

Project	Steamboat Base Village Redevelopment	Date	07/22/2021
Project Location	Steamboat, Colorado	Architect's Project Number	03.7835.000
Owner/Client	Alterra Mountain Company / East West Partners	File	6BL This is page 1 of 3
To	Saunders Construction Inc.	Attention	Bryan Sculthorpe
Address	86 Inverness Place North		
City	Englewood	State	CO Zip Code 80112
Delivered via:	☐ Messenger ☐ Hand carried ☐ Facsimile ☐ Express ☐ Pick-up ☐ E-mail Address ☐ Mail ☐ UPS ☒ Website Address BIM360		

This Bulletin Conveys to Contractor (Check one of the following five choices.):

- ☐ **Architect's Authorization for Minor Changes**
Architect recommends modifications to the Work as described below.
- ☐ **Architect's Clarification / Supplemental Instructions** (Use this Bulletin form in place of *Architect's Supplemental Instructions* form.)
Contractor shall carry out the Work in accordance with the following supplemental instructions.
- ☐ **Architect's Confirmation of a Field Order** (Use this Bulletin form in place of a *Field Order* form.)
This confirms Architect's verbal instructions to (individual's name) _____ on (date) _____, as described below.
Note: The above three choices are each subject to the following terms: The change(s), clarification(s) and/or confirmation(s) described below is/are issued in accordance with the Contract Documents, without change in Contract Sum and/or Time.
- ☒ **Architect's Request for Contractor's Proposal** (Use this Bulletin form in place of an *Estimate Request* form.)
Please submit an itemized proposal for changes in the Contract Sum and/or Time for proposed modifications to the Contract Documents described herein. Submit proposal **within** _____ **days** or notify the Architect in writing of the date on which you anticipate submitting your proposal. This is not a Change Order or a Construction Change Directive or a direction to proceed with the Work described in the proposed modifications.
- ☐ **Other:** As described below.

Attachments BP3 PROMENADE - BULLETIN 05

Requested by

☒ Architect ☐ Owner ☐ Contractor ☐ Other (specify): _____

Issued by Gensler by Jon Gambrell **Date Signed** 07/22/2021

Issued by Owner by **Date Signed**

☐ Required; Please return signed copy to Gensler ☐ Not Required

Accepted by Contractor by **Date Signed**

☐ Required; Please return signed copy to Gensler ☐ Not Required

Distribution

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Bulletin Number - BP3 Promenade - 05

continued

Gensler

Project	Steamboat Base Village Redevelopment	Date	07/22/2021
Project Location	Steamboat, Colorado	This is page	2 of 3
Eric McTee			
Prepared by Gensler by	Jacob Apple	Date Signed	7/22/2021
Instructions / Description / References / Dates			

Description of Changes

General:

This bulletin addresses the following:

Foundation and Lower Level Floor Plan Changes in the Promenade Building

Structural Drawing Changes:

1. 1A-S1.00
 - a. Top of slab elevation is clarified at existing pit slab
 - b. 'F6xCONT-A' reinforcement hook requirement is clarified to match shop drawing.
 - c. Footing elevation at grid 7.1/8 is revised.
 - d. Steel column size at grid E.5/8.5 is clarified.
 - e. Footing elevation is revised at grid A/8.
 - f. Foundation step location is clarified.
 - g. Pilaster dimension at grid B/8 is clarified.
 - h. Combined footing at grid A/2 to B/2 is revised.
 - i. Elevator footing is revised.
 - j. Combined footing at grid A/3 to B/3 is revised.
 - k. Combined footing at grid A/4 to B/4 is revised.
 - l. Combined footing at grid A/5 to B/5 is revised.
 - m. Combined footing at grid A/6 to B/6 is revised.
 - n. CMU control joint location is revised.
 - o. Spread footing at Grid A/7 is revised.
 - p. Spread footing at Grid B/7 is revised.
 - q. Spread footing at Grid C/4 is revised.
 - r. Spread footing at Grid C/5 is revised.
 - s. Spread footing at Grid C/6 is revised.
 - t. Spread footing at Grid C/7 is revised.
2. 1A-S3.01
 - a. Detail 4:
 - i. F7x7A and F8x8A footings are added.
 - b. Detail 8:
 - i. MS30A is added.
 - c. Detail 10:
 - i. Elevator footing is revised.
3. 1A-S3.02
 - a. Detail 3:
 - i. Footing reinforcement is clarified to match shop drawing.
 - b. Detail 9:
 - i. Top of pilaster elevation is clarified.

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Bulletin Number - BP3 Promenade - 05 continued

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Project	Steamboat Base Village Redevelopment	Date	07/22/2021
Project Location	Steamboat, Colorado	This is page	2 of 3

- c. Detail 11:
 - i. Detail is added.
- d. Detail 12:
 - i. Detail is added.
- e. Detail 15:
 - i. Detail is added.
- f. Plan 1:
 - i. F4x4 footing added for future column location at grid B/1.

Architectural Drawing Changes:

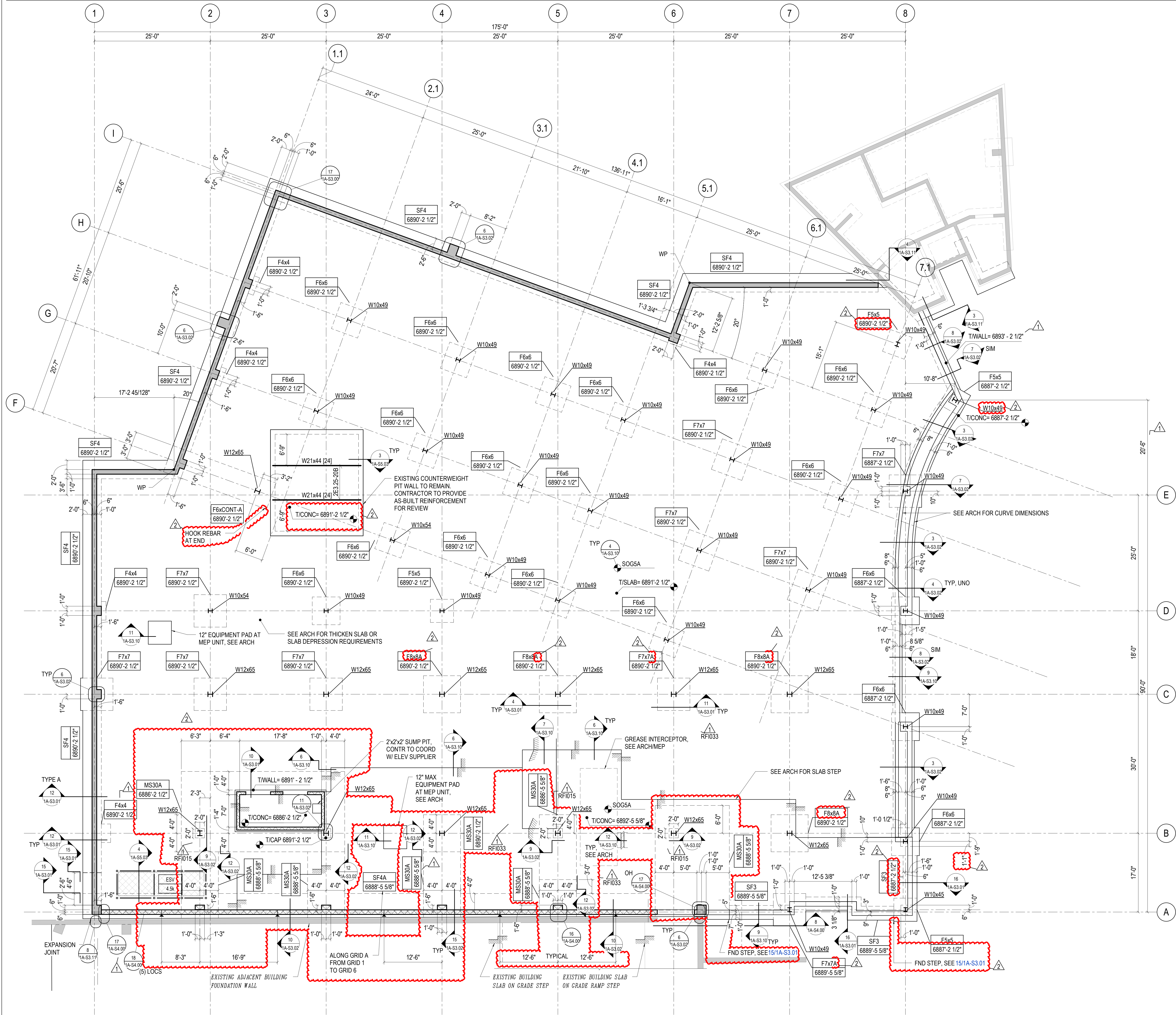
1. 1A-A1.200
 - a. Revised CMU walls to accommodate additional elevators and structural changes.
 - b. Revised concrete ramp location and slope at gridline 5
 - c. Revised Electrical Room P.007 location and size
 - d. Removed tenant areas from Summer 2021 scope
 - e. Revised landscape walls at Stage Restroom entry

Specfication Changes:

1. Added Specification SECTION 31 66 13 – AGGREGATE PIERS

DESIGNER: NC METN
LEAD REVIS: TECH COLIN MONKES
DATE PRINTED: 10/22/2021 11:16:55 PM
FILE PATH: S:\14111.S\01 - Steamboat Promenade Building 2021 - 2021.14

MIL JOB # - 2014111.S\01
PRINCIPAL: KELLY KNOWLES
ENGINEER: KELLY KNOWLES
PROJECT MANAGER: C. A. CHEN



1 PROMENADE BUILDING - FOUNDATION PLAN
1/8" = 1'-0"

PLAN NOTES

GENERAL:
SEE S3 SERIES SHEETS FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
- VERIFY ALL USGS ELEVATIONS IN FIELD AND WITH CIVIL AND ARCHITECTURAL DRAWINGS PRIOR TO CONSTRUCTION.
- SEE S3 SERIES SHEETS FOR TYPICAL CONCRETE DETAILS.

1) GRADE BEAMS / STEM WALLS:
1A) SEE PLAN FOR DIMENSIONED LOCATIONS OF STEM WALLS.
1B) SEE 19/S3.01 FOR LIMITS OF GRADE BEAM/WALL POUR LENGTHS.
1C) SEE 11/S3.00 FOR TYPICAL PENETRATIONS THROUGH GRADE BEAMS / STEM WALLS.
1D) REINFORCING
SEE 17/S3.00 FOR FOUNDATION WALL HORIZONTAL CORNER AND INTERSECTION REINFORCING

2) SLAB-ON-GRADE:
2A) SEE DETAIL 4/1A-S3.10 FOR TYPICAL SLAB-ON-GRADE DETAIL.
2B) SEE DETAIL 5/1A-S3.10 FOR TYPICAL SLAB-ON-GRADE LAYOUT INFORMATION.
2C) SEE ARCH AND MECH DRAWINGS FOR SLAB SLOPES, DEPRESSIONS, FILL PADS, AND CURBS NOT SHOWN ON THE STRUCTURAL DRAWINGS.
- SEE 11/1A-S3.10 FOR CURB AND MECHANICAL EQUIPMENT PAD DETAILS
2D) SEE ARCH DRAWINGS FOR VAPOR RETARDER LOCATIONS. INSTALL VAPOR RETARDER DIRECTLY UNDER SLAB PER RECOMMENDATIONS OF PCA AND ACI 302.1R-04. TAKE PRECAUTIONS TO MINIMIZE SLAB CURLING. GRIND SLAB TO ACHIEVE SPECIFIED FLOOR FLATNESS AND LEVELNESS VALUES.
2E) SLABS-ON-GRADE WITH EXTERIOR EXPOSURE, SHALL BE REINFORCED WITH EPOXY COATED (EC) REINFORCING.
2F) SEE "CONCRETE GENERAL NOTES" FOR JOINTING REQUIREMENTS AT SLAB-ON-GRADE.

3) COLUMNS/PILASTERS:
3A) ALL COLUMNS/PILASTERS ARE CENTERED ON THE INTERSECTION OF GRIDS BELOW THE SUPPORTED COLUMN UNLESS DIMENSIONED OTHERWISE ON PLAN.

4) MASONRY WALLS:
4A) MASONRY PARTITION WALLS ARE NOT SHOWN.
- SEE 1A-S4.00 FOR TYPICAL MASONRY PARTITION WALL DETAILS.
4B) SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS OF ALL MASONRY WALLS.

5) MISCELLANEOUS NOTES:
5A) SEE SHEET 1A-S3.00 FOR MISCELLANEOUS CONCRETE DETAILS AND INFORMATION INCLUDING CONCRETE LAP SPlice SCHEDULE, TYPICAL HOOK DETAILS, AND CLEAR COVER REQUIREMENTS.
5B) SEE DETAIL 11/1A-S3.00 FOR TYPICAL REINFORCING AT WALL PENETRATIONS.
5C) SEE DETAIL 8/1A-S3.00 FOR TYPICAL WELD BETWEEN REINFORCING BARS AND EMBED PLATES. DETAIL APPLIES AT ALL LOCATIONS WHERE "DAS" IS INDICATED ON DRAWINGS.
5D) CONTRACTOR TO FIELD LOCATE ALL UTILITIES BELOW GRADE. CONTRACTOR SHALL NOTIFY ARCHITECT BY DIMENSIONED DRAWING OF LOCATIONS WHERE UTILITIES CONFLICT WITH FOUNDATION INSTALLATION. CONTRACTOR SHALL MAKE ALLOWANCE FOR THE RESOLUTION OF SUCH DISCOVERIES PRIOR TO PROCEEDING WITH AFFECTED FOUNDATIONS.

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Seal / Signature

Date	Description
2021.05.19	BP3: PROMENADE - ISSUE FOR BID AND PERMIT
2021.06.29	BP3: PROMENADE - BULLETIN 02
2021.07.22	BP3: PROMENADE - BULLETIN 05

Project Name

SSRC | BASE AREA IMPROVEMENTS

Project Number

20.1411.S.01

Description

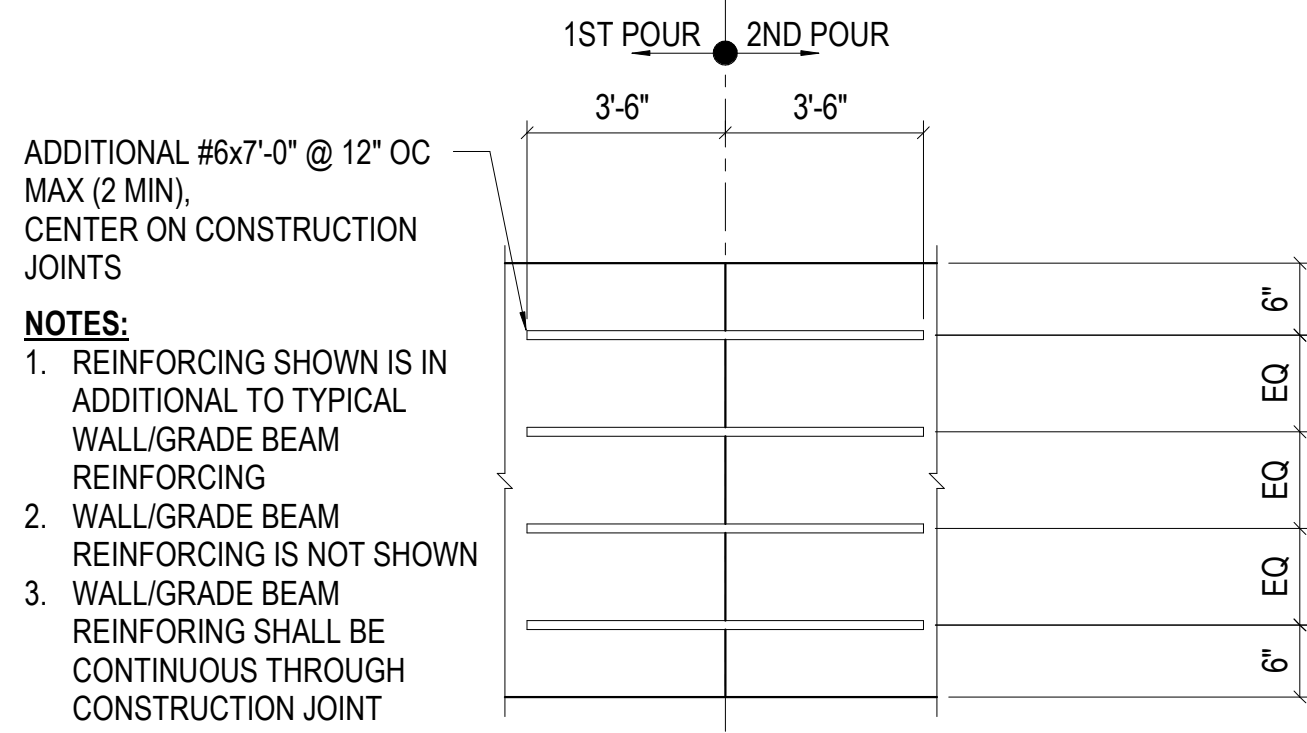
PROMENADE BUILDING - LOWER LEVEL 1

Scale

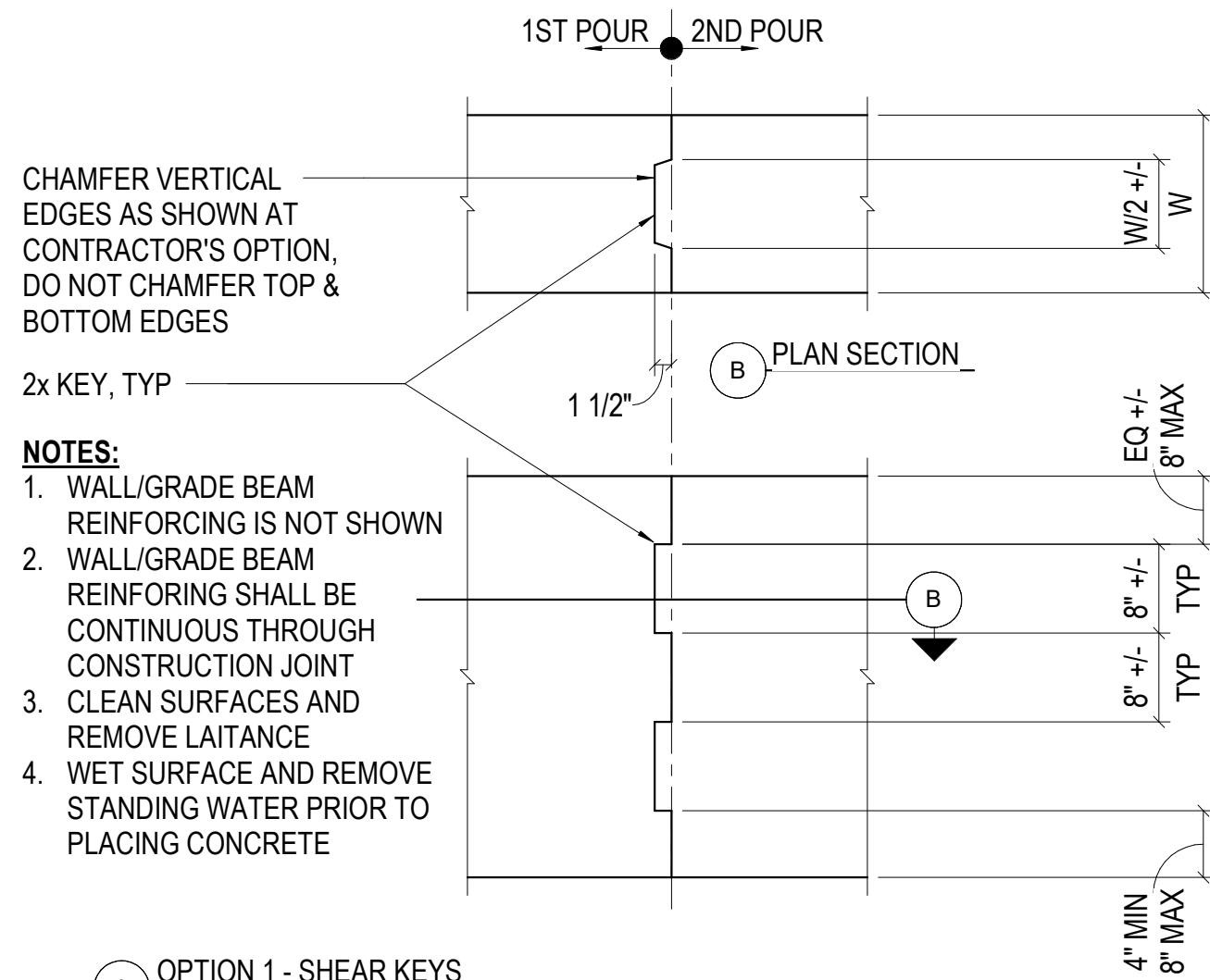
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1A-S1.00

