



Department of Public Works

Engineering Division

Robert F. Phillips, P.E., City Engineer

City-County Building, Room 115

210 Martin Luther King, Jr. Blvd.

Madison, WI 53703

Phone: (608) 266-4751 | Fax: (608) 264-9275

engineering@cityofmadison.com

cityofmadison.com/engineering

Deputy City Engineer

Gregory T. Fries, P.E.

Deputy Division Manager

Kathleen M. Cryan

Principal Engineer 2

Christopher J. Petykowski, P.E.

John S. Fahrney, P.E.

Principal Engineer 1

Christina M. Bachmann, P.E.

Mark D. Moder, P.E.

Janet Schmidt, P.E.

Facilities & Sustainability

Jeanne E. Hoffman, Manager

Bryan Cooper, Principal Architect

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

March 15, 2019

NOTICE OF ADDENDUM ADDENDUM NO. 3

CONTRACT NO. 7528, PROJECT NO. 10305 NAKOOSA TRAIL FLEET/FIRE/RADIO SHOP FACILITY

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

This addendum consists of the following documents:

- **Reponses to Bidders Questions in Section 2**
- **Acceptable Equivalentents in Section 3**
- **Specification changes outlined in Section 4**
- **Drawings changes as detailed in Section 5**
- **190228 Pre Bid Meeting Minutes and an Exhibit in Section 7**

1. GENERAL CONTRACT CONDITIONS

No Change

2. GENERAL QUESTIONS AND ANSWERS

Q1: Can Advanced Precast Company (APC) be added to manufacturer list in SECTION 03 45 00 PRECAST ARCHITECTURAL CONCRETE?

A1: Specification does not limit to listed manufacturer. Qualified manufacturers not listed are welcome to bid on the project.

Q2: Project includes demolition and renovation work on a former existing building. Regardless of whether asbestos is present, or whether the scope of work includes asbestos removal, State and Federal law requires a survey for Asbestos Containing Materials (ACM) and Presumed Asbestos Containing Materials (PACM) be completed in accordance with DNR and OSHA requirements. A completed survey report number must be listed on the permit application submitted to the DNR (DNR Notification Form # 4500-113) prior to any demolition. This report can take (30) days or longer to complete and as such may impact the project schedule. Please clarify if this survey has

been completed. If not, please indicate whether the Owner will commission said survey or if the bidding contractors will be required to provide by including costs in their bids.

A2: The former Cub Foods building shell and core above the concrete slab was demolished by the City as a separate project in 2016. Asbestos removal and demolition of the shell and core occurred at that time. It will not be necessary to apply to the DNR for a permit for removal of the existing slab on grade and the building foundation. The DNR Notification Form #4500-113 will not be required. A copy of the asbestos completion letter with the DNR asbestos abatement notification and asbestos notification summary for the asbestos removal work in 2016 is attached to this addendum for reference.

Q3: Can proR pre-assembled duct and fittings with internal duct insulation be substituted for the product material specified in 23 07 13 DUCT INSULATION.

A3: No. The product is not an equivalent substitution.

Q4: Please provide what BL-X is required in conference room 1041 on sheet A105.

A4: Per A-104, the borrowed lite being referred to is BL-12.

Q5: Sheet A-104 – Enlarged Plan note #9 states to include Corner Guards at all gypsum corners. Is that to include column corners in offices as well as corners at casework recesses like in Training Room 1001?

A5: Corner guards to be provided at all outside gypsum corner. Corner guards are not to be provided on outside corners of exposed columns.

Q6: Detail A14/A516, does this angle need to be continuous or can this be designed by the precast supplier?

A6: Per detail A14/A-516, this angle should be continuous.

Q7: Detail E14/A516, does this steel plate need to be continuous or can this be designed by the precast supplier

A7: Per detail E14/A-516, this angle should be continuous.

Q8: Sheet A104, the masonry wall between room 1003 and 1007 needs a wall tag. One is shown but no tag is indicated. Please provide.

A8: This is a 7 5/8" CMU wall with 2 1/2" metal studs and 5/8" gypsum wallboard on both sides. Shallow electrical boxes shall be provided.

Q9: Keynote 19 on sheet A-121 calls out a ladder with metal cage. Our understanding of the revised OSHA fixed ladder rules is that caged ladders are no longer required or acceptable as a fall prevention device. Please advise if a caged ladder is still required.

A9: Provide metal cage at all roof ladders.

Q10: Water repellent specification calls to spray all concrete surfaces. Please confirm all precast and concrete above grade is to be sprayed with water repellent.

A10: Only exposed, unpainted concrete and masonry surfaces are to receive water repellent coating in compliance with Specification Section 071900.

Q11:Water repellent in mortar and grout is called out in the unit masonry specification. None of the block is exposed to weather or grout. Please confirm locations on where this is required.

A11: Only exposed, unpainted concrete and masonry surfaces are to receive water repellent coating in compliance with Specification Section 071900.

Q12:Sheet A104, is it intended for the masonry wall from column line 12 to column line 15 go to the bottom of the structure or stop at the bottom of mechanical mezzanine?

A12: As shown in detail A12 on sheet A-310, the CMU wall between column line 12 and 15 goes to underside of metal deck.

Q13:Sheet A001 general note 29 mentions fireproofing. After reviewing all the plans no fireproofing is called out or shown. If there is fireproofing on the project, please indication locations and provide specs.

A13:Fireproofing is not required. However, provide fire stopping or sealant where indicated on specification 07 84 43 Penetration Firestopping.

Q14:Based on the soil conditions found in the soil's report, scaffold, cranes and other equipment needed to construct the building will need support. Please clarify if a construction road around the building would be acceptable.

A14: This is means and method.

Q15:Is it necessary to provide a weather barrier between the decorative panels and the precast (example G1/A511)? No barrier is called out, but one is shown on H13/A511. On A6 and I6 on sheet A511 doesn't show or call out any barrier behind the metal wall panels.

A15:No weather barrier is required between the precast and decorative wall panels. No weather barrier is required at any of the precast walls.

Q16:On G1/A511, the weather barrier does not go to the full height of the building, is this the intent to stop mid-way through the panel?

A16:See answer to Q15 above.

Q17:No air barrier is called out on the drawings, but a spec is provided. Please indicate locations.

A17:An A.I.B. (air infiltration barrier), in compliance with Specification Section 072500, is required on the outside face of sheathing on all exterior walls that are not precast, concrete finish.

Q18:There is a waterproof membrane called out in several locations above grade on metal studs. See A1/A511. What produce is this?

A18:This is an A.I.B. in compliance with Specification Section 072500.

Q19:Detail A1 on A512 calls out vapor barrier at the soffit while J12/A512 calls out waterproof membrane at the soffit. Please clarify which is correct. Also, if the vapor barrier is correct, is this weather barrier (Tyvek) or air and vapor barrier?

A19: All soffits require continuous A.I.B. in compliance with Specification Section 072500. This is only an air barrier.

Q20:Detail H13/A511 displays two different weights for a barrier system on the soffit and on the wall. Please clarify is this is a single product or two different products and what they are.

A20:This is a single product for all soffits and wall locations. No weights are called out on the drawings. For A.I.B. product specifics, refer to Specification Section 072500. Refer to answer 17.a. above for precast concrete walls.

Q21:There is no consistency in the thermal properties. On A7/A512 calls for a waterproof membrane. On A1/A511 that's also a waterproof membrane. Then on G1/A511 calls for a weather barrier. Which one is correct?

A21: Vertical walls and soffits require an A.I.B. on the exterior face of sheathing in compliance with Specification Section 072500. Horizontal roof surfaces require a vapor retarder in compliance with Specification Section 074113.16 Standing Seam Metal Roof or 075323 EPDM Roofing.

Q22: The specifications call for a Hubbell/Mohawk solution for the voice data portion. Not all bidders are able to supply a warranty for that system. Is a Panduit/General Solution would be acceptable? Please advise.

A22: No. The product is not an equivalent substitution.

Q23: On A200, Conc-2 calls for a Dunn Edwards manufacturer on the exterior materials schedule. Please confirm manufacturer?

A23: Dunn Edwards.

Q24: Dunn Edwards is not a readily available paint in WI. Please advise as to a match for Sherwin Williams, Hallman Lindsay, etc. as these are local paint manufacturers.

A24: Dunn Edwards or approved equal.

Q25: Sheets A-104 & A-722 – All the lockers shown on A-104 are noted to be 'Not In Contract' but A-722 appears to show an integral wood bench at the two locker rooms. Who furnishes and installs the wood bench?

A25: Locker benches, built in or not, shall be contractor furnished and installed.

Q26: Sheets A-104 & A-722 – All the lockers shown on A-104 are noted to be 'Not In Contract' but A-722 appears to show an integral wood bench at the two locker rooms. Who furnishes and installs the wood bench?

A26: Locker benches, built in or not, shall be contractor furnished and installed.

Q27: Sheets A-106 & A-534 – Is there a spec already provided we are to reference in regards to the Welded Wire Mesh fence enclosure at Tool Box Storage 1085?

A27: In specification. Refer to Addendum 2.

Q28: Sheets A-121 & A-200 series – Can exterior elevations be provided for the three remaining faces of roof and wall at the two sloped roof systems above the Office spaces 1001-1024 and Parts Room 1025? Needed to confirm scope of metal siding and related tie-ins.

A28: Refer to building sections for elevations not seen on elevation drawings.

Q29: Addenda 2, Sheet A104 calls for a free-standing copier. Is this being owner furnished owner installed? Answer: All free-standing copiers to be owner furnished, owner installed?

A29: Copier NIC.

Q30: Specification section 04 20 00 – unit masonry assemblies. 2.2 brick is called out. Please provide locations. Answer: There is no brick in this project?

A30: There is no brick in the project.

Q31: Question: Please confirm the radio communication tower is not part of this project. Contractor is only to provide structural concrete base.

Q31: Radio Tower NIC.

Q32: Regarding the Fire Test Pit on A1/AS003, where are the specifications for this item?

A32: Specification will not be provided. Refer to notes under detail.

Q33: Regarding the Fire Test Pit on A1/AS003, please confirm no insulation or waterproofing is required around the enclosure?

A33: Refer to notes in detail.

Q34: Regarding the Fire Test Pit on A1/AS003, is there any granular fill required under the slab?

A34: Provide 6" base course under the slab.

Q35: Regarding the Fire Test Pit on A1/AS003, what are the requirements for the removable wood plank?

A35: A metal u or c-channel anchored to concrete wall for oak wood slats to allow removal of slats at an angle from bottom up. Purpose of wood baffle is to control turbulence of water.

Q36: Regarding the Fire Test Pit on A1/AS003, is the manhole covered required to be provided by the site utility specification?

A36: Owner furnished, contractor installed.

Q37: Regarding the Fire Test Pit on A1/AS003, please confirm no site utilities are needed for this equipment. No sanitary or storm is attached to this tank.

A37: Yes. Portable pump will be used to remove clean water out of pit.

A38: Regarding the Fire Test Pit on A1/AS003, please confirm the contractor is required to design the test pit. A design has been provided on the drawing already.

A38: Removed note 3 in detail A1/AS-003.

Q39. Are there any other mechanical or electrical hookups needed for Fire Test Pit on A1/AS-003?

A39: No mechanical hookups. Provide surface mounted disconnect switch on trash enclosure wall next to pit. Power will be required for pumps, however requirements will need to be coordinated during construction.

Q40: Specification Section 06 10 53 – Miscellaneous Rough Carpentry paragraph 2.5.A describes Equipment Backing Panels, where are these to be located? None of the Electrical or IT Rooms show any panels

A40: Incoming telephone and/or cable service will require backing panels.

Q41: Specification Section 06 10 53 – Miscellaneous Rough Carpentry paragraph 2.5.D describes Rooftop Equipment Blocking which is also detailed on Plan Sheet A-515, details H5 and H10. The only rooftop units appear to be in Area A and doesn't call out any details for blocking, Mechanical drawings don't show anything either.

A41: Blocking for RTU shall be used if/when required as a means and method. Paragraph in specification shall remain.

Q42: Delegated design is called out throughout the specifications. Please provide full clarification of the requirements of the delegated design (hire a separate PE to confirm design. a. 03 45 00 – Architectural Precast b. 05 51 13 – Metal Pan Stairs c. 05 52 13 – Pipe and Tube Railings d. 07 42 13.33 – Metal Wall Panels for Transpired Solar Collections (2 designs). e. 10 14 26 – Post and Panel/Plyon Signage f. 21 90 00 – fire suppression g. 23 05 29 – hanger and supports.

A42: Professional Engineer responsible for the preparation of the submittals shall sign and seal document. Requirements for the design and submittal for delegated design are outlined in each specs. Trapeze hangers requires oversight by PE for hanging multiple pipes due to weight for large pipes. Contractor has the option not to use trapeze hangers on the project.

Q43: Spec. 07 95 13.13, Sheet A-106 & S-131C – Spec section 07 95 13.13 calls for Interior Expansion Joint Assemblies. Can we get clarification on A-106 & S-131C or others where they should be accounted for and whether there's a concrete floor detail that should be followed to receive the assemblies along Grid Line 17? Will a Wall to Floor assembly be required?

A44: Refer to structure drawings in Addendum 2 for location of expansion joint indicated with heavy dashed line. Expansion joint is located where Area A/B separate C. Floor, wall, and roof details are provided in the architectural drawings.

Q45: Detail 4 on S-551 shows an angle edge condition on the exterior wall and no edge condition on the interior edge. Is this correct? If not please indicate the desired edge condition here.

A45: No edge angle is required on line B.

Q46: Detail 11/S501, please confirm this detail is only typical at the actual openings and the panels on either side of the opening are to be continuous from footing to top of wall like 8/S501.

A46: Detail 11/S-551 is applicable only at openings. Detail 8/S-551 is typical at locations without openings.

Q47: We are assuming strip footing SF1.5 occurs at all stoops. Please confirm.

A47: Detail 11/S-501 applies to all stoops. Detail 11/S-501 requires SF1.5.

Q48: We are assuming strip footing SF1.5 occurs at all stoops. Please confirm.

A48: Detail 11/S-501 applies to all stoops. Detail 11/S-501 requires SF1.5.

Q49: Spec. 05 12 00 – Will the Fabricator’s AISC Certification requirement be waived to allow for manufacturers that show a reasonable proof of history and level of experience?

A49: Requirement will not be waived.

Q50: For the metal roof deck are powder-actuated fasteners or puddle welds an acceptable alternative to the #12 screws called out on the drawings?

A50: Powder-actuated fasteners and puddle weld substitutions will be evaluated and accepted if shown to be of equivalent deck shear strength and stiffness.

Q51: Please provide the manufacturer and model number for all existing equipment being relocated that is identified in specification 11 11 40.A26: Reel are identified in Sheet QS -101C and equipment id is 7781.

A51: Reference attached data and cut sheet.

Q52: Please confirm that the (4) unidentified reel banks (North side of building) depicted on drawing Q- 101C are part number 7780.

A52: Reel are identified in Sheet QS -101C and equipment id is 7781.

Q53: Conflicting information regarding the air compressors. Specs reference to relocate two compressor and bid one compressor. Prints show four compressors on the plans. One each in: Light Duty, Heavy Duty, Body Shop, and Radio Shop. Please clarify.

A53: There are two new compressors both with ID: 2161 located in Lube / Compressor room. The other two compressors ID: 21611 and ID: 21612 are to be relocated.

Q54: Are Challenger and Omer acceptable manufactures for new lifts?

A54: What was submitted was not a substitution request, but an approved as equal request. The specifications note that “Alternate manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in Submittals, equipment produced by other manufacturer’s may be considered as equal.” During the formal submittal process we review the documents to ensure compliance with the specifications, but in this case, this is not a formal submittal from the Contractor. Without a full set shop drawings and product data, at this time we cannot say that they would meet the specifications.

3. **ACCEPTABLE EQUIVALENTS**

- A. XeteX Custom AHU Manufacturer for air-handling units is an acceptable product that may be incorporated into the Work.

4. **SPECIFICATIONS**

- A. **MODIFIED** 03 30 00 – CAST IN PLACE CONCRETE (Spec not attached)
 - a. REVISE – 2.12.A Section header to be “Footings, Grade beams, Foundation Walls, Piers”

- b. ADD - 3.7.G, F(F)45/F(L)35 in Corridors 1023, 1028, and 1136 where called out in finished schedule to be polished concrete.
- B. **MODIFIED** 03 35 43 POLISHED CONCRETE FINISH (Spec not attached)
 - a. REVISE - Paragraph 3.1A to "Polish: Level 3, Class A Aggregate Exposure."
- C. **MODIFIED** 05 12 00 – STRUCTURAL STEEL (Spec not attached)
 - a. ADD – Section 1.4.A.6: Connection Design: Provide final substantiating connection information in the form of calculations or a letter of certification. Whichever is submitted shall be signed and sealed from the licensed professional engineer in responsible charge of the connection design. Provide a means by which the substantiating connection information is referenced to the related connections on the shop and erection drawings for purpose of review.
- D. **MODIFIED** 05 31 00 – STEEL DECKING (Spec not attached)
 - a. DELETE – Section 3.4.B.1.
- E. **MODIFIED** 07 21 00 – THERMAL INSULATION
 - a. REVISE – Section 2.4
- F. **MODIFIED** 07 25 00 – WEATHER BARRIERS
 - a. Various sections revised
- G. **MODIFIED** 10 11 16.13 – FIXED MARKER BOARDS
 - a. ADD – Section 2.5 Tackboard Panels.
- H. **MODIFIED** 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
 - a. ADD – Procedure for CNG Ventilation.
- I. **MODIFIED** 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC
 - a. ADD – Current Sensors product data.
- J. **MODIFIED** 23 83 16 - RADIANT-HEATING HYDRONIC PIPING
 - a. ADD – Custom Radiant Panel Enclosure product data.
- A. **MODIFIED** 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
 - a. DELETE - Article 3.3.C in its entirety.
 - b. DELETE - Article 3.3.I.1 in its entirety.
 - c. DELETE - Article 3.3.J in its entirety.
- K. **MODIFIED** 26 31 00 - PHOTOVOLTAIC SYSTEM PERFORMANCE REQUIREMENTS (Spec not attached)
 - a. REVISE – Article 2.1.C.4.g to be "DC to AC size Ratio: 1.2".
- L. **MODIFIED** 26 31 11 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM (Spec not attached)
 - a. ADD "Gamewell-FCI by Honeywell" as an acceptable manufacturer under Article 2.1.A.

- M. **MODIFIED** 26 51 00 - INTERIOR LIGHTING (Spec not attached)
 - a. REVISE – Warranty period for the interior LED light fixtures in paragraph 1.8.A. item1 to read as follows: min of Five (5) years from the date of substantial completion, unless ten (10) years warranties are listed as standard by the fixture manufacturer.

- N. **MODIFIED** 26 56 00 - EXTERIOR LIGHTING (Spec not attached)
 - a. REVISE - warranty period for the exterior LED luminaires in paragraph 1.7.A. items 1, 2 and 3 to read as follows: min of Five (5) years from the date of Substantial completion for LED Luminaries, Meal Corrosion and Color Retention.

- O. **MODIFIED** 31 32 19, GEOTEXTILES, PART 2 – MATERIALS
 - a. REPLACE - paragraph 2.1.B in its entirety with the following: “B. Geotextile, if needed, below base course shall be Mirafi 600X, or equal.”

- P. **MODIFIED** 32 11 00, AGGREGATE BASE COURSE, PART 2 – MATERIALS
 - a. REPLACE - paragraph 2.1.A in its entirety with the following: “A. Aggregate for base course shall meet the requirements of Article 401 - Crushed Aggregate Base Course of the City of Madison Standard Specifications for Public Works Construction, Latest Edition.”
 - b. REPLACE - paragraph 2.1.B in its entirety with the following: “B. Base Course shall be uniformly graded and shall conform to Article 401.1(b). The 6-inch lower layer shall be Gradation 1 and the 6-inch upper layer shall be Gradation 2.”

- Q. **MODIFIED** 32 11 26, HOT MIX ASPHALT PAVING, PART 2 – MATERIALS
 - a. REPLACE - paragraph 2.1.A in its entirety with the following: “A. Asphaltic mix shall be MT 58-28 H for both the lower layer and upper layer for all asphalt areas, except for the 41-stall employee parking lot near the western detention basin, where the asphalt mix shall be LT 58-28 S for both the lower layer and upper layer.”
 - b. REPLACE - paragraph 2.1.B in its entirety with the following: “B. Aggregate shall conform to the requirements of Section 460.2.2 of the Standard Specifications. Aggregate for the lower layer shall be nominal size of 19 mm. Aggregate for the upper layer shall be nominal size of 12.5 mm.”

5. **DRAWINGS**

- A. **MODIFIED** C-100-OVERALL SITE PLAN for the limits of the asphalt mill and overlay on Nakoosa Trail and provide temporary directional traffic signage for the existing gas station.

- B. **MODIFIED** C-101-SITE PLAN for the limits of the asphalt mill and overlay on Nakoosa Trail and indicate permanent sanitary sewer easement and temporary construction easement.

- C. **MODIFIED** C-103-SITE PLAN for providing a 6-inch perforated pipe at the modular retaining wall.

- D. **MODIFIED** C-104-INTERSECTION DETAIL to reduce the extend of new asphalt.
- E. **MODIFIED** C-105-UTILITY PLAN for the limits of the asphalt mill and overlay on Nakoosa Trail and provide a 6-inch perforated pipe at the modular retaining wall.
- F. **MODIFIED** C-106-UTILITY PLAN for providing a 6-inch perforated pipe at the modular retaining wall.
- G. **MODIFIED** C-107-EROSION CONTROL for the limits of the asphalt mill and overlay on Nakoosa Trail.
- H. **MODIFIED** C-110-FIRE ACCESS for the limits of the asphalt mill and overlay on Nakoosa Trail.
- I. **MODIFIED** C-112-DEMOLITION PLAN for the limits of the asphalt mill and overlay on Nakoosa Trail and adjusted the scale.
- J. **MODIFIED** C-113-STANDARD DETAILS to Detail A for providing a pipe underdrain, and to Detail B for asphalt thicknesses and removal of the geotextile below the base course.
- K. **MODIFIED** L-201-LANDSCAPING PLAN for the limits of the asphalt mill and overlay on Nakoosa Trail.
- L. **MODIFIED** AS-001-SITE PLAN to include note in detail D14.
- M. **MODIFIED** AS-002-ENLARGED SITE PLAN to include E16 Typical Fence Footing detail and add an overall length dimension in detail A1.
- N. **MODIFIED** AS-003-SITE SECTIONS to remove an exterior bench detail, remove note 3 in detail A1, and add a hatch pattern and material callout to detail K10.
- O. **MODIFIED** A-101-OVERALL LEVEL 1 FLOOR PLAN to remove green and gray hatch pattern and the exterior concrete benches between column line 32 and 34.
- P. **MODIFIED** A-103-OVERALL ROOF PLAN to remove green and gray hatch pattern.
- Q. **MODIFIED** A-104-LEVEL 1 FLOOR PLAN AREA A to revise wall between grid line 16 and 17 from 12" CMU to precast.
- R. **MODIFIED** A-105-LEVEL 1 FLOOR PLAN AREA A to revise wall between grid line 16 and 17 from 12" CMU to precast.
- S. **MODIFIED** A-106-LEVEL 1 FLOOR PLAN AREA A to revise wall between grid line 16 and 17 from 12" CMU to precast.
- T. **MODIFIED** A-108-LEVEL 1 FLOOR PLAN AREA A to remove the exterior concrete benches between column line 32 and 34.

- U. **MODIFIED** A-114-MEZZANINE FLOOR PLAN AREA E to show metal railings between Jy and Kf as well as the at the top of stair.
- V. **MODIFIED** A-121-ROOF PLAN AREA A to add SS-2 material callouts to the roof.
- W. **MODIFIED** A-134-LEVEL 1 AREA C REFLECTED CEILING PLAN to remove the RCP Notes.
- X. **MODIFIED** A-201-BUILDING ELEVATIONS to revise Key Note 13.
- Y. **MODIFIED** A-202-BUILDING ELEVATIONS to revise Key Note 13.
- Z. **MODIFIED** A-203-BUILDING ELEVATIONS to revise Key Note 13.
- AA. **MODIFIED** A-301-BUILDING SECTIONS to revise the wall between grid line 16 and 17 from 12" CMU to precast, and reduce height of CMU wall along column line 15 to stop at underside of mezzanine metal deck in detail J1.
- BB. **MODIFIED** A-302-BUILDING SECTIONS to revise the wall between grid line 16 and 17 from 12" CMU to precast in detail J1 and E1.
- CC. **MODIFIED** A-313-E/W WALL SECTIONS to add detail callouts in details A1, A4, and A10.
- DD. **MODIFIED** A-501 – PARTITION TYPES to revise the detail number of detail 1 Partition Type M001 to be H12, add detail H16 Partition Type M005, and added "RE: STRUCTURAL" note in the following details:
 - a. E8 Partition Type A042, R070
 - b. E12 Partition Type A041
 - c. H1 Partition Type M006
 - d. H4 Partition Type M001
 - e. H8 Partition Type M002
 - f. H12 Partition Type M001
- EE. **MODIFIED** A-513-EXTERIOR DETAILS to add detail F1 Typical Roof Overhang and revised the angle of the exterior grade gypsum sheathing soffit in detail H10.
- FF. **MODIFIED** A-522-RAILING DETAILS to revise the stair tread in detail E1.
- GG. **MODIFIED** A-551-EXPANSION JOINT DETAILS to revise detail A7, and E7.
- HH. **MODIFIED** A-601-DOOR SCHEDULE to revise and add additional information.
- II. **MODIFIED** 700 – INTERIORS FINISH SCHEDULE & LEGEND PC-1 polish finish to state "Refer to Specification" in lieu of "800-Grit."
- JJ. **MODIFIED** A-911-SIGNAGE TYPES EXTERIOR to remove signs.
- KK. **MODIFIED** A-921-SITE SIGNAGE ELEVATIONS AND DETAILS to revise notes in detail A8.

- LL. **MODIFIED** S-001 - STRUCTURAL NOTES. See revised drawing attached.
- MM. **MODIFIED** S-010 - LATERAL FORCE RESISTING SYSTEMS PLAN. See revised drawing attached.
- NN. **MODIFIED** S-101A - FOUNDATION PLAN AREA A. See revised drawing attached.
- OO. **MODIFIED** S-101B - FOUNDATION PLAN AREA B. See revised drawing attached.
- PP. **MODIFIED** S-101C - FOUNDATION PLAN AREA C. See revised drawing attached.
- QQ. **MODIFIED** S-101D - FOUNDATION PLAN AREA D. See revised drawing attached.
- RR. **MODIFIED** S-101E - FOUNDATION PLAN AREA E. See revised drawing attached.
- SS. **MODIFIED** S-111A - FLATWORK PLAN AREA A. See revised drawing attached.
- TT. **MODIFIED** S-111B - FLATWORK PLAN AREA B. See revised drawing attached.
- UU. **MODIFIED** S-111C - FLATWORK PLAN AREA C. See revised drawing attached.
- VV. **MODIFIED** S-111D - FLATWORK PLAN AREA D. See revised drawing attached.
- WW. **MODIFIED** S-111E - FLATWORK PLAN AREA E. See revised drawing attached.
- XX. **MODIFIED** S-131A - LEVEL 1 STRUCTURAL FLOOR PLAN AREA A. See revised drawing attached.
- YY. **MODIFIED** S-131B - LEVEL 1 STRUCTURAL FLOOR PLAN AREA B. See revised drawing attached.
- ZZ. **MODIFIED** S-131E - LEVEL 1 STRUCTURAL FLOOR PLAN AREA E. See revised drawing attached.
- AAA. **MODIFIED** S-132A - MEZZANINE STRUCTURAL FLOOR PLAN AREA A. See revised drawing attached.
- BBB. **MODIFIED** S-132B - MEZZANINE STRUCTURAL FLOOR PLAN AREA B. See revised drawing attached.
- CCC. **MODIFIED** S-132D - MEZZANINE STRUCTURAL FLOOR PLAN AREA D. See revised drawing attached.
- DDD. **MODIFIED** S-132E - MEZZANINE STRUCTURAL FLOOR PLAN AREA E. See revised drawing attached.
- EEE. **MODIFIED** S-142B - MEZZANINE FRAMING PLAN AREA B. See revised drawing attached.

- FFF. **MODIFIED** S-142E - MEZZANINE FRAMING PLAN AREA E. See revised drawing attached.
- GGG. **MODIFIED** S-151A - LOW ROOF FRAMING PLAN AREA A. See revised drawing attached.
- HHH. **MODIFIED** S-151B - LOW ROOF FRAMING PLAN AREA B. See revised drawing attached.
- III. **MODIFIED** S-151C - LOW ROOF FRAMING PLAN AREA C. See revised drawing attached.
- JJJ. **MODIFIED** S-152A - HIGH ROOF FRAMING PLAN AREA A. See revised drawing attached.
- KKK. **MODIFIED** S-152B - HIGH ROOF FRAMING PLAN AREA B. See revised drawing attached.
- LLL. **MODIFIED** S-152C - HIGH ROOF FRAMING PLAN AREA C. See revised drawing attached.
- MMM. **MODIFIED** S-152D - HIGH ROOF FRAMING PLAN AREA D. See revised drawing attached.
- NNN. **MODIFIED** S-152E - HIGH ROOF FRAMING PLAN AREA E. See revised drawing attached.
- OOO. **MODIFIED** S-241 - STRUCTURAL FRAMING ELEVATIONS. See revised drawing attached.
- PPP. **MODIFIED** S-401 - MISCELLANEOUS FOUNDATION PLANS. See revised drawing attached.
- QQQ. **MODIFIED** S-451 - MISCELLANEOUS FRAMING PLANS. See revised drawing attached.
- RRR. **MODIFIED** S-503 - FOUNDATION DETAILS. See revised drawing attached.
- SSS. **MODIFIED** S-511 - FLATWORK DETAILS. See revised drawing attached.
- TTT. **MODIFIED** S-522 - STRUCTURAL WALL DETAILS. See revised drawing attached.
- UUU. **MODIFIED** S-531 - STRUCTURAL FRAMING DETAILS. See revised drawing attached.
- VVV. **MODIFIED** S-532 - STRUCTURAL FRAMING DETAILS. See revised drawing attached.
- WWW. **MODIFIED** S-541 - STRUCTURAL FRAMING DETAILS. See revised drawing attached.
- XXX. **MODIFIED** S-542 - STRUCTURAL FRAMING DETAILS. See revised drawing attached.
- YYY. **MODIFIED** S-543 - STRUCTURAL FRAMING DETAILS. See revised drawing attached.
- ZZZ. **MODIFIED** S-551 - STRUCTURAL ROOF FRAMING DETAILS. See revised drawing attached.
- AAAA. **MODIFIED** S-552 - STRUCTURAL ROOF FRAMING DETAILS. See revised drawing attached.

- BBBB. **MODIFIED** S-601 - STRUCTURAL SCHEDULES. See revised drawing attached.
- CCCC. **MODIFIED** M-131E LEVEL 1 FLOOR PLAN – PIPING – AREA E:
 - a. Revise location of Zone E2 M-29 manifold as indicated on sheet M-131E
- DDDD. **MODIFIED** M-132 LEVEL 1 FLOOR PLAN RADIANT INFLOOR EATING – AREAS A & B:
 - a. Revise RADIANT FLOOR HATCH PATTERN LEGEND as indicated on sheet M-132
- EEEE. **MODIFIED** M-133 LEVEL 1 FLOOR PLAN RADIANT INFLOOR EATING – AREAS C, D, & E:
 - a. Revise RADIANT FLOOR HATCH PATTERN LEGEND as indicated on sheet M-133
- FFFF. **MODIFIED** M-809 MECHANICAL WATER FLOW DIAGRAM:
 - a. Revised control sequences as indicated on sheet M-809.
- GGGG. **MODIFIED** F-101B LEVEL 1 FLOOR PLAN – FIRE PROTECTION – AREA B:
 - a. Removed the hatch pattern for Tire Storage 1044
- HHHH. **MODIFIED** F-101C LEVEL 1 FLOOR PLAN - FIRE PROTECTION – AREA C:
 - a. Removed the hatch pattern for Tire Shop/Storage 1076
- IIII. **MODIFIED** E-503 DETAILS:
 - a. Add ground bar to the riser diagram and delete a couple articles in the specification to eliminate any confusion.
- JJJJ. **MODIFIED** E-601 SCHEDULES:
 - a. Revise downlight fixture types D, D1, D2, and D4
- KKKK. **MODIFIED** E-702 ONE-LINE DIAGRAM PHOTOVOLTAICS (Sheet not attached)
 - a. Revise general note #1 to indicate “Sheet E-142” in place of “Sheet E-138”
- LLLL. **MODIFIED** T-141 LEVEL 1 FLOOR PLAN AREA A - AUDIO/VISUAL
 - a. Revise general note #1
 - b. Removed speaker zoning from key plan
- MMMM. **MODIFIED** T-142 LEVEL 1 FLOOR PLAN AREA B - AUDIO/VISUAL
 - a. Revise general note #1
 - b. Removed speaker zoning from key plan
- NNNN. **MODIFIED** T-143 LEVEL 1 FLOOR PLAN AREA C - AUDIO/VISUAL
 - a. Revise general note #1
 - b. Removed speaker zoning from key plan
- OOOO. **MODIFIED** T-144 LEVEL 1 FLOOR PLAN AREA D - AUDIO/VISUAL
 - a. Revise general note #1
 - b. Removed speaker zoning from key plan

PPPP. **MODIFIED T-145 LEVEL 1 FLOOR PLAN AREA E - AUDIO/VISUAL**

- a. Revise general note #1
- b. Removed speaker zoning from key plan

6. **PROPOSAL**

No Change

7. **ADDITIONAL DOCUMENTS**

- A. Existing Equipment Data Sheets and Cut Sheets (16 pages).
- B. EXHIBIT, A&A Environmental Services report for the City of Madison, dated October 19, 2016 regarding the Former Cub Foods Asbestos Removal/Demolition. (10 pages) is known information relating to the existing Commercial Building on site.
- C. Pre-Bid (Contractors) Meeting: The Pre-Bid (Contractors) Meeting was held at 10:30am on Thursday, February 28, 2019 at the Engineering Operations Facility located at 1600 Emil Street. A copy of the pre-bid meeting minutes are attached to this addendum for reference.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on Bid Express at:

<https://www.bidexpress.com/>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 to receive the material by another route.

Sincerely,



Robert F. Phillips, P.E., City Engineer

Cc: Greg Fries, Kathy Cryan

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Extruded polystyrene foam-plastic board.
 - 2. Glass-fiber blanket.
 - 3. Mineral-wool blanket.
 - 4. Spray-applied cellulosic insulation.
- B. Applications include:
 - 1. Under slab-on-grade.
 - 2. On interior foundation wall surfaces backfilled.
 - 3. In framed construction cavities.
- C. Related Requirements:
 - 1. Section 06 16 00 "Sheathing" for foam-plastic board sheathing installed directly over wood or steel framing.
 - 2. Section 07 53 23 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.
 - 3. Section 09 29 00 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED2009 - Sustainable Design Submittals:
 - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
 - 2. Product Data: For adhesives, indicating VOC content.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- C. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 - 1. Applications include:
 - a. On interior foundation wall surfaces.
 - 2. Thermal Resistance (R Value): Minimum 5.0/inch.
 - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - 4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS-FIBER BLANKET

- A. LEED2009 - Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Guardian Building Products, Inc.
 - c. Johns Manville; a Berkshire Hathaway company.
 - d. Knauf Insulation.
 - e. Owens Corning.

2.3 MINERAL-WOOL BLANKETS

- A. LEED2009 - Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Roxul Inc.
 - b. Thermafiber Inc.; an Owens Corning company.

2.4 SPRAY-APPLIED CELLULOSIC INSULATION

- A. LEED2009 - Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

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- B. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications), chemically treated for flame-resistance, processing, and handling characteristics.

1. Basis-of-Design Product: Subject to compliance with requirements, provide k-13 spray on systems insulation by International Cellulose Corporation or comparable product by one of the following:
- a. Central Fiber LLC.
 - b. Hamilton Manufacturing Inc.
 - c. Nu-Wool Co., Inc.

2.5 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

2.6 ACCESSORIES

- A. Joint Tape: Pressure-sensitive plastic tape recommended by insulation manufacturer for sealing joints and minor penetrations in board insulation.
1. Tape Width: 2-7/8 inches minimum.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

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

3.3 INSTALLATION UNDER SLAB-ON-GRADE

- A. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.
 2. Stagger end joints and tightly abut insulation units.
 3. Seal seams and penetrations with joint tape centered over joints.

3.4 INSTALLATION AT FOUNDATION WALL INTERIOR FACE

- A. On vertical foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.6 PROTECTION

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

END OF SECTION 07 21 00

SECTION 07 25 00 - WEATHER BARRIERS

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Section Revised

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 self-adhering modified bituminous sheet air barriers.
- B. Related Requirements:
 - 1. Section 06 16 00 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier materials, accessories, and assemblies specific to Project conditions.
 - 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 3. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.
- B. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.

- B. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
 - 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
 - 2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to ASTM E 783 .
 - 3. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate according to ASTM D 4541.
 - 4. Notify Architect seven days in advance of the dates and times when mockups will be tested.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 SELF-ADHERING SHEET AIR BARRIER

- A. Modified Bituminous Sheet: 40-mil- thick, self-adhering sheet consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick, cross-laminated polyethylene film with release liner on adhesive side.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc; CCW-705 LT.
 - b. Grace Construction Products; W.R. Grace & Co. -- Conn.; Perm-A-Barrier Low Temperature Wall Membrane.
 - c. Henry Company; Blueskin SA LT.
 - d. Polyguard Products, Inc.; Polyguard 400 Sheet Air Barrier.
 - e. Rubber Polymer Corporation, Inc.; Rub-R-Wall SA.
 - f. Tremco Incorporated; ExoAir 110/110LT.
 - g. W.R. Meadows, Inc; SealTight Air-Shield.
 - 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Tensile Strength: Minimum 250 psi ; ASTM D 412, Die C.
 - c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.
 - d. Puncture Resistance: Minimum 40 lbf; ASTM E 154/E 154M.

- e. Water Absorption: Maximum 0.15 percent weight gain after 48-hour immersion at 70 deg F; ASTM D 570.
- f. Vapor Permeance: Maximum 0.1 perm); ASTM E 96/E 96M, Desiccant Method.
- g. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541 as modified by ABAA.
- h. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- i. UV Resistance: Can be exposed to sunlight for 60 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
- C. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 123 Silicone Seal.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; US11000 UltraSpan.
 - c. Pecora Corporation; Sil-Span.
 - d. Tremco Incorporated; Spectrem Simple Seal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 - 3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

- H. Bridge isolation joints discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 INSTALLATION

- A. Install materials according to air-barrier manufacturer's written instructions and details and according to recommendations in ASTM D 6135 to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air-barrier sheet produced for low-temperature application. Do not install low-temperature sheet if ambient or substrate temperature is higher than 60 deg F.
 - 2. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
- B. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.
- C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.
- D. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
 - 1. Apply sheets in a shingled manner to shed water.
 - 2. Roll sheets firmly to enhance adhesion to substrate.
- E. Apply continuous air-barrier sheets over accessory strips bridging substrate cracks, construction, and contraction joints.
- F. CMU: Install air-barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air-barrier sheet immediately below protruding masonry ties or joint reinforcement or ties, and firmly adhere in place.
 - 1. Overlap horizontally adjacent sheets a minimum of 2 inches and roll seams.
 - 2. Apply overlapping sheets with bottom edge slit to fit around masonry reinforcing or ties. Roll firmly into place.
 - 3. Seal around masonry reinforcing or ties and penetrations with termination mastic.
 - 4. Continue the sheet into all openings in the wall, such as doors and windows, and terminate at points to maintain an airtight barrier that is not visible from interior.
- G. Seal top of through-wall flashings to air-barrier sheet with an additional 6-inch- wide, transition strip.
- H. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- I. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
 - 1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
- J. Connect and seal exterior wall air-barrier sheet continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- K. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.
- L. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- M. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.

2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- N. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- O. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.
- P. Do not cover air barrier until it has been tested and inspected by testing agency.
- Q. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.4 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of air-barrier system has been provided.
 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed.
 7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
 8. Termination mastic has been applied on cut edges.
 9. Air barrier has been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (air barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- D. Tests: As determined by testing agency from among the following tests:
 1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783.
 3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.
- E. Air barriers will be considered defective if they do not pass tests and inspections.
 1. Remove and replace deficient air-barrier components for retesting as specified above.
- F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

- B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 25 00

SECTION 10 11 16.13

FIXED MARKERBOARDS

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. Fixed markerboards.
- B. Related Requirements:
 - 1. Section 10 12 00 "Display Cases" for individually framed and enclosed, wall-mounted bulletin boards and for tackboards within display cases.

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, finishes, and accessories for visual display units.
 - 2. Include electrical characteristics for motorized units.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 2. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that the product contains no urea formaldehyde.
- C. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
 - 2. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.
 - 3. Show locations and layout of special-purpose graphics.
 - 4. Include sections of typical trim members.
 - 5. Include wiring diagrams for power and control wiring.
- D. Samples for Verification: For each type of visual display unit indicated.
 - 1. Visual Display Panel: Not less than 8-1/2 by 11 inches, with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch- long sections of each trim profile.
 - 3. Display Rail: 6-inch- long section of each type.
 - 4. Rail Support System: 6-inch- long sections.
 - 5. Accessories: Full-size Sample of each type of accessory.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For visual display units 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 2. Warranty Period: 50 years from date of Substantial Completion.
 3. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.

2.2 VISUAL DISPLAY BOARD ASSEMBLY

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Claridge Products and Equipment, Inc.
- B. Markerboard Panel: Porcelain-enamel-faced markerboard panel on core indicated.
1. Color: White.
- C. Tackboard Panel: Natural-cork Plastic-impregnated-cork Vinyl-fabric-faced Polyester-fabric-faced tackboard panel on core indicated.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; standard size and shape.
1. Aluminum Finish: Clear anodic finish.
- E. Chalktray: Manufacturer's standard; continuous.
1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

2.3 RAIL SUPPORT SYSTEM FOR VISUAL DISPLAY BOARD ASSEMBLIES

- A. Visual Display Board Assemblies: Fabricated from not less than 3/8-inch- thick, kraft-paper honeycomb core; designed to be rigid and to resist warpage, and with aluminum trim designed to engage hanger clips.

2.4 MARKERBOARD PANELS

03 Addendum

- A. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.

2.5 TACKBOARD PANELS

- A. Tackboard Panels:
 - 1. Facing: 1 " Sound Silencer PEPP board by Acoustical Surfaces, Inc. 123 Columbia Court North, Suite 201, Chaska, MN 55318. Ph: 1-888-223-5287, www.acousticalsurfaces.com
 - 2. Color: Selected from manufacturers full range of colors.
 - 3. Backing: 1/4-inch- thick hardboard .
- B. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; standard size and shape.
 - 1. Aluminum Finish: Clear anodic finish.

2.6 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
- C. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.7 GENERAL FINISH REQUIREMENTS

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

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display units.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.

- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prepare recesses for sliding visual display units as required by type and size of unit.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Factory-Fabricated Visual Display Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches o.c. Secure tops and bottoms of boards to walls.
- C. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings.
- D. Rail Support System: Install horizontal support rail at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall with fasteners at 12 inches o.c.
 - 1. Mounting Height: 72 inches above finished floor to top of rail.
 - 2. Hang visual display units on rail support system.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 10 11 16.13

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.3 ACTION SUBMITTALS

A. LEED Submittals:

- 1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- 2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 60 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- C. Certified TAB reports.
- D. Sample report forms.
- E. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.
- B. TAB Conference: Meet with Owner, Construction team, Commissioning Authority and Engineer on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.
1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."
- 1.6 COORDINATION
- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements, available TAB contractors that may be engaged include, but are not limited to, the following:
1. Balco Balancing, Inc.
 2. Badger Balancing LLC
 3. Environmental System Analysis
 4. Professional System Analysis, Inc

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
 - C. Examine the approved submittals for HVAC systems and equipment.
 - D. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
 - E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
 - F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
 - G. Examine test reports specified in individual system and equipment Sections.
 - H. Examine HVAC equipment and filters and verify that bearings are greased, and equipment with functioning controls is ready for operation.
 - I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
 - J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
 - K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
 - L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
 - M. Examine system pumps to ensure absence of entrained air in the suction piping.
 - N. Examine operating safety interlocks and controls on HVAC equipment.
 - O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.
- 3.3 PREPARATION
- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
 - B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.

7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", or ASHRAE 111 or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and/or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. For variable-air-volume systems, develop a plan to simulate diversity.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
1. Measure total airflow:
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fan's VFD or ECM motor to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.7 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
- B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
 2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 3. Measure total system airflow. Adjust to within indicated airflow.
 4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
 6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
 7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
 8. Record final fan-performance data.
 9. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
 10. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.8 PROCEDURE FOR CNG VENTILATION

- A. Contractor shall provide report of the testing, adjusting and balancing of the CNG ventilation mode for HVAC equipment. The make-up air units supply airflow and purge exhaust fans shall indicated CNG airflows. Contractor to engage ventilation system into CNG mode for the selected make-up air and exhaust fans. Set fans to their respective set-point for their maximum airflows per schedule. Contractor to adjust the exhaust purge airflows by variable frequency drive to maintain a negative space. The exhaust airflow shall exceed the supply airflow plus the negative offset. (Adj.)
- B. In CNG mode, the Contractor shall demonstrate the force for pushing or pulling open interior swinging egress doors, other than fire doors, shall not exceed 5 pounds. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. For other swinging doors, as well as sliding and folding doors, the door latch shall release when subjected to a 15-pound force. The door shall be set in motion when subjected to a 30-pound force. The door shall swing to a full-open position when subjected to a 15-pound force.
- C. Contractor shall provide field readings of the maximum pressure differential across adjacent interior doorways to demonstrate negative of the space in CNG mode.

3.9 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
 - 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 - 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 - 6. Set system controls so automatic valves are wide open to heat exchangers.
 - 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 - 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.10 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.

3.11 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

- A. Balance the primary circuit flow first and then balance the secondary circuits.

3.12 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.

6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.
- C. Motors Driven by Electronically Commutated Motor (ECM): Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.
- 3.13 PROCEDURES FOR CONDENSING UNITS
- A. Verify proper rotation of fans.
 - B. Measure entering- and leaving-air temperatures.
 - C. Record compressor data.
- 3.14 PROCEDURES FOR BOILERS
- A. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow.
- 3.15 PROCEDURES FOR HEAT-TRANSFER COILS
- A. Measure, adjust, and record the following data for each water coil:
 1. Entering- and leaving-water temperature.
 2. Water flow rate.
 3. Water pressure drop.
 4. Dry-bulb temperature of entering and leaving air.
 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 6. Airflow.
 7. Air pressure drop.
 - B. Measure, adjust, and record the following data for each electric heating coil:
 1. Nameplate data.
 2. Airflow.
 3. Entering- and leaving-air temperature at full load.
 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 5. Calculated kilowatt at full load.
 6. Fuse or circuit-breaker rating for overload protection.
 - C. Measure, adjust, and record the following data for each refrigerant and hot gas reheat coil:
 1. Dry-bulb temperature of entering and leaving air.
 2. Wet-bulb temperature of entering and leaving air.
 3. Airflow.
 4. Air pressure drop.
 5. Refrigerant suction pressure and temperature.
- 3.16 TOLERANCES
- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.
5. Solar Heating-Water Flow Rate: Plus or minus 10 percent.

3.17 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system.

3.18 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.

15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Settings for supply-air, static-pressure controller.
 - g. Other system operating conditions that affect performance.

- D. Make-Up and Air-Handling-Unit Test Reports: For units with coils, include the following:
 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Number, type, and size of filters.

 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.

 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outdoor-air damper position.
 - l. Return-air damper position.

- E. Apparatus-Coil Test Reports:
 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.

- i. Tube and fin materials.
 - j. Circuiting arrangement.
 - 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - l. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.
 - n. Refrigerant suction temperature in deg F.
- F. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- G. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.

- g. Indicated air flow rate in cfm.
- h. Indicated velocity in fpm.
- i. Actual air flow rate in cfm.
- j. Actual average velocity in fpm.
- k. Barometric pressure in psig.

H. Air-Terminal-Device Reports:

1. Unit Data:

- a. System and air-handling unit identification.
- b. Location and zone.
- c. Apparatus used for test.
- d. Area served.
- e. Make.
- f. Number from system diagram.
- g. Type and model number.
- h. Size.
- i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

- a. Air flow rate in cfm.
- b. Air velocity in fpm.
- c. Preliminary air flow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final air flow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.

I. System-Coil Reports: For water coils of terminal units, include the following:

1. Unit Data:

- a. System and air-handling-unit identification.
- b. Location and zone.
- c. Room or riser served.
- d. Coil make and size.
- e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

- a. Air flow rate in cfm.
- b. Entering-water temperature in deg F.
- c. Leaving-water temperature in deg F.
- d. Water pressure drop in feet of head or psig.
- e. Entering-air temperature in deg F.
- f. Leaving-air temperature in deg F.

J. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

- a. Unit identification.
- b. Location.
- c. Service.
- d. Make and size.

- e. Model number and serial number.
- f. Water flow rate in gpm.
- g. Water pressure differential in feet of head or psig.
- h. Required net positive suction head in feet of head or psig.
- i. Pump rpm.
- j. Impeller diameter in inches.
- k. Motor make and frame size.
- l. Motor horsepower and rpm.
- m. Voltage at each connection.
- n. Amperage for each phase.
- o. Full-load amperage and service factor.
- p. Seal type.

2. Test Data (Indicated and Actual Values):

- a. Static head in feet of head or psig.
- b. Pump shutoff pressure in feet of head or psig.
- c. Actual impeller size in inches.
- d. Full-open flow rate in gpm.
- e. Full-open pressure in feet of head or psig.
- f. Final discharge pressure in feet of head or psig.
- g. Final suction pressure in feet of head or psig.
- h. Final total pressure in feet of head or psig.
- i. Final water flow rate in gpm.
- j. Voltage at each connection.
- k. Amperage for each phase.

3.19 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.
- 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
- 3. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.
- 3.20 ADDITIONAL TESTS
- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION 23 09 00
INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

- B. Related Sections include the following:

1. Section 230519 "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Section 230925 "Direct Digital Control System for HVAC" for requirements that relate to this Section.
3. Section 230993 "Sequence of Operations for HVAC Controls" for requirements that relate to this Section.

- C. Furnish and install all labor, materials, equipment, electronic interfaces and actuation devices, apparatus, software, services, permits and supervision, and all permanent and temporary facilities necessary to provide complete and proper working Direct Digital Control system as indicated on the drawings, called for in the specifications or required by job conditions. Drawings are diagrammatic only. Provide any equipment and labor not specifically referred to herein or on the drawings that are required to meet the functional intent, such as repeaters, routers, bridges, and gateways.

1.3 SYSTEM DESCRIPTION

- A. System is to use direct digital control with electric actuation for air handling units; direct digital control with electric actuation for room temperature, room humidity, and terminal airflow control; and electric control for other terminal units.

1.4 DEFINITIONS

- A. BAS: Building Automation System.
- B. DDC: Direct digital control.
- C. I/O: Input/output.
- D. LAN: Local Area Network.
- E. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.
- F. RTD: Resistance temperature detector.

1.5 SYSTEM PERFORMANCE

1. Comply with the following performance requirements:
2. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
 - a. Water Temperature: Plus or minus 1 deg F.

- b. Water Flow: Plus or minus 5 percent of full scale.
 - c. Water Pressure: Plus or minus 2 percent of full scale.
 - d. Space Temperature: Plus or minus 1 deg F.
 - e. Ducted Air Temperature: Plus or minus 1 deg F.
 - f. Outside Air Temperature: Plus or minus 2 deg F.
 - g. Dew Point Temperature: Plus or minus 3 deg F.
 - h. Temperature Differential: Plus or minus 0.25 deg F.
 - i. Relative Humidity: Plus or minus 5 percent.
 - j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
 - k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
 - l. Airflow (Terminal): Plus or minus 10 percent of full scale.
 - m. Air Pressure (Space): Plus or minus 0.01-inch wg.
 - n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
 - o. Carbon Monoxide: Plus or minus 5 percent of reading.
 - p. Carbon Dioxide: Plus or minus 50 ppm.
 - q. Electrical: Plus or minus 5 percent of reading.
- B. Communications protocol:
- 1. BACnet protocol per the latest version of ASHRAE Standard 135 and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
 - 2. LonTalk protocol using the LonWorks neuron chip from Echelon Corporation and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
- C. Engineering units: English.
- D. Provide at least 10% spare I/O connections on each controller.
- E. Components shall operate within 32 deg F to 122 deg F and 5-85% relative humidity, non-condensing.
- 1.6 SEQUENCE OF OPERATION
- A. Refer to Section 230925 "Direct Digital Control System for HVAC" for requirements that relate to this Section.
- 1.7 ACTION SUBMITTALS
- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- 1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
 - 2. Schematic flow diagrams for each system showing fans, pumps, coils, dampers, valves, and control devices.
 - 3. Wiring Diagrams: Power, signal, and control wiring. Differentiate between factory and field installed wiring.
 - 4. Wire Tabulation List: wire ID, "to" and "from", and wire color.
 - 5. Details of control panel faces, including controls, instruments, and labeling.
 - 6. Schedule of dampers including size, leakage, and flow characteristics.
 - 7. Schedule of valves including flow characteristics.
 - 8. Control valve assemblies shall be provided and delivered from a single manufacturer as a complete assembly.
- C. Samples for Initial Selection: For each color required, of each type of thermostat or sensor cover with factory-applied color finishes.
- D. Samples for Verification: For each color required, of each type of thermostat or sensor cover.

1.8 INFORMATIONAL SUBMITTALS

- A. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.
- B. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.
- C. Qualification Data: For Installer.
- D. Field quality-control test reports.

1.9 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - 1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
 - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 - 3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 - 4. Calibration records and list of set points.
 - 5. Programming manuals.
 - 6. Maintenance instructions.
 - 7. Record documents ("as-builts"), including updated schematic diagrams, wiring diagrams, and control sequences.
 - 8. Training documentation.
 - 9. Contact information of service contractor and parts suppliers.

1.10 QUALITY ASSURANCE

- A. Installing contractor must be a manufacturer's branch office or an authorized representative of a Direct Digital Control (DDC) equipment manufacturer that provides engineering and commissioning of the DDC equipment. Submit written confirmation of such authorization from the manufacturer. Indicate in letter of authorization that installing contractor has successfully completed all necessary training required for engineering, installation, and commissioning of equipment and systems and that such authorization has been in effect for a period of not less than three years. DDC equipment may or may not be required to be installed by this contractor as part of the project, but the intent of this quality assurance specification is to ensure that the installing contractor has the capabilities to engineer, install, and commission the field devices supplied under this section for temperature control.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with ASHRAE 135 for DDC system components.
- D. Comply with the following:
 - 1. **UL-916; Energy Management Systems.**
 - 2. **UL-873; Temperature Indication and Regulating Equipment.**
 - 3. **UL-864, Subcategories UUKL, UOXX, UDTZ; Fire Signaling and Smoke Control Systems.**
 - 4. **FCC, Part 15, Subpart J, Class A Computing Devices.**

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

1.12 COORDINATION

- A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.
- B. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.
- C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

1.13 WARRANTY

- A. Provide warranty on all parts and labor for one year starting at the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONTROL SYSTEM

- 1. Refer to Section 230925 "Direct Digital Control System for HVAC" for requirements that relate to this Section.

2.3 INTERFACE WITH DDC EQUIPMENT

- A. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers. Systems which command multiple outputs over a single pair of wires, such as power line carrier systems, are not acceptable.
 - 1. Binary Inputs: Allow monitoring of on-off signals without external power.
 - 2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
 - 3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
 - 4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
 - 5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
 - 6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
 - 7. Universal I/Os: Provide software selectable binary or analog outputs.
 - 8. SPDT Output Relays: Indicate status with an LED.
- B. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
 - 1. Output ripple of 5.0 mV maximum peak to peak.
 - 2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
 - 3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.
 - 4. Provide all required power supplies for transducers, sensors, transmitters and relays. All low voltage transformers shall have a resettable secondary circuit break.

- C. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
1. Minimum dielectric strength of 1000 V.
 2. Maximum response time of 10 nanoseconds.
 3. Minimum transverse-mode noise attenuation of 65 dB.
 4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.
- D. Control Panels:
1. Provide panel enclosures for all DDC controllers and associated function modules. All controls to be in enclosures without exception. Panels will be approved provided all conduit is bonded and grounded.
 2. Provide UL listed cabinets for use with line voltage devices.
 3. See Division 26 for control panel assembly and installation.
 4. NEMA Rating:
 - a. Inside: NEMA-1.
 - b. Outside: NEMA-3R or NEMA-4.
 5. Constructed of steel or extruded aluminum, with hinged door, keyed lock, and baked enamel finish. Install controls, relays, transducers and automatic switches inside panels. Label devices with permanent printed labels and provide asbuilt wiring/piping diagram within enclosure. Provide raceways for wiring and poly within panel for neat appearance. Provide termination blocks for all wiring terminations. Label outside of panel with panel number corresponding to plan tags and asbuilt control drawings as well as building system(s) served.
 6. Control panels that have devices or terminations that are fed or switch 50V or higher shall enclose the devices, terminations, and wiring so that Personal Protective Equipment (PPE) is not required to service the under 50V devices and terminations within the control panel. As an alternative, a separate panel for only the 50V and higher devices may be provided and mounted adjacent to the under 50V control panel.
 7. For panels that have 120VAC power feeds provide a resettable circuit breaker. Provide label within the panel indicating circuit number of 120VAC serving panel
 8. Provide a service shutdown toggle switch for each air handling unit system located inside the temperature control panel that will initiate a logical shutdown of the air handling unit system. Label the switch so it is clear which position is shutdown and which is auto.
- E. Interface with Other Systems: All hardware and software required to provide the specified interactions with other systems, such as fire alarm, security, and lighting systems.

2.4 ELECTRONIC SENSORS AND TRANSMITTERS

- A. General Requirements:
1. Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
 2. For wall, immersion, or duct mounting as required.
 - a. Architectural housing for office space mounting.
 - b. Weatherproof/sunshield housing for outdoors.
 - c. Thermowell housing for water applications.
 - 1) Non-corrosive fluids below 250 deg F: brass or stainless steel.
 - 2) Other applications: 300 series stainless steel.
 - d. Protective housing for duct mounting.
 - e. Water and dust tight stainless-steel housing for space sensors located in process areas.
 3. The sensor/transducer shall be selected to withstand ambient conditions, including moisture or condensation and transient conditions for temperatures, pressures, humidities, etc.
 4. Transducers may be supplied as an integral unit with the field sensor, or as part of the controller.
 5. The sensor/transducer shall be appropriately selected to most closely match the expected sensing range.
 6. Use a transmitter where the sensor is more than 100 feet from its associated controller, there is excessive electrical noise present, or the controller cannot accept direct sensor input, a 4-20mA type.
 7. All temperature and humidity sensors shall be of the same manufacturer.

8. All pressure transmitters and transducers shall be of the same manufacturer.
- B. RTDs and Transmitters:
1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. MAMAC Systems, Inc.
 - c. RDF Corporation.
 2. Accuracy: Plus or minus 0.2 percent at calibration point.
 3. Wire: Twisted, shielded-pair cable.
 4. Insertion Elements in Ducts: Single point, 18 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
 5. Averaging Elements in Ducts: 18 inches long, rigid use where prone to temperature stratification or where ducts are larger than 9 sq. ft.; length as required.
 6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches.
 7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed.
 - b. Set-Point Indication: Concealed.
 - c. Thermometer: Concealed.
 - d. Color: White.
 - e. Orientation: Vertical.
 8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
 9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
- C. Humidity Sensors: Bulk polymer sensor element.
1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. General Eastern Instruments.
 - c. MAMAC Systems, Inc.
 - d. ROTRONIC Instrument Corp.
 - e. TCS/Basys Controls.
 - f. Vaisala.
 2. Accuracy: 2 percent full range with linear output.
 3. Room Sensor Range: 20 to 80 percent relative humidity.
 4. Temperature Effect: 0.06 percent per deg F.
 5. Repeatability: 0.5 percent relative humidity.
 6. Hysteresis: 1 percent.
 7. Long-term Stability: 1 percent relative humidity drift per year.
 8. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed.
 - b. Set-Point Indication: Concealed.
 - c. Thermometer: Concealed.
 - d. Color: White.
 - e. Orientation: Vertical.
 9. Duct Sensor: 0 to 95 percent relative humidity range with element guard and mounting plate.
 10. Outside-Air Sensor: 0 to 95 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of minus 40 to plus 170 deg F]
 11. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
- D. Pressure Transmitters/Transducers:
1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. General Eastern Instruments.

- c. MAMAC Systems, Inc.
 - d. ROTRONIC Instrument Corp.
 - e. TCS/Basys Controls.
 - f. Vaisala.
 2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
 - a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - b. Output: 4 to 20 mA.
 - c. Building Static-Pressure Range: 0- to 0.25-inch wg.
 - d. Duct Static-Pressure Range: 0- to 5-inch wg.
 3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output 4 to 20 mA.
 4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output 4 to 20 mA.
 5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
 6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.
 7. Air Filters: Provide filters on all pressure probes in return or exhaust air systems.
- E. PRESSURE TRANSDUCERS (AIR)
 1. Provide pressure transducers specified below for the following applications:
 - a. Duct static pressure applications where setpoints are specified to control at greater than 0.1" w.c.
 - b. Pitot type fan inlet air flow stations.
 2. Manufacturers: Mamac Systems, Setra, and Veris Industries.
 3. Provide a transmitter that operates on the capacitance principle and is capable of sensing low positive, negative or differential pressures. Transmitter shall have a minimum of three pressure ranges adjustable by an onboard switch or jumper. Size the transmitter where the middle or high range is suitable for the application. Use a bi-directional transmitter for applications that may have both positive and negative pressure excursions. Transmitter shall be provided with an integral four-digit display of the pressure sensed.
 - a. Accuracy (including non-linearity and hysteresis) + 1% FS
 - b. Compensated Temperature Range 32°-140° F
 - c. Temperature Effect 0-1"wc Range .09% FS/°F;
 - d. >1"wc Range .02% FS/°F
 - e. Output 4-20 MA
 - f. Load Impedance (smallest maximum acceptable) 800 Ω max.
 - g. Operating Temperature 32°-140° F
 4. Provide pressure transducers specified below for the following applications:
 - a. Duct static pressure applications where setpoints are specified to control at 0.1" w.c. or lower.
 - b. All duct mounted pitot type air flow stations.
 - c. Space/building static control or monitoring.
 5. Manufacturers: Paragon Controls MicroTrans, Air Monitor Veltron DPT2500 Plus, or approved equal.
 6. The airflow transducer shall provide noise filtration and automatic auto-zeroing. The automatic zeroing circuit shall be capable of maintaining the transducer output to within ±0.25% of operating span. The transducer output shall be locked and maintained at the last given output value during the automatic zeroing period so as not to interrupt the automatic control process. Use a bi-directional transmitter for applications that may have both positive and negative pressure excursions. Transmitter shall be provided with an integral four-digit display of the pressure sensed.
 7. Transducer Span: <2 times the design velocity pressure at maximum flow, single range
 8. Accuracy: ±0.25% of full scale, including non-linearity, hysteresis, deadband, and non-repeatability
 9. Temperature Effect: ±0.15% of full scale/°F
 10. Response: 0.5 sec. for 98% of full span change
 11. Overpressure: 5 PSIG Proof

12. Power: 24VAC/VDC
 13. Analog Output: 0-5VDC, 0-10VDC, or 4-20mA field adjustable
 14. Auto Zero Frequency: every 1 to 24 hours on 1 hour intervals
 15. For space or building static pressure monitoring, use Vaisala model SPH10 Static Pressure Head, or approved equal for outside air reference. Mount in location shown on plans or approved by AE.
- F. Room Sensor Cover Construction: Manufacturer's standard locking covers.
1. Set-Point Adjustment: Concealed.
 2. Set-Point Indication: Concealed.
 3. Thermometer: Concealed.
 4. Color: White
 5. Orientation: Vertical.
- G. Room sensor accessories include the following:
1. Insulating Bases: For sensors located on exterior walls.
 2. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base.
 3. Adjusting Key: As required for calibration and cover screws.
- 2.5 STATUS SENSORS
- A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.
- B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.
- C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.
- D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.
- E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.
- F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements. Provide a current sensor with adjustable threshold and digital output with LED display, equal to a Veris model H-708/H-904. Threshold adjustment must be by a multi-turn potentiometer or set by multiprocessor that will automatically compensate for frequency and amperage changes associated with variable frequency drives. When used on variable speed motor applications, use a current sensor that will not change state due to varying speeds.
- G. Current Sensors: Series-connect current sensors produce a digital logic level output for monitoring. Series-connect current sensors produce a digital logic level output as signal feedback to monitor the current flowing of the HVAC equipment. Operating temperature range -25 to 85 degrees C. Provide solid core or split core Vdc output current transmitters. Current sensor to have a five year limited warranty.
1. Current Sensor: Provide Honeywell CS Series or equivalent.
- H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure NTP fitting, rated for 300 psig for chilled water applications or 150 psig other applications.
1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. I.T.M. Instruments Inc.
- I. Position Sensors:

1. Rotary Switches: cam action, lever, or proximity type, accuracy plus or minus 1 percent of full span, repeatability plus or minus 0.5 percent of full span, maximum temperature 125 deg F.
 2. Door Position Switches: magnetic proximity type.
- J. Paddle Flow Switches: Adjustable setpoint, selected for accuracy and ranges to match process conditions and electrical requirements; mounted on duct top, side, or bottom. Mounting in vertical duct with downward flow is not allowed.
- 2.6 GAS DETECTION EQUIPMENT
- A. Standalone Carbon Monoxide and Nitrogen Dioxide Detectors and Controllers
1. Available Manufacturers:
 - a. B. W. Technologies.
 - b. CEA Instruments.
 - c. Vulcain Inc.
 2. Controller:
 - a. General: Microprocessor controlled, capable of performing the specified sequence of operation.
 - b. Enclosure: Corrosion resistant.
 - c. Operating Temperature Range: 32 to 104 deg F.
 - d. Operating Relative Humidity Range: 15 to 90%, non-condensing.
 - e. Input Power: 120V connection. 24V with transformer is acceptable.
 - f. Outputs:
 - 1) Indicating Lights: For power and alarm.
 - 2) Audible Alarm: with manual silence switch.
 - 3) Ventilation Equipment Activation Relay: 120V, 5A at 240 VAC.
 - 4) Fault Alarm Relay: 24V, to signal building automation system.
 - 5) Activate ventilation equipment when power to controller fails.
 - g. Accessories:
 - 1) Calibration kit.
 - 2) Splash Protection: Corrosion-resistant splash guard with transparent cover to see indicating lights, or NEMA rating 3R or higher.
 3. Sensors:
 - a. General: Electrochemical, factory calibrated.
 - b. Accuracy: +5%.
 - c. Minimum Life: 2 years
 - d. Repeatability: +10% at calibration point.
 4. Alternates:
 - a. A separate controller with remote transmitters is permitted.
 - b. Combination carbon dioxide / nitrogen dioxide sensors or transmitters are permitted.
- B. Manufacturers:
1. B. W. Technologies.
 2. CEA Instruments, Inc.
 3. Ebtron, Inc.
 4. Gems Sensors Inc.
 5. Greystone Energy Systems Inc.
 6. Honeywell International Inc.; Home & Building Control.
 7. INTEC Controls, Inc.
 8. I.T.M. Instruments Inc.
 9. MSA Canada Inc.

10. QEL/Quatrosense Environmental Limited.
 11. Sauter Controls Corporation.
 12. Sensidyne, Inc.
 13. TSI Incorporated.
 14. Vaisala.
 15. Vulcain Inc.
 16. Brasch Manufacturing Company.
 17. General Analysis Corporation.
 18. Macurco Inc.
 19. MDA Scientific
 20. Toxalert.
- C. Carbon Monoxide Detectors: Single or multichannel, dual-level detectors using solid-state plug-in sensors with a 3-year minimum life; suitable over a temperature range of 32 to 104 deg F; with 2 factory-calibrated alarm levels at 35 and 200 ppm in a heavy-gauge aluminum NEMA 1 enclosure.
- D. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of 23 to 130 deg F and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output; range 0 to 2000 ppm, self-calibrating, for wall mounting.
- E. Oxygen Sensor and Transmitter: Single detectors using solid-state zircon cell sensing; suitable over a temperature range of minus 32 to plus 1100 deg F and calibrated for 0 to 5 percent, with continuous or averaged reading, 4- to 20-mA output; for wall mounting.
- F. Occupancy Sensor: Passive infrared, with time delay, daylight sensor lockout, sensitivity control, and 180-degree field of view with vertical sensing adjustment; for flush mounting.
- G. Nitrogen Dioxide Detection System: packaged system with microcontroller, sensor(s), control relays and contacts in a heavy-gauge aluminum NEMA 1 enclosure.
1. Detection Resolution: Plus or minus 0.1 ppm.
 2. Ambient Temperature Range: Minus 4 to plus 113 deg F (minus 20 to 45 deg C).
 3. Ambient Humidity Range: 10 to 95 percent relative humidity.
 4. Low alert level adjustable in increments of 0.1 ppm.
 5. Indicator lights for power, relay status, and alarm condition.
 6. Protected against static discharge, excessive electrical noise, and tested in accordance with ANSI/UL 1244.
 7. Output relays providing a normally closed set of contacts for the alert states and the alarm states, which will automatically operate ventilation equipment on power loss to the sensor.
 8. If a large area must be monitored with multiple sensors, a controller system with remote sensors may be used.

2.7 CARBON DIOXIDE (CO2) SENSOR

- A. Provide a Carbon Dioxide (CO2) sensor that shall utilize non-dispersive infrared (NDIR) technology. The sensor shall have a linear analog output over a range of 0-2000 ppm and have built in display of CO2 level. The sensor shall have an automatic calibration algorithm that will compensate for sensor drift over time due to sensor element degradation. Unit shall be provided with a 0-10VDC or 4-20mA analog output that is selectable and a field adjustable relay alarm output. Accuracy shall be better than $\pm 5\%$ of reading or ± 50 ppm whichever is higher. The sensor shall be user calibratable with a minimum calibration interval of five years.

2.8 FLOW MEASURING STATIONS

- A. Duct Airflow Station: Combination of air straightener and multiport, self-averaging pitot tube station.
1. Manufacturers:
 - a. Ebtron.
 - b. Tek-Air.
 - c. Air Monitor.

- d. Kurz Instruments.
 - 2. Casing: Galvanized-steel frame, same size as duct.
 - 3. Flow Straightener: Aluminum honeycomb, 3/4-inch parallel cell, 3 inches deep.
 - 4. Sensing Manifold: Copper manifold with bullet-nosed static pressure sensors positioned on equal area basis.
 - 5. Accuracy: 2 percent of full range.

- B. Provide duct mounted airflow station type based on the following manufacturer's minimum design velocities. Outside air flow stations shall be thermal dispersion type only. Turndown of variable volume fan systems must be considered. Provide an airflow station schedule detailing the airflow range to be measured, corresponding velocity pressure, differential pressure transducer range, and the airflow station size.

- C. Fan inlet piezometers: Where fan inlet piezometers are provided, these shall be used by the control contractor for air flow measurement. The air velocity transducers shall be provided under this Section and sized as described below.

- D. For factory mounted fan piezometers rings, air velocity transducers range shall be sized less than two times the design velocity pressure at maximum flow and will meet the requirements under the PRESSURE TRANSDUCERS (AIR) specification later in this specification section unless noted below.

- E. Thermal dispersion air flow stations:
 - 1. Probe Sensor Density:

	Area (sq. ft.)	Sensors
a.	<= 1.5	2
b.	>1.5 to <4	4
c.	4 to <8	6
d.	8 to <12	8
e.	12 to <16	12
f.	>=16	15
 - 2. Airflow Sensor Accuracy: $\pm 2\%$ of reading
 - 3. Calibrated Range: 0-2500 FPM for duct applications and 5000 FPM for fan inlet applications
 - 4. Temperature Sensor Accuracy: $\pm 0.15^\circ\text{F}$
 - 5. Temperature: -20°F to $+140^\circ\text{F}$
 - 6. Relative Humidity: 0 to 95% (non-condensing)

- F. Provide transmitter that will average up to sixteen sensors and provide two field selectable linear analog output signals (4-20mA and 0-10 VDC) proportional to airflow and temperature. Sensor electronic circuitry other than the temperature sensors shall not be exposed to the air stream and shall be protected from moisture to prevent failure.

2.9 THERMOSTATS

- A. Manufacturer: Basis-of-Design Product: The design is based on the following:
 - 1. Honeywell TR71.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Erie Controls.
 - 2. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
 - 3. Heat-Timer Corporation.
 - 4. Sauter Controls Corporation.
 - 5. Tekmar Control Systems, Inc.
 - 6. Theben AG - Lumilite Control Technology, Inc.

- C. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.
 - 1. Label switches "FAN ON-OFF" or "FAN HIGH-LOW-OFF" or "FAN HIGH-MED-LOW-OFF" based on system operation.
 - 2. Mount on single electric switch box.

- D. Electric, solid-state, microcomputer-based room thermostat with remote sensor and occupancy modes. (Type T1)
1. Automatic switching from heating to cooling.
 2. Preferential rate control to minimize overshoot and deviation from set point.
 3. Set up for four separate temperatures per day.
 4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
 5. Three-hour occupied override button.
 6. Short-cycle protection.
 7. Programming based on weekday, Saturday, and Sunday.
 8. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, fan on-auto, and occupied/unoccupied modes.
 9. Battery replacement without program loss.
 10. Minimum deadband temperature: 2 deg F.
 11. Control accuracy: +1 deg F.
 12. Multiple stage operation as required by equipment being controlled.
 13. Thermostat display features include the following:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Programmed time.
 - e. Duration of timed override.
 - f. Day of week.
 - g. System mode indications include "heating," "cooling," "off," "fan auto," "fan on", "occupied," and "unoccupied."
- E. Electric, solid-state, microcomputer-based room thermostat with remote sensor (Type T2).
1. Automatic switching from heating to cooling.
 2. Preferential rate control to minimize overshoot and deviation from set point.
 3. Set up for four separate temperatures per day.
 4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
 5. Short-cycle protection.
 6. Programming based on weekday, Saturday, and Sunday.
 7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
 8. Battery replacement without program loss.
 9. Minimum deadband temperature: 2 deg F.
 10. Control accuracy: +1 deg F.
 11. Multiple stage operation as required by equipment being controlled.
 12. Thermostat display features include the following:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Programmed time.
 - e. Duration of timed override.
 - f. Day of week.
 - g. System mode indications include "heating," "cooling," "off," "fan auto," and "fan on."
- F. Low-Voltage, On-Off Thermostats (Type T3): NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, visible temperature reading, concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.
- G. Line-Voltage, On-Off Thermostats (Type T4): Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; visible temperature reading, listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.
1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
 2. Selector Switch: Integral, manual on-off-auto.

- H. Remote-Bulb Thermostats (Type T5): On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.
1. Bulbs in water lines with separate wells of same material as bulb.
 2. Bulbs in air ducts with flanges and shields.
 3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
 4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
 5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
 6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.
- I. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual-reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below set point.
1. Bulb Length: Minimum 1 foot (3 m) for every square foot of coil surface.
 2. Quantity: One thermostat for every 20 sq. ft. of coil surface.
- J. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual-reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above set point.
1. Bulb Length: Minimum 20 feet.
 2. Quantity: One thermostat for every 20 sq. ft. of coil surface.
 3. Temperature Setpoint: 38 deg F, adjustable within 35 deg F to 45 deg F.
- K. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25 psig and cast housing with position indicator and adjusting knob.
- L. Hazardous Room Thermostats (Type T13): Equal to Johnson Controls A19BUC-2, line voltage, SPDT, single stage, external adjustment knob, external sensing coil secured to enclosure, and temperature sensing range 20 deg F to 80 deg F; for Class I or II, Group D, E, F, or G locations.
- M. Thermostat Accessories:
1. Cover: Manufacturer's standard locking covers.
 2. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base
 3. Insulating Bases: For sensors located on exterior walls.

2.10 ACTUATORS

- A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action. Stroke time for 90-degree rotation 90 seconds or less for major equipment and 6 minutes or less for terminal equipment. Provide position feedback potentiometers connected to controller for closed loop control on major equipment analog control loops. Provide pilot positioners.
1. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
 2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
 3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
 4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
 5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
 6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.
 7. Provide external adjustable stops on damper actuators.
- B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque. Stroke time for 90-degree rotation 90 seconds or less for major equipment and 6 minutes or less for terminal equipment. Provide

position feedback potentiometers connected to controller for closed loop control on major equipment analog control loops. Provide pilot positioners.

1. Manufacturers:
 - a. Belimo Air Controls (USA), Inc.
2. Valves: Size for torque required for valve close off at maximum pump differential pressure. Provide operators and pilot positioners with linkages and brackets for mounting on control valve. Design mounting and/or support to provide no more than 5% hysteresis in either direction.
3. Dampers: Size for running torque calculated as follows:
 - a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
 - b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
 - c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft. of damper.
 - d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
 - e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
 - f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.
4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: 40 to 104 deg F.
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
12. Run Time: 12 seconds open, 5 seconds closed.
13. Provide external adjustable stops on damper actuators.
14. Position Feedback:
 - a. Two-position actuators with limits switches or other positive means of a position indication signal for remote monitoring of open and close position.
 - b. Modulating actuators with a position feedback through current or voltage signal for remote monitoring. Add a 500 ohm resistor across a 4-20 mA signal to create a 2-10 VDC signal when required.
 - c. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.
 - d. Provide auxiliary switches and feedback potentiometer for control valves and damper actuators for position indication. Belimo actuators and auxiliary switches are designed for IEC protection class II and double insulated.

2.11 CONTROL VALVES

- A. Manufacturer: Basis-of-Design Product: The design is based on the following:
 1. Belimo Air Controls (USA), Inc.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Honeywell
 2. Siemens
 3. Johnson Controls, Inc.
- C. Hydronic system control valves shall have the following characteristics:
 1. NPS 2 and Smaller:
 - a. Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity re-packable under pressure.

- b. Characterized Ball Valves: The following manufacturers are acceptable: Belimo, Air Controls (USA), and Johnson Controls. Forged brass or bronze body, stainless steel shaft and ball, reinforced Teflon or PTFE ball seals, double O-ring stem seals, characterized disk, maximum of ANSI Class IV (0.01%) leakage, suitable for use on water systems at 150 psig and 212° F. Minimum size for ball valves shall be 0.4 Cv.
 - 1) Pressure Rating for NPS 1 and Smaller: Nominal 600 psi.
 - 2) Pressure Rating for NPS 1-1/2 through NPS 2: Nominal 400 psi.
 - 3) Close-off Pressure: 200 psig.
 - 4) Process Temperature Range: Zero to 250 deg F.
 - 5) Control Port Leakage: 0%
 - 6) Body and Tail Piece: Cast bronze ASTM B61, ASTM B62, ASTM B584, or forged brass with nickel plating.
 - 7) End Connections: Threaded (NPT) ends.
 - 8) Ball: stainless steel.
 - 9) Stem and Stem Extension:
 - 10) Material to match ball.
 - 11) Blowout-proof design.
 - 12) Ball Seats: Reinforced PTFE.
 - 13) Stem Seal: Reinforced PTFE packing ring with a threaded packing ring follower to retain the packing ring under design pressure with the linkage removed. Alternative means, such as EPDM O-rings, are acceptable if an equivalent cycle endurance can be demonstrated by testing.
 - 14) Flow Characteristic: Equal percentage.
- 2. NPS 2-1/2 and Larger: Class 125 iron, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
- 3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
 - a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
 - b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
- 4. Sizing: 5-psig maximum pressure drop at design flow rate or the following:
 - a. Two Position: Line size.
 - b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
 - c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.
- 5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
- 6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
- D. Butterfly Valves: 200-psig, 150-psig maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
 - 1. Body Style: Wafer or Lug.
 - 2. Disc Type: Nickel-plated ductile iron or Elastomer-coated ductile iron.
 - 3. Sizing: 1-psig maximum pressure drop at design flow rate.
 - 4. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
- E. Terminal Unit Control Valves: Pressure Independent Control valve (PICV) Bronze body, bronze trim, two or three ports ball valve as indicated, replaceable plugs and seats, and union and threaded ends.
 - 1. PICV equal to Belimo Zone Tight ball valve (PIQCV)
 - 2. Combination of differential pressure regulator and 2-way valve.

3. Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.
4. Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.
5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
6. Performance:
 - a. Pressure Rating: 360 psig.
 - b. Close-off pressure of 200 psig.
 - c. Process Temperature Range: Between 36 deg F to 212 deg F.
 - d. Rangeability: 100 to 1.
7. Integral Pressure Regulator: Located upstream of ball to regulate pressure, to maintain a constant pressure differential while operating within a pressure differential range of 5 to 50 psig.
8. Body: Forged brass, nickel plated, and with threaded ends.
9. Ball: Stainless steel.
10. Stem and Stem Extension: Stainless steel, blowout-proof design.
11. Ball Seats: Reinforced PTFE.
12. Stem Seal: Reinforced PTFE packing ring stem seal with threaded packing ring follower to retain the packing ring under design pressure with the linkage removed. Alternative means, such as EPDM O-rings, are acceptable if equivalent cycle endurance can be achieved.

F. All valves unless specifically noted on the plans or indicated below shall be globe style or Characterized Ball valves.

VALVE SERVING	TYPE Globe Butterfly (BF) Ball Press Independent Ball (PI Ball)	SIGNAL 0-10 VDC 2-Position Elect	SPRING RETURN REQUIRED Yes No	FAIL POSITION Open (thru Coil) Closed (bypass Coil) Last Position
Booster Reheat Coil	PICV Ball	0-10 VDC	No	Last Position
Radiation w/Reheat	PICV Ball	0-10 VDC	No	Last Position
Standalone Radiation	PICV Ball	0-10 VDC	No	Last Position
Radiant Manifolds	PICV Ball	0-10 VDC	No	Last Position
Unit Heaters	PICV Ball	2-Pos Elect	Yes	Open
MAU Heating Coil	Globe	0-10 VDC	Yes	Open
AHU Heating Coil	Globe	0-10 VDC	Yes	Open

2.12 DAMPERS

- A. Manufacturer: Basis-of-Design Product: The design is based on the following:
 1. TAMCO 7000 (T. A. Morrison & Co. Inc.).
- B. Manufacturers:
 1. Air Balance Inc.
 2. Don Park Inc.; Autodamp Div.
 3. United Enertech Corp.
 4. Vent Products Company, Inc.
- C. Dampers: AMCA-rated, parallel or opposed-blade design; 0.108-inch-minimum thick, galvanized-steel or 0.125-inch-minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch-thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.
 1. Secure blades to 1/2-inch-diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze or nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.

2. Operating Temperature Range: From minus 40 to plus 200 deg F.
 3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
 4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.
- D. High-Performance Control Dampers: AMCA-rated.
1. Frame: extruded-aluminum, 0.125-inch-minimum thick; frames with holes for duct mounting.
 2. Blades: minimum 0.064-inch-thick aluminum with maximum blade width of 8 inches and length of 48 inches, with end caps.
 3. Secure blades to 1/2-inch-diameter, zinc-plated axles using zinc-plated hardware, with Celcon inner bearing fixed to an aluminum hexagon blade pin rotating within a polycarbonate outer bearing inserted in the damper frame, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
 4. Operating Temperature Range: From minus 40 to plus 200 deg F
 5. Edge Seals: Use inflatable blade edging or replaceable silicone rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 1.7 cfm per sq. ft. of damper area, at differential pressure of 1-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

2.13 ELECTRICAL POWER DEVICES

- A. Transformers:
1. Transformer shall be sized for the total connected load, plus an additional 25 percent of connected load.
 2. Transformer shall be at least 100 VA.
 3. Transformer shall have both primary and secondary fuses.
- B. Power-Line Conditioner:
1. General Power-Line Conditioner Requirements:
 - a. Design to ensure maximum reliability, serviceability and performance.
 - b. Overall function of the power-line conditioner is to receive raw, polluted electrical power and purify it for use by electronic equipment. The power-line conditioner shall provide isolated, regulated, transient and noise-free sinusoidal power to loads served.
 2. Standards: NRTL listed per UL 1012.
 3. Performance:
 - a. Single phase, continuous, 100 percent duty rated KVA/KW capacity. Design to supply power for linear or nonlinear, high crest factor, resistive and reactive loads.
 - b. Automatically regulate output voltage to within 2 percent or better with input voltage fluctuations of plus 10 to minus 20 percent of nominal when system is loaded 100 percent. Use Variable Range Regulation to obtain improved line voltage regulation when operating under less than full load conditions.
 - 1) At 75 Percent Load: Output voltage automatically regulated to within 3 percent with input voltage fluctuations of plus 10 to minus 35 percent of nominal.
 - 2) At 50 Percent Load: Output voltage automatically regulated to within 3 percent with input voltage fluctuations of plus 10 to minus 40 percent of nominal.
 - 3) At 25 Percent Load: Output voltage automatically regulated to within 3 percent with input voltage fluctuations of plus 10 to minus 45 percent of nominal.
 - c. With input voltage distortion of up to 40 percent, limit the output voltage sine wave to a maximum harmonic content of 5 percent.
 - d. Automatically regulate output voltage to within 2.5 percent when load (resistive) changes from zero percent to 100 percent to zero percent.

- e. Output voltage returns to 95 percent of nominal level within two cycles and to 100 percent within three cycles when the output is taken from no load to full resistive load or vice-versa. Recovery from partial resistive load changes is corrected in a shorter period of time.
 - f. K Factor: 30, designed to operate with nonlinear, non-sinusoidal, high crest factor loads without overheating.
 - g. Input power factor within 0.95 approaching unity with load power factor as poor as 0.6.
 - h. Attenuate load-generated odd current harmonics 23 dB at the input.
 - i. Electrically isolate the primary from the secondary. Meet isolation criteria as defined in NFPA 70, Article 250-5D.
 - j. Lighting and Surge Protection: Compares to UL 1449 rating of 330 V when subjected to Category B3 (6000 V/3000 A) combination waveform as established by IEEE C62.41.
 - k. Common-mode noise attenuation of 140 dB.
 - l. Transverse-mode noise attenuation of 120 dB.
 - m. With loss of input power for up to 16.6 ms, the output sine wave remains at usable ac voltage levels.
 - n. Reliability of 200,000 hours' MTBF.
 - o. At full load, when measured at 1-m distance, audible noise is not to exceed 54 dB.
 - p. Approximately 92 percent efficient at full load.
4. Transformer Construction:
- a. Ferroresonant, dry type, convection cooled, 600V class. Transformer windings of Class H (220 deg C) insulated copper.
 - b. Use a Class H installation system throughout with operating temperatures not to exceed 150 deg C over a 40-deg C ambient temperature.
 - c. Configure transformer primary for multi-input voltage. Include input terminals for source conductors and ground.
 - d. Manufacture transformer core using M-6 grade, grain-oriented, stress-relieved transformer steel.
 - e. Configure transformer secondary in a 240/120-V split with a 208-V tap or straight 120 V, depending on power output size.
 - f. Electrically isolate the transformer secondary windings from the primary windings. Bond neutral conductor to cabinet enclosure and output neutral terminal.
 - g. Include interface terminals for output power hot, neutral and ground conductors.
 - h. Label leads, wires and terminals to correspond with circuit wiring diagram.
 - i. Vacuum impregnate transformer with epoxy resin.
- C. Transient Voltage Suppression and High-Frequency Noise Filter Unit:
- 1. The maximum continuous operating voltage shall be at least 125 percent.
 - 2. The operating frequency range shall be 47 to 63 Hz.
 - 3. Protection modes according to NEMA LS-1.
 - 4. The rated single-pulse surge current capacity, for each mode of protection, shall be no less than the following:
 - a. Line to Neutral: 45,000 A.
 - b. Neutral to Ground: 45,000 A.
 - c. Line to Ground: 45,000 A.
 - d. Per Phase: 90,000 A.
 - 5. Clamping voltages shall be in compliance with test and evaluation procedures defined in NEMA LS-1. Maximum clamping voltage shall be as follows:
 - a. Line to Neutral: 360 V.
 - b. Line to Ground: 360 V.
 - c. Neutral to Ground: 360 V.

6. Electromagnetic interference and RF interference noise rejection or attenuation values shall comply with test and evaluation procedures defined in NEMA LS-1.
 - a. Line to Neutral:
 - 1) 100 kHz: 42 dB.
 - 2) 1 MHz: 25 dB.
 - 3) 10 MHz: 21 dB.
 - 4) 100 MHz: 36 dB.
 - b. Line to Ground:
 - 1) 100 kHz: 16 dB.
 - 2) 1 MHz: 55 dB.
 - 3) 10 MHz: 81 dB.
 - 4) 100 MHz: 80 dB.
7. Unit shall have LED status indicator that extinguishes to indicate a failure.
8. Unit shall be listed by an NRTL as a transient voltage surge suppressor per UL 1449, and as an electromagnetic interference filter per UL 1283.
9. Unit shall not generate any appreciable magnetic field.
10. Unit shall not generate an audible noise.

D. DC Power Supply:

1. Plug-in style suitable for mating with a standard eight-pin octal socket. Include the power supply with a mating mounting socket.
2. Enclose circuitry in a housing.
3. Include both line and load regulation to ensure a stable output. To protect both the power supply and the load, power supply shall have an automatic current limiting circuit.
4. Performance:
 - a. Output voltage nominally 25-V dc within 5 percent.
 - b. Output current up to 100 mA.
 - c. Input voltage nominally 120-V ac, 60 Hz.
 - d. Load regulation within 0.5 percent from zero- to 100-mA load.
 - e. Line regulation within 0.5 percent at a 100-mA load for a 10 percent line change.
 - f. Stability within 0.1 percent of rated volts for 24 hours after a 20-minute warmup.

2.14 CONTROL CABLE

- A. Electronic and fiber-optic cables for control wiring are specified in Section 271500 "Communications Horizontal Cabling."

2.15 ANALOG ELECTRONIC INSTRUMENT INDICATORS

- A. Panel mount type and at least 2" square.
- B. Output: analog needle type or digital with ½" high LED or backlit LCD displays.
- C. Marked in appropriate units (Degrees, PSI, %RH, GPM, CFM, etc.) and with appropriate range of values.
- D. Minimum accuracy of 1% of scale range.
- E. Digital units shall be scaled to show 3 digits plus 1 decimal point.

2.16 SWITCHES

- A. Emergency Shutdown Pushbutton: Wall-mounted, mushroom-type momentary (reset through building automation system) pushbutton, pilot light or pushbutton illuminated after activation, NEMA 1, clear lifting cover, stainless steel cover plate, labeled "EMERGENCY VENTILATION STOP" or similar wording.
1. Available Manufacturers: Kele ST120SL.
- B. Boiler Kill Switch: Kele WPS-MP-BS-CLM with auxiliary contacts Kele PILNCCB or equal. Switch shall be a push-pull maintained contact switch with clear hinged lockout lid and auxiliary contacts for DDC monitoring and each boiler. Labeling shall be provided to indicate switch is for Emergency Boiler Shut-Down and action required to reset.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditioned power supply is available to control units and operator workstation.
- B. Verify that pneumatic piping and duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

3.2 SYSTEM DESIGN

- A. General Criteria:
1. Size all control devices to properly supply and/or operate and control the apparatus served.
 2. Provide control devices suitable for the environment in which they will operate:
 - a. All devices shall be constructed to withstand system temperatures and pressures.
 - b. Devices used in outdoor ambient conditions shall be constructed to withstand those conditions or shall be suitably weather protected.
 - c. Devices in corrosive environments shall be constructed of materials to withstand the effects of that environment.
- B. Control Dampers:
1. General:
 - a. Unless otherwise indicated, use opposed blade for modulating control dampers and use parallel blade dampers for two position (open/close) dampers and for mixing applications.
 - b. All blade linkage hardware shall have a corrosion resistant finish and be readily accessible for maintenance.
 - c. Damper construction material shall be the same as the connecting duct material. Exception: Aluminum damper may be used in a galvanized duct system.
 - d. Maximum single damper size shall be 48"x48". If total width or height exceeds maximum, use multiple dampers.
 - e. Locate actuators outside of the air stream, unless otherwise indicated.
 2. Sizing/selection criteria:
 - a. Two position dampers shall be sized as close as possible to duct size but in no case is the damper to be less than duct area.
 - b. When damper is part of an intake louver assembly, damper shall be same nominal size as louver unless specified otherwise on drawings.
 - c. All dampers used for mixing of airstreams shall be sized for 1800 to 2000 feet per minute velocity.

3. All control dampers furnished by the control manufacturer are to be installed by the Mechanical Contractor under the coordinating control and supervision of the Control Contractor in locations shown on plans or where required to provide specified sequence of control
 4. Damper end switches, where required, shall be independently mounted to the damper drive shaft or auxiliary shaft attached to a damper drive blade. End switches shall be adjusted to prove the damper the position opposite the fail position of the damper actuator unless the control sequence requires a different position to be proven to accomplish the specified control sequence.
 5. Coordinate installation with the sheetmetal installer to obtain smooth duct transitions where damper size is different than duct size. Blank off plates will not be accepted.
 6. Each operator shall serve a maximum damper area of 36 square feet. Where larger dampers are used, provide multiple operators.
- C. Control Valves:
1. All temperature control valves furnished by the control manufacturer are to be installed by the Mechanical Contractor under the coordinating control and supervision of the Control Contractor in locations shown on plans or where required to provide specified sequence of control.
 2. Sizing/selection criteria:
 - a. Valves with pressure drop greater than 50% of upstream pressure shall have sound reduction trim.
 - b. Water Service:
 - 1) Characteristic: equal percentage for two-way valves; linear for three-way valves.
 - 2) Select control valves based on pressure drop calculations based on C_v values at 100% stroke.
 - 3) Heating: globe type, selected for a minimum of 25% of equipment subcircuit pressure drop but no more than maximum available pump head allowing 2 psi pressure drop for balancing valve.
 - 4) Cooling: globe or butterfly type, selected for minimum of 10% of equipment subcircuit pressure drop, but not more than maximum pump head allowing minimum 2 psi pressure drop for balancing valve. Modulating butterfly valves shall be high performance type.
- D. Air Temperature Sensors:
1. Ducts with cross-sectional area less than 3 square feet: single point type.
 2. Ducts with cross-sectional area more than 3 square feet: RTD type.
 3. Mixed air: averaging type
- ### 3.3 INSTALLATION
- A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
1. Check and verify location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. Align with light switches and humidistats. For drywall installations, thermostat mounting shall use a back-box attached to a wall stud, drywall anchors are not acceptable.
- C. Verify location of thermostats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.
1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
 2. Meet ADA requirements.
 3. Locate temperature sensors away from direct sunlight, diffuser air streams, and heat sources.
 4. Install thermostats and temperature sensors mounted on outside walls on insulated subbases. Subbase to provide a minimum of one half inch of insulation.
 5. Install devices with visible readouts where the display can be easily read.

- D. Install guards on thermostats in the following locations:
1. Entrances.
 2. Public areas.
 3. Where indicated.
 4. Provide guards on thermostats and sensors in entrance hallways, other public areas, or in locations where thermostat is subject to physical damage.
- E. Install automatic dampers according to Section 233300 "Air Duct Accessories."
- F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- G. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."
- H. Install hydronic instrument wells, valves, and other accessories according to Section 232116 Hydronic Piping Specialties."
- I. Install refrigerant instrument wells, valves, and other accessories according to Section 232300 "Refrigerant Piping."
- J. Install electronic and fiber-optic cables according to Section 271500 "Communications Horizontal Cabling."
- K. Provide power wiring to each component requiring power, such as control panels. Use circuits dedicated for controls. For equipment on emergency power, use emergency power circuits for their controllers.
- L. Mount all control devices in accessible locations.
- M. Interposing Relays:
1. Provide interposing relays necessary for interfacing to low voltage outputs with 120 VAC or line voltage motor control.
 - a. Use Type C horsepower rated interposing relays for motors and electric heaters.
 - b. Use Type K interposing relays for other general-purpose use.
- N. Well-Mounted Sensors:
1. Install thermal conducting compound.
 2. In pipe 2 ½ inches and smaller: install at elbow with tee fitting with well pointed upstream. Minimum 2" tee size.
 3. In pipe 3 inches and larger: install the element in the flow.
- O. Low Limit Thermostats (Freezestats):
1. Install low limit controls where indicated on the drawings or as specified. Unless otherwise indicated, install sensing element on the downstream side of heating coils.
 2. Mount units using flanges and element holders. Provide duct collars or bushings where sensing capillary passes through sheetmetal housings or ductwork; seal this penetration to eliminate air leakage. Mount the units in an accessible location as to allow for resetting after low limit trips while still meeting manufacturer's installation requirements for proper function.
 3. Distribute (serpentine) sensing element horizontally across the coil to cover every square foot of coil; on larger coils this may require more than one instrument. Install controls at accessible location with mounting brackets and element duct collars where required.
- P. Liquid Flow Sensors
1. Install where indicated on the drawings and details for flow sensing in hydronic piping systems. Do not install close to elbows, valves, or other piping specialties, which might affect the reading of the sensor; follow manufacturer's installation instructions.
 2. Location of remote mounted display shall be so that the flow measurement display shall be mounted four to five feet above finished floor. Refer to drawing detail for differential pressure transmitter piping detail.

All piping to and from sensors shall be by Section 23 21 13 and 23 22 13 contractor and shall comply with requirements of Sections 23 21 13 and 23 22 13.

- Q. Pressure Transducers and High Limit Pressure Switches
1. Install capped tees in air piping at air pressure transducers for connection of calibration equipment. Capped tee shall consist of two inch poly tubing capped with a brass plug. Rubber caps are not acceptable. Install Petes Plugs fittings at each take-off from main piping for liquid pressure transducers for connection of calibration equipment.
 2. Install differential pressure transducers for filter monitoring at the filter section of the air handling unless otherwise specified. All other differential or static pressure transducers and differential or static pressure high limit switches for air applications should be mounted in the temperature control panel serving the equipment being controlled or monitored. All devices mounted on equipment shall be mounted in a location that is at a maximum of five feet above the floor. For liquid applications, provide shutoff valves at piping takeoff points.
- R. Air Flow Stations:
1. Install airflow stations in accordance with manufacturer's recommendations. Install straightening vanes upstream of unit where required per manufacturers recommendations.
- S. Temperature Control Panels:
1. Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron supports. All control panel openings shall be plugged. Conduits and other penetrations on the top of the cabinets shall be sealed on the exterior of the cabinet with silicone caulk to resist water penetration. One cabinet may accommodate more than one system in same equipment room. Provide permanent printed labeling for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
 2. Provide as-built control drawings of all systems served by each local panel in a location adjacent to or inside of panel cover. Provide a protective cover or envelope for drawings.
- T. Carbon Dioxide (CO₂) Sensor
1. Provide a Carbon Dioxide (CO₂) sensor for conference areas and return ductwork for AHU-A1 and E1. Refer to plan for locations of devices.
- U. Differential Pressure Switches:
1. Provide for each fan or pump specified or shown on point list. Provide shutoff valves at piping takeoff points. Readjust pressure and/or differential setpoints for proper operation after final balancing is completed.
- V. Current Status Switches:
1. Provide for each fan or pump specified or shown on point list. Set threshold adjustment to indicate belt or coupling loss. Readjust threshold for proper operation after final balancing is completed. Use the variable frequency drive (VFD) integrated relay output for motor status, if provided on the VFD, in lieu of a discrete current switch.
- W. HVAC System - Emergency Shutdown
1. Contractor to install wall-mounted pushbutton switches for shutdown of the HVAC systems at the main entry/exit for the Administration Building. Refer to plan for locations of devices.
- X. Boiler System - Emergency Shutdown
1. Contractor to install two wall-mounted pushbutton switches for shutdown of the boiler system at the main entry/exit for the Mezzanine Level – Area B. Refer to plan for locations of devices.
- 3.4 ELECTRICAL WIRING AND CONNECTION INSTALLATION
- A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."
- B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

- C. Install signal and communication cable according to Section 271500 "Communications Horizontal Cabling."
1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 2. Install cable in conduit in the following locations:
 - a. Exposed areas, such as mechanical rooms and electrical rooms.
 - b. Inaccessible concealed spaces, such as above gypboard ceilings and in concrete or furred walls.
 3. Install exposed cable in raceway.
 4. Install concealed cable in raceway.
 5. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 6. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 7. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 8. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.
 9. Route wires parallel or perpendicular to the building structural elements.
 10. Do not route wires across telephone equipment areas.
 11. In enclosures, install wiring in plastic track.
 12. In controllers, wrap and secure all wiring.
 13. Install wires at least 3 inches away from hot surfaces, such as steam and hot water pipes.
- D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
- E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.
- F. Where the sensor voltage exceeds the controller's allowed input voltage, modify the circuit with resistor(s) so that the input voltage to the controller is as high as practical and below the controller's limit.
- G. Provide transient voltage surge protection according to Division 26.
- H. For equipment powered by emergency power, provide power to the equipment's controller from an emergency power panel.
- 3.5 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.
- 3.6 ADJUSTING
- A. Calibrating and Adjusting:
1. Calibrate instruments.
 2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
 - a. Use manufacturer's linearity curve to linearize the signal from each sensor.
 3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated. Factory calibration does not replace field calibration.
 4. Control System Inputs and Outputs:
 - a. Check analog inputs at 0, 50, and 100 percent of span.
 - b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.

- c. Check digital inputs using jumper wire.
 - d. Check digital outputs using ohmmeter to test for contact making or breaking.
 - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
 - 5. Flow:
 - a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
 - b. Manually operate flow switches to verify that they make or break contact.
 - 6. Pressure:
 - a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
 - b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
 - 7. Temperature:
 - a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
 - b. Calibrate temperature switches to make or break contacts.
 - 8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
 - 9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
 - 10. Provide diagnostic and test instruments for calibration and adjustment of system.
 - 11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
- B. Adjust initial temperature and humidity set points.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.
- 3.7 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 01 "Demonstration and Training."
- 1. The first training session, minimum 8 hours, shall take place just prior to Substantial Completion. Training shall include system operation, maintenance procedures, and operating the system software. Submit O&M manuals at least one week prior to training session.
 - 2. A follow-up training session, minimum 4 hours, shall take place approximately six months after Substantial Completion to assist troubleshooting answer questions.
 - 3. A second follow-up training session, minimum 4 hours, shall take place approximately twelve months after Substantial Completion (just before the end of the warranty period) to assist troubleshooting answer questions.

END OF SECTION 23 09 00

SECTION 23 83 16
RADIANT-HEATING HYDRONIC PIPING

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 radiant-heating piping, including pipes, fittings, and piping specialties.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. PEX: Crosslinked polyethylene.
- C. PEX/AL/PEX: Crosslinked polyethylene/aluminum/crosslinked polyethylene.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include data for piping, fittings, manifolds, specialties, and controls; include pressure and temperature ratings, oxygen-barrier performance, fire-performance characteristics, and water-flow and pressure-drop characteristics.
 2. Provide product data for injection pumps and control valves
- B. Shop Drawings: Show piping layout and details drawn to scale, including valves, manifolds, controls, and support assemblies, and their attachments to building structure.
1. Shop Drawing Scale: 1/4 inch = 1 foot.
 2. Drawing(s) shall show proof of review and approval by radiant floor heating system manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For radiant-heating piping valves and equipment to include in operation and maintenance manuals.

1.6 WARRANTY

- A. Manufacturer's standard twenty (20) year warranty on tubing.
- B. Manufacturer's standard thirty-six (36) month warranty on manifolds and other auxiliary components.

PART 2 - PRODUCTS

2.1 PEX PIPE AND FITTINGS

- A. Manufacturer Basis-of-Design Product: The design is based on the following:

1. Uponor- Radiant Rollout Mat.
 - B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. REHAU Incorporated.
 2. Heatlink.
 3. Watts Radiant, inc.; a Watts Water Technologies company.
 - C. Alternate for Roth XPert S5 or DuoPex S5- Pex C or may be substituted from the manufacturers listed in the following sections provided the materials of construction equal the basis of design, and the layout and scheduled performance is maintained. Final approval of substitutions will be determined by Architect/Engineer.
 1. Roth XPert S5 with EVERLOC® Fitting System
 2. Roth DuoPex S5 or Pex C
 - D. Pipe Material: PEX plastic according to ASTM F 876, PEX A.
 - E. Oxygen Barrier: Limit oxygen diffusion through the tube to maximum 0.10 mg per cu. m/day at 104 deg F according to DIN 4726.
 - F. Fittings: ASTM F 1807, metal insert and copper crimp rings for cold expansion fittings with reinforcing rings.
 1. Uponor ProPEX® Fitting System
 2. Sioux Chief PowerPEX™ F1960 Fitting System
 - G. Pressure/Temperature Rating: Minimum 100 psig and 180 deg F.
- 2.2 DISTRIBUTION MANIFOLDS
- A. Manifold: Minimum NPS 1, brass or stainless steel.
 - B. Main Shutoff Valves:
 1. Mount on supply and return connections.
 2. Shut-off valves are specified in Section 230523 - "General-duty valves for HVAC Piping."
 - C. Manual Air Vents:
 1. Mount on supply and return connections.
 2. Manual air vents are specified in Section 232116 – "Hydronic Piping Specialties."
 - D. Balancing Valves:
 1. Mount on return connections.
 2. Balancing valves are specified in Section 232116 – "Hydronic Piping Specialties."
 - E. Zone Control Valves:
 1. Temperature-control devices and sequence of operations are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence of Operations for HVAC Controls."
 - F. Mounting Brackets: Copper, or plastic- or copper-clad steel, where in contact with manifold.
 - G. Manifold Radiant Cabinets:
 1. Contractor to provide radiant manifold cabinets for recessed wall cabinet and surface mounted enclosures. Manufacturer's standard recessed manifold cabinets 22 gauge shall be used. For surface mounted cabinet, the contractor to provide custom cabinetry with a minimum 18 gauge. Cabinetry shall be factory painted with a custom color. Architect to select a custom color for cabinetry. Provide cabinet one or two coin/screwdriver locks per door.
 - a. Badger Sheetmetal or equivalent for fabrication the cabinetry

2. Refer to the Architectural drawings for surface and recessed cabinetry location.

H. Mounting Brackets: Copper, or plastic- or copper-clad steel, where in contact with manifold.

2.3 PIPING SPECIALTIES

A. Cable Ties:

1. Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
2. Minimum Width: 1/8 inch.
3. Tensile Strength: 20 lb, minimum.
4. Temperature Range: Minus 40 to plus 185 deg F.

B. Floor Mounting Staples:

1. Steel, with corrosion-resistant coating and smooth finish without sharp edges.
2. Minimum Thickness: 3/32 inch.
3. Width: Minimum, wider than tubing.

C. Floor Mounting Clamps:

1. Two bolts, steel, with corrosion-resistant coating and smooth finish without sharp edges.
2. Minimum Thickness: 3/32 inch.
3. Width: Minimum, wider than tubing.

D. Floor Mounting Tracks:

1. Aluminum or plastic channel track with smooth finish and no sharp edges.
2. Minimum Thickness: 1/16 inch.
3. Slot Width: Snap fit to hold tubing.
4. Slot Spacing: 2-inch intervals.
5. Rehau "Octa Rail" or equivalent

2.4 CONTROLS

A. Temperature-control devices and sequence of operations are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence of Operations for HVAC Controls."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive radiant-heating piping for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Ensure that surfaces and pipes in contact with radiant-heating piping are free of burrs and sharp protrusions.
2. Ensure that surfaces and substrates are level and plumb.

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

3.2 APPLICATIONS

A. Install the following types of radiant-heating piping for the applications described:

1. Piping in Interior Reinforced-Concrete Floors: PEX.

3.3 PRE-INSTALLATION CONFERENCE

- A. 90 days prior to beginning of the installation of radiant heating hydronic piping, the contractor shall conduct a conference with the Architect/Engineer, Owner's Project Representative, Commissioning Provider (CxP) and the mechanical system and temperature control system installing Contractors. Provide AE and CxP with a complete copy of the radiant piping system with dimensions and system piping diagrams for the project. The objective is final coordination and verification of system operation and readiness for installation procedures and scheduling procedures with the above mentioned parties. Indicate work required to be completed prior to installation and identify the party responsible for completion of that work.

3.4 INSTALLATION

- A. Engage a factory-authorized service representative to perform field inspections for installation of radiant heating hydronic piping. Install Uponor "Roll-Out" mats per manufacturer's requirements.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings or coordination drawings.
- C. Install radiant-heating piping continuous from the manifold through the heated panel and back to the manifold without piping joints in heated panels.
 1. If a fitting must be installed in the concrete slab it must be protected with a HDPE shrink sleeve as recommended by the manufacturer and must be approved by the engineer.
- D. Contractor shall install the product "Octa Rail" or equivalent for securing Pex tubing to board insulation. fastened to insulation every 3 to 5 ft. using appropriate pins or nails. PEX tubing snaps easily into the pre-cut Rail grooves. Rail length is 3.4 feet and 1.25-inch high. Connect radiant piping to manifold in a reverse-return arrangement.
- E. Do not bend pipes in radii smaller than manufacturer's minimum bend radius dimensions.
- F. Install manifolds in accessible locations or install access panels to provide maintenance access as required in Division 08 "Access Doors and Frames."
- G. Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties" for pipes and connections to hydronic systems and for glycol-solution fill requirements.
- H. Fire- and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials according to Division 07 "Penetration Firestopping."
- I. Piping in Interior Reinforced-Concrete Floors:
 1. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
 2. Space cable ties a maximum of 18 inches o.c. and at center of turns or bends.
 3. Maintain 2-inch minimum cover.
 4. Install a sleeve of 3/8-inch-thick, foam-type insulation or PE pipe around tubing and extending for a minimum of 10 inches on each side of slab joints to protect the tubing passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.
 5. Maintain minimum 40-psig pressure in piping during concrete placement and continue for 24 hours after placement.
- J. Revise locations and elevations from those indicated as required to suit field conditions and ensure integrity of piping and as approved by Architect.

- K. After system balancing has been completed, mark balancing valves to permanently indicate final position.
- L. Perform the following adjustments before operating the system:
1. Open valves to fully open position.
 2. Check operation of automatic valves.
 3. Set temperature controls so all zones call for full flow.
 4. Purge air from piping.
- M. After concrete or plaster heating panel has cured as recommended by concrete or plaster supplier, operate radiant-heating system as follows:
1. Start system heating at a maximum of 10 deg F above the ambient radiant-panel temperature and increase 10 deg F each following day until design temperature is achieved.
 2. For freeze protection, operate at a minimum of 60 deg F supply-water temperature.
- N. Maximum loop lengths shall be:
1. 5/8" diameter tubing: 500 ft.
 2. 3/4" diameter tubing: 500 ft.
- O. Tubing connections shall be made with compression fittings supplied by manufacturer. Fittings from other sources are not acceptable.
- P. Extend power wiring from fused disconnect to electrical junction box on unit.
1. Install thermostat or sensor in indicated location, provide line or low voltage wiring from thermostat to electrical junction box on unit.
 2. Comply with Division 16 specifications for wiring.
- Q. All fittings shall be accessible for maintenance.
- R. Acceptable tube spacing: 6" to 9" O.C.
1. When underfloor tubing is routed adjacent to an exterior wall having an excess of 30% glass area, tubing spacing shall be 6" o.c. within 12" of exterior wall.
- S. When installing the tubing the joint must be made immediately or capped with tape to seal the tube from contaminants.
- T. All circuits will be labeled and marked as supply and return. The contractor will submit a record of actual tube circuit length for final balancing purposes.
- 3.5 FIELD QUALITY CONTROL
- A. Prepare radiant-heating piping for testing as follows:
1. Open all isolation valves and close bypass valves.
 2. Open and verify operation of zone control valves.
 3. Flush with clean water and clean strainers.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
1. Leak Test: After installation, charge system and test for leaks. Subject piping to hydrostatic test pressure that is not less than 1.5 times the design pressure but not more than 100 psig. Repair leaks and retest until no leaks exist.

- 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Radiant-heating piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Protect hydronic piping system from damage during construction.

END OF SECTION 23 83 16

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment, plus the following special applications:

1. Common ground bonding with lightning protection system.

1.3. ACTION SUBMITTALS

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

1.4. INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Test wells.
2. Ground rods.
3. Grounding arrangements and connections for separately derived systems.

- B. Qualification Data: For qualified testing agency and testing agency's field supervisor.

- C. Field quality-control reports.

1.5. CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Instructions for periodic testing and inspection of grounding features at test wells, ground rings, and grounding connections for separately derived systems based on NETA MTS.
 - a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - b. Include recommended testing intervals.
2. NFPA 99 grounding test results for patient care areas.

1.6. QUALITY ASSURANCE

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

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of 1/4 inches annealed copper, minimum 4 by 20 inches in main electrical rooms and minimum 4 by 10 inches in all other areas, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Panduit: Irreversible compression connectors.
 2. Erico: Welded connectors.
- B. Listed and labeled by a NRTL acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- C. Bolted Connectors for Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
1. Pipe Connectors: Clamp type, sized for pipe.
- D. Welded Connectors: Exothermic-welding kits, low-emission, electric-starting types and of types recommended by kit manufacturer for materials being joined and installation conditions.
- E. Compression Connectors: Irreversible type meeting IEEE standard 837-2002 and UL listed.
- F. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.01 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4-inch diameter by 10 feet.
- B. Grounding Test Wells:
 - 1. Well Pipe: 8-inch by 24-inch-long pipe with belled end.
 - 2. Well Cover: Cast iron with legend "GROUND" embossed on cover. Provide bolted, traffic rated cover.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Grounding Bus: Install in all electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus bar on insulated spacers 1 inch, minimum, from wall 18 inches above finished floor, unless otherwise indicated.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors.
 - 3. Connections to Ground Rods at Test Wells: Welded connectors.
 - 4. Connections to Structural Steel: Welded connectors.
 - 5. Aboveground Accessible Connections: Irreversible compression or welded connectors.
 - 6. Connections in areas that may be a fire hazard to use welded connectors: Irreversible compression connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits. Terminate each end on suitable lug, bus or bushing.
- B. Bond equipment grounding terminal bars of the normal and emergency electrical system panelboards that serve the same patient area with an insulated continuous copper conductor not smaller than 8 AWG.
- C. Provide grounding and bonding in patient care areas to meet requirements of NFPA 99 and Regulatory Requirements.
- D. Bond fuel storage tanks and associated metallic piping systems to building ground system.
- E. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide insulated grounding conductor in raceway (minimum 4 AWG) from the main service copper bus bar to each service location(s), terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a copper grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
3. Bond all cable tray, metallic conduits, and equipment racks with minimum 6 AWG to copper bus bar.

3.3 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions and NECA 331.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Ground Rods: Drive rods until tops are 12 inches below finished floor or final grade, unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
- D. Test Wells: Install at each ground rod. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts. Bond together metal siding not attached to grounded structure and bond to grounding electrode system.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Grounding and Bonding for dry type transformers:
1. Step-down transformer secondaries shall be grounded to the nearest electrical room ground bus bar. Also, bond the grounded conductor of the transformer to the nearest available point of the interior metal water piping system in the area served by the transformer in accordance with NEC Article 250-104.
- H. Grounding for Steel Building Structure:
1. Install insulated copper grounding conductor in conduit from main electrical service copper bus bar to building structural steel.
- I. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor sized the same as building grounding electrode conductor and shall not be smaller than 4 AWG.

1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
2. Locate at or near bottom of footing with minimum 2 inches concrete encasement.
3. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.4 TERMINATIONS AND CONNECTIONS

- A. Make terminations and connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- E. Test Wells: Use exothermic welded connections.
- F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
 1. Manufacturer's Field Service – Electrolytic Grounding System: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

- C. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- G. Excessive Ground Resistance: If resistance to ground exceeds specified values above, provide additional grounding electrodes to meet values above.
- H. Provide a grounding system test in accordance with NFPA-99 for all patient care areas. Include test results in close-out documents. A Hampden Ground Integrity Tester Model MVO-1-PB or equivalent shall be used for grounding system test.

END OF SECTION 26 05 26

SECTION 31 32 19

GEOTEXTILES

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Geotextiles for areas below base course and below riprap.

1.2 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, including all issued supplemental specifications.
- B. Reference the City of Madison Standard Specifications for Public Works Construction, latest edition. The City of Madison Standard Specifications for Public Works Construction, latest edition, takes precedence over this specification section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Geotextile to be placed below riprap shall be Mirafi 180N, or equal.

- B. Geotextile, if needed, below base course shall be Mirafi 600X, or equal.

— 03ADD

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Geotextile shall be installed in accordance with manufacturer's recommendations.
- B. Geotextile shall be lapped a minimum of 24 inches.
- C. CONTRACTOR shall protect the construction fabric from exposure to the sun until installation. Construction fabric shall be covered with stone or soil immediately upon placement.

END OF SECTION 31 32 19

SECTION 32 11 00

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Aggregate base course for roads and parking areas.
- B. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall repair all roads, shoulders, and gravel areas damaged in accordance with this section. All paved areas shall also be repaired in accordance with Section 32 11 26—Hot Mix Asphalt Paving.

1.2 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, including all issued supplemental specifications.
- B. Reference the City of Madison Standard Specifications for Public Works Construction, latest edition. The City of Madison Standard Specifications for Public Works Construction, latest edition, takes precedence over this specification section.

1.3 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

1.4 SUBMITTALS

- A. Submit sieve analysis for proposed materials.

1.5 DRAINAGE DURING CONSTRUCTION

- A. CONTRACTOR shall comply with the provisions of Section 205.3.3 of the Standard Specifications.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. Aggregate for base course shall meet the requirements of Article 401—Crushed Aggregate Base Course of the City of Madison Standard Specifications for Public Works Construction, latest edition.
- B. Base course shall be uniformly graded and shall conform to the Article 401.1(b). The 6-inch lower layer shall be Gradation 1 and the 6-inch upper layer shall be Gradation 2.

03 ADD

PART 3 - EXECUTION

3.1 PREPARATION

- A. The subgrade shall be graded and rolled to provide uniform density and shall comply with the elevations contained in the drawings. All street subgrade in cut areas and all areas to receive fill shall be proof-rolled in the presence of OWNER or ENGINEER with a heavily loaded triaxle dump truck or similar equipment prior to the placement of any fill materials or base course. The subgrade shall be prepared in accordance with Section 31 23 00—Excavation, Fill, Backfill, and Grading, and also with Section 211 of the Standard Specifications.

3.2 CONSTRUCTION

- A. Base course grade shall be set to allow placement of 5-inch thickness of asphaltic pavement.
- B. Depth of base course below asphaltic pavement shall be 12 inches.
- C. Each layer of base course shall be wetted and rolled to provide maximum compaction in accordance with Section 305 of the Standard Specifications.

- D. The finished base course shall be fine graded in preparation for paving.
- E. After final grading, CONTRACTOR shall maintain the base course until asphaltic paving work has been completed.

END OF SECTION 32 11 00

SECTION 32 11 26

HOT MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work includes Hot Mix Asphalt (HMA) paving, tack coat, and casting adjustments.

1.2 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, including all issued supplemental specifications.
- B. Reference the City of Madison Standard Specifications for Public Works Construction, latest edition. The City of Madison Standard Specifications for Public Works Construction, latest edition, takes precedence over this specification section.

1.3 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

1.4 SUBMITTALS

- A. Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted.

PART 2 - PRODUCTS

03 ADD

2.1 HMA PAVEMENT

- A. Asphaltic mix shall be MT 58-28 H for both the lower layer and upper layer for all asphalt areas, except for the 41-stall employee parking lot near the western detention basin, where the asphalt mix shall be LT 58-28 S for both the lower layer and upper layer.
- B. Aggregate shall conform to the requirements of Section 460.2.2 of the Standard Specifications. Aggregate for the lower layer shall be nominal size of 19 mm. Aggregate for the upper layer shall be nominal size of 12.5 mm.
- C. Asphaltic pavement lower layer shall be 3 inches minimum. Asphaltic pavement upper layer shall be 2 inches minimum. Asphaltic pavement upper layer shall be 2 inches minimum at the milled asphaltic pavement on Nakoosa Trail.
- D. Materials for tack coat shall conform to the requirements of Section 455.2.5 and shall be MS-2, SS-1, SS-1h, CSS-1 or CSS-1h.
- E. Pavement markings shall be yellow and shall conform to Section 646. If not otherwise specified, pavement markings shall have a minimum width of 4 inches. Diagonal pavement markings shall be 4 inches wide and 36 inches on center.

PART 3 - EXECUTION

3.1 ALLOWABLE REMOVAL OF PAVEMENT

- A. CONTRACTOR shall remove asphalt pavement and road surface as a part of the general excavation. The width of pavement removed shall be the minimum possible and acceptable for convenient and safe installation of structures, utilities, and appurtenances.
- B. All asphalt pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the excavation. Should the cut edge be damaged, a new cut shall be made in neat, straight lines parallel to the original cut encompassing all damaged areas. Pavement removal shall be extended to a seam or joint if seam or joint is within 3 feet of damaged pavement.

3.2 CASTING ADJUSTMENTS

- A. All new and existing manhole castings and valve boxes within the paving limits, which require adjustment, shall be adjusted to match the finished asphaltic surface. Adjustments shall not be made greater than 48 hours prior to the anticipated time of paving. CONTRACTOR shall furnish Class 1 barricades with flashers on all adjusted castings until paving has been completed. Tops of castings and valve boxes shall be oiled or protected by other methods to prevent sealing of lids and filling of lift holes during paving. Upon completion of paving operations, CONTRACTOR shall check all castings and valve boxes to see that the lids are clean and operational. Manhole casting adjustment shall be included in the cost of other items of work, and no further compensation will be made. Valve box adjustment shall be considered an incidental item of work.

3.3 TACK COAT

- A. All work shall be in accordance with the Standard Specifications.
- B. If asphaltic upper layer is applied to an existing street or is not applied the same day as lower layer, the existing street or lower layer shall be tack coated prior to surface paving. Prior to placement of tack coat, the streets shall be thoroughly cleaned and broomed. Tack coat shall be applied at a rate of 0.10 gallons per square yard immediately prior to placement of asphaltic upper layer.
- C. In situations where traffic must be maintained, tack coat shall not be placed on the traveled half of the street until traffic can be switched to the new pavement.

3.4 JOINTS

- A. Joints between old and new pavements or between successive day's work shall be constructed and treated as to provide thorough and continuous bond between the old and new mixtures. Transverse construction joints shall be constructed by cutting the material back for its full depth so as to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. These joints shall be treated with tack coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.
- B. The longitudinal joint shall be made by overlapping the screed on the previously laid material for a width of not more than 2 inches and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight. Longitudinal joints in the upper layer shall at no time be placed immediately over similar joints in the lower layer beneath. A minimum distance of 12 inches shall be permitted between the location of the joints in the lower layer and the location of similar joints in the upper layer above.
- C. All costs for furnishing and applying tack coat to butt joints as specified above shall be considered incidental.

3.5 FINISHING ROADWAY

- A. The finished base course shall be fine-graded in preparation for HMA paving. Base course ramps at all existing pavement shall be removed to provide a full depth butt joint. Base course around manhole castings and valve boxes shall be hand-trimmed and compacted with a vibratory plate compactor.
- B. This item shall include all of the following preparatory and finishing items and any other incidental items of work required for construction. Asphaltic ramps around manholes on existing lower layer to receive upper layer shall be removed. Asphaltic ramps shall be installed on all manholes and at all butt joints in areas to receive lower layer only.
- C. Finishing roadway shall be considered incidental to HMA paving.
- D. Paint all markings as shown on drawings with lines not less than 4 inches wide.

3.6 TESTING HOT MIX ASPHALT

- A. ENGINEER may require samples of HMA pavement for testing. CONTRACTOR shall cut samples from the finished pavement where marked by ENGINEER and patch the sample area.

3.7 HOT MIX ASPHALT PAVING

- A. HMA paving work shall include the construction of plant-mixed hot mix asphalt pavement in the areas shown on the drawings. All work shall be performed in accordance with Section 460 of the Standard Specifications.
- B. Prior to commencement of paving operations, CONTRACTOR shall examine the finished road bed. CONTRACTOR shall notify ENGINEER of any areas of suspected instability.

3.8 MILLED ASPHATIC PAVEMENT

- A. Mill the existing asphaltic pavement to a depth of 2 inches on Nakoosa Trail for the area as shown on the drawings.

END OF SECTION 32 11 26

21611 Existing Equipment Datasheet

Manufacturer:		Quincy					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Quincy QT-10					Equipment		70		29		55		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---	
									Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:															
Architectural		Coordinate size of housekeeping pad with equipment. Pad size should be appropriate to match functional requirements and work with other					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		'Coordinate size of housekeeping pad with equipment. Pad size should be appropriate to match functional requirements and work with other					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---					Venting		Connection (inches)		---				
									Volume (CFM)		---				
Electrical		---					Connection Size		Requirements		---	---	---		
									Voltage		30/46	---	---		
									Phase		3	---	---		
									Horsepower (HP)		10	---	---		
									Amps		28/14	---	---		
							Connection Type		Provide disconnect						
Plumbing		Locate floor sink on housekeeping pad; provide 2 inch floor sink to sand-oil interceptor.					Domestic Water		Connection (inches)		---				
									Flow Rate (GPM)		---				
									Capacity (PSI)		---				
							Natural Gas		Connection (inches)		---				
									Capacity (BTU)		---				
							Drain		Floor Drain (Y/N)		Y				
							Compressed Air		Connection (inches)		3/4				
									Volume (CFM)		---				
									Capacity (PSI)		---				
Equipment Description:										EQ ID Number:					
Compressor, air, receiver mounted, 10 HP duplex										21611					

21611 Existing Equipment Cutsheet

Equipment Description:

Compressor, air, receiver mounted, 10 HP duplex

EQ ID Number:

21611

Manufacturer: Quincy

Model No.: Quincy QT-10



21612 Existing Equipment Datasheet

Manufacturer:		Quincy					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Quincy QT-15					Equipment		70		29		55		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---	
								Right	---	Back	---	Below	---		
DISCIPLINE COORDINATION:															
Architectural		Coordinate size of housekeeping pad with equipment. Pad size should be appropriate to match functional requirements and work with other elements					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		Coordinate size of housekeeping pad with equipment. Pad size should be appropriate to match functional requirements and work with other elements					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements			---	---	---	
									Voltage			---	---	---	
									Phase			---	---	---	
									Horsepower (HP)			---	---	---	
									Amps			---	---	---	
							Connection Type		Provide disconnect						
Plumbing		Locate floor sink on housekeeping pad; provide 2 inch floor sink to sand-oil interceptor.					Domestic Water		Connection (inches)			---			
									Flow Rate (GPM)			---			
									Capacity (PSI)			---			
							Natural Gas		Connection (inches)			---			
									Capacity (BTU)			---			
							Drain		Floor Drain (Y/N)			Y			
							Compressed Air		Connection (inches)			3/4			
									Volume (CFM)			---			
									Capacity (PSI)			---			
Equipment Description:										EQ ID Number:					
Compressor, air, receiver mounted, 15 HP duplex										21612					

21612 Existing Equipment Cutsheet

Equipment Description:

Compressor, air, receiver mounted, 15 HP duplex

EQ ID Number:

21612

Manufacturer:

Quincy

Model No.: Quincy QT-15



24401 Existing Equipment Datasheet

Manufacturer:		Corgi				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		HD1200 E (2005)				Equipment		---		---		---		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		230	---	---		
								Phase		3	---	---		
								Horsepower (HP)		---	---	---		
								Amps		40	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		3/4				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Changer, tire, auto										24401				

24401 Existing Equipment Cutsheet

Equipment Description:

Changer, tire, auto

EQ ID Number:

24401

Manufacturer: Corghi

Model No.: HD1200 E (2005)

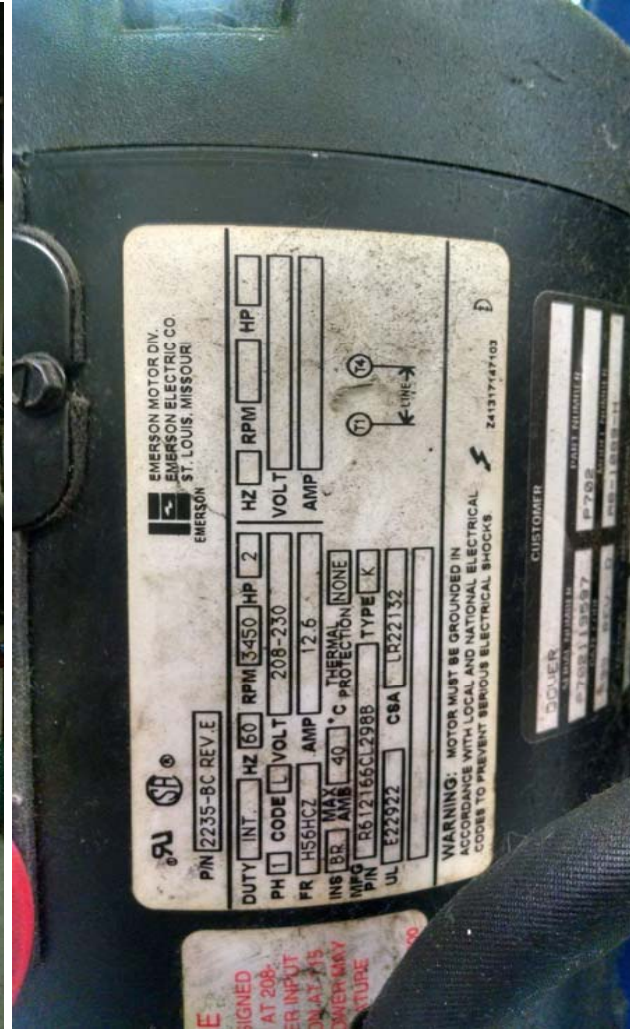


57091 Existing Equipment Datasheet

Manufacturer:		Rotary				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		SPOA9-200				Equipment		120		138		140			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---	
								Right	---	Back	---	Below	---		
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		Unit		---		---	
								Voltage		208/230		---		---	
								Phase		1		---		---	
								Horsepower (HP)		2		---		---	
								Amps		12.6		---		---	
						Connection Type		Provide disconnect							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		---					
								Volume (CFM)		---					
								Capacity (PSI)		---					
Equipment Description:										EQ ID Number:					
Lift, surface mounted, twin-post, 9,000 pounds										57091					

57091 Existing Equipment Cutsheet

Equipment Description: <h3 style="margin: 0;">Lift, surface mounted, twin-post, 9,000 pounds</h3>	EQ ID Number: <h2 style="margin: 0;">57091</h2>
Manufacturer: Rotary	Model No.: SPOA9-200

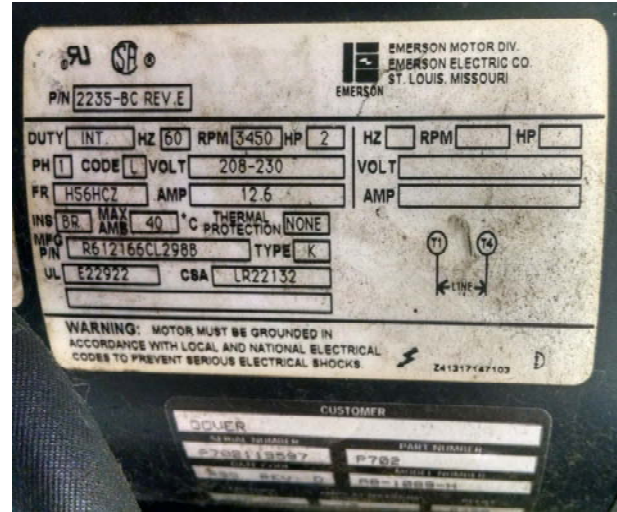


57092 Existing Equipment Datasheet

Manufacturer:		Rotary					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		SPOA9-200					Equipment		120		138		140	
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Mechanical		---					Venting		Connection (inches)		---			
									Volume (CFM)		---			
Electrical		---					Connection Size		Requirements		Unit	---	---	
									Voltage		08/23	---	---	
									Phase		1	---	---	
									Horsepower (HP)		2	---	---	
									Amps		12.6	---	---	
							Connection Type		Provide disconnect					
Plumbing		---					Domestic Water		Connection (inches)		---			
									Flow Rate (GPM)		---			
									Capacity (PSI)		---			
							Natural Gas		Connection (inches)		---			
									Capacity (BTU)		---			
							Drain		Floor Drain (Y/N)		N			
							Compressed Air		Connection (inches)		---			
									Volume (CFM)		---			
									Capacity (PSI)		---			
Equipment Description:										EQ ID Number:				
Lift, surface mounted, twin-post, 9,000 pound										57092				

57092 Existing Equipment Cutsheet

Equipment Description: Lift, surface mounted, twin-post, 9,000 pound	EQ ID Number: 57092
Manufacturer: Rotary	Model No.: SPOA9-200



57093 Existing Equipment Datasheet

Manufacturer:		Rotary					Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		SPOA9-200					Equipment		120		138		140			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---		
								Right	---	Back	---	Below	---			
DISCIPLINE COORDINATION:																
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N			
Mechanical		---					Venting		Connection (inches)				---			
									Volume (CFM)				---			
Electrical		---					Connection Size		Requirements		Unit		---		---	
									Voltage		08/23		---		---	
									Phase		1		---		---	
									Horsepower (HP)		2		---		---	
									Amps		12.6		---		---	
							Connection Type		Provide disconnect							
Plumbing		---					Domestic Water		Connection (inches)				---			
									Flow Rate (GPM)				---			
									Capacity (PSI)				---			
							Natural Gas		Connection (inches)				---			
									Capacity (BTU)				---			
							Drain		Floor Drain (Y/N)				N			
							Compressed Air		Connection (inches)				---			
									Volume (CFM)				---			
									Capacity (PSI)				---			
Equipment Description:										EQ ID Number:						
Lift, surface mounted, twin-post, 9,000 pound										57093						

57093 Existing Equipment Cutsheet

Equipment Description:

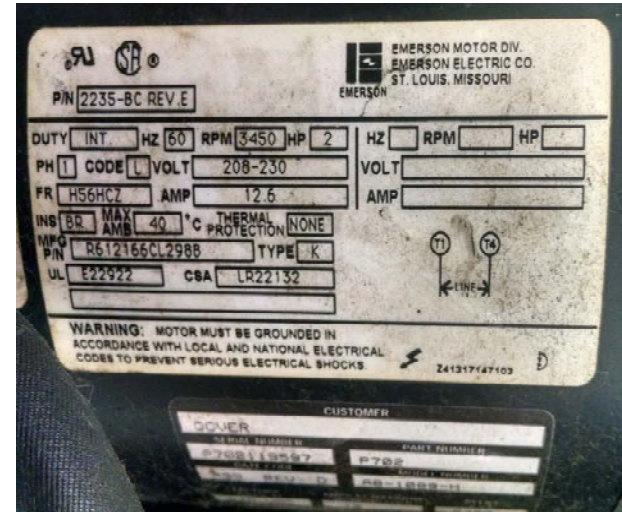
EQ ID Number:

Lift, surface mounted, twin-post, 9,000 pound

57093

Manufacturer: Rotary

Model No.: SPOA9-200

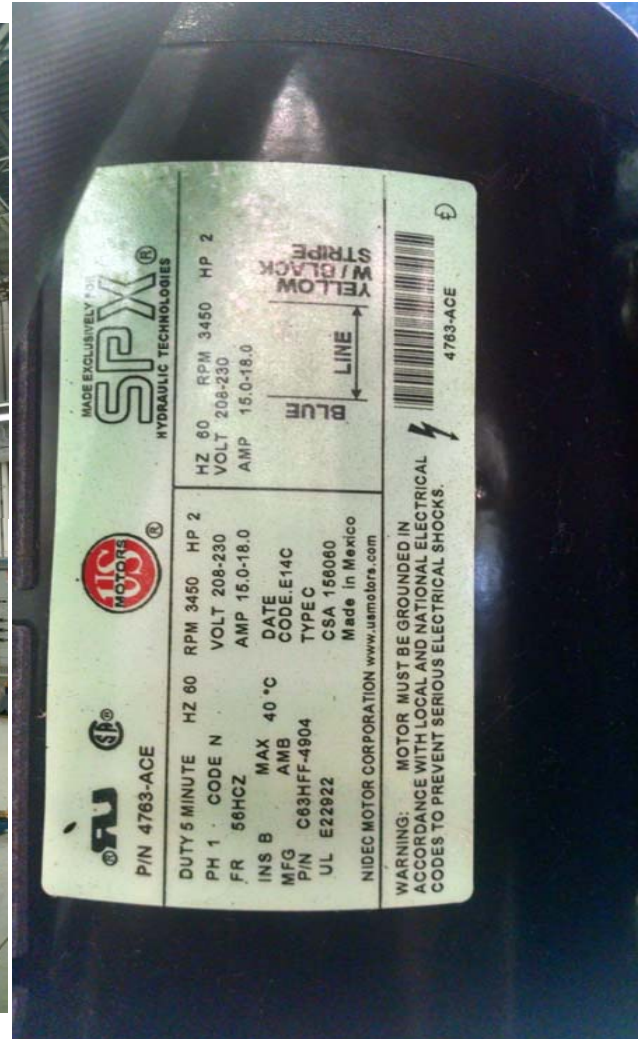


57141 Equipment Datasheet

Manufacturer:		Rotary				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		SPO15N310				Equipment		144		138		178		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		208/230	---	---		
								Phase		1	---	---		
								Horsepower (HP)		2	---	---		
								Amps		15-18	---	---		
						Connection Type		Provide disconnect						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Lift, surface mounted, twin-post, 15,000 pound										57141				

57141 Equipment Cutsheet

Equipment Description: <h3 style="margin: 0;">Lift, surface mounted, twin-post, 15,000 pound</h3>	EQ ID Number: <h2 style="margin: 0;">57141</h2>
Manufacturer: Rotary	Model No.: SPO15N310



57142 Equipment Datasheet

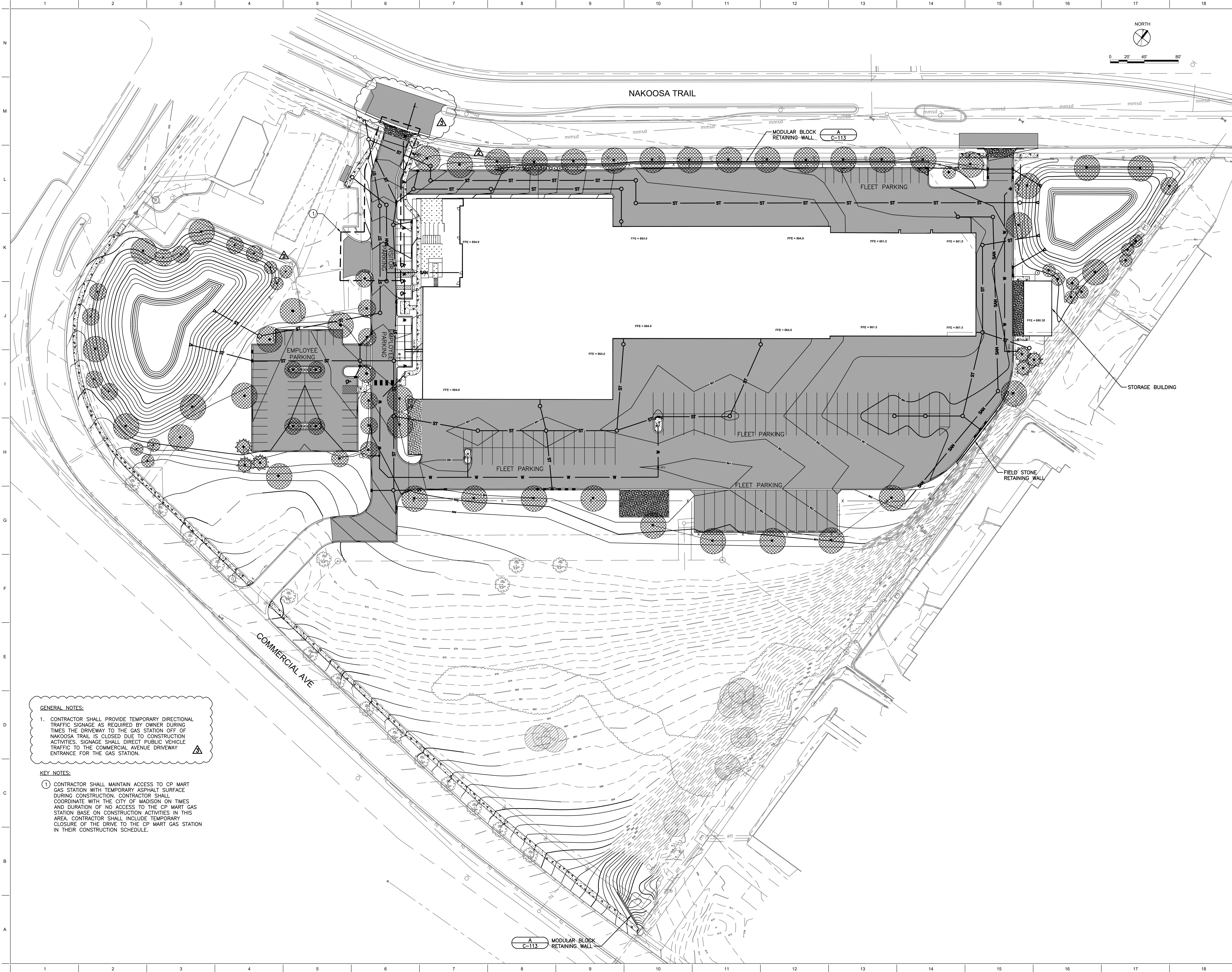
Manufacturer:		Rotary				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		SPO15N310				Equipment		144		138		178		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		208/230	---	---		
								Phase		1	---	---		
								Horsepower (HP)		2	---	---		
								Amps		15-18	---	---		
						Connection Type		Provide disconnect						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Lift, surface mounted, twin-post, 15,000 pound										57142				

57142 Equipment Cutsheet

Equipment Description: Lift, surface mounted, twin-post, 15,000 pound	EQ ID Number: 57142
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Manufacturer: Rotary	Model No.: SPO15N310
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GENERAL NOTES:

- CONTRACTOR SHALL PROVIDE TEMPORARY DIRECTIONAL TRAFFIC SIGNAGE AS REQUIRED BY OWNER DURING TIMES THE DRIVEWAY TO THE GAS STATION OFF OF NAKOOSA TRAIL IS CLOSED DUE TO CONSTRUCTION ACTIVITIES. SIGNAGE SHALL DIRECT PUBLIC VEHICLE TRAFFIC TO THE COMMERCIAL AVENUE DRIVEWAY ENTRANCE FOR THE GAS STATION.

KEY NOTES:

- CONTRACTOR SHALL MAINTAIN ACCESS TO CP MART GAS STATION WITH TEMPORARY ASPHALT SURFACE DURING CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH THE CITY OF MADISON ON TIMES AND DURATION OF NO ACCESS TO THE CP MART GAS STATION BASE ON CONSTRUCTION ACTIVITIES IN THIS AREA. CONTRACTOR SHALL INCLUDE TEMPORARY CLOSURE OF THE DRIVE TO THE CP MART GAS STATION IN THEIR CONSTRUCTION SCHEDULE.

NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA 1
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714

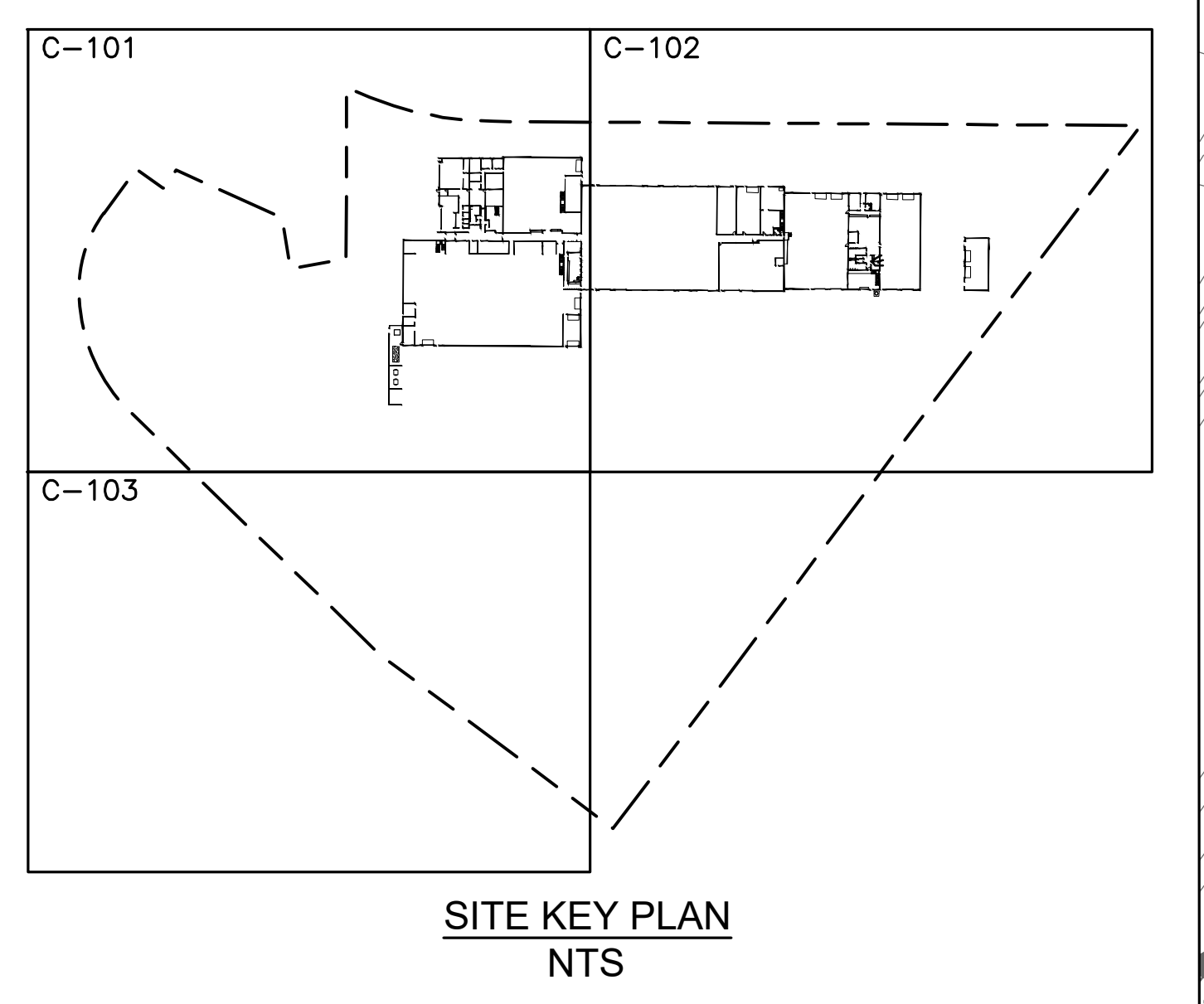
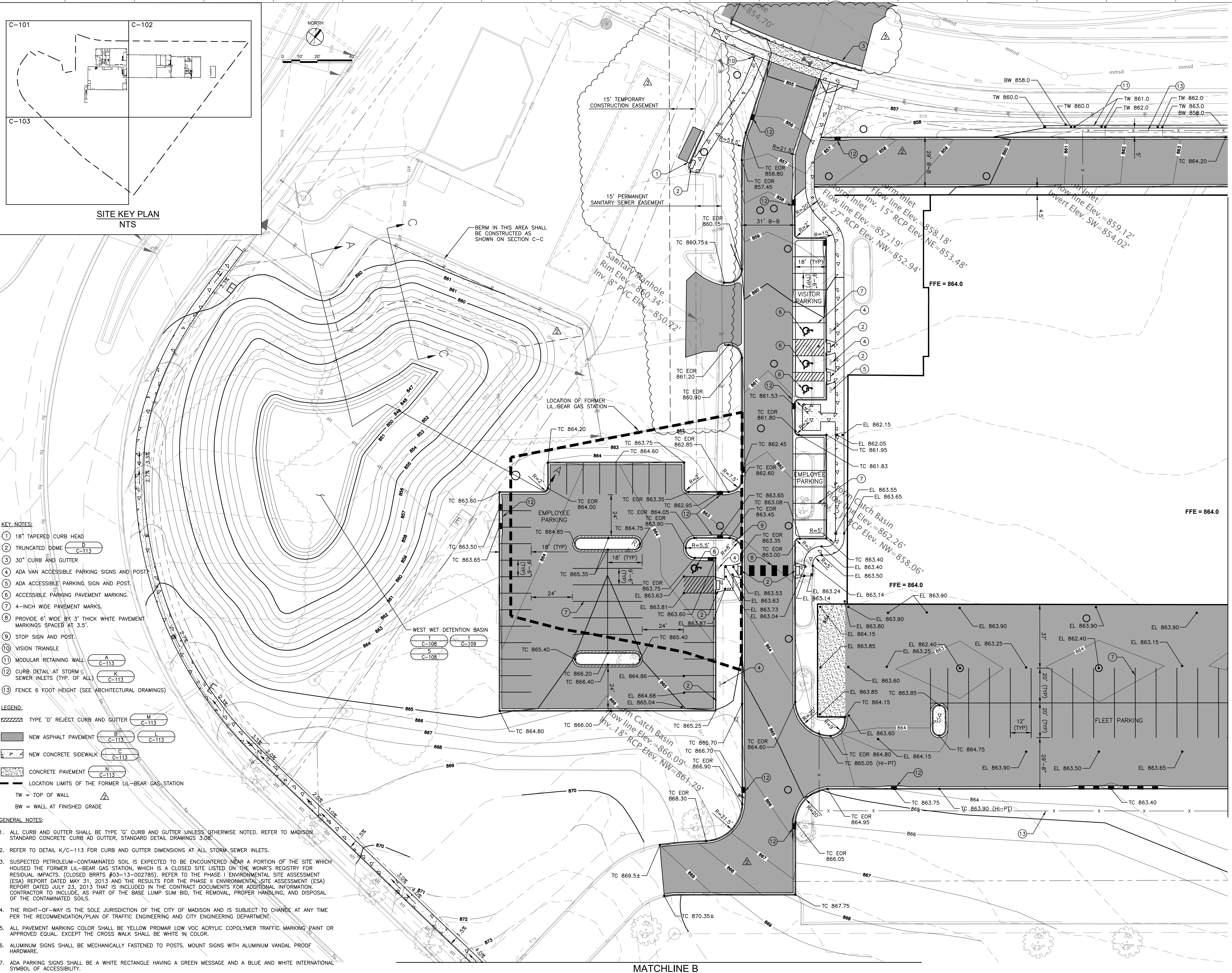


ADDENDUM NO. 3	3/14/19
ADDENDUM NO. 2	3/5/19
ISSUE FOR BID	2/7/19
REVISION/SUBMISSION	DATE
PROJECT No: 376603	

AREA 1
OVERALL SITE PLAN

C-100

SD SUBMISSION



- KEY NOTES:**
- 1 18" TAPERED CURB HEAD
 - 2 TRUNCATED DOME
 - 3 30" CURB AND GUTTER
 - 4 ADA VAN ACCESSIBLE PARKING SIGNS AND POST
 - 5 ADA ACCESSIBLE PARKING SIGN AND POST.
 - 6 ACCESSIBLE PARKING PAVEMENT MARKING.
 - 7 4-INCH WIDE PAVEMENT MARKS.
 - 8 PROVIDE 6' WIDE BY 3" THICK WHITE PAVEMENT MARKINGS SPACED AT 3.5'.
 - 9 STOP SIGN AND POST.
 - 10 VISION TRIANGLE
 - 11 MODULAR RETAINING WALL
 - 12 CURB DETAIL AT STORM SEWER INLETS (TYP. OF ALL)
 - 13 FENCE 6 FOOT HEIGHT (SEE ARCHITECTURAL DRAWINGS)

- LEGEND:**
- TYPE 'D' REJECT CURB AND GUTTER
 - NEW ASPHALT PAVEMENT
 - NEW CONCRETE SIDEWALK
 - CONCRETE PAVEMENT
 - LOCATION LIMITS OF THE FORMER LIL-BEAR GAS STATION
 - TW = TOP OF WALL
 - BW = WALL AT FINISHED GRADE

- GENERAL NOTES:**
1. ALL CURB AND GUTTER SHALL BE TYPE 'G' CURB AND GUTTER UNLESS OTHERWISE NOTED. REFER TO MADISON STANDARD CONCRETE CURB AND GUTTER, STANDARD DETAIL DRAWINGS 3.08.
 2. REFER TO DETAIL K/C-113 FOR CURB AND GUTTER DIMENSIONS AT ALL STORM SEWER INLETS.
 3. SUSPECTED PETROLEUM-CONTAMINATED SOIL IS EXPECTED TO BE ENCOUNTERED NEAR A PORTION OF THE SITE WHICH HOUSED THE FORMER LIL-BEAR GAS STATION WHICH IS A CLOSED SITE LISTED ON THE WORK'S REGISTRY FOR RESIDUAL IMPACTS. (CLOSED BRITS #03-13-002785). REFER TO THE PHASE I ENVIRONMENTAL SITE ASSESSMENT (ESA) REPORT DATED MAY 31, 2013 AND THE RESULTS FOR THE PHASE II ENVIRONMENTAL SITE ASSESSMENT (ESA) REPORT DATED JULY 23, 2013 THAT IS INCLUDED IN THE CONTRACT DOCUMENTS FOR ADDITIONAL INFORMATION. CONTRACTOR TO INCLUDE, AS PART OF THE BASE LUMP SUM BID, THE REMOVAL, PROPER HANDLING, AND DISPOSAL OF THE CONTAMINATED SOILS.
 4. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.
 5. ALL PAVEMENT MARKING COLOR SHALL BE YELLOW PROMAR LOW VOC ACRYLIC COPOLYMER TRAFFIC MARKING PAINT OR APPROVED EQUAL. EXCEPT THE CROSS WALK SHALL BE WHITE IN COLOR.
 6. ALUMINUM SIGNS SHALL BE MECHANICALLY FASTENED TO POSTS. MOUNT SIGNS WITH ALUMINUM VANDAL PROOF HARDWARE.
 7. ADA PARKING SIGNS SHALL BE A WHITE RECTANGLE HAVING A GREEN MESSAGE AND A BLUE AND WHITE INTERNATIONAL SYMBOL OF ACCESSIBILITY.

MATCHLINE A

MATCHLINE B

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA 1
4151 NAKOOSA TRAIL
MADISON, WISCONSIN 53714
SD SUBMISSION



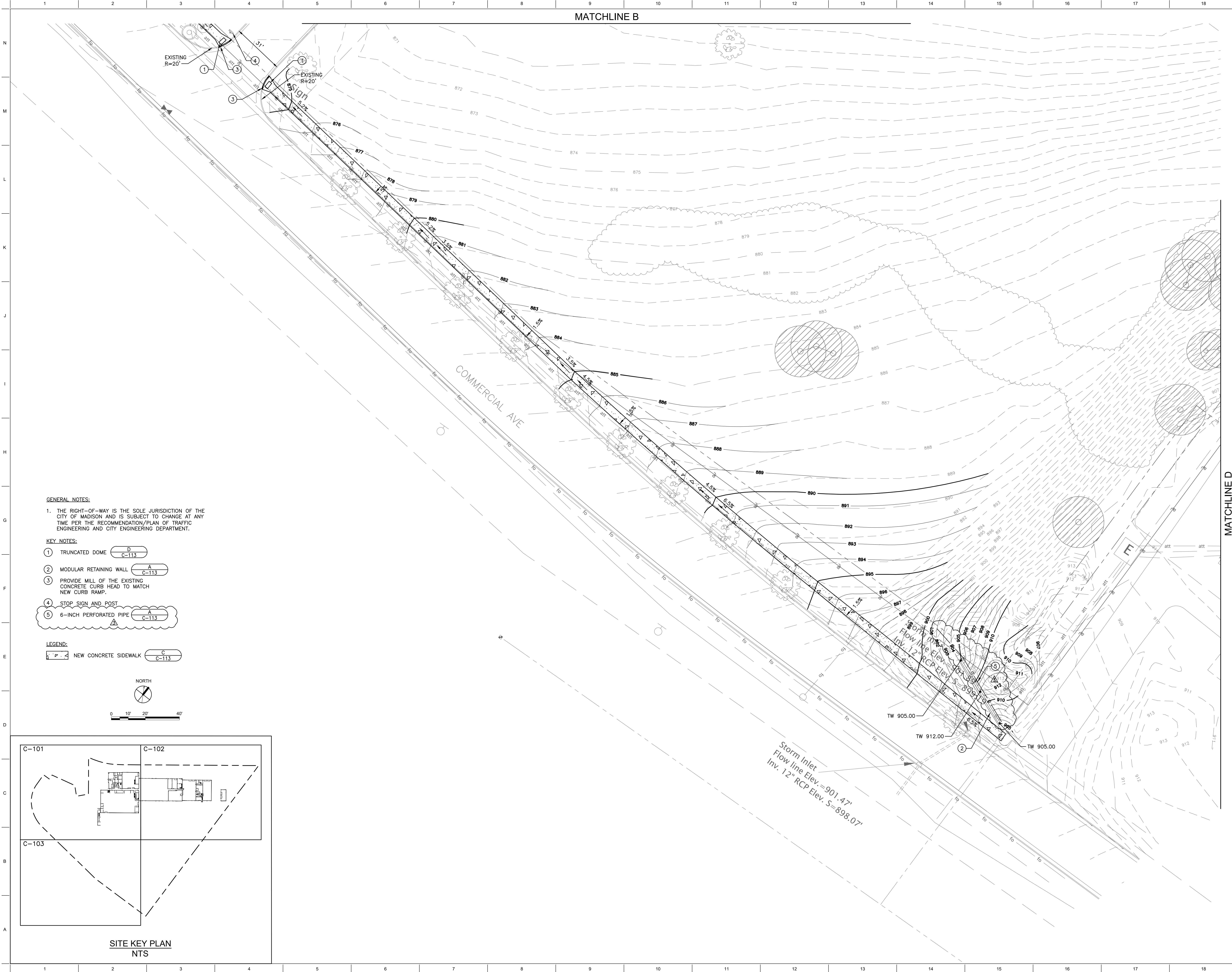
ADDENDUM NO. 3	3/14/19
ADDENDUM NO. 2	3/5/19
ISSUE FOR BID	2/7/19
REVISION SUBMISSION	DATE
PROJECT No: 376603	AREA 1
SITE PLAN	

C-101

MATCHLINE B

RNL

1600 WILSON BLVD.
SUITE 360
ARLINGTON, VA 22209
571.290.7679



GENERAL NOTES:

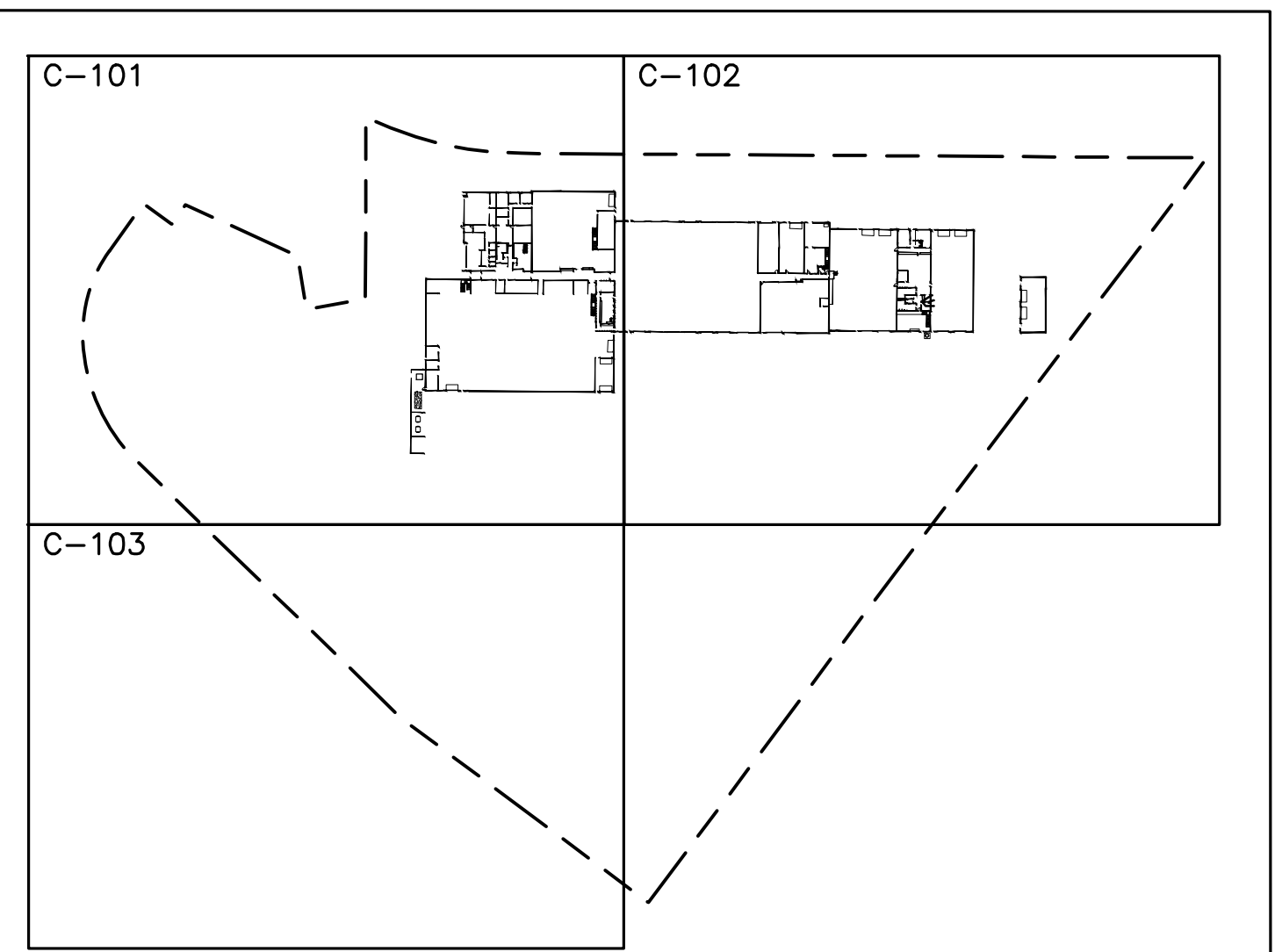
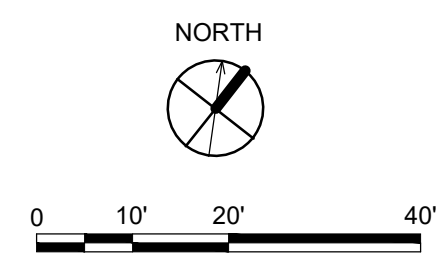
1. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.

KEY NOTES:

- ① TRUNCATED DOME (D C-113)
- ② MODULAR RETAINING WALL (A C-113)
- ③ PROVIDE MILL OF THE EXISTING CONCRETE CURB HEAD TO MATCH NEW CURB RAMP.
- ④ STOP SIGN AND POST
- ⑤ 6-INCH PERFORATED PIPE (A C-113)

LEGEND:

- NEW CONCRETE SIDEWALK (C C-113)



SITE KEY PLAN
NTS

MATCHLINE D

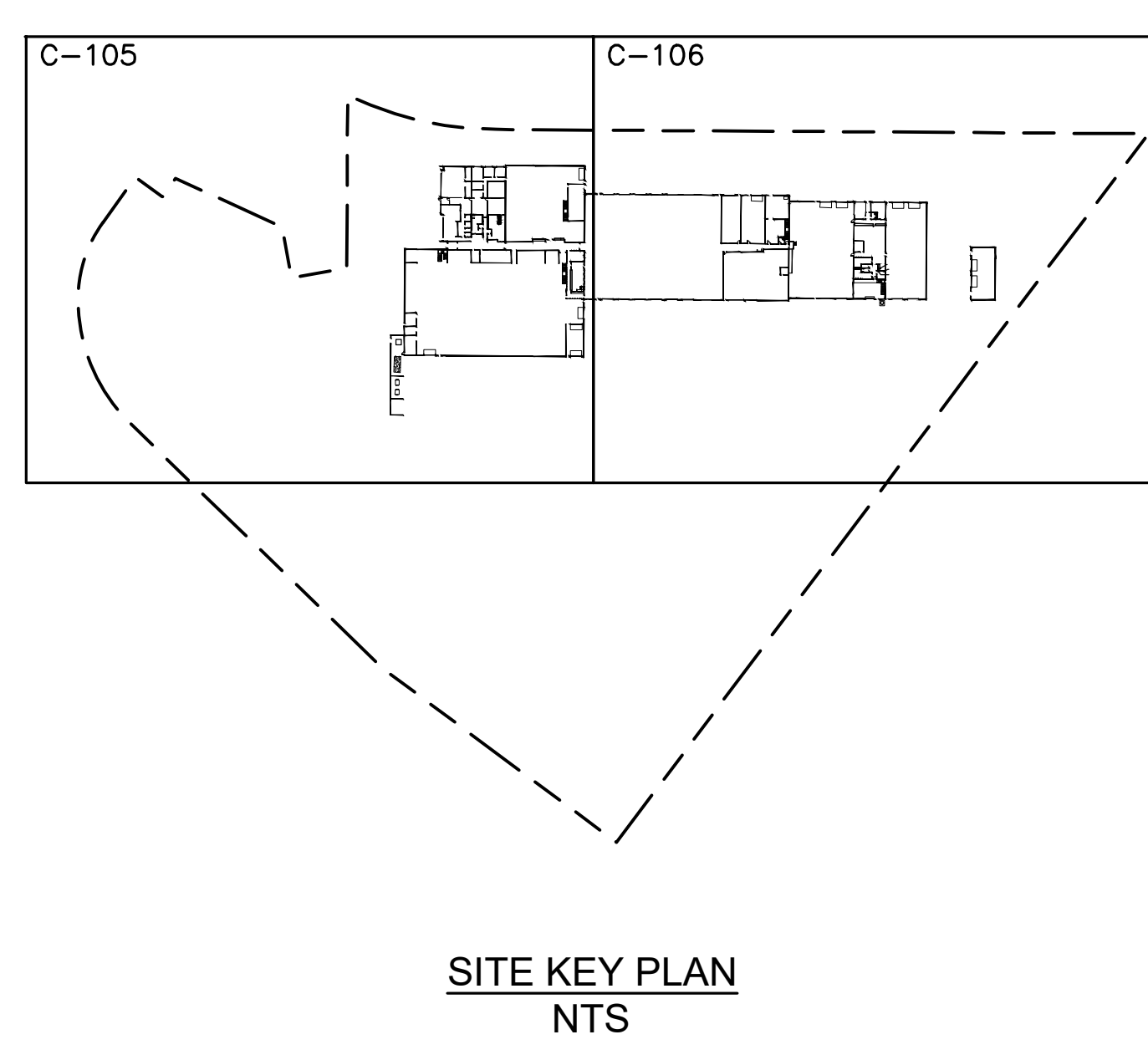
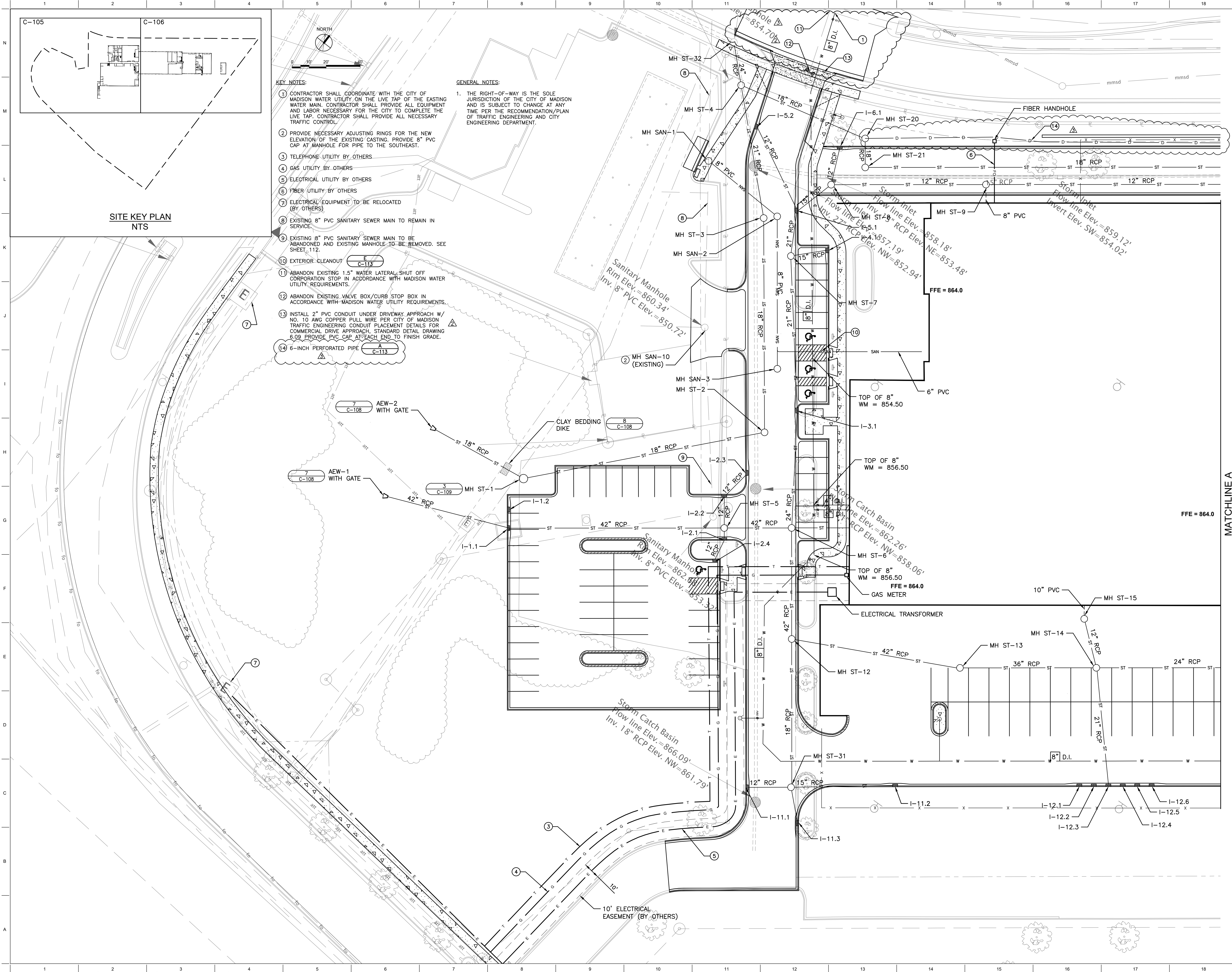
CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA 1
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
SD SUBMISSION



ADDENDUM NO. 3	3/14/19
ISSUE FOR BID	2/7/19
REVISION/SUBMISSION	DATE
PROJECT No: 376603	

AREA 1
SITE PLAN

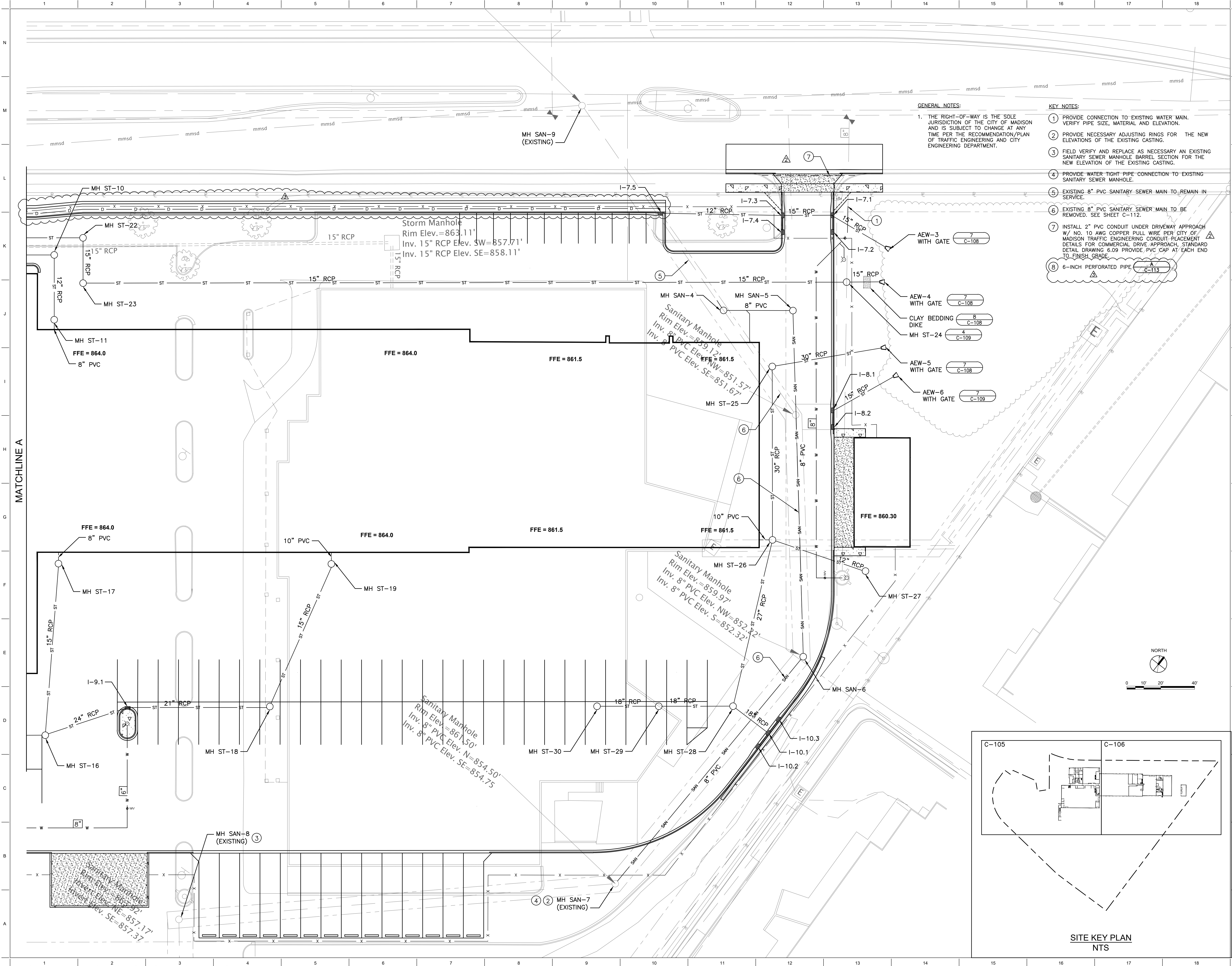
C-103



- KEY NOTES:**
- CONTRACTOR SHALL COORDINATE WITH THE CITY OF MADISON WATER UTILITY ON THE LIVE TAP OF THE EXISTING WATER MAIN. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR NECESSARY FOR THE CITY TO COMPLETE THE LIVE TAP. CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL.
 - PROVIDE NECESSARY ADJUSTING RINGS FOR THE NEW ELEVATION OF THE EXISTING CASTING. PROVIDE 8" PVC CAP AT MANHOLE FOR PIPE TO THE SOUTHEAST.
 - TELEPHONE UTILITY BY OTHERS
 - GAS UTILITY BY OTHERS
 - ELECTRICAL UTILITY BY OTHERS
 - FIBER UTILITY BY OTHERS
 - ELECTRICAL EQUIPMENT TO BE RELOCATED (BY OTHERS)
 - EXISTING 8" PVC SANITARY SEWER MAIN TO REMAIN IN SERVICE.
 - EXISTING 8" PVC SANITARY SEWER MAIN TO BE ABANDONED AND EXISTING MANHOLE TO BE REMOVED. SEE SHEET 112.
 - EXTERIOR CLEANOUT (E C-113)
 - ABANDON EXISTING 1.5" WATER LATERAL SHUT OFF CORPORATION STOP IN ACCORDANCE WITH MADISON WATER UTILITY REQUIREMENTS.
 - ABANDON EXISTING VALVE BOX/CURB STOP BOX IN ACCORDANCE WITH MADISON WATER UTILITY REQUIREMENTS.
 - INSTALL 2" PVC CONDUIT UNDER DRIVEWAY APPROACH W/ NO. 10 AWG COPPER PULL WIRE PER CITY OF MADISON TRAFFIC ENGINEERING CONDUIT PLACEMENT DETAILS FOR COMMERCIAL DRIVE APPROACH, STANDARD DETAIL DRAWING 6.09 PROVIDE PVC CAP AT EACH END TO FINISH GRADE.
 - 6-INCH PERFORATED PIPE (A C-113)

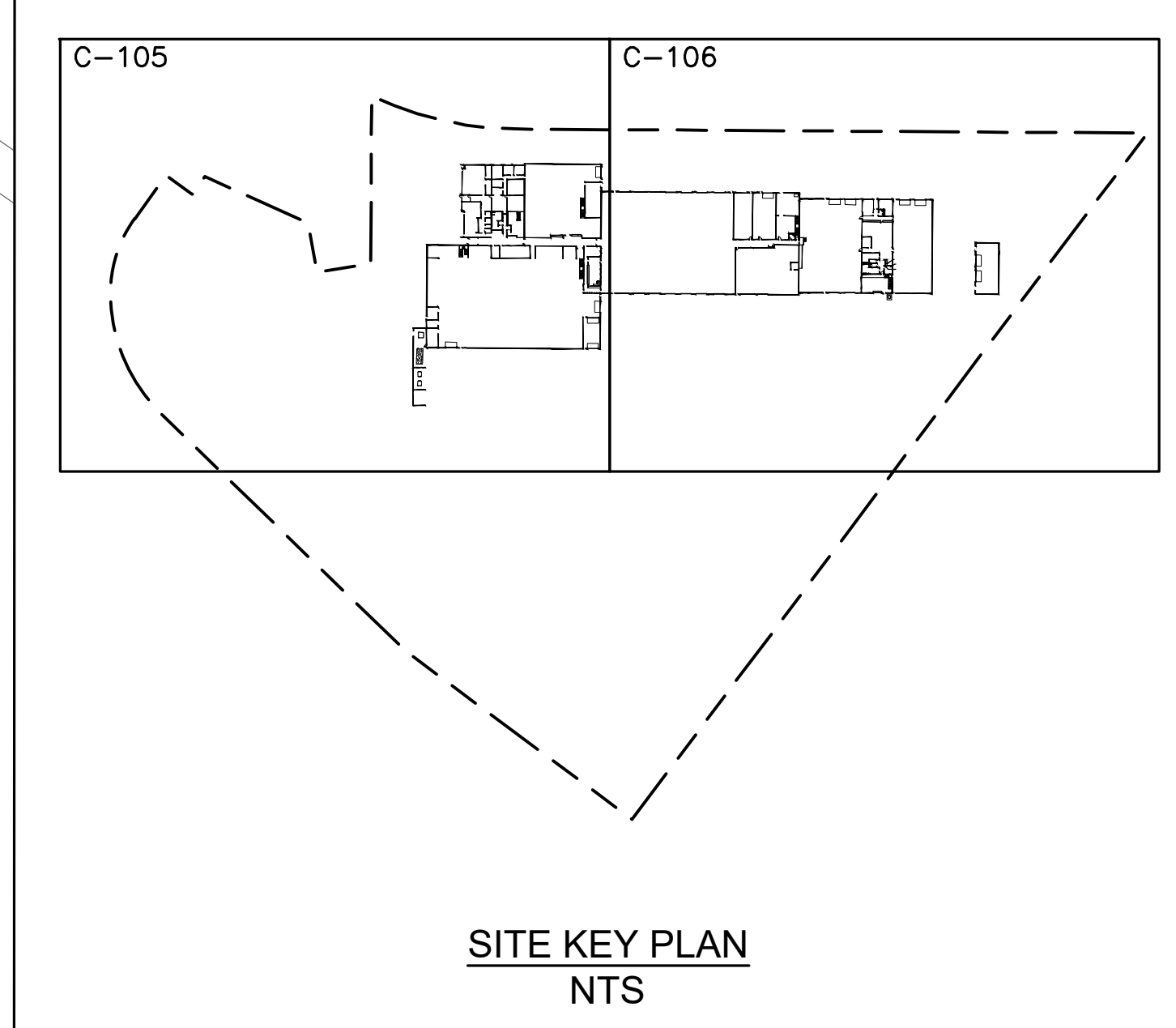
GENERAL NOTES:

- THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.



GENERAL NOTES:
1. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.

