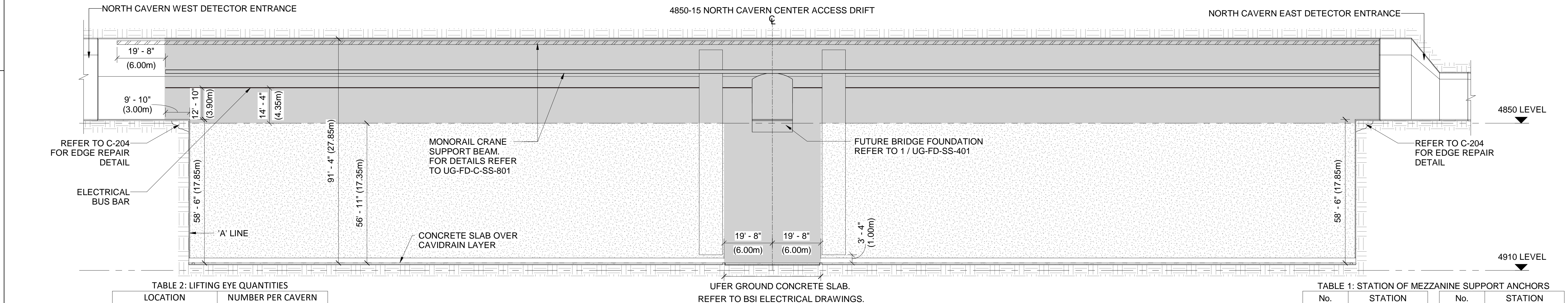


PLAN VIEW

SCALE: 1" = 20'-0"



LONGITUDINAL SECTION

SCALE: 1" = 20'-0"

- LEGEND**
- USE FIBER REINFORCED SHOTCRETE IN LOCATIONS INDICATED
 - ALL CT-BOLTS IN CROWN TO RECEIVE LIFTING EYES WITH A WORKING LOAD LIMIT (WLL) OF 11 US SHORT TONS (10 METRIC TONS). SEE 1 / UG-FD-SS-803.
 - ALL CT-BOLTS IN CROWN TO RECEIVE LIFTING EYES WITH WORKING LOAD LIMIT (WLL) OF (2 METRIC TONS). SEE 2 / UG-FD-SS-803.
 - USE WELDED WIRE FABRIC REINFORCED SHOTCRETE AND DUST SEAL SHOTCRETE IN LOCATIONS INDICATED.

TABLE 2: LIFTING EYE QUANTITIES

LOCATION	NUMBER PER CAVERN
MEZZANINE	490
MID-CHAMBER	124

TABLE 1: STATION OF MEZZANINE SUPPORT ANCHORS

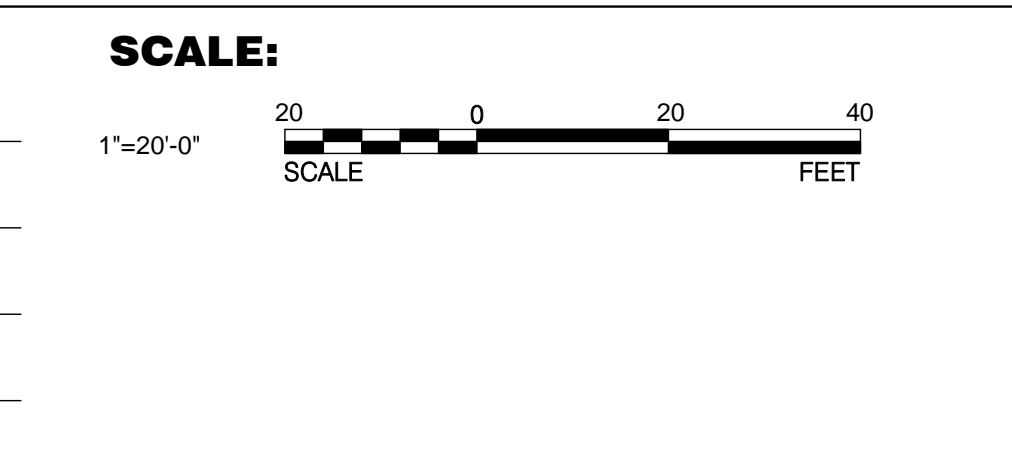
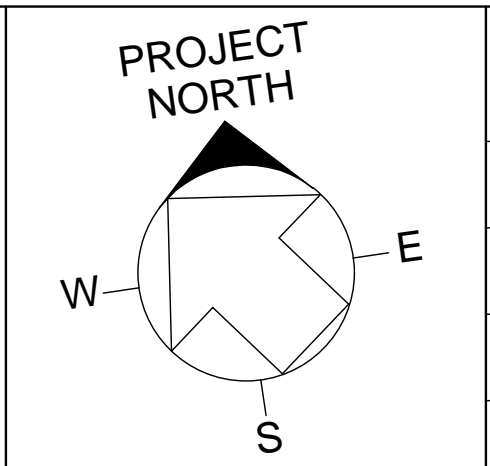
No.	STATION	No.	STATION
NC-1	0+12.60	NC-14	2+85.10
NC-2	0+29.00	NC-15	3+01.50
NC-3	0+45.40	NC-16	3+17.90
NC-4	0+61.80	NC-17	3+34.30
NC-5	0+78.20	NC-18	3+50.80
NC-6	0+94.60	NC-19	3+67.20
NC-7	1+11.00	NC-20	3+83.60
NC-8	1+27.40	NC-21	4+00.00
NC-9	1+43.80	NC-22	4+16.40
NC-10	1+60.20	NC-23	4+32.80
NC-11	1+76.60	NC-24	4+49.20
NC-12	1+93.00	NC-25	4+65.60
NC-13	2+09.40	NC-26	4+82.00

- NOTES:**
- FOR GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING UG-FD-C-002.
 - FOR GROUND SUPPORT DETAILS, REFER TO DRAWING UG-FD-C-207.
 - FOR CONCRETE SLAB OVER CAVIDRAIN LAYER DETAILS, REFER TO DRAWING UG-FD-SS-810.
 - ALL SHOTCRETE SURFACES ABOVE THE 4850L WITHIN SECTION 1 SHALL BE SEALED IN ACCORDANCE WITH SPECIFICATION SECTION 03 37 13.
 - FOR SHOTCRETE/CONCRETE SEALANT MATERIAL DETAILS, REFER TO 03 37 13.
 - SECTION 6 IS IDENTICAL TO SECTION 1 IN TERMS OF GEOMETRY AND SUPPORT TYPE ON DRAWING EXCEPT FOR THE LIFTING EYES.

