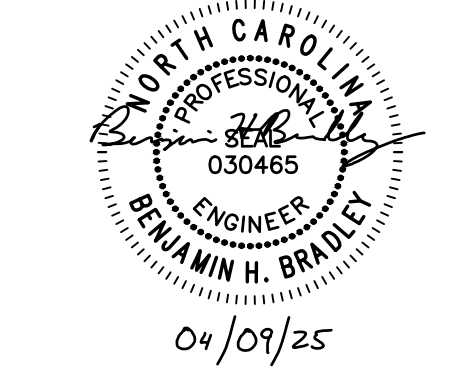
**LIFE SAFETY/ FIRE PROTECTION LEGEND**

--- 1-HR FIRE BARRIER

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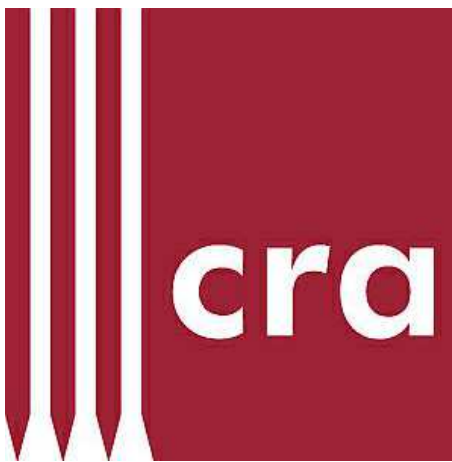