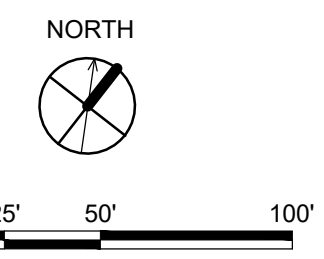
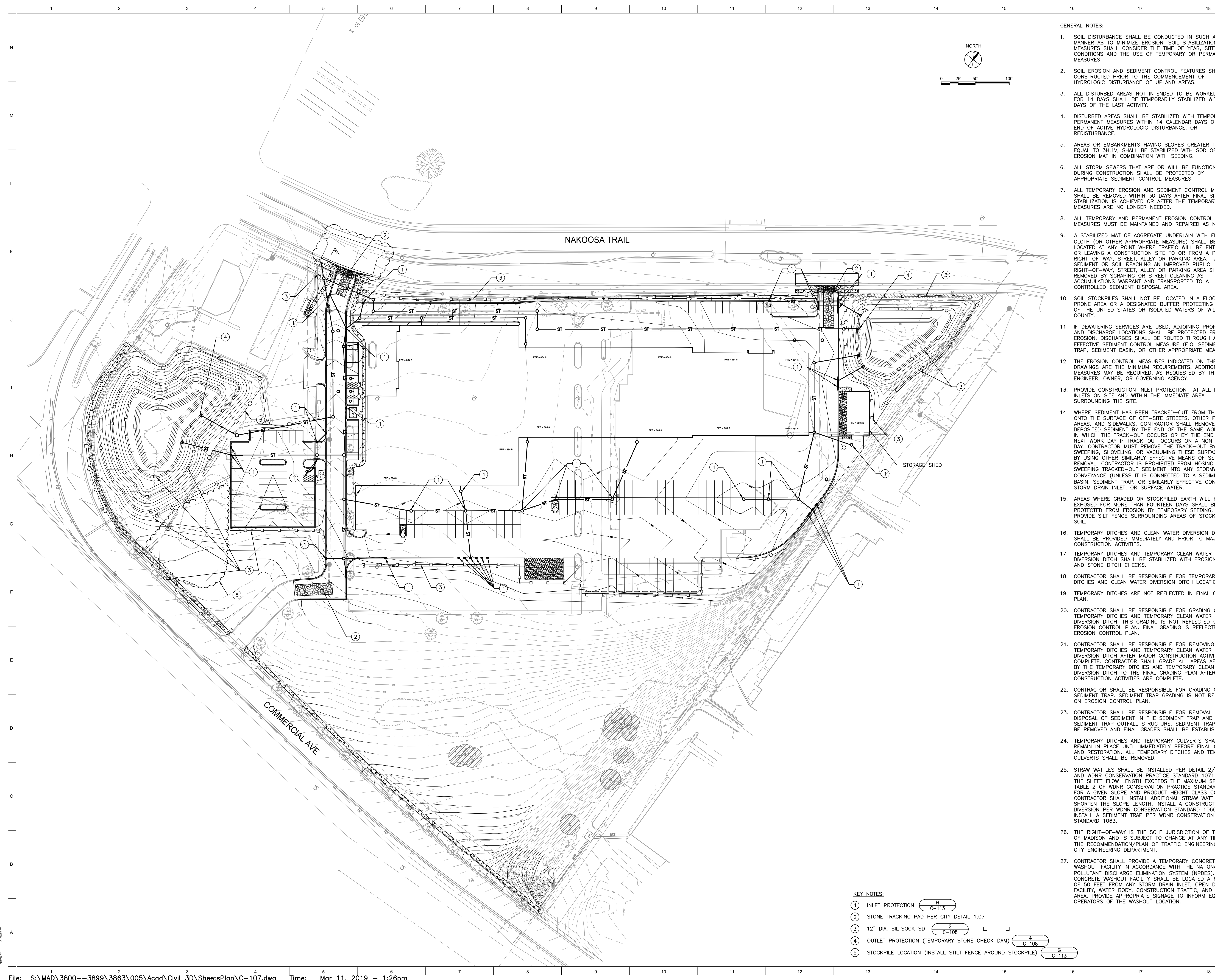
- KEY NOTES:**
- 1 PROVIDE CONNECTION TO EXISTING WATER MAIN. VERIFY PIPE SIZE, MATERIAL AND ELEVATION.
 - 2 PROVIDE NECESSARY ADJUSTING RINGS FOR THE NEW ELEVATIONS OF THE EXISTING CASTING.
 - 3 FIELD VERIFY AND REPLACE AS NECESSARY AN EXISTING SANITARY SEWER MANHOLE BARREL SECTION FOR THE NEW ELEVATION OF THE EXISTING CASTING.
 - 4 PROVIDE WATER TIGHT PIPE CONNECTION TO EXISTING SANITARY SEWER MANHOLE.
 - 5 EXISTING 8" PVC SANITARY SEWER MAIN TO REMAIN IN SERVICE.
 - 6 EXISTING 8" PVC SANITARY SEWER MAIN TO BE REMOVED. SEE SHEET C-112.
 - 7 INSTALL 2" PVC CONDUIT UNDER DRIVEWAY APPROACH W/ NO. 10 AWG COPPER PULL WIRE PER CITY OF MADISON TRAFFIC ENGINEERING CONDUIT PLACEMENT DETAILS FOR COMMERCIAL DRIVE APPROACH. STANDARD DETAIL DRAWING 6.09 PROVIDE PVC CAP AT EACH END TO FINISH GRADE.
 - 8 6-INCH PERFORATED PIPE (C-113)



CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA 1
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
SD SUBMISSION



ADDENDUM NO. 2	3/5/19
ISSUE FOR BID	2/7/19
REVISION/SUBMISSION	DATE
PROJECT No: 376603	AREA 1
UTILITY PLAN	



GENERAL NOTES:

1. SOIL DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER AS TO MINIMIZE EROSION. SOIL STABILIZATION MEASURES SHALL CONSIDER THE TIME OF YEAR, SITE CONDITIONS AND THE USE OF TEMPORARY OR PERMANENT MEASURES.
2. SOIL EROSION AND SEDIMENT CONTROL FEATURES SHALL BE CONSTRUCTED PRIOR TO THE COMMENCEMENT OF HYDROLOGIC DISTURBANCE OF UPLAND AREAS.
3. ALL DISTURBED AREAS NOT INTENDED TO BE WORKED ON FOR 14 DAYS SHALL BE TEMPORARILY STABILIZED WITHIN 7 DAYS OF THE LAST ACTIVITY.
4. DISTURBED AREAS SHALL BE STABILIZED WITH TEMPORARY OR PERMANENT MEASURES WITHIN 14 CALENDAR DAYS OF THE END OF ACTIVE HYDROLOGIC DISTURBANCE, OR REDISTURBANCE.
5. AREAS OR EMBANKMENTS HAVING SLOPES GREATER THAN OR EQUAL TO 3H:1V, SHALL BE STABILIZED WITH SOD OR EROSION MAT IN COMBINATION WITH SEEDING.
6. ALL STORM SEWERS THAT ARE OR WILL BE FUNCTIONING DURING CONSTRUCTION SHALL BE PROTECTED BY APPROPRIATE SEDIMENT CONTROL MEASURES.
7. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED.
8. ALL TEMPORARY AND PERMANENT EROSION CONTROL MEASURES MUST BE MAINTAINED AND REPAIRED AS NEEDED.
9. A STABILIZED MAT OF AGGREGATE UNDERLAIN WITH FILTER CLOTH (OR OTHER APPROPRIATE MEASURE) SHALL BE LOCATED AT ANY POINT WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC RIGHT-OF-WAY, STREET, ALLEY OR PARKING AREA. ANY SEDIMENT OR SOIL REACHING AN IMPROVED PUBLIC RIGHT-OF-WAY, STREET, ALLEY OR PARKING AREA SHALL BE REMOVED BY SCRAPING OR STREET CLEANING AS ACCUMULATIONS WARRANT AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
10. SOIL STOCKPILES SHALL NOT BE LOCATED IN A FLOOD PRONE AREA OR A DESIGNATED BUFFER PROTECTING WATERS OF THE UNITED STATES OR ISOLATED WATERS OF WILL COUNTY.
11. IF DEWATERING SERVICES ARE USED, ADJOINING PROPERTIES AND DISCHARGE LOCATIONS SHALL BE PROTECTED FROM EROSION. DISCHARGES SHALL BE ROUTED THROUGH AN EFFECTIVE SEDIMENT CONTROL MEASURE (E.G. SEDIMENT TRAP, SEDIMENT BASIN, OR OTHER APPROPRIATE MEASURE).
12. THE EROSION CONTROL MEASURES INDICATED ON THE DRAWINGS ARE THE MINIMUM REQUIREMENTS. ADDITIONAL MEASURES MAY BE REQUIRED, AS REQUESTED BY THE ENGINEER, OWNER, OR GOVERNING AGENCY.
13. PROVIDE CONSTRUCTION INLET PROTECTION AT ALL EXISTING INLETS ON SITE AND WITHIN THE IMMEDIATE AREA SURROUNDING THE SITE.
14. WHERE SEDIMENT HAS BEEN TRACKED-OUT FROM THE SITE ONTO THE SURFACE OF OFF-SITE STREETS, OTHER PAVED AREAS, AND SIDEWALKS, CONTRACTOR SHALL REMOVE THE DEPOSITED SEDIMENT BY THE END OF THE SAME WORK DAY IN WHICH THE TRACK-OUT OCCURS OR BY THE END OF THE NEXT WORK DAY IF TRACK-OUT OCCURS ON A NON-WORK DAY. CONTRACTOR MUST REMOVE THE TRACK-OUT BY SWEEPING, SHOVELING, OR VACUUMING THESE SURFACES, OR BY USING OTHER SIMILARLY EFFECTIVE MEANS OF SEDIMENT REMOVAL. CONTRACTOR IS PROHIBITED FROM HOISING OR SWEEPING TRACKED-OUT SEDIMENT INTO ANY STORMWATER CONVEYANCE (UNLESS IT IS CONNECTED TO A SEDIMENT BASIN, SEDIMENT TRAP, OR SIMILARLY EFFECTIVE CONTROL), STORM DRAIN INLET, OR SURFACE WATER.
15. AREAS WHERE GRADED OR STOCKPILED EARTH WILL REMAIN EXPOSED FOR MORE THAN FOURTEEN DAYS SHALL BE PROTECTED FROM EROSION BY TEMPORARY SEEDING. PROVIDE SILT FENCE SURROUNDING AREAS OF STOCKPILED SOIL.
16. TEMPORARY DITCHES AND CLEAN WATER DIVERSION DITCH SHALL BE PROVIDED IMMEDIATELY AND PRIOR TO MAJOR CONSTRUCTION ACTIVITIES.
17. TEMPORARY DITCHES AND TEMPORARY CLEAN WATER DIVERSION DITCH SHALL BE STABILIZED WITH EROSION MAT AND STONE DITCH CHECKS.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DITCHES AND CLEAN WATER DIVERSION DITCH LOCATIONS.
19. TEMPORARY DITCHES ARE NOT REFLECTED IN FINAL GRADING PLAN.
20. CONTRACTOR SHALL BE RESPONSIBLE FOR GRADING OF TEMPORARY DITCHES AND TEMPORARY CLEAN WATER DIVERSION DITCH. THIS GRADING IS NOT REFLECTED ON EROSION CONTROL PLAN. FINAL GRADING IS REFLECTED ON EROSION CONTROL PLAN.
21. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING TEMPORARY DITCHES AND TEMPORARY CLEAN WATER DIVERSION DITCH AFTER MAJOR CONSTRUCTION ACTIVITIES ARE COMPLETE. CONTRACTOR SHALL GRADE ALL AREAS AFFECTED BY THE TEMPORARY DITCHES AND TEMPORARY CLEAN WATER DIVERSION DITCH TO THE FINAL GRADING PLAN AFTER MAJOR CONSTRUCTION ACTIVITIES ARE COMPLETE.
22. CONTRACTOR SHALL BE RESPONSIBLE FOR GRADING OF SEDIMENT TRAP. SEDIMENT TRAP GRADING IS NOT REFLECTED ON EROSION CONTROL PLAN.
23. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND DISPOSAL OF SEDIMENT IN THE SEDIMENT TRAP AND THE SEDIMENT TRAP OUTFALL STRUCTURE. SEDIMENT TRAP SHALL BE REMOVED AND FINAL GRADES SHALL BE ESTABLISHED.
24. TEMPORARY DITCHES AND TEMPORARY CULVERTS SHALL REMAIN IN PLACE UNTIL IMMEDIATELY BEFORE FINAL GRADING AND RESTORATION. ALL TEMPORARY DITCHES AND TEMPORARY CULVERTS SHALL BE REMOVED.
25. STRAW WATTLES SHALL BE INSTALLED PER DETAIL 2/C-108 AND WDNR CONSERVATION PRACTICE STANDARD 1071. IF THE SHEET FLOW LENGTH EXCEEDS THE MAXIMUM SPACING IN TABLE 2 OF WDNR CONSERVATION PRACTICE STANDARD 1071 FOR A GIVEN SLOPE AND PRODUCT HEIGHT, CLASS CONDITION, CONTRACTOR SHALL INSTALL ADDITIONAL STRAW WATTLES TO SHORTEN THE SLOPE LENGTH, INSTALL A CONSTRUCTION SITE DIVERSION PER WDNR CONSERVATION STANDARD 1066, OR INSTALL A SEDIMENT TRAP PER WDNR CONSERVATION STANDARD 1063.
26. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.
27. CONTRACTOR SHALL PROVIDE A TEMPORARY CONCRETE WASHOUT FACILITY IN ACCORDANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES). CONCRETE WASHOUT FACILITY SHALL BE LOCATED A MINIMUM OF 50 FEET FROM ANY STORM DRAIN INLET, OPEN DRAINAGE FACILITY, WATER BODY, CONSTRUCTION TRAFFIC, AND ACCESS AREA. PROVIDE APPROPRIATE SIGNAGE TO INFORM EQUIPMENT OPERATORS OF THE WASHOUT LOCATION.

KEY NOTES:

- 1 INLET PROTECTION H C-113
- 2 STONE TRACKING PAD PER CITY DETAIL 1.07 S C-108
- 3 12" DIA. SILT SOCK SD 2 C-108
- 4 OUTLET PROTECTION (TEMPORARY STONE CHECK DAM) 4 C-108
- 5 STOCKPILE LOCATION (INSTALL STILT FENCE AROUND STOCKPILE) G C-113

RNL
 1800 WILSON BLVD.
 SUITE 380
 ARLINGTON, VA 22209
 571.290.7679

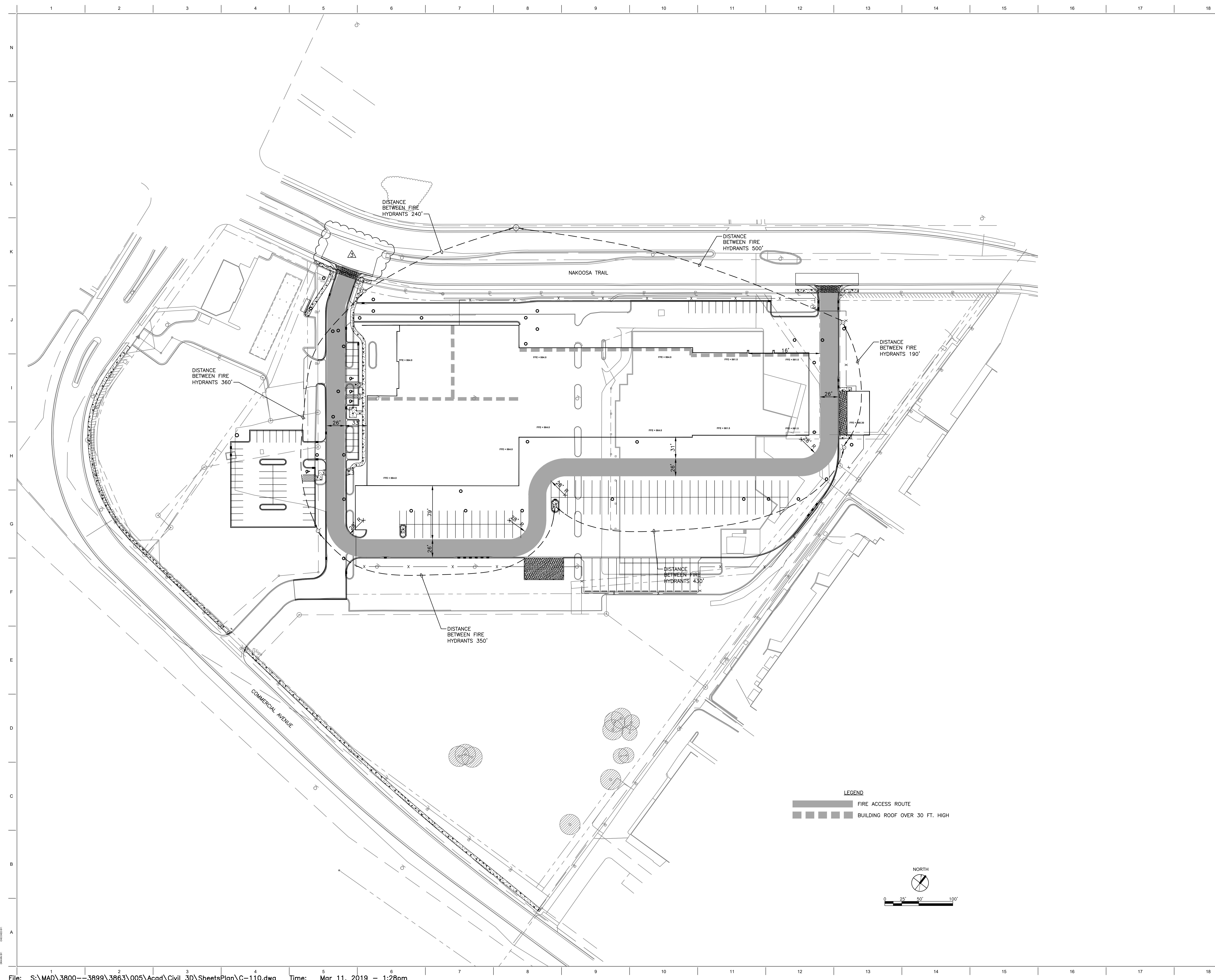
CITY OF MADISON
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 FLEET/FIRE/RADIO SHOP
 FACILITY
 AREA 1
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EROSION CONTROL

C-107



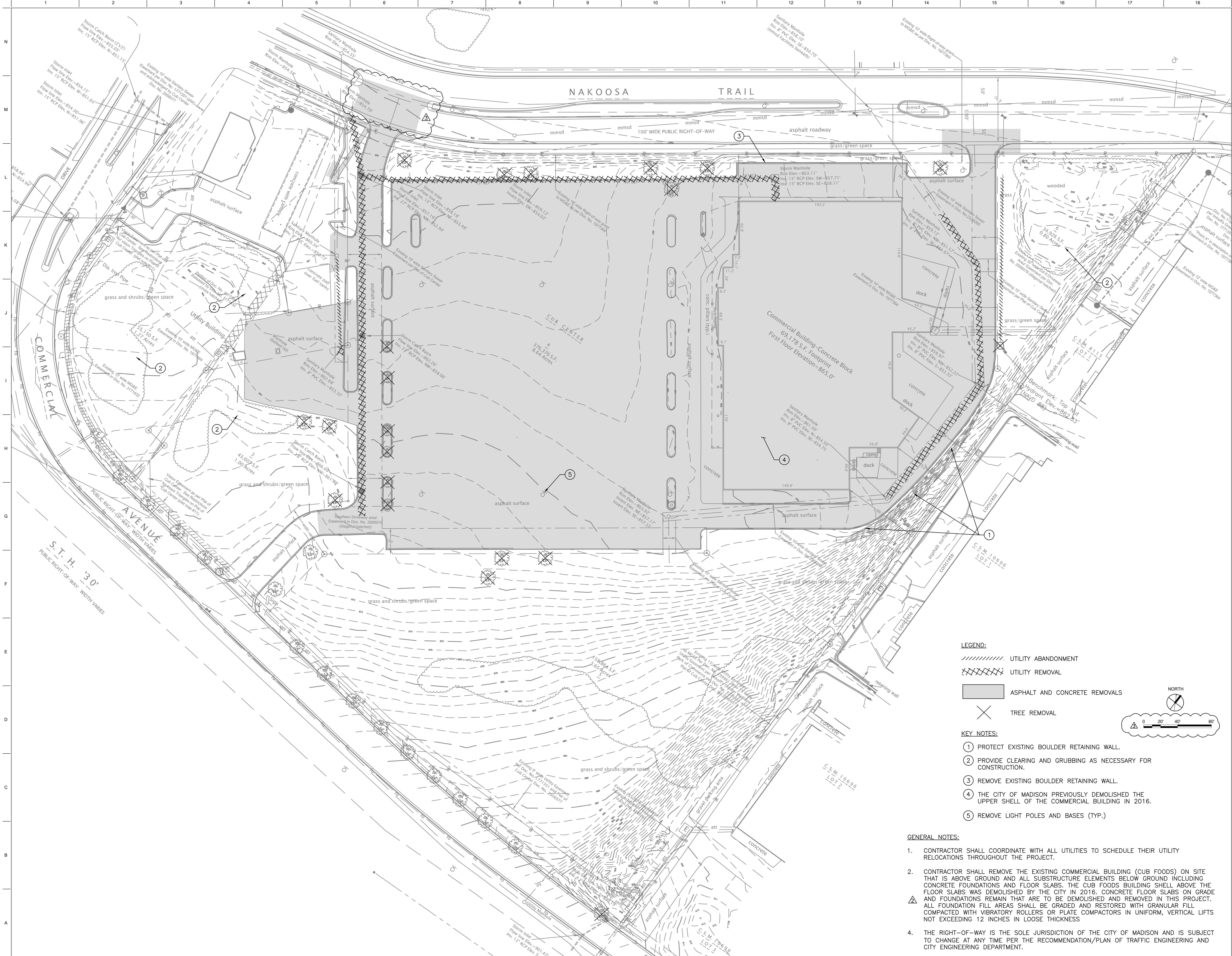
CITY OF MADISON
 NAKOOSA TRAIL
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 AREA 1
 4151 NAKOOSA TRAIL
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PROJECT No: 376603

FIRE ACCESS
C-110



LEGEND:

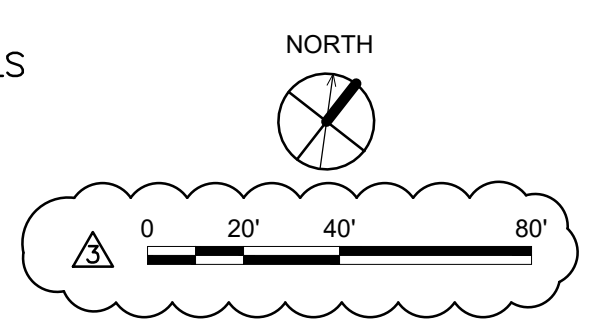
- UTILITY ABANDONMENT
- UTILITY REMOVAL
- ASPHALT AND CONCRETE REMOVALS
- TREE REMOVAL

KEY NOTES:

- 1 PROTECT EXISTING BOULDER RETAINING WALL.
- 2 PROVIDE CLEARING AND GRUBBING AS NECESSARY FOR CONSTRUCTION.
- 3 REMOVE EXISTING BOULDER RETAINING WALL.
- 4 THE CITY OF MADISON PREVIOUSLY DEMOLISHED THE UPPER SHELL OF THE COMMERCIAL BUILDING IN 2016.
- 5 REMOVE LIGHT POLES AND BASES (TYP.)

GENERAL NOTES:

1. CONTRACTOR SHALL COORDINATE WITH ALL UTILITIES TO SCHEDULE THEIR UTILITY RELOCATIONS THROUGHOUT THE PROJECT.
2. CONTRACTOR SHALL REMOVE THE EXISTING COMMERCIAL BUILDING (CUB FOODS) ON SITE THAT IS ABOVE GROUND AND ALL SUBSTRUCTURE ELEMENTS BELOW GROUND INCLUDING CONCRETE FOUNDATIONS AND FLOOR SLABS. THE CUB FOODS BUILDING SHELL ABOVE THE FLOOR SLABS WAS DEMOLISHED BY THE CITY IN 2016. CONCRETE FLOOR SLABS ON GRADE AND FOUNDATIONS REMAIN THAT ARE TO BE DEMOLISHED AND REMOVED IN THIS PROJECT. ALL FOUNDATION FILL AREAS SHALL BE GRADED AND RESTORED WITH GRANULAR FILL COMPACTED WITH VIBRATORY ROLLERS OR PLATE COMPACTORS IN UNIFORM, VERTICAL LIFTS NOT EXCEEDING 12 INCHES IN LOOSE THICKNESS
3. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.



CITY OF MADISON
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FLEET/FIRE/RADIO SHOP
FACILITY
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SD SUBMISSION

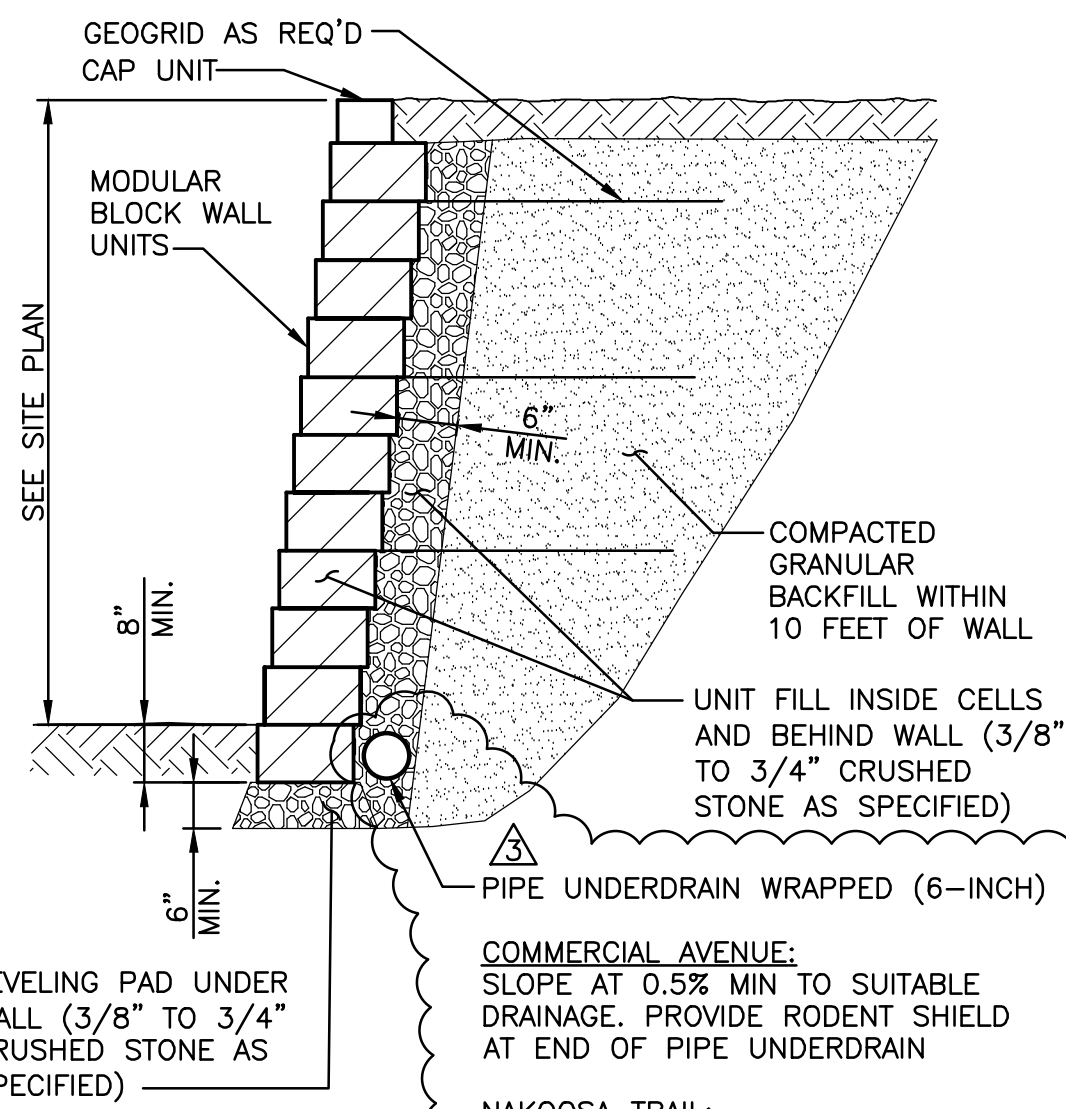


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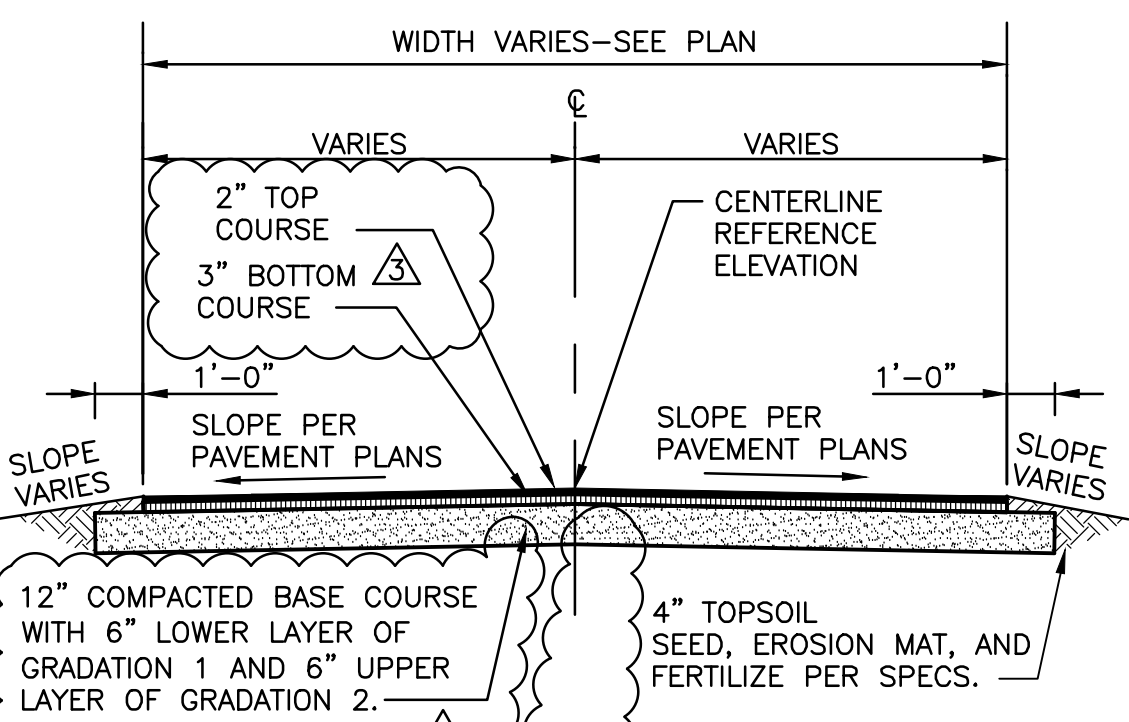
PROJECT No: 376603

DEMOLITION PLAN

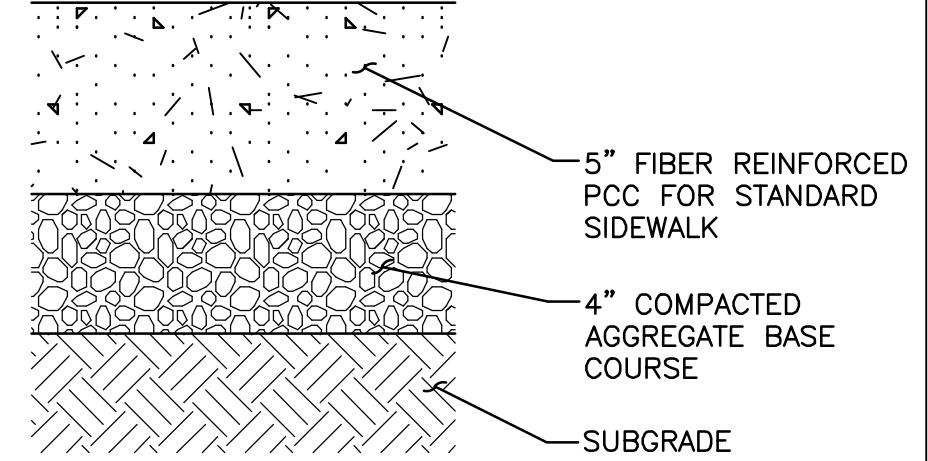
C-112



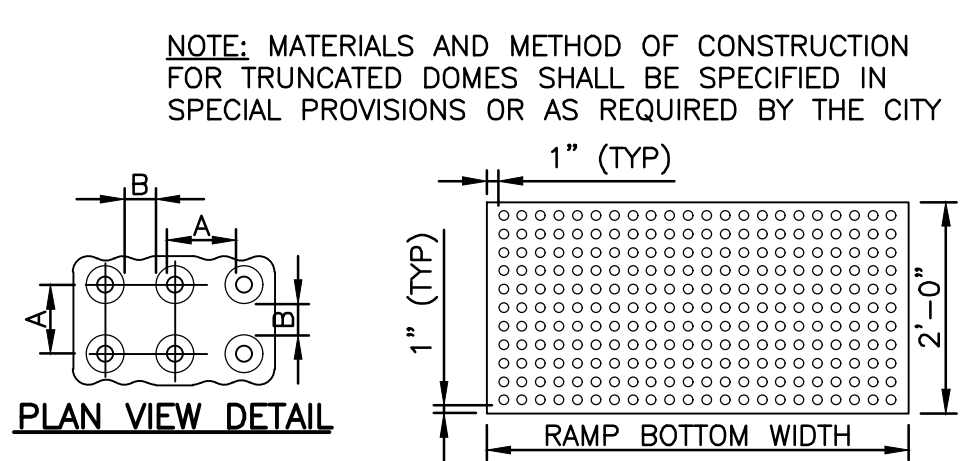
A MODULAR RETAINING WALL
C-113 NO SCALE



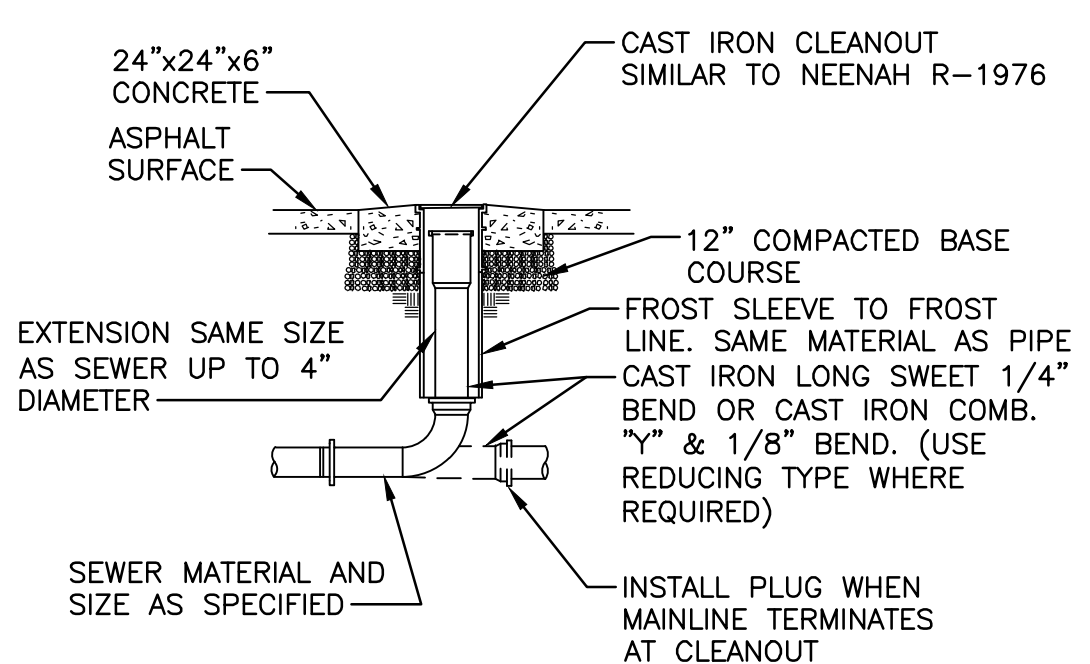
B NEW ASPHALT PAVEMENT SECTION
C-113 NO SCALE



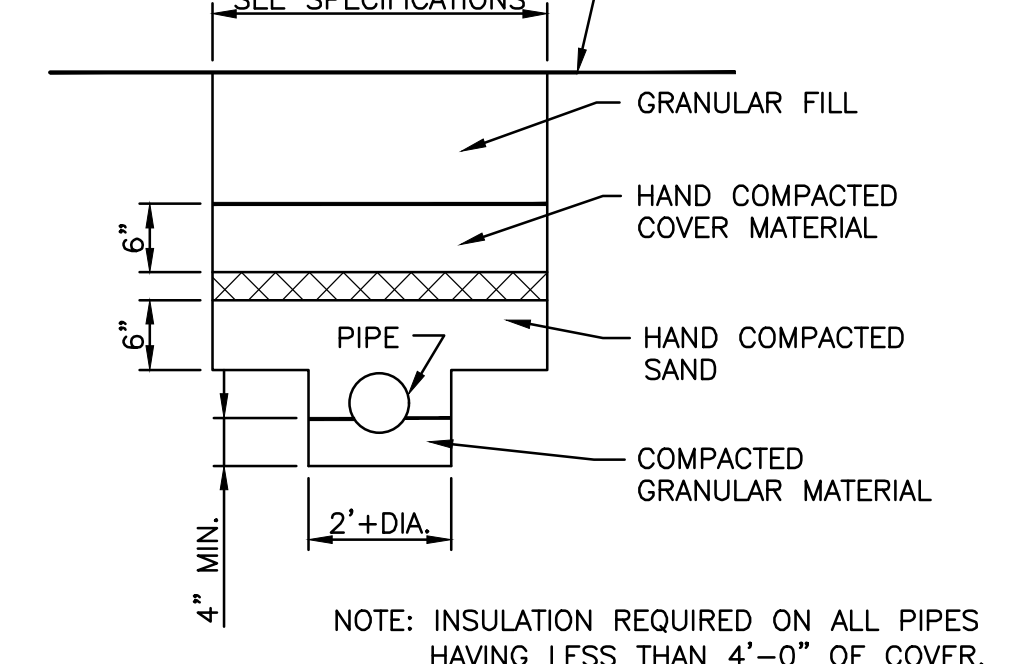
C CONCRETE SIDEWALK
C-113 NO SCALE



D TRUNCATED DOMES
C-113 NO SCALE

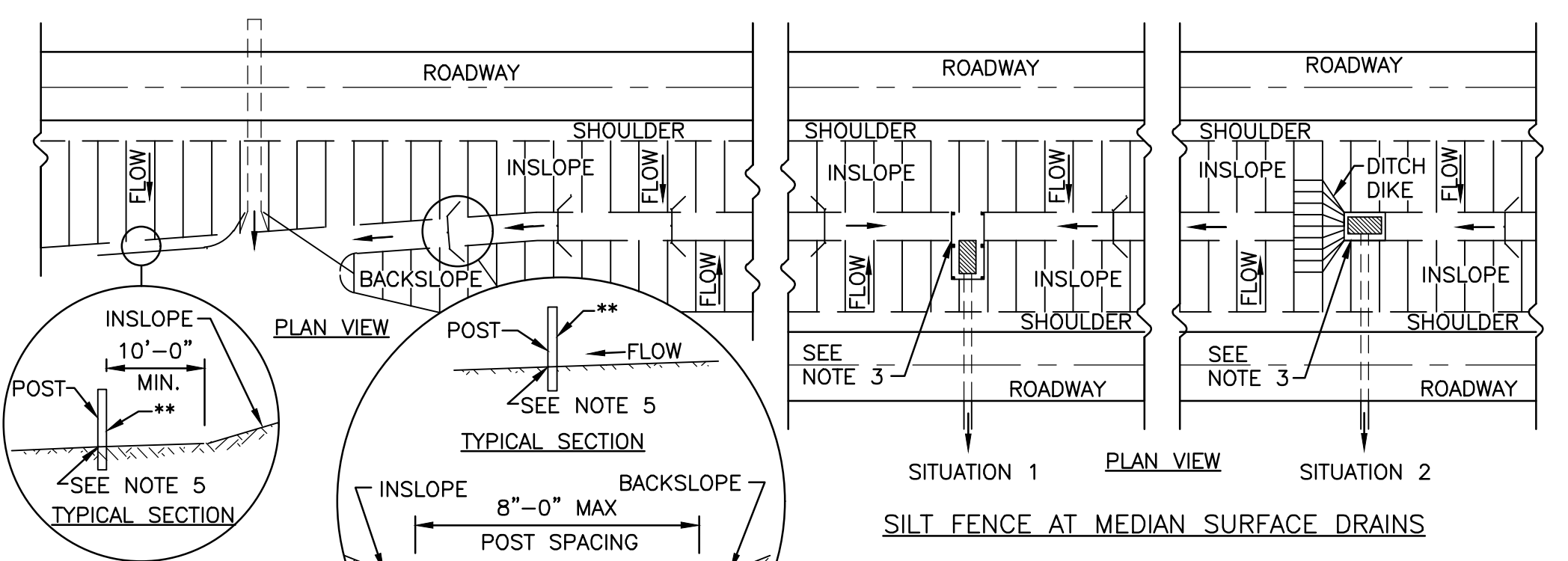


E EXTERIOR CLEANOUT DETAIL
C-113 NO SCALE

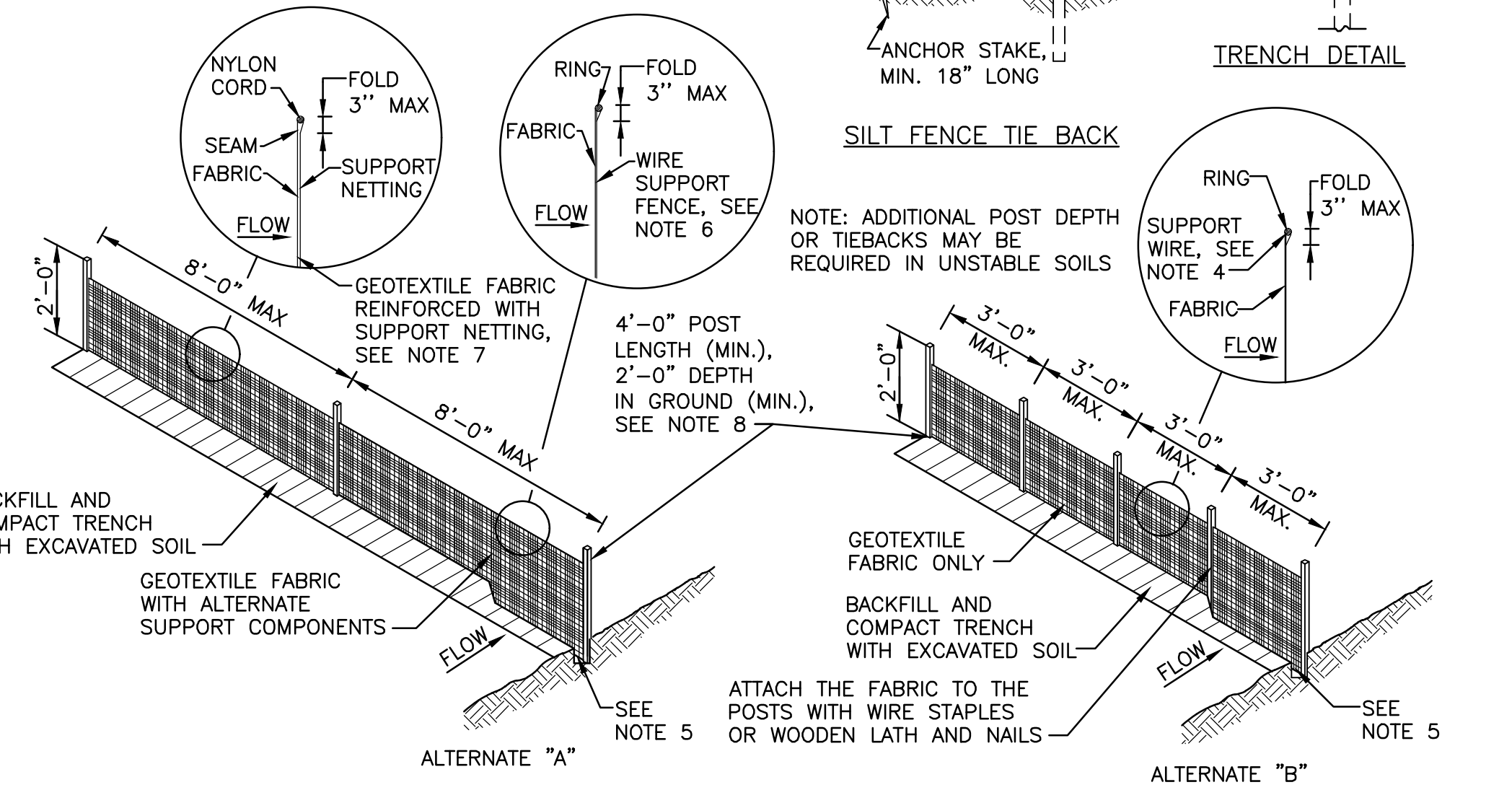


F UNDERGROUND PIPE INSULATION
C-113 NO SCALE

- NOTES:**
- DETAILS OF CONSTRUCTION NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.
 - WHEN POSSIBLE THE SILT FENCE SHALL BE CONSTRUCTED IN AN ARC OR HORSESHOE SHAPE, WITH THE ENDS POINTING UPSLOPE TO MAXIMIZE BOTH STRENGTH AND EFFECTIVENESS.
 - CROSS BRACE WITH 2"x4" WOODEN FRAME OR EQUIVALENT AT TOP OF POSTS.
 - MINIMUM 14 GAGE WIRE REQUIRED, FOLD FABRIC 3" OVER THE WIRE AND STAPLE OR PLACE WIRE RINGS ON 12" C-C.
 - EXCAVATE TRENCH A MINIMUM OF 4" WIDE AND 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC, FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH WITH EXCAVATED SOIL.
 - WIRE SUPPORT FENCE SHALL BE 14 GAGE MINIMUM WOVEN WIRE WITH A MAXIMUM MESH SPACING OF 6". SECURE TOP OF GEOTEXTILE FABRIC TO TOP OF FENCE WITH STAPLES OR WIRE RINGS AT 12" C TO C.
 - GEOTEXTILE FABRIC SHALL BE REINFORCED WITH AN INDUSTRIAL POLYPROPYLENE NETTING WITH A MAXIMUM MESH SPACING OF 1/4" OR EQUAL. A HEAVY DUTY NYLON TOP SUPPORT CORD OR EQUIVALENT IS REQUIRED.
 - STEEL POSTS SHALL BE STUDDED "TEE" OR "U" TYPE WITH A MINIMUM WEIGHT OF 1.2 LBS/LINEAR FOOT WITHOUT ANCHORS, OR ANCHORS SUFFICIENT TO RESIST POST MOVEMENT ARE REQUIRED. WOOD POSTS SHALL BE A MINIMUM SIZE OF 4" DIAMETER, OR 2 1/2"x3 1/2", EXCEPT WOOD POSTS FOR GEOTEXTILE FABRIC REINFORCED WITH NETTING SHALL BE 1 1/8"x1 1/8" OAK OR HICKORY.
 - ALTERNATES "A" AND "B" ARE EQUAL AND EITHER MAY BE USED.



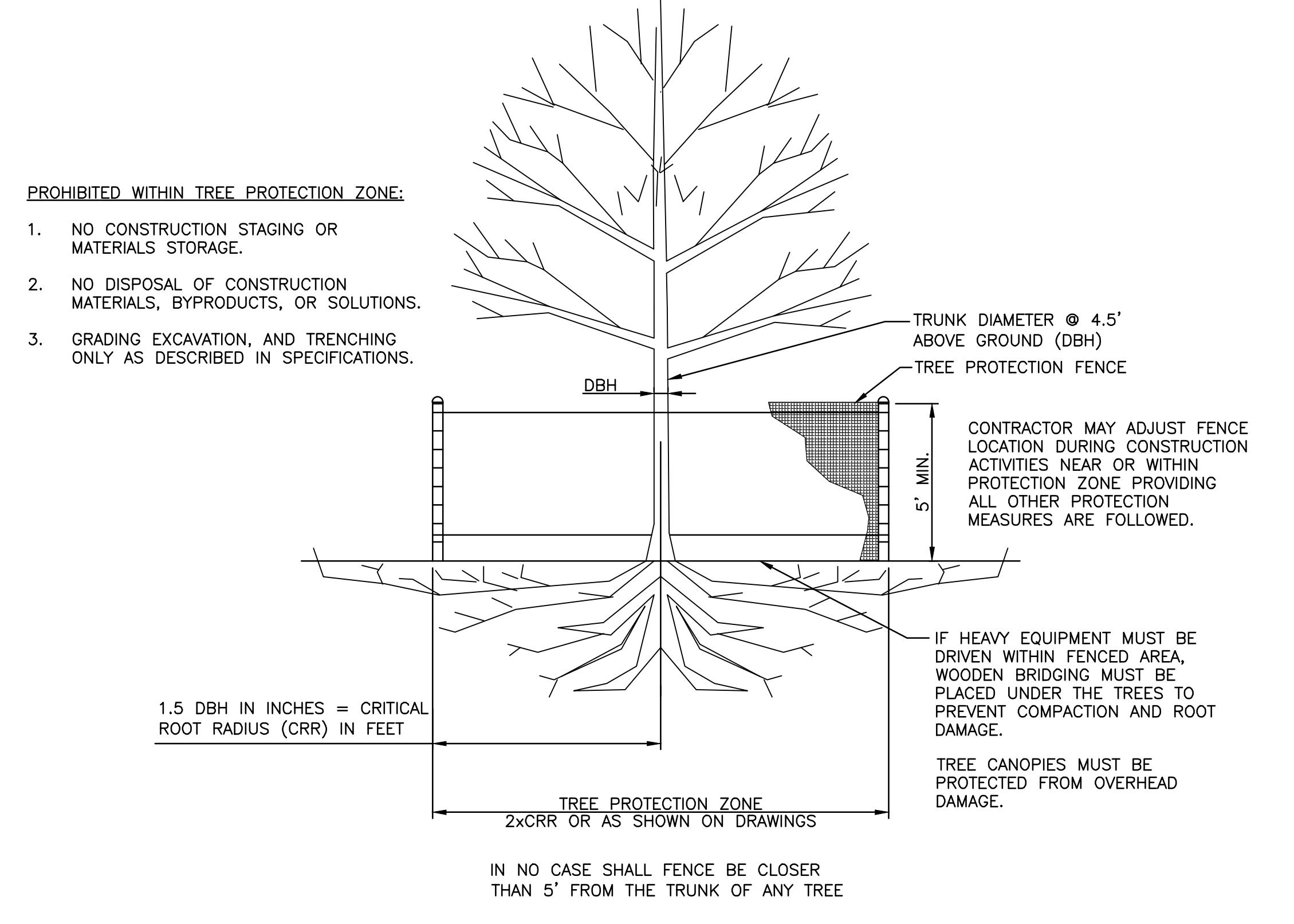
TYPICAL APPLICATIONS OF SILT FENCE



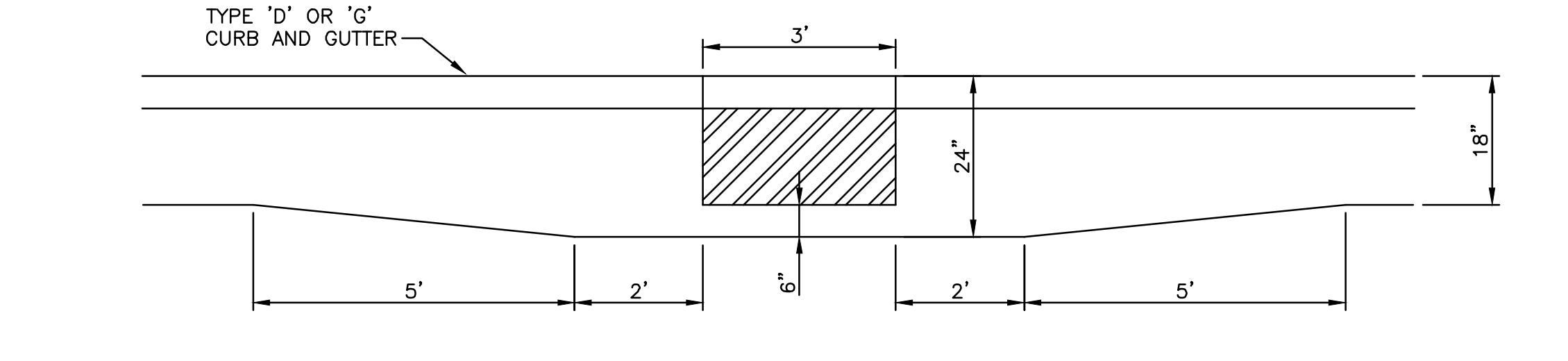
H INLET PROTECTION TYPE A, B, C, AND D
C-113 NO SCALE

- NOTES:**
- MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENTS EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.
 - WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET, ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.
 - FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.
 - FOR INLET PROTECTION, TYPE C (WITH CURB BOX), AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.
 - FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2X4.
 - FOR TYPES B AND C, TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE. THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.
 - FOR TYPE D, DO NOT INSTALL INLET PROTECTION TYPE D INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE. TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE. THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY, THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE.

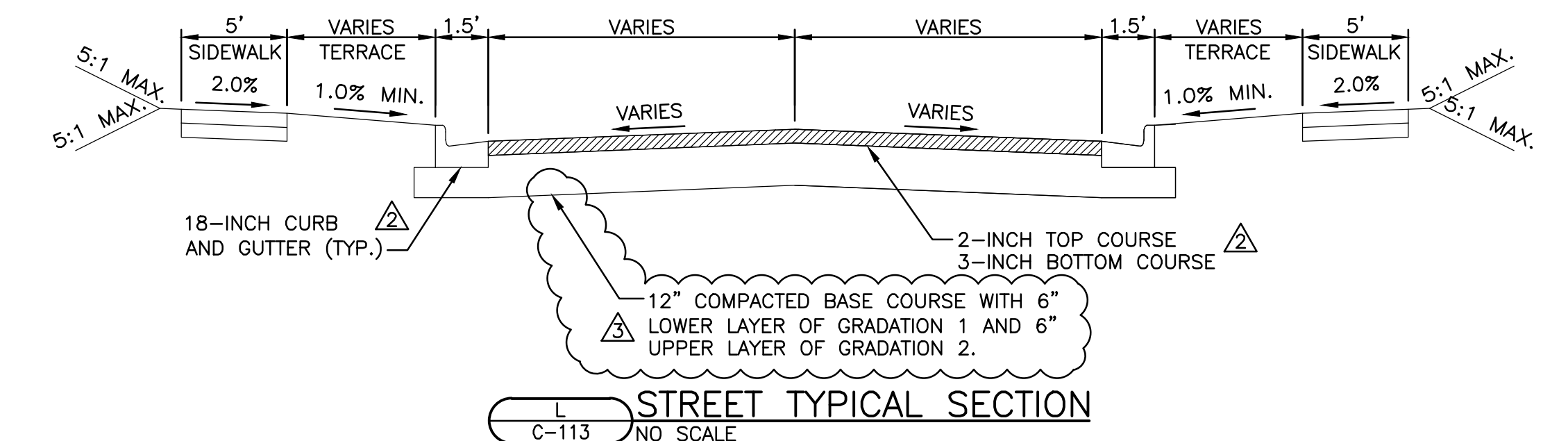
M MOUNTABLE CURB AND GUTTER SECTION
C-113 NO SCALE



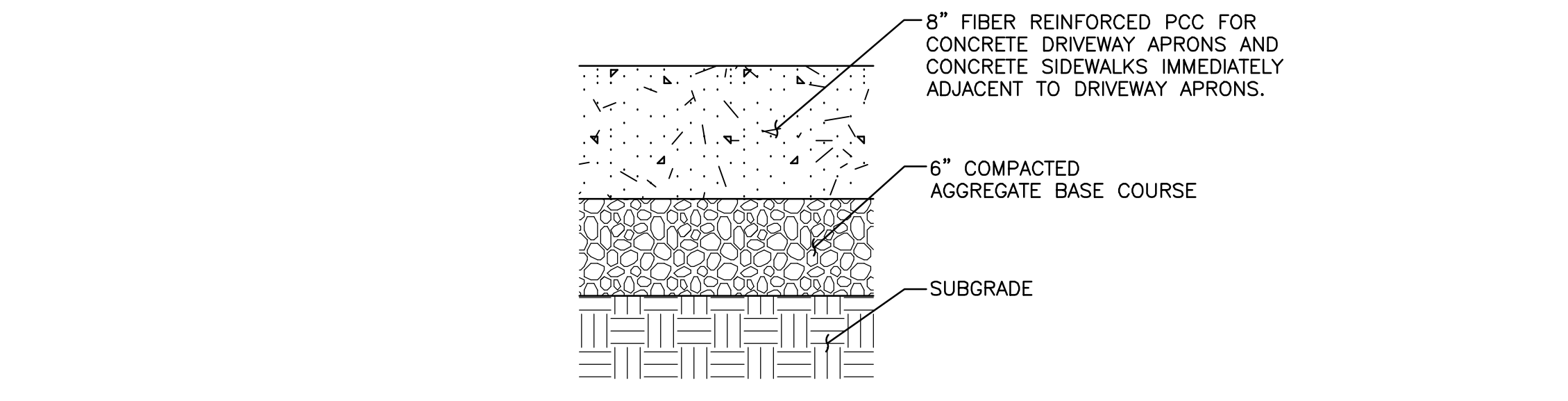
J TREE PROTECTION DETAIL
C-113 NO SCALE



K CURB DETAIL AT STORM SEWER INLETS
C-113 NO SCALE



L STREET TYPICAL SECTION
C-113 NO SCALE



N CONCRETE PAVEMENT
C-113 NO SCALE

RNL
1600 WILSON BLVD.
SUITE 960
ARLINGTON VA 22209
571 290 7679 t

CITY OF MADISON
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SD SUBMISSION

STRAND ASSOCIATES

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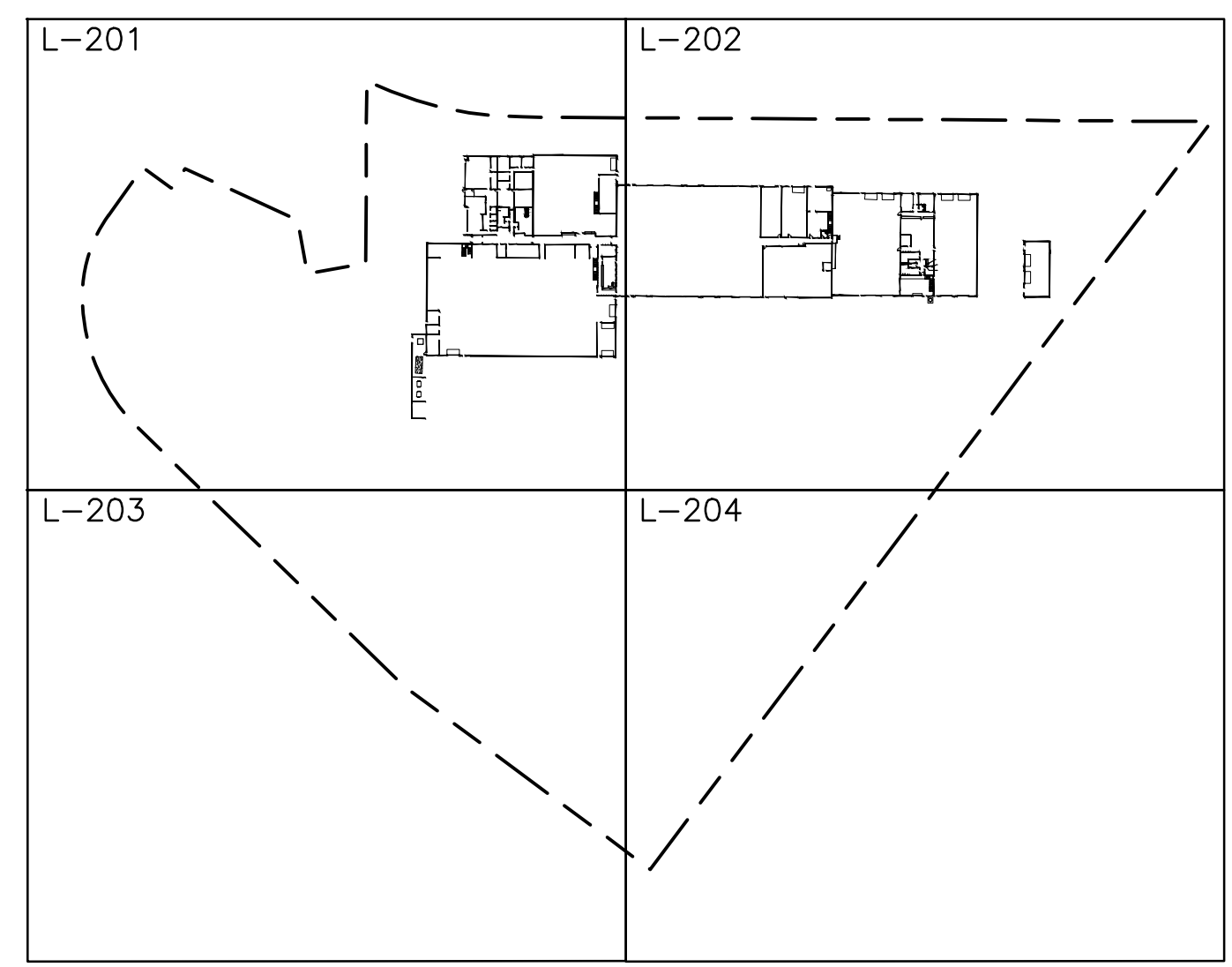
STANDARD DETAILS

C-113

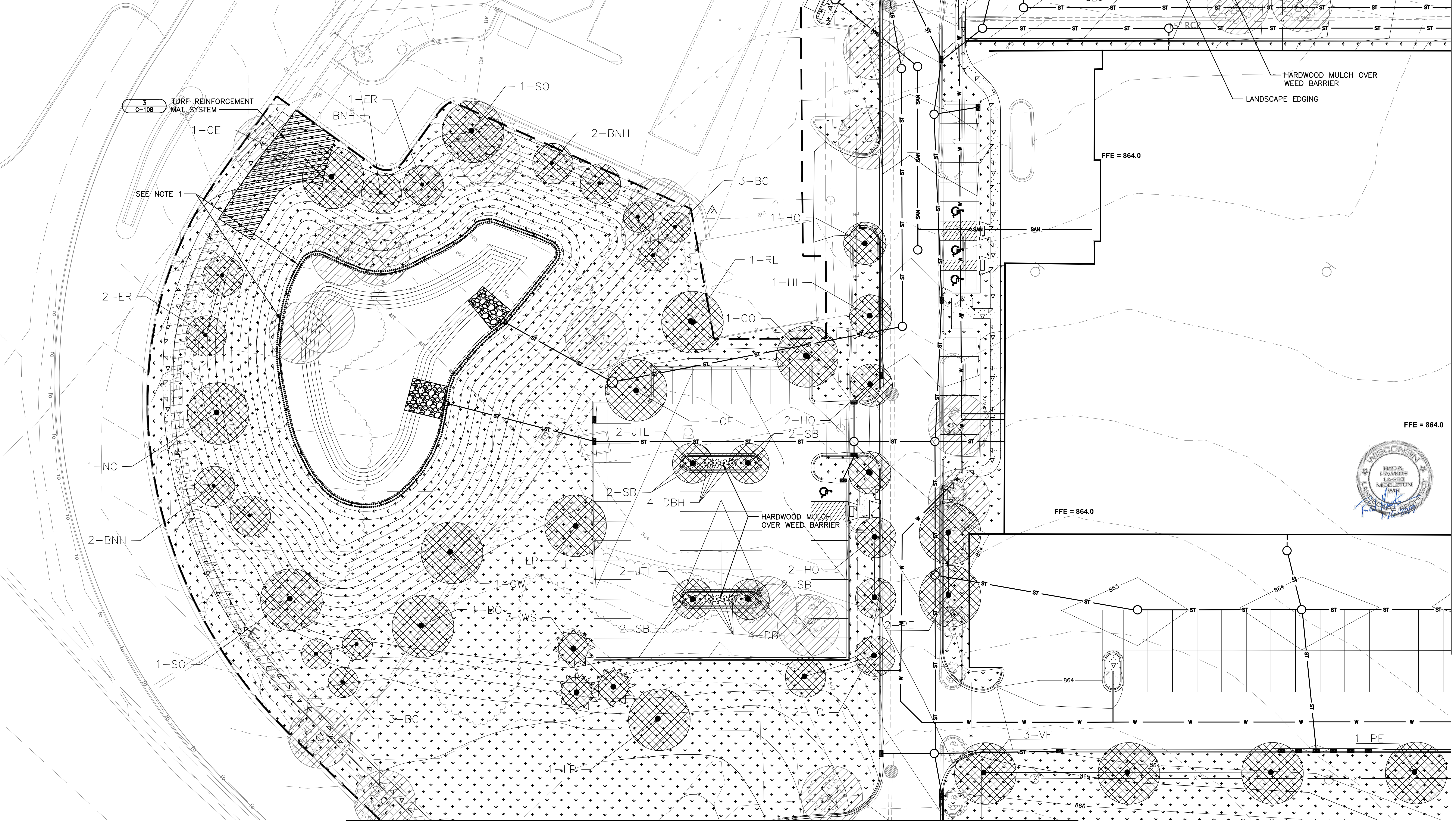
LEGEND

	EXISTING TREE		DECIDUOUS TREE
	EXISTING TREE (TO BE REMOVED)		EVERGREEN TREE
	EXISTING TREE (TO REMAIN - LANDSCAPE)		EVERGREEN SHRUB
	LOW MAINTENANCE NATIVE MEADOW GARDEN W/ EROSION MAT		DECIDUOUS SHRUB
	LOW MAINTENANCE NATIVE MEADOW GARDEN W/ TURF REINFORCEMENT MAT SYSTEM		HARDWOOD MULCH OVER WEED BARRIER

- GENERAL NOTES:**
1. PROVIDE 2 ROWS OF WET EDGE NATIVE PLUGS AROUND POND PERIMETER AT (1 PLUG PER LF IN EACH ROW).
 2. SEE SHEET L-204 FOR PLANT DATA TABLE.
 3. THE RIGHT-OF-WAY IS THE SOLE JURISDICTION OF THE CITY OF MADISON AND IS SUBJECT TO CHANGE AT ANY TIME PER THE RECOMMENDATION/PLAN OF TRAFFIC ENGINEERING AND CITY ENGINEERING DEPARTMENT.



SITE KEY PLAN NTS

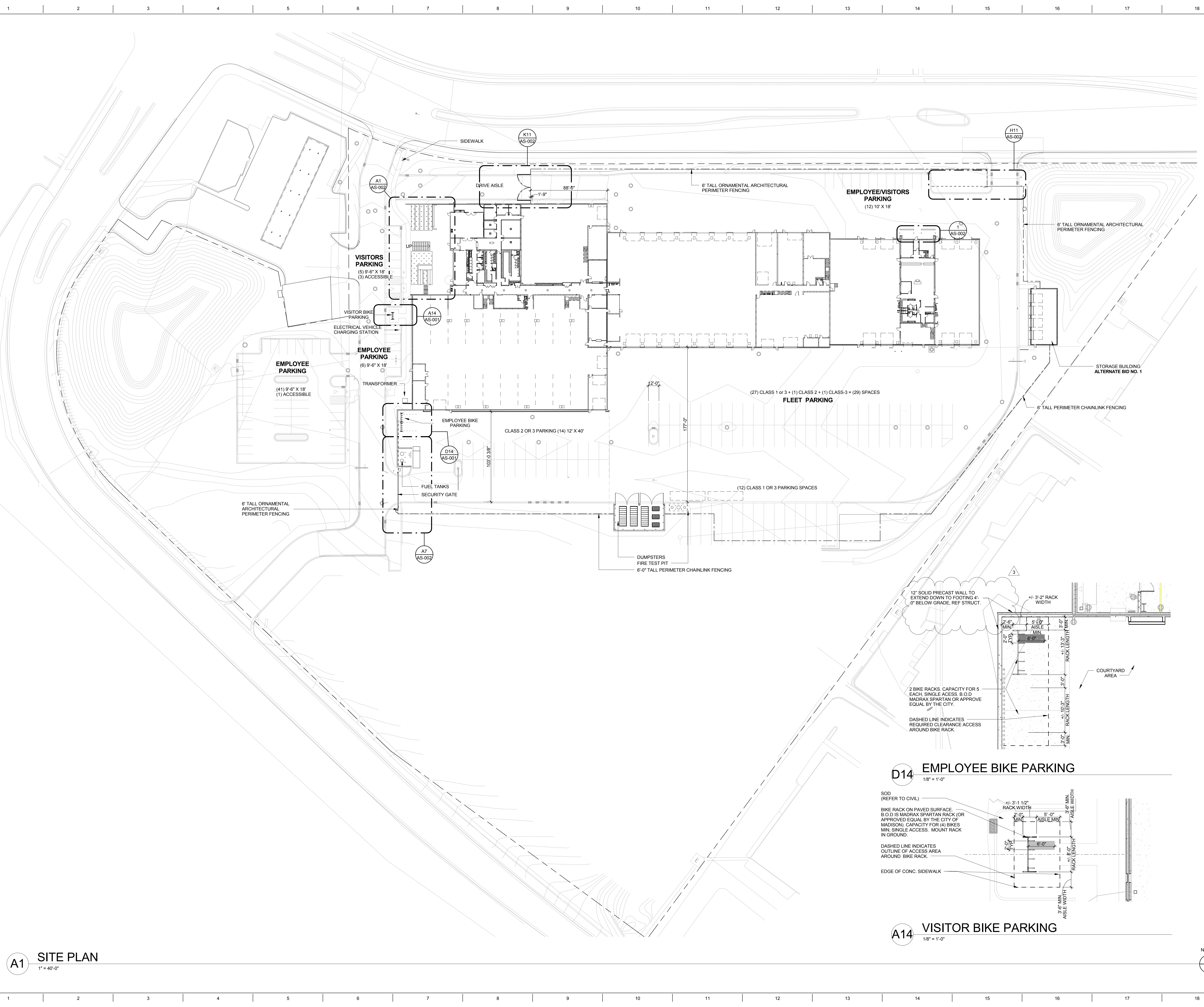


CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA 1
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
SD SUBMISSION



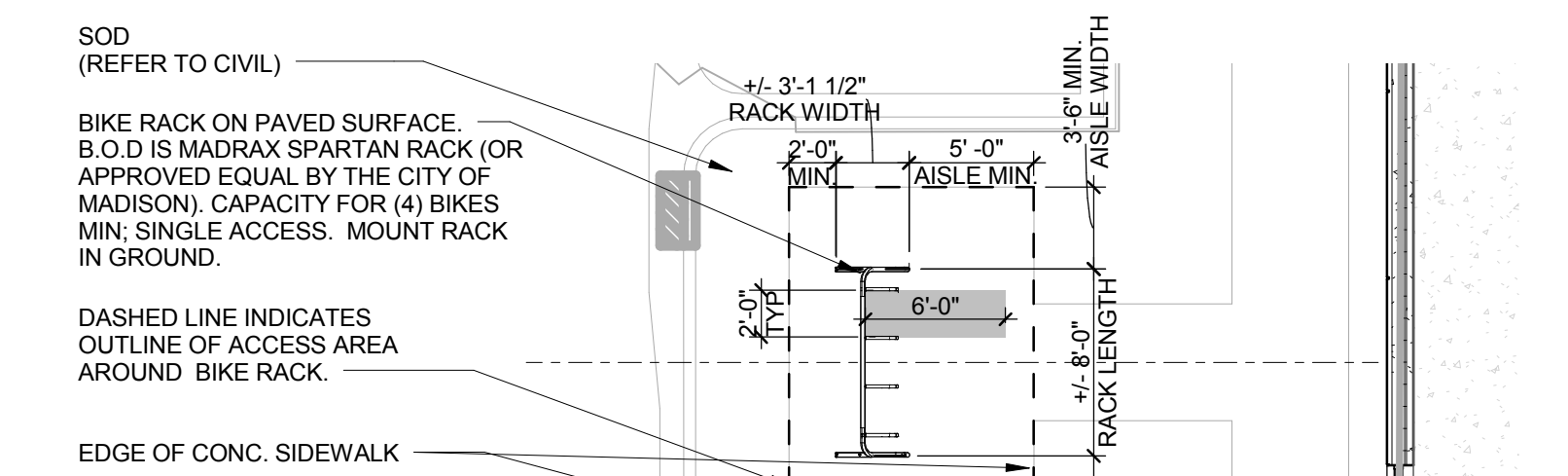
NO.	REVISION/SUBMISSION	DATE
ADDENDUM NO. 3		3/14/19
ADDENDUM NO. 2		3/5/19
ISSUE FOR BID		2/07/19

PROJECT No: 376603
AREA 1
LANDSCAPING PLAN

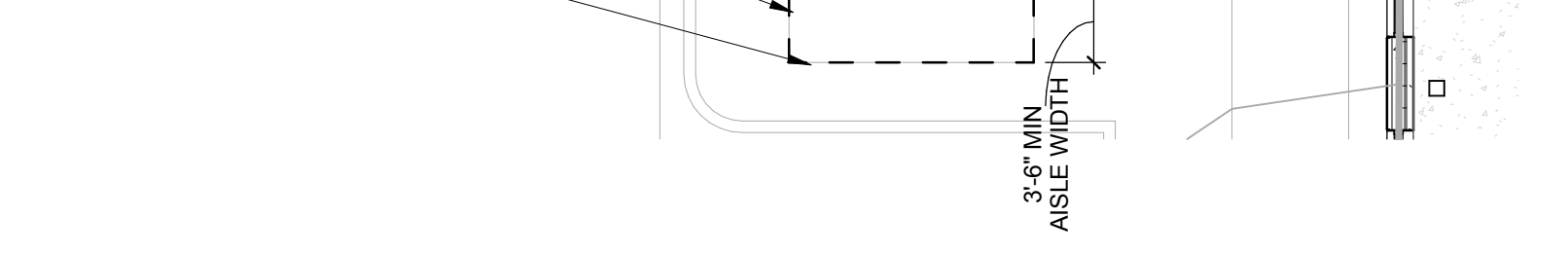


A1 SITE PLAN
1" = 40'-0"

D14 EMPLOYEE BIKE PARKING
1/8" = 1'-0"



A14 VISITOR BIKE PARKING
1/8" = 1'-0"



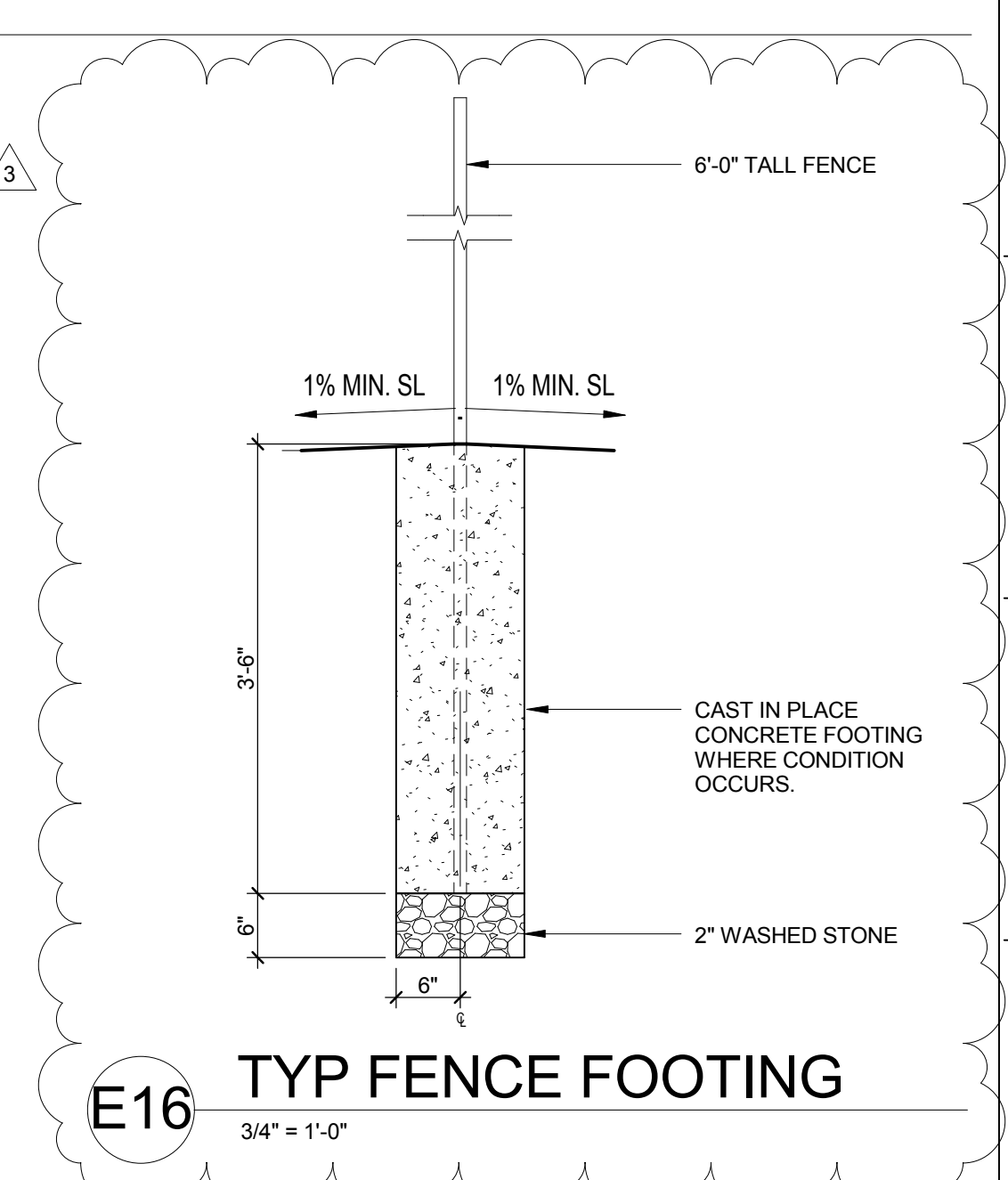
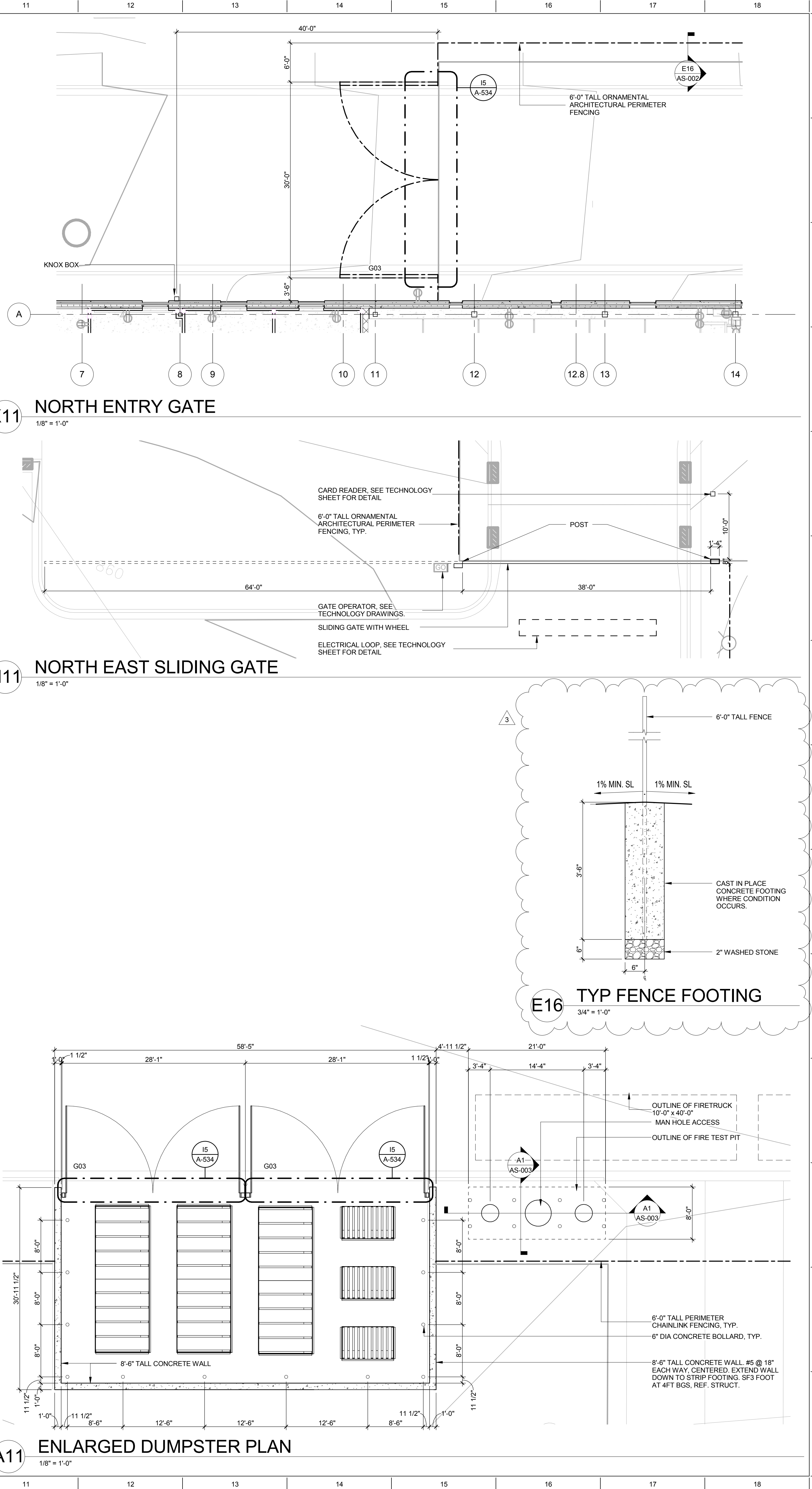
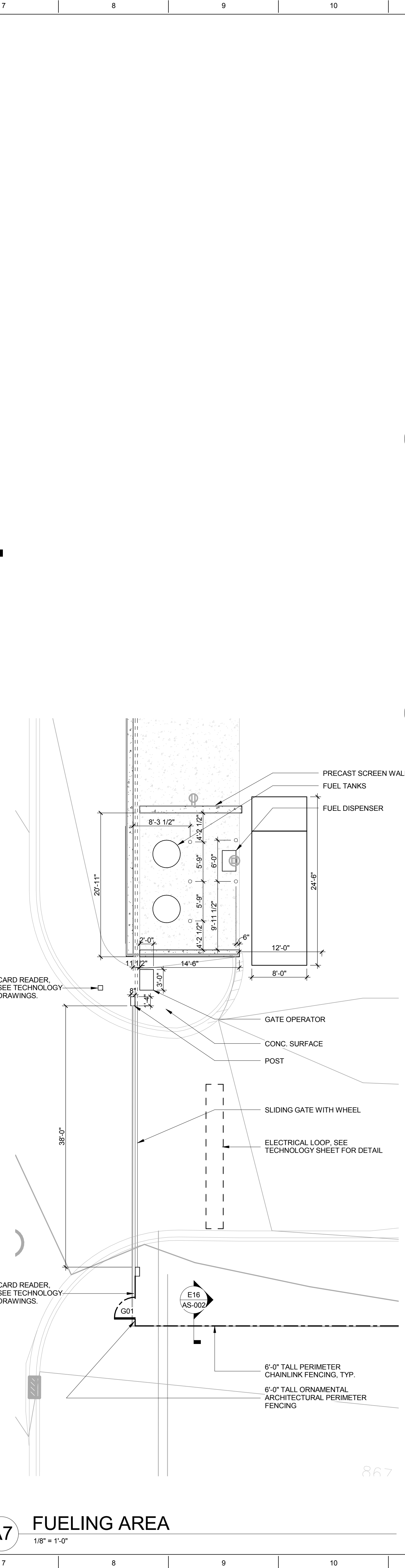
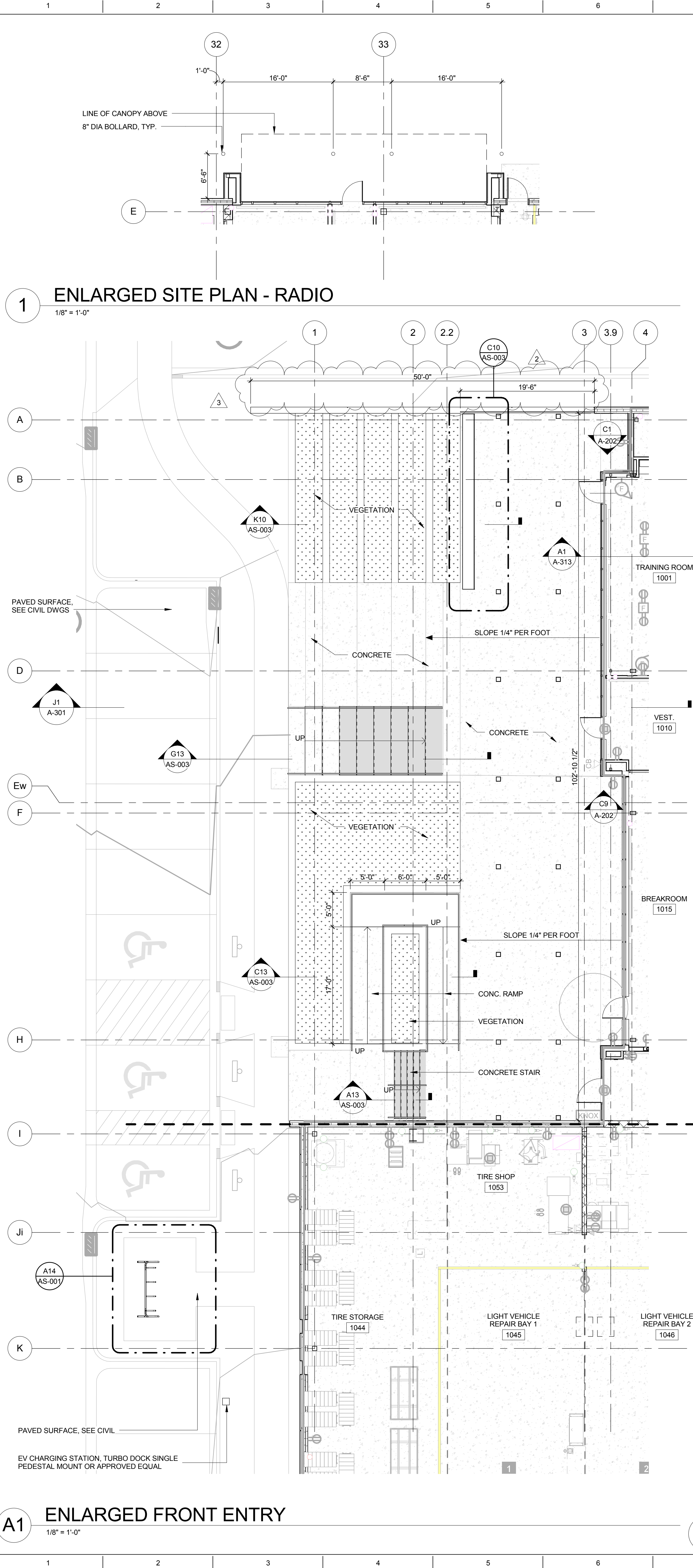
CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA: 117,946 GROSS SF
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
ARCHITECTURE

3	ADDENDUM 3	03/14/2019
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	ISSUE FOR PERMIT	01/17/2019
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3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
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ENLARGED SITE PLAN

AS-002

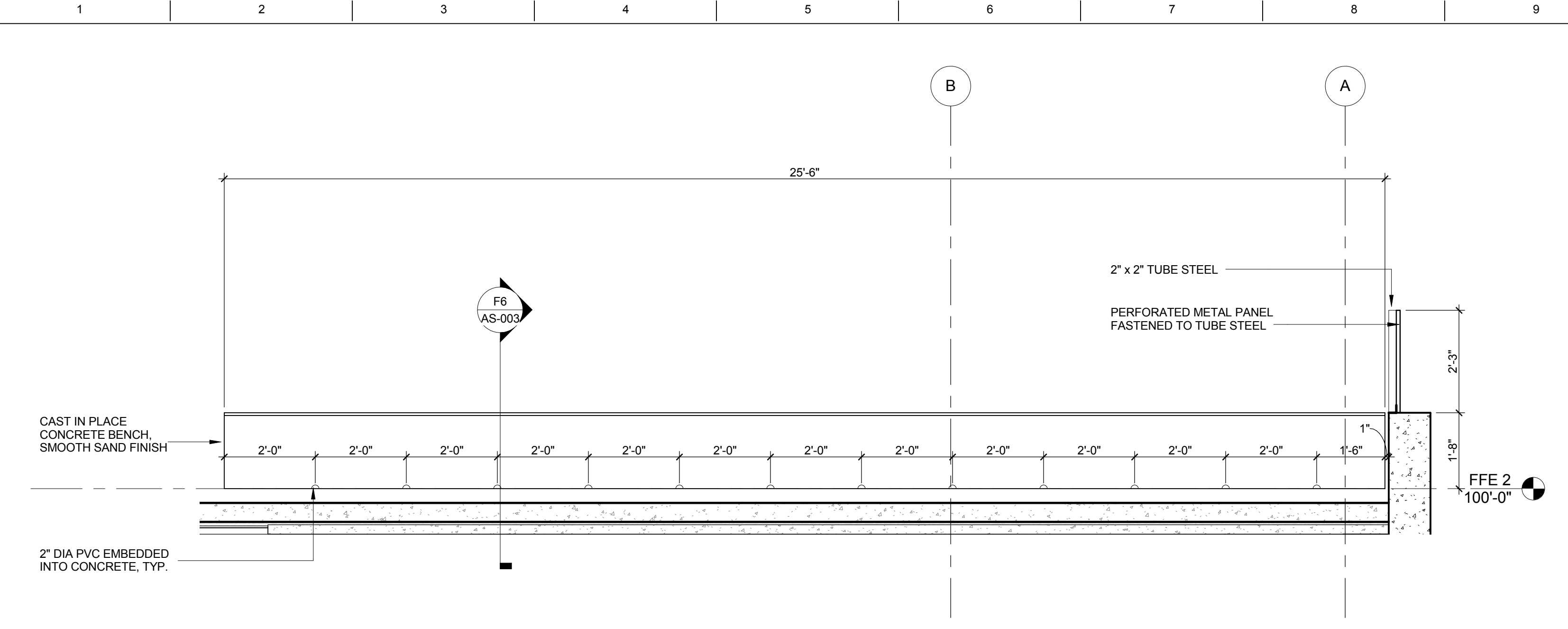


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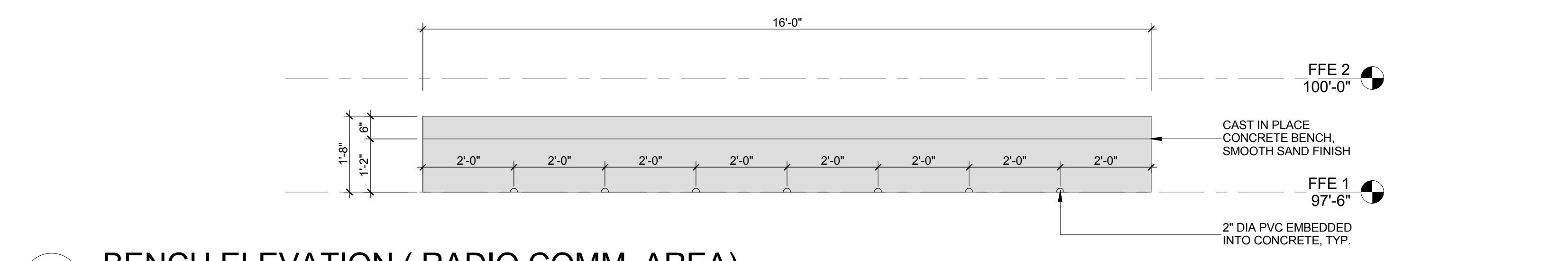
3	ADDENDUM 3	03/14/2019
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	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE
PROJECT No.: 376603		

SITE SECTIONS

AS-003



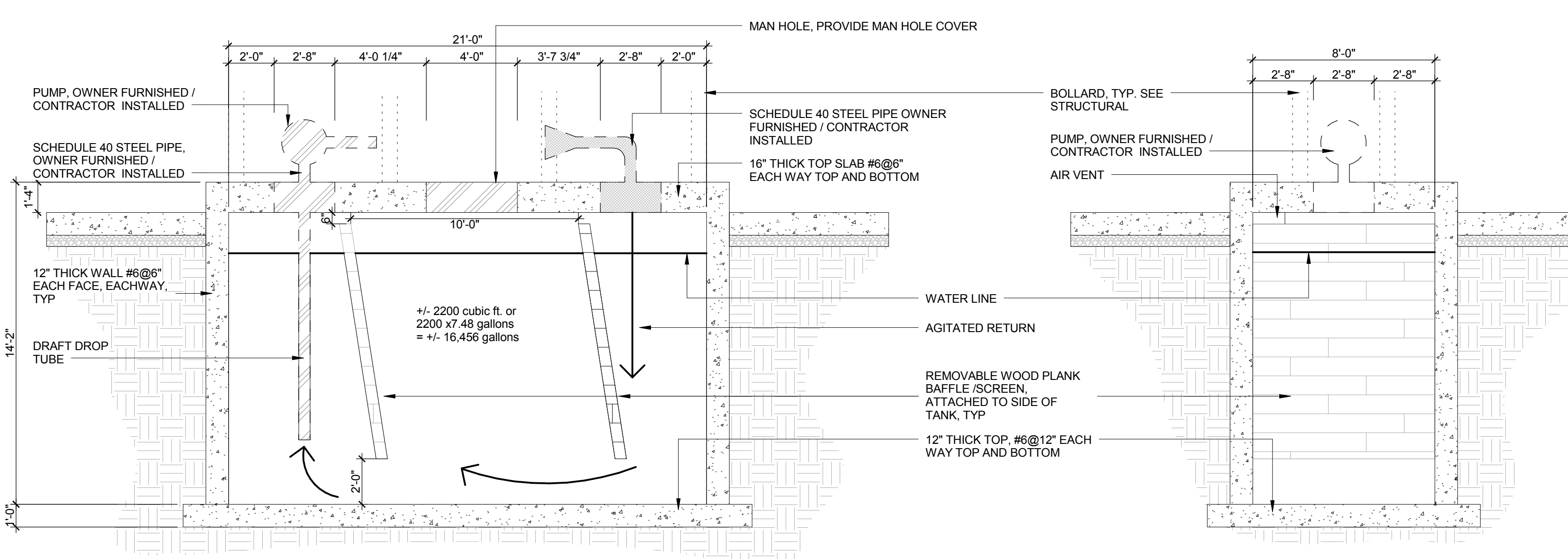
K1 ENLARGED ELEVATION OF ENTRY PLAZA SEATING
1/2" = 1'-0"



I1 BENCH ELEVATION (RADIO COMM. AREA)
1/2" = 1'-0"

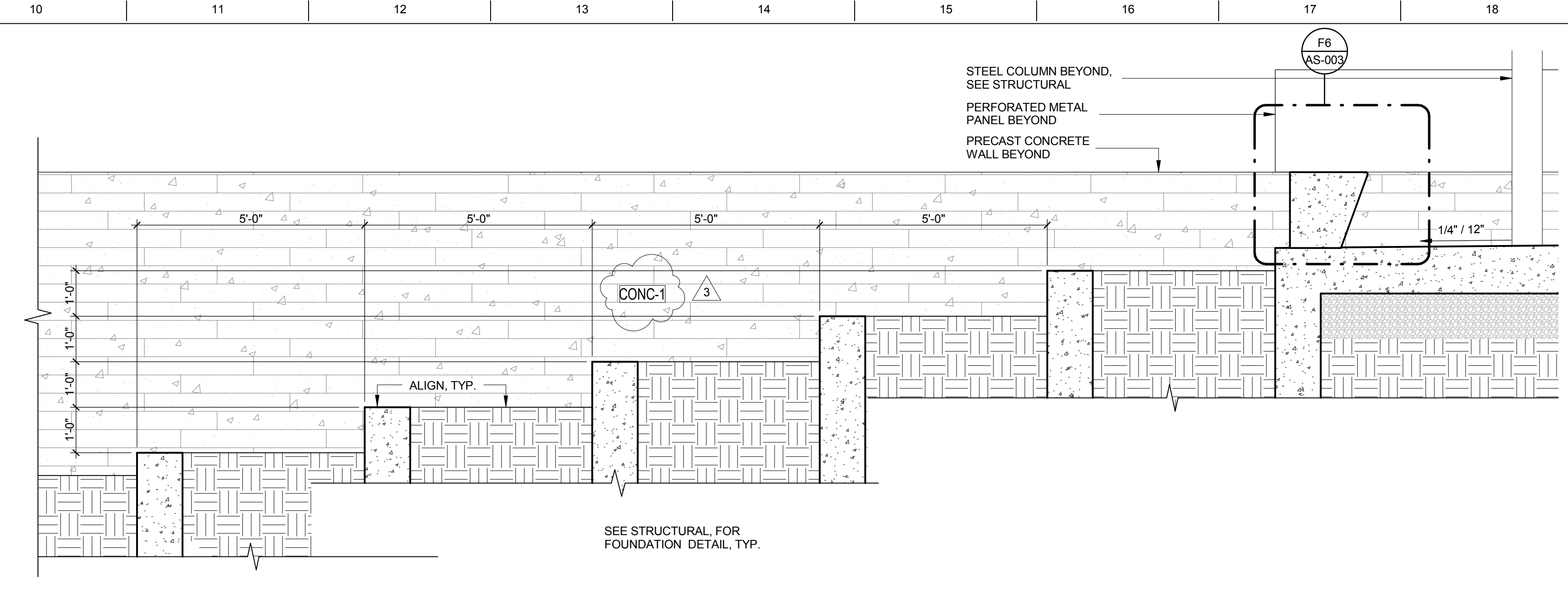


F6 OUTDOOR SEATING SECT
1" = 1'-0"

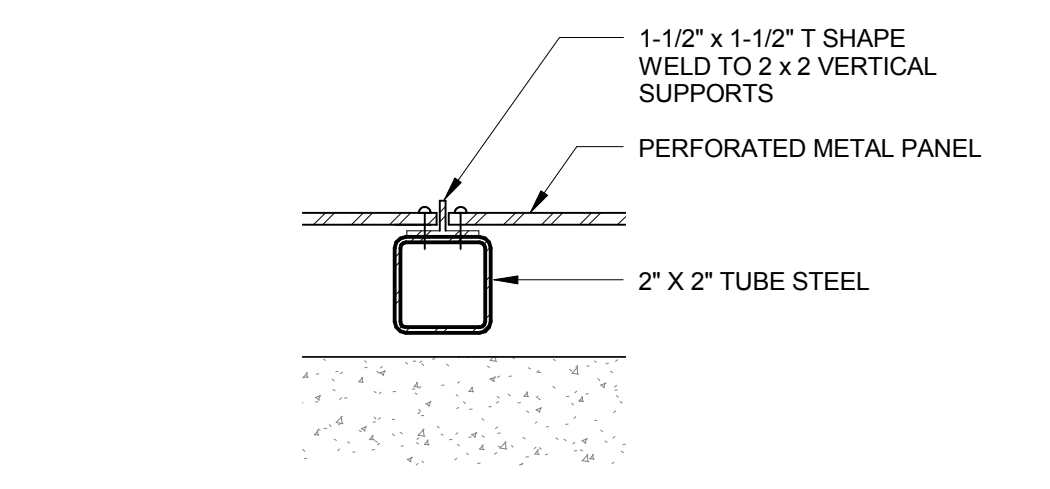


1. STRUCTURE TO BE WATER TIGHT WITH EXCEPTION OF WALL TO TOP SLAB JOINT.
2. THE STRUCTURAL DESIGN SHALL CONFORM TO BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318)
3. TOP SLAB JOINT MIN 4" ABOVE PAVEMENT SURFACE.
4. NO LOADING ON TOP SLAB.
5. WATER DEPTH IN STRUCTURE WILL VARY.

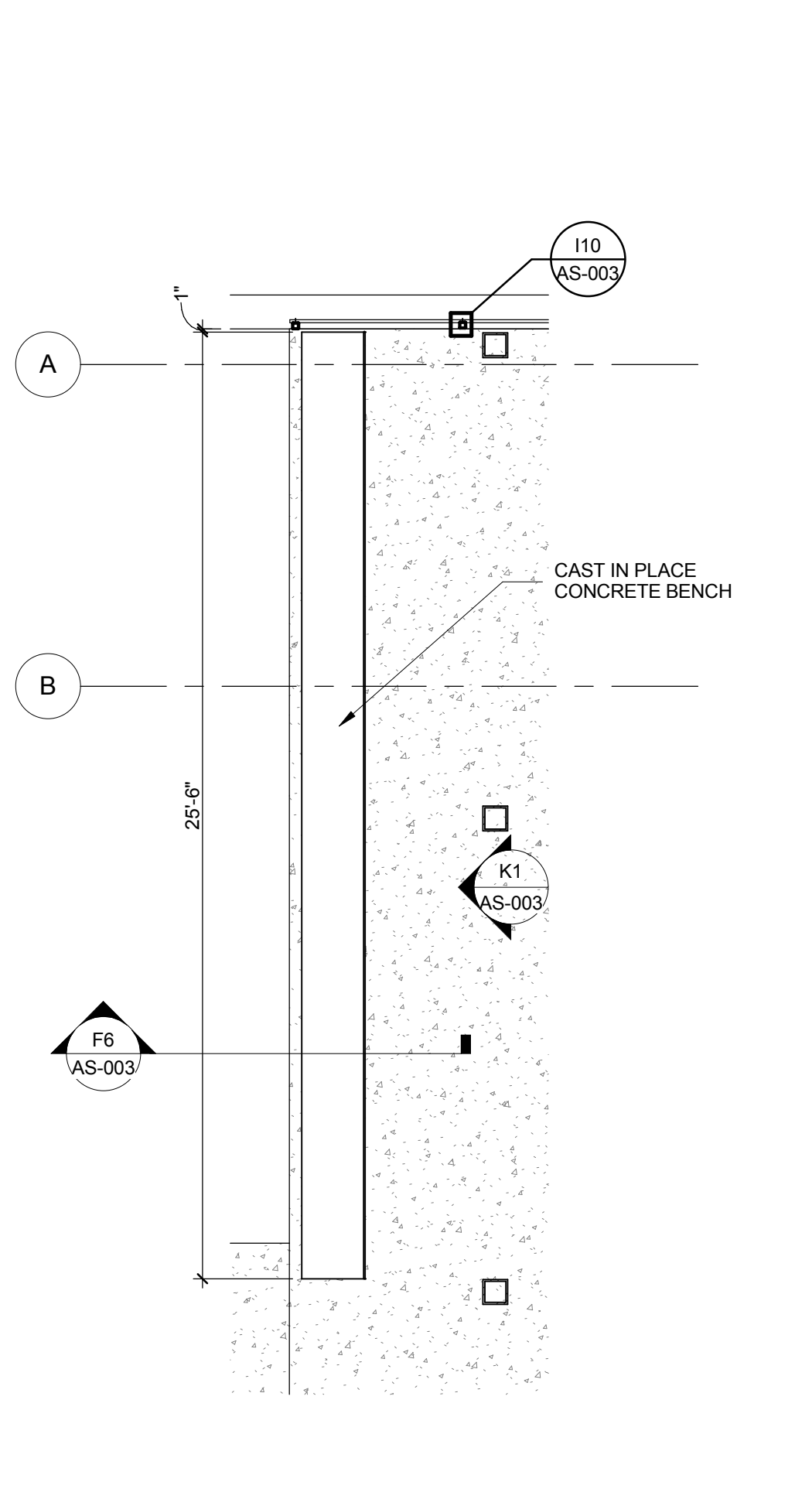
A1 FIRE TEST PIT
1/4" = 1'-0"



K10 LANDSCAPING SECTION
1/2" = 1'-0"

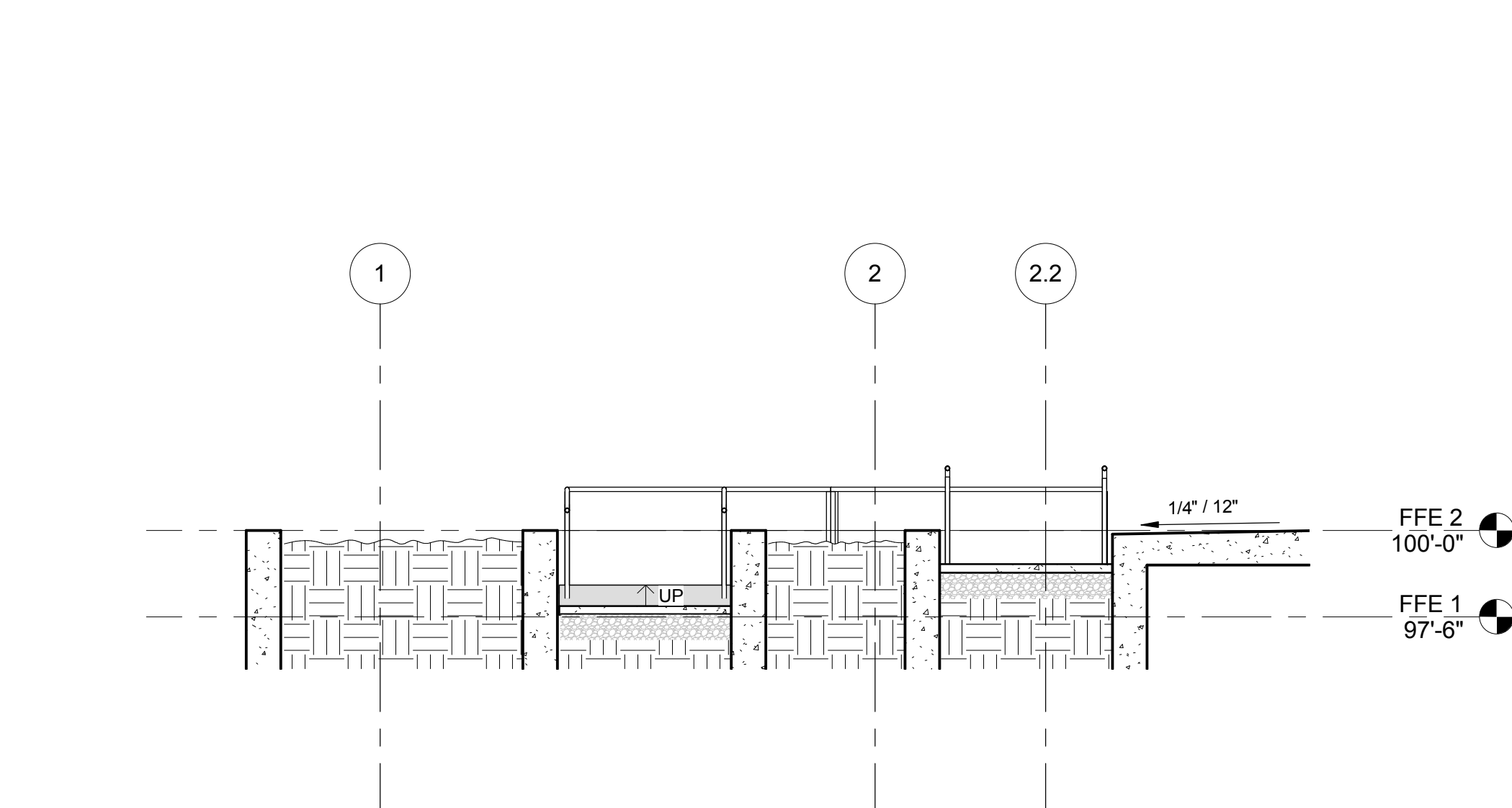


I10 PERFORATED PANEL WALL DETAIL
3" = 1'-0"

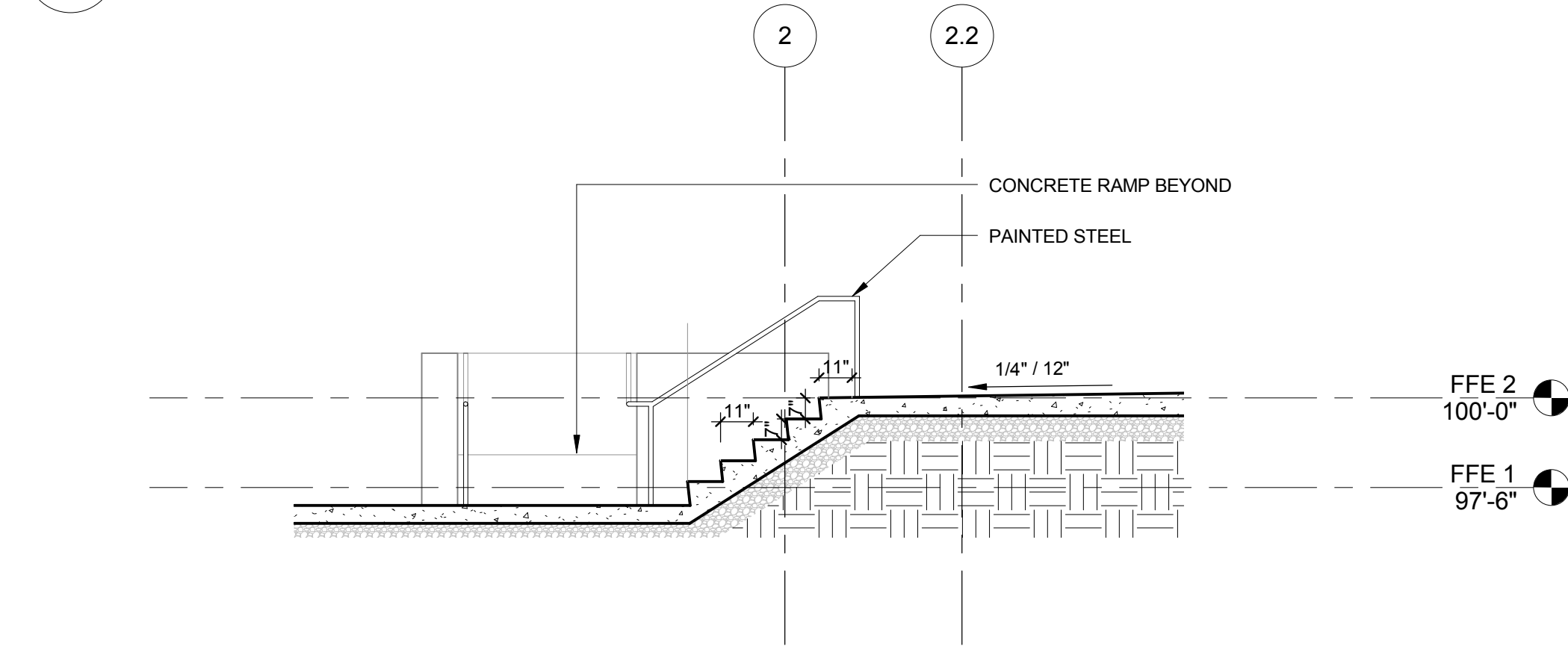


C10 OUTDOOR SEATING PLAN
1/4" = 1'-0"

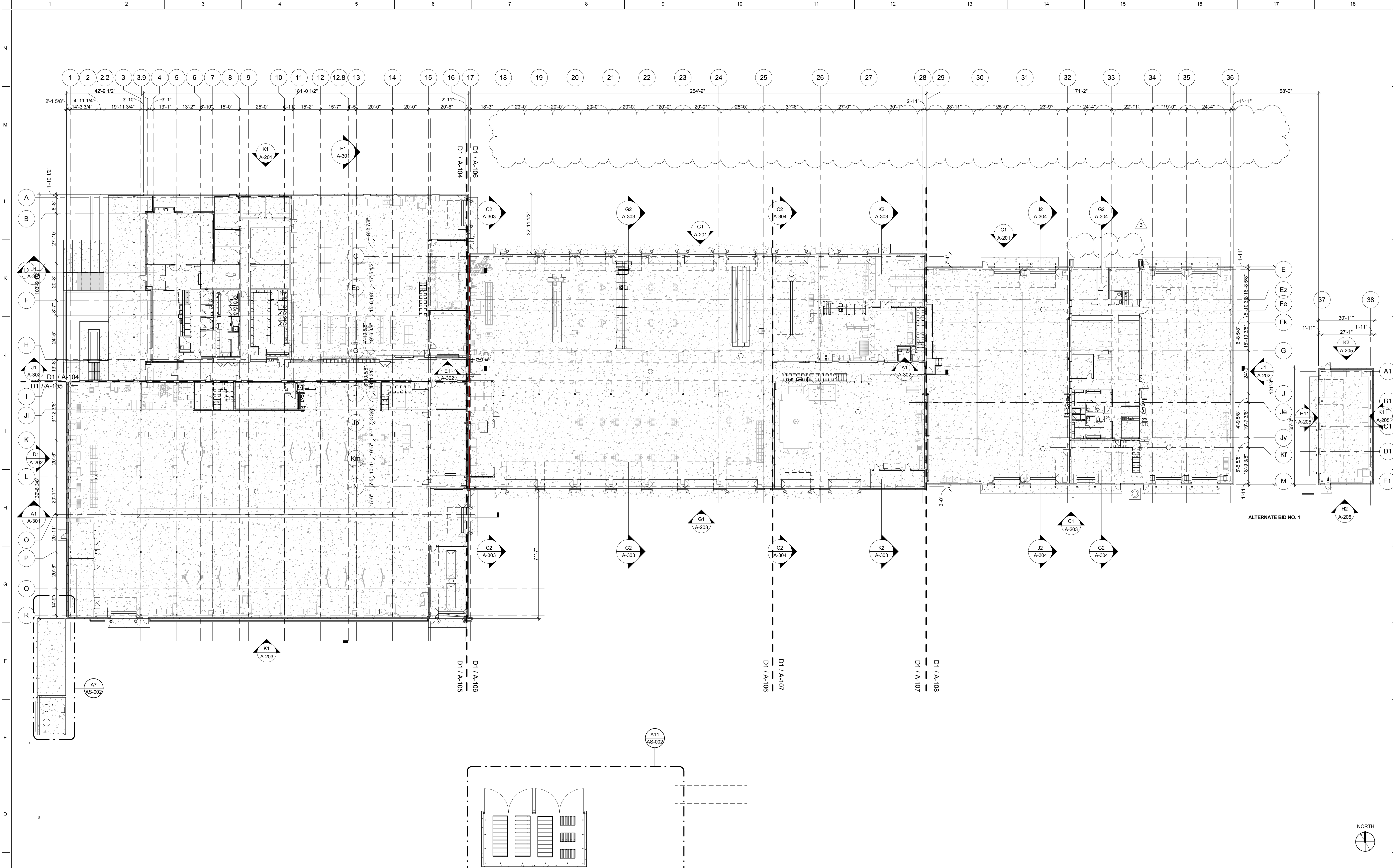
G13 FRONT ENT STR SECTION
1/4" = 1'-0"



C13 FRNT STRS SECTION
1/4" = 1'-0"



A13 STAIRS SECTION
1/4" = 1'-0"

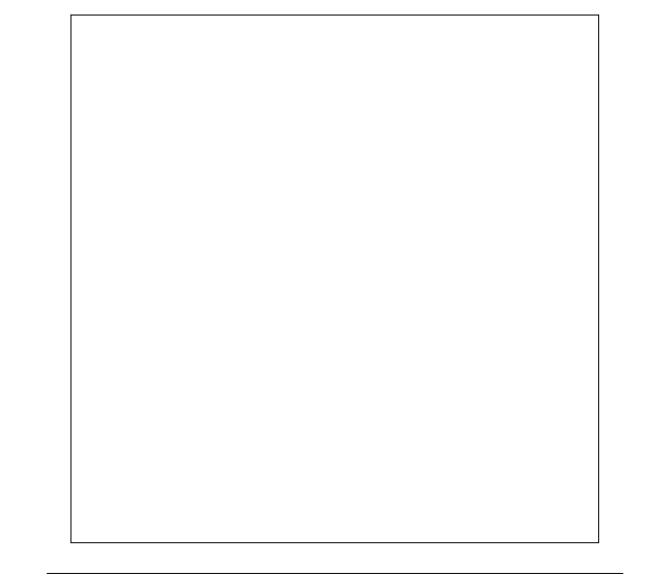


D1 OVERALL LEVEL 1 FLOOR PLAN
3/64" = 1'-0"

OVERALL FLOOR PLAN NOTES	
1	DO NOT SCALE FROM THE DRAWINGS. CONTRACTOR SHALL REQUEST FROM THE ARCHITECT NECESSARY DIMENSIONS NOT SHOWN ON THE DRAWINGS.
2	GRID LINES SHOWN ARE LOCATED AT CENTERLINE OF COLUMNS, U.O.N.
3	REFER TO 1/8" FLOOR PLANS FOR ADDITIONAL GENERAL NOTES, DIMENSIONS, KEYNOTES, WALL SECTION TAGS, AND SIDE ELEVATION TAGS.
4	WINDOW AND DOOR OPENINGS DIMENSIONED ON 1/8" FLOOR PLANS.
5	DIMENSIONS ARE TAKEN FROM OUTSIDE FACE OF PRECAST WALL AND CENTERLINE OF COLUMNS WHERE INDICATED.

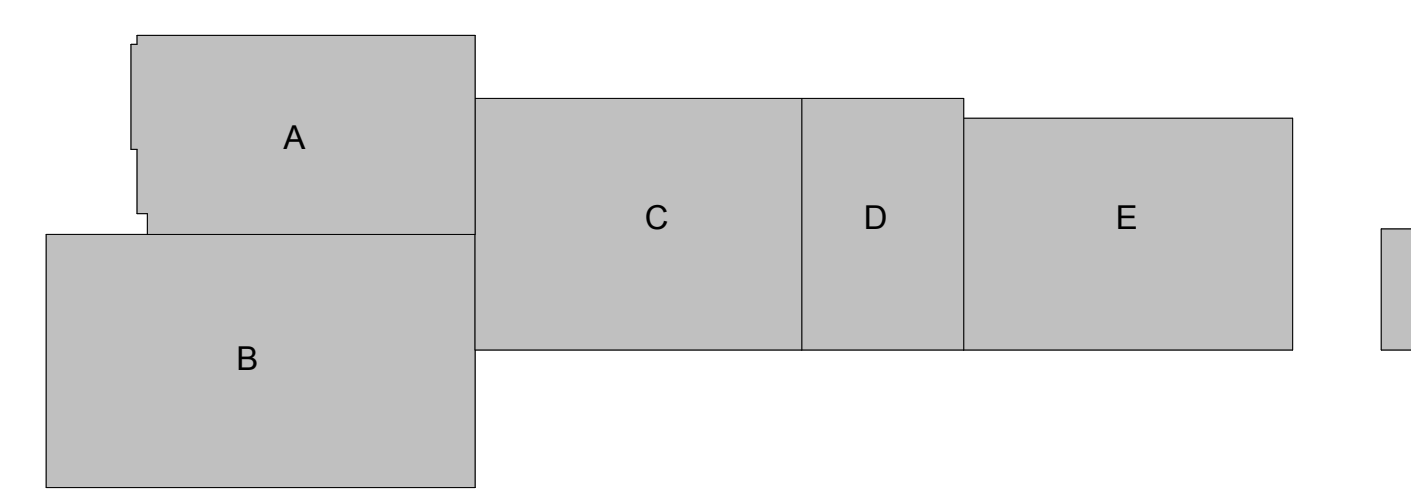
KEY NOTES	

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA: 117,946 GROSS SF
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
ARCHITECTURE

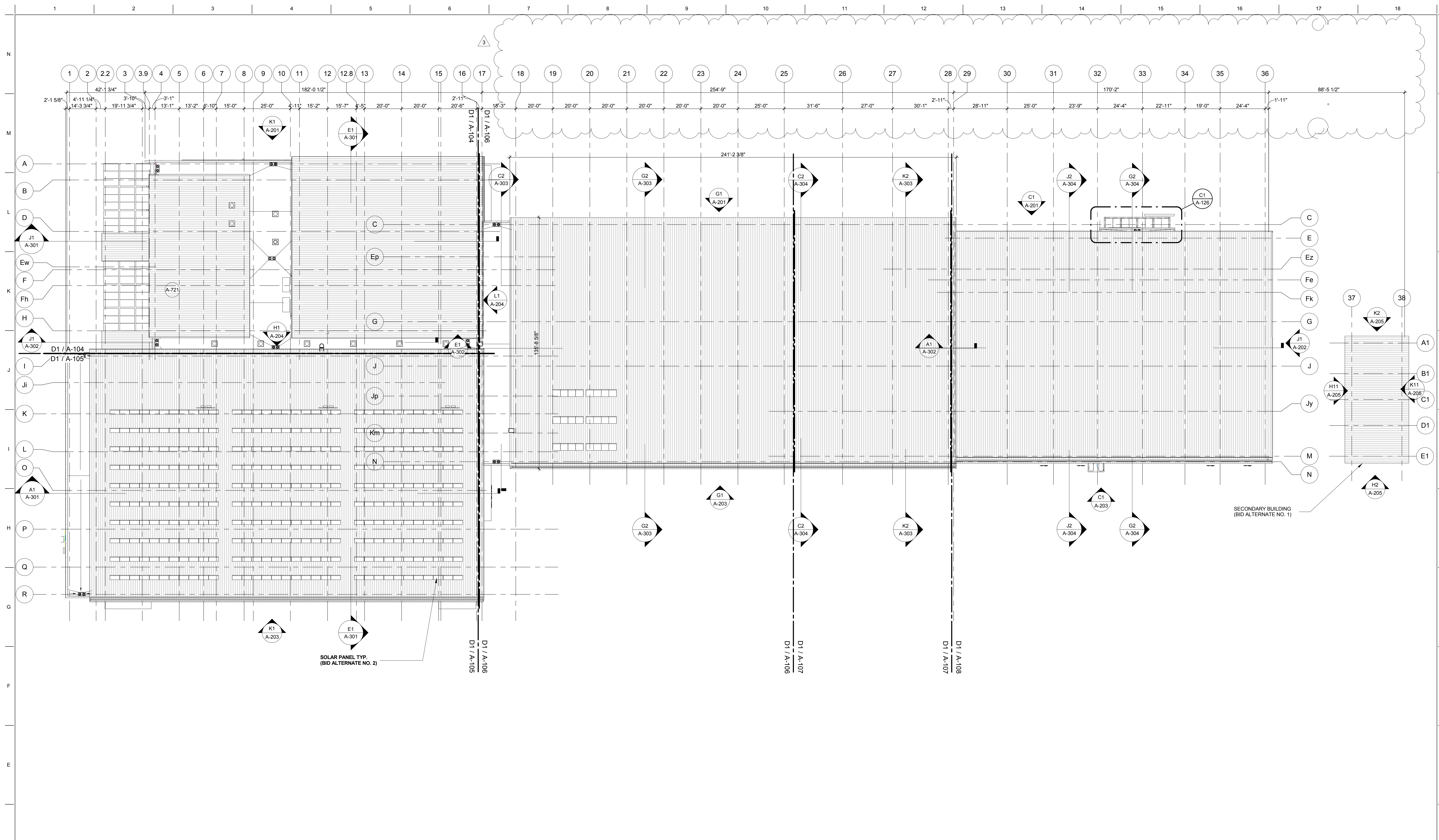


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3	ADDENDUM 3	03/14/2019
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PROJECT No: 376603



OVERALL LEVEL 1 FLOOR PLAN

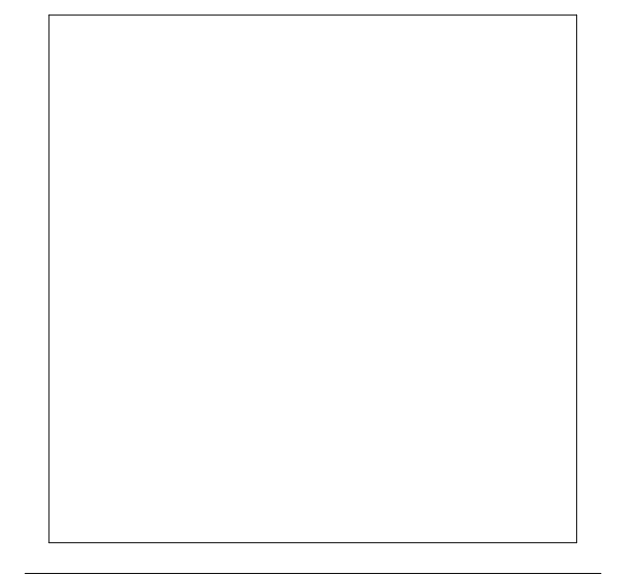


D1 OVERALL ROOF PLAN
3/64" = 1'-0"

OVERALL FLOOR PLAN NOTES	
1	DO NOT SCALE FROM THE DRAWINGS. CONTRACTOR SHALL REQUEST FROM THE ARCHITECT NECESSARY DIMENSIONS NOT SHOWN ON THE DRAWINGS.
2	GRID LINES SHOWN ARE LOCATED AT CENTERLINE OF COLUMNS, U.O.N.
3	REFER TO 1/8" FLOOR PLANS FOR ADDITIONAL GENERAL NOTES, DIMENSIONS, KEYNOTES, WALL SECTION TAGS, AND SIDE ELEVATION TAGS.
4	WINDOW AND DOOR OPENINGS DIMENSIONED ON 1/8" FLOOR PLANS.
5	DIMENSIONS ARE TAKEN FROM OUTSIDE FACE OF PRECAST WALL AND CENTERLINE OF COLUMNS WHERE INDICATED.

KEY NOTES	

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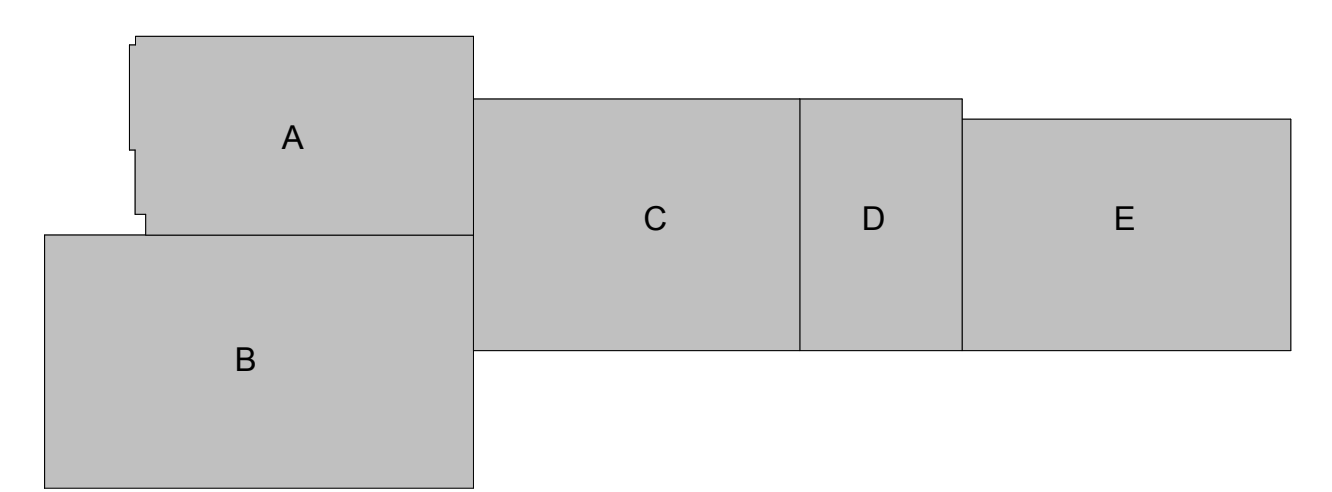


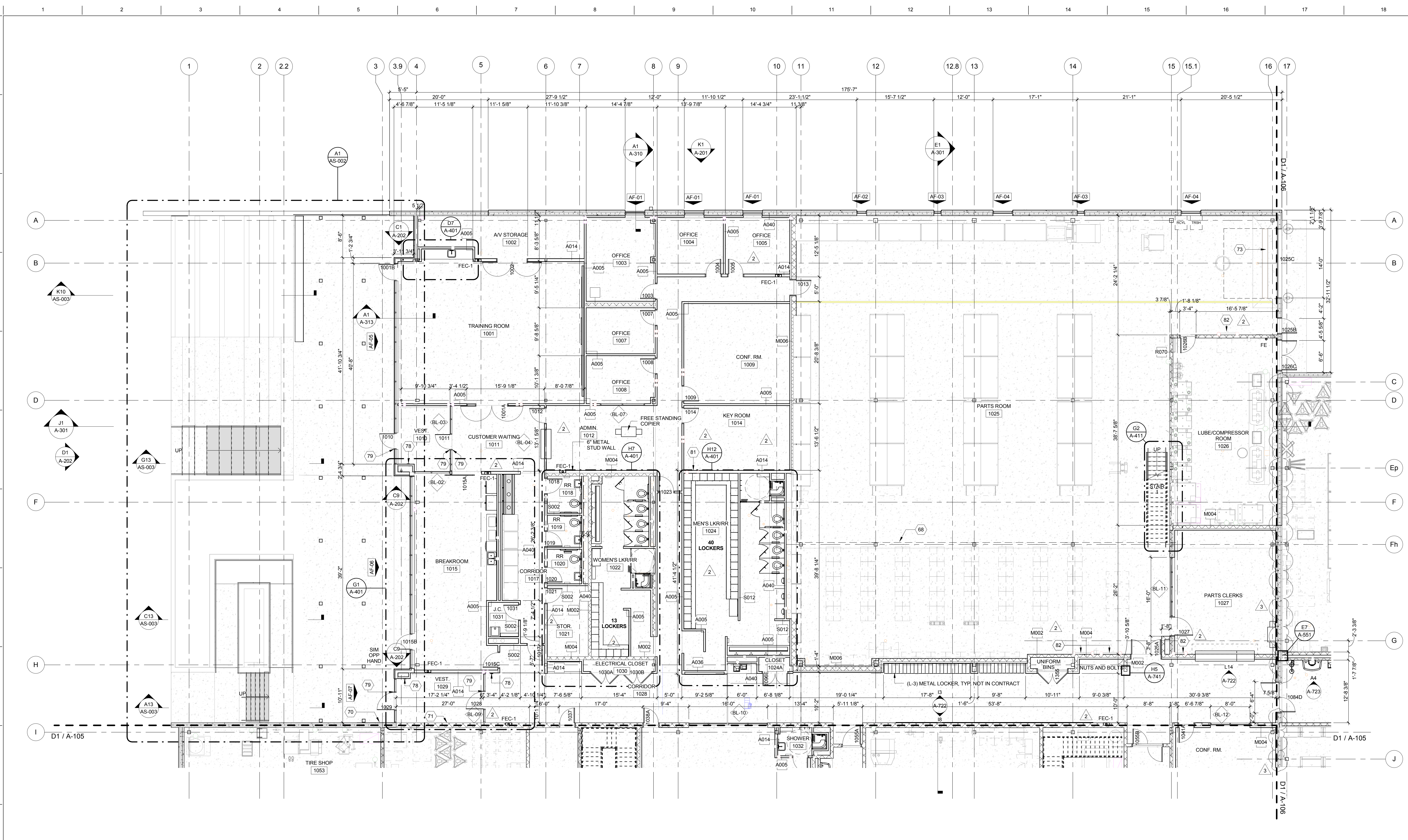
REVISION/SUBMISSION	DATE
3	ADDENDUM 3 03/14/2019
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	ISSUE FOR PERMIT 01/17/2019

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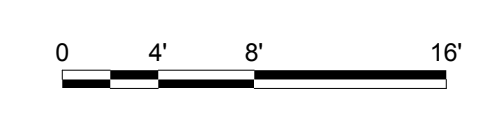
OVERALL ROOF PLAN

A-103





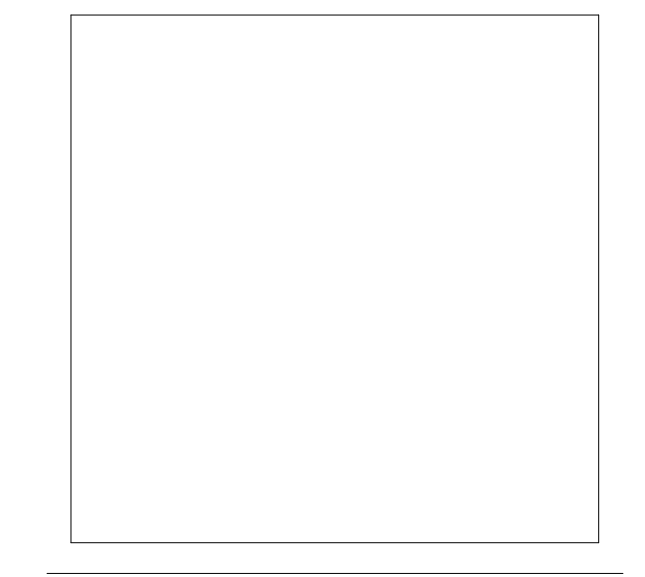
D1 LEVEL 1 PLAN AREA A
1/8" = 1'-0"



ENLARGED PLAN AND ELEVATION NOTES	
1	REFER TO A-101 FOR GENERAL DIMENSIONING & GRID LINE INFORMATION.
2	INTERIOR PARTITIONS ARE DIMENSIONED IN PLAN AS FOLLOWS, U.O.N. FINISH FACE OF WALL TO FINISH FACE.
3	HINGE SIDE OF DOOR OPENINGS SHALL TYPICALLY BE 4" FROM PERPENDICULAR WALL FRAMING, U.O.N.
4	CENTER CLOSET AND MECHANICAL DOORS IN SPACES, U.O.N.
5	WHERE DIMENSIONED OPENING IN METAL STUD WALL OR PARTITIONS TAKEN TO CENTERLINE OF OPENING, U.O.N.
6	WHERE DIMENSIONED OPENINGS IN CMU WALLS ARE DIMENSIONED AS MASONRY OPENINGS (M.O.)
7	FIRESTOP ALL PENETRATIONS THROUGH FLOORS, WALLS, CEILING, AND ROOFS. PROVIDED RATING TO MATCH ASSEMBLY. REFER TO CODE ANALYSIS AND SPECS.
8	CONTRACTOR TO NOTIFY ARCHITECT SHOULD VERIFIED INFORMATION DEVIATE FROM DRAWING INFORMATION.
9	PER SPECIFICATION, PROVIDE CORNER GUARDS AT ALL GYPSUM WALLBOARD CORNERS MOUNTED ABOVE WALL BASE.

KEY NOTES	
68	LINE OF MEZZANINE ABOVE.
70	KNOX BOX
71	FIRE ANNUNCIATOR PANEL
73	TRENCH DRAIN, TYP.
78	ADA DOOR ACTUATOR
79	ADA MULLION MOUNTED DOOR ACTUATOR
81	RECESSED RADIANT FLOOR MANIFOLD MOUNTING BOX
82	SURFACE MOUNTED RADIANT FLOOR MANIFOLD MOUNTING BOX.

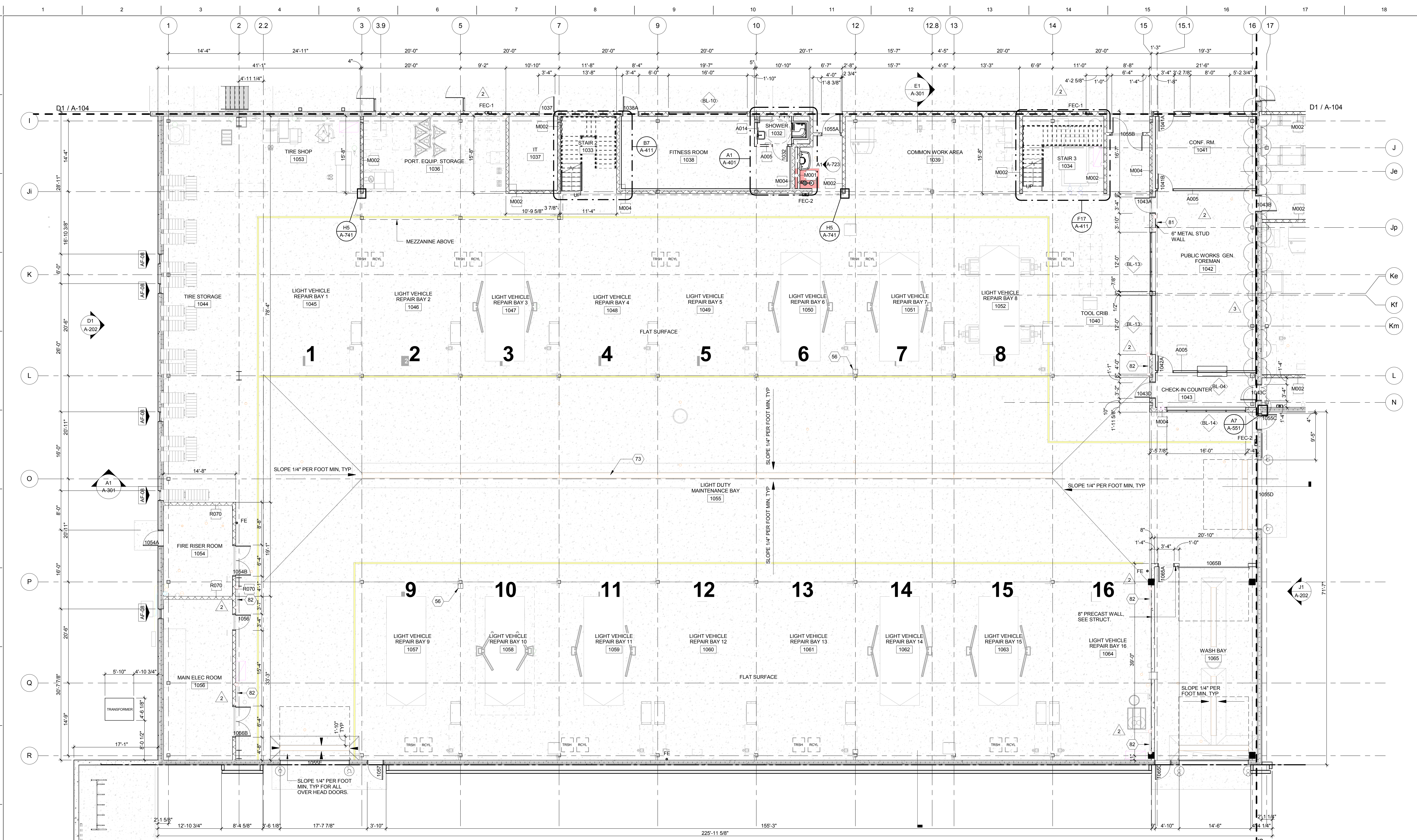
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2	ADDENDUM 2	03/05/2019
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LEVEL 1 FLOOR PLAN
AREA A



D1 LEVEL 1 PLAN AREA B
1/8" = 1'-0"

ENLARGED PLAN AND ELEVATION NOTES	
1	REFER TO A-101 FOR GENERAL DIMENSIONING & GRID LINE INFORMATION.
2	INTERIOR PARTITIONS ARE DIMENSIONED IN PLAN AS FOLLOWS. U.O.N. FINISH FACE OF WALL TO FINISH FACE.
3	HINGE SIDE OF DOOR OPENINGS SHALL TYPICALLY BE 4" FROM PERPENDICULAR WALL FRAMING, U.O.N.
4	CENTER CLOSET AND MECHANICAL DOORS IN SPACES, U.O.N.
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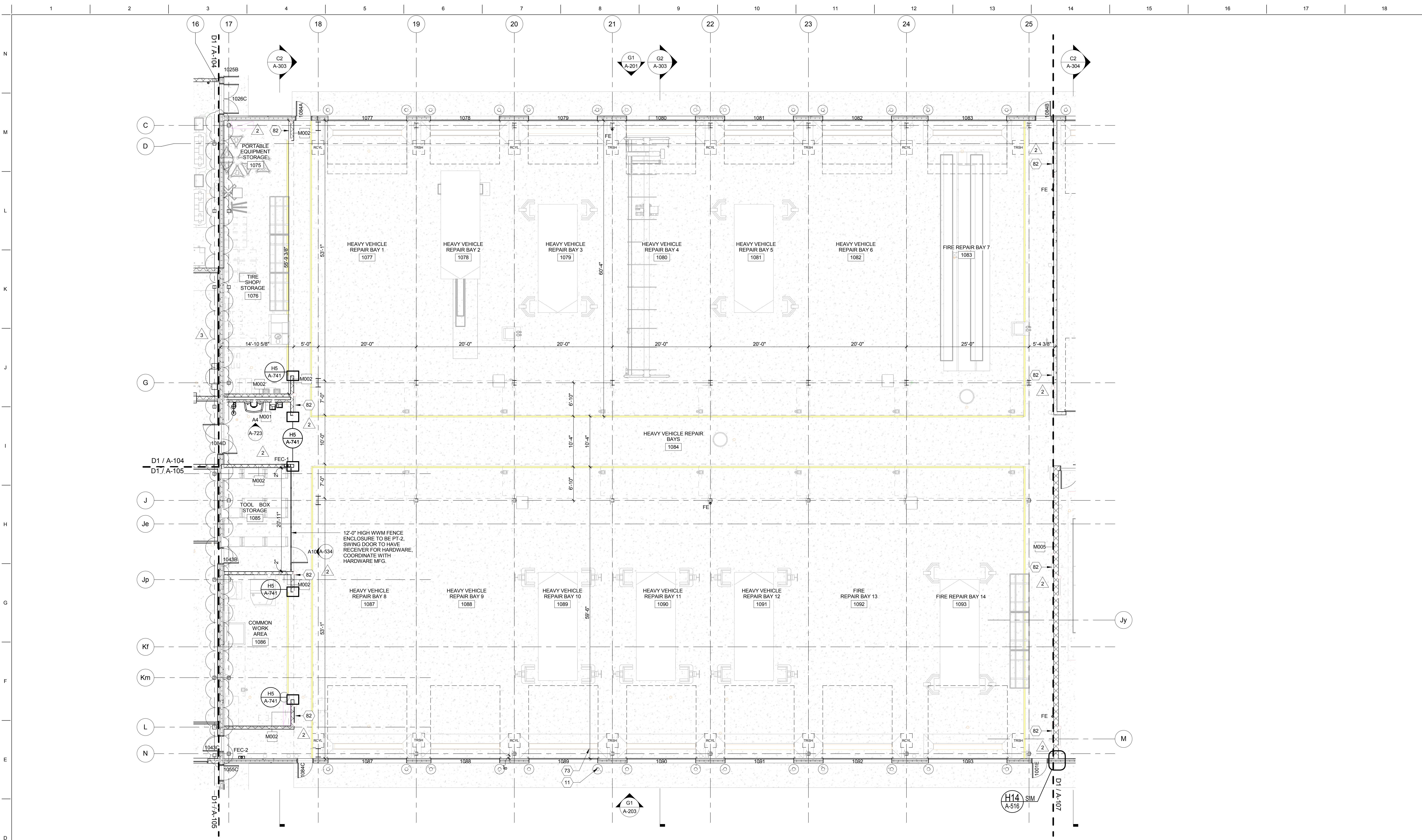
KEY NOTES	
56	EV CHARGING STATION, OWNERS TO SELECT THE UNIT.
73	TRENCH DRAIN, TYP.
81	RECESSED RADIANT FLOOR MANIFOLD MOUNTING BOX.
82	SURFACE MOUNTED RADIANT FLOOR MANIFOLD MOUNTING BOX.

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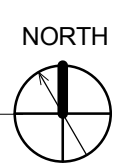
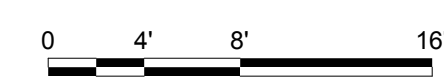
REVISION	DATE
3	ADDENDUM 3 03/14/2019
2	ADDENDUM 2 03/05/2019
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PROJECT No.: 376603

LEVEL 1 FLOOR PLAN AREA B



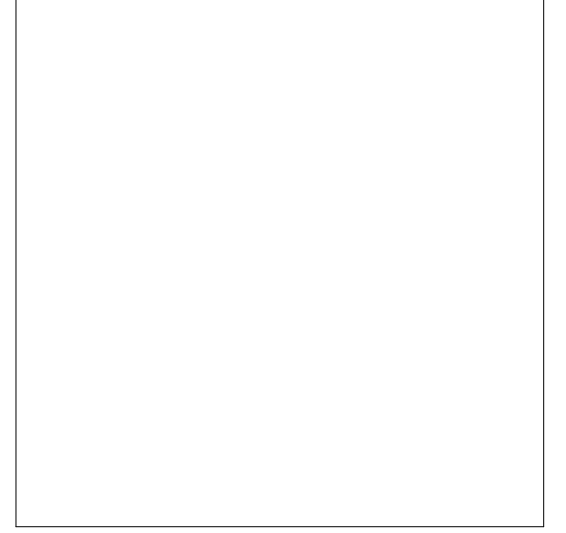
D1 LEVEL 1 PLAN AREA C
1/8" = 1'-0"



ENLARGED PLAN AND ELEVATION NOTES	
1	REFER TO A-101 FOR GENERAL DIMENSIONING & GRID LINE INFORMATION.
2	INTERIOR PARTITIONS ARE DIMENSIONED IN PLAN AS FOLLOWS. U.O.N. FINISH FACE OF WALL TO FINISH FACE.
3	HINGE SIDE OF DOOR OPENINGS SHALL TYPICALLY BE 4" FROM PERPENDICULAR WALL FRAMING, U.O.N.
4	CENTER CLOSET AND MECHANICAL DOORS IN SPACES, U.O.N.
5	WHERE DIMENSIONED OPENING IN METAL STUD WALL OR PARTITIONS TAKEN TO CENTERLINE OF OPENING, U.O.N.
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8	CONTRACTOR TO NOTIFY ARCHITECT SHOULD VERIFIED INFORMATION DEVIATE FROM DRAWING INFORMATION.
9	PER SPECIFICATION, PROVIDE CORNER GUARDS AT ALL GYPSUM WALLBOARD CORNERS MOUNTED ABOVE WALL BASE.

KEY NOTES	
11	8" CONCRETE BOLLARD WITH SAFETY YELLOW BOLLARD SLEEVE, TYP.
73	TRENCH DRAIN, TYP.
82	SURFACE MOUNTED RADIANT FLOOR MANIFOLD MOUNTING BOX.

CITY OF MADISON
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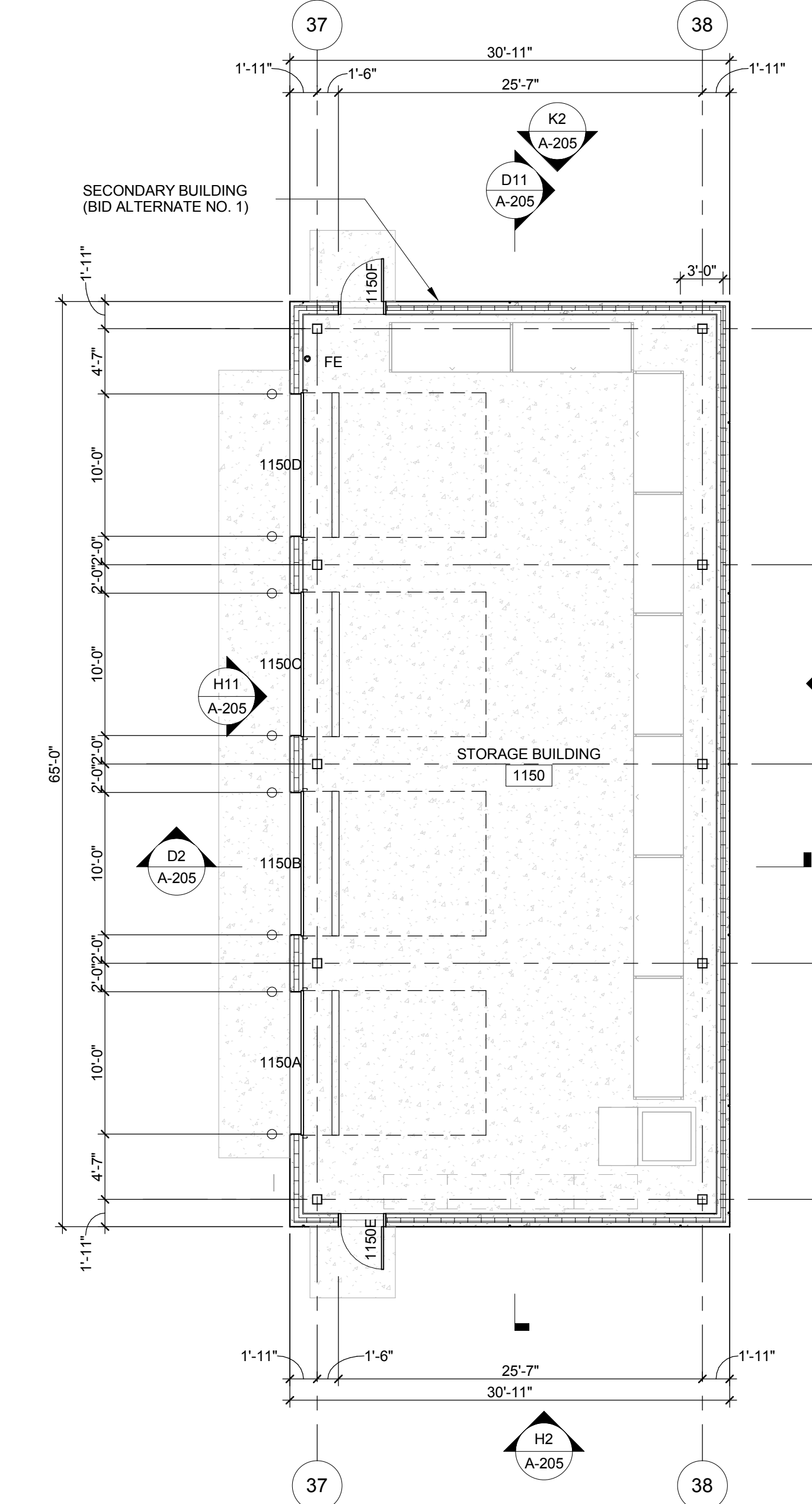
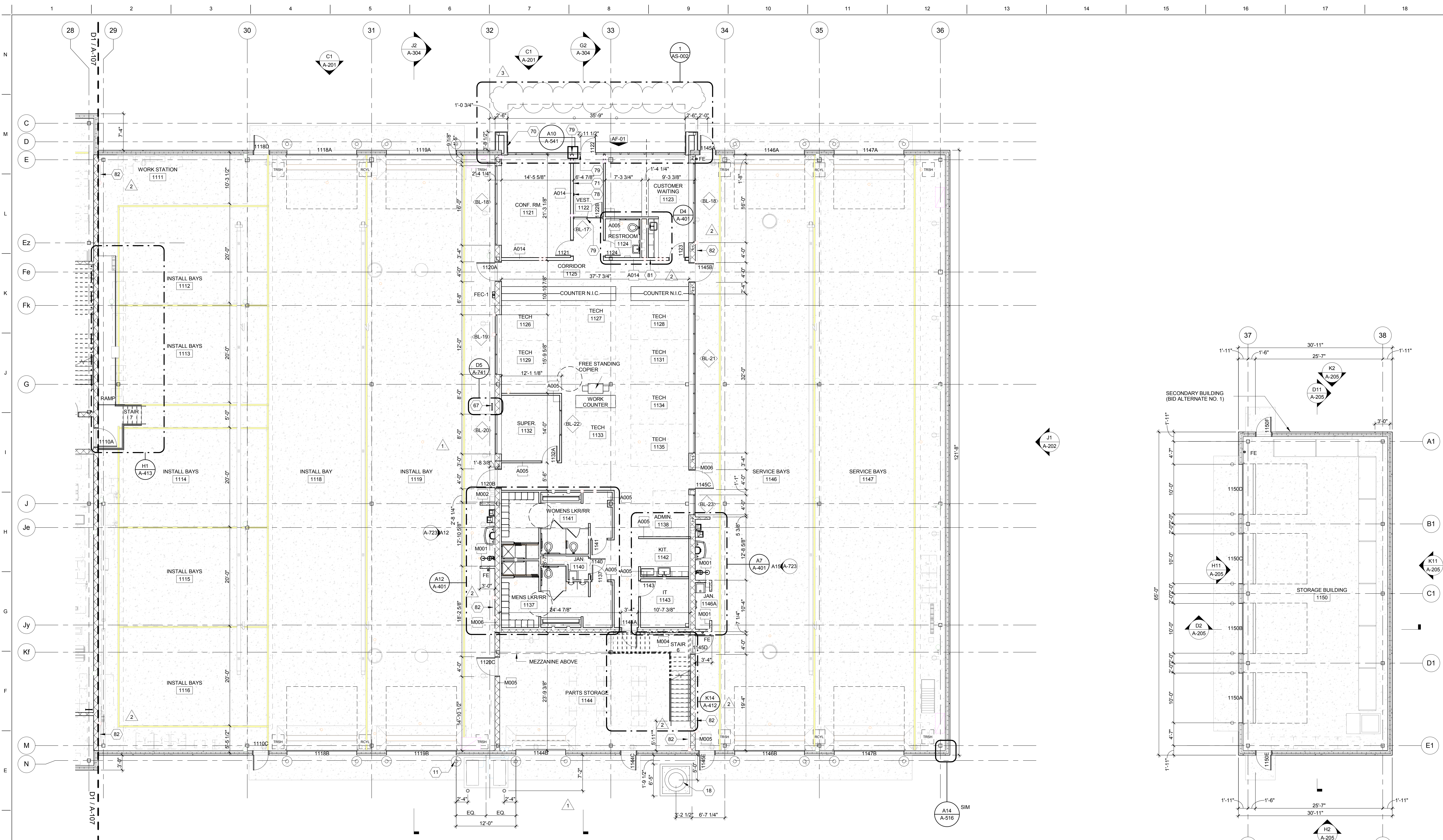


REVISION/SUBMISSION	DATE
3 ADDENDUM 3	03/14/2019
2 ADDENDUM 2	03/05/2019
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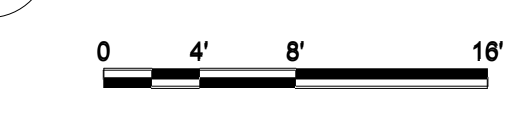
PROJECT No: 376603

LEVEL 1 FLOOR PLAN
AREA C

A-106



D1 LEVEL 1 PLAN AREA E
1/8" = 1'-0"



ENLARGED PLAN AND ELEVATION NOTES

- REFER TO A-101 FOR GENERAL DIMENSIONING & GRID LINE INFORMATION.
- INTERIOR PARTITIONS ARE DIMENSIONED IN PLAN AS FOLLOWS, U.O.N. FINISH FACE OF WALL TO FINISH FACE.
- HINGE SIDE OF DOOR OPENINGS SHALL TYPICALLY BE 4" FROM PERPENDICULAR WALL FRAMING, U.O.N.
- CENTER CLOSET AND MECHANICAL DOORS IN SPACES, U.O.N.
- WHERE DIMENSIONED OPENING IN METAL STUD WALL OR PARTITIONS TAKEN TO CENTERLINE OF OPENING, U.O.N.
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- CONTRACTOR TO NOTIFY ARCHITECT SHOULD VERIFIED INFORMATION DEVIATE FROM DRAWING INFORMATION.
- PER SPECIFICATION, PROVIDE CORNER GUARDS AT ALL GYPSUM WALLBOARD CORNERS MOUNTED ABOVE WALL BASE.

KEY NOTES

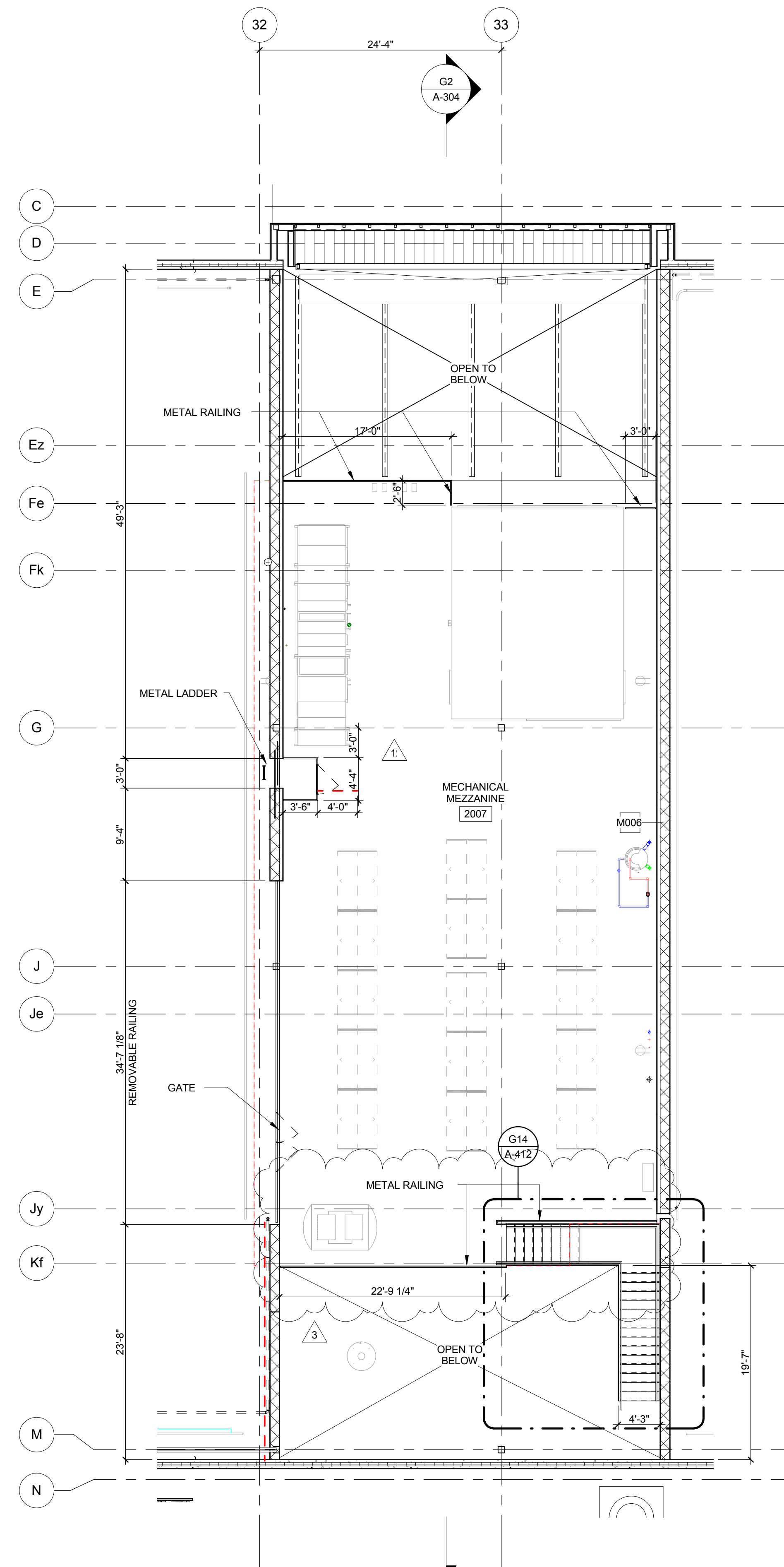
11	8" CONCRETE BOLLARD WITH SAFETY YELLOW BOLLARD SLEEVE, TYP.
18	RADIO COMMUNICATION TOWER BY OTHER.
67	STEEL LADDER TO MEZZANINE.
70	KNOX BOX.
71	FIRE ANNUNCIATOR PANEL.
78	ADA DOOR ACTUATOR.
79	ADA MULLION MOUNTED DOOR ACTUATOR.
81	RECESSED RADIANT FLOOR MANIFOLD MOUNTING BOX.
82	SURFACE MOUNTED RADIANT FLOOR MANIFOLD MOUNTING BOX.

CITY OF MADISON
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ARCHITECTURE

3	ADDENDUM 3	03/14/2019
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PROJECT No: 376603

LEVEL 1 FLOOR PLAN AREA E



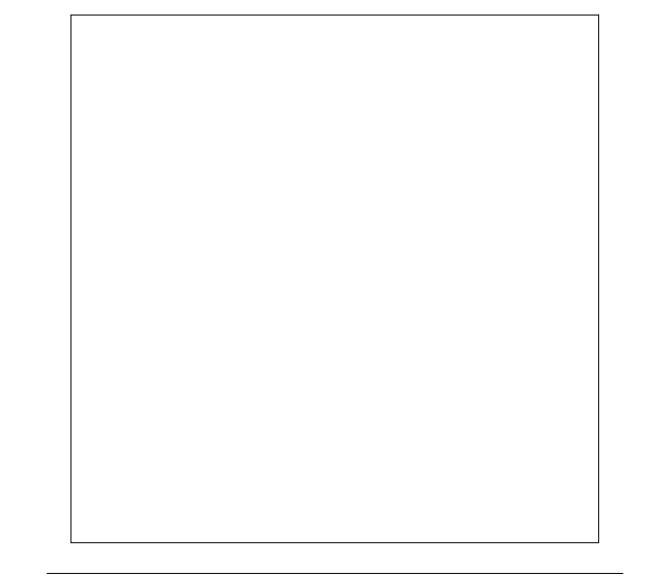
D1 RADIO/COMM MEZZANINE
1/8" = 1'-0"



ENLARGED PLAN AND ELEVATION NOTES	
1	REFER TO A-101 FOR GENERAL DIMENSIONING & GRID LINE INFORMATION.
2	INTERIOR PARTITIONS ARE DIMENSIONED IN PLAN AS FOLLOWS, U.O.N. FINISH FACE OF WALL TO FINISH FACE.
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KEY NOTES

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	ISSUE FOR PERMIT	01/17/2019

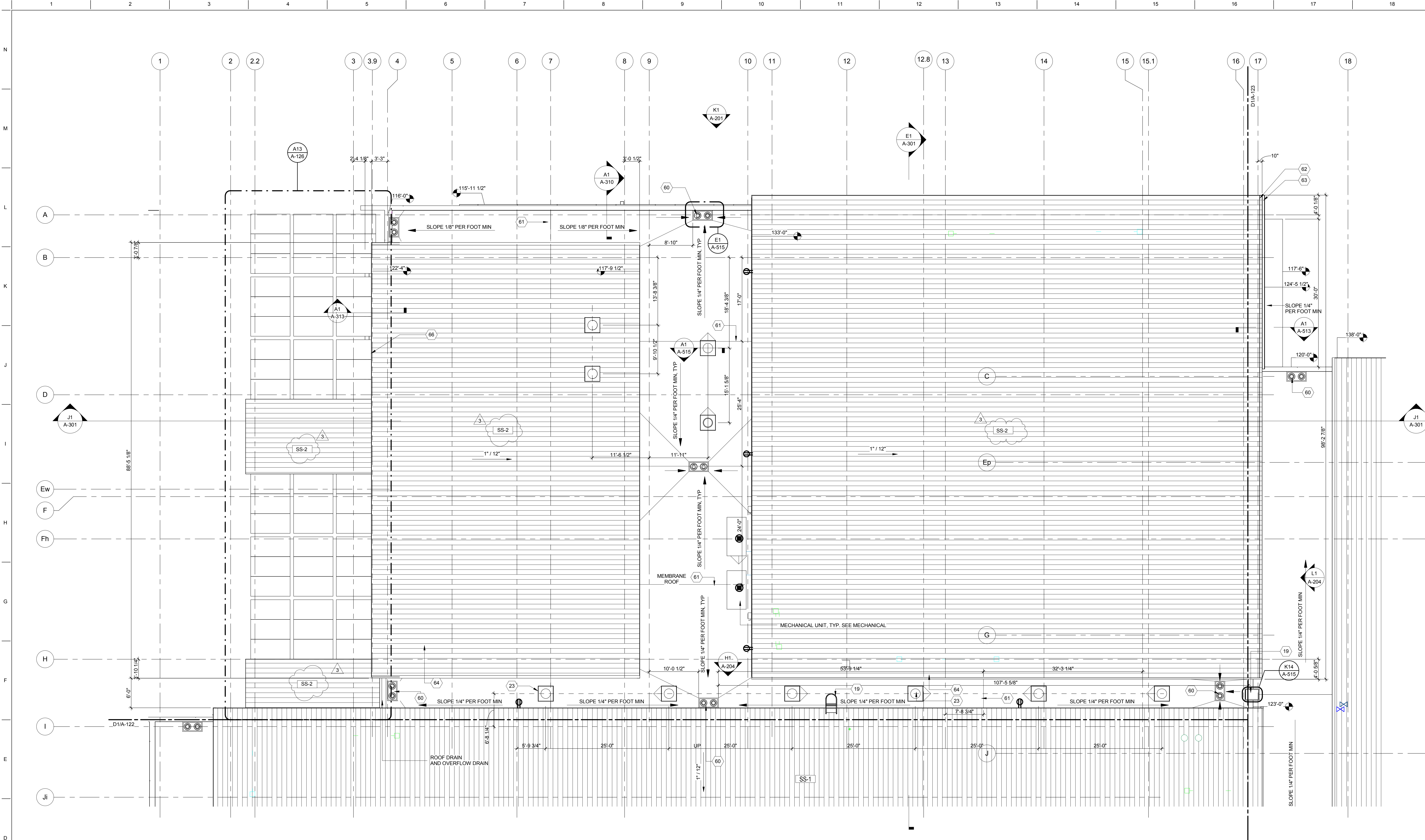
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MEZZANINE FLOOR PLAN
AREA E

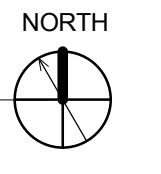
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ROOF PLAN AREA A

A-121

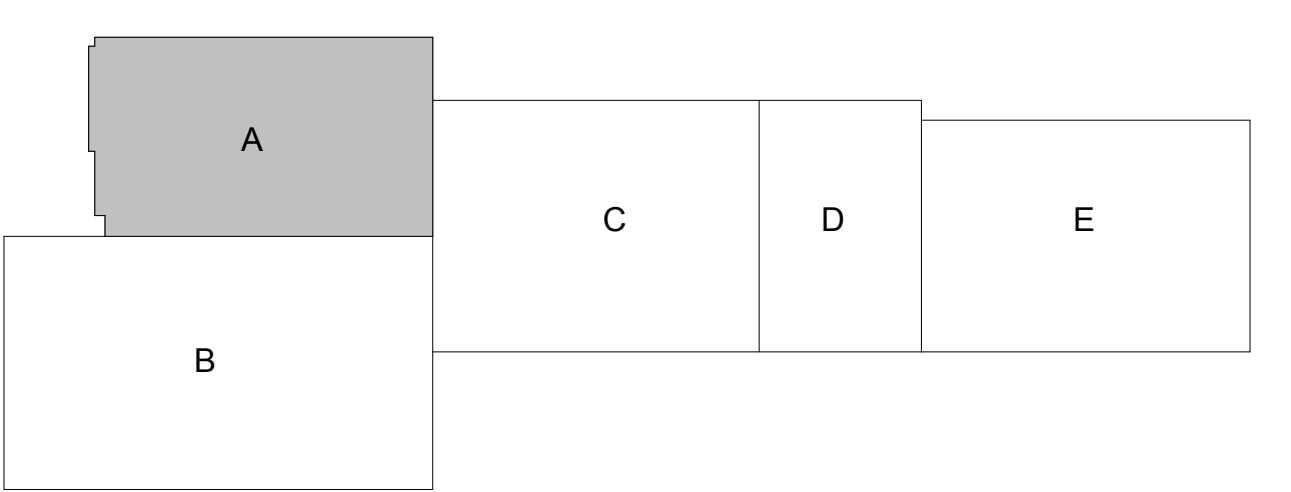


D1 AREA A ROOF PLAN
1/8" = 1'-0"
0 4' 8' 16'

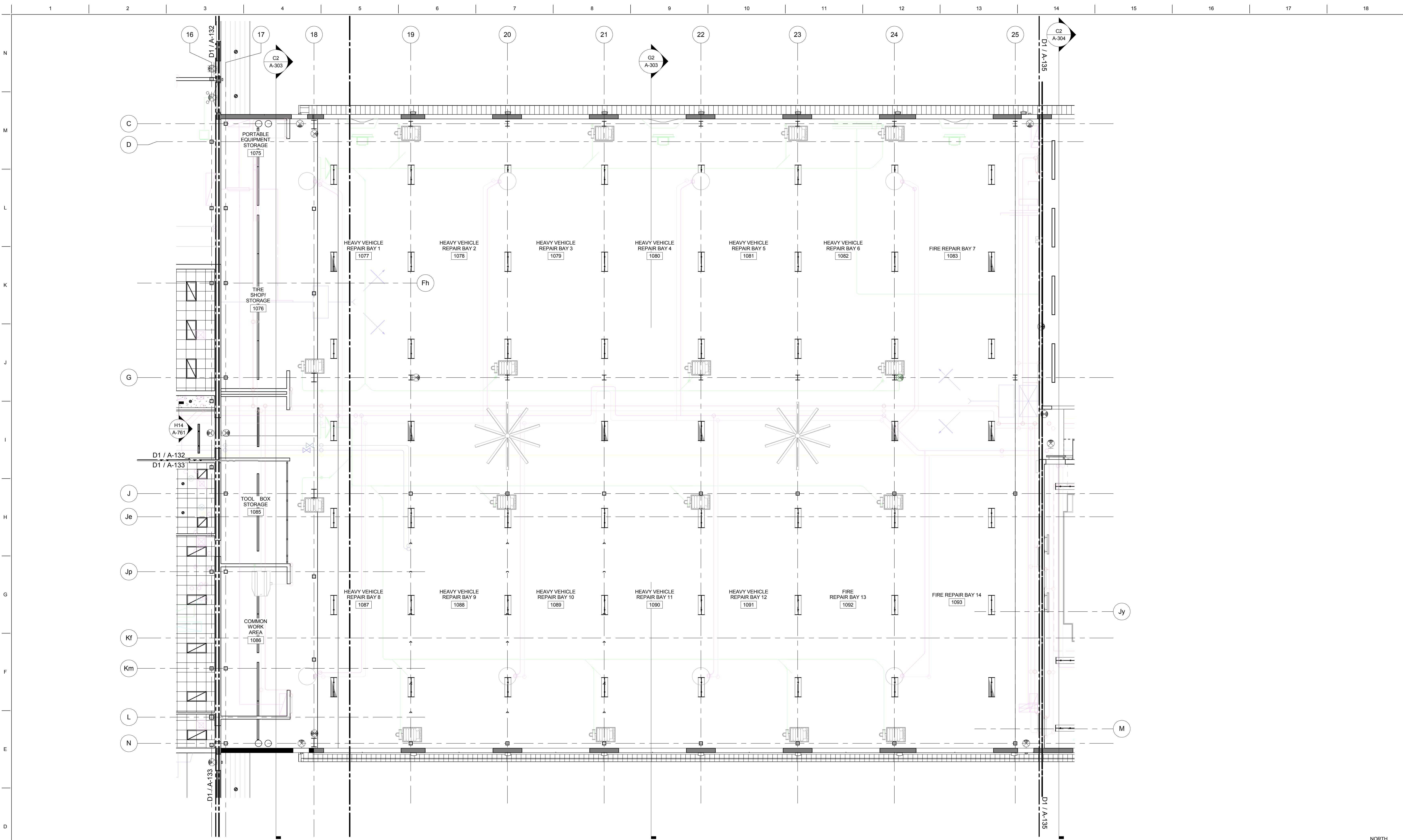


ROOF PLAN NOTES	
1	PROVIDE 1/4" PER FOOT MINIMUM SLOPE TOWARD ROOF DRAIN AT MEMBRANE ROOF U.O.N.
2	

KEY NOTES	
19	ROOF LADDER WITH METAL CAGE, TYP.
23	SOLATUBE, TYP.
60	ROOF DRAIN AND OVERFLOW DRAIN, TYP.
61	ROOF RIDGELINE.
62	CONTINUOUS SNOWGUARD, TYP.
63	CONTINUOUS METAL GUTTER WITH INTERNAL ROOF DRAINS.
64	STANDING SEAM METAL ROOF.
66	ROOF DRAIN AND OVERFLOW DRAIN AT THE MIDDLE OF THE ROOF BELOW.



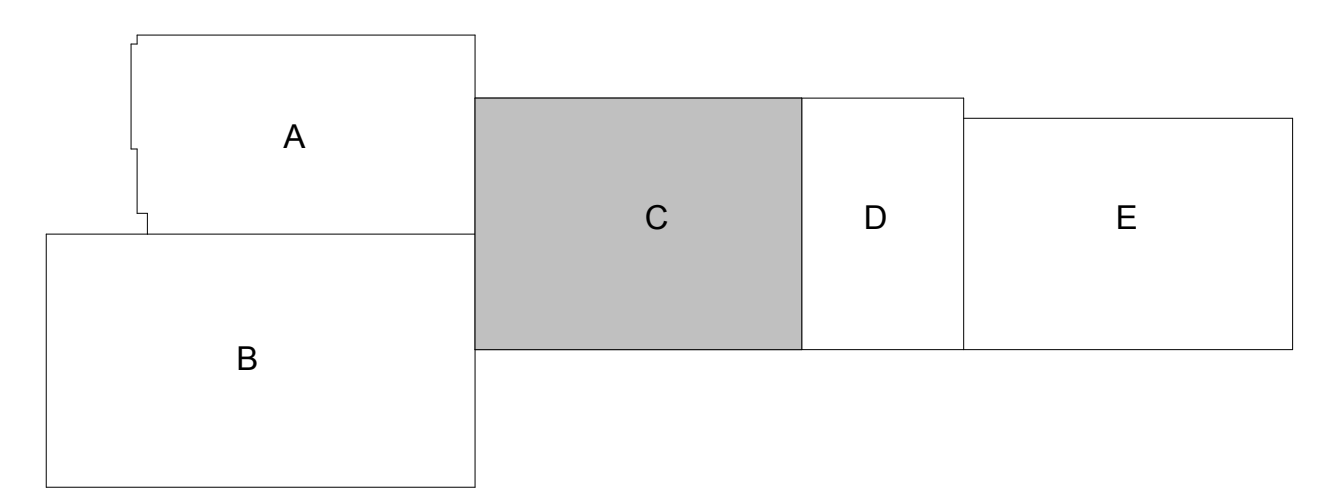
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D1 LEVEL 1 AREA C REFLECTED CEILING PLAN
1/8" = 1'-0"



CEILING MATERIAL LEGEND			
	ACT-1		OPEN TO STRUCTURE ABOVE
	ACT-2		SPRAY FOAM INSULATION TO UNDERSIDE OF MTL DECK
	ACT-3		
	GB-1		GB-2

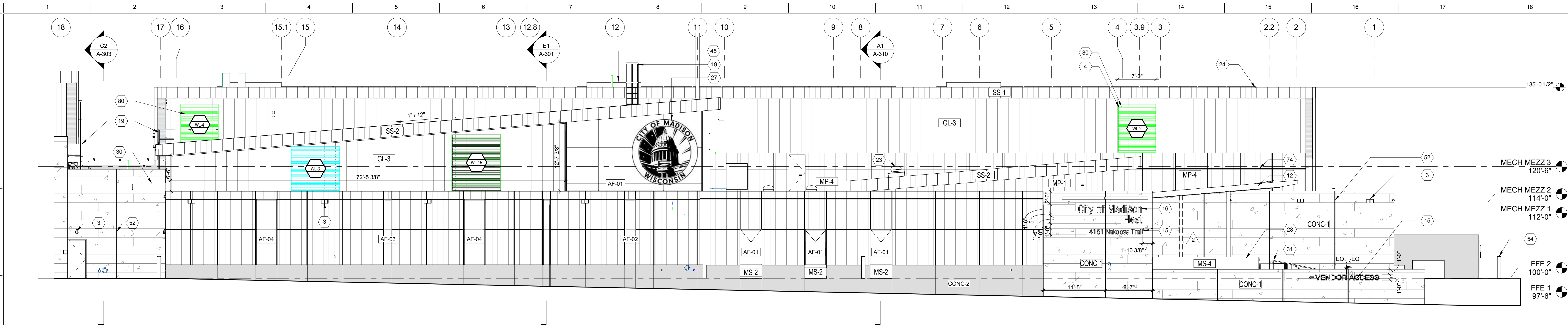


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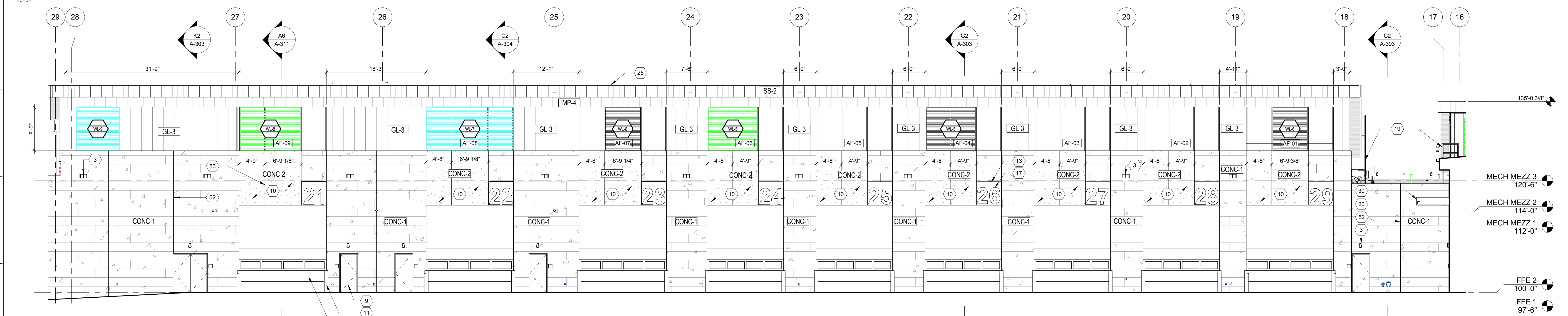
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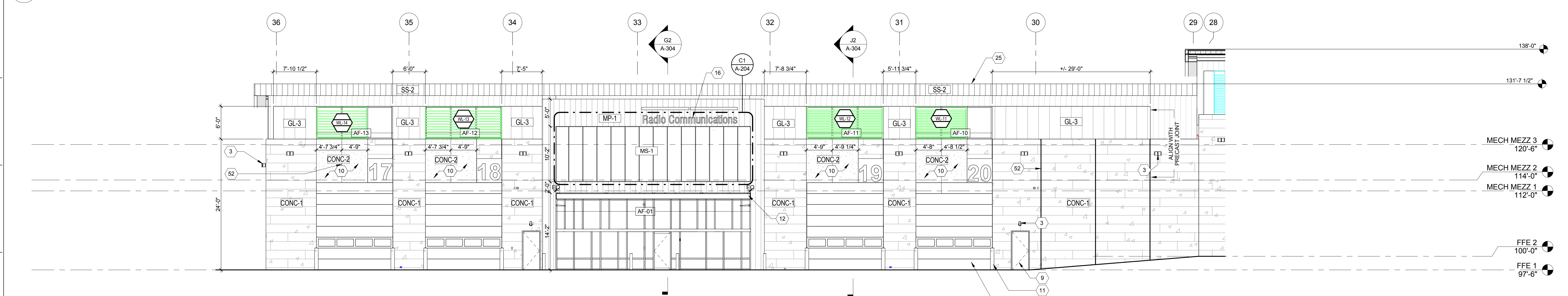
LEVEL 1 AREA C REFLECTED CEILING PLAN



K1 NORTH ELEVATION AB
1/8" = 1'-0"



G1 NORTH ELEVATION CD
1/8" = 1'-0"



C1 NORTH ELEVATION E
1/8" = 1'-0"

ENLARGED ELEVATION NOTES

- REFER TO G-001 FOR PROJECT GENERAL NOTES, REFERENCE AND MATERIAL SYMBOLS, AND ABBREVIATIONS USED ON THIS DRAWING.
- REFER TO THE ARCHITECTURAL GENERAL NOTES ON SHEET G-002 FOR ADDITIONAL NOTES WHICH MAY BE APPLICABLE TO THE WORK SHOWN ON THIS SHEET.
- REFER TO AND COORDINATE WITH CIVIL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- REFER TO SITE SCHEDULE, ARCHITECTURAL GENERAL NOTES FOR SITE SIGNAGE AND SITE SIGNAGE LOCATION ON SHEET AS-005.
- SEE SHEET A-200 FOR ADDITIONAL EXTERIOR FINISH INFORMATION AND SCHEDULE.
- FOR ALUMINUM FRAMED (AF) WINDOW AND GLAZING TYPES, REFER TO SHEETS A-503 AND A-504.

KEY NOTES

- INSULATED STEEL SECTIONAL OVERHEAD DOOR WITH VISION AND PLASTIC GLAZING PANELS, TYP.
- LIGHT FIXTURE, REFER TO ELECTRICAL DRAWINGS.
- MECHANICAL LOUVER, REFER TO MECHANICAL DRAWINGS.
- (PT-1) HOLLOW METAL DOOR AND FRAME, TYP.
- (PT-2) PAINTED INSULATED PRECAST WALL PANELS WITH SMOOTH TEXTURE, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- 8" CONCRETE BOLLARD WITH SAFETY YELLOW BOLLARD SLEEVE, TYP.
- (PT-1) PAINTED STEEL STRUCTURE CANOPY.
- (PT-3) PAINTED STEEL PLATE WITH APPLIED MATTE ALUMINUM LETTERS, TYP.
- MATTE ALUMINUM LETTERS 1'-0" HEIGHT, TYP.
- MATTE ALUMINUM LETTERS 1'-6" HEIGHT, TYP.
- MATTE ALUMINUM LETTERS 3'-0" HEIGHT, TYP.
- ROOF LADDER WITH METAL CAGE, TYP.
- SOLATUBE, TYP.
- (SS-1) STANDING SEAM METAL ROOF, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- (SS-2) STANDING SEAM METAL ROOF, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- VINYL APPLIED GRAPHIC.
- PERFORATED METAL SCREEN WITH PAINTED SUBSTRUCTURE TO MATCH MS-1.
- METAL PANEL CANOPY WITH MEMBRANE ROOFING.

KEY NOTES CONT.

- PREFINISHED METAL PIPE HANDRAIL/GUARDRAIL, TYP.
- SOLAR PANEL, TYP. SEE ELECTRICAL (ALTERNATE BID NUMBER 2).
- 3/4" INSULATED PRECAST PANEL JOINT, TYP.
- 1/2" INSULATED PRECAST PANEL REVEAL, TYP.
- BIKE RACK ON PAVED SURFACE, SEE AS-002.
- 1/2" REVEAL IN METAL PANEL, TYP.
- PROVIDE BIRD-SCREEN ON EXTERIOR SIDE OF LOUVER.