2/8/2019 6:57:50 PM

REV.	DATE	DESCRIPTION
3	02/08/19	90% FD SUBMISSION
2	11/02/18	60% FD SUBMISSION
1	07/13/18	30% FD SUBMISSION

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LBNF - FSCF - EXCAVATION

4850 LEVEL

NORTH CAVERN

PLAN AND PROFILE

DRAWING NO. **15-1-6F** **UG-FD-C-200** REV. **3**

08/26/15
02/08/19

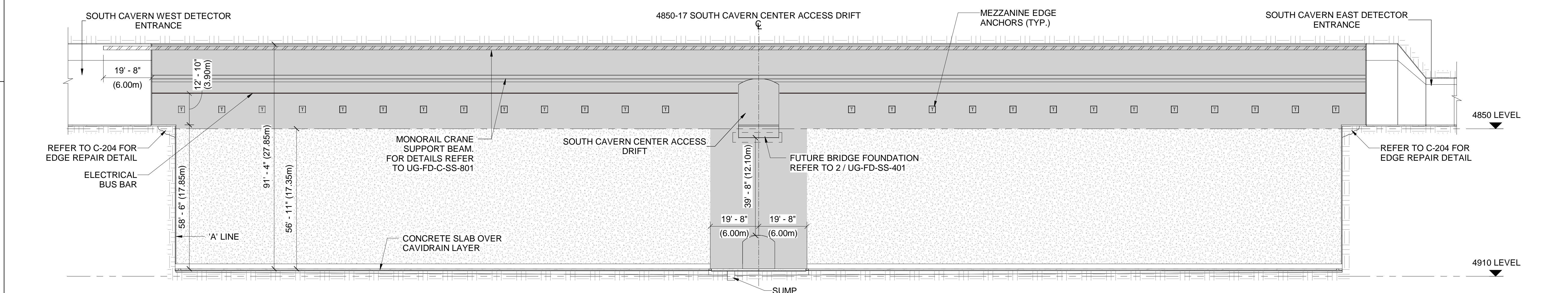
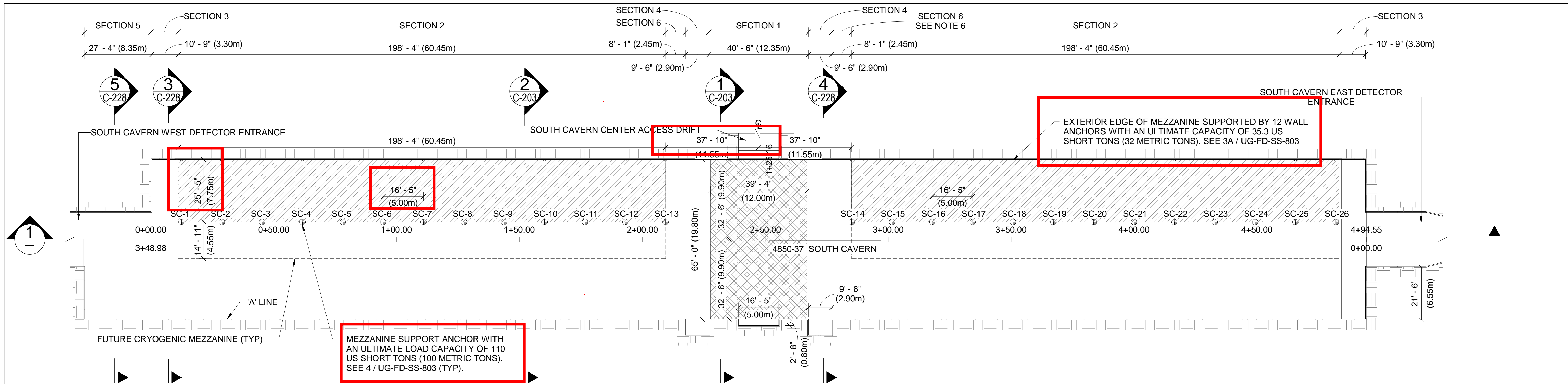


TABLE 2: LIFTING EYE QUANTITIES

LOCATION	NUMBER PER CAVERN
MEZZANINE	490
MID-CHAMBER	124

TABLE 1: STATION OF MEZZANINE SUPPORT ANCHORS

No.	STATION	No.	STATION
SC-1	0+12.40	SC-14	2+85.10
SC-2	0+28.80	SC-15	3+01.50
SC-3	0+45.20	SC-16	3+17.90
SC-4	0+61.60	SC-17	3+34.30
SC-5	0+78.00	SC-18	3+50.70
SC-6	0+94.40	SC-19	3+67.10
SC-7	1+10.80	SC-20	3+83.50
SC-8	1+27.20	SC-21	3+99.90
SC-9	1+43.60	SC-22	4+16.30
SC-10	1+60.00	SC-23	4+32.70
SC-11	1+76.40	SC-24	4+49.10
SC-12	1+92.80	SC-25	4+65.50
SC-13	2+09.20	SC-26	4+81.90

- NOTES:**
- FOR GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING UG-FD-C-002.
 - FOR GROUND SUPPORT DETAILS, REFER TO DRAWING UG-FD-C-207.
 - FOR CONCRETE SLAB OVER CAVIDRAIN LAYER DETAILS, REFER TO DRAWING UG-FD-SS-810.
 - ALL SHOTCRETE SURFACES ABOVE THE 4850L WITHIN SECTION 1 SHALL BE SEALED IN ACCORDANCE WITH SPECIFICATION SECTION 03 37 13.
 - FOR SHOTCRETE/CONCRETE SEALANT MATERIAL DETAILS, REFER TO 03 37 13.
 - SECTION 6 IS IDENTICAL TO SECTION 1 IN TERMS OF GEOMETRY AND SUPPORT TYPE ON DRAWING EXCEPT FOR THE LIFTING EYES.

LEGEND

- USE FIBER REINFORCED SHOTCRETE IN LOCATIONS INDICATED
- ALL CT-BOLTS IN CROWN TO RECEIVE LIFTING EYES WITH A WORKING LOAD LIMIT (WLL) OF 11 US SHORT TONS (10 METRIC TONS). SEE 1 / UG-FD-SS-803.
- ALL CT-BOLTS IN CROWN TO RECEIVE LIFTING EYES WITH WORKING LOAD LIMIT (WLL) OF (2 METRIC TONS). SEE 2 / UG-FD-SS-803.
- USE WELDED WIRE FABRIC REINFORCED SHOTCRETE AND DUST SEAL SHOTCRETE IN LOCATIONS INDICATED.

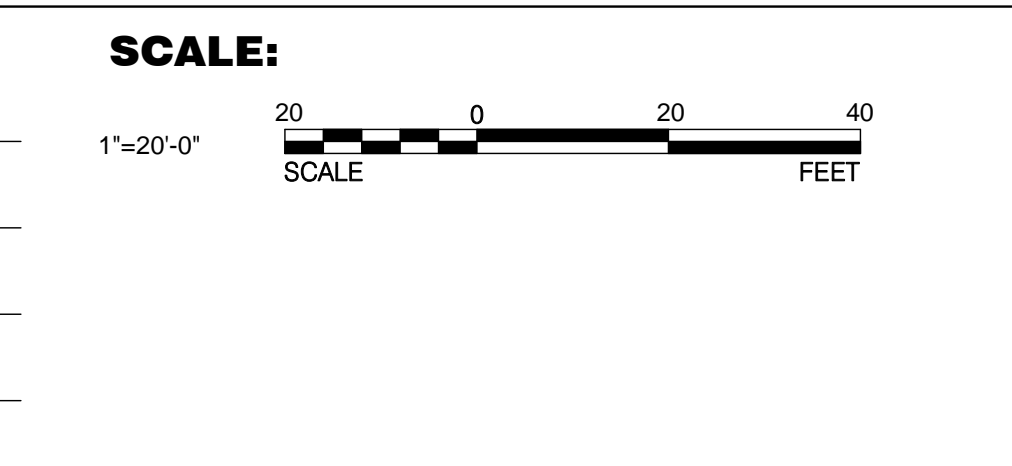
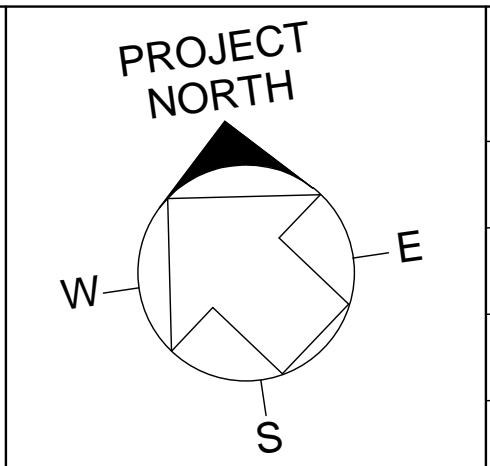
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REV.	DATE	DESCRIPTION	REVISIONS
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2	11/02/18	60% FD SUBMISSION	
1	07/13/18	30% FD SUBMISSION	