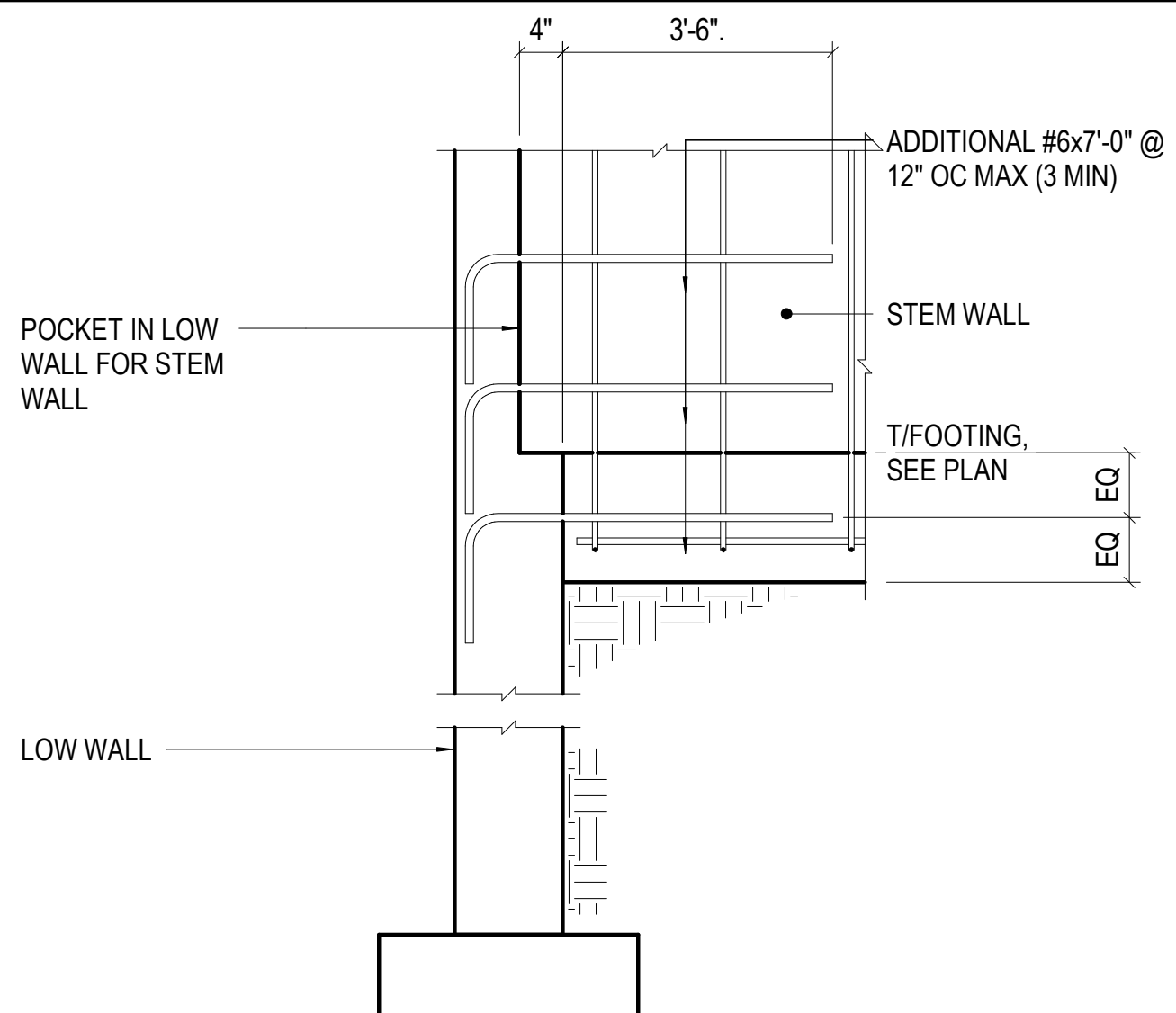
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ML JOB #: 201411.S.01
PRINCIPAL: KELLY KNOWLES
FOR: KELLY KNOWLES
PROJECT MANAGER: C. A. CHEN