MATERIAL GRAPHIC LEGEND

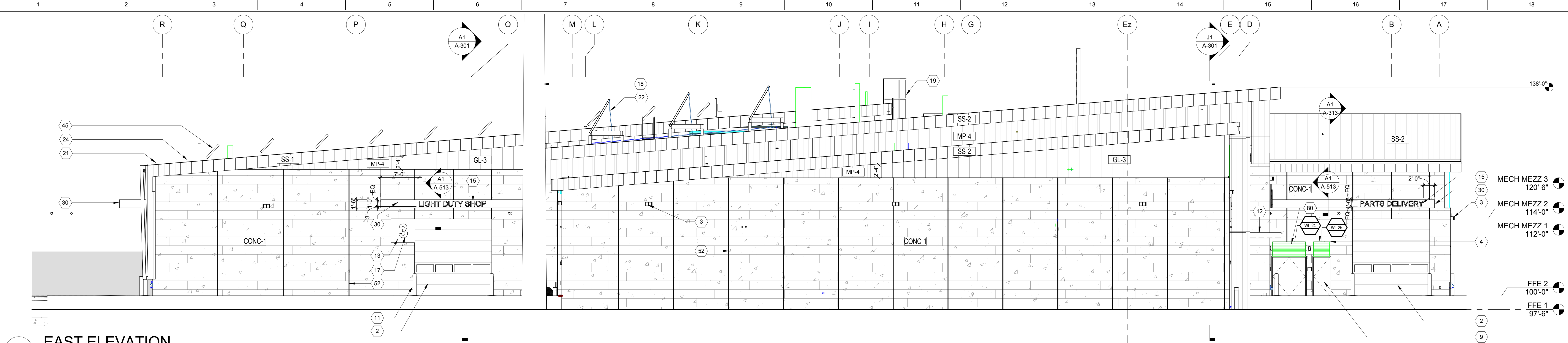
WL-X	LOUVER TYPE, SEE SHEET A-602
AF-X	(AF) ALUMINUM FRAME, SEE SHEET A-503 - A-504
XXX-X	EXTERIOR FINISH, SEE SHEET A-200
PT-X	PAINTS AND COATINGS, SEE SHEET A-200
BL-X	BORROWED LITE TYPE, SEE SHEET A503 - A-504
XXX	KEYNOTE

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA: 117,946 GROSS SF
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
ARCHITECTURE

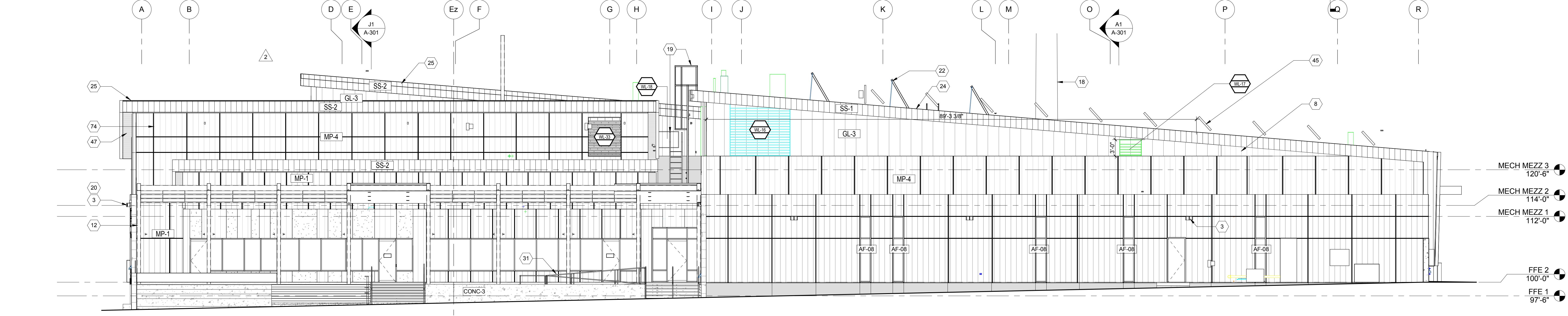
NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	DISP RESPONSE 1	01/28/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 376603

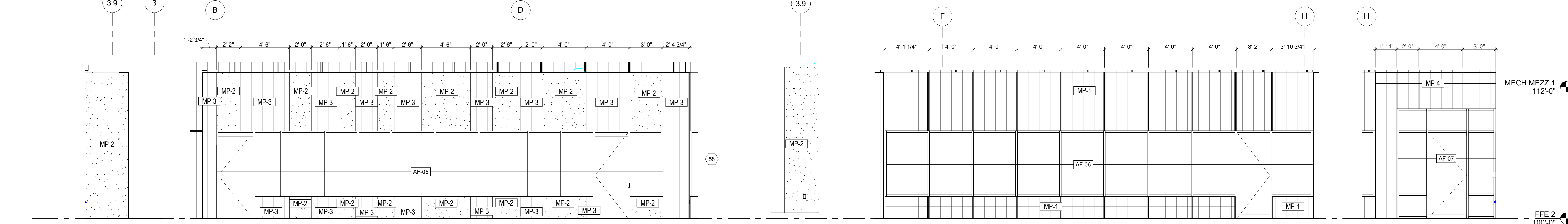
BUILDING ELEVATIONS



J1 EAST ELEVATION
1/8" = 1'-0"



D1 WEST ELEVATION
1/8" = 1'-0"



C1 NRTH ENTRY ELEV
1/4" = 1'-0"

C3 ENLARGED WEST ELEVATION AT ENTRY
1/4" = 1'-0"

C9 STH ENTRY ELEV
1/4" = 1'-0"

C11 ENLARGED WEST ELEVATION AT ENTRY 1
1/4" = 1'-0"

C16 ENLARGD WST ELEV ENTRY 2
1/4" = 1'-0"

ENLARGED ELEVATION NOTES

- REFER TO G-001 FOR PROJECT GENERAL NOTES, REFERENCE AND MATERIAL SYMBOLS, AND ABBREVIATIONS USED ON THIS DRAWING.
- REFER TO THE ARCHITECTURAL GENERAL NOTES ON SHEET G-002 FOR ADDITIONAL NOTES WHICH MAY BE APPLICABLE TO THE WORK SHOWN ON THIS SHEET.
- REFER TO AND COORDINATE WITH CIVIL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- REFER TO SITE SCHEDULE, ARCHITECTURAL GENERAL NOTES FOR SITE SIGNAGE AND SITE SIGNAGE LOCATION ON SHEET AS-005.
- SEE SHEET A-200 FOR ADDITIONAL EXTERIOR FINISH INFORMATION AND SCHEDULE.
- FOR ALUMINUM FRAMED (AF) WINDOW AND GLAZING TYPES, REFER TO SHEETS A-503 AND A-504.

KEY NOTES

- INSULATED STEEL SECTIONAL OVERHEAD DOOR WITH VISION AND PLASTIC GLAZING PANELS, TYP.
- LIGHT FIXTURE, REFER TO ELECTRICAL DRAWINGS.
- MECHANICAL LOUVER, TYP. REFER TO MECHANICAL DRAWINGS.
- (MP-4) METAL WALL PANEL, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- (PT-1) HOLLOW METAL DOOR AND FRAME, TYP.
- 8" CONCRETE BOLLARD WITH SAFETY YELLOW BOLLARD SLEEVE, TYP.
- (PT-3) PAINTED STEEL STRUCTURE CANOPY.
- (PT-3) PAINTED STEEL PLATE WITH APPLIED MATTE ALUMINUM LETTERS, TYP.
- MATTE ALUMINUM LETTERS 1'-0" HEIGHT, TYP.
- MATTE ALUMINUM LETTERS 3'-0" HEIGHT, TYP.
- RADIO COMMUNICATION TOWER BY OTHER.
- ROOF LADDER WITH METAL CAGE, TYP.
- SNOWGUARD, TYP.
- SOLAR HOT WATER PANEL SYSTEM, REFER TO MECHANICAL DRAWINGS.
- (SS-1) STANDING SEAM METAL ROOF, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- (SS-2) STANDING SEAM METAL ROOF, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- METAL PANEL CANOPY WITH MEMBRANE ROOFING.
- PREFINISHED METAL PIPE HANDRAIL/GUARDRAIL, TYP.
- SOLAR PANEL, TYP. SEE ELECTRICAL (ALTERNATE BID NUMBER 2).

KEY NOTES CONT.

- PERFORATED METAL SOFFIT TO MATCH S-2, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- 3/4" INSULATED PRECAST PANEL JOINT, TYP.
- 1/2" REVEAL IN METAL PANEL, TYP.
- PROVIDE BIRD-SCREEN ON EXTERIOR SIDE OF LOUVER.

MATERIAL GRAPHIC LEGEND

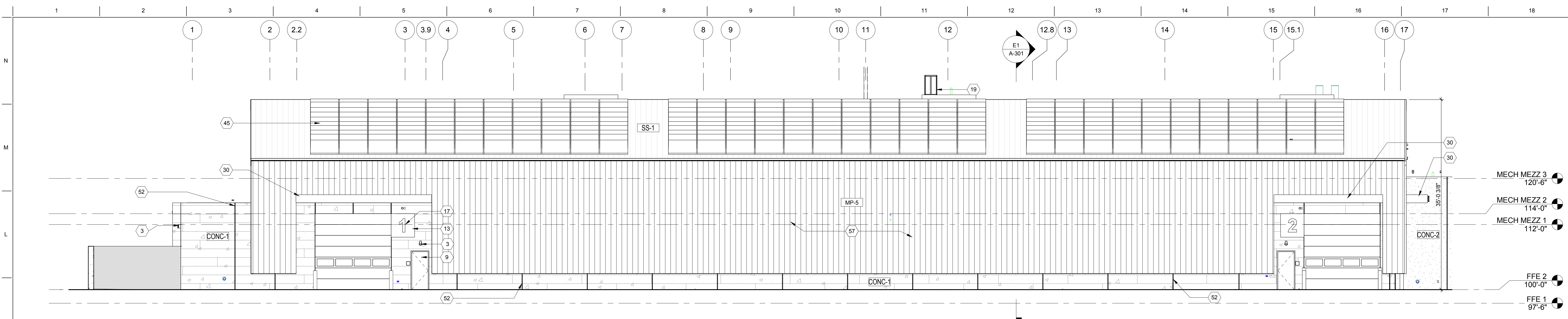
	LOUVER TYPE, SEE SHEET A-602
	(AF) ALUMINUM FRAME, SEE SHEET A-503 - A-504
	EXTERIOR FINISH, SEE SHEET A-200
	PAINTS AND COATINGS, SEE SHEET A-200
	BORROWED LITE TYPE, SEE SHEET A503 - A-504
	KEYNOTE

CITY OF MADISON
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FACILITY
AREA: 117,946 GROSS SF
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
ARCHITECTURE

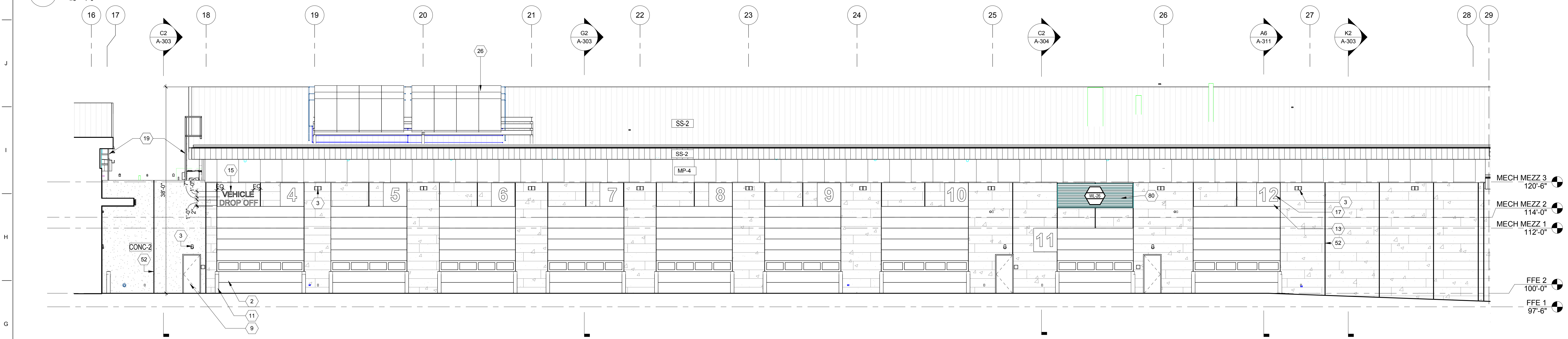
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
1	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

No. REVISION/SUBMISSION DATE
PROJECT No. 376603

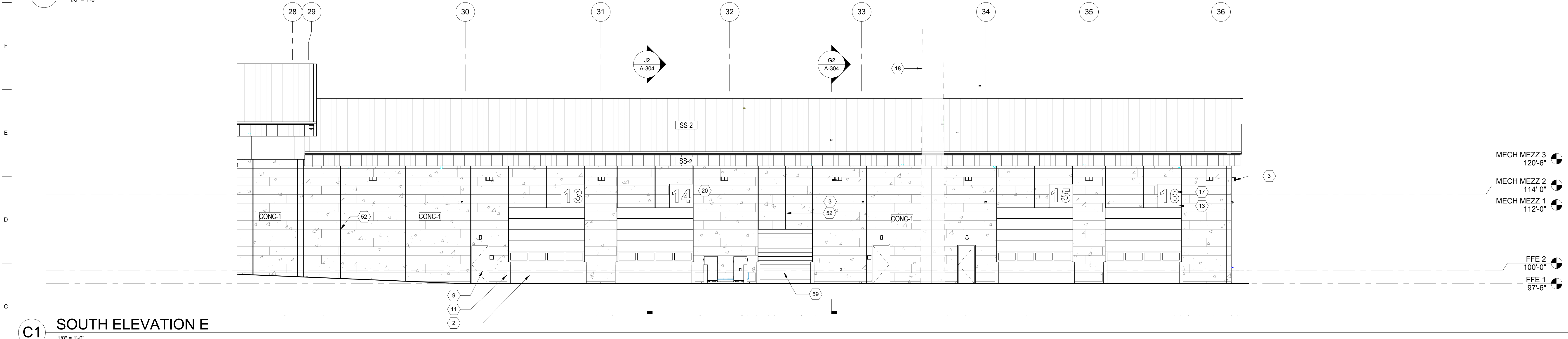
BUILDING ELEVATIONS



K1 SOUTH ELEVATION AB
1/8" = 1'-0"



G1 SOUTH ELEVATION CD
1/8" = 1'-0"



C1 SOUTH ELEVATION E
1/8" = 1'-0"

ENLARGED ELEVATION NOTES

- REFER TO G-001 FOR PROJECT GENERAL NOTES, REFERENCE AND MATERIAL SYMBOLS, AND ABBREVIATIONS USED ON THIS DRAWING.
- REFER TO THE ARCHITECTURAL GENERAL NOTES ON SHEET G-002 FOR ADDITIONAL NOTES WHICH MAY BE APPLICABLE TO THE WORK SHOWN ON THIS SHEET.
- REFER TO AND COORDINATE WITH CIVIL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- REFER TO SITE SCHEDULE, ARCHITECTURAL GENERAL NOTES FOR SITE SIGNAGE AND SITE SIGNAGE LOCATION ON SHEET AS-005.
- SEE SHEET A-200 FOR ADDITIONAL EXTERIOR FINISH INFORMATION AND SCHEDULE.
- FOR ALUMINUM FRAMED (AF) WINDOW AND GLAZING TYPES, REFER TO SHEETS A-503 AND A-504.

KEY NOTES

- INSULATED STEEL SECTIONAL OVERHEAD DOOR WITH VISION AND PLASTIC GLAZING PANELS, TYP.
- LIGHT FIXTURE, REFER TO ELECTRICAL DRAWINGS.
- (PT-1) HOLLOW METAL DOOR AND FRAME, TYP.
- 8" CONCRETE BOLLARD WITH SAFETY YELLOW BOLLARD SLEEVE, TYP.
- (PT-3) PAINTED STEEL PLATE WITH APPLIED MATTE ALUMINUM LETTERS, TYP.
- MATTE ALUMINUM LETTERS 3'-0" HEIGHT, TYP.
- MATTE ALUMINUM LETTERS 1'-0" HEIGHT, TYP.
- RADIO COMMUNICATION TOWER BY OTHER.
- ROOF LADDER WITH METAL CASE, TYP.
- SOLAR HOT WATER PANEL SYSTEM, TYP REFER TO MECHANICAL DRAWINGS.
- METAL PANEL CANOPY WITH MEMBRANE ROOFING.
- SOLAR PANEL, TYP. SEE ELECTRICAL. (ALTERNATE BID NUMBER 2).
- 3/4" INSULATED PRECAST PANEL JOINT, TYP.
- (MP-5) TRANSPARENT SOLAR COLLECTOR, SEE EXTERIOR FINISH SCHEDULE ON A-200.
- (PT-1) PAINTED INSULATED OVERHEAD COILING DOOR.
- PROVIDE BIRD-SCREEN ON EXTERIOR SIDE OF LOUVER.

MATERIAL GRAPHIC LEGEND

	LOUVER TYPE, SEE SHEET A-602
	(AF) ALUMINUM FRAME, SEE SHEET A-503 - A-504
	EXTERIOR FINISH, SEE SHEET A-200
	PAINTS AND COATINGS, SEE SHEET A-200
	BORROWED LITE TYPE, SEE SHEET A503 - A-504
	KEYNOTE

CITY OF MADISON
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ARCHITECTURE

3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE

PROJECT No: 376603

BUILDING ELEVATIONS

NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 376603

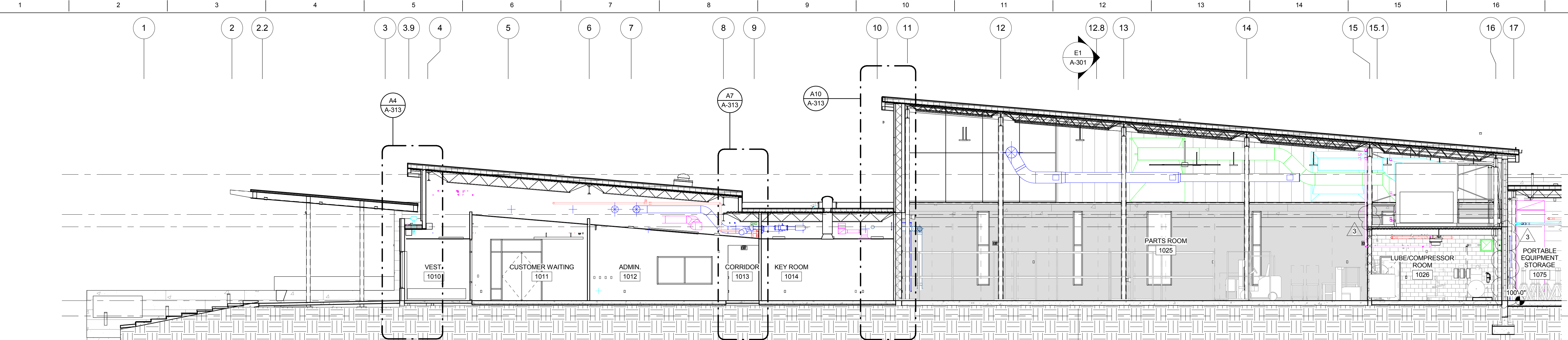
BUILDING SECTIONS

A-301

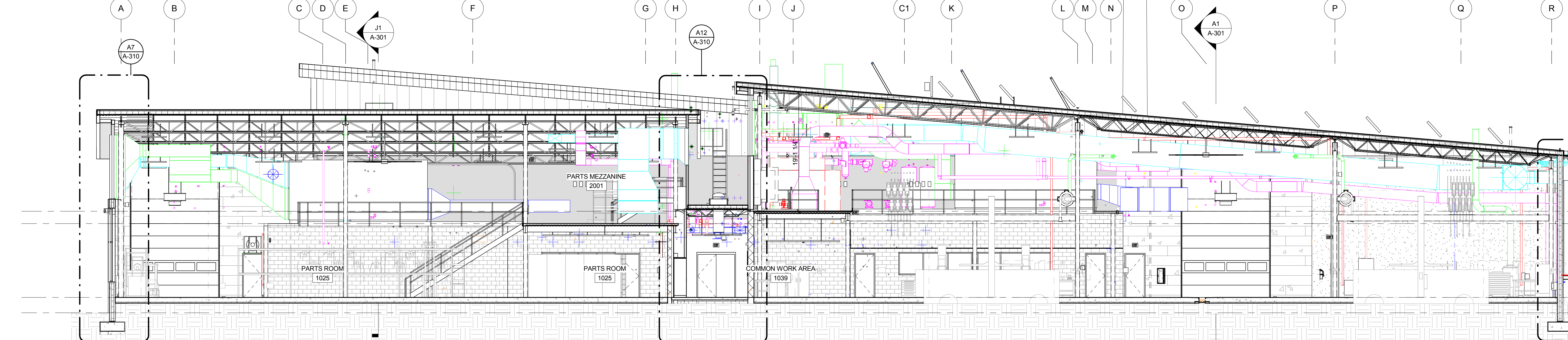
MECH MEZZ 3
120'-6"
MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
LOWER LEVEL 1
97'-6"

MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
FFE 1
97'-6"

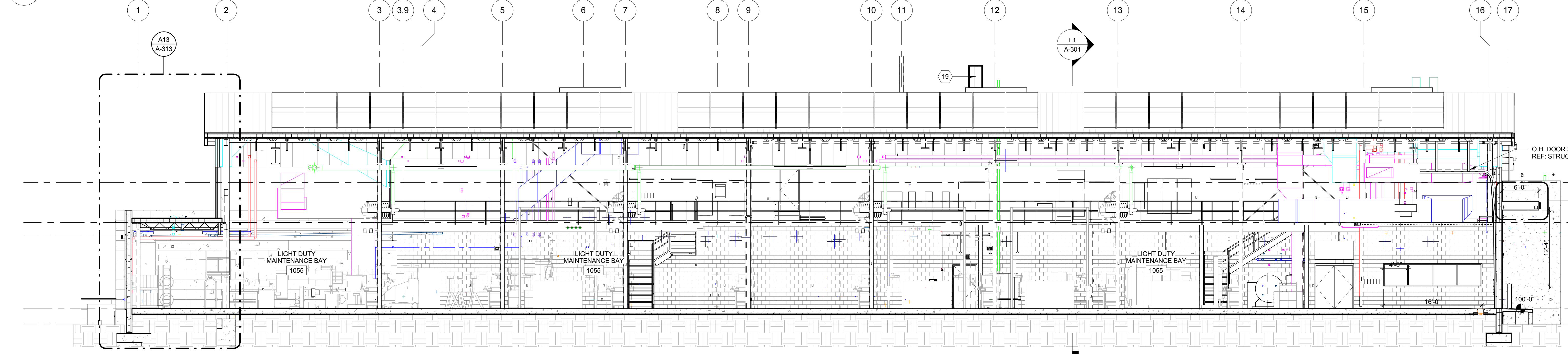
MECH MEZZ 3
120'-6"
MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
FFE 1
97'-6"



J1 SECTION @ ADMINISTRATION & PARTS
1/8" = 1'-0"



E1 SECTION @ PARTS & LIGHT MAINTENANCE
1/8" = 1'-0"

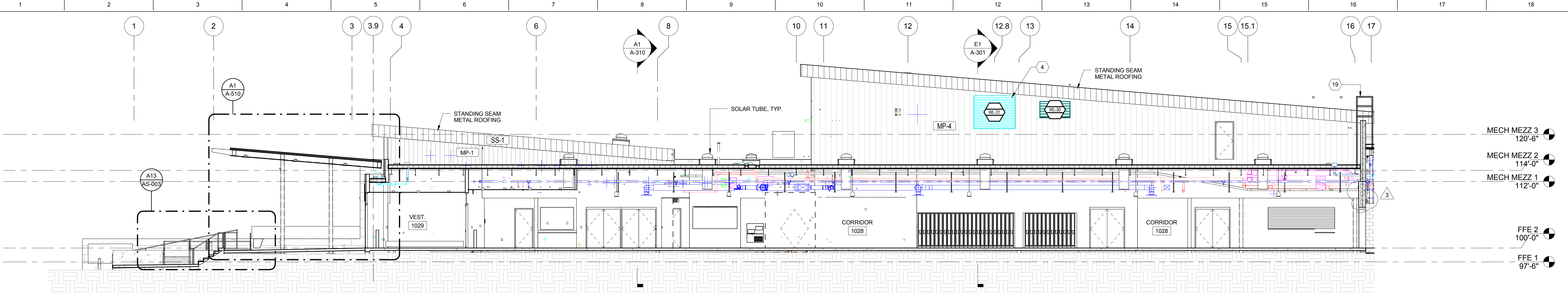


A1 SECTION @ LIGHT MAINTENANCE
1/8" = 1'-0"

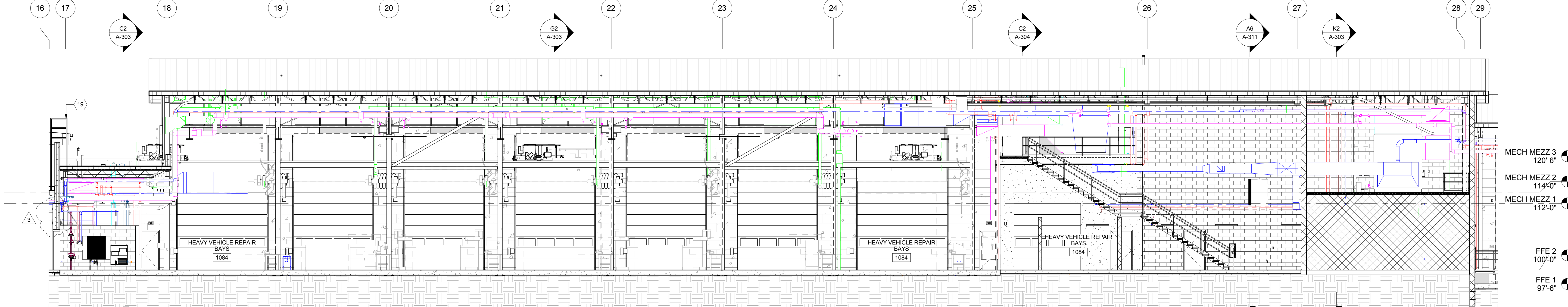
BUILDING SECTION NOTES	
1	SAMPLE NOTE

KEY NOTES	
19	ROOF LADDER WITH METAL CAGE, TYP.

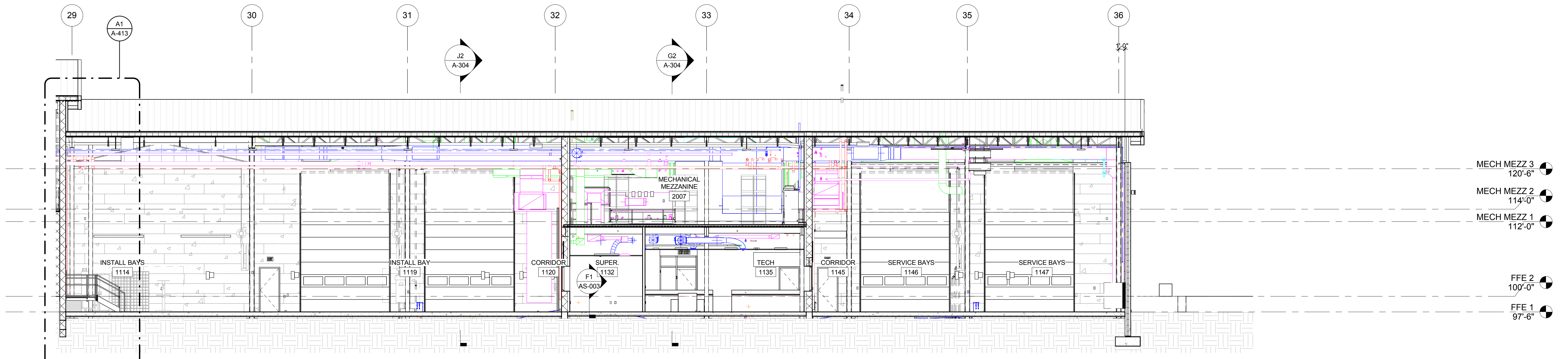
C:\Users\jacob.miller\OneDrive\Documents\Projects\NAKOOSA TRAIL\A-301.dwg
 03/14/2019 10:00 AM
 Jacob Miller
 571.290.7679



J1 SECTION @ ADMIN
1/8" = 1'-0"



E1 SECTION @ HEAVY MAINTENANCE
1/8" = 1'-0"



A1 SECTION @ RADIO/COMMUNICATION
1/8" = 1'-0"

MECH MEZZ 3
120'-6"
MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
FFE 1
97'-6"

MECH MEZZ 3
120'-6"
MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
FFE 1
97'-6"

MECH MEZZ 3
120'-6"
MECH MEZZ 2
114'-0"
MECH MEZZ 1
112'-0"
FFE 2
100'-0"
FFE 1
97'-6"

BUILDING SECTION NOTES	
1	SAMPLE NOTE

KEY NOTES	
4	MECHANICAL LOUVER, TYP. REFER TO MECHANICAL DRAWINGS.
19	ROOF LADDER WITH METAL CAGE, TYP.

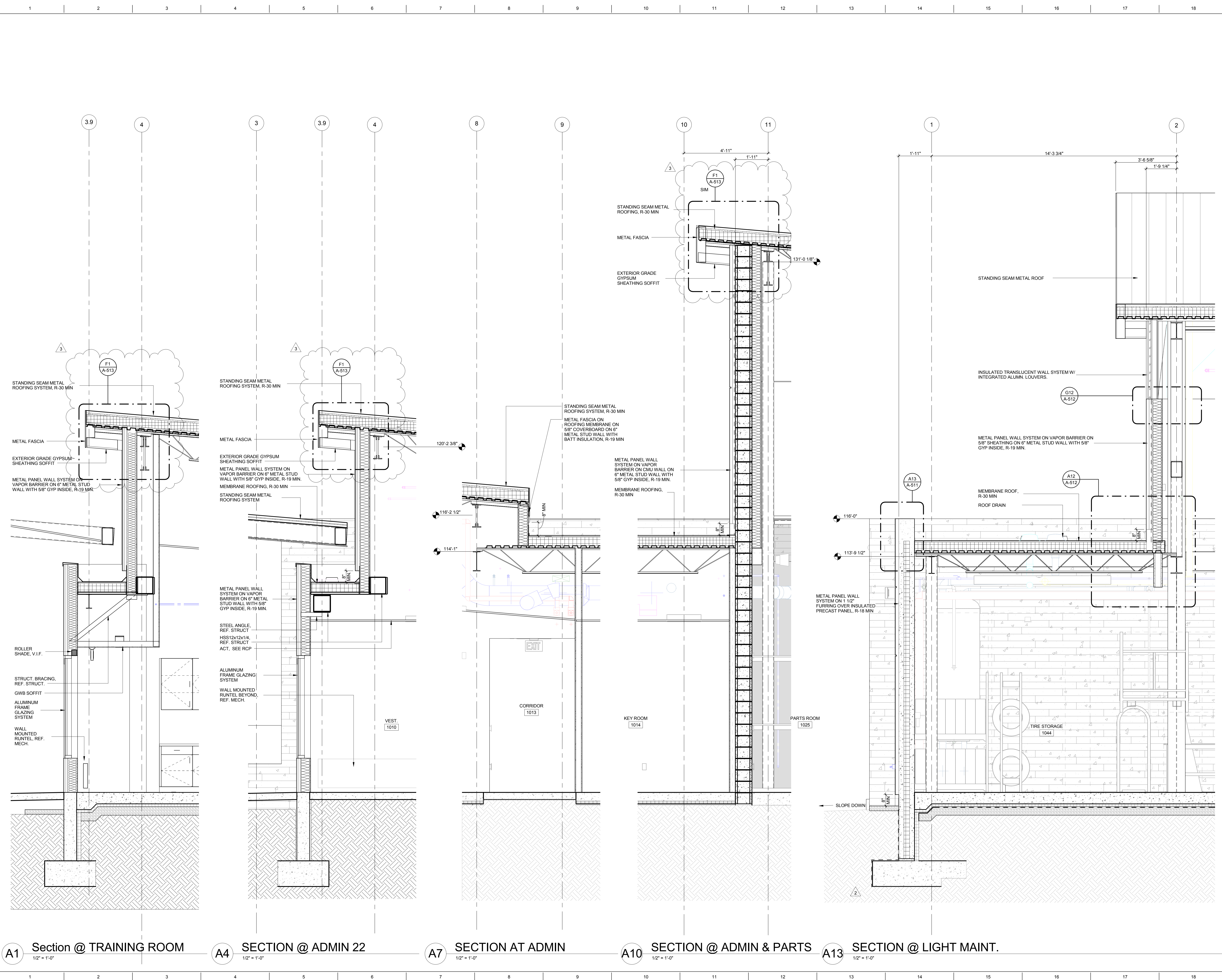
CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
AREA: 117,946 GROSS SF
4151 NAKOOSA TRAIL
MADISON, WISCONSIN, 53714
ARCHITECTURE

NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 376603

BUILDING SECTIONS

A-302



A1 Section @ TRAINING ROOM
1/2" = 1'-0"

A4 SECTION @ ADMIN 22
1/2" = 1'-0"

A7 SECTION AT ADMIN
1/2" = 1'-0"

A10 SECTION @ ADMIN & PARTS
1/2" = 1'-0"

A13 SECTION @ LIGHT MAINT.
1/2" = 1'-0"

CITY OF MADISON
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ARCHITECTURE

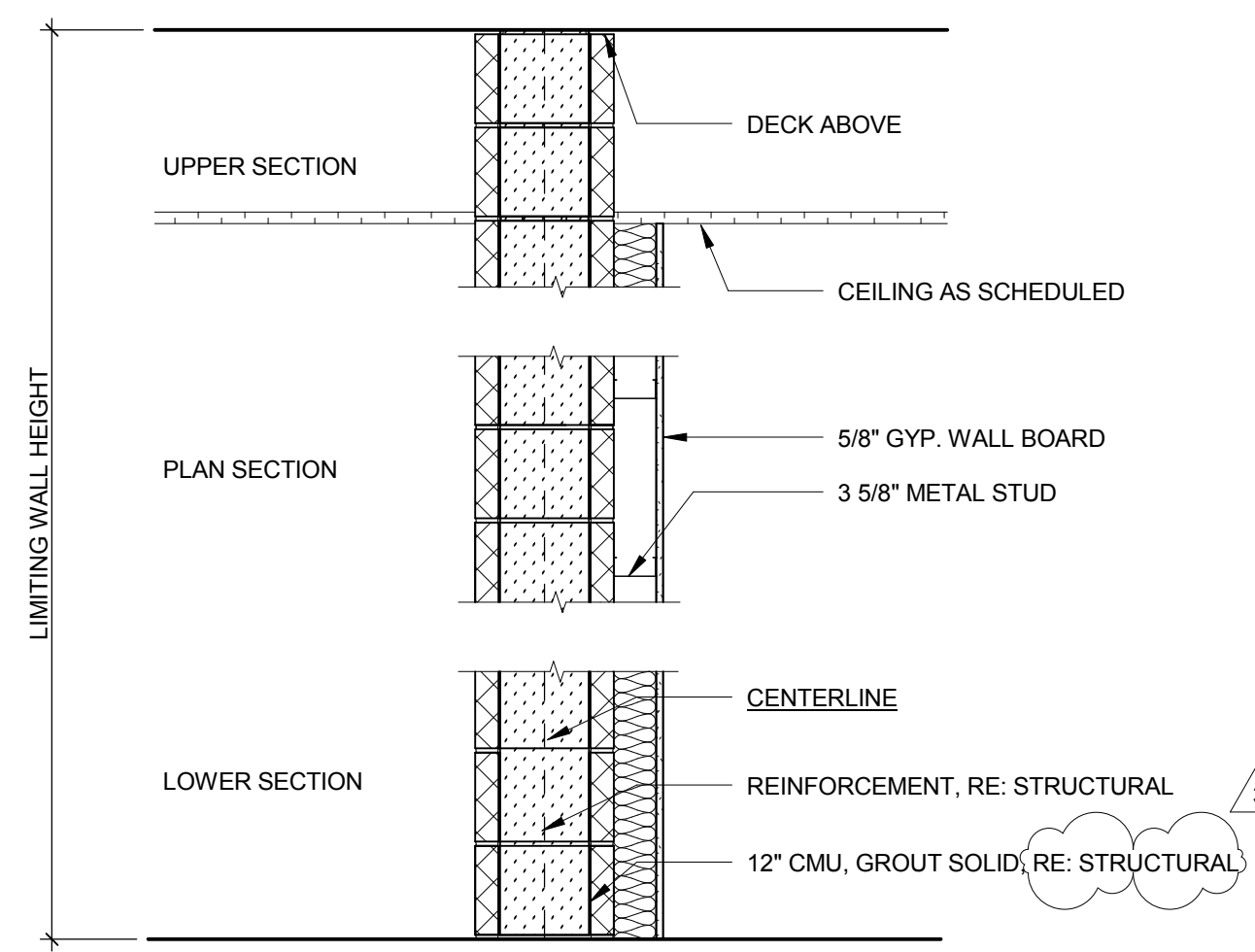
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE
PROJECT No: 376603		

E/W WALL SECTIONS

A-313

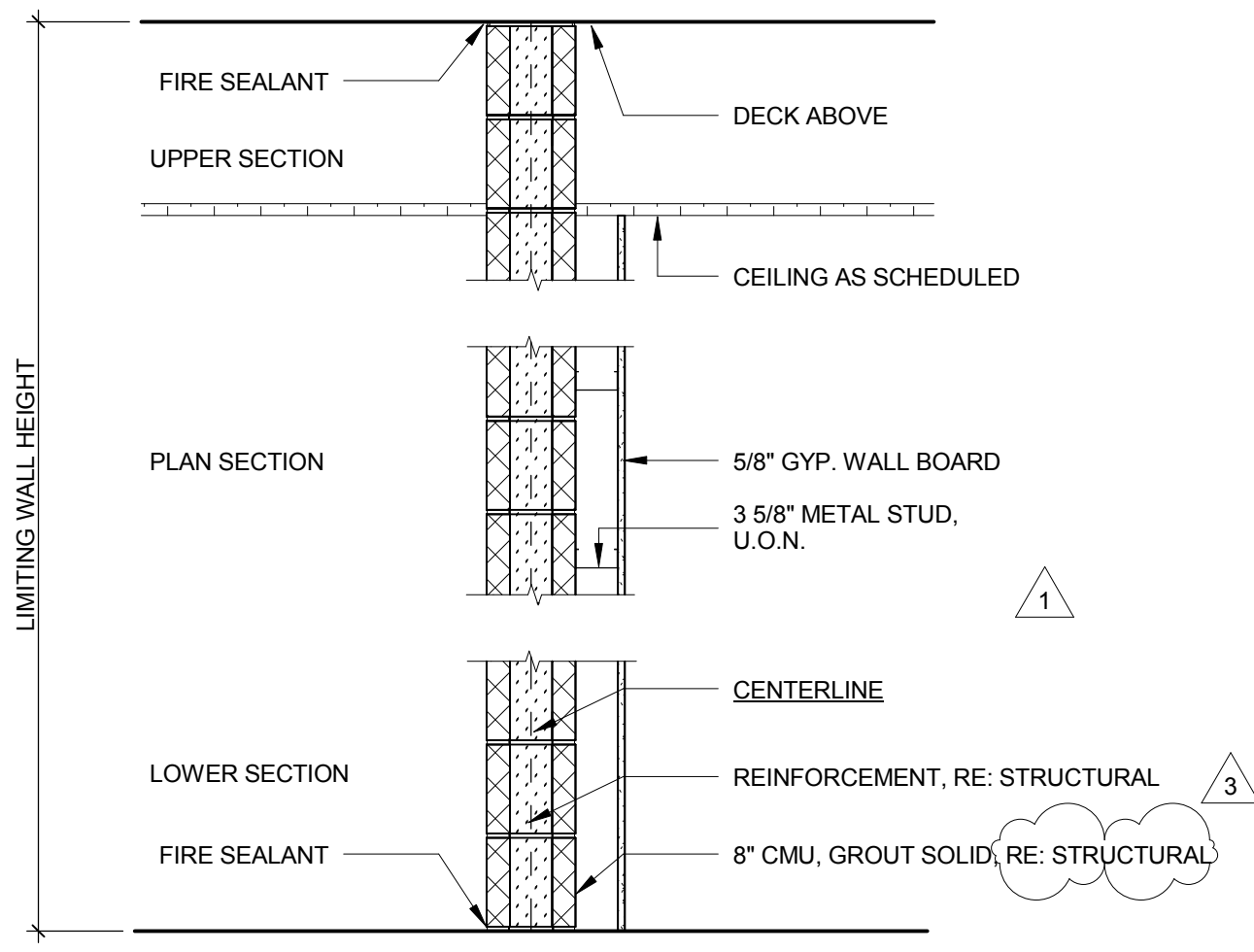
PARTITION LEGEND

	1 HOUR
	2 HOUR
	3 HOUR
	4 HOUR
	SMOKE
	DEMISING



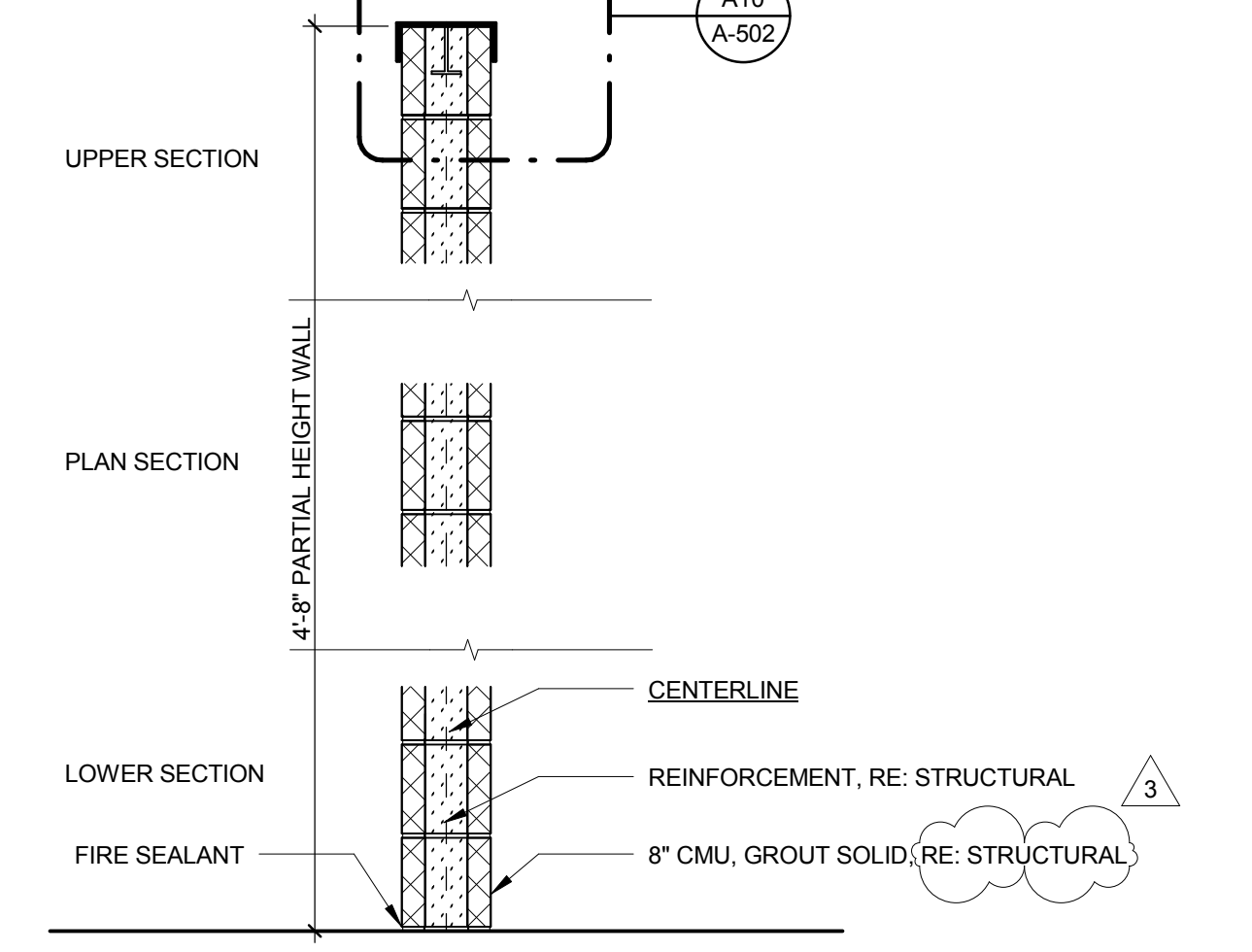
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

H1 PARTITION TYPE M006
3/4" = 1'-0"



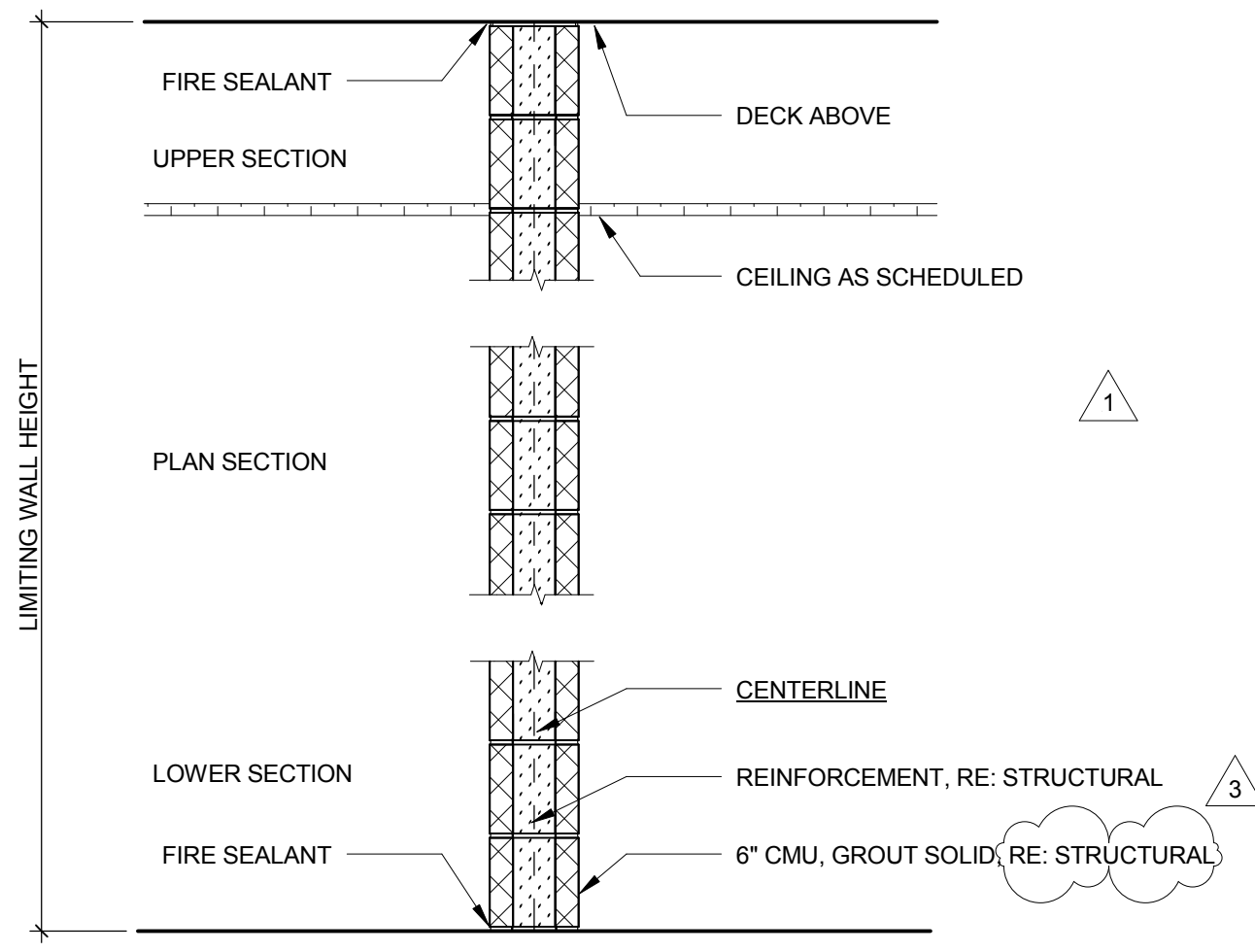
FIRE RATING:	1 HR
UL DESIGN:	U905
STC RATING:	
SOUND TEST NO.:	

H4 PARTITION TYPE M004
3/4" = 1'-0"



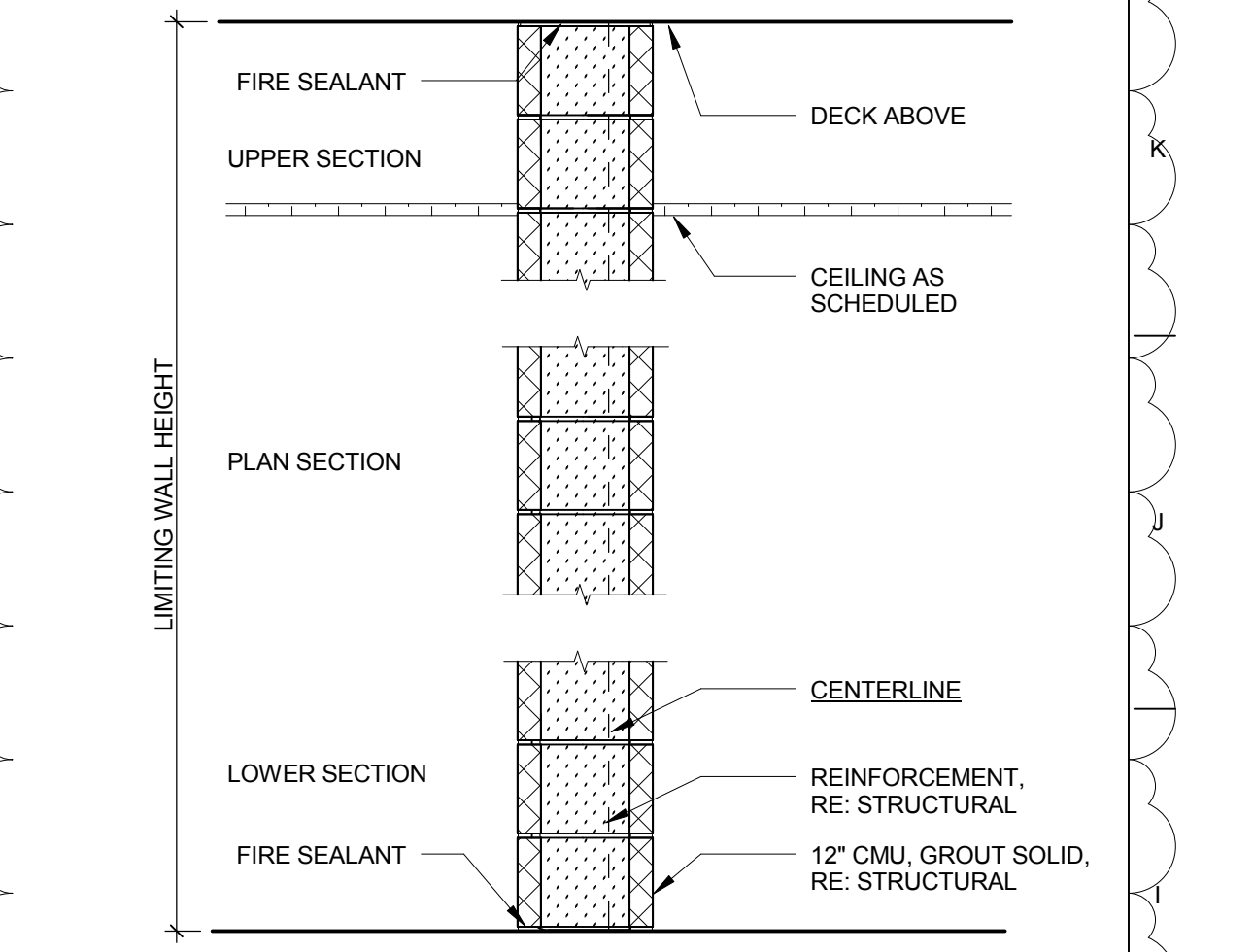
FIRE RATING:	NA
UL DESIGN:	NA
STC RATING:	
SOUND TEST NO.:	

H8 PARTITION TYPE M002
3/4" = 1'-0"



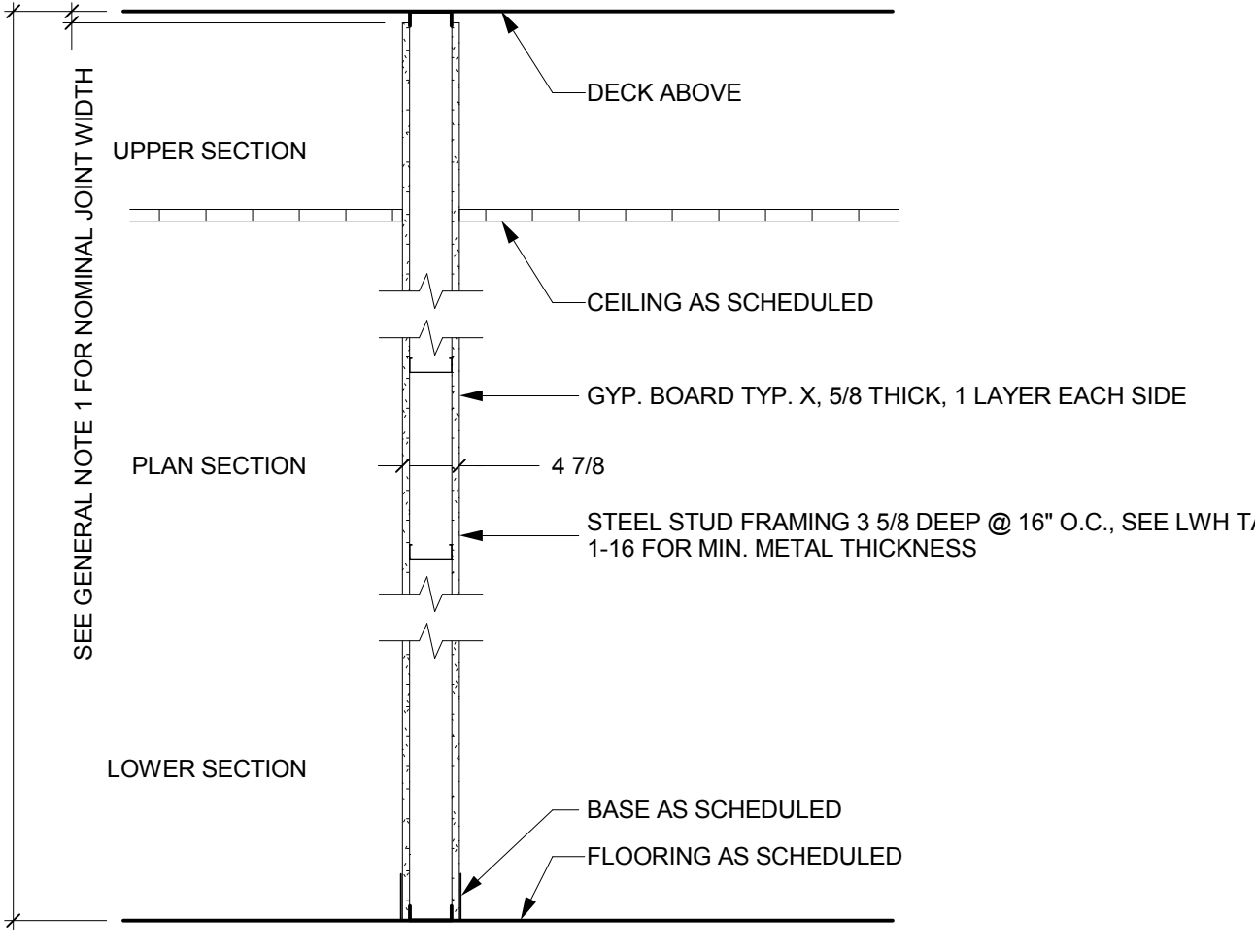
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

H12 PARTITION TYPE M001
3/4" = 1'-0"



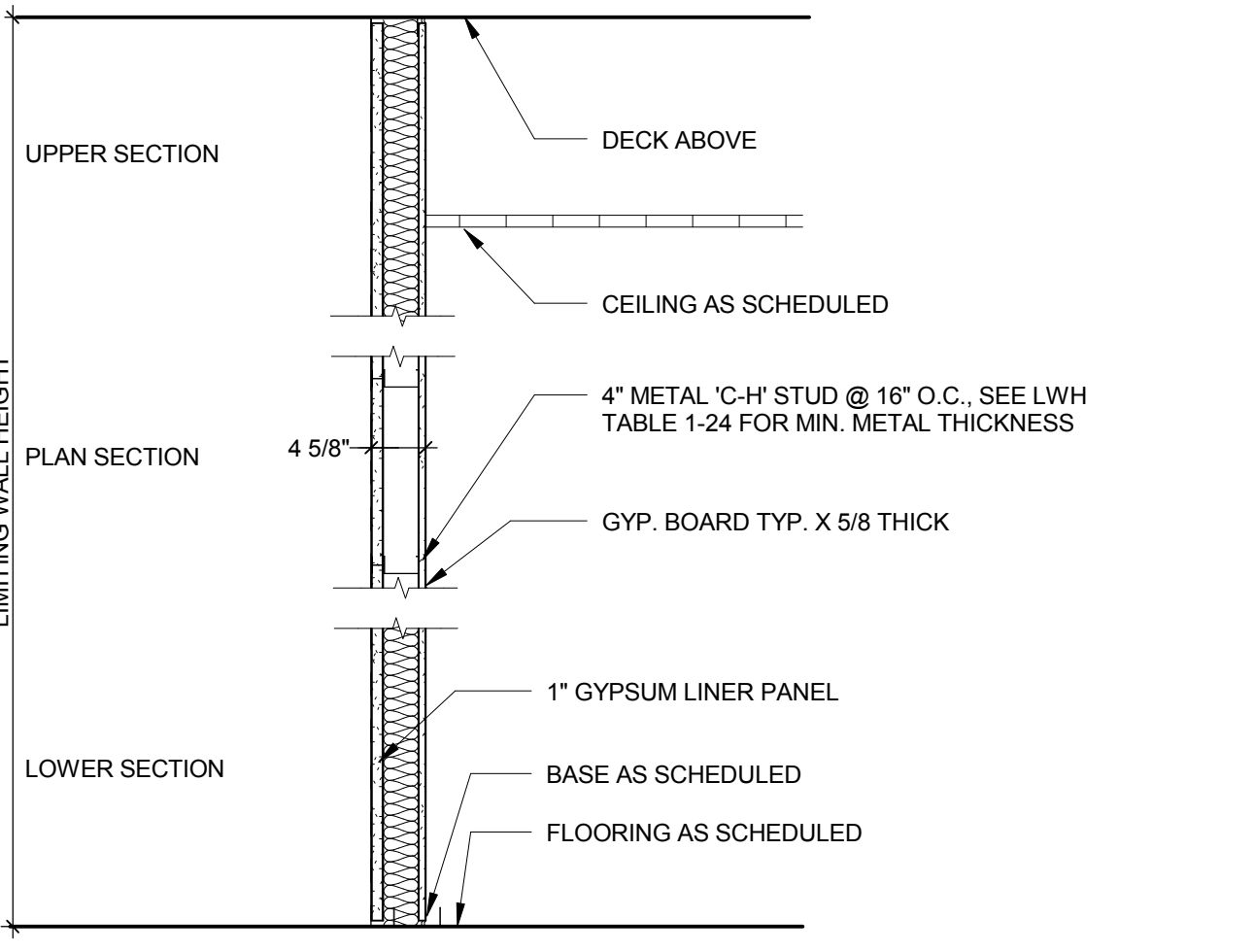
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

H16 PARTITION TYPE M005
3/4" = 1'-0"



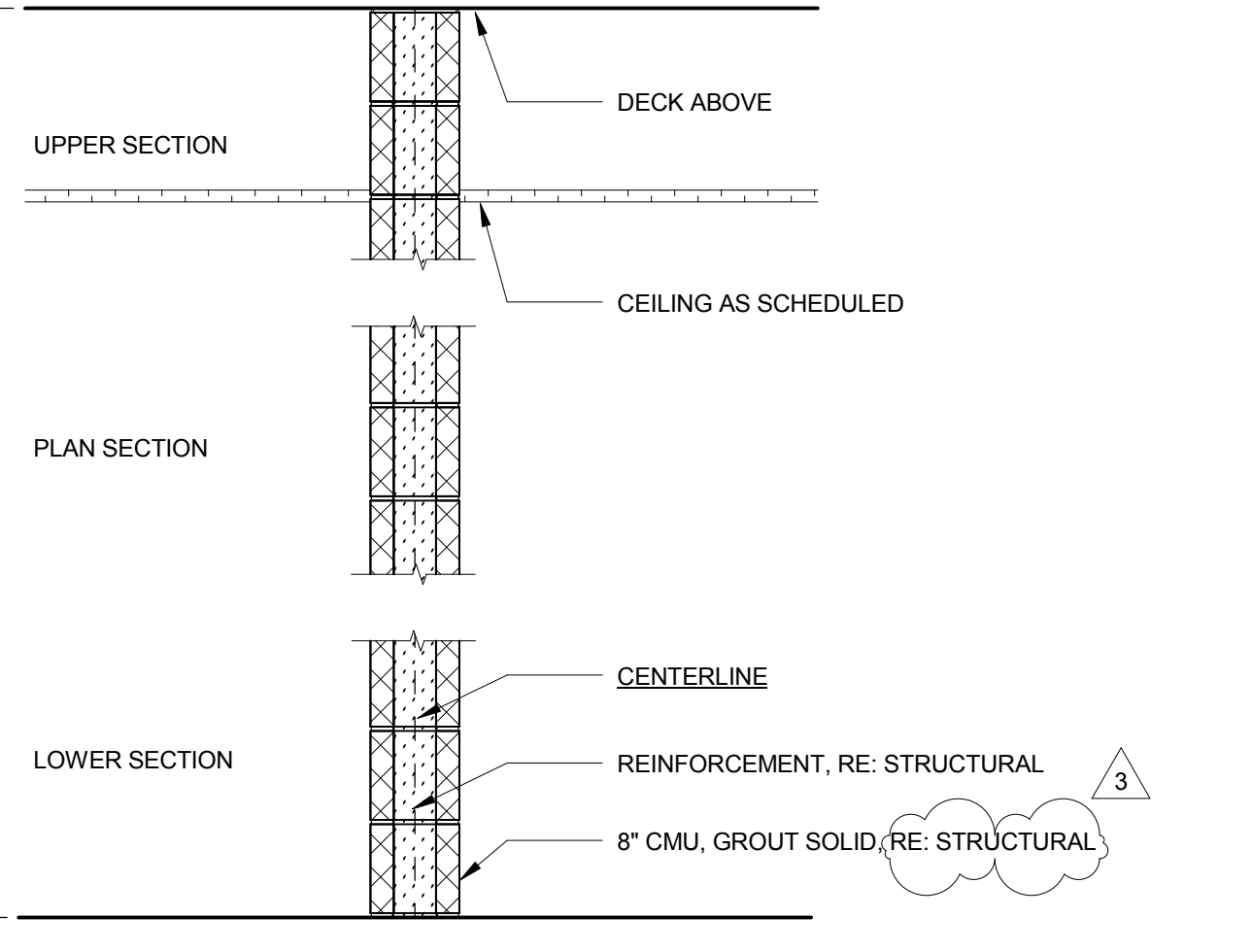
FIRE RATING:	1 HOUR
UL DESIGN:	465
STC RATING:	38
SOUND TEST NO.:	NBC-S42 FOR WALL ASSEMBLY 0, SLSS397/NRC-TL 92 418

E1 PARTITION TYPE R002
3/4" = 1'-0"



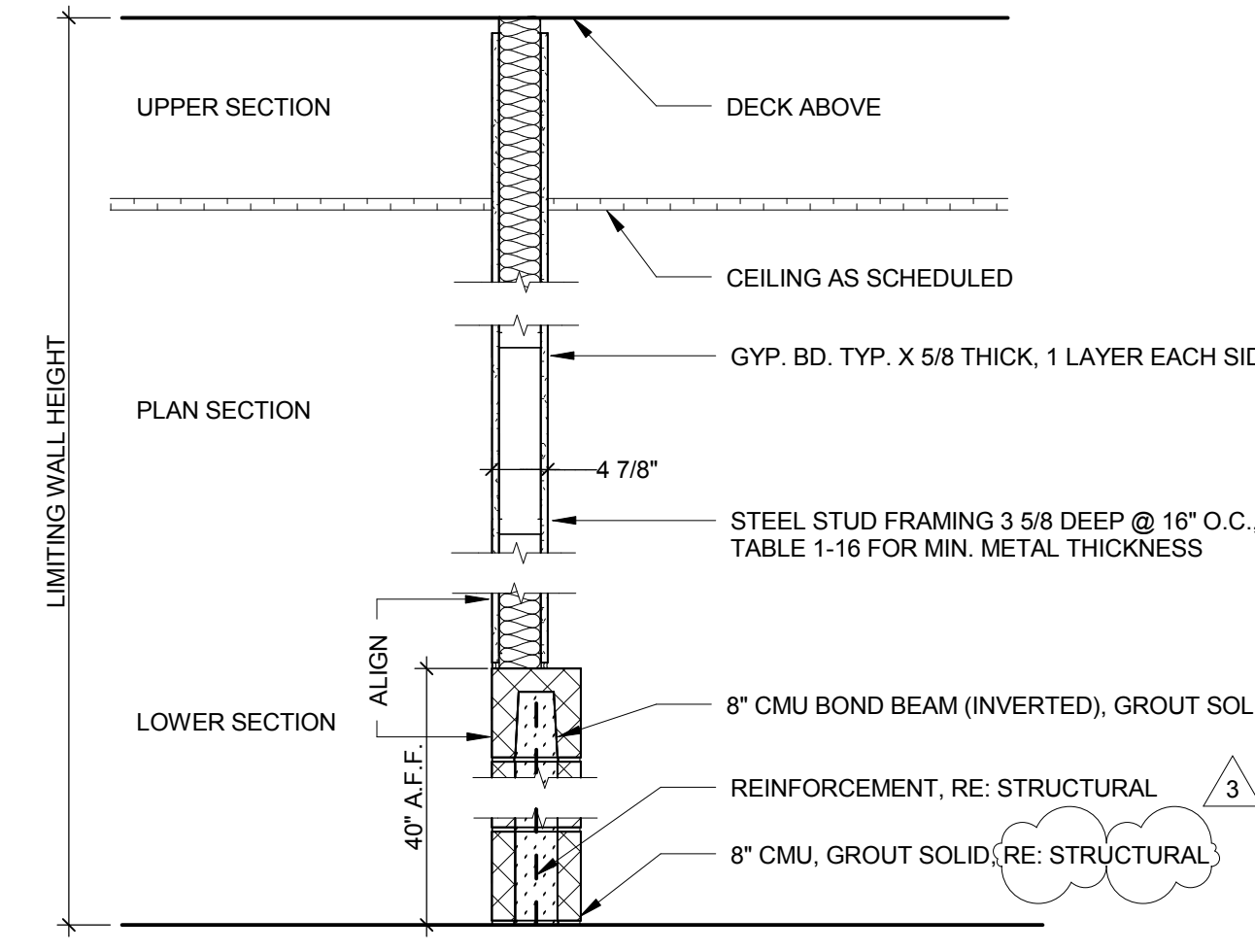
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

E4 PARTITION TYPE A043
3/4" = 1'-0"



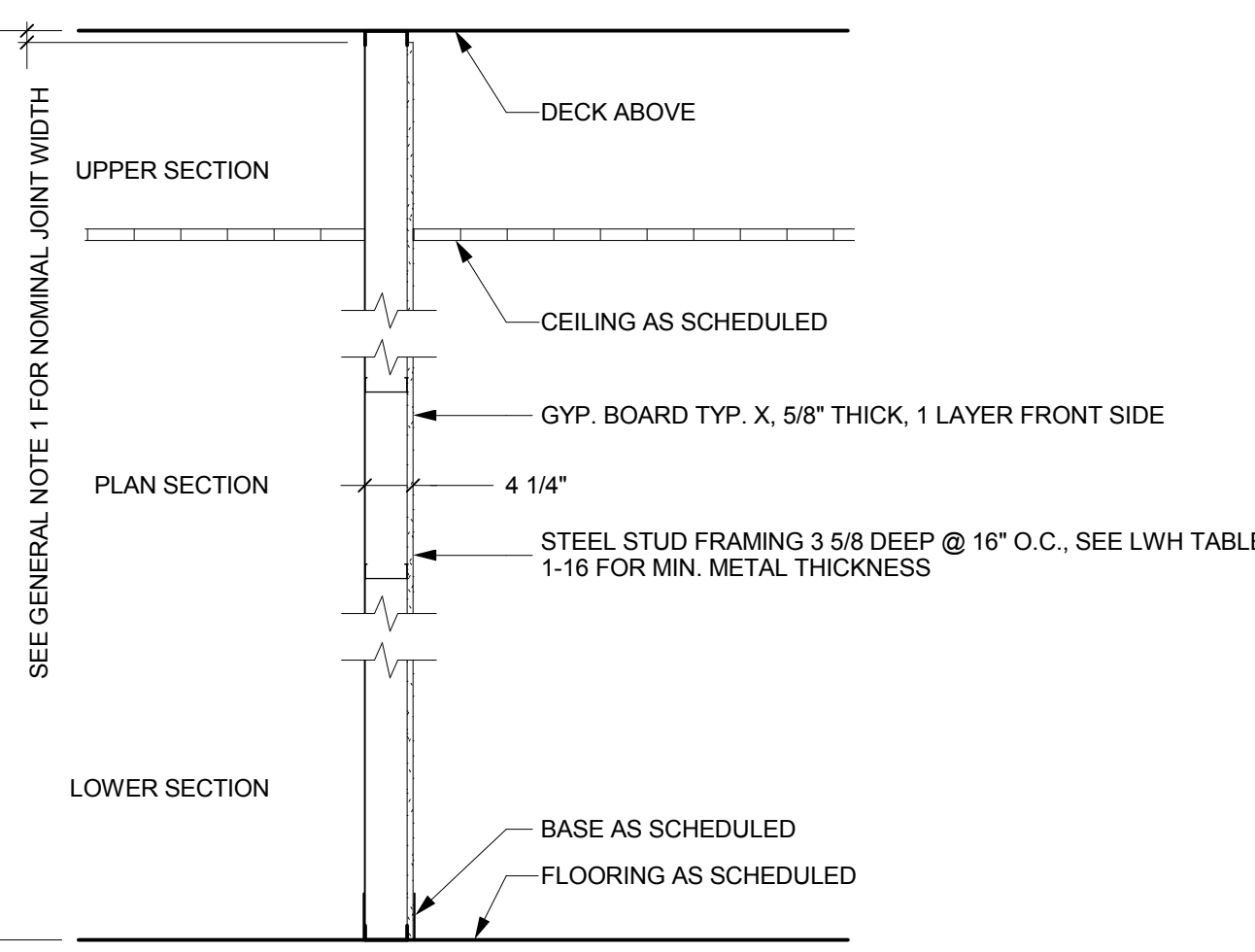
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

E8 PARTITION TYPE A042, R070
3/4" = 1'-0"



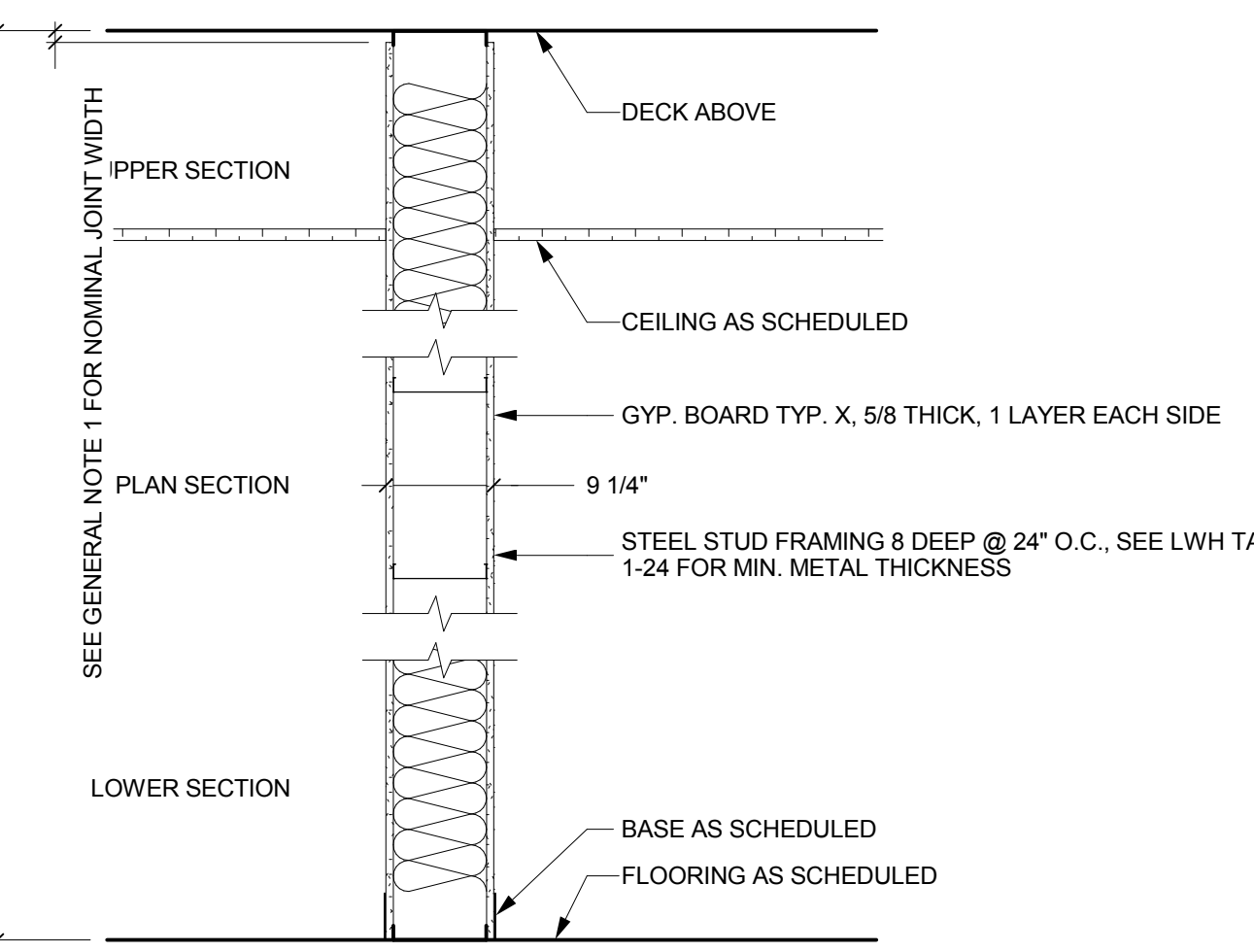
FIRE RATING:	
UL DESIGN:	
STC RATING:	
SOUND TEST NO.:	

E12 PARTITION TYPE A041
3/4" = 1'-0"



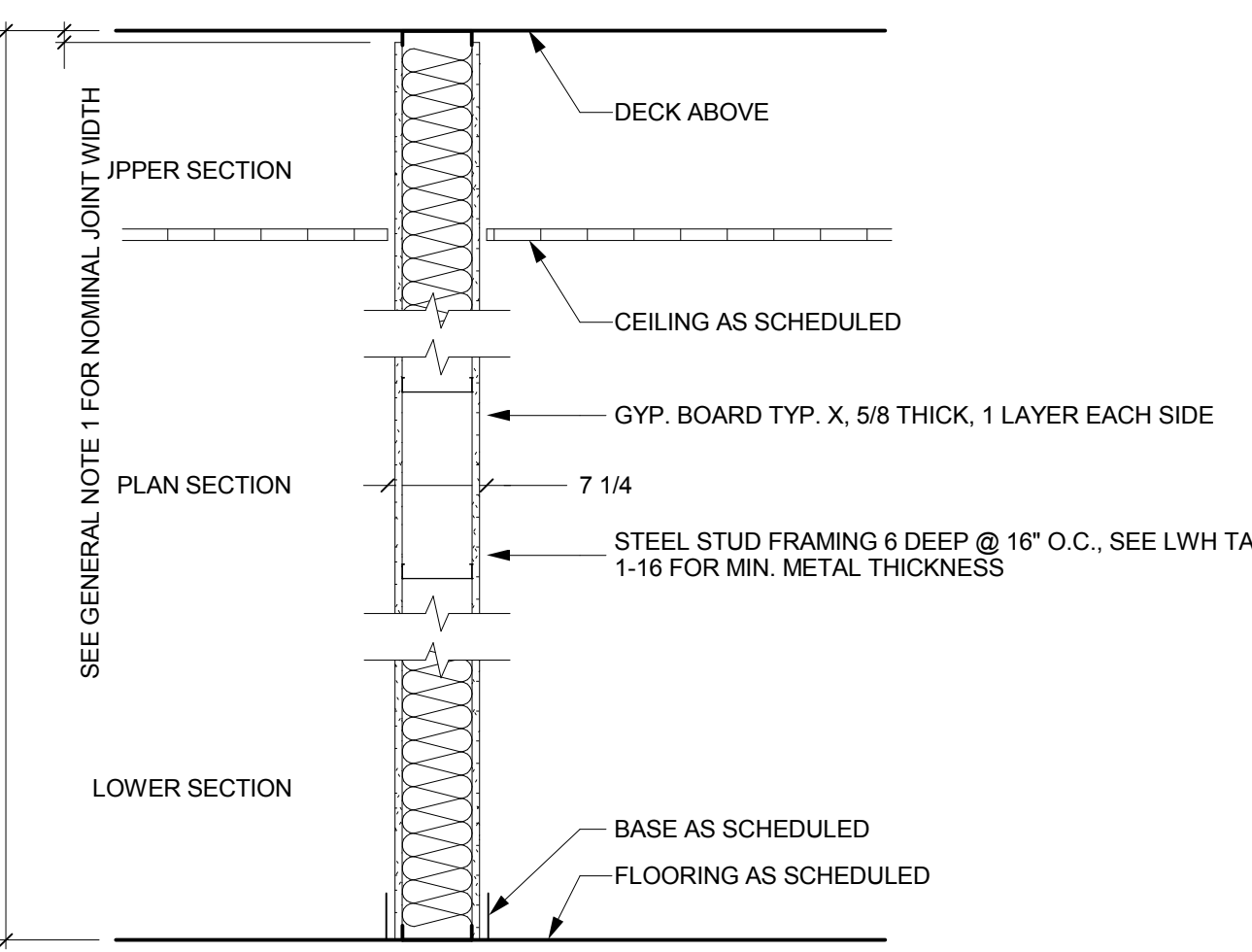
FIRE RATING:	NA
UL DESIGN:	NA
STC RATING:	NA
SOUND TEST NO.:	NA

A1 PARTITION TYPE A040
3/4" = 1'-0"



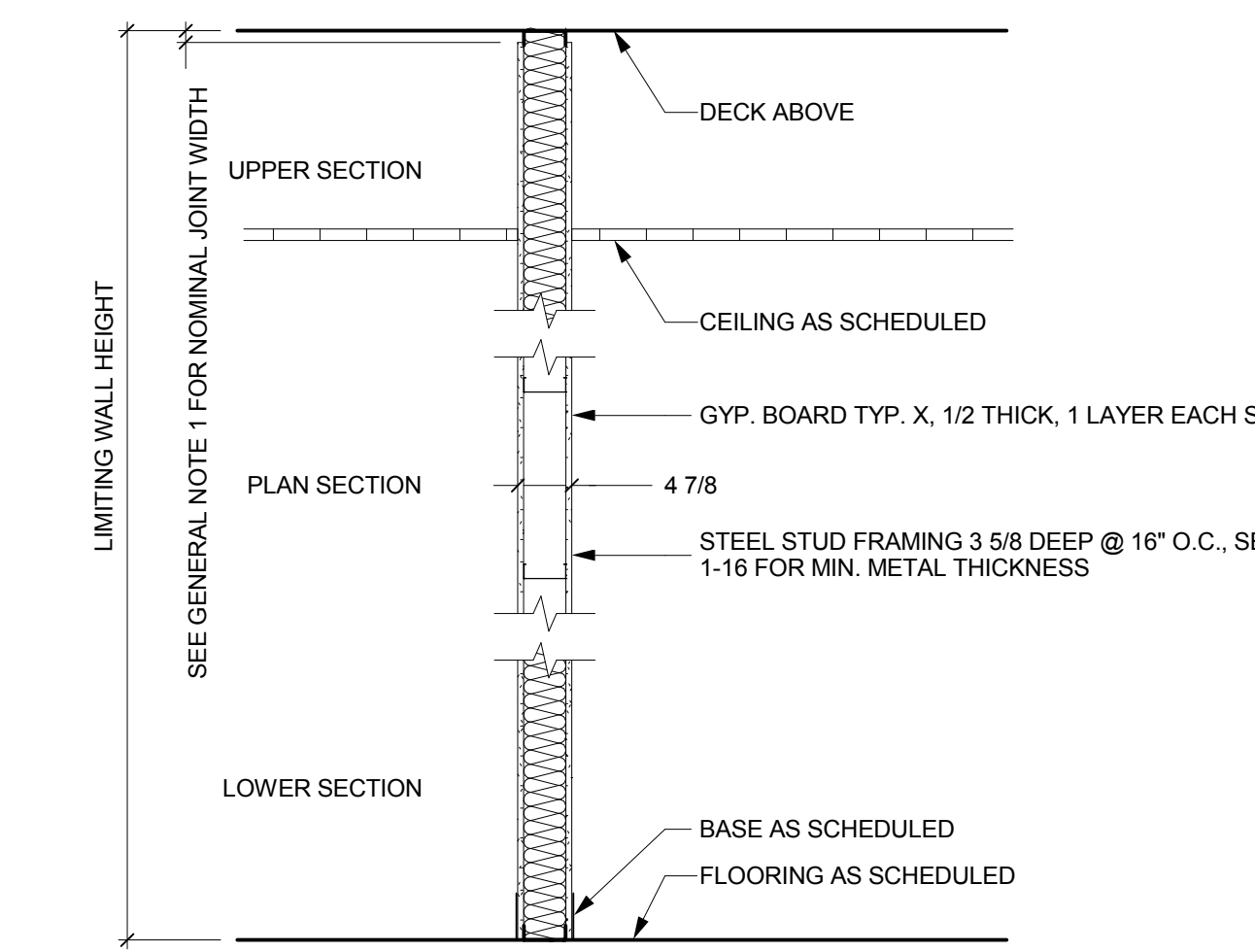
FIRE RATING:	NA
UL DESIGN:	NA
STC RATING:	1
SOUND TEST NO.:	NA

A4 PARTITION TYPE A036
3/4" = 1'-0"



FIRE RATING:	NA
UL DESIGN:	NA
STC RATING:	51
SOUND TEST NO.:	ALA-TL89-288

A8 PARTITION TYPE A014
3/4" = 1'-0"



FIRE RATING:	NA
UL DESIGN:	NA
STC RATING:	NA
SOUND TEST NO.:	NA

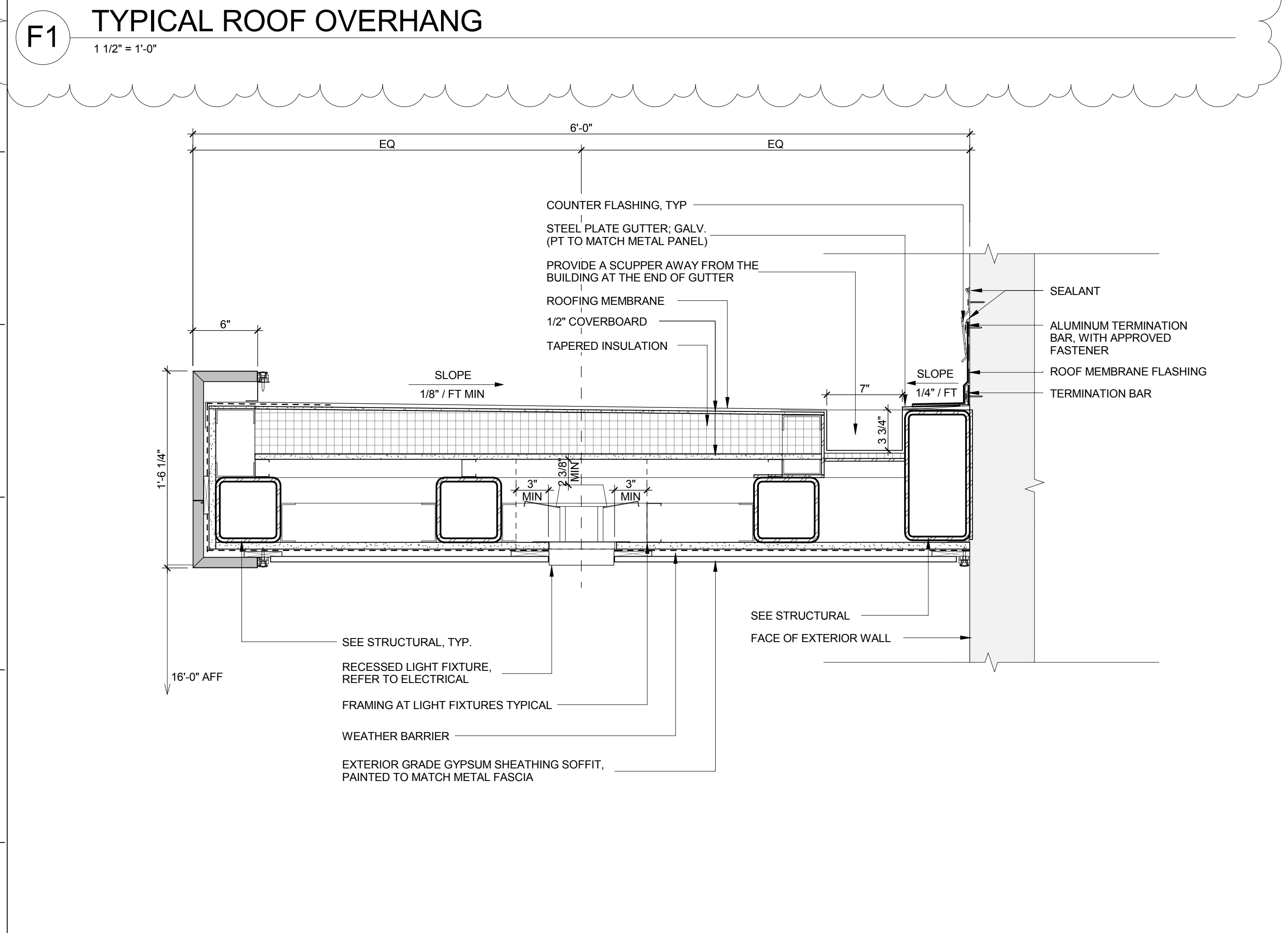
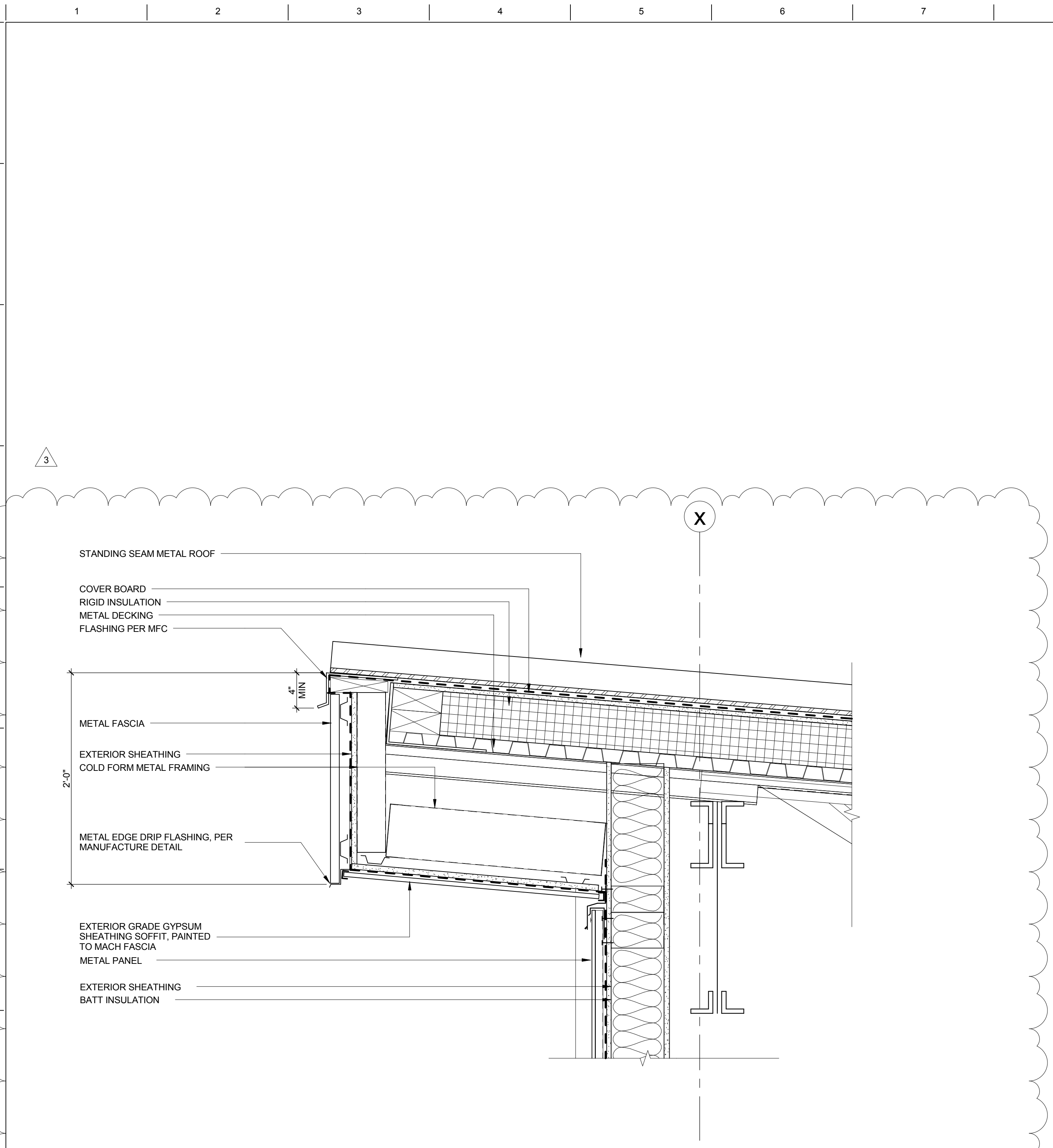
A12 PARTITION TYPE A005
3/4" = 1'-0"

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ARCHITECTURE

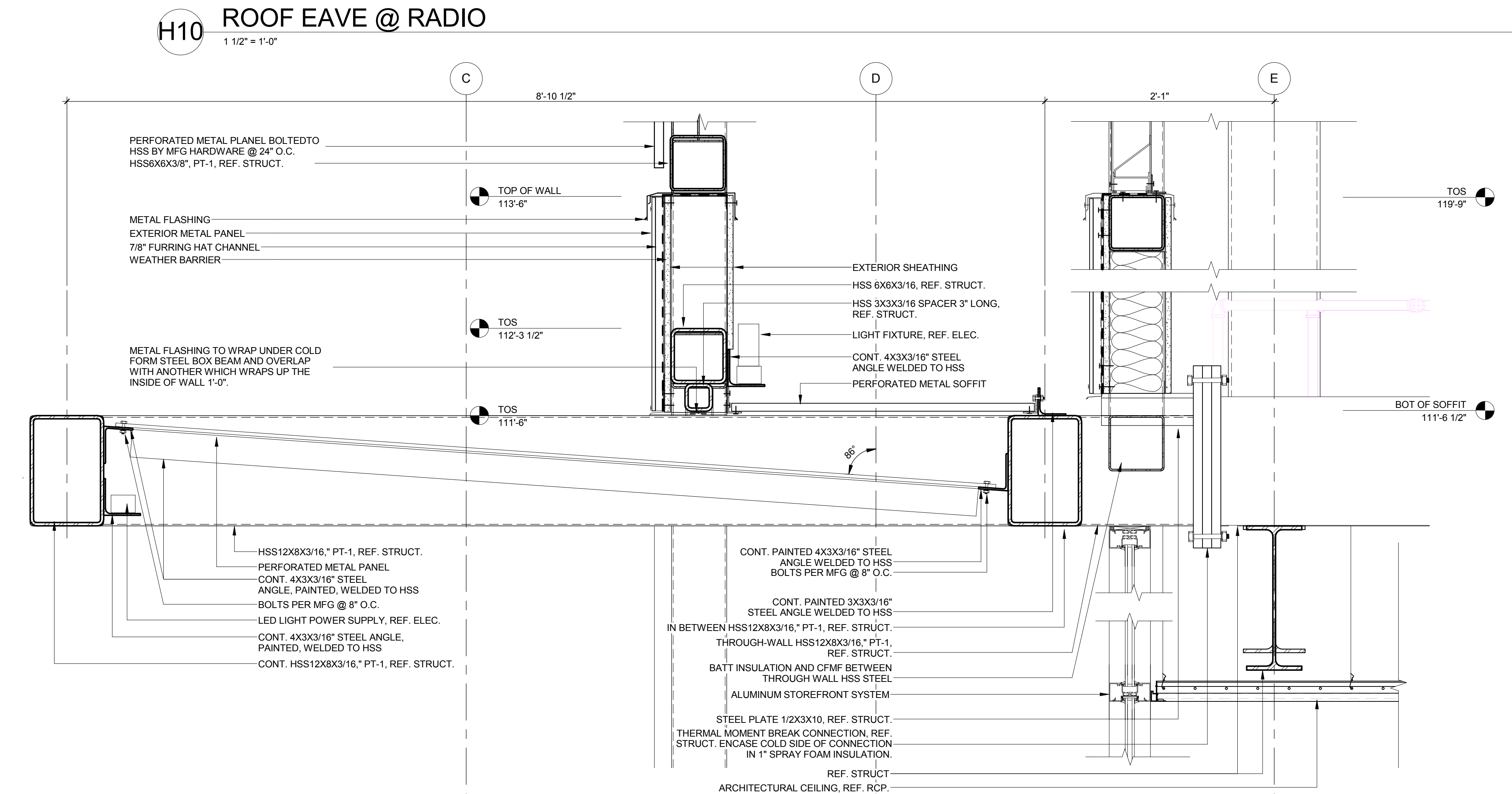
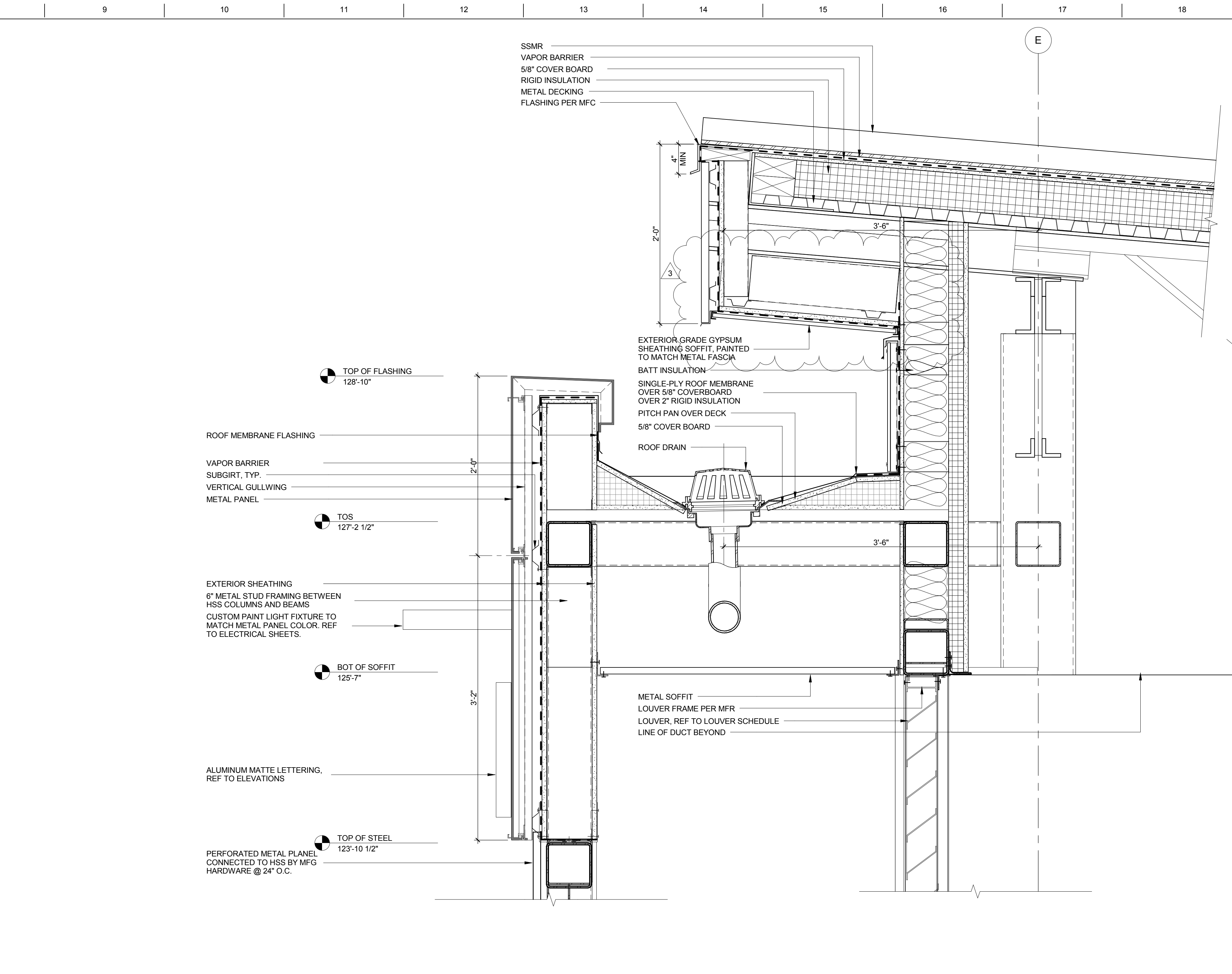
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE

PROJECT No: 376603

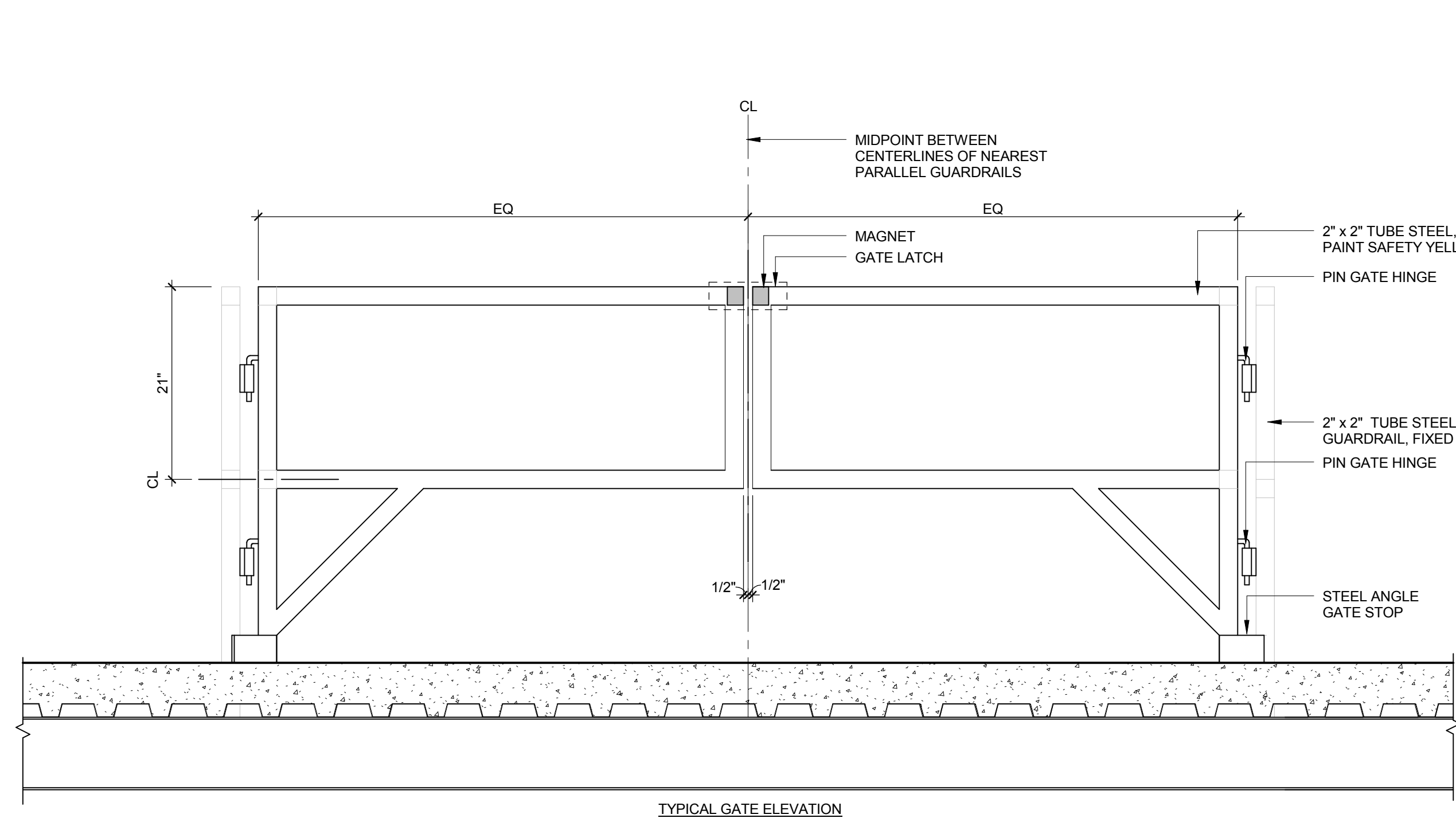
PARTITION TYPES



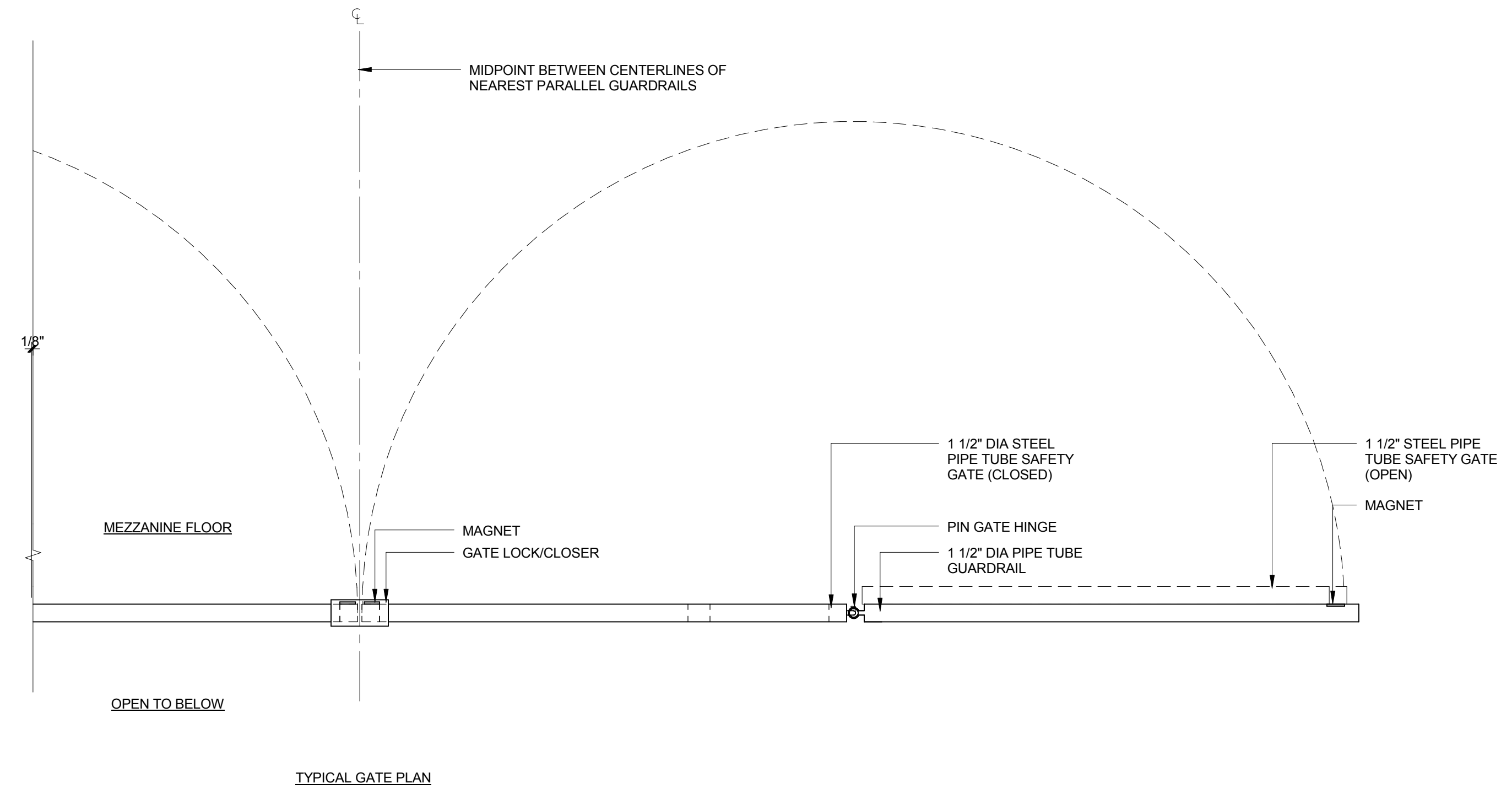
A1 CANOPY DETAIL
1 1/2" = 1'-0"



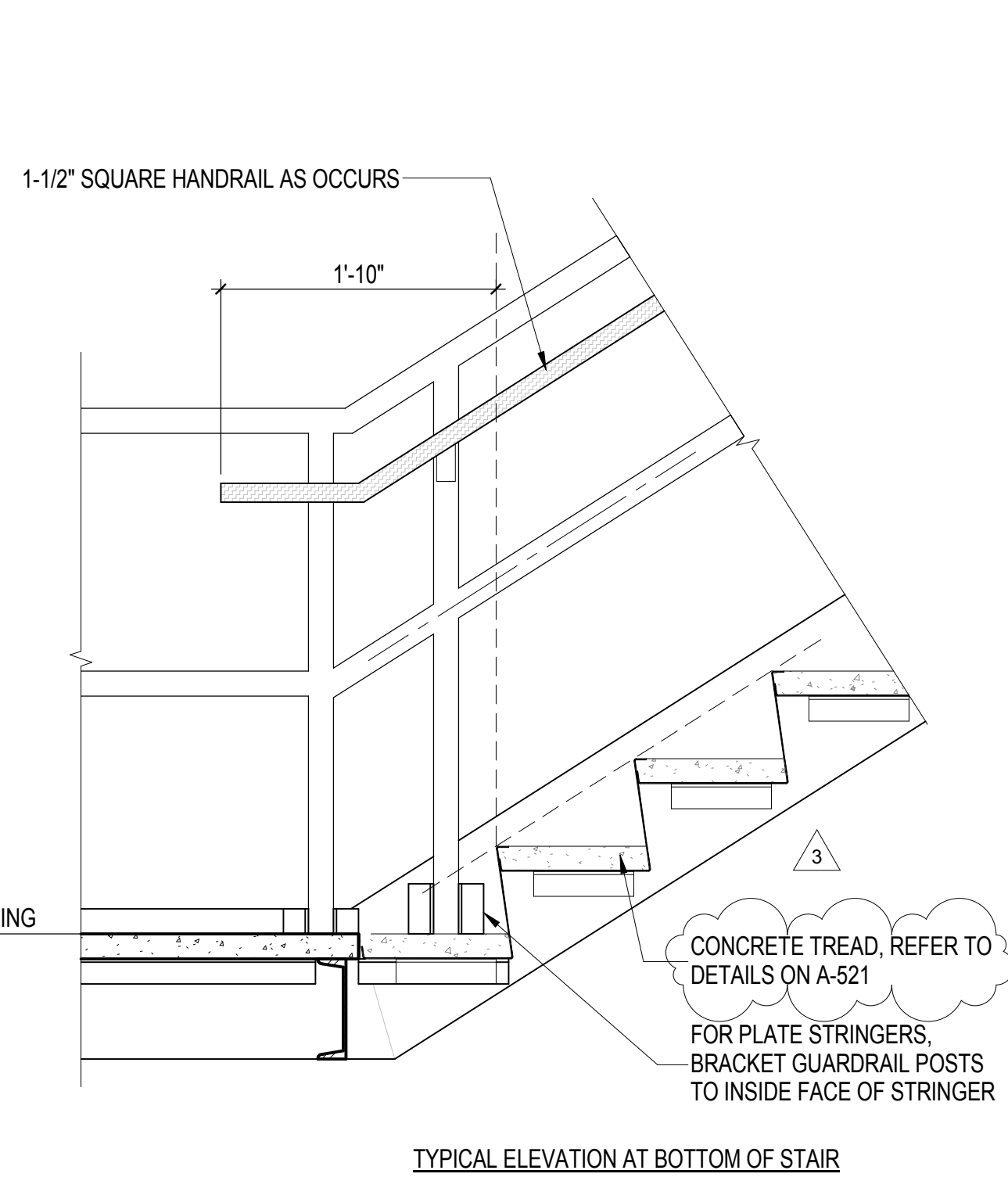
A8 CANOPY @ RADIO
1 1/2" = 1'-0"



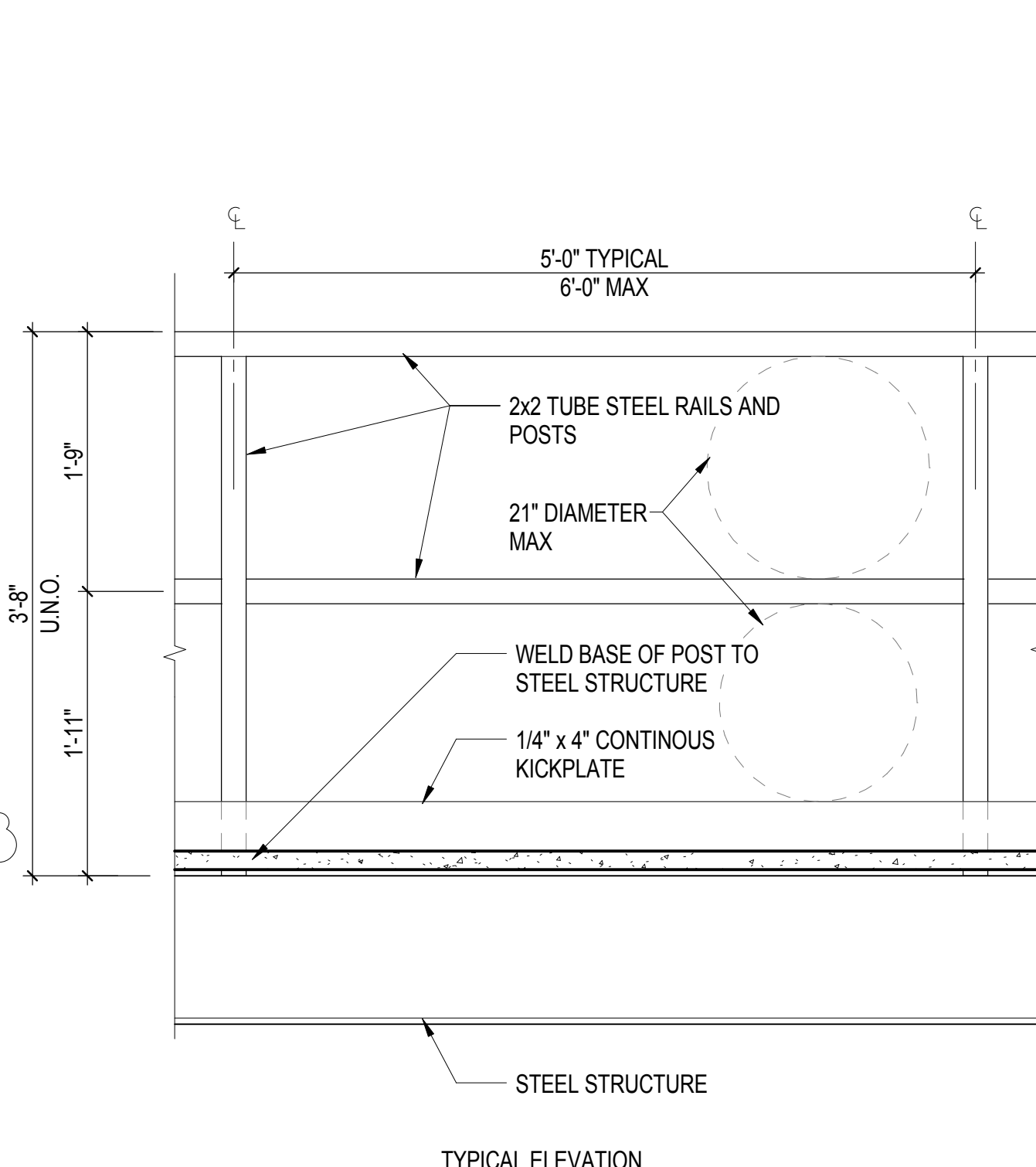
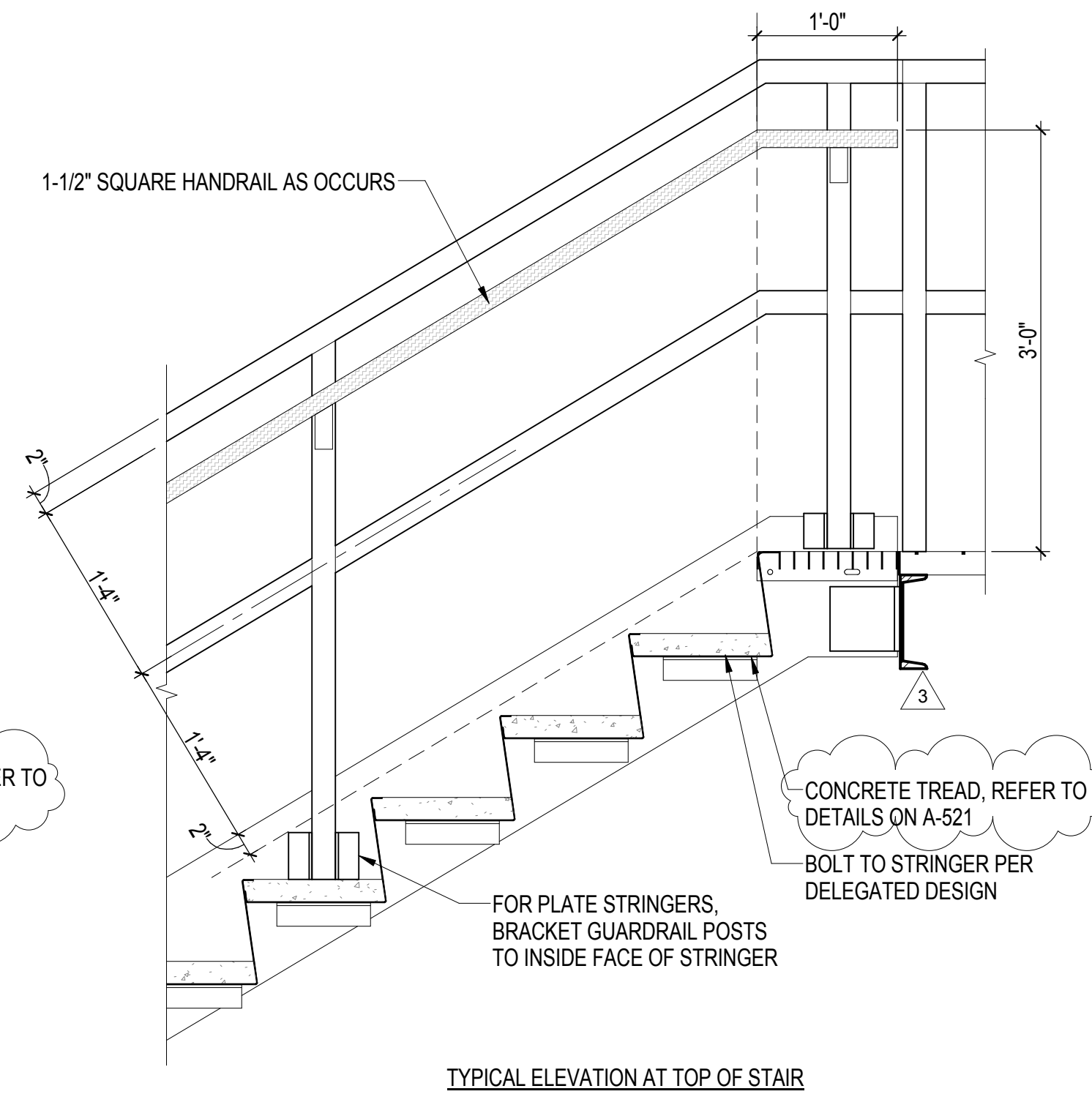
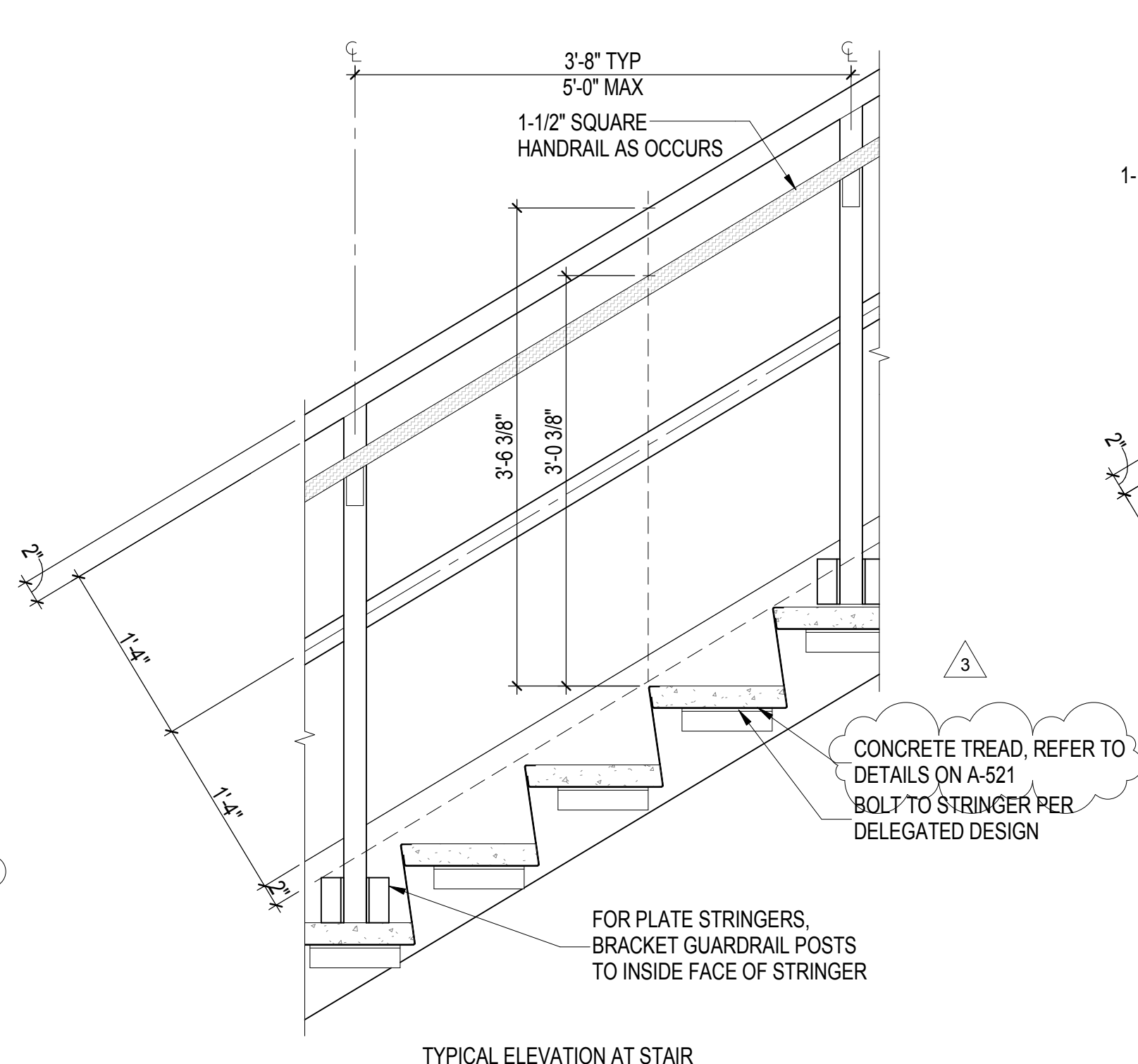
J1 MEZZANINE GATE ELEVATION
1" = 1'-0"



J8 MEZZANINE GATE PLAN
1" = 1'-0"

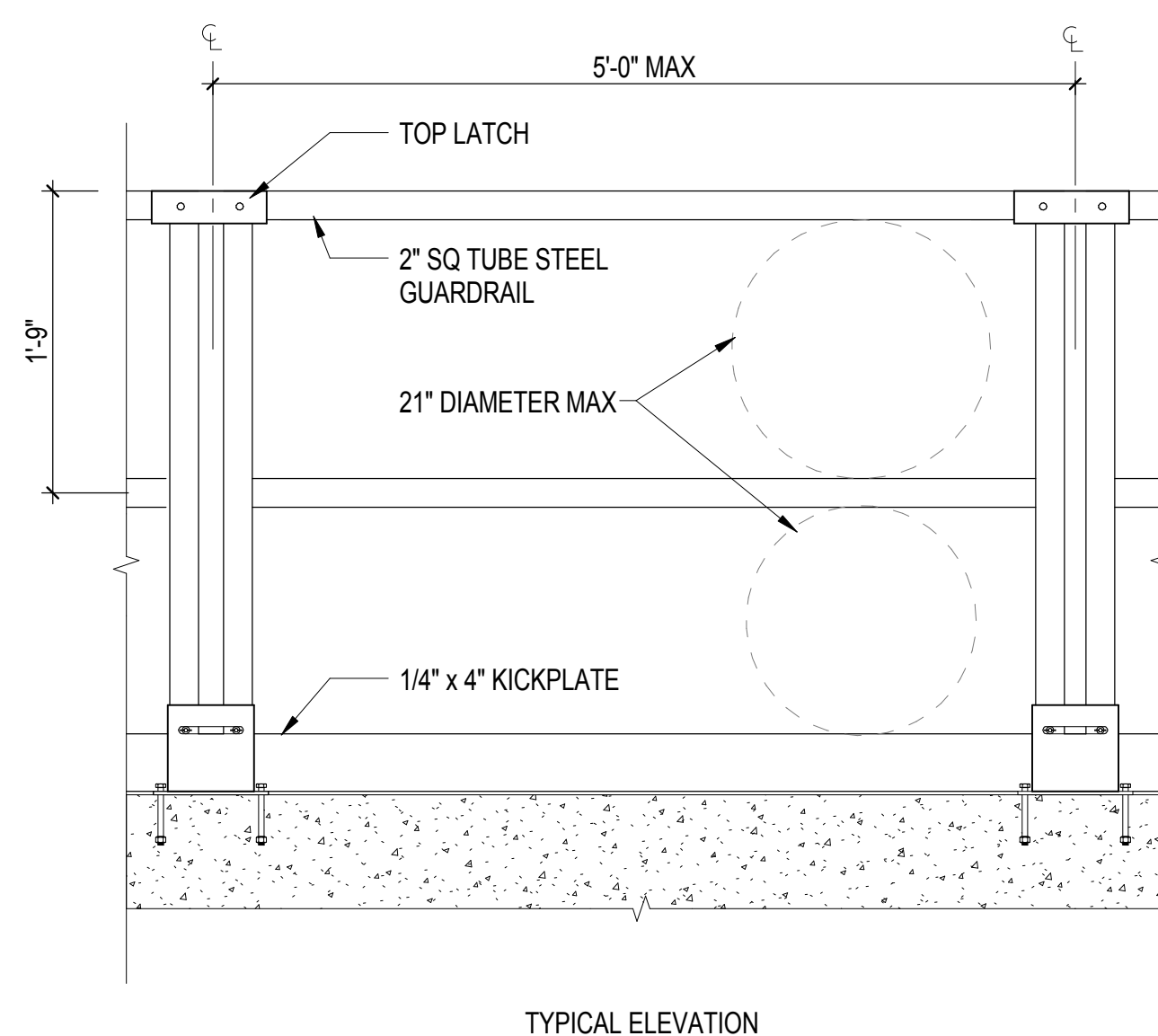


E1 GUARDRAIL @ STAIR & MEZZANINE- TUBE STEEL PAN STR
1" = 1'-0"

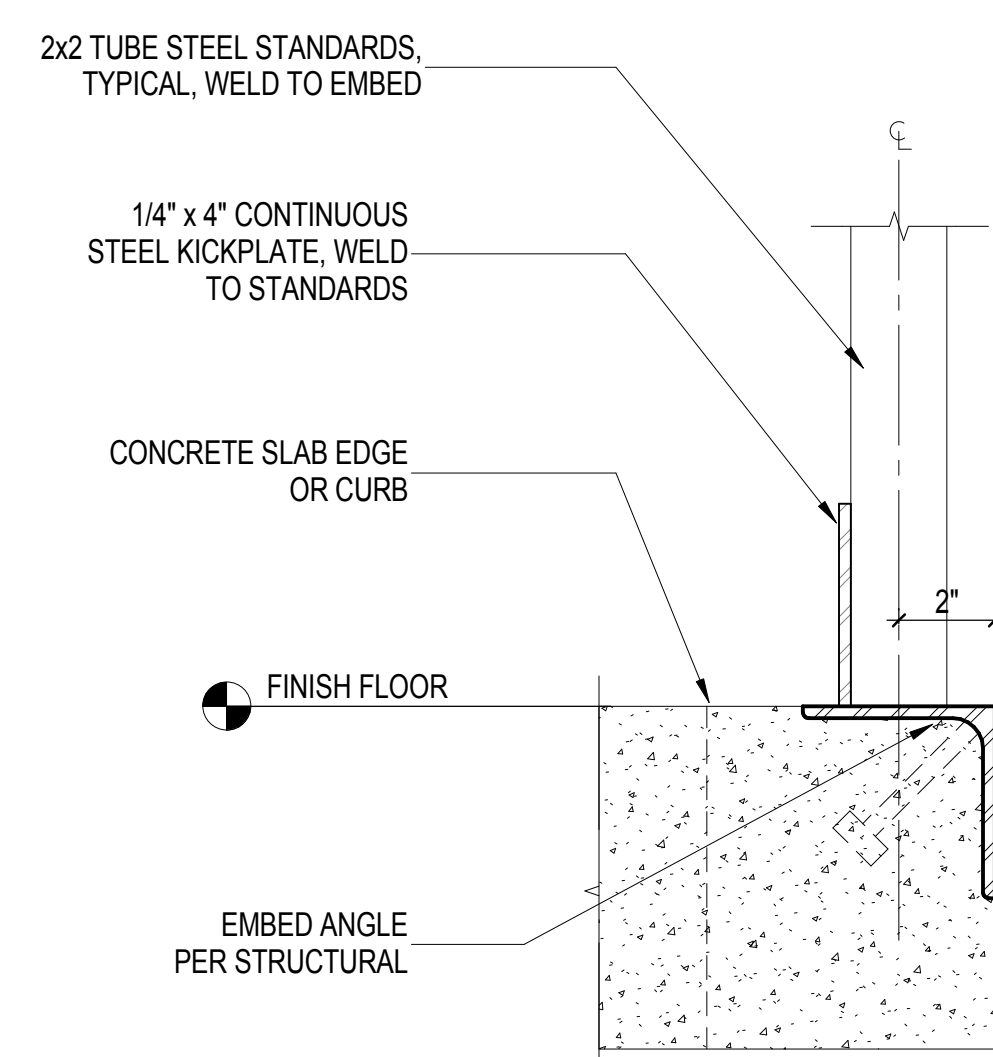
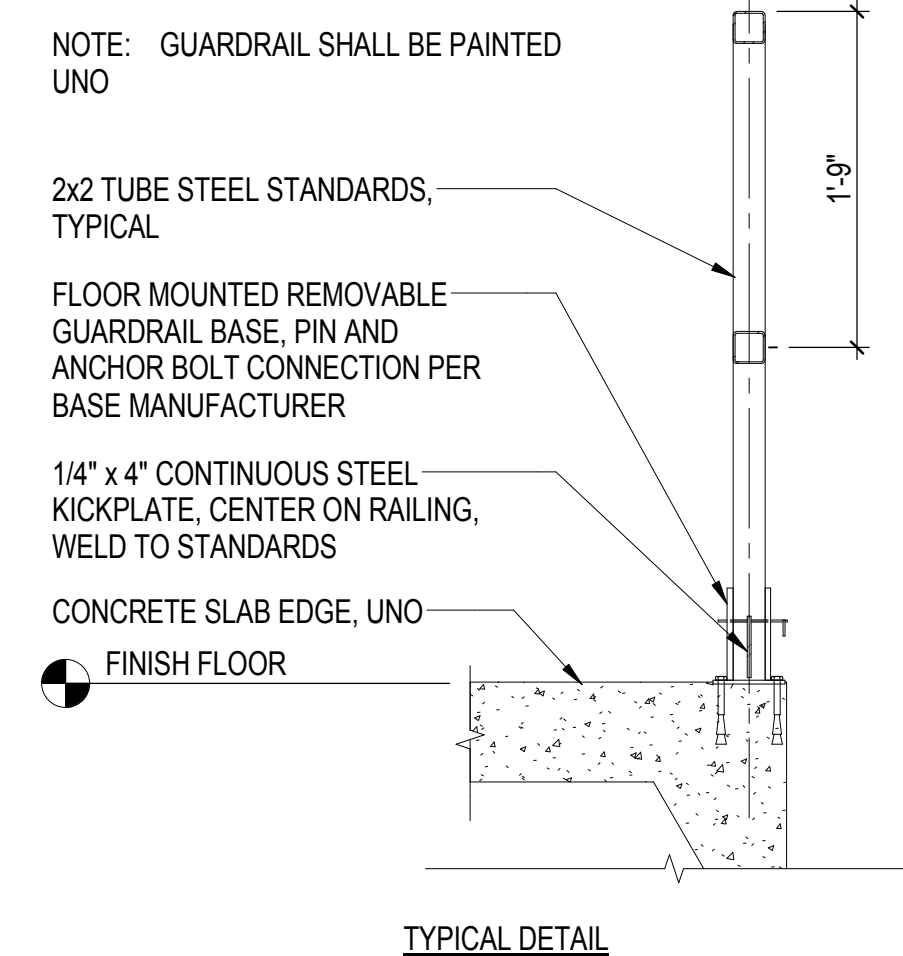


NOTE: TYPE 1 GUARDRAIL SHALL BE PAINTED UNO

1-1/2" HANDRAIL, WHERE OCCURS
1 1/2" SQUARE TUBE STEEL GUARDRAIL
POST BRACKET: 1-1/2" x 1-1/2" x 3" LONG MINIMUM ANGLE ON EACH SIDE OF POST, WELD TO STRINGER
FLOOR OR STAIR TREAD
TREAD SUPPORT ANGLE
PLATE STRINGER, PAINTED



A1 REMOVABLE GUARDRAIL @ MEZZANINE
1" = 1'-0"



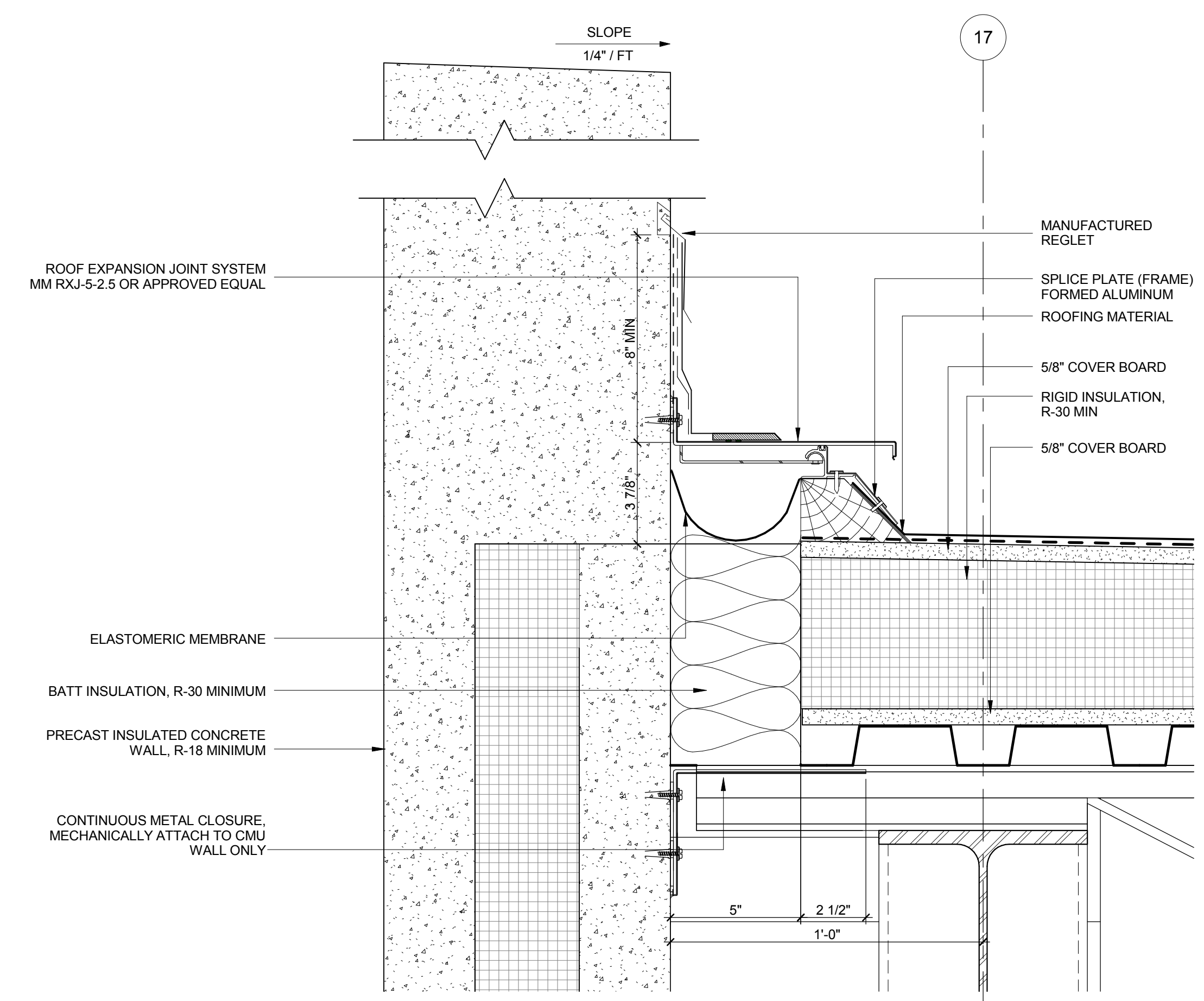
A8 GUARDRAIL AT CONC EDGE
3" = 1'-0"

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ARCHITECTURE

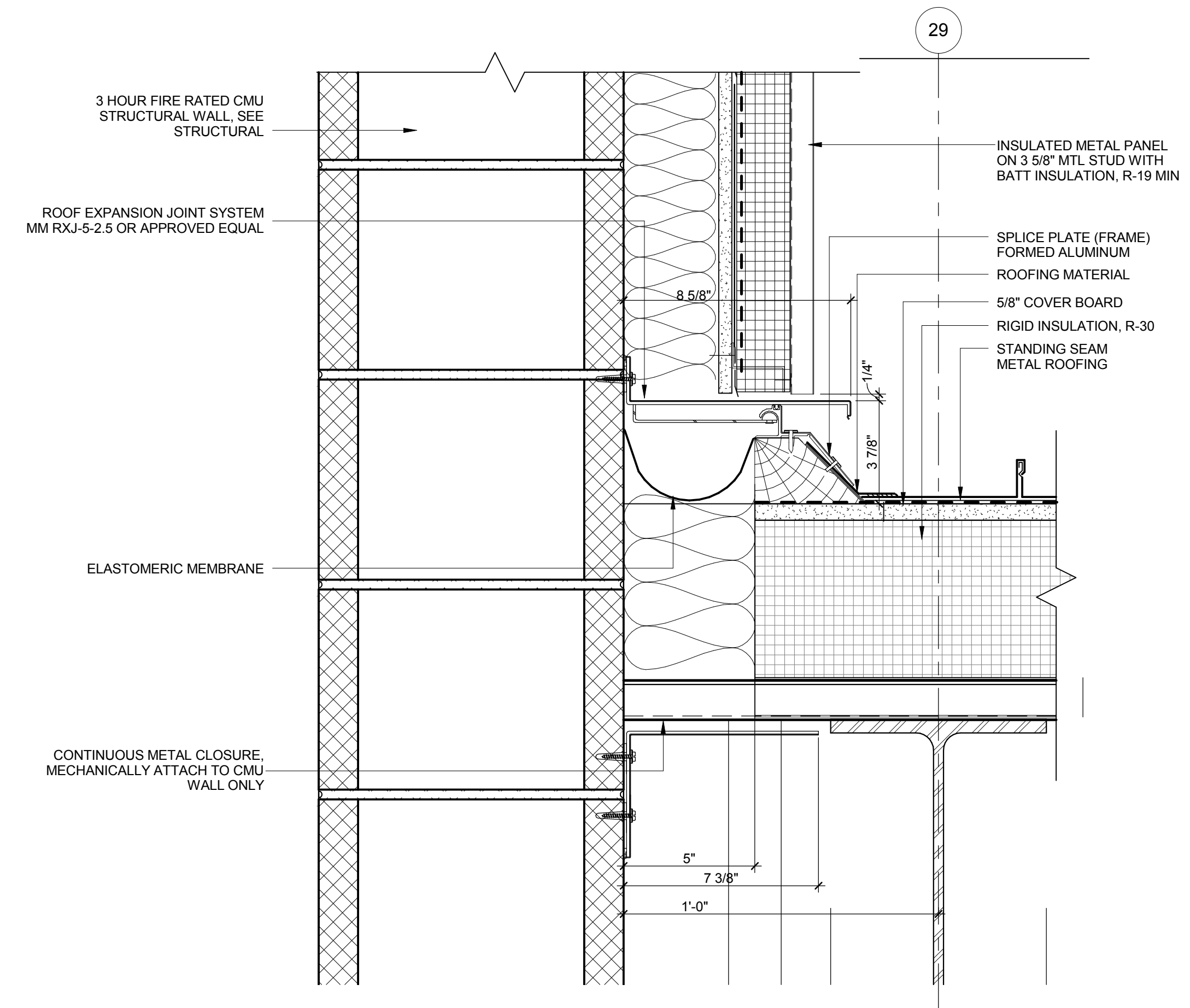
3	ADDENDUM 3	03/14/2019
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	ISSUE FOR PERMIT	01/17/2019
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PROJECT No: 376603		

RAILING DETAILS

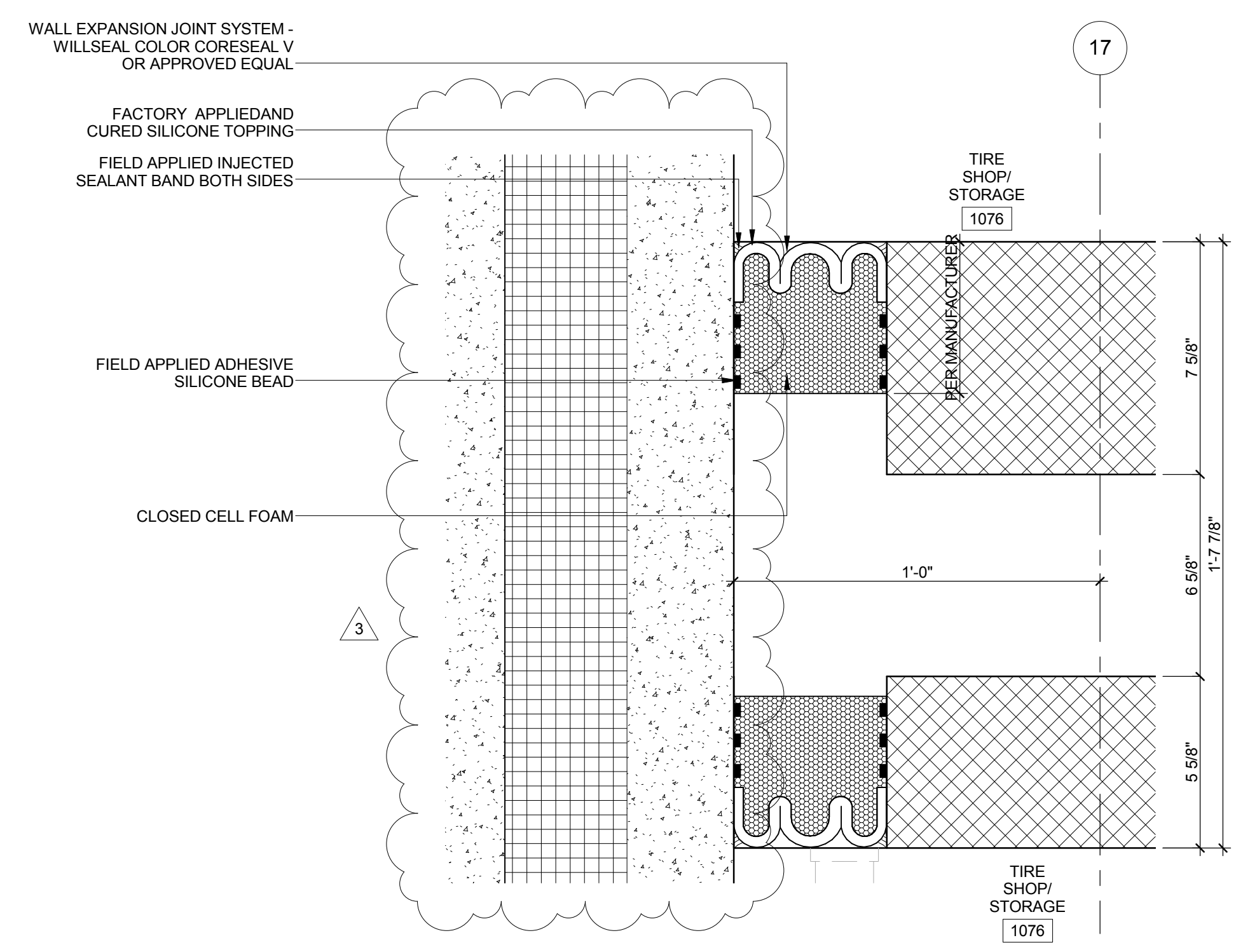
A-522



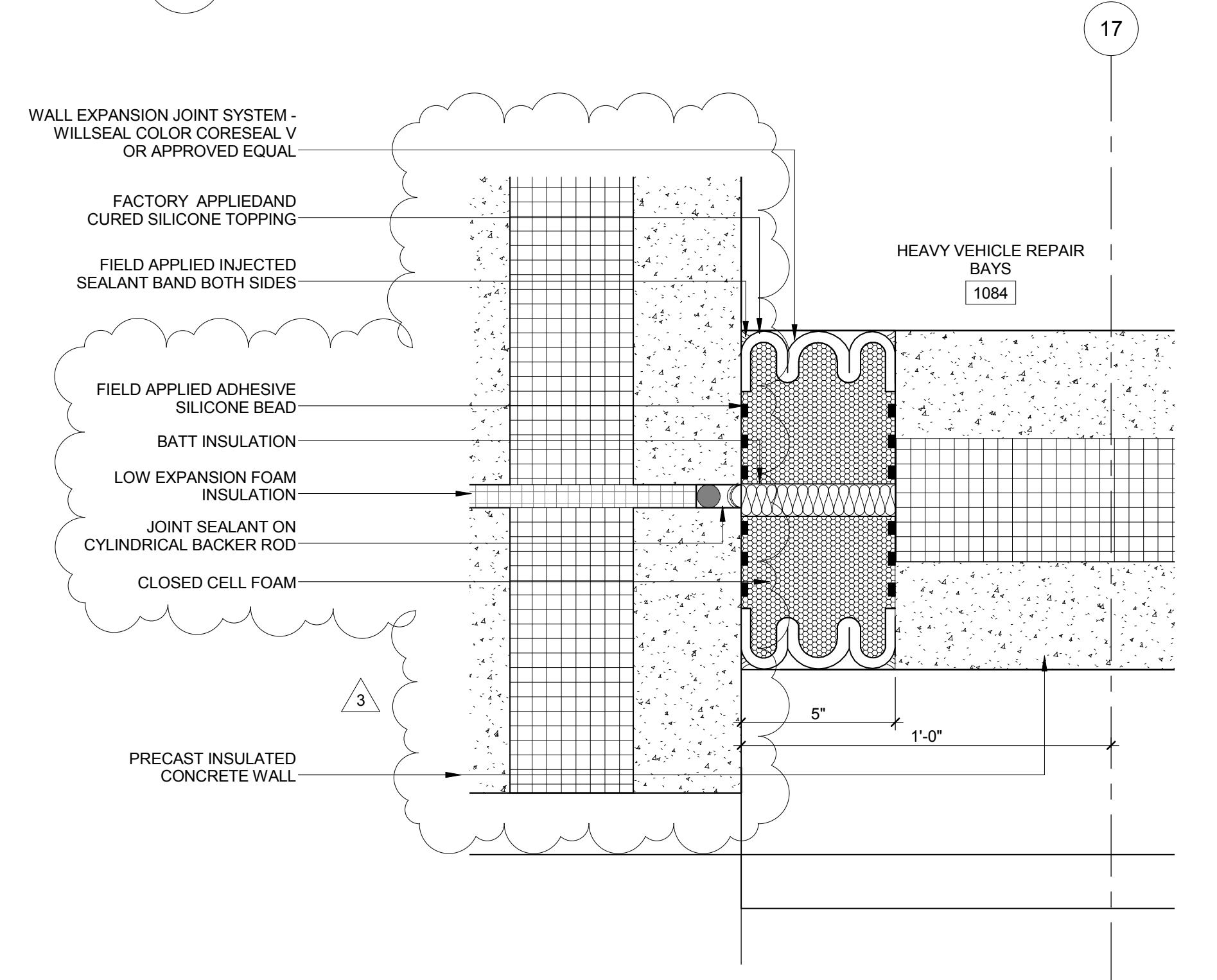
J7 ROOF EXP. JOINT SECTION DETAIL @ GRID 17
3" = 1'-0"



J14 ROOF EXP. JOINT SECTION DETAIL @ GRID 29
3" = 1'-0"

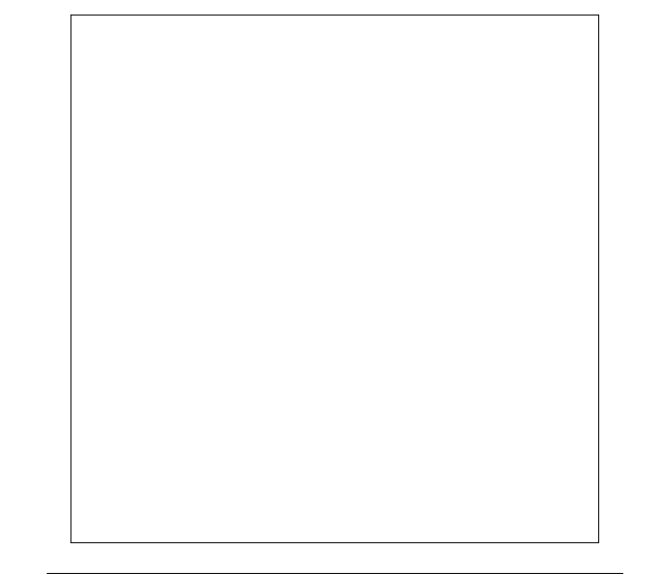


E7 WALL EXP. JOINT PLAN DETAIL @ GRID 17
3" = 1'-0"



A7 EXT. WALL EXP. JOINT PLAN DETAIL @ GRID 17
3" = 1'-0"

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EXPANSION JOINT
DETAILS

A-551

DOOR AND FRAME SCHEDULE

Table with columns: NO, HW SET, DOOR (SIZE, TYPE, MATL, FINISH, GLASS), FRAME (MATERIAL, FINISH, GLASS), HEAD, JAMB, SILL, FIRE RATING, Notes. Rows include various door types like 1001A, 1001B, 1001E, etc.

- DOOR AND HARDWARE NOTES
1 ALL DOOR FRAMES TO MATCH BUILDING STANDARDS. TO BE PAINTED TO MATCH ADJACENT WALL U.N.O.
2 ALL EXISTING DOORS AND DOOR FRAMES TO REMAIN AT BASE BUILDING CORE ROOMS U.N.O.
3 ALL NEW DOORS TO RECEIVE HARDWARE. LEVERSET TO MATCH BASE BUILDING STANDARD. ALL HARDWARE TO BE ADA COMPLIANT AND UL RATED.
4 SECURITY VENDOR TO COORDINATE CARD READER ACCESS WITH BUILDING APPROVED SYSTEM AND TENANT REQUIREMENTS. REFER TO SCHEDULE AND CONSTRUCTION PLANS FOR INTENDED LOCATIONS OF CARD READERS. MOUNT CARD READERS 44" AFF TO CENTERLINE OF DEVICE. TYP. TOP OF CARD READER SHALL NOT BE MOUNTED ABOVE 48" AFF.
5 SECURITY VENDOR SHALL OBTAIN A SEPARATE ACCESS CONTROL PERMIT FROM THE BUILDING DEPARTMENT PRIOR TO INSTALLATION OF ANY ACCESS CONTROL DEVICES OR EQUIPMENT.
6 WHERE INDICATED PROVIDE COAT HOOKS. MOUNT ON WALL BEHIND DOOR AT CENTERLINE OF DOOR, 60" AFF. TYP.
7 KICK PLATES SHALL BE 8" HIGH, STAINLESS STEEL TO MATCH BASE BUILDING FINISH AND SHALL BE APPLIED TO KICK SIDE OF DOOR U.N.O.
8 HIKETS SHALL BE KEYPED TO THE BUILDING MASTER. COORDINATE REQUIREMENTS WITH TENANT AND BUILDING OWNER.
9 ALL LOCKSETS SHALL BE KEYPED TO THE BUILDING MASTER. COORDINATE REQUIREMENTS WITH TENANT AND BUILDING OWNER.
10 VERIFY IN FIELD FOR TRACK HEIGHT & LIFT CLEARANCE OF ALL OVERHEAD DOORS TO AVOID ANY BUILDING COMPONENTS INCLUDING STRUCTURES, EQUIPMENTS, MECHANICAL, ETC.

- REMARKS LEGEND
1 ADA OPERATOR
2 INSULATED
3 TRACK
4 HIGH LIFT DOOR
5 CARD READER
6 PANIC DEVICE
7 ELECTRIC LATCH RETRACTION PANIC DEVICE
8 PANIC DEVICE
9 1" UNDERCUT DOORS

- ABBREVIATIONS
ADA AMERICANS WITH DISABILITIES ACT (ACCESSIBILITY)
ALUM ALUMINUM
CLR CLEAR OPENING
CR CARD READER
EXIST EXISTING
GLASS GLASS
HM HOLLOW METAL
MFC MANUFACTURER
MO MASONRY OPENING
OH OVERHEAD DOOR
PERF MTL PERFORATED METAL
PH PANIC HARDWARE
PR PAIR OF DOORS
RO ROUGH OPENING
STL STEEL
VIF VERIFY IN FIELD

2

3

4

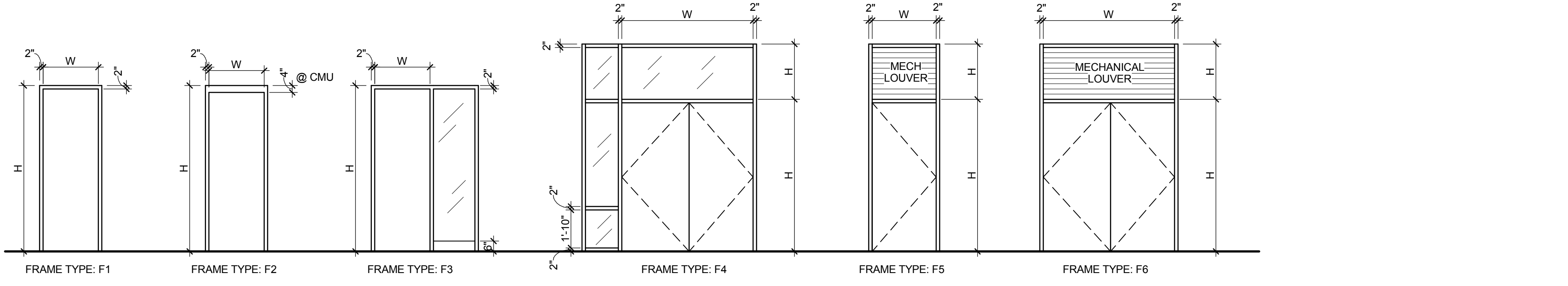
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6

7

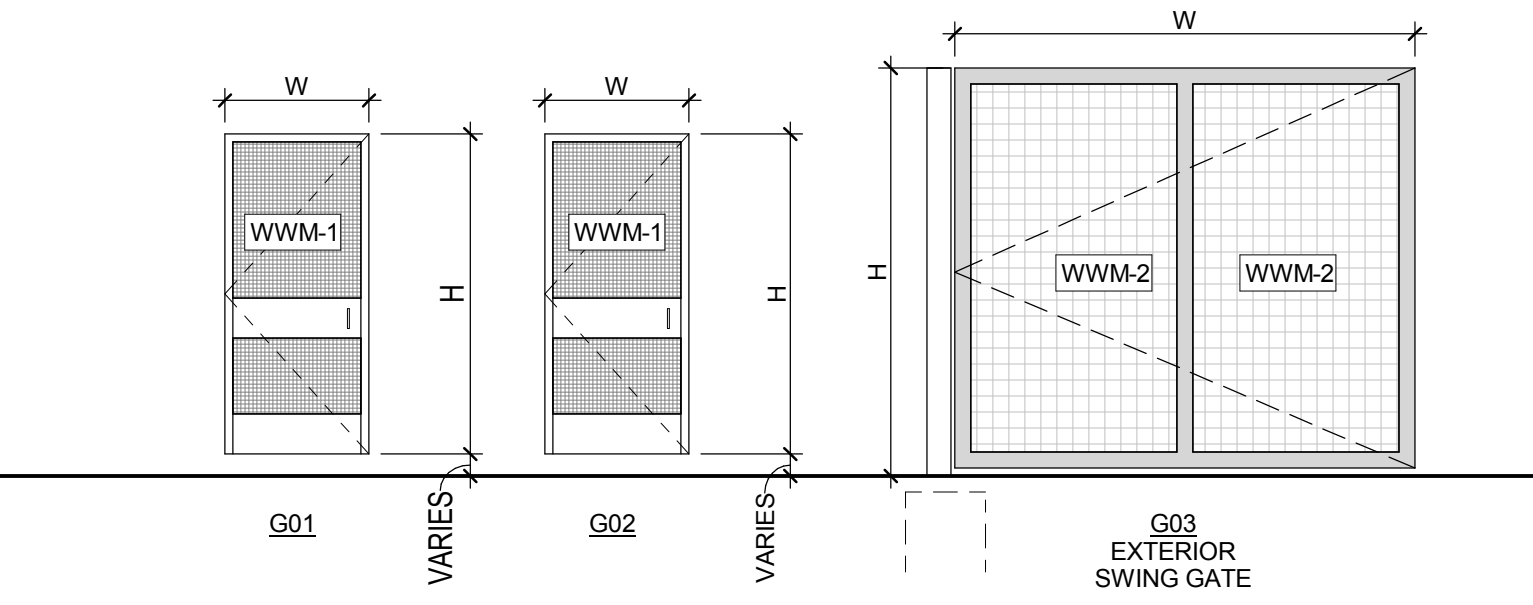
8

9



FRAME TYPES (common)

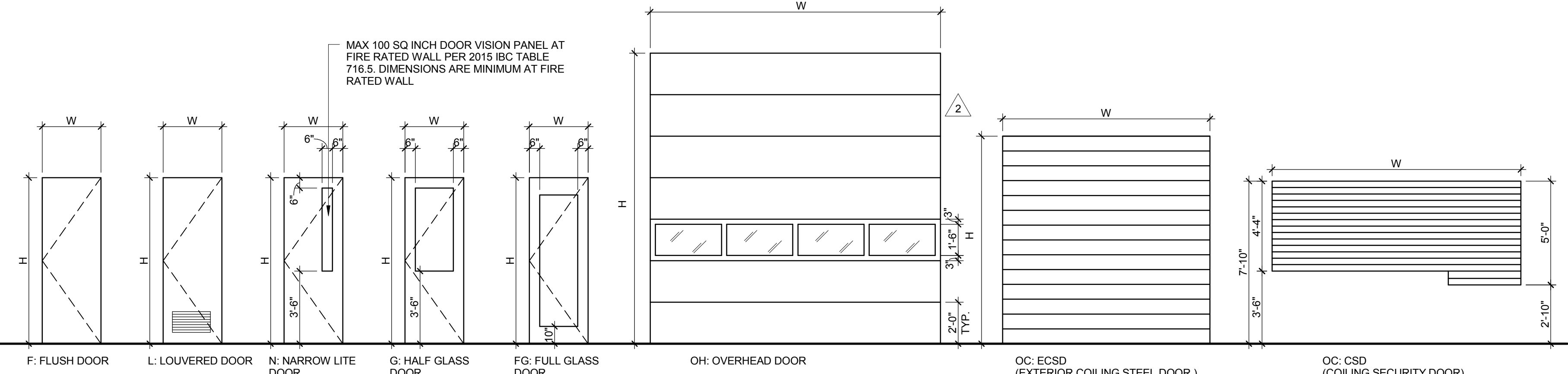
1/4" = 1'-0"



GATE TYPES (common)

REFER TO A-634 FOR DETAILS

1/4" = 1'-0"



DOOR TYPES (common)

1/4" = 1'-0"

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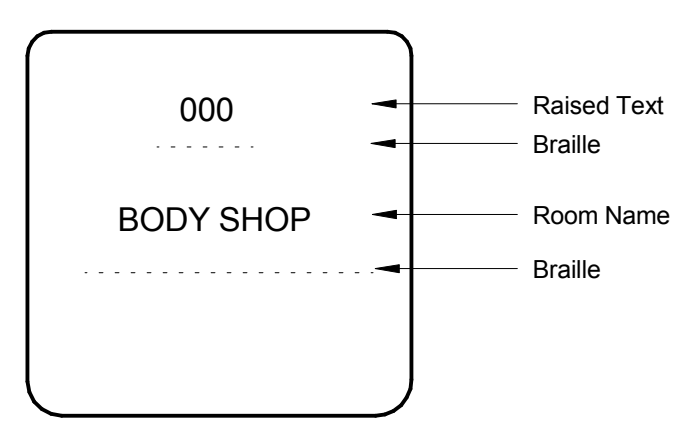
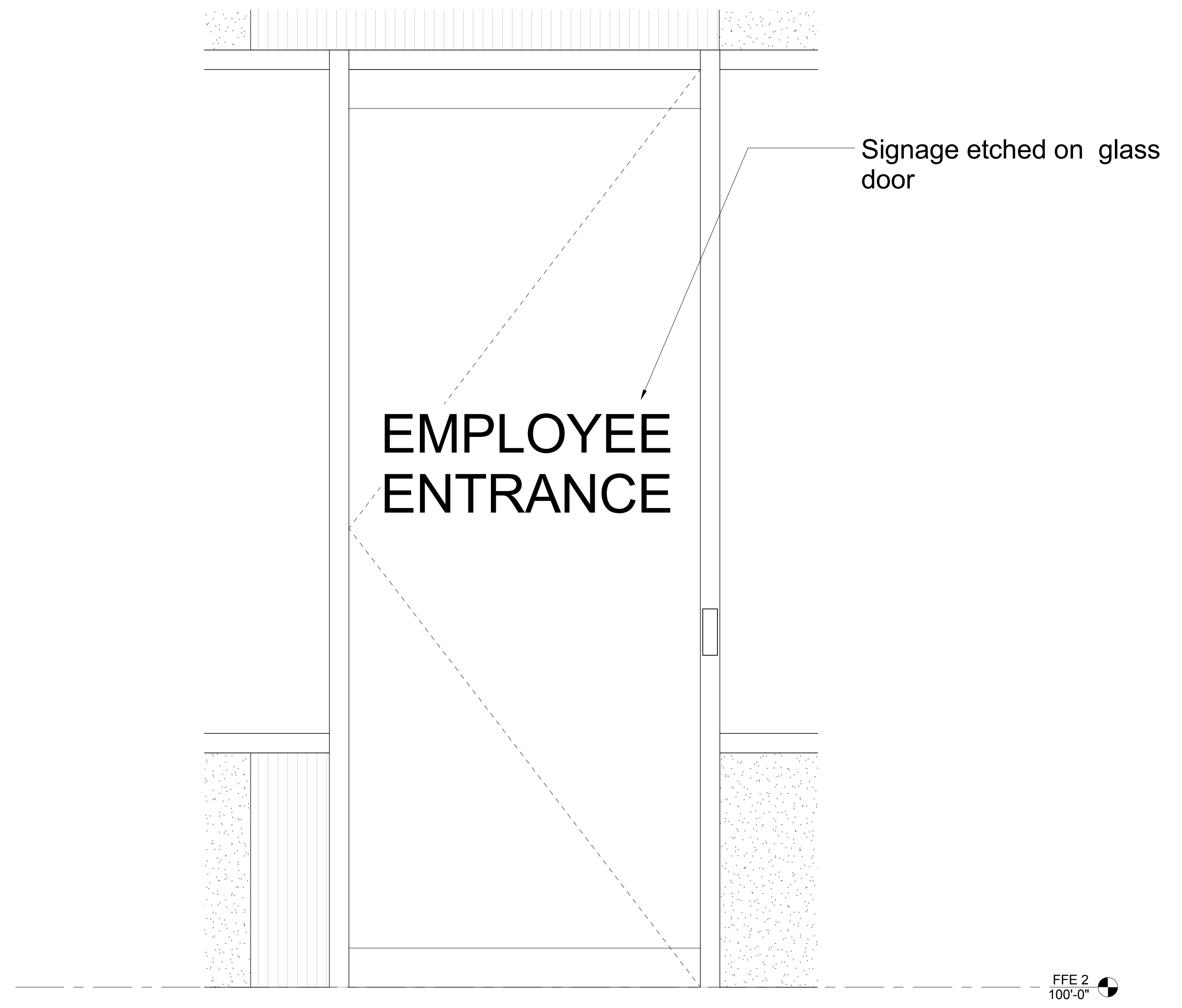
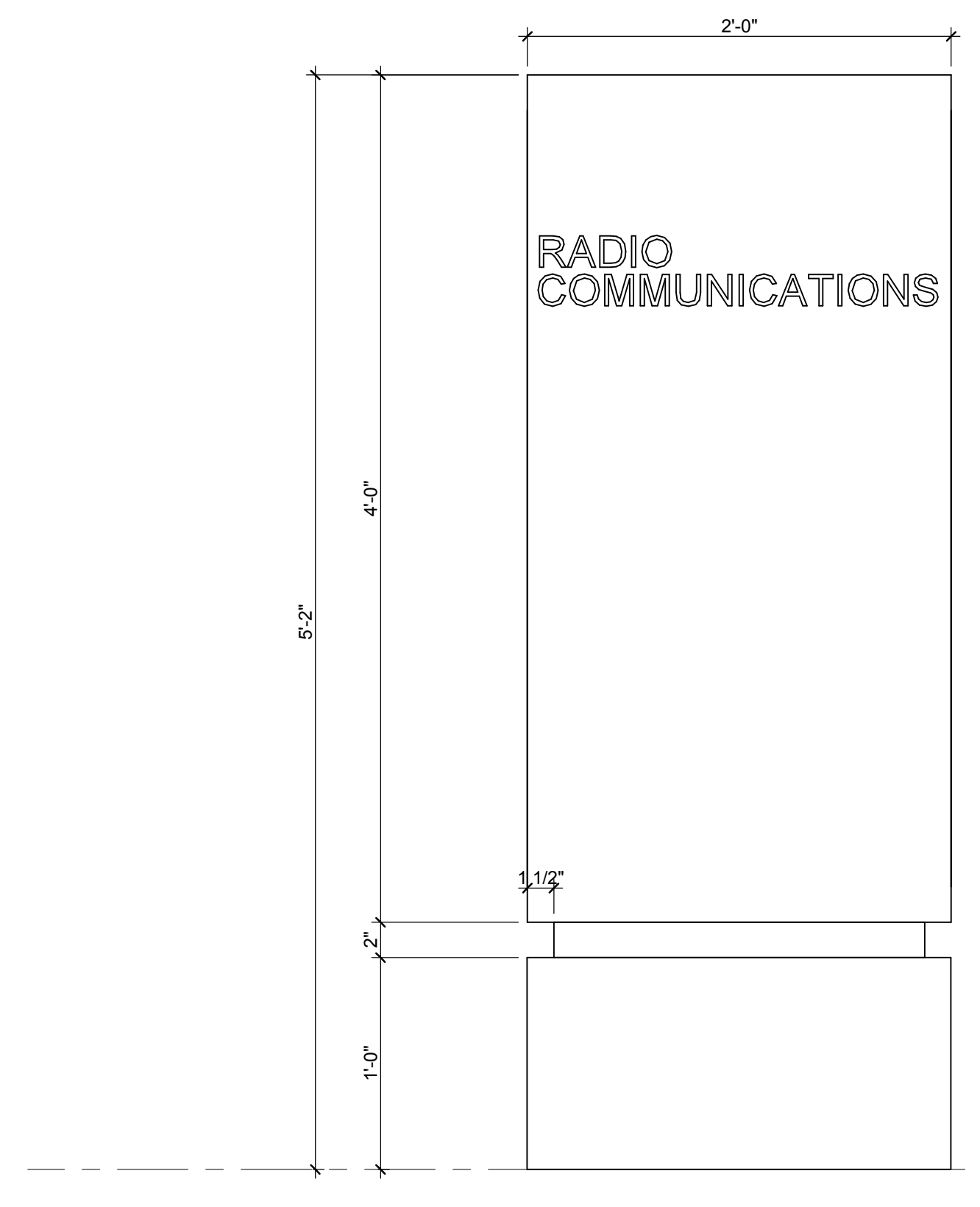
Table with columns: No, REVISION/SUBMISSION, DATE. Rows include Addendum 3, Addendum 2, Issue for Bid, Issue for Permit, and Revision/Submission.

PROJECT No: 376603

DOOR SCHEDULE

A-601

Vertical text on the left margin: 1600 WILSON BLVD., SUITE 360, ARLINGTON, VA 22209, 571-290-7679



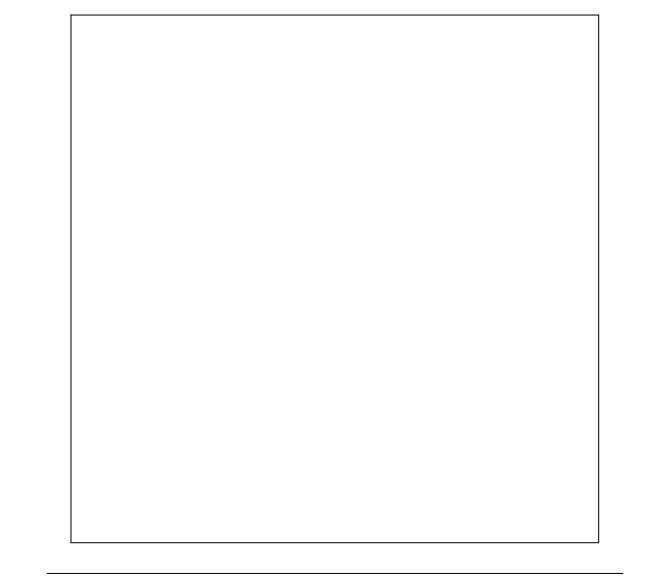
AA - Generic Room Name
8" x 8"

G1 EXTERIOR SIGNAGE TYPES
3" = 1'-0"

G6 SIGNAGE II- DETAIL
1 1/2" = 1'-0"

G11 SIGNAGE JJ-DETAIL
1 1/2" = 1'-0"

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3	ADDENDUM 3	03/14/2019
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PROJECT No: 376603		

SIGNAGE TYPES
EXTERIOR

A-911

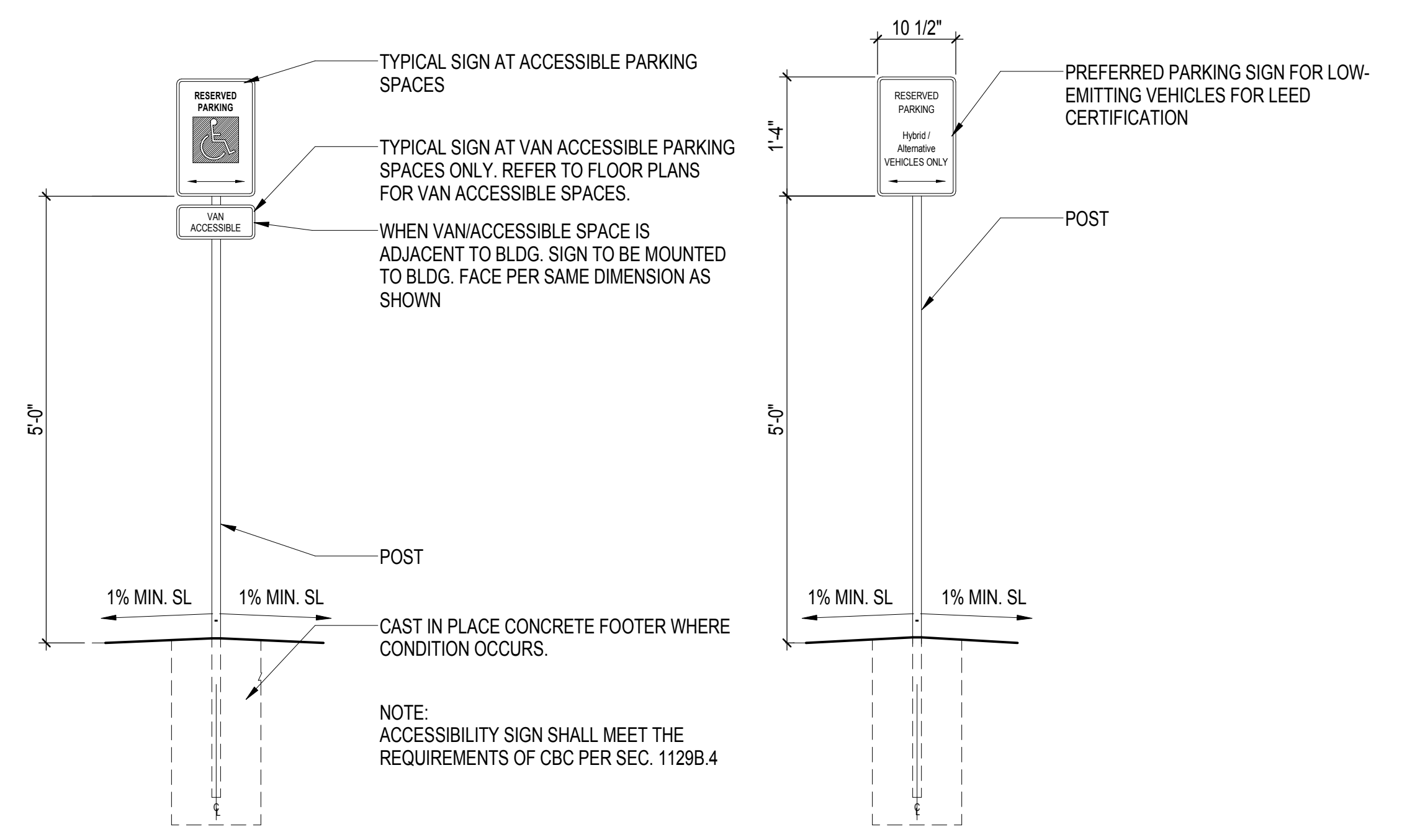
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BASIS OF DESIGN EXAMPLES
SIGNAGE EXAMPLES
1. INFORMATION & CODE SIGNS BASED ON TAKEFORM FUSION S1 SIGNAGE TYPE.

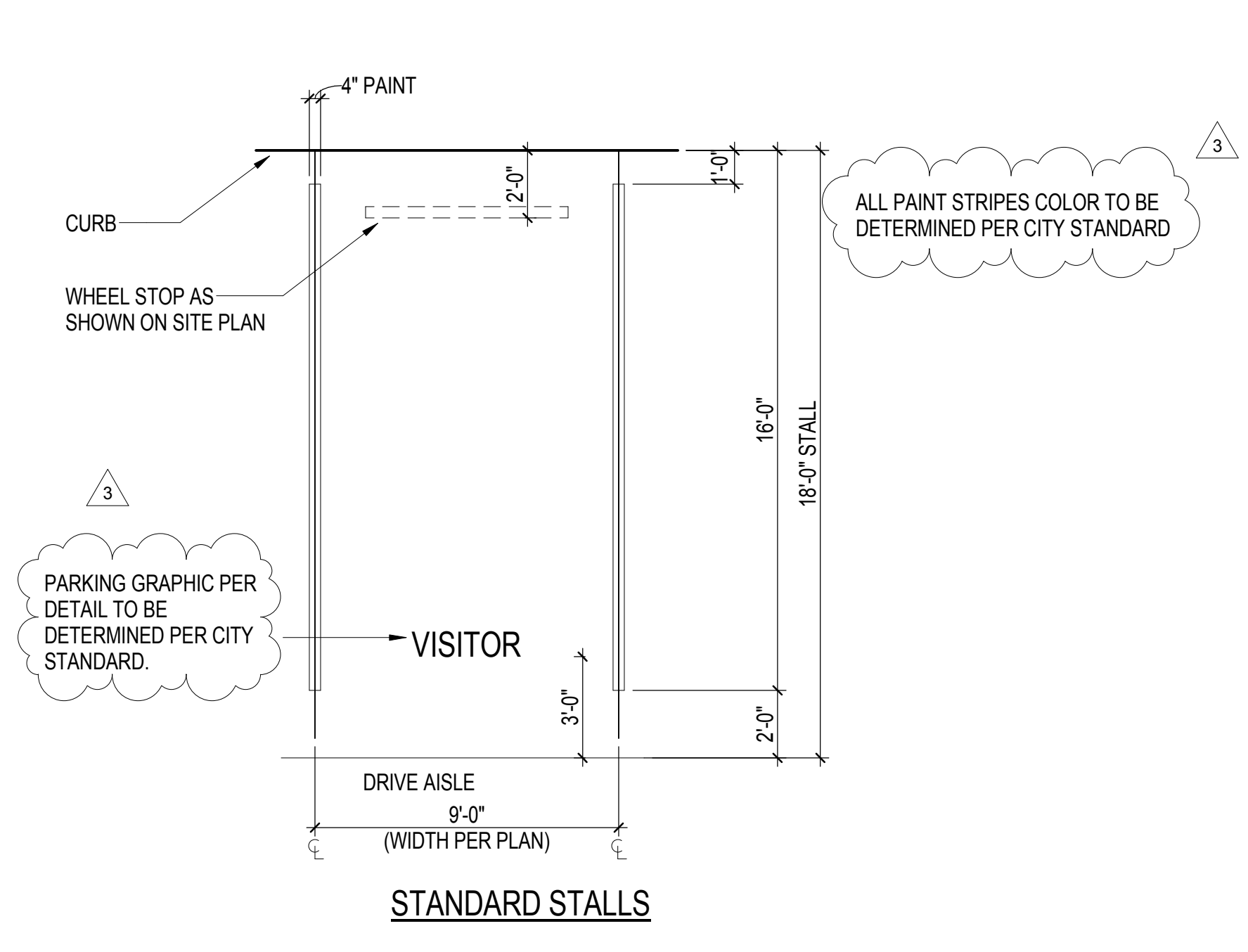


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CITY OF MADISON
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A1 PARKING SIGN
3/4" = 1'-0"



A8 PARKING STALLS
1/4" = 1'-0"



A14 SIGN TYPE D
1" = 1'-0"

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	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE
PROJECT No: 376603		

SITE SIGNAGE
 ELEVATIONS AND
 DETAILS

A-921

STRUCTURAL DESIGN CRITERIA

Table with 2 columns: Item number and description. Includes sections for Governing Code, Floor Live Load, Roof Live Load, Wind Design Data, Earthquake Design Data, Flood Design Data, and Special Loads.

FOUNDATION NOTES

- 1. ALL COLUMN FOOTINGS ARE TO BE CENTERED UNDER COLUMN CENTERLINES...
2. THE FOUNDATION CONTRACTOR SHALL FULLY REVIEW UNDER-GROUND PLUMBING DRAWINGS...
3. PROVIDE PVC SLEEVES THROUGH FOUNDATION WALLS/FOOTINGS FOR PIPE, CONDUIT, AND CABLE PENETRATIONS...
4. FOOTING SUBGRADES SHALL BE CLEAN AND FREE OF DEBRIS, STANDING WATER, AND LOOSE SOIL.

CONCRETE & REINFORCING STEEL NOTES

- 1. PROVIDE ONE (1) HOOKED REINFORCING BAR IN CONCRETE FOOTING TO SERVE AS A 'CONCRETE ENCASED ELECTRODE' IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE...
2. ALL BAR LAPS SHALL CONFORM TO ACI 318 CLASS 'B' SPLICE CRITERIA...
3. LAP LENGTH SHALL BE SPECIFICALLY NOTED ON SHOP DRAWINGS WHERE MORE THAN ONE BAR MAKES UP A CONTINUOUS STRING...
4. HORIZONTAL BARS SHALL BE DETAILED TO SHOW THE DISTANCE FROM AT LEAST ONE END OF THE BAR TO THE NEAREST SHIELD GRID LINE OR WALL.

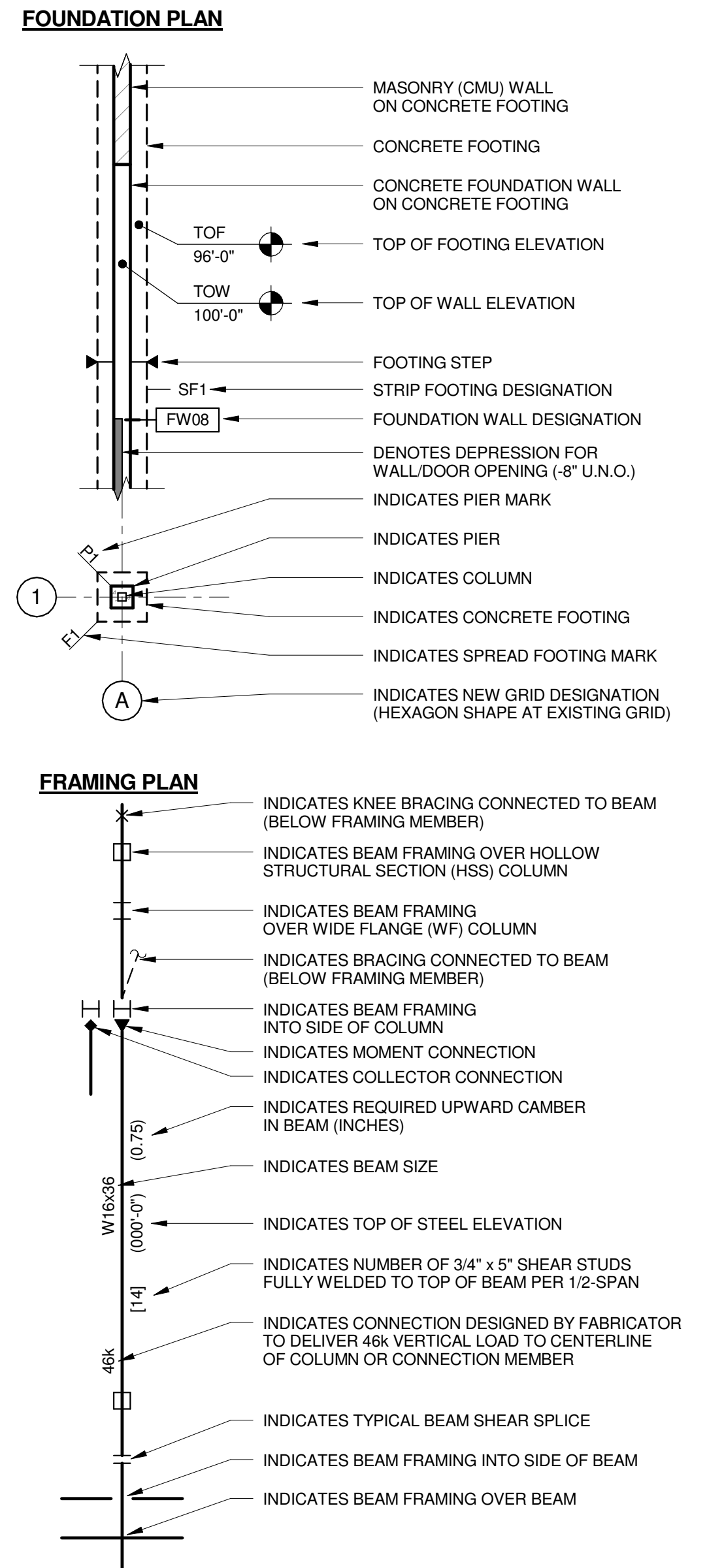
STRUCTURAL STEEL NOTES

- 1. STEEL BEAMS WITH RESIDUAL CAMBER RESULTING FROM MILL FABRICATION OR ROLLING SHALL BE SHOP FABRICATED AND ERECTED SUCH THAT THIS RESIDUAL CAMBER COUNTERACTS GRAVITY LOAD DEFLECTION...
2. UNO. ALL BOLTED CONNECTIONS SHALL UTILIZE 3/4" DIAMETER A325 BOLTS TIGHTENED TO THE SNUG-TIGHT CONDITION...
3. ALL ANCHOR RODS ARE TO BE 3/4" INCH DIAMETER F1554 S1 GR. 55 THREADED RODS UNLESS NOTED OTHERWISE...
4. BEAM AND LINTEL PLATES SHALL BE FULLY GROUDED WITH A MINIMUM 1/2" NON-SHRINK GROUT.

STRUCTURAL TESTING AND INSPECTION

- 1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT ALL STRUCTURAL WORK FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS...
2. THE CONTRACTOR SHALL RETAIN AN INDEPENDENT TESTING AGENCY TO PROVIDE FIELD AND LAB TESTING OF CONSTRUCTION MATERIALS AND TO PROVIDE CONSTRUCTION INSPECTIONS...
3. THE CONTRACTOR SHALL PROVIDE THE TESTING AND INSPECTING AGENCY ACCESS TO ALL PLACES WHERE THE WORK IS BEING PERFORMED...
4. THE TESTING AGENCY IS NOT AUTHORIZED TO DIRECT OR APPROVE ANY CHANGES FROM THE CONTRACT DOCUMENTS.

STRUCTURAL SYMBOLOGY



GENERAL NOTES

- 1. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO START OF CONSTRUCTION...
2. FOR CLARITY, ALL EXTERIOR SLABS AND SIDEWALKS MAY NOT BE SHOWN FOR EXACT DIMENSIONS, LOCATIONS, JOINTS AND SCORE LINES...
3. VERIFY ALL SIZES, WEIGHTS AND LOCATIONS OF MECHANICAL AND ELECTRICAL EQUIPMENT...
4. DETAILS MARKED 'TYPICAL' MAY OR MAY NOT BE CUT ON PLANS, BUT SHALL APPLY UNLESS NOTED OTHERWISE.