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LBNF - FSCF - EXCAVATION

4850 LEVEL

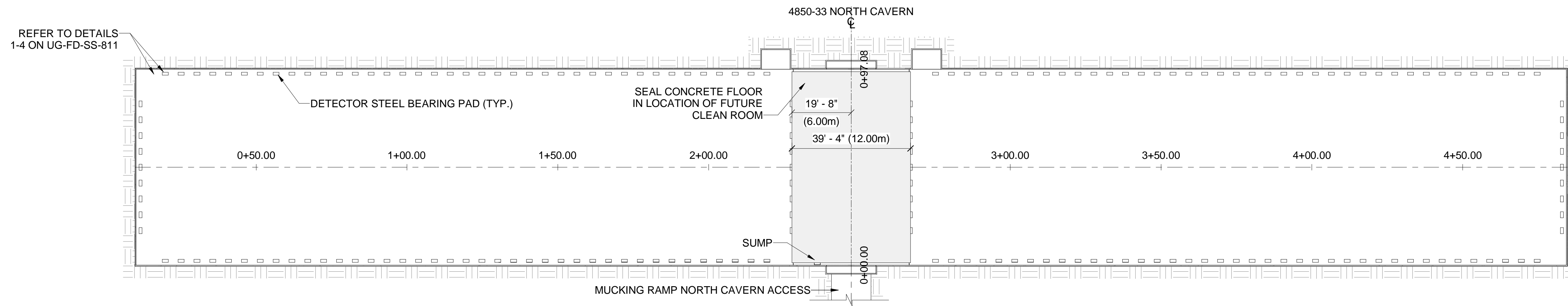
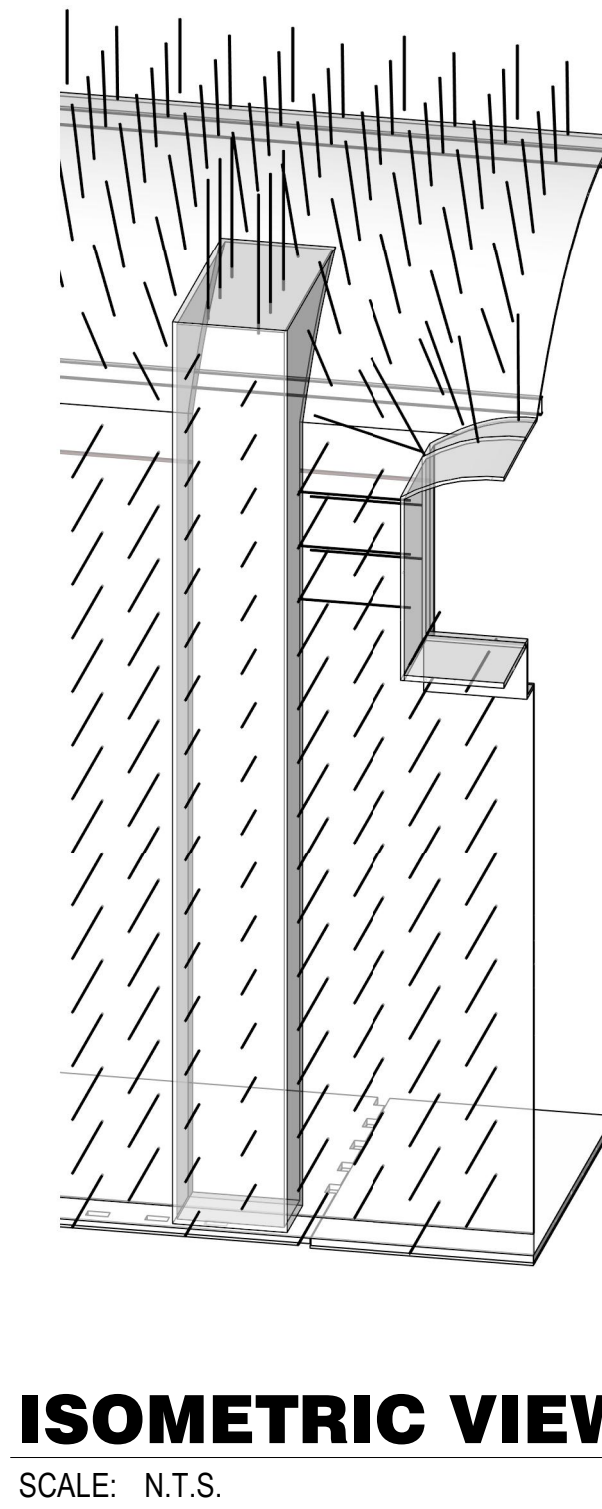
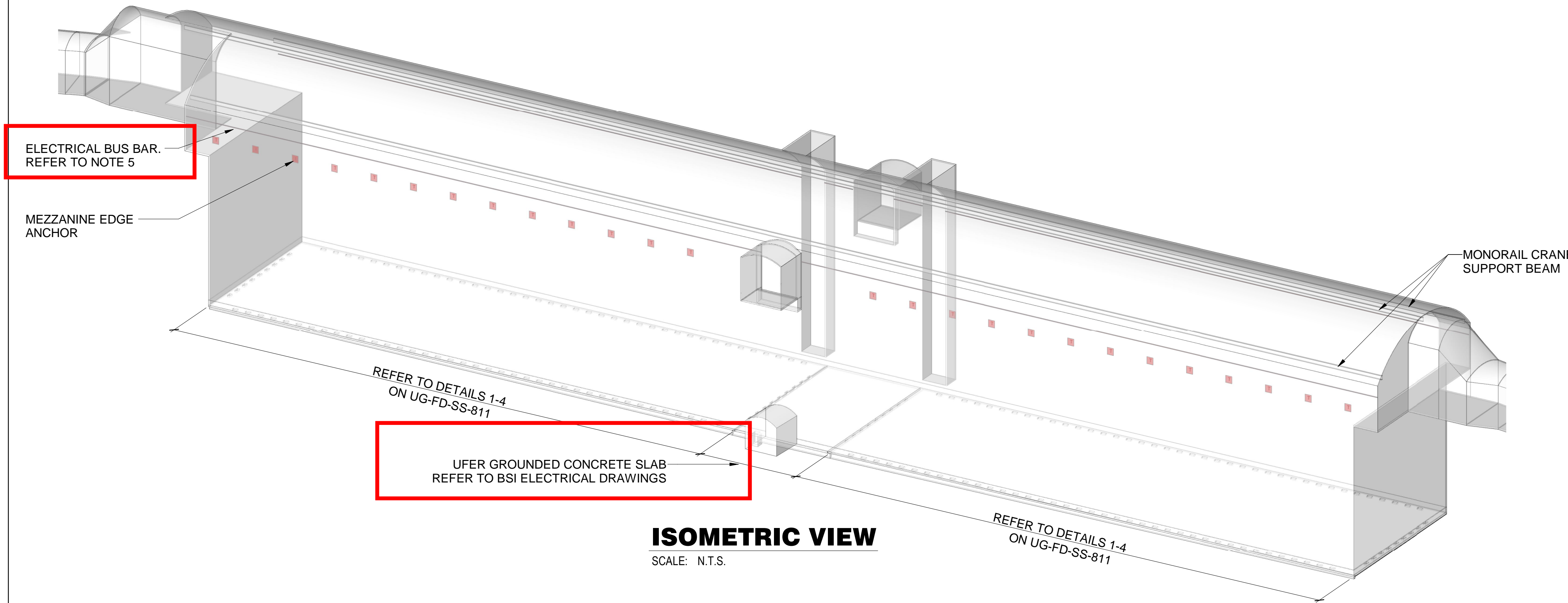
SOUTH CAVERN

PLAN AND PROFILE

DRAWING NO. **15-1-6F** **UG-FD-C-201** REV. **3**

02/08/19

08/26/15



NOTES:

1. FOR GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING UG-FD-C-002.
2. FOR MONORAIL CRANE SUPPORT BEAM DETAILS, REFER TO DRAWING UG-FD-SS-801.
3. FOR ROCK REINFORCEMENT DETAILS, REFER TO DRAWING UG-FD-C-500 TO UG-FD-C-502.
4. FOR CONCRETE SLAB OVER CAVIDRAIN LAYER DETAILS, REFER TO DRAWING UG-FD-SS-810.
5. INSTALL TIN PLATED COPPER BUS BAR ALONG CAVERN SIDEWALLS.
6. NORTH CAVERN SHOWN. SOUTH CAVERN SIMILAR, REFLECTED.
7. FOR SHOTCRETE/CONCRETE SEALANT MATERIAL DETAILS, REFER TO 03 37 13.
8. FOR UFER GROUND CONCRETE SLAB DETAILS, REFER TO BSI ELECTRICAL DRAWINGS.
9. ALL SHOTCRETE SURFACES ABOVE THE 4850L WITHIN PLAN SHALL BE SEALED IN ACCORDANCE WITH SPECIFICATION SECTION 03 37 13.

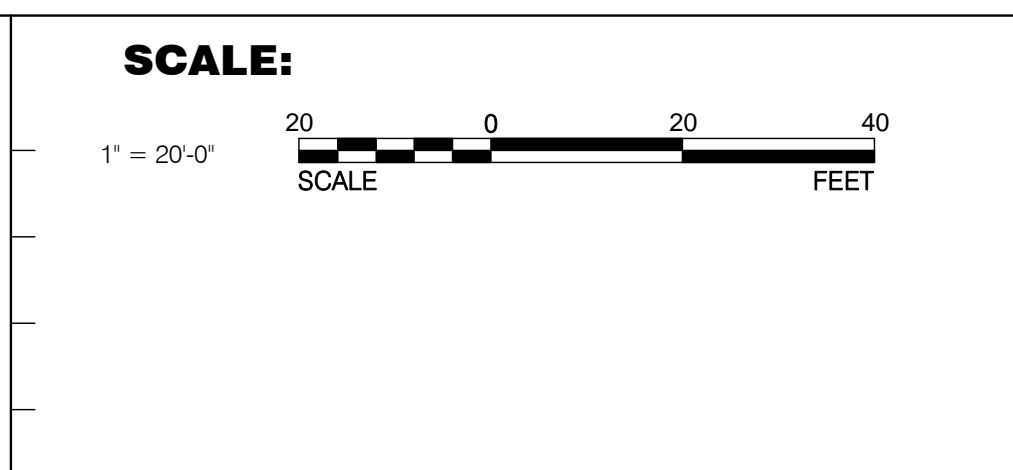
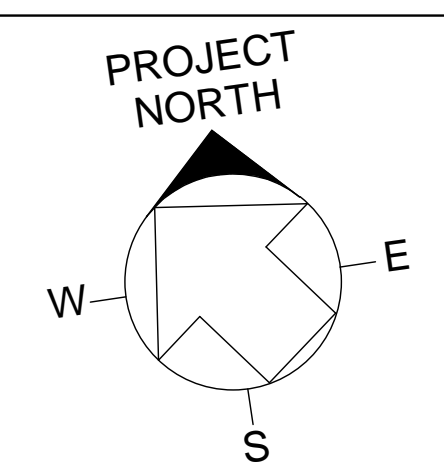
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REV.	DATE	DESCRIPTION
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2	11/02/18	60% FD SUBMISSION
1	07/13/18	30% FD SUBMISSION