OPTION 2 - ADDITIONAL REINFORCING WALL ELEVATION

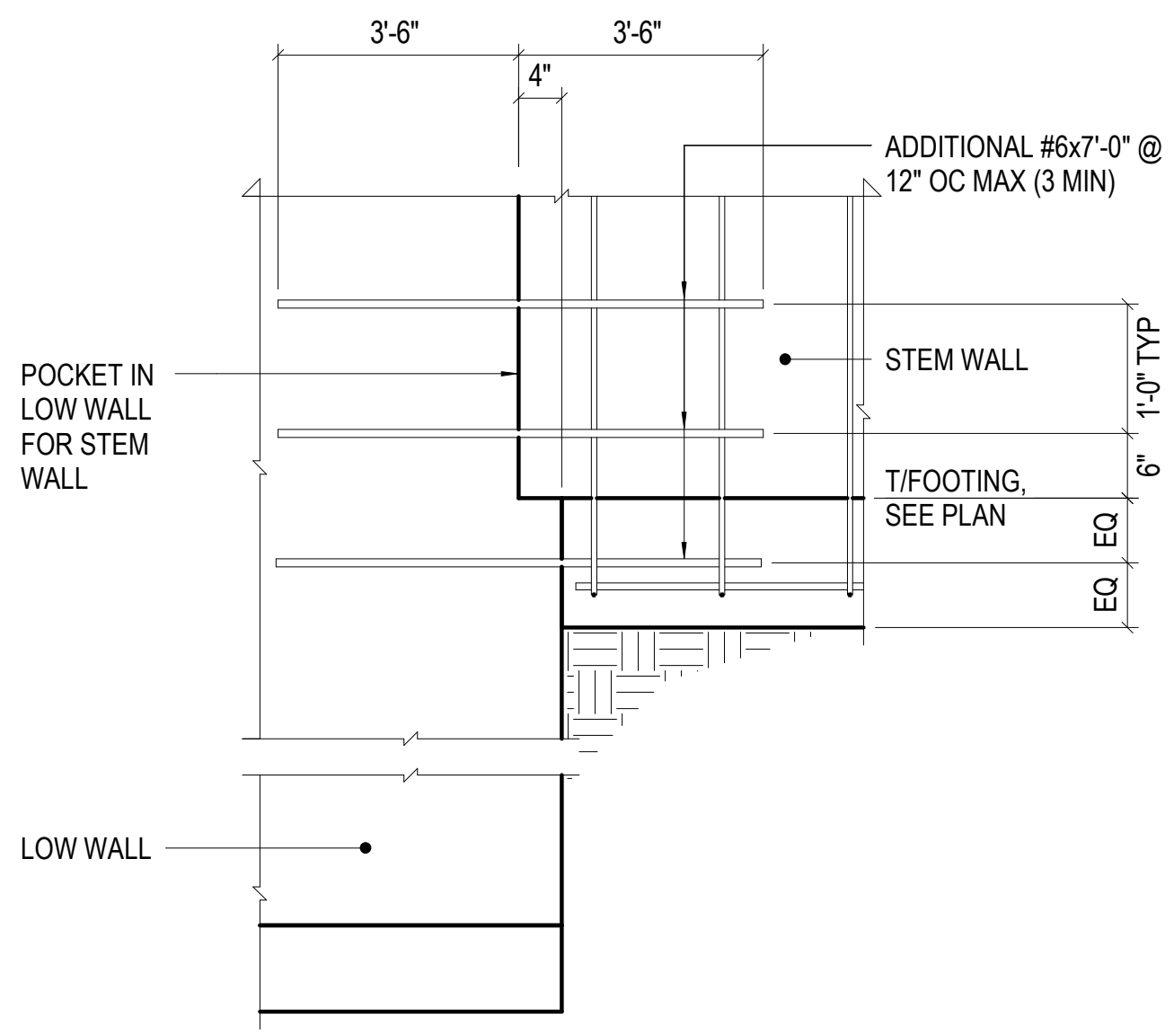


OPTION 1 - SHEAR KEYS WALL ELEVATION



AT STEM WALL PERPENDICULAR TO LOW WALL

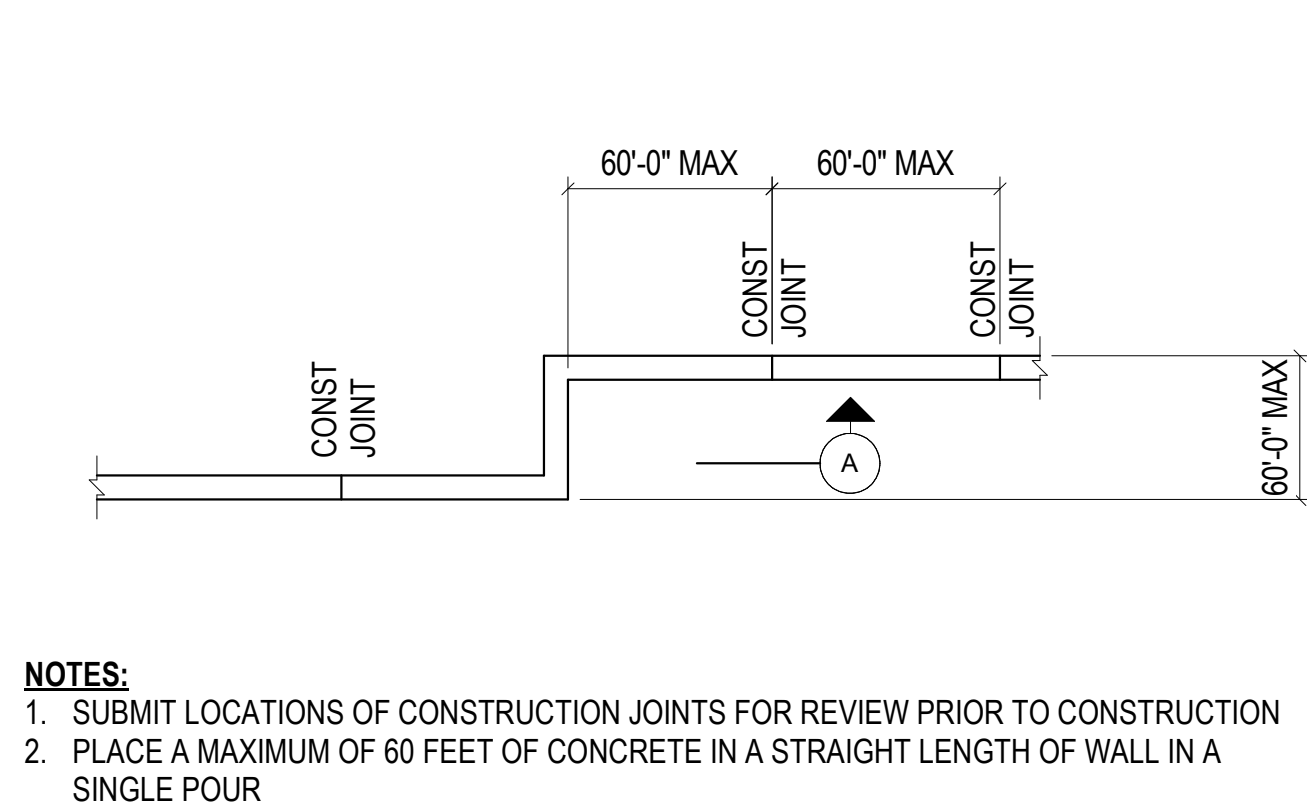
NOTES:
1. WALL HORIZONTAL & VERTICAL MAT REINFORCING NOT SHOWN



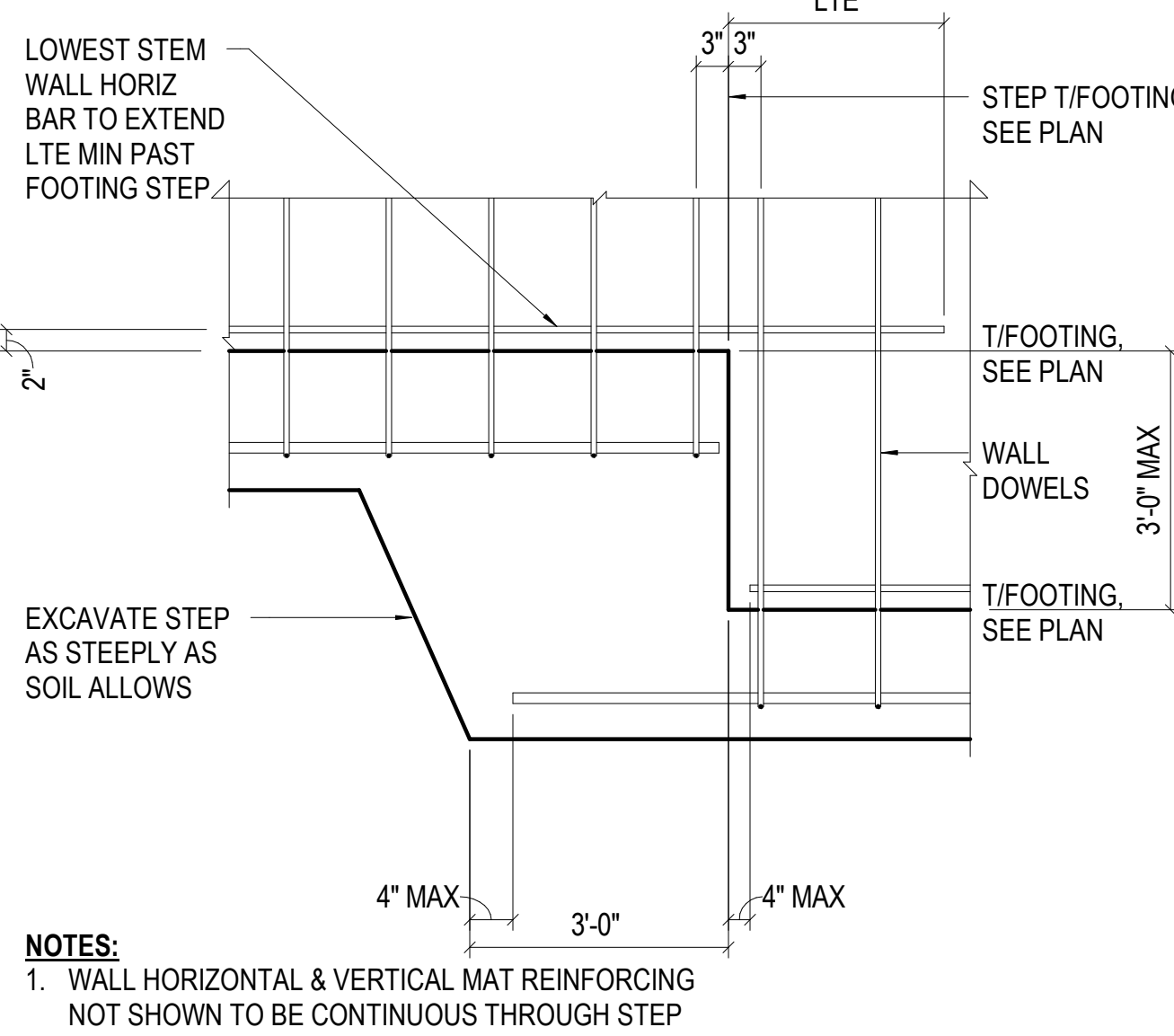
AT STEM WALL PARALLEL TO LOW WALL

NOTES:
1. WALL HORIZONTAL & VERTICAL MAT REINFORCING NOT SHOWN TO BE CONTINUOUS THROUGH STEP

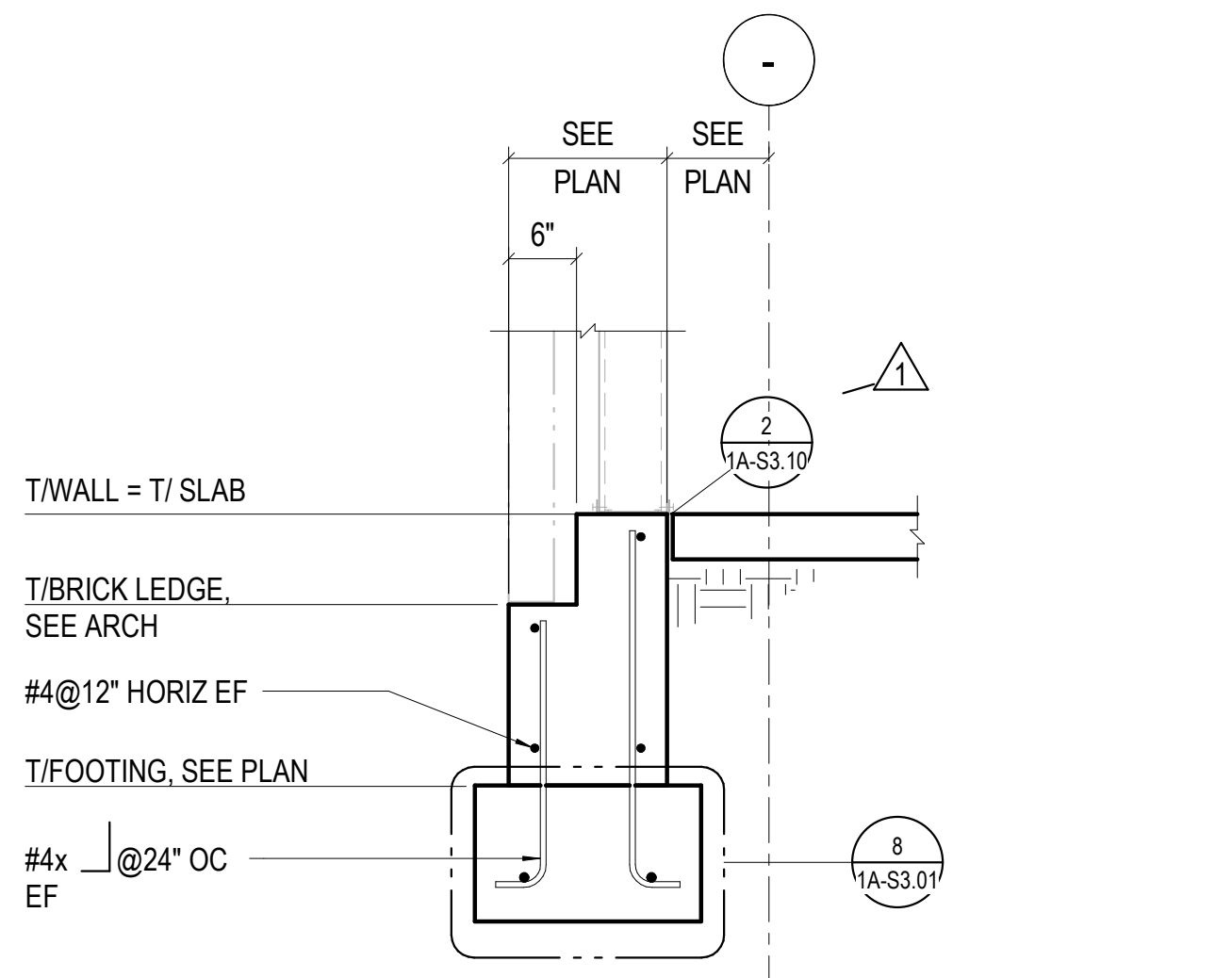
14 3/4" = 1'-0" STRIP FOOTING w/CIP STEM WALL STEP, GREATER THAN 3'-0"



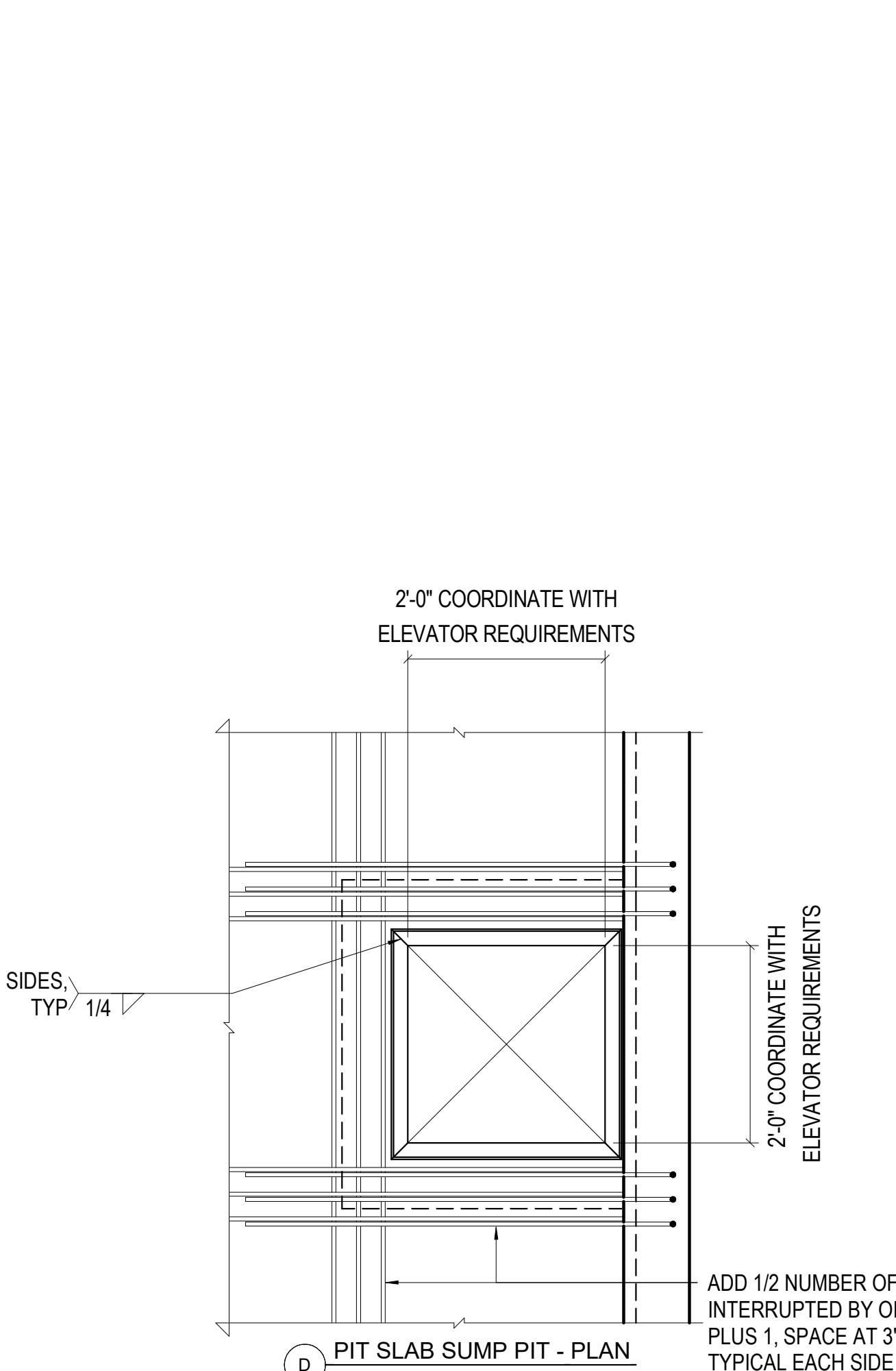
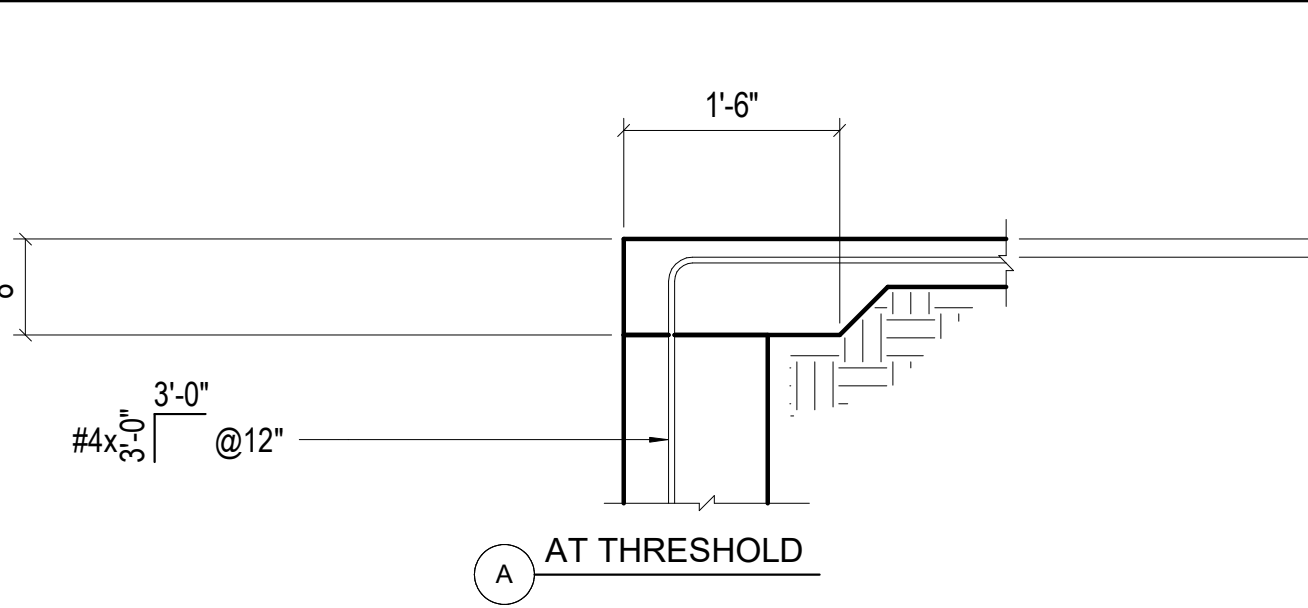
19 NO SCALE CONSTRUCTION JOINT IN WALL ON FOOTINGS



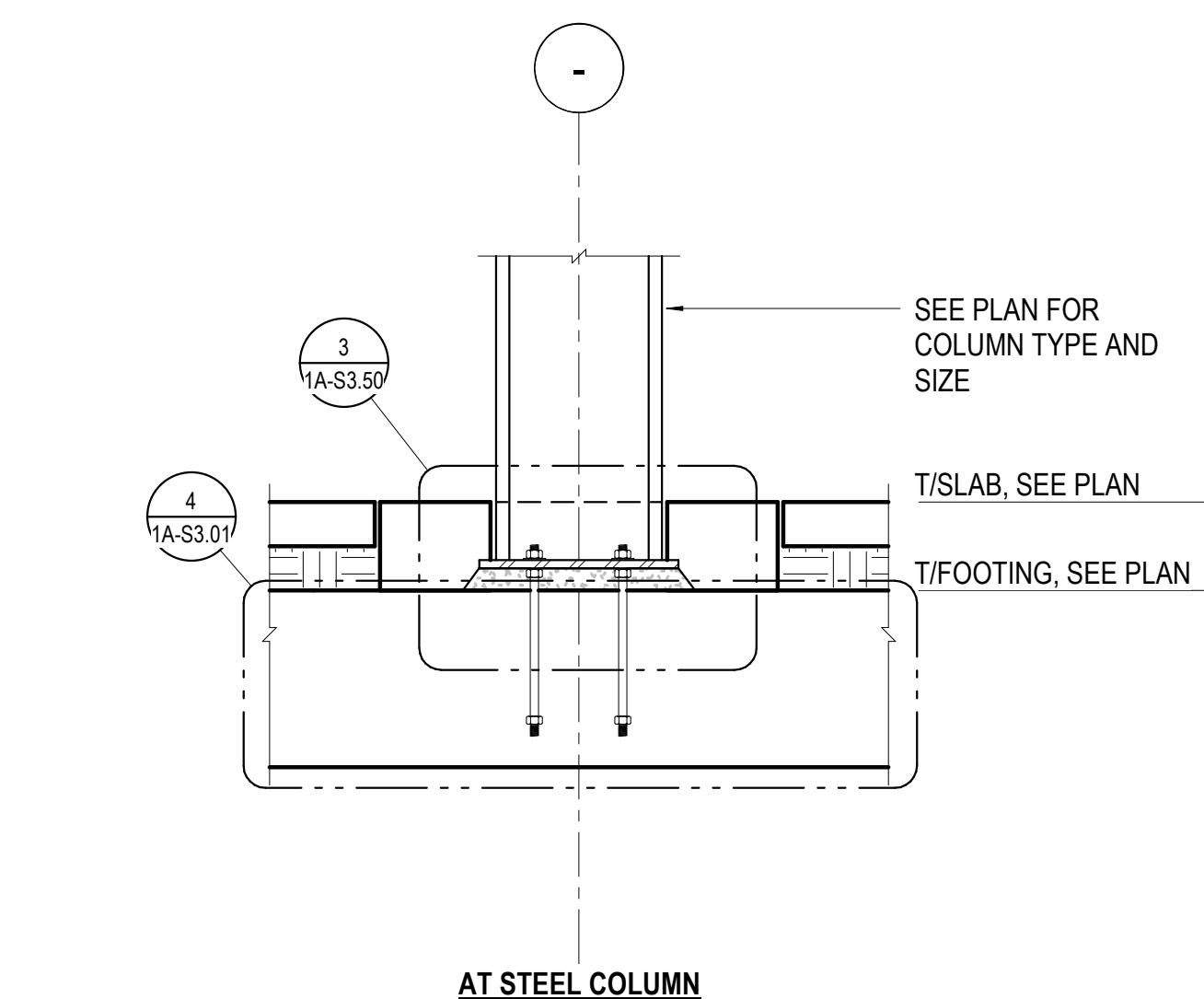
15 3/4" = 1'-0" STRIP FOOTING w/CIP STEM WALL STEP, 3'-0" AND LESS