MASONRY NOTES

- 1. ALL MASONRY WALLS ARE TO HAVE 9 GAUGE HORIZONTAL JOINT REINFORCEMENT WHICH DOES NOT EXCEED 16 INCHES ON CENTER VERTICALLY...
2. ALL LAPS SHALL BE 50 BAR DIAMETERS U.N.O.
3. HOLLOW MASONRY UNITS SHALL BE LAID WITH FULL HEAD JOINTS AND FULL BED JOINTS OF THE FACE SHELLS AND UNDER WEBS WHERE THE ADJACENT CELLS ARE TO BE FILLED WITH GROUT AND AT THE BOTTOM COURSE.

PRECAST CONCRETE NOTES

- 1. PRECAST CONCRETE SUPPLIER SHALL BE RESPONSIBLE FOR DESIGN OF PRECAST ELEMENTS AND CONNECTIONS TO ALL DESIGN LOADS (VERTICAL AND LATERAL) TO THE FOUNDATIONS...
2. REFER TO GENERAL NOTES AND DRAWINGS FOR SUPERIMPOSED LOADS USED IN DESIGN...
3. ESTIMATED PRECAST WEIGHTS USED IN DESIGN: DOUBLE TEES: 32" DEEP = 74PSF, 48" DEEP = 87PSF, PLATE: 8" HOLLOW-CORE = 83PSF, 12" HOLLOW-CORE = 88PSF.

STEEL BAR JOISTS

- 1. BAR JOISTS SHALL BE DESIGNED TO RESIST FORCES INDICATED ON DRAWINGS AND SPECIFICATIONS...
2. PLACE LOADS AT PANEL POINTS OR WELD ADDITIONAL DOUBLE ANGLE MEMBERS ONE EACH SIDE FROM POINT OF CONCENTRATED LOAD TO THE NEAREST PANEL POINT ON THE OPPOSITE CHORD...
3. ALL FIELD MODIFICATIONS OR REPAIRS TO THE JOIST, OR JOIST GIRDEES, SHALL BE APPROVED BY THE JOIST MANUFACTURER IN WRITING...
4. CUTTING AND DRILLING OF JOISTS IS NOT PERMITTED.

EARTHWORK NOTES

- 1. SEE GEOTECHNICAL REPORT AND SPECIFICATIONS FOR DEFINITION OF MATERIALS AND COMPACTION REQUIREMENTS...
2. UNO. THE CONTRACTOR SHALL RETAIN AN INDEPENDENT, QUALIFIED GEOTECHNICAL ENGINEERING FIRM TESTING AGENCY TO IDENTIFY AREAS OF POOR SOILS...
3. ALL SUBTERRANEAN STRUCTURES, UTILITIES, PIPING, ETC. IN THE AREA OF EXCAVATIONS TO BE LOCATED AND MARKED BY CONTRACTOR PRIOR TO EARTH REMOVAL WORK.

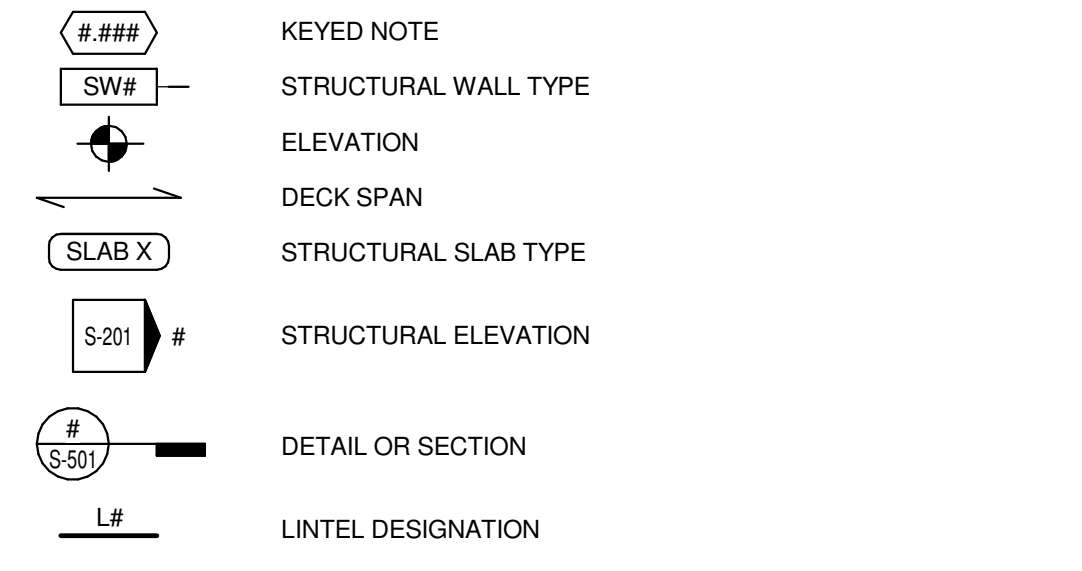
METAL DECK

- 1. BUTTON PUNCHING ROOF DECK IS NOT PERMITTED. REFERENCE DRAWINGS FOR ROOF DECK ATTACHMENT REQUIREMENTS, STRUCTURAL DIAPHRAGM ACTION IS PROVIDED BY THE ROOF DECK AND ITS ATTACHMENT...
2. UNLESS NOTED OTHERWISE, ALL MISCELLANEOUS OPENINGS IN METAL ROOF DECK ARE TO BE FRAMED BY 6x6x8/8" ANGLES. LONG LEG OF ANGLES SHALL BE VERTICAL...
3. UNLESS NOTED OTHERWISE, METAL DECKING SHALL BE CONTINUOUS OVER 3 SPANS AND HAVE JOINTS OVER SUPPORTING MEMBERS.

ALTERNATE BID

- ALTERNATE BID NO. 1 STORAGE BUILDING INCLUDES STRUCTURAL ELEMENTS EXCLUSIVE TO THE STORAGE BUILDING INCLUDING BUT NOT LIMITED TO: FOOTINGS, FOUNDATIONS, FLATWORK, FRAMING, DECKING ETC.
ALTERNATE BID NO. 2 SOLAR PHOTOVOLTAIC PANELS PROVIDE SUPPORT FOR SOLAR PANELS PER DETAIL 15B-251, TYPICAL FRAMED ROOF OPENING LONGITUDINAL NOTE: JOIST, JOIST GIRDEES SHALL BE DESIGNED FOR METAL DECK PER SDI FOR STOP SELECTION TABLE RECOMMENDATIONS OR BENT PLATE FOUR STOPS AS REQUIRED TO FORM THE SLAB EDGE.

GENERAL SYMBOLS



ABBREVIATIONS

- B.O. = BOTTOM OF
BA = BASE PLATE TYPE
BRG = BEARING
C TO C = CENTER TO CENTER
CCJ = CONSTRUCTION CONTROL JOINT
CJ = CONTROL JOINT
CLSM = CONTROLLED LOW STRENGTH MATERIAL ('FLOWABLE FILL')
CONT = CONTINUOUS
DLBT = DOUBLE-TEE
DIA = DIAMETER
DTB = DOUBLE TEE BEARING
EF = EACH FACE
EL = ELEVATION
EW = EACH WAY
F# = SPREAD FOOTING TYPE
FDTN = FOUNDATION
FV = FIELD VERIFY
GA = GAUGE
GALV = GALVANIZED
HPC = HIGH PERFORMANCE COATING
JB = JOIST BEARING
K = KIPS
LH = LONG LEG HORIZONTAL
LV = LONG LEG VERTICAL
LONG = LONGITUDINAL
MCJ = MASONRY CONTROL JOINT
NIC = NOT IN CONTRACT
NSFS = NEAR SIDE FAR SIDE WELD
NTS = NOT TO SCALE
OC = ON CENTER
OH = OVERHANG
P# = PIER TYPE
PCB = PRECAST BEARING (ELEVATION)
PRECAST = PRECAST
R# = REACTION
SC = SLIP CRITICAL END CONNECTION
SF# = STRIP FOOTING TYPE
SIM = SIMILAR
SST = STAINLESS STEEL
STL = STEEL
T.O. = TOP OF
TBD = TO BE DETERMINED
TOC = TOP OF COLUMN
TOF = TOP OF FOOTING
TOL = TOP OF LEDGE
TOP = TOP OF PIER
TOS = TOP OF STEEL
TOW = TOP OF WALL
TPC = TOP OF PRECAST
TRANS = TRANSVERSE
TSL = TOP OF SLAB
TYP = TYPICAL
UNO = UNLESS NOTED OTHERWISE
WWF = WELDED WIRE FABRIC/REINFORCEMENT



1600 WILSON BLVD. SUITE 360 ARLINGTON, VA 22209 571-290-7679



Mead & Hunt, Inc. 2440 Deming Way Middleton, WI 53662 phone: 608-273-6580 mead@mead.com

CITY OF MADISON NAKOOSA TRAIL FLEET/FIRE/RADIO SHOP FACILITY

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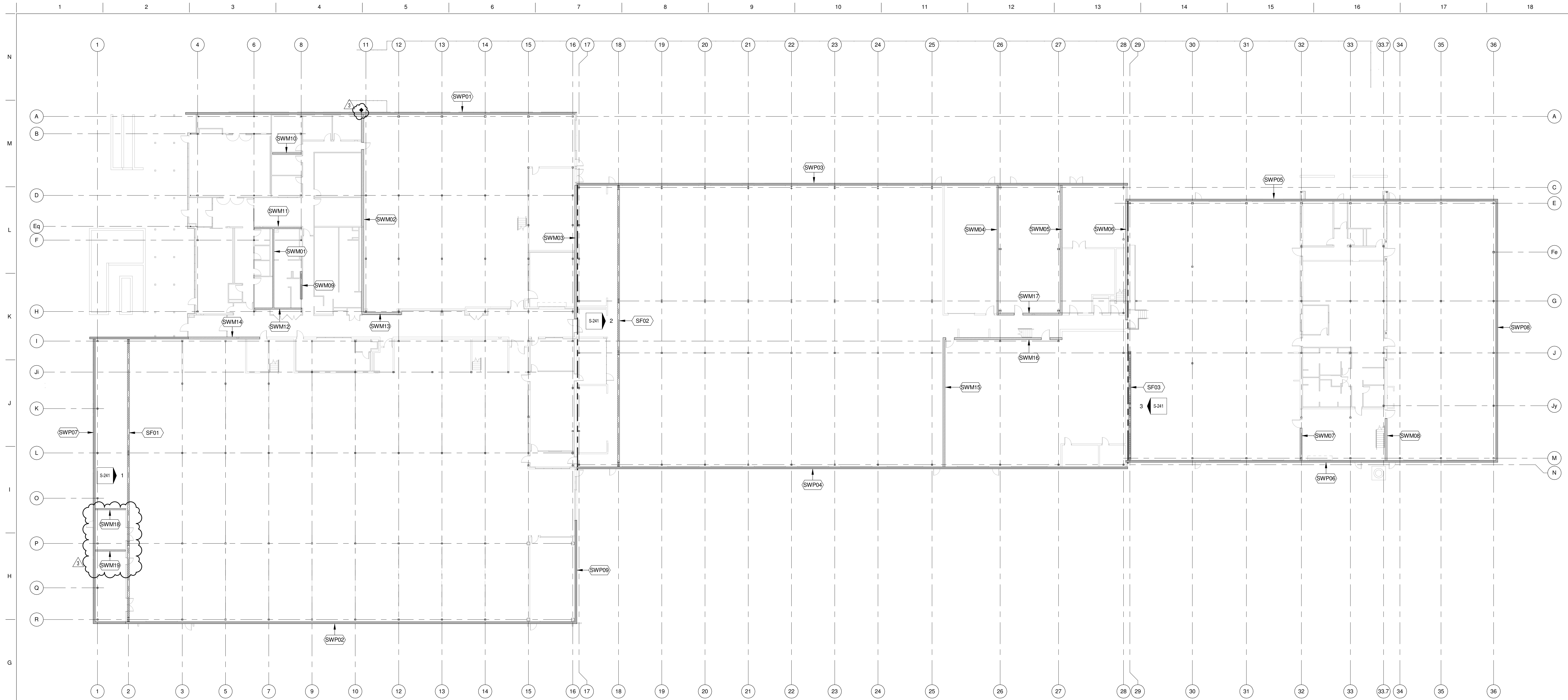
ISSUE FOR BID

Table with 2 columns: Revision number, Description, and Date. Includes Addendum 3 (03/14/2019), Addendum 2 (03/05/2019), and Issue For Bid (02/07/2019).

PROJECT No: 1303500-160264.01

STRUCTURAL NOTES

S-001



LATERAL FORCE RESISTING SYSTEMS GENERAL NOTES:

1. SHEAR WALL PRECAST LOADS ARE SHOWN AS STRENGTH LEVEL.
2. SHEAR FRAMES HAVE GRADE BEAM FOUNDATIONS. NO PENETRATIONS OR NOTCHES ARE ALLOWED IN GRADE BEAMS.
3. SHEAR WALL PRECAST LOADS SHALL BE APPLIED AT THE TOP OF THE SHEAR WALL.

SHEAR WALLS - PRECAST

- SWP01 PRECAST SHEAR WALL V = 36.0K
- SWP02 PRECAST SHEAR WALL V = 40.7K
- SWP03 PRECAST SHEAR WALL V = 45.K
- SWP04 PRECAST SHEAR WALL V = 45.K
- SWP05 PRECAST SHEAR WALL V = 43.5K
- SWP06 PRECAST SHEAR WALL V = 43.5K
- SWP07 PRECAST SHEAR WALL V = 1.9K
- SWP08 PRECAST SHEAR WALL V = 17.6K
- SWP09 PRECAST SHEAR WALL V = 76.3K
SEGMENTS OF THE PRECAST WALL SHALL BE CONNECTED TO TRANSFER HORIZONTAL AND VERTICAL SHEAR.

SHEAR FRAMES

- SF01 TRUSSED SWAY FRAME
- SF02 TRUSSED SWAY FRAME
- SF03 STEEL X-BRACE

SHEAR WALLS - MASONRY

- SWM01 CMU SHEAR WALL
- SWM02 CMU SHEAR WALL
- SWM03 CMU SHEAR WALL
- SWM04 CMU SHEAR WALL
- SWM05 CMU SHEAR WALL
- SWM06 CMU SHEAR WALL
- SWM07 CMU SHEAR WALL
- SWM08 CMU SHEAR WALL
- SWM09 CMU SHEAR WALL
- SWM10 CMU SHEAR WALL
- SWM11 CMU SHEAR WALL
- SWM12 CMU SHEAR WALL
- SWM13 CMU SHEAR WALL
- SWM14 CMU SHEAR WALL
- SWM15 CMU SHEAR WALL
- SWM16 CMU SHEAR WALL
- SWM17 CMU SHEAR WALL
- SWM18 CMU SHEAR WALL
- SWM19 CMU SHEAR WALL



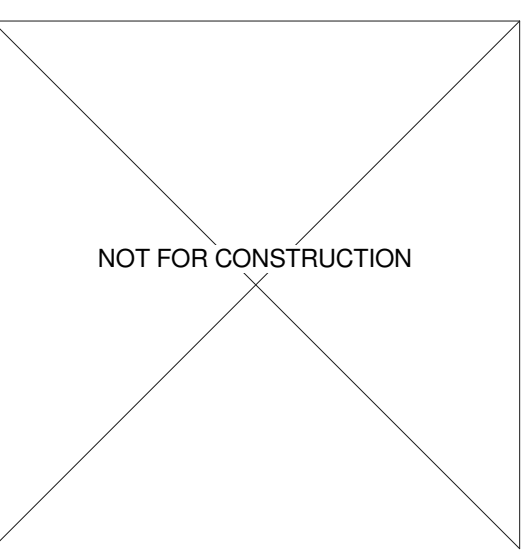
LATERAL FORCE RESISTING SYSTEMS PLAN

1" = 20'-0"

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ISSUE FOR BID

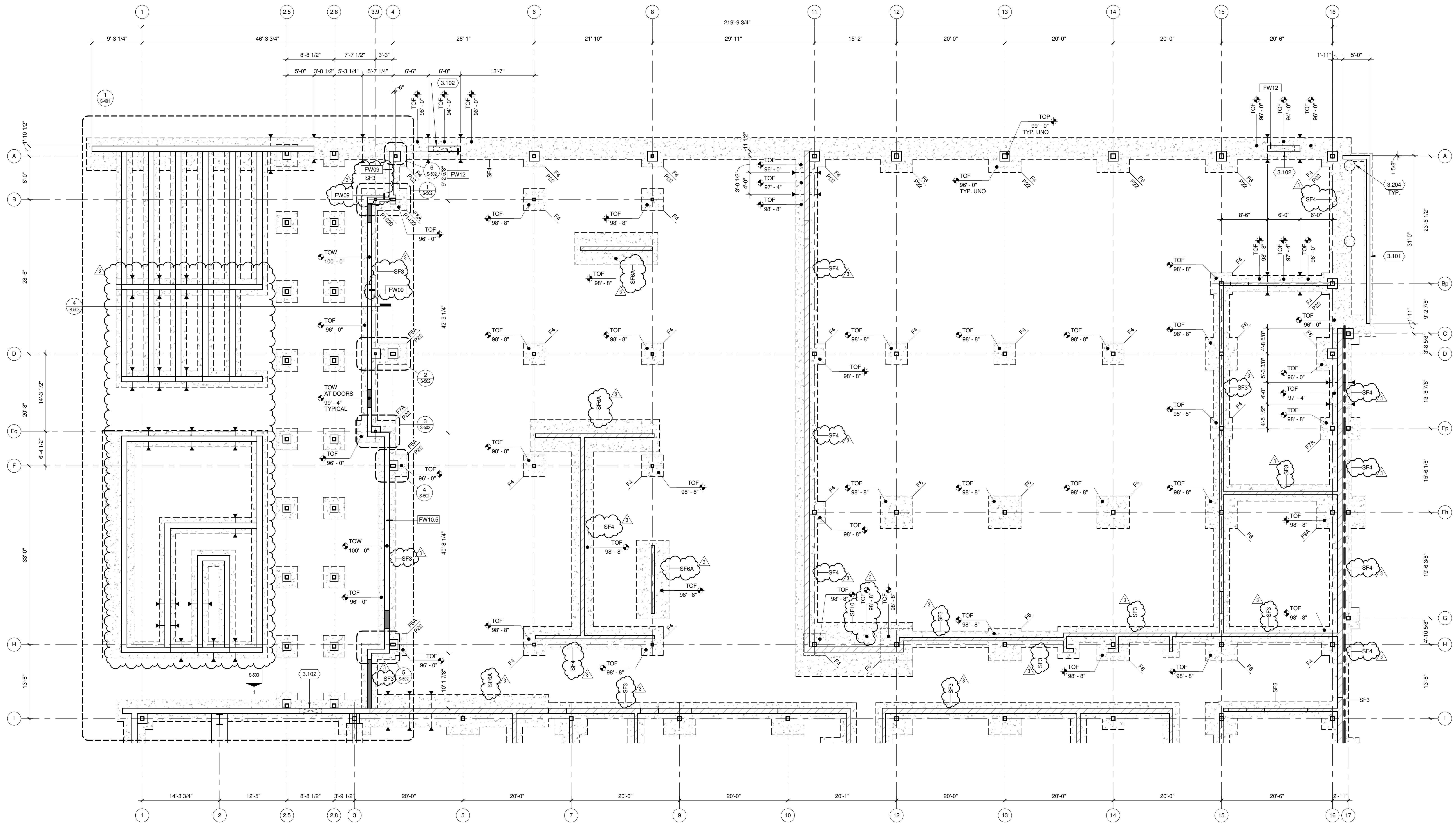


No.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

LATERAL FORCE RESISTING SYSTEMS PLAN

S-010



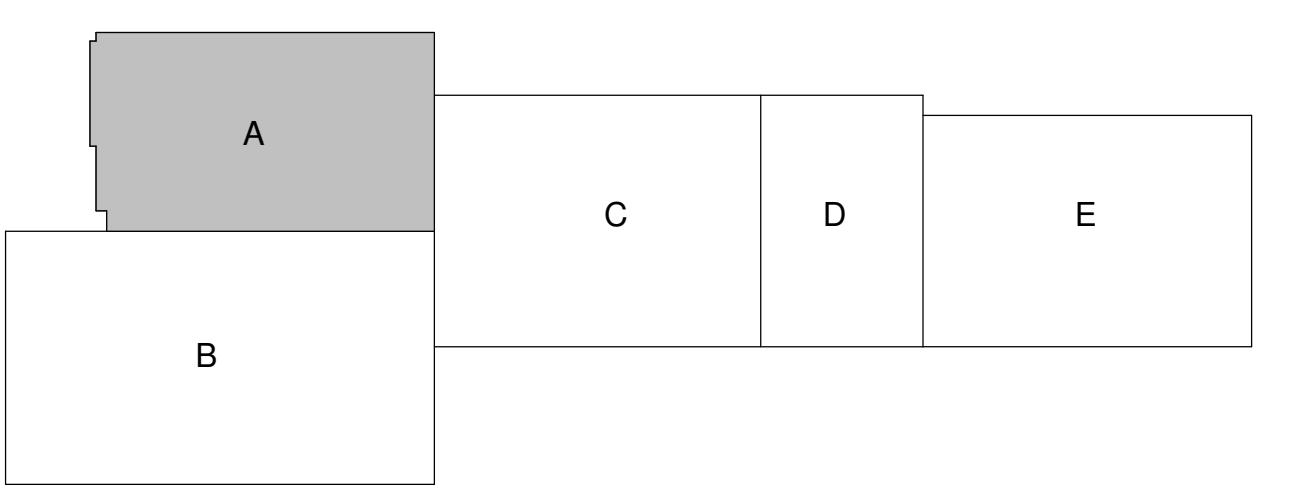
TRUE PLAN
NORTH NORTH
FOUNDATION PLAN AREA A
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.102 PROVIDE 1'-0" X 4'-0" OPENING IN PRECAST FOUNDATION WALL FOR TELECOMMUNICATIONS/ELECTRICAL CABLE. SEE TYPICAL DETAIL 10/S-502. COORDINATE FINAL LOCATION WITH ELECTRICAL.
- 3.204 BOLLARD, SEE DETAIL 14/S-511

FOUNDATION PLAN GENERAL NOTES:

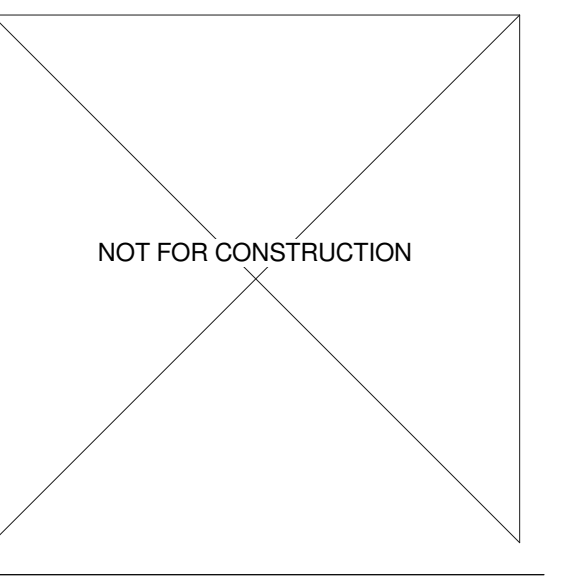
1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-501 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION MASONRY WALLS UNLESS NOTED OTHERWISE.



CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY

4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714

ISSUE FOR BID

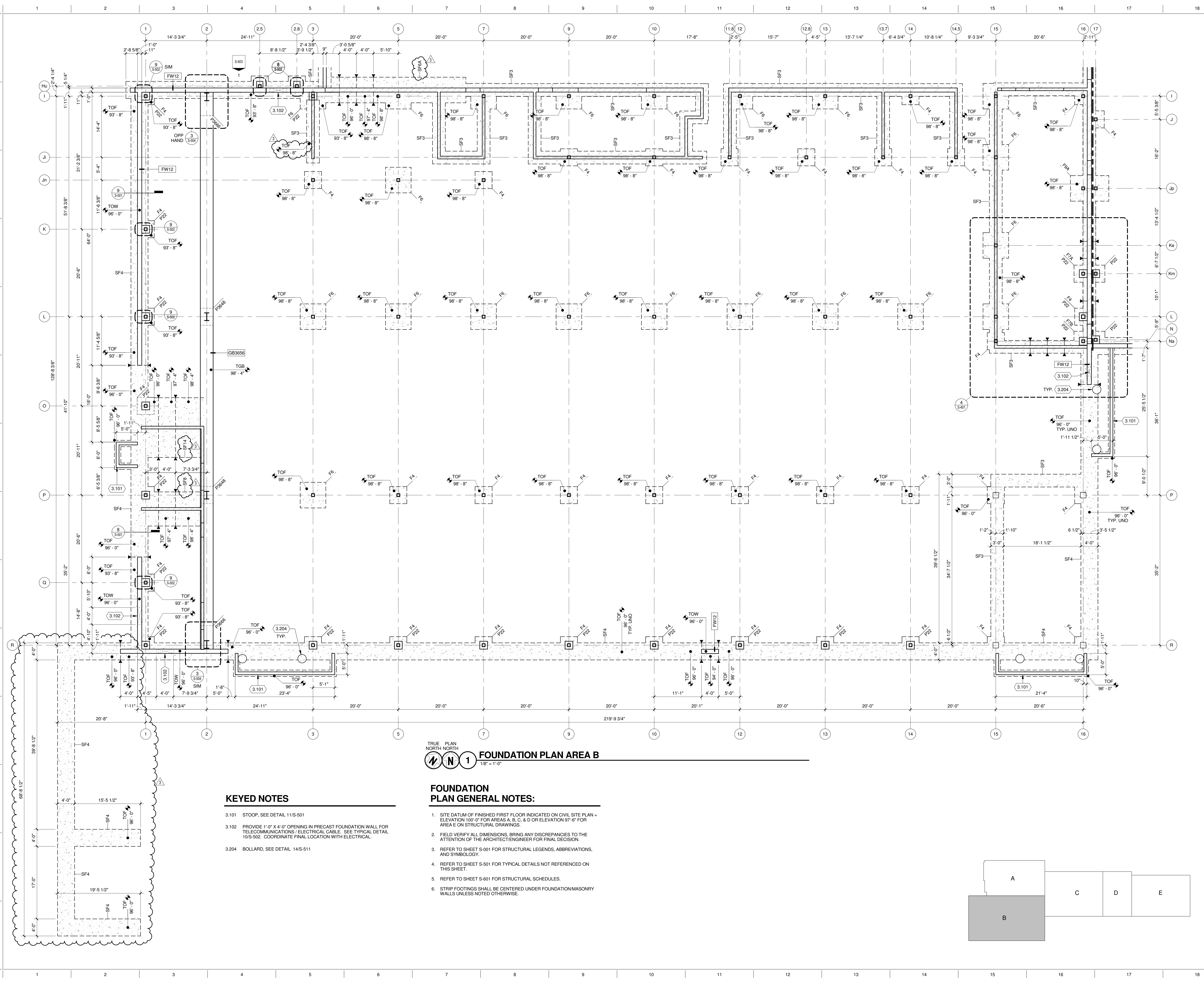


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
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1	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

FOUNDATION PLAN AREA A

S-101A



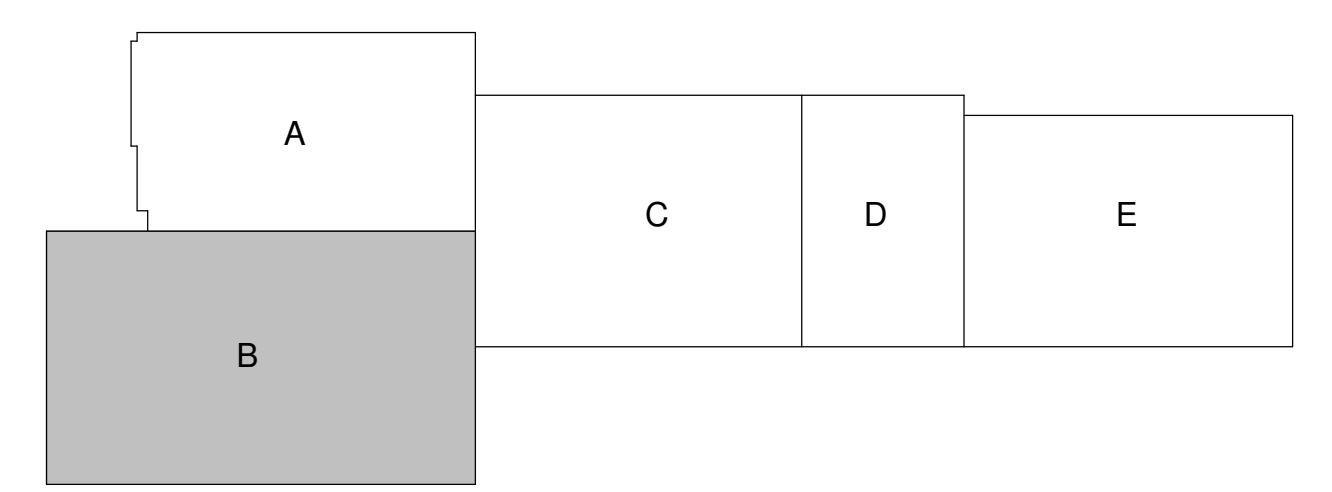
TRUE PLAN
NORTH NORTH
FOUNDATION PLAN AREA B
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.102 PROVIDE 1'-0" X 4'-0" OPENING IN PRECAST FOUNDATION WALL FOR TELECOMMUNICATIONS/ELECTRICAL CABLE. SEE TYPICAL DETAIL 10/S-502. COORDINATE FINAL LOCATION WITH ELECTRICAL.
- 3.204 BOLLARD, SEE DETAIL 14/S-511

FOUNDATION PLAN GENERAL NOTES:

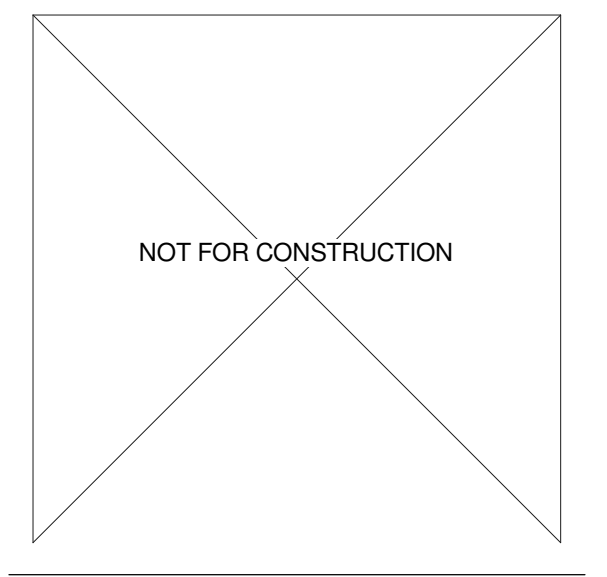
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3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
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6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION/MASONRY WALLS UNLESS NOTED OTHERWISE.



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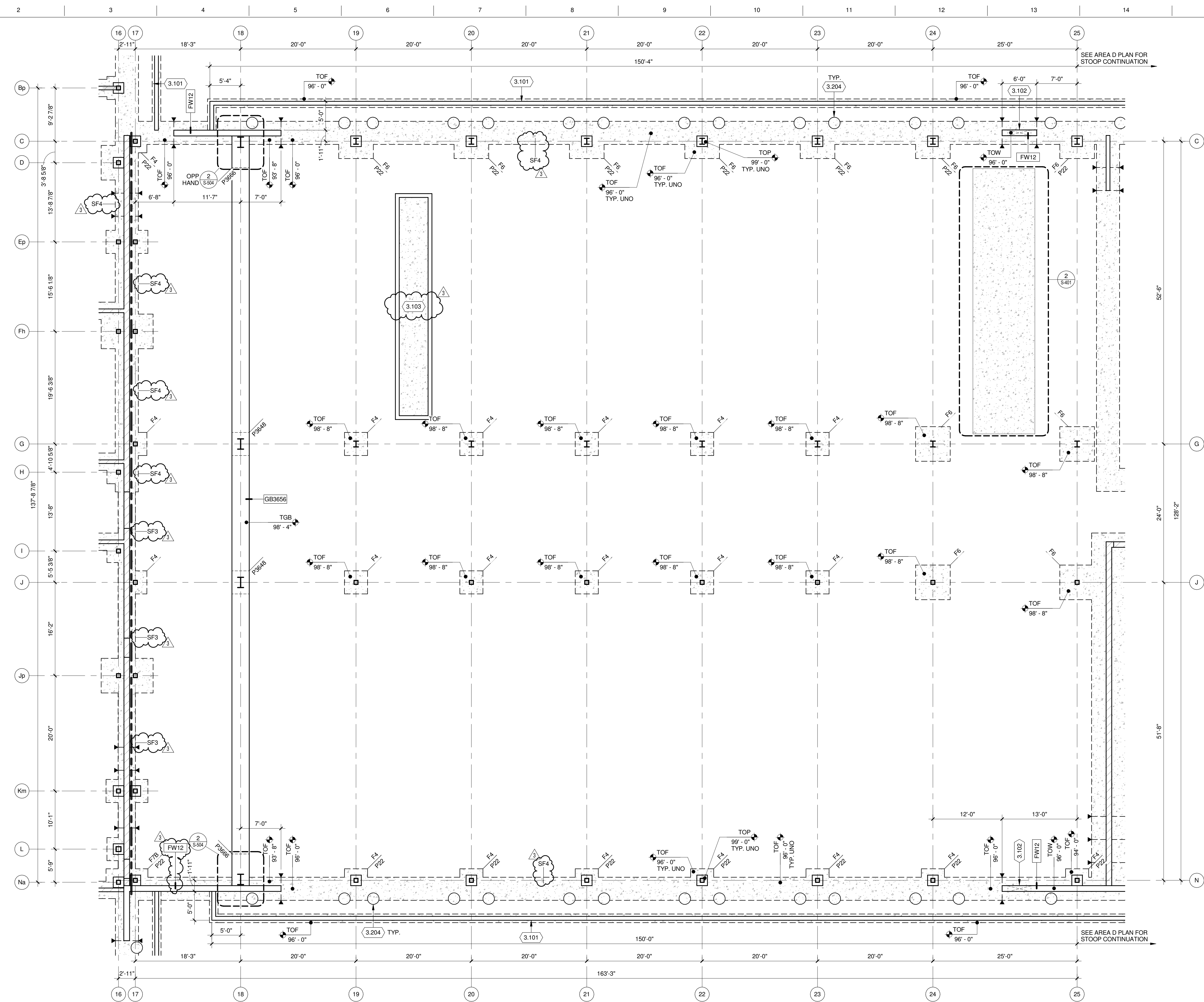


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FOUNDATION PLAN AREA B

S-101B



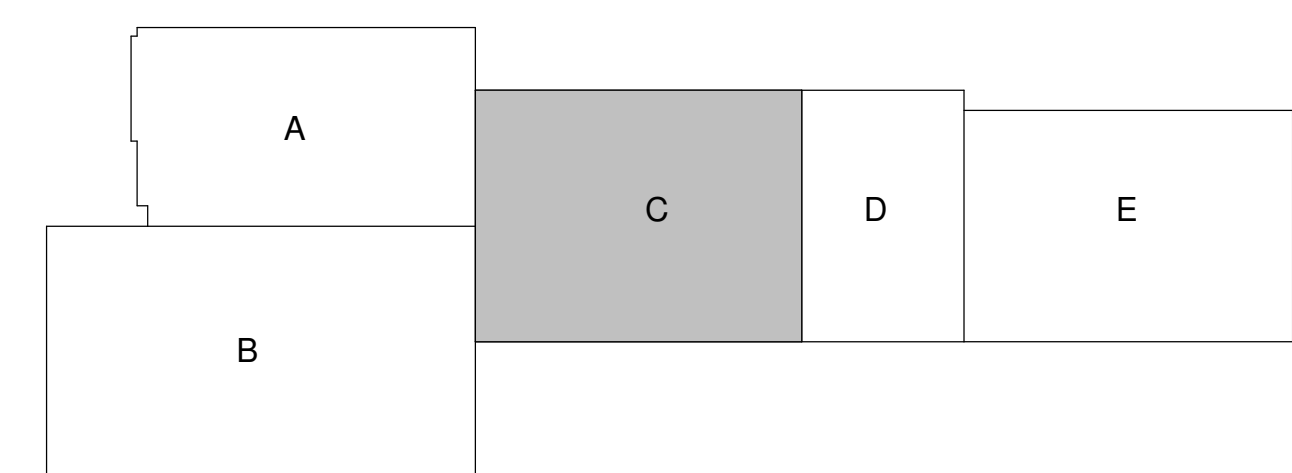
TRUE PLAN NORTH NORTH
FOUNDATION PLAN AREA C
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.102 PROVIDE 1'-0" X 4'-0" OPENING IN PRECAST FOUNDATION WALL FOR TELECOMMUNICATIONS/ELECTRICAL CABLE. SEE TYPICAL DETAIL 10/S-502. COORDINATE FINAL LOCATION WITH ELECTRICAL.
- 3.103 LIFT FOUNDATION DESIGN BY LIFT SUPPLIER'S PROFESSIONAL ENGINEER. SUBMIT RE STAMPED AND SIGNED FOUNDATION DESIGN.
- 3.204 BOLLARD, SEE DETAIL 14/S-511

FOUNDATION PLAN GENERAL NOTES:

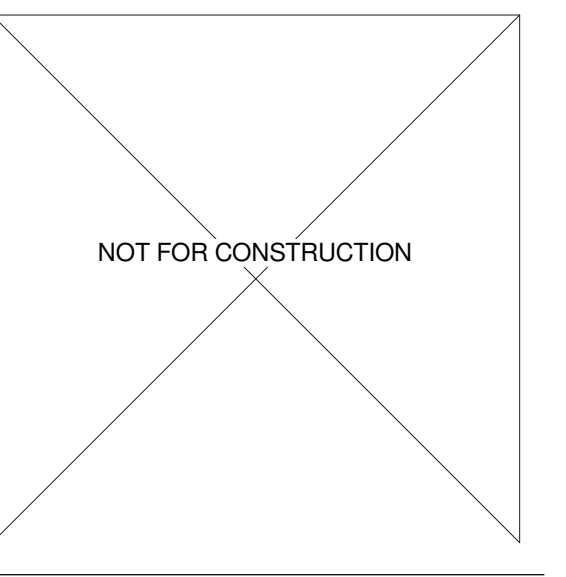
1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
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3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
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5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION/MASONRY WALLS UNLESS NOTED OTHERWISE.



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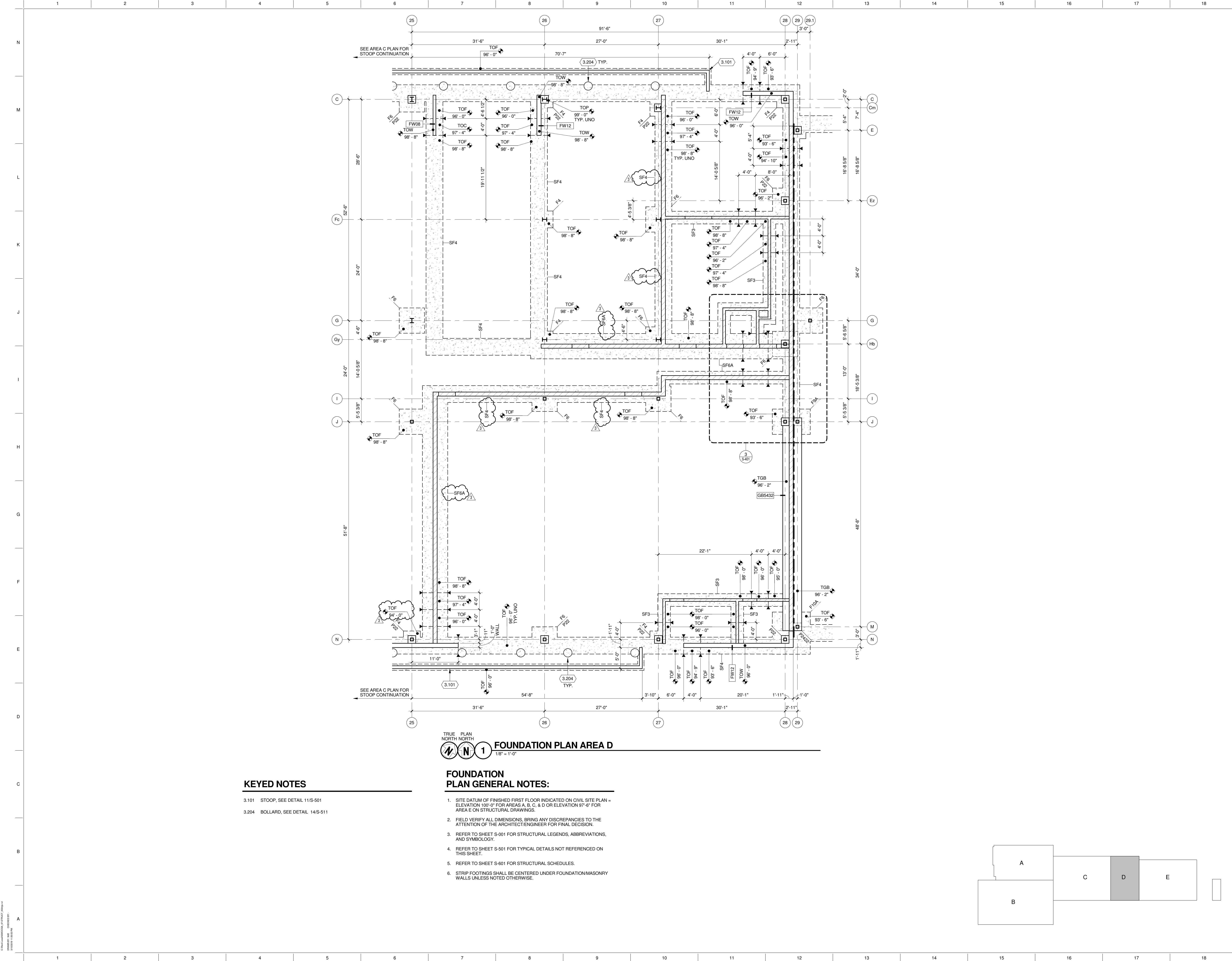


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FOUNDATION PLAN AREA C

S-101C



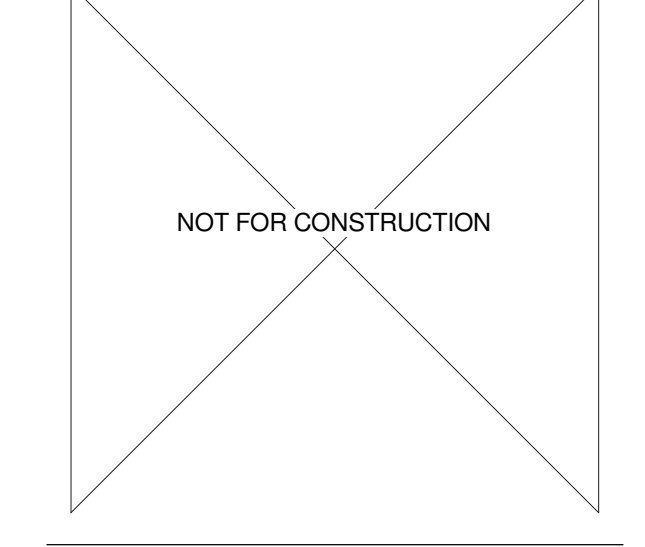
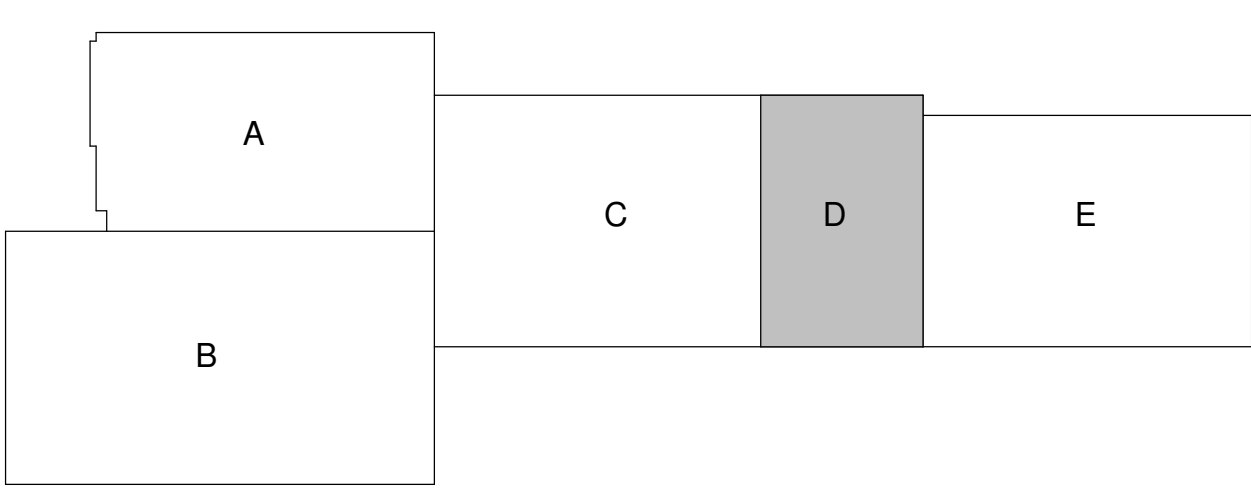
TRUE PLAN NORTH NORTH
FOUNDATION PLAN AREA D
 1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.204 BOLLARD, SEE DETAIL 14/S-511

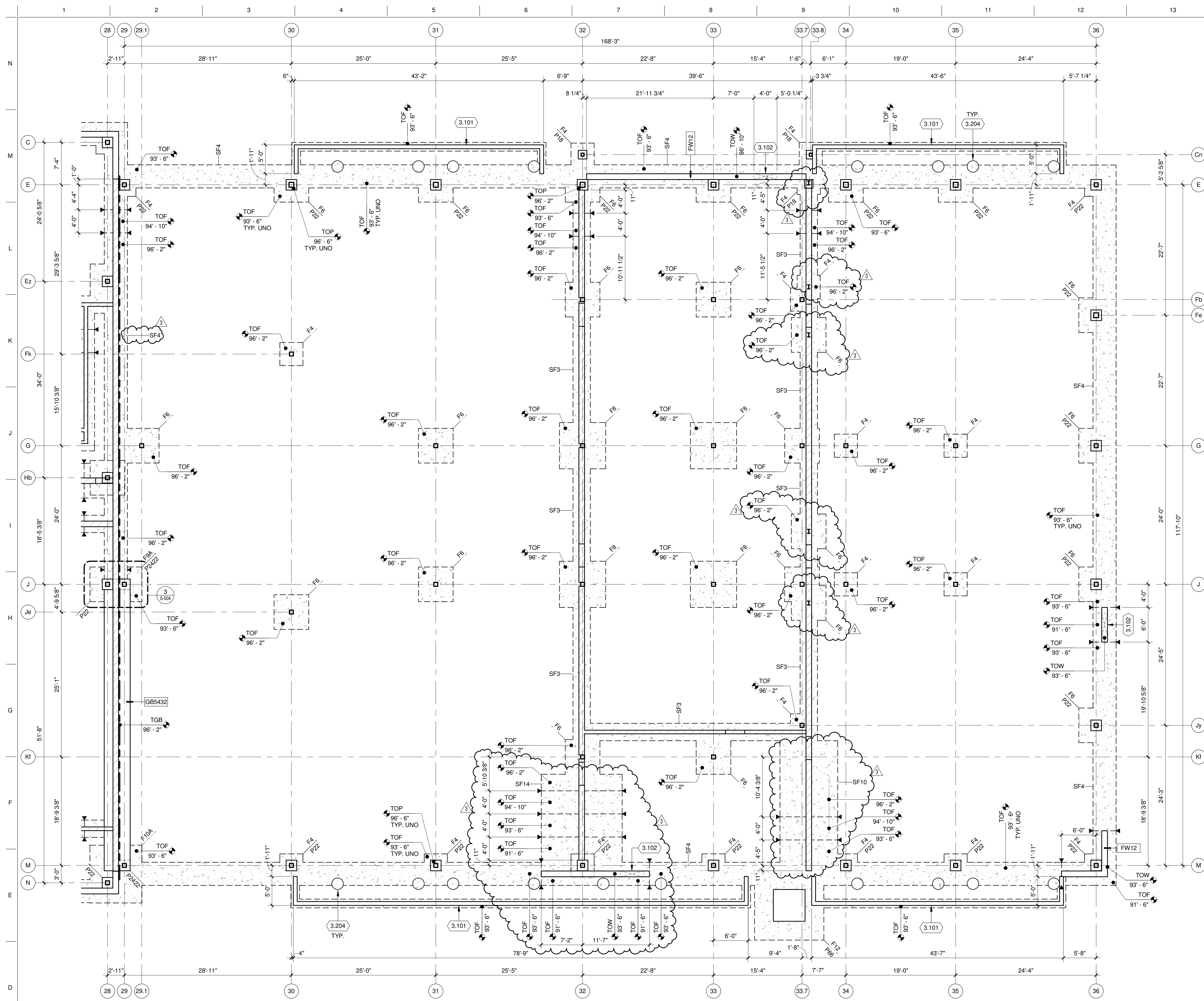
FOUNDATION PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
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4. REFER TO SHEET S-501 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION/MASONRY WALLS UNLESS NOTED OTHERWISE.



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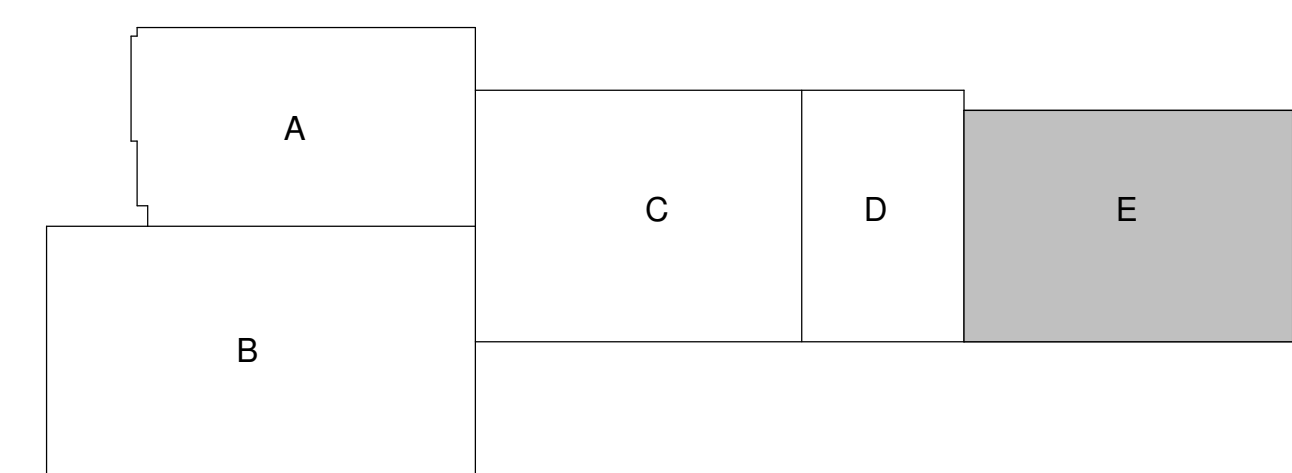
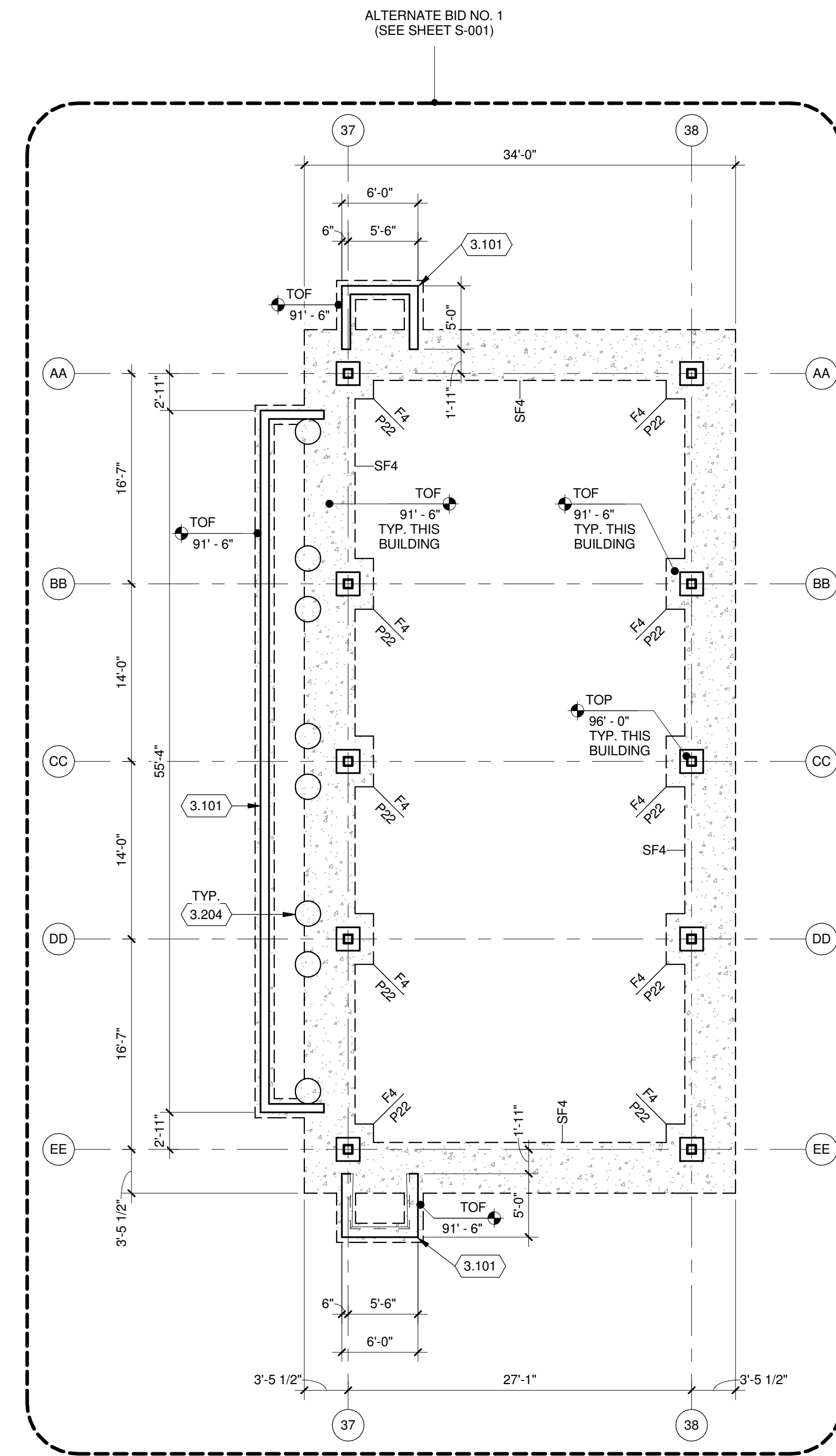
TRUE PLAN NORTH NORTH
FOUNDATION PLAN AREA E
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.102 PROVIDE 1'-0" X 4'-0" OPENING IN PRECAST FOUNDATION WALL FOR TELECOMMUNICATIONS/ELECTRICAL CABLE. SEE TYPICAL DETAIL 10/S-502. COORDINATE FINAL LOCATION WITH ELECTRICAL.
- 3.204 BOLLARD, SEE DETAIL 14/S-511

FOUNDATION PLAN GENERAL NOTES:

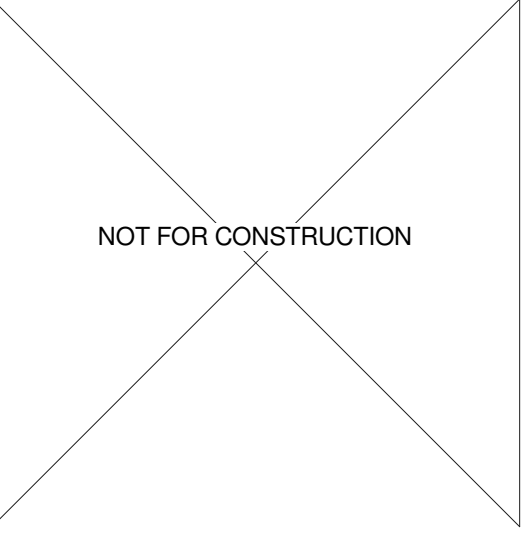
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6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION MASONRY WALLS UNLESS NOTED OTHERWISE.



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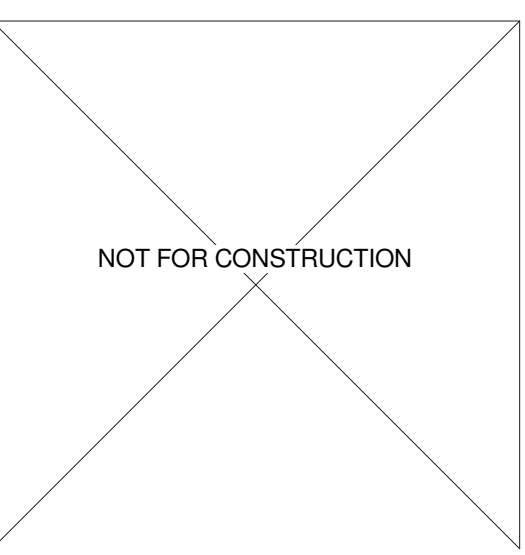


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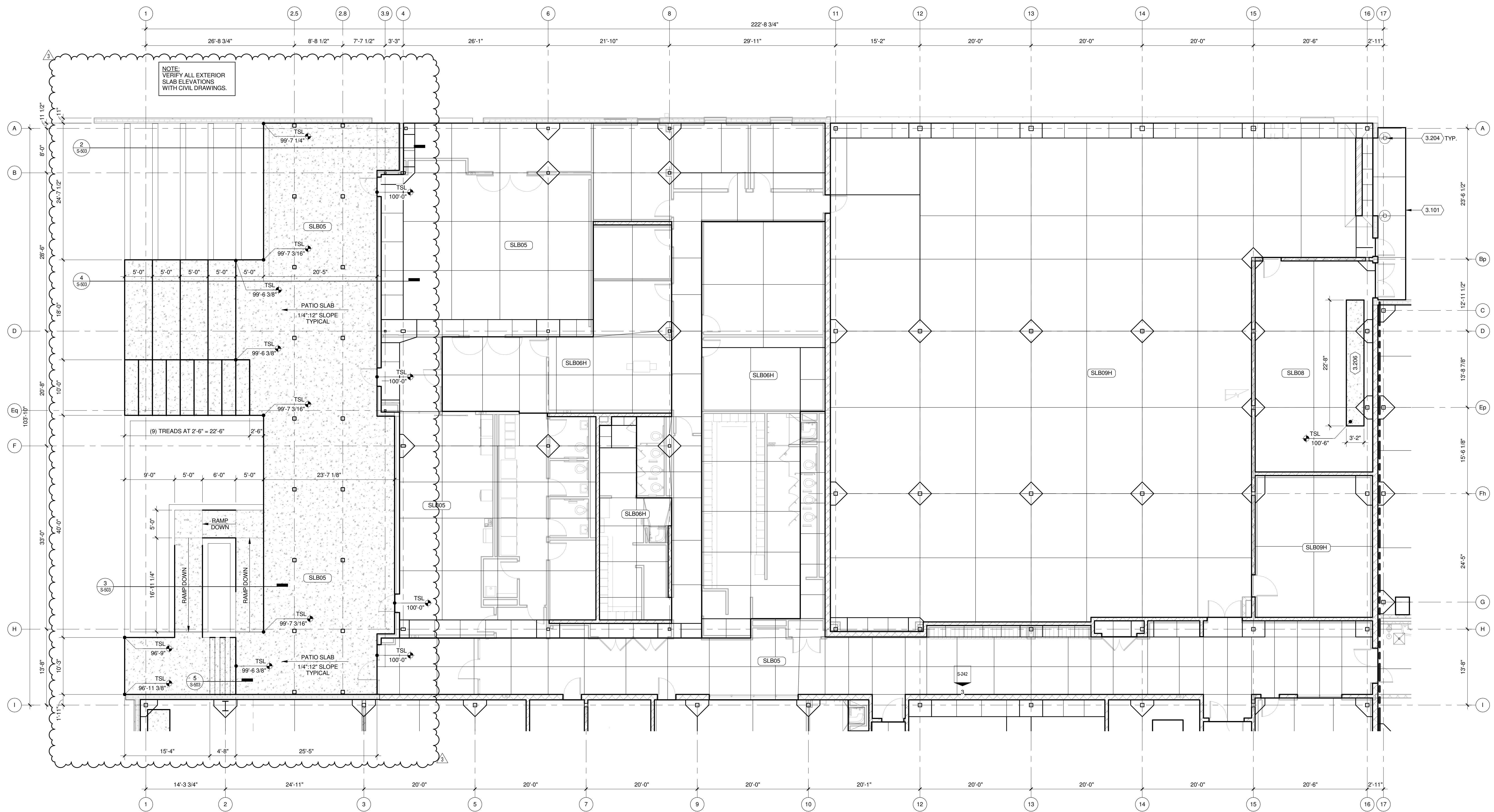
FOUNDATION PLAN AREA E

S-101E



NO.	REVISION/SUBMISSION	DATE
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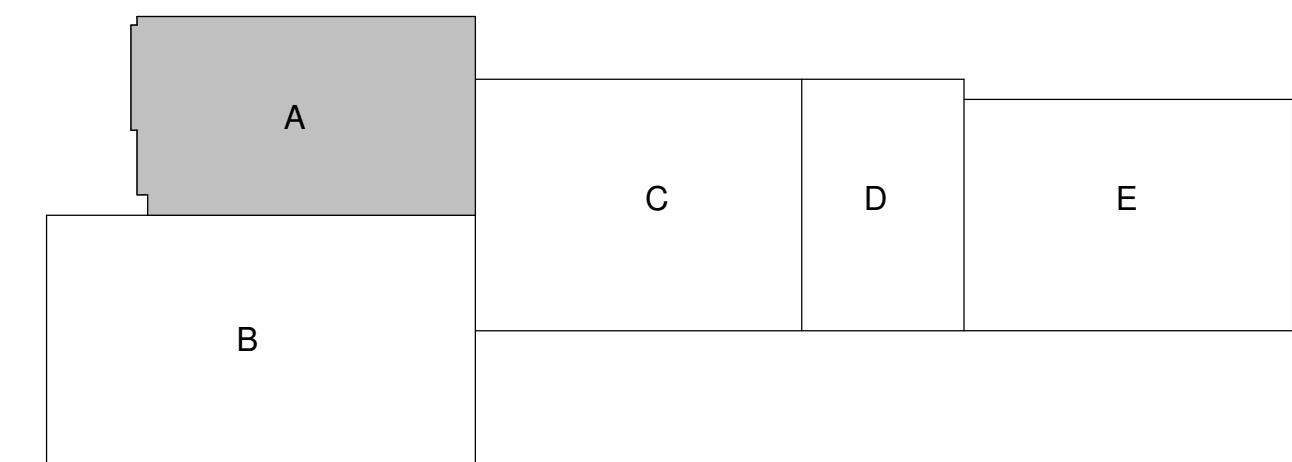
TRUE PLAN NORTH NORTH
1 FLATWORK PLAN AREA A
1/8" = 1'-0"

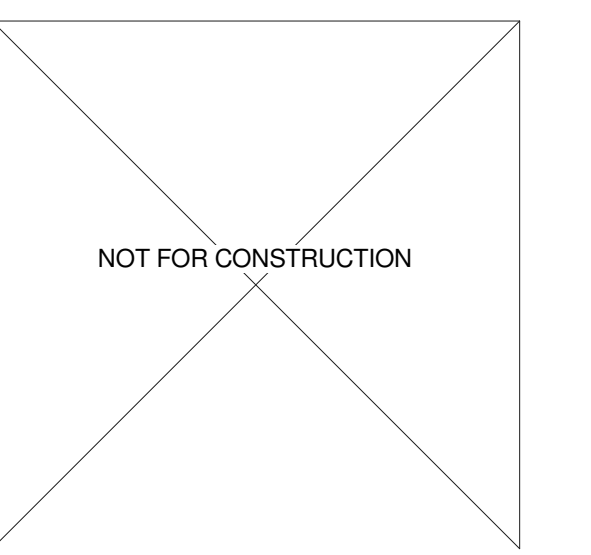
KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.204 BOLLARD, SEE DETAIL 14/S-511
- 3.206 GROUND LEVEL EQUIPMENT PAD, SEE DETAIL 8/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

FLATWORK PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-511 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO DETAIL 11/S-511 FOR STRUCTURAL SLAB TYPES.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. FLOAT AND TROWEL FLOOR SLABS PER REQUIREMENTS OF ARCH. FLOOR FINISH SYSTEM.
8. (2) DASHED LINES = - - - - INDICATE (2) ADDITIONAL #4 BARS (5'-0" LONG) DIAGONAL 6" FROM CORNER IN SLAB, 2" CLEAR FROM TOP OF SLAB.
9. COORDINATE EXTENTS OF RADIANT FLOOR SLABS WITH MECHANICAL.
10. LINES SHOWN AT INTERIOR CONCRETE FLOOR SLABS ON-GRADE INDICATE CONCEPT LEVEL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT. SEE JOINT DETAILS ON SHEET S-551.
11. CONTRACTOR SHALL SUBMIT A FINAL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT FOR APPROVAL PRIOR TO INSTALLATION OF CONCRETE SLABS.
12. THE FINAL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT SHALL CONFORM TO THE FOLLOWING:
 - A. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 5-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - B. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 6-INCH SLAB SHALL BE LIMITED TO 10'-0".
 - C. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 7-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - D. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 8-INCH SLAB SHALL BE LIMITED TO 14'-0".
 - E. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 9-INCH SLAB SHALL BE LIMITED TO 16'-0".
 - F. PROVIDE JOINT SPACING AS NECESSARY TO MAINTAIN APPROXIMATELY SQUARE PANELS.
 - G. MAXIMUM CONTROL/CONTRACTION JOINT ASPECT RATIO SHALL BE LIMITED TO 1.5/1.0.
13. SEE SPECIFICATION SECTION 03.30.00 FOR ADDITIONAL INFORMATION REGARDING JOINTING FOR CONCRETE WORK.



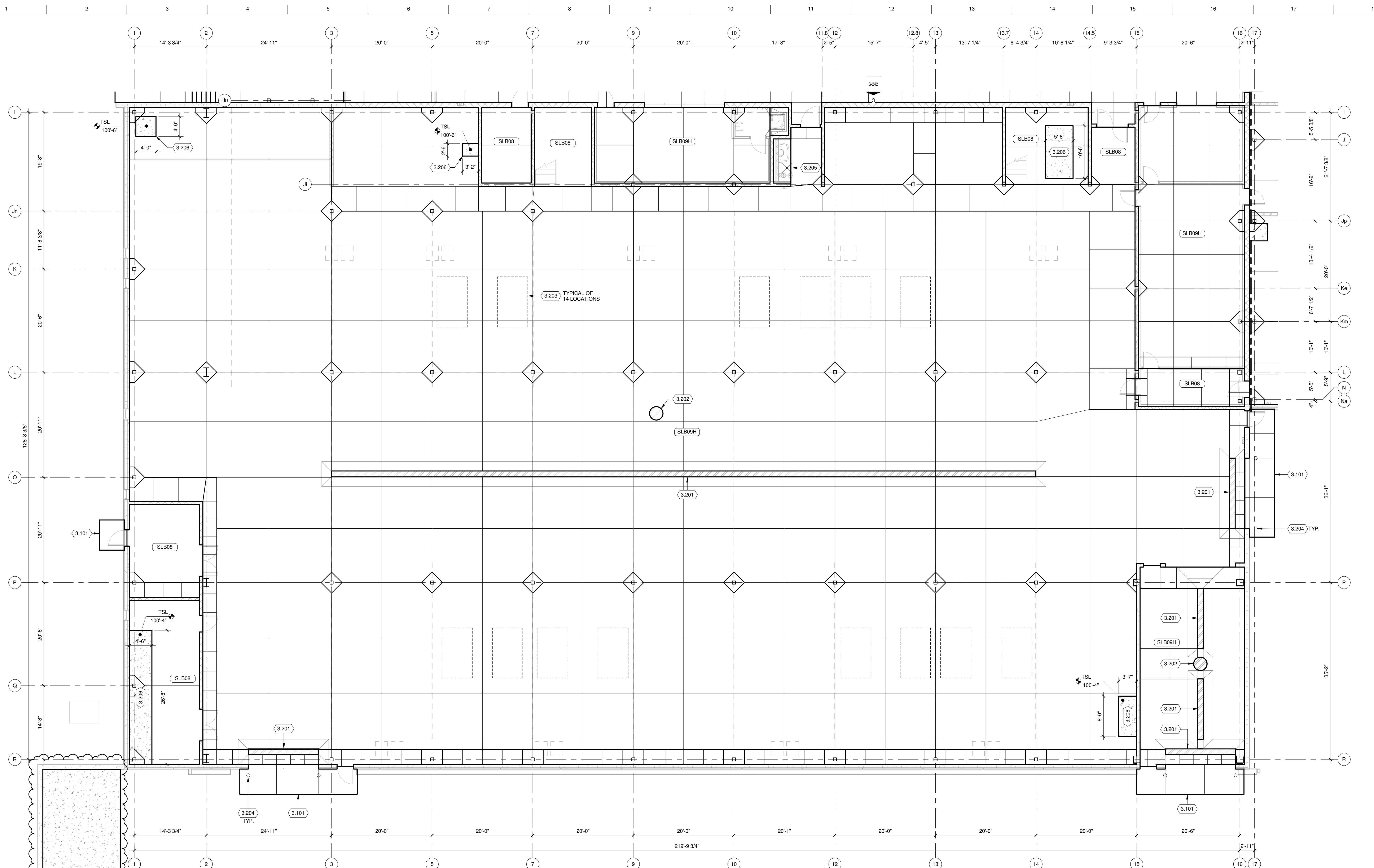


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FLATWORK PLAN AREA B

S-111B



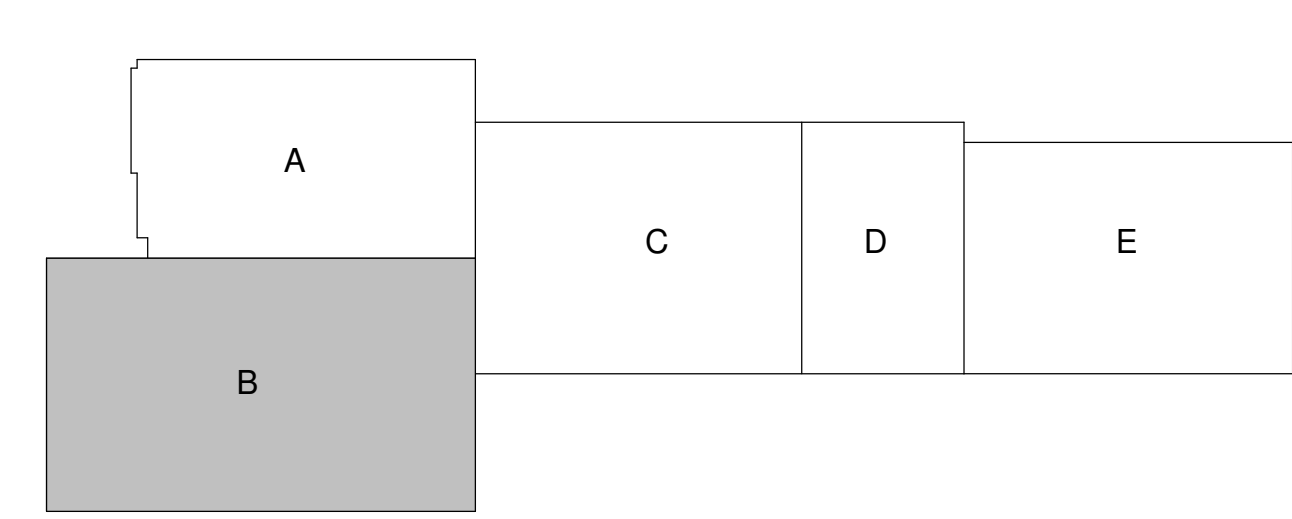
TRUE PLAN NORTH NORTH
1 FLATWORK PLAN AREA B
1/8" = 1'-0"

KEYED NOTES

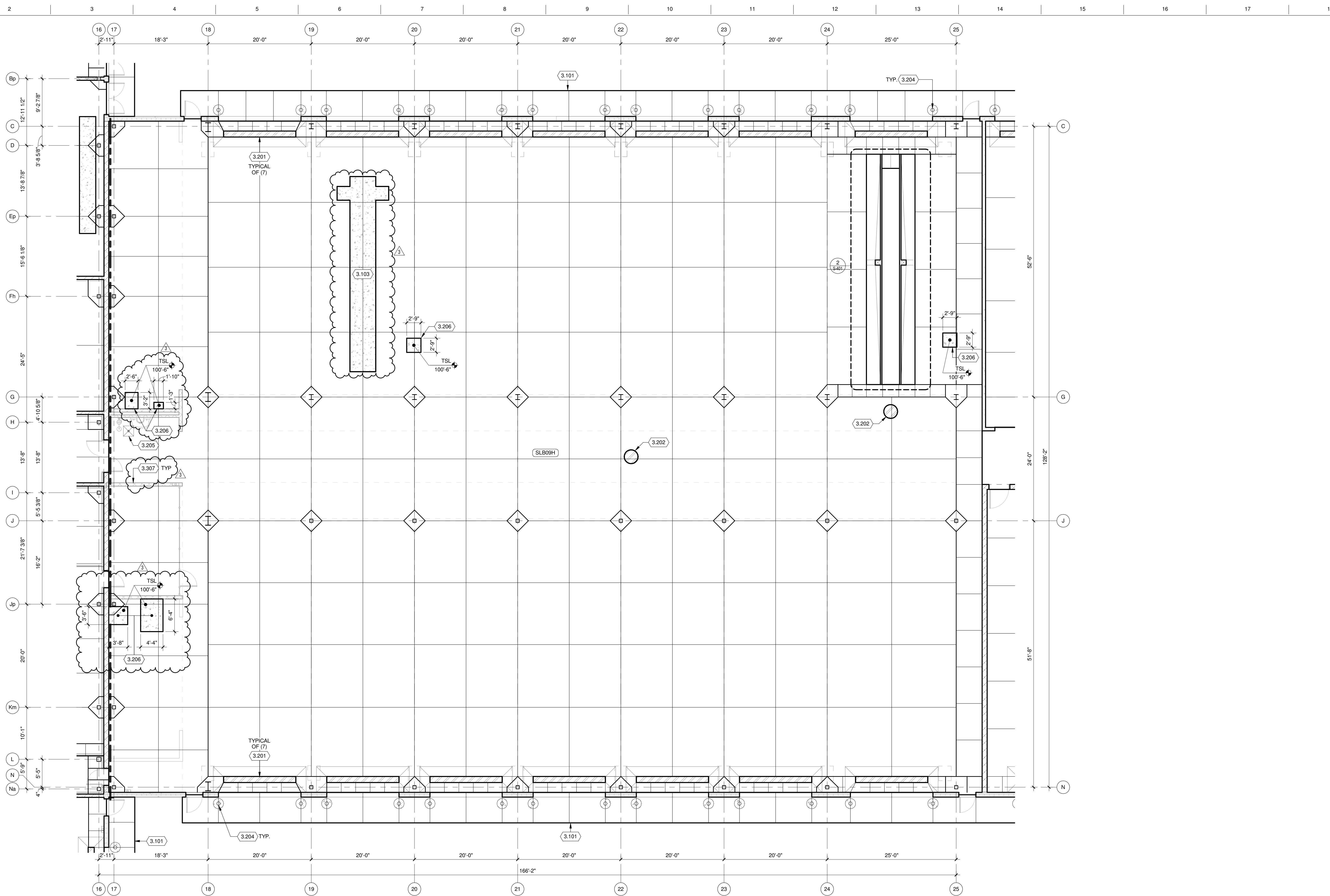
- 3.101 STOOP. SEE DETAIL 11/S-501
- 3.201 TRENCH DRAIN. SEE DETAIL
- 3.202 CATCH BASIN. SEE PLUMBING DRAWINGS.
- 3.203 10'-0" X 6'-0" AREA CENTERED UNDER LIFT IN ADDITION TO TYPICAL SLAB REINFORCING ADD #5 BARS AT 4" O.C. IN THE 10'-0" DIRECTION AND #5 BARS AT 16" O.C. IN THE 6'-0" DIRECTION, CENTERED IN SLAB.
- 3.204 BOLLARD. SEE DETAIL 14/S-511
- 3.205 2'-0" X 2'-0" AREA WELL SLOPED DOWN TO FLOOR DRAIN. FLOOR DRAIN RIM ELEVATION -1/2" FROM TOP OF SLAB.
- 3.206 GROUND LEVEL EQUIPMENT PAD. SEE DETAIL 8/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

FLATWORK PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS. BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-501 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-511 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO DETAIL 1/S-511 FOR STRUCTURAL SLAB TYPES.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. FLOAT AND TROWEL FLOOR SLABS PER REQUIREMENTS OF ARCH. FLOOR FINISH SYSTEM.
8. (2) DASHED LINES = = = = INDICATE (2) ADDITIONAL #4 BARS (5'-0" LONG) DIAGONAL 6" FROM CORNER IN SLAB, 2" CLEAR FROM TOP OF SLAB.
9. COORDINATE EXTENTS OF RADIANT FLOOR SLABS WITH MECHANICAL.
10. LINES SHOWN AT INTERIOR CONCRETE FLOOR SLABS-ON-GRADE INDICATE CONCEPT LEVEL CONTROL/CONSTRUCTION JOINT LAYOUT. SEE JOINT DETAILS ON SHEET S-551.
11. CONTRACTOR SHALL SUBMIT A FINAL CONTROL/CONSTRUCTION JOINT LAYOUT FOR APPROVAL PRIOR TO INSTALLATION OF CONCRETE SLABS.
12. THE FINAL CONTROL/CONSTRUCTION JOINT LAYOUT SHALL CONFORM TO THE FOLLOWING:
 - A. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 5-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - B. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 6-INCH SLAB SHALL BE LIMITED TO 10'-0".
 - C. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 7-INCH SLAB SHALL BE LIMITED TO 14'-0".
 - D. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 8-INCH SLAB SHALL BE LIMITED TO 16'-0".
 - E. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 9-INCH SLAB SHALL BE LIMITED TO 18'-0".
 - F. PROVIDE JOINT SPACING AS NECESSARY TO MAINTAIN APPROXIMATELY SQUARE PANELS.
 - G. MAXIMUM CONTROL/CONSTRUCTION JOINT ASPECT RATIO SHALL BE LIMITED TO 1.5/1.0.
13. SEE SPECIFICATION SECTION 03.30.00 FOR ADDITIONAL INFORMATION REGARDING JOINTING FOR CONCRETE WORK.



CHUCK WOODS ARCHITECTURE
 1000 WILSON BLVD.
 SUITE 360
 ARLINGTON, VA 22209
 571-290-7679



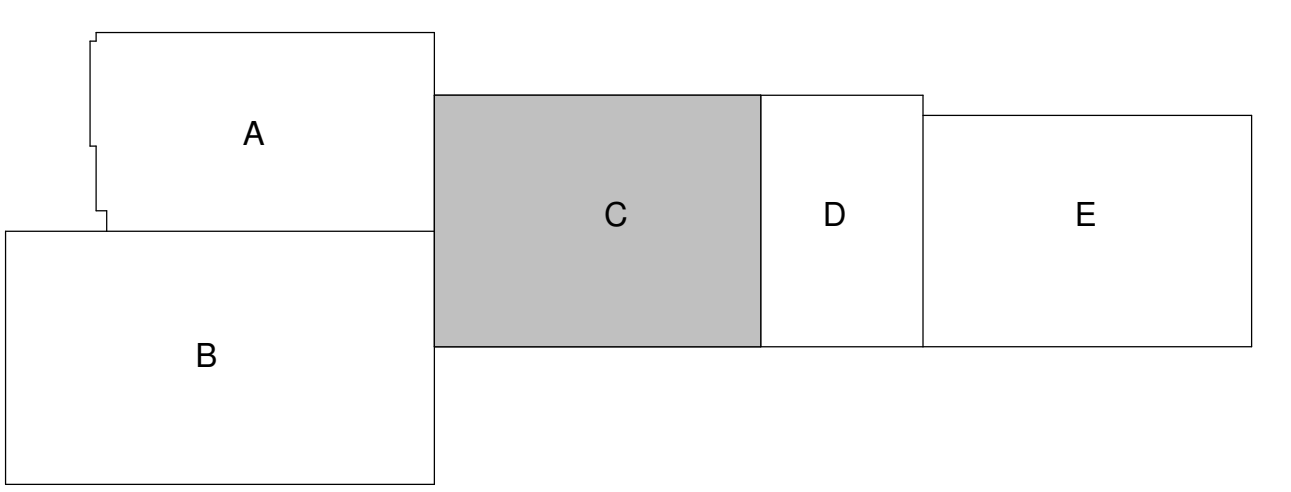
TRUE PLAN NORTH NORTH
1 **FLATWORK PLAN AREA C**
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.103 LIFT FOUNDATION DESIGN BY LIFT SUPPLIER'S PROFESSIONAL ENGINEER. SUBMIT PE STAMPED AND SIGNED FOUNDATION DESIGN.
- 3.201 TRENCH DRAIN, SEE DETAIL.
- 3.202 CATCH BASIN, SEE PLUMBING DRAWINGS.
- 3.204 BOLLARD, SEE DETAIL 14/S-511
- 3.205 2'-0" X 2'-0" AREA WELL SLOPED DOWN TO FLOOR DRAIN. FLOOR DRAIN RIM ELEVATION -1/2" FROM TOP OF SLAB.
- 3.206 GROUND LEVEL EQUIPMENT PAD, SEE DETAIL 8/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)
- 3.307 CONSTRUCTED MASONRY WALLS 8'-0" OR LESS IN HEIGHT ON TOP OF SLAB. REINFORCE WALL WITH #4 BARS AT 24" O.C. EXTEND REINFORCEMENT INTO SLAB 6" IN EPOXY.

FLATWORK PLAN GENERAL NOTES:

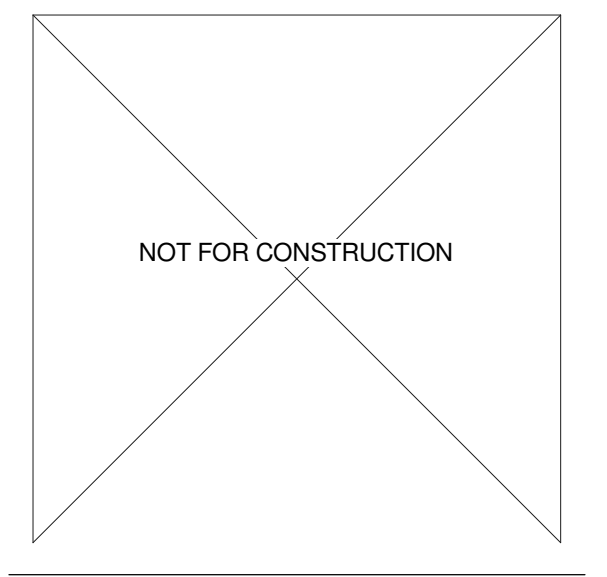
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2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
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4. REFER TO SHEET S-511 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO DETAIL 1/S-511 FOR STRUCTURAL SLAB TYPES.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. FLOAT AND TROWEL FLOOR SLABS PER REQUIREMENTS OF ARCH. FLOOR FINISH SYSTEM.
8. (2) DASHED LINES - - - - INDICATE (2) ADDITIONAL #4 BARS (5'-0" LONG) DIAGONAL 6" FROM CORNER IN SLAB, 2" CLEAR FROM TOP OF SLAB.
9. COORDINATE EXTENTS OF RADIANT FLOOR SLABS WITH MECHANICAL.
10. LINES SHOWN AT INTERIOR CONCRETE FLOOR SLABS-ON-GRADE INDICATE CONCEPT LEVEL CONTROL/CONSTRUCTION JOINT LAYOUT. SEE JOINT DETAILS ON SHEET S-551.
11. CONTRACTOR SHALL SUBMIT A FINAL CONTROL/CONSTRUCTION JOINT LAYOUT FOR APPROVAL PRIOR TO INSTALLATION OF CONCRETE SLABS.
12. THE FINAL CONTROL/CONSTRUCTION JOINT LAYOUT SHALL CONFORM TO THE FOLLOWING:
 - A. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 5-INCH SLAB SHALL BE LIMITED TO 10'-0".
 - B. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 6-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - C. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 7-INCH SLAB SHALL BE LIMITED TO 14'-0".
 - D. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 8-INCH SLAB SHALL BE LIMITED TO 16'-0".
 - E. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 9-INCH SLAB SHALL BE LIMITED TO 18'-0".
 - F. PROVIDE JOINT SPACING AS NECESSARY TO MAINTAIN APPROXIMATELY SQUARE PANELS.
 - G. MAXIMUM CONTROL/CONSTRUCTION JOINT ASPECT RATIO SHALL BE LIMITED TO 1.5/1.0.
13. SEE SPECIFICATION SECTION 03.30.00 FOR ADDITIONAL INFORMATION REGARDING JOINTING FOR CONCRETE WORK.



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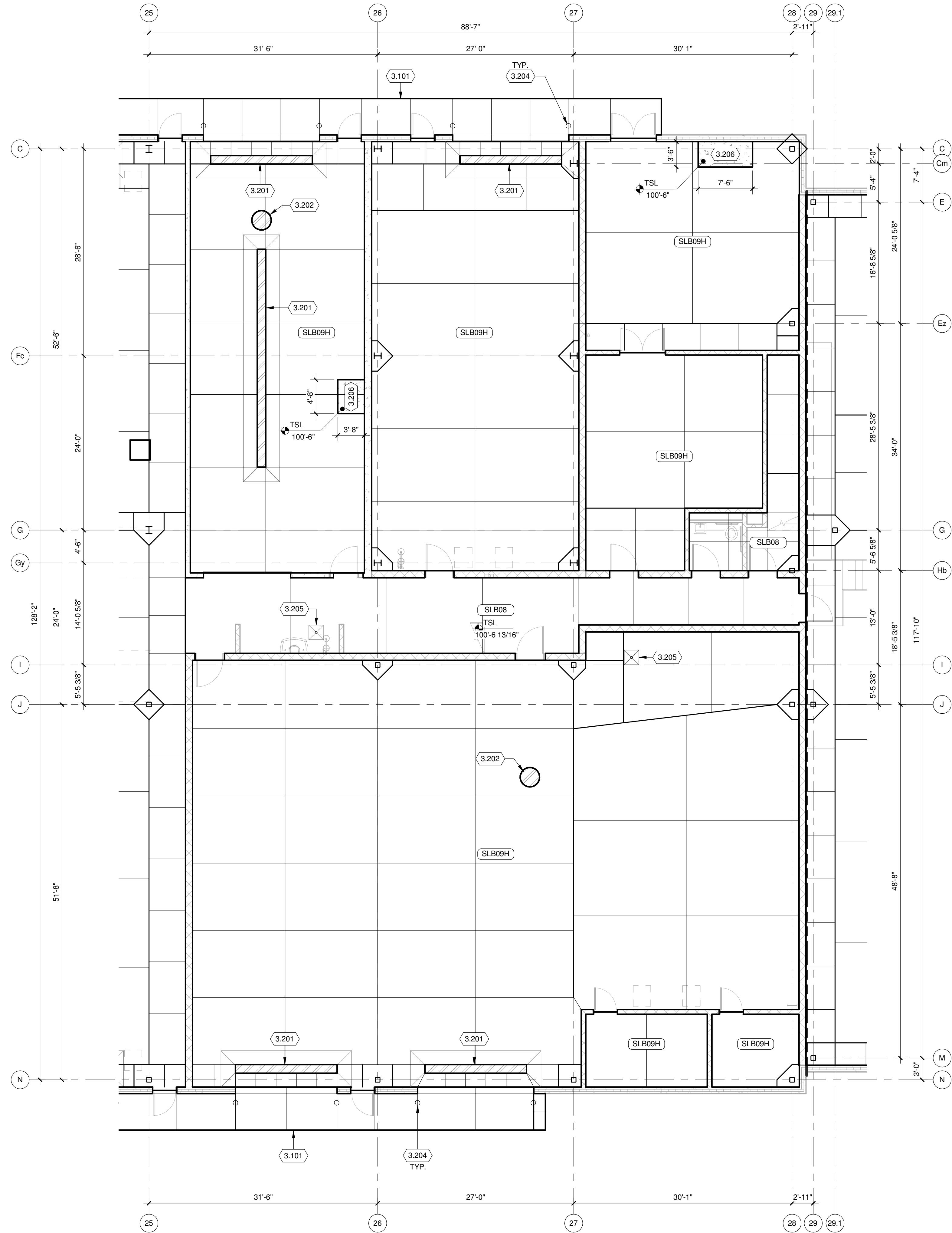


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FLATWORK PLAN AREA C

S-111C



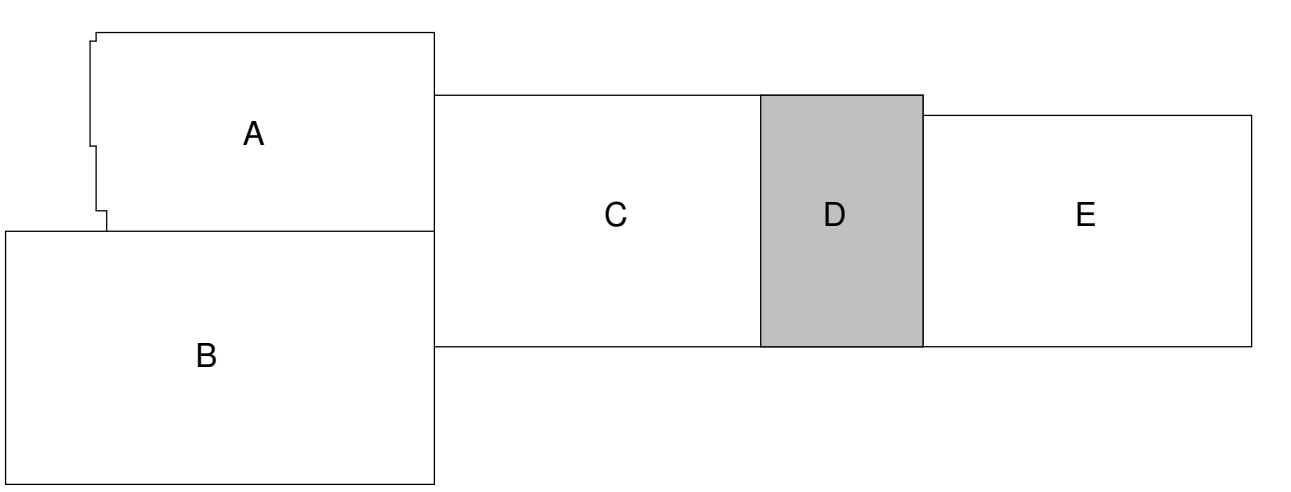
TRUE PLAN NORTH NORTH
FLATWORK PLAN AREA D
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.201 TRENCH DRAIN, SEE DETAIL
- 3.202 CATCH BASIN, SEE PLUMBING DRAWINGS.
- 3.204 BOLLARD, SEE DETAIL 14/S-511
- 3.205 2'-0" X 2'-0" AREA WELL SLOPED DOWN TO FLOOR DRAIN. FLOOR DRAIN RIM ELEVATION -1/2" FROM TOP OF SLAB.
- 3.206 GROUND LEVEL EQUIPMENT PAD. SEE DETAIL 03/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

FLATWORK PLAN GENERAL NOTES:

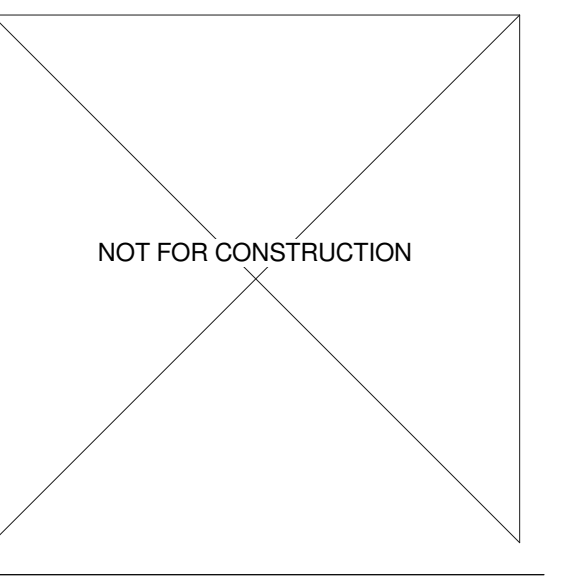
1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-511 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO DETAIL 1/S-511 FOR STRUCTURAL SLAB TYPES.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. FLOAT AND TROWEL FLOOR SLABS PER REQUIREMENTS OF ARCH. FLOOR FINISH SYSTEM.
8. (2) DASHED LINES = = = = INDICATE (2) ADDITIONAL #4 BARS (5'-0" LONG) DIAGONAL 6" FROM CORNER IN SLAB, 2" CLEAR FROM TOP OF SLAB.
9. COORDINATE EXTENTS OF RADIANT FLOOR SLABS WITH MECHANICAL.
10. LINES SHOWN AT INTERIOR CONCRETE FLOOR SLABS ON-GRADE INDICATE CONCEPT LEVEL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT. SEE JOINT DETAILS ON SHEET S-551.
11. CONTRACTOR SHALL SUBMIT A FINAL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT FOR APPROVAL PRIOR TO INSTALLATION OF CONCRETE SLABS.
12. THE FINAL CONTROL/CONTRACTION/CONSTRUCTION JOINT LAYOUT SHALL CONFORM TO THE FOLLOWING:
 - A. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 5-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - B. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 6-INCH SLAB SHALL BE LIMITED TO 10'-0".
 - C. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 7-INCH SLAB SHALL BE LIMITED TO 14'-0".
 - D. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 8-INCH SLAB SHALL BE LIMITED TO 18'-0".
 - E. MAXIMUM CONTROL/CONTRACTION JOINT SPACING AT 9-INCH SLAB SHALL BE LIMITED TO 16'-0".
 - F. PROVIDE JOINT SPACING AS NECESSARY TO MAINTAIN APPROXIMATELY SQUARE PANELS.
 - G. MAXIMUM CONTROL/CONTRACTION JOINT ASPECT RATIO SHALL BE LIMITED TO 1.5/1.0.
13. SEE SPECIFICATION SECTION 03.30.00 FOR ADDITIONAL INFORMATION REGARDING JOINTING FOR CONCRETE WORK.



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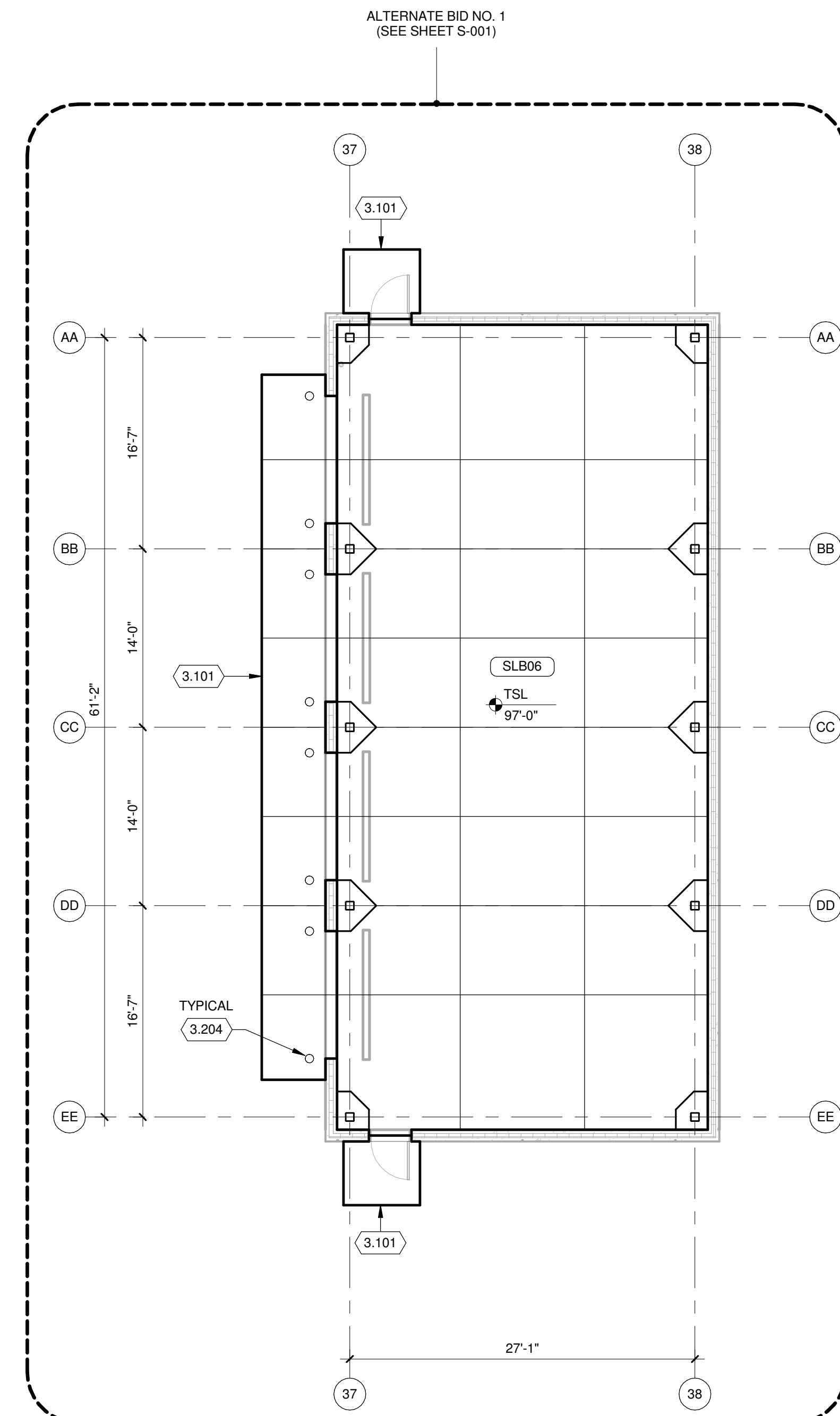
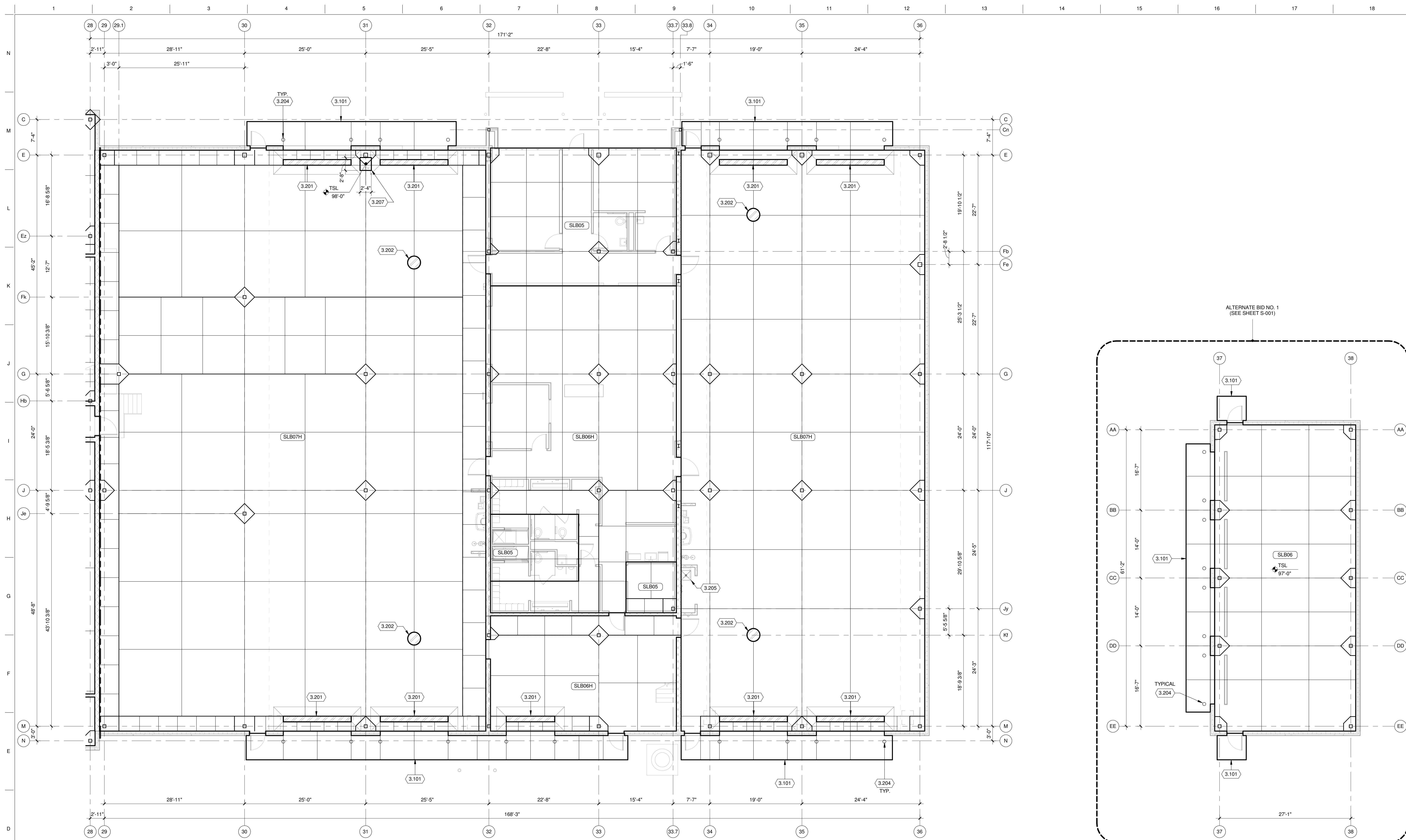


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
1	ISSUE FOR BID	02/07/2019
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FLATWORK PLAN AREA D

S-111D



TRUE PLAN NORTH NORTH
1 FLATWORK PLAN AREA E
1/8" = 1'-0"

KEYED NOTES

- 3.101 STOOP, SEE DETAIL 11/S-501
- 3.201 TRENCH DRAIN, SEE DETAIL
- 3.202 CATCH BASIN, SEE PLUMBING DRAWINGS.
- 3.204 BOLLARD, SEE DETAIL 14/S-511
- 3.205 2'-0" X 2'-0" AREA WELL SLOPED DOWN TO FLOOR DRAIN. FLOOR DRAIN RIM ELEVATION -1/2" FROM TOP OF SLAB.
- 3.207 GROUND LEVEL EQUIPMENT PAD, SIMILAR TO DETAIL 8/S-511. ANCHOR PAD TO MAIN SLAB ON ONE SIDE OF CONTROL JOINT ONLY. INSTALL TWO LAYERS OF TAR PAPER BETWEEN MAIN SLAB AND PAD. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

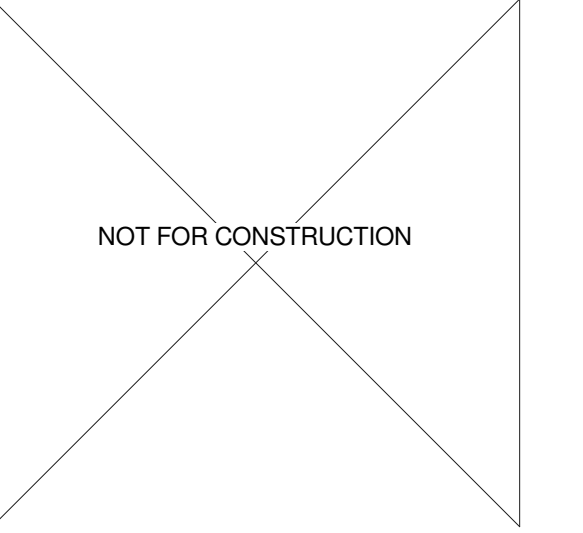
FLATWORK PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-011 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO DETAIL 1/S-511 FOR STRUCTURAL SLAB TYPES.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. FLOAT AND TROWEL FLOOR SLABS PER REQUIREMENTS OF ARCH. FLOOR FINISH SYSTEM.
8. (2) DASHED LINES = INDICATE (2) ADDITIONAL #4 BARS (5'-0" LONG) DIAGONAL 6" FROM CORNER IN SLAB, 2" CLEAR FROM TOP OF SLAB.
9. COORDINATE EXTENTS OF RADIANT FLOOR SLABS WITH MECHANICAL.
10. LINES SHOWN AT INTERIOR CONCRETE FLOOR SLABS-ON-GRADE INDICATE CONCEPT LEVEL CONTROL/CONSTRUCTION JOINT LAYOUT. SEE JOINT DETAILS ON SHEET S-551.
11. CONTRACTOR SHALL SUBMIT A FINAL CONTROL/CONSTRUCTION JOINT LAYOUT FOR APPROVAL PRIOR TO INSTALLATION OF CONCRETE SLABS.
12. THE FINAL CONTROL/CONSTRUCTION JOINT LAYOUT SHALL CONFORM TO THE FOLLOWING:
 - A. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 5-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - B. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 6-INCH SLAB SHALL BE LIMITED TO 12'-0".
 - C. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 7-INCH SLAB SHALL BE LIMITED TO 14'-0".
 - D. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 8-INCH SLAB SHALL BE LIMITED TO 16'-0".
 - E. MAXIMUM CONTROL/CONSTRUCTION JOINT SPACING AT 9-INCH SLAB SHALL BE LIMITED TO 18'-0".
 - F. PROVIDE JOINT SPACING AS NECESSARY TO MAINTAIN APPROXIMATELY SQUARE PANELS.
 - G. MAXIMUM CONTROL/CONSTRUCTION JOINT ASPECT RATIO SHALL BE LIMITED TO 1.5/1.0.
13. SEE SPECIFICATION SECTION 03.30.00 FOR ADDITIONAL INFORMATION REGARDING JOINTING FOR CONCRETE WORK.

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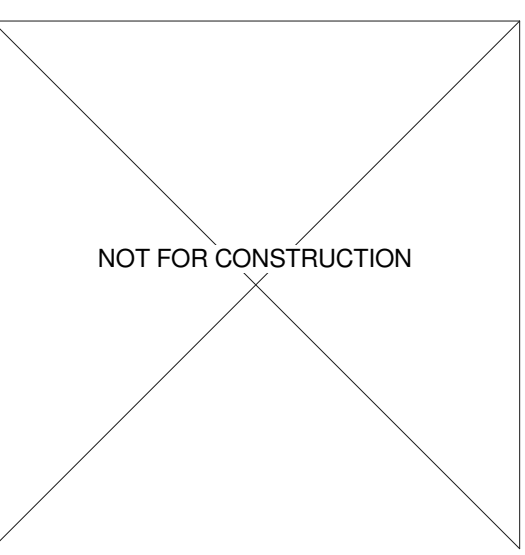


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3	ADDENDUM 3	03/14/2019
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FLATWORK PLAN AREA E

S-111E

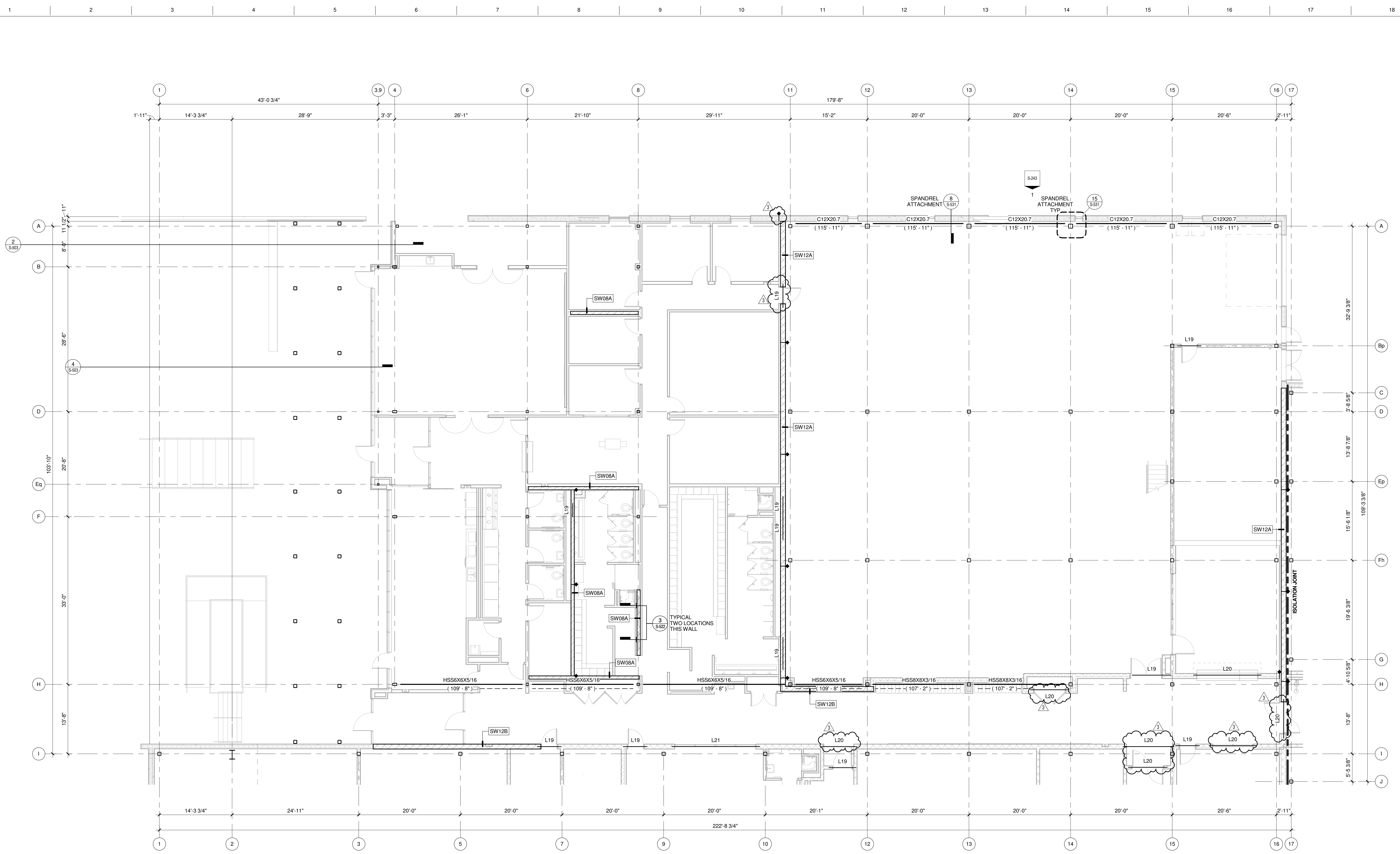


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LEVEL 1 STRUCTURAL FLOOR PLAN AREA A

S-131A

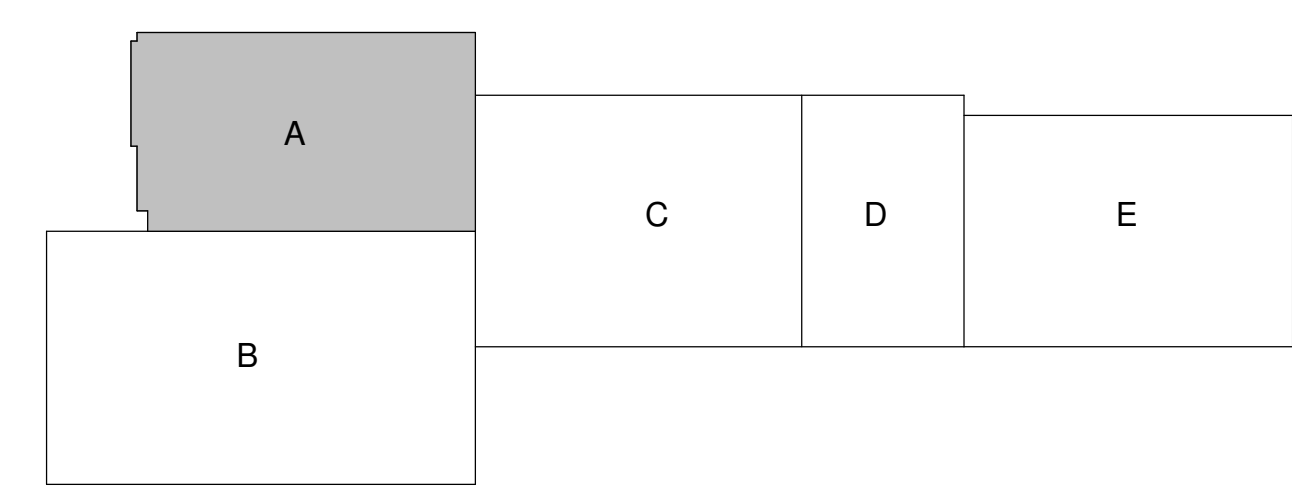


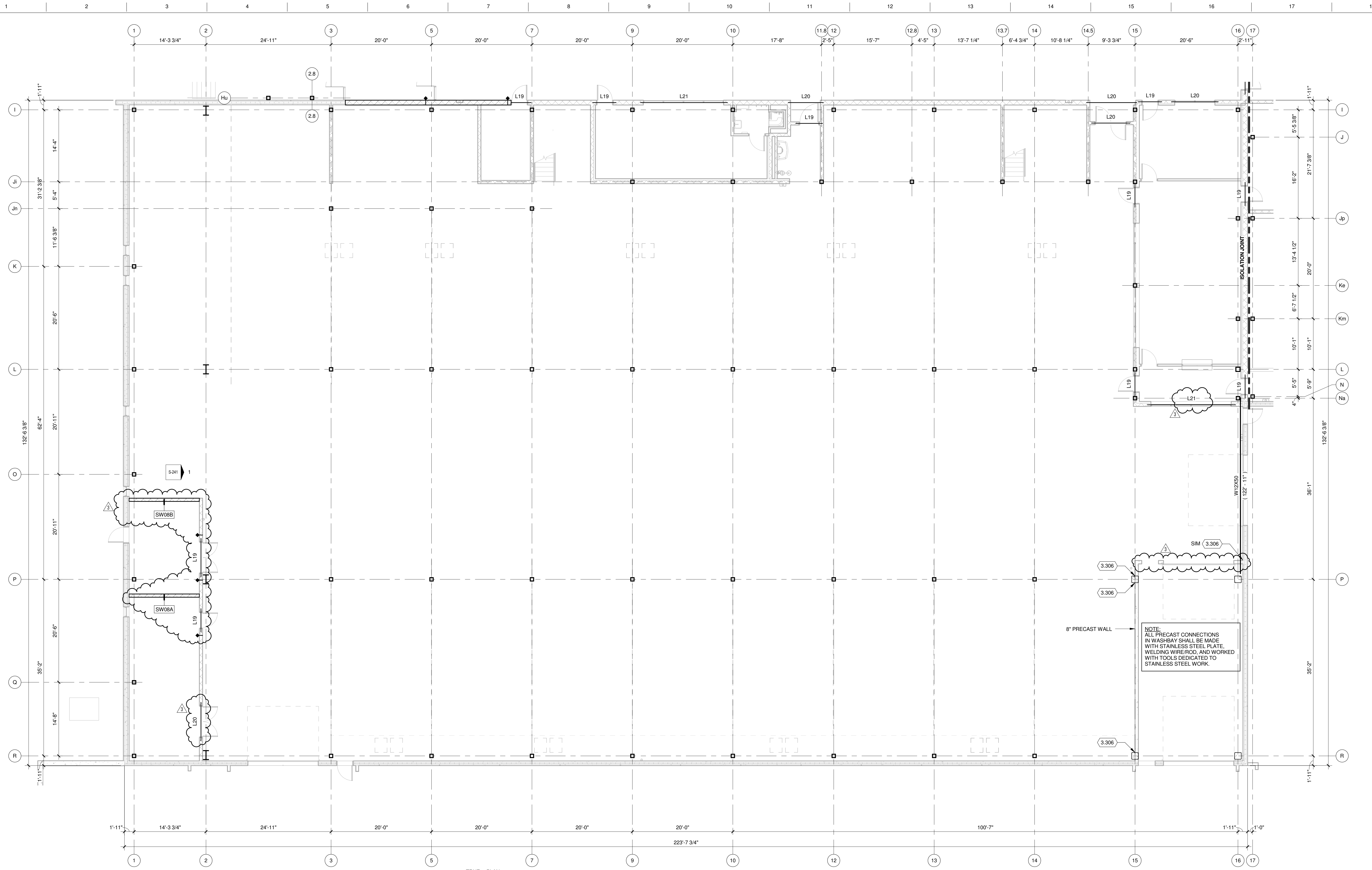
TRUE PLAN NORTH NORTH
1 LEVEL 1 STRUCTURAL FLOOR PLAN AREA A
1/8" = 1'-0"

KEYED NOTES

STRUCTURAL FLOOR PLAN GENERAL NOTES:

- SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOGY.
- REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
- GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
- ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
- STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
- PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
- COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, SOUD BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
- CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
- ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
- CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.





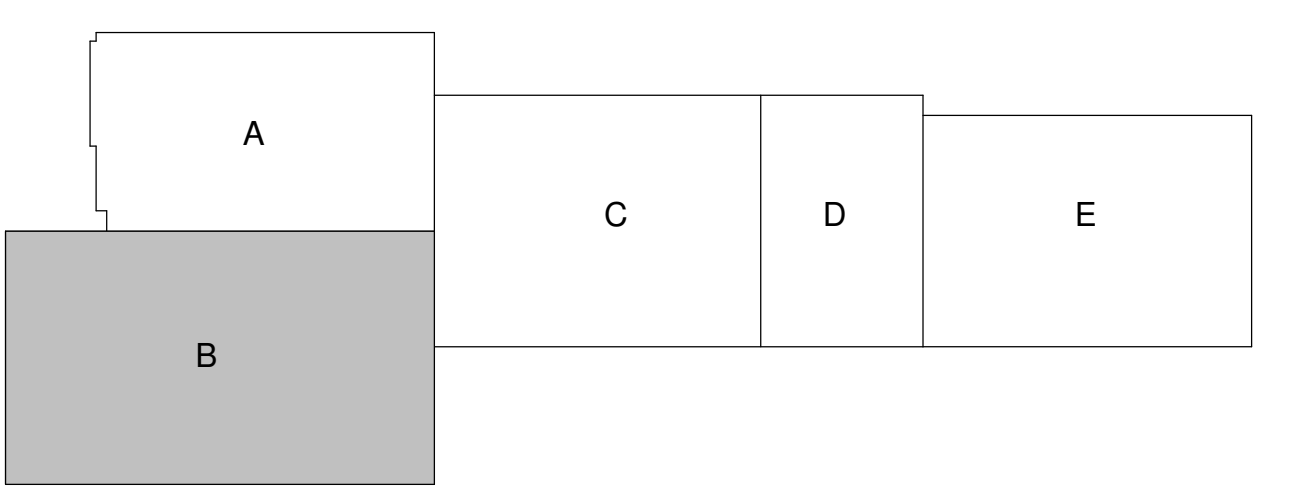
TRUE PLAN NORTH NORTH
1 LEVEL 1 STRUCTURAL FLOOR PLAN AREA B
1/8" = 1'-0"

KEYED NOTES

3.306 CONNECTION OF PRECAST WALL TO PRECAST COLUMN BY PRECAST DESIGNER.

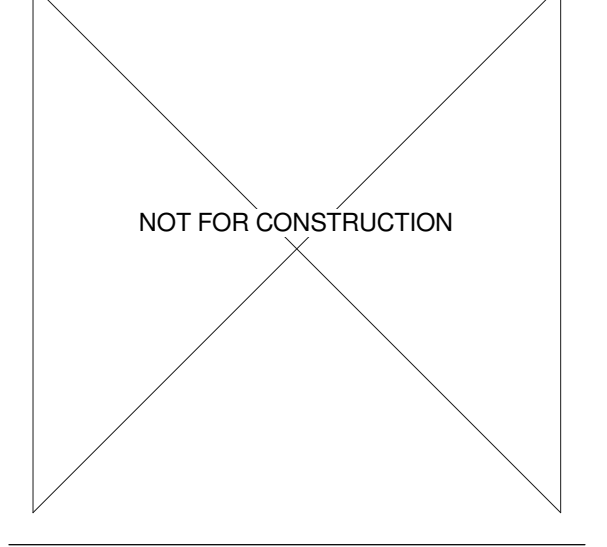
STRUCTURAL FLOOR PLAN GENERAL NOTES:

- SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOLOGY.
- REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
- GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
- ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
- STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
- PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
- COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, SOUD BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
- CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
- ◆ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
- CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.



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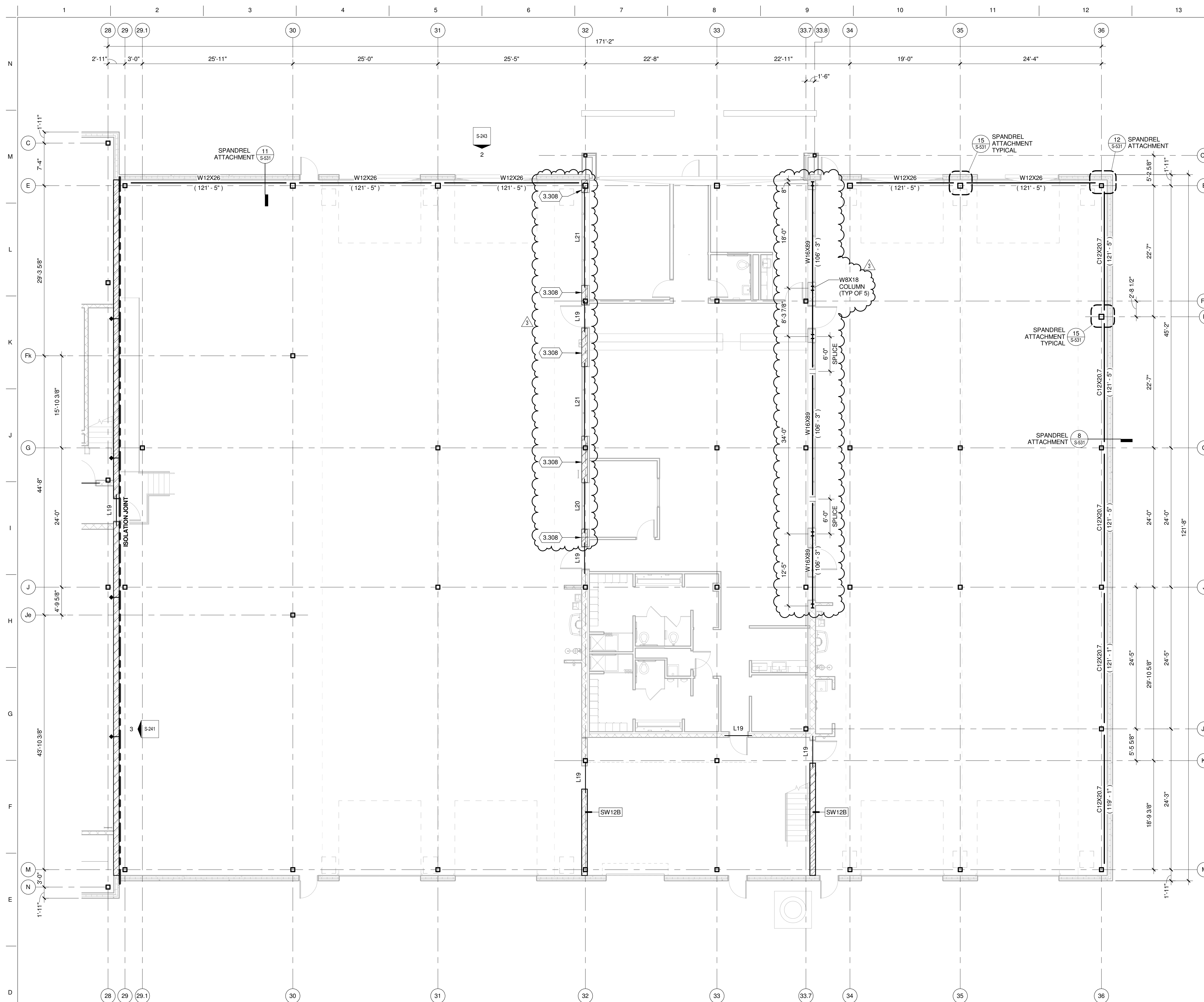


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
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LEVEL 1 STRUCTURAL FLOOR PLAN AREA B

S-131B



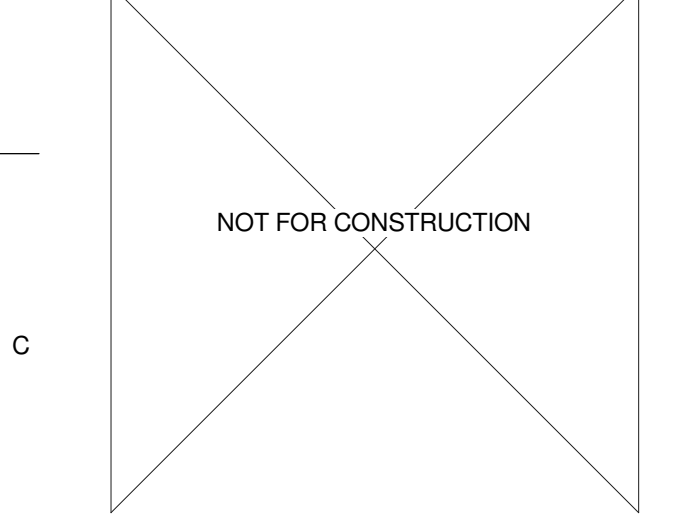
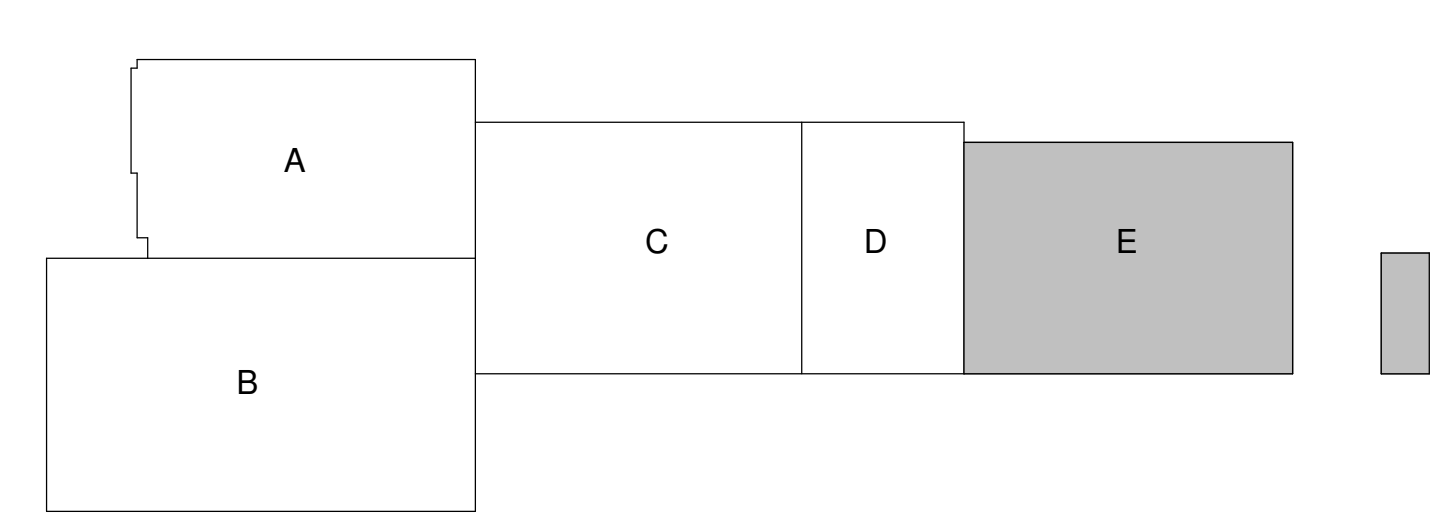
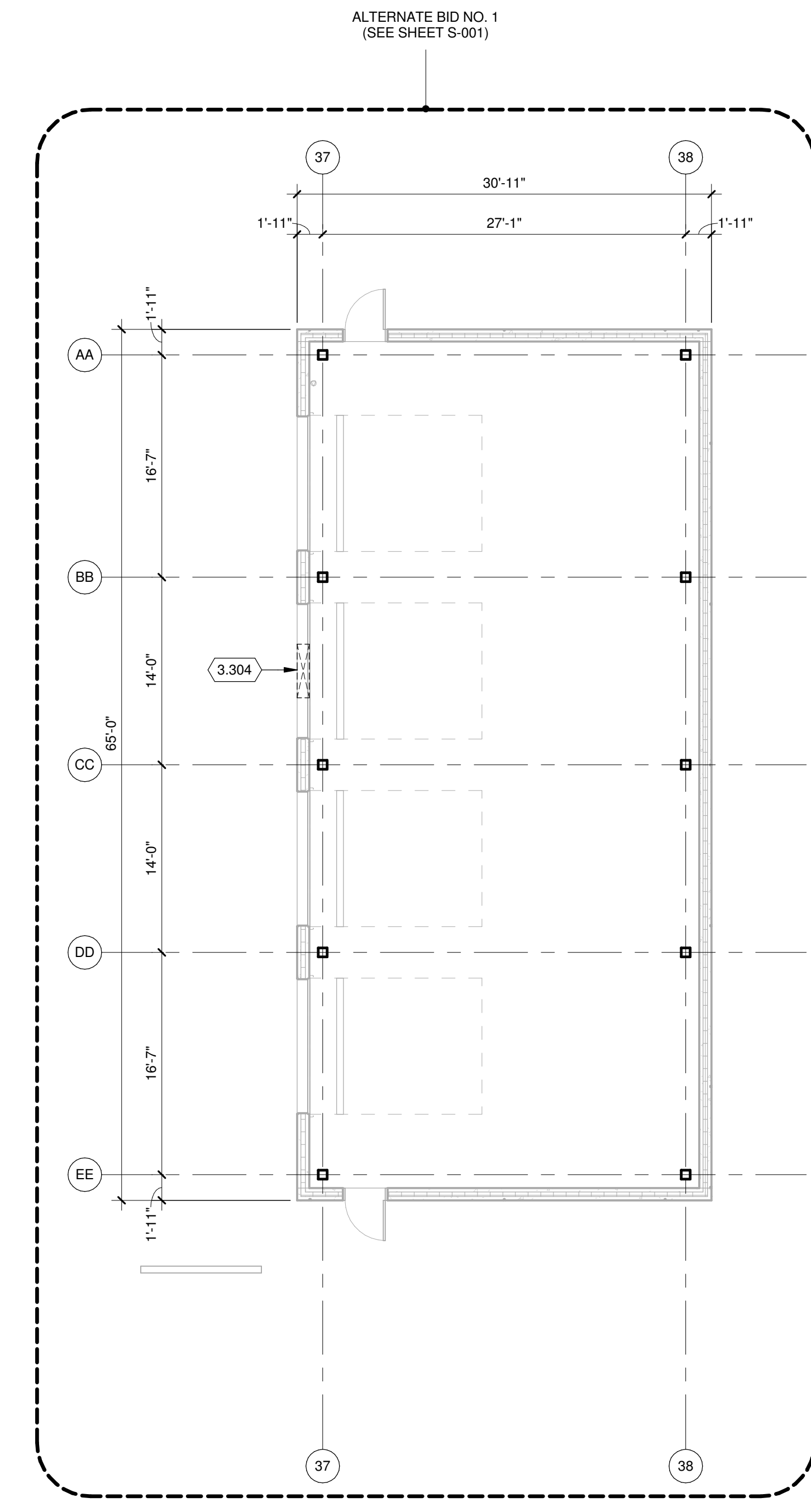
TRUE PLAN NORTH NORTH
1 LEVEL 1 STRUCTURAL FLOOR PLAN AREA E
 1/8" = 1'-0"

KEYED NOTES

- 3.304 PRECAST SUPPLIER PROVIDE 1'-0" HIGH X 4'-0" WIDE OPENING IN PRECAST WALL PANEL BELOW FLOOR LEVEL FOR ELECTRICAL/TECHNOLOGY CONDUIT BANK. COORDINATE EXACT SIZE AND LOCATION WITH ELECTRICAL/TECHNOLOGY.
- 3.308 GROUT MASONRY SOLID. (1) #5 BAR AT 8" O.C. EACH FACE.

STRUCTURAL FLOOR PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOLOGY.
4. REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
7. GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
8. ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
9. STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
10. PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
11. COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, SCRD BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
12. CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
13. ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
14. CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.

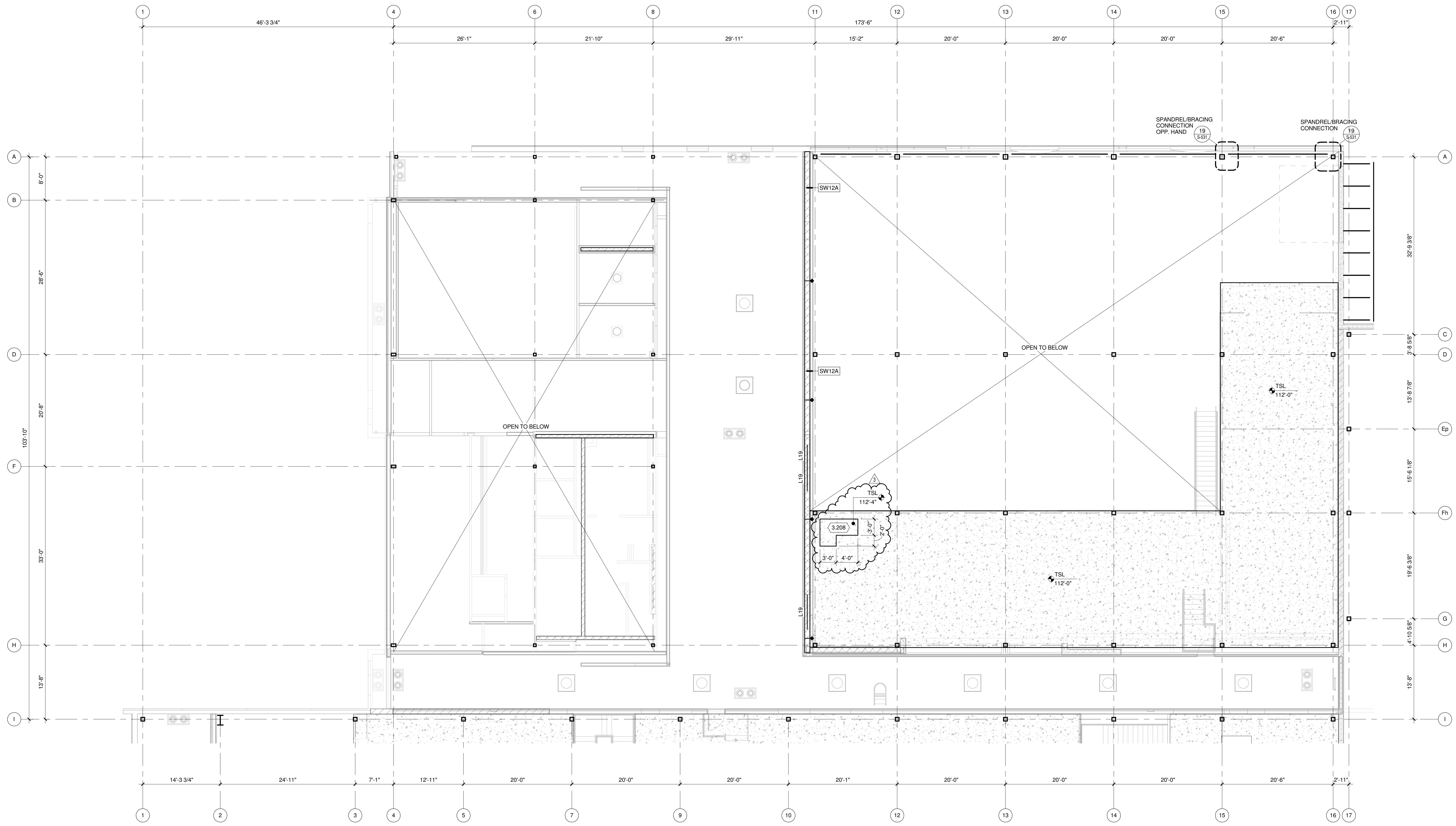


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LEVEL 1 STRUCTURAL FLOOR PLAN AREA E

S-131E



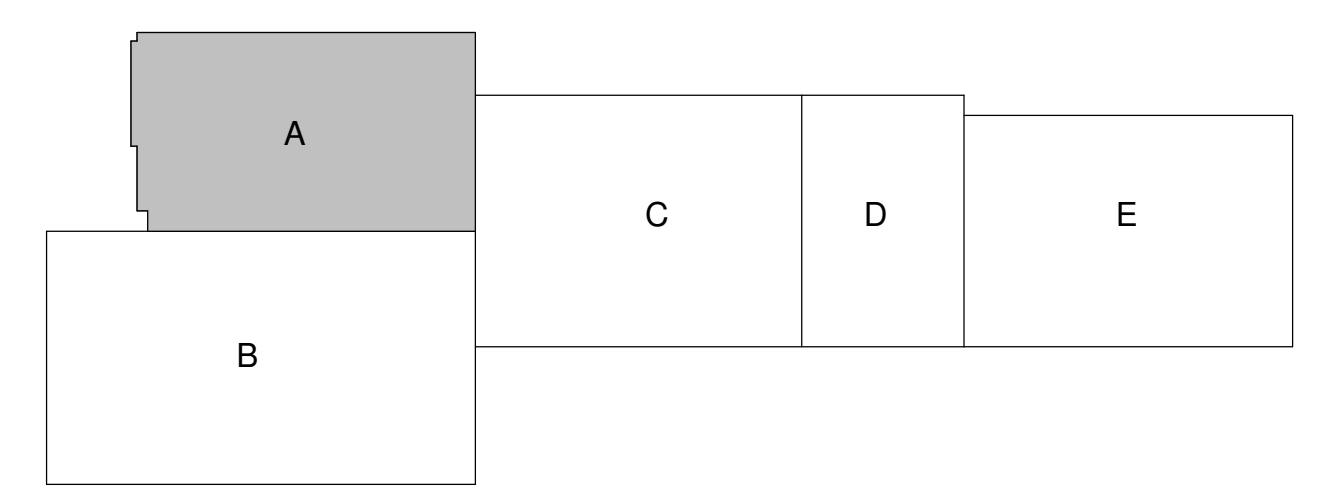
TRUE PLAN NORTH NORTH
MEZZANINE STRUCTURAL FLOOR PLAN AREA A
1/8" = 1'-0"

KEYED NOTES

- 3.208 MEZZANINE LEVEL EQUIPMENT PAD, SEE DETAIL 10/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

STRUCTURAL FLOOR PLAN GENERAL NOTES:

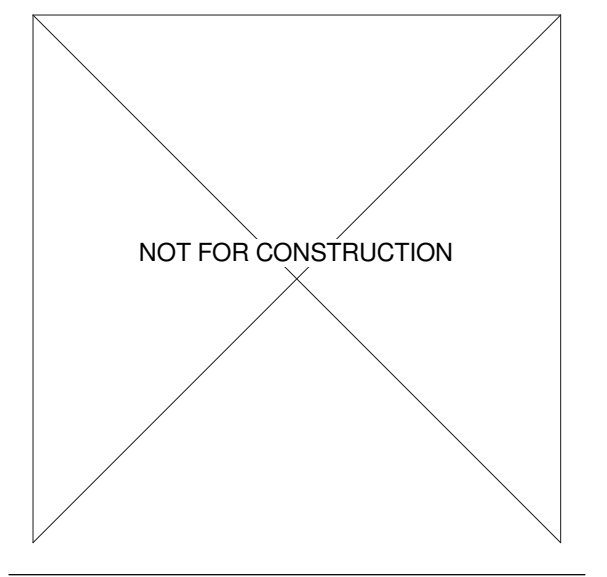
1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOGY.
4. REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
7. GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
8. ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
9. STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
10. PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
11. COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, BOND BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
12. CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
13. ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
14. CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.



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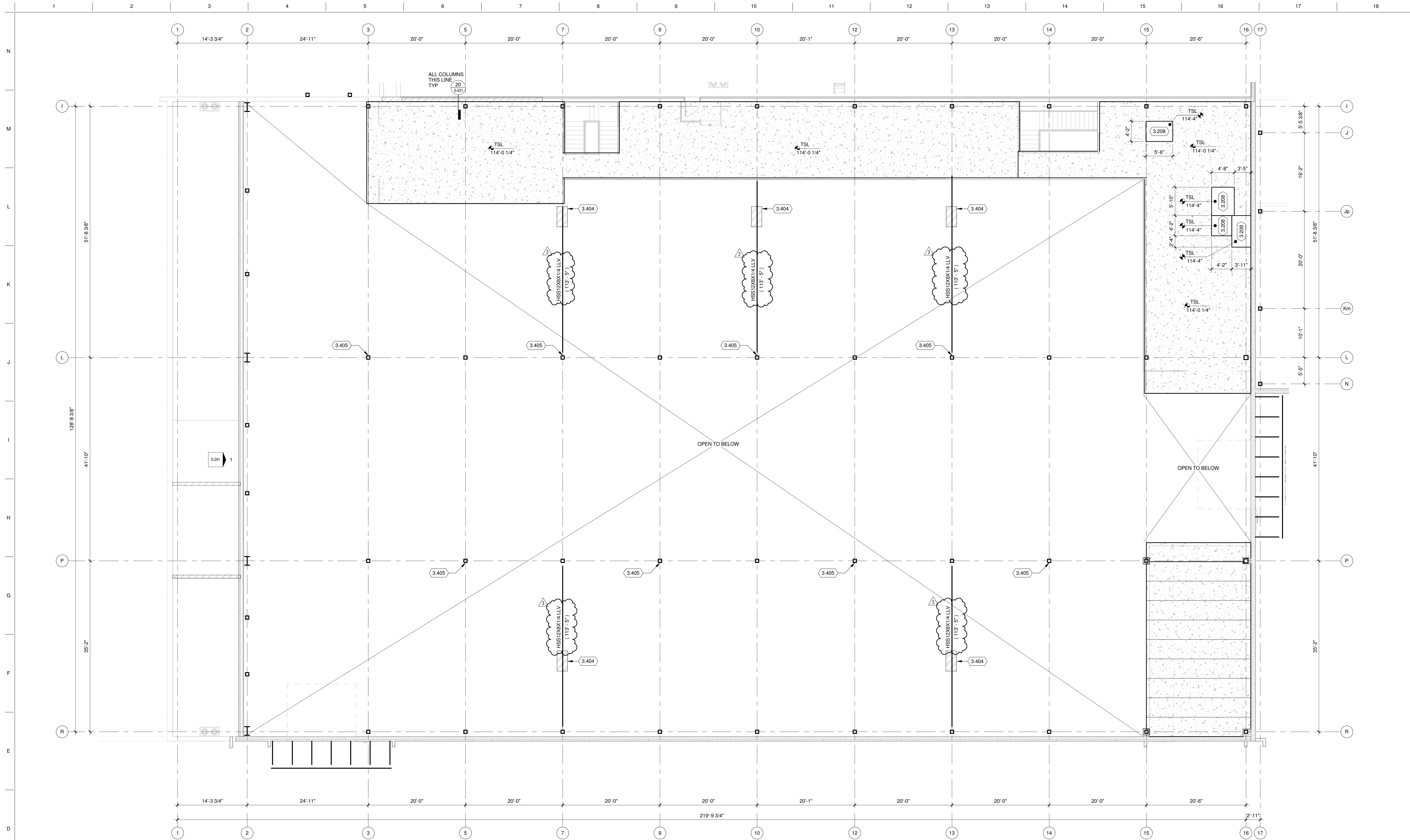


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MEZZANINE STRUCTURAL FLOOR PLAN AREA A

S-132A



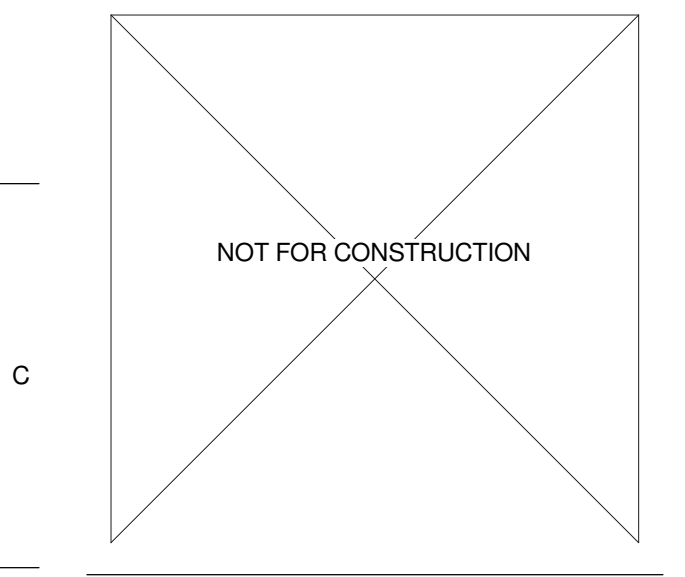
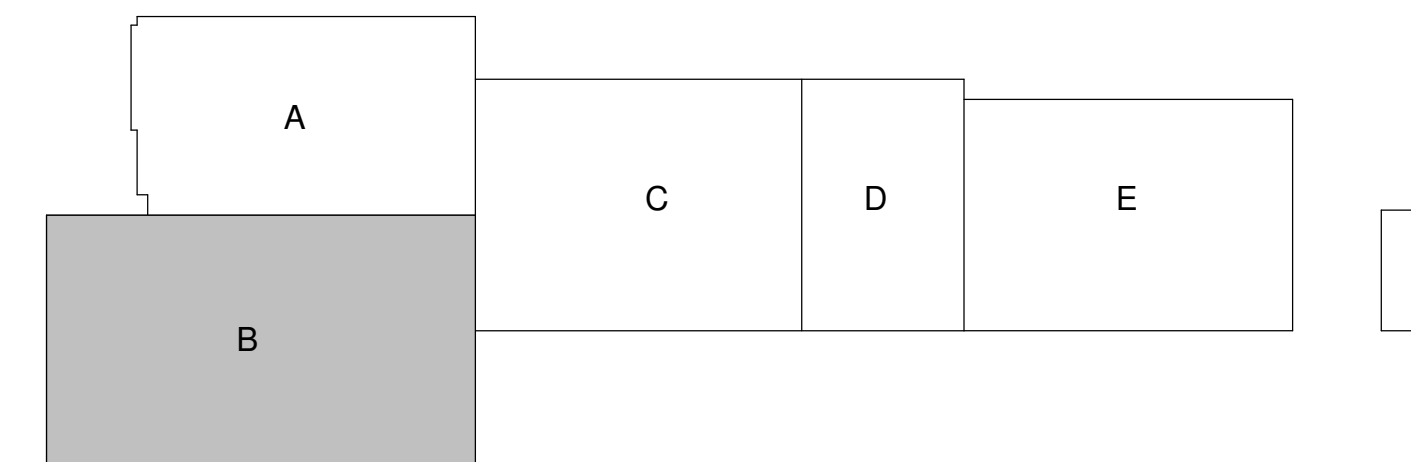
TRUE PLAN
NORTH NORTH
MEZZANINE STRUCTURAL FLOOR PLAN AREA B
1/8" = 1'-0"

KEYED NOTES

- 3.208 MEZZANINE LEVEL EQUIPMENT PAD, SEE DETAIL 10/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)
- 3.404 PROVIDE 3/8" THICK PLATE WELDED TO HSS BEAM FOR SUPPORT OF LUBE REEL. COORDINATE SIZE OF PLATE AND HOLE PATTERN WITH EQUIPMENT SUPPLIER.
- 3.405 PROVIDE 3/8" THICK PLATE WELDED TO COLUMN FOR SUPPORT OF EXHAUST HOSE. COORDINATE SIZE OF PLATE AND HOLE PATTERN WITH EQUIPMENT SUPPLIER. (SEE DETAIL 2/Q-501)

STRUCTURAL FLOOR PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-601 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOGY.
4. REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW88A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
7. GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
8. ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
9. STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
10. PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
11. COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, BOND BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
12. CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
13. ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
14. CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.

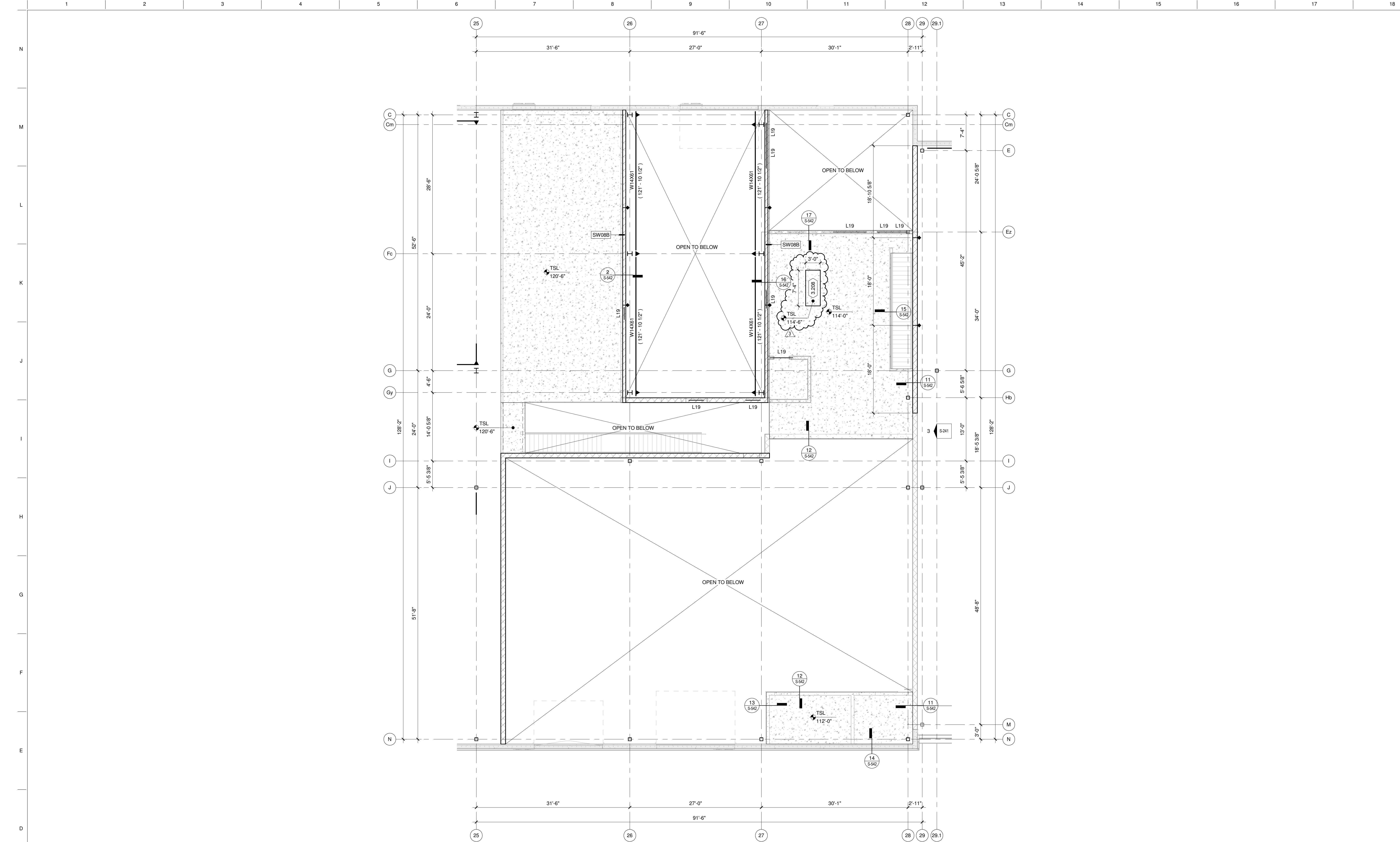


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
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PROJECT No: 1303500-160264.01

MEZZANINE STRUCTURAL
FLOOR PLAN AREA B

S-132B



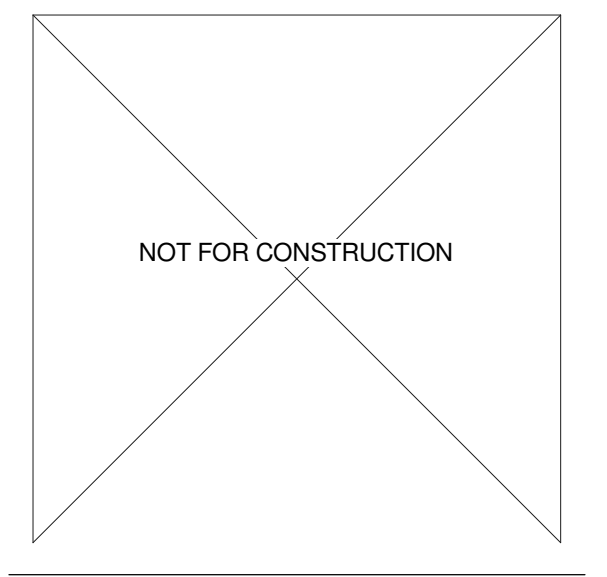
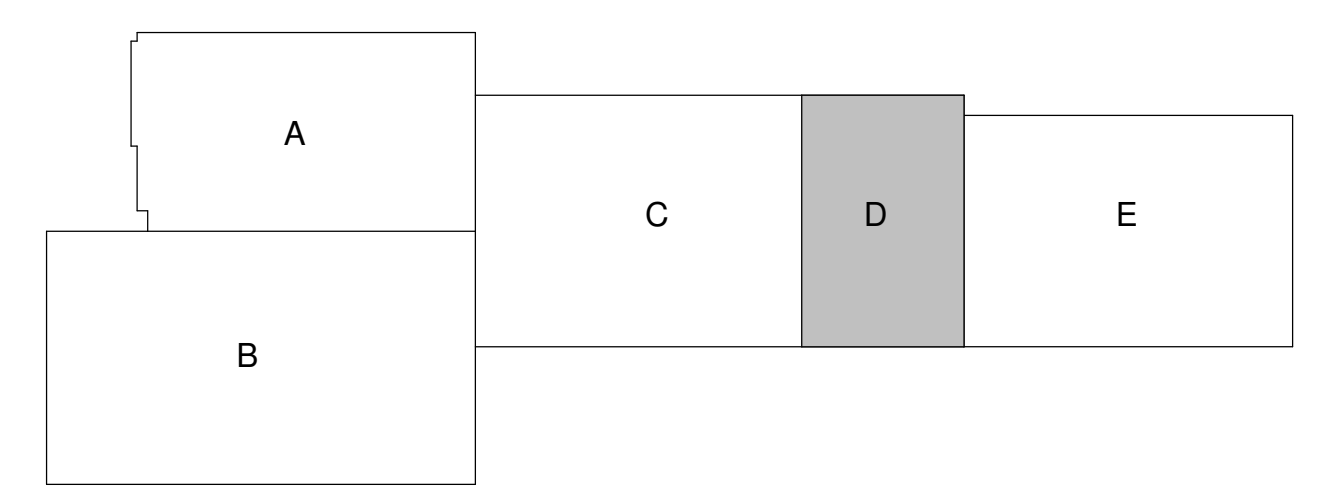
TRUE PLAN NORTH NORTH
MEZZANINE STRUCTURAL FLOOR PLAN AREA D
 1/8" = 1'-0"

KEYED NOTES

3.208 MEZZANINE LEVEL EQUIPMENT PAD, SEE DETAIL 10/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL)

STRUCTURAL FLOOR PLAN GENERAL NOTES:

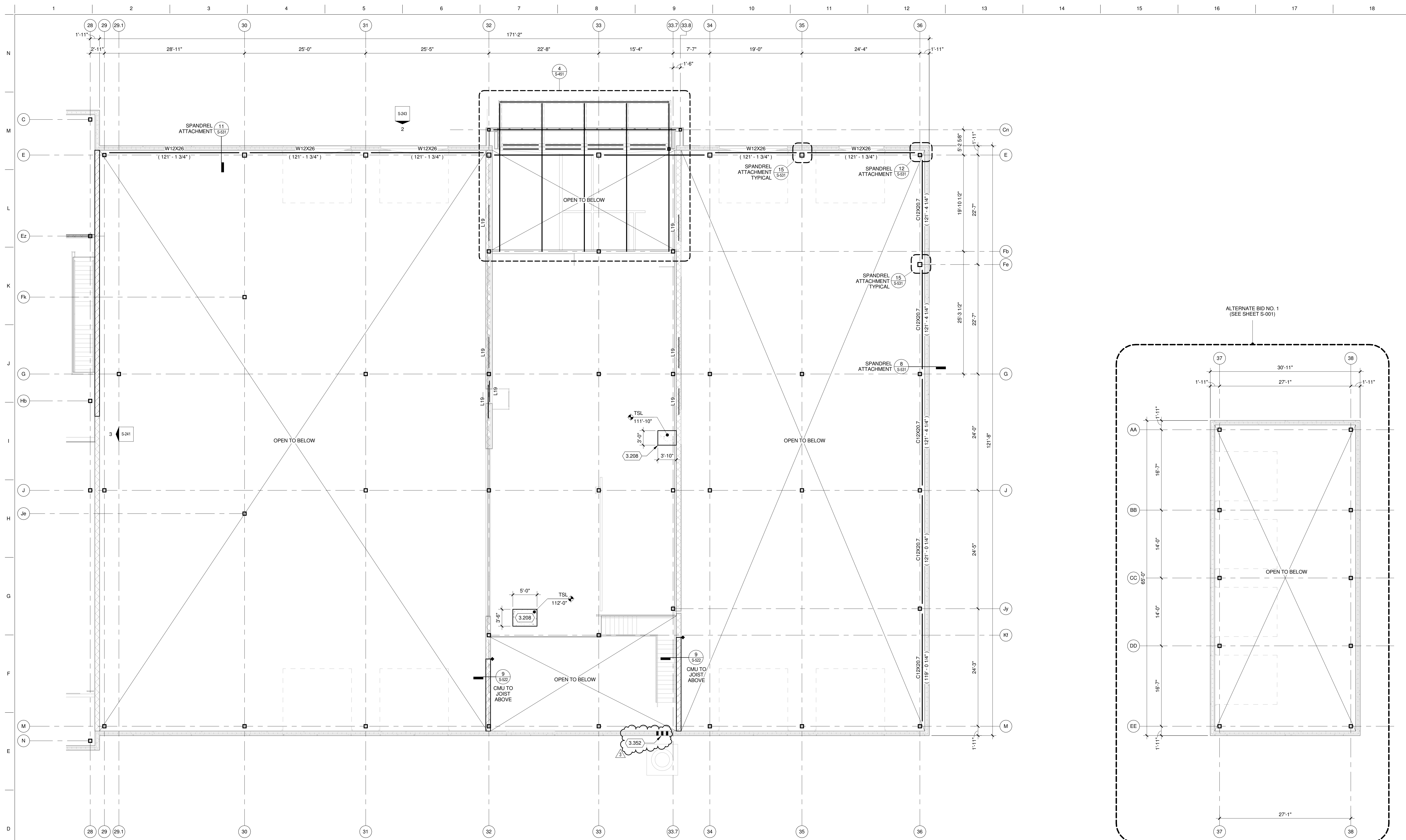
- SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, E, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOGY.
- REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
- GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
- ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
- STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
- PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
- COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, BOND BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
- CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
- ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
- CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.



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MEZZANINE STRUCTURAL FLOOR PLAN AREA D



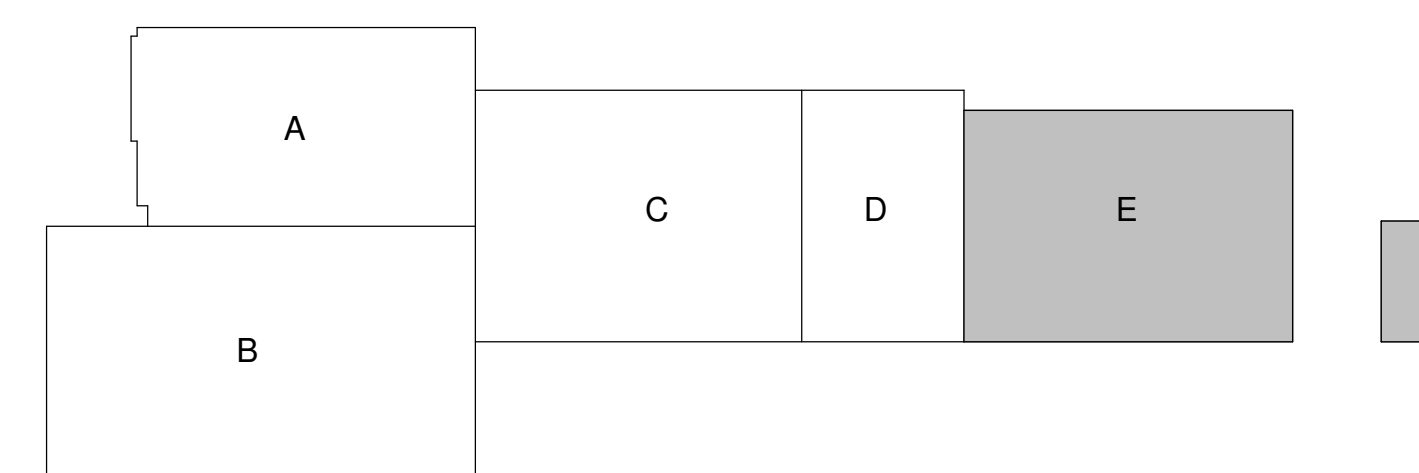
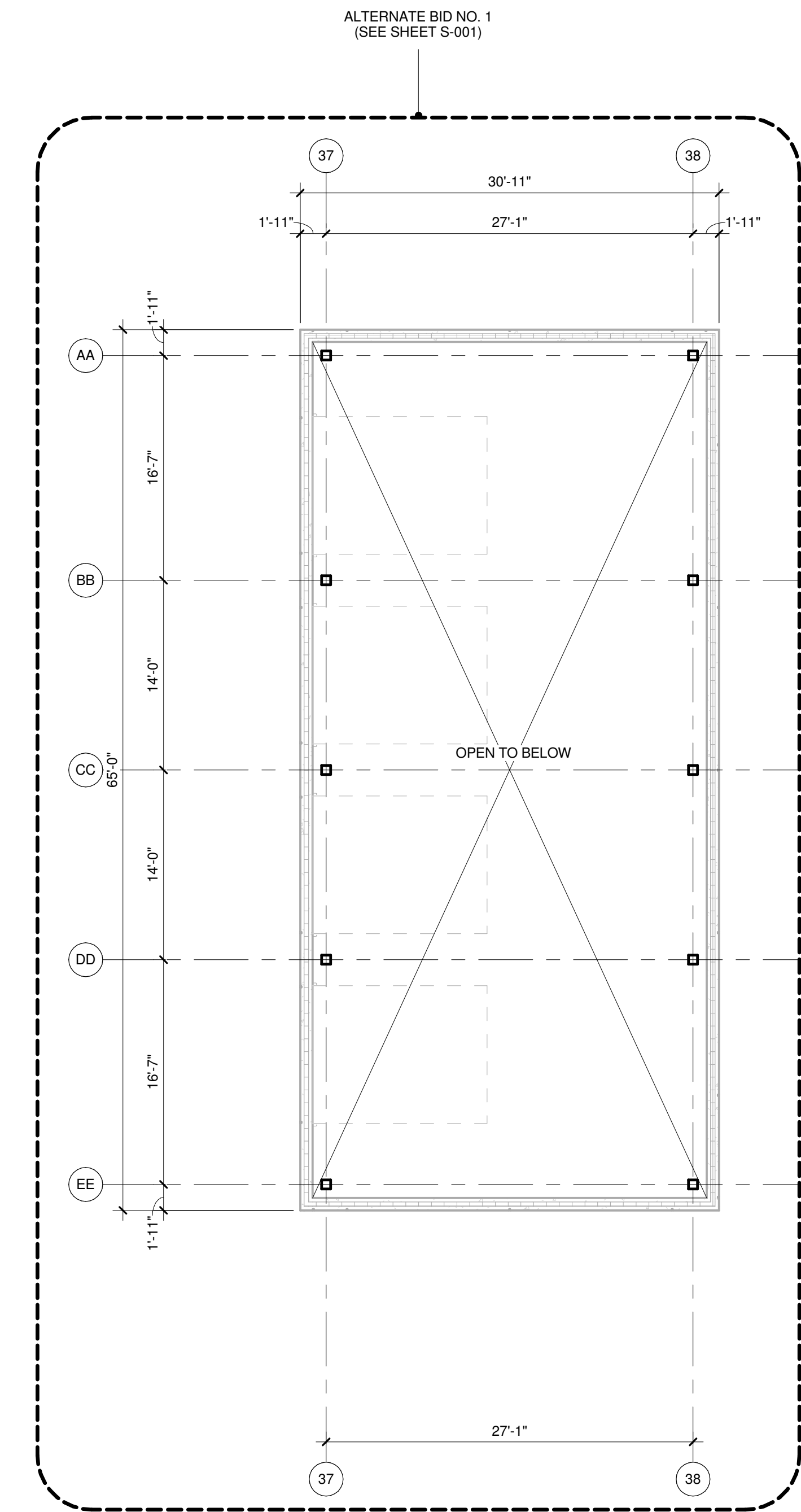
TRUE PLAN NORTH NORTH
MEZZANINE STRUCTURAL FLOOR PLAN AREA E
1/8" = 1'-0"

KEYED NOTES

- 3.208 MEZZANINE LEVEL EQUIPMENT PAD, SEE DETAIL 10/S-511. COORDINATE EXACT SIZE AND LOCATION WITH CORRESPONDING DISCIPLINE (EQUIPMENT, PLUMBING, MECHANICAL, ELECTRICAL).
- 3.352 PROVIDE SLEEVES FOR (3) 4" CONDUIT THROUGH PRECAST WALL PANEL. COORDINATE ELEVATION AND EXACT LOCATION WITH TECHNOLOGY. THESE CONDUITS SERVE COMMUNICATIONS TOWER.

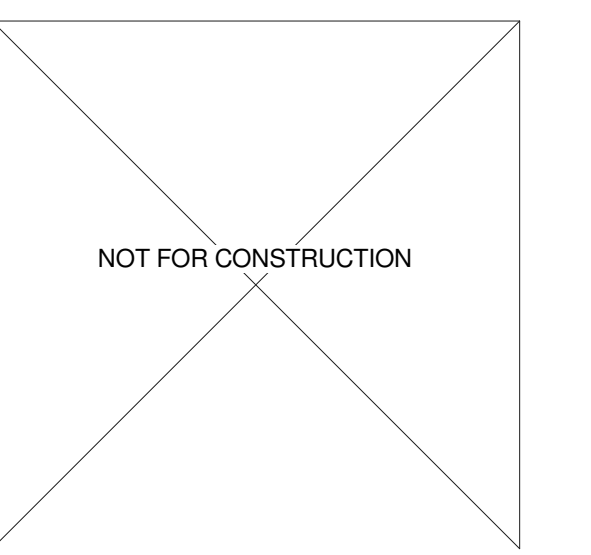
STRUCTURAL FLOOR PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, E, C & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS AND SYMBOLOLOGY.
4. REFER TO SHEET S-521 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. ALL 8" (NOMINAL) MASONRY WALLS SHALL BE SW08A UNLESS NOTED OR DETAILED OTHERWISE. SEE DETAIL 1/S-521 FOR STRUCTURAL WALL TYPES.
7. GROUT ALL MASONRY SOLID BELOW ELEVATION 100'-0".
8. ALL MASONRY WALL REINFORCEMENT SHALL BE FULL HEIGHT UNLESS NOTED OR DETAILED OTHERWISE.
9. STRUCTURAL WALL TYPES SHALL REMAIN CONTINUOUS ACROSS LINTELS AND MASONRY CONTROL JOINTS (MCJ), UNLESS NOTED OR DETAILED OTHERWISE.
10. PROVIDE L19 LINTEL AT ALL MASONRY OPENINGS (NOT INDICATED) EXCEEDING 1'-0" IN WIDTH. COORDINATE WITH ALL OTHER DISCIPLINES FOR LOCATION AND SIZE OF SUCH PENETRATIONS.
11. COORDINATE REQUIRED WALL PENETRATIONS WITH ALL OTHER DISCIPLINES TO AVOID PENETRATION OF STRUCTURAL MEMBERS AT LINTELS, TOP OF WALL, AND ANY OTHER STRUCTURAL ELEMENTS IN THE FIELD OF THE MASONRY WALL. NOTIFY ENGINEER PRIOR TO PENETRATION OF ANY STRUCTURAL MEMBERS INCLUDING, BUT NOT LIMITED TO, SCRD BEAMS AND PORTIONS OF FULLY GROUTED MASONRY WALLS.
12. CONTROL JOINTS IN MASONRY SHALL NOT BE LOCATED CLOSER THAN 2'-0" TO THE EDGE OF MASONRY OPENINGS, UNLESS NOTED OTHERWISE.
13. ♦ DENOTES MASONRY CONTROL JOINT. CONTROL JOINTS IN CONCRETE MASONRY WALL MAY OR MAY NOT ALIGN WITH CONTROL JOINTS IN VENEER. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR CONTROL JOINTS IN VENEER.
14. CRANE RUNWAY BEAMS SHALL BE STRAIGHTENED AND FABRICATED TO CMAA 74 REQUIREMENTS FOR BRIDGE CRANE RUNWAYS.



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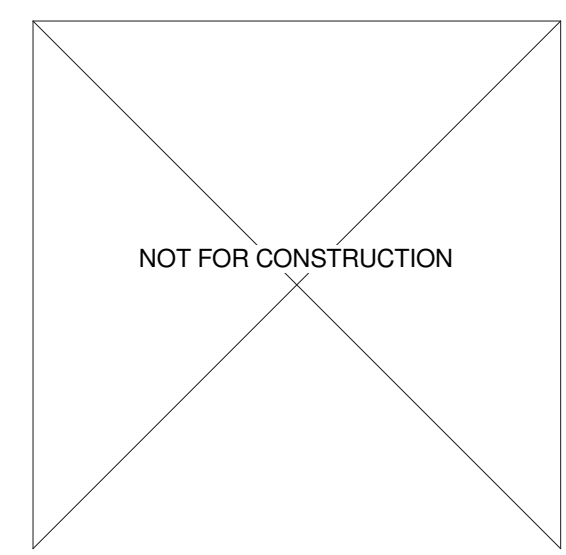


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MEZZANINE STRUCTURAL FLOOR PLAN AREA E

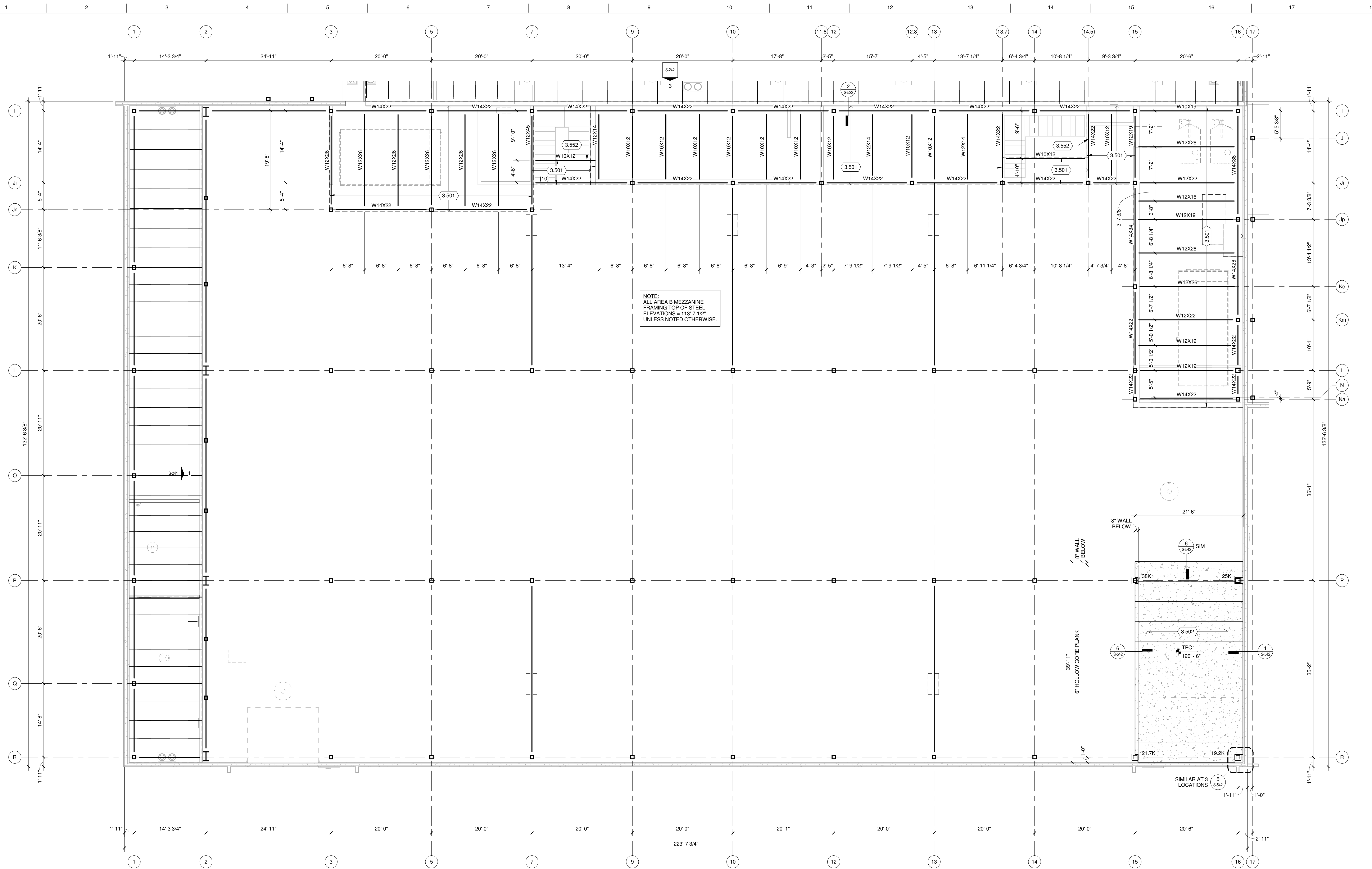
S-132E



REVISION/SUBMISSION	DATE
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MEZZANINE FRAMING PLAN AREA B



NOTE:
 ALL AREA B MEZZANINE
 FRAMING TOP OF STEEL
 ELEVATIONS = 113'-7 1/2"
 UNLESS NOTED OTHERWISE.

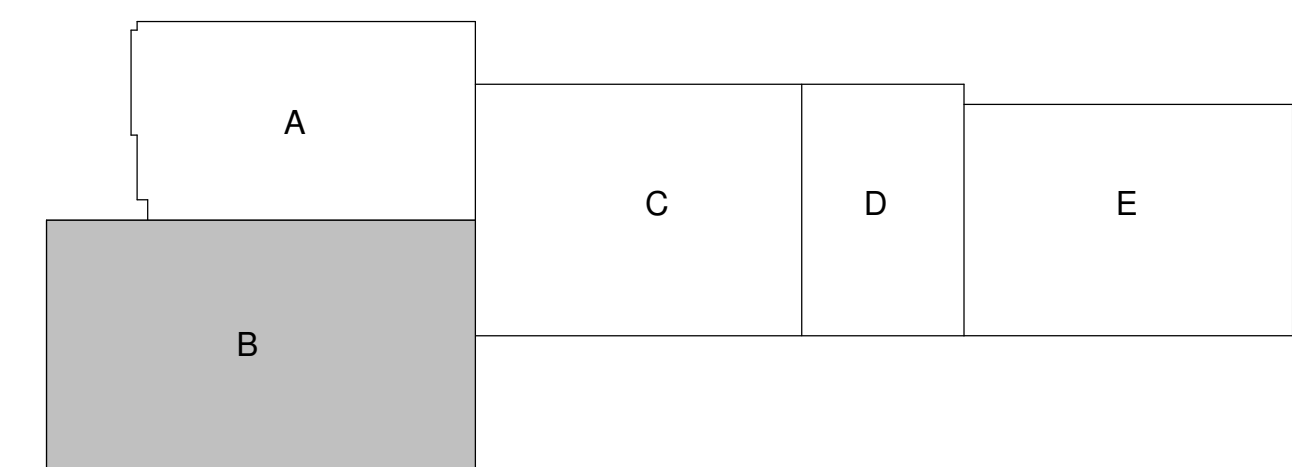
TRUE PLAN NORTH NORTH
1 MEZZANINE FRAMING PLAN AREA B
 1/8" = 1'-0"

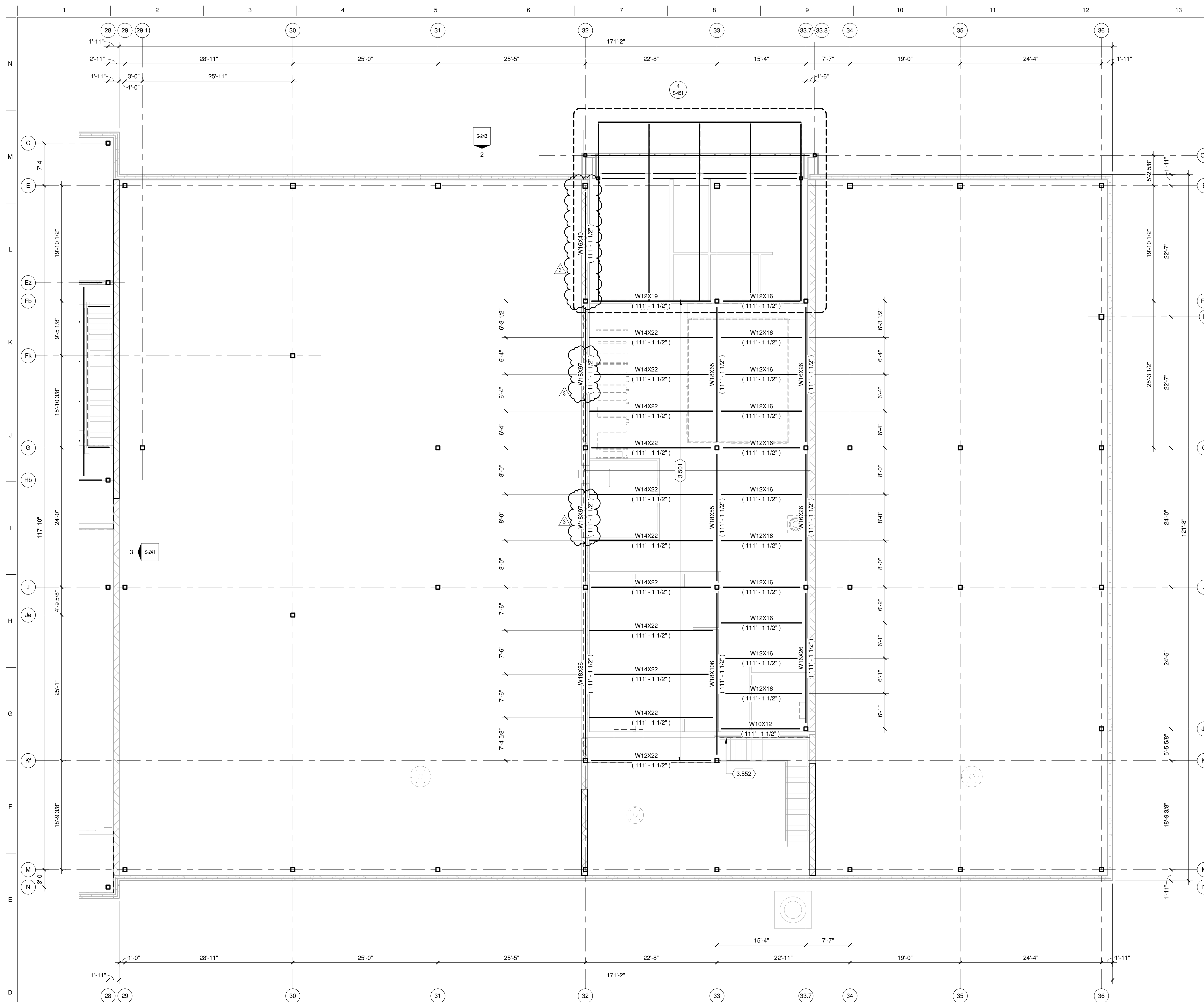
KEYED NOTES

- 3.501 MEZZANINE DECK WILL BE CONSTRUCTED WITH CONCRETE ON COMPOSITE, 1 1/2" DEEP, WIDE RIB, 50 GAUGE METAL DECK FOR A 4 1/2" TOTAL THICKNESS.
- 3.502 6" OR 8" HOLLOW CORE PLANK WITH GROUTED KEYWAYS AND NO REINFORCING BARS. PRECAST DIAPHRAGM SHEAR: V = 2K. PRECAST SUPPLIER TO DESIGN AND SUPPLY SUPPORT FOR HOLLOW CORE PLANK ON PRECAST WALL PANEL.
- 3.552 POST SIGN ON GUARDRAIL: "MEZZANINE LIVE LOAD = 200 PSF"

FRAMING PLAN GENERAL NOTES:

- SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
- REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KCS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
- ALL MEZZANINE BEAMS REQUIRE 3/4" DIAMETER X 3 1/2" LONG SHEAR STUDS SPACED AT 12" O.C. ALONG LENGTH.