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LBNF - FSCF - EXCAVATION

4850 LEVEL

DETECTOR CAVERNS

INVERT PLAN & ISOMETRIC

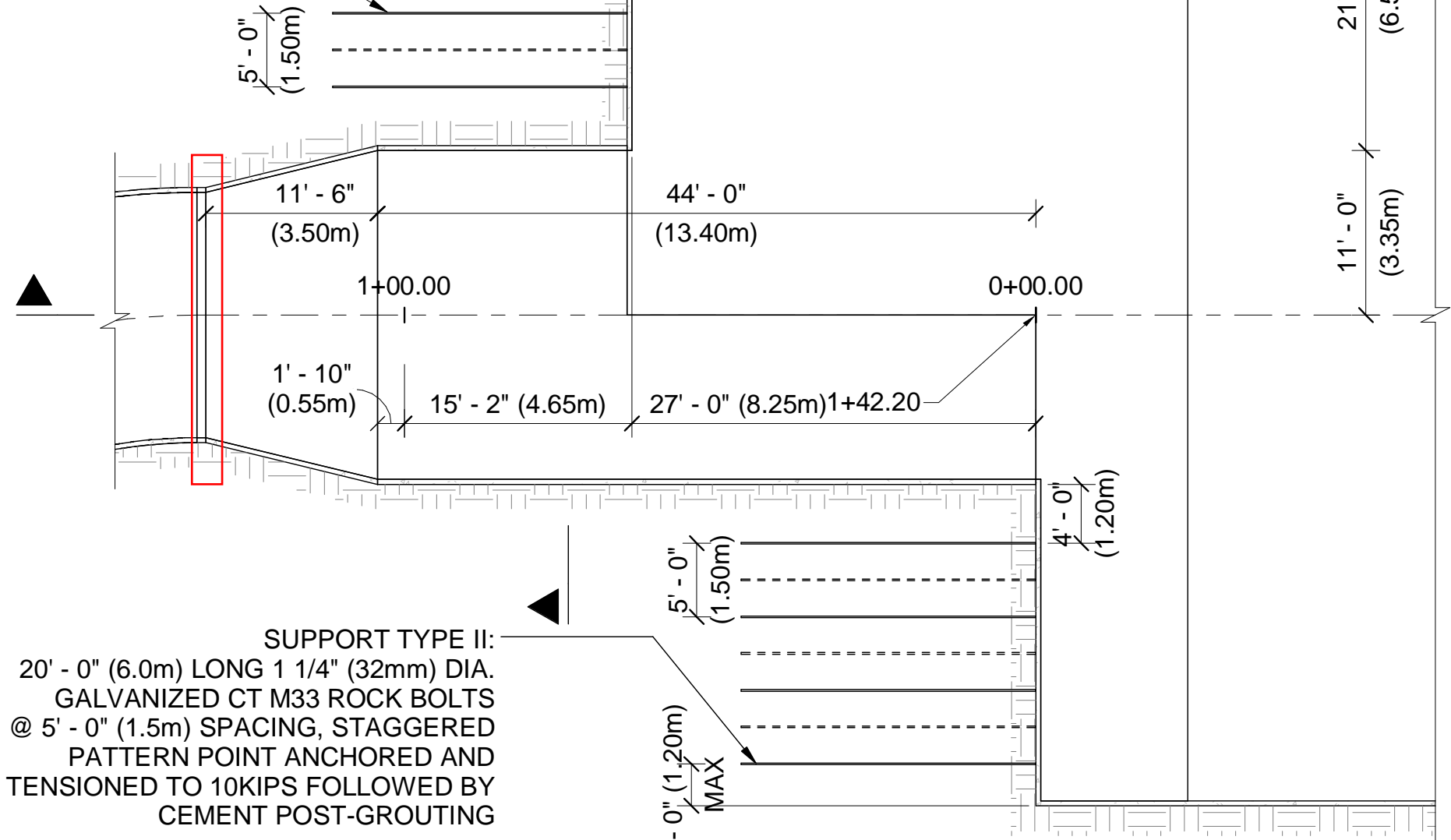
DRAWING NO. **15-1-6F** **UG-FD-C-202** REV. **3**

08/26/15

02/08/19

SUPPORT TYPE II:
20' - 0" (6.0m) LONG 1 1/4" (32mm) DIA.
GALVANIZED CT M33 ROCK BOLTS
@ 5' - 0" (1.5m) SPACING, STAGGERED
PATTERN POINT ANCHORED AND
TENSIONED TO 10KIPS FOLLOWED BY
CEMENT POST-GROUTING

CAVERN ENDWALL
SUPPORT TYPE II



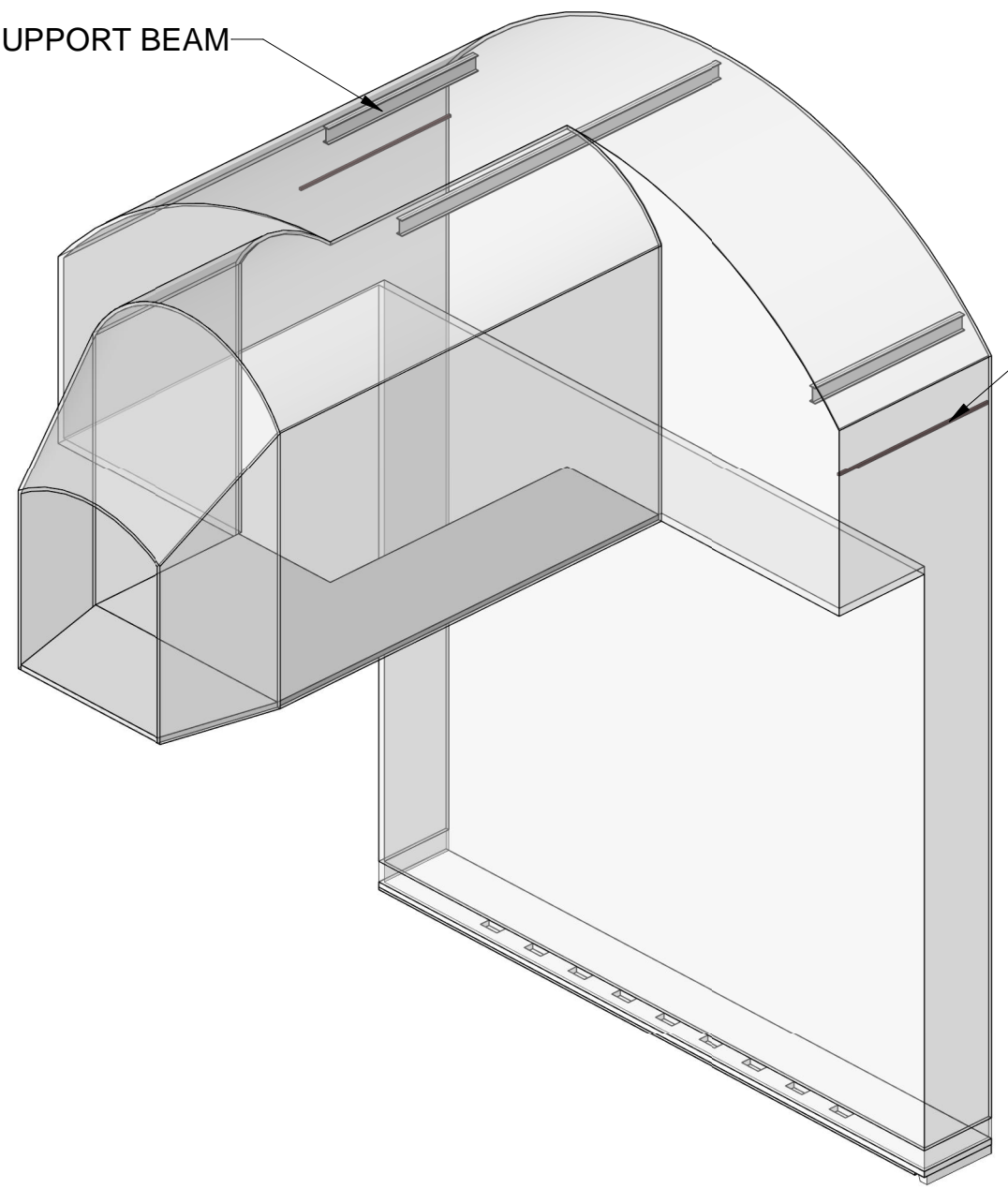
PLAN VIEW

SCALE: 1" = 10'-0"