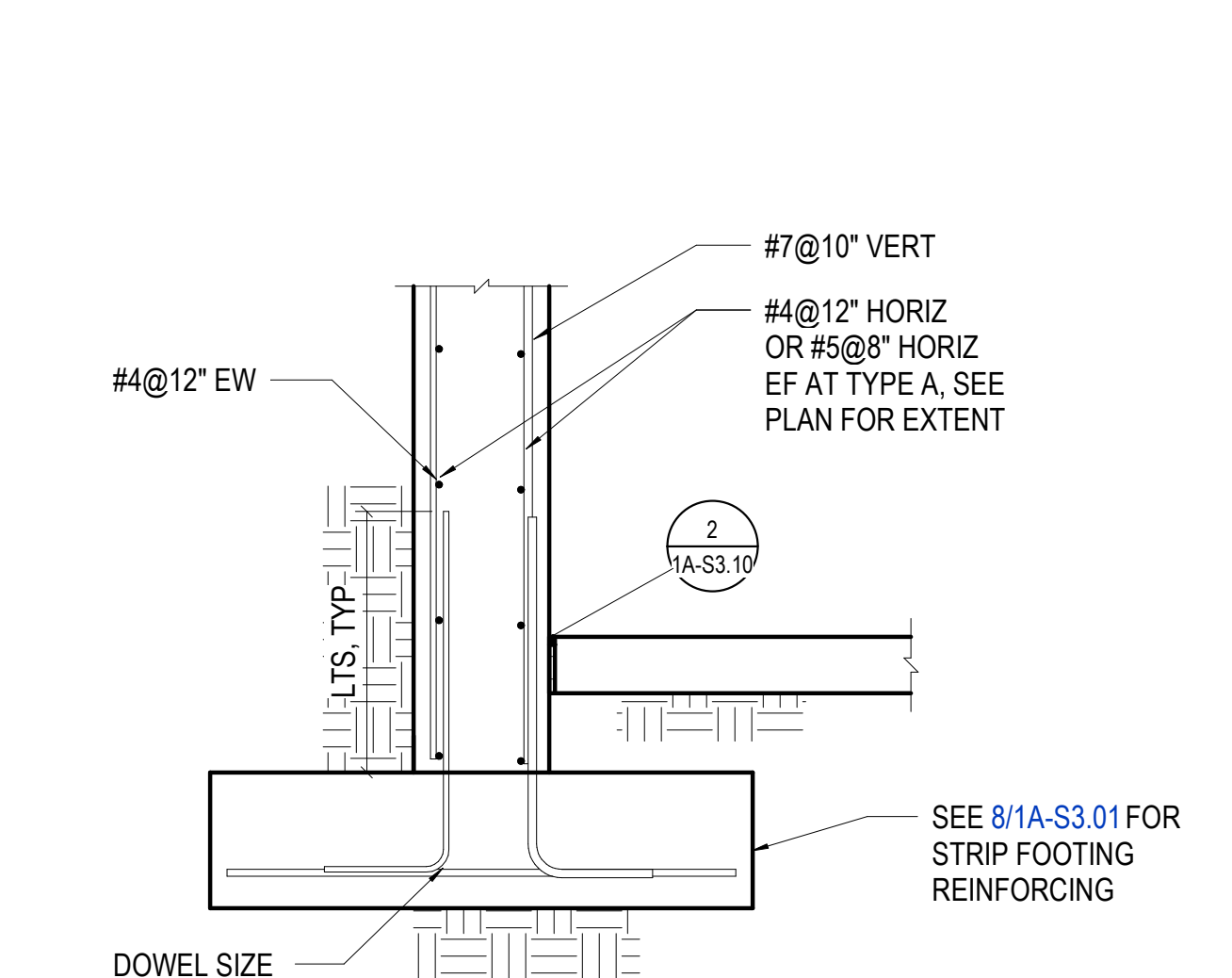
16 3/4" = 1'-0" WIDE STEM WALL AT PERIMETER WITH BRICK LEDGE



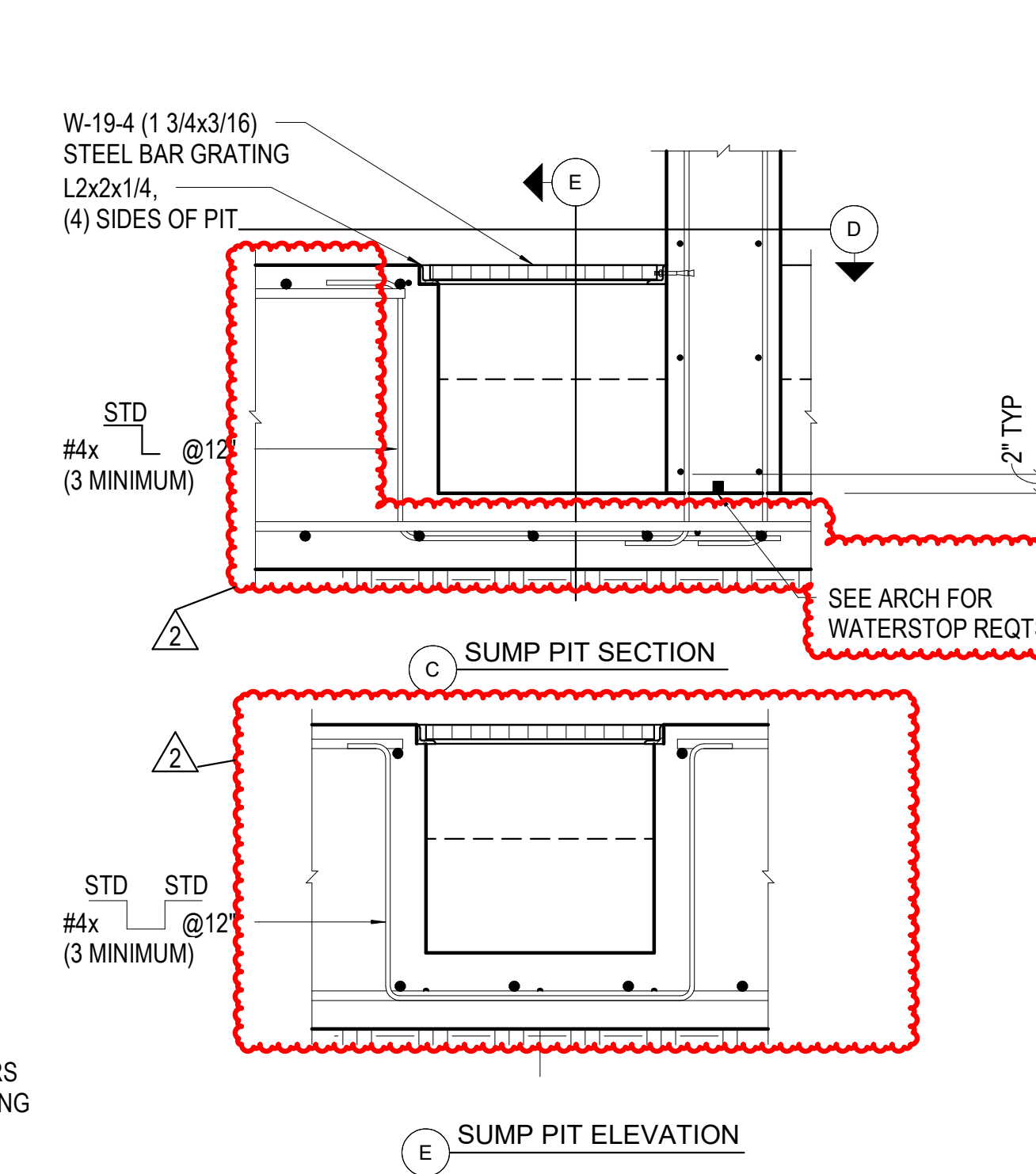
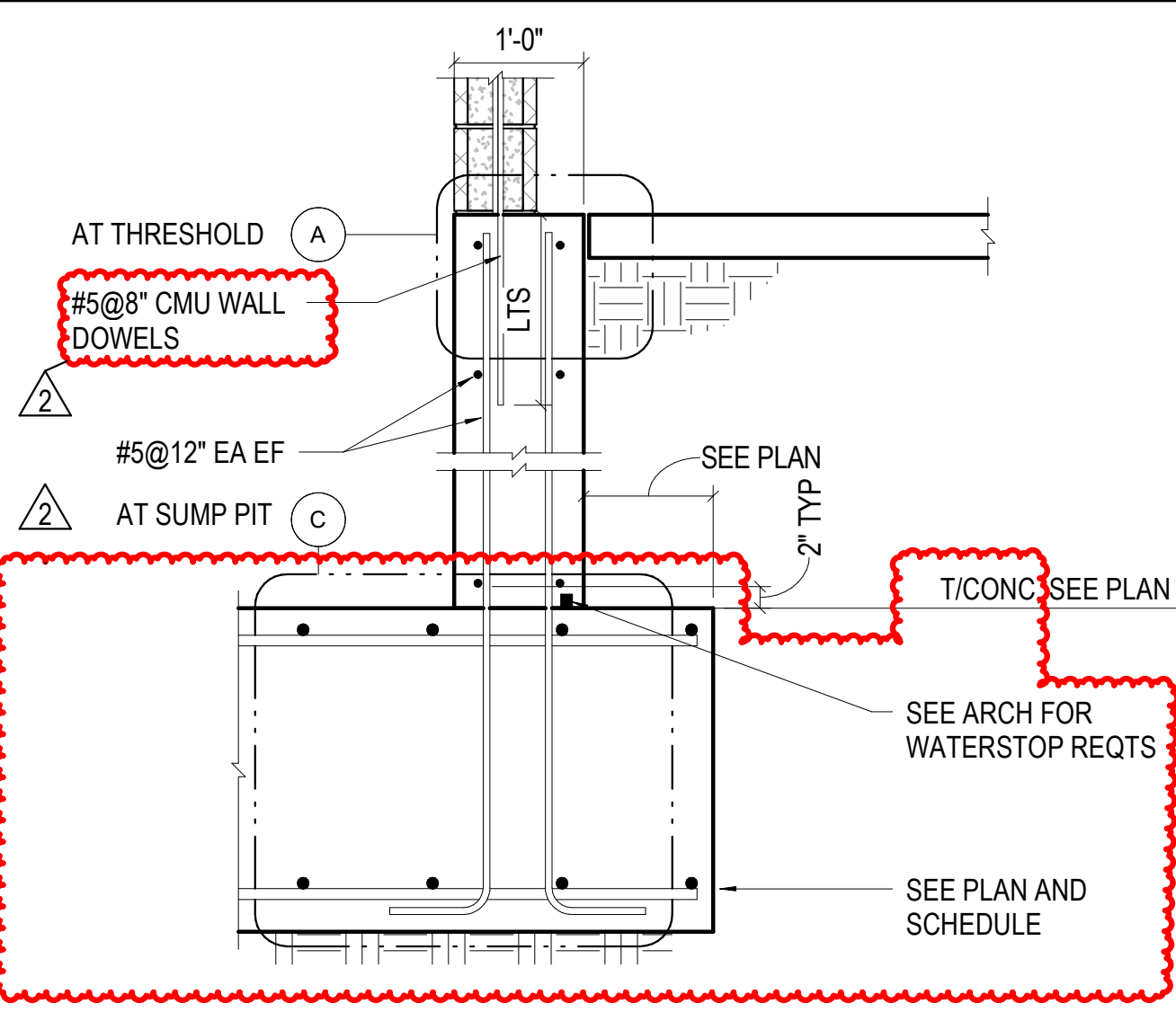
10 NO SCALE ELEVATOR PIT ON FOOTING



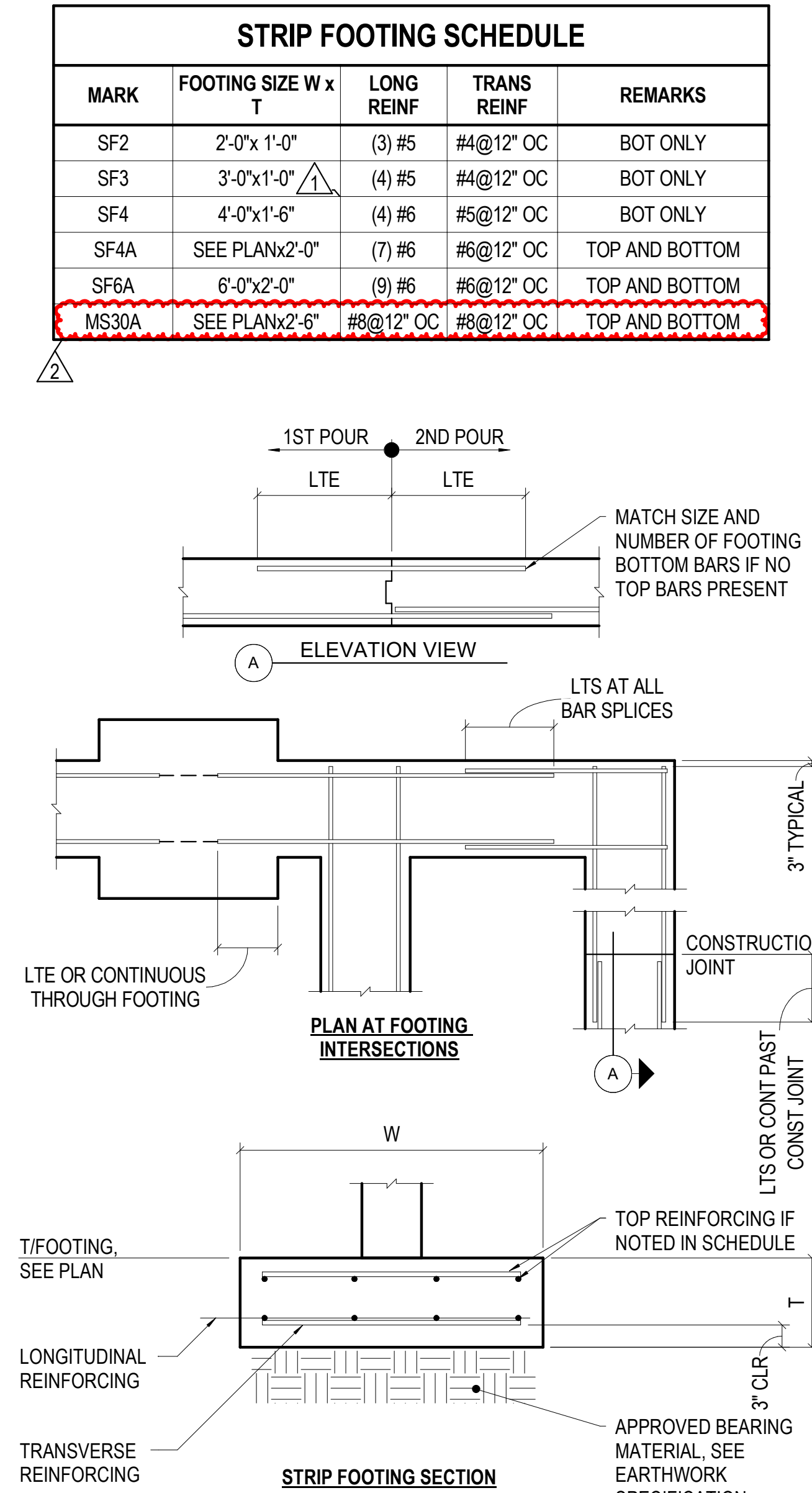
11 3/4" = 1'-0" INTERIOR COLUMN AT SPREAD FOOTING