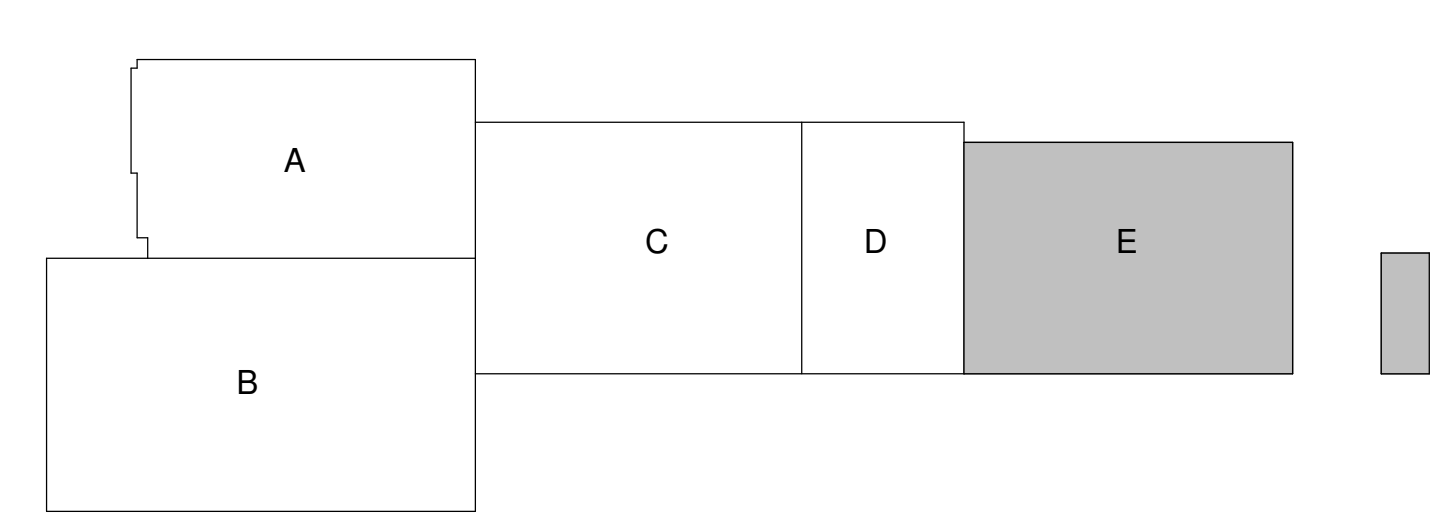
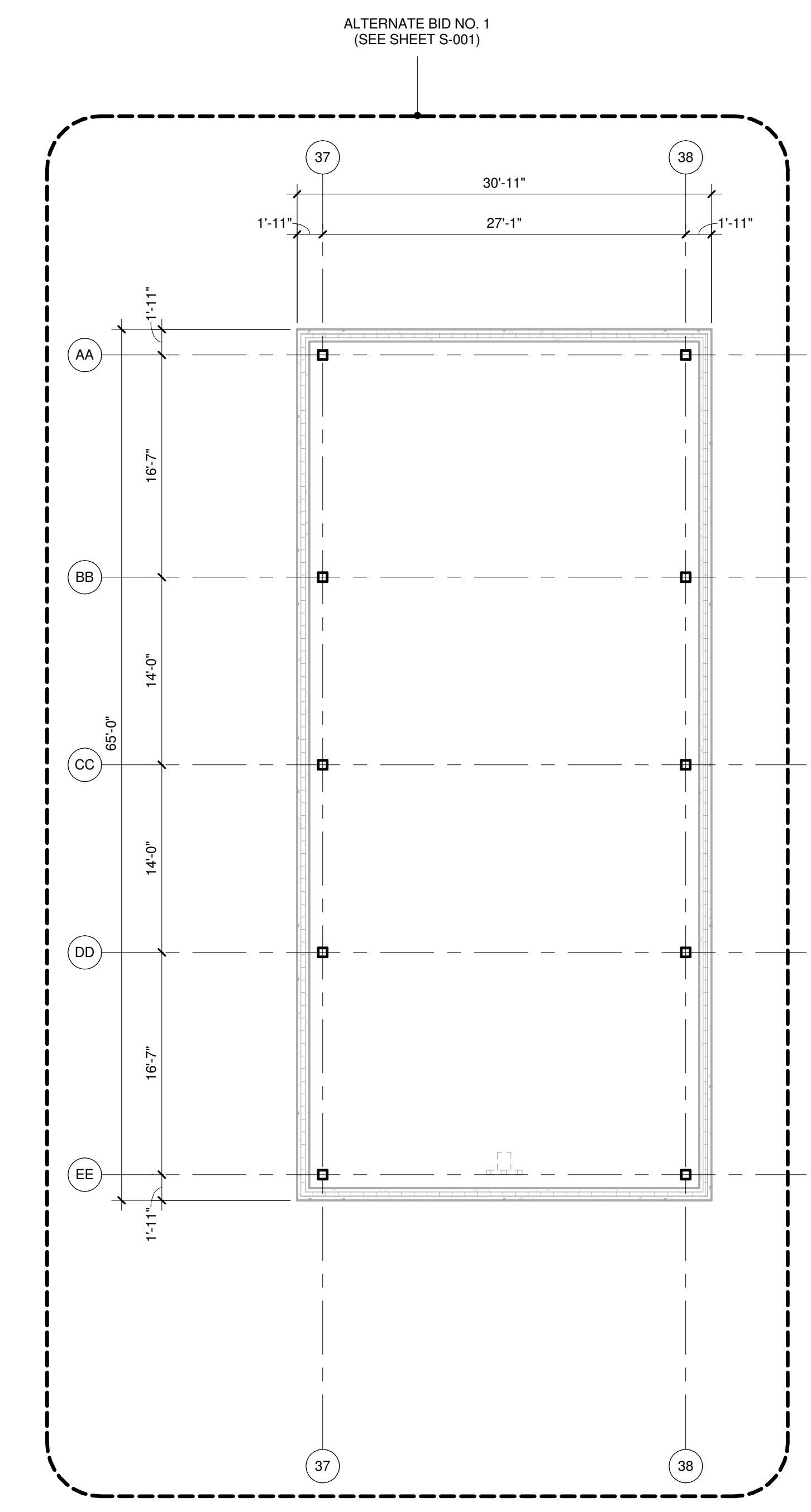
TRUE PLAN NORTH NORTH
1 MEZZANINE FRAMING PLAN AREA E
 1/8" = 1'-0"

KEYED NOTES

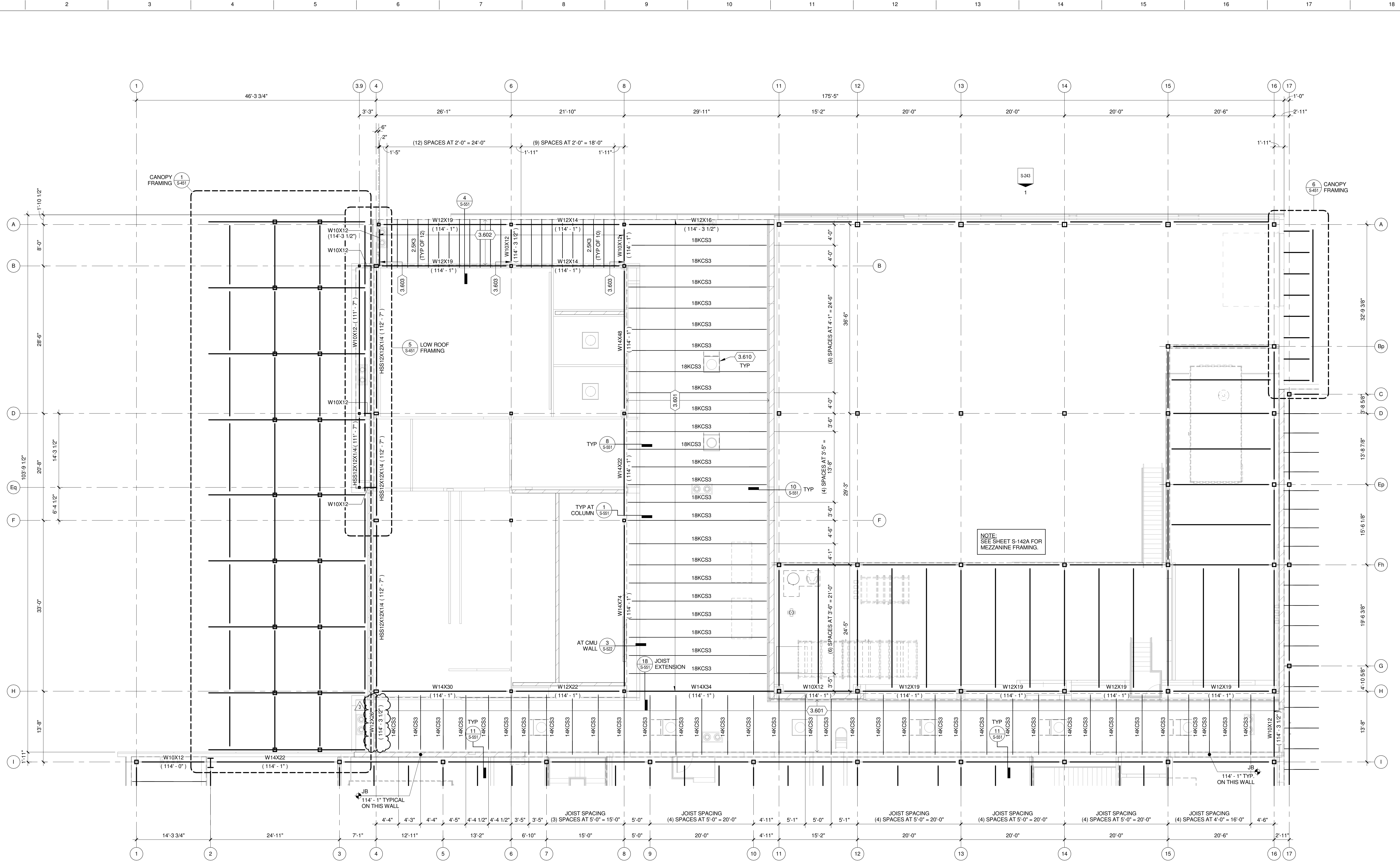
- 3.501 MEZZANINE DECK WILL BE CONSTRUCTED WITH CONCRETE ON COMPOSITE, 1 1/2" DEEP, WIDE RIB, 30 GAUGE METAL DECK FOR A 4 1/2" TOTAL THICKNESS.
- 3.552 POST SIGN ON GUARDRAIL: "MEZZANINE LIVE LOAD = 200 PSF"

FRAMING PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
6. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KCS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
7. ALL MEZZANINE BEAMS REQUIRE 3/4" DIAMETER X 3 1/2" LONG SHEAR STUDS SPACED AT 12" O.C. ALONG LENGTH.



NOT FOR CONSTRUCTION		
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LOW ROOF FRAMING PLAN AREA A
1/8" = 1'-0"

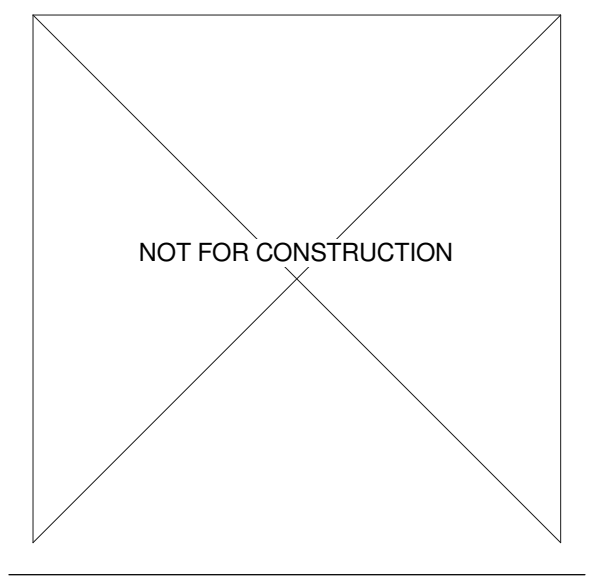
KEYED NOTES

- 3.601 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 12" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (36/4-3)
- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (36/7-3)
- 3.603 FULLY PRETENSION CONNECTION BOLTS.
- 3.610 TYPICAL FRAMING FOR ROOF OPENING, SEE DETAIL 15/S-551.

ROOF FRAMING PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-00x FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
5. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
8. SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
9. OUTRIGGERS ARE 2.5K LINO AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S = 1.2IN3, MINIMUM T = 1.5IN4.
10. JOIST EXTENSIONS ARE R9, MINIMUM S-1.67IN3, MINIMUM I = 2.09IN4.
11. PROVIDE TUBE ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER SPLICE DETAIL 16/S-541. AT CORNERS THE HSS TUBE MUST BE 15 FEET LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS - SEE DETAIL 17/S-541.

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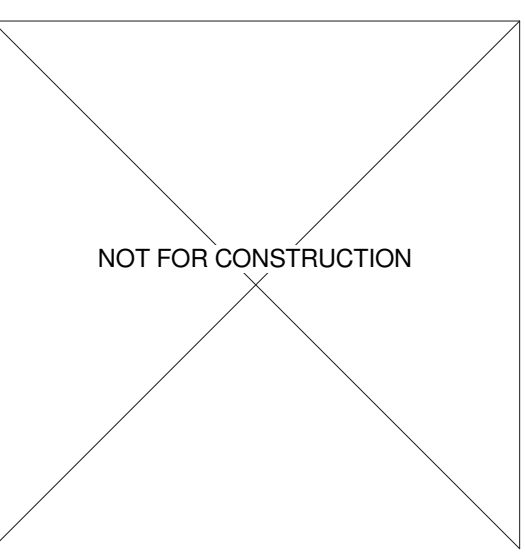


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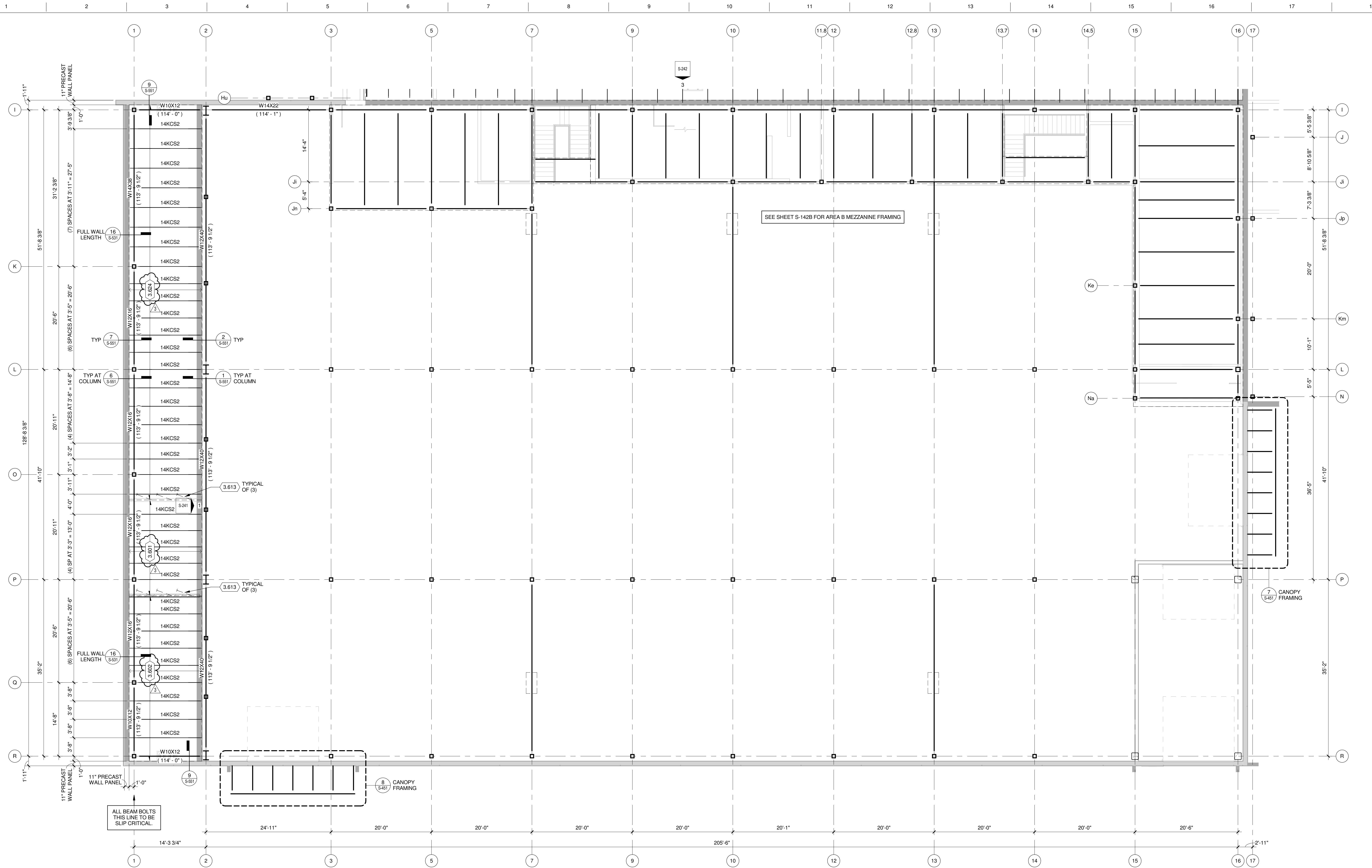
LOW ROOF FRAMING PLAN AREA A

S-151A



NO.	REVISION/SUBMISSION	DATE
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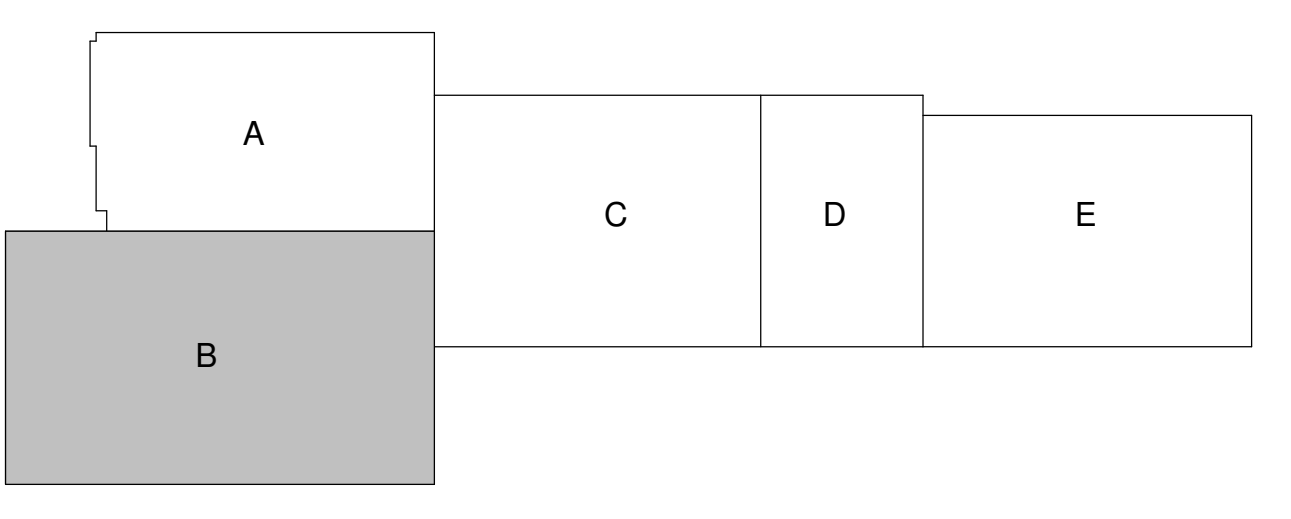
TRUE PLAN
NORTH NORTH
1 LOW ROOF FRAMING PLAN AREA B
1/8" = 1'-0"

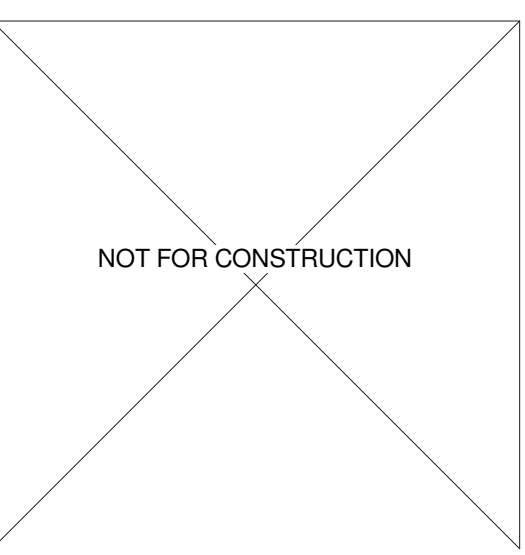
KEYED NOTES

- 3.601 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 12" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS, (36/4-3)
- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS, (36/7-3)
- 3.613 SEE DETAIL 8/S-522 AND SECTION DETAIL 7/S-522 FOR MASONRY SHEAR TRANSFER BRACING.
- 3.624 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH 5/8" PUDDLE WELDS AT 6" ON CENTER AND SIX WELDS PER SPAN IN SIDELAPS, (36/7P-6W).

ROOF FRAMING PLAN GENERAL NOTES:

- 1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- 2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- 3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
- 4. REFER TO SHEET S-00X FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
- 5. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- 6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- 7. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
- 8. SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
- 9. OUTRIGGERS ARE 2.5K UNID AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S=1.2IN3, MINIMUM T=1.5IN4.
- 10. JOIST EXTENSIONS ARE R9, MINIMUM S=1.67IN3, MINIMUM T=2.09IN4.
- 11. PROVIDE TUBE ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER SPLICE DETAIL 16/S-541. AT CORNERS THE HSS TUBE MUST BE 15 FEET LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS - SEE DETAIL 17/S-541.

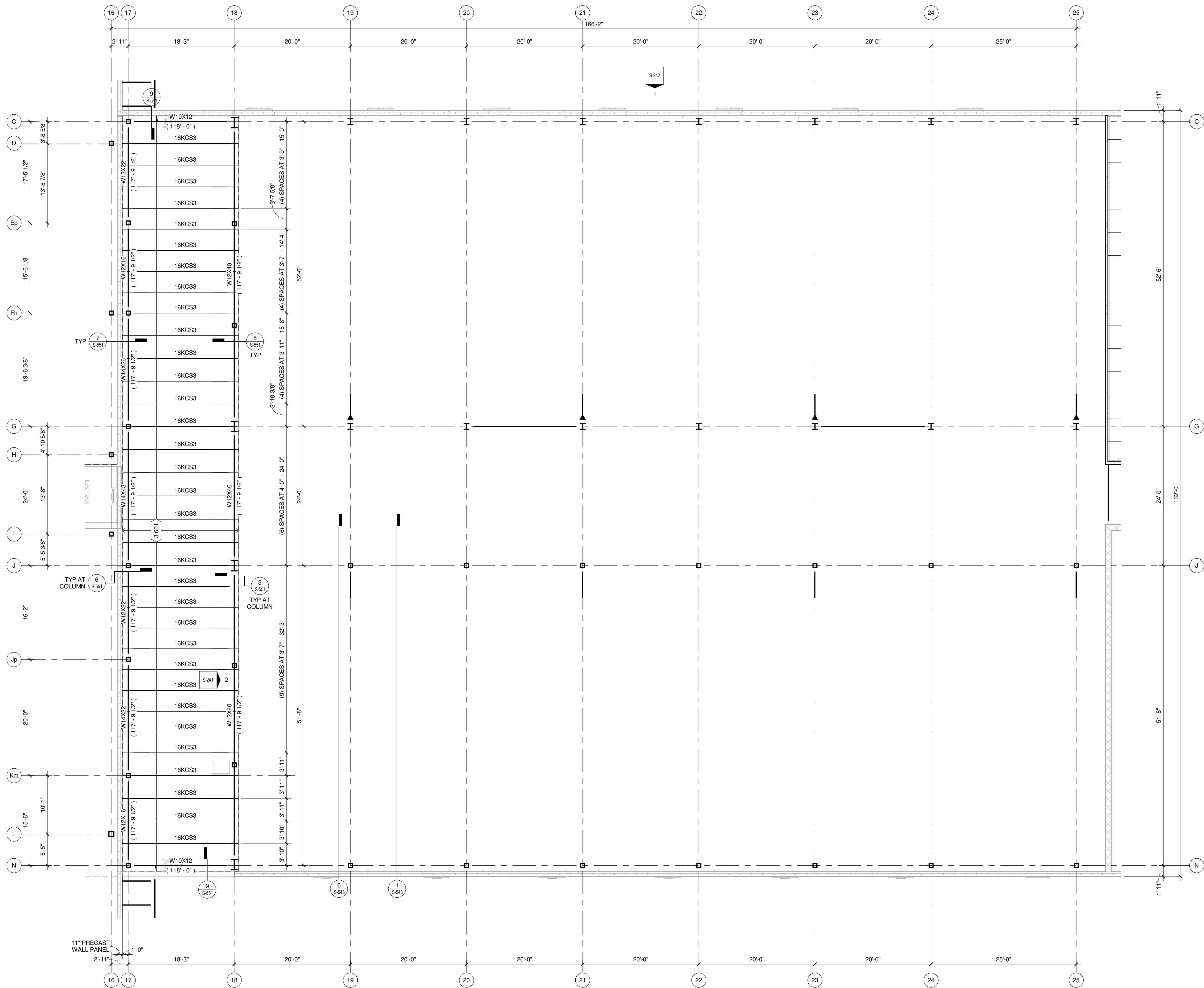




3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

No.	REVISION/SUBMISSION	DATE

PROJECT No: 1303500-160264.01



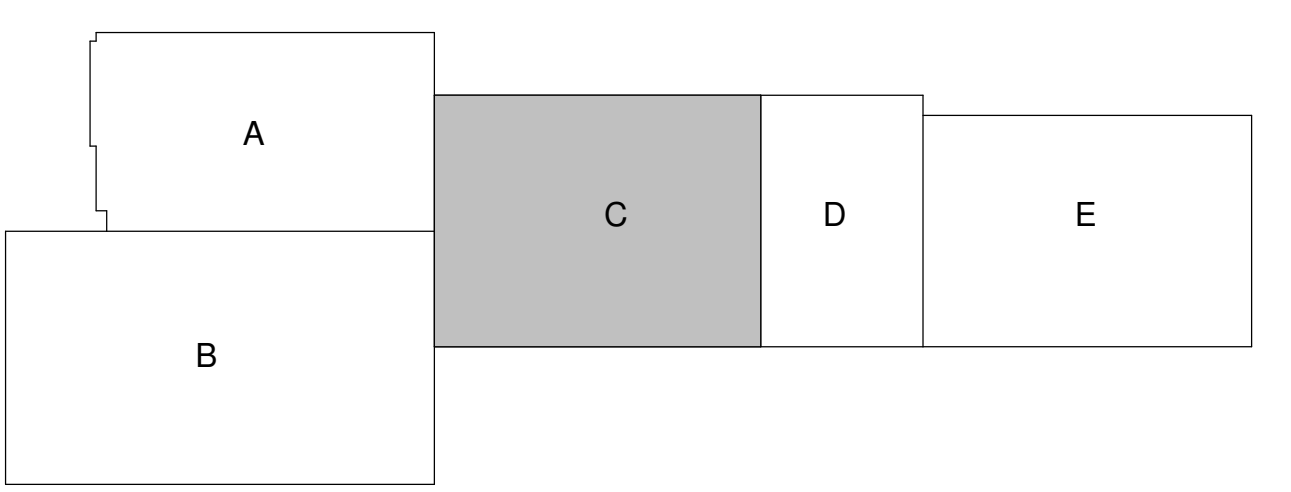
TRUE PLAN NORTH NORTH
LOW ROOF FRAMING PLAN AREA C
1/8" = 1'-0"

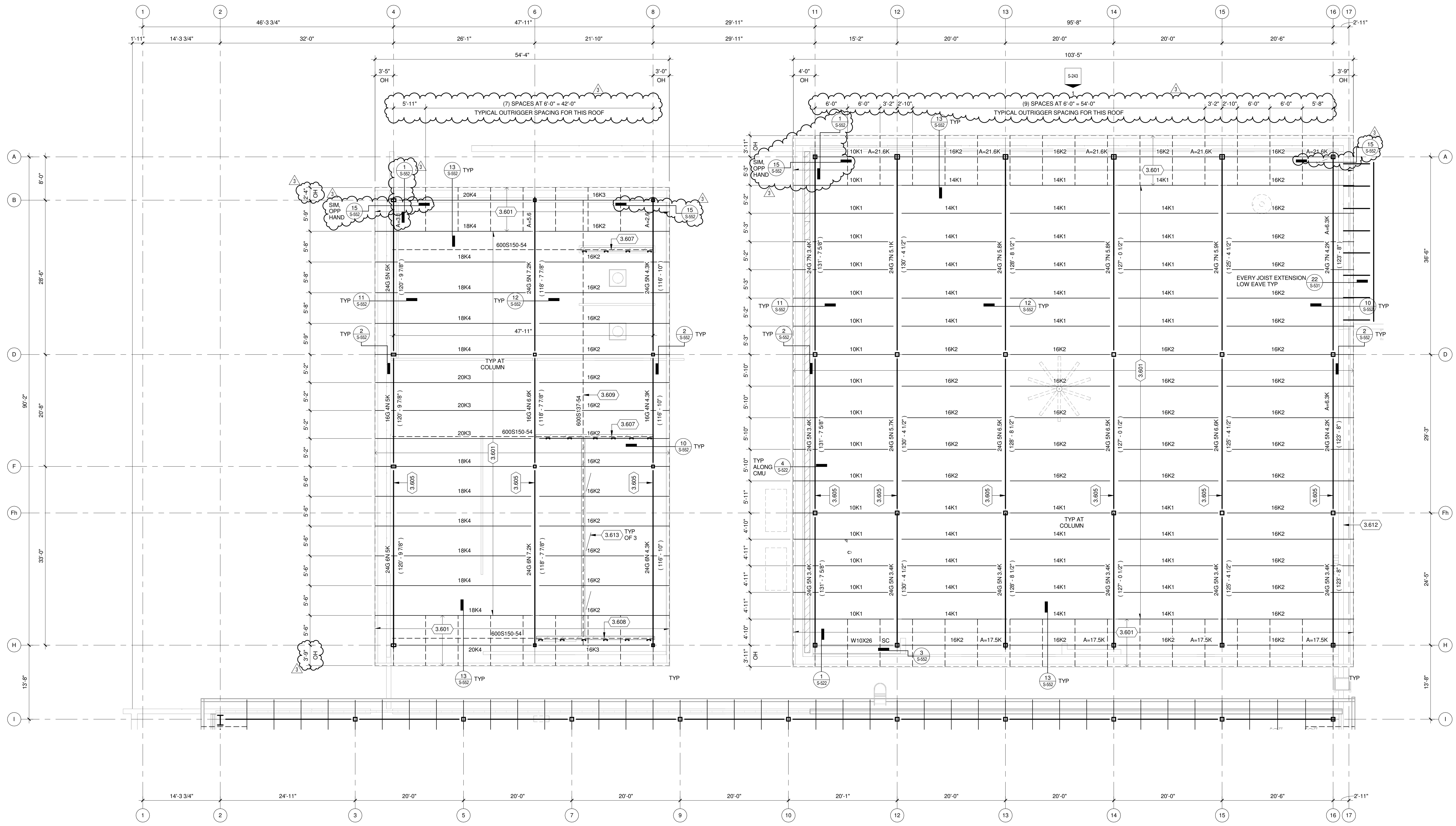
KEYED NOTES

- 3.601 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 12" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS, (3/4-3)

ROOF FRAMING PLAN GENERAL NOTES:

- SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
- REFER TO SHEET S-00X FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
- REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
- SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
- OUTRIGGERS ARE 2.5K LINDAT AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S=1.2IN3, MINIMUM T=1.5IN4.
- JOIST EXTENSIONS ARE R9. MINIMUM S=1.67IN3, MINIMUM I=2.09IN4.
- PROVIDE TUBE ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER SPLICE DETAIL 16/S-541. AT CORNERS THE HSS TUBE MUST BE 15 FEET LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS - SEE DETAIL 17/S-541.





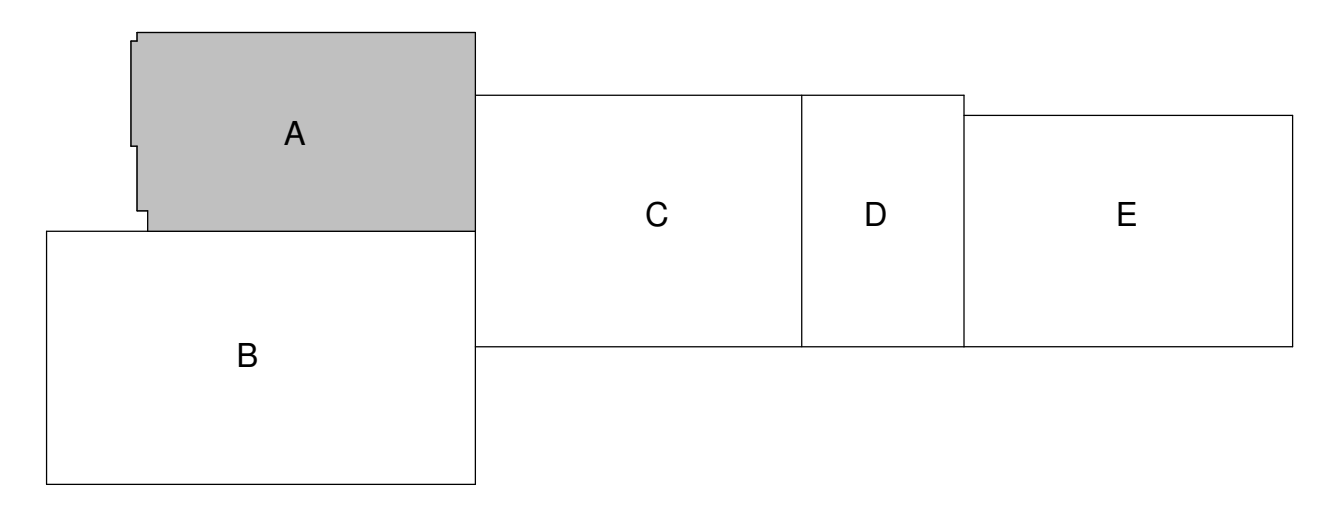
TRUE PLAN NORTH NORTH
1 HIGH ROOF FRAMING PLAN AREA A
1/8" = 1'-0"

KEYED NOTES

- 3.601 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 12" O.C. CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (36/4-3)
- 3.605 3 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.607 600S150-54 STRUT WITH (10) #12 SCREWS PER SPLICE. FASTEN STRUTS TO ROOF DECK WITH #12 SCREWS AT 12" O.C. SEE DETAIL 6/S-522 FOR ATTACHMENT TO MASONRY WALL BELOW.
- 3.608 600S150-54 STRUT WITH TOES TURNED UP INTO DECK FLUTES. SPLICE STRUTS WITH 600T150-54 SPLINT SPLICE AND (10) #12 SCREWS INTO EACH 600S. FASTEN STRUTS TO ROOF DECK WITH #12 SCREWS AT 12" O.C. SEE DETAIL 6/S-522 FOR SIMILAR ATTACHMENT TO MASONRY WALL BELOW.
- 3.609 600S137-118 STRUT ON TOP OF JOISTS, BELOW ROOF DECK, NESTED INTO ROOF DECK FLUTES. FASTEN STRUT TO ROOF DECK WITH #10 SCREWS AT 12" O.C.
- 3.612 CMU WALL ATTACHMENT TO DECK SIMILAR TO DETAIL 4/S-522. BENT PLATES (14) TO BE PLACED ALONG THE LENGTH OF THE CMU WALL BETWEEN JOIST.
- 3.613 SEE DETAIL 8/S-522 AND SECTION DETAIL 7/S-522 FOR MASONRY SHEAR TRANSFER BRACING.

ROOF FRAMING PLAN GENERAL NOTES:

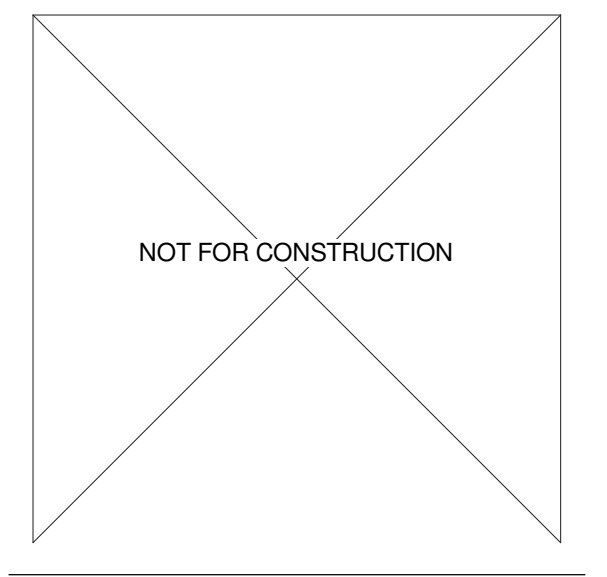
- 1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
- 2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
- 3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
- 4. REFER TO SHEET S-00x FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
- 5. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
- 6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
- 7. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
 - AT MASONRY WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
- 8. SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
- 9. OUTRIGGERS ARE 2.5K UNCL AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S=1.2IN3, MINIMUM T=1.5IN4.
- 10. JOIST EXTENSIONS ARE R9. MINIMUM S=1.67IN3, MINIMUM T=2.09IN4.
- 11. PROVIDE TUBE AT ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER SPLICE DETAIL 16/S-541. AT CORNERS THE HSS TUBE MUST BE 15 FEET LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS. SEE DETAIL 17/S-541.



CITY OF MADISON
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MADISON, WISCONSIN 53714

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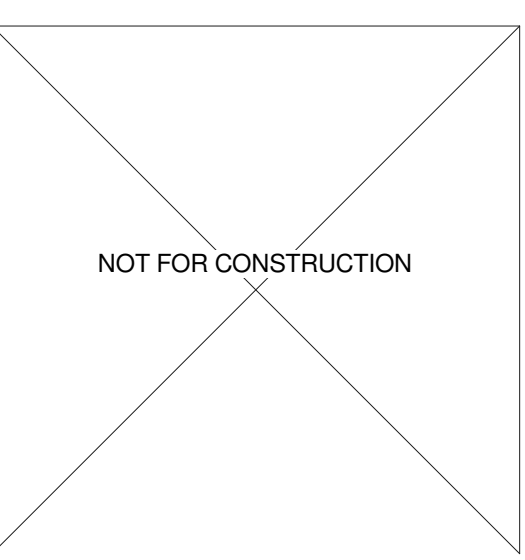


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PROJECT No.: 1303500-160264.01

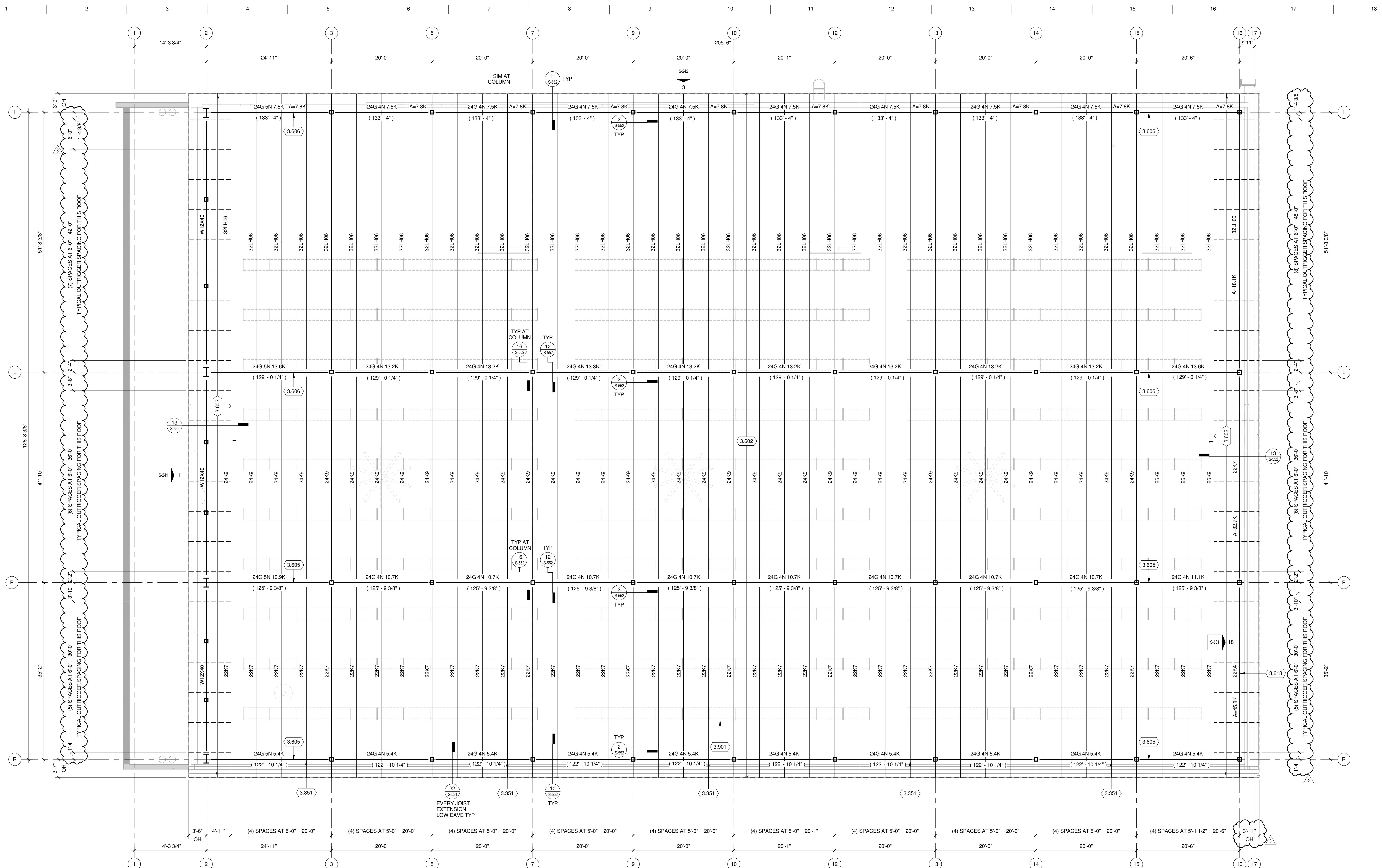
HIGH ROOF FRAMING PLAN
AREA A

S-152A



No.	REVISION/SUBMISSION	DATE
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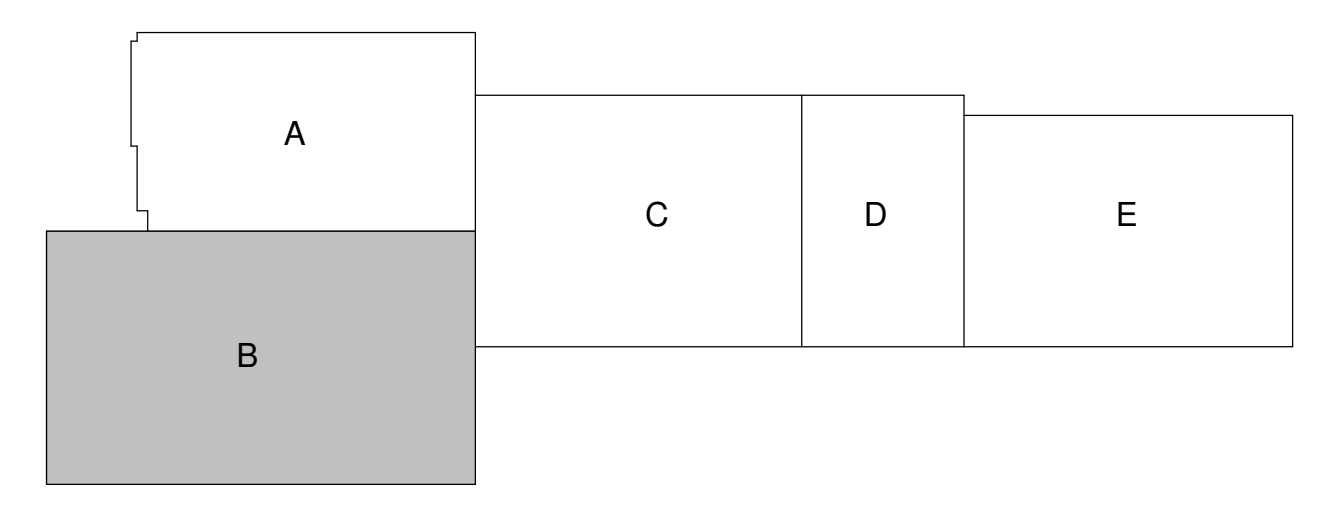
TRUE PLAN NORTH NORTH
1 HIGH ROOF FRAMING PLAN AREA B
1/8" = 1'-0"

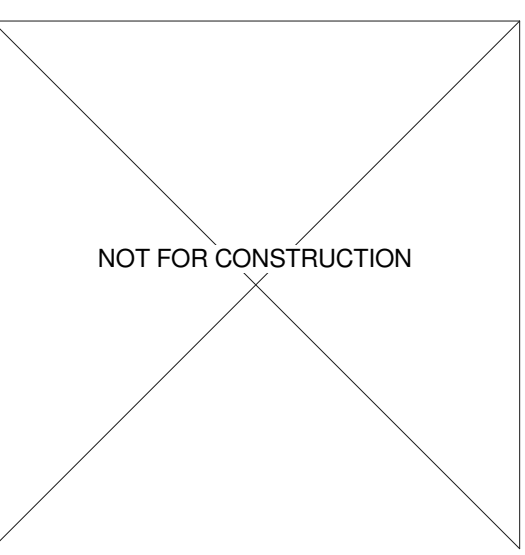
KEYED NOTES

- 3.351 FOR LATERAL SUPPORT FROM JOIST OR JOIST GIRDER BOTTOM CHORD TO PRECAST WALL AT SPECIFIC LOCATIONS SEE DETAIL 17/S-531.
- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (36/7-3)
- 3.605 3 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.606 6 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.618 DESIGN TOP AND BOTTOM CHORD FOR FULL AXIAL FORCE.
- 3.901 ALTERNATE BID NO. 2: PROVIDE SUPPORT FOR SOLAR PANELS PER DETAIL 15/S-552.

ROOF FRAMING PLAN GENERAL NOTES:

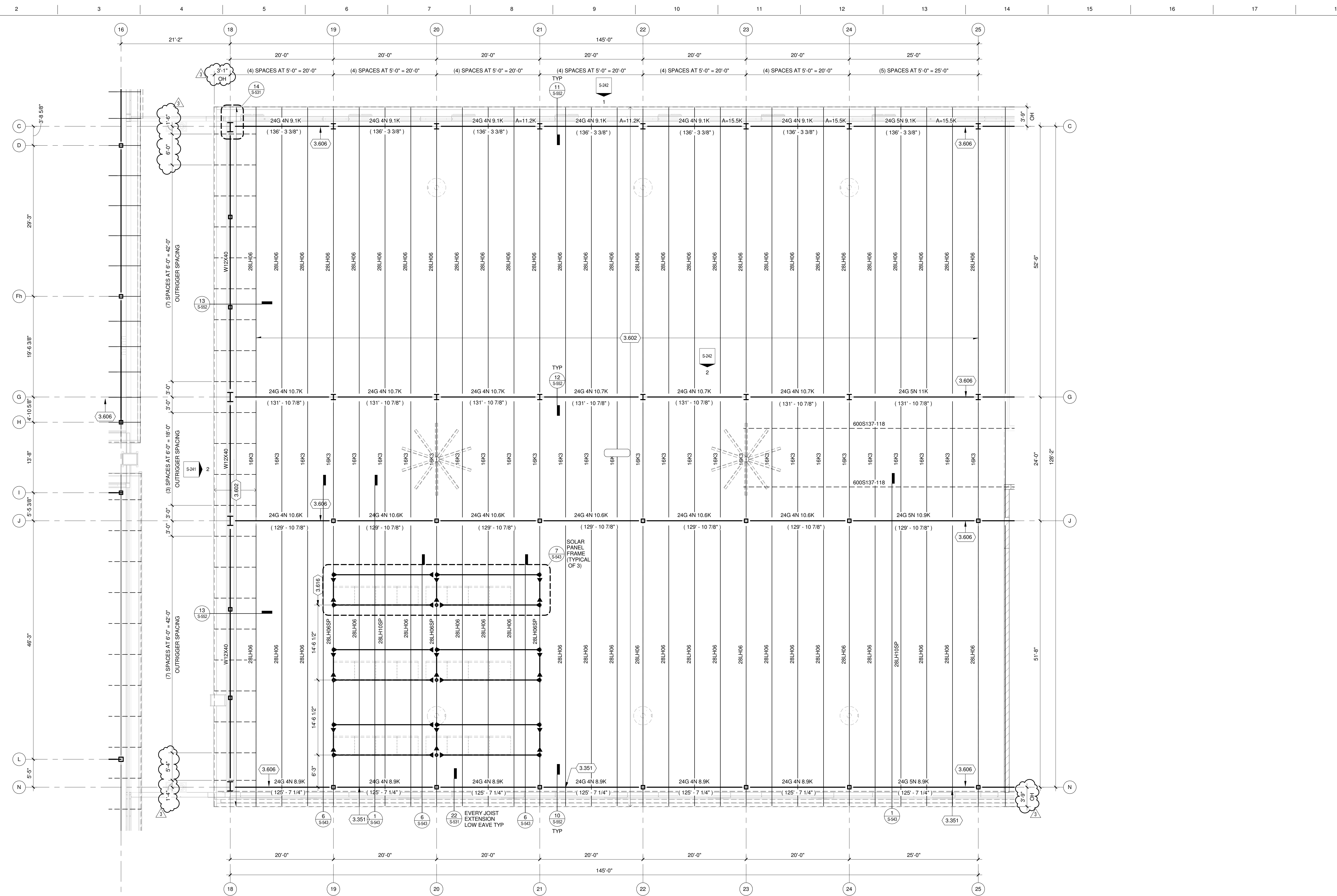
1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-00x FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
5. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS UNLESS NOTED OR DETAILED OTHERWISE:
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 - "K" SERIES - MIN. 4"
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 - "LH" SERIES - MIN. 6"
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 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
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8. SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
9. OUTRIGGERS ARE 2.5K LUNG AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S=1.2IN3, MINIMUM I = 1.5IN4.
10. JOIST EXTENSIONS ARE R9; MINIMUM S=1.67IN3, MINIMUM I = 2.09IN4.
11. PROVIDE TUBE ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS. SEE DETAIL 17/S-541.





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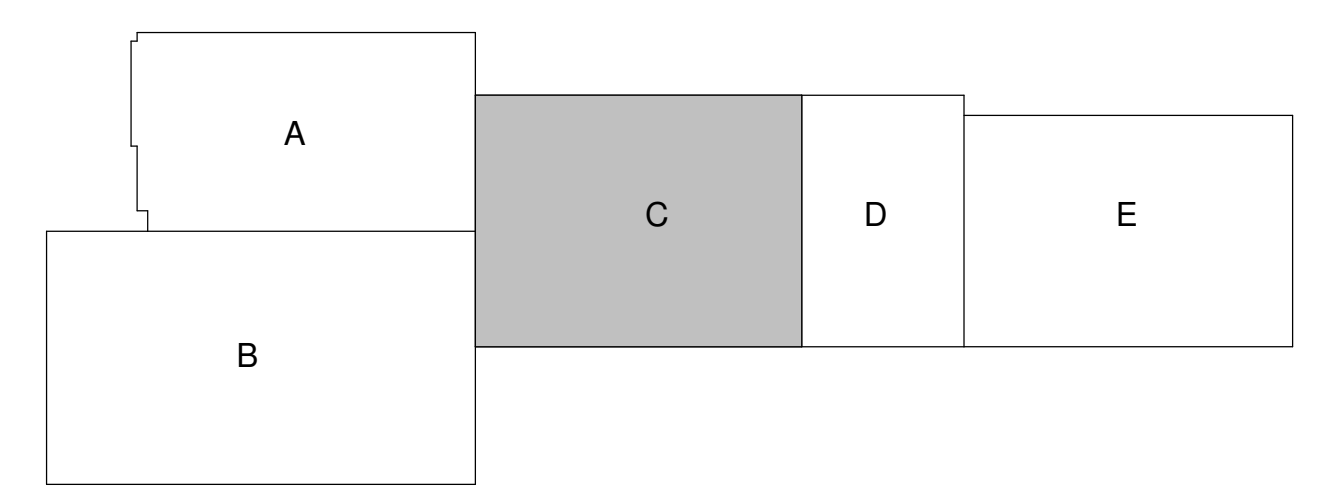
TRUE PLAN NORTH NORTH
1 HIGH ROOF FRAMING PLAN AREA C
1/8" = 1'-0"

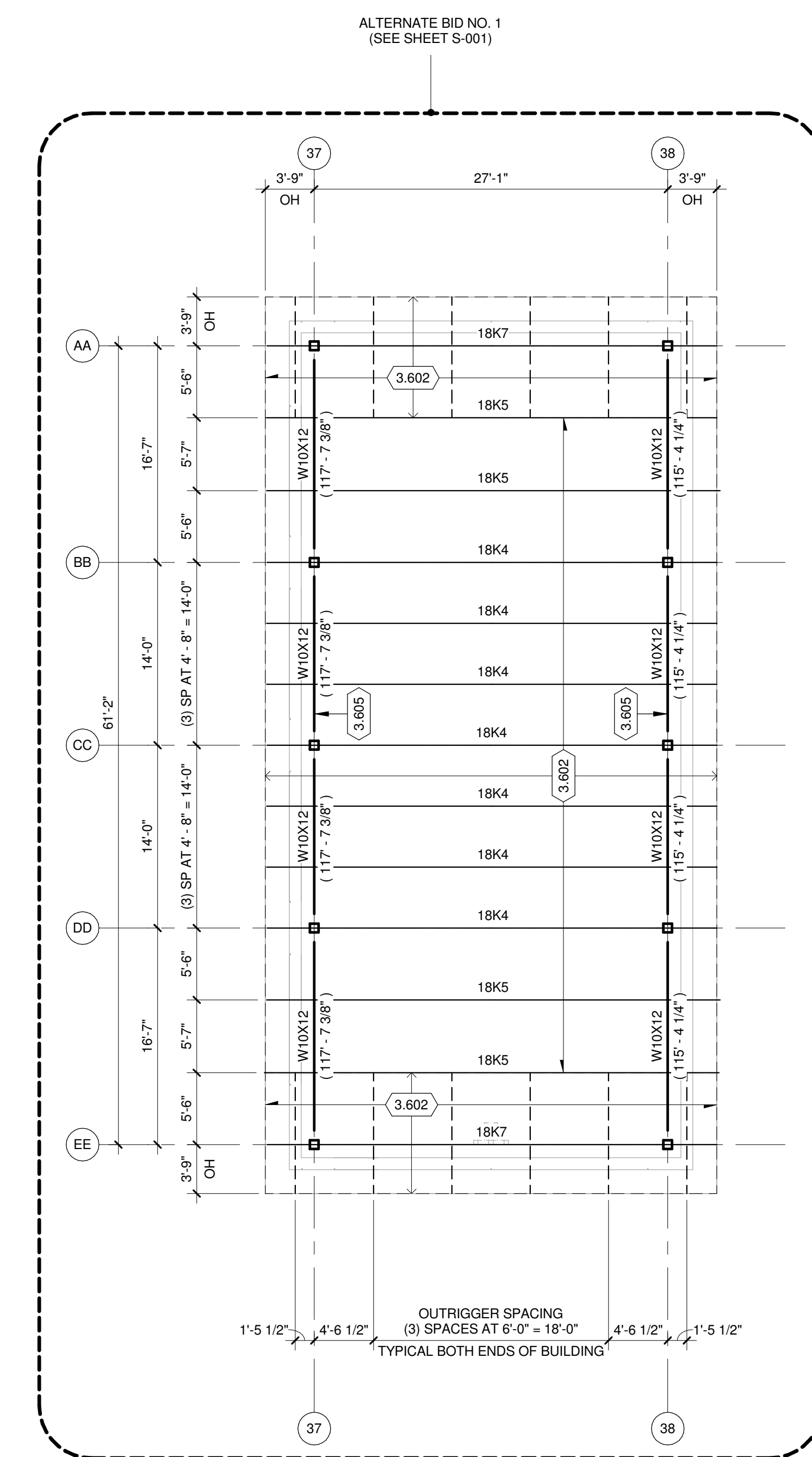
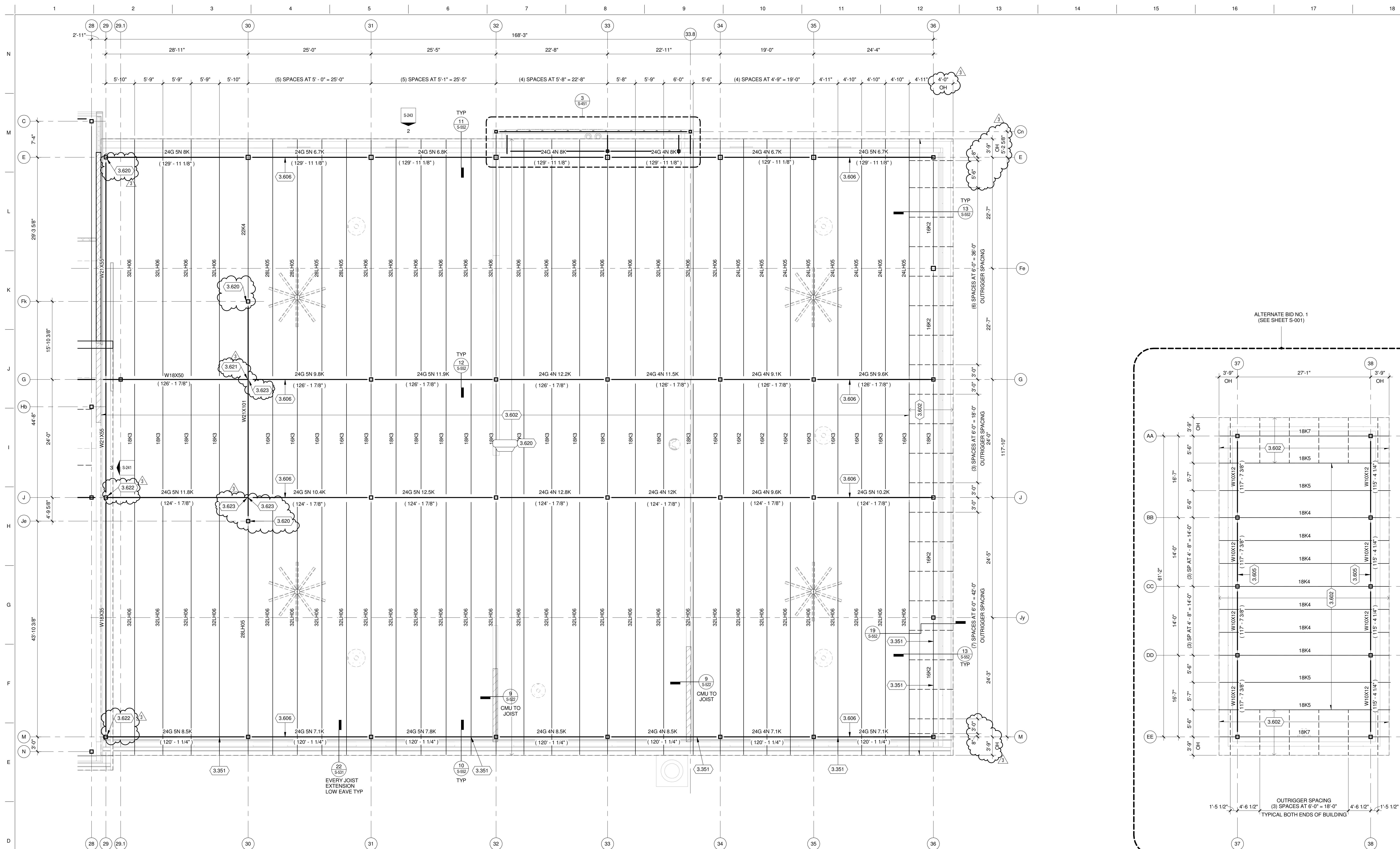
KEYED NOTES

- 3.351 FOR LATERAL SUPPORT FROM JOIST OR JOIST GIRDER BOTTOM CHORD TO PRECAST WALL AT SPECIFIC LOCATIONS SEE DETAIL 17/S-531.
- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 23 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (36/7-3)
- 3.606 6 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.616 VERIFY EXACT LOCATION AND SPACING OF FRAMES WITH MECHANICAL.

ROOF FRAMING PLAN GENERAL NOTES:

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 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS
 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
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10. JOIST EXTENSIONS ARE R9; MINIMUM S=1.673IN3, MINIMUM I=2.091IN4.
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KEYED NOTES

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- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (367-3)
- 3.605 3 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.606 6 1/2" DEEP JOIST SEATS FOR ALL JOISTS ALONG THIS GRID LINE.
- 3.620 SIDE FRAME THE BEAM WITH STANDARD SINGLE PLATE SHEAR CONNECTION. FULLY PRETENSION THE BOLTS. TOP FRAME THE JOIST TO THE COLUMN.
- 3.621 FULLY PRETENSION WEB BOLTS.
- 3.622 SIDE FRAME ALL BEAMS/JOIST/GIRDERS AT COLUMN.
- 3.623 SEE SECTION DETAIL 22/S-552 FOR GIRDER TO BEAM CONNECTION.

TRUE PLAN NORTH NORTH
1 HIGH ROOF FRAMING PLAN AREA E
1/8" = 1'-0"

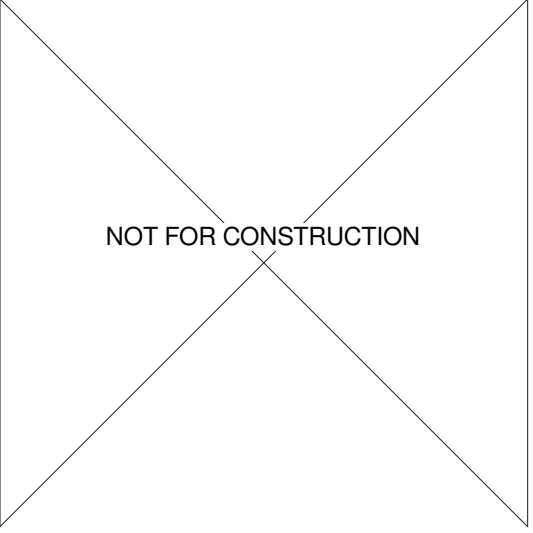
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 - "K" SERIES - MIN. 4"
 - "KS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS
 - "K" SERIES - MIN. 2 1/2"
 - "KS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
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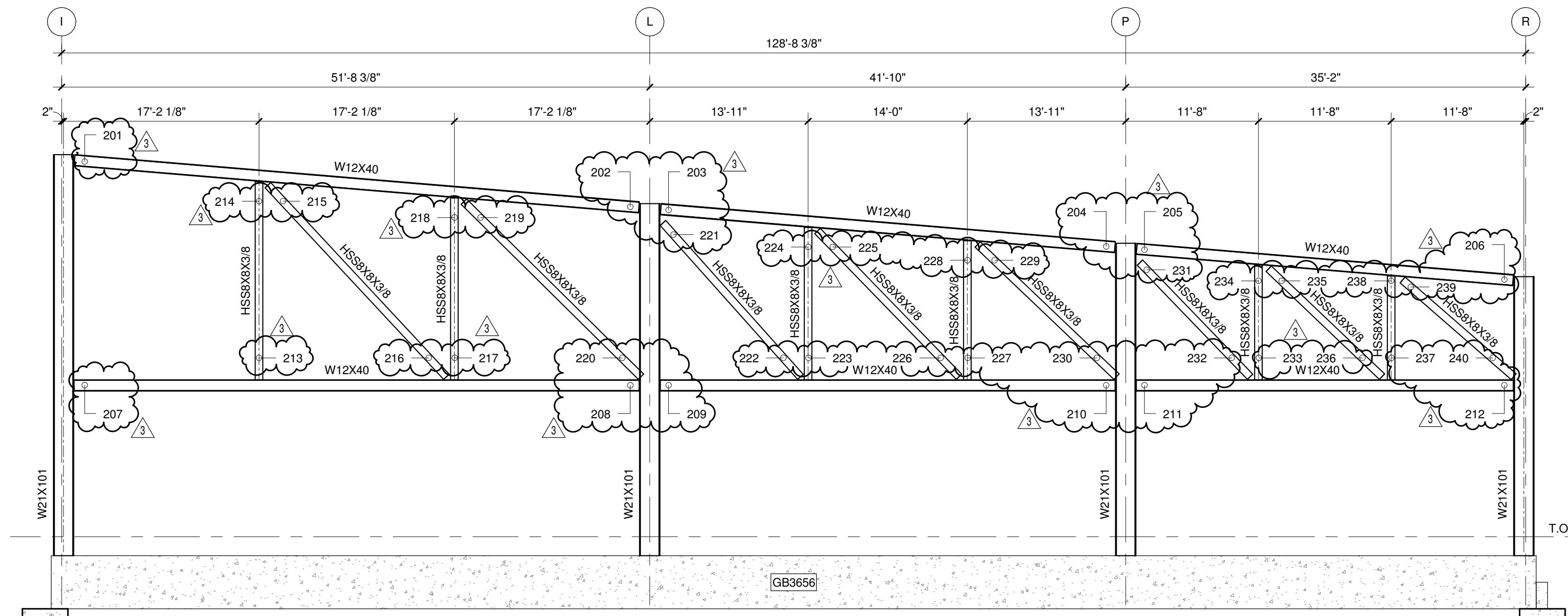
PROJECT No.: 1303500-160264.01

HIGH ROOF FRAMING PLAN
AREA E

S-152E

**TRUSS CONNECTION LOADS
GRID 2**

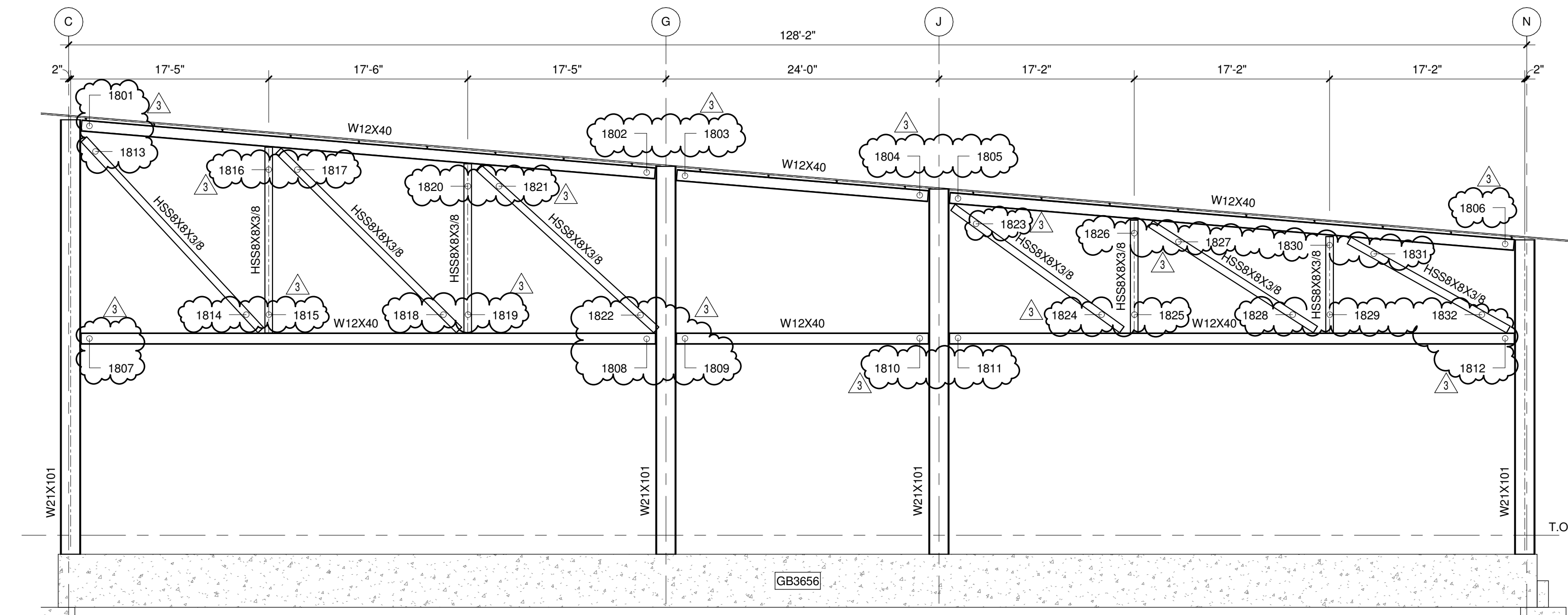
CONNECTION NUMBER	AXIAL (KIPS)	SHEAR (KIPS)
201	3.6	9.6
202	94.2	6.9
203	50.8	6.0
204	28.7	6.1
205	4.2	5.3
206	16.4	5.4
207	14.5	5.1
208	21.5	2.5
209	91.1	2.2
210	17.2	2.5
211	33.2	2.1
212	26.5	2.4
213	3.2	0.0
214	3.5	0.0
215	30.0	0.2
216	30.3	0.2
217	31.0	0.0
218	31.2	0.0
219	96.1	0.2
220	96.4	0.2
221	61.7	0.1
222	61.4	0.1
223	35.8	0.0
224	35.5	0.0
225	37.8	0.1
226	37.6	0.1
227	19.1	0.0
228	19.9	0.0
229	22.3	0.1
230	22.5	0.1
231	48.5	0.1
232	48.3	0.1
233	25.1	0.0
234	25.0	0.0
235	26.4	0.1
236	26.2	0.1
237	11.4	0.0
238	11.2	0.0
239	30.8	0.1
240	30.9	0.1



1 STRUCTURAL FRAMING ELEVATION ALONG GRID "2" (LOOKING EAST)
1/8" = 1'-0"

**TRUSS CONNECTION LOADS
GRID 18**

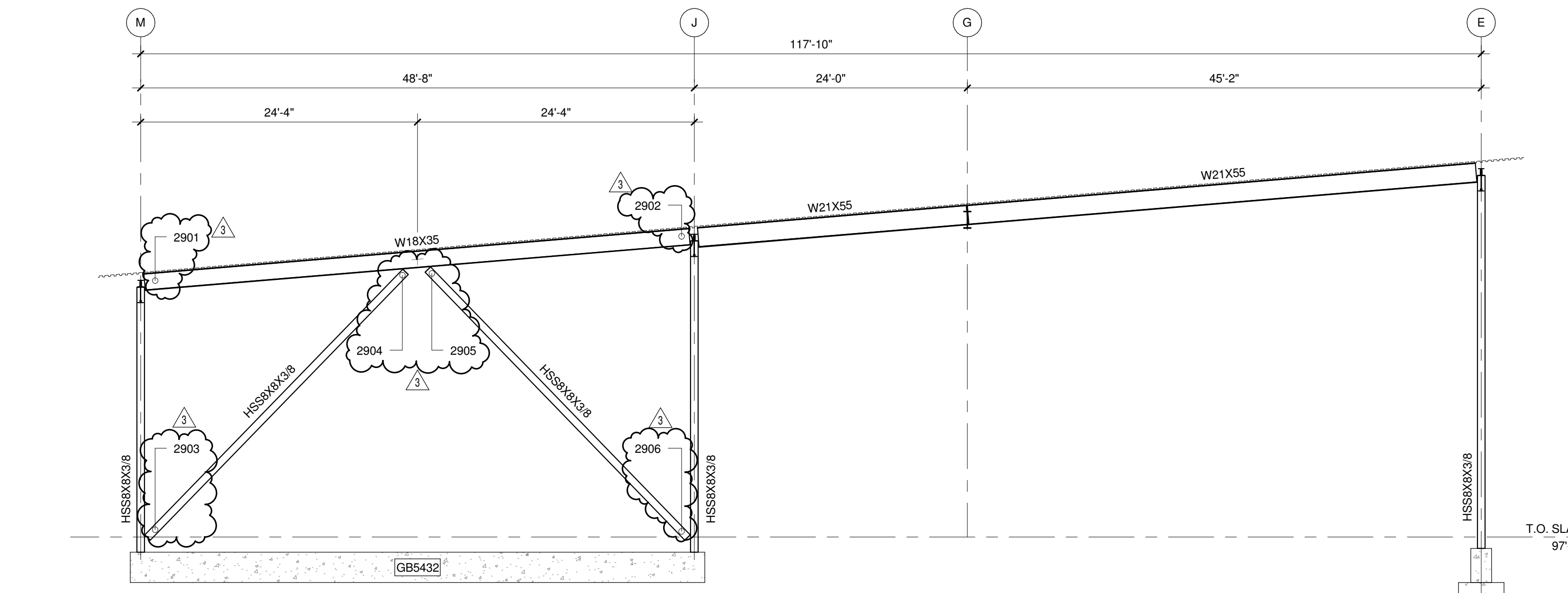
CONNECTION NUMBER	AXIAL (KIPS)	SHEAR (KIPS)
1801	12.8	4.0
1802	10.4	4.0
1803	6.8	6.7
1804	11.5	6.7
1805	11.9	3.9
1806	12.4	4.0
1807	16.7	0.3
1808	10.7	0.4
1809	7.2	0.5
1810	7.2	0.5
1811	25.7	0.4
1812	17.9	0.4
1813	24.5	0.2
1814	24.2	0.2
1815	17.1	0.0
1816	16.7	0.0
1817	16.2	0.2
1818	16.6	0.2
1819	12.8	0.0
1820	13.1	0.0
1821	30.5	0.2
1822	30.9	0.2
1823	32.9	0.2
1824	32.7	0.2
1825	18.8	0.0
1826	18.6	0.0
1827	21.3	0.2
1828	21.1	0.2
1829	11.1	0.0
1830	11.0	0.0
1831	34.8	0.2
1832	35.0	0.2



2 STRUCTURAL FRAMING ELEVATION ALONG GRID "18" (LOOKING EAST)
1/8" = 1'-0"

**TRUSS CONNECTION LOADS
GRID 29**

CONNECTION NUMBER	AXIAL (KIPS)	SHEAR (KIPS)
2901	0.2	2.2
2902	0.2	2.2
2903	27.0	0.2
2904	26.5	0.2
2905	25.2	0.2
2906	25.7	0.2

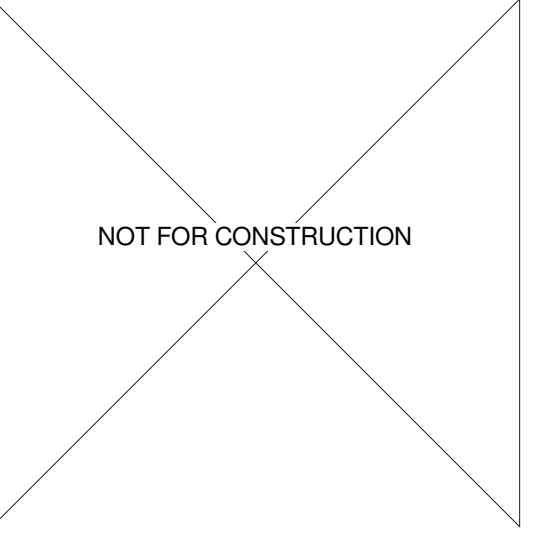


3 STRUCTURAL FRAMING ELEVATION ALONG GRID "29" (LOOKING WEST)
1/8" = 1'-0"

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4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714

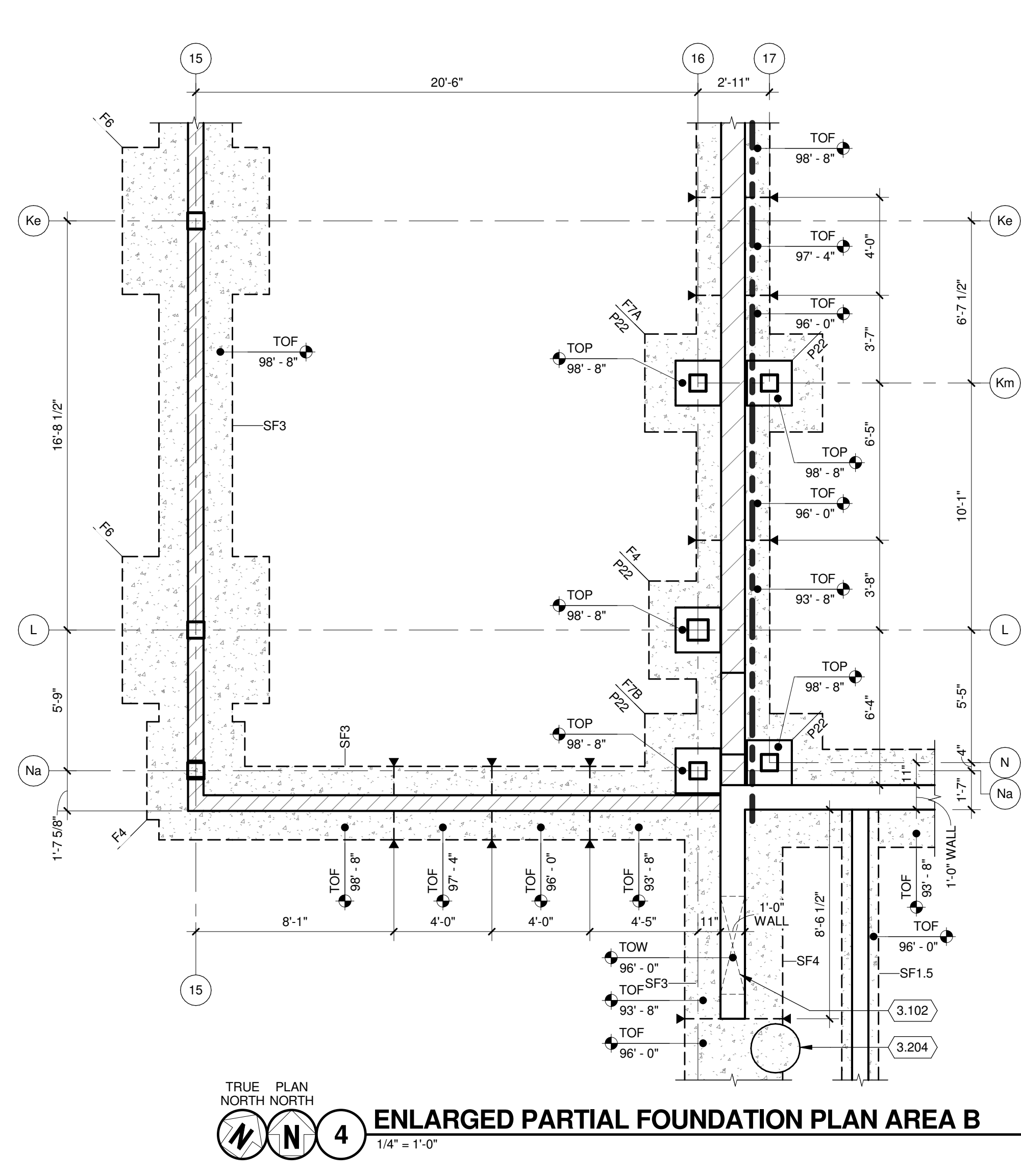
ISSUE FOR BID



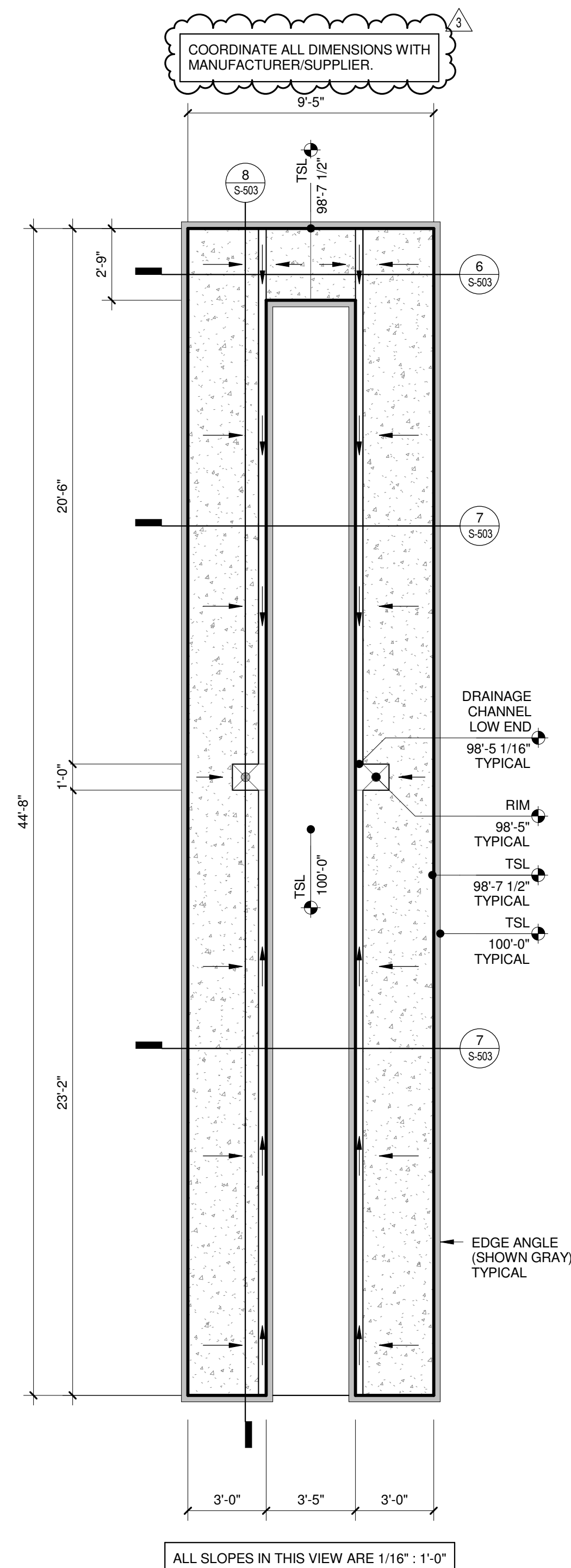
NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

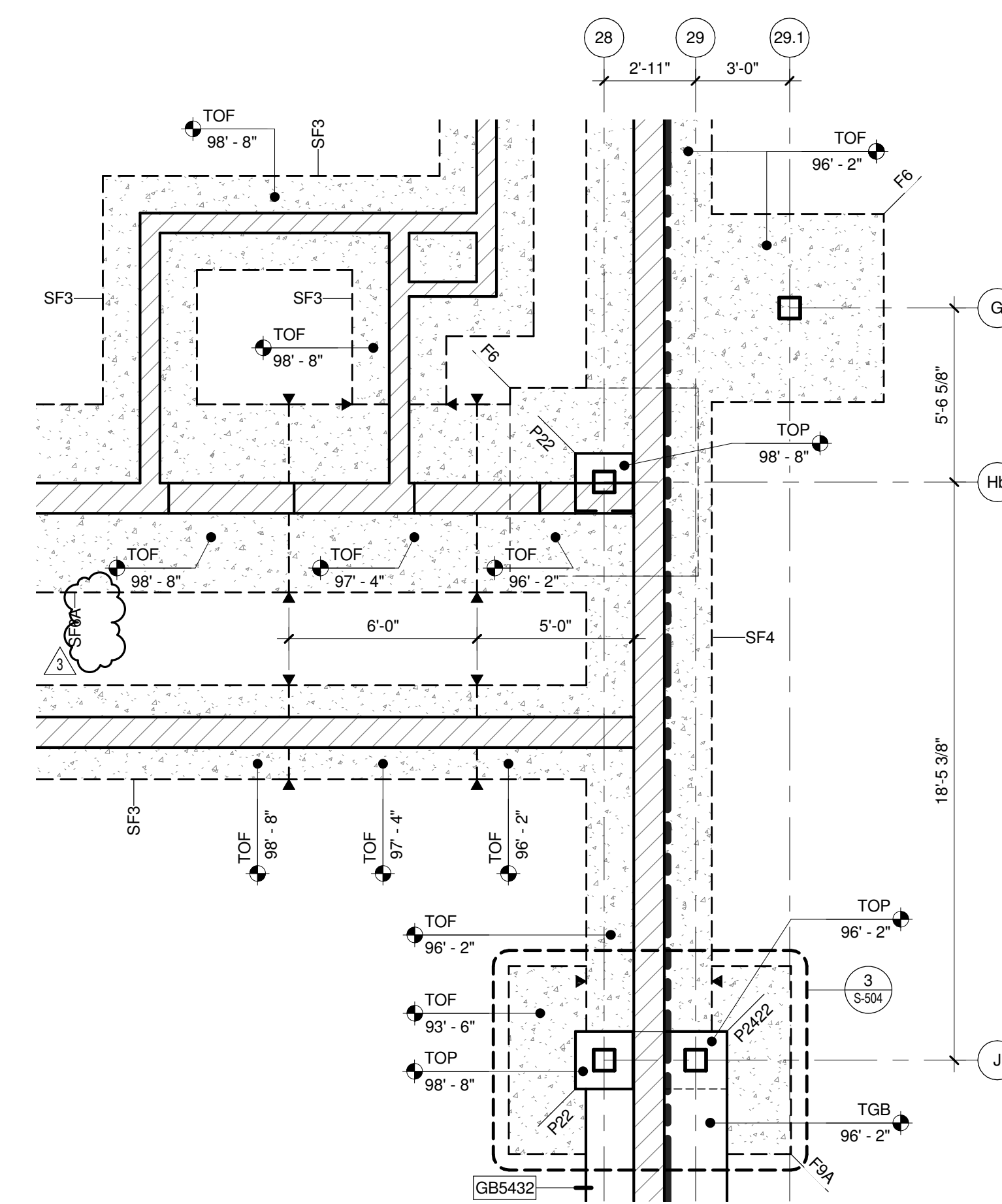
STRUCTURAL FRAMING
ELEVATIONS



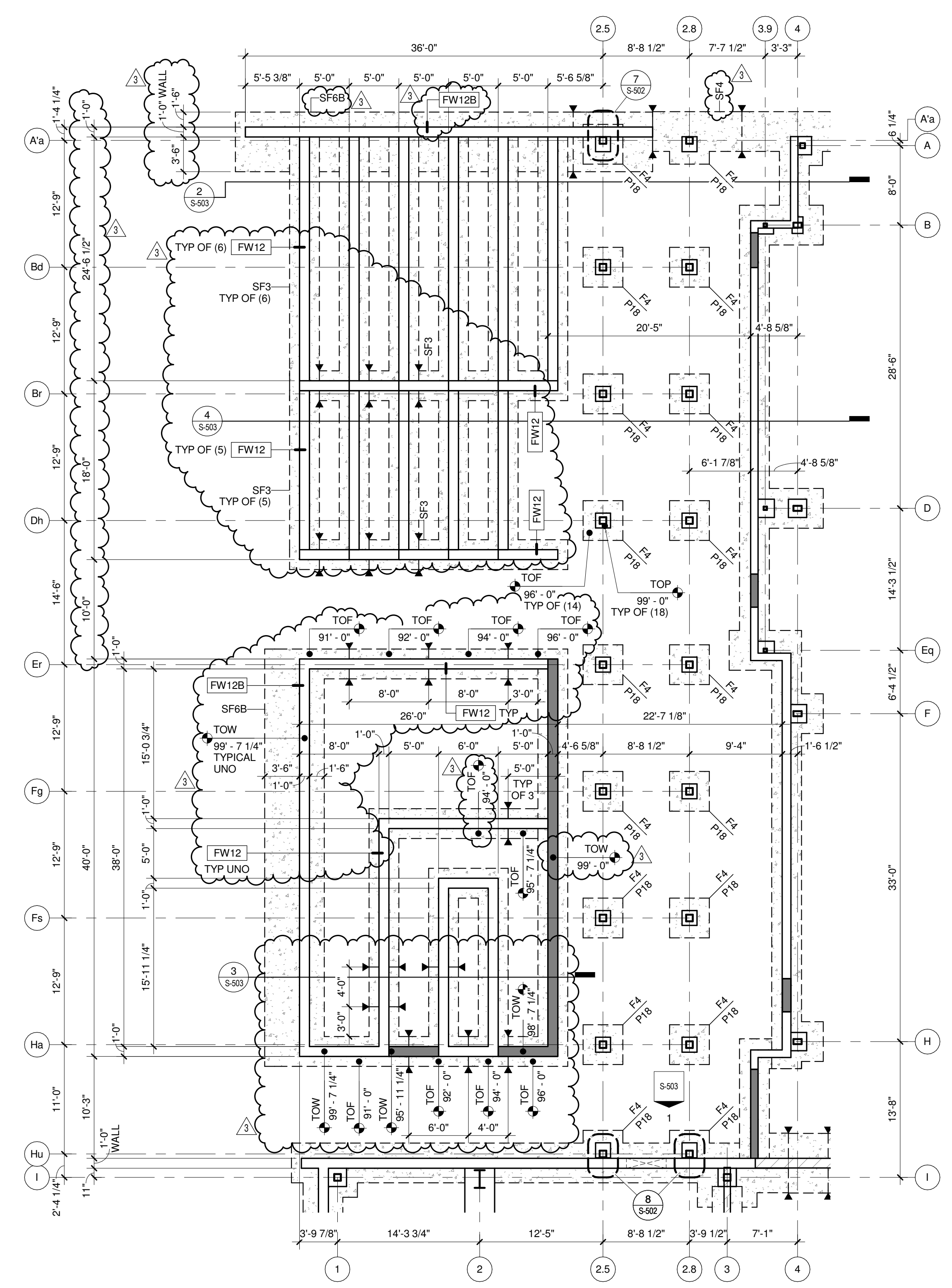
TRUE PLAN NORTH NORTH
ENLARGED PARTIAL FOUNDATION PLAN AREA B
 1/4" = 1'-0"



TRUE PLAN NORTH NORTH
ENLARGED FLATWORK PLAN AREA C
 1/4" = 1'-0"



TRUE PLAN NORTH NORTH
ENLARGED PARTIAL FOUNDATION PLAN AREA D
 1/4" = 1'-0"



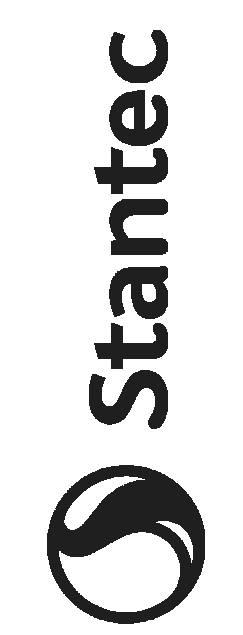
TRUE PLAN NORTH NORTH
PARTIAL FOUNDATION PLAN
 1/8" = 1'-0"

KEYED NOTES

- 3.102 PROVIDE 1'-0" X 4'-0" OPENING IN PRECAST FOUNDATION WALL FOR TELECOMMUNICATIONS / ELECTRICAL CABLE. SEE TYPICAL DETAIL 10S-502. COORDINATE FINAL LOCATION WITH ELECTRICAL.
- 3.204 BOLLARD, SEE DETAIL 14S-511

FOUNDATION PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS. BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-501 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-501 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
5. REFER TO SHEET S-501 FOR STRUCTURAL SCHEDULES.
6. STRIP FOOTINGS SHALL BE CENTERED UNDER FOUNDATION/MASONRY WALLS UNLESS NOTED OTHERWISE.



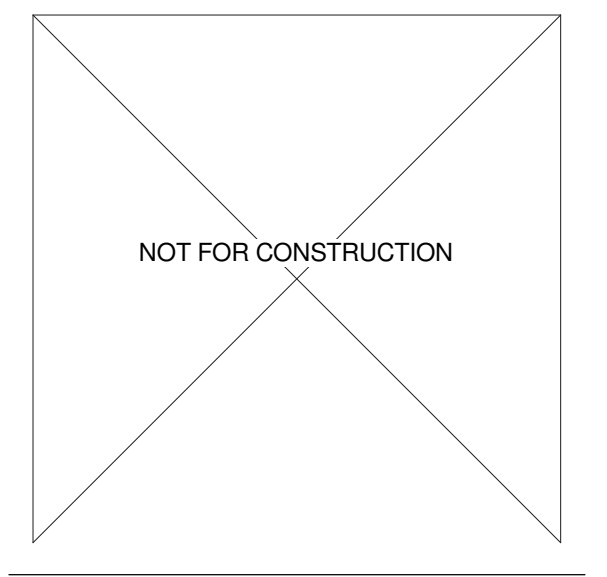
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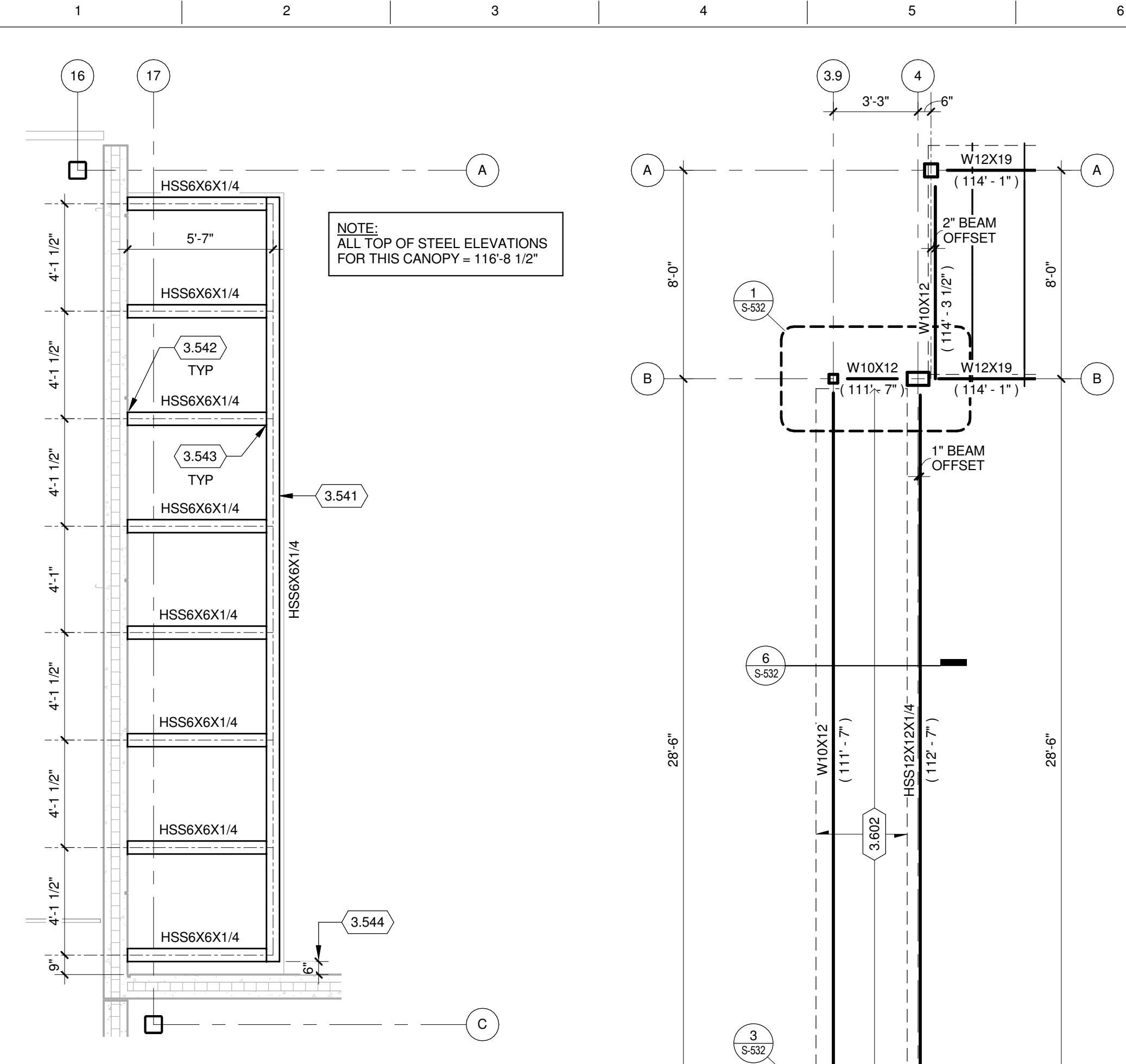


No.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
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	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

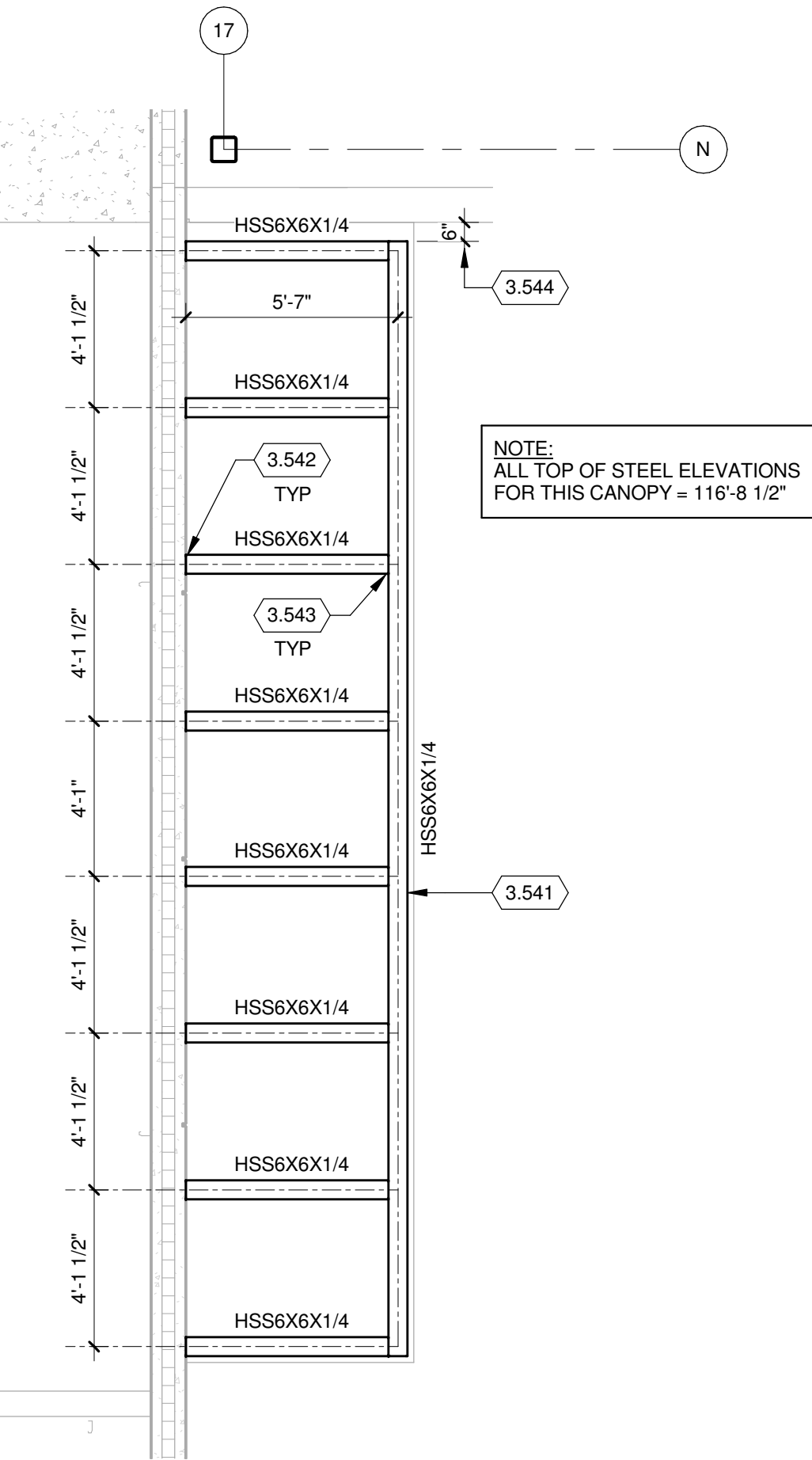
PROJECT No: 1303500-160264.01

MISCELLANEOUS
 FOUNDATION PLANS

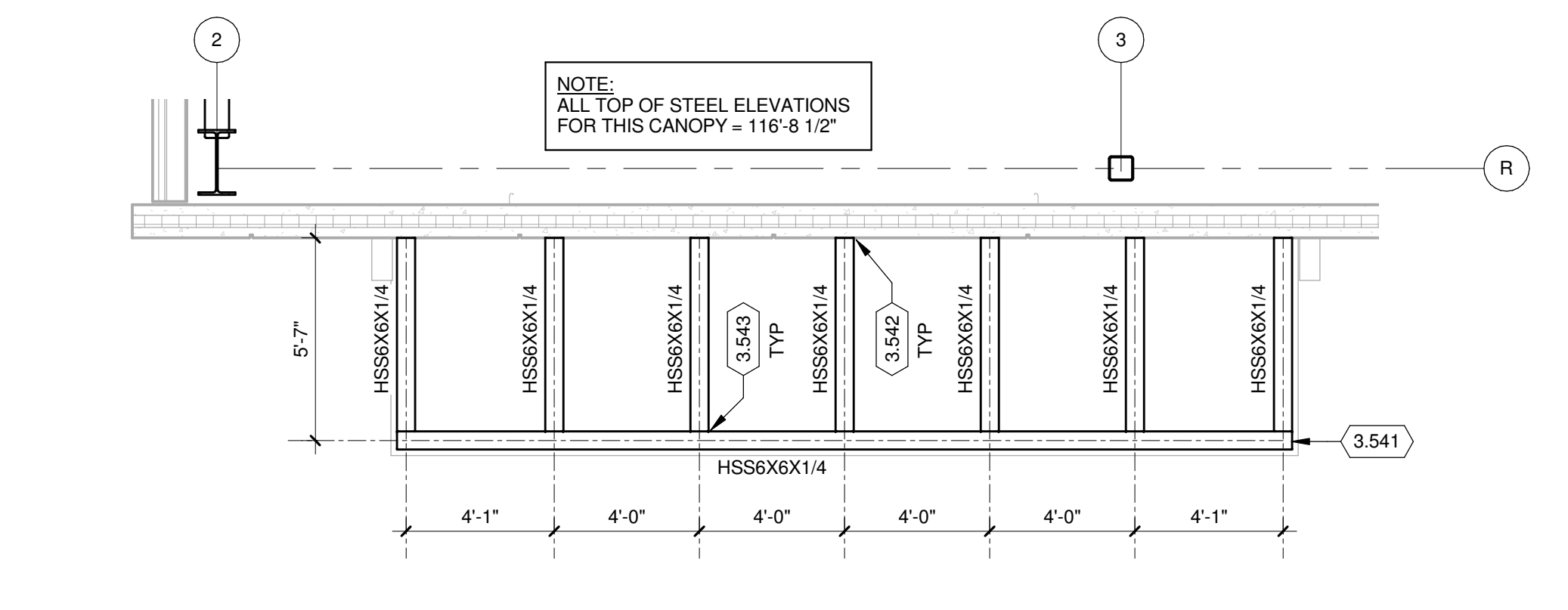
S-401



DOOR CANOPY FRAMING PLAN - AREA A
1/4" = 1'-0"



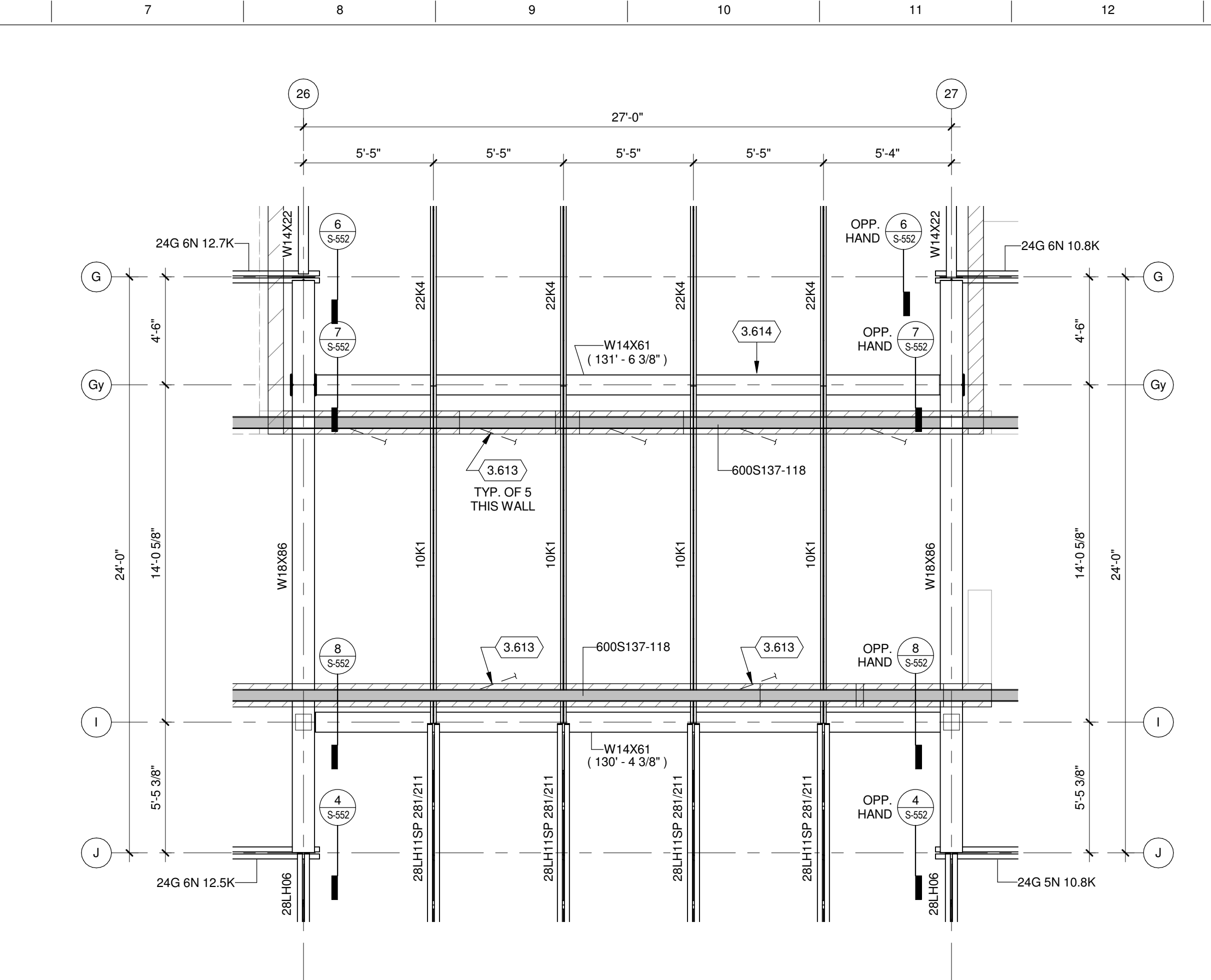
DOOR CANOPY FRAMING PLAN - AREA B
1/4" = 1'-0"



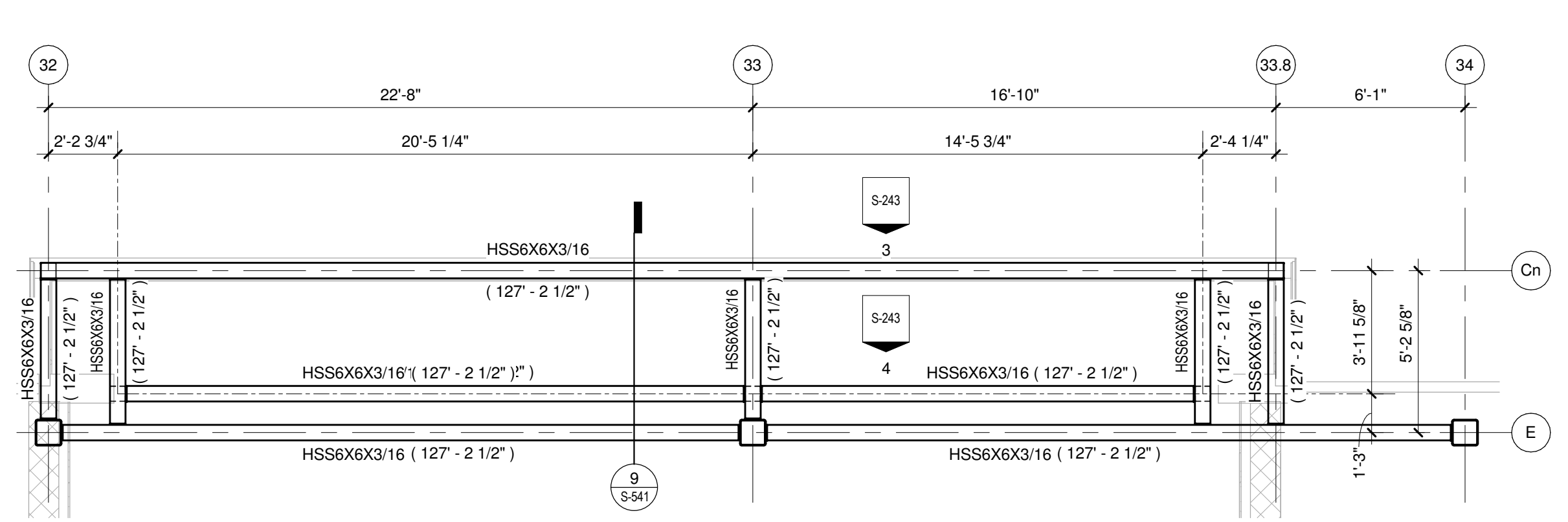
PARTIAL ENLARGED LOW ROOF FRAMING PLAN AREA A
1/4" = 1'-0"



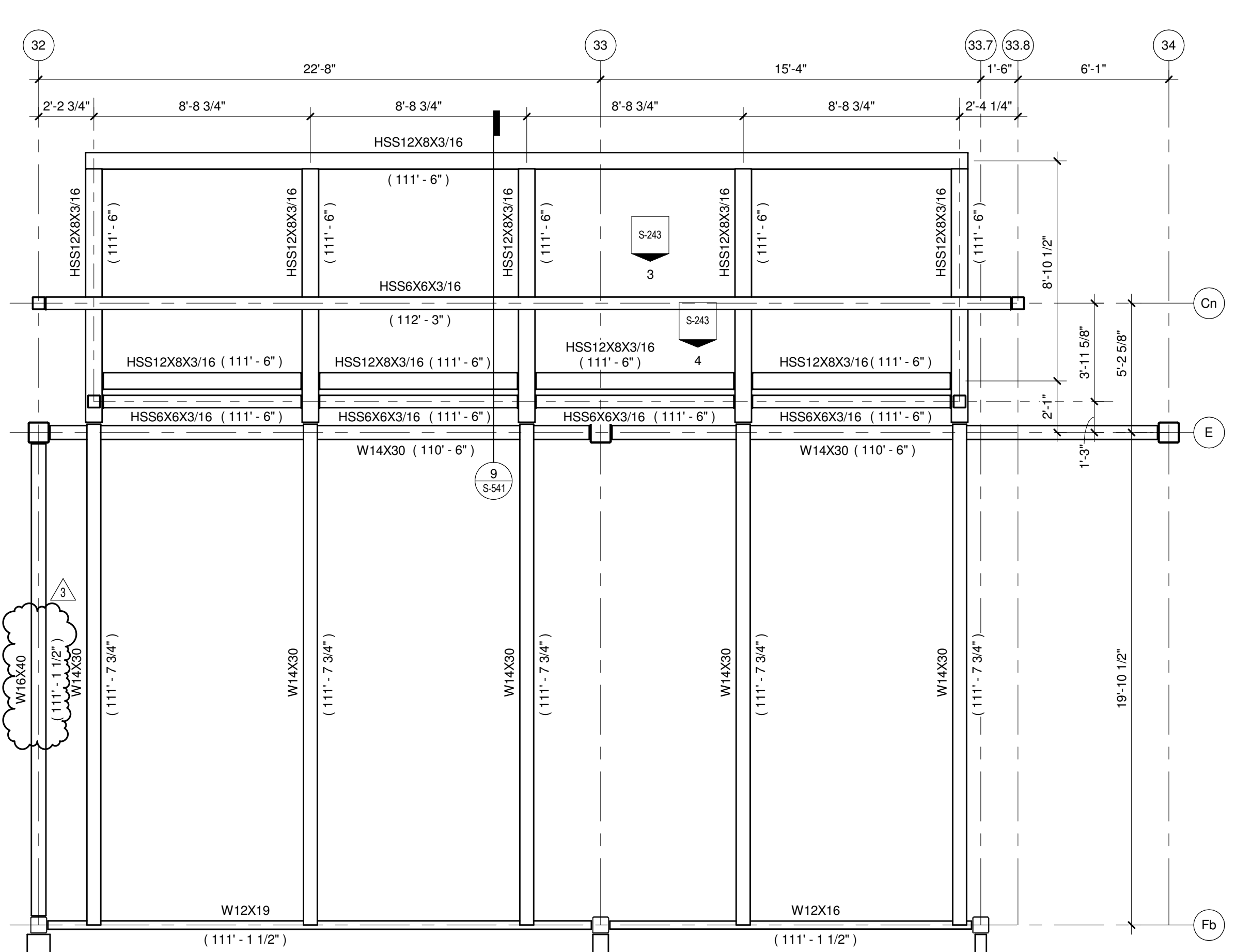
DOOR CANOPY FRAMING PLAN - AREA B
1/4" = 1'-0"



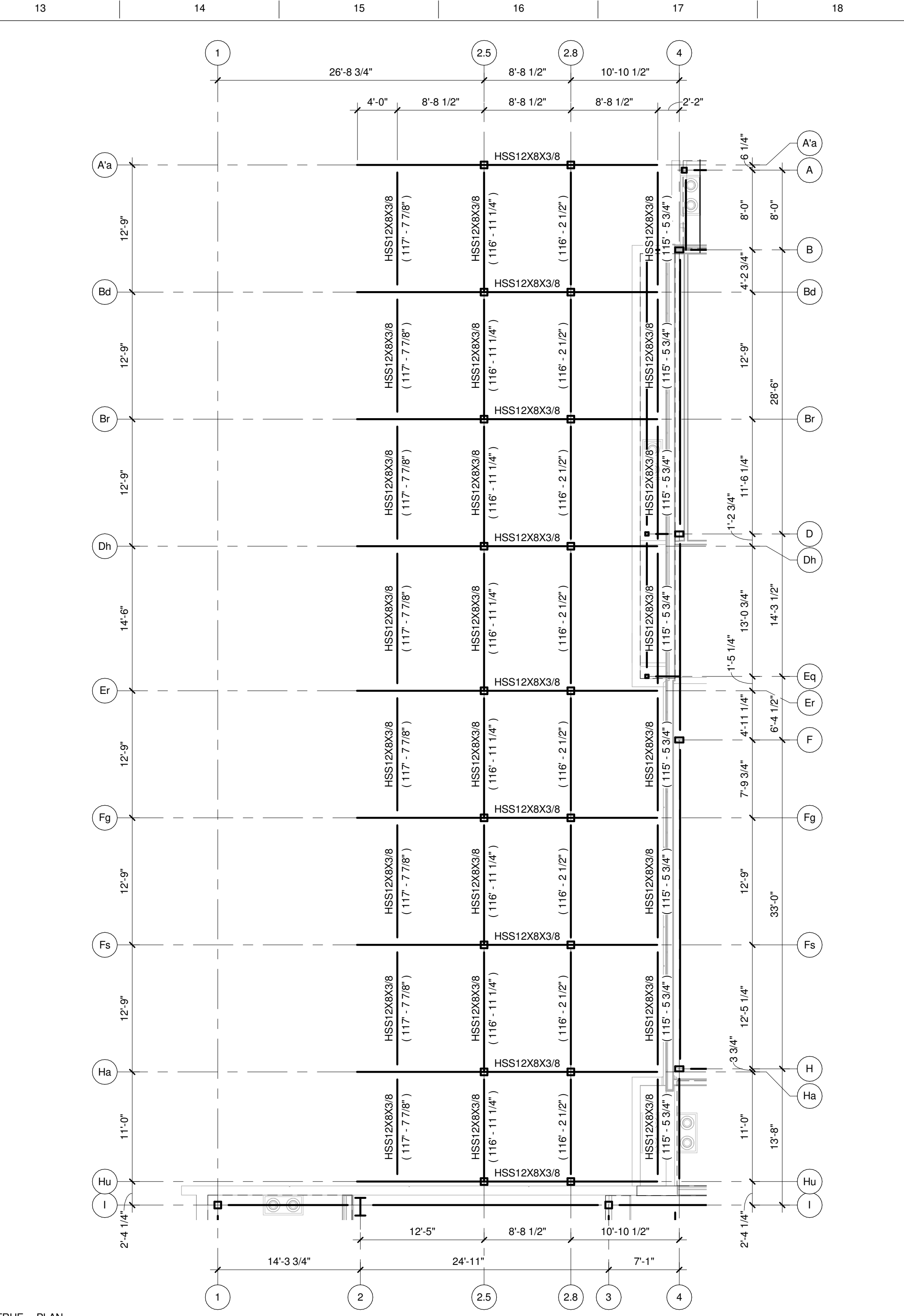
ENLARGED HIGH ROOF FRAMING PLAN AREA D
1/4" = 1'-0"



ENLARGED ENTRY HIGH FRAMING PLAN AREA E
1/4" = 1'-0"



ENLARGED ENTRY CANOPY LOW FRAMING PLAN AREA E
1/4" = 1'-0"



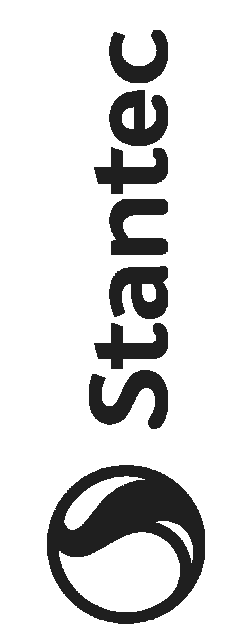
CANOPY ROOF FRAMING PLAN AREA A
1/8" = 1'-0"

KEYED NOTES

- 3.541 CAP EACH END OF HSS HEADER BEAM.
- 3.542 WELD ALL AROUND TO EMBED PLATE IN PRECAST WALL. LOAD TO PRECAST AT EACH OUTRIGGER (V=2.9K, M=104"K).
- 3.543 WELD OUTRIGGER ALL AROUND TO HSS HEADER BEAM.
- 3.544 NO CONNECTION ALLOWED FROM CANOPY TO AREA C. MAINTAIN 6 INCH GAP BETWEEN CANOPY STRUCTURE AND AREA C STRUCTURE.
- 3.602 ROOF DECK IS 1 1/2" DEEP, WIDE RIB, 20 GAUGE METAL DECK. FASTEN ROOF DECK TO SUPPORTS WITH #12 SCREWS AT 6" ON CENTER AND THREE #10 SCREWS PER SPAN IN SIDELAPS. (S67-3)
- 3.613 SEE DETAIL S-522 AND SECTION DETAIL 7/S-522 FOR MASONRY SHEAR TRANSFER BRACING.
- 3.614 PROVIDE BENT PLATE DECK SUPPORT FULL LENGTH OF THIS BEAM/JOIST GIRDER. SIMILAR TO DETAIL 17/S-552 EXCEPT ATTACH WITH #10 SCREWS AT 6" O.C.

ROOF FRAMING PLAN GENERAL NOTES:

1. SITE DATUM OF FINISHED FIRST FLOOR INDICATED ON CIVIL SITE PLAN = ELEVATION 100'-0" FOR AREAS A, B, C, & D OR ELEVATION 97'-6" FOR AREA E ON STRUCTURAL DRAWINGS.
2. FIELD VERIFY ALL DIMENSIONS, BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR FINAL DECISION.
3. REFER TO SHEET S-001 FOR STRUCTURAL LEGENDS, ABBREVIATIONS, AND SYMBOLOLOGY.
4. REFER TO SHEET S-00x FOR ROOF LOADING PLAN AND SPECIAL JOIST LOADING REQUIREMENTS.
5. REFER TO SHEETS S-541 AND S-542 FOR TYPICAL DETAILS NOT REFERENCED ON THIS SHEET.
6. REFER TO SHEET S-601 FOR STRUCTURAL SCHEDULES.
7. MINIMUM JOIST BEARING LENGTH REQUIREMENTS ARE AS FOLLOWS:
 - AT MASONRY WALLS:
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 4"
 - "LH" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - "K" SERIES - MIN. 6"
 - "KCS" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 6"
 - AT CONCRETE WALLS:
 - "K" SERIES - MIN. 4"
 - "KCS" SERIES - MIN. 6"
 - "DLH" SERIES - MIN. 6"
 - AT STEEL BEAMS:
 - "K" SERIES - MIN. 2 1/2"
 - "KCS" SERIES - MIN. 2 1/2"
 - "LH" SERIES - MIN. 4"
 - "DLH" SERIES - MIN. 4"
8. SC = SLIP CRITICAL END CONNECTION. OMIT SHOP PAINT, INSTALL BOLTS FULLY PRETENSIONED.
9. OUTRIGGERS ARE 2.5K UNO AT 6'-0" O.C. SPACING MAXIMUM. MINIMUM S=1.2IN3, MINIMUM I = 1.5IN4.
10. JOIST EXTENSIONS ARE R9. MINIMUM S=1.67IN3, MINIMUM I = 2.09IN4.
11. PROVIDE TUBE ATTACHMENT AS SHOWN IN OUTRIGGER SECTION DETAIL 13/S-552 AT EDGES OF ALL SLOPING ROOFS. SPLICE EDGE HSS TUBE PER SPLICE DETAIL 16/S-541. AT CORNERS THE HSS TUBE MUST BE 15 FEET LONG MINIMUM WITHOUT ANY SPLICES. THE HSS TUBES ARE TO BE WELDED AT THE CORNERS - SEE DETAIL 17/S-541.



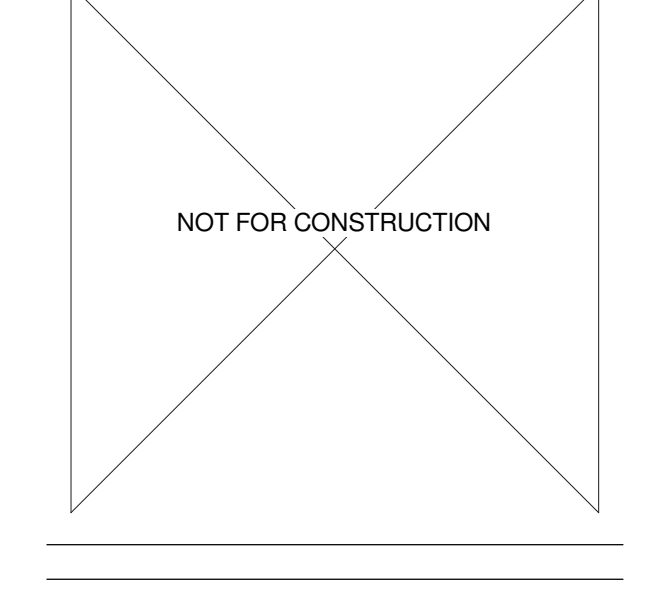
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571-290-7679



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phone: 608-273-6360
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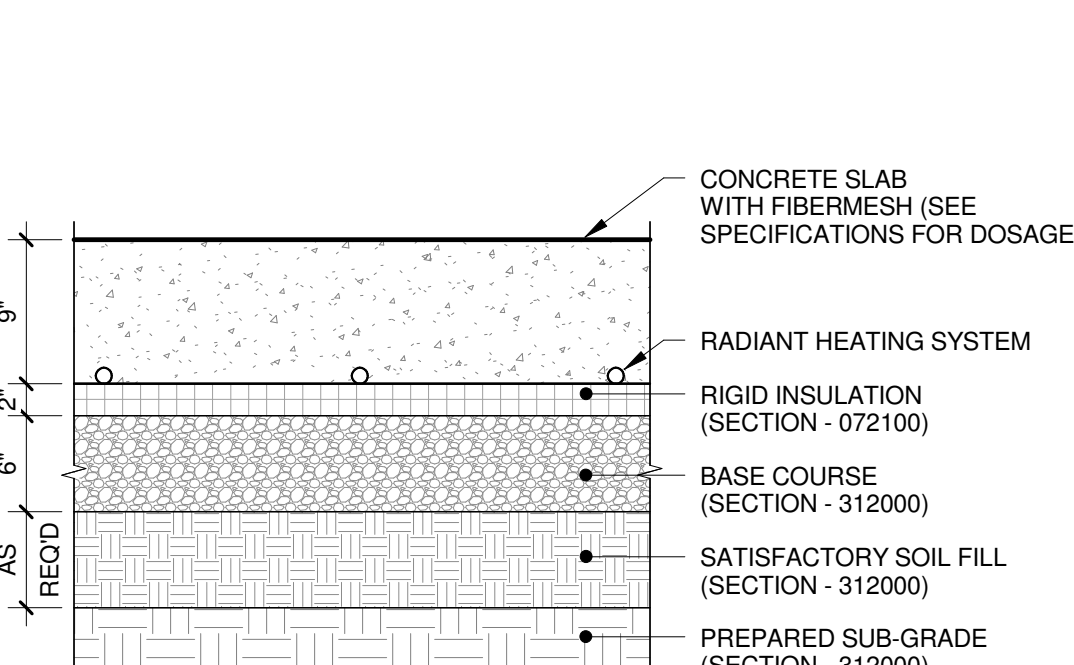
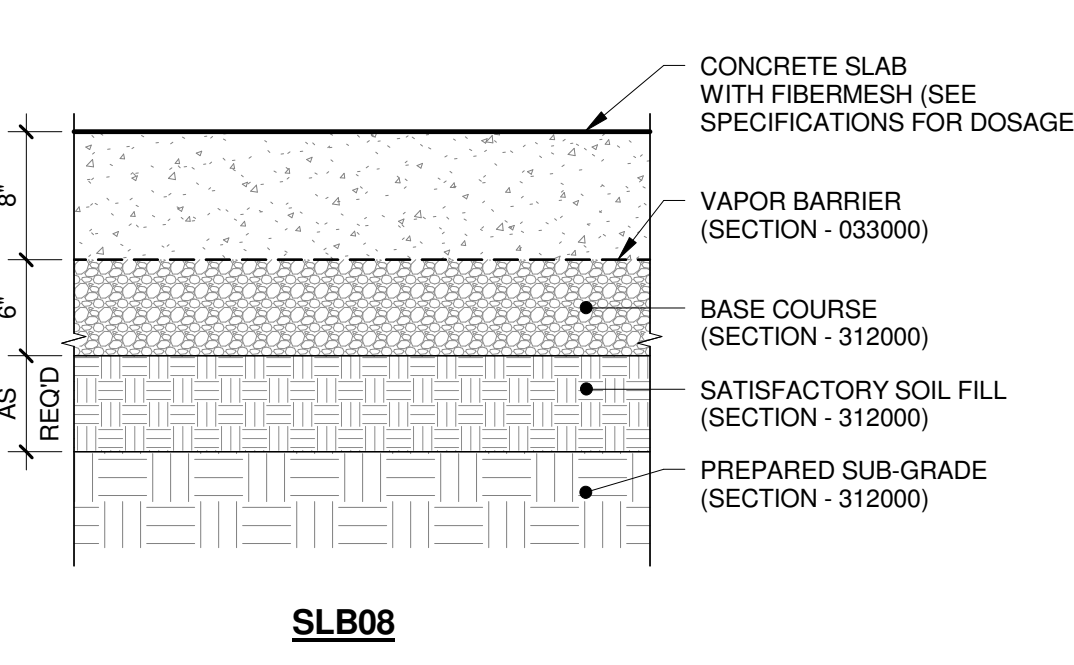
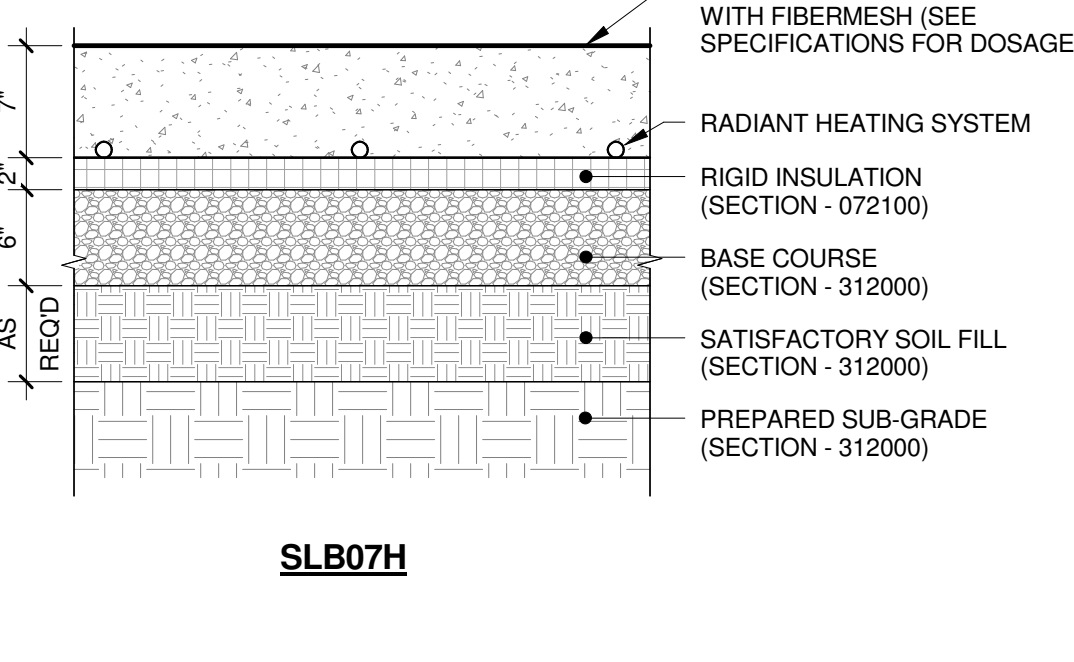
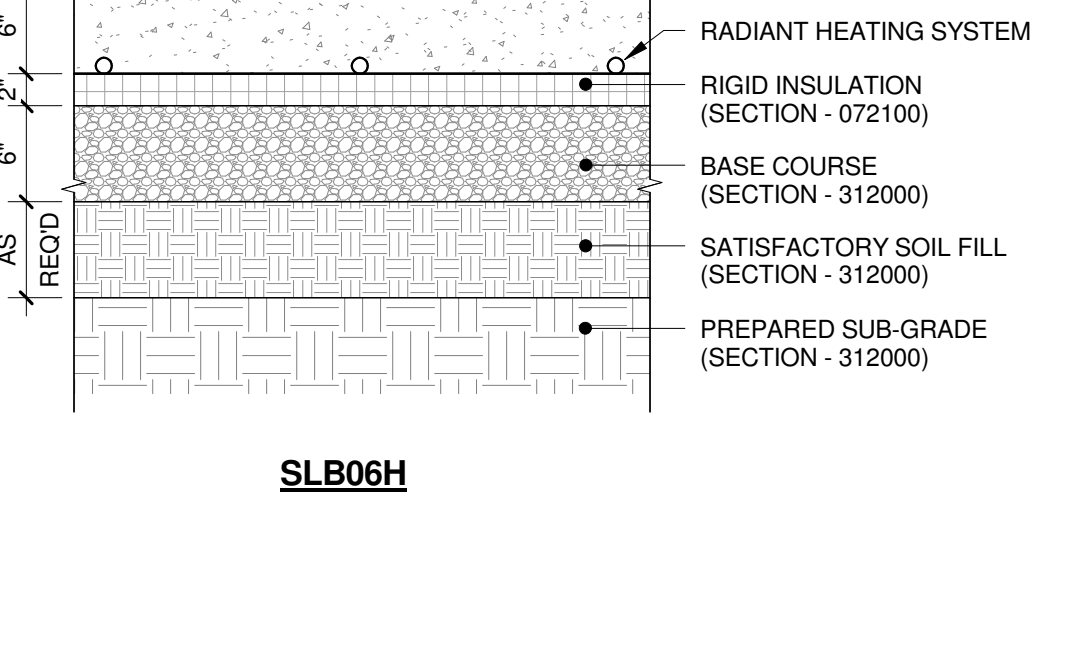
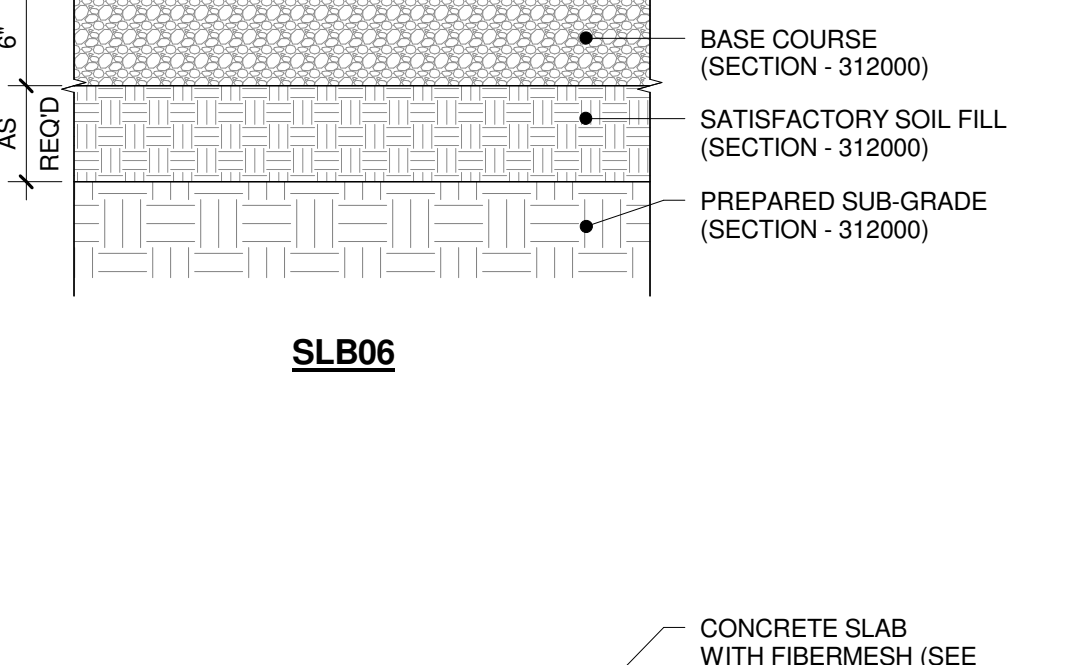
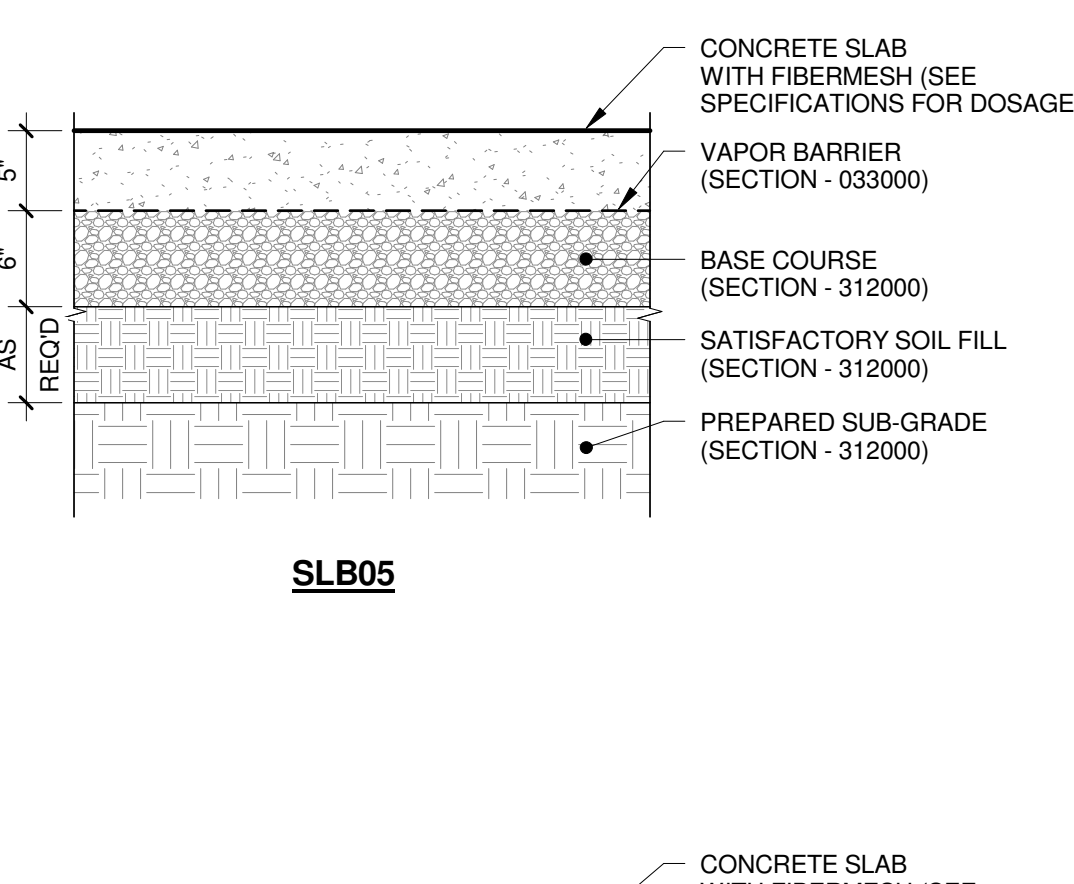
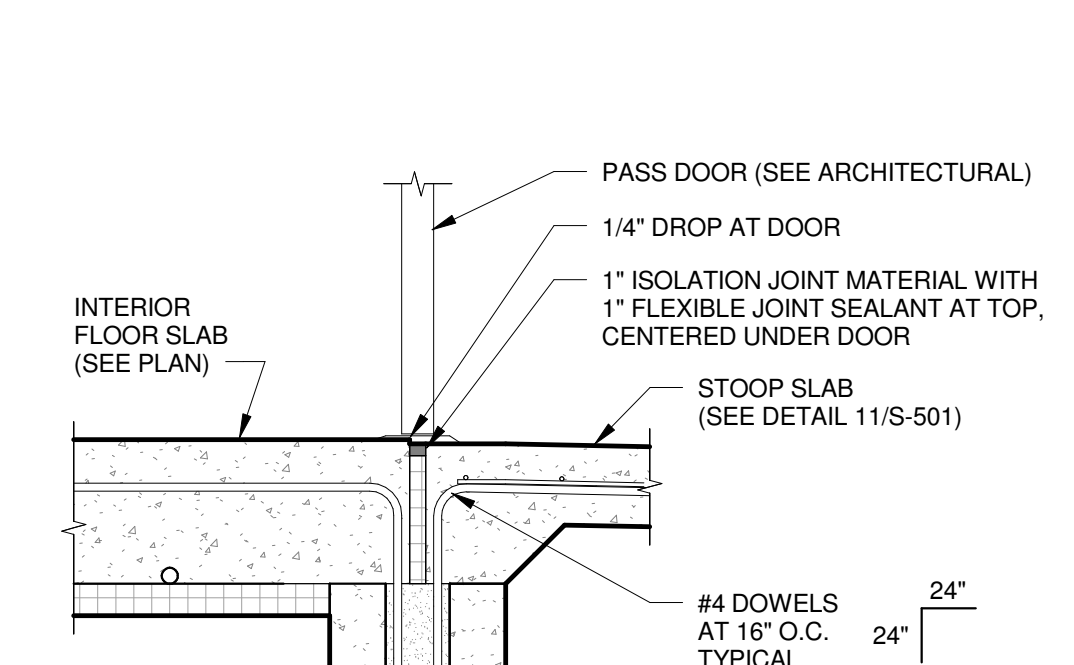
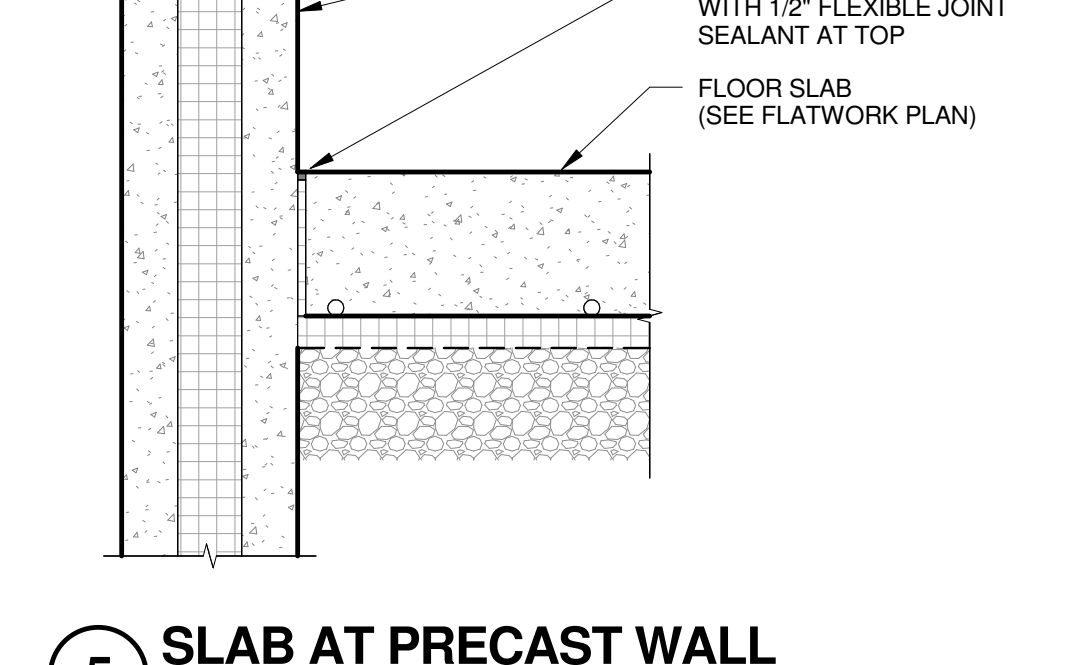
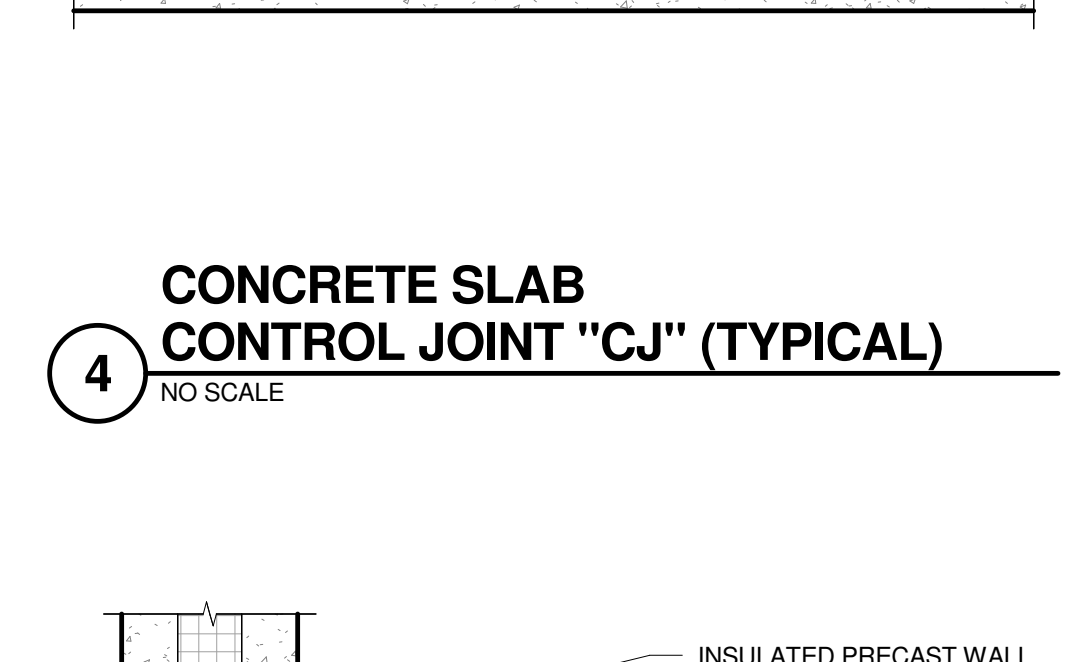
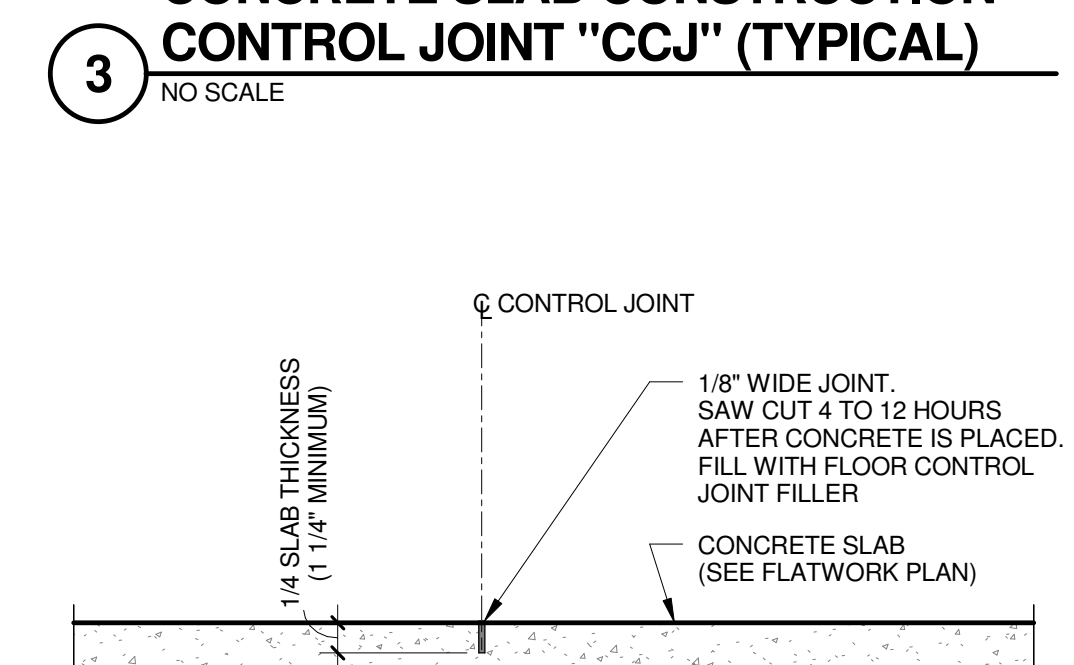
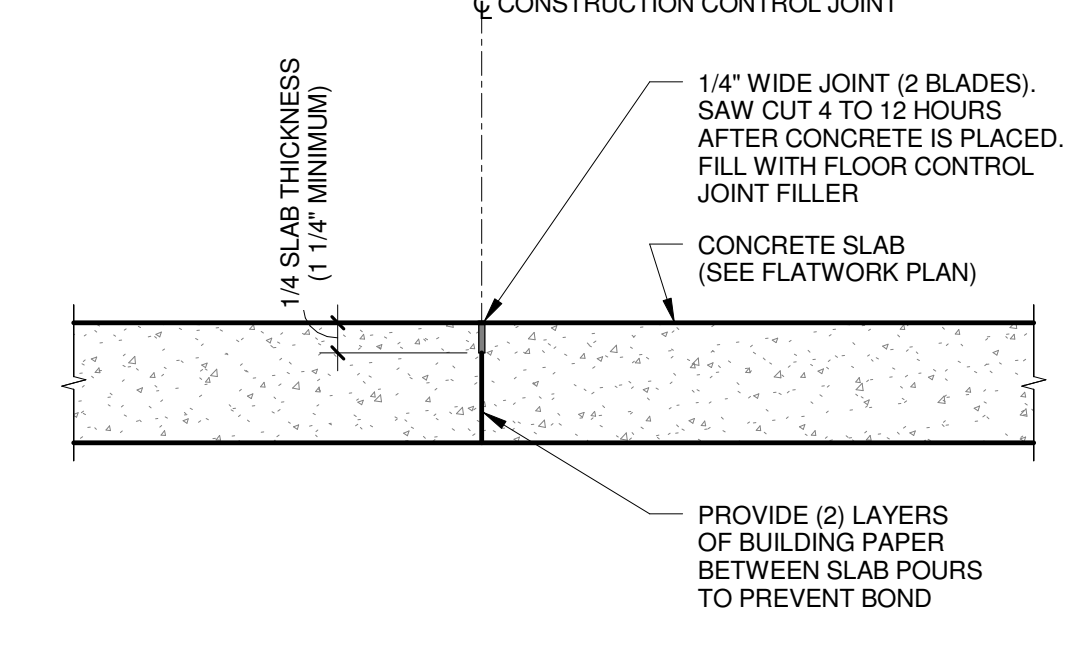
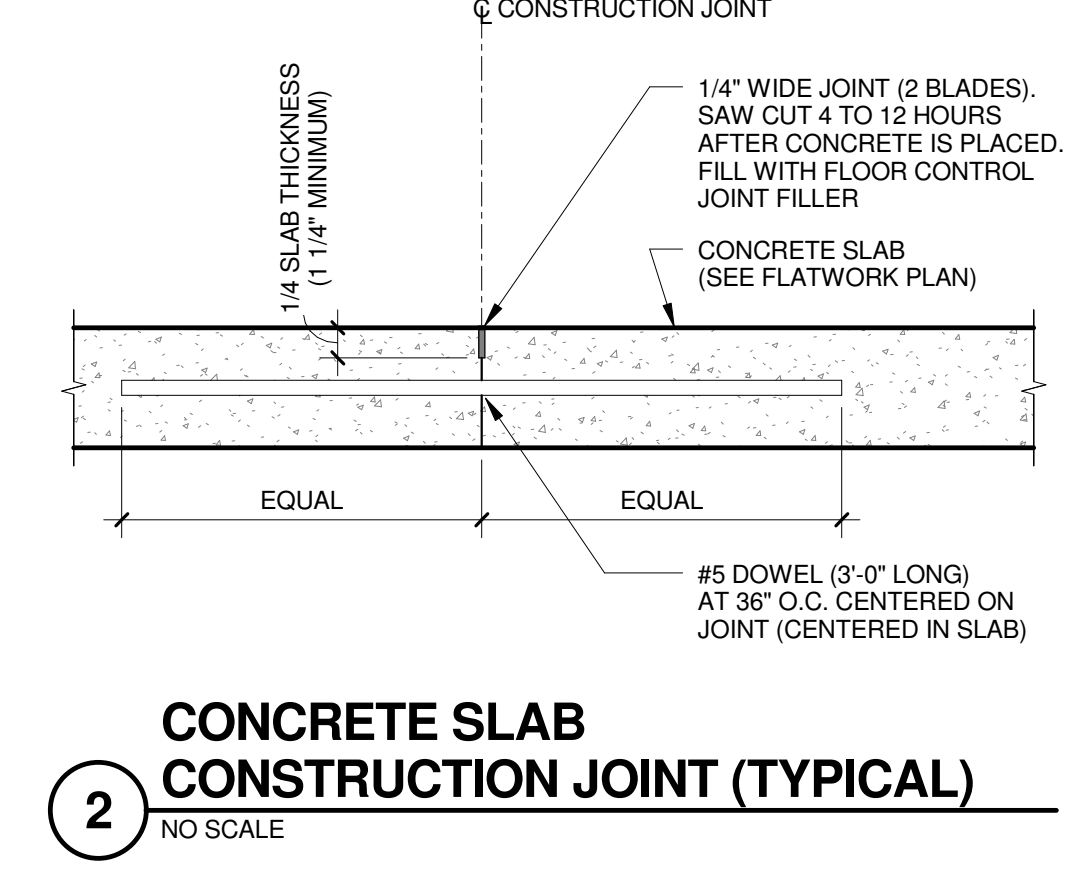
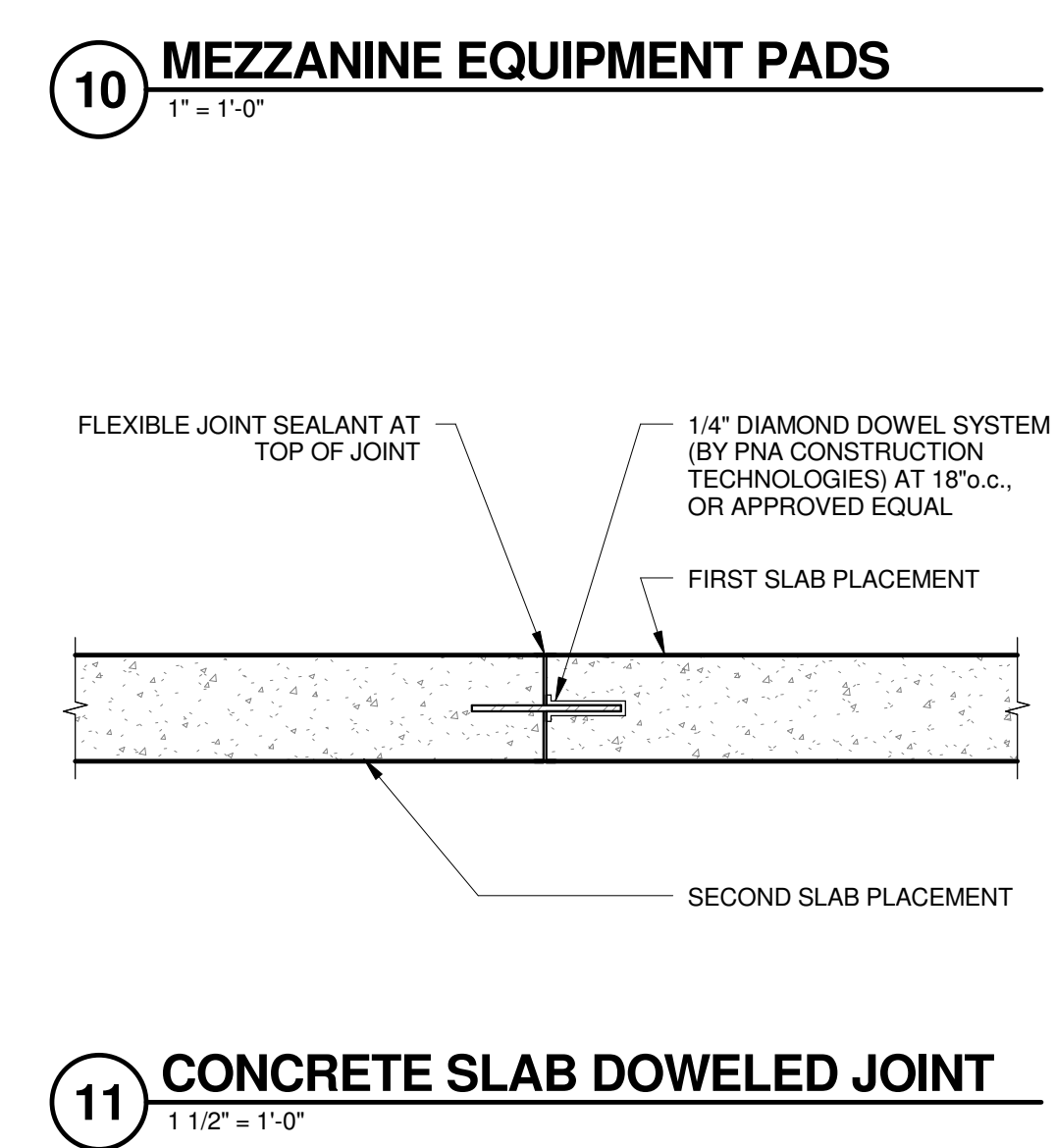
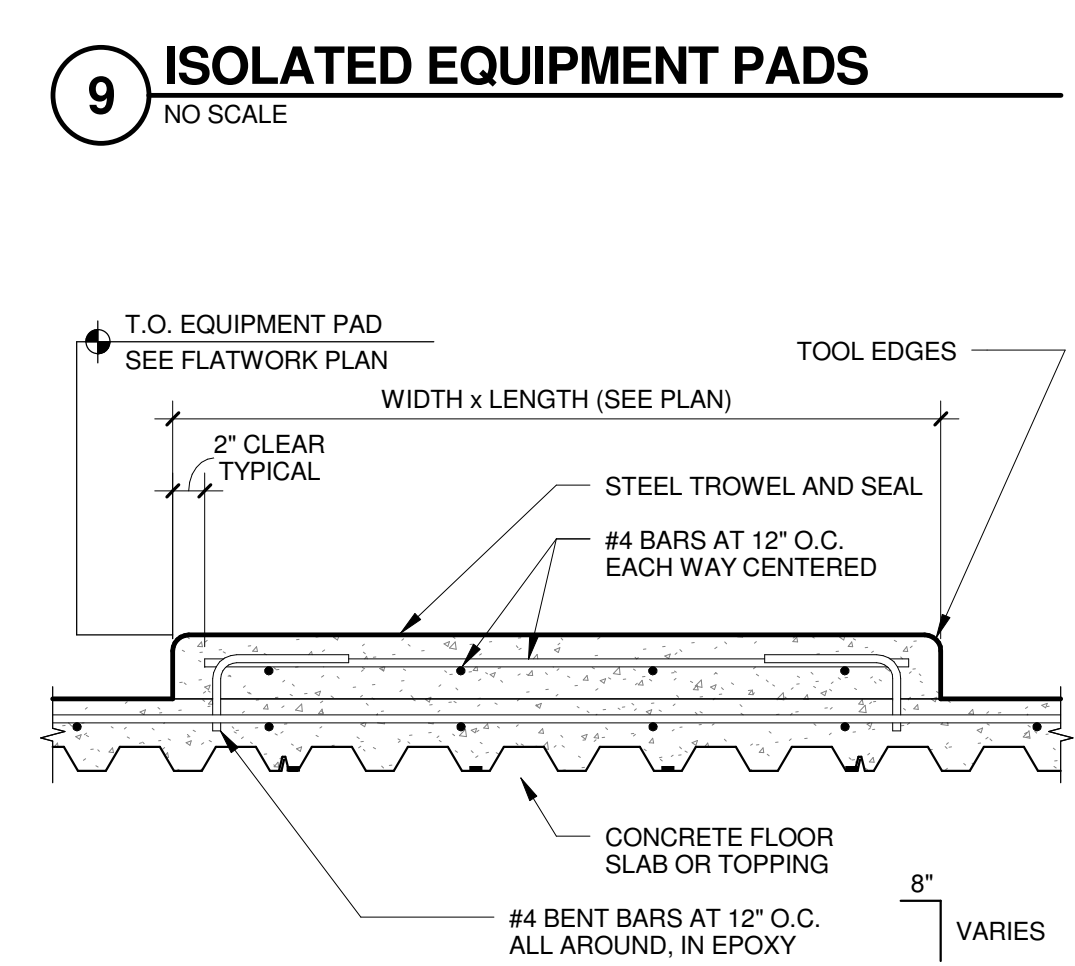
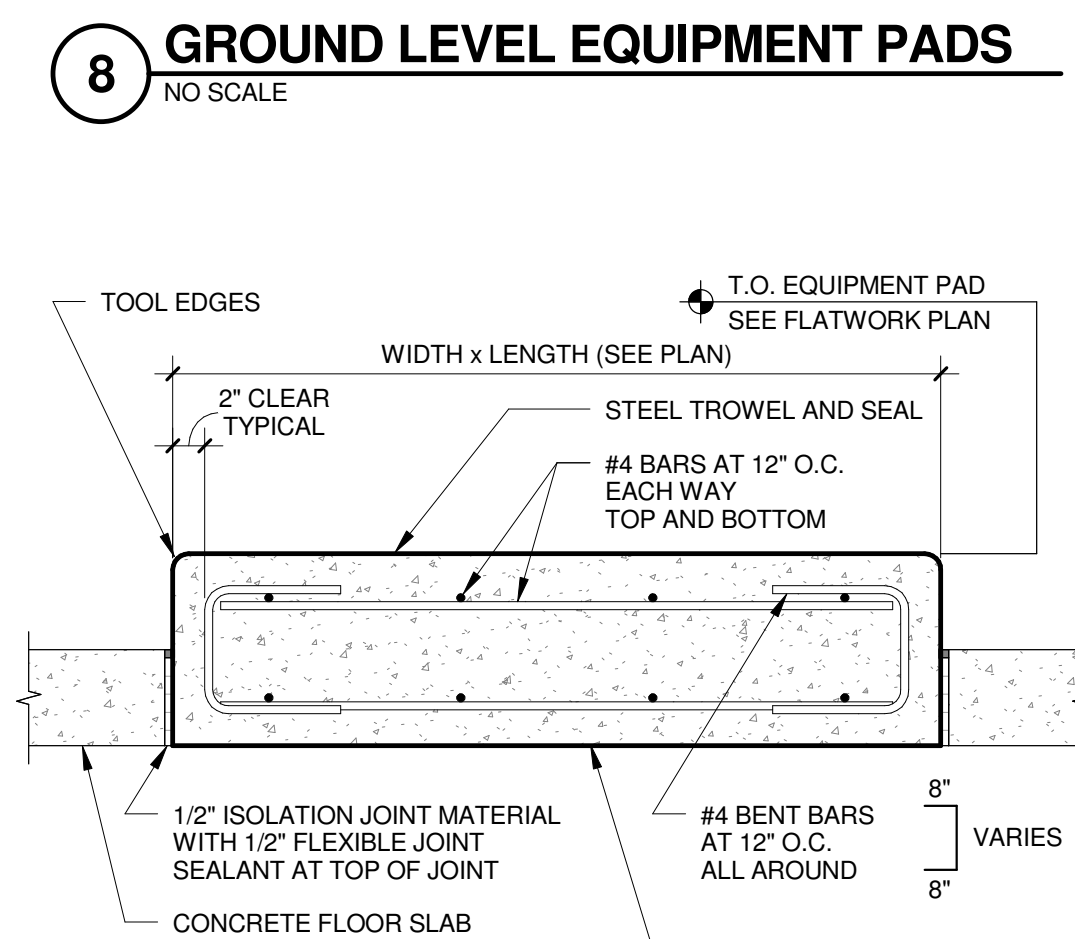
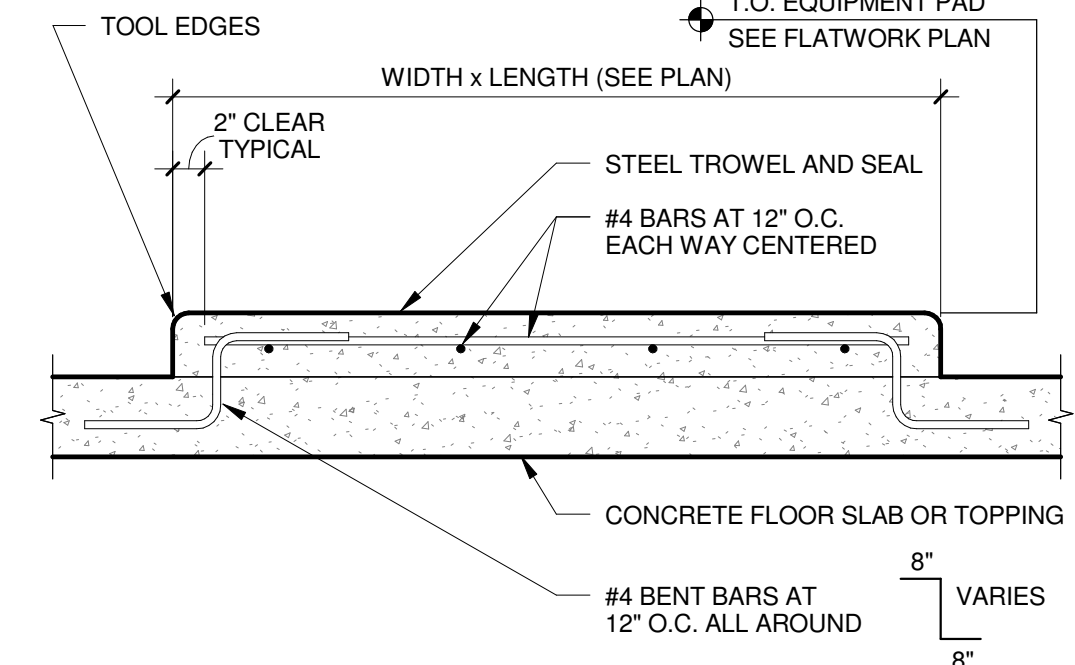
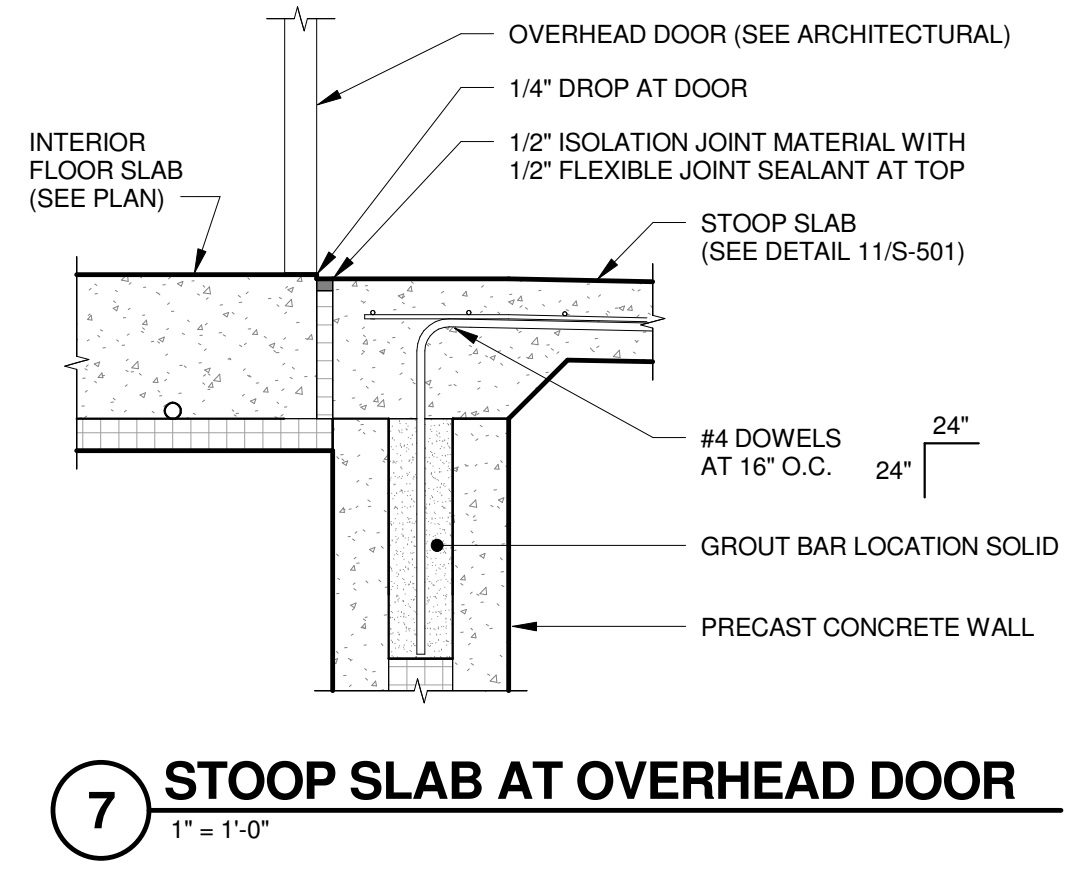
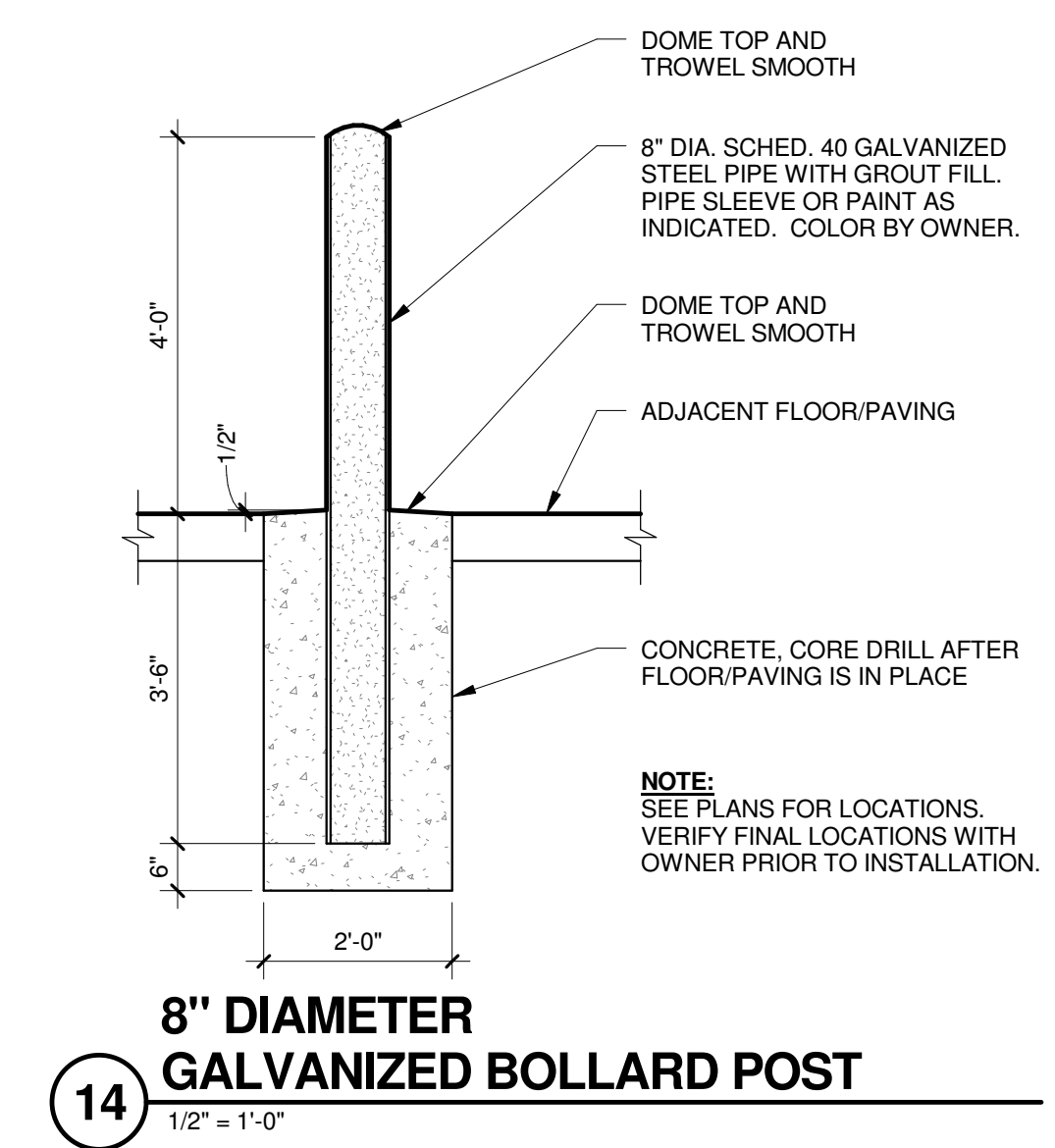
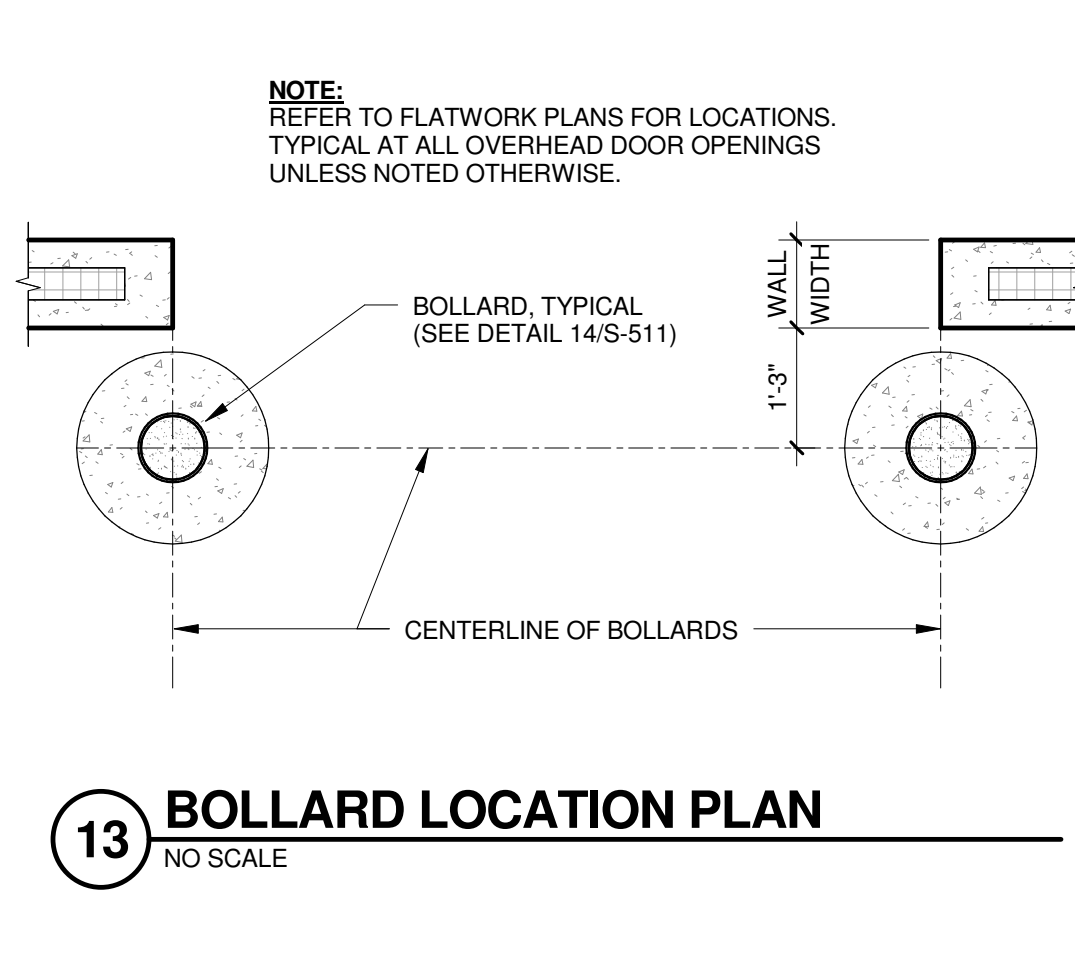
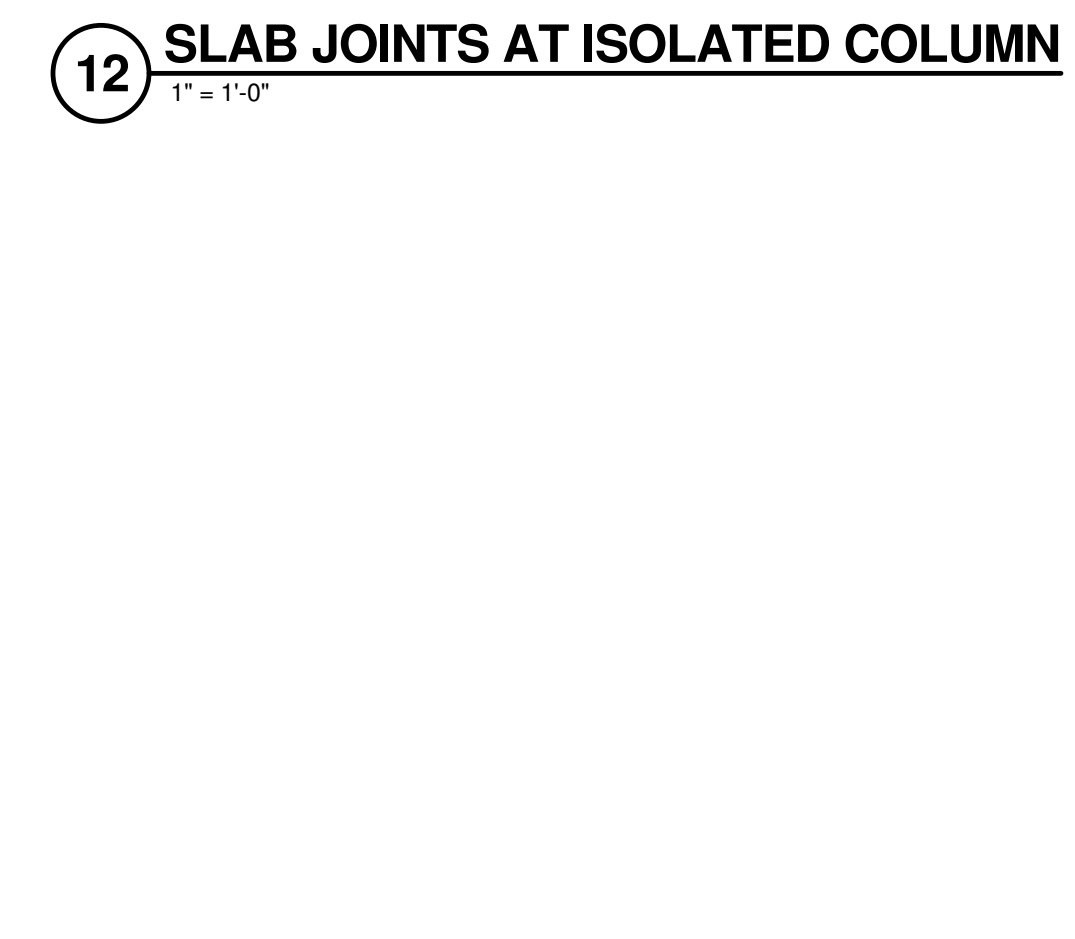
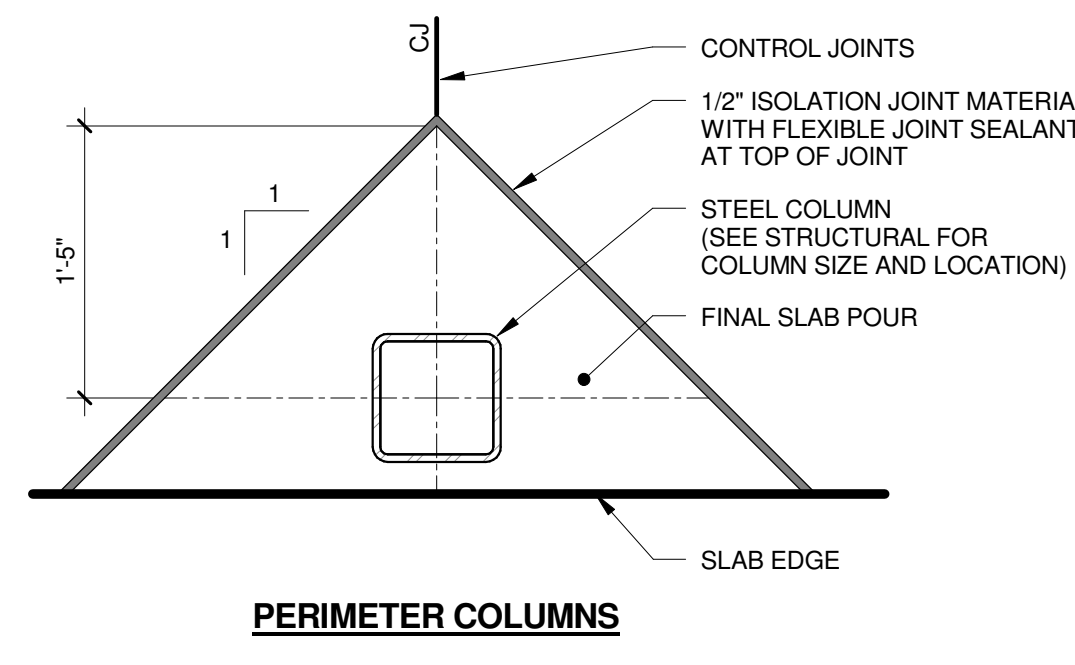
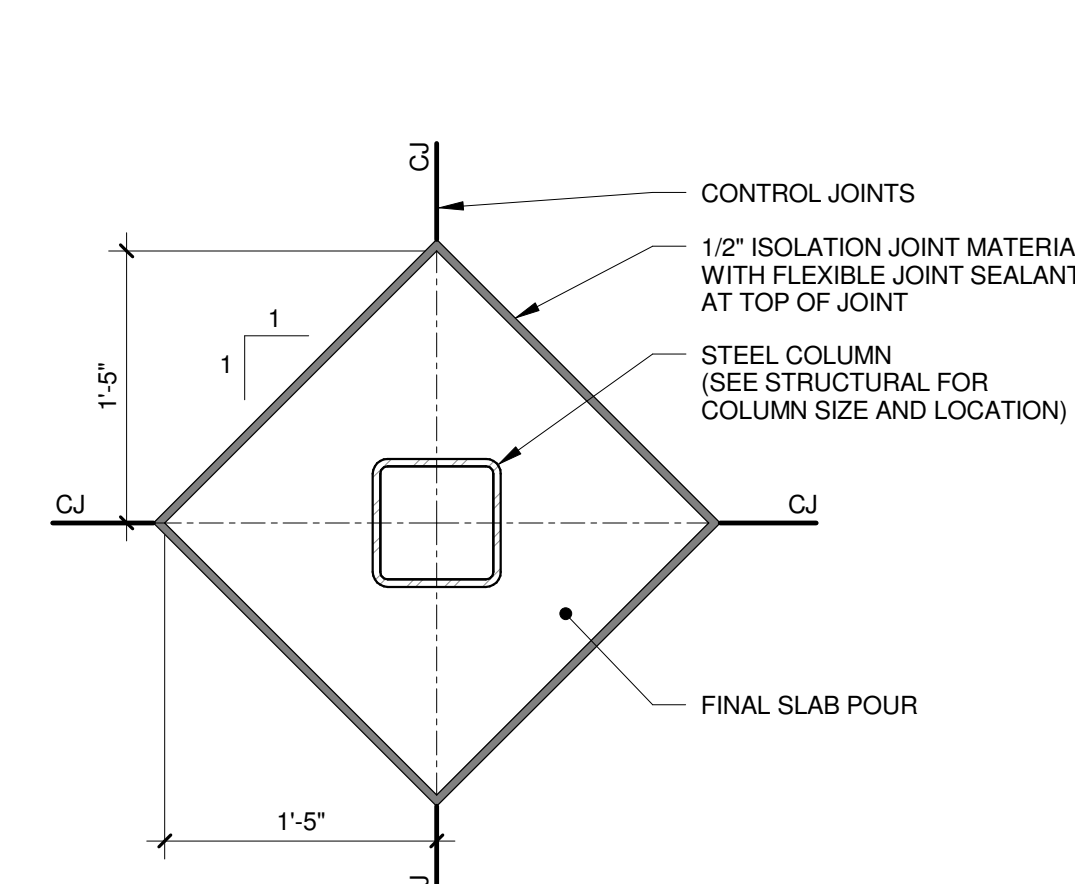
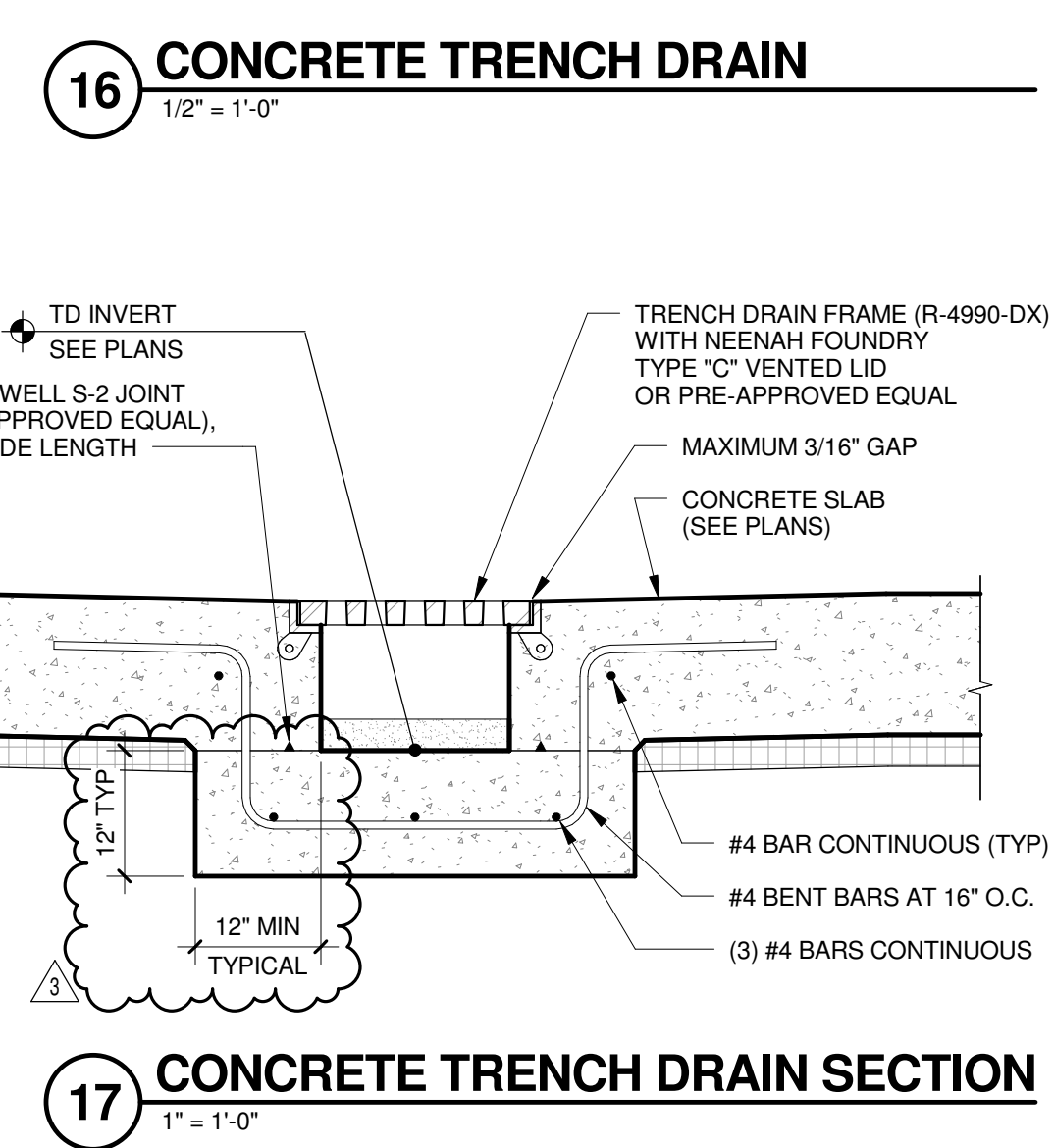
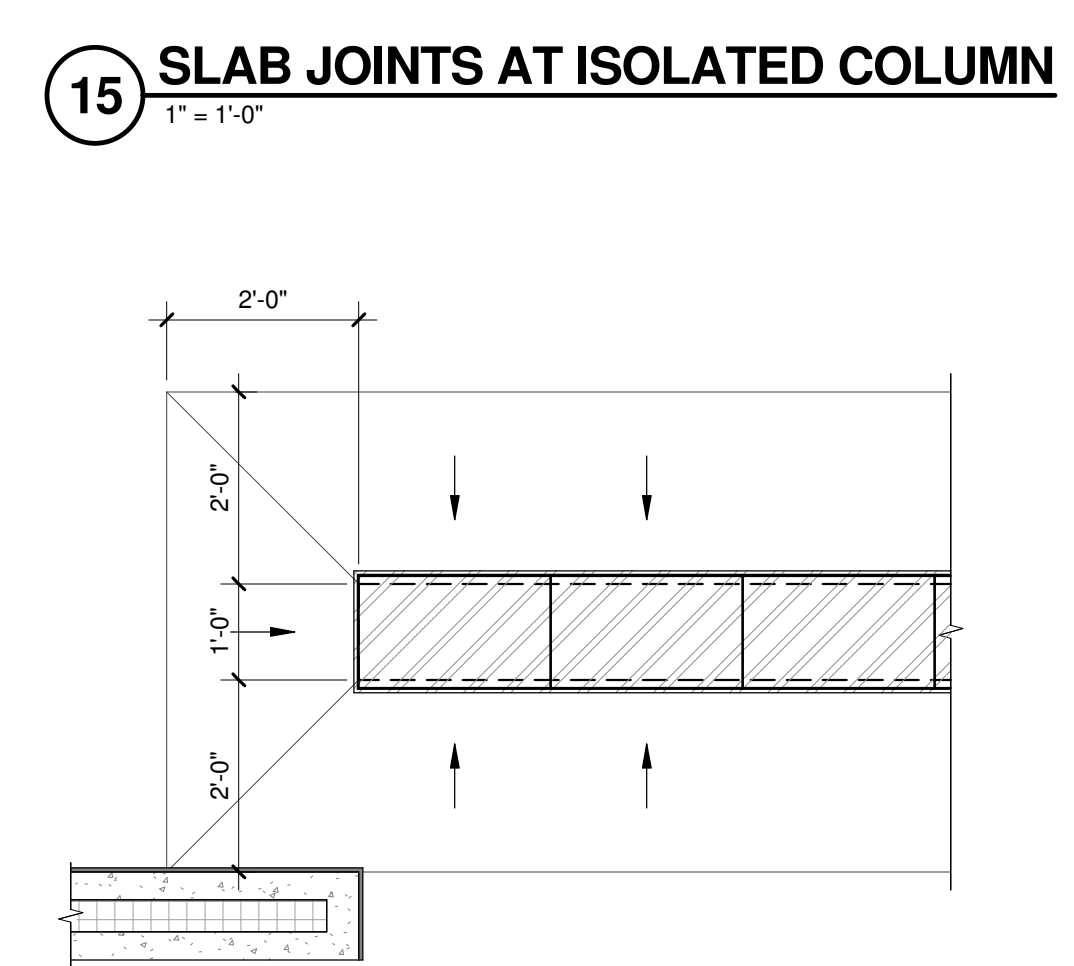
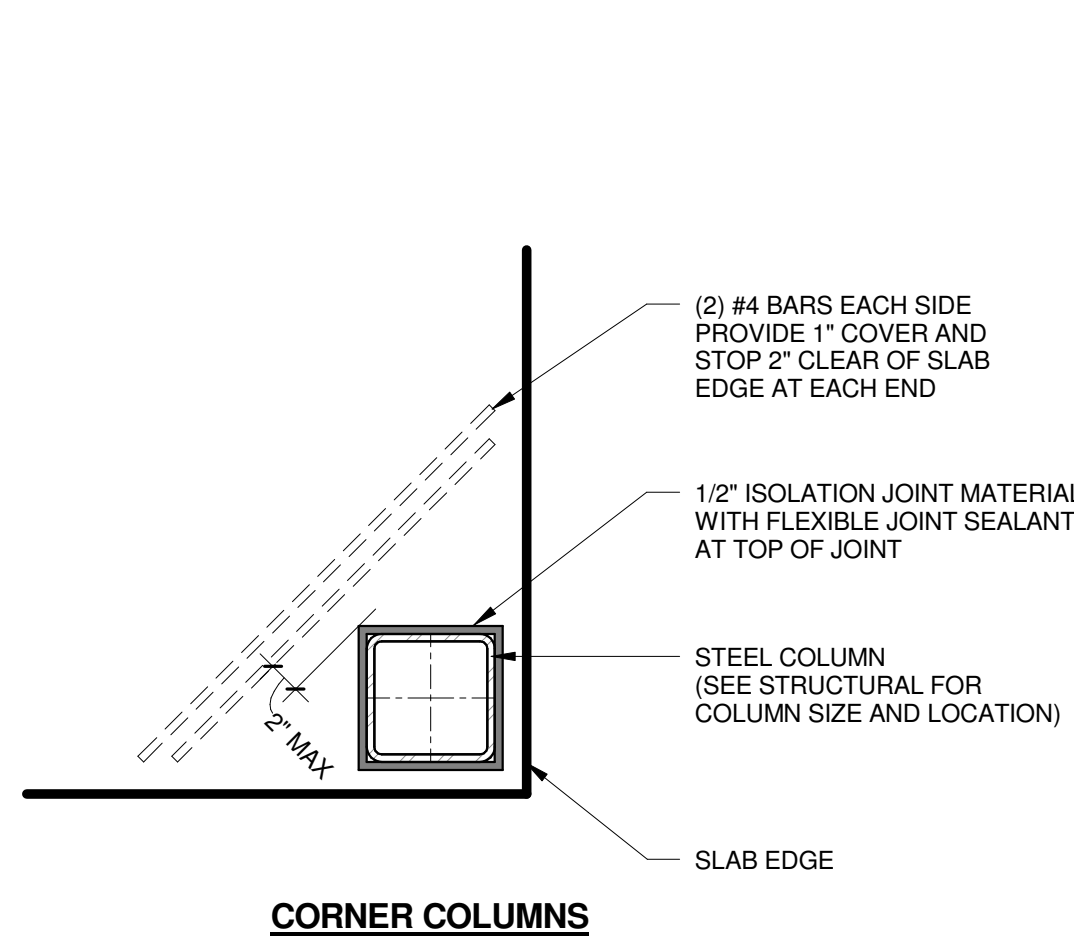
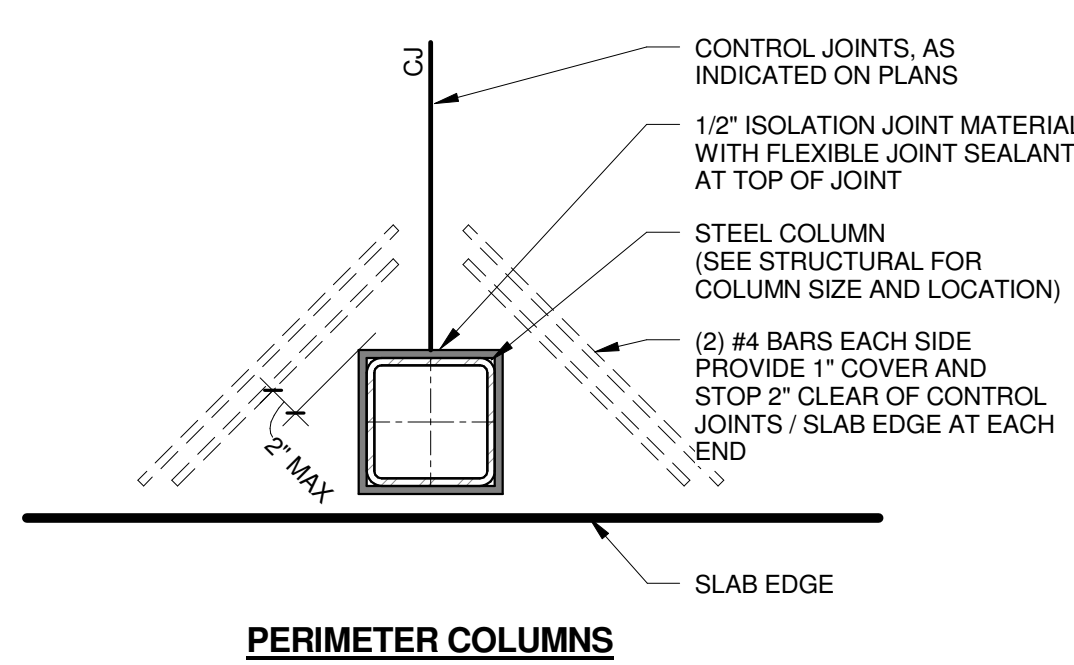
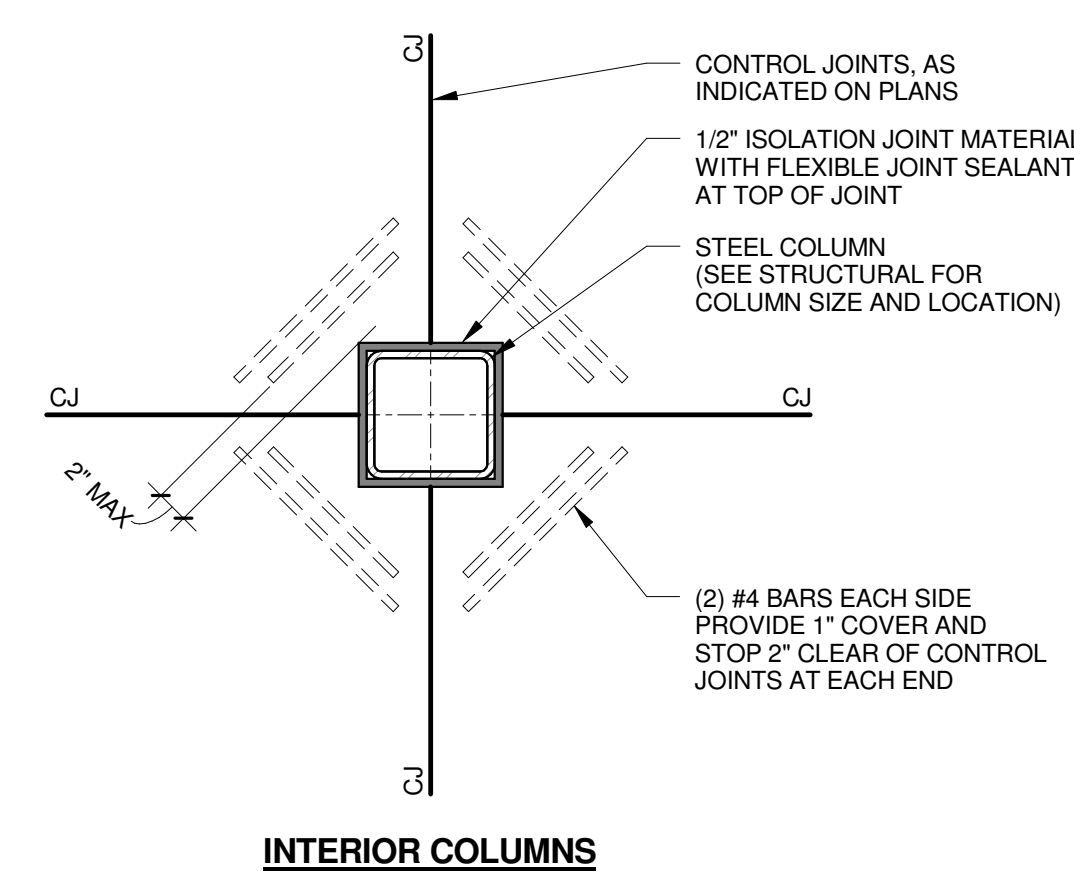