SUPPORT TYPE II:
20' - 0" (6.0m) LONG 1 1/4" (32mm) DIA.
GALVANIZED CT M33 ROCK BOLTS
@ 5' - 0" (1.5m) SPACING, STAGGERED
PATTERN POINT ANCHORED AND
TENSIONED TO 10KIPS FOLLOWED BY
CEMENT POST-GROUTING

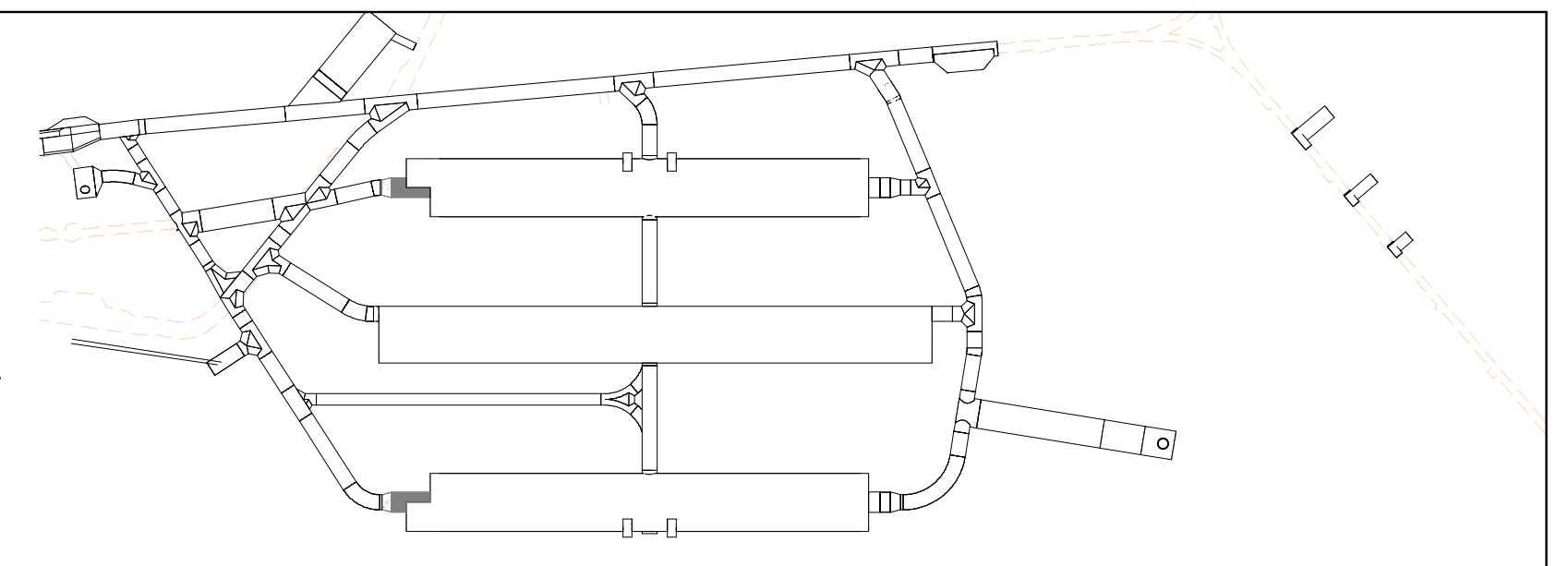
MONORAIL CRANE SUPPORT BEAM

0' - 3" (0.075m) PLAIN SHOTCRETE
0' - 1" (0.025m) SMOOTHING SHOTCRETE LAYER



TYPICAL ISOMETRIC VIEW

SCALE: N.T.S.

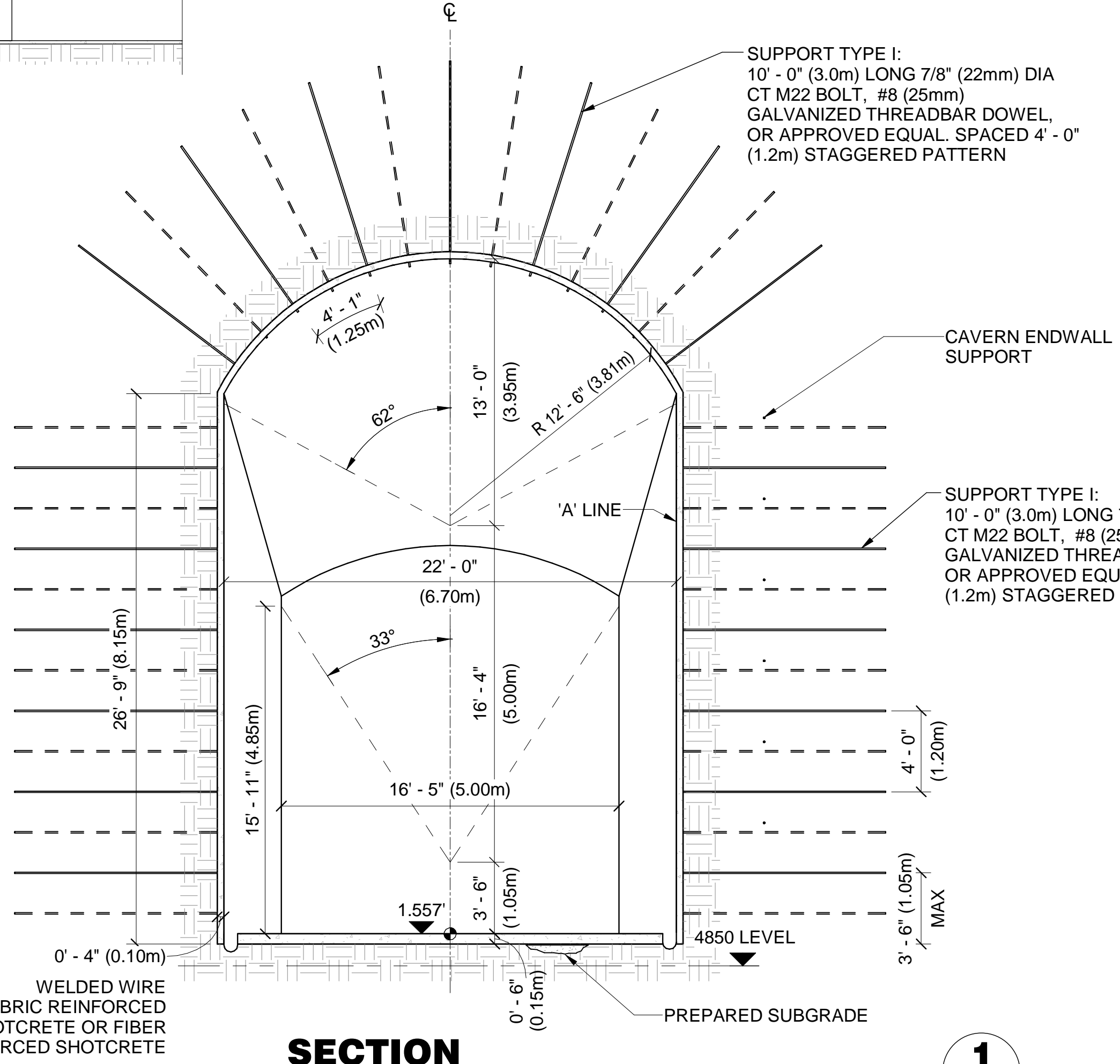


KEY PLAN

SCALE: 1" = 200'-0"