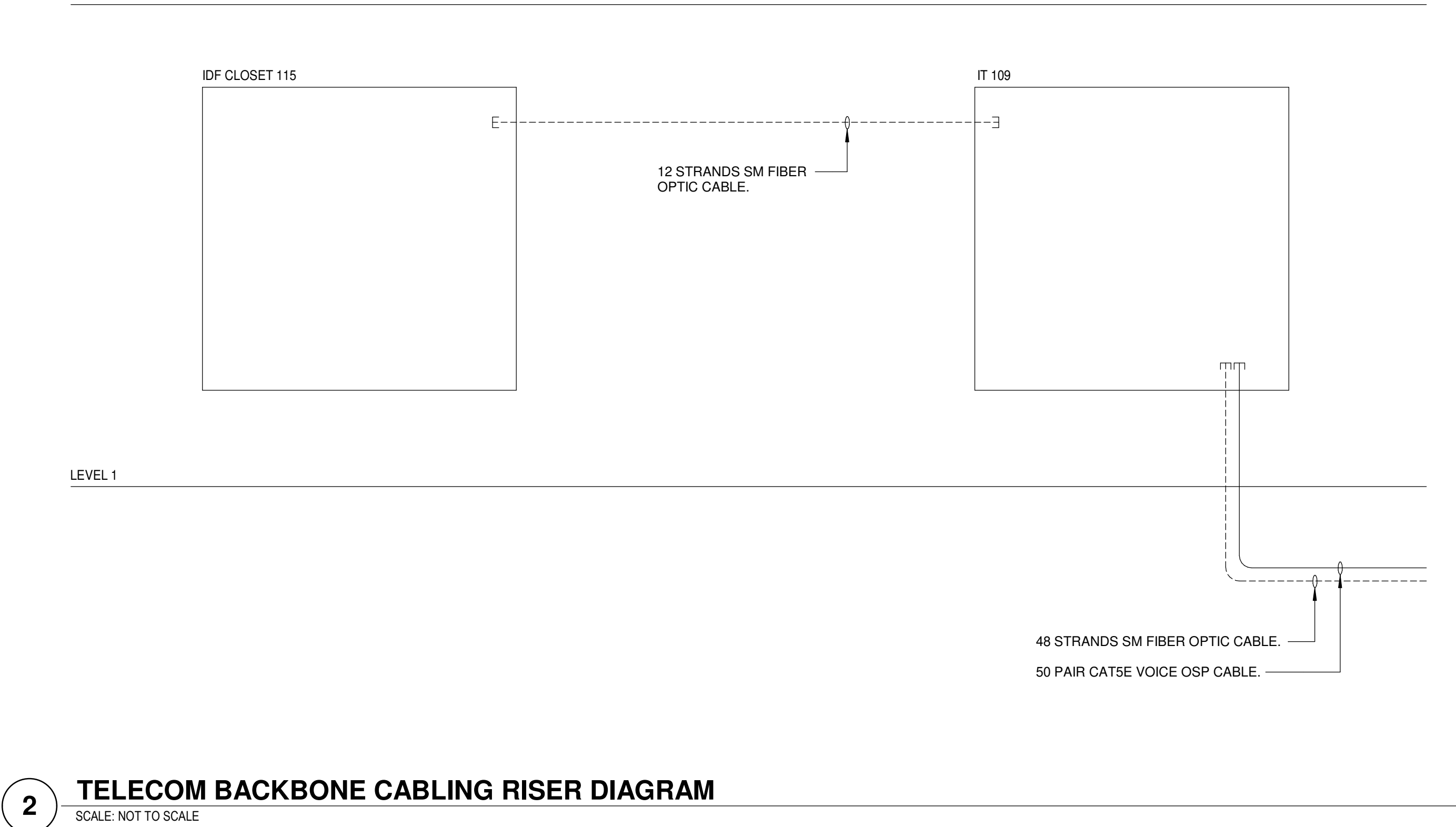
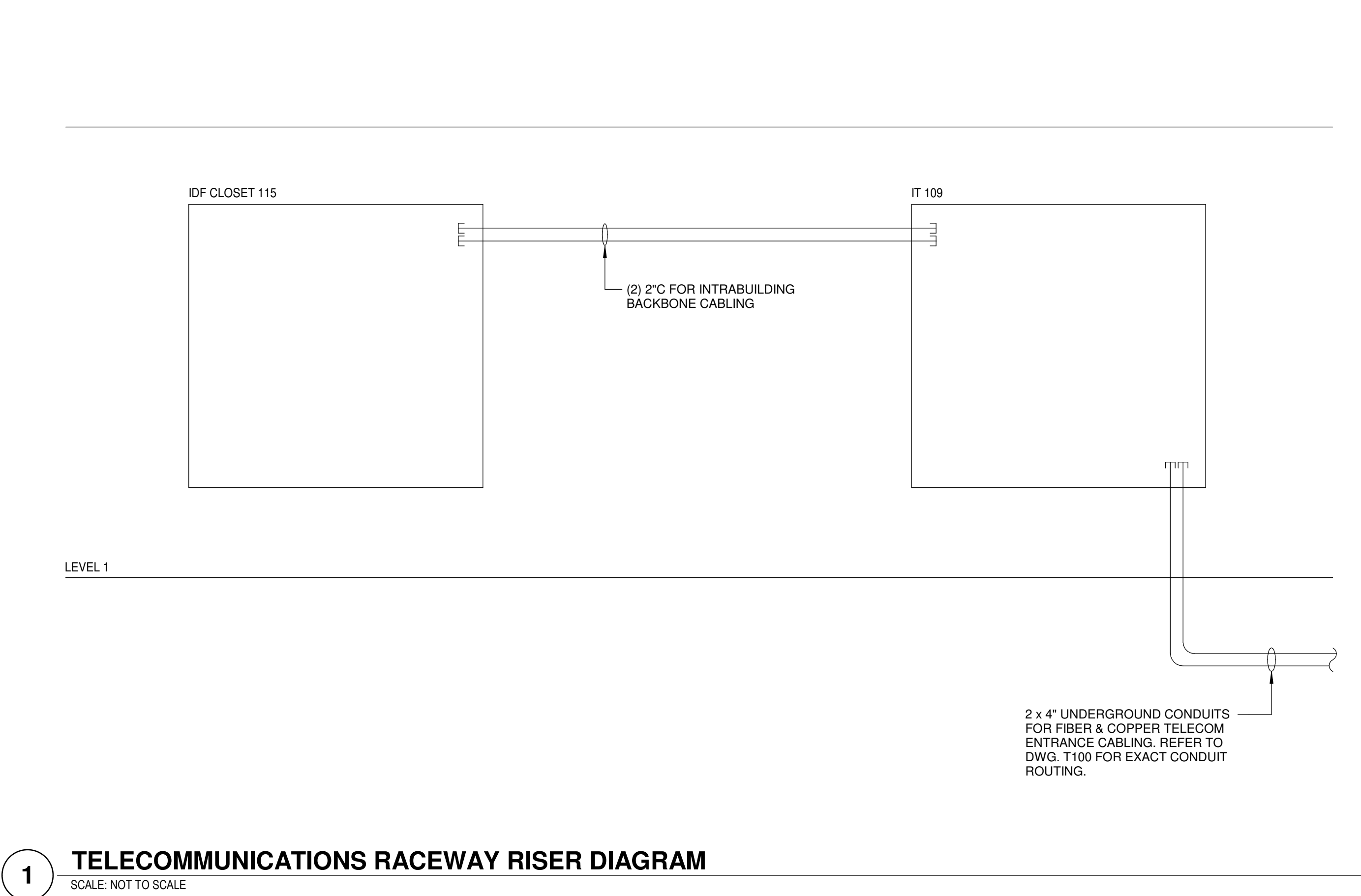
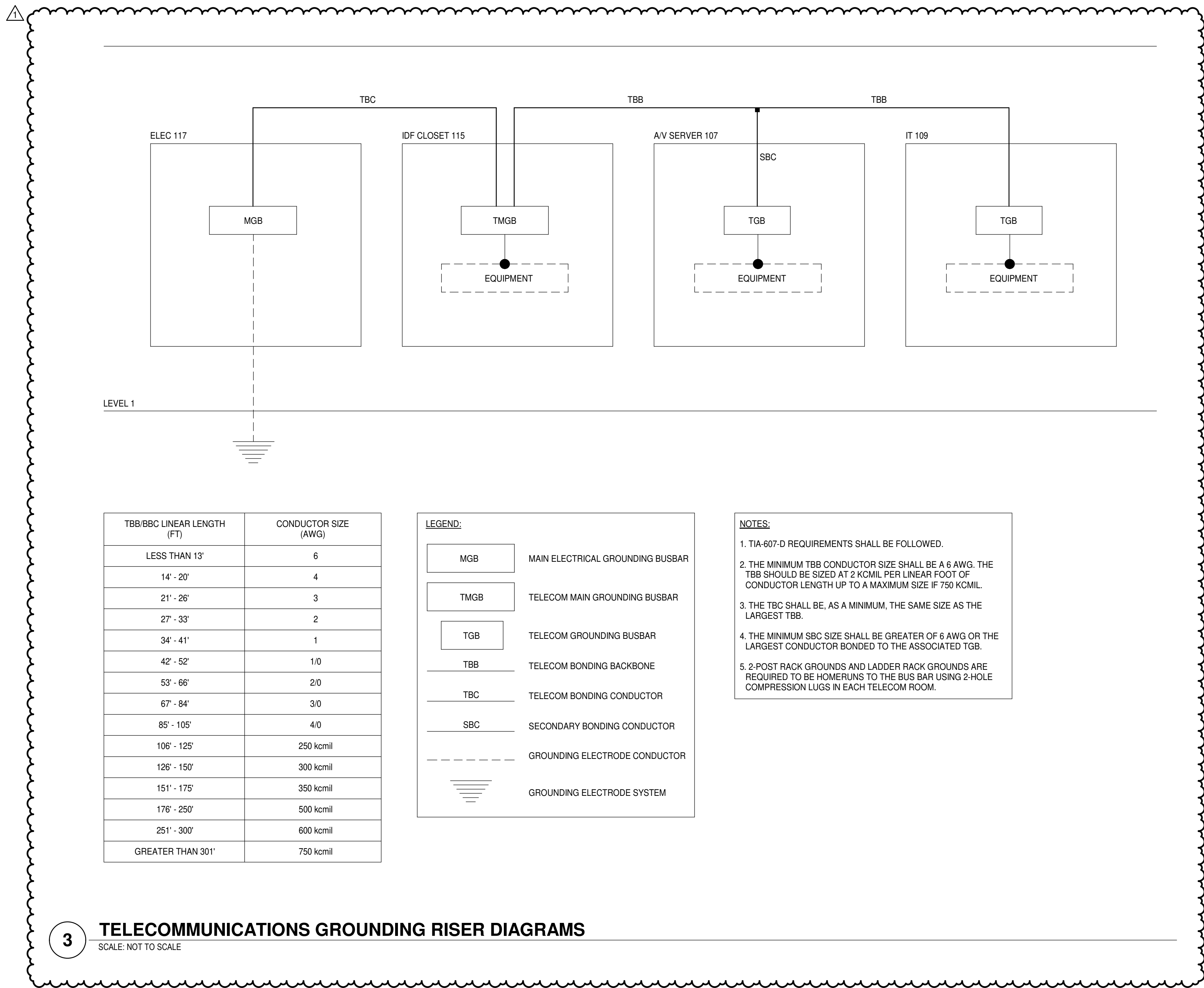
**LEVEL 1 - FLOOR PLAN - SECTION B - TECHNOLOGY**

SHEET

T202

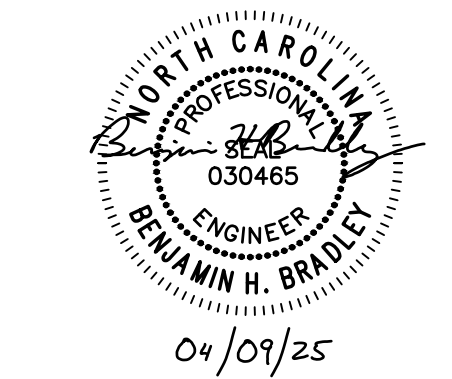
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TELECOM RISER  
DIAGRAMS

SHEET

T400

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