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

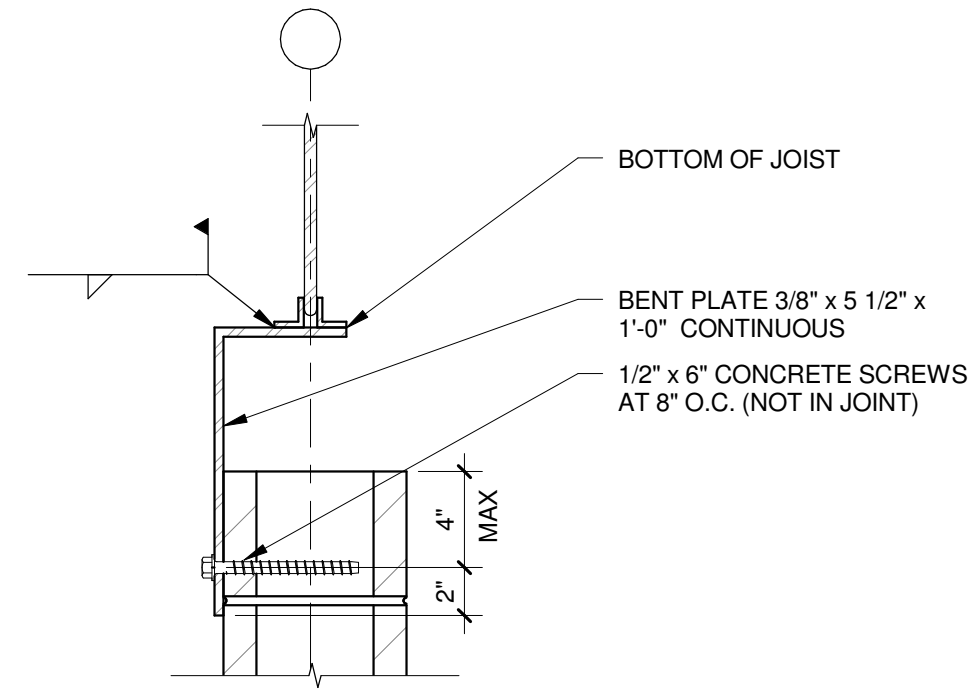
MISCELLANEOUS FRAMING PLANS

S-451

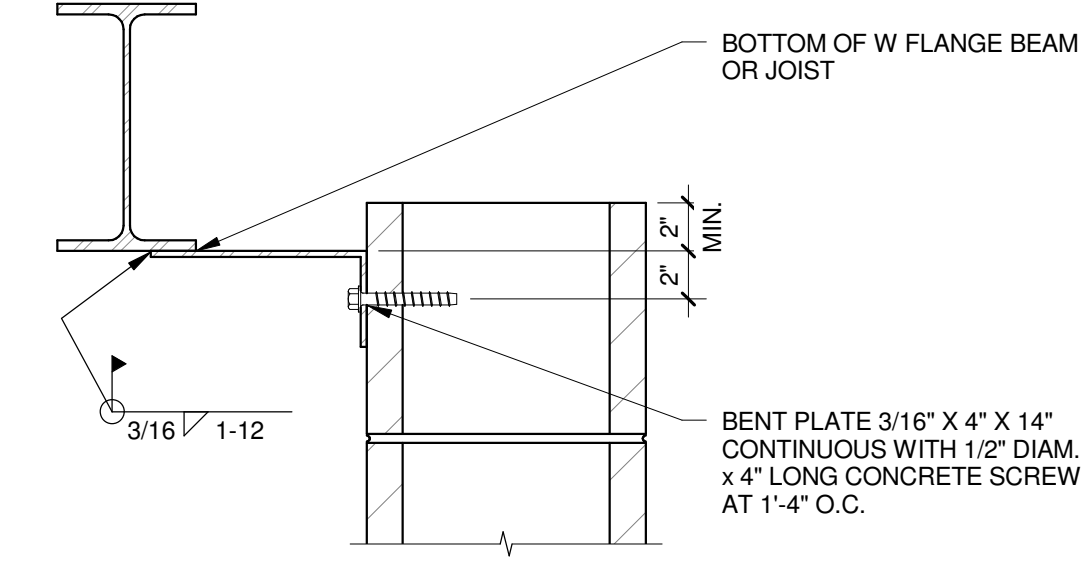


NOT FOR CONSTRUCTION		
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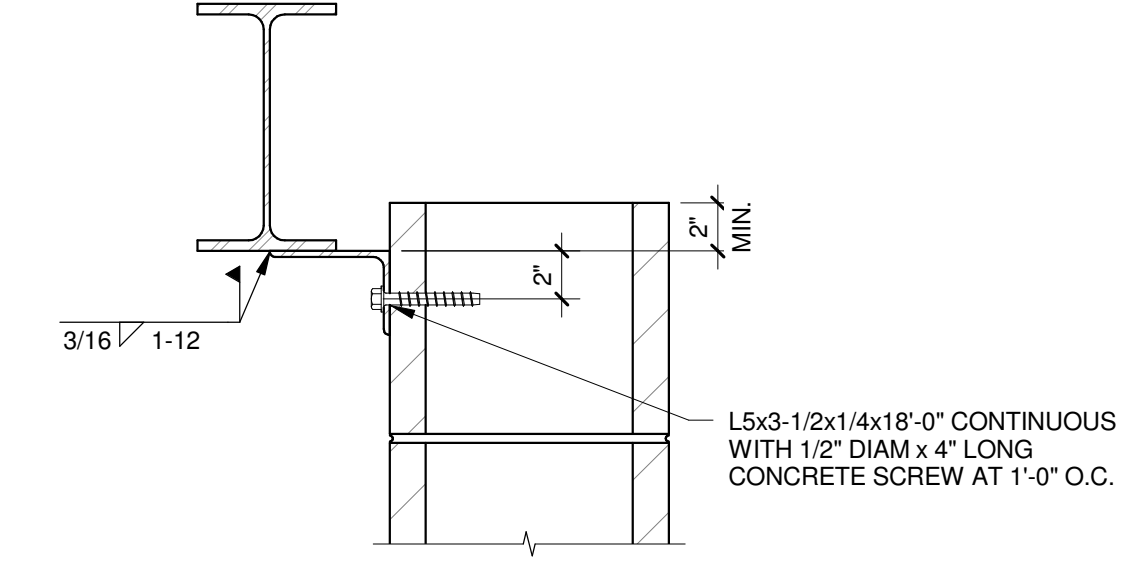
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1	ISSUE FOR PERMIT	01/17/2019
PROJECT No: 1303500-160264.01		



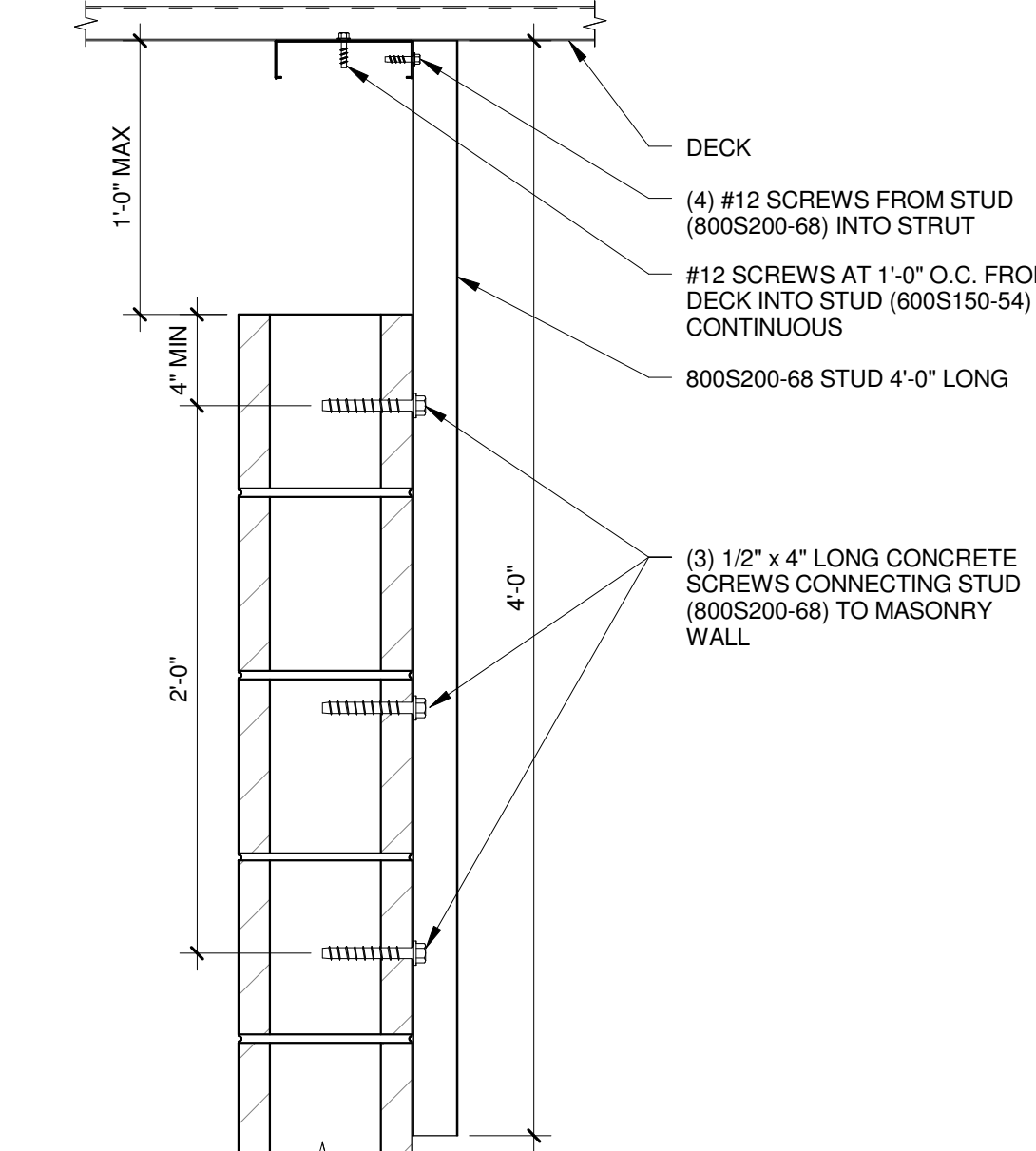
9 MASONRY WALL TOP CONNECTION
1 1/2" = 1'-0"



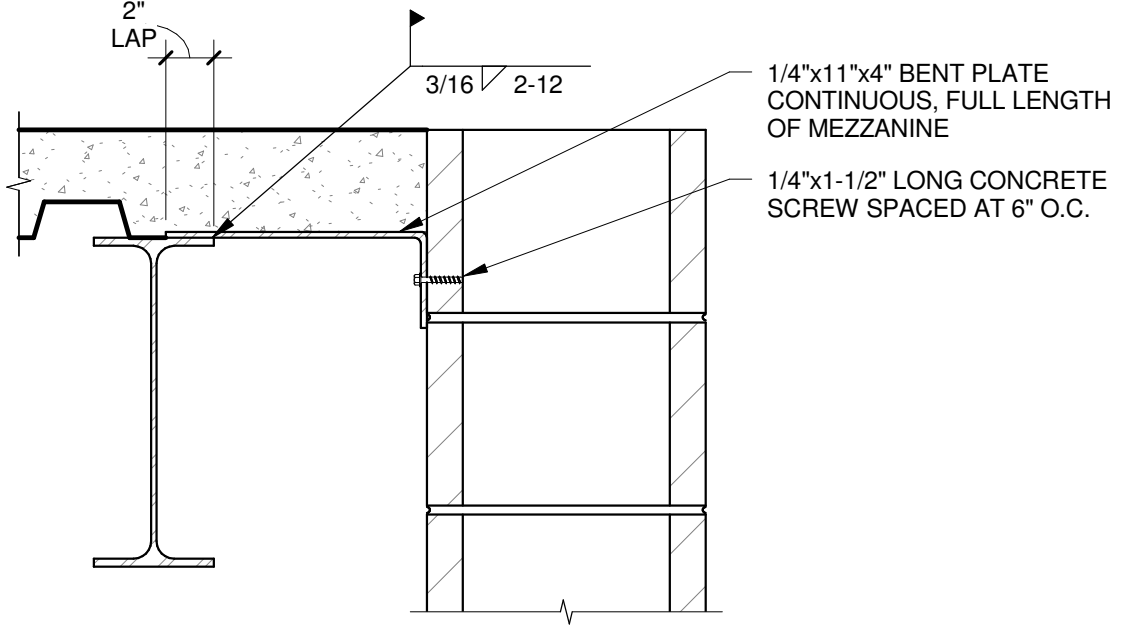
5 MASONRY WALL TOP CONNECTION
1 1/2" = 1'-0"



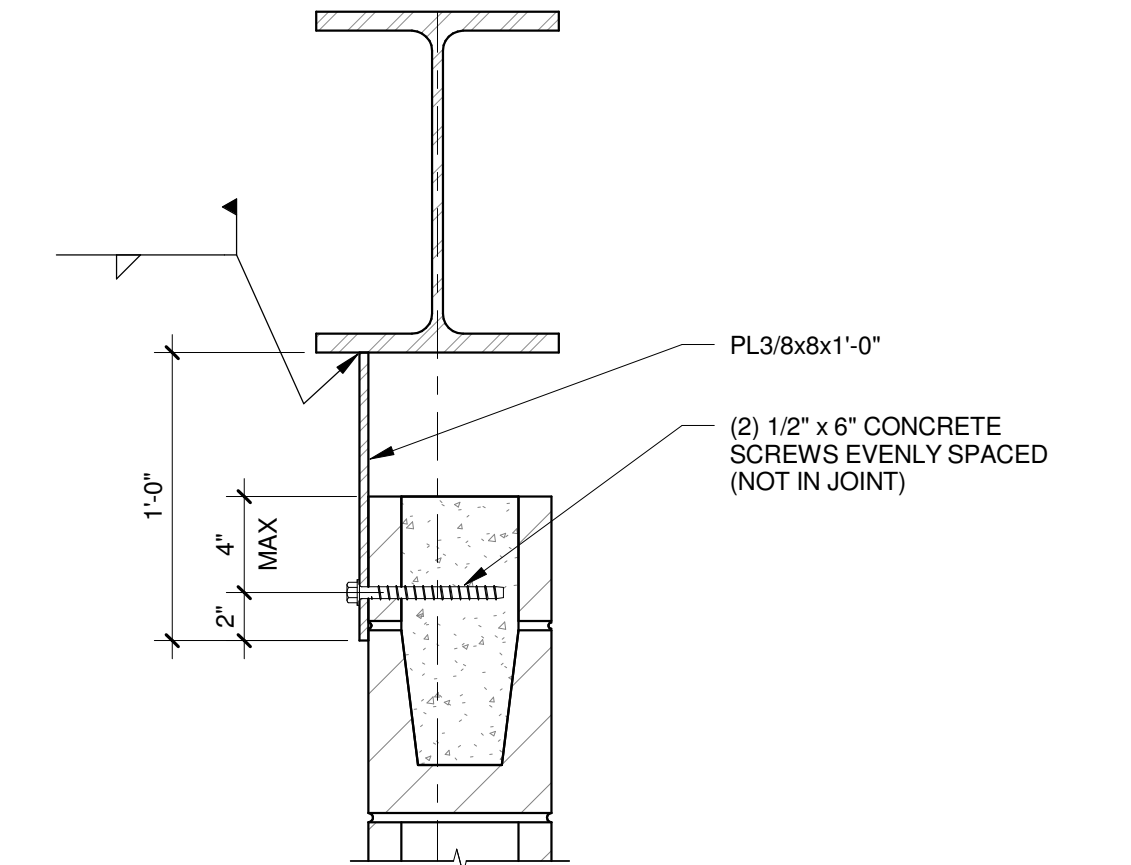
1 MASONRY WALL TOP CONNECTION
1 1/2" = 1'-0"



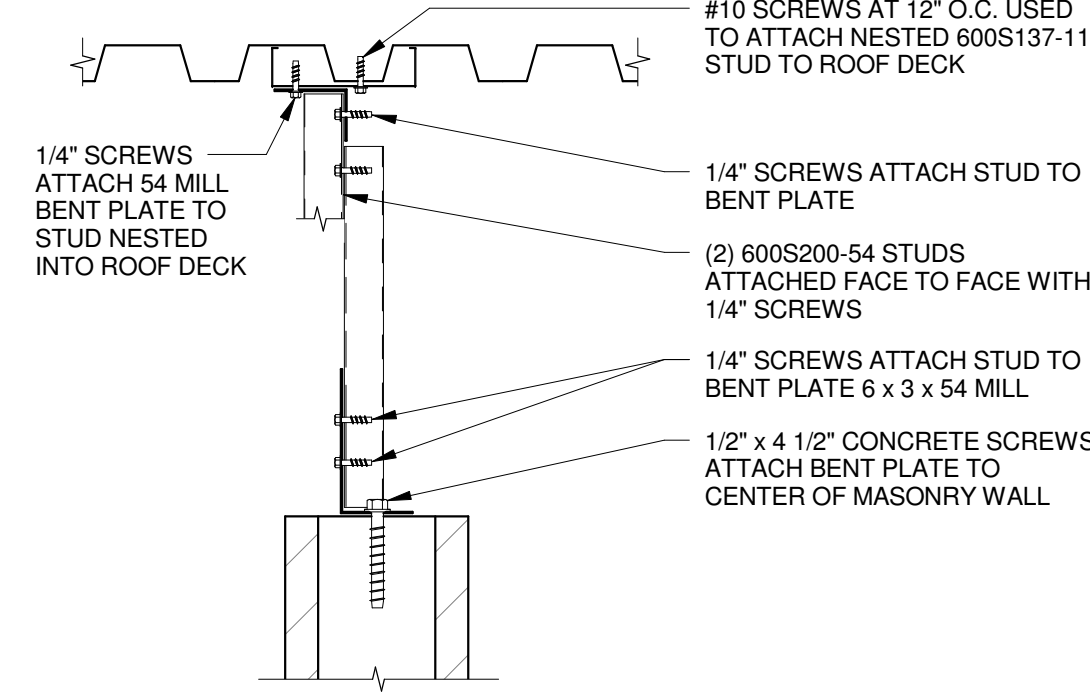
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1 1/2" = 1'-0"



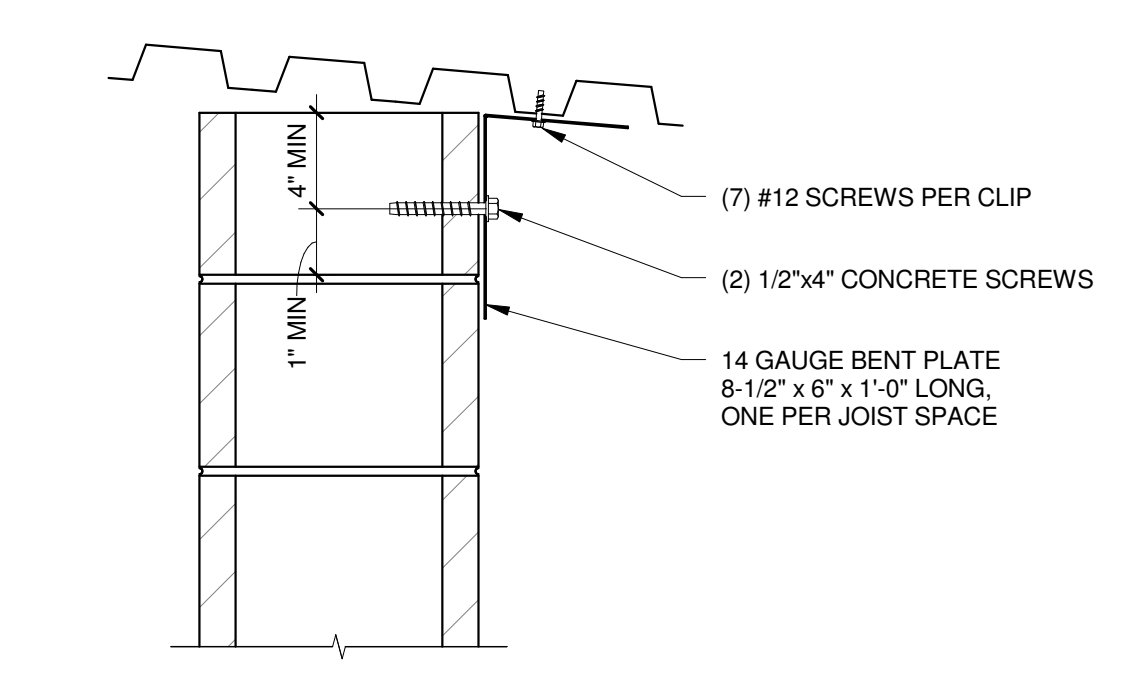
2 TYPICAL MEZZANINE TO MASONRY/PRECAST CONNECTION
1 1/2" = 1'-0"



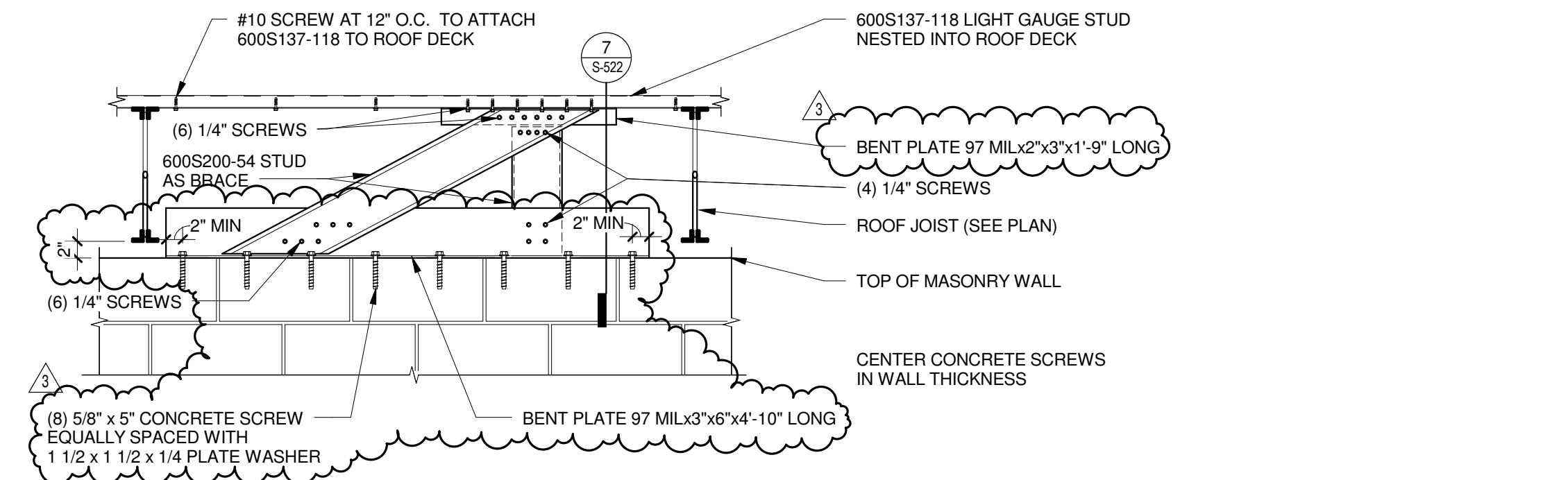
3 MASONRY WALL TOP CONNECTION
1 1/2" = 1'-0"



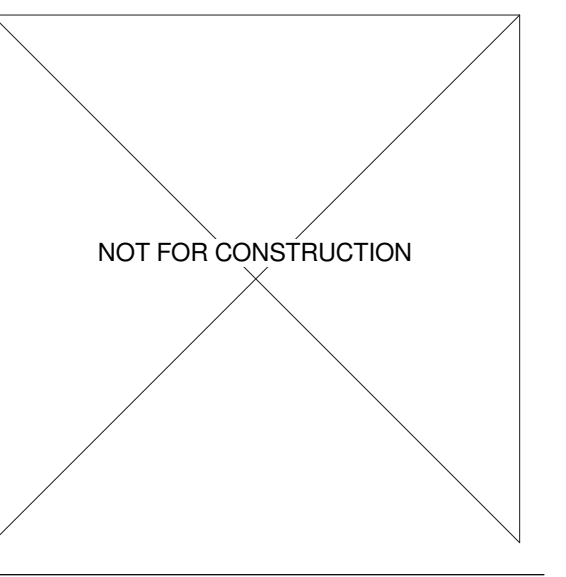
7 MASONRY SHEAR WALL TRANSFER BRACE SECTION
1 1/2" = 1'-0"



4 MASONRY WALL TOP CONNECTION
1 1/2" = 1'-0"

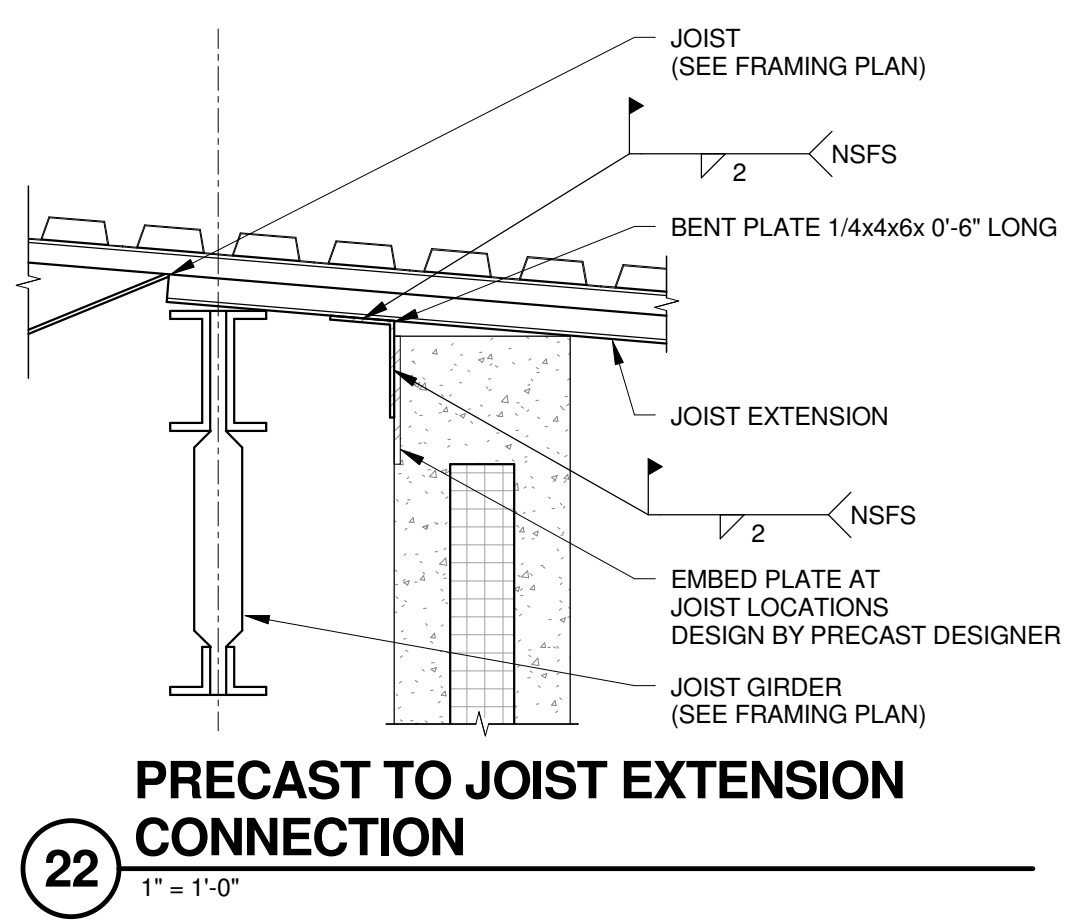


8 MASONRY SHEAR WALL TRANSFER BRACE
3/4" = 1'-0"

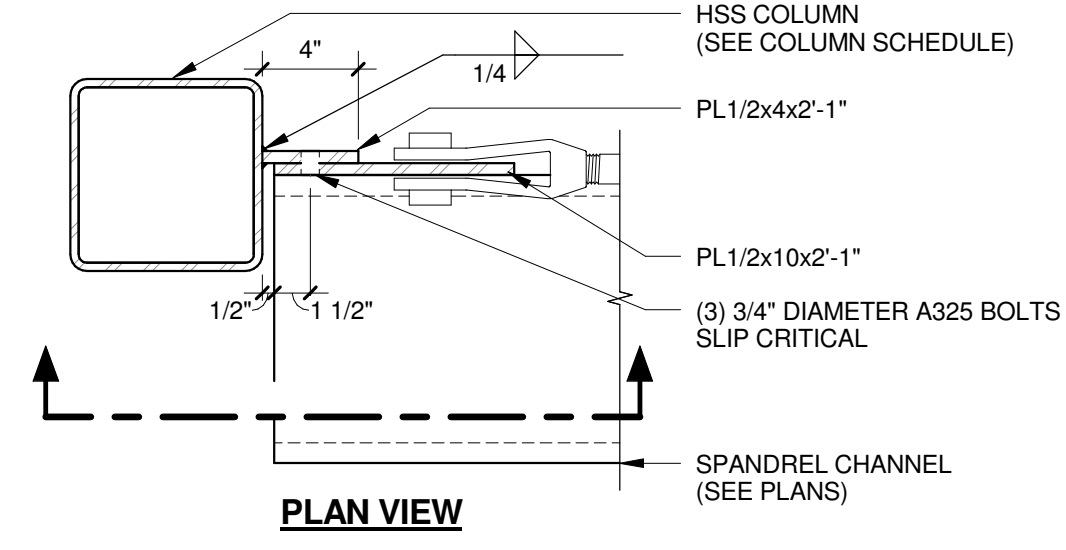


No	REVISION/SUBMISSION	DATE
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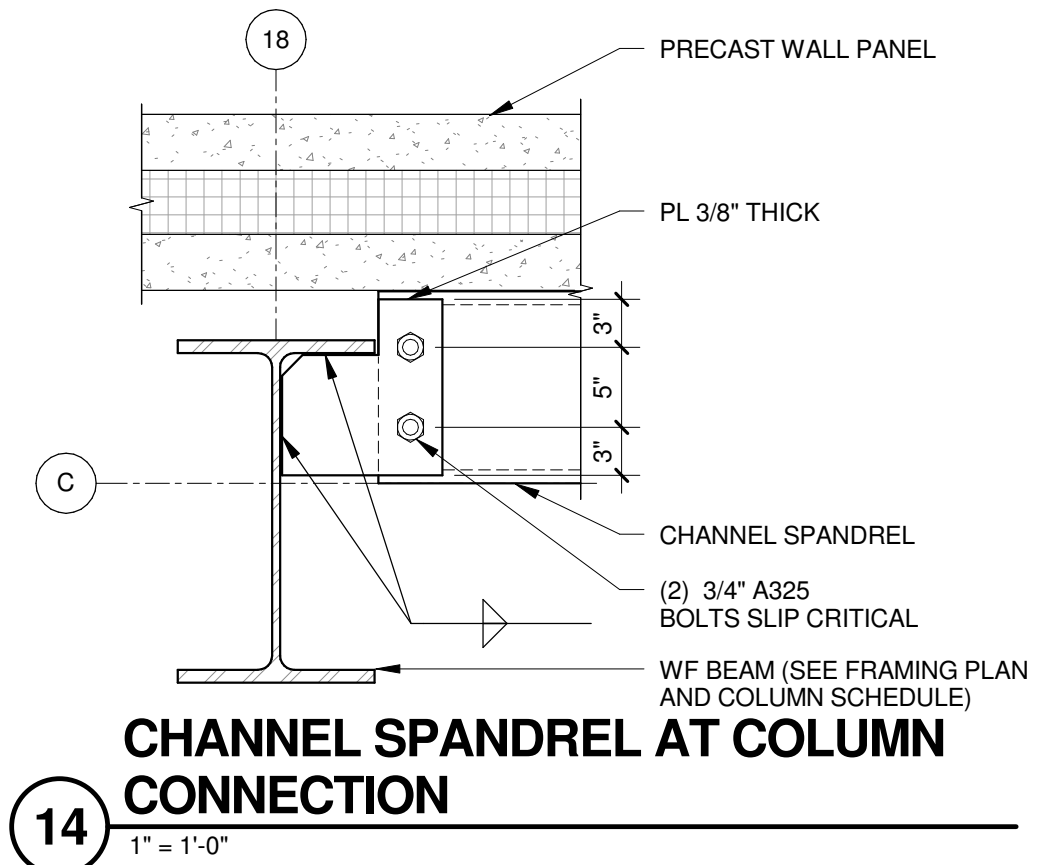
PROJECT No: 1303500-160264.01



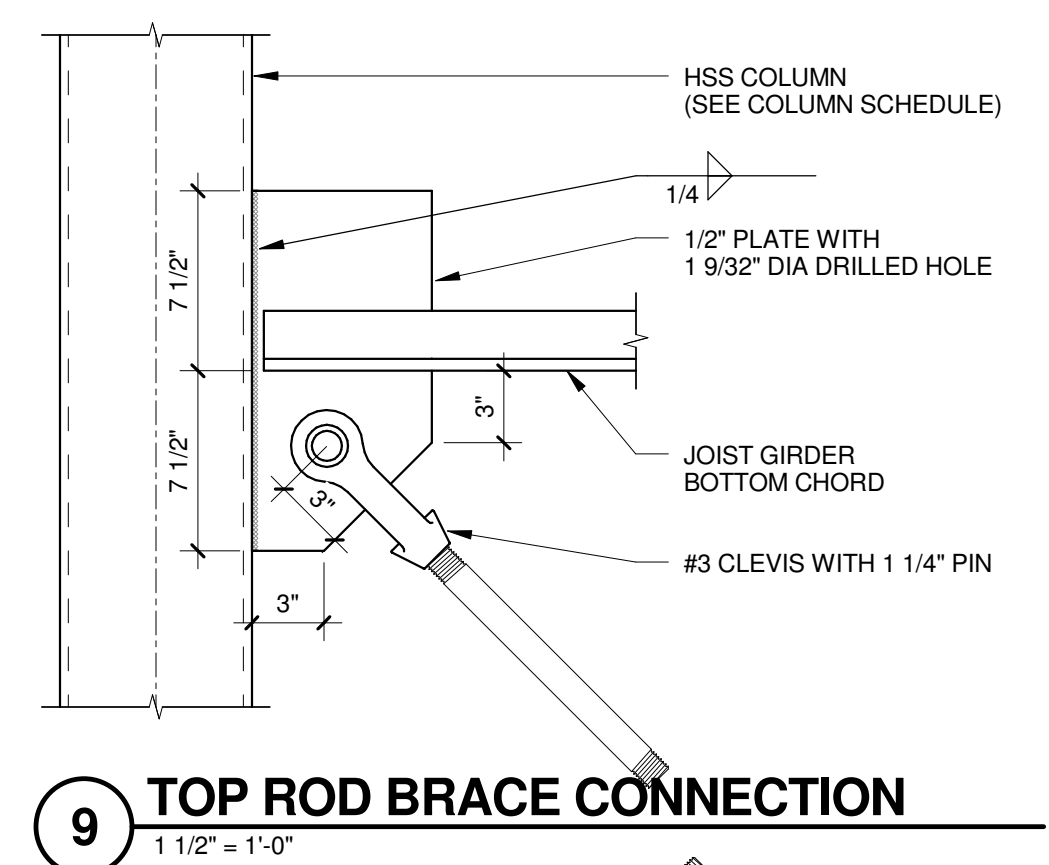
22 PRECAST TO JOIST EXTENSION CONNECTION
1" = 1'-0"



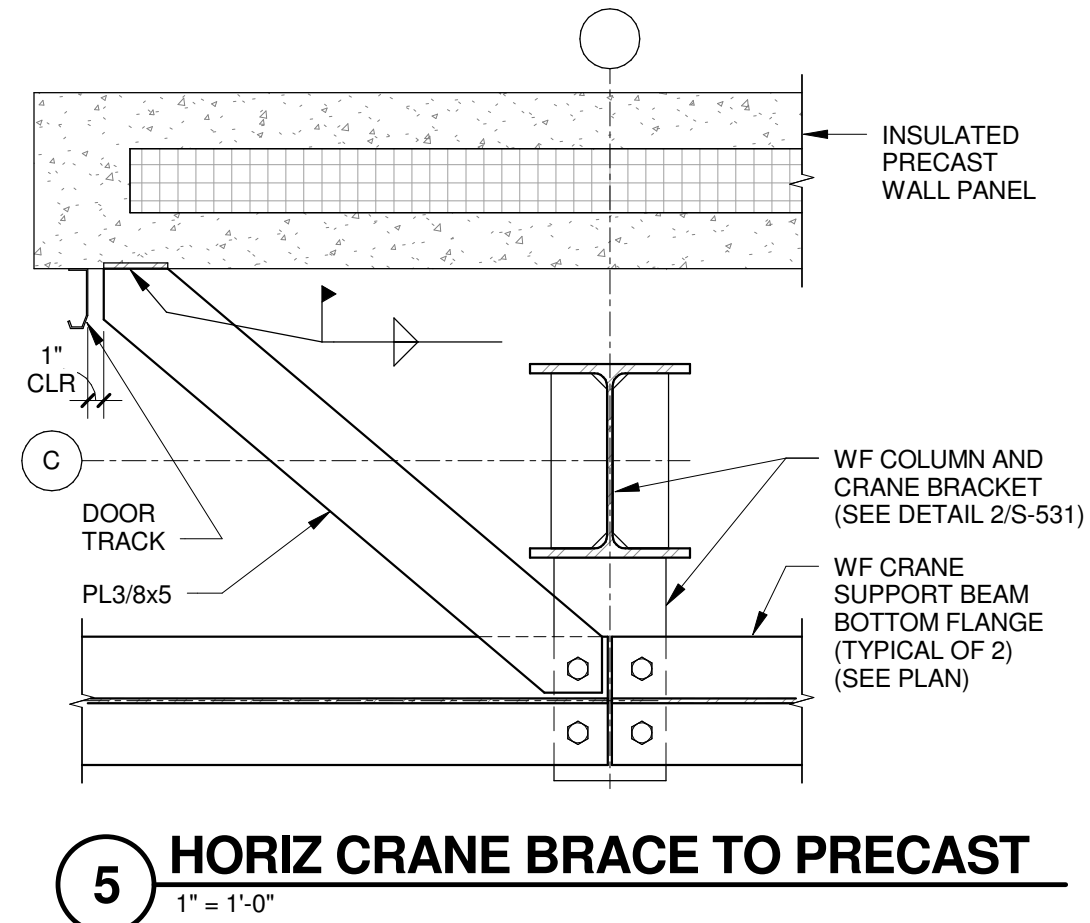
19 SPANDREL CHANNEL AT BRACE PLATE
1 1/2" = 1'-0"



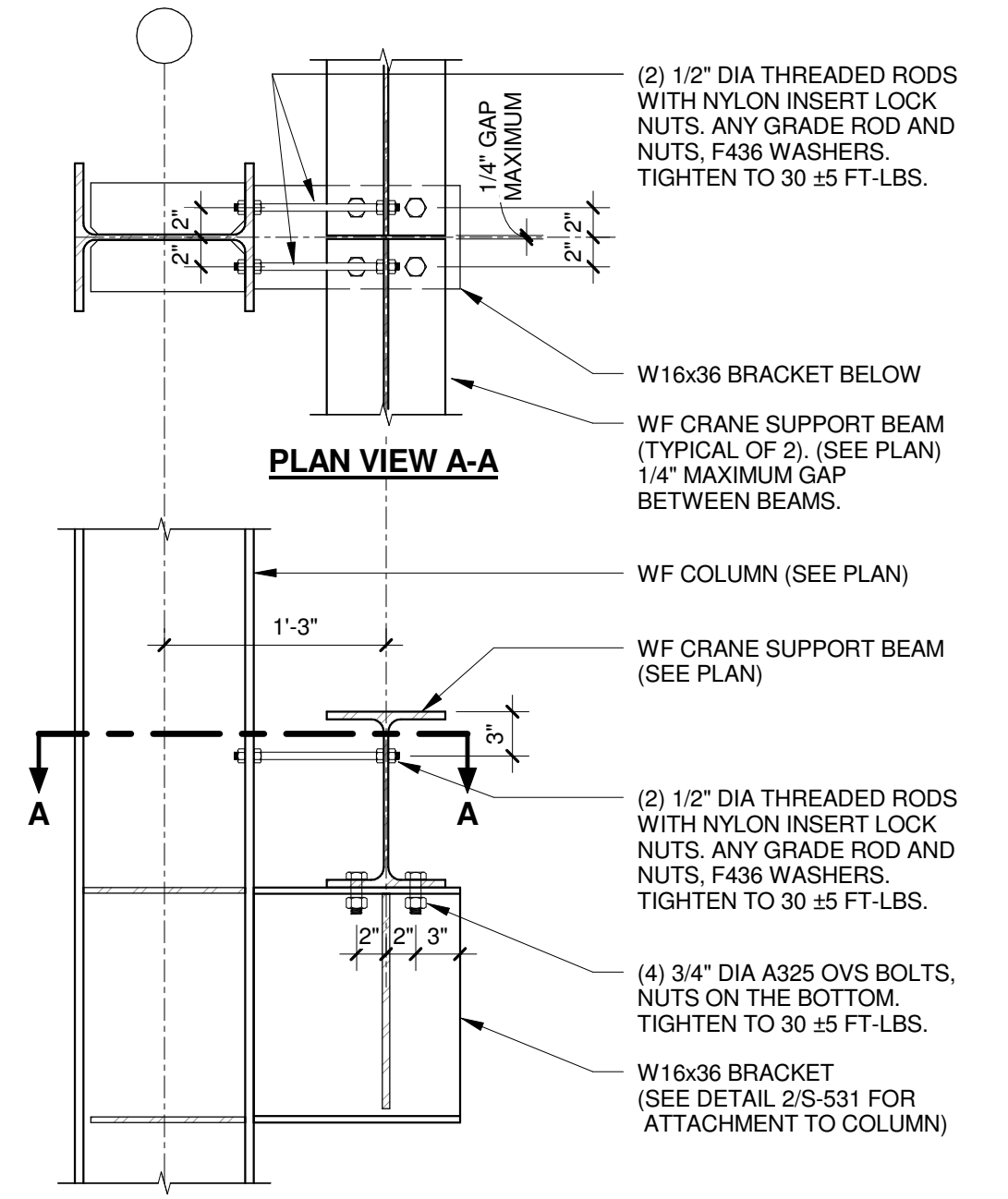
14 CHANNEL SPANDREL AT COLUMN CONNECTION
1" = 1'-0"



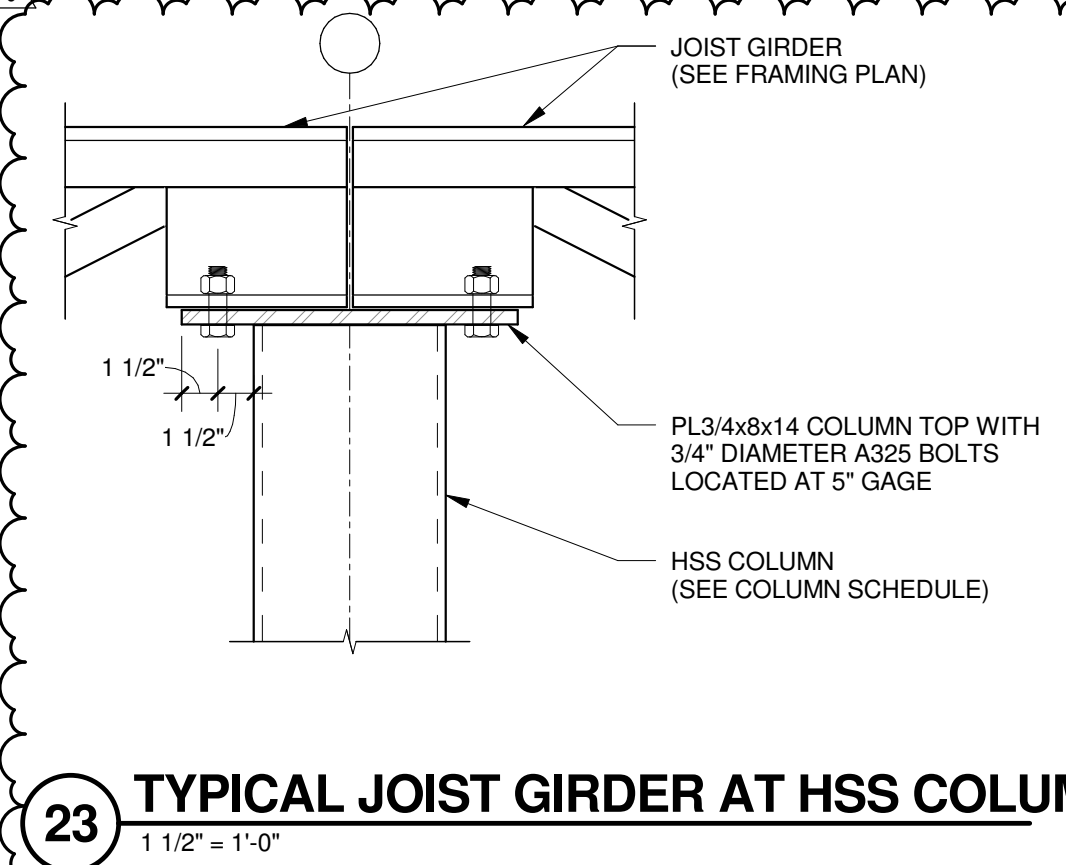
9 TOP ROD BRACE CONNECTION
1 1/2" = 1'-0"



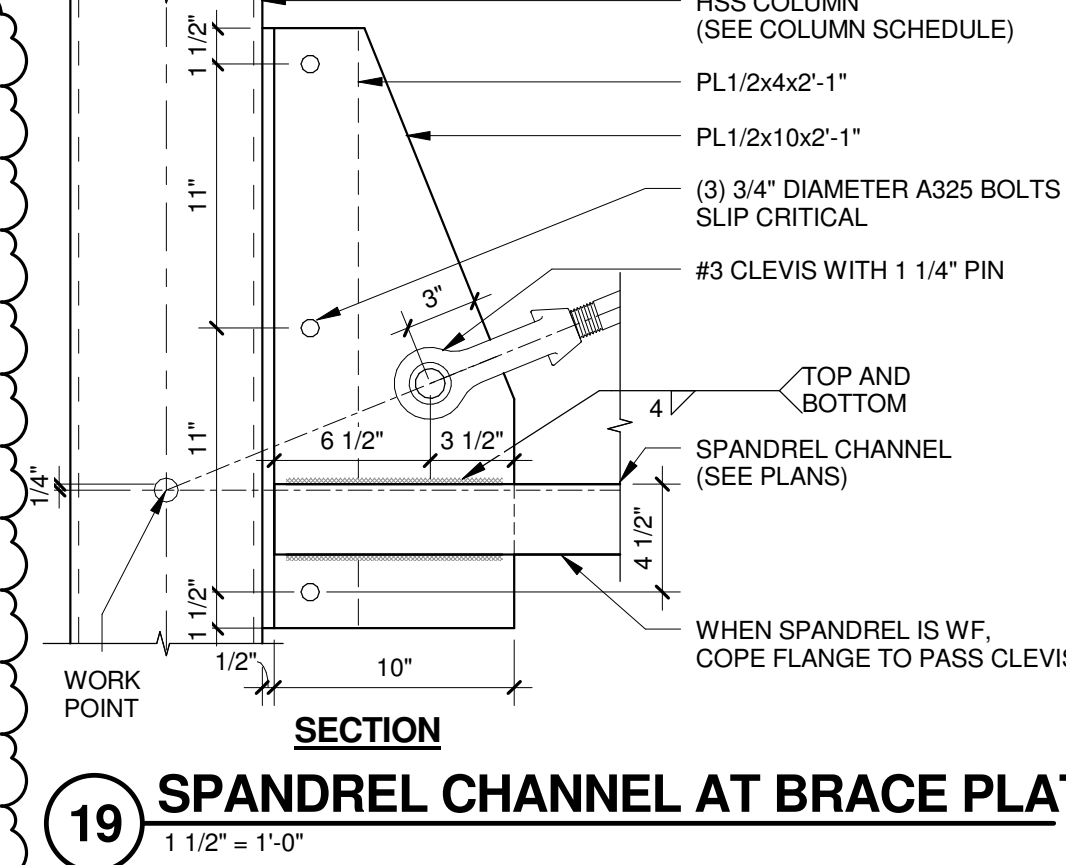
5 HORIZ CRANE BRACE TO PRECAST
1" = 1'-0"



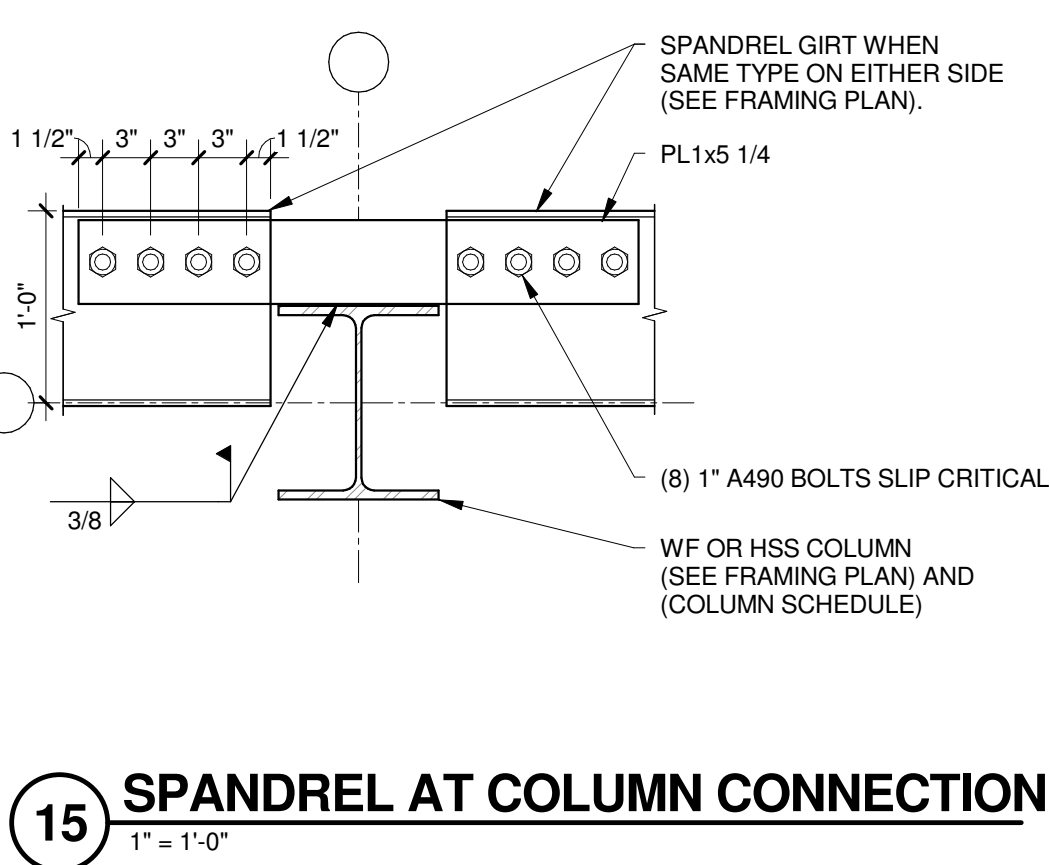
1 CRANE RAIL SUPPORT FRAMING
1" = 1'-0"



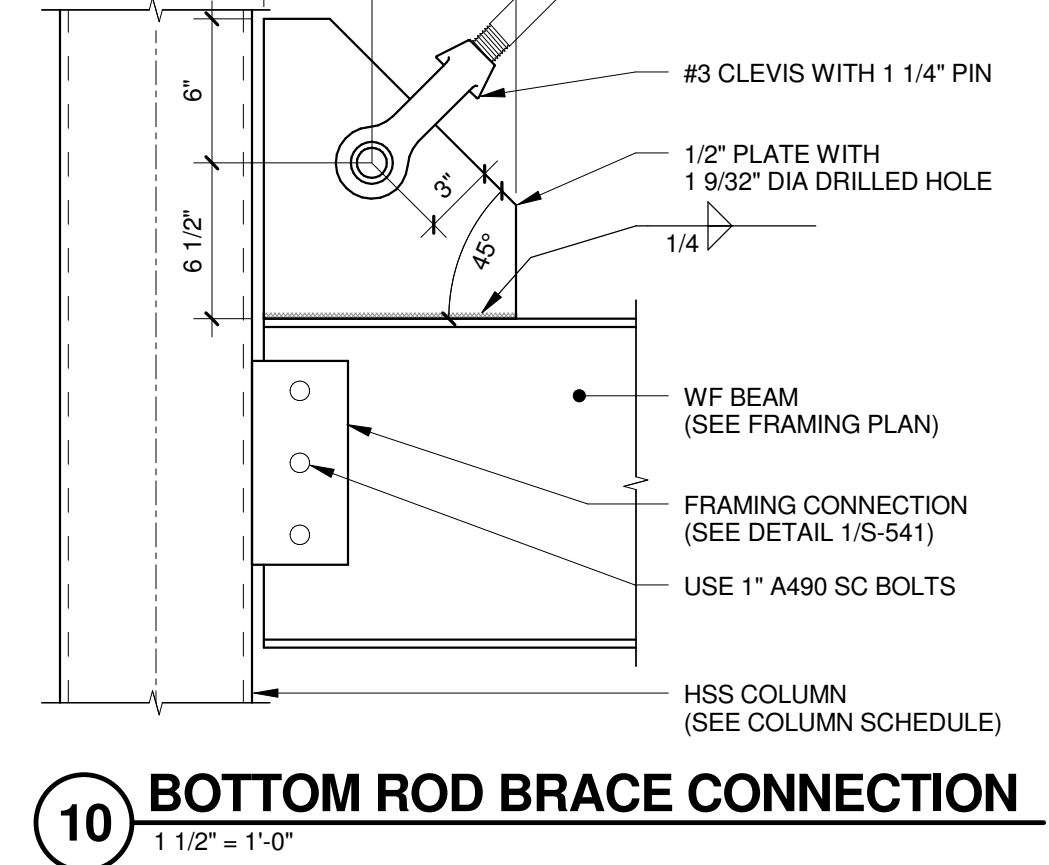
23 TYPICAL JOIST GIRDER AT HSS COLUMN
1 1/2" = 1'-0"



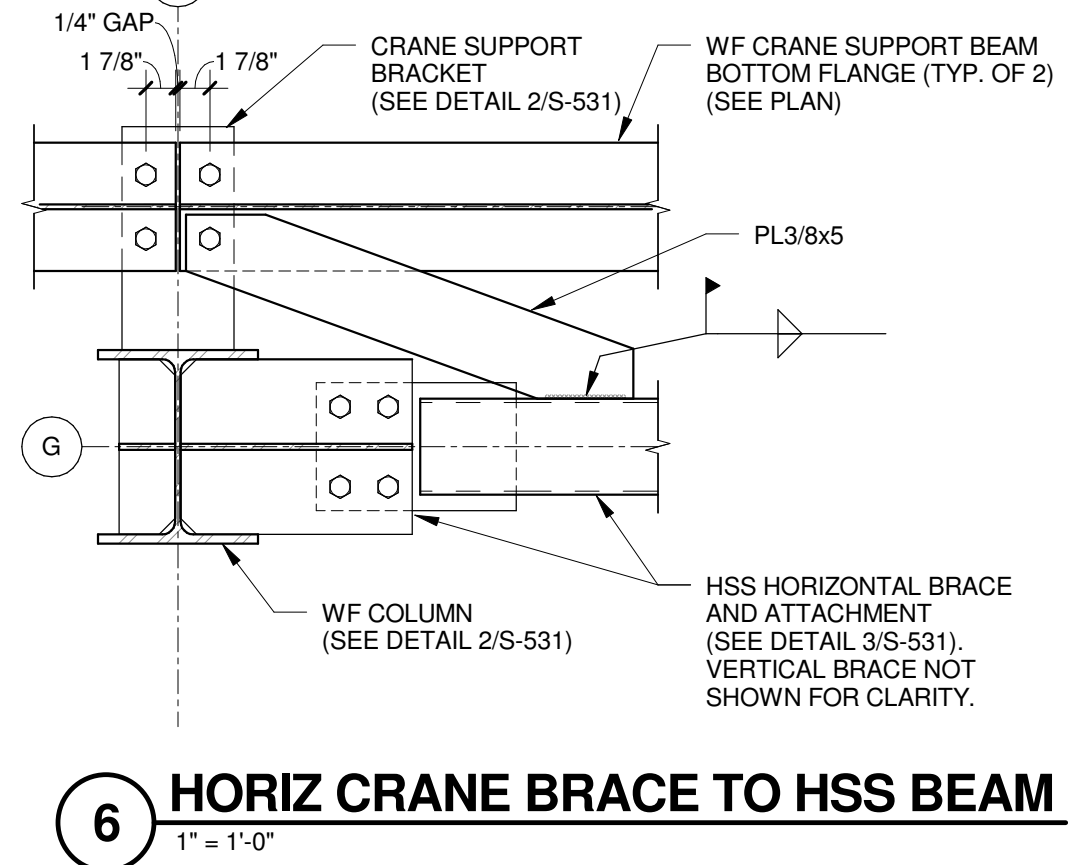
19 SPANDREL CHANNEL AT BRACE PLATE
1 1/2" = 1'-0"



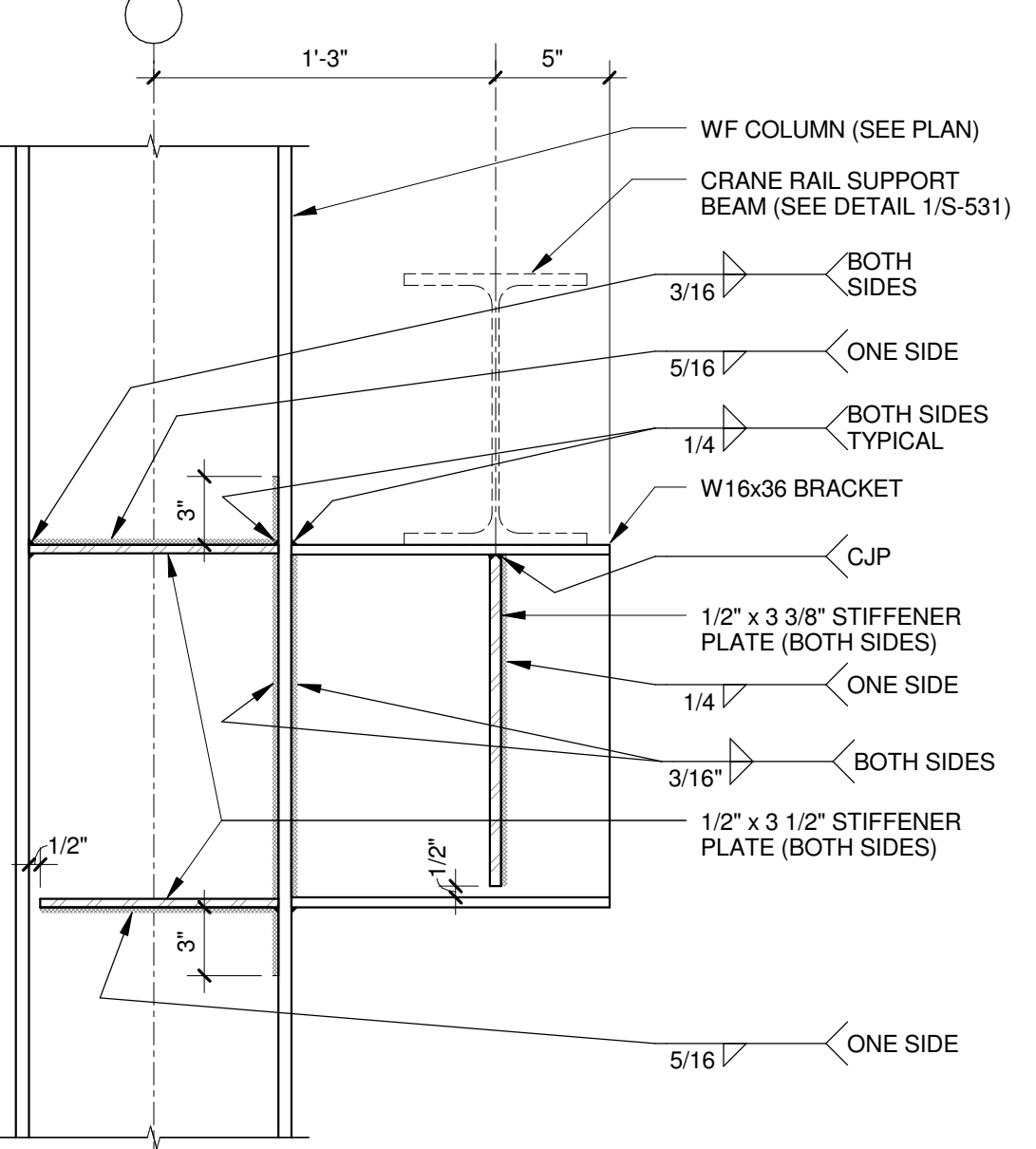
15 SPANDREL AT COLUMN CONNECTION
1" = 1'-0"



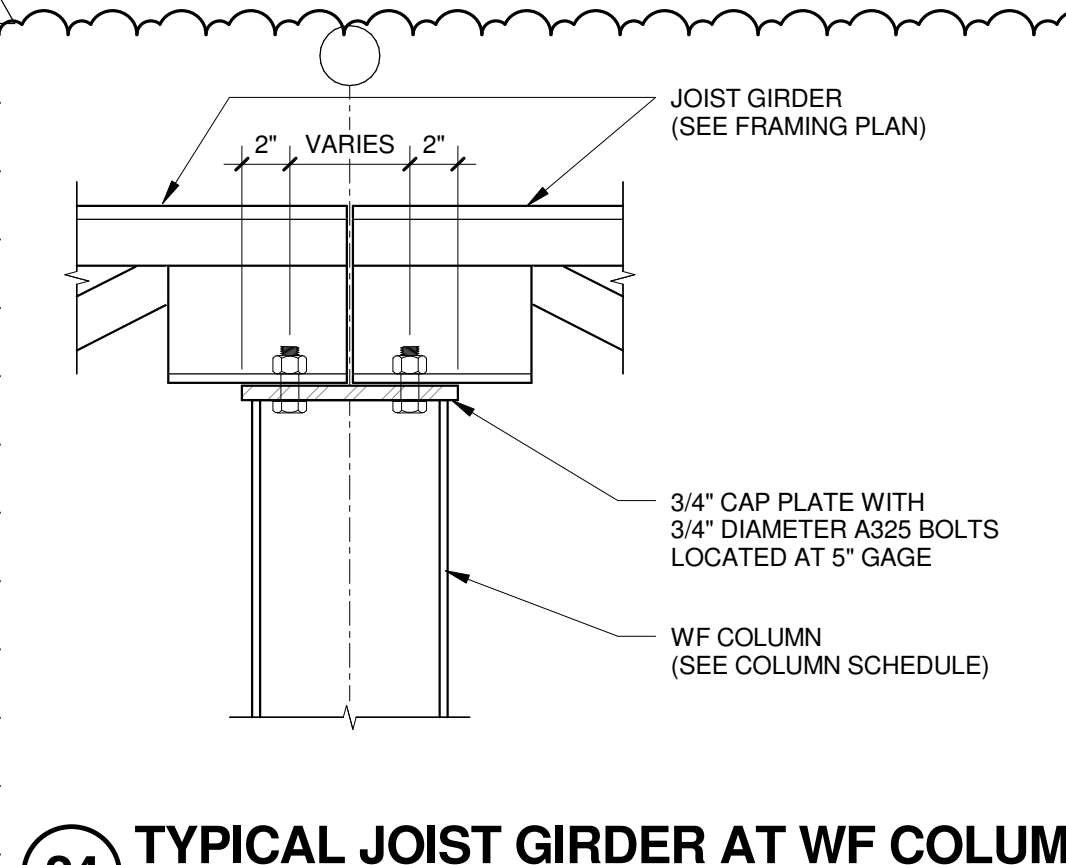
10 BOTTOM ROD BRACE CONNECTION
1 1/2" = 1'-0"



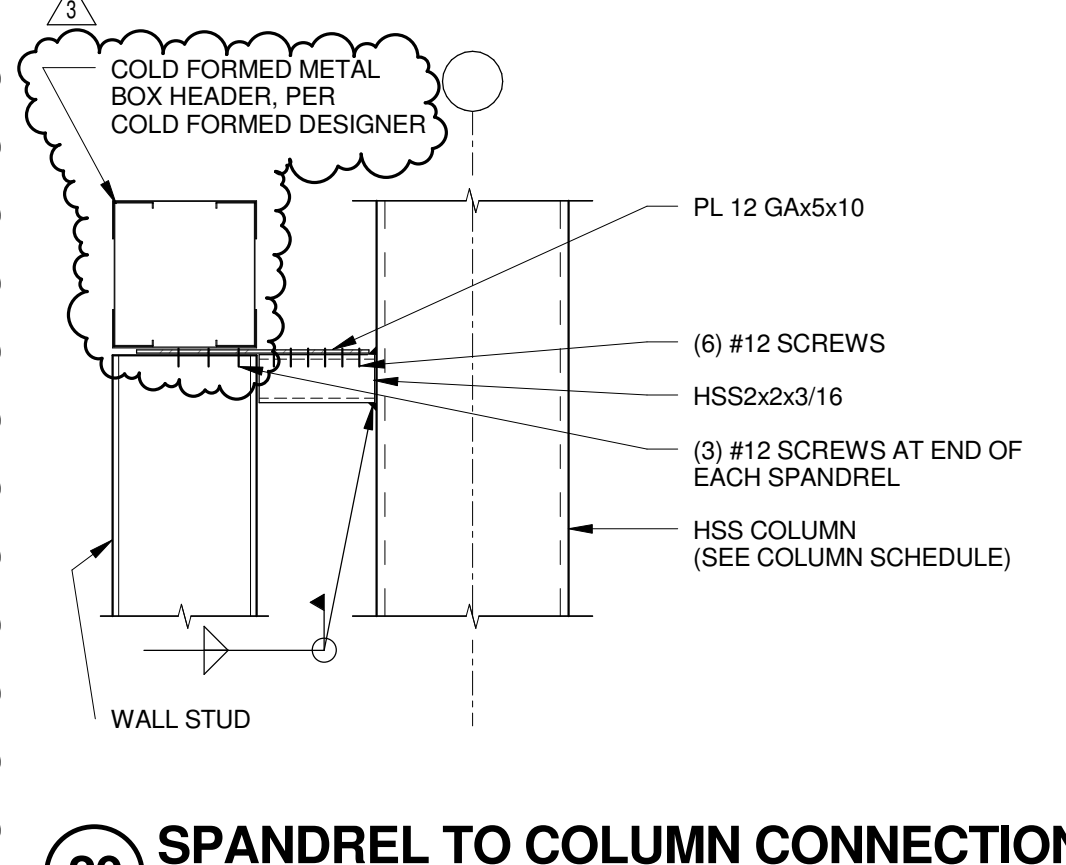
6 HORIZ CRANE BRACE TO HSS BEAM
1" = 1'-0"



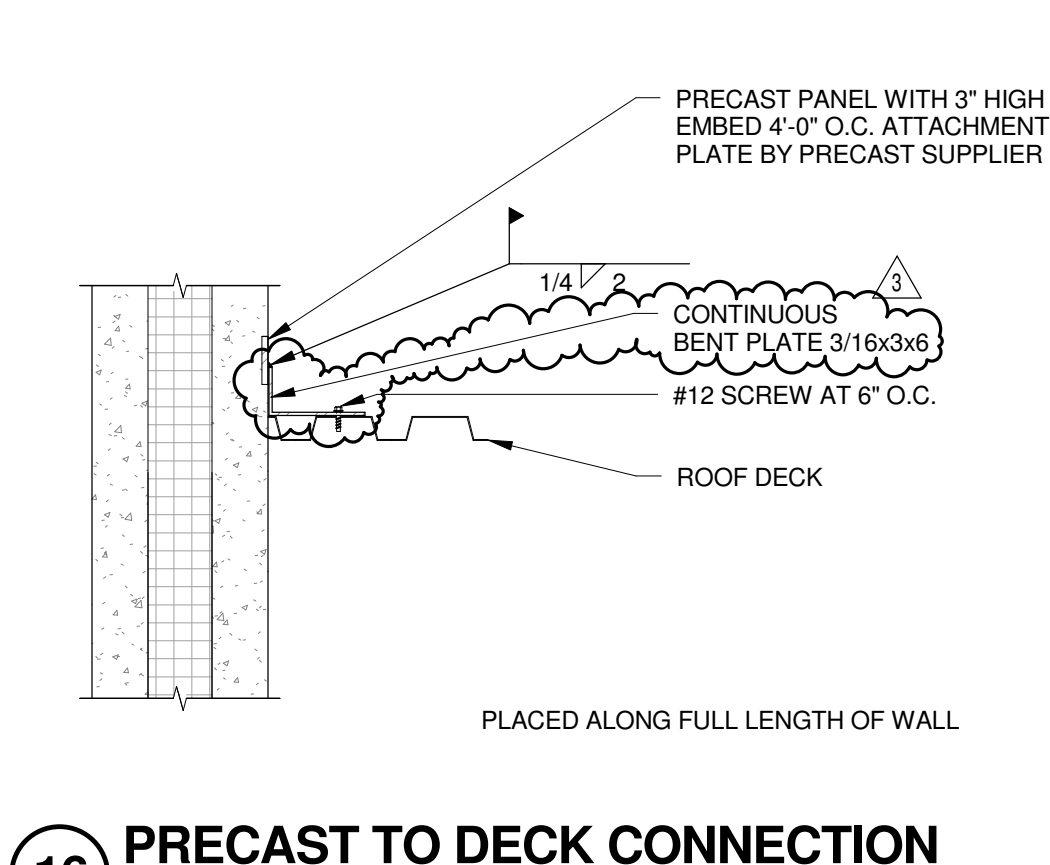
2 CRANE RAIL BRACKET ATTACHMENT
1 1/2" = 1'-0"



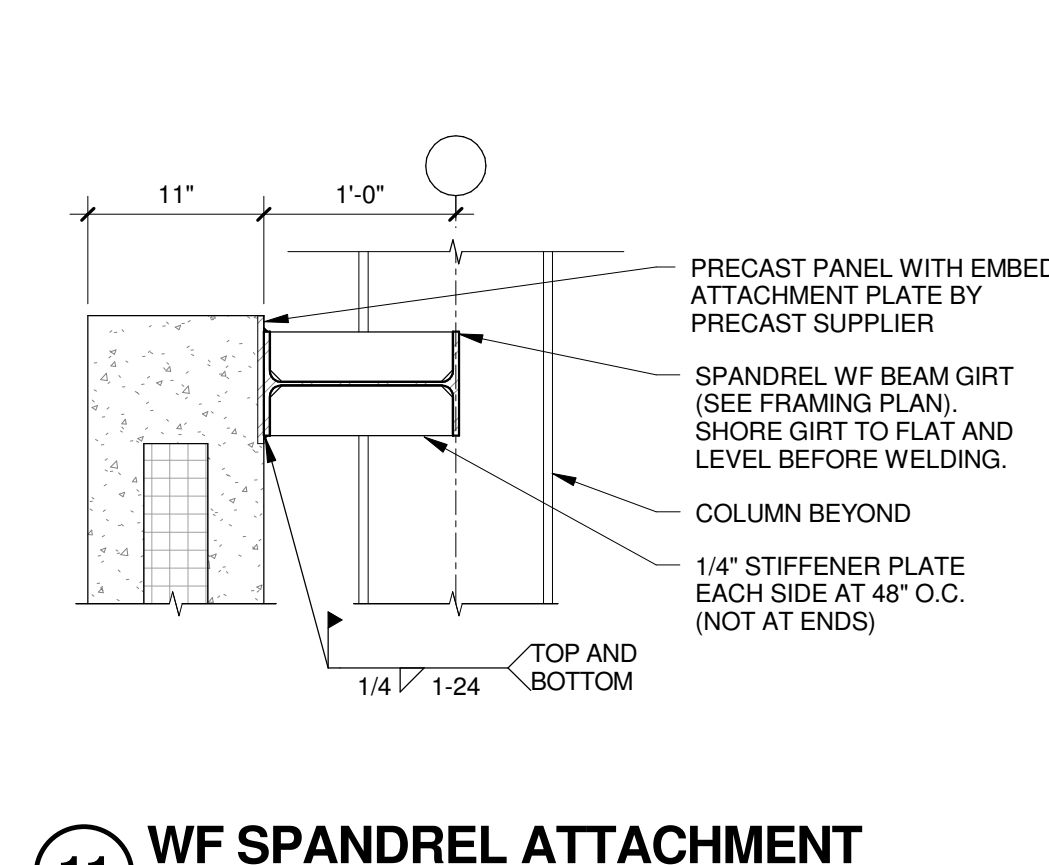
24 TYPICAL JOIST GIRDER AT WF COLUMN
1 1/2" = 1'-0"



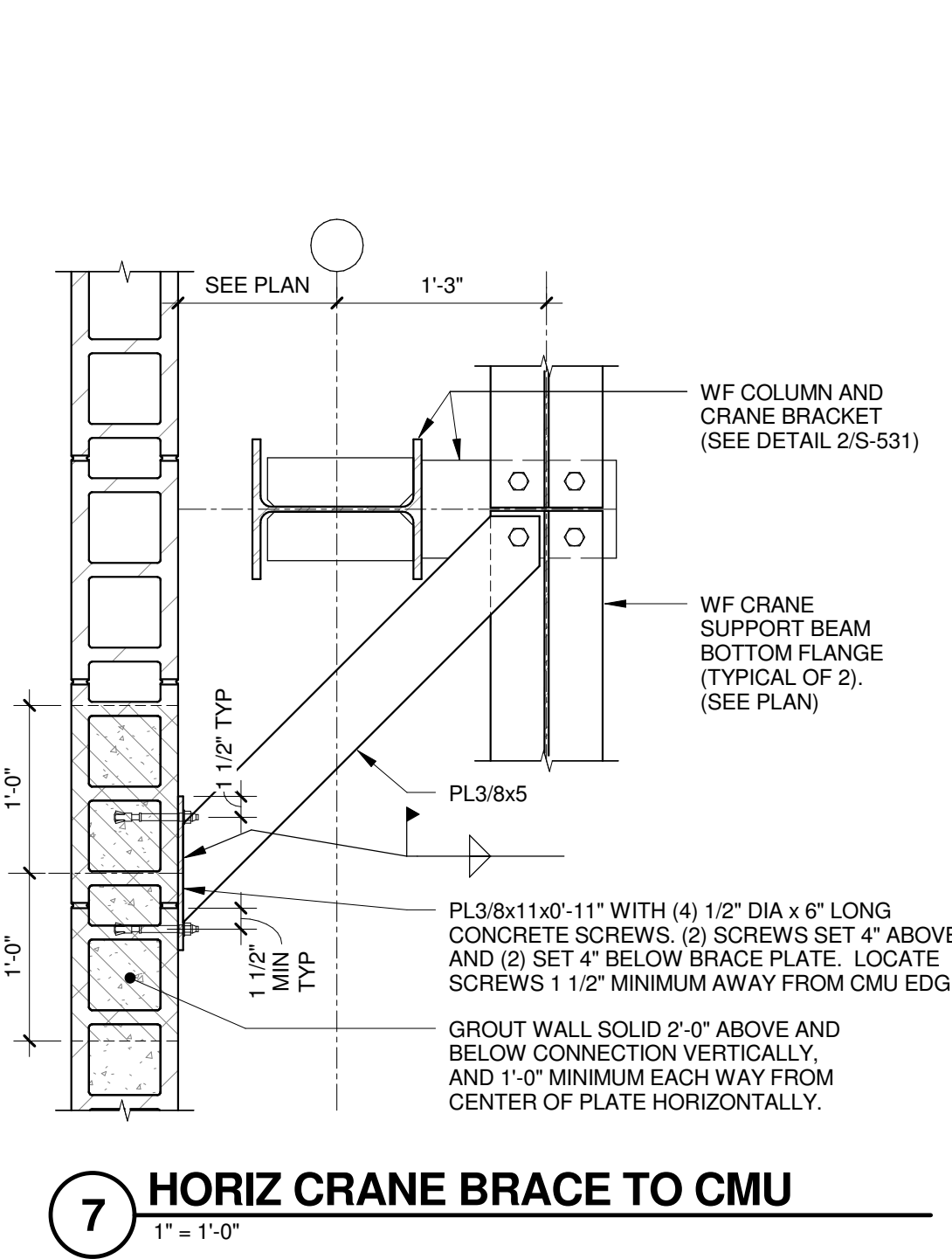
20 SPANDREL TO COLUMN CONNECTION
1 1/2" = 1'-0"



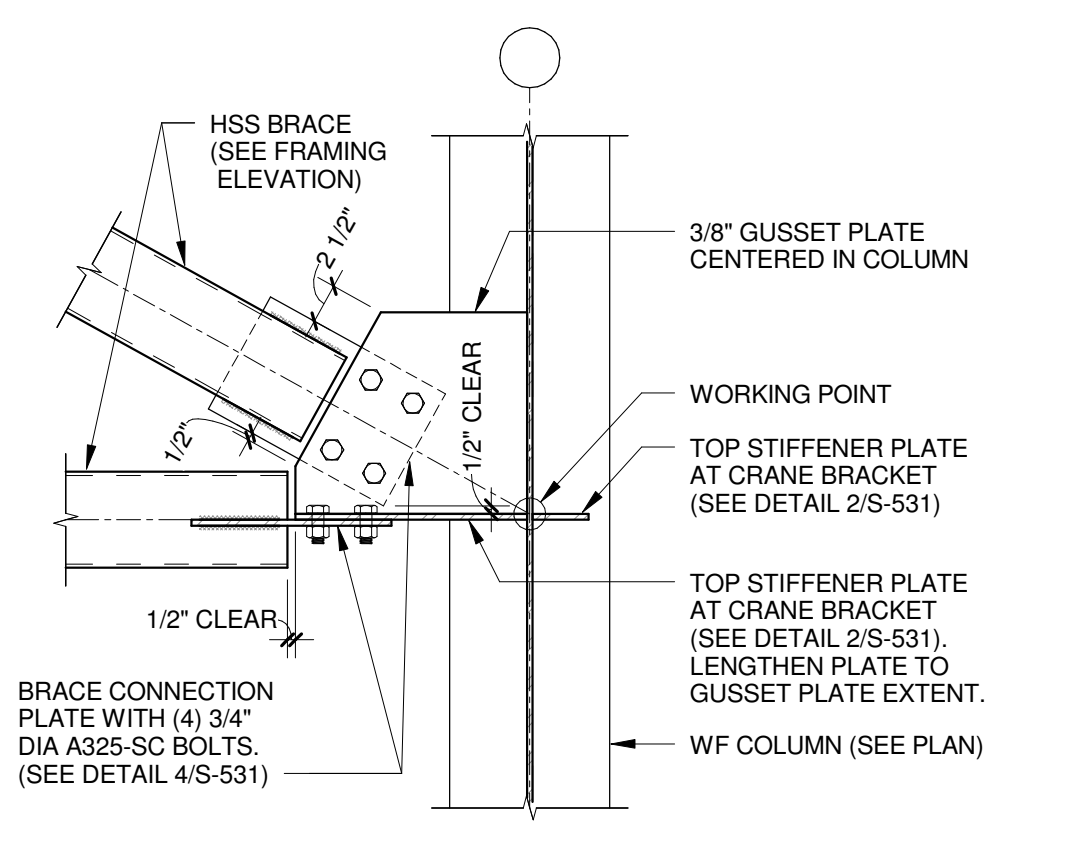
16 PRECAST TO DECK CONNECTION
1" = 1'-0"



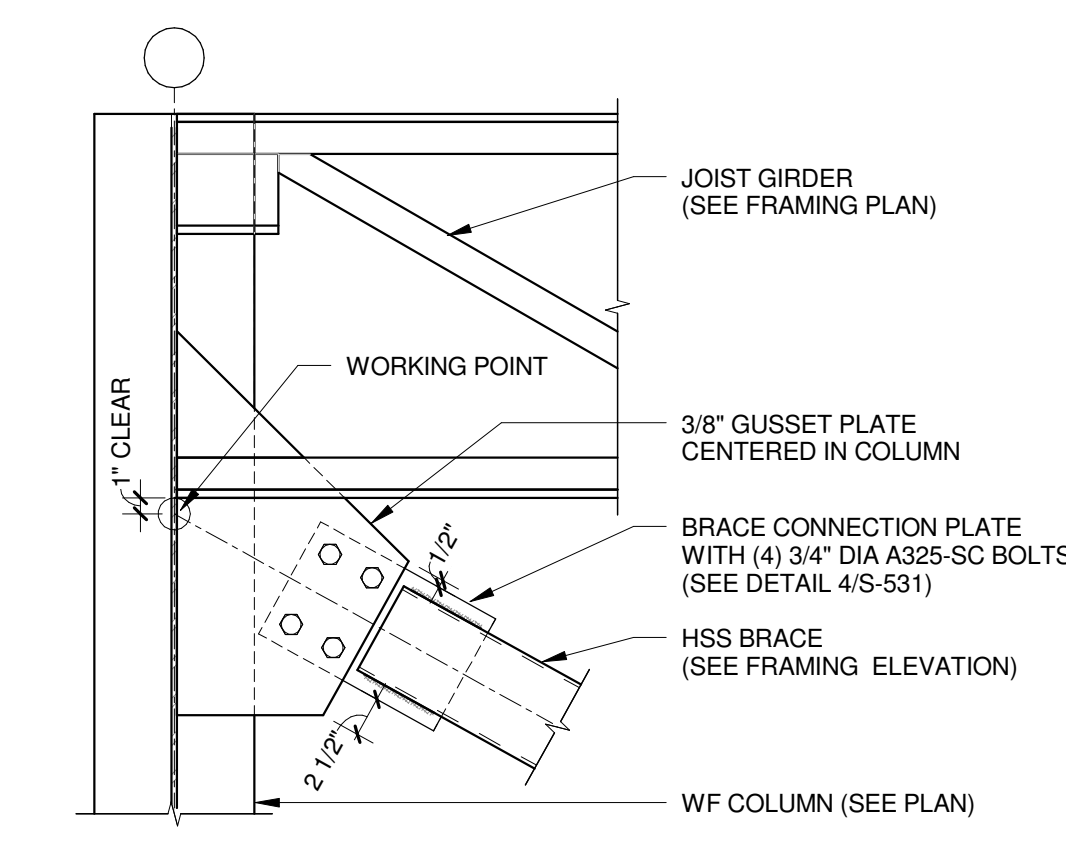
11 WF SPANDREL ATTACHMENT
1" = 1'-0"



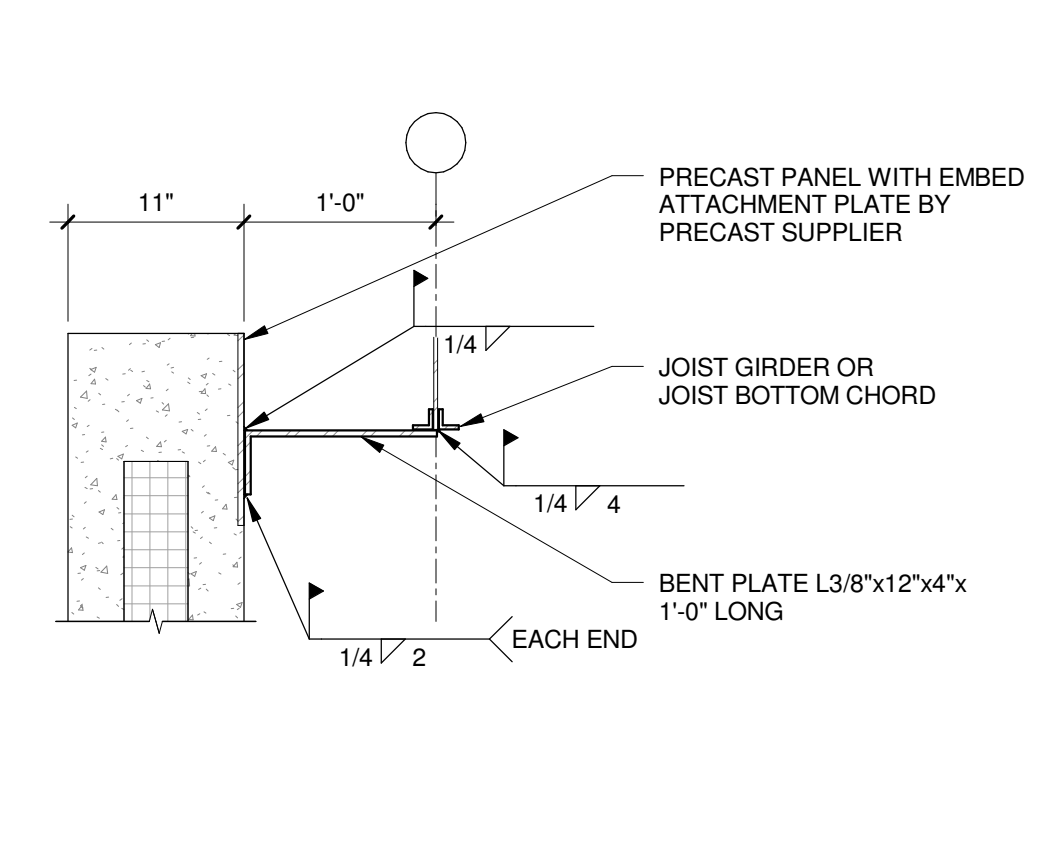
7 HORIZ CRANE BRACE TO CMU
1" = 1'-0"



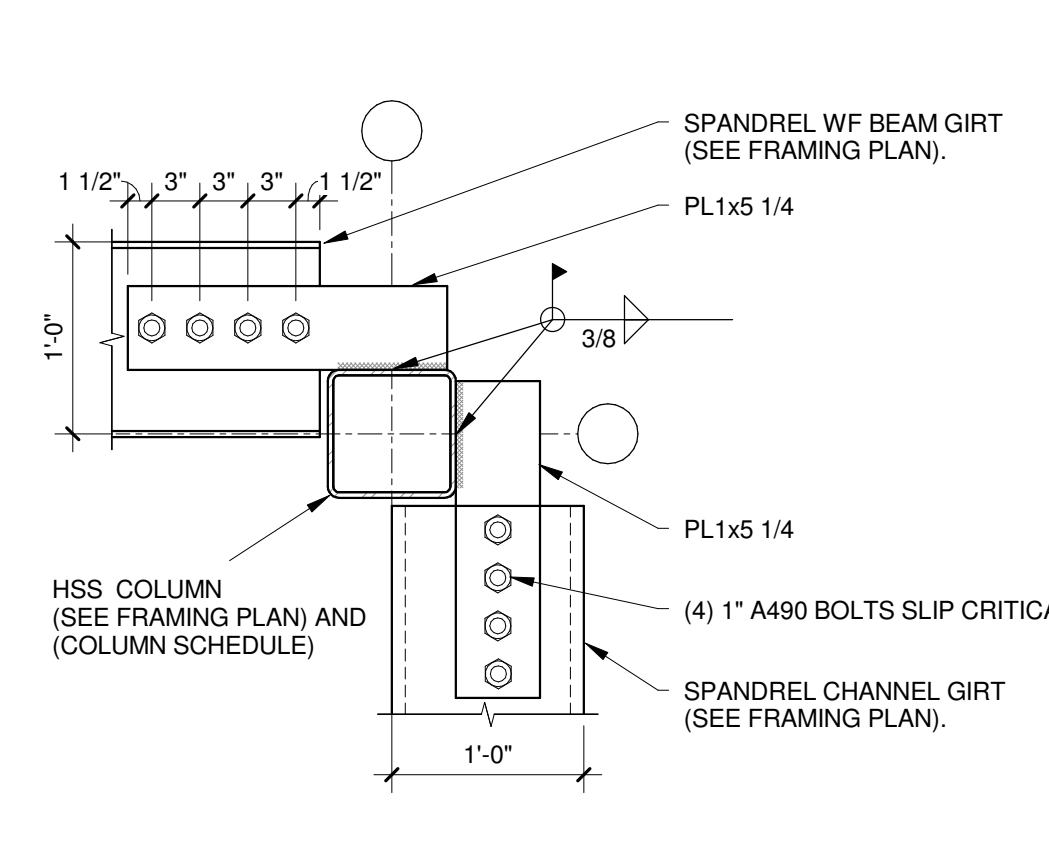
3 BOTTOM CRANE BRACE CONNECTION
1" = 1'-0"



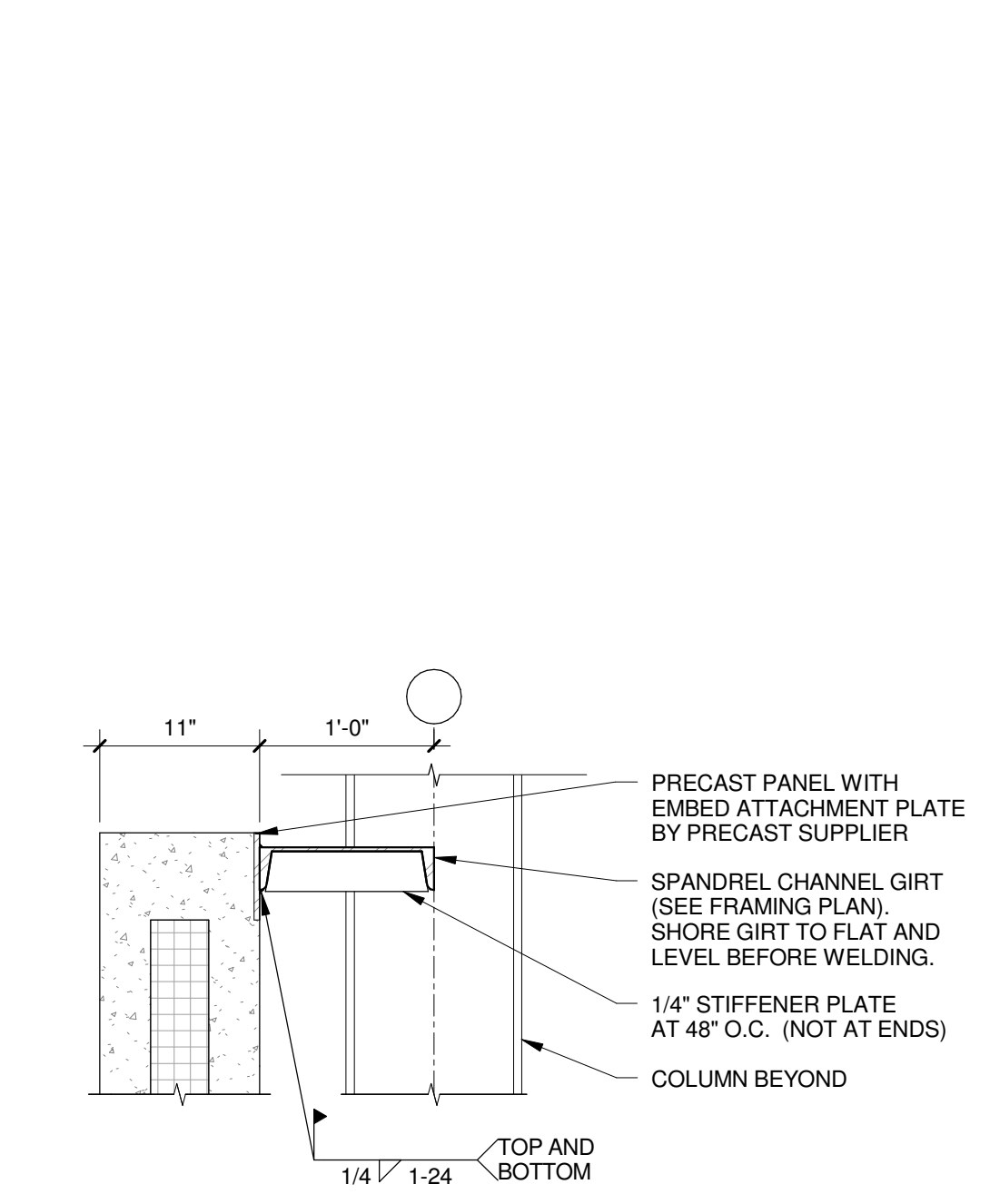
21 TOP CRANE BRACE CONNECTION
1" = 1'-0"



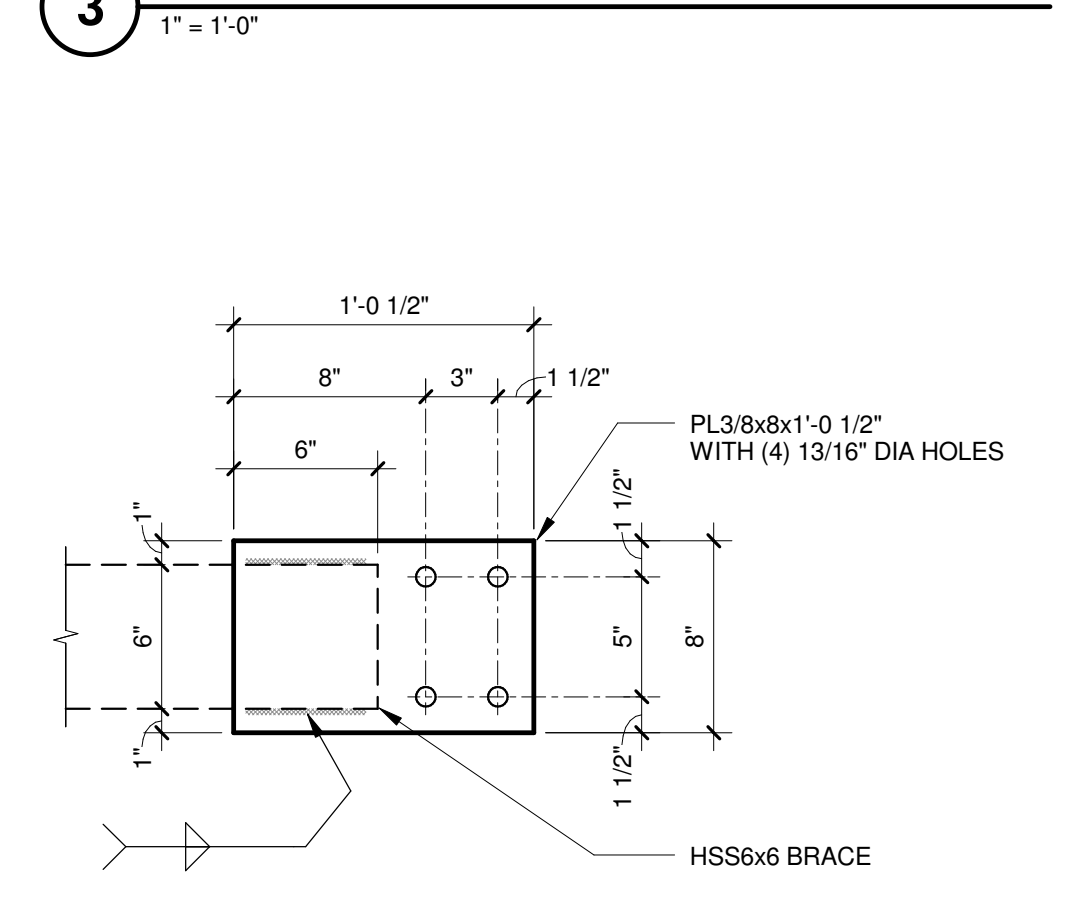
17 PRECAST TO JOIST CONNECTION
1" = 1'-0"



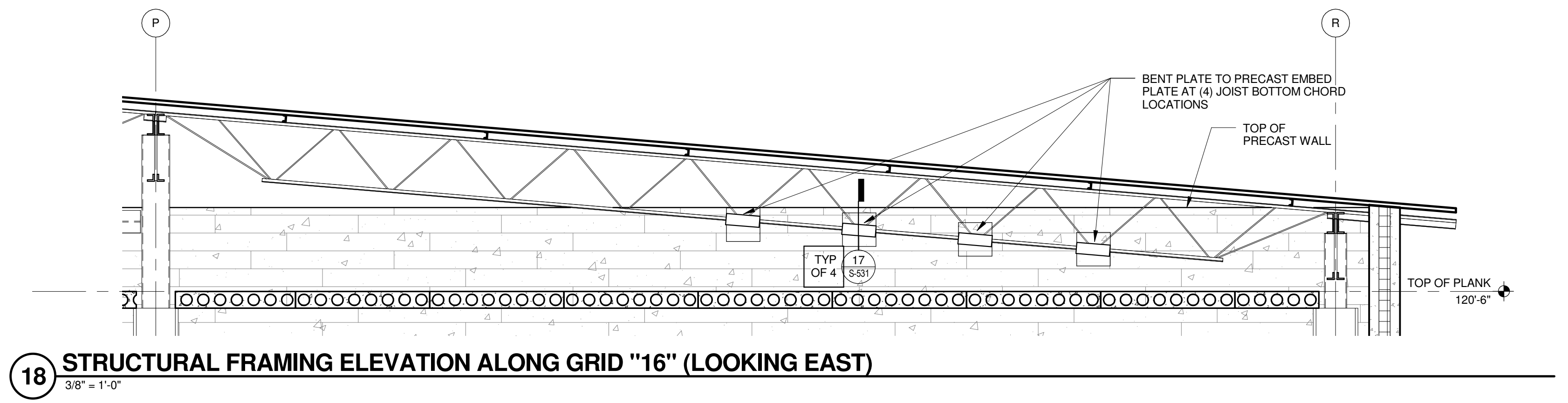
12 SPANDREL AT CORNER HSS COLUMN
1" = 1'-0"



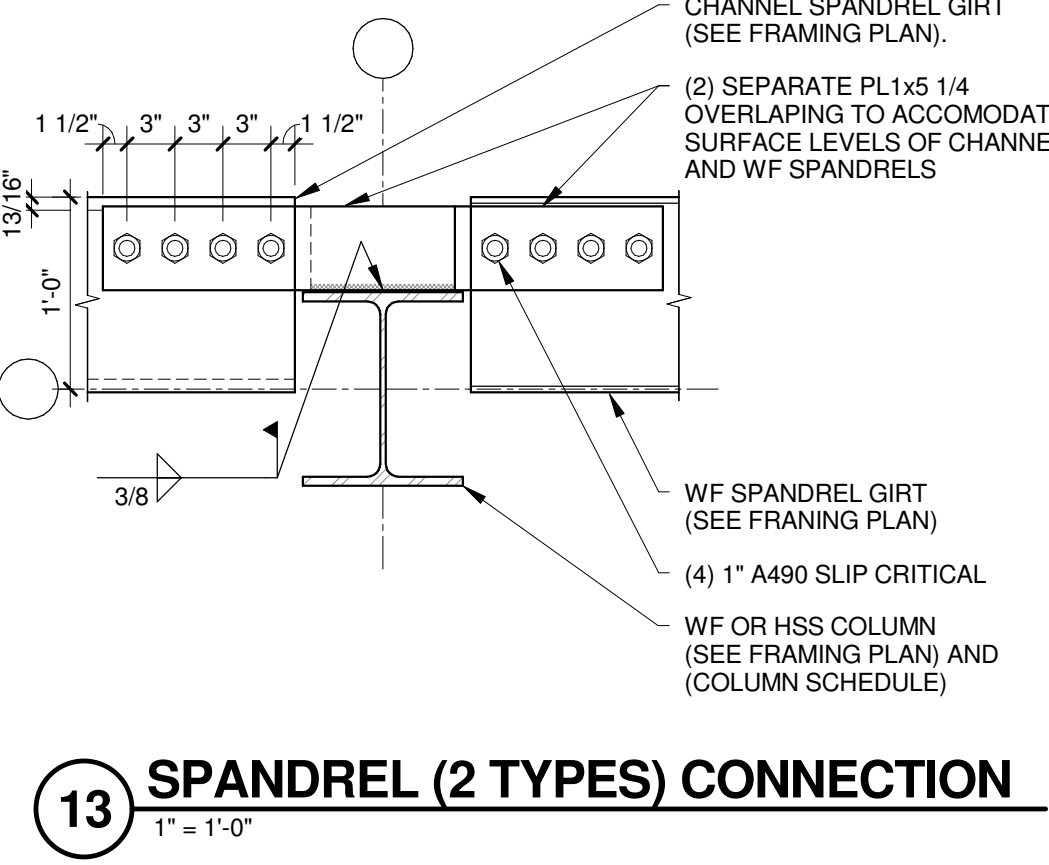
8 CHANNEL SPANDREL ATTACHEMNT
1" = 1'-0"



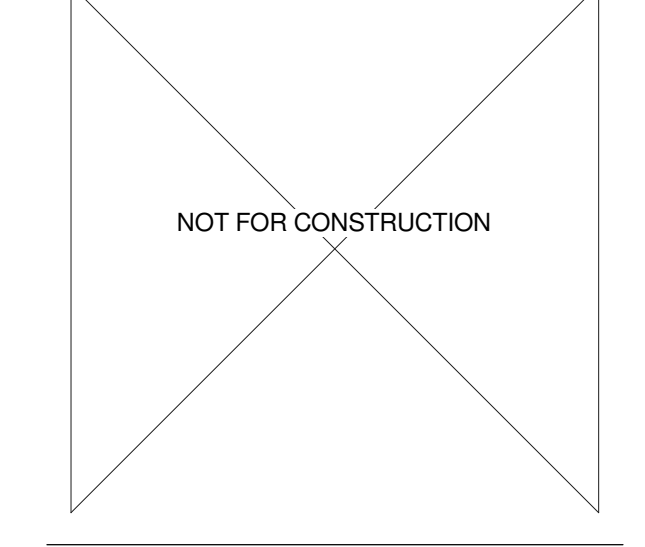
4 CRANE BRACE CONNECTION PLATE
1 1/2" = 1'-0"



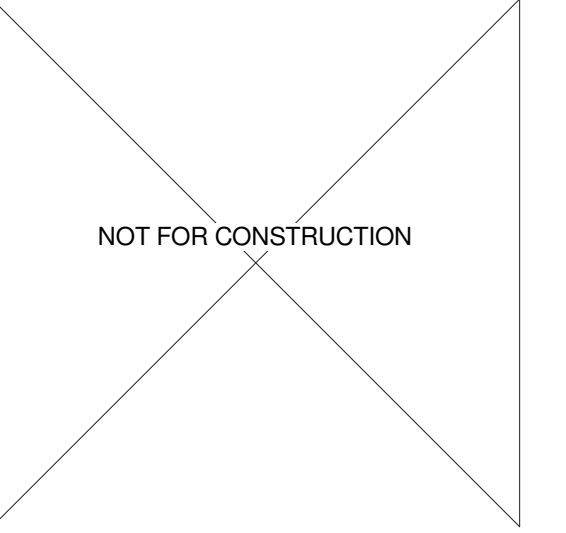
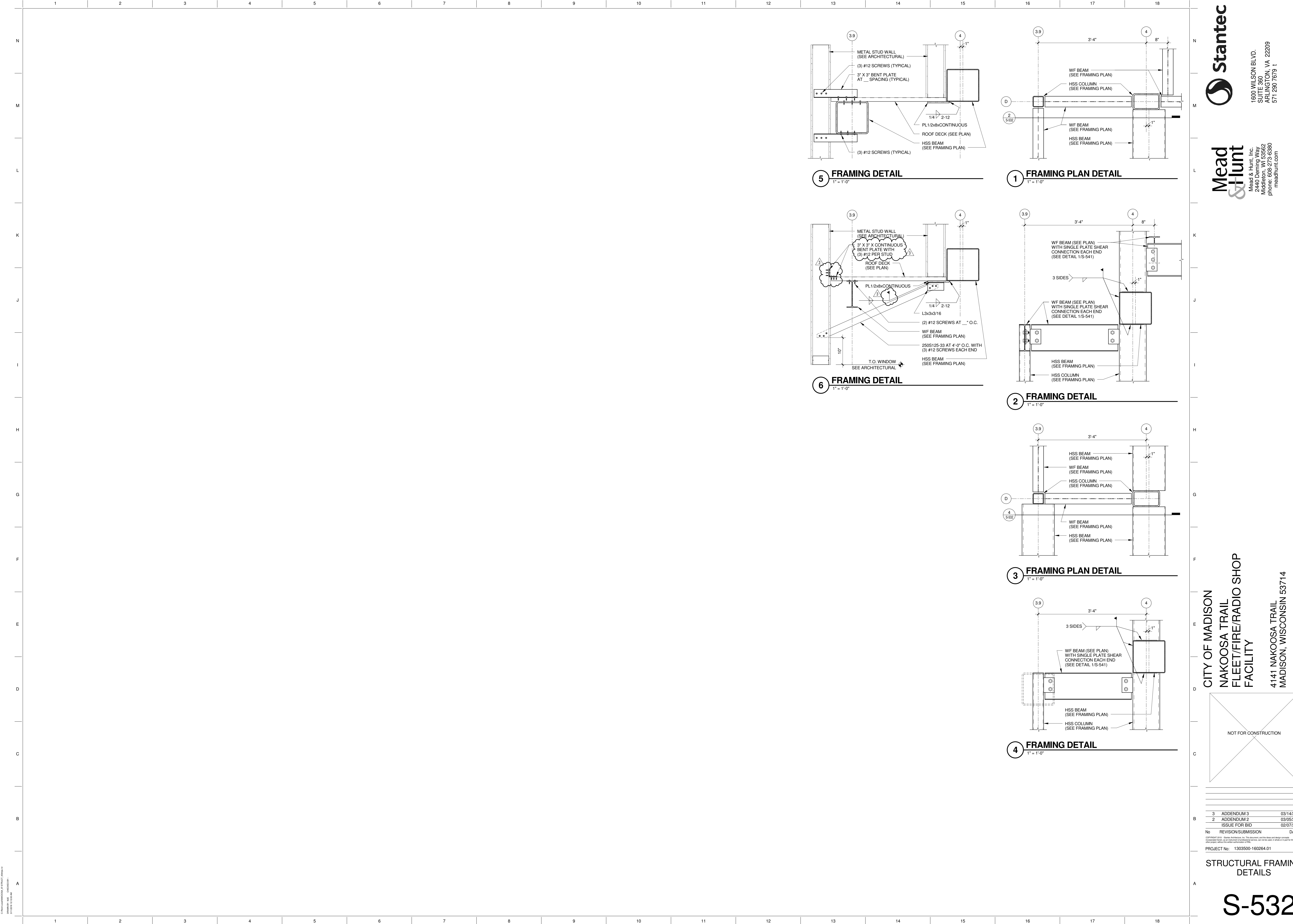
18 STRUCTURAL FRAMING ELEVATION ALONG GRID '16" (LOOKING EAST)
3/8" = 1'-0"



13 SPANDREL (2 TYPES) CONNECTION
1" = 1'-0"



3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No REVISION/SUBMISSION DATE		
PROJECT No: 1303500-160264.01		

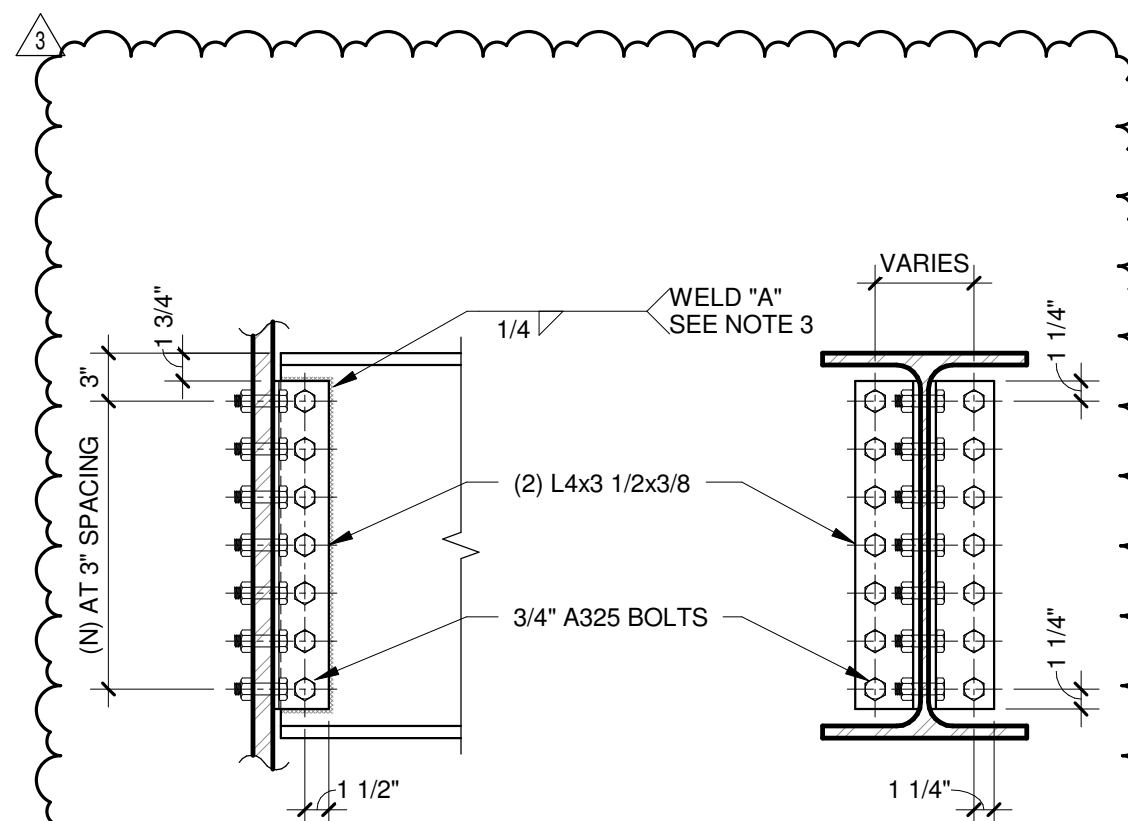


REVISION	SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019

PROJECT No: 1303500-160264.01

STRUCTURAL FRAMING
DETAILS

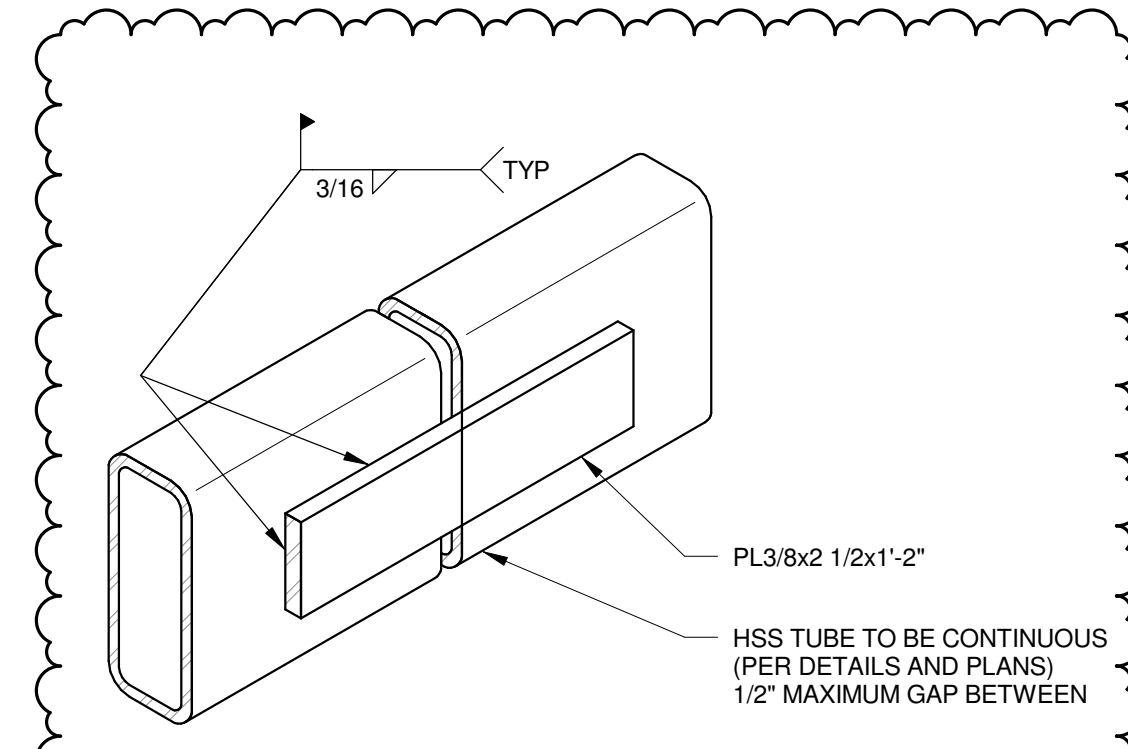
S-532



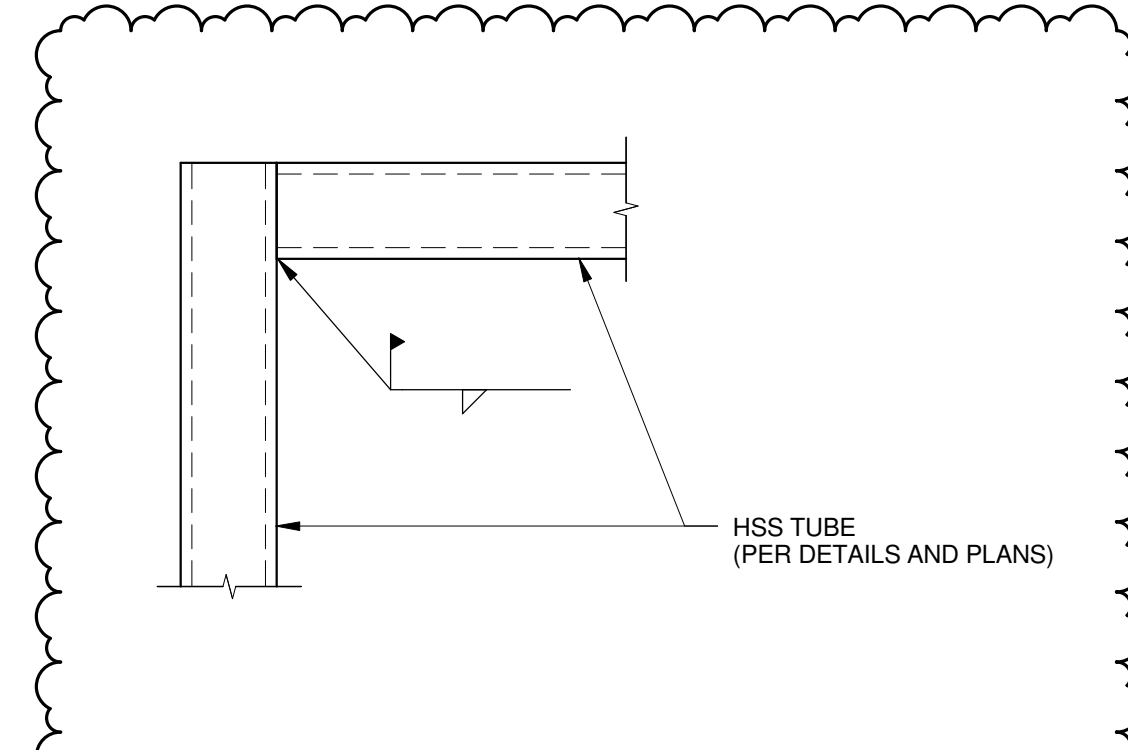
DOUBLE ANGLE CONNECTION		
NOMINAL BEAM DEPTH, INCHES	ROWS OF BOLTS (N)	LENGTH OF ANGLE
W36	10	29 1/2"
W33	9	26 1/2"
W30	8	23 1/2"
W24 - W27	7	20 1/2"
W21	6	17 1/2"
W18	5	14 1/2"
W16	4	11 1/2"
W12 - W14	3	8 1/2"
W8 - W10	2	5 1/2"

- DOUBLE ANGLE CONNECTION NOTES**
- ALL FRAMING CONNECTIONS SHALL CONFORM TO SCHEDULE UNLESS DETAILED OR NOTED OTHERWISE.
 - STANDARD HOLES OR HORIZONTAL SHORT SLOT HOLES MAY BE UTILIZED AT CONTRACTORS OPTION IN EITHER THE CONNECTION ANGLE OR THE FRAMING MEMBERS.
 - WELD "A" MAY BE USED IN LIEU OF "A" SIDE BOLTS AT CONTRACTORS OPTION. WELD SHALL BE ON ALL 3 SIDES.
 - FOR MISS-ALIGNED BOLT HOLES, PROVIDE FIELD WELDS. NOTIFY THE ARCHITECT/ENGINEER OF LOCATIONS USING FIELD WELDED CONNECTION.
 - REFER TO TYPICAL COPING DETAIL FOR CONNECTIONS WHERE COPING IS REQUIRED.
 - THIS DETAIL IS NOT INTENDED FOR EVERY WF SECTION. CHECK RIDING THE FILLET AND COPE DEPTH PRIOR TO FABRICATION.

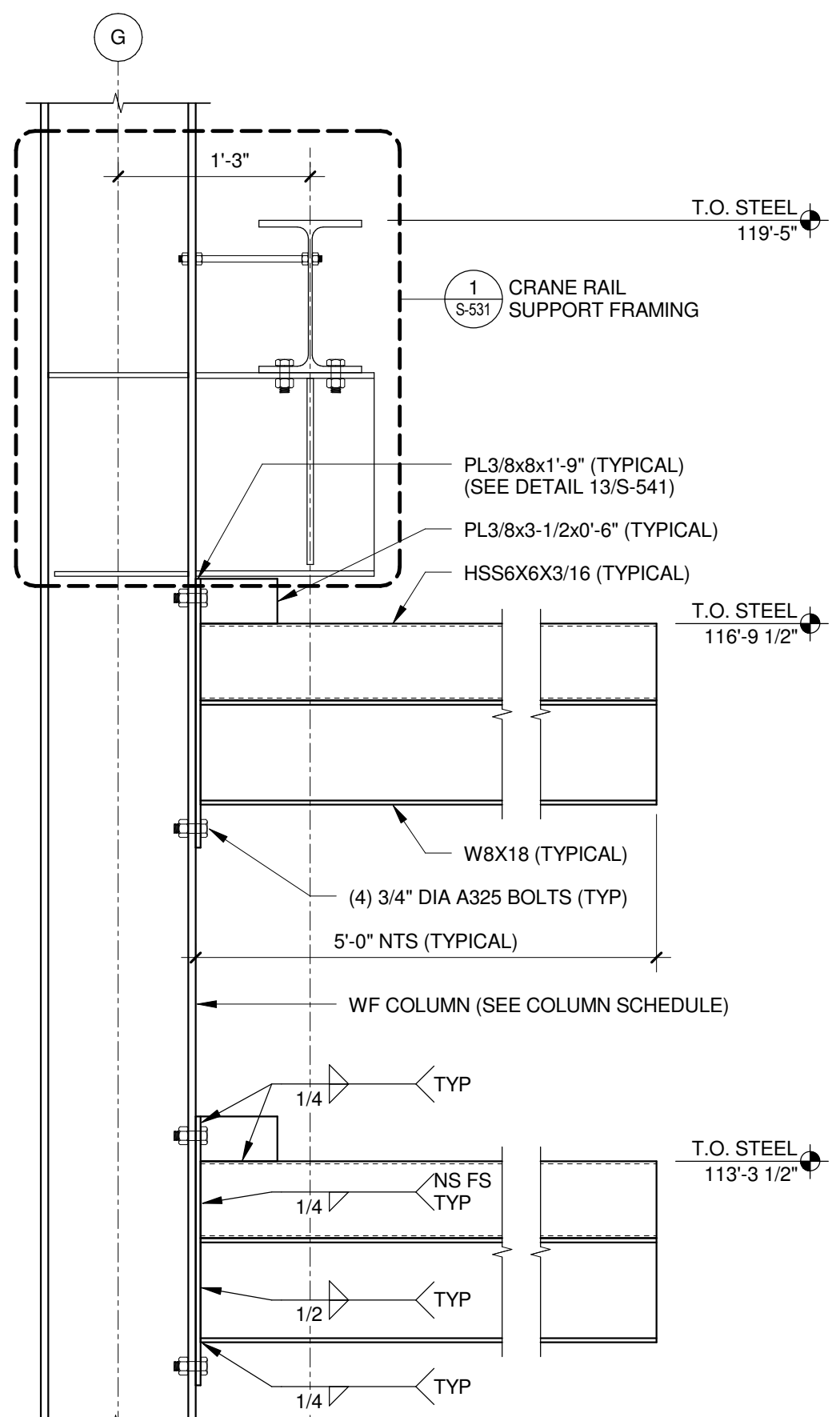
15 TYPICAL DOUBLE ANGLE FRAMING CONNECTION
1" = 1'-0"



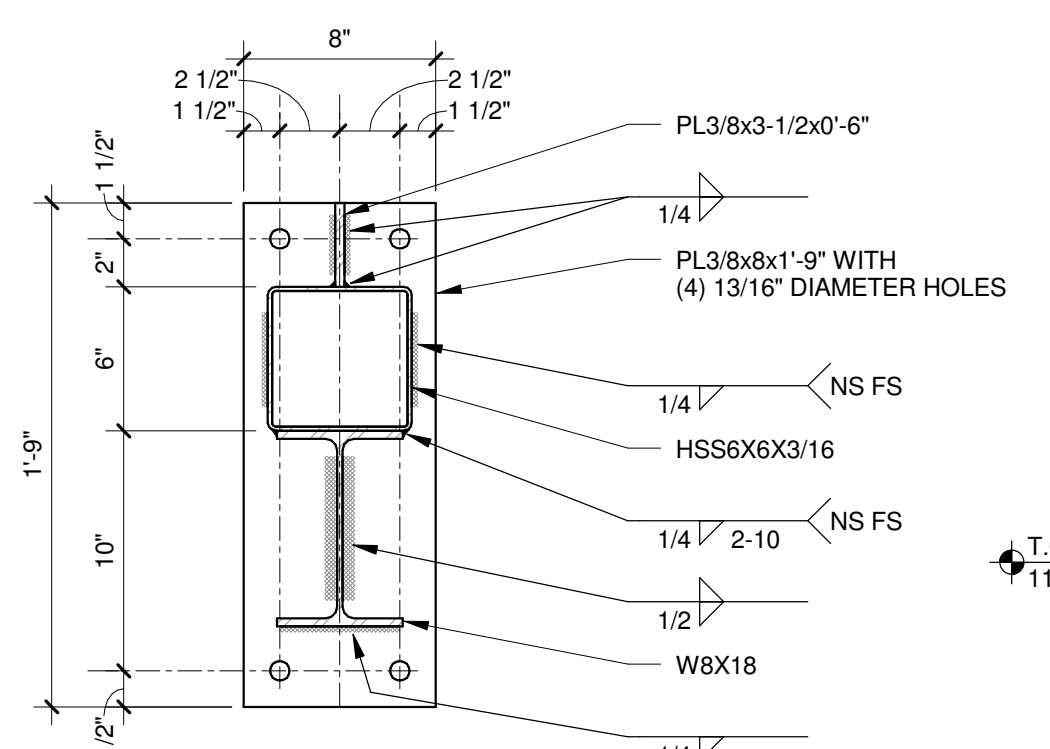
16 ROOF EDGE HSS SPLICE
3" = 1'-0"



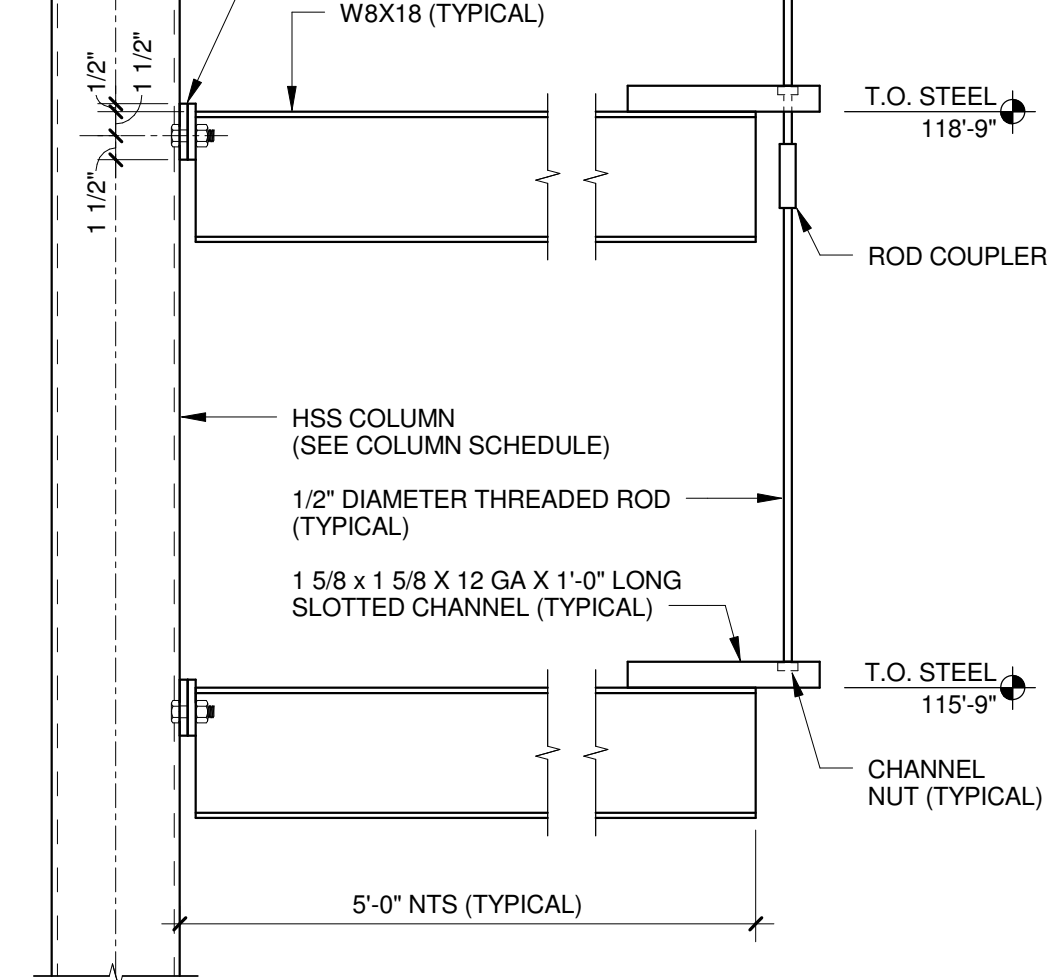
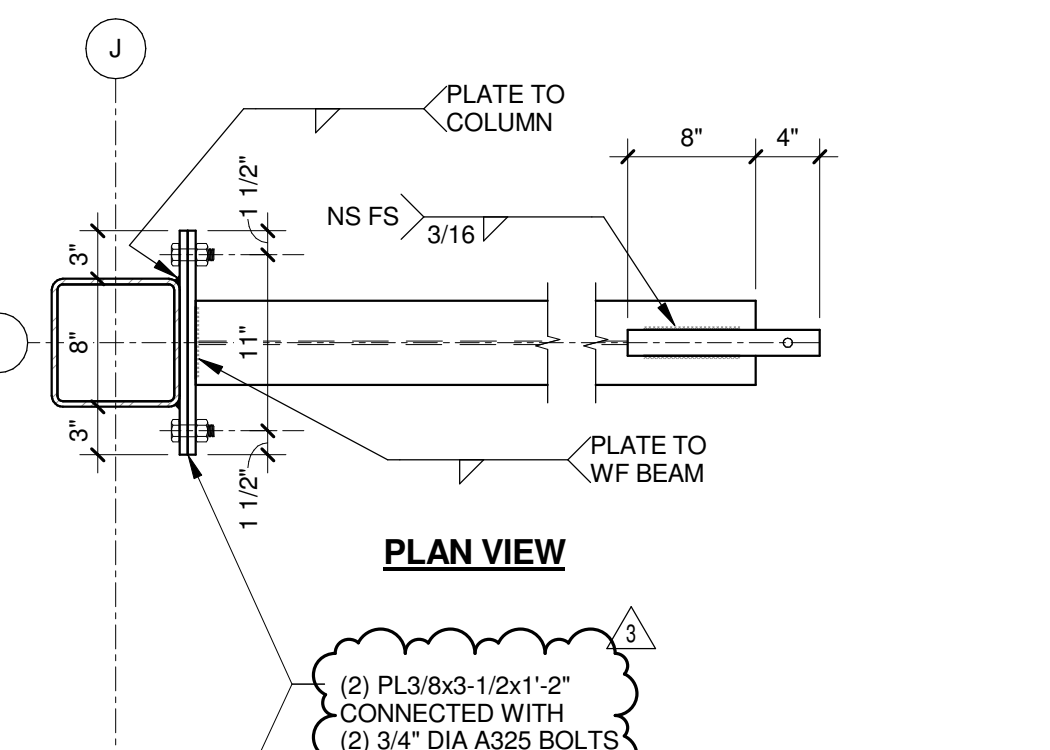
17 ROOF EDGE HSS CORNER WELD
3" = 1'-0"



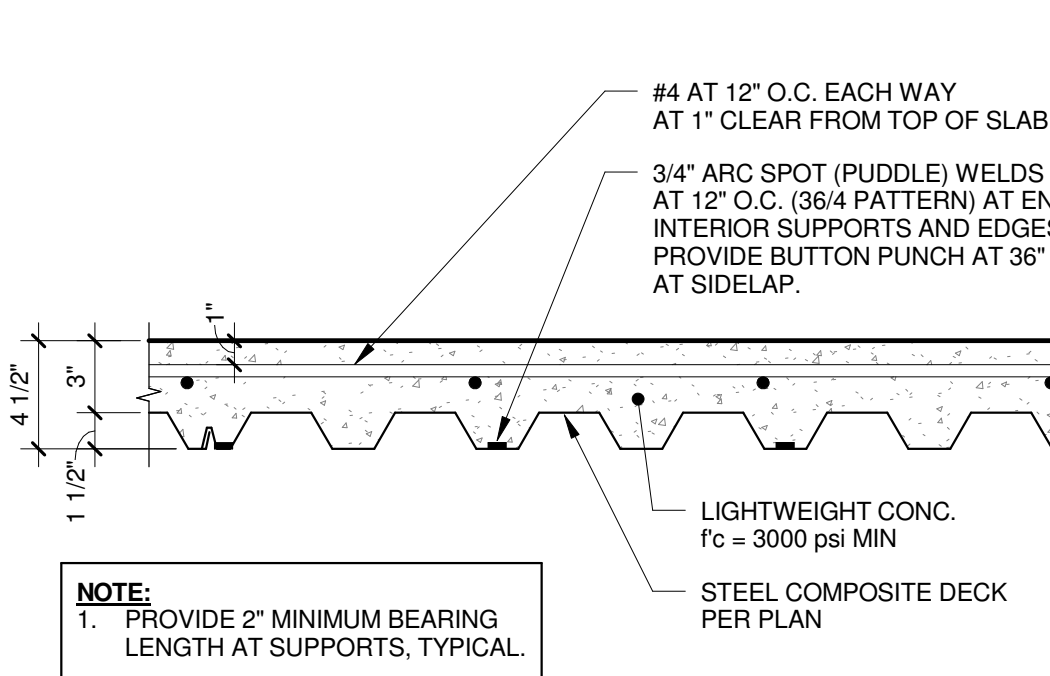
12 LUBE REEL ATTACHMENT FRAME
1" = 1'-0"



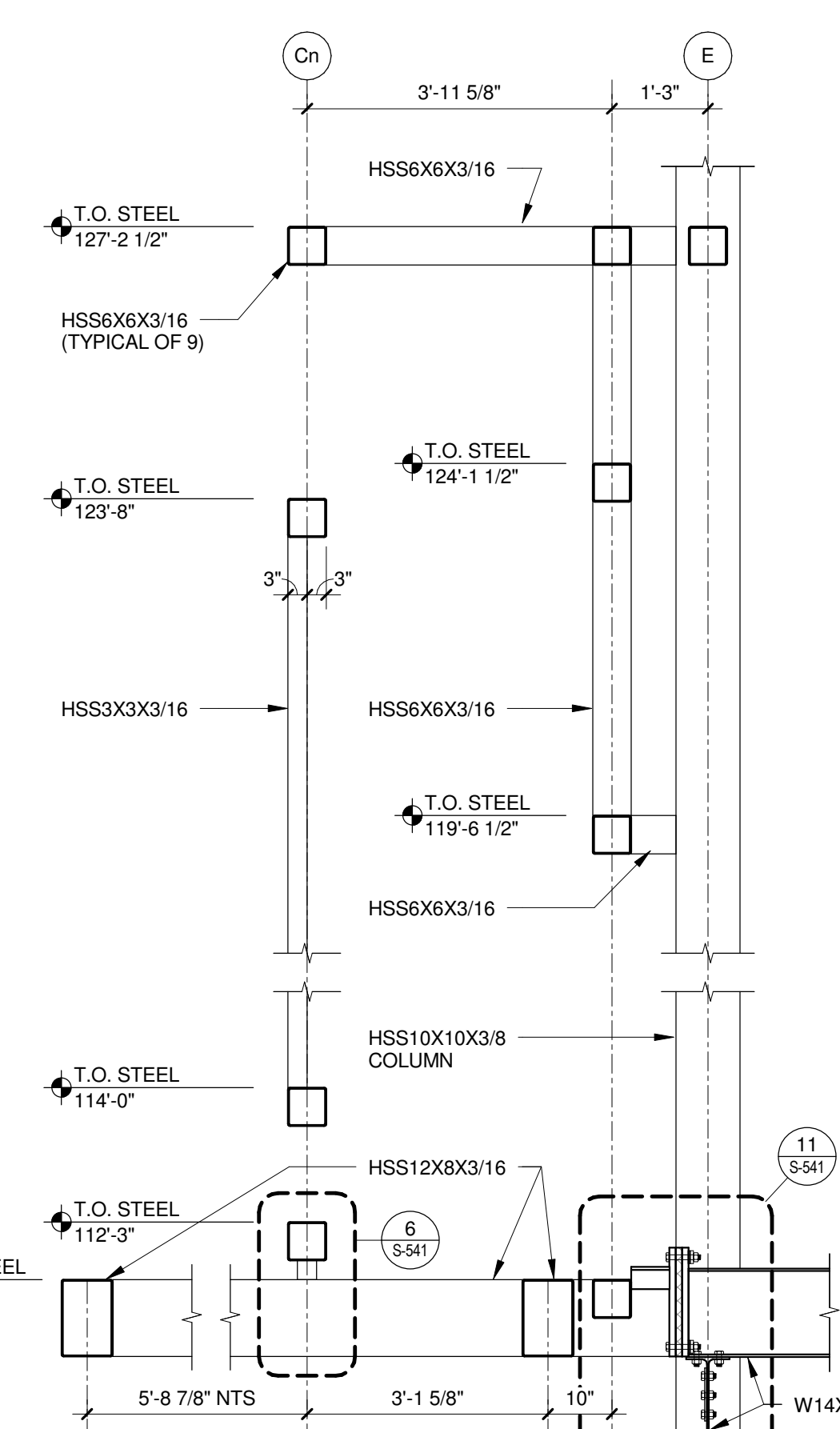
13 LUBE REEL ATTACHMENT PLATE
1 1/2" = 1'-0"



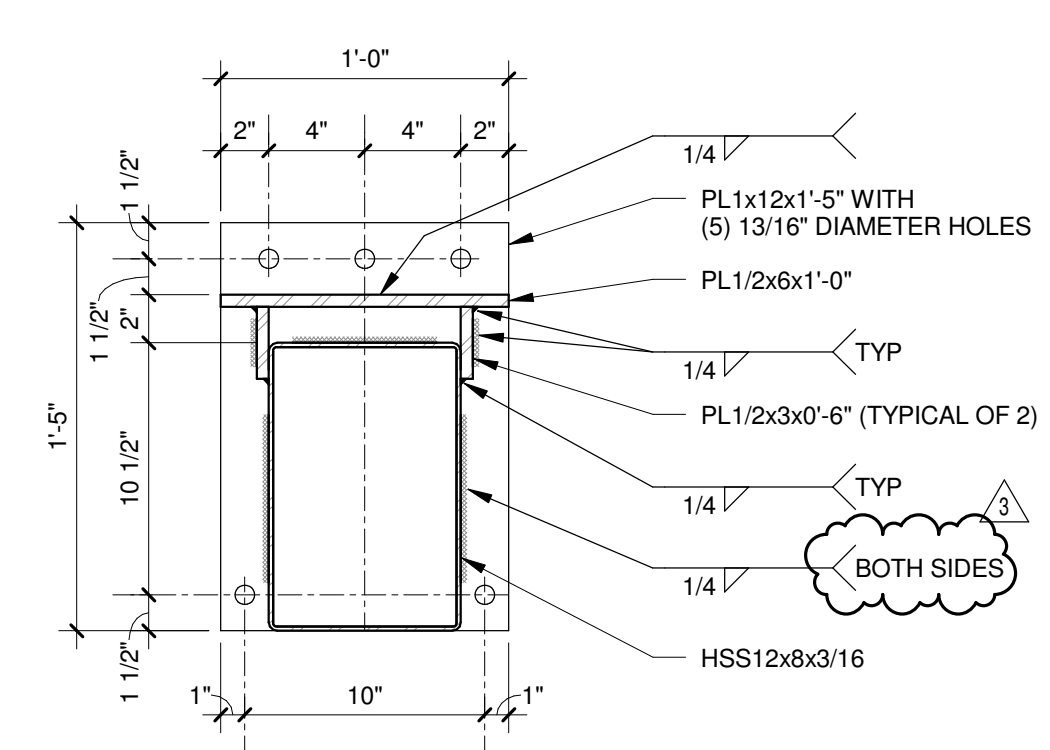
14 LUBE REEL ATTACHMENT FRAME
1" = 1'-0"



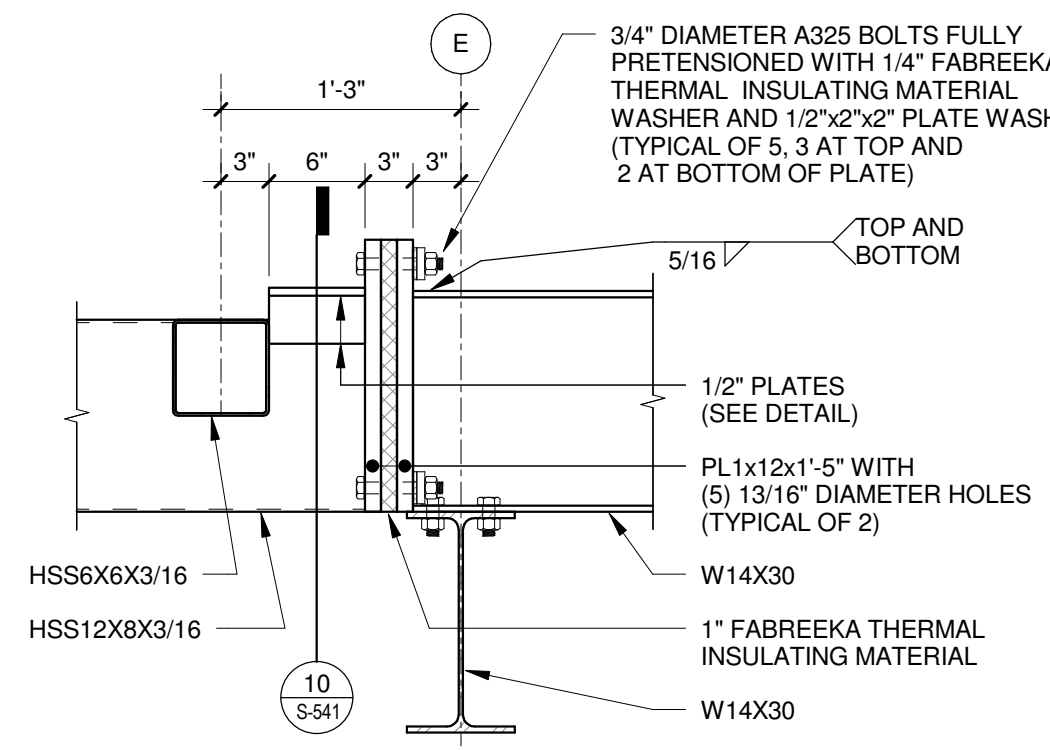
8 TYPICAL CONCRETE ON METAL DECK SECTION
1 1/2" = 1'-0"



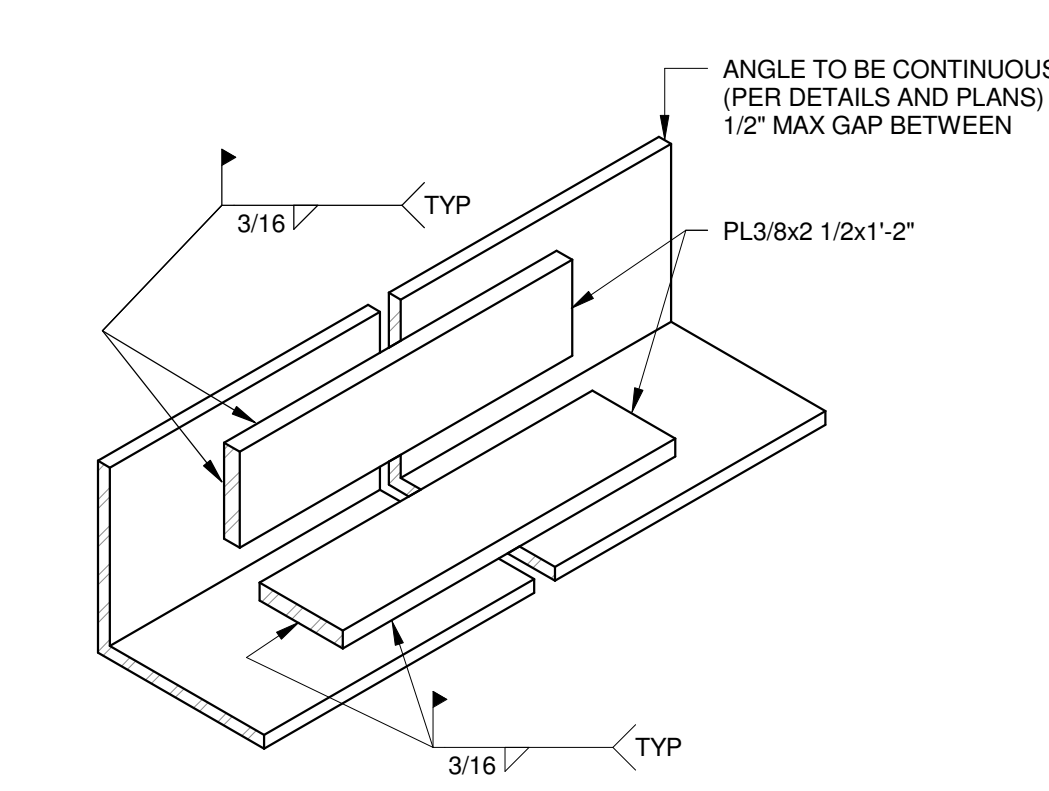
9 RADIO ENTRY CANOPY SECTION
1/2" = 1'-0"



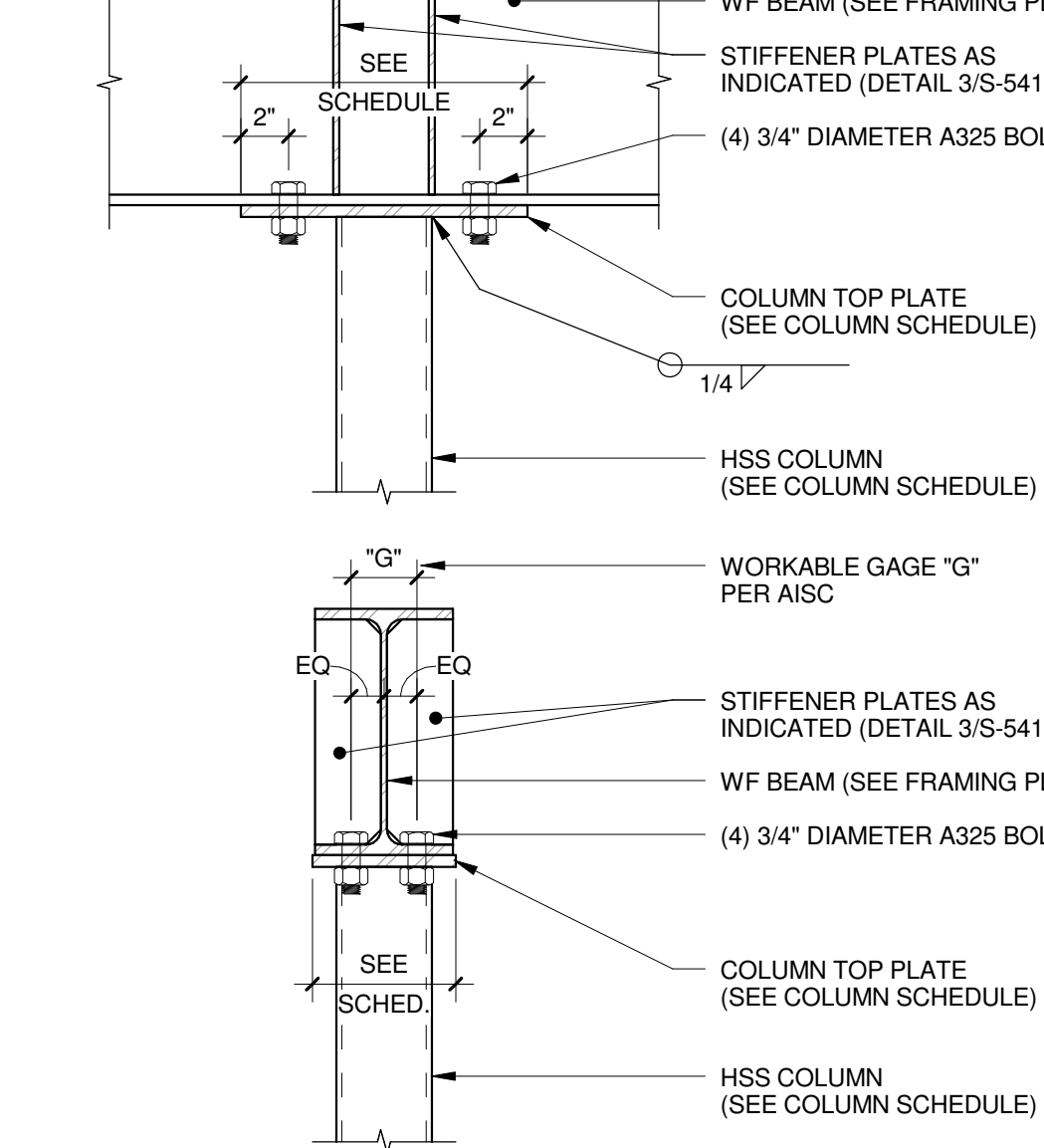
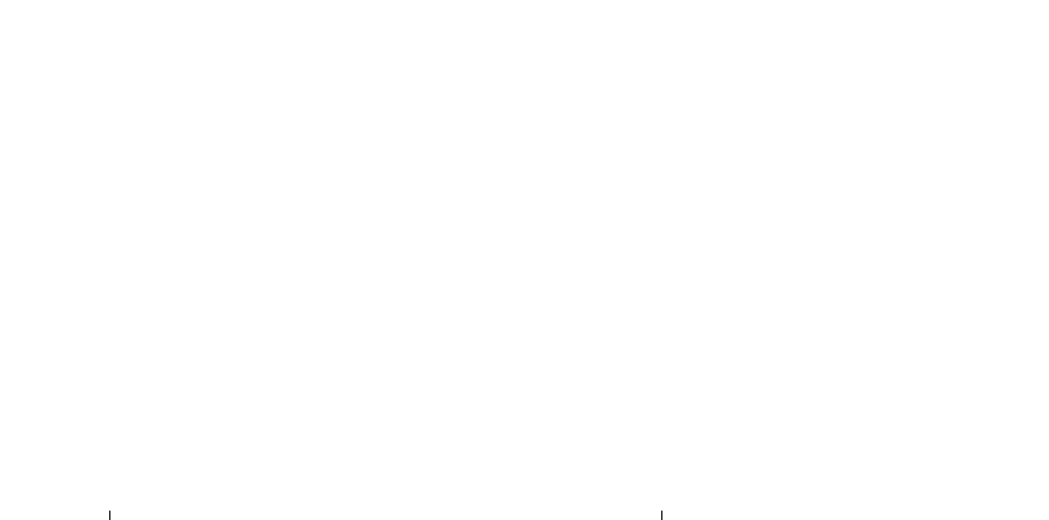
10 RADIO ENTRY CANOPY THERMAL MOMENT CONNECTION PLATE
1 1/2" = 1'-0"



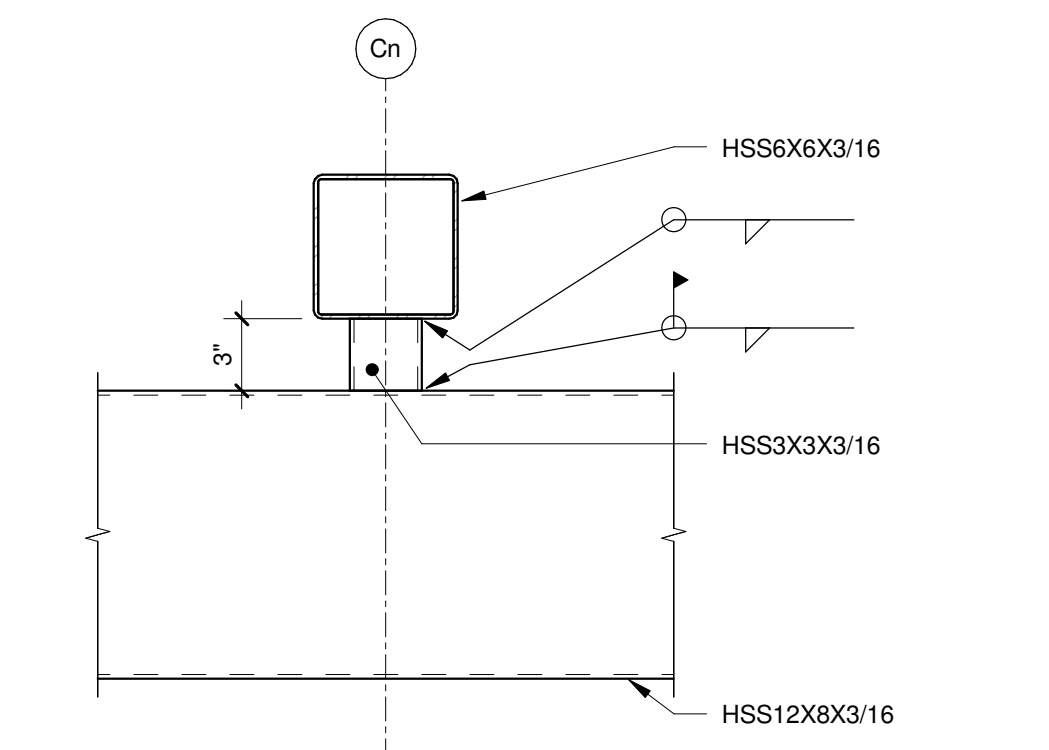
11 RADIO ENTRY CANOPY THERMAL MOMENT CONNECTION
1" = 1'-0"



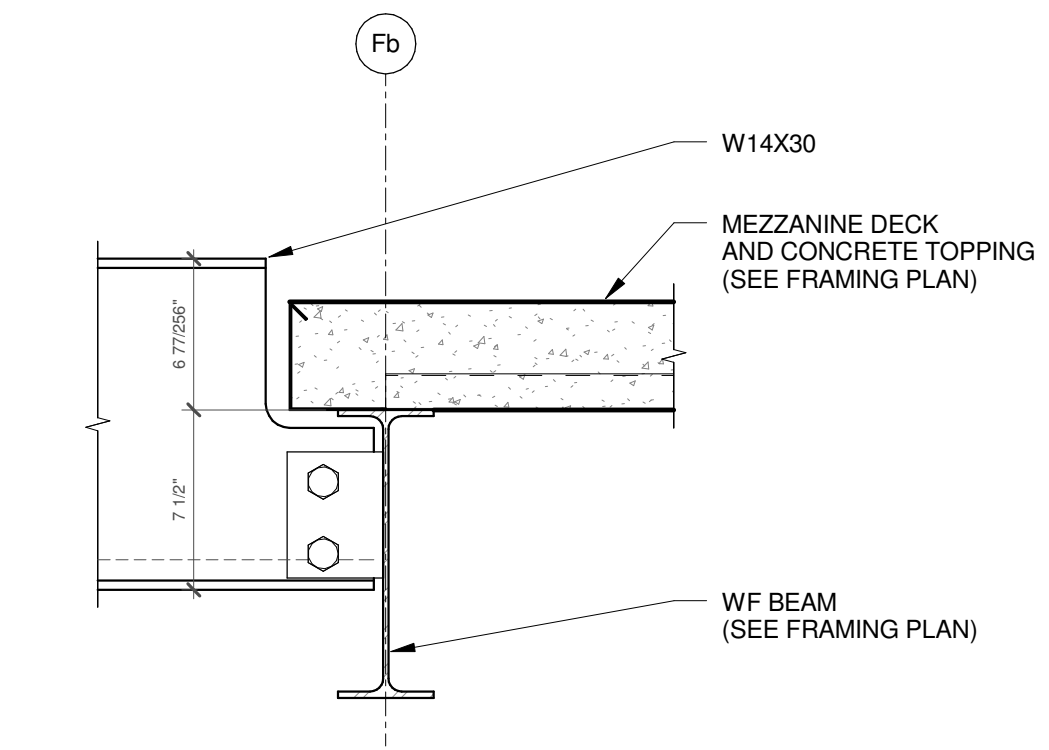
4 TYPICAL ANGLE SPLICE
3" = 1'-0"



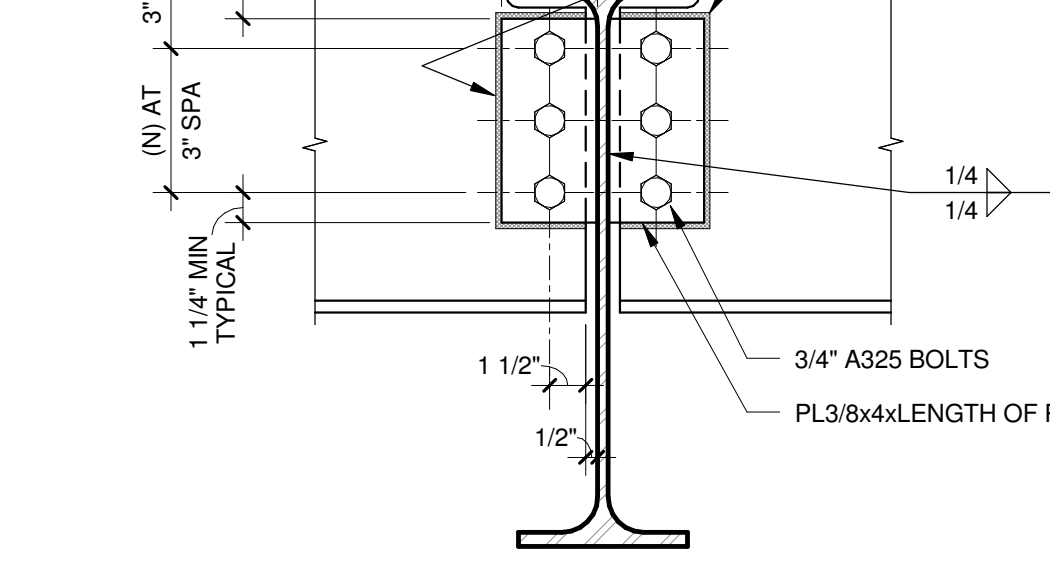
5 TYPICAL WF BEAM OVER HSS COLUMN
1 1/2" = 1'-0"



6 RADIO ENTRY CANOPY FRAMING CONNECTION
1 1/2" = 1'-0"



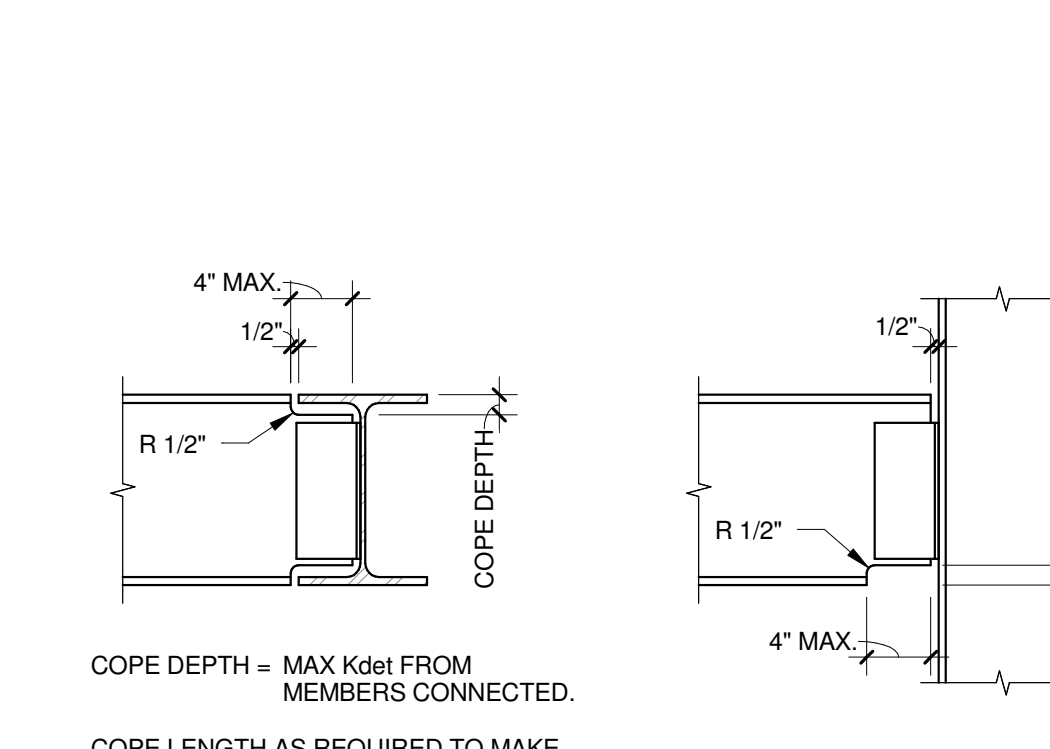
7 RADIO ENTRY CANOPY FRAMING CONNECTION
1 1/2" = 1'-0"



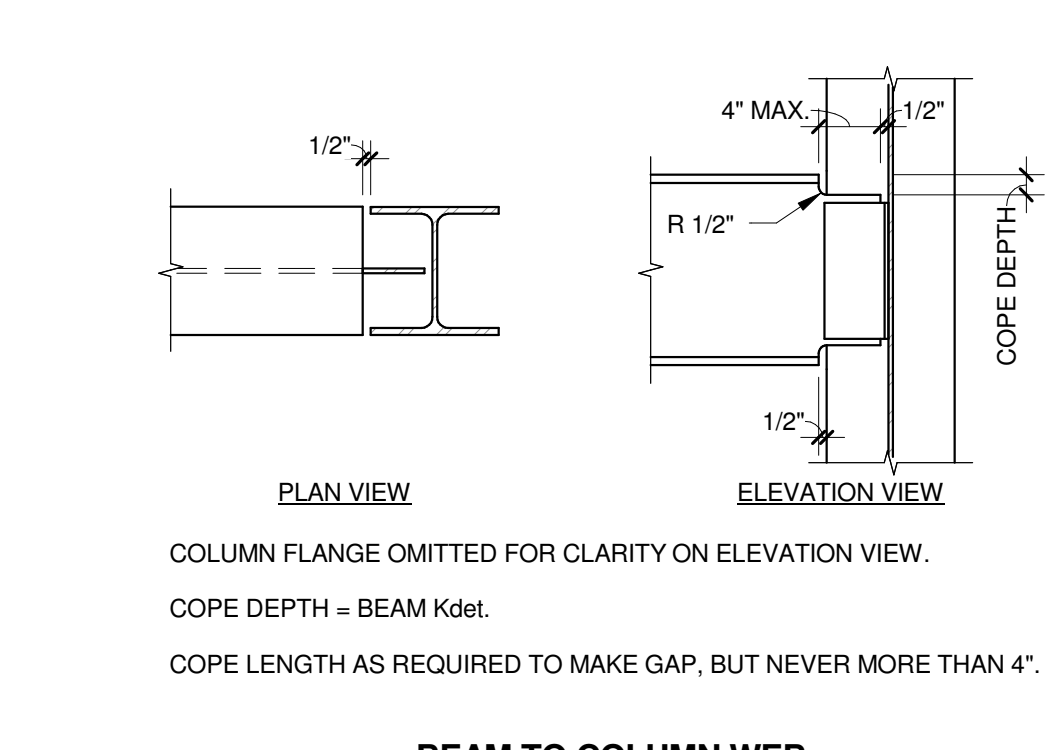
SINGLE PLATE SHEAR CONNECTION		
NOMINAL BEAM DEPTH, INCHES	ROWS OF BOLTS (N)	LENGTH OF PLATE
W36	10	29 1/2"
W33	9	26 1/2"
W30	8	23 1/2"
W24 - W27	7	20 1/2"
W21	6	17 1/2"
W18	5	14 1/2"
W16	4	11 1/2"
W12 - W14	3	8 1/2"
W8 - W10	2	5 1/2"

- SINGLE PLATE SHEAR CONNECTION NOTES**
- ALL FRAMING CONNECTIONS SHALL CONFORM TO SCHEDULE UNLESS DETAILED OR NOTED OTHERWISE.
 - STANDARD HOLES OR HORIZONTAL SHORT SLOT HOLES MAY BE UTILIZED AT CONTRACTORS OPTION IN EITHER THE CONNECTION ANGLE OR THE FRAMING MEMBERS.
 - WELD "A" MAY BE USED IN LIEU OF "A" SIDE BOLTS AT CONTRACTORS OPTION. WELD SHALL BE ON ALL 3 SIDES.
 - FOR MISS-ALIGNED BOLT HOLES, PROVIDE FIELD WELDS. NOTIFY THE ARCHITECT/ENGINEER OF LOCATIONS USING FIELD WELDED CONNECTION.
 - REFER TO TYPICAL COPING DETAIL S-S-541 FOR CONNECTIONS WHERE COPING IS REQUIRED.
 - THIS DETAIL IS NOT INTENDED FOR EVERY WF SECTION. CHECK RIDING THE FILLET AND COPE DEPTH PRIOR TO FABRICATION.