4850-11 NORTH CAVERN WEST DETECTOR ENTRANCE
4850-14 SOUTH CAVERN WEST DETECTOR ENTRANCE

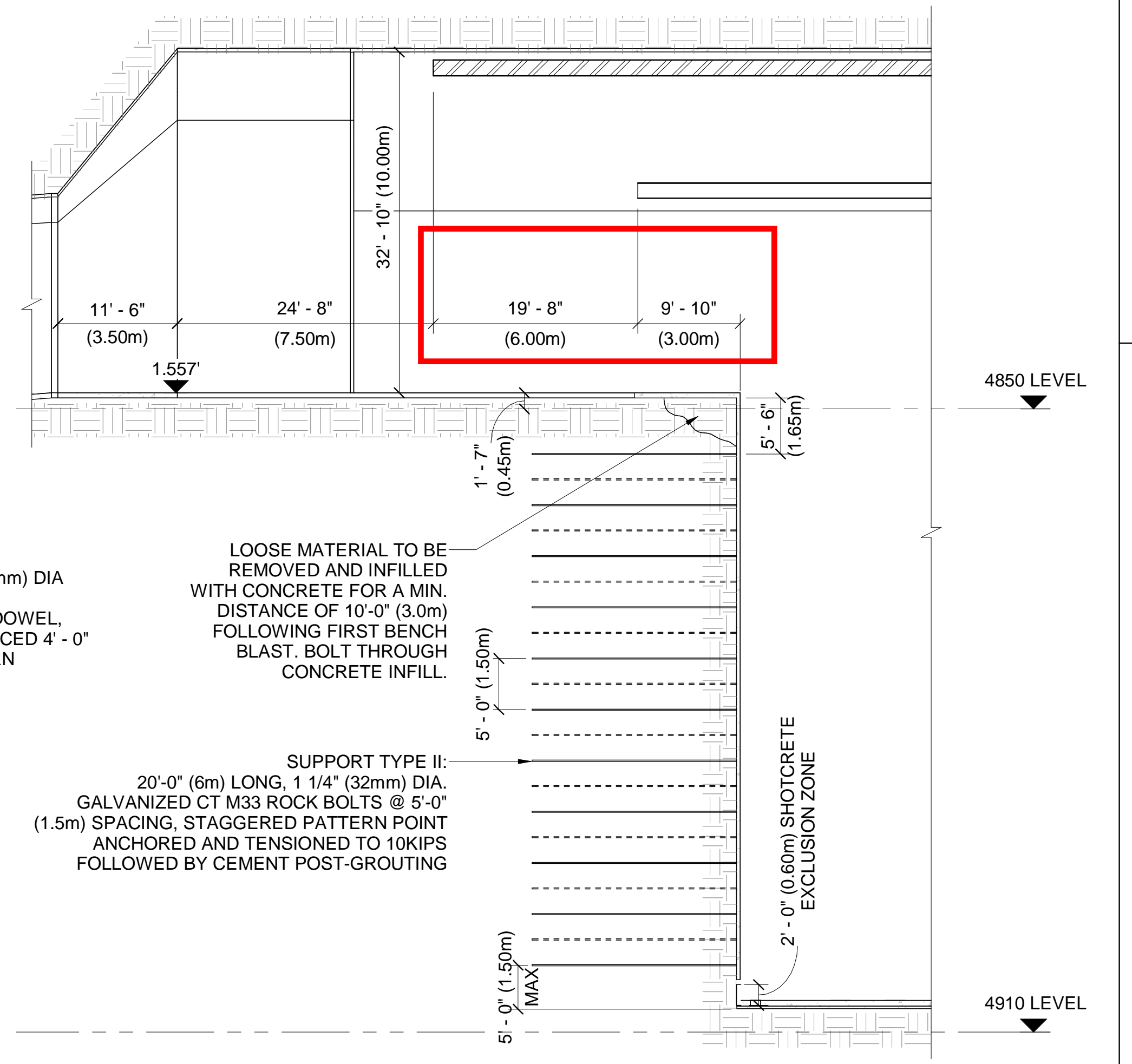
SUPPORT TYPE I:
10' - 0" (3.0m) LONG 7/8" (22mm) DIA
CT M22 BOLT, #8 (25mm)
GALVANIZED THREADBAR DOWEL,
OR APPROVED EQUAL. SPACED 4' - 0"
(1.2m) STAGGERED PATTERN



SECTION

SCALE: 1" = 5'-0"

1



LONGITUDINAL SECTION

SCALE: 1" = 10'-0"

2

NOTES:

- FOR GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING UG-FD-C-002.
- SHOTCRETE SHALL BE REINFORCED WITH A SINGLE LAYER OF 6" x 6" - W4.0XW4.0 WELDED WIRE FABRIC OR FIBERS AT SUFFICIENT DOSAGE TO MEET THE PERFORMANCE CRITERIA GIVEN IN SPECIFICATION SECTION 03 37 13.
- ROCK REINFORCEMENT OMITTED FOR CLARITY ON PLAN, LONGITUDINAL, AND ISOMETRIC VIEWS.
- PLAN AND ISOMETRIC SHOW ARRANGEMENT AT NORTH CAVERN. SOUTH CAVERN SIMILAR, MIRRORED ABOUT CUC.

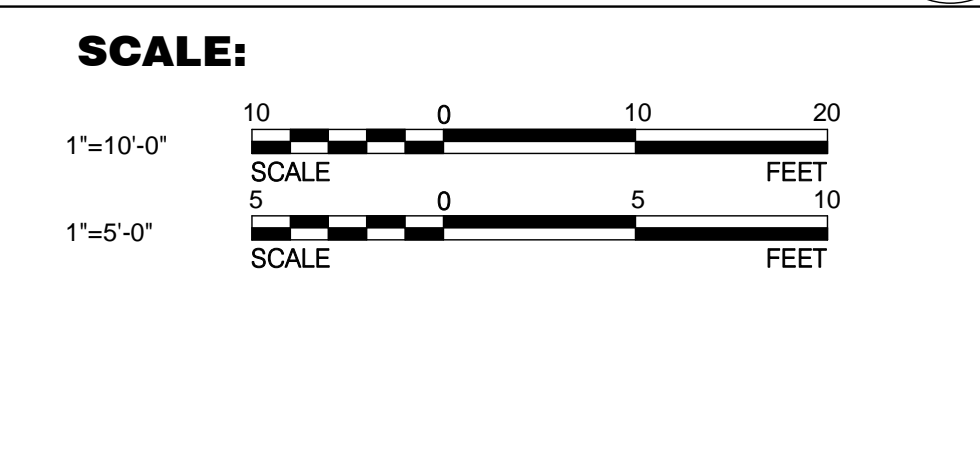
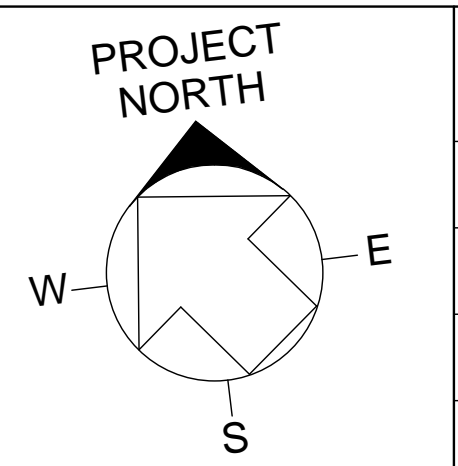
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REV.	DATE	DESCRIPTION	REVISIONS
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2	11/02/18	60% FD SUBMISSION	
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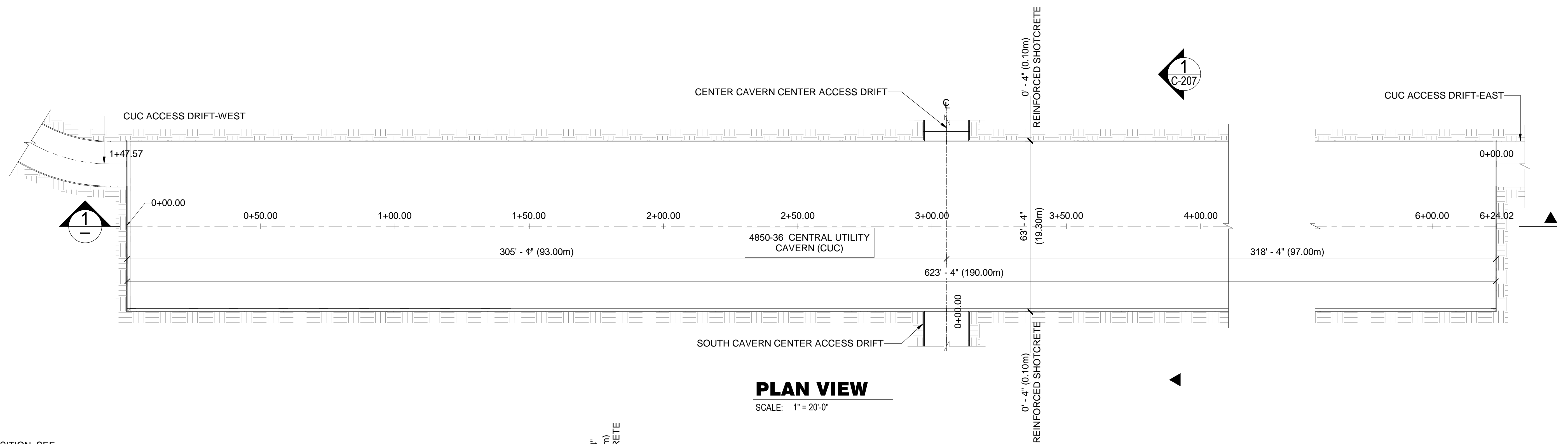
LBNF - FSCF - EXCAVATION