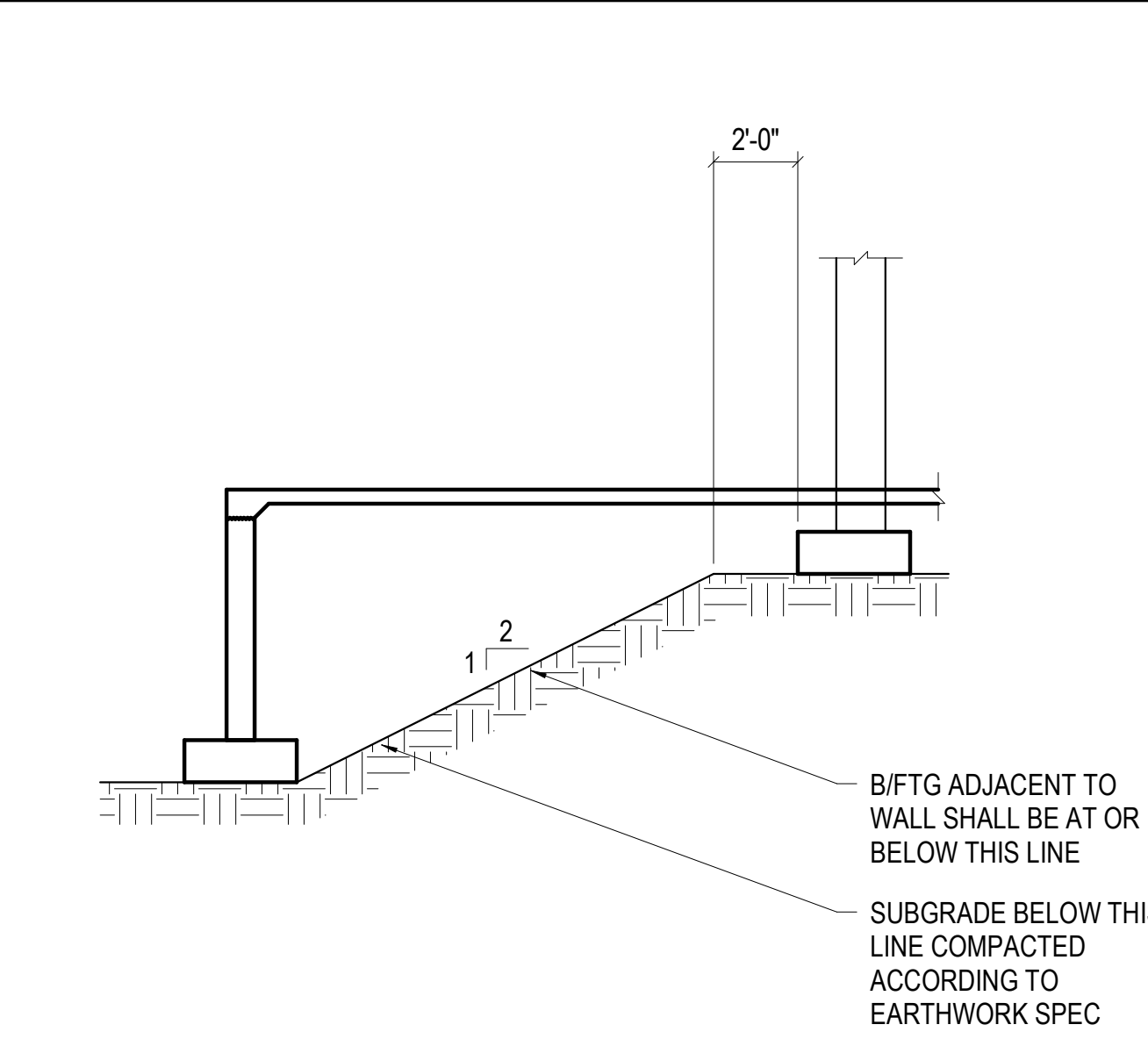
12 3/4" = 1'-0" TYPICAL FOUNDATION WALL



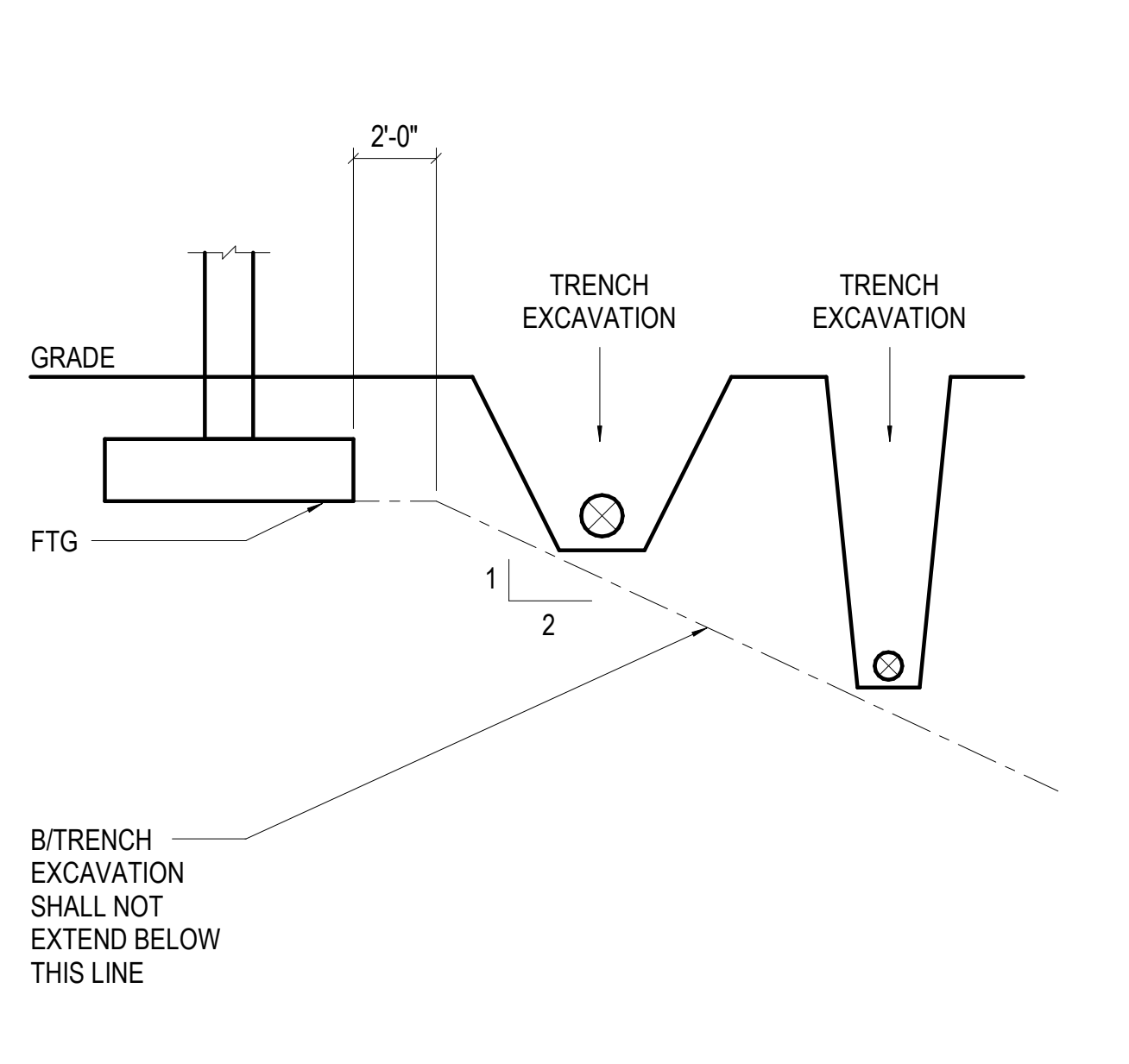
8 NO SCALE TYP STRIP FOOTING



NOTES:
1. SEE 19/1A-S3.01 FOR POUR LENGTH LIMITS AND CONSTRUCTION JOINT DETAILS

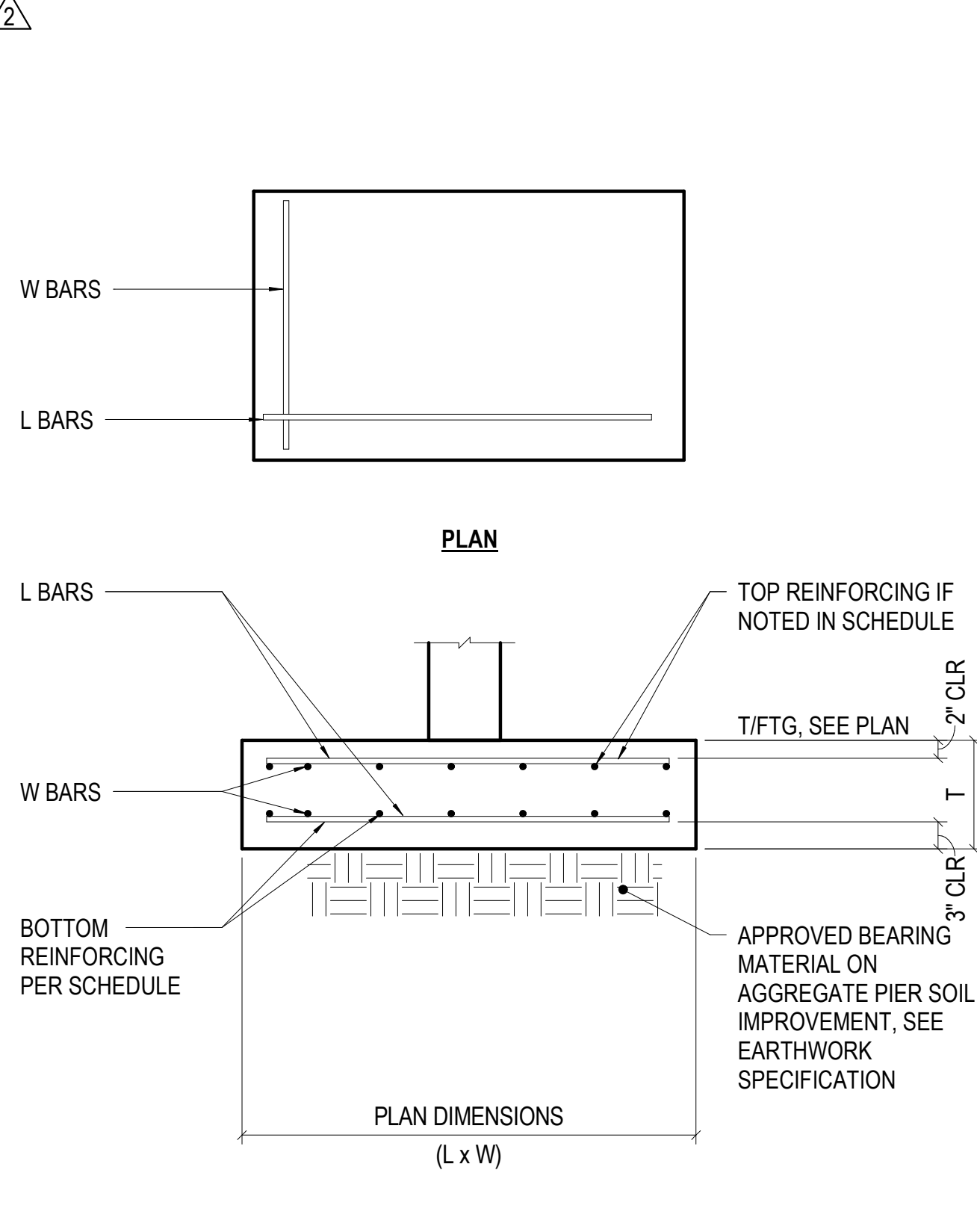


1 1/4" = 1'-0" TYP FTG ADJACENT TO WALL



2 NO SCALE TYP EXCAVATION AT FTG

SPREAD FOOTING SCHEDULE				
SOIL ALLOWABLE PRESSURE = 7000 PSF				
MARK	FOOTING SIZE L x W x T	REINFORCING	SERVICE CAPACITY (KIPS)	REMARKS
F3x5	3'-0"x5'-0"x1'-8"	(6) #6 EW BOT	105	-
F4x4	4'-0"x4'-0"x1'-4"	(5) #5 EW BOT	112	-
F5x5	5'-0"x5'-0"x1'-8"	(6) #6 EW BOT	175	-
F6x6	6'-0"x6'-0"x2'-0"	(7) #7 EW BOT	252	-
F7x7	7'-0"x7'-0"x2'-4"	(8) #7 EW BOT	343	-
F7x7A	7'-0"x7'-0"x2'-4"	(8) #7 EW T&B	-	-
F8x8	8'-0"x8'-0"x2'-6"	(9) #7 EW BOT	448	-
F8x8A	8'-0"x8'-0"x2'-6"	(9) #7 EW T&B	448	-
F6xCONT-A	SEE PLANx3'-0"	#8@9" EW T&B	-	-