1 TYPICAL SINGLE PLATE SHEAR FRAMING CONNECTION
1 1/2" = 1'-0"



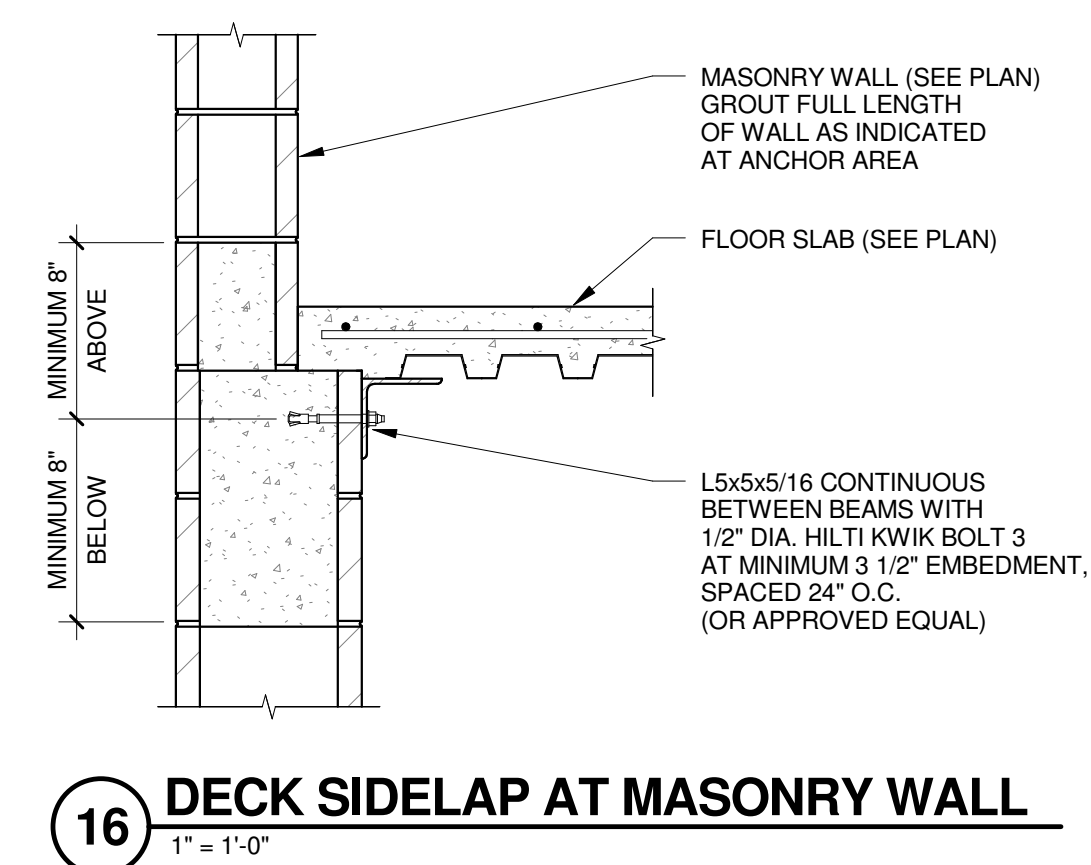
2 TYPICAL COPING DETAIL
1" = 1'-0"



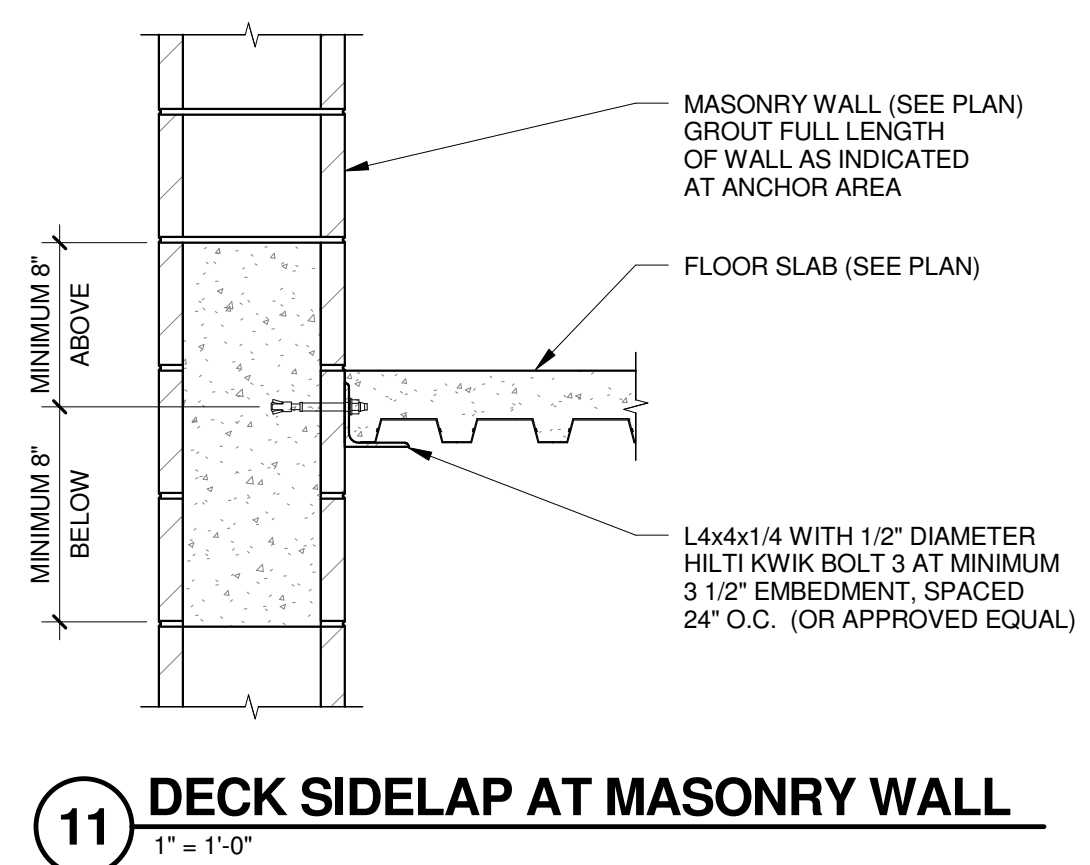
3 TYPICAL WF STIFFENER PLATE
1 1/2" = 1'-0"

NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

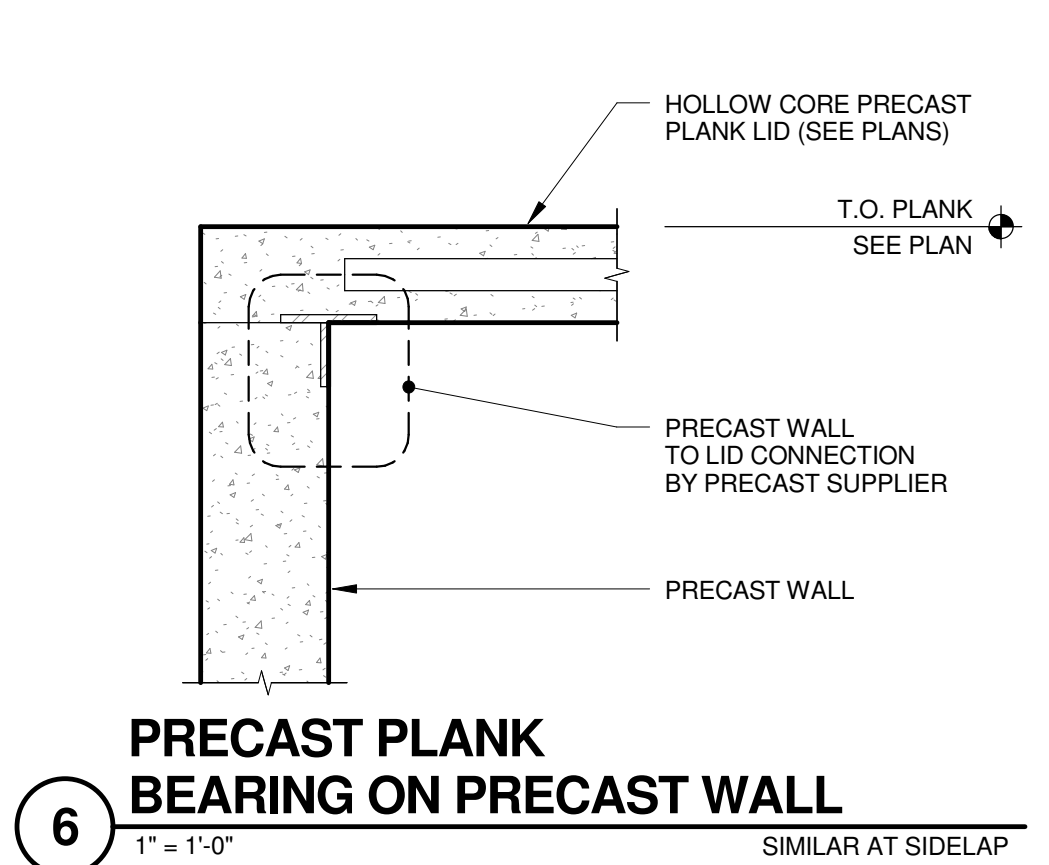
PROJECT No: 1303500-160264.01



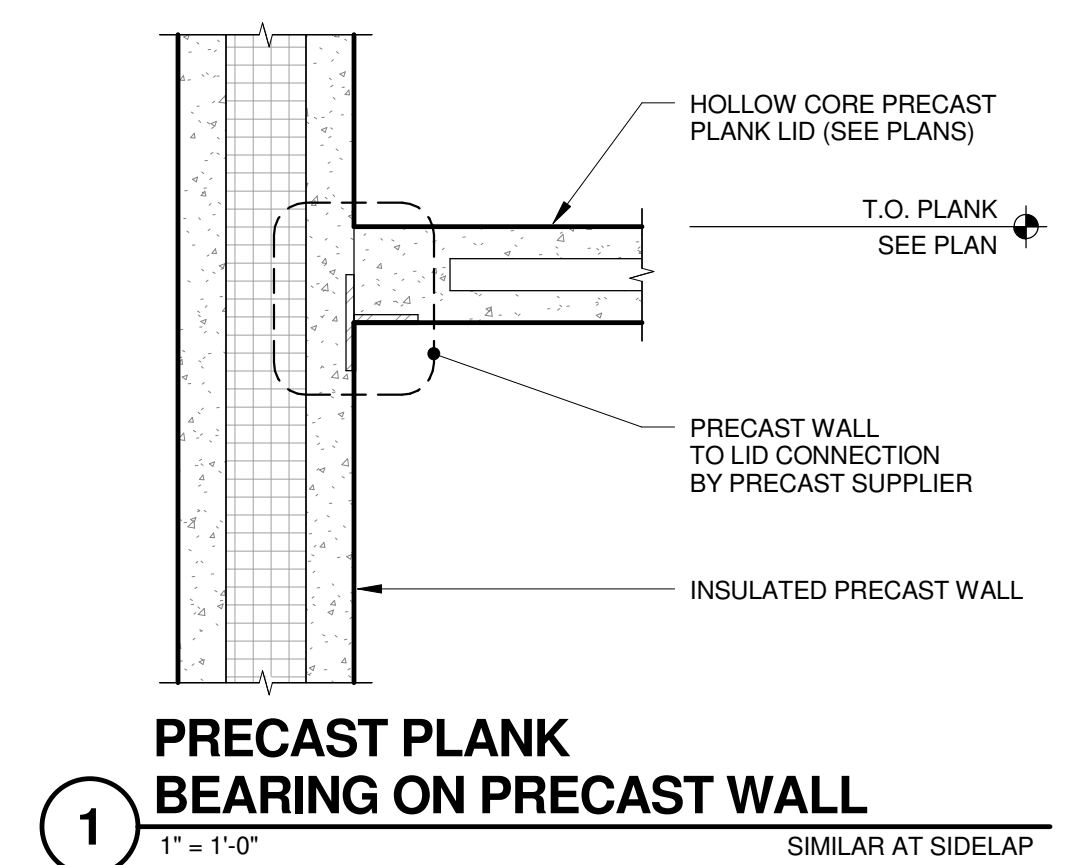
16 DECK SIDELAP AT MASONRY WALL
1" = 1'-0"



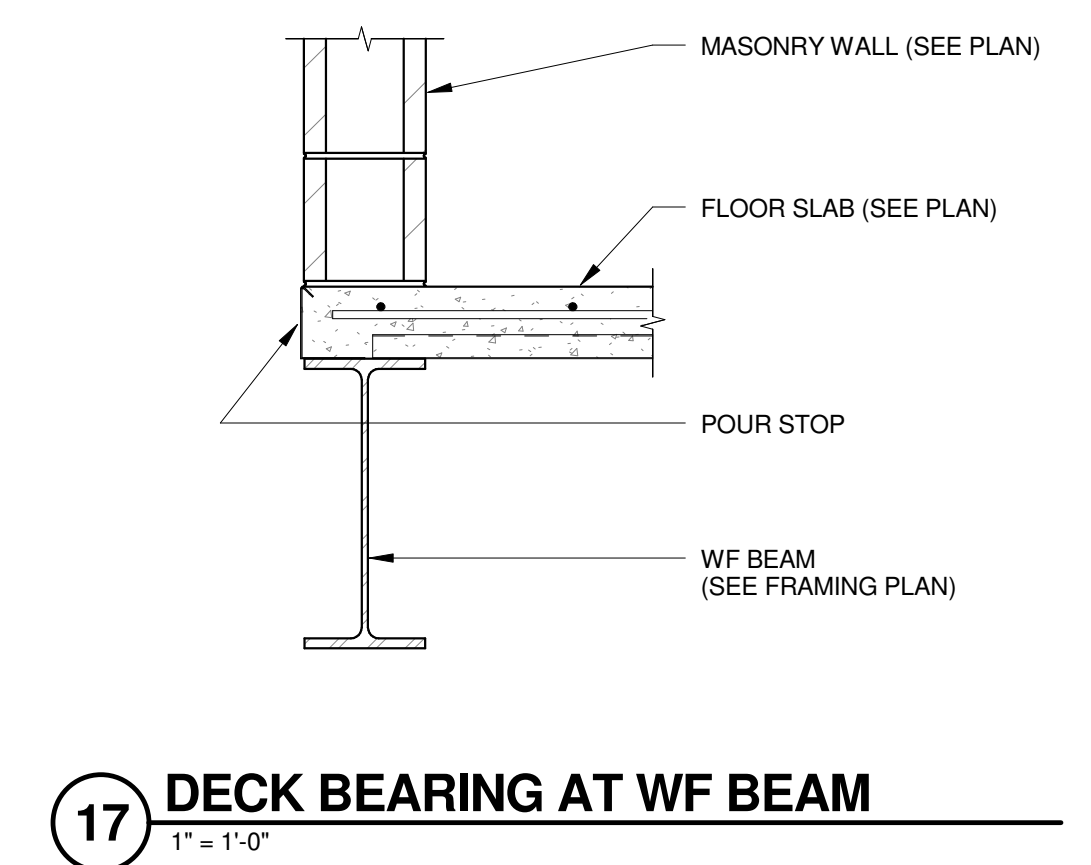
11 DECK SIDELAP AT MASONRY WALL
1" = 1'-0"



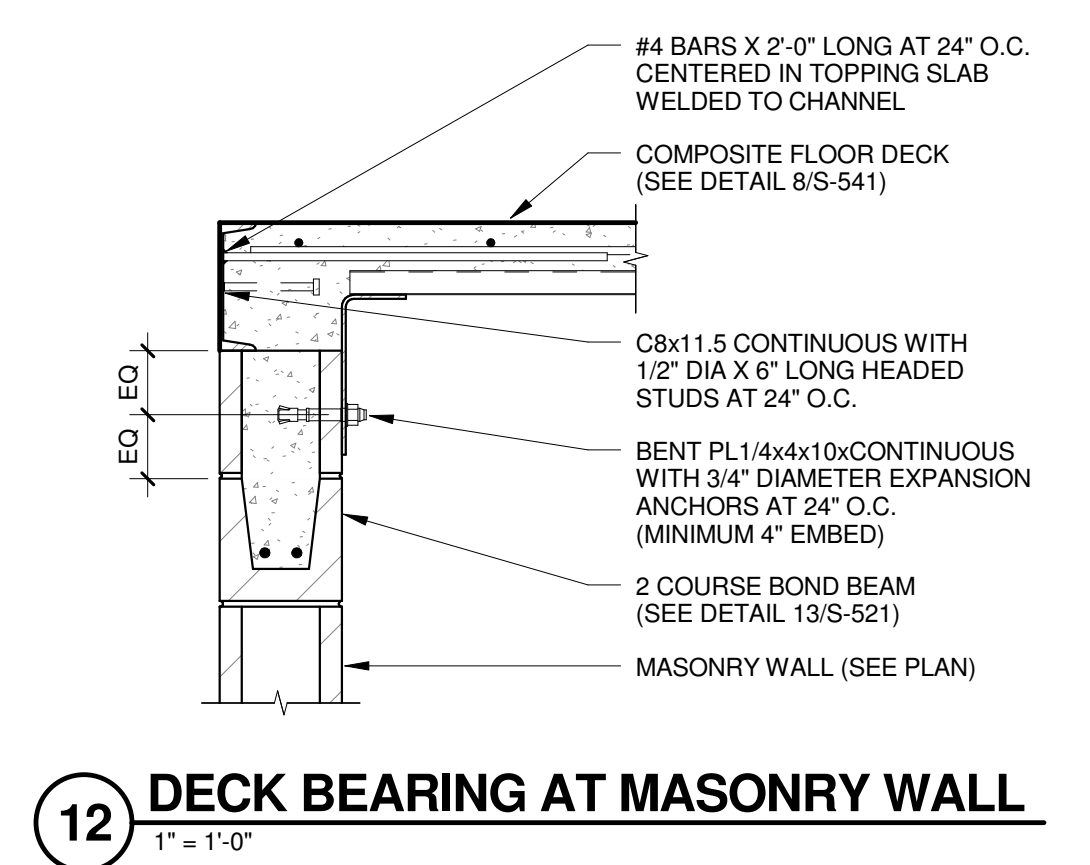
6 PRECAST PLANK BEARING ON PRECAST WALL
1" = 1'-0" SIMILAR AT SIDELAP



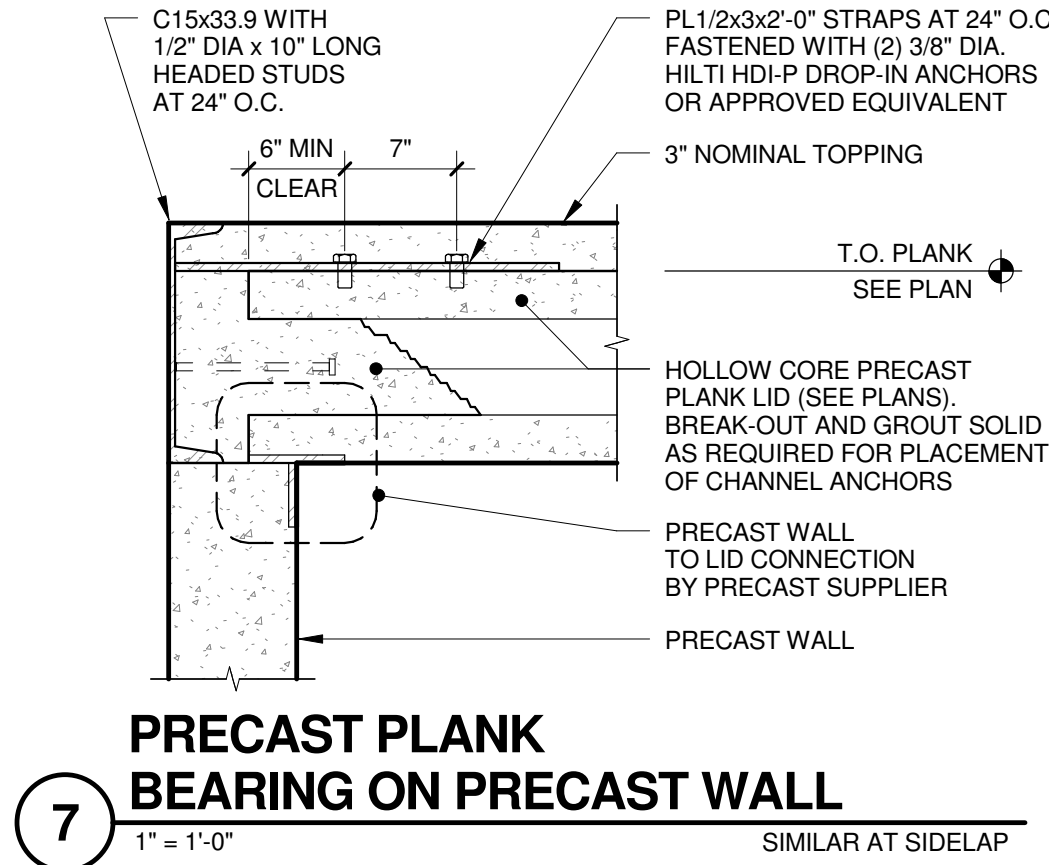
1 PRECAST PLANK BEARING ON PRECAST WALL
1" = 1'-0" SIMILAR AT SIDELAP



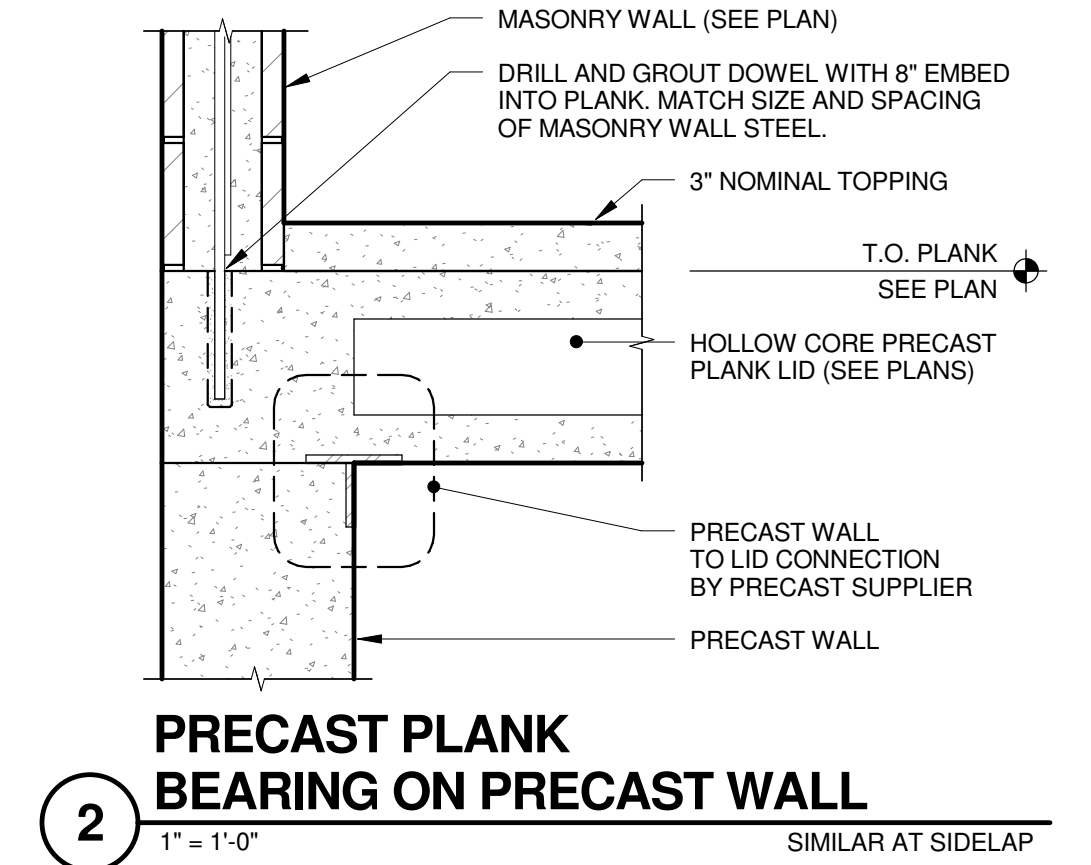
17 DECK BEARING AT WF BEAM
1" = 1'-0"



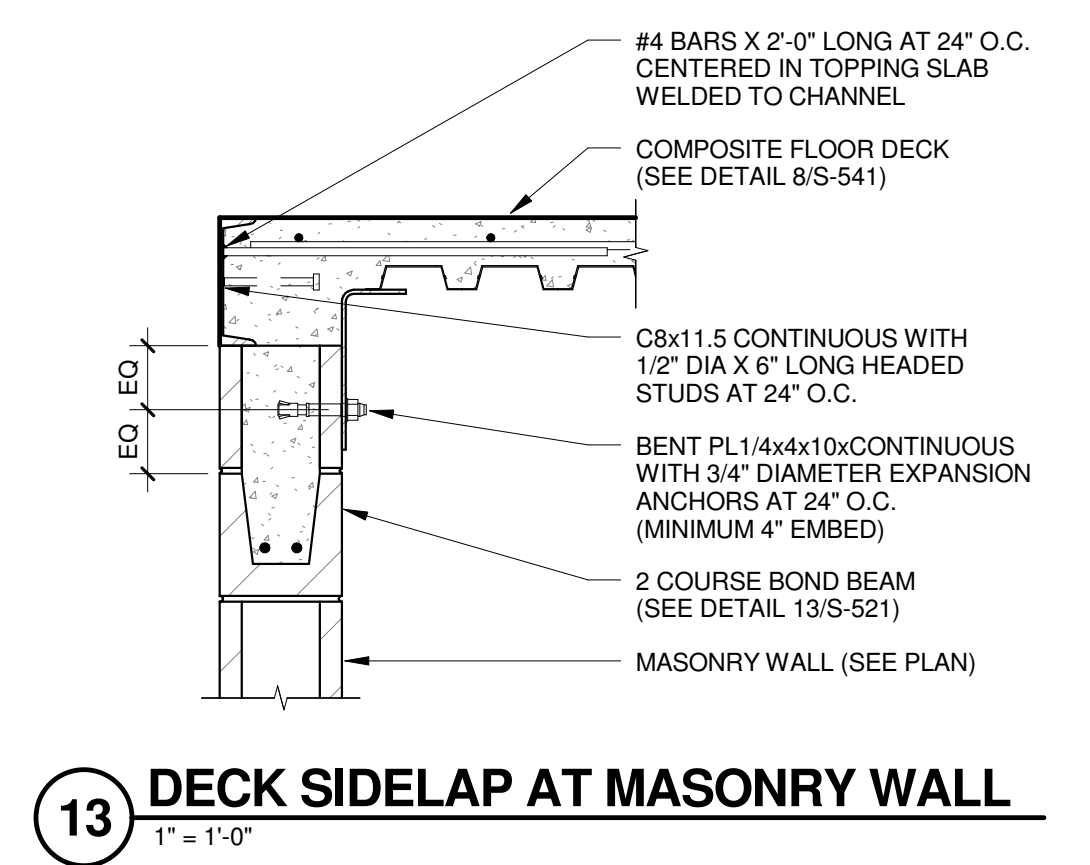
12 DECK BEARING AT MASONRY WALL
1" = 1'-0"



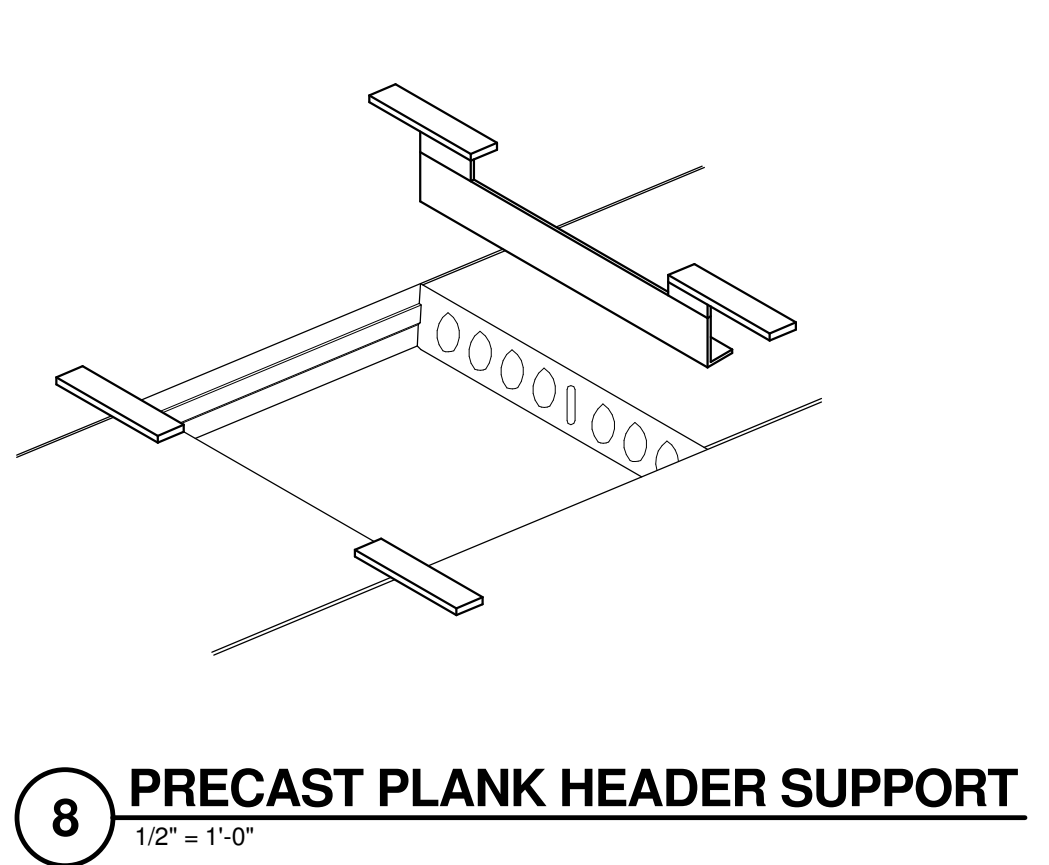
7 PRECAST PLANK BEARING ON PRECAST WALL
1" = 1'-0" SIMILAR AT SIDELAP



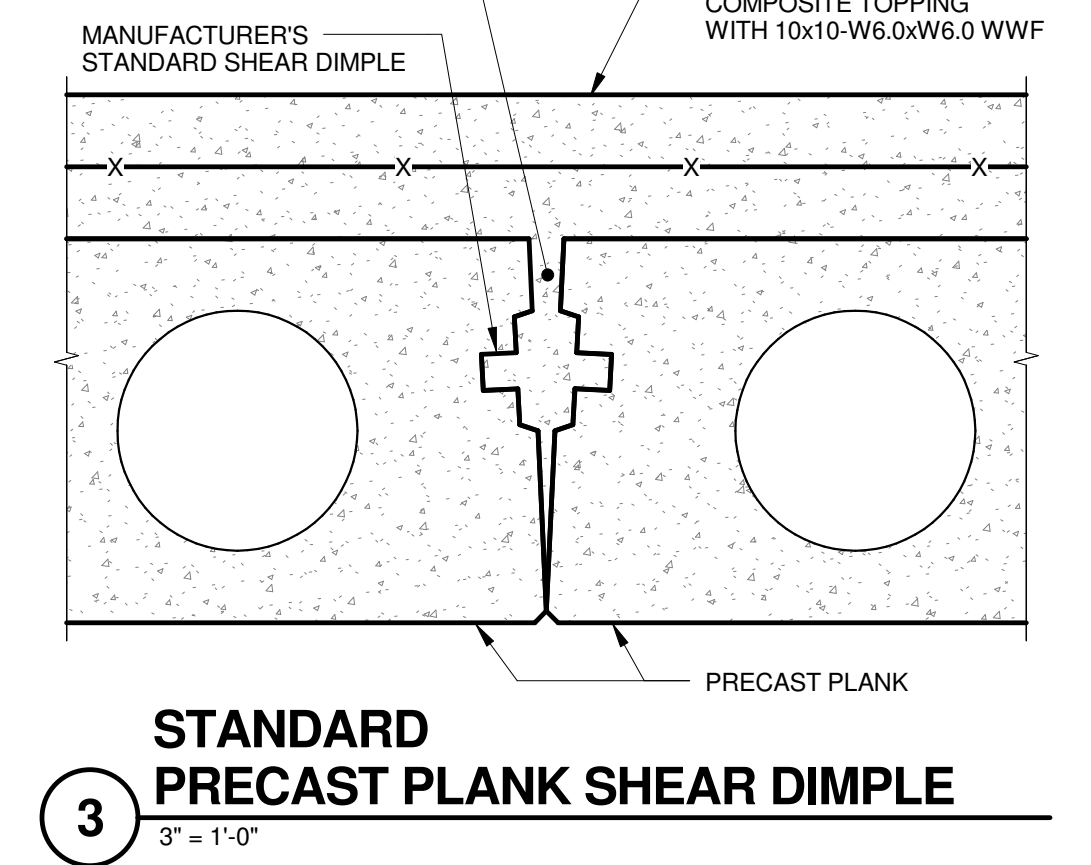
2 PRECAST PLANK BEARING ON PRECAST WALL
1" = 1'-0" SIMILAR AT SIDELAP



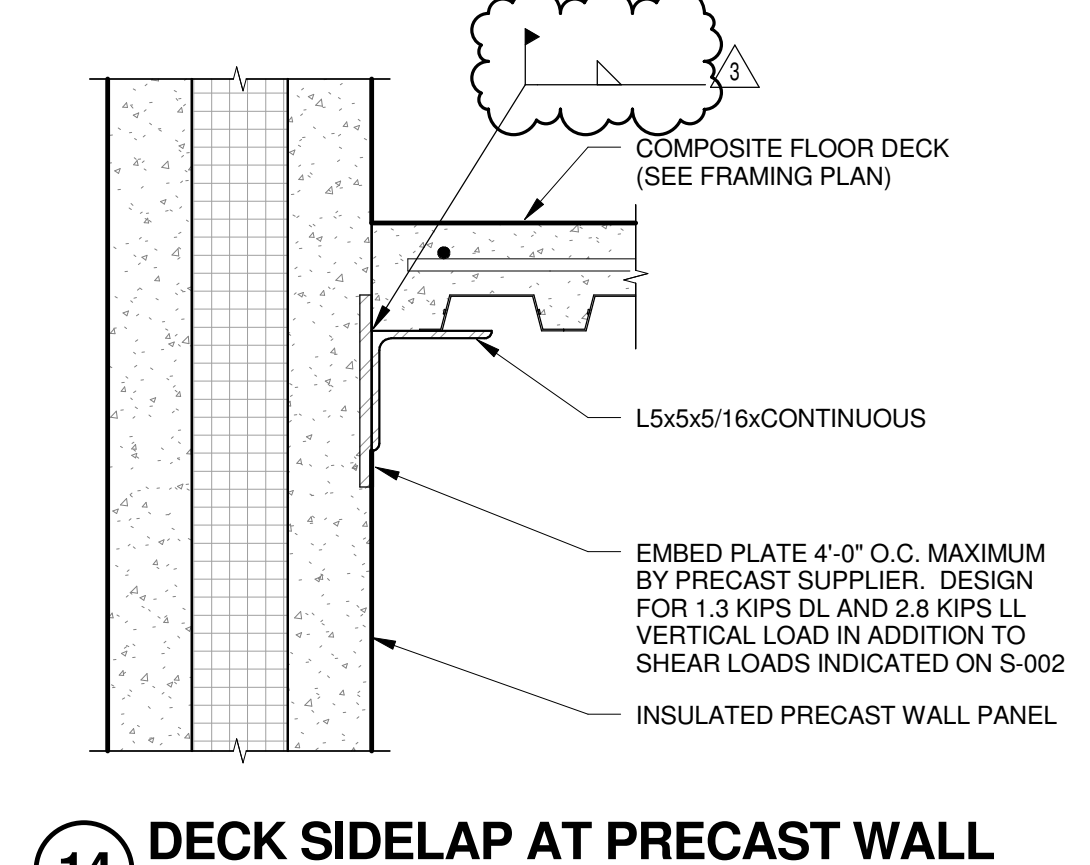
13 DECK SIDELAP AT MASONRY WALL
1" = 1'-0"



8 PRECAST PLANK HEADER SUPPORT
1/2" = 1'-0"



3 STANDARD PRECAST PLANK SHEAR DIMPLE
3" = 1'-0"



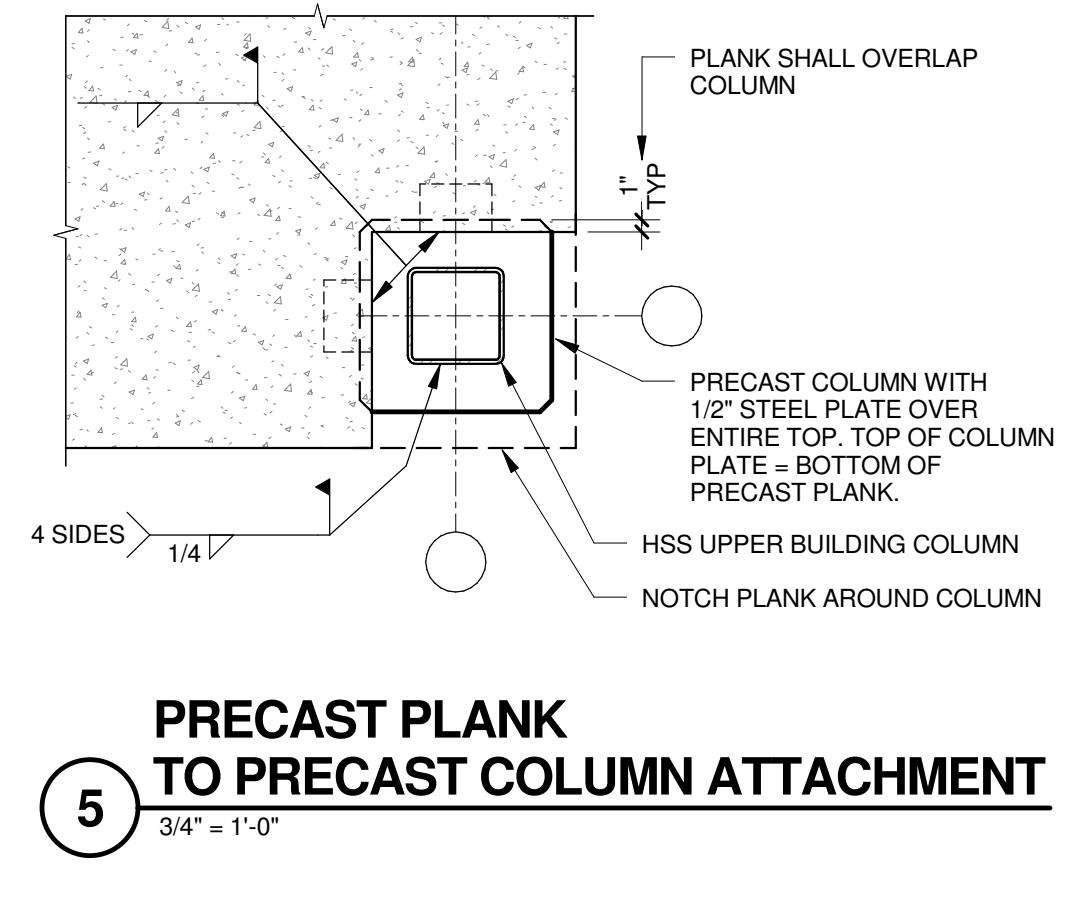
14 DECK SIDELAP AT PRECAST WALL
1 1/2" = 1'-0"



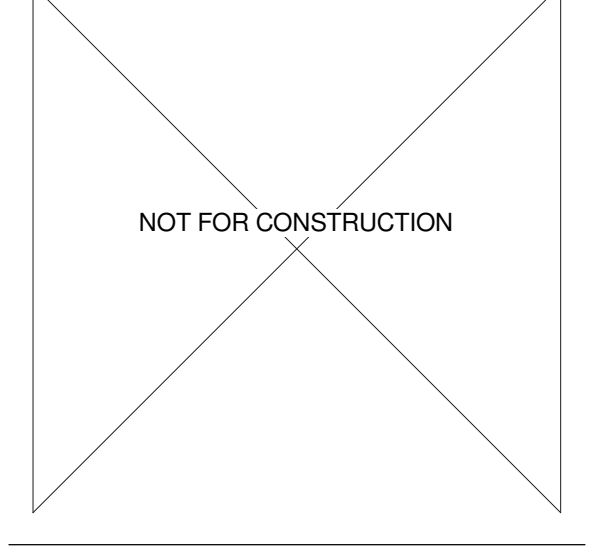
4 STANDARD PRECAST SHEAR DIMPLE WITH WELD PLATES
1 1/2" = 1'-0"



15 DECK SIDELAP AT WF BEAM
1" = 1'-0"

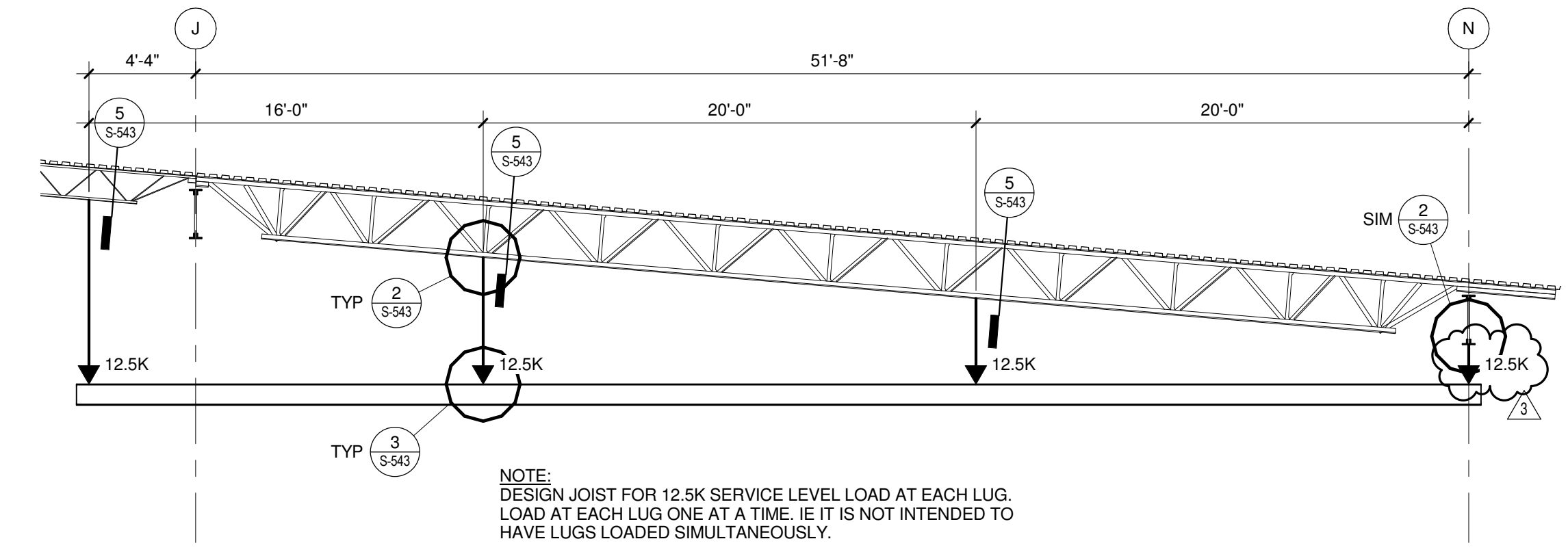


5 PRECAST COLUMN TO PRECAST COLUMN ATTACHMENT
3/4" = 1'-0"



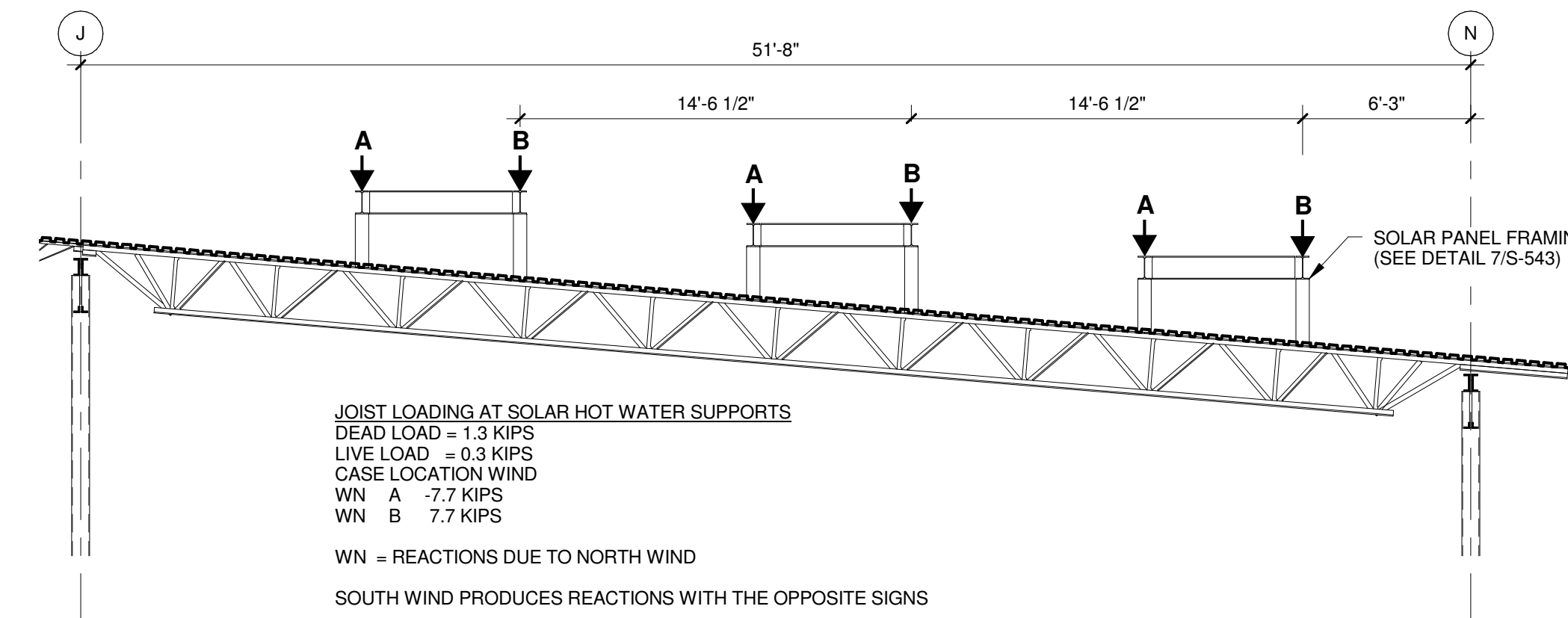
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3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01
STRUCTURAL FRAMING
DETAILS



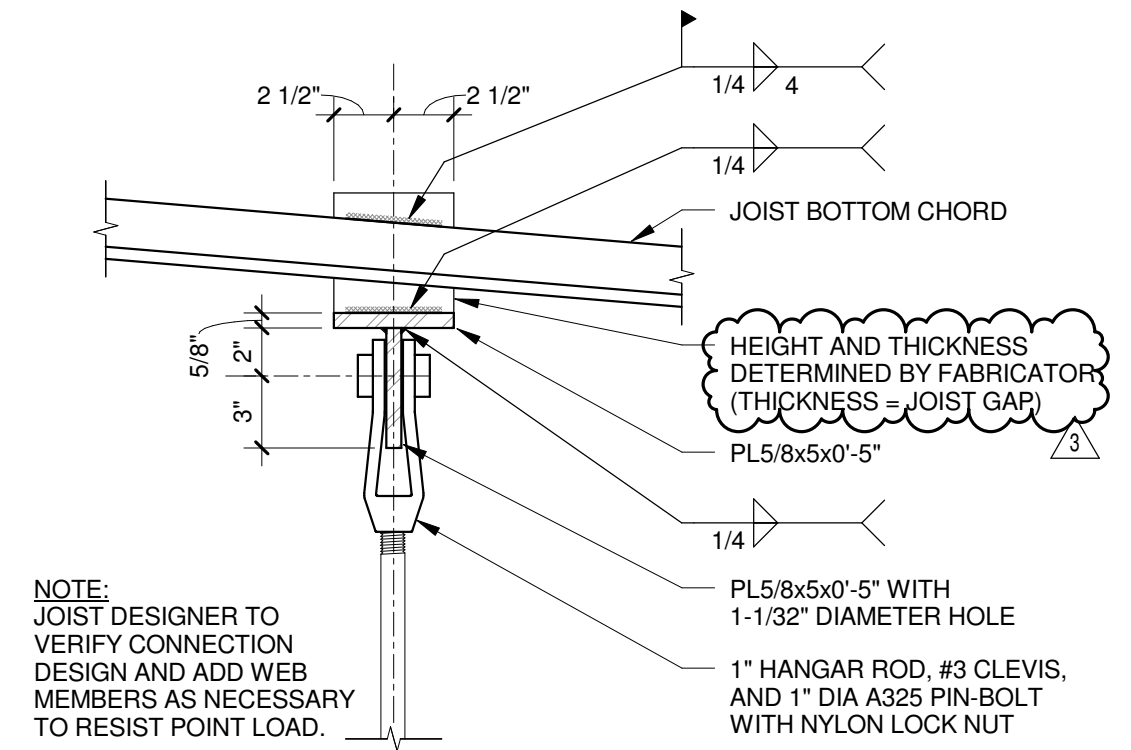
1 JOIST LOADS FOR FALL PROTECTION SUPPORT FRAMING
3/16" = 1'-0"

NOTE: DESIGN JOIST FOR 12.5K SERVICE LEVEL LOAD AT EACH LUG. LOAD AT EACH LUG ONE AT A TIME. IE IT IS NOT INTENDED TO HAVE LUGS LOADED SIMULTANEOUSLY.



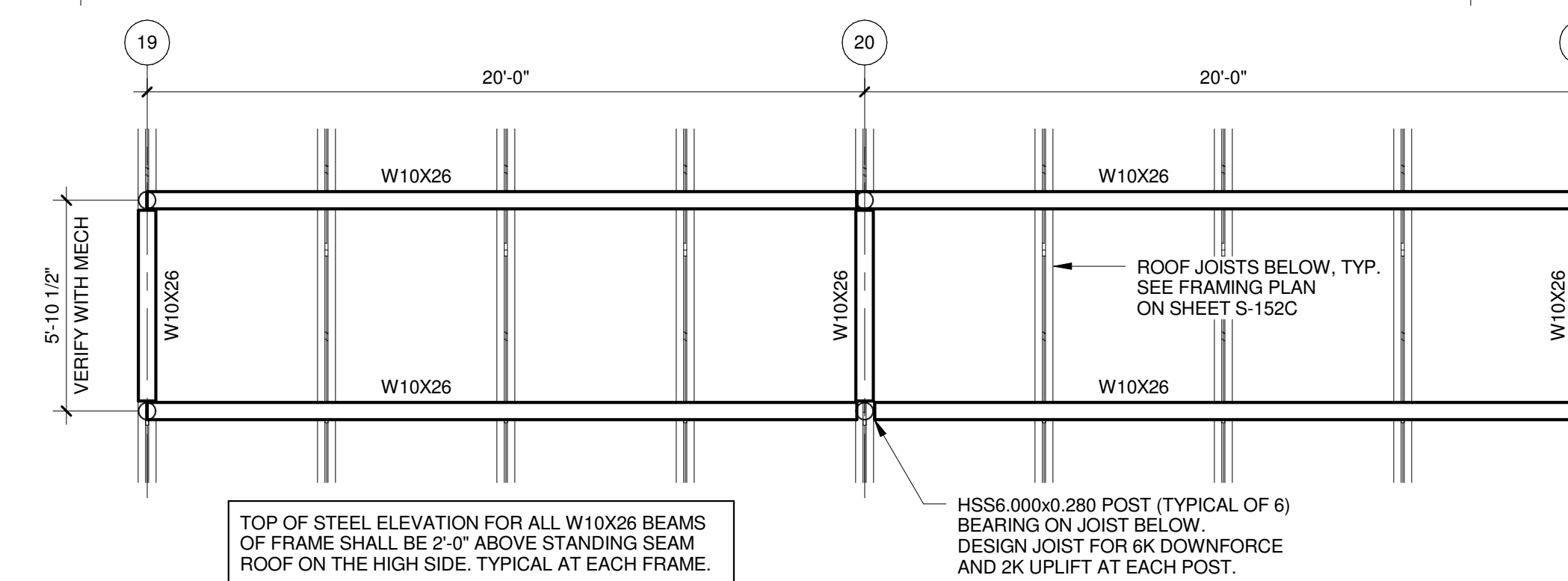
6 JOIST LOADS AT SOLAR HOT WATER SUPPORTS
3/16" = 1'-0"

JOIST LOADING AT SOLAR HOT WATER SUPPORTS
DEAD LOAD = 1.3 KIPS
LIVE LOAD = 0.3 KIPS
CASE LOCATION WIND
WN A - 7.7 KIPS
WN B - 7.7 KIPS
WN = REACTIONS DUE TO NORTH WIND
SOUTH WIND PRODUCES REACTIONS WITH THE OPPOSITE SIGNS



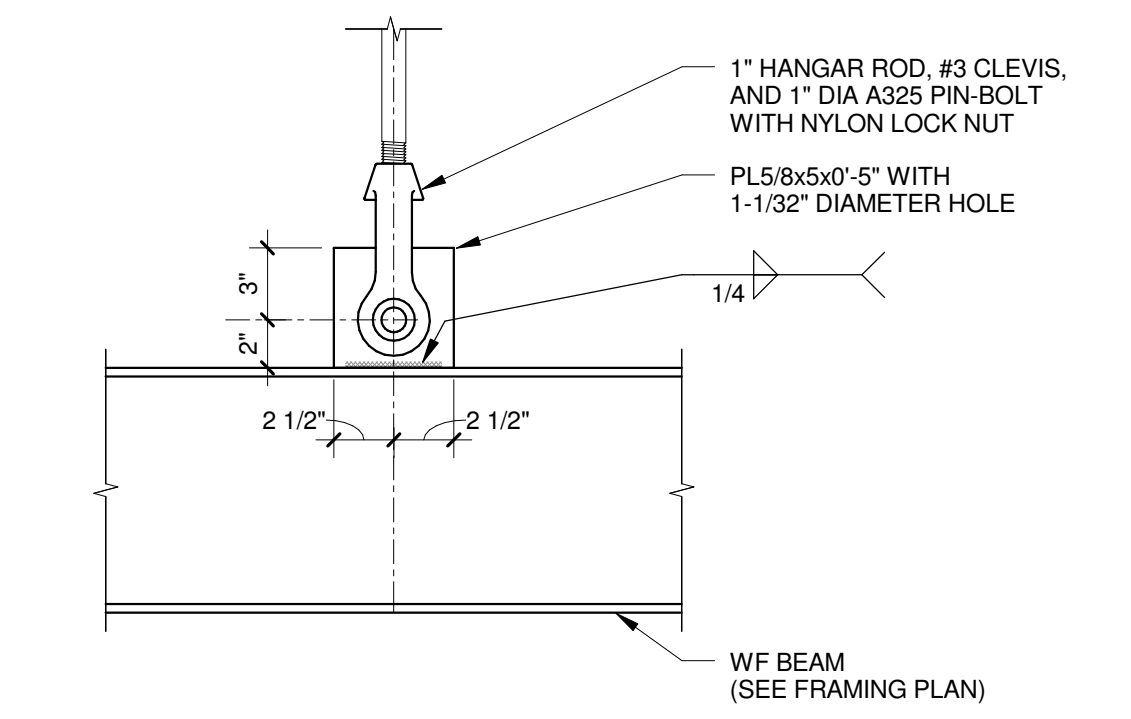
2 FALL PROTECTION SUPPORT ATTACHMENT AT JOIST
1 1/2" = 1'-0"

NOTE: JOIST DESIGNER TO VERIFY CONNECTION DESIGN AND ADD WEB MEMBERS AS NECESSARY TO RESIST POINT LOAD.



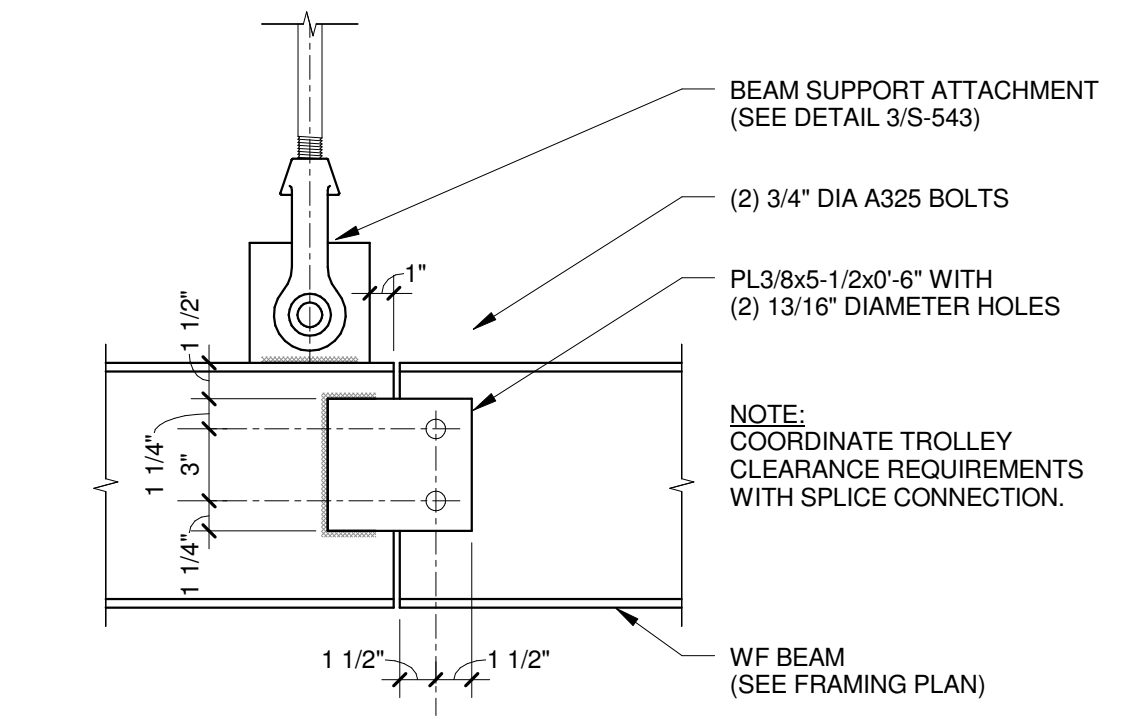
7 SOLAR PANEL FRAMING PLAN AREA C
1/4" = 1'-0"

TOP OF STEEL ELEVATION FOR ALL W10x26 BEAMS OF FRAME SHALL BE 2'-0" ABOVE STANDING SEAM ROOF ON THE HIGH SIDE. TYPICAL AT EACH FRAME.



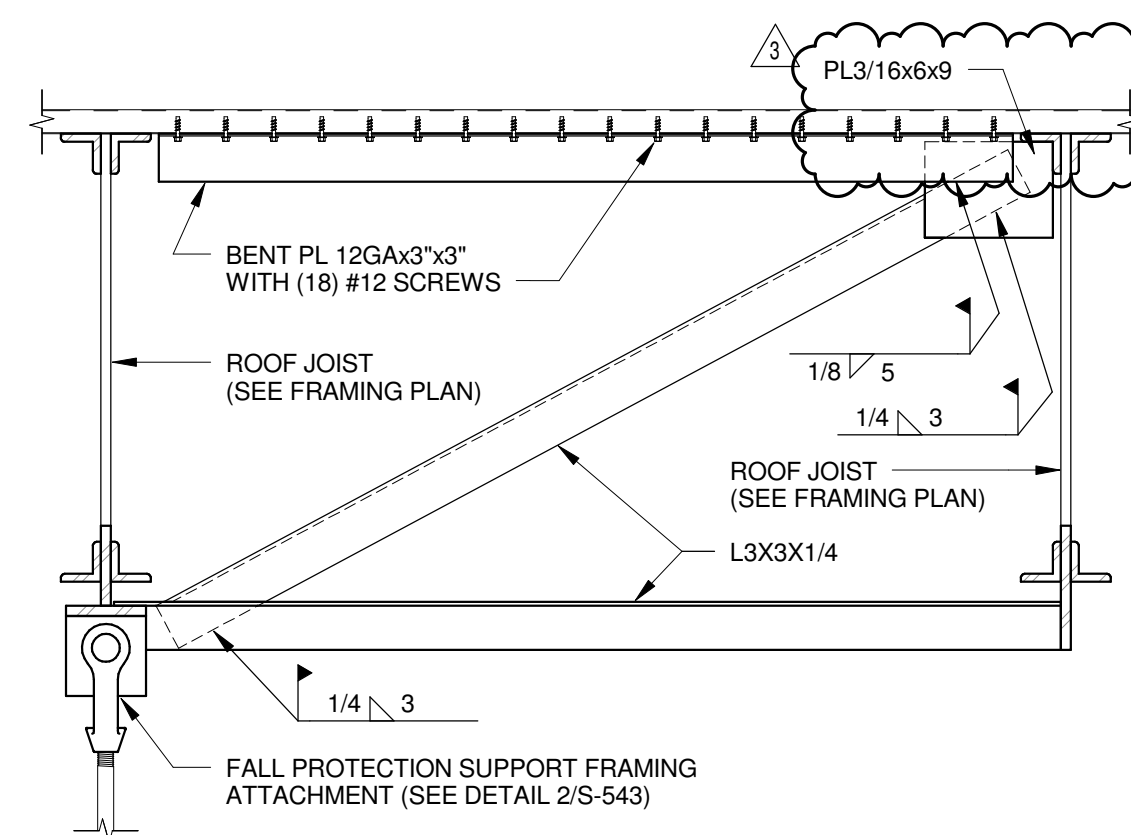
3 FALL PROTECTION SUPPORT ATTACHMENT AT BEAM
1 1/2" = 1'-0"

NOTE: COORDINATE TROLLEY CLEARANCE REQUIREMENTS WITH SPLICE CONNECTION.



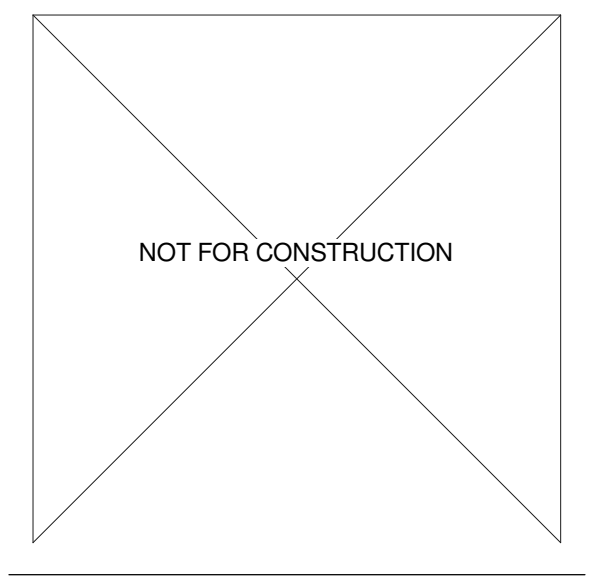
4 FALL PROTECTION SUPPORT BEAM SPLICE
1 1/2" = 1'-0"

NOTE: COORDINATE TROLLEY CLEARANCE REQUIREMENTS WITH SPLICE CONNECTION.



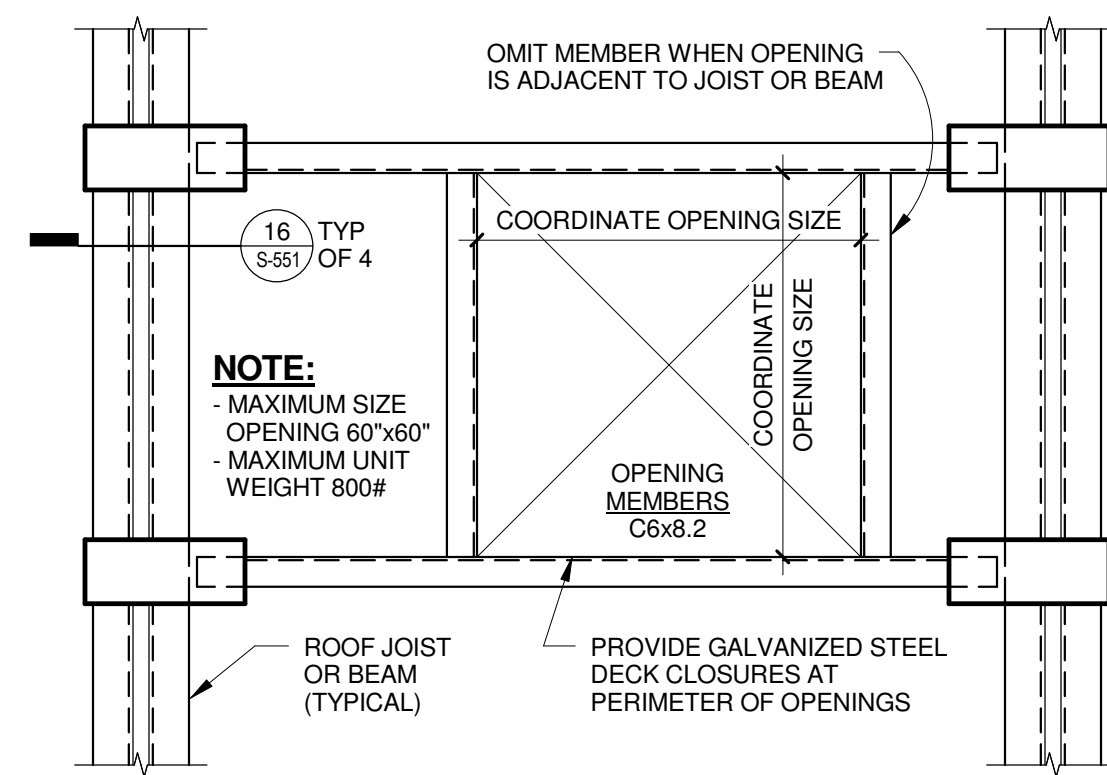
5 FALL PROTECTION SUPPORT ATTACHMENT BRACING
1" = 1'-0"

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714
ISSUE FOR BID

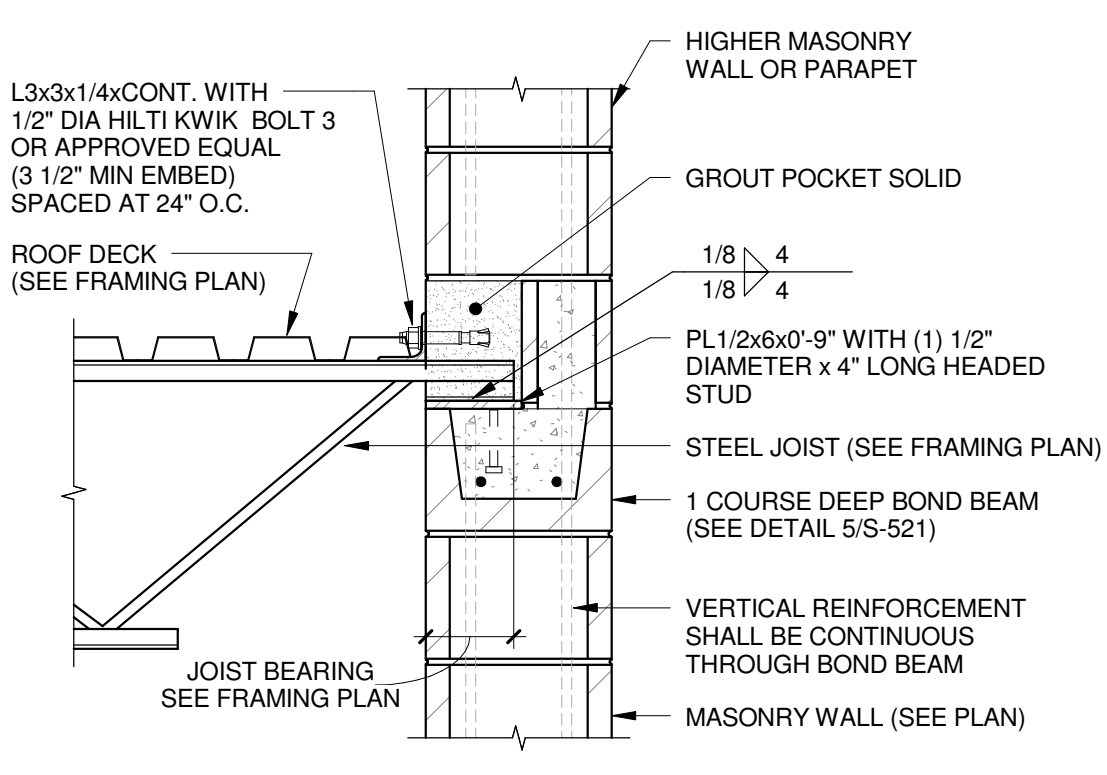


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

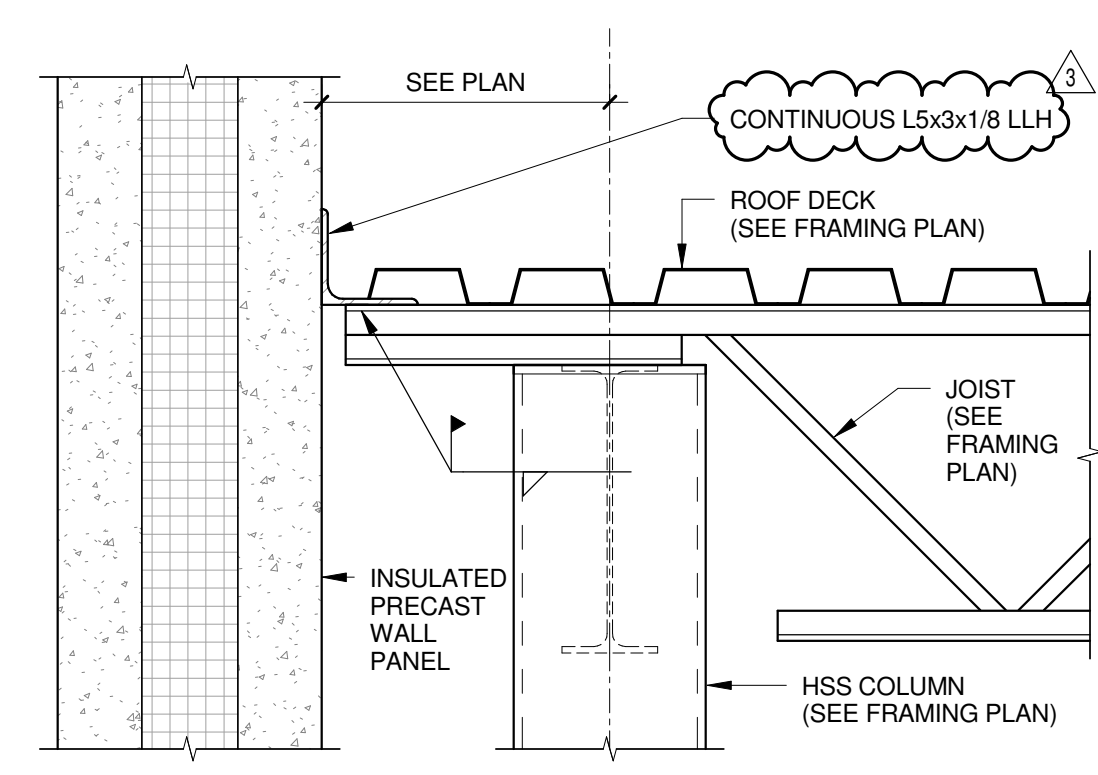
PROJECT No: 1303500-160264.01
STRUCTURAL FRAMING DETAILS



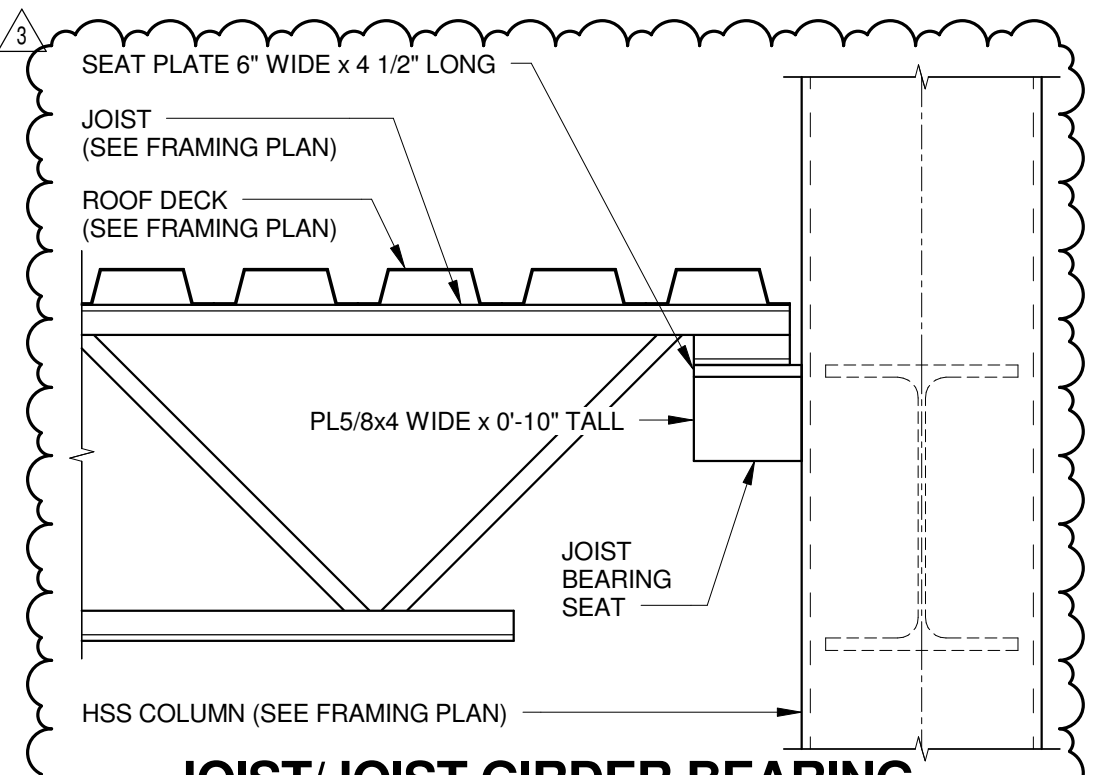
15 TYPICAL FRAMED ROOF OPENING
1" = 1'-0"



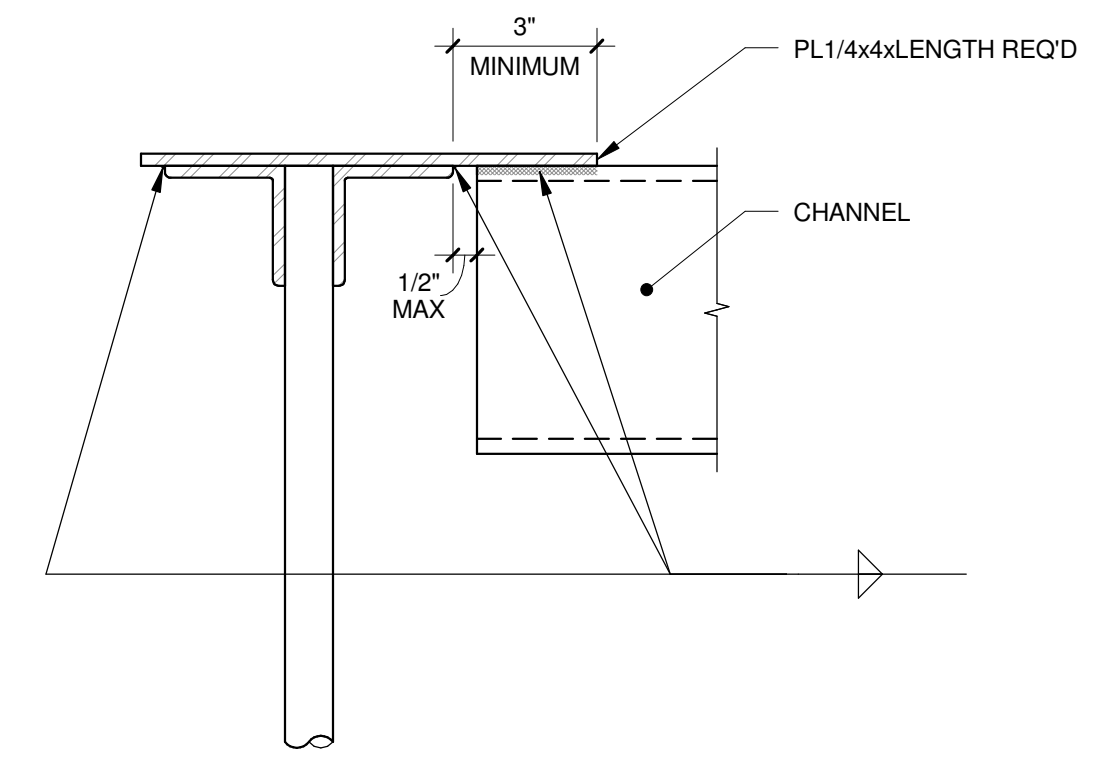
10 JOIST BEARING AT MASONRY WALL
1" = 1'-0"



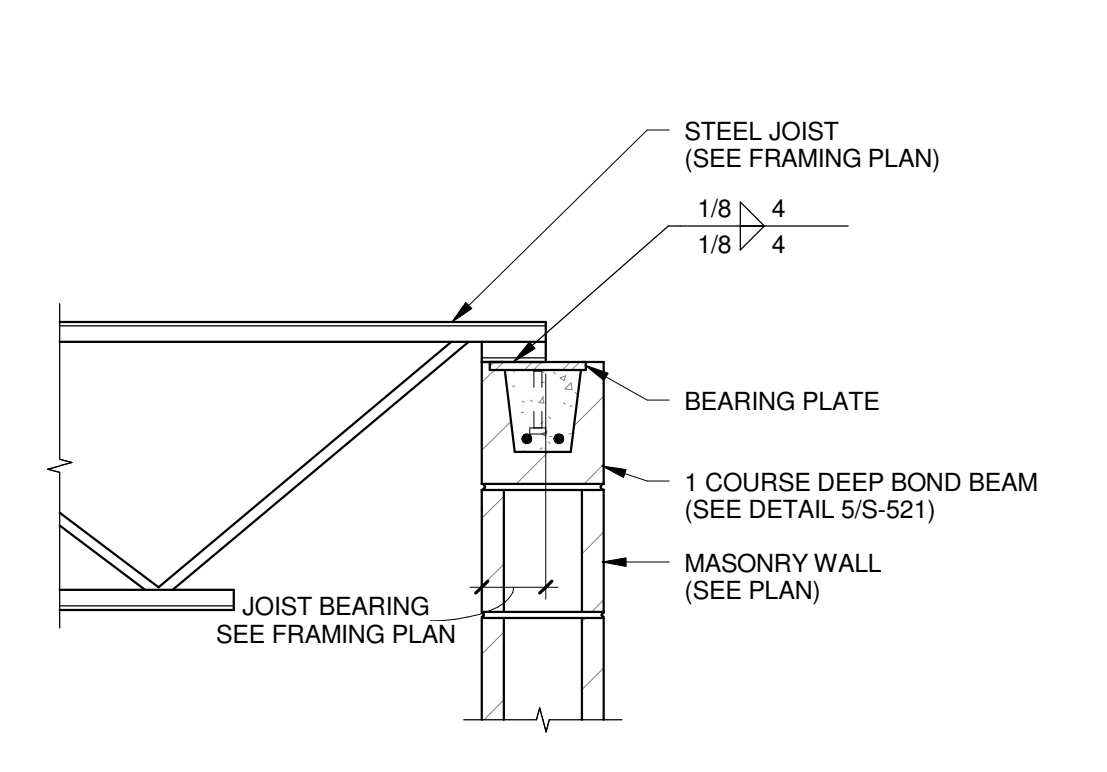
6 JOIST BEARING AT HSS COLUMN
1 1/2" = 1'-0"



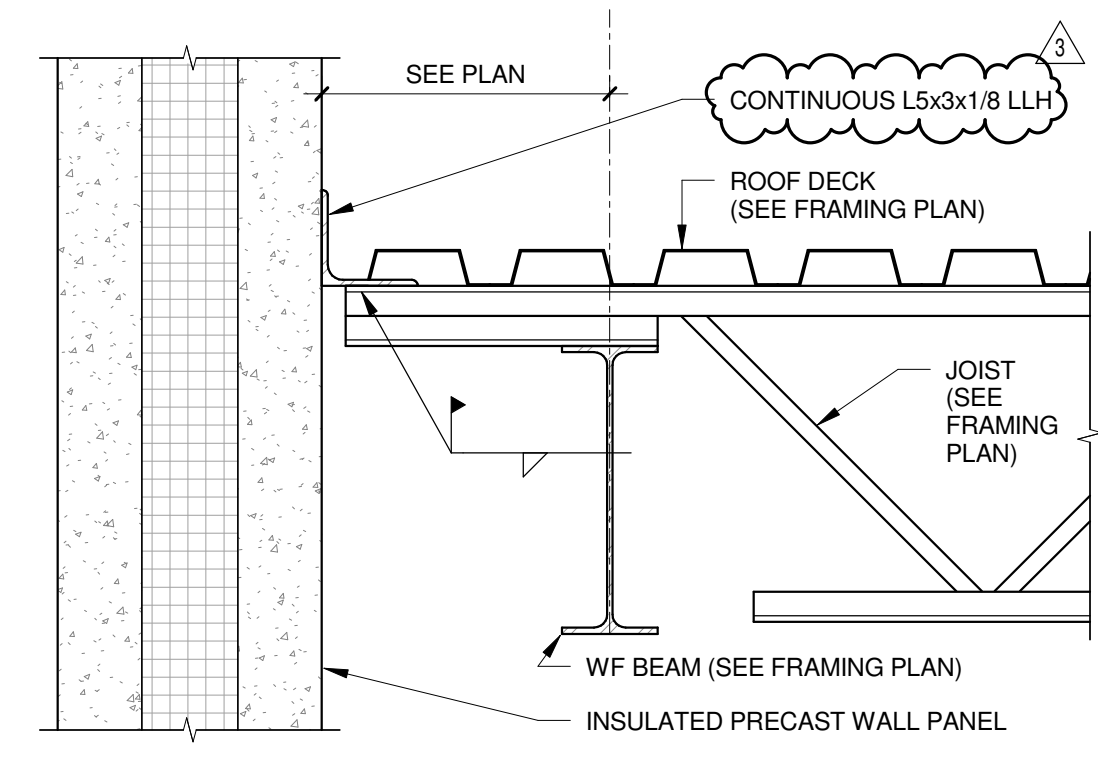
1 JOIST/JOIST GIRDER BEARING AT HSS COLUMN
1 1/2" = 1'-0"



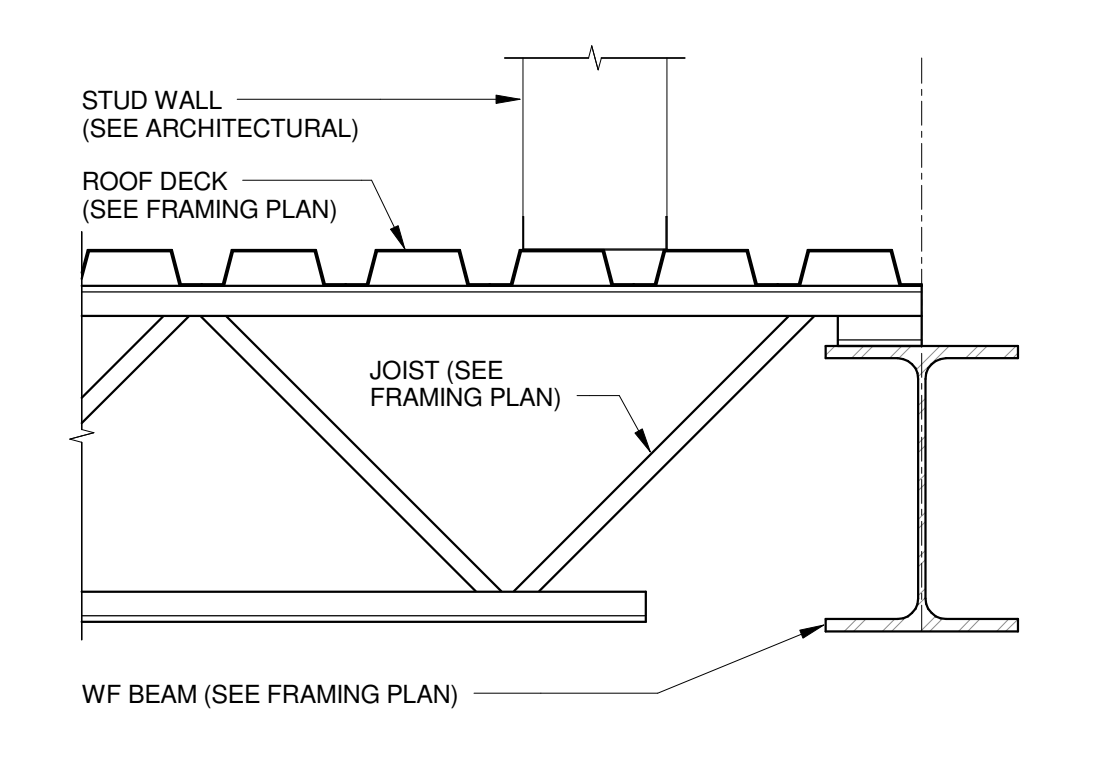
16 CHANNEL TO JOIST CONNECTION
3" = 1'-0"



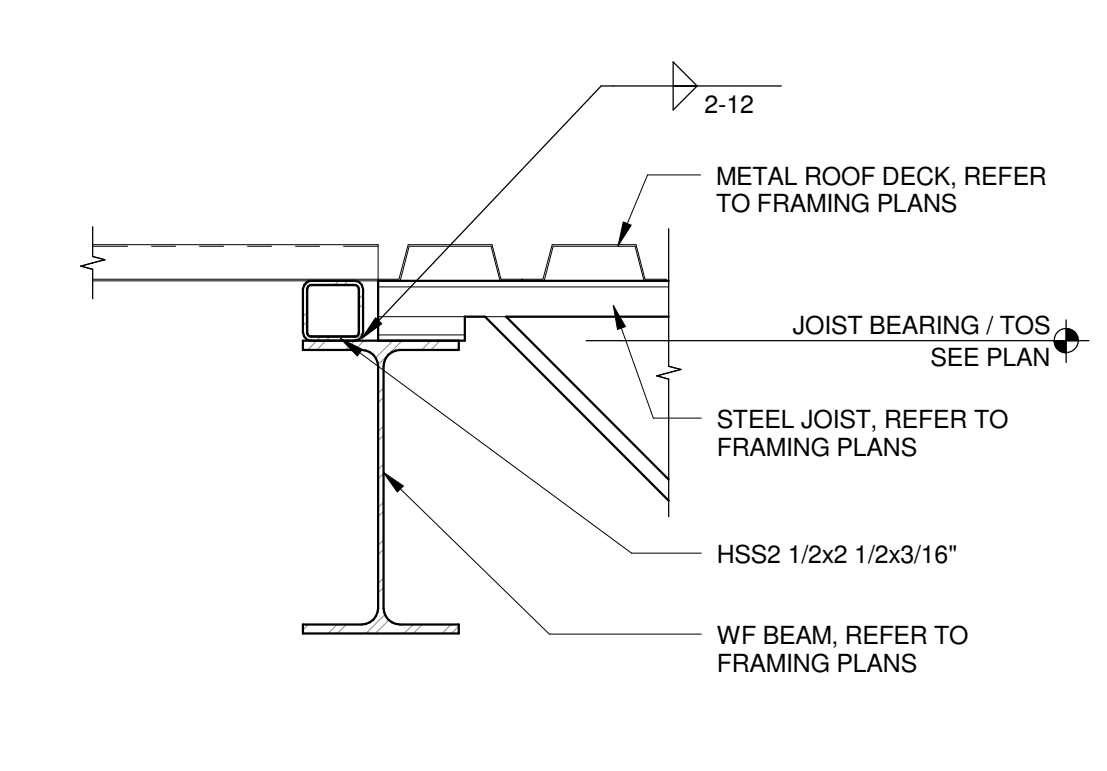
11 JOIST BEARING AT MASONRY WALL
1" = 1'-0"



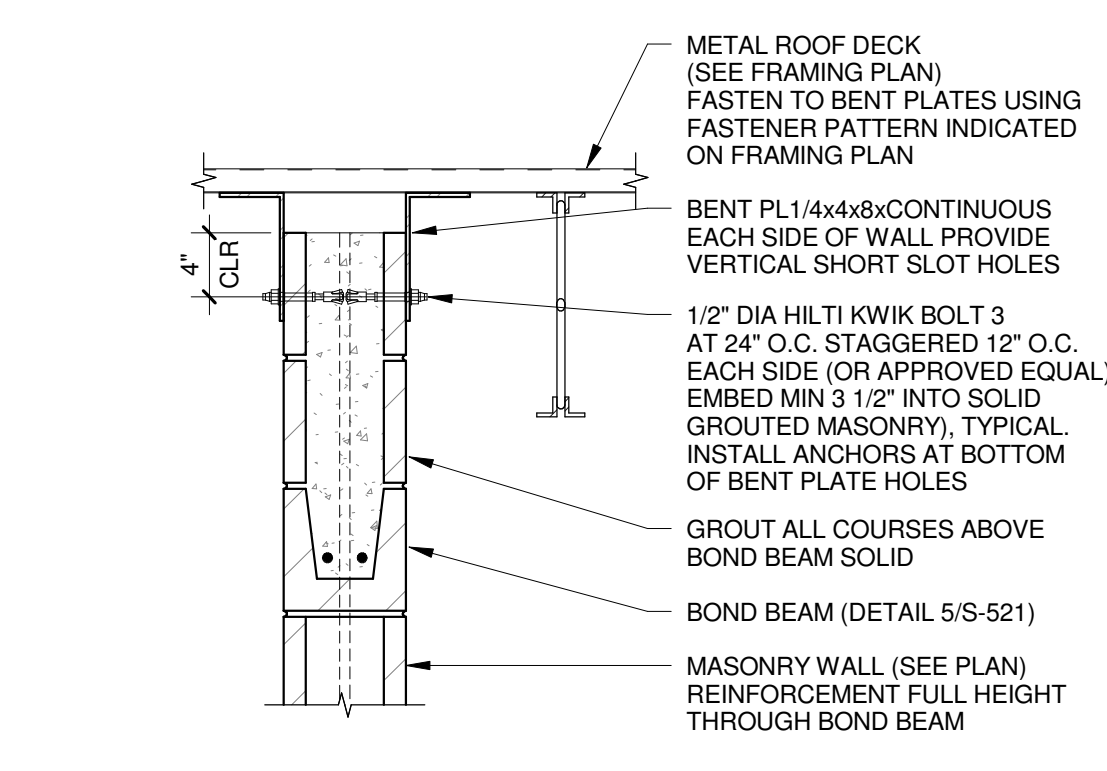
7 JOIST BEARING AT WF BEAM
1 1/2" = 1'-0"



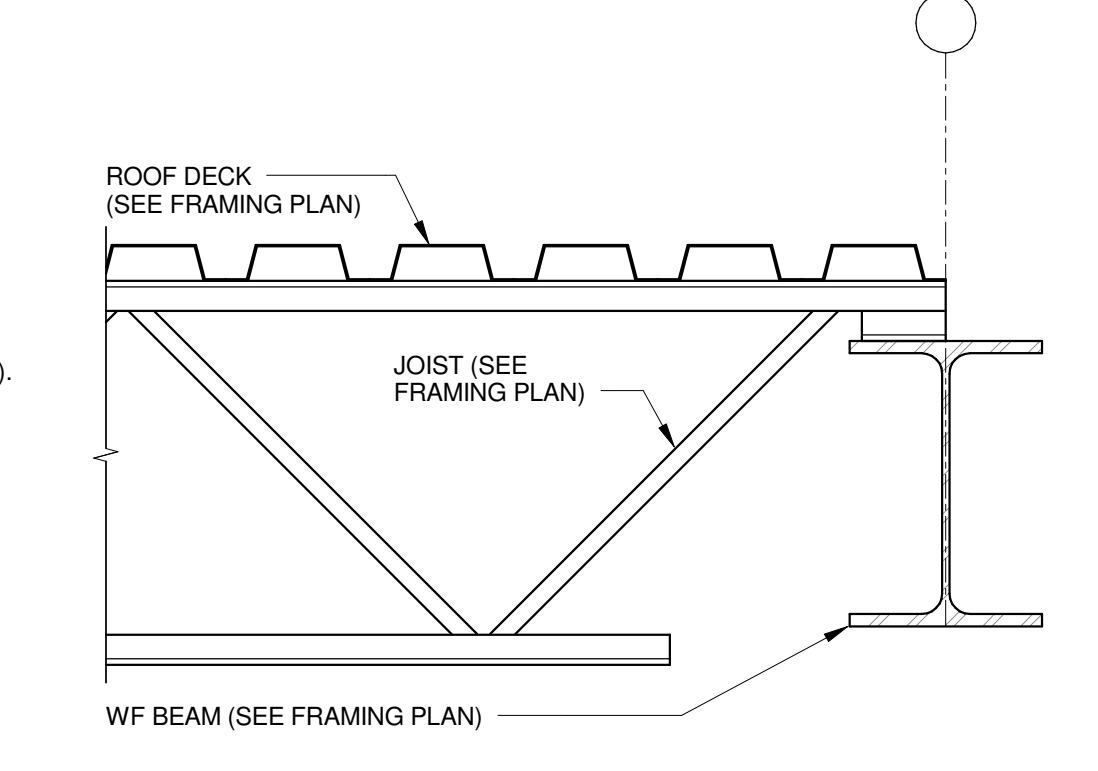
2 JOIST BEARING AT WF BEAM
1 1/2" = 1'-0"



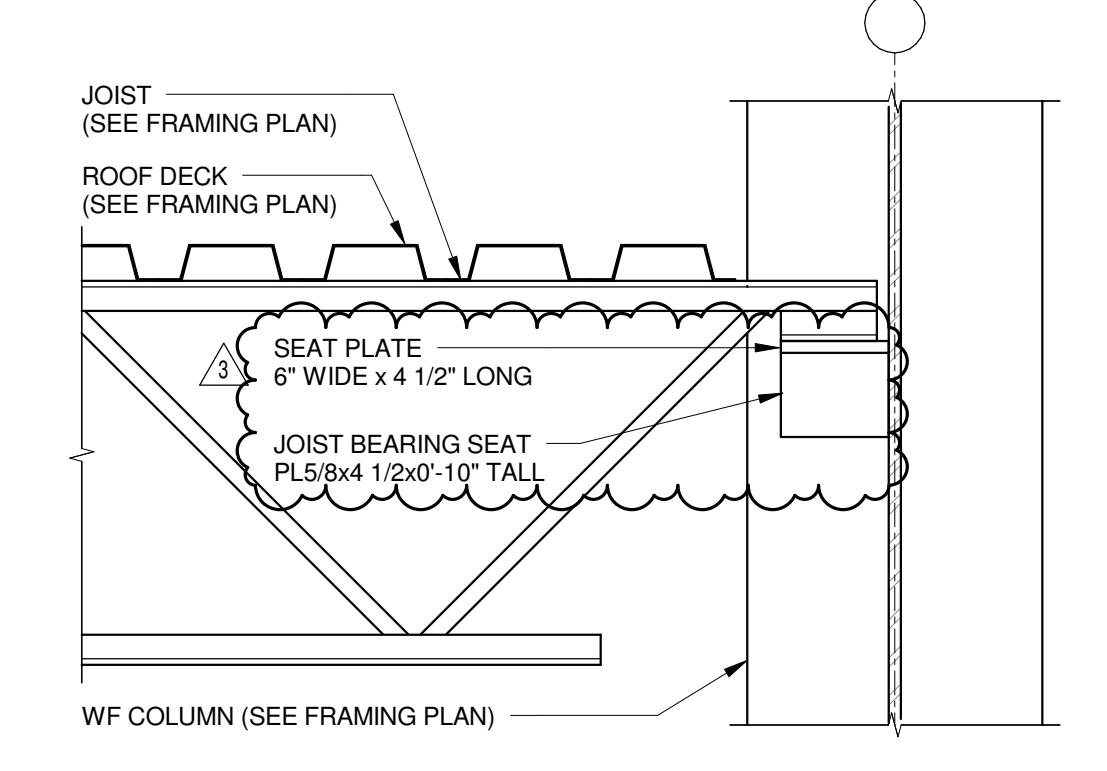
17 DECK DIRECTION CHANGE
1 1/2" = 1'-0"



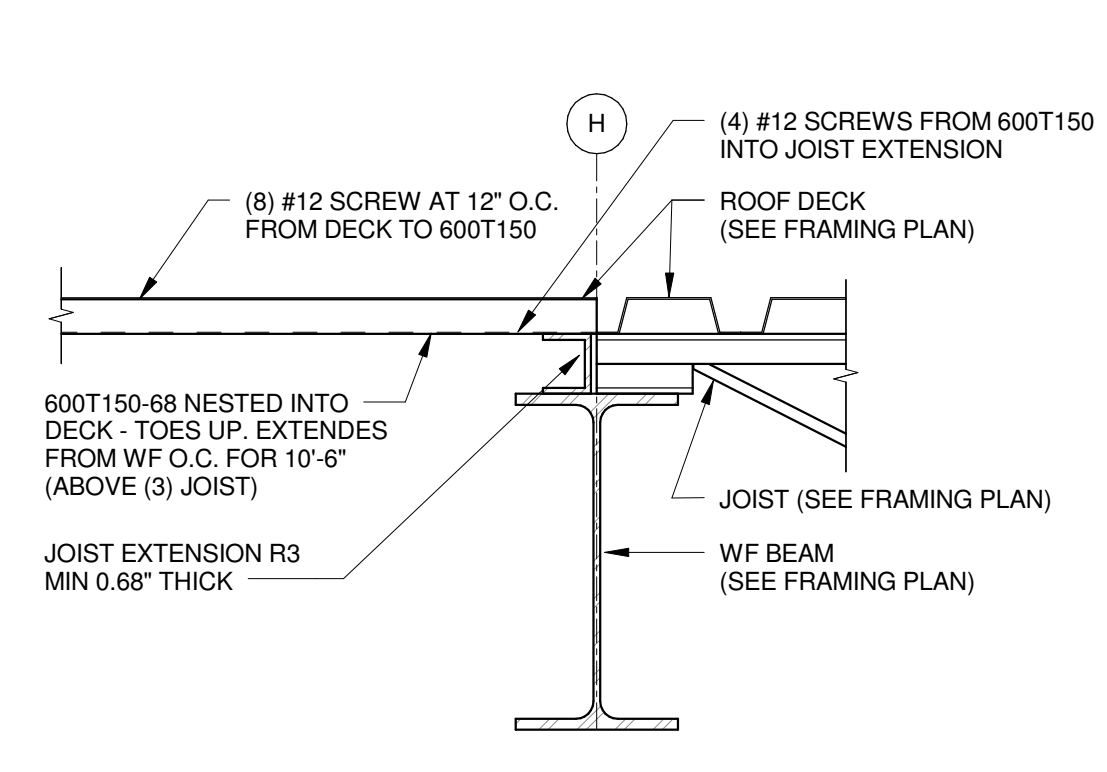
12 DECK BEARING AT MASONRY WALL
1" = 1'-0"



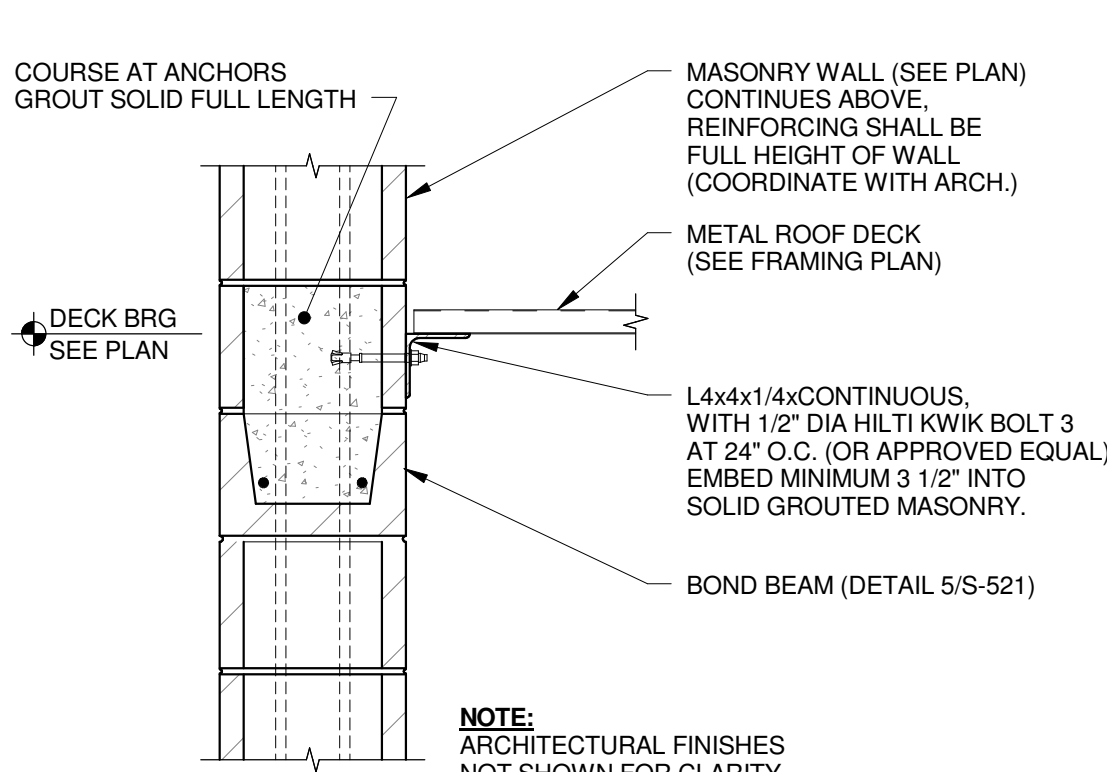
8 JOIST BEARING AT WF BEAM
1 1/2" = 1'-0"



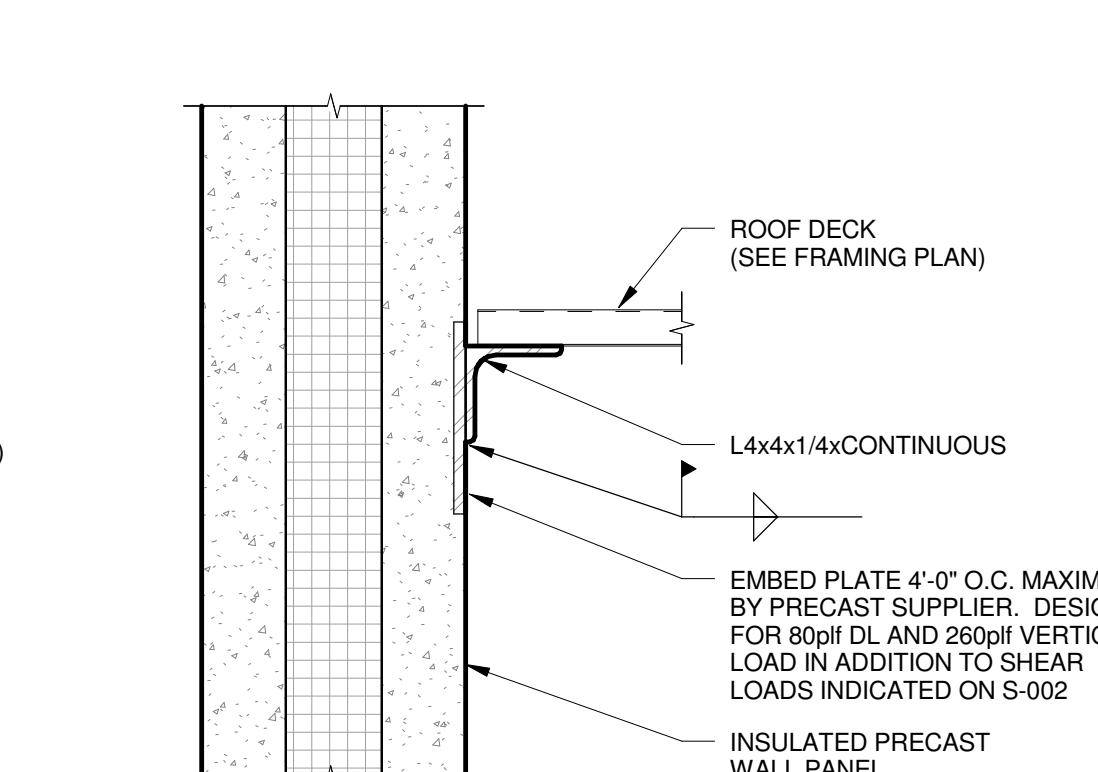
3 JOIST BEARING AT WF COLUMN
1 1/2" = 1'-0"



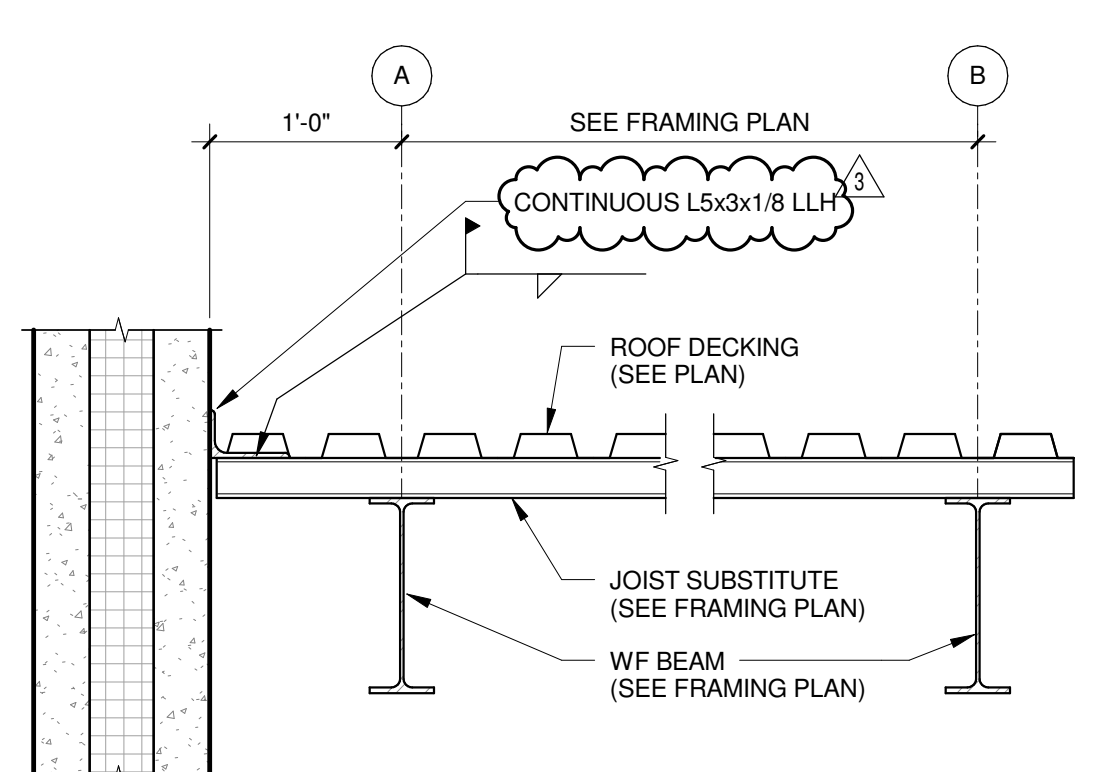
18 JOIST EXTENSION ALONG GRID H
1 1/2" = 1'-0"



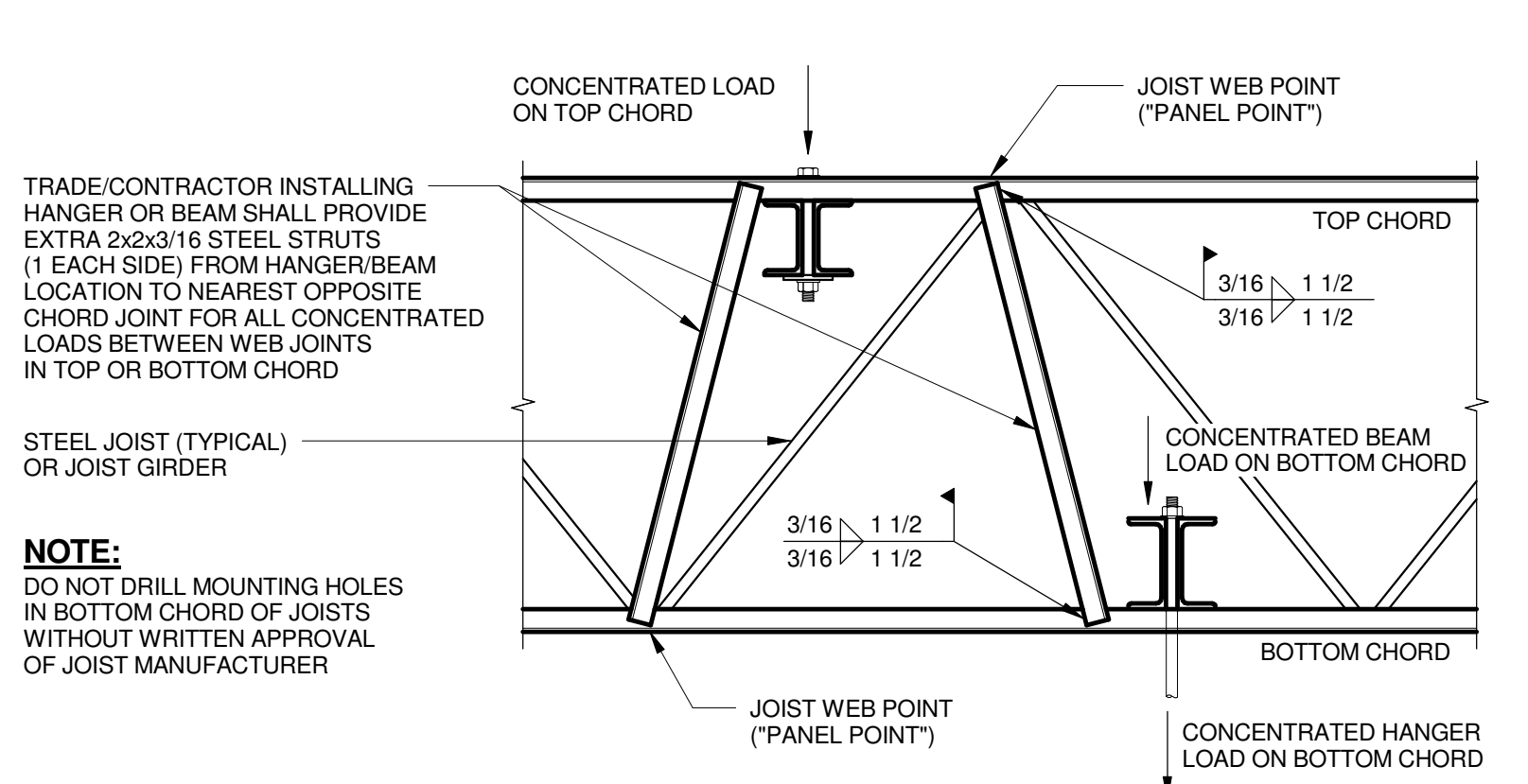
13 DECK BEARING AT MASONRY WALL
1" = 1'-0"



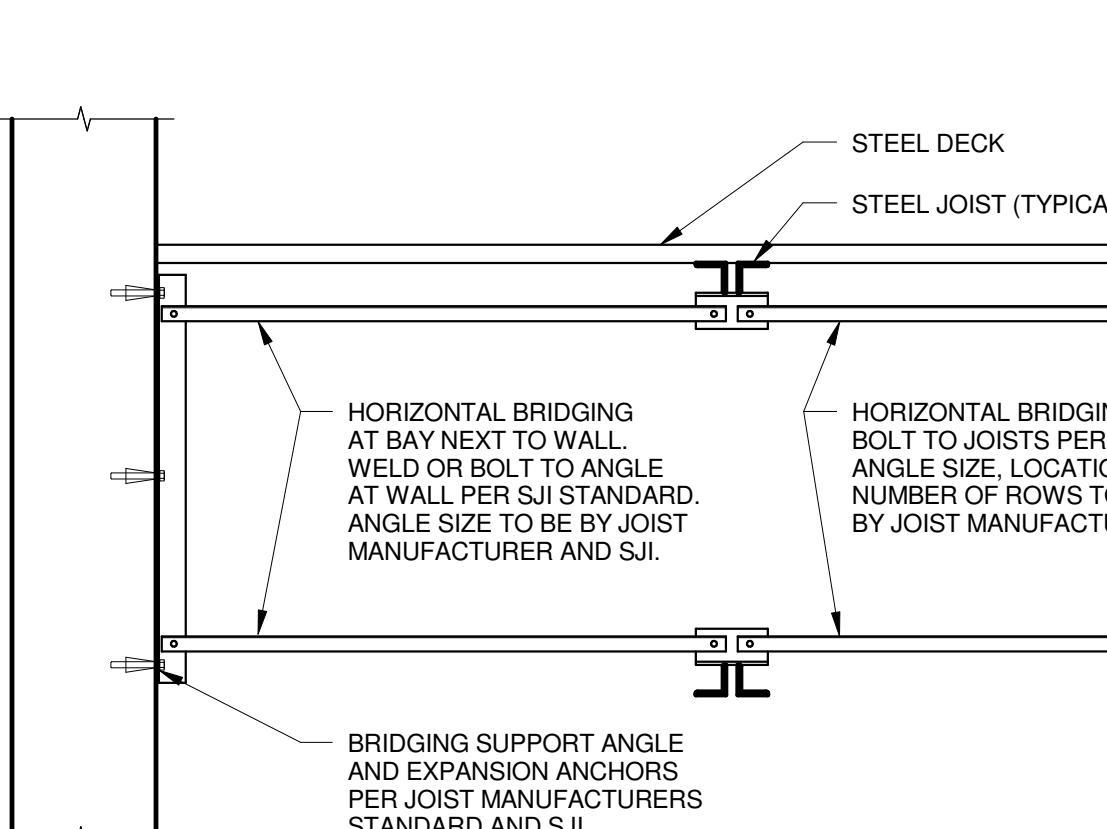
9 DECK BEARING AT PRECAST WALL
1 1/2" = 1'-0"



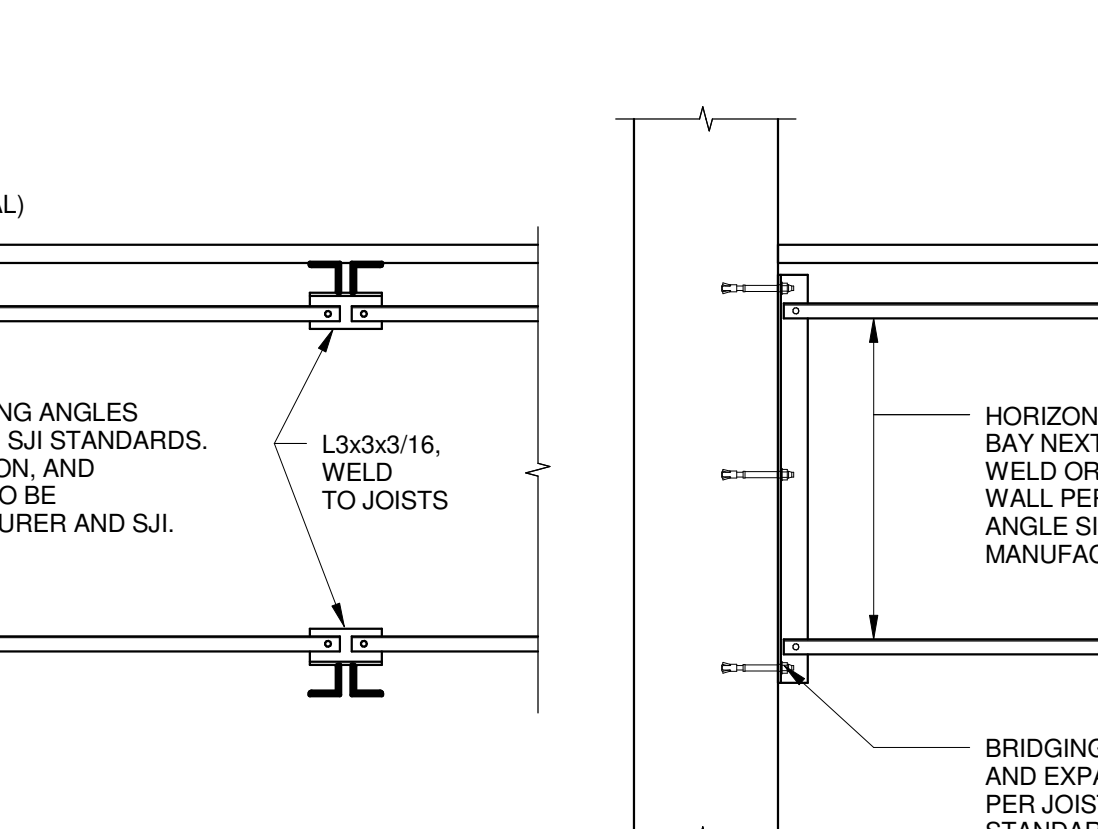
4 ROOF FRAMING SECTION
1" = 1'-0"



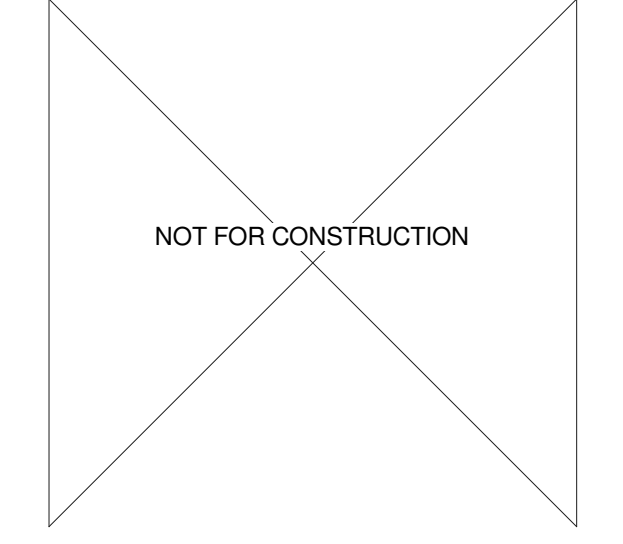
19 TYPICAL PROVISIONS AT CONCENTRATED LOADS ON OPEN WEB STEEL JOIST/GIRDERS
3/4" = 1'-0"



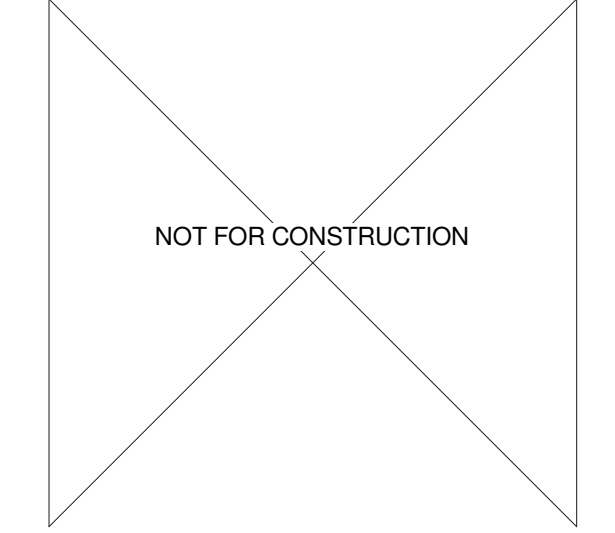
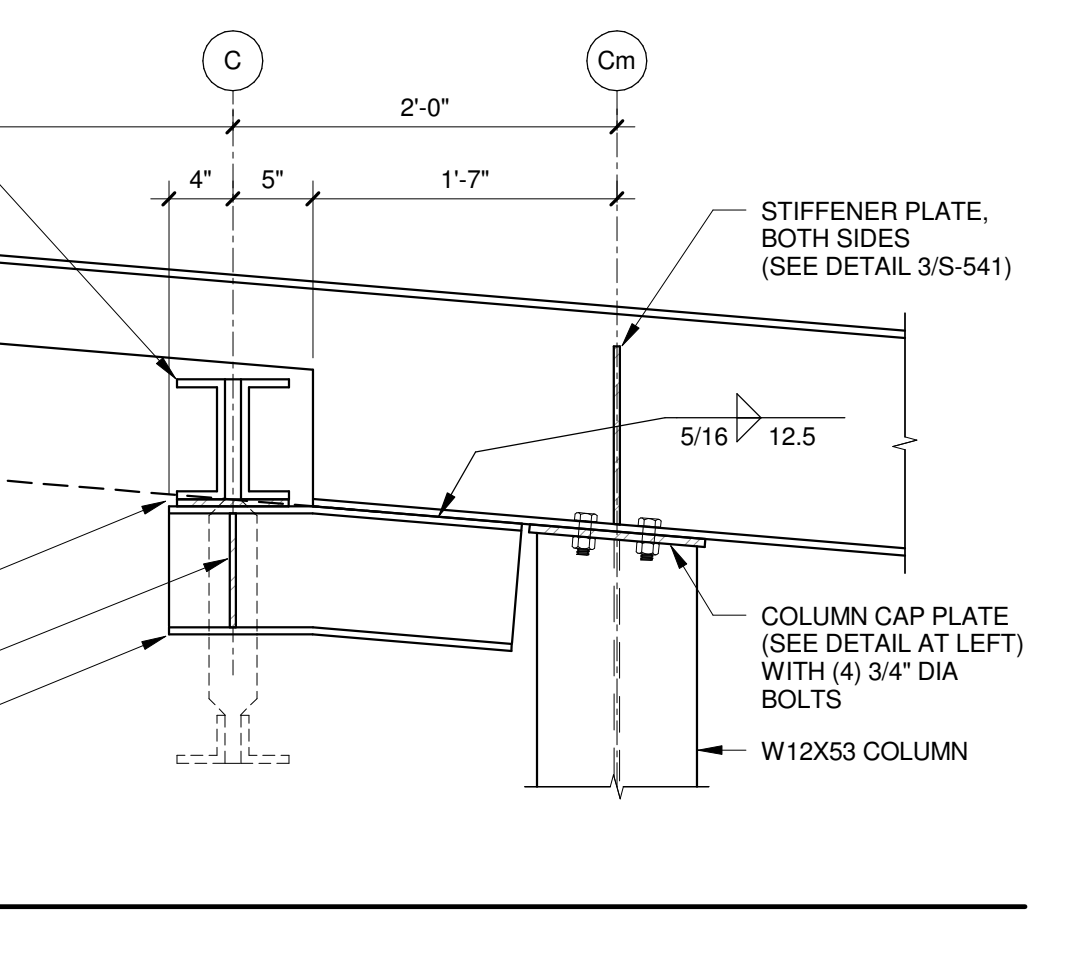
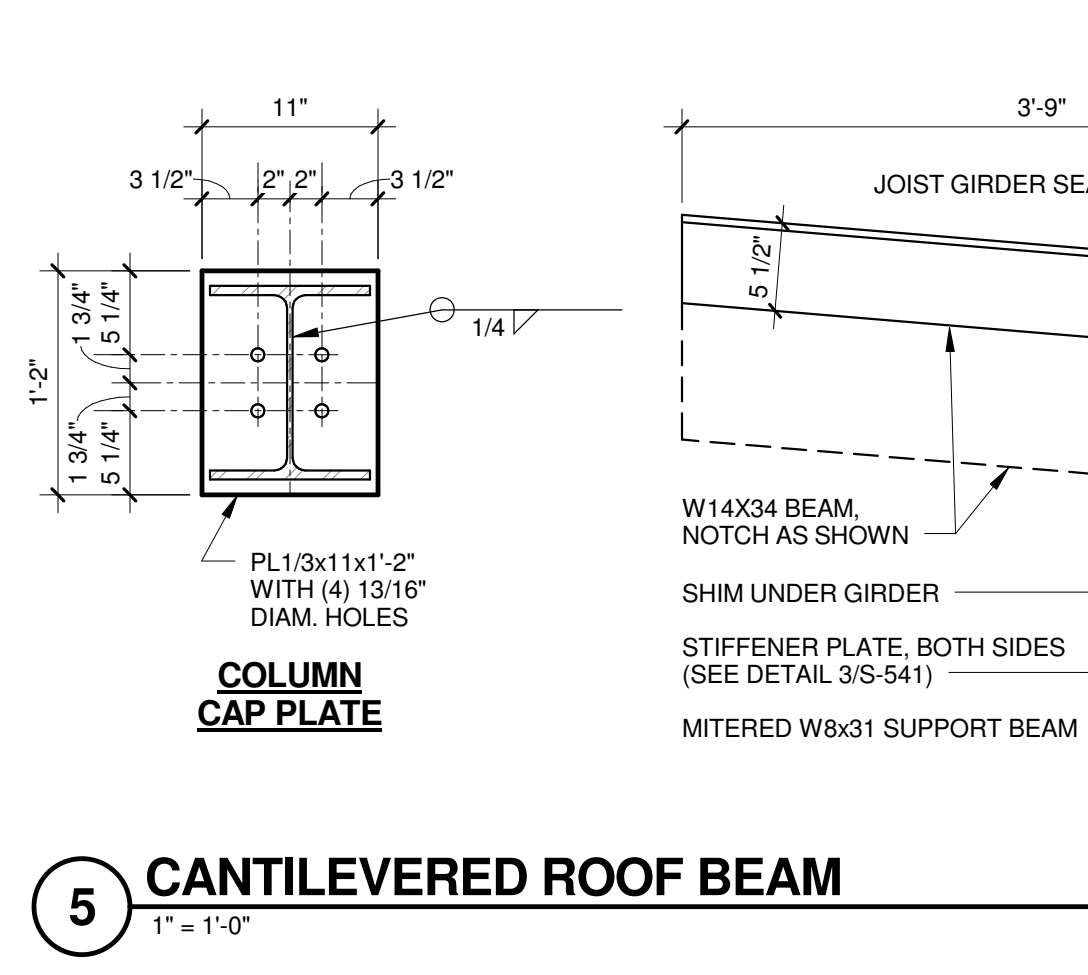
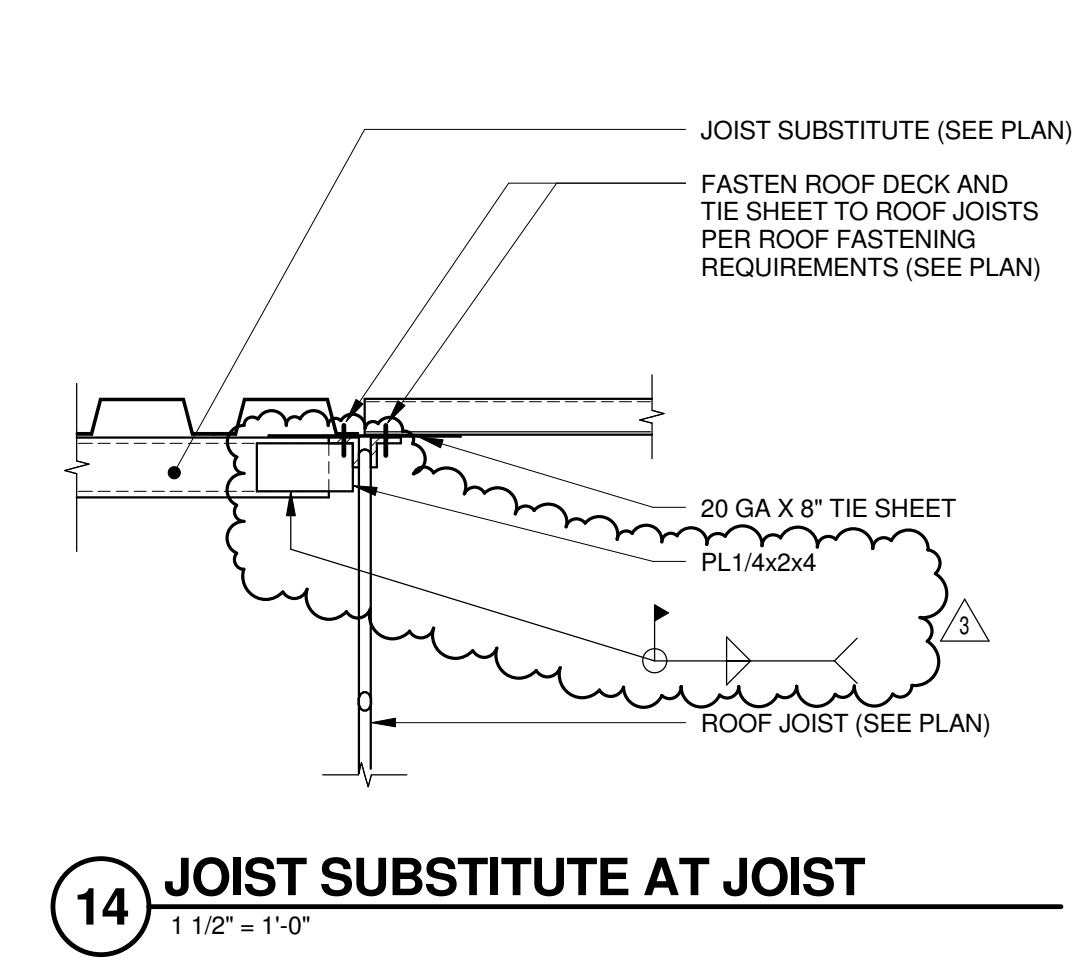
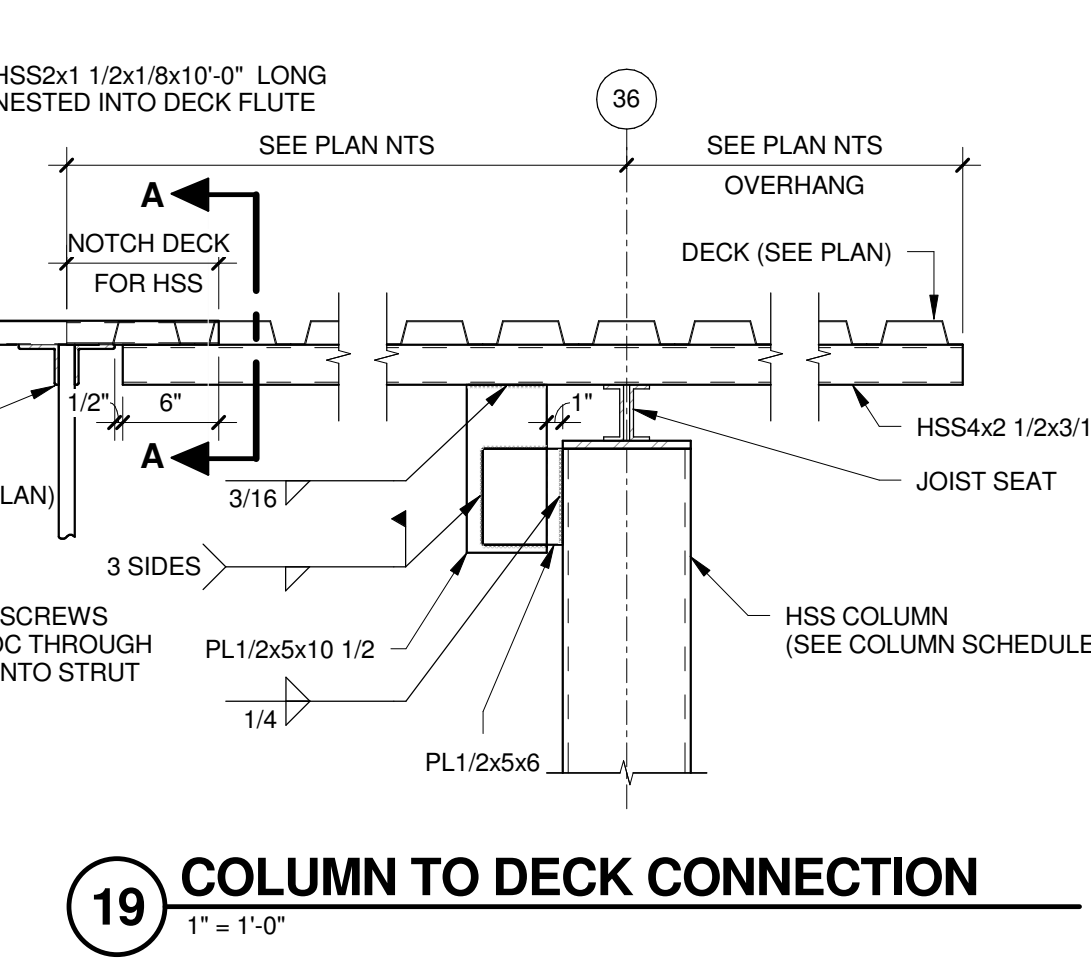
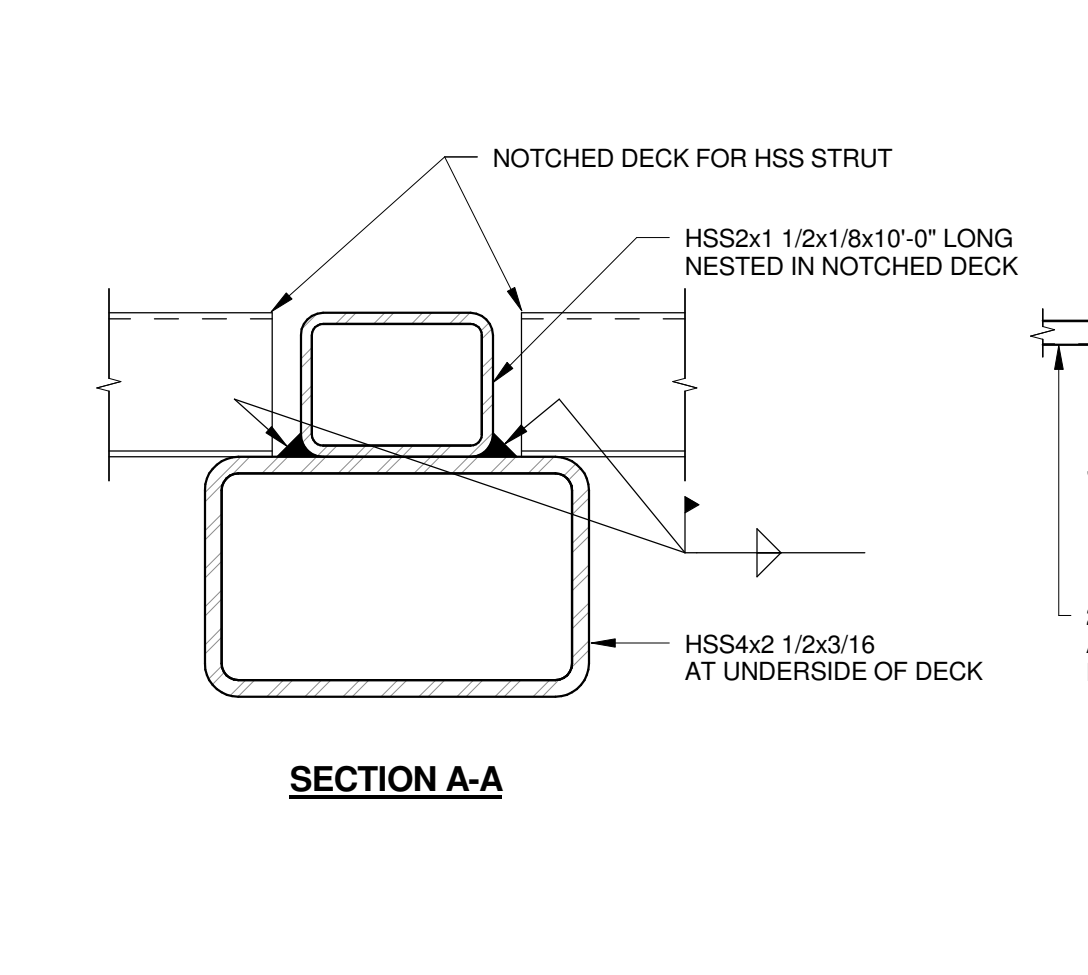
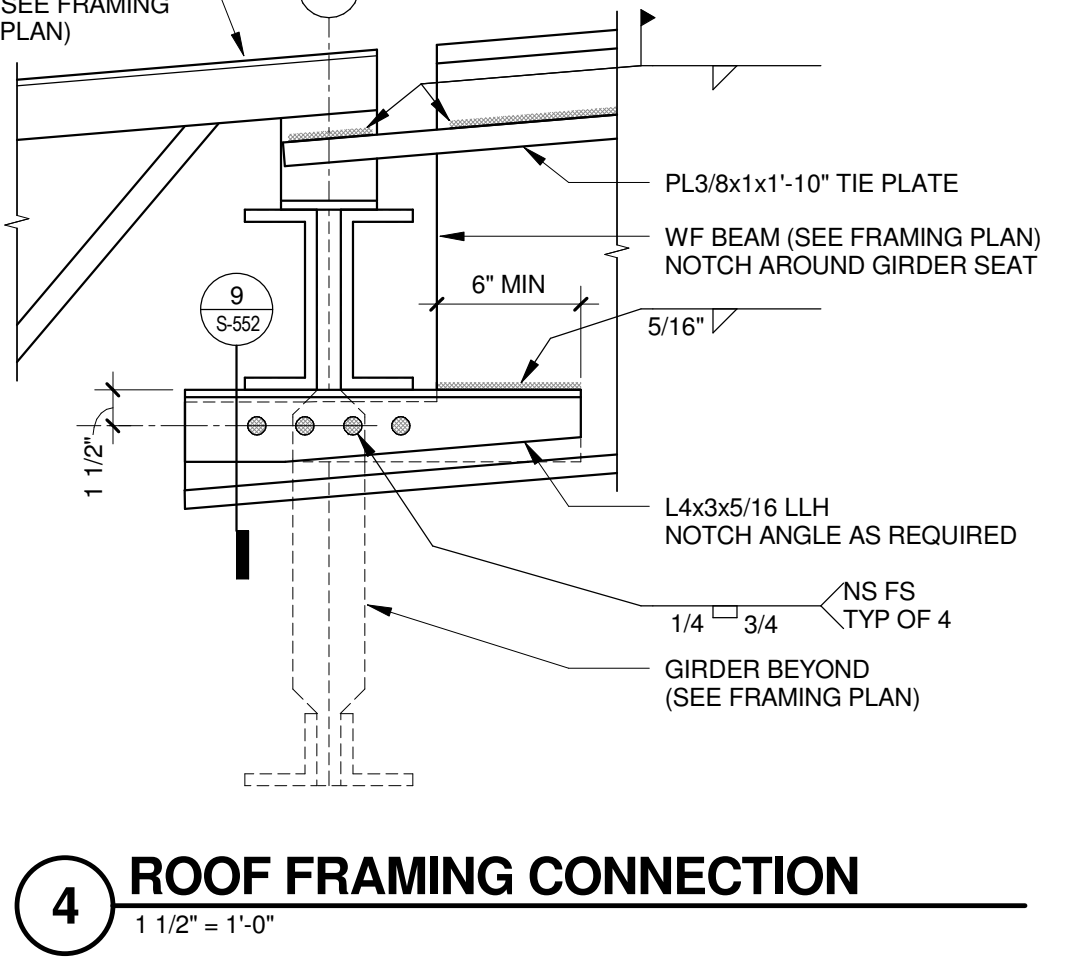
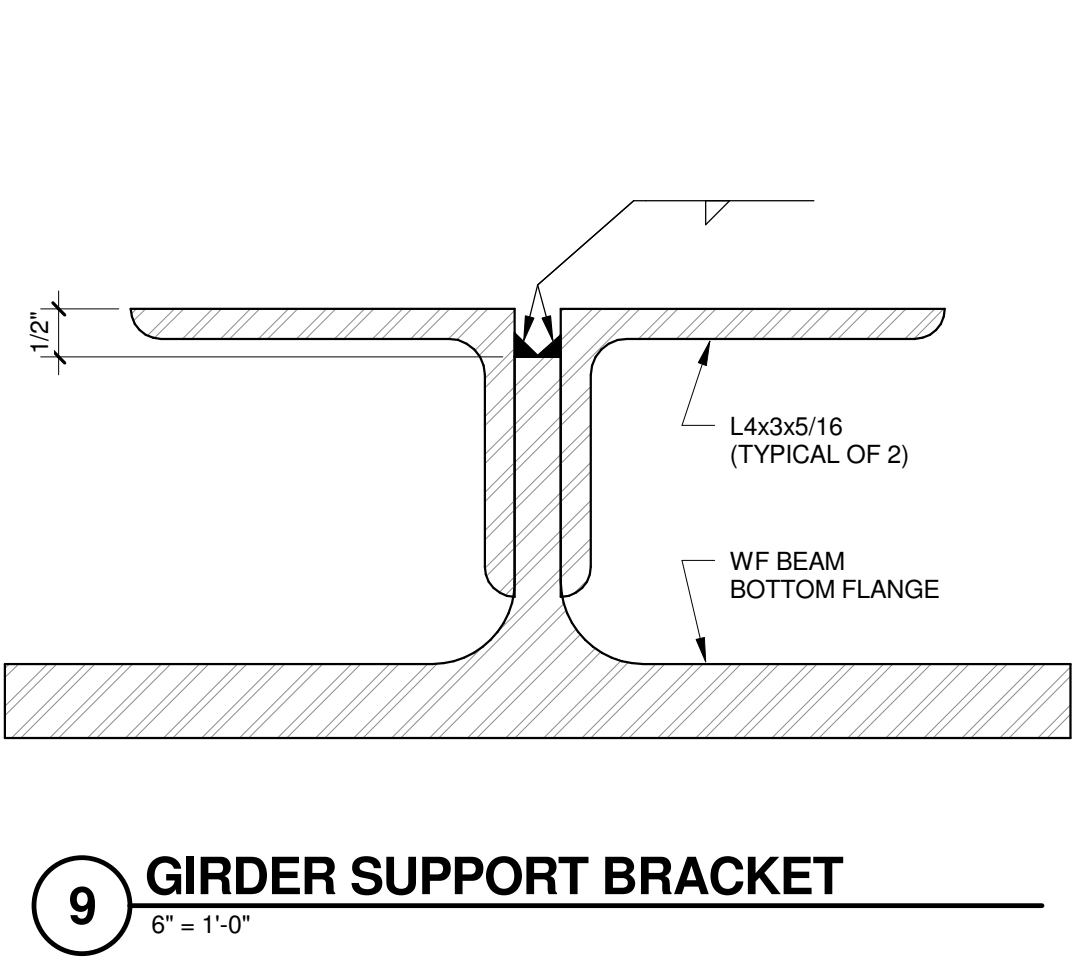
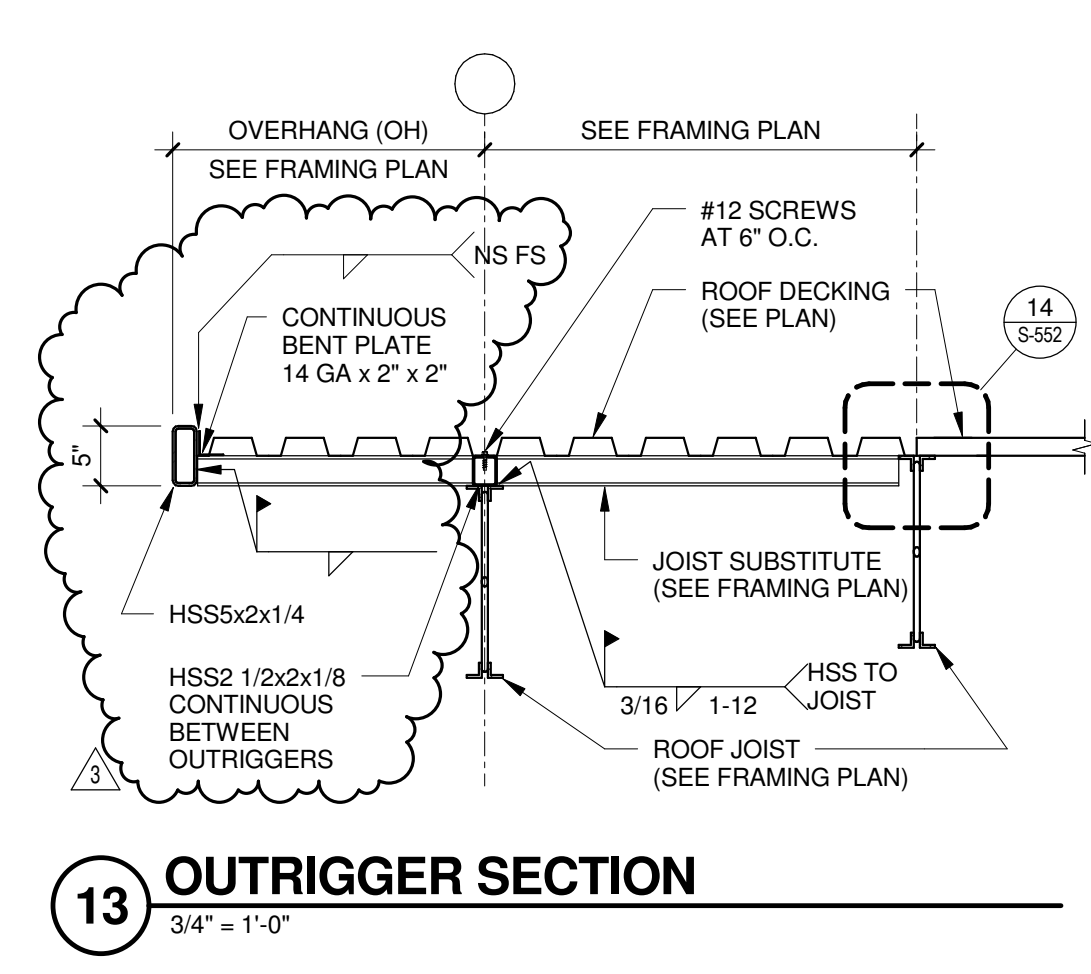
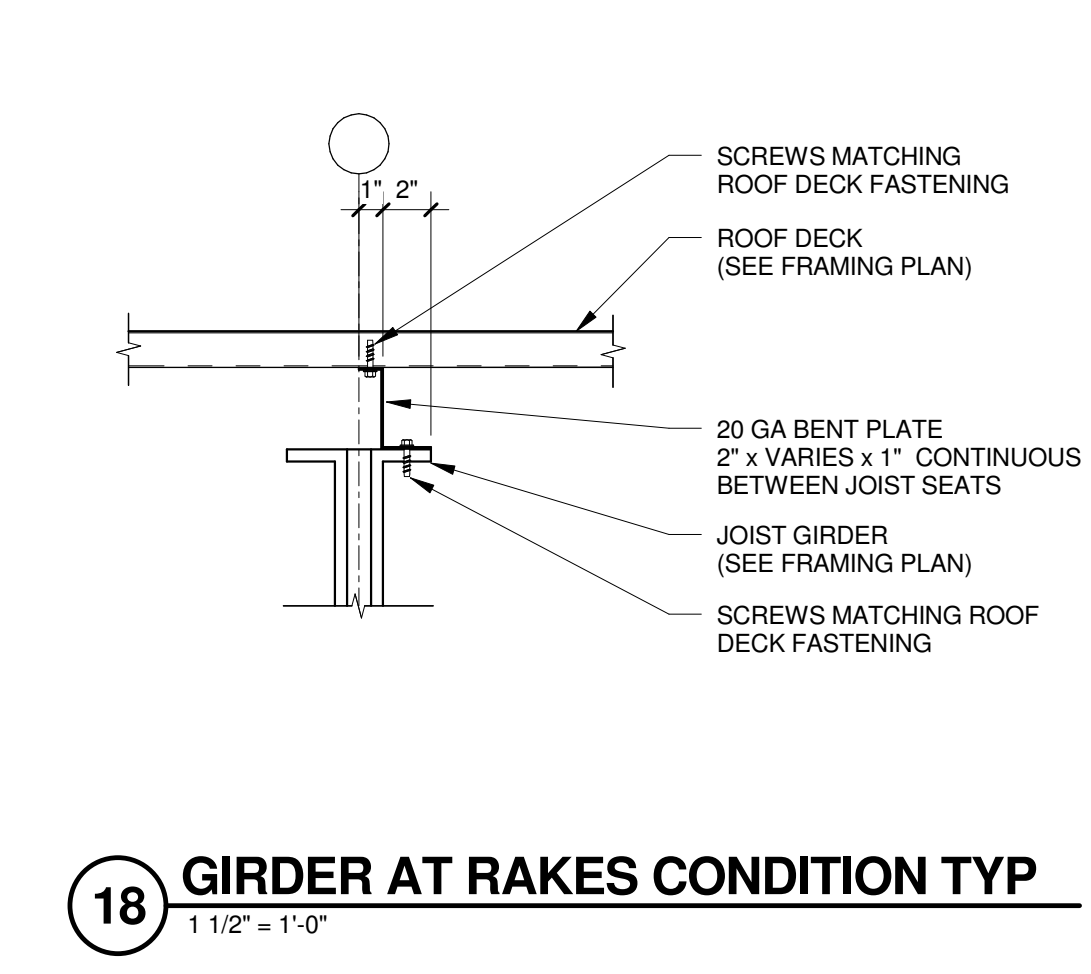
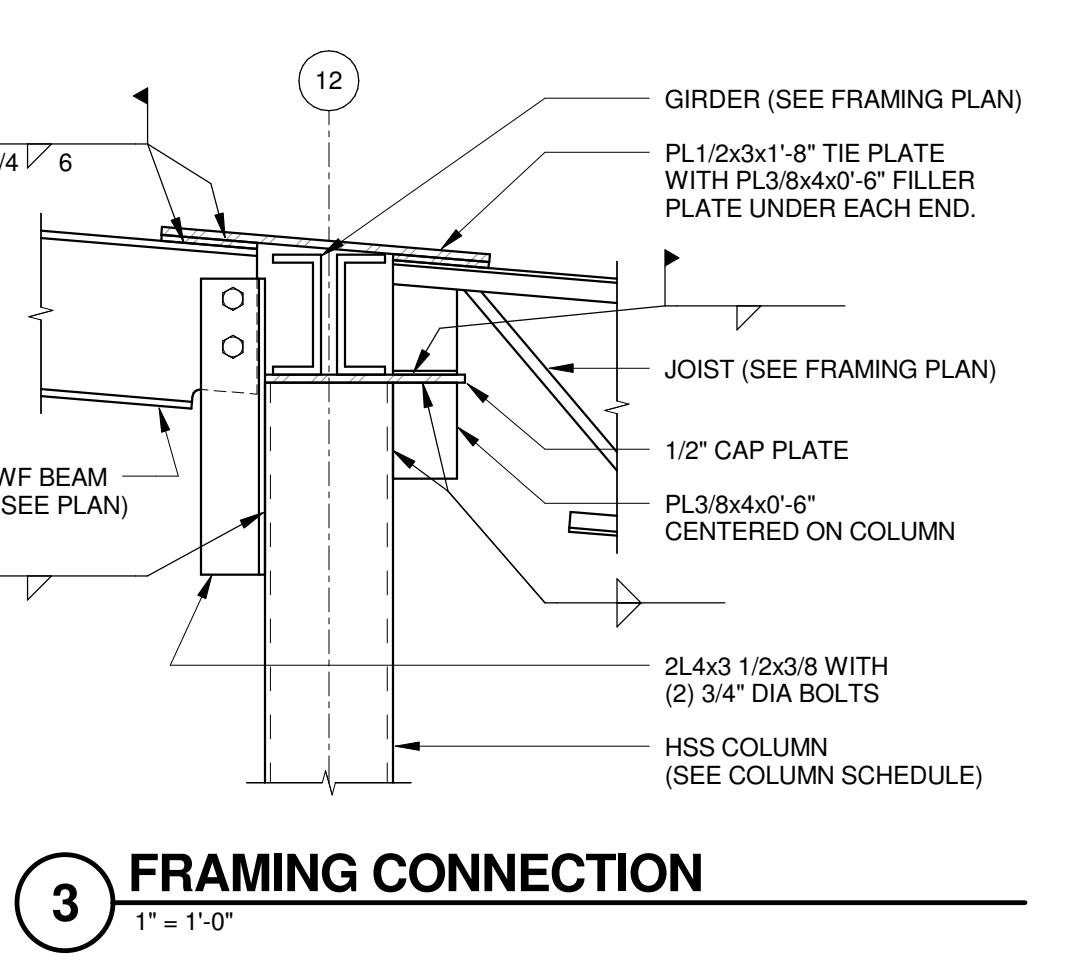
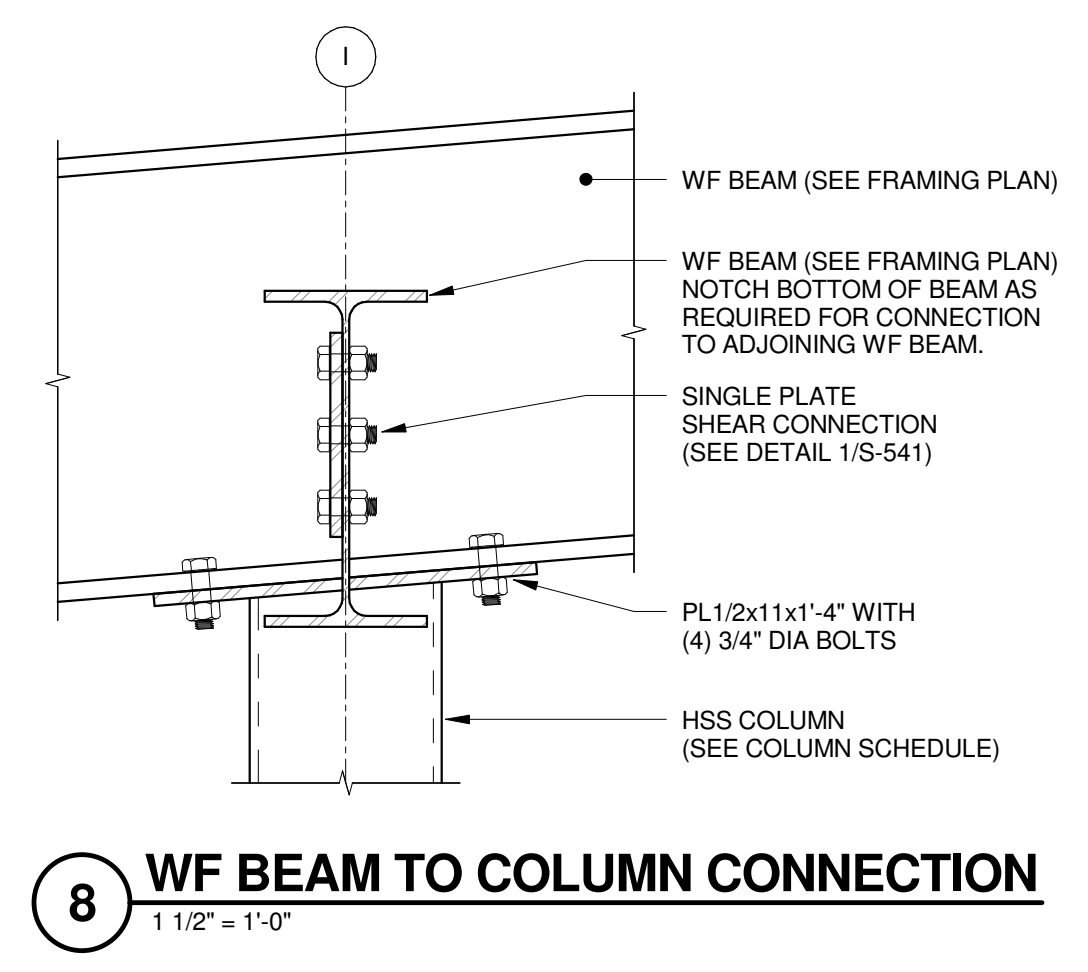
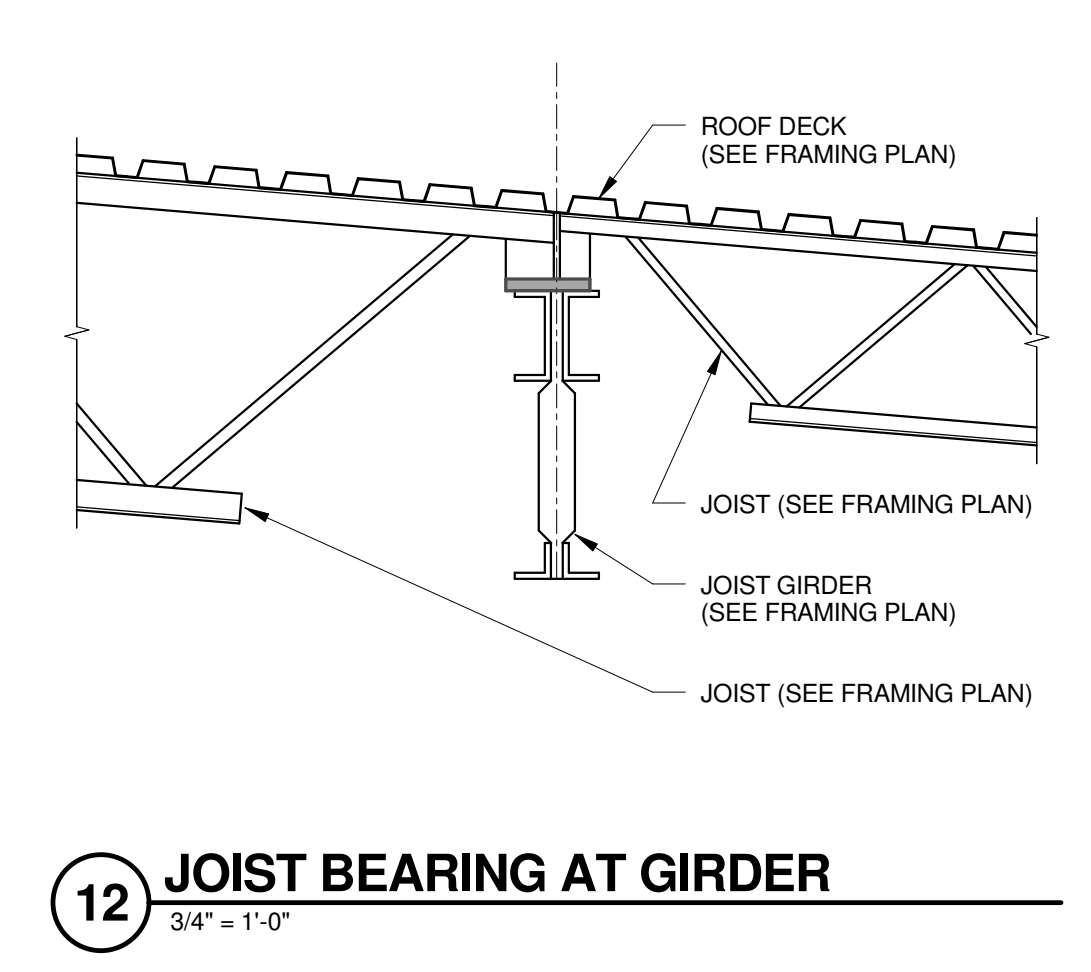
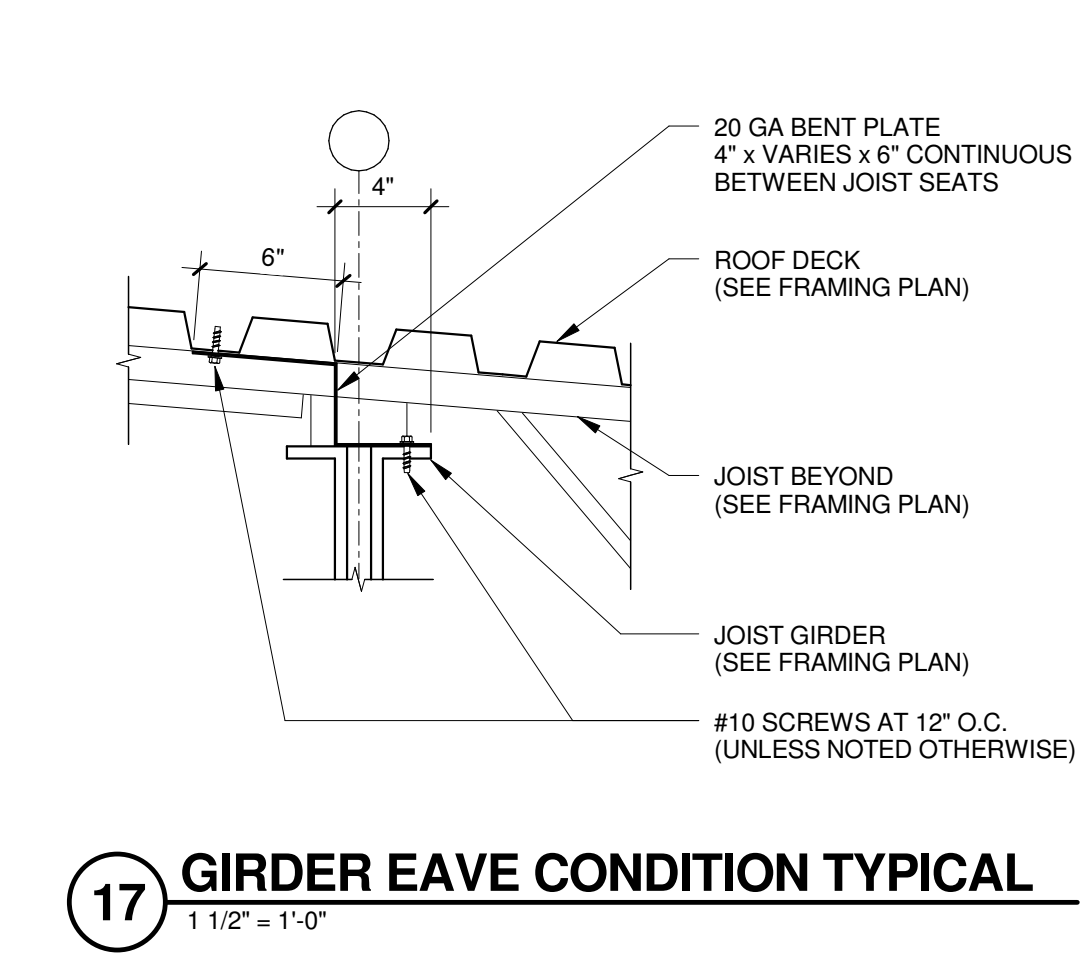
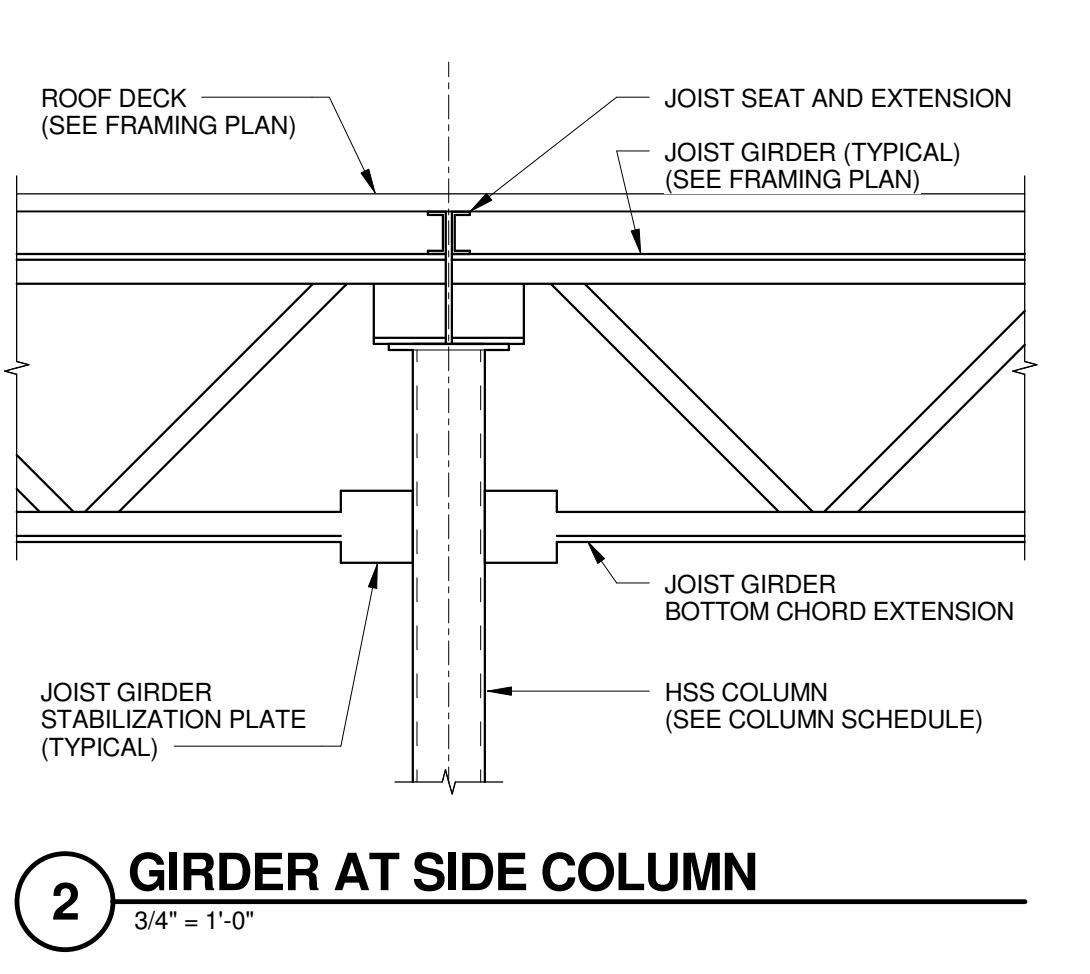
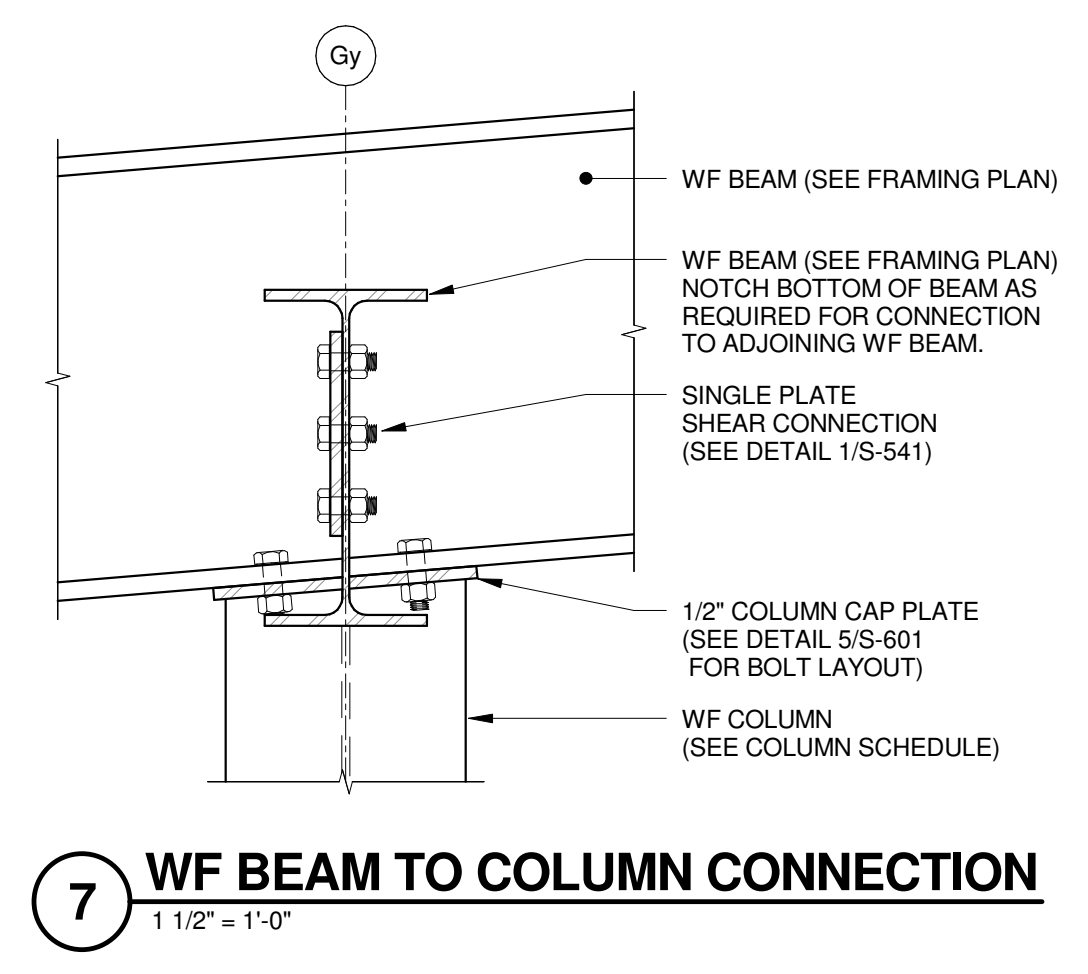
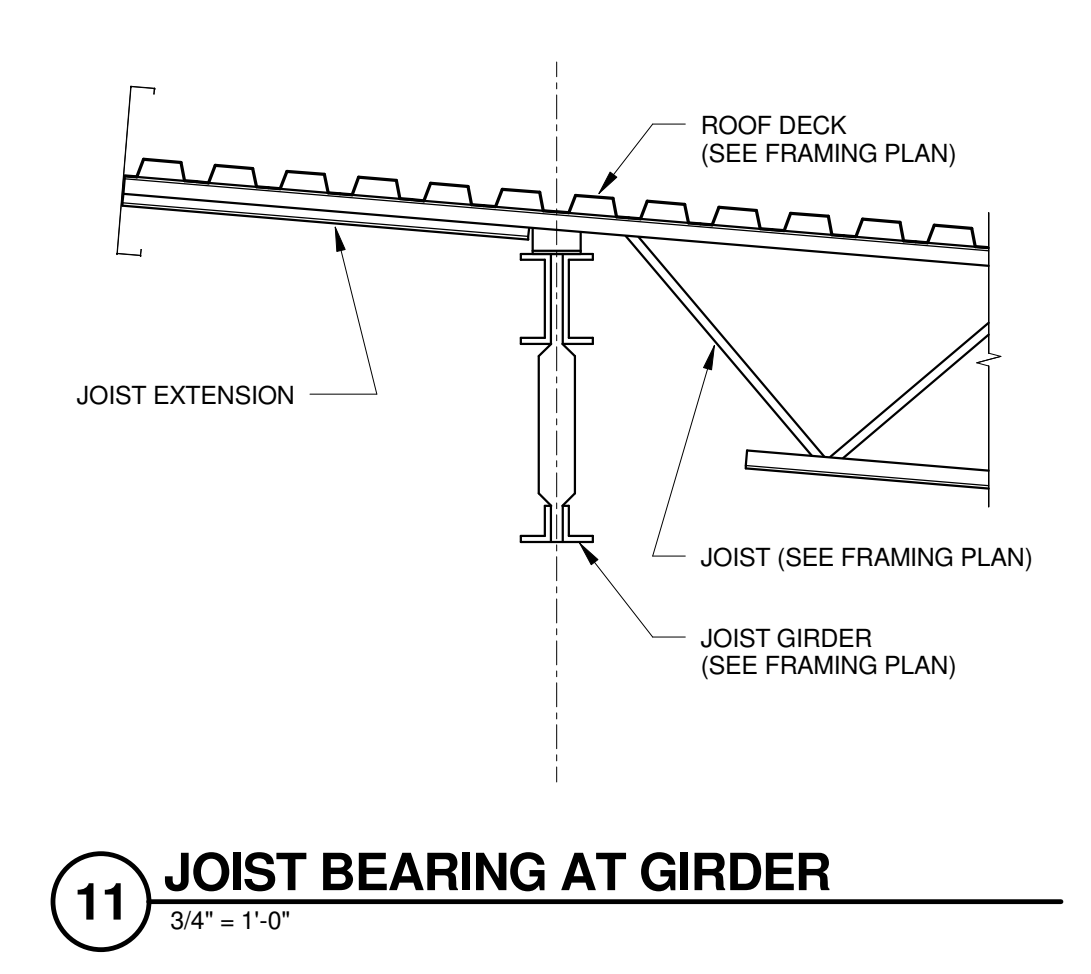
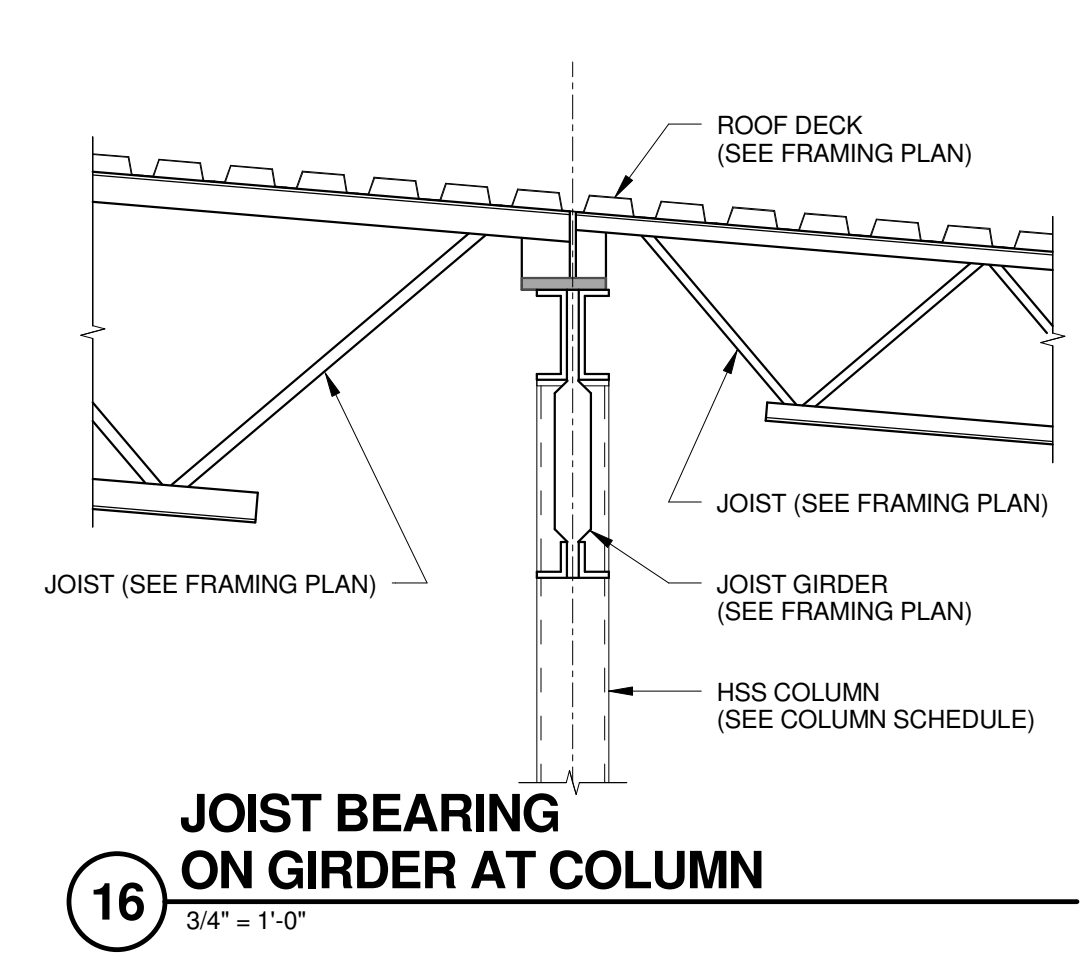
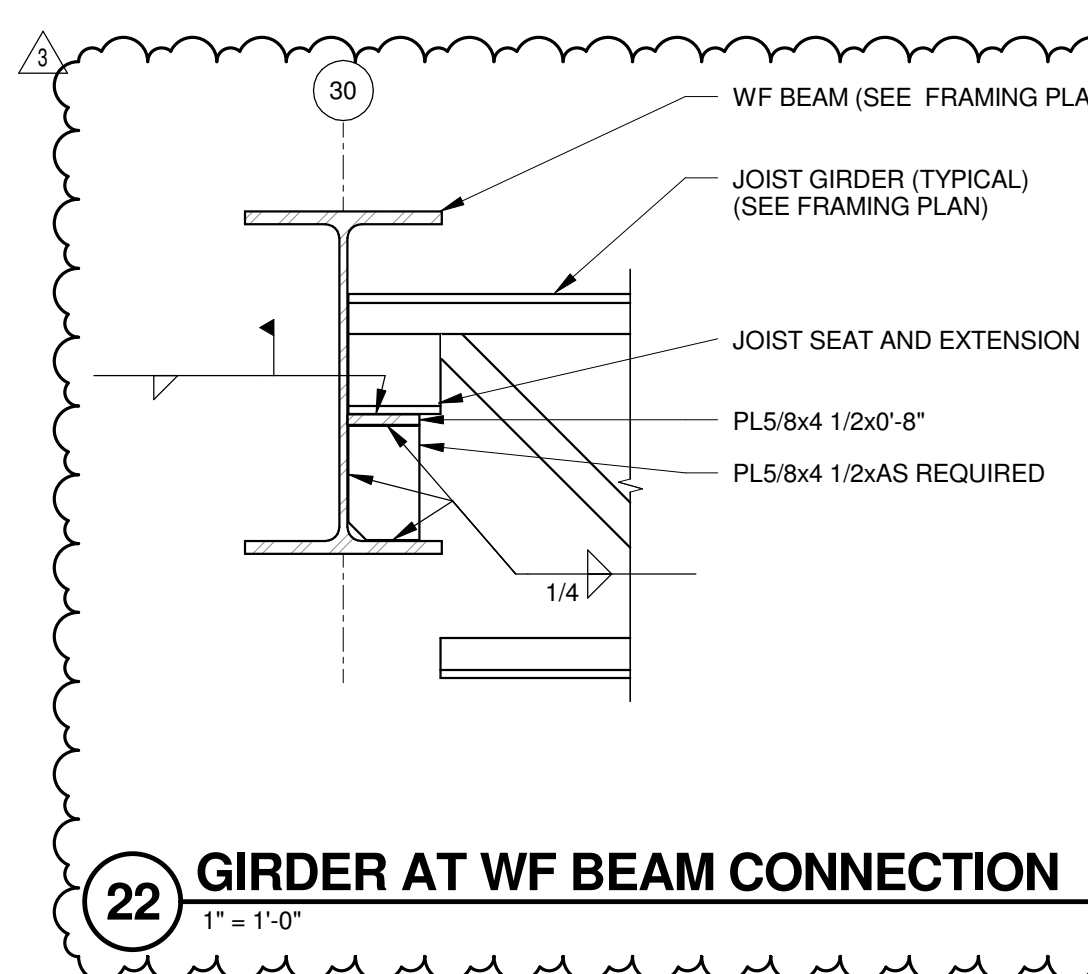
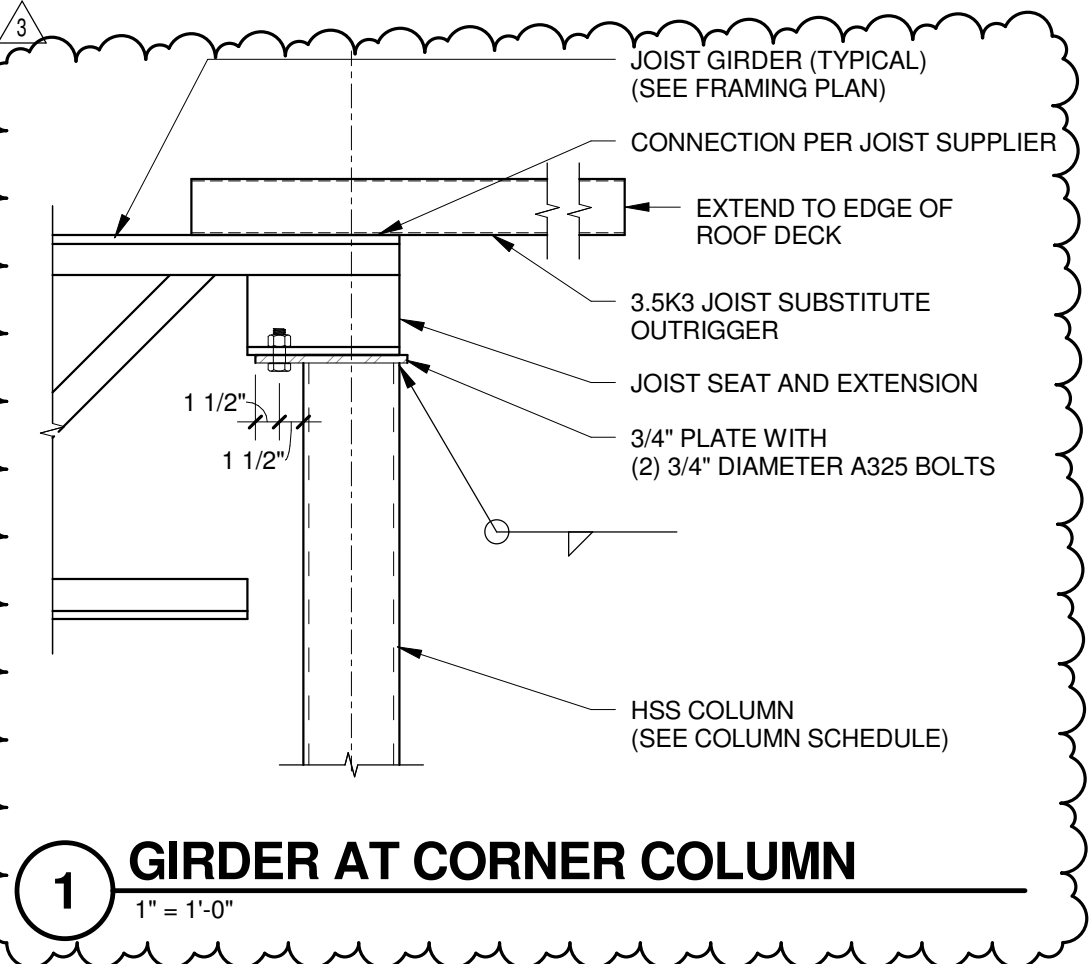
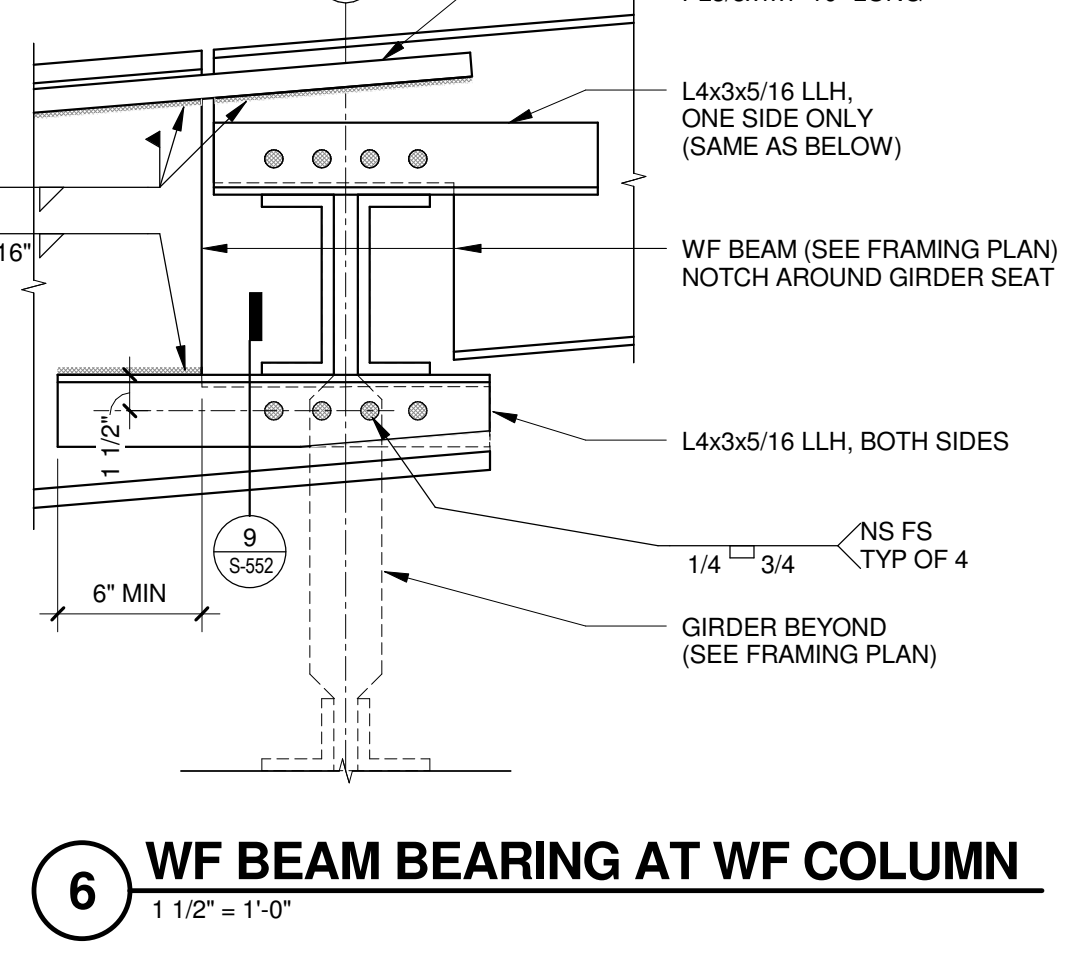
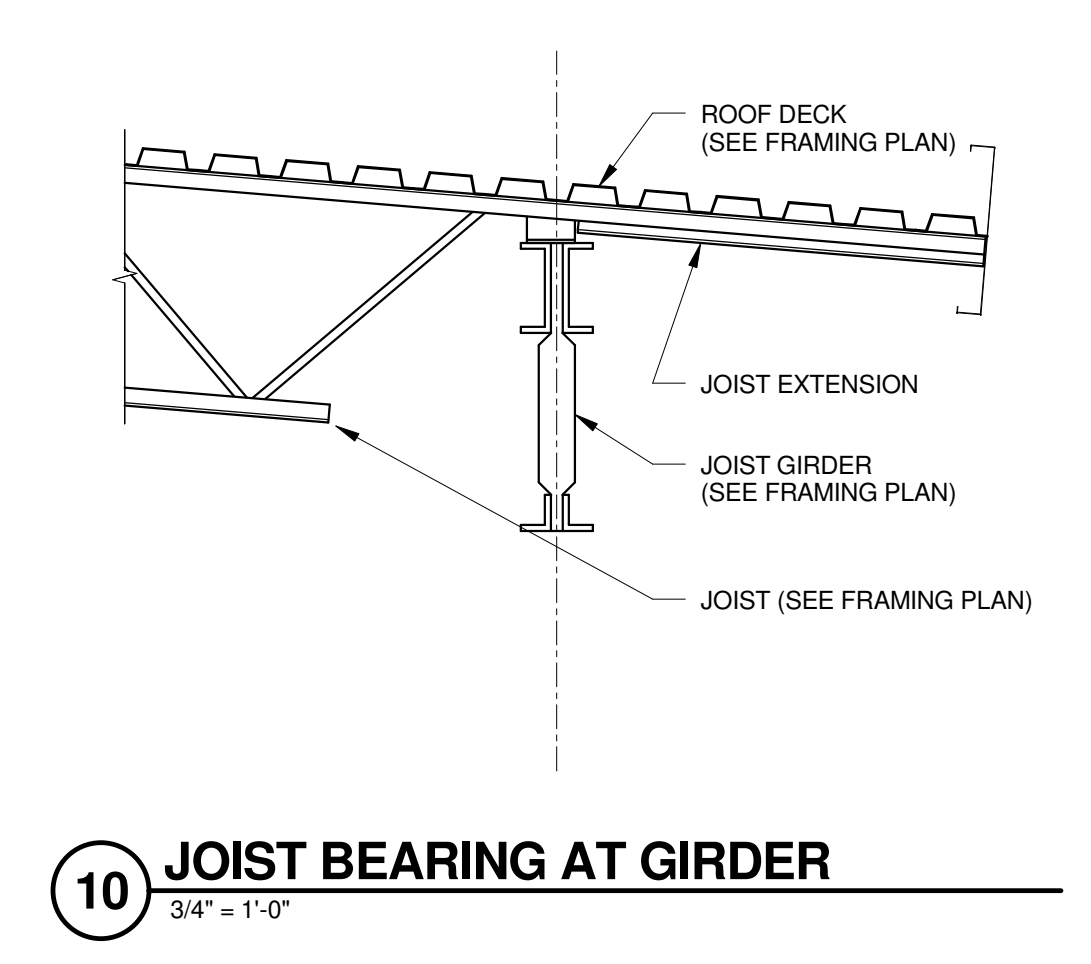
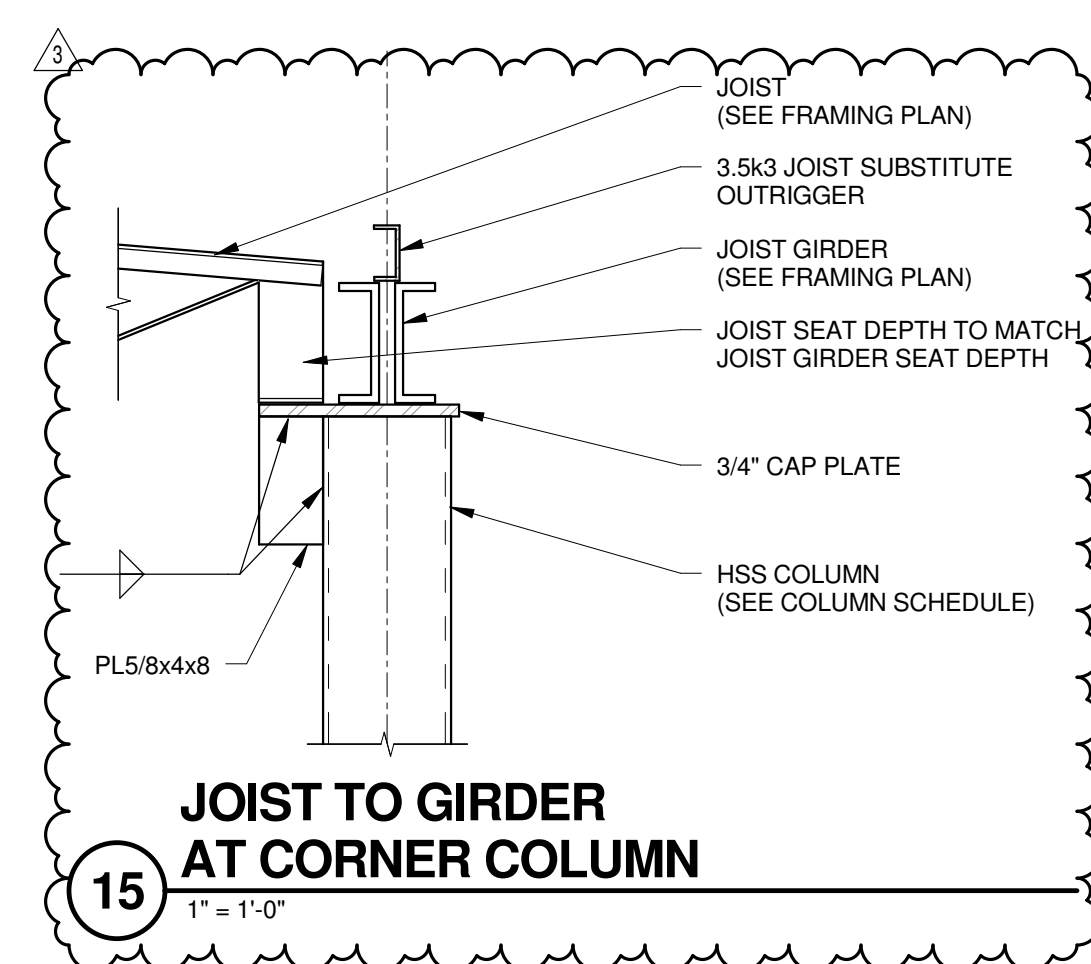
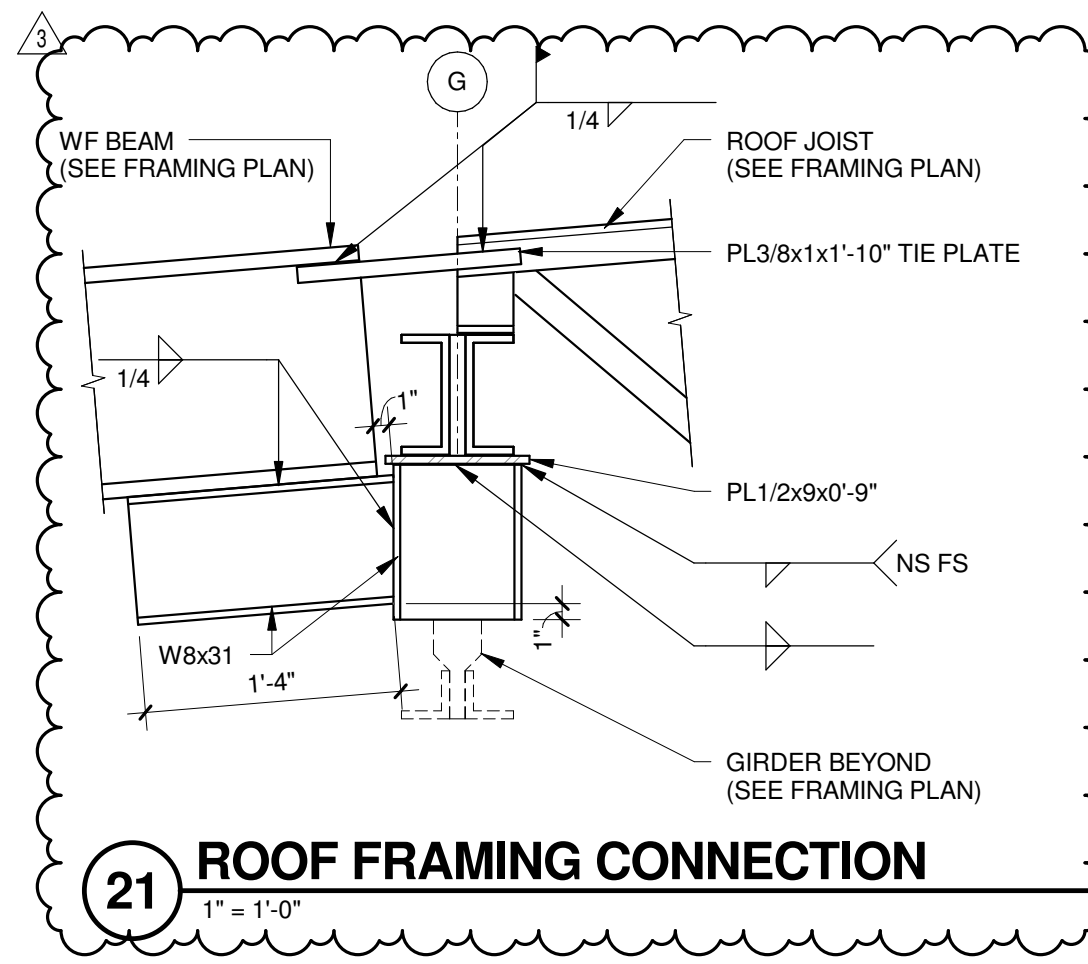
14 HORIZONTAL JOIST BRIDGING AT WALL
3/4" = 1'-0"