4850 LEVEL

WEST DETECTOR ENTRANCE

DRAWING NO. **15-1-6F** **UG-FD-C-204** REV. **3**

08/26/15
02/08/19



PLAN VIEW

SCALE: 1" = 20'-0"

INDICATIVE TRANSITION. SEE NOTE 10 ON DWG UG-FD-C-002



LONGITUDINAL SECTION

SCALE: 1" = 20'-0"

NOTES:

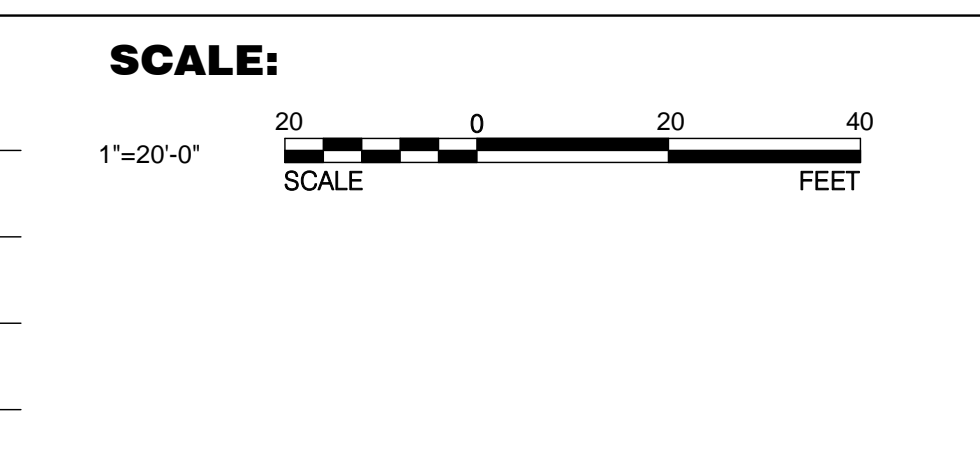
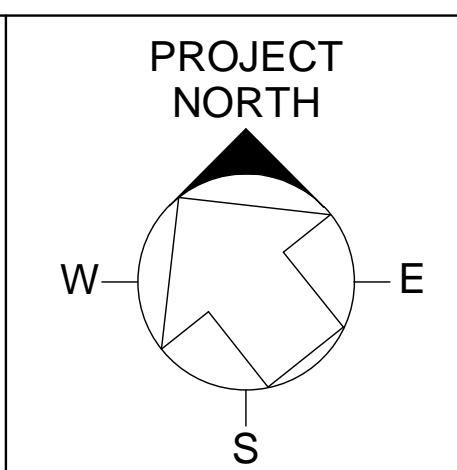
1. FOR GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING UG-FD-C-002.
2. FOR GROUND SUPPORT DETAILS, REFER TO DRAWING UG-FD-C-207.
3. FOR CONCRETE SLAB OVER CAVIDRAIN LAYER DETAILS, REFER TO DRAWING UG-FD-SS-810.
4. ALL SHOTCRETE SURFACES ABOVE THE 4850L WITHIN SECTION 1 SHALL BE SEALED IN ACCORDANCE WITH SPECIFICATION SECTION 03 37 13.
5. FOR SHOTCRETE/CONCRETE SEALANT MATERIAL DETAILS, REFER TO 03 37 13.
6. SECTION 6 IS IDENTICAL TO SECTION 1 IN TERMS OF GEOMETRY AND SUPPORT TYPE ON DRAWING EXCEPT FOR THE LIFTING EYES.

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REV.	DATE	DESCRIPTION
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LBNF - FSCF - EXCAVATION
4850 LEVEL
CENTRAL UTILITY CAVERN (CUC)
PLAN AND PROFILE

DRAWING NO.	15-1-6F	UG-FD-C-206	REV. 3
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02/08/19 08/26/15

CODES AND STANDARDS

- WHERE DOCUMENTS ARE REFERENCED IN THE GENERAL AND DESIGN NOTES, THEY SHALL BE THE LATEST APPLICABLE EDITIONS, UNLESS OTHERWISE NOTED.
- ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2015 INTERNATIONAL BUILDING CODE, INCLUDING REFERENCE STANDARDS, ADDENDA AND APPENDICES.
- IN ADDITION, THE FOLLOWING CODES, STANDARDS AND SPECIFICATIONS SHALL APPLY WHERE MORE STRINGENT AND AS MODIFIED BY THE BUILDING CODE:
 - ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE AND
 - ACI 530/530.1 "BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES AND RELATED COMMENTARIES"
 - AISC "STEEL CONSTRUCTION MANUAL" AND AISC 360 "SPECIFICATION FOR STRUCTURAL STEEL
 - AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
 - AISC "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A 325 OR A 490 BOLTS"
 - AWS D1.1 "STRUCTURAL WELDING CODE"
 - AWS D1.4 "STRUCTURAL WELDING CODE-- REINFORCING STEEL"
 - AISI "SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS"

PROJECT DOCUMENTS

- THIS SET OF DRAWINGS, TOGETHER WITH THE SPECIFICATIONS, CONSTITUTES THE COMPLETE DOCUMENT BY WHICH ALL WORK IS TO BE CARRIED OUT.
- THE CM/GC SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AT THE JOB SITE. THE CM/GC SHALL USE STRUCTURAL DRAWINGS IN CONJUNCTION WITH ARCHITECTURAL, CIVIL, MECHANICAL, ELECTRICAL, PLUMBING, FIRE PROTECTION AND ALL OTHER RELEVANT CONSULTANTS' DRAWINGS BEFORE COMMENCING WITH THE WORK AND SHALL NOTIFY THE FRA CONSTRUCTION COORDINATOR OF ANY DISCREPANCIES REQUIRING CLARIFICATION OR REVISION.
- SCALES NOTED ON THE DRAWINGS ARE FOR GENERAL INFORMATION ONLY. NO DIMENSIONAL INFORMATION SHALL BE OBTAINED BY SCALING FROM THE DRAWINGS.
- IN THE EVENT THAT CERTAIN DETAILS OF THE CONSTRUCTION ARE NOT FULLY SHOWN OR NOTED ON DRAWINGS, THEIR CONSTRUCTION SHALL BE OF THE SAME TYPE AS FOR SIMILAR CONDITIONS THAT ARE SHOWN OR NOTED, SUBJECT TO THE STRUCTURAL ENGINEER'S [PRIOR WRITTEN] APPROVAL.
- REFER TO ARCHITECTURAL DRAWINGS FOR THE FOLLOWING:
 - SIZE AND LOCATION OF ALL DOOR OPENINGS, EXCEPT AS NOTED.
 - SIZE AND LOCATION OF ALL INTERIOR NON-BEARING PARTITIONS.
 - DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.
- REFER TO MEP DRAWINGS FOR THE FOLLOWING:
 - PIPE AND DUCT RUNS, SLEEVES, HANGERS, TRENCHES, WALL AND SLAB OPENINGS, EXCEPT AS SHOWN OR NOTED.
 - SIZE AND LOCATION OF MACHINE OR EQUIPMENT BASES, ANCHOR BOLTS FOR MOTOR MOUNTS, EXCEPT AS SHOWN OR NOTED.