4 NO SCALE TYP SPREAD FOOTING

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Seal / Signature

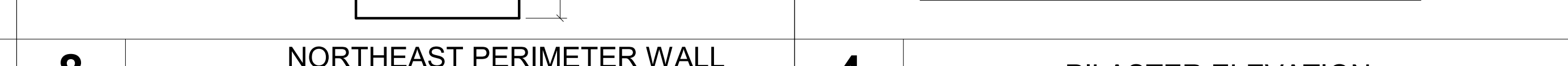
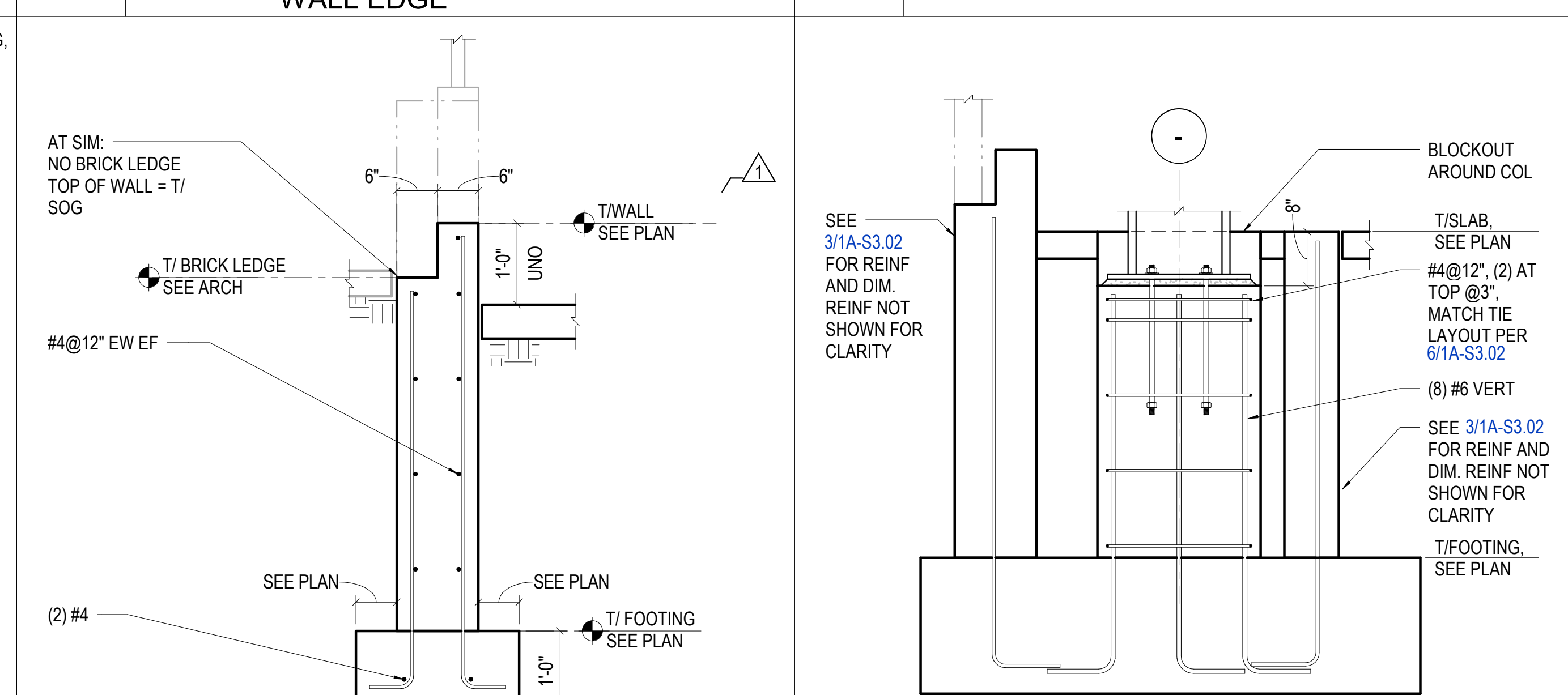
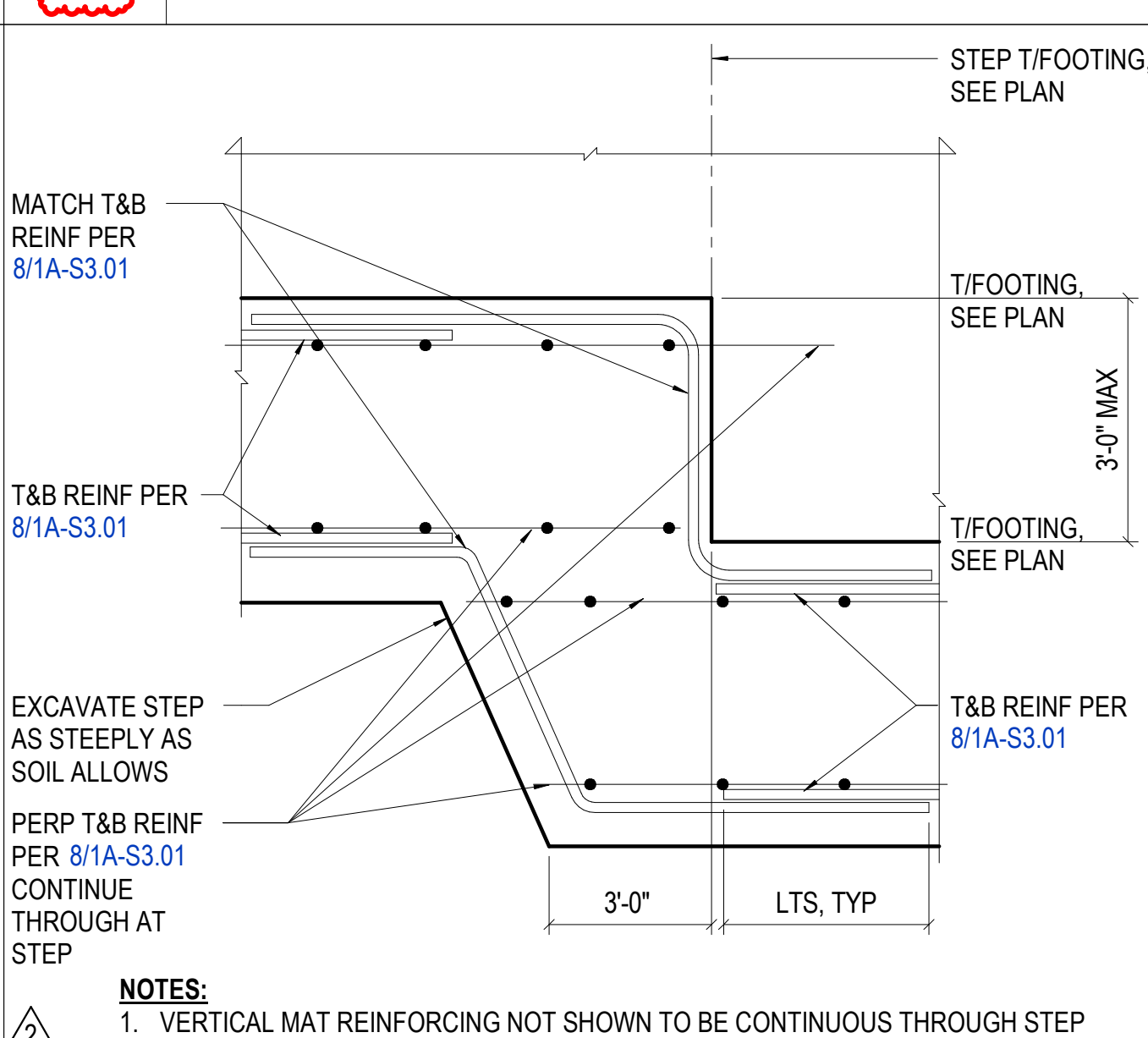
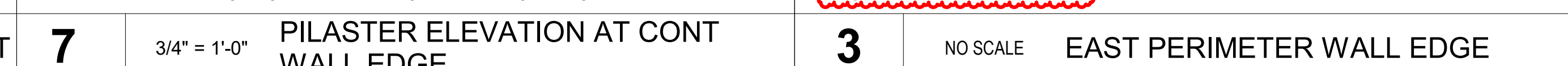
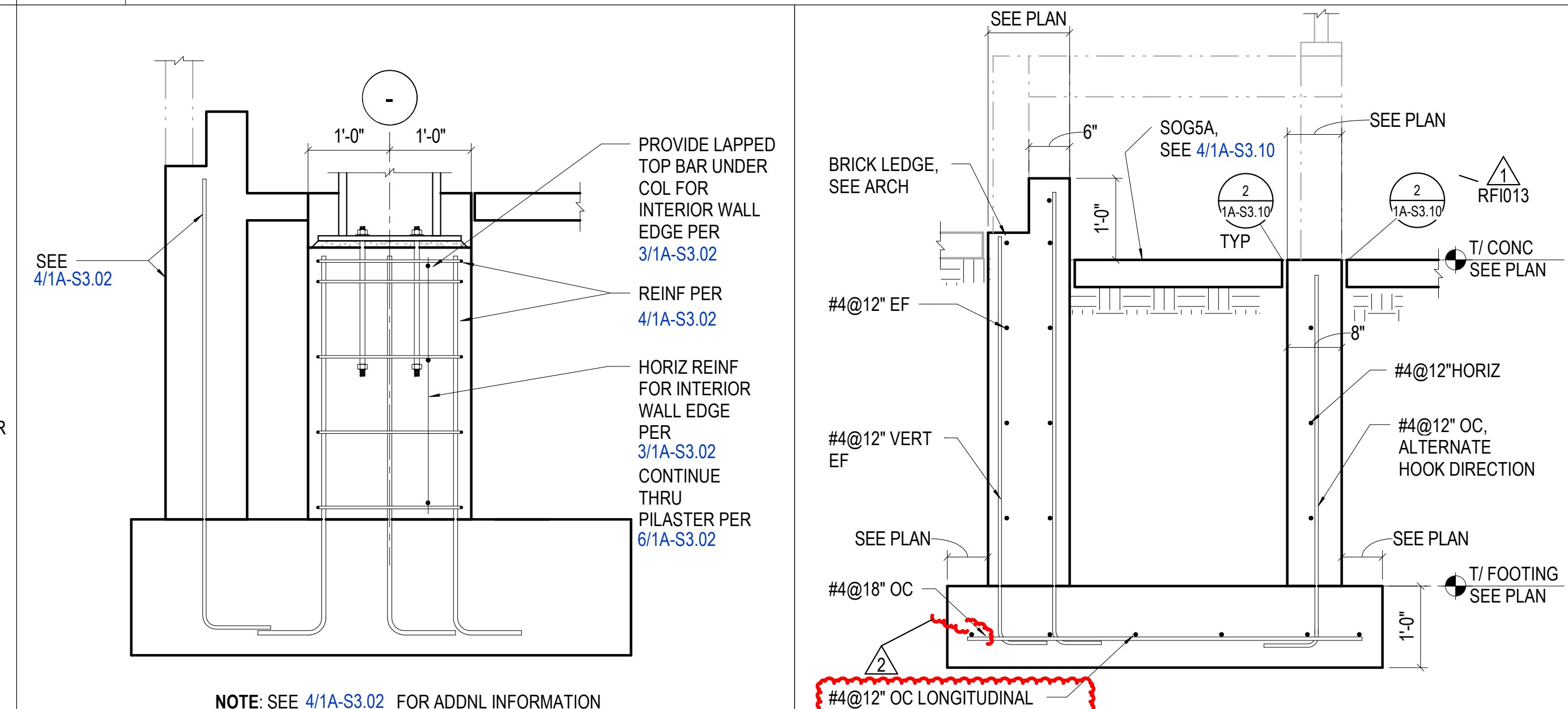
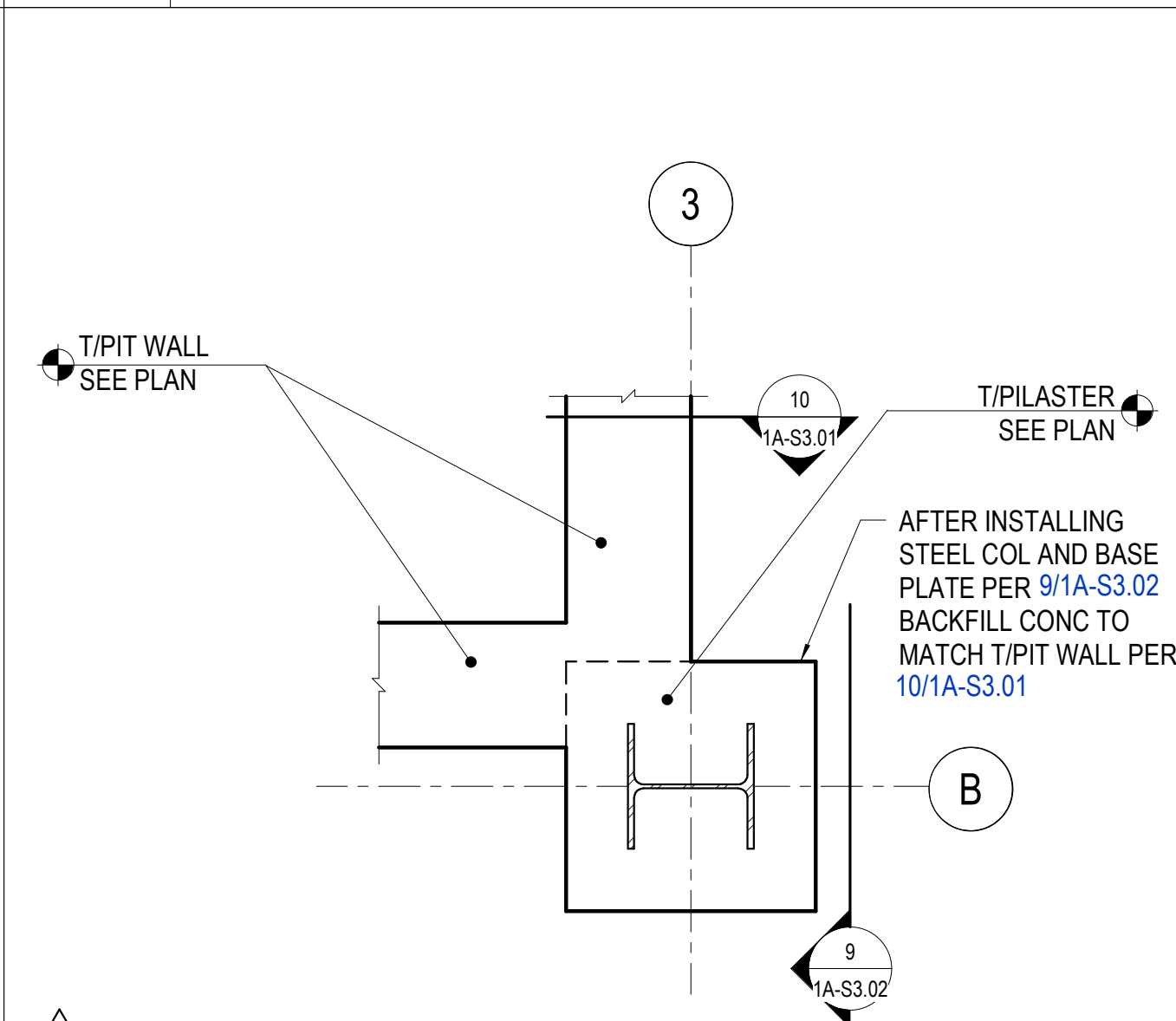
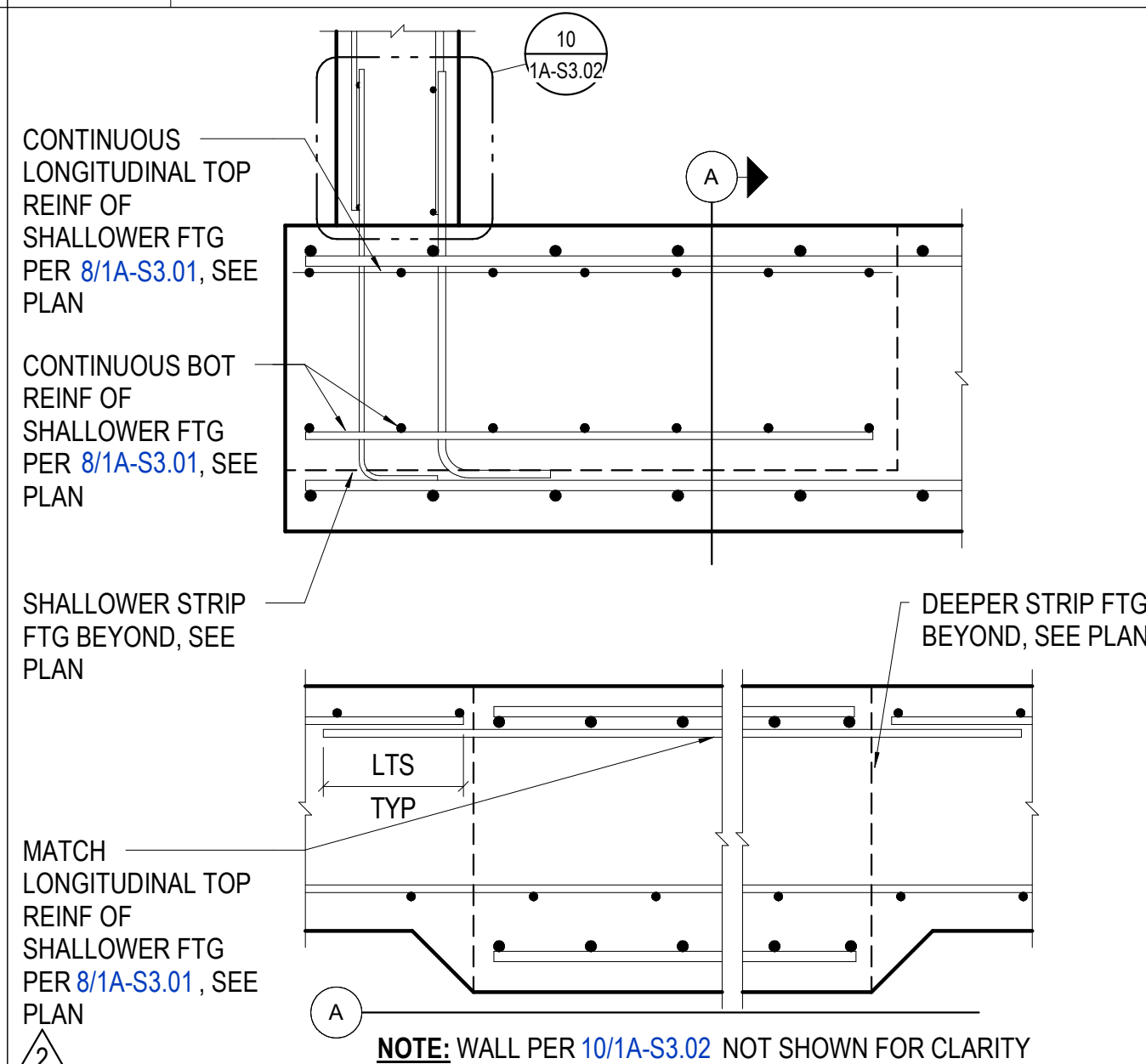
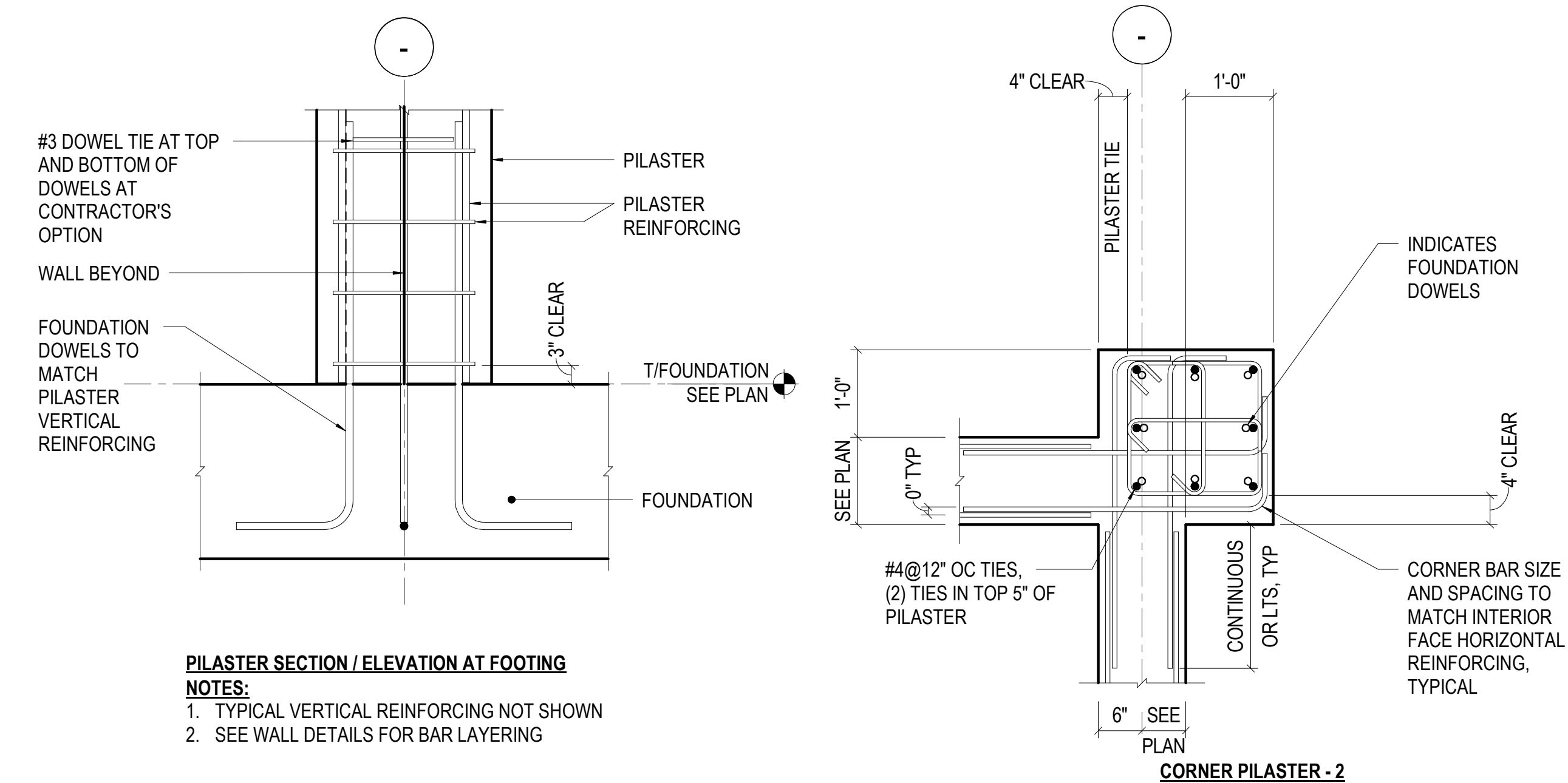
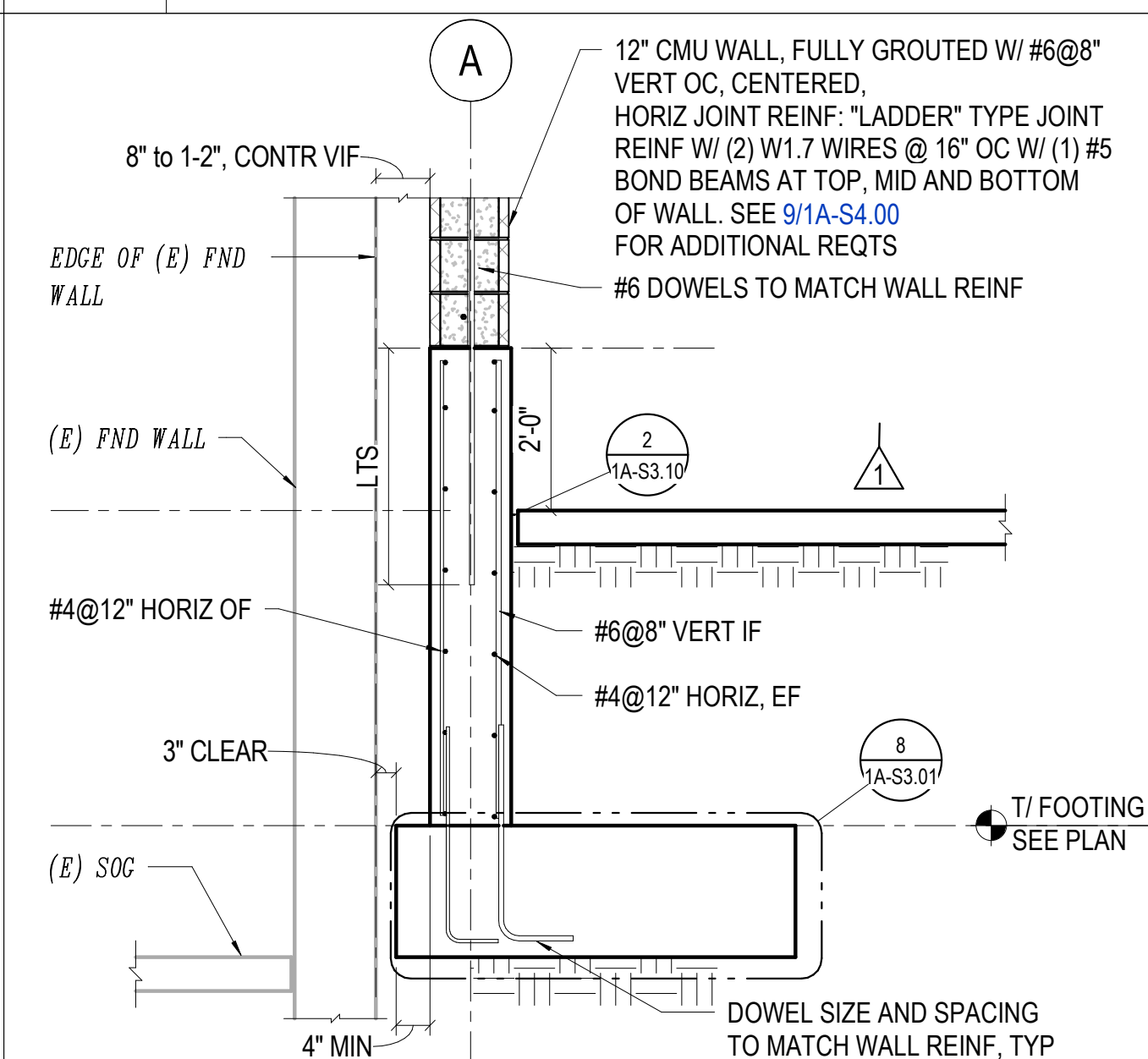
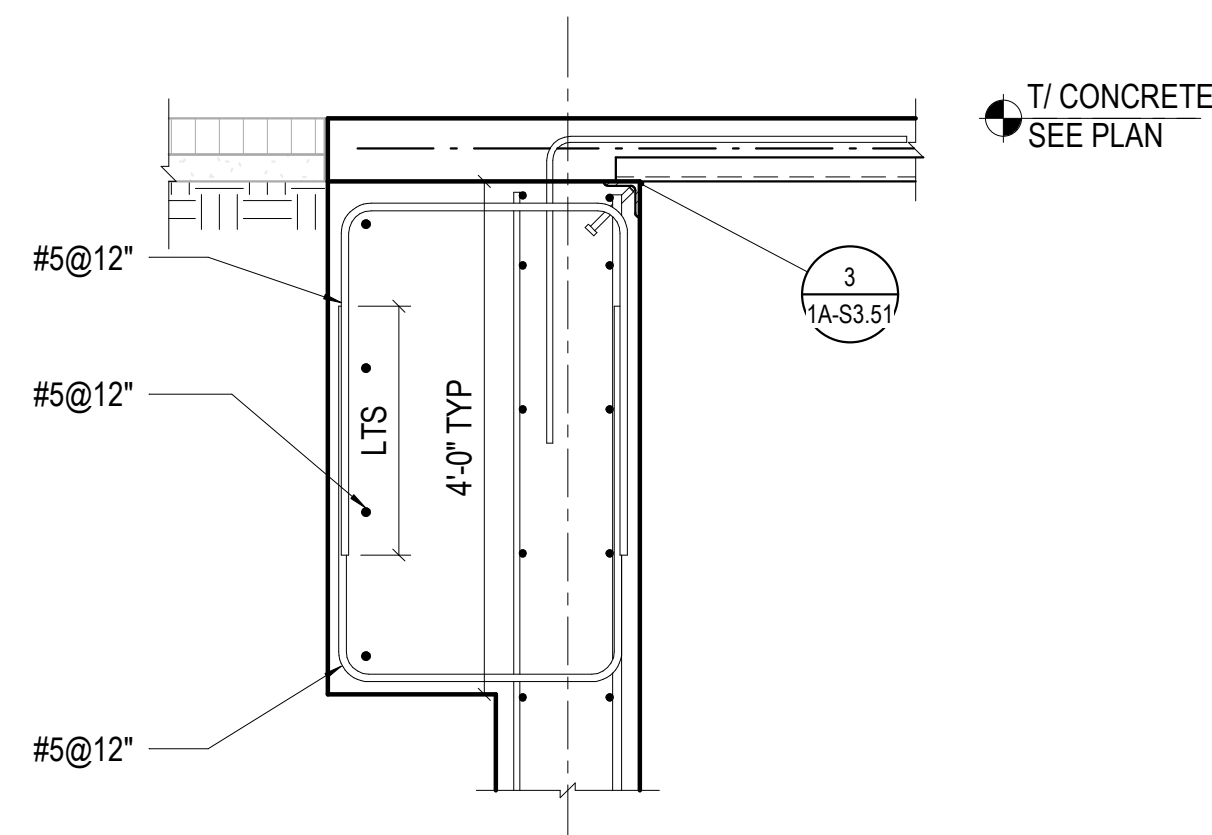
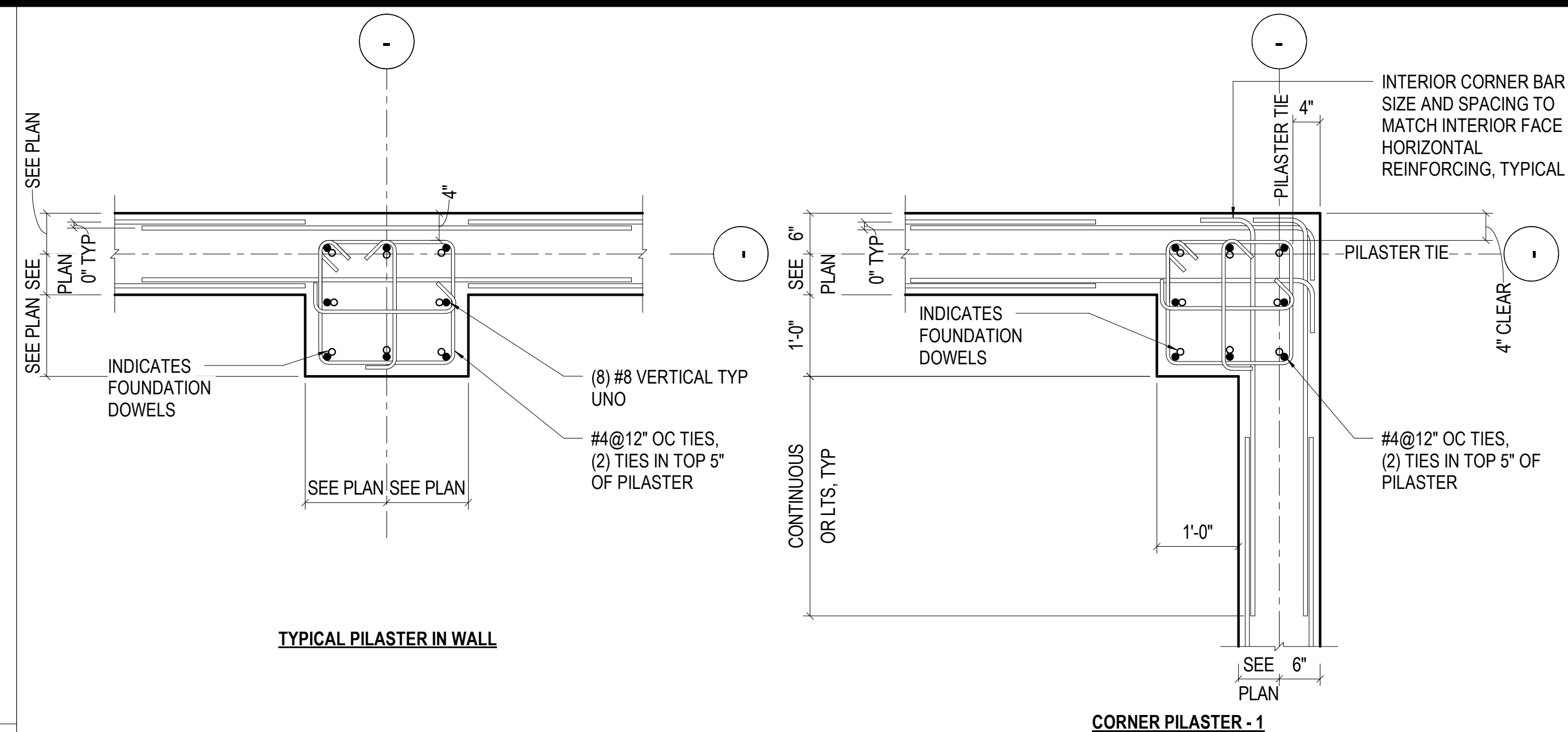
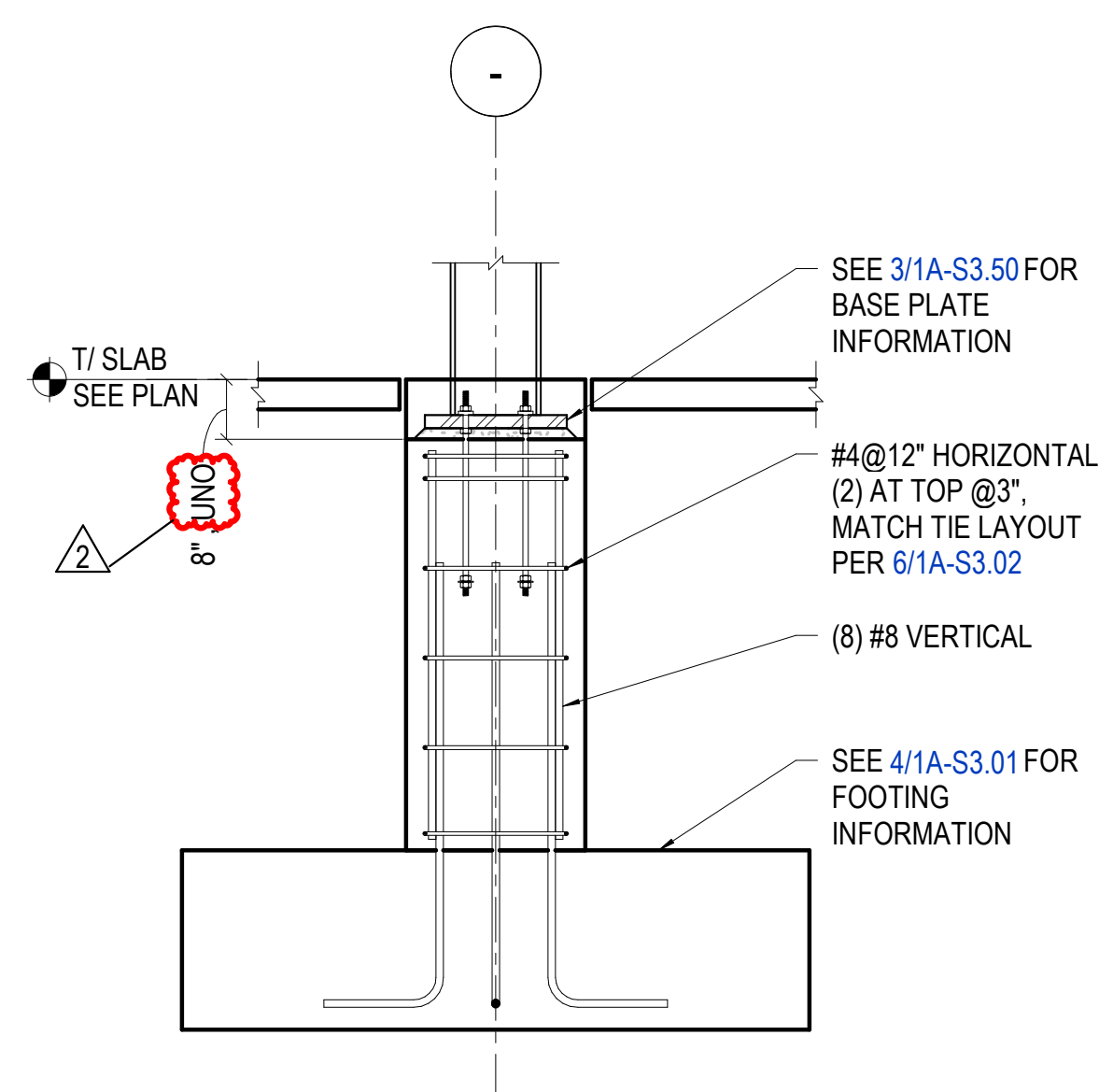
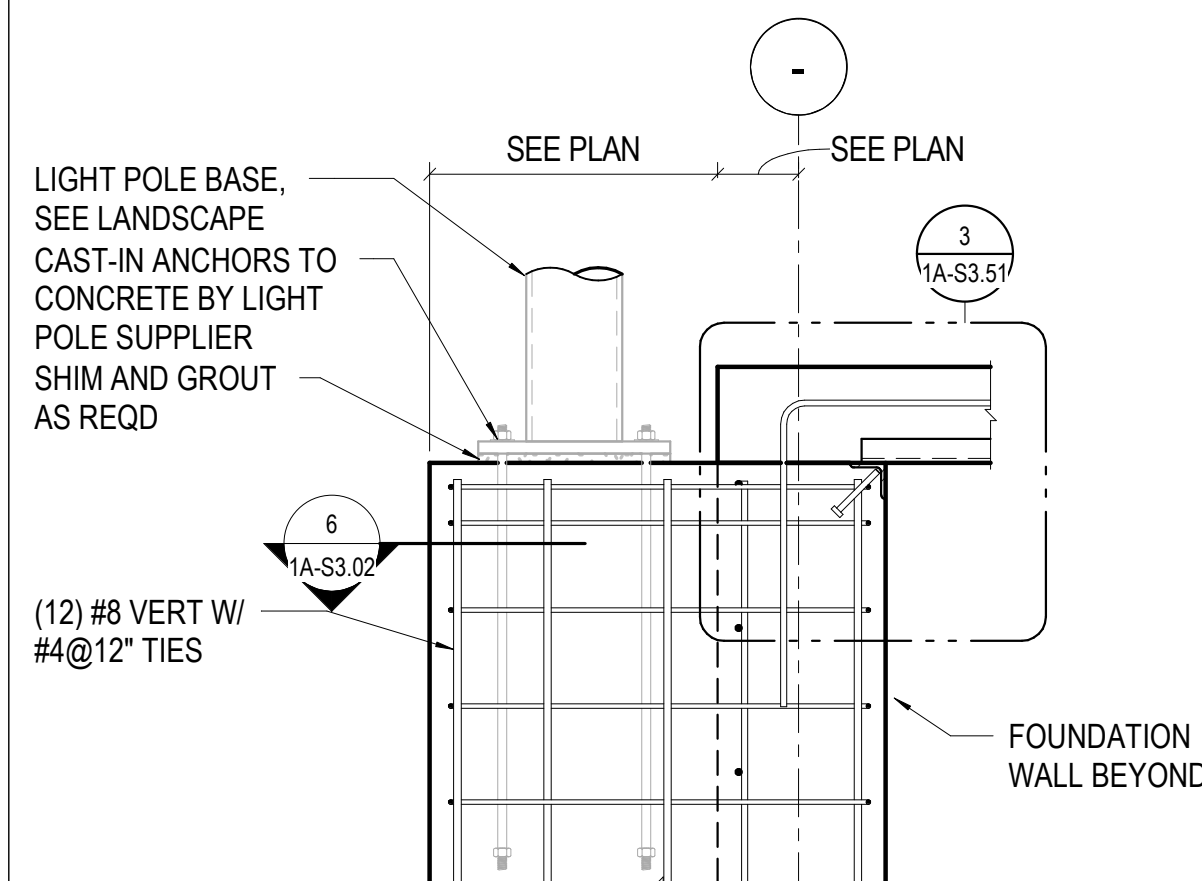
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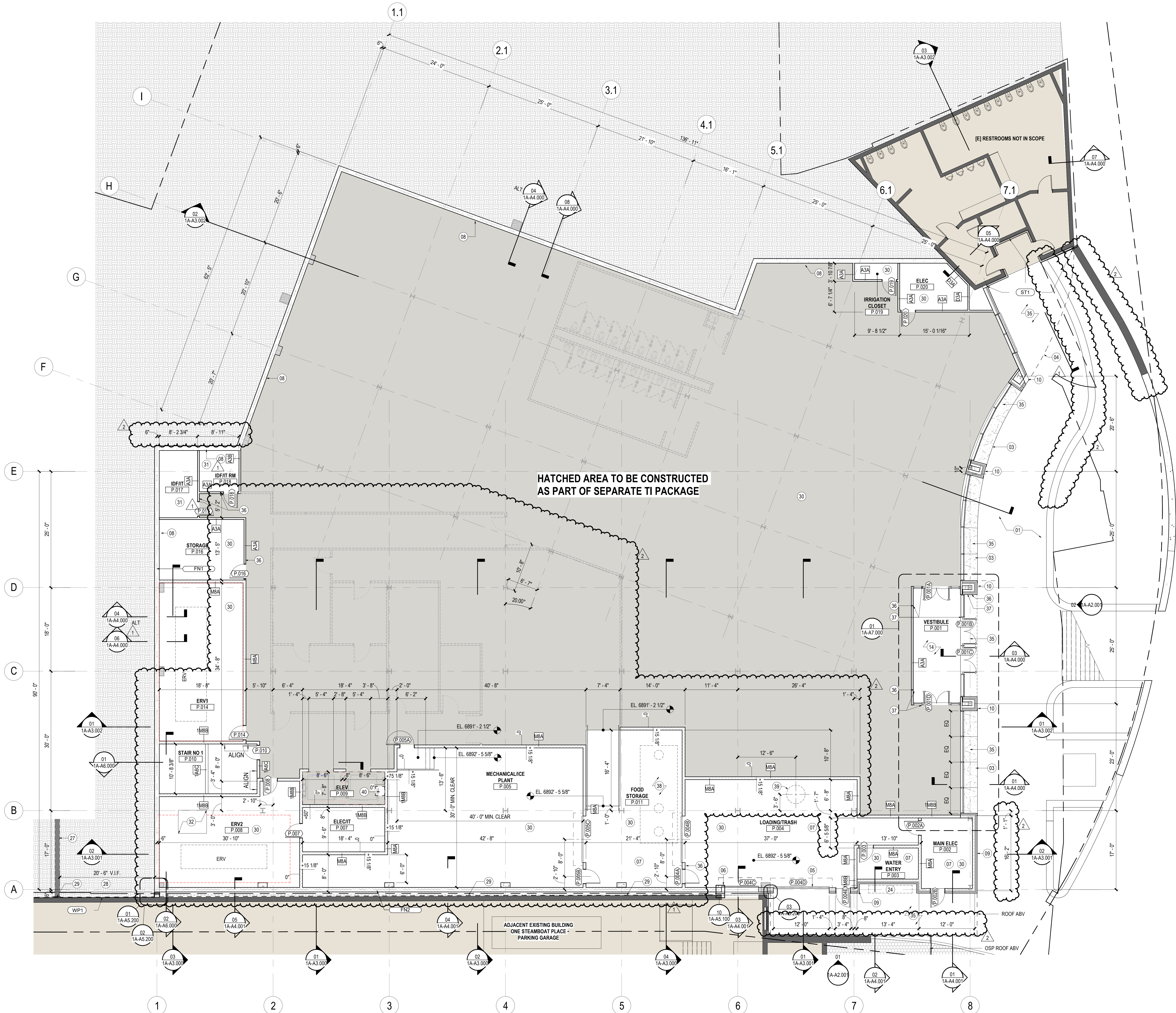
- 2021.05.19 BP3: PROMENADE - ISSUE FOR BID AND PERMIT
- 1 2021.06.29 BP3: PROMENADE - BULLETIN 02
- 2 2021.07.22 BP3: PROMENADE - BULLETIN 05