5 DIAGONAL JOIST BRIDGING AT WALL
3/4" = 1'-0"



3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE
PROJECT No: 1303500-160264.01		



No.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

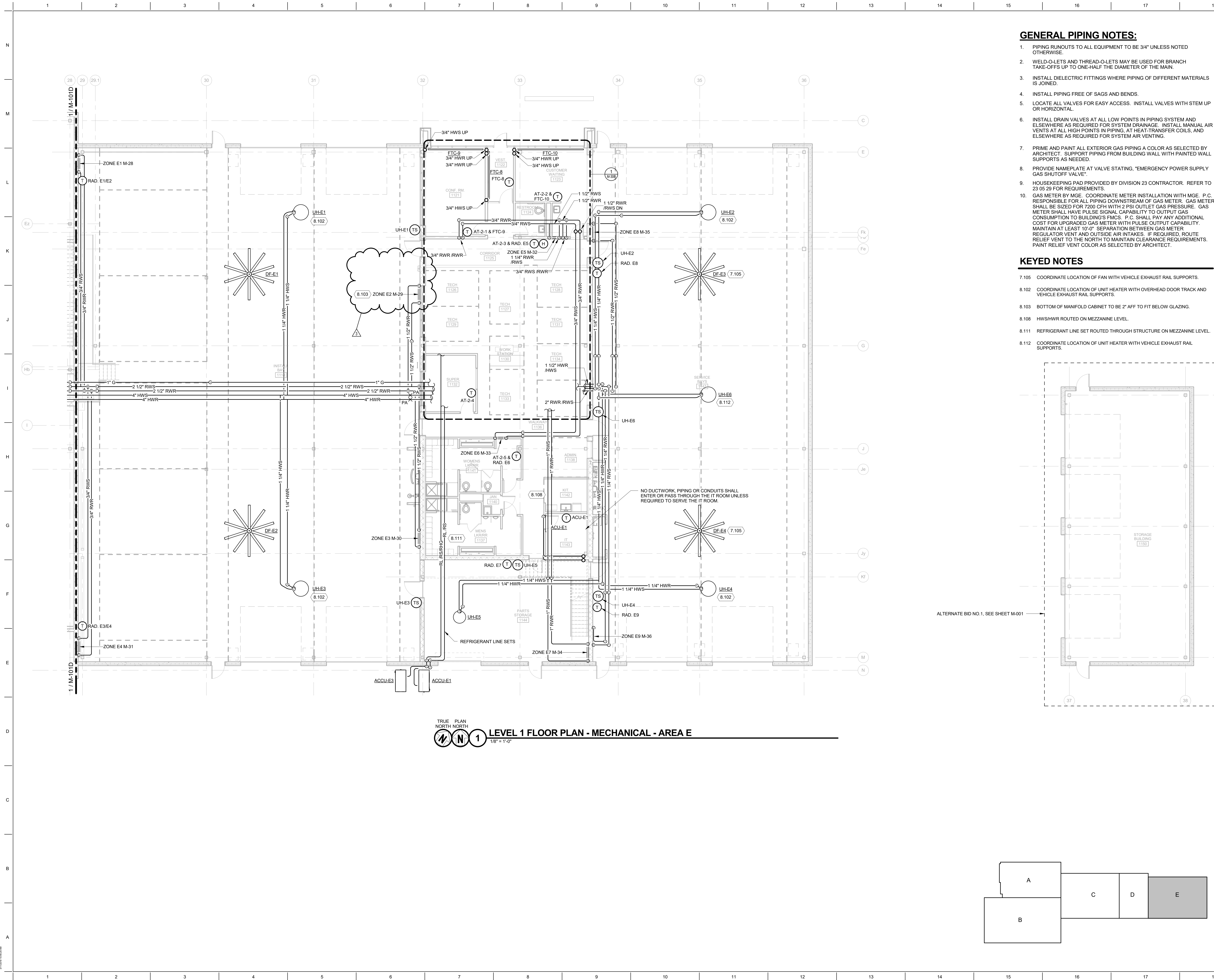
PROJECT No: 1303500-160264.01

STRUCTURAL COLUMN SCHEDULE - AREA A					
COLUMN LOCATION	COLUMN SIZE	BASE PLATE DETAIL	THICKNESS	ANCHOR BOLTS SIZE / EMBEDMENT	REMARKS
Aa-2.5	HSS8X8X3/8	8/S-602	1"	(4) 1" DIA / 18" EMBED	
Aa-2.8	HSS8X8X3/8	8/S-602	1"	(4) 1" DIA / 18" EMBED	
A-4(0'-6")	HSS6X6X3/8	7/S-602			
A-6	HSS6X6X3/8	6/S-602			
A-8	HSS6X6X3/8	6/S-602			
A-11	HSS6X6X3/8	6/S-602			
A-12	HSS10X10X3/8	6/S-602			
A-13	HSS10X10X3/8	6/S-602			
A-14	HSS10X10X3/8	6/S-602			
A-15	HSS10X10X3/8	6/S-602			
A-16	HSS8X8X3/8	6/S-602			
B-3.9	HSS4X4X1/4	12/S-602			
B-4	HSS10X6X1/2	11/S-602			
B-6	HSS6X6X3/8	6/S-602			
B-8	HSS6X6X3/8	6/S-602			
Bd-2.5	HSS8X8X3/8	6/S-602			
Bd-2.8	HSS8X8X3/8	6/S-602			
Bp-15	HSS8X8X3/8	7/S-602			
Bp-16	HSS8X8X3/8	7/S-602			
Br-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Br-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
D-3.9	HSS4X4X1/4	6/S-602			
D-4	HSS10X6X1/2	6/S-602			
D-6	HSS6X6X3/8	6/S-602			
D-8	HSS6X6X3/8	6/S-602			
D-11	HSS8X8X3/8	6/S-602			
D-12	HSS8X8X3/8	6/S-602			
D-13	HSS8X8X3/8	6/S-602			
D-14	HSS8X8X3/8	6/S-602			
D-15	HSS8X8X3/8	7/S-602			
D-16	HSS8X8X3/8	6/S-602			
Dh-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Dh-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Ep-15	HSS8X8X3/8	7/S-602			
Ep-16	HSS8X8X3/8	6/S-602			
Eq-3.9	HSS4X4X1/4	9/S-602			
Er-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Er-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
F-4	HSS10X6X1/2	10/S-602			
F-6	HSS6X6X3/8	6/S-602			
F-8	HSS6X6X3/8	6/S-602			
Fg-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Fg-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Fh-11	HSS8X8X3/8	6/S-602			
Fh-11	HSS8X8X3/8	6/S-602			
Fh-12	HSS8X8X3/8	6/S-602			
Fh-13	HSS8X8X3/8	6/S-602			
Fh-14	HSS8X8X3/8	6/S-602			
Fh-15	HSS8X8X3/8	7/S-602			
Fh-16	HSS8X8X3/8	6/S-602			
Fg-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Fg-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
H-4	HSS10X6X1/2	10/S-602			
H-6	HSS6X6X3/8	6/S-602			
H-8	HSS6X6X3/8	6/S-602			
H-11	HSS8X8X3/8	7/S-602			
H-12	HSS8X8X3/8				
H-13	HSS8X8X3/8	6/S-602			
H-14	HSS8X8X3/8				
H-15	HSS8X8X3/8	6/S-602			
H-16	HSS8X8X3/8	6/S-602			
Ha-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Ha-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Hu-2.5	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	
Hu-2.8	HSS8X8X3/8	6/S-602	1"	(4) 1" DIA / 18" EMBED	

STRUCTURAL COLUMN SCHEDULE - AREA B					
COLUMN LOCATION	COLUMN SIZE	BASE PLATE DETAIL	THICKNESS	ANCHOR BOLTS SIZE / EMBEDMENT	REMARKS
I-1	HSS8X8X3/8	6/S-602			
I-2	W21X101	4/S-602	4"	(10) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
I-3	HSS8X8X3/8	7/S-602			
I-5	HSS8X8X3/8	6/S-602			
I-7	HSS8X8X3/8	7/S-602			
I-9	HSS8X8X3/8	6/S-602			
I-10	HSS8X8X3/8	6/S-602			
I-12	HSS8X8X3/8	6/S-602			
I-13	HSS8X8X3/8	6/S-602			
I-14	HSS8X8X3/8	6/S-602			
I-15	HSS8X8X3/8	7/S-602			
I-16	HSS8X8X3/8	6/S-602			
J-9	HSS8X8X3/8	7/S-602			
J-10	HSS8X8X3/8	7/S-602			
J-11.8	HSS8X8X3/8	7/S-602			
J-12.8	HSS8X8X3/8	7/S-602			
J-13.7	HSS8X8X3/8	7/S-602			
J-14.5	HSS8X8X3/8	7/S-602			
J-15	HSS8X8X3/8	7/S-602			
Jn-3	HSS8X8X3/8	6/S-602			
Jn-5	HSS8X8X3/8	6/S-602			
Jn-7	HSS8X8X3/8	6/S-602			
Jp-16	HSS8X8X3/8	6/S-602			
K-1	HSS8X8X3/8	6/S-602			
Ke-15	HSS8X8X3/8	7/S-602			
Km-16	HSS8X8X3/8	6/S-602			
L-1	HSS8X8X3/8	6/S-602			
L-2	W21X101	4/S-602	2"	(6) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
L-3	HSS8X8X3/8	6/S-602			
L-5	HSS8X8X3/8	6/S-602			
L-7	HSS8X8X3/8	6/S-602			
L-9	HSS8X8X3/8	6/S-602			
L-10	HSS8X8X3/8	6/S-602			
L-12	HSS8X8X3/8	6/S-602			
L-13	HSS8X8X3/8	6/S-602			
L-14	HSS8X8X3/8	6/S-602			
L-15	HSS8X8X3/8	7/S-602			
L-16	HSS10X10X3/8	6/S-602			
Na-15	HSS8X8X3/8	7/S-602			
Na-16	HSS8X8X3/8	6/S-602			
O-1	HSS8X8X3/8	6/S-602			
P-1	HSS8X8X3/8	6/S-602			
P-2	W21X101	4/S-602	2"	(6) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
P-3	HSS8X8X3/8	6/S-602			
P-5	HSS8X8X3/8	6/S-602			
P-7	HSS8X8X3/8	6/S-602			
P-9	HSS8X8X3/8	6/S-602			
P-10	HSS8X8X3/8	6/S-602			
P-12	HSS8X8X3/8	6/S-602			
P-13	HSS8X8X3/8	6/S-602			
P-14	HSS8X8X3/8	6/S-602			
P-15	16"X16"				SEE REMARK 1
P-15	HSS8X8X3/8	6/S-602			
P-16	16"X16"				SEE REMARK 1
P-16	HSS10X10X3/8	6/S-602			
Q-1	HSS8X8X3/8	6/S-602			
R-1	HSS8X8X3/8	6/S-602			
R-2	W21X101	4/S-602	4"	(10) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
R-3	HSS8X8X3/8	6/S-602			
R-5	HSS8X8X3/8	6/S-602			
R-7	HSS8X8X3/8	6/S-602			
R-9	HSS8X8X3/8	6/S-602			
R-10	HSS8X8X3/8	6/S-602			
R-12	HSS8X8X3/8	6/S-602			
R-13	HSS8X8X3/8	6/S-602			
R-14	HSS8X8X3/8	6/S-602			
R-15	16"X16"				SEE REMARK 1
R-15	HSS8X8X3/8	7/S-602			
R-16	16"X16"				SEE REMARK 1
R-16	HSS8X8X3/8	6/S-602			

STRUCTURAL COLUMN SCHEDULE - AREAS C AND D					
COLUMN LOCATION	COLUMN SIZE	BASE PLATE DETAIL	THICKNESS	ANCHOR BOLTS SIZE / EMBEDMENT	REMARKS
C-17	HSS8X8X3/8	6/S-602			
C-18	W21X101	4/S-602	4"	(10) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
C-19	W12X53	3/S-602			
C-20	W12X53	3/S-602			
C-21	W12X53	3/S-602			
C-22	W12X53	3/S-602			
C-23	W12X53	3/S-602			
C-24	W12X53	3/S-602			
C-25	W12X53	3/S-602			
C-26	W12X53	3/S-602			
C-28	HSS8X8X3/8	6/S-602			
Cm-27	W12X53	3/S-602			
Ep-17	HSS8X8X3/8	6/S-602			
Er-28	HSS8X8X3/8	6/S-602			
Fc-26	W12X53	3/S-602			
Fc-27	W12X53	3/S-602			
Fh-17	HSS8X8X3/8	6/S-602			
G-17	HSS8X8X3/8	6/S-602			
G-18	W21X101	4/S-602	2"	(6) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
G-19	W12X53	3/S-602			
G-20	W12X53	3/S-602			
G-21	W12X53	3/S-602			
G-22	W12X53	3/S-602			
G-23	W12X53	3/S-602			
G-24	W12X53	3/S-602			
G-25	W12X53	3/S-602			
Gy-26	W12X53	3/S-602			
Gy-27	W12X53	3/S-602			
Hb-28	HSS8X8X3/8	6/S-602			
I-26	HSS8X8X3/8	7/S-602			
I-27	HSS8X8X3/8	7/S-602			
J-17	HSS8X8X3/8	6/S-602			
J-18	W21X101	4/S-602	2"	(6) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
J-19	HSS8X8X3/8	6/S-602			
J-20	HSS8X8X3/8	6/S-602			
J-21	HSS8X8X3/8	6/S-602			
J-22	HSS8X8X3/8	6/S-602			
J-23	HSS8X8X3/8	6/S-602			
J-24	HSS8X8X3/8	6/S-602			
J-25	HSS8X8X3/8	6/S-602			
J-28	HSS8X8X3/8	6/S-602			
Jp-17	HSS8X8X3/8	6/S-602			
Kn-17	HSS8X8X3/8	6/S-602			
N-17	HSS8X8X3/8	6/S-602			
N-18	W21X101	5/S-602	4"	(10) 1 1/2" DIA / 24" EMBED	SEE REMARK 2
N-19	HSS8X8X3/8	6/S-602			
N-20	HSS8X8X3/8	6/S-602			
N-21	HSS8X8X3/8	6/S-602			
N-22	HSS8X8X3/8	6/S-602			
N-23	HSS8X8X3/8	6/S-602			
N-24	HSS8X8X3/8	6/S-602			
N-25	HSS8X8X3/8	6/S-602			
N-26	HSS8X8X3/8	6/S-602			
N-27	HSS8X8X3/8	6/S-602			
N-28	HSS8X8X3/8	6/S-602			

STRUCTURAL COLUMN SCHEDULE - AREA E					
COLUMN LOCATION	COLUMN SIZE	BASE PLATE DETAIL	THICKNESS	ANCHOR BOLTS SIZE / EMBEDMENT	REMARKS
AA-37	HSS8X8X3/8	6/S-602			
AA-38	HSS8X8X3/8	6/S-602			
BB-37	HSS8X8X3/8	6/S-602			
BB-38	HSS8X8X3/8	6/S-602			
CC-37	HSS8X8X3/8	6/S-602			
CC-38	HSS8X8X3/8	6/S-602			
Ch-32	HSS8X8X3/8	6/S-602			
Ch-33.8	HSS8X8X3/8	7/S-602			
DD-37	HSS8X8X3/8	6/S-602			
DD-38	HSS8X8X3/8	6/S-602			
E-29	HSS8X8X3/8	6/S-602			
E-30	HSS10X10X3/8	6/S-602			
E-31	HSS10X10X3/8	6/S-602			
E-32	HSS10X10X3/8	6/S-602			
E-33	HSS10X10X3/8	6/S-602			
E-34	HSS10X10X3/8	6/S-602			
E-35	HSS10X10X3/8	6/S-602			
E-36	HSS8X8X3/8	6/S-602			
EE-37	HSS8X8X3/8	6/S-602			
EE-38	HSS8X8X3/8	6/S-602			
Fb-32	HSS8X8X3/8	6/S-602			
Fb-33	HSS8X8X3/8	6/S-602			
Fb-33.7	HSS8X8X3/8	7/S-602			
Fb-36	HSS10X10X3/8	6/S-602			
Fk-30	HSS8X8X3/8	6/S-602			
G-29.1	HSS8X8X3/8	6/S-602			
G-31	HSS8X8X3/8	6/S-602			
G-32	HSS8X8X3/8	6/S-602			
G-33	HSS8X8X3/8	6/S-602			
G-33.7	HSS8X8X3/8	7/S-602			
G-34	HSS8X8X3/8	6/S-602			
G-35	HSS8X8X3/8	6/S-602			
G-36	HSS8X8X3/8	6/S-602			
J-29	HSS8X8X3/8	6/S-602			
J-31	HSS8X8X3/8	6/S-602			
J-32	HSS8X8X3/8	6/S-602			
J-33	HSS8X8X3/8	6/S-602			
J-33.7	HSS8X8X3/8	7/S-602			
J-34	HSS8X8X3/8	6/S-602			
J-35	HSS8X8X3/8	6/S-602			
J-36	HSS8X8X3/8	6/S-602			
Je-30	HSS8X8X3/8	6/S-602			
Jy-35.7	HSS8X8X3/8	7/S-602			
Jy-36	HSS8X8X3/8	6/S-602			
Kf-32	HSS8X8X3/8	6/S-602			
Kf-33	HSS8X8X3/8	6/S-602			
M-29	HSS8X8X3/8	6/S-602			
M-30	HSS8X8X3/8				



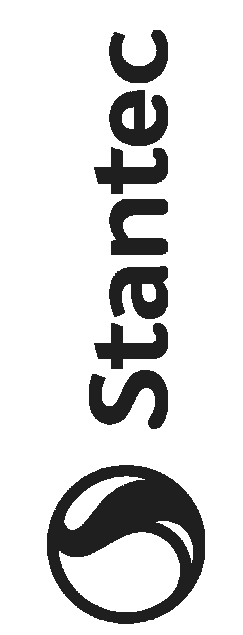
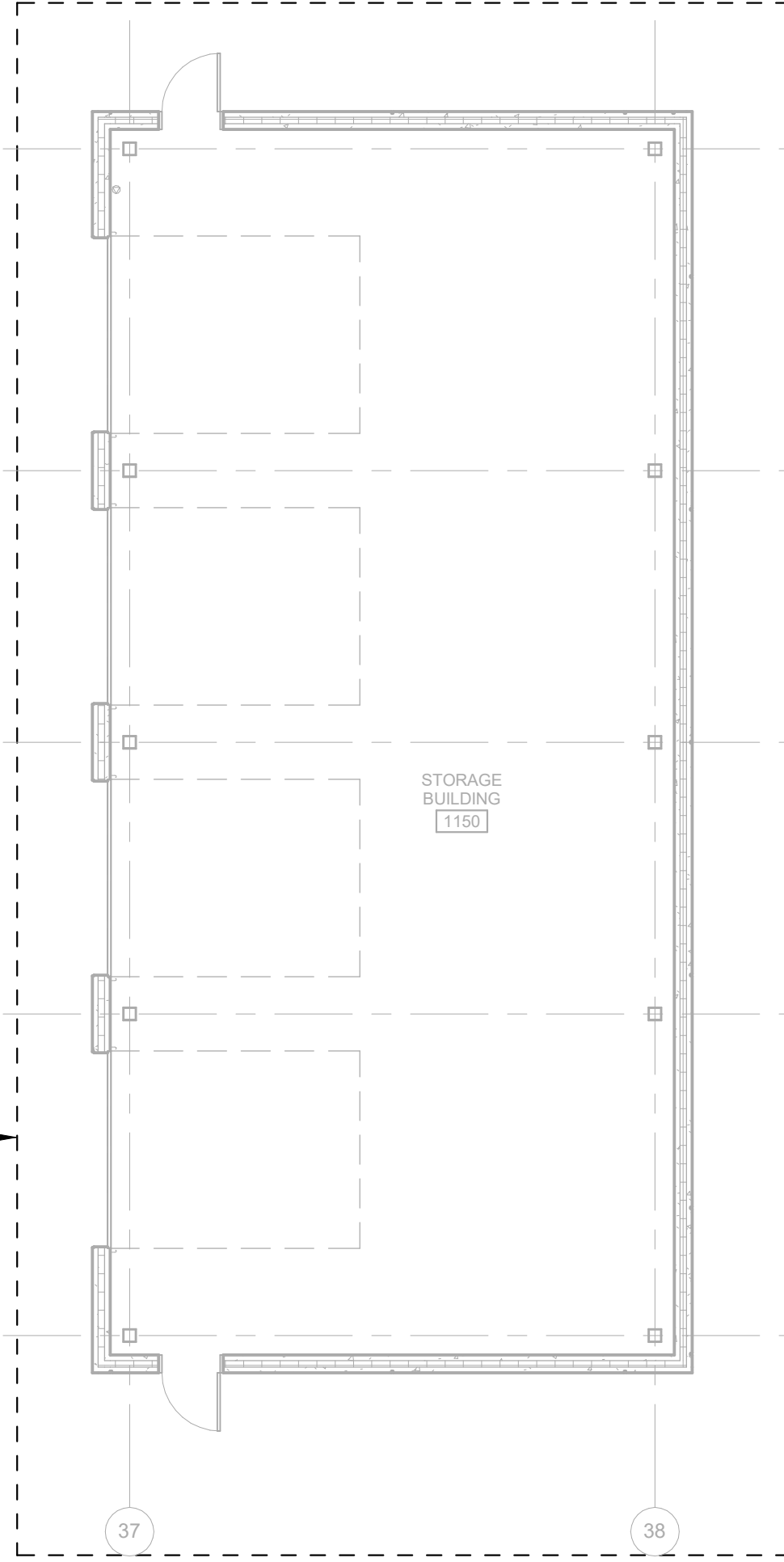
TRUE PLAN NORTH NORTH
1 LEVEL 1 FLOOR PLAN - MECHANICAL - AREA E
 1/8" = 1'-0"

GENERAL PIPING NOTES:

1. PIPING RUNOUTS TO ALL EQUIPMENT TO BE 3/4" UNLESS NOTED OTHERWISE.
2. WELD-O-LETS AND THREAD-O-LETS MAY BE USED FOR BRANCH TAKE-OFFS UP TO ONE-HALF THE DIAMETER OF THE MAIN.
3. INSTALL DIELECTRIC FITTINGS WHERE PIPING OF DIFFERENT MATERIALS IS JOINED.
4. INSTALL PIPING FREE OF SAGS AND BENDS.
5. LOCATE ALL VALVES FOR EASY ACCESS. INSTALL VALVES WITH STEM UP OR HORIZONTAL.
6. INSTALL DRAIN VALVES AT ALL LOW POINTS IN PIPING SYSTEM AND ELSEWHERE AS REQUIRED FOR SYSTEM DRAINAGE. INSTALL MANUAL AIR VENTS AT ALL HIGH POINTS IN PIPING, AT HEAT-TRANSFER COILS, AND ELSEWHERE AS REQUIRED FOR SYSTEM AIR VENTING.
7. PRIME AND PAINT ALL EXTERIOR GAS PIPING A COLOR AS SELECTED BY ARCHITECT. SUPPORT PIPING FROM BUILDING WALL WITH PAINTED WALL SUPPORTS AS NEEDED.
8. PROVIDE NAMEPLATE AT VALVE STATING, "EMERGENCY POWER SUPPLY GAS SHUTOFF VALVE".
9. HOUSEKEEPING PAD PROVIDED BY DIVISION 23 CONTRACTOR. REFER TO 23 05 29 FOR REQUIREMENTS.
10. GAS METER BY MGE. COORDINATE METER INSTALLATION WITH MGE. P.C. RESPONSIBLE FOR ALL PIPING DOWNSTREAM OF GAS METER. GAS METER SHALL BE SIZED FOR 7200 CFH WITH 2 PSI OUTLET GAS PRESSURE. GAS METER SHALL HAVE PULSE SIGNAL CAPABILITY TO OUTPUT GAS CONSUMPTION TO BUILDING'S FMDS. P.C. SHALL PAY ANY ADDITIONAL COST FOR UPGRADED GAS METER WITH PULSE OUTPUT CAPABILITY. MAINTAIN AT LEAST 10'-0" SEPARATION BETWEEN GAS METER REGULATOR VENT AND OUTSIDE AIR INTAKES. IF REQUIRED, ROUTE RELIEF VENT TO THE NORTH TO MAINTAIN CLEARANCE REQUIREMENTS. PAINT RELIEF VENT COLOR AS SELECTED BY ARCHITECT.

KEYED NOTES

- 7.105 COORDINATE LOCATION OF FAN WITH VEHICLE EXHAUST RAIL SUPPORTS.
- 8.102 COORDINATE LOCATION OF UNIT HEATER WITH OVERHEAD DOOR TRACK AND VEHICLE EXHAUST RAIL SUPPORTS.
- 8.103 BOTTOM OF MANIFOLD CABINET TO BE 2" AFF TO FIT BELOW GLAZING.
- 8.108 HWS/HWR ROUTED ON MEZZANINE LEVEL.
- 8.111 REFRIGERANT LINE SET ROUTED THROUGH STRUCTURE ON MEZZANINE LEVEL.
- 8.112 COORDINATE LOCATION OF UNIT HEATER WITH VEHICLE EXHAUST RAIL SUPPORTS.



1600 WILSON BLVD.
 SUITE 380
 ARLINGTON, VA 22209
 571-290-7679

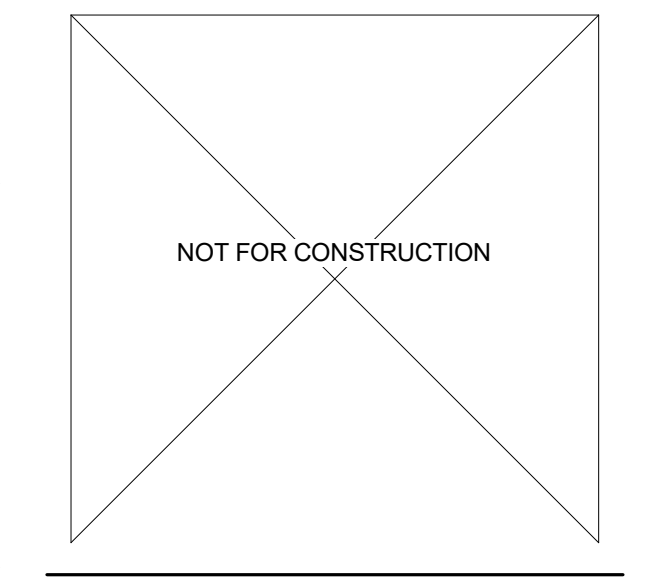


Mead & Hunt, Inc.
 2440 Derring Way
 Middleton, WI 53562
 phone: 608-273-6380
 meadhunt.com

CITY OF MADISON
 NAKOOSA TRAIL
 FLEET/FIRE/RADIO SHOP
 FACILITY

4141 NAKOOSA TRAIL
 MADISON, WISCONSIN 53714

ISSUE FOR BID

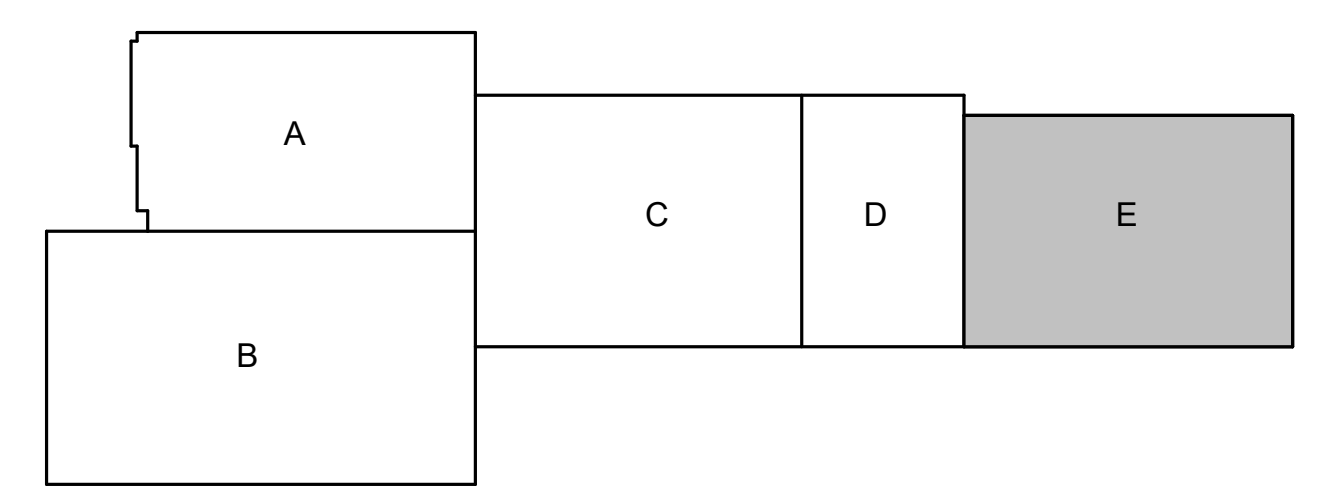


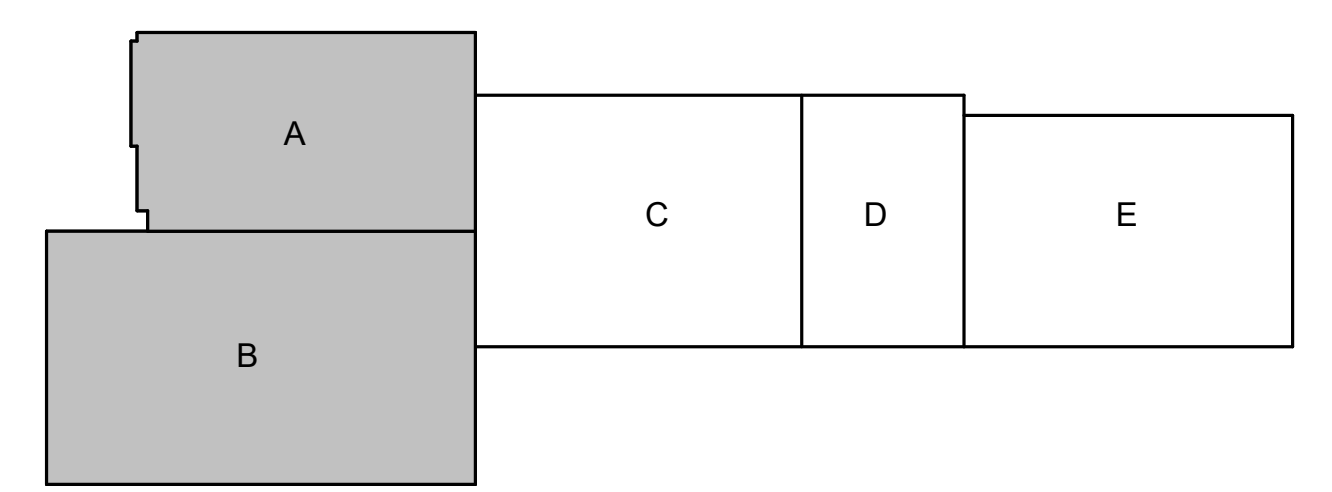
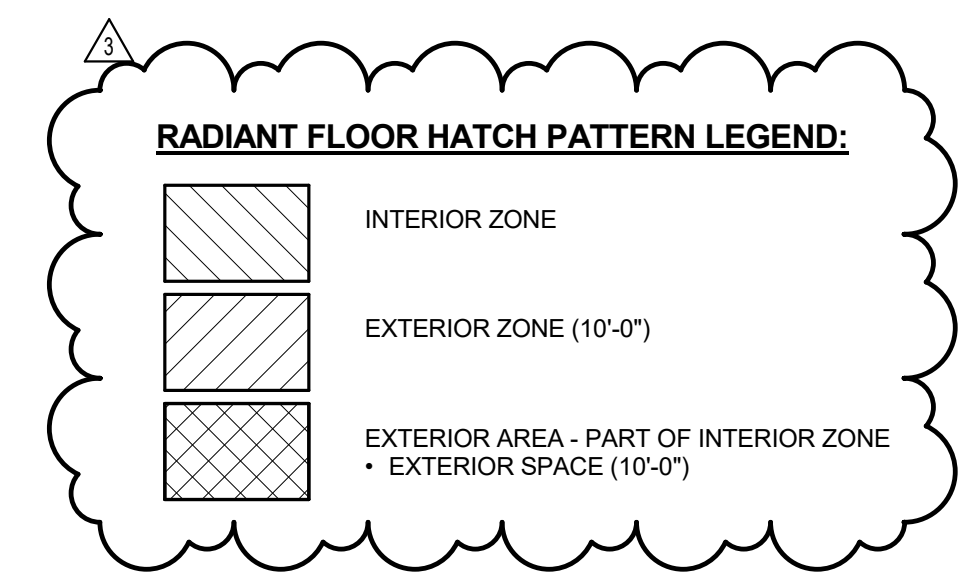
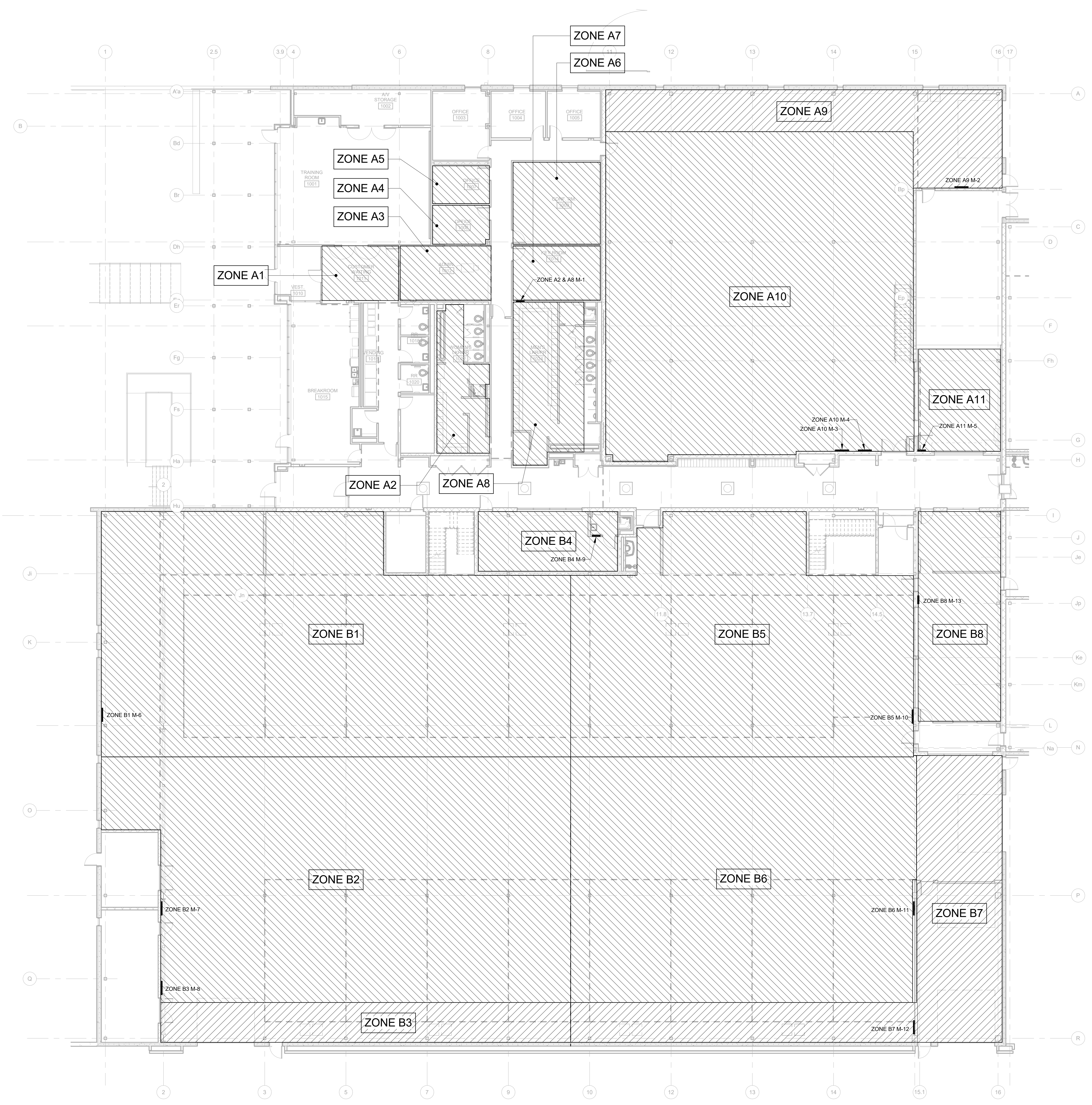
REVISION/SUBMISSION	DATE
3 ADDENDUM 3	03/14/2019
2 ADDENDUM 2	03/05/2019
ISSUE FOR BID	02/07/2019
ISSUE FOR PERMIT	01/17/2019

No. REVISION/SUBMISSION DATE
 PROJECT No: 1303500-160264.01

LEVEL 1 FLOOR PLAN - PIPING - AREA E

M-131E

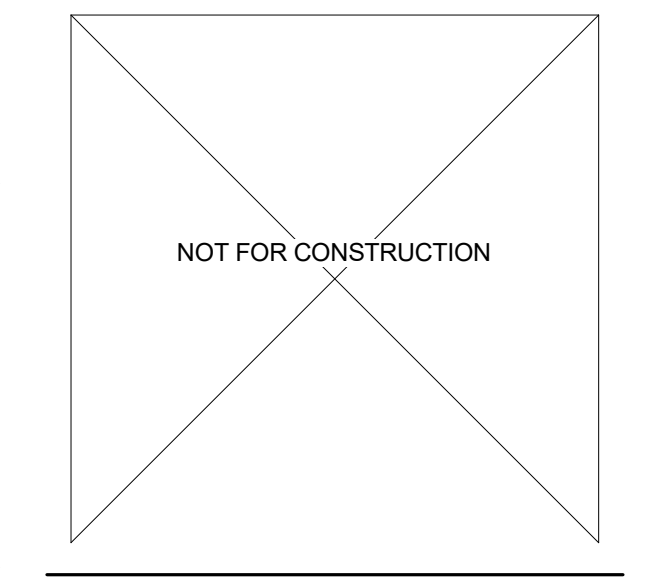




TRUE PLAN NORTH NORTH
1 LEVEL 1 RADIANT INFLOOR FLOOR PLAN - MECHANICAL - AREA A & B
3/32" = 1'-0"

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY

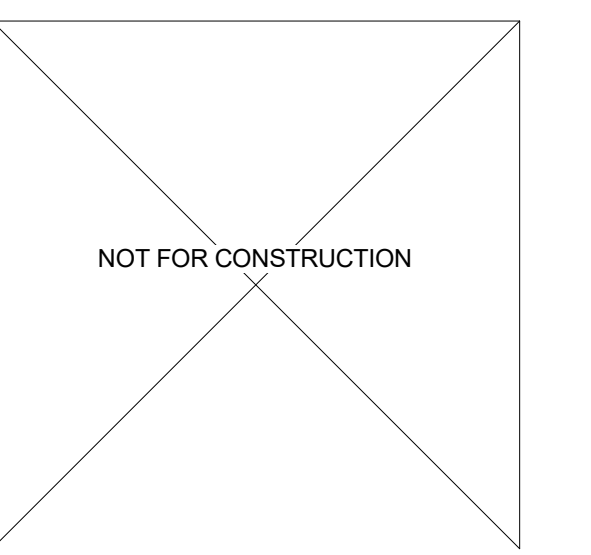
4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714
ISSUE FOR BID



ISSUE FOR BID	02/07/2019
ISSUE FOR PERMIT	01/17/2019
REVISION/SUBMISSION	DATE
PROJECT No:	1303500-160264.01

LEVEL 1 FLOOR PLAN -
RADIANT INFLOOR
HEATING - AREAS A & B

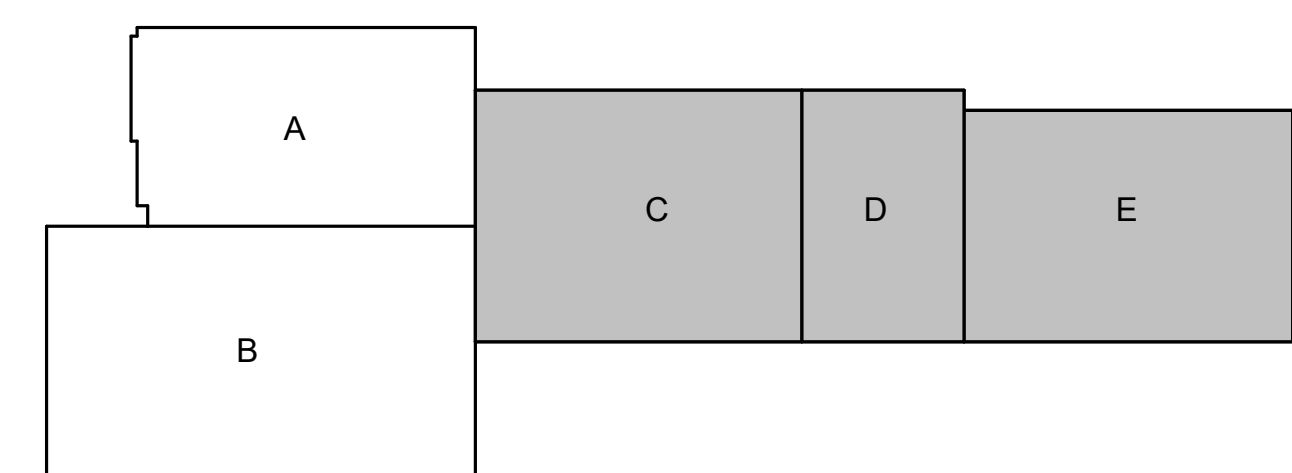
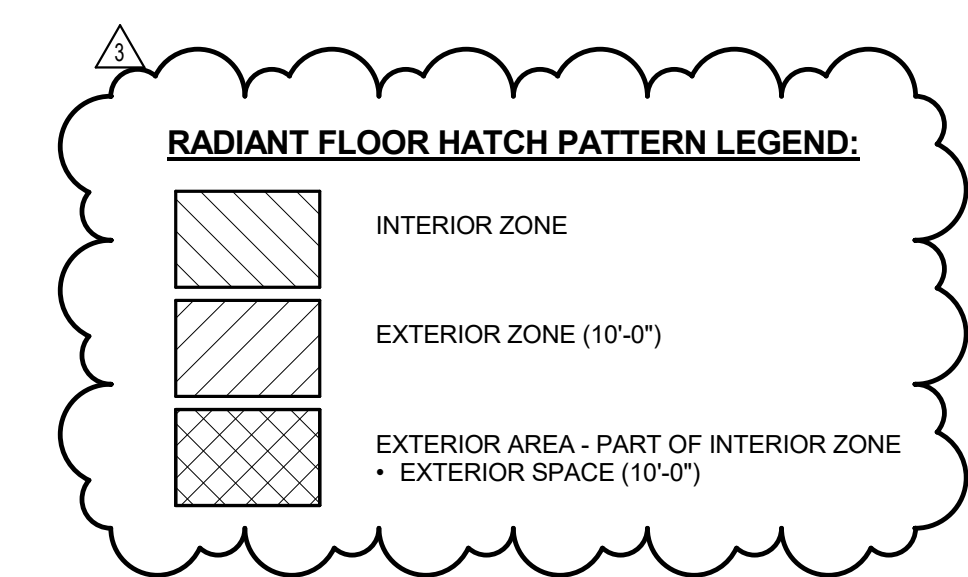
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ISSUE FOR BID	02/07/2019
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REVISION/SUBMISSION	DATE
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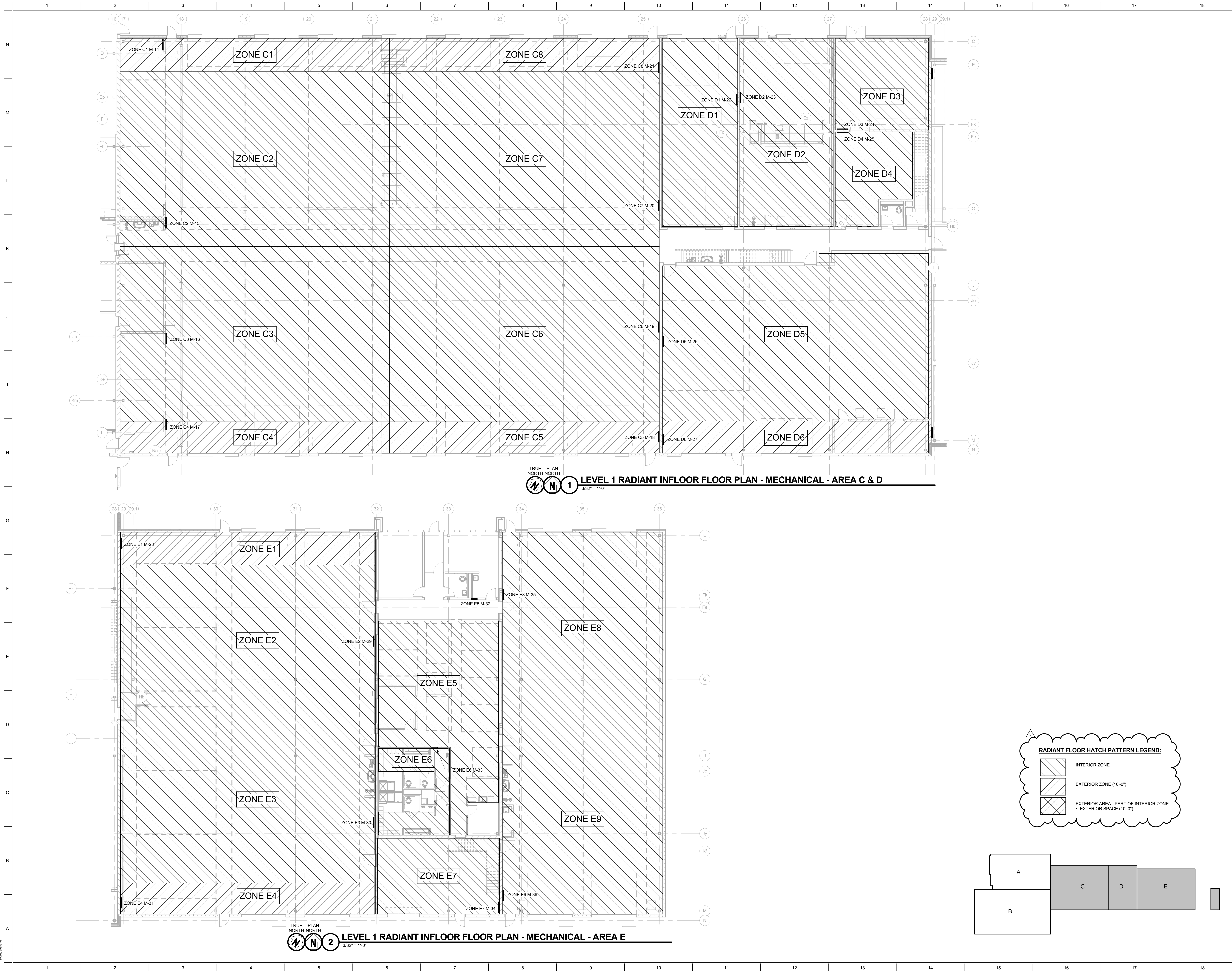
LEVEL 1 FLOOR PLAN -
RADIANT INFLOOR
HEATING - AREAS C, D & E

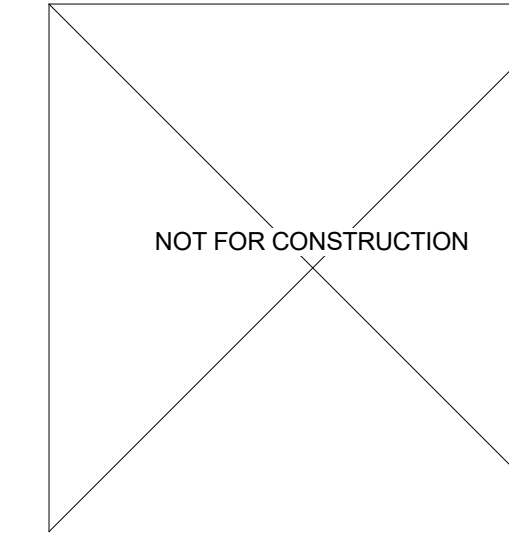
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TRUE PLAN NORTH NORTH
1 LEVEL 1 RADIANT INFLOOR FLOOR PLAN - MECHANICAL - AREA C & D
3/32" = 1'-0"

TRUE PLAN NORTH NORTH
2 LEVEL 1 RADIANT INFLOOR FLOOR PLAN - MECHANICAL - AREA E
3/32" = 1'-0"

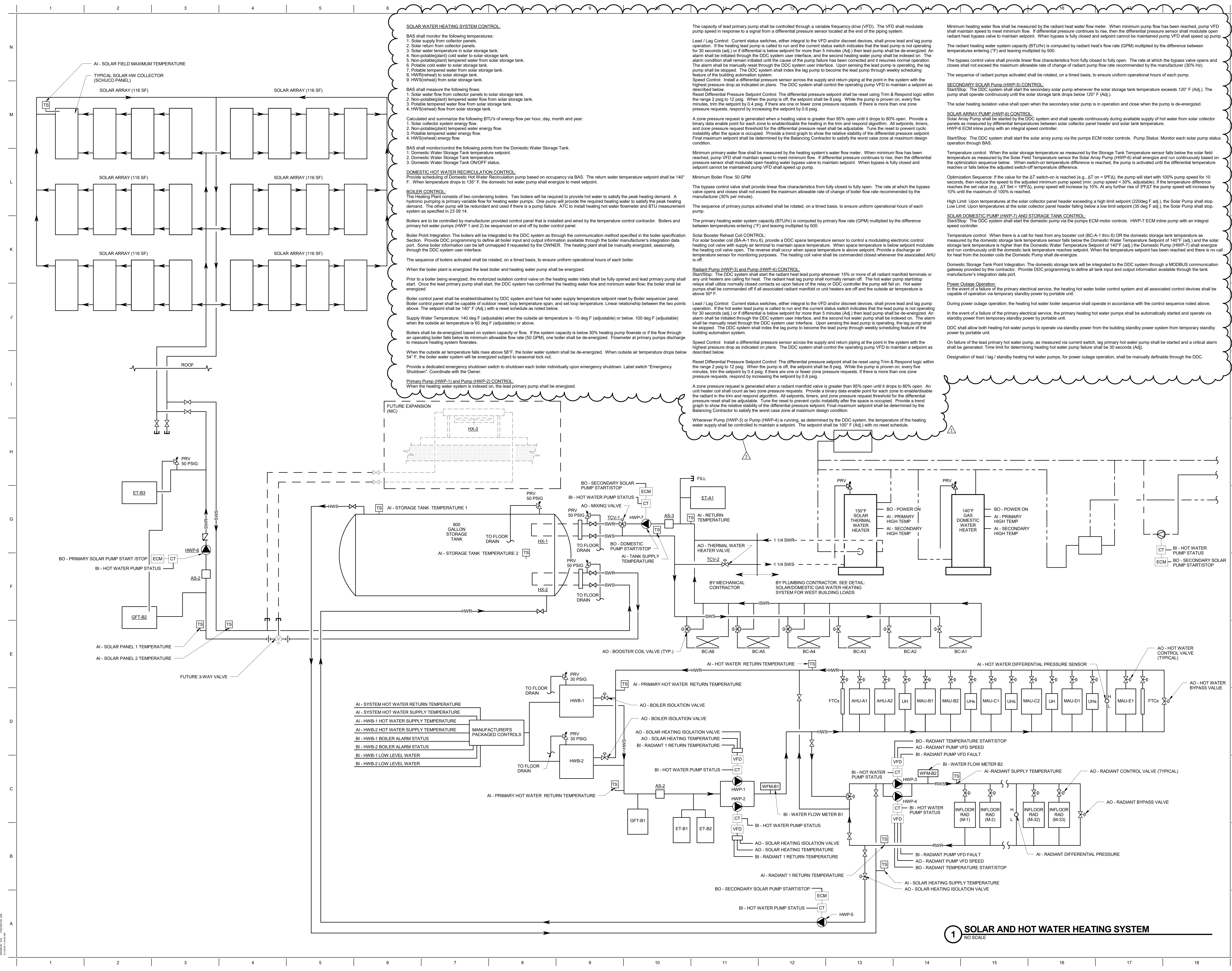




3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019
No.	REVISION/SUBMISSION	DATE
PROJECT No: 1303500-160264.01		

MECHANICAL WATER FLOW DIAGRAM

1 SOLAR AND HOT WATER HEATING SYSTEM
NO SCALE



SOLAR WATER HEATING SYSTEM CONTROL:

- BAS shall monitor the following temperatures:
- Solar supply from collector panels.
 - Solar return from collector panels.
 - Solar water temperature in solar storage tank.
 - Non-potable(cold) water to solar storage tank.
 - Non-potable(plant) tempered water from solar storage tank.
 - Potable cold water to solar storage tank.
 - Potable tempered water from solar storage tank.
 - HWR(heat) to solar storage tank.
 - HWS(heat) flow from solar storage tank.

- BAS shall measure the following flows:
- Solar collector system energy flow.
 - Non-potable(plant) tempered water flow to solar storage tank.
 - Potable tempered water flow from solar storage tank.
 - HWS(heat) flow from solar storage tank.
- Calculated and summarize the following BTU's of energy flow per hour, day, month and year:
- Solar collector system energy flow.
 - Non-potable(plant) tempered water energy flow.
 - Potable tempered water energy flow.
 - HWS(heat) energy flow.

- BAS shall monitor/control the following points from the Domestic Water Storage Tank:
- Domestic Water Storage Tank temperature setpoint.
 - Domestic Water Storage Tank temperature.
 - Domestic Water Storage Tank ON/OFF status.
- Domestic Hot Water Recirculation Control:
Provide scheduling of Domestic Hot Water Recirculation pump based on occupancy via BAS. The return water temperature setpoint shall be 140° F. When temperature drops to 135° F, the domestic hot water pump shall energize to meet setpoint.

- BOILER CONTROL:
The Heating Plant consists of two condensing boilers. Two boilers will be required to provide hot water to satisfy the peak heating demand. A hydronic pumping is primary variable flow for heating water pumps. One pump will provide the required heating water to satisfy the peak heating demand. The other pump will be redundant and used if there is a pump failure. ATC to install heating hot water flowmeter and BTU measurement system as specified in 23 09 14.
- Boilers are to be controlled by manufacturer provided control panel that is installed and wired by the temperature control contractor. Boilers and primary hot water pumps (HWP-1 and 2) be sequenced on and off by boiler control panel.

- Boiler Point Integration: The boilers will be integrated to the DDC system as through the communication method specified in the boiler specification Section. Provide DDC programming to define all boiler input and output information available through the boiler manufacturer's integration data port. Some boiler information can be left unmapped if requested by the OWNER. The heating plant shall be manually energized, seasonally, through the DDC system user interface.
- The sequence of boilers activated shall be rotated, on a timed basis, to ensure uniform operational hours of each boiler.
- When the boiler plant is energized the lead boiler and heating water pump shall be energized.

- Prior to a boiler being energized, the motorized isolation control valve on the heating water inlets shall be fully opened and lead primary pump shall start. Once the lead primary pump shall start, the DDC system has confirmed the heating water flow and minimum water flow, the boiler shall be energized.
- Boiler control panel shall be enabled/disabled by DDC system and have hot water supply temperature setpoint reset by Boiler sequencer panel. Boiler control panel shall be capable of outdoor reset, loop temperature span, and set loop temperature. Linear relationship between the two points above. The setpoint shall be 140° F (Adj.) with a reset schedule as noted below.

- Supply Water Temperature: 140 deg F (adjustable) when the outside air temperature is -10 deg F (adjustable) or below. 100 deg F (adjustable) when the outside air temperature is 55 deg F (adjustable) or above.
- Boilers shall be de-energized based on system capacity or flow. If the system capacity is below 30% heating pump flowrate or if the flow through an operating boiler falls below its minimum allowable flow rate (50 GPM), one boiler shall be de-energized. Flowmeter at primary pumps discharge to measure heating system flowrates.

- When the outside air temperature falls rises above 58°F, the boiler water system shall be de-energized. When outside air temperature drops below 54° F, the boiler water system will be energized subject to seasonal lock out.
- Provide a dedicated emergency shutdown switch to shutdown each boiler individually upon emergency shutdown. Label switch "Emergency Shutdown". Coordinate with the Owner.

Primary Pump (HWP-1) and Pump (HWP-2) CONTROL:

- When the heating water system is indexed on, the lead primary pump shall be energized.

The capacity of lead primary pump shall be controlled through a variable frequency drive (VFD). The VFD shall modulate pump speed in response to a signal from a differential pressure sensor located at the end of the piping system.

Lead / Lag Control: Current status switches, either integral to the VFD and/or discrete devices, shall prove lead and lag pump operation. If the heating lead pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.) or if differential is below setpoint for more than 5 minutes (Adj.) then lead pump shall be de-energized. An alarm shall be initiated through the DDC system user interface, and the second heating water pump shall be indexed on. The alarm condition shall remain initiated until the cause of the pump failure has been corrected and it resumes normal operation. The alarm shall be manually reset through the DDC system user interface. Upon sensing the lead pump is operating, the lag pump shall be stopped. The DDC system shall index the lag pump to become the lead pump through weekly scheduling feature of the building automation system.

Speed Control: Install a differential pressure sensor across the supply and return piping at the point in the system with the highest pressure drop as indicated on plans. The DDC system shall control the operating pump VFD to maintain a setpoint as described below.

A zone pressure request is generated when a heating valve is greater than 95% open until it drops to 80% open. An unit heater coil shall count as two zone pressure requests. Provide a binary data enable point for each zone to enable/disable the radiant in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the differential pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the differential pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

Minimum primary water flow shall be measured by the heating system's water flow meter. When minimum flow has been reached, pump VFD shall maintain speed to meet minimum flow. If differential pressure continues to rise, then the differential pressure sensor shall modulate opening heating water valve to maintain setpoint. When bypass is fully closed and setpoint cannot be maintained pump VFD shall speed up pump.

Minimum Boiler Flow: 50 GPM

The bypass control valve shall provide linear flow characteristics from fully closed to fully open. The rate at which the bypass valve opens and closes shall not exceed the maximum allowable rate of change of boiler flow rate recommended by the manufacturer (30% per minute).

The sequence of primary pumps activated shall be rotated, on a timed basis, to ensure uniform operational hours of each pump.

The primary heating water system capacity (BTU/hr) is computed by primary flow rate (GPM) multiplied by the difference between temperatures entering (°F) and leaving multiplied by 500.

Solar Booster Reheat Coil CONTROL:
For solar booster coil (BA-1 thru 6), provide a DDC space temperature sensor to control a modulating electronic control heating coil valve with supply air terminal to maintain space temperature. When space temperature is below setpoint modulate the heating coil valve open. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor that modulate opening heating water valve to maintain setpoint. When switch-on temperature difference is above 50° F.

Lead / Lag Control: Current status switches, either integral to the VFD and/or discrete devices, shall prove lead and lag pump operation. If the hot water lead pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.) or if differential is below setpoint for more than 5 minutes (Adj.) then lead pump shall be de-energized. An alarm shall be initiated through the DDC system user interface, and the second hot water pump shall be indexed on. The alarm shall be manually reset through the DDC system user interface. Upon sensing the lead pump is operating, the lag pump shall be stopped. The DDC system shall index the lag pump to become the lead pump through weekly scheduling feature of the building automation system.

Speed Control: Install a differential pressure sensor across the supply and return piping at the point in the system with the highest pressure drop as indicated on plans. The DDC system shall control the operating pump VFD to maintain a setpoint as described below.

Reset Differential Pressure Setpoint Control: The differential pressure setpoint shall be reset using Trim & Respond logic within the range 2 psig to 12 psig. When the pump is off, the setpoint shall be 8 psig. While the pump is proven on, every five minutes, trim the setpoint by 0.4 psig. If there are one or fewer zone pressure requests, if there is more than one zone pressure requests, respond by increasing the setpoint by 0.6 psig.

A zone pressure request is generated when a radiant manifold valve is greater than 95% open until it drops to 80% open. An unit heater coil shall count as two zone pressure requests. Provide a binary data enable point for each zone to enable/disable the radiant in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the differential pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the differential pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

Whenever Pump (HWP-3) or Pump (HWP-4) is running, as determined by the DDC system, the temperature of the heating water supply shall be controlled to maintain a setpoint. The setpoint shall be 100° F (Adj.) with no reset schedule.

Minimum heating water flow shall be measured by the radiant heat water flow meter. When minimum pump flow has been reached, pump VFD shall maintain speed to meet minimum flow. If differential pressure continues to rise, then the differential pressure sensor shall modulate open radiant heat bypass valve to maintain setpoint. When bypass is fully closed and setpoint cannot be maintained pump VFD shall speed up pump.

The radiant heating water system capacity (BTU/hr) is computed by radiant heat's flow rate (GPM) multiplied by the difference between temperatures entering (°F) and leaving multiplied by 500.

The bypass control valve shall provide linear flow characteristics from fully closed to fully open. The rate at which the bypass valve opens and closes shall not exceed the maximum allowable rate of change of radiant pump flow rate recommended by the manufacturer (30% Hz).

The sequence of radiant pumps activated shall be rotated, on a timed basis, to ensure uniform operational hours of each pump.

Secondary Solar Pump (HWP-5) CONTROL:
Start/Stop: The DDC system shall start the secondary solar pump whenever the solar storage tank temperature exceeds 120° F (Adj.). The pump shall operate continuously until the solar storage tank drops below 120° F (Adj.).

Solar Array Pump (HWP-6) CONTROL:
Solar Array Pump shall be started by the DDC system and shall operate continuously during available supply of hot water from solar collector panels as measured by differential temperatures between solar collector panel header and solar tank temperature. HWP-6 ECM inline pump with an integral speed controller.

Start/Stop: The DDC system shall start the solar array pump via the pumps ECM motor controls. Pump Status: Monitor each solar pump status operation through BAS.

Temperature control: When the solar storage temperature as measured by the Storage Tank Temperature sensor falls below the solar field temperature as measured by the Solar Field Temperature sensor the Solar Array Pump (HWP-6) shall energize and run continuously based on the optimization sequence below. When switch-on temperature difference is reached, the pump is activated until the differential temperature reaches or falls below the adjusted switch-off temperature difference.

Optimization Sequence: If the value for the AT switch-on is reached (e.g., ΔT on = 9°F), the pump will start with 100% pump speed for 10 seconds, then reduce the speed to the adjusted minimum pump speed (min. pump speed = 30%, adjustable). If the temperature difference reaches the set value (e.g., ΔT Set = 18°F), pump speed will increase by 10%. At any further rise of 3°F ΔT the pump speed will increase by 10% until the maximum of 100% is reached.

High Limit: Upon temperatures at the solar collector panel header exceeding a high limit setpoint (220deg F adj.), the Solar Pump shall stop. Low Limit: Upon temperatures at the solar collector panel header falling below a low limit setpoint (35 deg F adj.), the Solar Pump shall stop.

Solar Domestic Pump (HWP-7) AND STORAGE TANK CONTROL:
Start/Stop: The DDC system shall start the domestic pump via the pumps ECM motor controls. HWP-7 ECM inline pump with an integral speed controller.

Temperature control: When there is a call for heat from any booster coil (BC-A-1 thru 6) OR the domestic storage tank temperature as measured by the domestic storage tank temperature sensor falls below the Domestic Water Temperature Setpoint of 140° F (adj.) and the solar storage tank temperature is higher than the Domestic Water Temperature Setpoint of 140° F (adj.) the Domestic Pump (HWP-7) shall energize and run continuously until the domestic tank temperature reaches setpoint. When the temperature setpoint has been reached and there is no call for heat from the booster coils the Domestic Pump shall de-energize.

Domestic Storage Tank Point Integration: The domestic storage tank will be integrated to the DDC system through a MODBUS communication gateway provided by this contractor. Provide DDC programming to define all tank input and output information available through the tank manufacturer's integration data port.

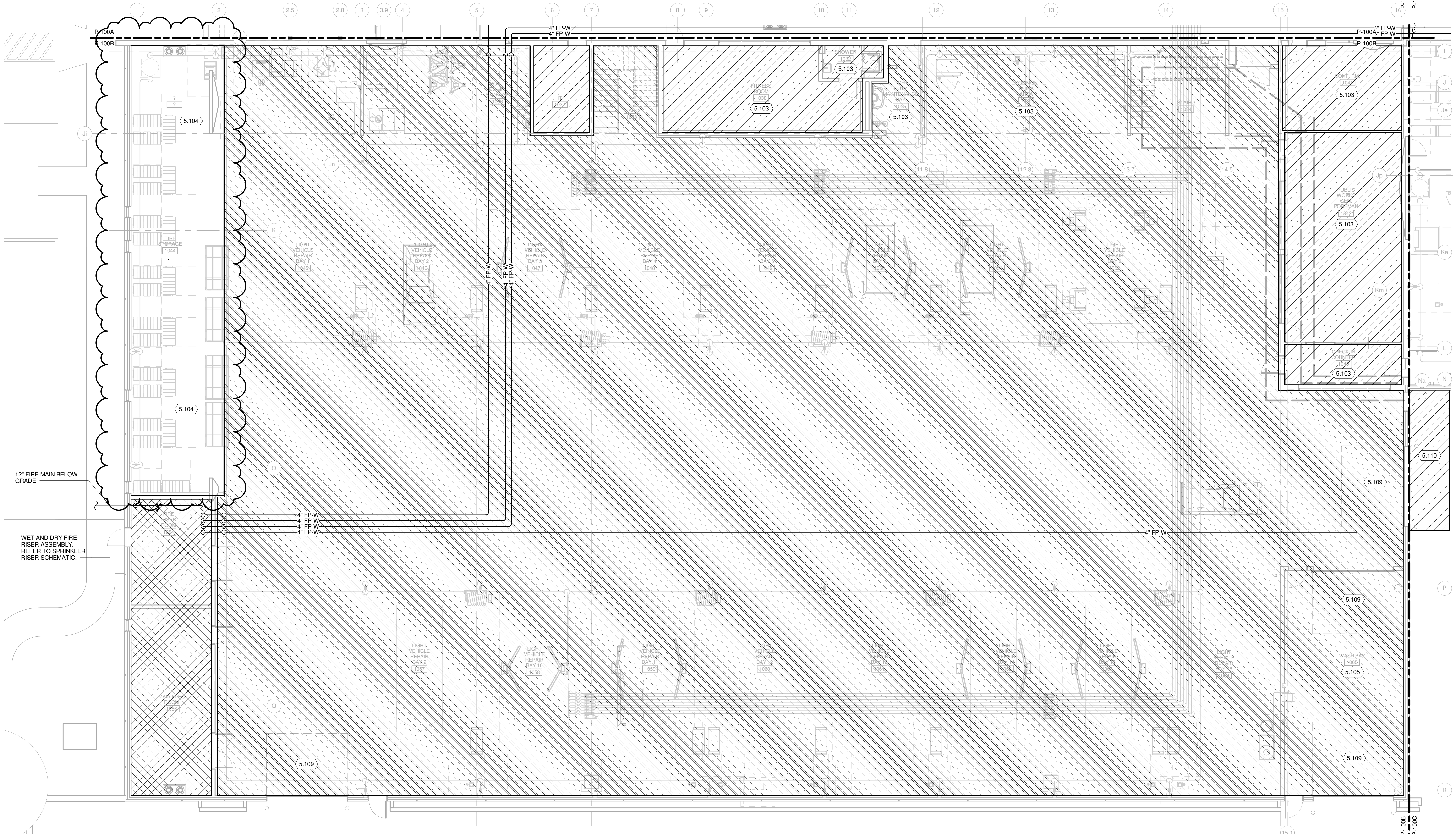
Power Outage Operation: In the event of a failure of the primary electrical service, the heating hot water boiler control system and all associated control devices shall be capable of operation via temporary standby power by portable unit.

During power outage operation, the heating hot water boiler sequence shall operate in accordance with the control sequence noted above. In the event of a failure of the primary electrical service, the primary heating hot water pumps shall be automatically started and operate via standby power from temporary standby power by portable unit.

DDC shall allow both heating hot water pumps to operate via standby power from the building standby power system from temporary standby power by portable unit.

On failure of the lead primary hot water pump, as measured via current switch, lag primary hot water pump shall be started and a critical alarm shall be generated. Time limit for determining heating hot water pump failure shall be 30 seconds (Adj.).

Designation of lead / lag / standby heating hot water pumps, for power outage operation, shall be manually definable through the DDC.



TRUE PLAN
NORTH NORTH
1
FIRE PROTECTION - FIRST FLOOR PLAN
1/8" = 1'-0"

NFPA-13 HYDRAULIC CALCULATION STANDARD			
HAZARD CLASS	DENSITY GPM/SQ.FT.	AREA OF SPRINKLER OPERATION SQ. FT.	TOTAL HOSE STREAM GPM
LIGHT HAZARD	0.10	1500	100
ORDINARY HAZARD GROUP 1	0.15	1500	250
ORDINARY HAZARD GROUP 2	.20	1500	250
EXTRA HAZARD GROUP 1	.30	2500	500
EXTRA HAZARD GROUP 2	.40	2500	500

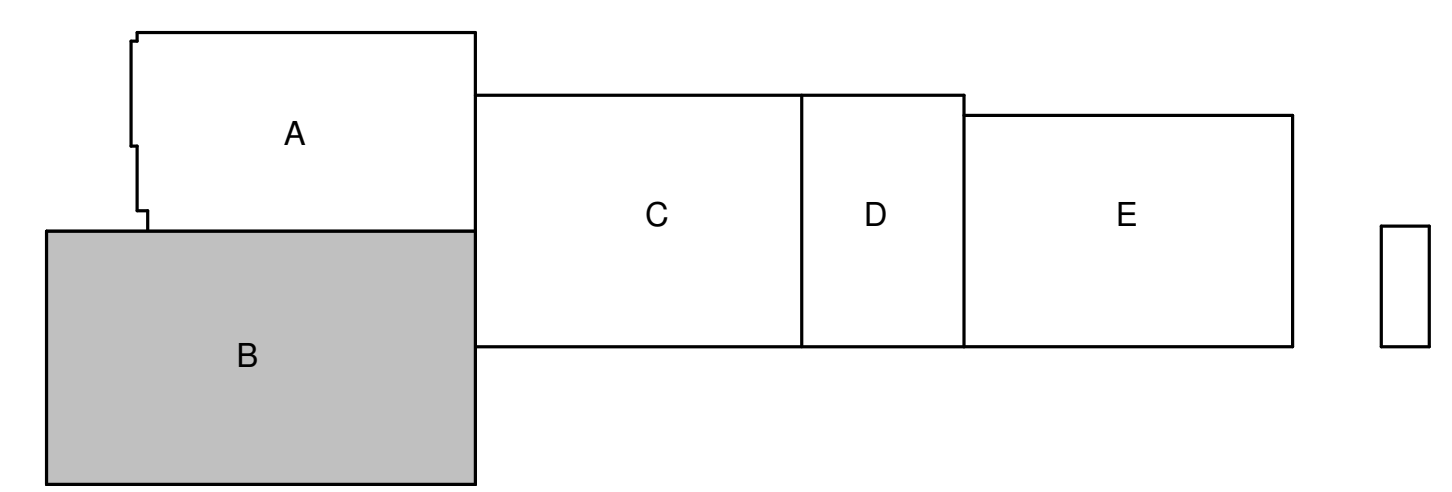
* THE MOST HYDRAULICALLY REMOTE LOCATIONS MUST MEET THE ABOVE REQUIREMENTS.

FIRE PROTECTION HATCH PATTERN LEGEND:

- LIGHT HAZARD
- ORDINARY HAZARD GROUP 1
- ORDINARY HAZARD GROUP 2
- EXTRA HAZARD GROUP 1
- EXTRA HAZARD GROUP 2

KEYED NOTES

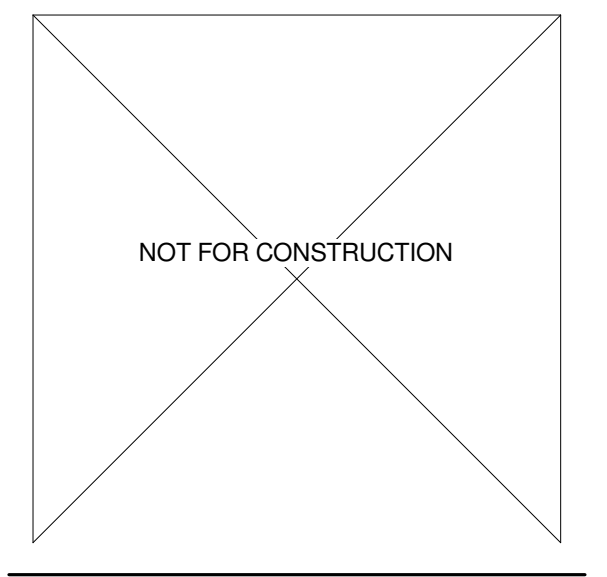
- 5.103 ROOM BELOW MEZZANINE: EXTEND SPRINKLER COVERAGE AS REQUIRED.
- 5.104 TIRE RACK STORAGE AREA. PROVIDE MINIMUM 0.39 GPM/SF DENSITY OVER A 2600 SF DESIGN AREA AND 750 GPM HOSE STREAM ALLOWANCE.
- 5.105 ROOM LID IS BELOW HIGHEST STRUCTURE OF BUILDING. PROVIDE SPRINKLER COVERAGE ABOVE AND BELOW ROOM LID.
- 5.109 PROVIDE SPRINKLER COVERAGE ABOVE AND BELOW OVERHEAD DOOR
- 5.110 PROVIDE DRY BARREL SIDEWALL SPRINKLER TO SERVE LOADING DOCK CANOPY.



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NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

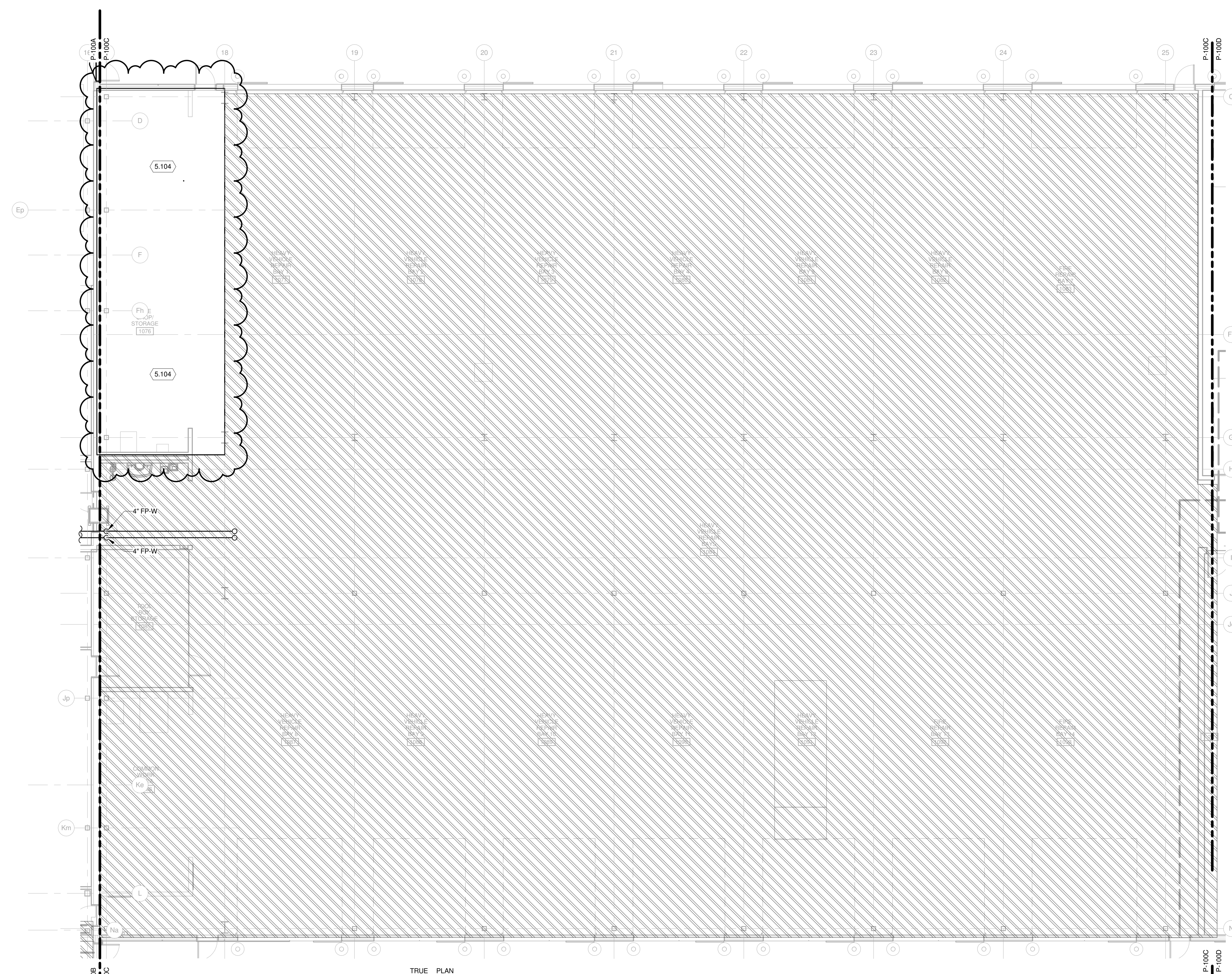
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LEVEL 1 FLOOR PLAN - FIRE PROTECTION - AREA B

F-101B

KEYED NOTES

5.104 TIRE RACK STORAGE AREA PROVIDE MINIMUM 0.39 GPM/SF DENSITY OVER A 2600 SF DESIGN AREA AND 750 GPM HOSE STREAM ALLOWANCE.

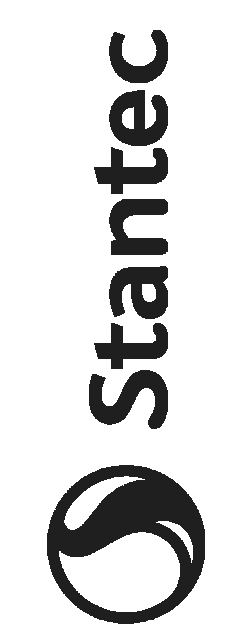
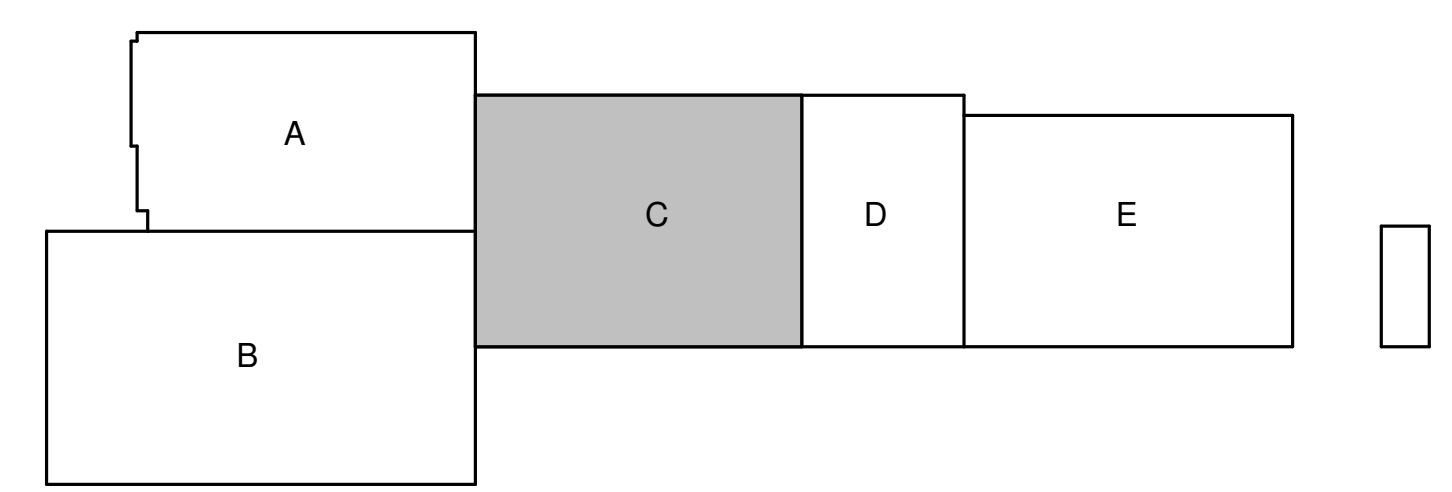
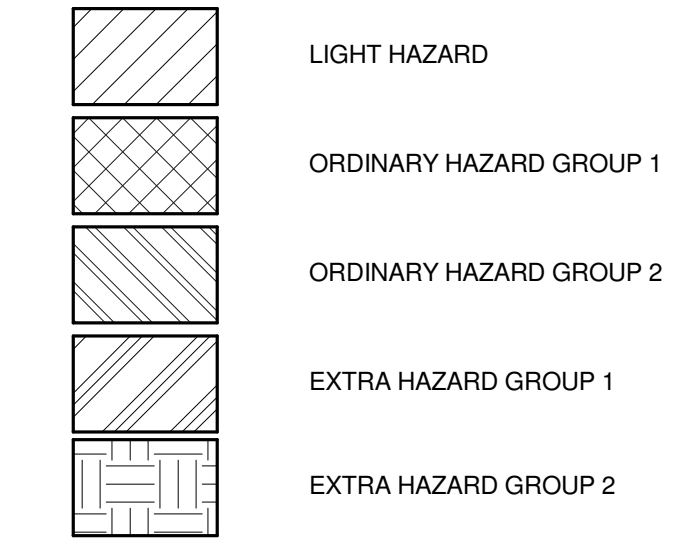


TRUE PLAN NORTH NORTH
FIRE PROTECTION - FIRST FLOOR PLAN
 1/8" = 1'-0"

NFPA-13 HYDRAULIC CALCULATION STANDARD			
HAZARD CLASS	DENSITY GPM/SQ.FT.	AREA OF SPRINKLER OPERATION SQ. FT.	TOTAL HOSE STREAM GPM
LIGHT HAZARD	0.10	1500	100
ORDINARY HAZARD GROUP 1	0.15	1500	250
ORDINARY HAZARD GROUP 2	.20	1500	250
EXTRA HAZARD GROUP 1	.30	2500	500
EXTRA HAZARD GROUP 2	.40	2500	500

* THE MOST HYDRAULICALLY REMOTE LOCATIONS MUST MEET THE ABOVE REQUIREMENTS.

FIRE PROTECTION HATCH PATTERN LEGEND:



1600 WILSON BLVD.
 SUITE 360
 ARLINGTON, VA 22209
 571.290.7679

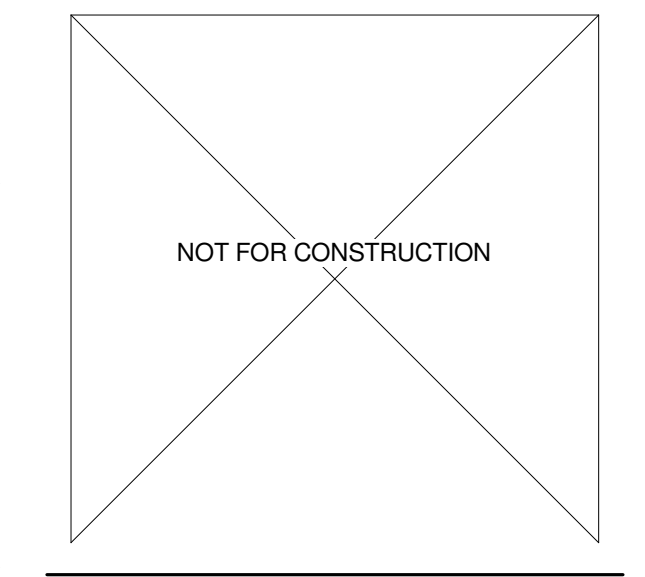


Mead & Hunt, Inc.
 2440 Deming Way
 Middleton, WI 53662
 phone: 608-273-6390
 meadhunt.com

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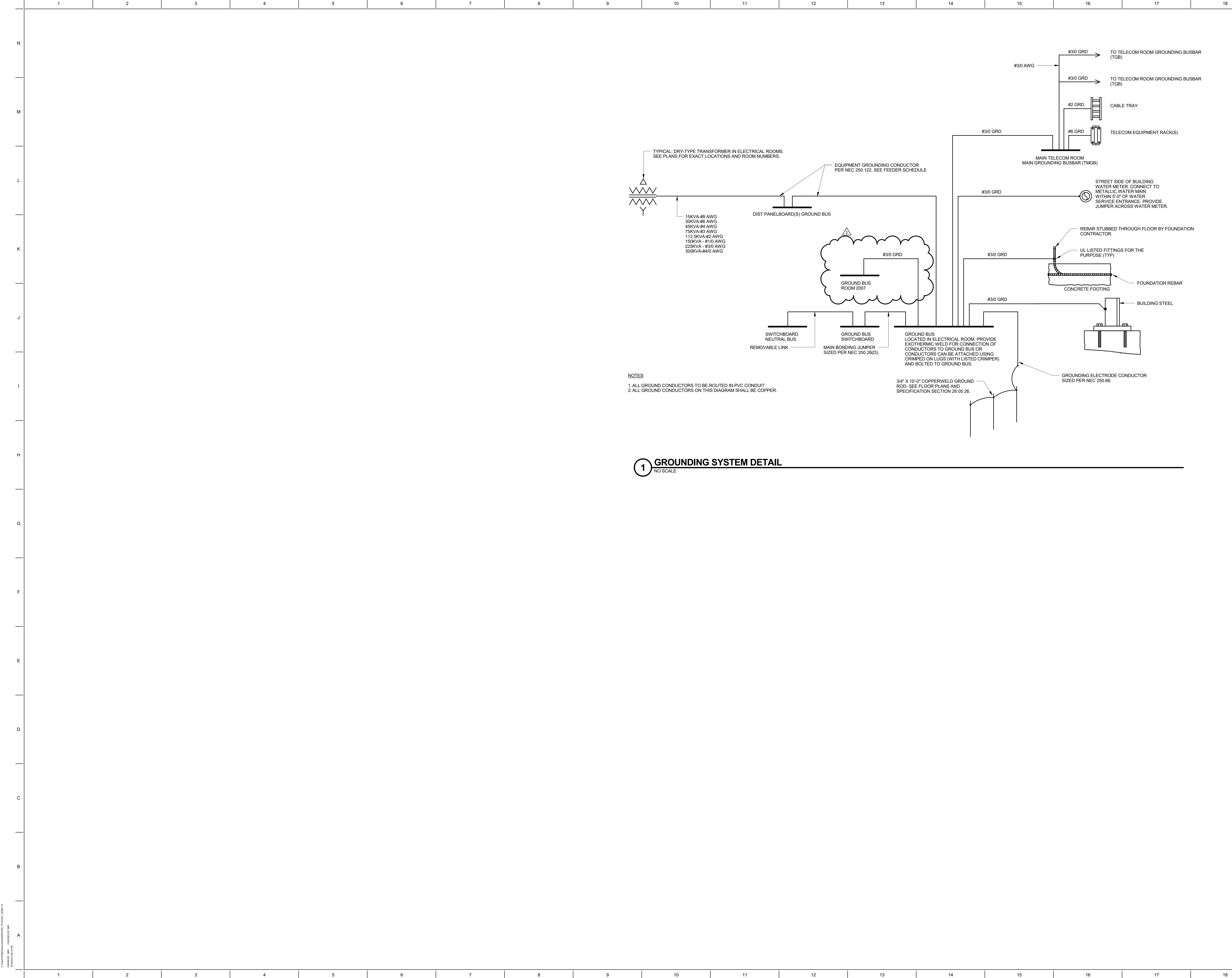


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3	ADDENDUM 3	03/14/2019
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	ISSUE FOR PERMIT	01/17/2019

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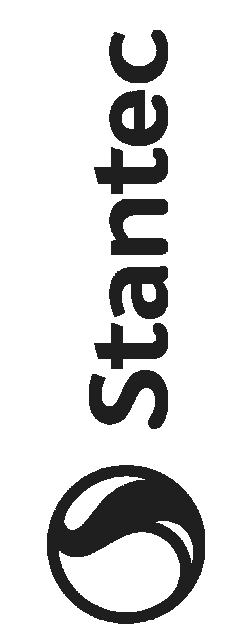
LEVEL 1 FLOOR PLAN -
 FIRE PROTECTION - AREA C

F-101C



NOTES:
 1. ALL GROUND CONDUCTORS TO BE ROUTED IN PVC CONDUIT.
 2. ALL GROUND CONDUCTORS ON THIS DIAGRAM SHALL BE COPPER.

1 GROUNDING SYSTEM DETAIL
 NO SCALE



1600 WILSON BLVD.
 SUITE 360
 ARLINGTON, VA 22209
 571.250.7679

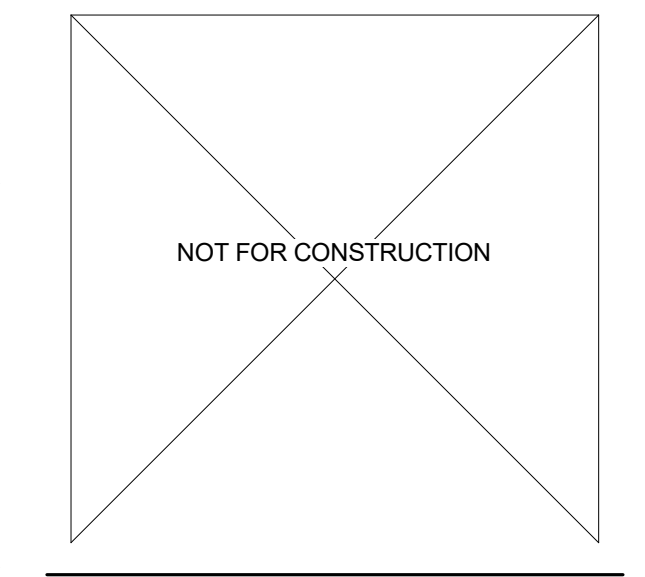


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 Middleton, WI 53662
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PROJECT No: 1303500-160264.01

DETAILS

E-503

OPTIONS/ACCESSORIES CODE LISTING:

15 MATTE DIFFUSE CLEAR REFLECTOR

BALLAST/DRIVER CODE LISTING: (SEE SPECIFICATIONS)

- B LED NON-DIMMABLE POWER SUPPLY.
- C LED DIMMABLE POWER SUPPLY (0-10V) 1%.
- D LED DIMMABLE POWER SUPPLY (0-10V) 10%.
- E LED DIMMABLE POWER SUPPLY (TRAILING EDGE).
- F LED DIMMABLE POWER SUPPLY 1% DIMMING LUTRON HI LUME OR EQUAL.
- G LED DIMMABLE POWER SUPPLY ADVANCE XITANIUM OR EQUAL.
- H LED DIMMABLE POWER SUPPLY (0-10V) 5%.
- J LED DIMMABLE POWER SUPPLY (0-10V) 1% ELDO OR EQUAL.

GENERAL NOTES:

1. ONLY DRIVERS LEGEND IS INDICATED ON THIS SCHEDULE TO ESTABLISH THE INTENT OF THE DESIGN AND ASSOCIATED CONTROLS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION. EACH FIXTURE SUBMITTAL SHALL BE PROVIDED WITH FULL DRIVER ANDED MODULES INFORMATION.
2. WHEN 0%, 1% OR DIM DIMMING IS IDENTIFIED IN THE SCHEDULE, EC SHALL PROVIDE A MIN OF TWO DRIVERS OF EACH KIND TO THE CONTROL MANUFACTURER FOR TESTING AND COMPATABILITY APPROVAL.
3. ALL LED REPLACEMENT LAMPS SHALL BE TESTED FOR DIMMING COMPATABILITY WITH DIMMING SYSTEM BEING SUPPLIED. CONTRACTOR SHALL PROVIDE MINIMUM OF (4) FOUR LAMPS OF EACH TYPE LISTED IN THIS SCHEDULE OR ANY SUBSTITUTE TO BE SUPPLIES TO DIMMING SYSTEMS/DEVICE MANUFACTURER FOR TESTING TO VERIFY LAMP PERFORMANCE.
4. EC SHALL VERIFY AND CONFIRM ALL LUMINAIRE TRIMS/FLANGES WITH RESPECTIVE CEILING TYPES SCHEDULED AND/OR SUBMITTED BY THE GC PRIOR TO LUMINAIRES ORDER RELEASE. SCHEDULE INDICATES TRIM TYPES BASED ON THE GENERIC CEILING INFORMATION AVAILABLE AT THE TIME BIDDING DOCUMENTS WERE ISSUED AND MAY NOT REFLECT ACTUAL THICKNESS OF GYPSUM WALL BOARD OR PLASTER CEILING OR EXACT GRID TYPE SPECIFIED BY THE ARCHITECT.

KEYED NOTES:

1. PROVIDE WITH ALL REQUIRED ACCESSORIES TO ALLOW INSTALLATION AS SHOWN ON THE PLANS.
2. SEE PLANS FOR EXACT LENGTH. PROVIDE WITH REMOTE POWER SUPPLIES IN QUANTITIES AS DICTATED BY THE INSTALLATION. EACH STRIP SHALL BE PROVIDED WITH MOUNTING CLIPS AND STAINLESS STEEL CHANNEL.
3. PROVIDE WITH 20' ROUND STEEL TAPERED POLE; CATALOG # RTS-6-D-20-S-T-1-X OR EQUAL.
4. PROVIDE WITH 25' ROUND STEEL TAPERED POLE; CATALOG # RTS-6-D-25-S-T-2-X OR EQUAL.
5. PROVIDE WITH 25' ROUND STEEL TAPERED POLE; CATALOG # RTS-6-D-25-S-T-3-X-E OR EQUAL.
6. PROVIDE WITH 10' Y TOGGLE #2 CABLE FOR PENDANT MOUNT INSTALLATION, (2) PER FIXTURE.
7. FIXTURE SHALL BE MOUNTED 8" MIN. BELOW TOP OF POLE MEASURED FROM TOP OF FIXTURE TO ALLOW FOR TYPE OL SLIPFITTING MOUNTING ON TOP OF POLE.
8. LED MODULES AND THEIR DRIVERS SHALL BE WIRED AND INSTALLED TO ALLOW INBOARD - OUTBOARD SWITCHING ARRANGEMENTS AS SHOWN ON THE PLANS.
9. MANUFACTURERS LISTED AS ACCEPTABLE SUBSTITUTION FOR THIS FIXTURE WILL REQUIRE TO PROVIDE A CUSTOMIZATION OF THEIR RESPECTIVE BASIC MODELS TO MEET THE INTENT OF THE DESIGN TO BE CONSIDERED FOR AN APPROVAL.
10. IT IS UNDERSTOOD THAT EXACT MATCH TO THE SPECIFIED FIXTURE IS NOT AVAILABLE BUT THE CLOSEST MATCH OF IN THE APPEARANCE, WATTAGE AND CONSTRUCTION QUALITY WILL BE CONSIDERED FOR APPROVAL.
11. PROVIDE WITH 20' ROUND STEEL TAPERED POLE; CATALOG # RTS-6-D-20-S-T-2-1-X OR EQUAL.
12. PROVIDE WITH 25' ROUND STEEL TAPERED POLE; CATALOG # RTS-6-D-25-S-T-3-2-X OR EQUAL.

LUMINAIRE SCHEDULE														
NOTE: SEE SPECIFICATION FOR ADDITIONAL INFORMATION REGARDING LUMINAIRE AND INSTALLATION REQUIREMENTS. PROVIDE OPTIONS AND ACCESSORIES REFERENCED BY THE COLUMN TITLED 'OPTIONS/ACCESSORIES'. MANUFACTURERS LISTED ACCEPTABLE SHALL MEET ALL REQUIREMENTS AND FEATURES INDICATED. ACCEPTABLE MANUFACTURERS MUST MEET THE PHOTOMETRIC PERFORMANCE OF THE LISTED UNIT.														
ABBREVIATIONS: GWB = GYPSUM WALL BOARD P = PENDANT R = RECESSED V = VARIES														
ES = EXPOSED STRUCTURE PLAS = PLASTER S = SURFACE W = WALL MOUNTED														
LG = LAY-IN GRID PL = POLE MOUNTED UNV = UNIVERSAL VOLTAGE														
DES.	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP DATA	VOLTAGE	BALLAST/DRIVER	MOUNT	CEILING TYPE	FIXTURE DEPTH	LED SYSTEM INPUT WATTAGE	LED DELIVERED LUMENS	OPTIONS / ACCESSORIES	ACCEPTABLE MANUFACTURERS	KEYED NOTE
A	FINELITE	HPRLD-A-2X4-DCO-S-8-40-277-SC-C1	2' WIDE X 4' LONG VOLUMETRIC TROFFER	LED, 4000K	277	C	R	LG	4"	27	3,893		COOPER LIGHTING	
A1	FINELITE	HPRLD-A-2X4-DCO-B-8-40-277-SC-C1	SAME AS 'A' EXCEPT LUMEN OUTPUT	LED, 4000K	277	C	R	LG	4"	35.2	4,894		PHILLIPS LIGHTING	
A2	METALUX	24FP4740C	2' WIDE X 4' LONG FLAT PANEL	LED, 4000K	277	D	R	LG	7/16"	40.3	4,858		COOPER LIGHTING	
B	FINELITE	HPRLD-A-2X2-DCO-S-8-40-277-SC-C1	2' WIDE X 4' LONG VOLUMETRIC TROFFER	LED, 4000K	277	D	R	LG	4"	28.5	3,506		PHILLIPS LIGHTING	
B2	METALUX	22FP3240C	2' WIDE X 2' LONG FLAT PANEL	LED, 4000K	277	D	R	LG	5/16"	30	3,560		COOPER LIGHTING	
B6	METALUX	22FP3240C-DF-22H-U	SAME AS 'B2' EXCEPT WITH DRYWALL KIT	LED, 4000K	277	D	R	GWB	5/16"	30	3,560		COOPER LIGHTING	
D	PATHWAY	6TCVFL2X-2000-4K-120-277-D8-6VLEDMSCLPF	6" DIAMETER DOWNLIGHT	LED, 4000K	UNV	C	R	V	8.375"	21	1,854	15	COOPER/PORTFOLIO	
D1	PATHWAY	4TCVFL2X-1500-4K-120-277-D8-4VLEDMSCLPF	4" DIAMETER DOWNLIGHT	LED, 4000K	UNV	C	R	V	8.375"	15	1,317	15	ACUTY/GOTHAM, GREE	
D2	PATHWAY	6TCVFL2X-2000-4K-120-277-D8-6VLEDPL-HAZ-W-L	6" DIAMETER DOWNLIGHT	LED, 4000K	UNV	C	R	GWB	8.375"	21	1,705	15	COOPER/PORTFOLIO	
D3	PATHWAY	6TCVFL2X-2000-4K-120-277-D8-6VLED-GLW	6" DIAMETER DOWNLIGHT WITH DECORATIVE GLASS TRIM	LED, 4000K	UNV	C	R	LG	8.375"	21	1,810	15	COOPER/PORTFOLIO	
D4	PATHWAY	4TCVFL2X-1500-4K-120-277-D8-4VLEDWW-SCLP-F	4" DIAMETER WALL WASH DOWNLIGHT	LED, 4000K	UNV	C	R	LG	8.375"	15	1,240	15	ACUTY/GOTHAM, GREE	
D5	FOCAL POINT	FC44D-20-200L-92-A-1-B-44-SC-160L-40K-C-WH	4" X 4.5" DOWNLIGHT	LED, 4000K	UNV	C	R	WOOD	5.81"	24	1,500	15	PHILLIPS/LITHONIA	
F10	FINELITE	HP-4-WW-R-K-10'-H-840-277-C1-SC	4" WIDE X 10' LONG WALL WASHER	LED, 4000K	277	D	R	LG	4"	3.8 / FT	364 / FT		AXIS LIGHTING; PRUDENTIAL	
G4	FINELITE	HP-4-R-4'-B-840-F-277-SC-C1	4" WIDE X 4' LONG RECESSED LINEAR	LED, 4000K	277	D	R	V	4"	4.6 / FT	479 / FT		FOCAL POINT LIGHTS; LEDALITE	
G8	FINELITE	HP-4-R-8'-H-840-F-277-SC-C1	4" WIDE X 8' LONG RECESSED LINEAR	LED, 4000K	277	D	R	WOOD	4"	7.1 / FT	748 / FT		AXIS LIGHTING; PRUDENTIAL	
G8P	FINELITE	HP-2-ID-8'-S-B-840-WSO-BG-277V-SC-FA-FA	2" WIDE X 10' LONG PENDANT LINEAR	LED, 4000K	277	D	P	LG	4-3/4"	8.2 / FT	825 / FT		AXIS LIGHTING; PRUDENTIAL	
G10P	FINELITE	HP-2-ID-10'-H-H-840-WSO-BG-277V-SC-FA-FA	2" WIDE X 10' LONG PENDANT LINEAR	LED, 4000K	277	D	P	LG	4-3/4"	14.2 / FT	1402 / FT		AXIS LIGHTING; PRUDENTIAL	
H	METALUX	VT4LED-LD5-30-DRF-JUN-V-L840-CD3-WL-SSL-VT4-LED-SS-MBK-PK-U	15.5" WIDE X 52" LONG VAPORTITE INDUSTRIAL	LED, 4000K	UNV	D	P	ES	6-3/4"	232	30,548		COOPER LIGHTING	6,8
H1	METALUX	VT4LED-LD5-24-DRF-JUN-V-L840-CD2-WL-SSL-VT4-LED-SS-MBK-PK-U	15.5" WIDE X 52" LONG VAPORTITE INDUSTRIAL	LED, 4000K	UNV	D	P	ES	6-3/4"	179	24,014		PHILLIPS LIGHTING	6,8
H2	METALUX	VT4LED-LD5-15-DRF-JUN-V-L840-CD2-WL-SSL-VT4-LED-SS-MBK-PK-U	15.5" WIDE X 52" LONG VAPORTITE INDUSTRIAL	LED, 4000K	UNV	D	P	ES	6-3/4"	112	15,229		COOPER LIGHTING	6,8
H3	METALUX	VT4LED-LD5-9-DRF-JUN-V-L840-CD1-WL-SSL-VT4LE-D-SS-MBK-PK-U	15.5" WIDE X 52" LONG VAPORTITE INDUSTRIAL	LED, 4000K	UNV	D	P	ES	6-3/4"	64	8,781		COOPER LIGHTING	6
H4	METALUX	VT4LED-LD5-12-DRF-JUN-V-L840-CD1-WL-SSL-VT4-LED-SS-MBK-PK-U	15.5" WIDE X 52" LONG VAPORTITE INDUSTRIAL	LED, 4000K	UNV	D	P	ES	6-3/4"	93	11,900		PHILLIPS LIGHTING	6
K	CREE	LS4-50L-40K-10V-ACS-18-5-48-Q14B-JB	2.5" WIDE X 4' LONG LINEAR PENDANT	LED, 4000K	UNV	H	P	V	3"	50	5,000		COOPER LIGHTING	
L4	CREE	LS4-40L-40K-10V-ACS-18-5-48-Q14B-JB	2.5" WIDE X 4' LONG LINEAR PENDANT	LED, 4000K	UNV	H	P	V	3"	44	4,000		PHILLIPS LIGHTING	
L6	FINELITE	HP-ID-6'-S-B-840-TG-BG-277V-DC-EXPOSED	2.25" WIDE X 6' LONG DIRECT/INDIRECT LINEAR PENDANT	LED, 4000K	277	D	P	ES	4-3/4"	8.2 / FT	825 / FT		AXIS LIGHTING; PRUDENTIAL	
L8	CREE	LS4-25L-40K-10V-TW-LS-RJ-LS4TWK-ACS-18/5-48-Q14B-JB	2.5" WIDE X 8' LONG LINEAR PENDANT	LED, 4000K	UNV	H	P	V	3"	46	5,000		COOPER LIGHTING	
L12	CREE	LS4-25L-40K-10V-TW-LS-RJ-LS4TWK-ACS-18/5-48-Q14B-JB	2.5" WIDE X 12' LONG LINEAR PENDANT	LED, 4000K	UNV	H	P	V	3"	69	7,500		PHILLIPS LIGHTING	
P1	SPI LIGHTING	AIC11990-LS7W-PT22-12-0-277V-4000K	25" X 25" SQUARE CUBES DECORATIVE LUMINAIRE CONSISTING OF FOUR CONNECTED CUBES	LED, 4000K	UNV	D	S	LG	13.7"	57	4,843		ACUTY/WINONA	9
P5	EUREKA	4175-LED.13-40-277V-DV-C-CHR-ANTE-CLR	7" DIAMETER DECORATIVE GLASS PENDANT	LED, 4000K	277	D	P	WOOD	7-1/2"	13	1,000		MANNING LIGHTING	10
S4	CREE	LS4-40L-40K-10V	2.5" WIDE X 4' LONG LINEAR STRIP	LED, 4000K	UNV	H	S	V	3"	44	4,000		COOPER LIGHTING	
S6	FINELITE	HP-2SM-6'-B-840-BG-277-V-C1-SC	2.25" WIDE X 6' LONG SURFACE LINEAR STRIP	LED, 4000K	277		S	LG	4"	4.6 / FT	427 / FT		AXIS LIGHTING; PRUDENTIAL	
S8	CREE	LS8-80L-40K-10V-ACS-18-5-48-Q14B-JB	2.5" WIDE X 8' LONG LINEAR STRIP	LED, 4000K	UNV	H	S	V	3"	88	8,000		COOPER LIGHTING	
T	FAIL-SAFE	FVS4W-8-LD4-1STD-40-2-77-P125-EDD1	4" WIDE X 8' LONG WRAPAROUND	LED, 4000K	277	C	W	-	3-3/4"	68	7,876		PHILLIPS/DAYBRITE	
U	PHILIPS	523-000027-91	19.25" UNDERCABINET LUMINAIRE	LED, 3000K	120	E	S	-	1.7"	13	450		ACUTY/LITHONIA	1
U1	PHILIPS	523-000027-92	39.25" UNDERCABINET LUMINAIRE	LED, 3000K	120	E	S	-	1.7"	25	862		COOPER/FAIL-SAFE	1
V	VODE LIGHTING	107-WG-01-40'-WA-6-IP-A-E-2-0-Z-LO-40-0-AL-0	40' OVERALL LENGTH - DISPAY BOARDS ACCENT LIGHT	LED, 4000K	UNV	J	W	-	2.12"	3.8 / FT	297 / FT		ACUTY/LITHONIA	
W2	OXYGEN LIGHTING	37-537-4024	24" VANITY LUMINAIRE	LED, 4000K	277	E	W	-	3.32"	11.6	1,258		SPI LIGHTING	
W4	CREE	LS4-25L-40K-10V	2.5" WIDE X 4' LONG LINEAR STRIP	LED, 4000K	UNV	H	W	-	3"	44	4,000		LITHONIA; DAYBRITE	
W6	VODE LIGHTING	107-WG-01-72"-WA-12-IP-AE-2-2-SO-40-1-AL	6' MARKERBOARD LIGHT ON 12" LONG CANTILVERED ARM	LED, 4000K	UNV	J	W	-	2.12"	6.30 / FT	802 / FT		LUMIUM LIGHTING	
W8	METALUX	8T-SNLED-LD5-83SL-LC-UNV-L840-CD1-U	3" WIDE X 8' LONG LINEAR STRIP	LED, 4000K	UNV	D	W	-	3-7/8"	61	8,537		ACUTY/LITHONIA	



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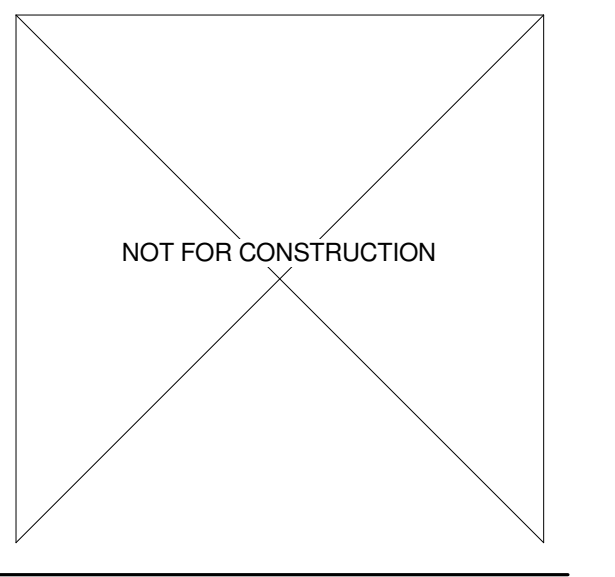


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PROJECT No: 1303500-160264.01

SCHEDULES

E-601

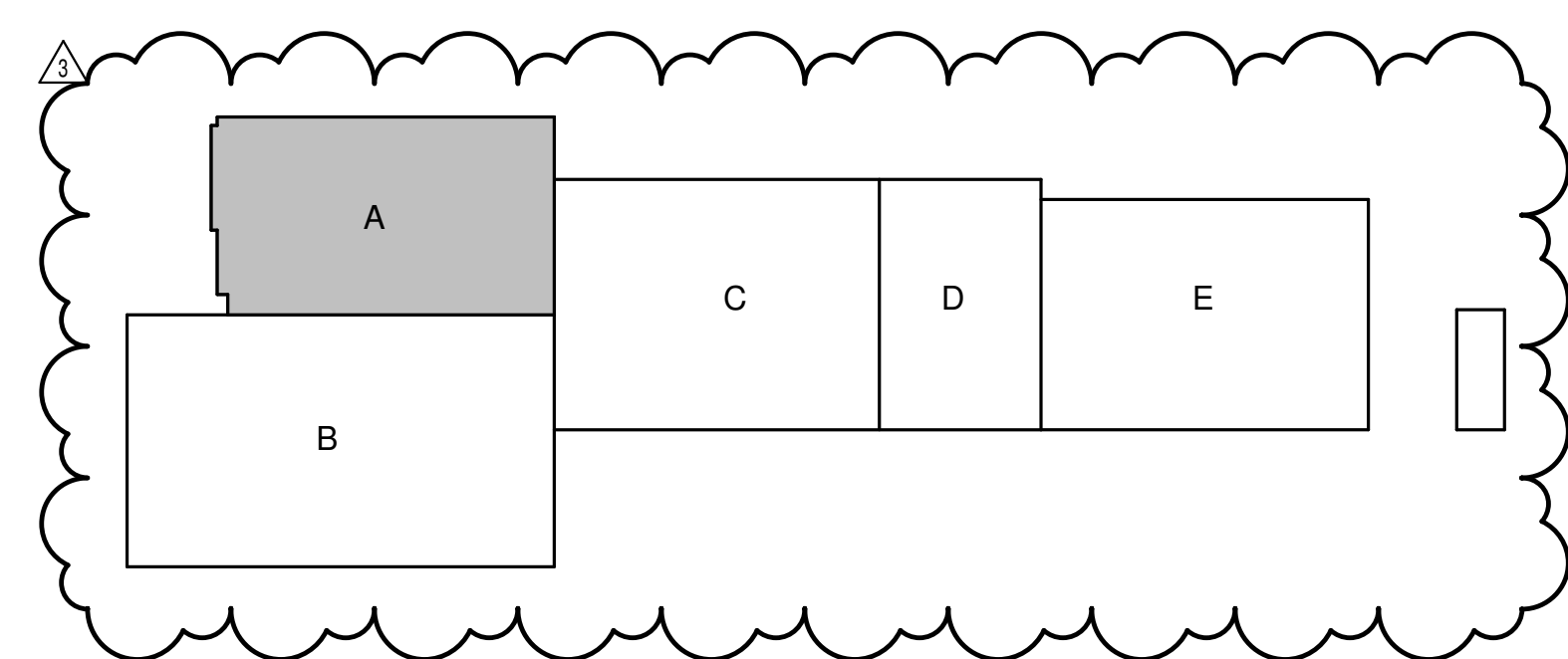
TRUE PLAN
NORTH NORTH
LEVEL 1 FLOOR PLAN
AREA A - AUDIO/VISUAL
1/8" = 1'-0"

KEYED NOTES

- 9.902 REFER TO 2/T-504 FOR ADDITIONAL INFORMATION.
- 9.903 REFER TO 3/T-504 FOR ADDITIONAL INFORMATION.
- 9.905 ROUGH IN ONLY. PROVIDE BACK BOX, CONDUIT AND CABLE FOR PTZ CAMERA FOR VIDEO CONFERENCING SYSTEM. SEE T-XXX FOR DETAILS

AUDIO/VISUAL GENERAL NOTES:

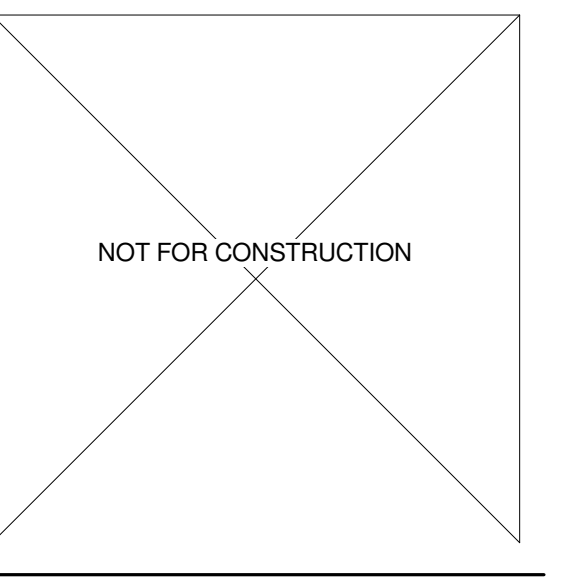
1. SEE PUBLIC ADDRESS ONE-LINE DIAGRAM ON SHEET T-701 FOR SPEAKER ZONING.
2. MOUNT ALL HORN TYPE SPEAKERS AT 15'-0" AFF UNLESS NOTED OTHERWISE.



CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY

4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714

ISSUE FOR BID

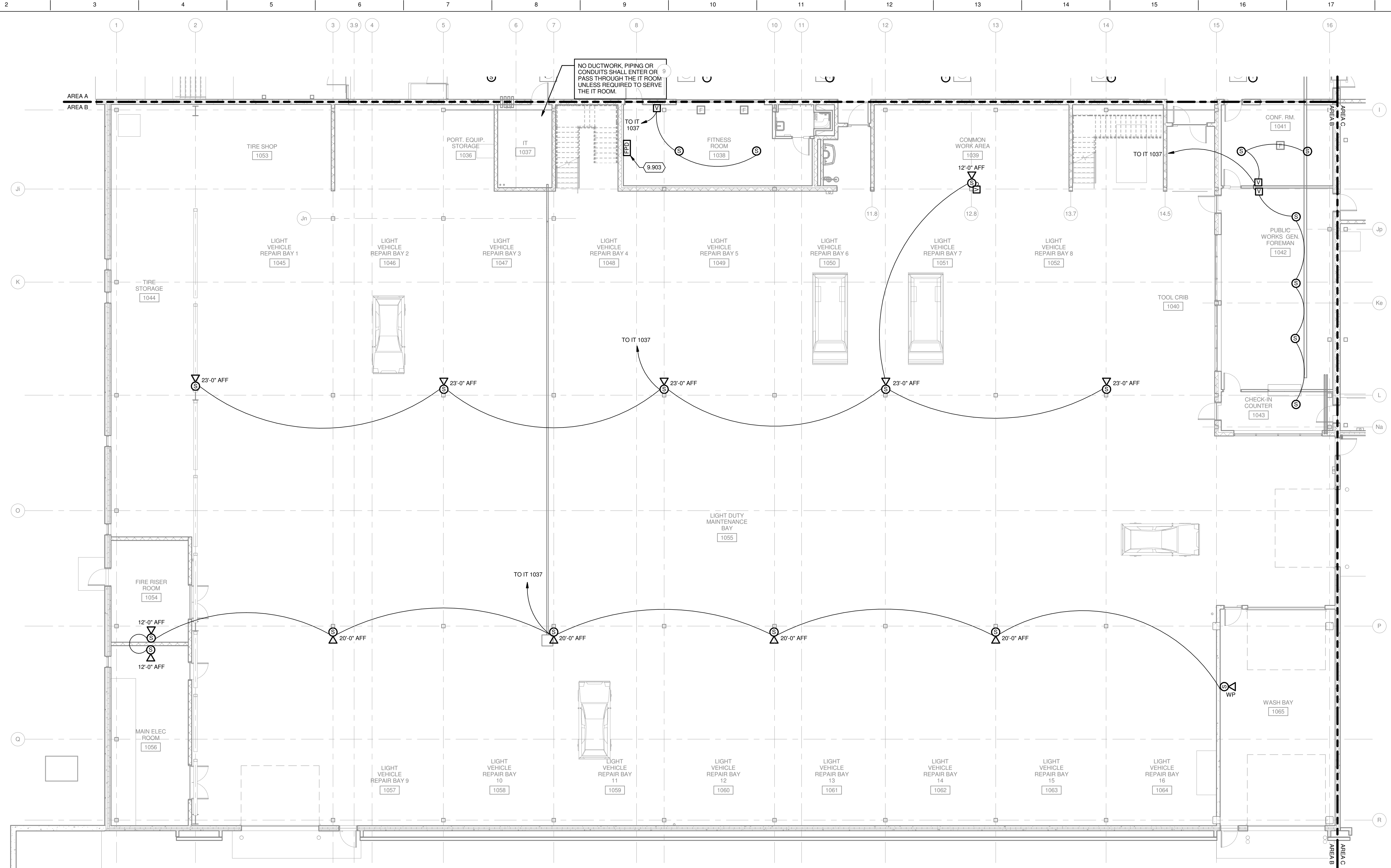


NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

LEVEL 1 FLOOR PLAN AREA A - AUDIO/VISUAL

T-141

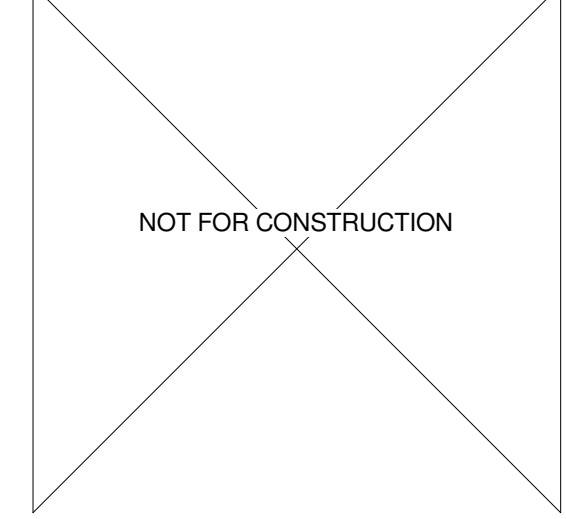


TRUE PLAN NORTH NORTH
**LEVEL 1 FLOOR PLAN
AREA B - AUDIO/VISUAL**
1/8" = 1'-0"

KEYED NOTES
9.903 REFER TO 317-504 FOR ADDITIONAL INFORMATION.

AUDIO/VISUAL GENERAL NOTES:
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2. MOUNT ALL HORN TYPE SPEAKERS AT 15'-0" AFF UNLESS NOTED OTHERWISE.

CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY
4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714
ISSUE FOR BID



NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
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	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

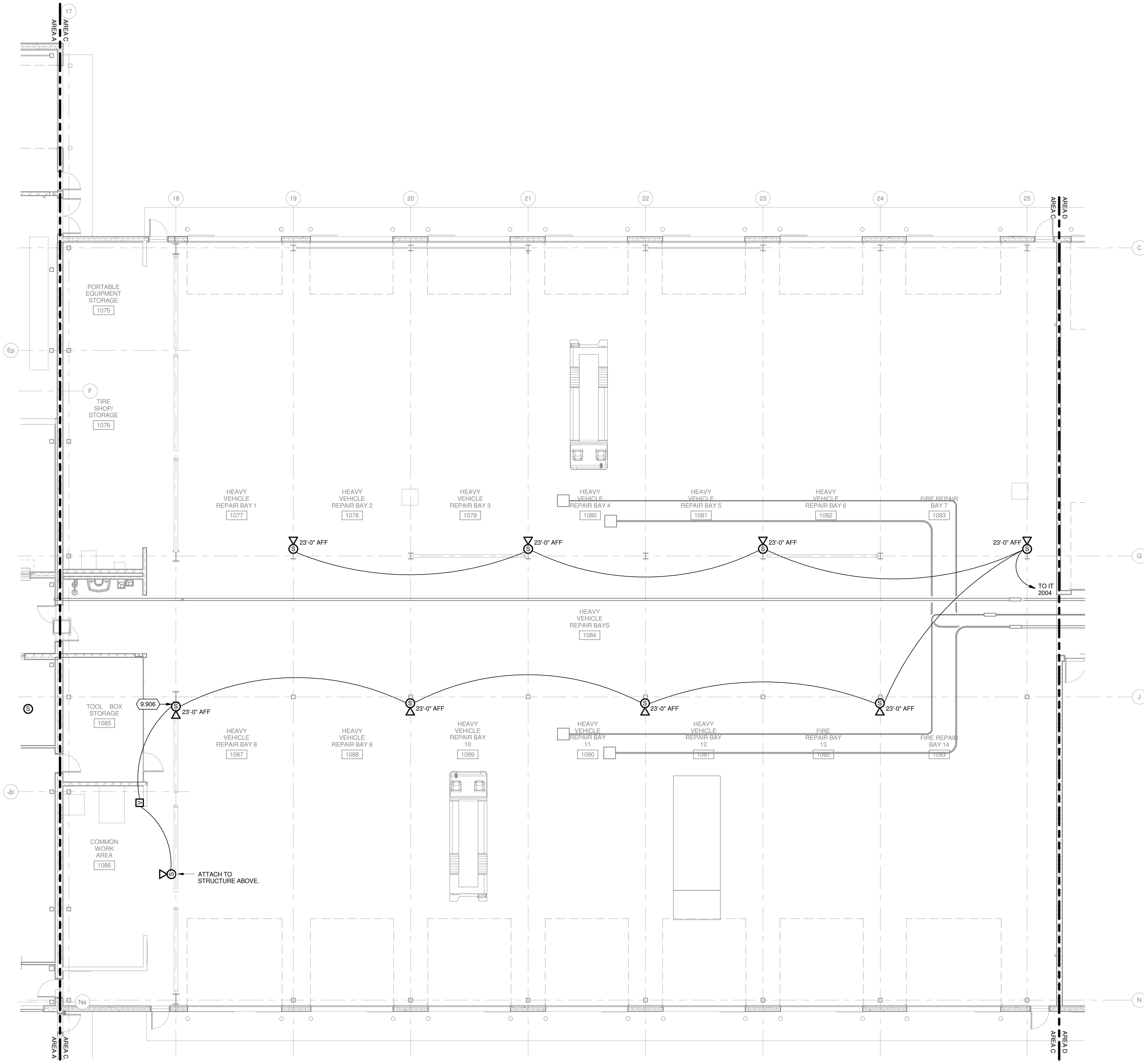
LEVEL 1 FLOOR PLAN AREA B - AUDIO/VISUAL

AUDIO/VISUAL GENERAL NOTES:

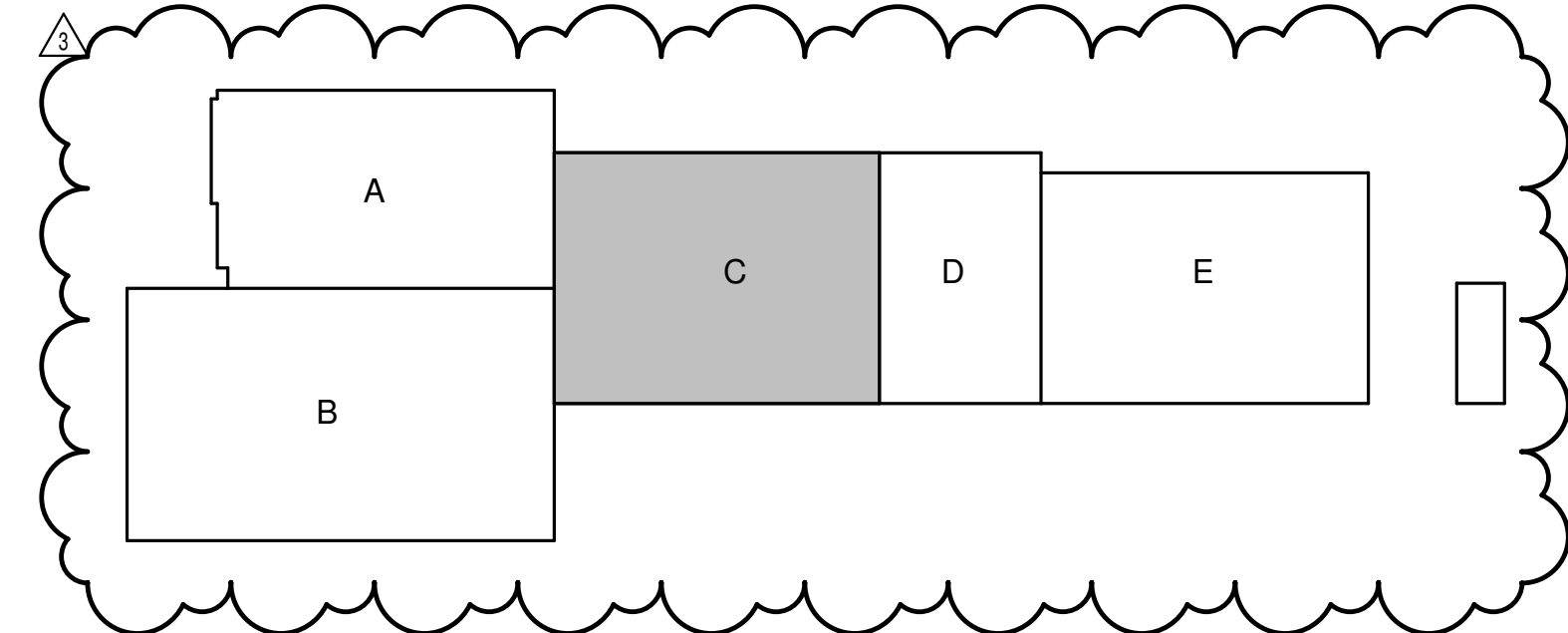
- SEE PUBLIC ADDRESS ONE-LINE DIAGRAM ON SHEET T-701 FOR SPEAKER ZONING.
- MOUNT ALL HORN TYPE SPEAKERS AT 15'-0" AFF UNLESS NOTED OTHERWISE.

KEYED NOTES

- 9.906 MOUNT HORN TYPE SPEAKER TO SIDE WALL.



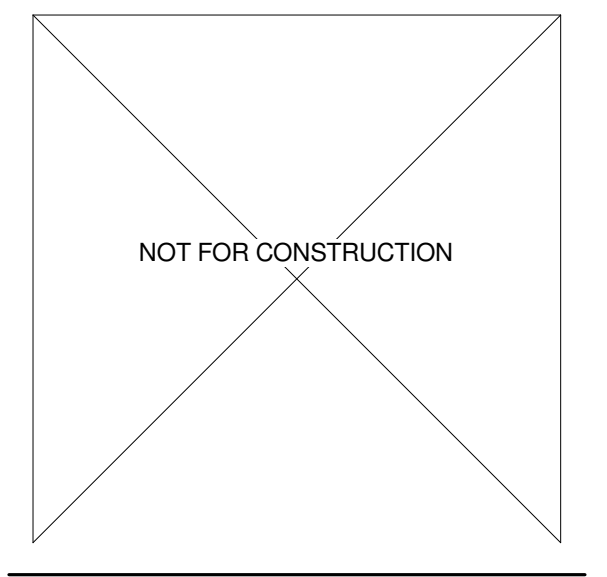
TRUE PLAN NORTH NORTH
LEVEL 1 FLOOR PLAN
AREA C - AUDIO/VISUAL
1/8" = 1'-0"



CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY

4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714

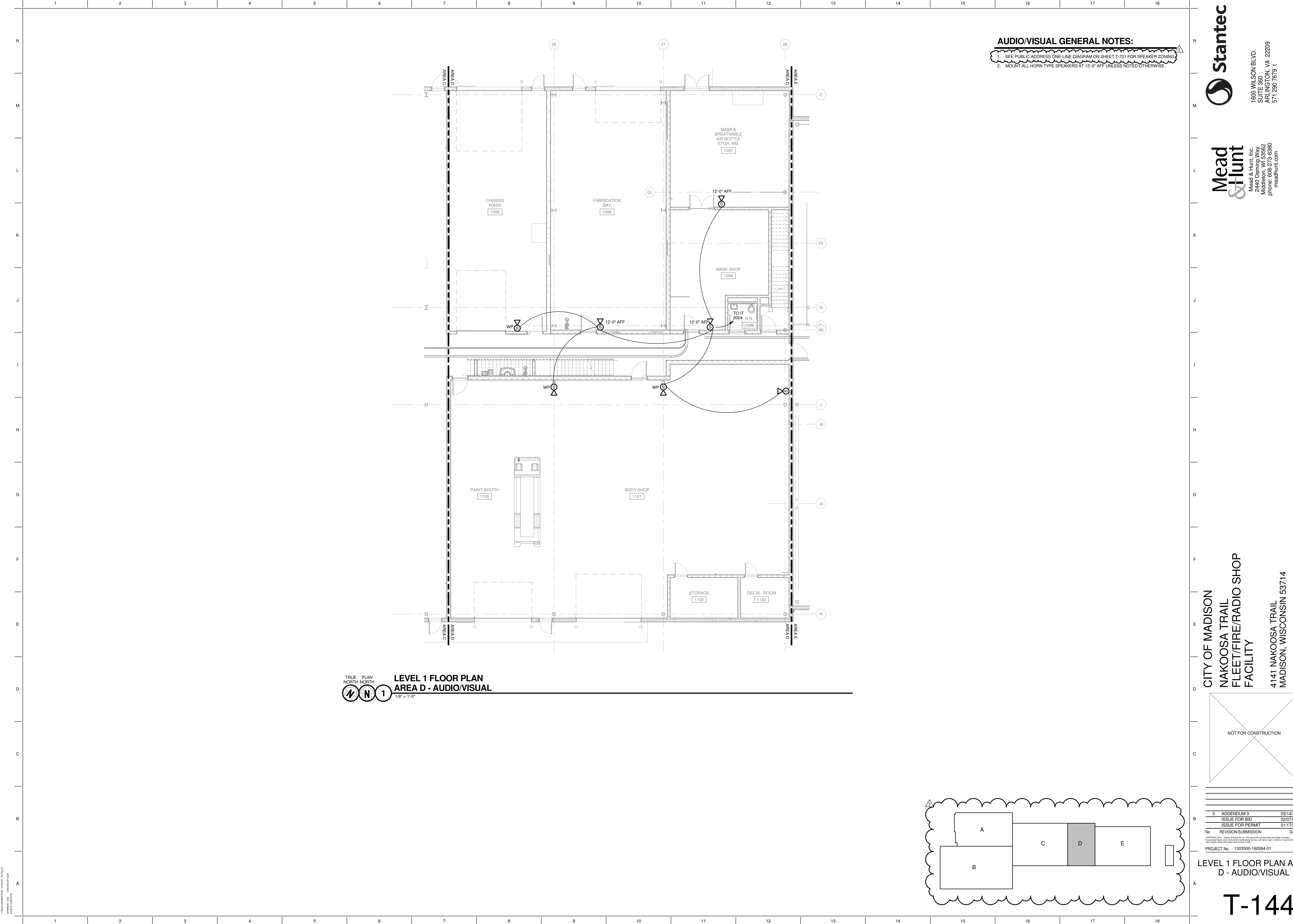
ISSUE FOR BID



NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
2	ADDENDUM 2	03/05/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

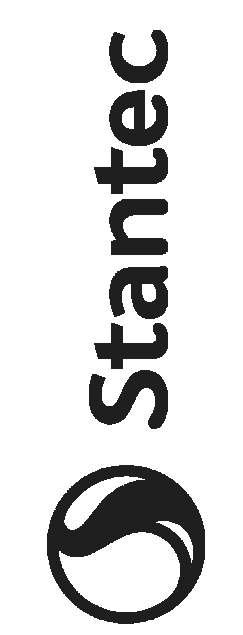
PROJECT No: 1303500-160264.01

LEVEL 1 FLOOR PLAN AREA
C - AUDIO/VISUAL



AUDIO/VISUAL GENERAL NOTES:
 1. SEE PUBLIC ADDRESS ONE-LINE DIAGRAM ON SHEET T-701 FOR SPEAKER ZONING.
 2. MOUNT ALL HORN TYPE SPEAKERS AT 15'-0" AFF UNLESS NOTED OTHERWISE.

TRUE PLAN
 NORTH NORTH
LEVEL 1 FLOOR PLAN
AREA D - AUDIO/VISUAL
 1/8" = 1'-0"



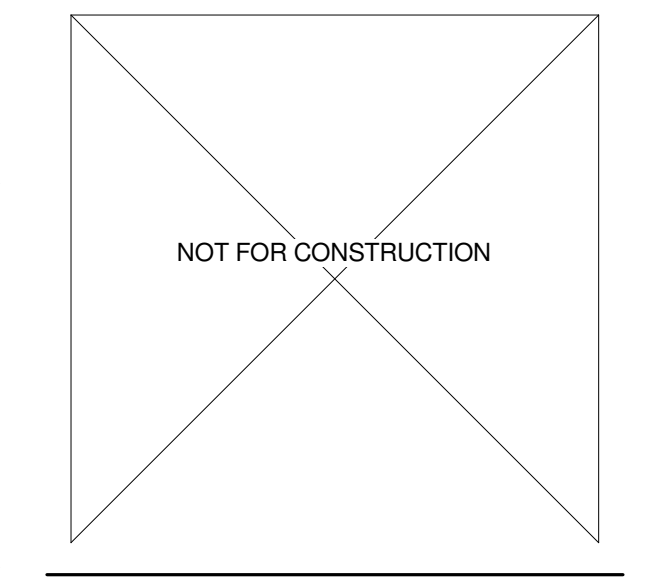
1600 WILSON BLVD.
 SUITE 360
 ARLINGTON, VA 22209
 571-290-7679



Mead & Hunt, Inc.
 2440 Deming Way
 Middleton, WI 53662
 phone: 608-273-6390
 meadhunt.com

CITY OF MADISON
 NAKOOSA TRAIL
 FLEET/FIRE/RADIO SHOP
 FACILITY

4141 NAKOOSA TRAIL
 MADISON, WISCONSIN 53714
 ISSUE FOR BID



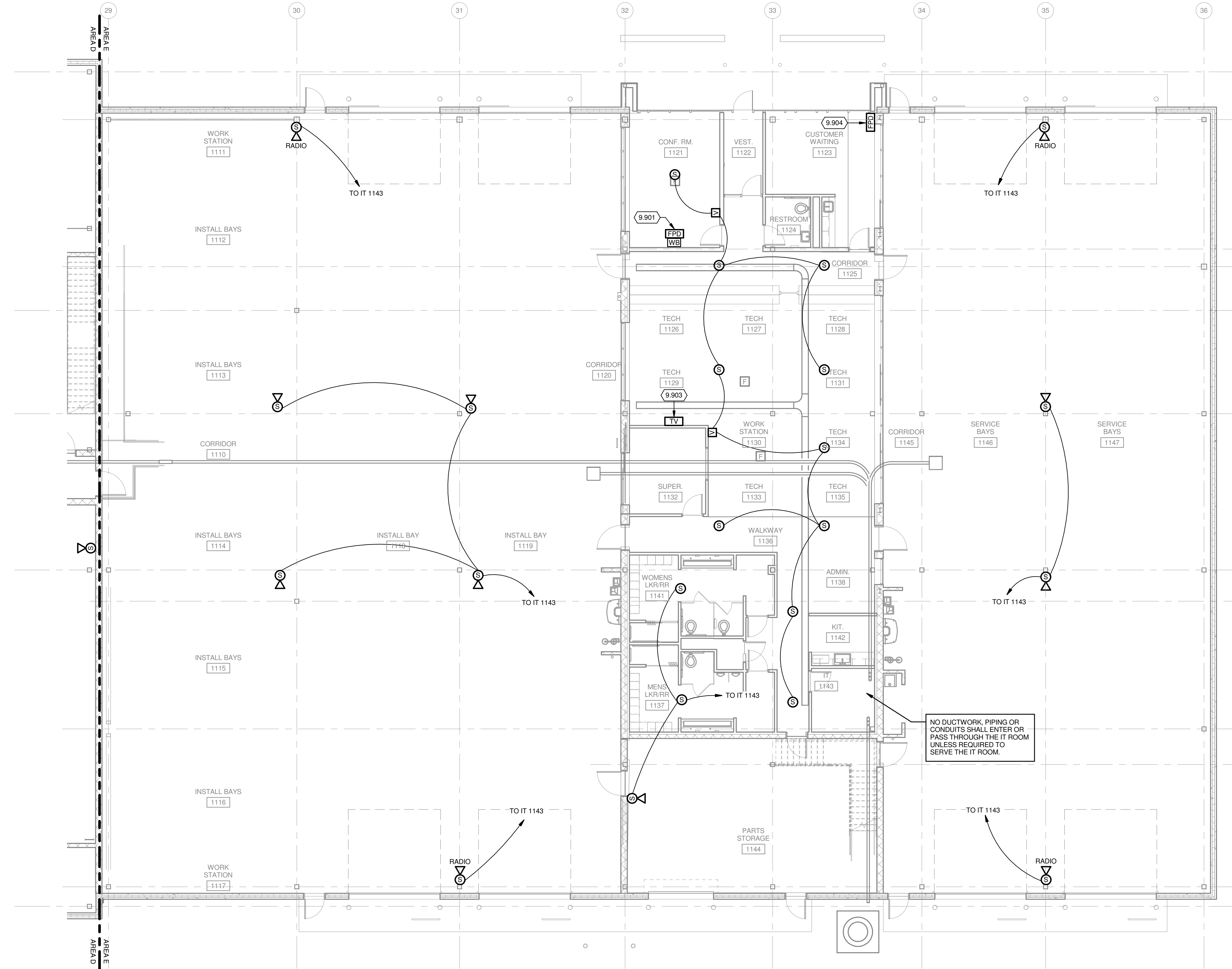
NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

LEVEL 1 FLOOR PLAN AREA
 D - AUDIO/VISUAL

T-144

C:\Users\m\OneDrive\Documents\1303500-160264.01\Drawings\1303500-160264.01\T-144.dwg
 DATE: 03/14/2019 10:00:00 AM
 USER: m



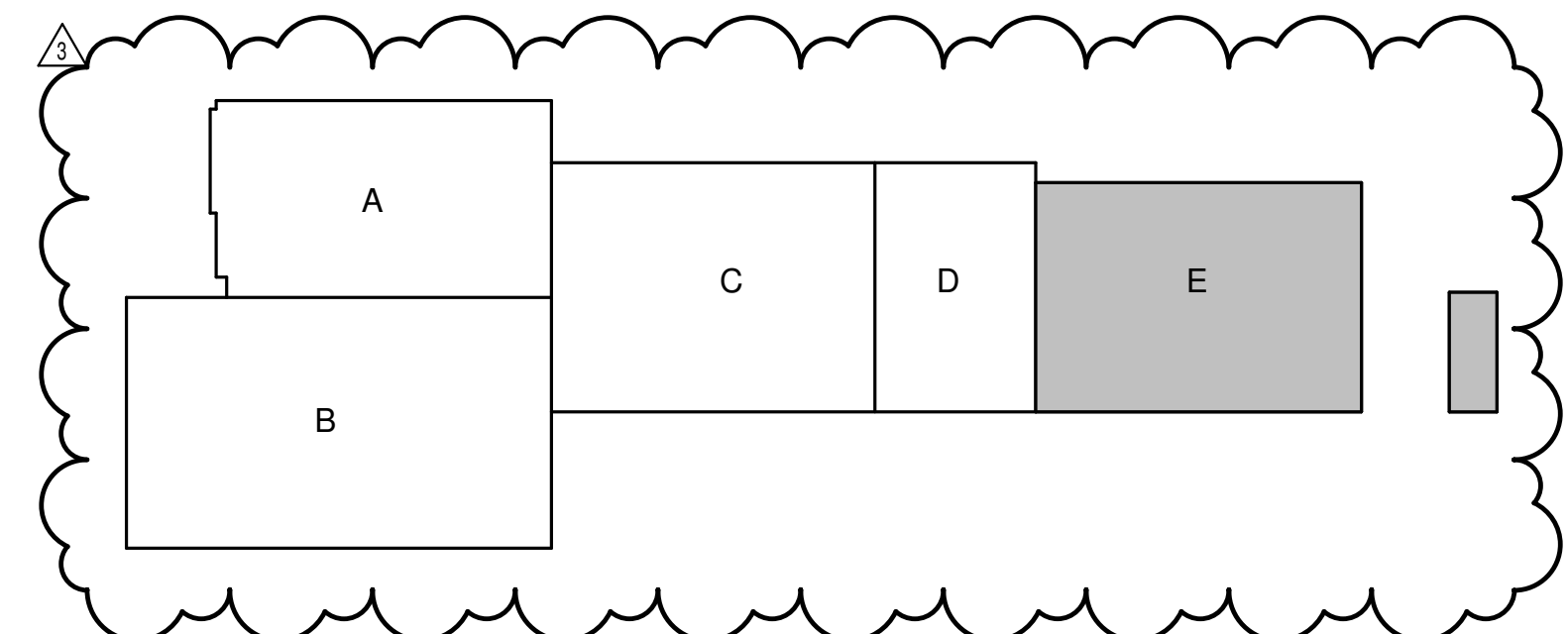
TRUE PLAN
NORTH NORTH
1
1/8" = 1'-0"
LEVEL 1 FLOOR PLAN AREA E - AUDIO/VISUAL

KEYED NOTES

- 9.901 REFER TO 1/T-504 FOR ADDITIONAL INFORMATION.
- 9.903 REFER TO 3/T-504 FOR ADDITIONAL INFORMATION.
- 9.904 REFER TO 5/T-504 FOR ADDITIONAL INFORMATION.

AUDIO/VISUAL GENERAL NOTES:

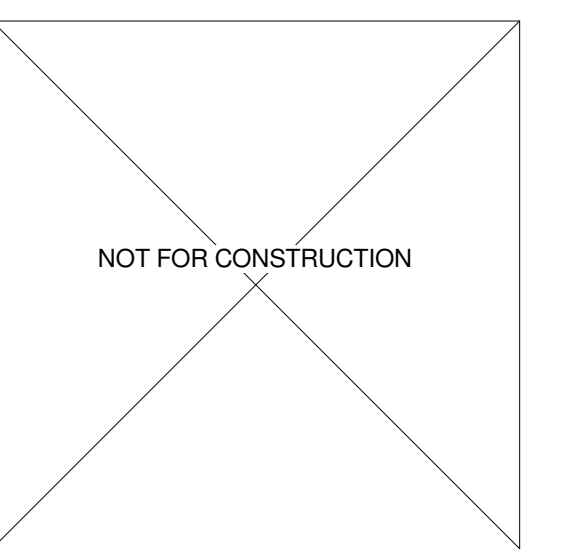
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2. MOUNT ALL HORN TYPE SPEAKERS AT 15'-0" AFF UNLESS NOTED OTHERWISE.



CITY OF MADISON
NAKOOSA TRAIL
FLEET/FIRE/RADIO SHOP
FACILITY

4141 NAKOOSA TRAIL
MADISON, WISCONSIN 53714

ISSUE FOR BID



NO.	REVISION/SUBMISSION	DATE
3	ADDENDUM 3	03/14/2019
	ISSUE FOR BID	02/07/2019
	ISSUE FOR PERMIT	01/17/2019

PROJECT No: 1303500-160264.01

LEVEL 1 FLOOR PLAN AREA E - AUDIO/VISUAL

T-145

A&A

ENVIRONMENTAL
SERVICES

*P.O. Box 708 • Poynette, WI 53955
Phone: (608) 240-1511 • Email: Office@aaenv.com • Fax: (608) 635-9717*

October 19, 2016


David C. Schaller
City of Madison
215 Martin Luther King Jr. Blvd, Room 115
Madison, WI 53703
(608) 243-5891, Fax (608) 264-9275

RE: Former Cub Foods Asbestos Removal/Demolition

I have included the submittals provided by Robinson Brothers Environmental, Inc. and a copy of the original DNR notification filed by A&A Environmental, Inc. for the asbestos removal and demolition of the former Cubs Foods facility located at 4141 Nakoosa Trail in Madison, WI.

This project asbestos abatement portion of this project was satisfactorily completed on September 30, 2016 with visual inspections completed on September 29, 2016 and September 30, 2016.

Sincerely,


Kim Sopha
President/Inspector #AII01851

Encl

KAS/bls



Form 9300-207 04-09

Invoice No: ASB015419
Invoice Date: 09/02/2016 Due Upon Receipt
Event Date: 09/02/2016
Notification Fee: \$135.00
Invoices(s): PASB015419
Invoice Amount: \$135.00
Reference: Notification ID:17-0952_ORIGINAL

A&A Environmental Services, Inc.
PO Box 708
Poynette, WI 53955

REMITTANCE: Please return this portion with your check to DNR. Alternatively, payments may be made electronically at <http://dnr.wi.gov/epay/>.

WI DNR
PO BOX 78816
MILWAUKEE WI 53278-0816

Make check payable to: Department of Natural Resources Amount Enclosed:

Invoice

Keep this portion for your records

State of Wisconsin

Department of Natural Resources

Duplicate



Bill to:

A&A Environmental Services, Inc.
PO Box 708
Poynette, WI 53955

Remit to:

WI DNR
PO BOX 78816
MILWAUKEE WI 53278-0816

DNR Contact: MARK DAVIS at (608) 219-4251
mark.davis@wisconsin.gov

Invoice No: **ASB015419**
Invoice Date: 09/02/2016
Due Date: 09/12/2016
Notification Fee: \$135.00
Invoices(s): PASB015419
Invoice Amount: **\$135.00**

Event Date: 09/02/2016
Customer PO No:

Reference: Notification ID:17-0952_ORIGINAL
Facility Name: Commercial
Project No: 7

Item	Cost
Asbestos Abatement Notification	\$135.00

Asbestos Notification Summary

Submitted

**State of Wisconsin Department of Natural Resources
Bureau of Air Management**



PROJECT INFORMATION

Project No:	16201-1	Notification Status:	Submitted
Invoice to:	Abatement Contractor	Insp End Date:	12/23/2015
Notification ID:	17-0952	Abtment End Date:	10/10/2016
Notification Type:	Revised	Ren/Dem End Date:	11/18/2016
Project Type:	Abatement/Demolition	End Hours:	5:30 PM
Insp Start Date:	12/10/2015	Emergency Date:	
Inspector:	SOPHA KIM No:1851		
Asbestos Present:	Yes		
Postmark Date:	09/02/2016		
Abtment Start Date:	09/26/2016		
Ren/Dem Start Date:	10/24/2016		
Working Days:	Mo,Tu,We,Th,Fr		
Start Hours:	7:00 AM		
Ordered Demolition:	No		
Emergency:	No		
Project	Removal of 11,800 sqft of black floor mastic		
Schedule/Comments:			

Submitted By: MELISSA LOWENBERG 09/26/2016 09:51:26

FACILITY INFORMATION

Name:	FORMER CUB FOODS	County:	DANE
Address 1:	4141 Nakoosa Trail	Current Use:	Commercial
Address 2:		Size (sqft):	83048
City:	Madison	Unit No:	0
Zip Code:	53714	Phone No:	
Prior Use:	Commercial	Single family home/garage/less than 5 apartment units?:	NO
Age:	29	Does the project have two or more houses as part of an urban renewal, commercial, or a highway construction project?:	NO
Stories No:	2		
Contact:			

Owner Name:	City of Madison	State:	WI
Address 1:	210 Martin Luther King Jr. Blvd, Room 115	Phone No:	608-243-4891
Address 2:			
City:	Madison		
Zip Code:	53703		
Contact:	David Schaller		
Email:	DSchaller@cityofmadison.com		

Submitted

State of Wisconsin Department of Natural Resources

Bureau of Air Management



ASBESTOS REPORT

Structures Demolished: 1

Inspection Procedures: Bulk sample - PLM

Description of ACM: Floor tile and mastic throughout the building.

Description of work: Enclosure removal method under negative air pressure, wetting agents used on materials, decon units and protective clothing worn by workers.

Work Practices: All asbestos is to be kept wet and put in double labeled bags, negative air pressure during the project in the enclosure where removal is taking place, bags will go through the 3 stage decon unit with bags wet wiped before coming out of containment.

If new ACM discovered: Work to be stopped, owner and regulatory agencies to be notified.

NAME	A. Friable RACM to be Removed	B. NonFriable to be Removed CAT I	B. NonFriable to be Removed CAT II	C. Nonfriable not removed CAT I	C. Nonfriable not removed CAT II
Pipes (linear feet)	0	0	0	0	0
Surface (square feet)	11800	0	0	0	0
Volume (cubic feet)	0	0	0	0	0

ABATEMENT CONTRACTOR

Project No: 16201-1

Contractor: Robinson Brothers Environmental Inc

Address 1: 220 Raemisch Rd

Address 2:

City: Waunakee

County: Dane

State: WI

Zip Code: 53597-

Contact: Mike Bricco

Phone No: 608-849-6980

E-mail: info@robinsonbros.com

Project Manager or Supervisor:

First Name:

Last Name:

Phone:

Mike

Bricco

608-849-6980

DEMOLITION CONTRACTOR

Contractor: Terra Engineering & Construction

Address 1: 2201 Vondron Rd

Address 2:

City: Madison

County: Dane

State: WI

Zip Code: 53704-

Contact: Scott Zimmerman

Phone No: 608-221-3501

E-mail:

Submitted

State of Wisconsin Department of Natural Resources

Bureau of Air Management



TRANSPORT INFORMATION

Contractor: Town & Country Sanitation
Address 1: Rt 3
Address 2:
City: Boscobel **County:** Grant
State: WI **Zip Code:** 53805-
Contact: **Phone No:** 608-375-5886
E-mail:

DISPOSAL INFORMATION

Disposal Site: Mallard Ridge Recycling & Disposal
Address 1: W8470 Hwy 11
Address 2:
City: Delavan **County:** Walworth
State: WI **Zip Code:** 53115-
Contact: **Phone No:** 262-724-3257
E-mail:

FEE INFORMATION

Fee: 1325 **Paid:** **Date:**
Owed:
Reported Agency: DEPARTMENT OF NATURAL RESOURCES

State of Wisconsin Department of Natural Resources

Bureau of Air Management



NAME	A. Friable RACM to be Removed	B. NonFriable to be Removed CAT I	B. NonFriable to be Removed CAT II	C. Nonfriable not removed CAT I	C. Nonfriable not removed CAT II
Pipes (linear feet)	0	0	0	0	0
Surface (square feet)	0	11800	0	0	0
Volume (cubic feet)	0	0	0	0	0

ABATEMENT CONTRACTOR

Project No: 7

Contractor: Robinson Brothers Environmental Inc

Address 1: 220 Raemisch Rd

Address 2:

City: Waunakee

County: Dane

State: WI

Zip Code: 53597-

Contact: Mike Bricco

Phone No: 608-849-6980

E-mail: info@robinsonbros.com

Project Manager or Supervisor:

First Name:

Last Name:

Phone:

Mike

Bricco

608-849-6980

DEMOLITION CONTRACTOR

Contractor: To Be Determined

Terra

TRANSPORT INFORMATION

Contractor: Waste Management- Madison Prairie LF

Address 1: 6002 Nelson Road

Address 2:

City: Sun Prairie

County:

State: WI

Zip Code: 53590-

Contact: Louis Bohlander

Phone No: 608-837-9031

E-mail:

DISPOSAL INFORMATION

Disposal Site: Madison Prarie Landfill

Address 1: 6002 Nelson Rd

Address 2:

City: Sun Prairie

County: DANE

State: WI

Zip Code: 53590-

Contact: Don Smith

Phone No: 608-837-9031

E-mail:

Asbestos Notification Summary

State of Wisconsin Department of Natural Resources



Bureau of Air Management

Submitted

FEE INFORMATION

Fee: 135 **Paid:** 0 **Date:**
Owed: 135
Reported Agency: DEPARTMENT OF NATURAL RESOURCES

Asbestos Notification Summary

State of Wisconsin Department of Natural Resources

Bureau of Air Management



Submitted

PROJECT INFORMATION

Project No:	16201-1	Notification Status:	Submitted
Invoice to:	Abatement Contractor	Insp End Date:	12/23/2015
Notification ID:	17-0952	Abtment End Date:	10/10/2016
Notification Type:	Revised	Ren/Dem End Date:	11/18/2016
Project Type:	Abatement/Demolition	End Hours:	5:30 PM
Insp Start Date:	12/10/2015	Emergency Date:	
Inspector:	SOPHA KIM No:1851		
Asbestos Present:	Yes		
Postmark Date:	09/02/2016		
Abtment Start Date:	09/26/2016		
Ren/Dem Start Date:	10/24/2016		
Working Days:	Mo,Tu,We,Th,Fr		
Start Hours:	7:00 AM		
Ordered Demolition:	No		
Emergency:	No		
Project	Removal of 11,800 sqft of black floor mastic		
Schedule/Comments:			

Submitted By: MELISSA LOWENBERG 09/15/2016 02:25:09

FACILITY INFORMATION

Name:	Commercial	County:	DANE
Address 1:	4141 Nakoosa Trail	Current Use:	Commercial
Address 2:		Size (sqft):	83048
City:	Madison	Unit No:	0
Zip Code:	53714	Phone No:	
Prior Use:	Commercial	Single family home/garage/less than 5 apartment units?:	NO
Age:	29	Does the project have two or more houses as part of an urban renewal, commercial, or a highway construction project?:	NO
Stories No:	2		
Contact:			

Owner Name:	City of Madison	State:	WI
Address 1:	210 Martin Luther King Jr. Blvd, Room 115	Phone No:	608-243-4891
Address 2:			
City:	Madison		
Zip Code:	53703		
Contact:	David Schaller		
Email:	DSchaller@cityofmadison.com		



State of Wisconsin Department of Natural Resources

Bureau of Air Management

Submitted

ASBESTOS REPORT

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Surface (square feet)	11800	0	0	0	0
Volume (cubic feet)	0	0	0	0	0

ABATEMENT CONTRACTOR

Project No: 16201-1

Contractor: Robinson Brothers Environmental Inc

Address 1: 220 Raemisch Rd

Address 2:

City: Waunakee

County: Dane

State: WI

Zip Code: 53597-

Contact: Mike Bricco

Phone No: 608-849-6980

E-mail: info@robinsonbros.com

Project Manager or Supervisor:

First Name:

Mike

Last Name:

Bricco

Phone:

608-849-6980

DEMOLITION CONTRACTOR

Contractor: Terra Engineering & Construction

Address 1: 2201 Vondron Rd

Address 2:

City: Madison

County: Dane

State: WI

Zip Code: 53704-

Contact: Scott Zimmerman

Phone No: 608-221-3501

E-mail:

Asbestos Notification Summary

State of Wisconsin Department of Natural Resources

Bureau of Air Management



Submitted

TRANSPORT INFORMATION

Contractor: Waste Management- Madison Prairie LF
Address 1: 6002 Nelson Road
Address 2:
City: Sun Prairie **County:**
State: WI **Zip Code:** 53590-
Contact: Louis Bohlander **Phone No:** 608-837-9031
E-mail:

DISPOSAL INFORMATION

Disposal Site: Madison Prarie Landfill
Address 1: 6002 Nelson Rd
Address 2:
City: Sun Prairie **County:** DANE
State: WI **Zip Code:** 53590-
Contact: Don Smith **Phone No:** 608-837-9031
E-mail:

FEE INFORMATION

Fee: 1325 **Paid:** **Date:**
Owed:
Reported Agency: DEPARTMENT OF NATURAL RESOURCES



Department of Public Works
Engineering Division
Robert F. Phillips, P.E., City Engineer

City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Deputy City Engineer

Gregory T. Fries, P.E.

Deputy Division Manager

Kathleen M. Cryan

Principal Engineer 2

Christopher J. Petykowski, P.E.
John S. Fahrney, P.E.

Principal Engineer 1

Christina M. Bachmann, P.E.
Mark D. Moder, P.E.
Janet Schmidt, P.E.

Facilities & Sustainability

Jeanne E. Hoffman, Manager
Bryan Cooper, Principal Architect

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

February 28, 2019

**NAKOOSA TRAIL FLEET/FIRE/RADIO SHOP FACILITY
CITY OF MADISON - CONTRACT #7528
PRE-BID MEETING MINUTES**

PURPOSE: To clarify any concerns bidders may have with the solicitation documents, scope of work and other requirements.

NOTE: All questions or requests for clarifications regarding plans and specifications shall be published by Stantec and the CPM (City Project Manager). Responses that change the contract scope and/or schedule will be published by Stantec and the CCM in the form of a bidding addendum that will be posted on Bid Express by the City of Madison.

• **Project Overview**

- This contract is for construction and site development for a new 1-story vehicle maintenance and repair facility for Fleet Services, Fire Maintenance, and the Radio Shop facility. The Fleet Services spaces will have light duty repair bays and heavy duty repair bays for fleet and fire vehicles and equipment. The Radio Shop spaces will have installation bays and running repair bays for installation and repairs of vehicle communications systems. The Building is approximately 104,910 sq. ft with approximately 13,074 sq. ft. of mezzanine space.

• **City of Madison Team Introductions**

- City Project Manager (CPM): Jim Whitney
- City Project Manager (CPM): Jon Evans
- City Construction Manager (CCM): Dave Schaller – not present
- City Architectural Aide: Laura Amundson
- Fleet Services Superintendent: Mahanth Joishy
- Fleet Services Program Manager: Tyson Roessler

• **A/E Project Team Introductions**

- Stantec Architecture – Architect: Ken Anderson – not present
- Stantec Architecture - Project Manager: Maybell Laluna
- Strand Associates - Civil: Pat Rank
- Strand Associates - Landscaping: Rad Hawkos – not present
- Mead & Hunt – Construction Administrator: Robert Kapsner – not present
- Mead & Hunt – Structural/Plumbing/Mechanical/Electrical: Kevin Lichtfuss

- **Attendee Introductions**
 - See attached sign-in sheet

- **City of Madison Requirements - Overview**
 - Bid Requirements
 - i. General Contractor prequalification application due by 2:00 PM on Thursday, March 14, 2019
 - ii. Bids Due by 2:00 PM on Thursday, March 21, 2019
 1. Options
 - a. Electronically to Bid Express
 - b. Hand deliver to 1600 Emil St. to Alane Boutelle
 - i. Includes Bid and SBE package.
 - SBE Requirements – Contract Section C
 - i. SBE Conference – Friday March 08, 2019 - 1:00 PM at 1600 Emil St – Conference Room
 - Bid Bonds – Contract Section G
 - Product Substitution Requirements
 - i. Specification Section 01 25 13 Product Substitution Procedures.

- **Project Special Requirements**
 - Alternate Bid No. 1: Provide all work to construct the east Storage Building with approximately 2,010 sq. ft.
 - Alternate Bid No. 2: Provide all work to furnish and install the roof mounted solar photovoltaic (PV) system.

- **Schedule**
 - February 28 - Pre-Bid Meeting
 - March 07 - Last day City will accept questions from Contractors
 - March 08 - City holds SBE conference at 1600 Emil St conference room at 1:00 PM
 - March 14 - City posts the final Addendum on Bid Express
 - March 14 - General Contractor Prequalification applications are due by 2:00 PM
 - March 21 - Bids due by 2:00 PM either via Bid Express or to 1600 Emil St.
 - March 21 - Bids opened starting at 2:30 PM at 1600 Emil St. Training Room

- **Site Information**
 - The project is located at 4151 Nakoosa Trail in Madison, Wisconsin
 - A portion of the shared drive from Nakoosa Trail to the CP Mart gas station needs to remain open as much as possible during construction for public vehicle access to the gas station.

- **Power Point**
 - General project overview presented by Jim Whitney and Maybell Laluna. See attached. The information, documents, and renderings in this power point presentation are from preliminary planning and design and are for informational purposes only and are not to be used for construction.

- **Questions/General Discussion – will be included in upcoming addendum:**
 1. Are bid alternates taken in order? YES
 2. Is there an overhead crane in the shop? YES
 3. It sounds like there are two different solar systems. Is one required and the other an alternate? YES. The Hydronic system to supplement the radiant floor heating and domestic hot water is not part of the alternate.
 4. Is there any asbestos abatement that will be involved for the removal of the existing slabs? NO. See asbestos documentation in the bid documents.
 5. The architectural specifications seem to be very incomplete with references to missing specification divisions (ie: allowances) and many missing edited choices. Recommend to check the other MEP specs also. Please review and republish.
 6. There are terraced planters that are not shown as walls on the plans at the front entrance patio area. What are they made of? The top of wall elevations are on the plans, but do not have bottom of walls elevations. Need details and wall heights.
 7. There is a wall shown along Nakoosa Trail near the parking and sidewalk. Is this existing? Is it stone or modular block. Please clarify.
 8. Conflicting information regarding the air compressors. Specs reference to relocate two compressor and bid one compressor. Prints show four compressors on the plans. One each in: Light Duty; Heavy Duty; Body Shop and Radio Shop. Please clarify.
 9. Have provisions been made in the floor design of the piping for the radiant heat to allow for drilling in the floor for the lifts? YES. The radiant heat piping will be located at the bottom of the slabs.

NAKOOSA TRAIL FLEET/FIRE/RADIO SHOP FACILITY

Contract # 7528

Pre-Bid Meeting

Thursday, February 28, 2019, 10:30 a.m.

ATTENDEES PLEASE SIGN-IN

NAME	COMPANY	EMAIL	PHONE
Mike Mohr	Veitusa	MMohr@veitusa	262-901-2700
Tony Tome	Walt's Petro	tonyt@waltspetro.com	715-551-0010
marcia Hoyer	midwest landscape	midwestlandpm@gmail.com	262-363-3970
John Zukowski	Fearin's Audio Video Security	JZukowski@Fearins.com	608-443-5904
Logan Crull	CD Smith	lcrull@cdsmith.com	920-960-9585
AARON WESTHUIS	CD SMITH	awesthuis@cdsmith.com	414-810-8609
Val Neumaier	Greenfire Mgmt Services	jeb.meter@greenfire.com	414.801.1028
JAY THOMSEN	^{Burner} Vowel Bros CO	Jthomson@vogelbidg.com	608 279 0295
Chris Hoffma-	Summit Companies	chhoffma-@summitcoas.com	608 516 7514
Cory Huschka	JP Cullen	CORY.HUSCHKA@JPCullen.com	608 751 7350
Low Olson	J.H FINDERFF-GE	madisonbids@findorff.com lolson@findorff.com	608-257-5321
KEVIN LICHTFOSS	MEAD & HUNT	kevin.lichtfoss@meadhunt.com	608-443-0595
Kurt Koopp	Het Water Products	Kurt@hetwaterproducts.com	414/430-5971
Clinton Dollak	McCray Metals	SCID@mcclraymetals.com	608-838-1331



Nakoosa Trail Fleet/Fire/Radio Shop Facility City of Madison

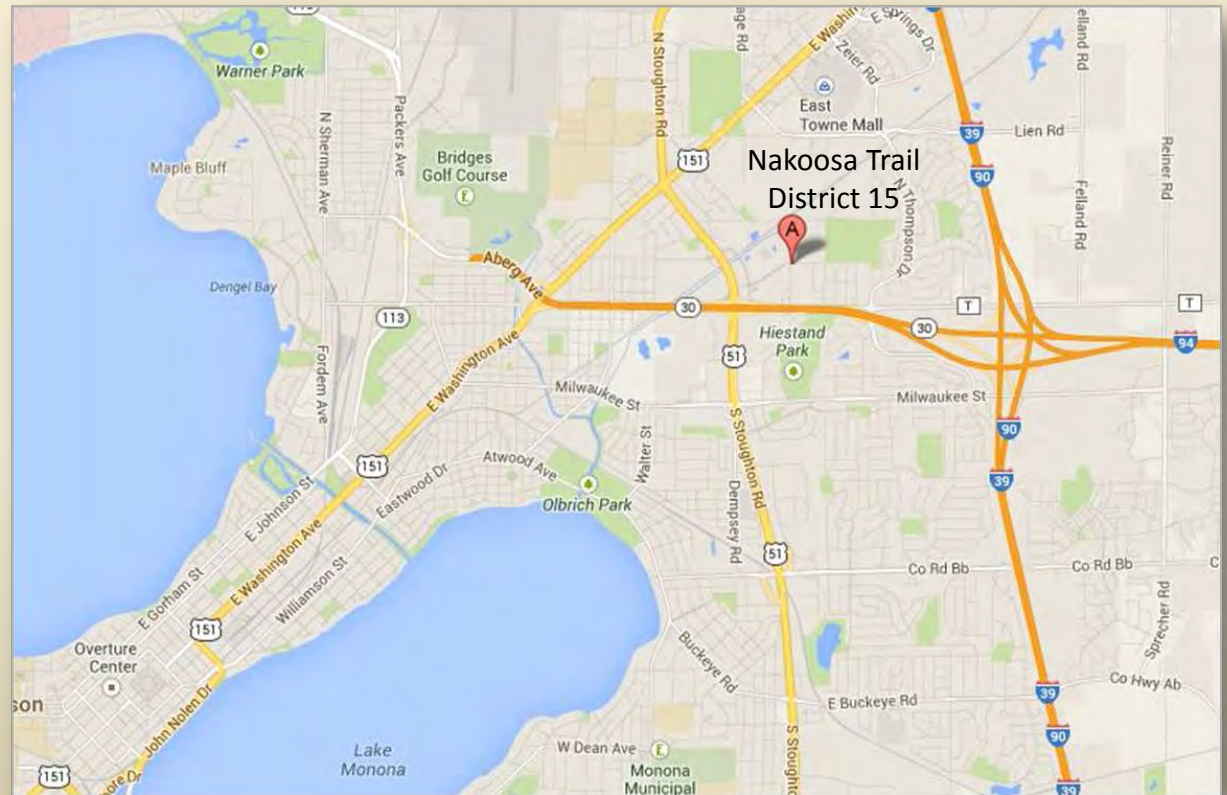
PRELIMINARY INFORMATION ONLY - NOT FOR CONSTRUCTION

A Combined Facility for:

- Fleet Services
- Fire Maintenance Building
- Radio Shop

Mahanth Joishy, Fleet Services

Phillip Nehmer, Radio Shop



Prepared by:

Jim Whitney, AIA

City of Madison

January 23, 2019

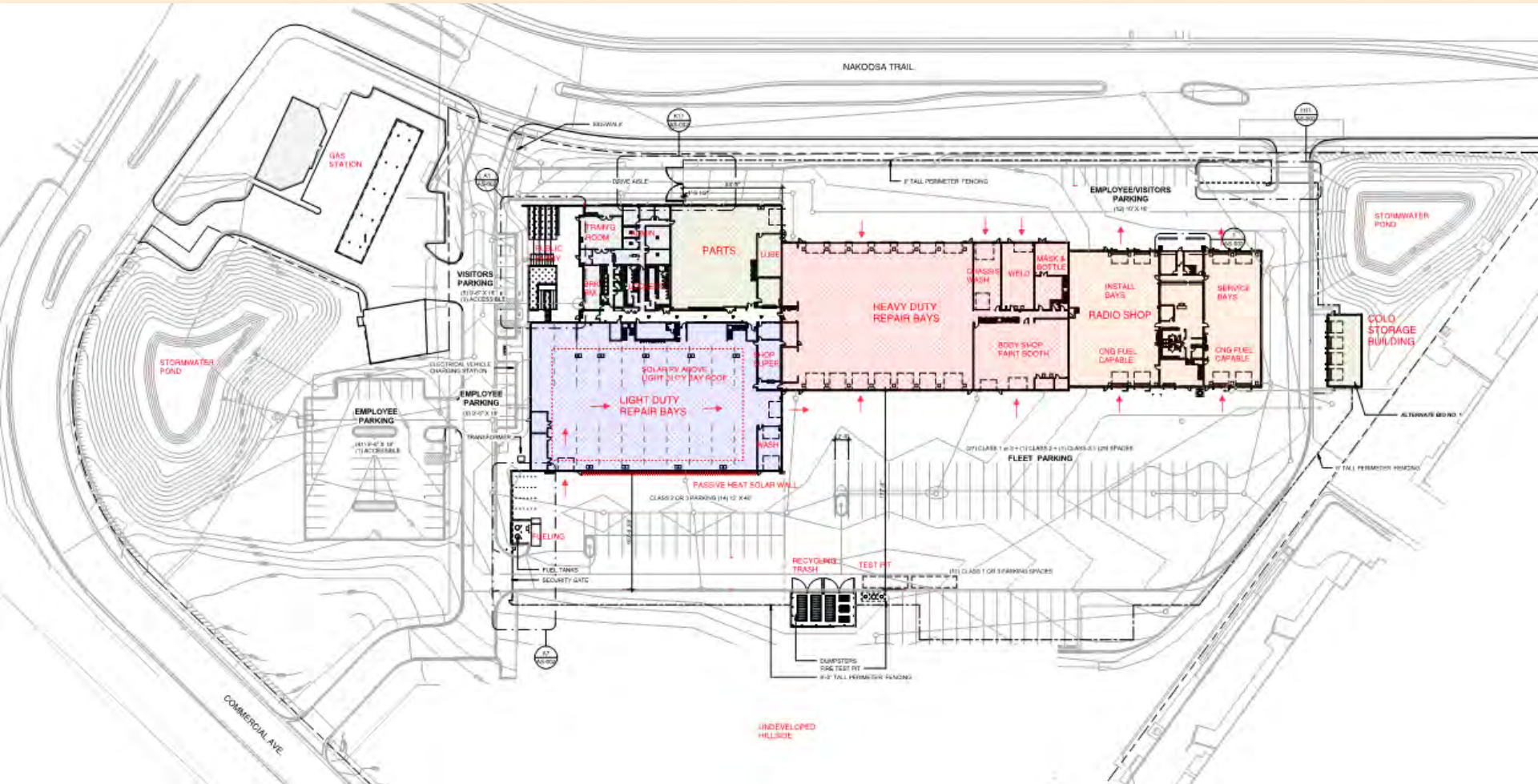
Cub Foods



Site Zone: Industrial Limited

Google Earth

Fleet Services



Site Plan

Fleet Services



Fleet Services



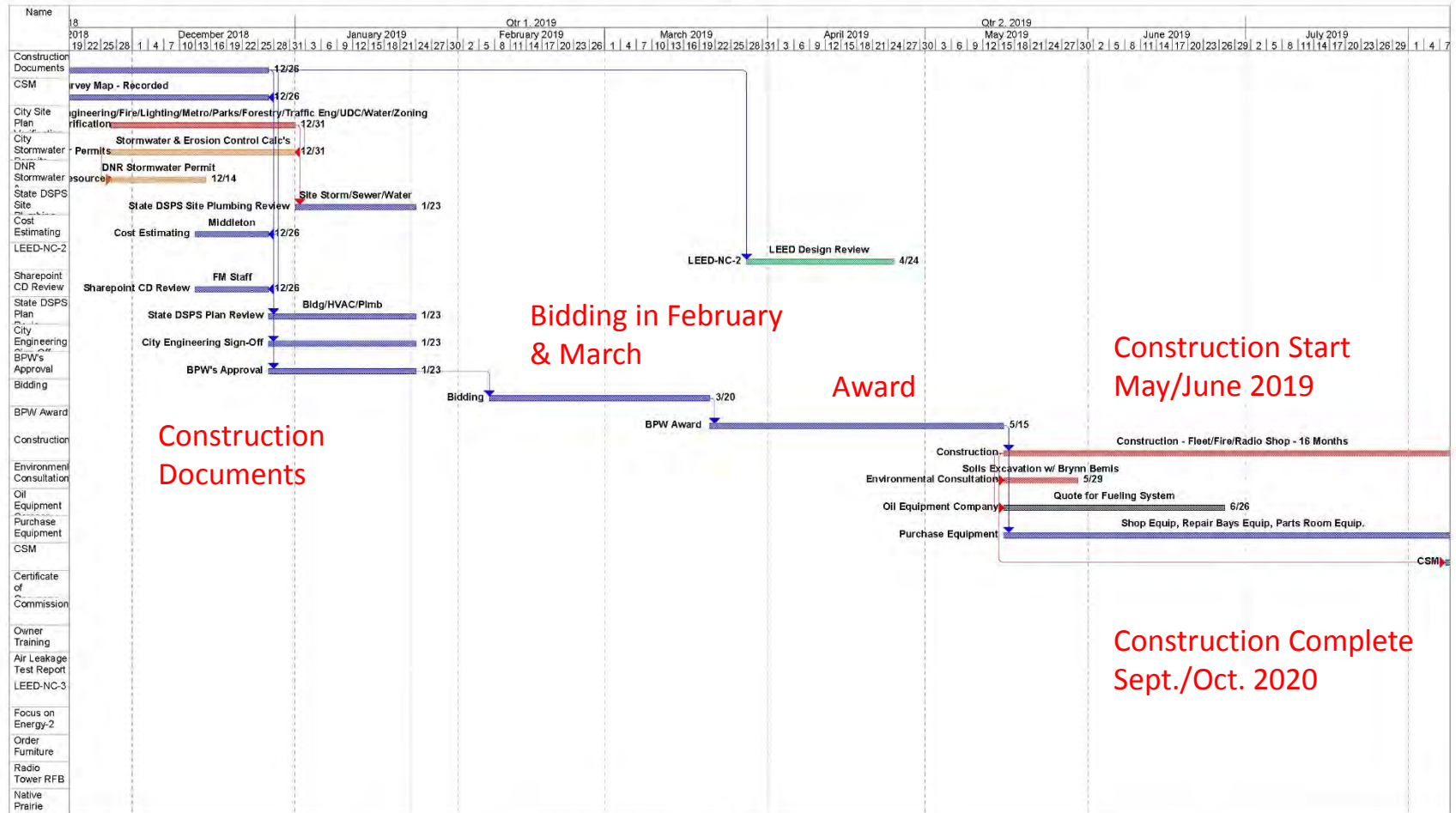
Fleet Services



Construction Timeline

Planning Schedule

Nakoosa Trail Fleet Services Facility draft



Summary

Fleet/Fire/Radio Shop Facility

Alder District 15

Approximately 104,910 Square Feet Footprint

Estimated Construction Cost: \$26,800,000

Estimated Construction Start: May/June 2019

Estimated Construction Completion: Sept./Oct. 2020

Alternate Bid No. 1: Cold Storage Building

Alternate Bid No. 2: Solar PV Photovoltaic Panels



Green Building Features

- Clerestory Window Daylighting
- Dimming Daylighting Controls
- Spray Foam Wall Insulation
- LED Lighting Systems w/ Sensors
- Hydronic Hot Water Floor Heating
- Variable Air Volume System
- Solar Electric Photovoltaic Panels, 100KW
- Passive Heat Solar Wall at Light Duty Bay
- LEED-Silver