Project Name
SSRC | BASE AREA IMPROVEMENTS
Project Number
20.1411.S.01
Description
TYPICAL FOUNDATION DETAILS

Scale
As indicated

1A-S3.01





01 CONSTRUCTION PLAN - LOWER LEVEL 00 PROMENADE
SCALE: 1/8" = 1'-0"

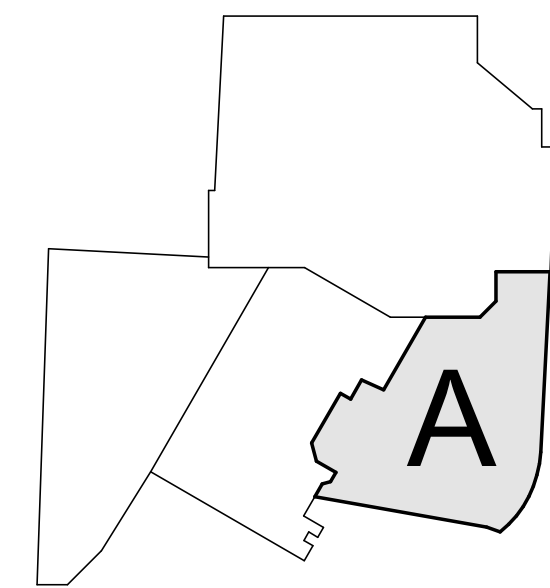
SHEET NOTES

- 01 REDEVELOPED OUTDOOR PATIO ADJACENT TO ENTRANCE. RE: CIVIL & LANDSCAPE PLANS
- 02 MT01 ACCENT PANEL AT ENTRY OVERHANG. RE: ELEVATION/3D VIEWS
- 03 ST2 @ WINDOW SILL LOCATION
- 04 EXTENT OF SOFFIT OVERHANG ABOVE
- 05 PT2 FIRE RATED ROLLUP OVERHEAD DOOR FOR SERVICE ACCESS TO PROMENADE
- 06 PT2 FIRE RATED ROLLUP OVERHEAD DOOR ADJACENT TO EXISTING SERVICE ACCESS DOOR @ ADJACENT EXISTING BUILDING (ONE STEAMBOAT PLACE) TO PROVIDE SERVICE FUNCTION BETWEEN BUILDINGS
- 07 BOH FFE TO MATCH EXISTING EXTERIOR GRADING FOR SERVICE TO EXTERIOR. BOH FFE TO RAMP TO DESIGNATED PUBLIC FFE IN FOOD STORAGE ROOM. RE: GRADING PLAN FOR EXTERIOR ELEVATIONS
- 08 SUBGRADE CONCRETE RETAINING WALL @ UNDER PLAZA LEVEL. CONDITION W/ 2 1/2" MTL. STUD AND 56" GWB FINISH @ ALL OCCUPIED LOCATIONS
- 09 ST01 STONE WALL @ EXPOSED EXTERIOR ELEVATIONS
- 10 ST-01 CLAD COLUMNS @ EAST ELEVATION
- 11 RECESSED WALK OFF MAT FLUSH TO T.O. FINISH
- 12 PASSENGER ELEVATOR. BASIS OF DESIGN SCHINDLER 3100 LOW-RISE, LOAD CAPACITY 3,000 LB. 3 STOPS WITH 3 FRONT OPENINGS. DOOR WIDTH 42". DOOR HEIGHT 64". SPEED 100 FPM. STANDARD CAB FINISHES
- 13 GAS METER. RE: MECHANICAL
- 14 EXISTING RETAINING WALL TO BE DEMOLISHED. RE: BP2A
- 15 NEW FILL AGAINST EXISTING OSP EXTERIOR WALL. RE: CIVIL
- 16 APPLY WP1 TO THE FULL EXTENT OF OSP WALL. TIE WP1 INTO EXISTING BELOW GRADE OSP WP. GC TO FIELD VERIFY EXTENT OF EXISTING OSP WP
- 17 ALL WALLS TO BE PAINTED WHITE. INSTALL 4" GRAY RUBBER BASE. FLOORS TO BE POLISHED CONCRETE. AND CEILING OPEN TO STRUCTURE ABOVE
- 18 ALL WALLS TO BE PAINTED WHITE. INSTALL 4" GRAY RUBBER BASE. FLOORS TO BE POLISHED CONCRETE. AND CEILING OPEN TO STRUCTURE ABOVE
- 19 PREFABRICATED METAL PLATFORM OVER MECHANICAL DUCT FOR MAINTENANCE ACCESS
- 20 GYP BOARD SOFFIT ABOVE. SKIM COAT AND PAINT PT3
- 21 CARD READER
- 22 ADA PUSH PLATE
- 23 GREASE INTERCEPTOR. RE: PLUMBING
- 24 SUMP PIT FOR UNDERSLAB DRAINAGE SYSTEM
- 25 SUMP PUMP RE: PLUMBING. SLOPE PIT 2% TO DRAIN

GENERAL NOTES

Date	Description
2021.05.19	BP3: PROMENADE - ISSUE FOR BID AND PERMIT
2021.06.29	BP3: PROMENADE - BULLETIN 02
2021.07.22	BP3: PROMENADE - BULLETIN 05

KEY PLAN



ALTRERA east west partners
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Project Name
SSRC | BASE AREA IMPROVEMENTS

Project Number
003.7835.000

Description
PROMENADE - CONSTRUCTION PLAN - LEVEL 00

Scale
1/8" = 1'-0"

Ref North

1A-A1.200

SECTION 31 66 13 – AGGREGATE PIERS

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. Aggregate Piers.
- B. Related Sections:
 - 1. Section 311000 "Site Clearing" for preparation of subgrade for aggregate pier operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface.
 - 2. Section 312000 "Earth Moving" for preparing and grading subgrades and placement of structural fill.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide all equipment, material, labor and supervision to design and install aggregate piers.
- B. The design of the aggregate pier system shall be based on the service load bearing pressure and the allowable total and differential settlement criteria. The aggregate pier system shall be designed in accordance with generally-accepted engineering practice and the methods described in these Specifications.
- C. The design shall meet the following criteria.
 - 1. Allowable Bearing Pressure for Footings supported by Aggregate Pier Reinforced Soils: 7000 psf
 - 2. Total Long-Term Settlement for Footings: ≤ 1 inch
 - 3. Long-Term Differential Settlement of Adjacent Footings: $\leq 1/2$ inch
- D. The aggregate pier elements shall be designed using an aggregate pier stiffness modulus to be verified by the results of the modulus test.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including:
 - 1. Aggregate
 - 2. Uplift anchors
- B. Aggregate Pier Layout Drawings, indicating identification number, location, spacing, diameter, and depth of aggregate piers.
- C. Detailed design calculations.
- D. Drawings and Calculations shall be signed and sealed by the qualified professional engineer, registered in the State of the project, who was responsible for their preparation.
- E. Ground improvement QA plan.
- F. Quality control test program and modulus test detail and setup for aggregate pier system.
- G. Modulus Test Reports – A modulus test shall be performed by the aggregate pier contractor to verify the design assumptions. The aggregate pier contractor shall furnish a description of the installation equipment, installation records, complete test data, analysis of the test data and verification of the design parameter values based on the modulus test results. The report shall be prepared under direction of a Registered Professional Engineer.
- H. Daily Aggregate Pier Progress Reports: Furnish a complete and accurate record of aggregate pier installation.
 - 1. Pier location, identification number, length, and diameter.
 - 2. Final elevations of the pier top and bottom.
 - 3. Type and size of compaction equipment and predrill auger diameter used
 - 4. Documentation of any changes in subsurface conditions encountered.
 - 5. Soil and groundwater observations.
- I. Upon completion of work, submit a report documenting the observations and results of the tests. This report shall certify that the design modulus value has been achieved within settlement tolerances.

1.5 QUALITY ASSURANCE

- A. Modulus Testing Standards:
 - 1. ASTM D 1143 - Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
- B. Uplift Testing Standards:
 - 1. ASTM D 3689 - Standard Test Methods for Deep Foundations Under Static Axial Tensile Load

C. Materials and Inspection Standards:

1. ASTM D 1241 - Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses

D. The aggregate pier contractor shall provide evidence of satisfactory experience with the design and installation of aggregate pier soil reinforcement systems, including examples of at least 5 previous projects for which the contractor has supported comparable structural loads and controlled settlement to the project tolerances. The design and installation shall be conducted and overseen by a registered professional engineer employed by the contractor.

E. The aggregate pier contractor shall maintain Quality Control records during pier installation. This work shall be conducted under the supervision of a registered professional engineer employed by the installer.

F. The aggregate pier contractor shall provide a certified quality control representative to observe the drilling and construction of all engineered aggregate piers. Quality Control observations shall include confirmation that all aggregate lifts have been constructed to the design criteria, as established by the aggregate pier design engineer.

G. The engineer of the aggregate pier system shall carry Errors and Omissions/Professional Liability Insurance with coverage of at least \$2 Million per occurrence and \$3 Million aggregate.

H. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of aggregate piers that are similar to those indicated for this Project in material, design, and extent.

I. Contractor's Design Engineer and Quality Control representative shall each have a minimum of 5 years of documented experience with aggregate piers constructed as specified herein.

J. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to provide special inspections and testing indicated.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Locate existing underground utilities before excavating for piers. If utilities are to remain in place, provide protection from damage during operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

- B. Interruption of Existing Utilities: Do not interrupt any utility to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of utility.
 - 2. Do not proceed with interruption of utility without Owner's written permission.
- C. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
 - 1. The geotechnical report is included elsewhere in the Project Manual.
 - a. The boring log and accompanying report are believed to be accurate; however, neither the owner, architect, nor structural engineer guarantees the information contained therein, nor do they guarantee the conditions indicated to exist at the locations of the test holes will prevail at other locations on the site.
- D. Survey Work: Engage a qualified surveyor to perform surveys, layouts, and measurements for aggregate piers. Before excavating, lay out each aggregate pier to lines and levels required. Record actual measurements of each pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.
 - 1. Record and maintain information pertinent to each aggregate pier and cooperate with Owner's testing and inspecting agency to provide data for required reports.

PART 2 - PRODUCTS

2.1 AGGREGATE

- A. Aggregate for the piers shall consist of materials that are in general conformance with gradation requirements as specified by the aggregate pier engineer. During wet weather conditions, the aggregate shall contain less than 5 percent fines. The aggregate pier system engineer shall make the determination of acceptable materials to be used in pier construction.
- B. Potable water or other suitable source shall be used to increase aggregate moisture content as needed for workability. The need for moisture conditioning aggregate shall be made by the aggregate pier contractor based on workability and/or dust control.

2.2 UPLIFT ANCHORS

- A. Uplift anchors shall be constructed of hot-dip galvanized structural steel and designed by aggregate pier engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which aggregate piers are to be installed.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by pier operations.
- B. Site subgrade established shall be within 6 inches of finish subgrade, or as approved by the aggregate pier contractor.
- C. If an adjacent building is within 15 ft of the aggregate pier work area, a relevant building examination shall be performed prior to initiating work to document preexisting cracks/damage. The building must also be monitored for movement during any work within 15 ft of the structure. The work shall be stopped, and the engineer notified if any building settlement is observed.

3.3 INSTALLATION

- A. The locations, size, and spacing of aggregate pier elements are described on the appropriate drawings or details. Any modifications in size and spacing of the aggregate pier element layout shall be approved by the aggregate pier system engineer.
- B. The aggregate pier contractor shall use one of the following construction methods:
 - 1. Down-Hole Vibrator.
 - 2. Down-Hole Tamper/Rammer
- C. Prior to installing production piers, the aggregate pier engineer shall establish the required energy output to achieve compaction of each lift. Energy output shall be confirmed by the contractor prior to construction of production piers.
 - 1. Where down-hole vibrator construction method is used, an appropriate metering device should be provided at such a location that inspection of amperage increase may be verified during the operation of the equipment. The metering device may be an ammeter directly indicating the performance of the vibrator tip.
 - 2. Where down-hole tamper/rammer construction method is used, rammer-blow deflection monitoring shall be performed randomly on a minimum of 10% of the installed piers to confirm that terminal rammer-blow deflections meet the established acceptance criterion. The aggregate pier engineer shall establish the required energy output for the rammer and establish terminal rammer-blow deflection criterion. Instrumentation used to confirm rammer-blow deflections shall be capable of recording to a precision of at least 0.001 inch

per rammer stroke and shall be capable of recording deflection accompanying each rammer blow. During pier construction, rammer-blow deflections shall be monitored to confirm that the design deflection per rammer-blow is achieved.

- D. Stable Ground Conditions: The following general procedures shall be followed when the pre-drilled hole remains open during construction.
1. Pre-drilling to the design depth will be performed with an auger diameter equal to the finished column diameter.
 2. Down-Hole Vibrator Method: The quantity of aggregate initially added shall be such that the vibrator tip is able to penetrate to within 12 inches of the design depth. The vibrator will be raised and lowered repeatedly, such that on each re-penetration, the tip of the vibrator advances to within 12 inches of the previous penetration depth.
 3. Down-Hole Tamper/Rammer Method: The bottom of the pier excavation shall be compacted prior to the placement of aggregate. If wet, soft or sensitive soils are present, open graded aggregate shall be placed and to stabilize the pier bottom and may serve as the initial pier lift. Following placement of the first lift of aggregate, the tamper/rammer is to be lowered to the top of the aggregate and activated. Subsequent lifts shall not exceed thickness determined by the aggregate pier engineer.
 4. The aggregate shall be removed and replaced with fresh aggregate if cave-ins occur during the aggregate placement such that the volume of caved-in soil is greater than 10 percent of the aggregate being compacted.
- E. Unstable Ground Conditions: The following general procedures will be followed when a pre-drilled hole will not remain open before or during pier construction.
1. Down-Hole Vibrator Method: If the hole will remain temporarily stable, the hole may be filled with aggregate to a level above the instability as long as the vibrator is still able to penetrate to within 1 foot of the pre-drilled depth. If the hole will not remain temporarily stable, a Bottom Feed Down-Hole vibrator may be used.
 2. Down-Hole Tamper/Rammer Method: A casing with a minimum outside diameter equal to 100% of the pier diameter is advanced to the full treatment depth. The bottom of the pier excavation shall be compacted prior to the placement of aggregate. Open graded aggregate shall be placed to stabilize the pier bottom and may serve as the initial pier lift. Subsequent lifts shall not exceed thickness determined by the aggregate pier engineer. The casing is extracted after each lift is compacted with the bottom of the casing always maintained below the top of the aggregate.
- F. Should any obstruction, including but not limited to cobbles, boulders, timber, concrete, asphalt, large roots etc., be encountered which prevents placing the elements to the required depth, or causes the aggregate pier to drift from the required location, the obstruction shall be removed. Additional aggregate pier elements shall be installed when required by the presence of obstacles.
- G. The center of each constructed aggregate pier element shall be within 6 inches of the design location. Foundation elements installed outside of the above tolerance and deemed not to be acceptable, shall be either rebuilt or other remedial measures taken as approved by the aggregate pier system engineer.

- H. Casing for elevator jack shafts located within 10 feet horizontally of any aggregate element shall be installed prior to aggregate pier installation and shall be grouted in-place for the full length of the casing.
- I. Acceptable constructed lift thickness shall be established by the aggregate pier engineer and confirmed by the aggregate pier contractor for each lift installed.
- J. Required compaction for each lift shall be established by the aggregate pier engineer and shall be consistent with the criteria used for the test pier construction.
- K. Aggregate piers installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers, unless the aggregate pier engineer approves the condition or provides other remedial measures. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner, unless the cause of rejection is due to an obstruction.

3.4 AGGREGATE PIER MODULUS TESTING

- A. Testing to determine specification compliance shall be provided by the aggregate pier contractor and will consist of at least one modulus test of an aggregate pier.
- B. Where down-hole tamper/rammer construction method is used, modulus test data shall be used by the aggregate pier system engineer to supplement rammer blow deflection monitoring to confirm aggregate pier element design parameters for the project. Test piers used for modulus testing shall be constructed using rammer deflection monitoring.
- C. Aggregate pier elements used for modulus testing which are located within tolerance and provide a safe design capacity may, upon approval of the aggregate pier system engineer, be used in the finished work.
- D. Compressive load test procedures shall be conducted in general accordance with ASTM D1143. A test pier shall be loaded to 150 percent of the estimated element design pressure. Alternatively, at the discretion of the aggregate pier engineer, the modulus test may be terminated when a modulus equal to 150 percent of the modulus used in the design is achieved.
- E. The modulus test shall be conducted as follows:
 - 1. ASTM D1143 test procedures shall be used as a guide to establishing load increments, load increment duration, load decrements, and total applied load.
 - 2. The test pier shall be constructed in such a manner that deflections at both the bottom and top of the pier can be measured at each increment of loading.
 - 3. With the exception of the load increment representing approximately 112% of the design maximum aggregate pier element stress, all load increments shall be held for a minimum of 15 minutes, a maximum of 1 hour, and until the rate of deflection reduces to 0.01 inch per hour, or less.

4. The load increment which represents approximately 112% of the design maximum aggregate pier element stress shall be held for a minimum of 15 minutes, a maximum of 4 hours, and until the rate of deflection reduces to 0.01 inch per hour, or less.
5. A seating load equal to 5 percent of the total load shall be applied to the loaded steel plate prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.
6. The test data shall be presented as a graph showing deflection of the pier top and bottom under each load increment.
7. At the design load, deflection measured at the top of the pier shall not exceed the design settlement for the aggregate pier-reinforced soil zone, and the ratio of bottom plate deflection to top plate deflection shall not exceed 0.25 unless specifically approved by the aggregate pier engineer.

3.5 AGGREGATE PIER UPLIFT TESTING

- A. If uplift loaded aggregate piers are specified for this project, testing to determine specification compliance shall be provided by the aggregate pier contractor, and will consist of at least one uplift test of an aggregate pier.
- B. In addition to specifications within this section, ASTM D3689 shall be the general guide in establishing uplift load test procedures. The uplift load test will be performed as described in the Design Submittal.
- C. Verification that the design of the aggregate pier system is in accordance with the performance observed during the uplift load test shall be attained through information acquired during the uplift load test.

3.6 FOOTING SUBGRADE PREPARATION

- A. Excavation and surface compaction of subgrade for all footings shall be the responsibility of the Contractor.
- B. Foundation excavations to expose the tops of aggregate pier elements shall be made in a workmanlike manner, and shall be protected until concrete placement, with procedures and equipment best suited to (1) prevent softening of the matrix soil between and around the aggregate pier elements before pouring structural concrete, and (2) achieving direct and firm contact between the dense, undisturbed aggregate pier elements and the concrete footing.
- C. Footing excavations shall be kept free of water.
- D. Foundation excavations shall be constructed as follows:
 1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment). Over-excavation shall be backfilled with material matching aggregate pier.

2. Compaction of surface soil and top of aggregate pier elements shall be prepared using a motorized impact compactor ("Wacker Packer," "Jumping Jack," or similar). Sled-type tamping devices shall not be used. Compaction shall be performed over the entire footing bottom to compact any loose surface soil and loose surface pier aggregate.
 3. Place footing concrete immediately after footing excavation is made and approved, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on expansive or sensitive soils.
 4. If same day placement of footing concrete is not possible, place a minimum 3-inch thick lean concrete seal ("mud mat") immediately after the footing is excavated and approved or an alternative subsurface protection layer that may consist of a geotextile fabric and six inches of crushed stone to prevent softening or disturbance of the subgrade soils.
 5. Confirm that immediately before footing construction or placement of an alternate subgrade protection layer, the tops of all the aggregate pier elements exposed in each footing excavation have been inspected and recompact as necessary with mechanical compaction equipment, and that the tops of any aggregate pier elements which may have been disturbed by footing excavation and related activity have been recompact to a dry density equivalent to at least 95% of the maximum dry density obtainable by the modified Proctor method (ASTM D-1557).
- E. No excavations or drilled shafts (elevator, etc) shall be made after installation of Aggregate Pier elements within a horizontal distance of 10' from the edge of any pier, without the written approval of the aggregate pier contractor.

3.7 FIELD QUALITY CONTROL

- A. The aggregate pier contractor shall have a full-time, on-site Quality Control representative to verify and report all installation procedures. The contractor shall immediately report any unusual conditions encountered during installation to the aggregate pier engineer, the General Contractor, and to the Special Inspection Agency. Submit daily aggregate pier progress reports, as indicated.
- B. Special Inspections: Owner will engage a qualified special inspector to perform special inspections on a full-time basis.
- C. Aggregate Pier Inspections: The special inspector shall log the following during installation for comparison with anticipated conditions and design parameters (from the engineer/contractor).
 1. Pier Identification
 2. Plan Top Elevation
 3. Date of Excavation
 4. Actual Ground Elevation
 5. Designed Pier Length
 6. Designed Pier Diameter
 7. As-Installed Depth of Pier Excavation
 8. As-installed Pier Bottom Elevation
 9. As-installed Total Pier Length

10. Soil Type(s) Encountered by Pier Excavation
11. Soil Type at Pier Excavation Bottom
12. Date of Aggregate Placement
13. Type/Description of Aggregate
14. Number of Aggregate Lifts Placed
15. Average Aggregate Lift Thickness
16. Actual Compaction Time
17. Rammer Blow Deflections (for down-hole tamper/rammer construction method)
18. Energy Output
19. Length of Casing Installed (if any)

D. Footings bearing on Aggregate Piers: The special inspector shall confirm:

1. That water (which may soften the unconfined matrix soil between and around the aggregate pier elements and may have detrimental effects on the supporting capability of the aggregate pier reinforced subgrade) is not ponding in the footing and there is no evidence of previous water ponding.
2. That all aggregate pier elements designed for each footing have been exposed in the footing excavation.
3. That immediately before footing construction, the tops of aggregate pier elements exposed in each footing excavation have been inspected and recompact as necessary with mechanical (*not vibratory*) compaction equipment; and that the tops of any pier elements which may have been disturbed by footing excavation and related activity have been recompact to a dry density equivalent to at least 95% of the maximum dry density obtainable by the modified AASHTO compaction procedure (ASTM D1557).
4. That any structural fill placed between the tops of aggregate pier elements and the bottoms of foundations consists of the same quality and gradation material, or better, as used in constructing the piers; and that the fill has been compacted to a dry density equivalent to at least 95% of the maximum dry density obtainable by the modified AASHTO compaction procedure (ASTM D1557);
5. That no excavations or drilled shafts (elevator, etc) have been observed within a horizontal distance of 10' from the edge of any pier.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove all soil and waste material, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 66 13