SUBGRADE PREPARATION

- SUBGRADE BELOW STRUCTURAL SLABS (INCLUDING MUD SLABS) SHALL CONSIST OF EITHER BLOWN ROCK OR COMPACTED FILL, MEETING THE FOLLOWING:
 - BLOWN ROCK:** SHALL CONSIST OF UNDISTURBED NATIVE ROCK WITH ALL LOOSE MATERIAL AND DEBRIS REMOVED SO THAT ONLY SOUND ROCK REMAINS. THE SURFACE SHALL BE SUITABLY CLEANED OF ANY FOREIGN SUBSTANCES RESULTING IN A CLEAN SURFACE SUITABLE TO RECEIVE CONCRETE OR ANY OTHER UNDERSLAB SYSTEM WHICH OCCUR.
 - COMPACTED FILL:** SHALL CONSIST OF COMPACTED FILL MATERIAL AND SPOILS IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS (SEE CIVIL DRAWINGS), BUILT UP TO AN ELEVATION SUITABLE TO RECEIVE THE CONCRETE SLAB AND ANY OTHER UNDERSLAB SYSTEMS WHICH OCCUR.
- UNLESS NOTED OTHERWISE, SUBGRADE PREPARATION SHALL BE AS FOLLOWS:
 - EXPERIMENT CAVERNS: BLOWN ROCK
 - ALL OTHER LOCATIONS: COMPACTED FILL

REINFORCED CONCRETE

- STRUCTURAL CONCRETE STRENGTHS AND TYPES USED IN THIS PROJECT SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

CALL OUT IN DOCUMENTS	f _c (PSI)	AGGREGATE
STANDARD CONCRETE	5000	NORMAL WEIGHT

- ALL CONCRETE MIXES SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE AND THE ACI 318. MIX DESIGNS FOR EACH TYPE AND STRENGTH SHALL BE PREPARED BY CM/GC AND TESTED BY AN INDEPENDENT TESTING LABORATORY. THE MIX DESIGNS SHALL THEN BE SUBMITTED TO THE FRA FOR REVIEW AND APPROVAL.
- PORTLAND CEMENT SHALL CONFORM TO ASTM C150. WHERE CONCRETE IS IN CONTACT WITH ROCK, THE TYPE OF EXPOSURE SHALL DETERMINE THE CEMENT TYPE. THE CONTRACT REQUIREMENT IS FOR ALL CONCRETE IN CONTACT WITH ROCK TO MEET:

MODERATE SULFATE EXPOSURE	TYPE II
---------------------------	---------
- NORMAL WEIGHT AGGREGATE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C33.

- CONCRETE FORMS SHALL BE LAID OUT AND CONSTRUCTED TO PROVIDE THE SPECIFIED CAMBERS INDICATED ON THE STRUCTURAL DRAWINGS, AND SHALL COMPLY WITH REQUIREMENTS OF ACI 318.
- THE PROJECTING CORNERS OF COLUMNS, BEAMS, WALLS, ETC. SHALL BE FORMED WITH 3/4 INCH CHAMFER, UNLESS OTHERWISE NOTED ON ARCHITECTURAL DRAWINGS.
- CONSTRUCTION JOINTS SHALL BE DOWELLED, KEYED AND THE SURFACES SHALL BE CLEANED AND LAITANCE REMOVED. ALTERNATIVELY, WHERE APPROVED BY FRA, PROVIDE JOINTS CLEANED AND ROUGHENED TO 1/4 INCH AMPLITUDE BY MECHANICAL METHODS.
- LOCATION OF CONSTRUCTION JOINTS SHALL BE AS INDICATED ON STRUCTURAL DRAWINGS. PROVIDE WATERSTOPS FOR ALL CONSTRUCTION JOINTS BELOW WATER TABLE OR AS INDICATED IN DETAILS. ADDITIONAL CONSTRUCTION JOINTS MAY BE ADDED ONLY WITH APPROVAL OF ARCHITECT AND FRA.
- REINFORCING BARS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615, GRADE 60. UNLESS NOTED OTHERWISE, REINFORCING BARS, WHICH ARE TO BE WELDED, SHALL CONFORM TO APPLICABLE ASTM AND AWS SPECIFICATIONS.
- REINFORCING BARS DENOTED AS "GFRP" SHALL BE SOLID ROUND GLASS FIBER REINFORCED POLYMER BARS CONFORMING TO ASTM D7957.
- ALL REINFORCING BARS MARKED "CONTINUOUS" SHALL BE TENSION SPLICED, UNLESS OTHERWISE SHOWN ON DRAWINGS.
- ALL BARS AT NON-CONTINUOUS ENDS SHALL HAVE A STANDARD HOOK.
- PROVIDE DEVELOPMENT AND SPLICES OF REINFORCEMENT ACCORDING TO THE TYPICAL DETAIL TABLES.
- ALL DOWELS SHALL BE FULLY DEVELOPED IN TENSION, UNLESS OTHERWISE NOTED.
- DOWEL TO WALLS AND COLUMNS SHALL MATCH THE CORRESPONDING REINFORCING OF THE WALL OR COLUMN.
- MINIMUM LAP OF WELDED WIRE FABRIC SHALL BE 6 INCHES OR ONE FULL MESH, WHICHEVER IS GREATER.
- POLYPROPYLENE MACROSYNTHETIC FIBER REINFORCING SHALL CONFORM TO ASTM C1116 (TYPE III).
- ALL REINFORCING STEEL SHALL BE SECURELY HELD IN ORDER TO MAINTAIN ITS POSITION WHILE CONCRETE IS POURED. CHAIRS, TIES, SPACERS, ADDITIONAL BARS AND STIRRUPS, ETC. SHALL BE PROVIDED BY THE CM/GC.
- CM/GC SHALL COORDINATE AND INSTALL ALL REQUIRED EMBEDDED ITEMS, SLEEVES, POCKETS, ETC. PRIOR TO CONCRETE PLACEMENT. REFER TO TYPICAL DETAILS OF PENETRATIONS FOR LIMITATIONS ON THEIR POSITIONING IN RESPECT TO REINFORCING. DO NOT CUT ANY REINFORCING THAT MIGHT INTERFERE WITH EMBEDDED ITEMS PLACEMENT.
- MECHANICAL PIPES AND/OR ELECTRICAL CONDUITS SHALL NOT PASS THROUGH CONCRETE COLUMNS AND BEAMS, UNLESS SPECIFICALLY DETAILED ON DRAWINGS.
- NO ALUMINUM SHALL BE EMBEDDED IN CONCRETE.
- CM/GC SHALL NOTIFY FRA CONSTRUCTION COORDINATOR, 24 HOURS BEFORE POURING OF CONCRETE. FOR INSPECTION OF REINFORCEMENT LAYOUT. NO CONCRETE SHALL BE POURED UNLESS ALL REINFORCEMENT AND INSTALLATIONS HAVE BEEN INSPECTED AND APPROVED BY THE FRA CONSTRUCTION COORDINATOR.
- CONCRETE CAST ON SLOPED SURFACES SHALL BEGIN AT THE LOWEST ELEVATION AND CONTINUE MONOLITHICALLY TOWARD THE HIGHER ELEVATION.
- NO JOINTS IN SLAB. BRUSH-IN CEMENT AT APPROX 6-12 WEEKS AFTER CASTING PRIOR TO TRAFFICKING.

EXPANSION ANCHORS AND ADHESIVE ANCHORS

- ALL EXPANSION ANCHOR AND ADHESIVE ANCHOR PRODUCTS SHALL BE SUBMITTED FOR REVIEW PRIOR TO USE. SUBMITTALS SHALL CONTAIN APPLICABLE PRODUCT LITERATURE AND AN ICC-ES EVALUATION REPORT.
- ALL EXPANSION ANCHORS AND ADHESIVE ANCHORS INSTALLED BE IN ACCORDANCE WITH THE MANUFACTURER REQUIREMENTS. SPECIAL INSPECTION AS STIPULATED IN THE APPLICABLE ICC-ES REPORT AND IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE.
- EPOXY ANCHORS INSTALLED HORIZONTALLY OR AT AN UPWARDLY INCLINED ANGLE (INCLUDING VERTICAL) SHALL BE INSTALLED BY PERSONNEL CERTIFIED BY AN APPLICABLE CERTIFICATION PROGRAM, SUCH AS THE ACI/CRSI ADHESIVE INSTALLER CERTIFICATION PROGRAM, OR AN APPROVED EQUIVALENT, AND SHALL HAVE CONTINUOUS SPECIAL INSPECTION.

GENERAL

- FOR CLARITY THE PREFIX SHEET NUMBER "UG-FD-" HAS BEEN REMOVED FROM ALL SECTION AND CALLOUT SYMBOLS. ALL SECTIONS AND CALLOUTS IN THIS PACKAGE REFER TO THE "UG-FD-SS-XXXX" SHEETS.
- ALL TOP OF SLAB ELEVATIONS ARE RELATIVE TO 4850 LEVEL AND ARE INDICATED AS:

T/SL = XXX' - XX X/X"

STRUCTURAL STEEL

- ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A123.
- STRUCTURAL STEEL SHALL BE PROVIDED AS FOLLOWS:

SHAPE	ASTM STANDARD	Fy (KSI)
WIDE FLANGES	A992	50
CHANNELS	A36	36
HSS (RECTANGULAR AND SQUARE)	A500 GRADE C	46
HSS (ROUND)	A500 GRADE C	46
PIPES	A53 GRADE B	35
ANGLES	A36	36
PLATES	A36	36
TEES	A992	50

- Fy IS THE MINIMUM TENSILE YIELDING STRESS TO BE PROVIDED UNLESS OTHERWISE NOTED.
- ALL BOLTED CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS CONFORMING TO ASTM A325 OR ASTM A490. ALL CONNECTIONS SHALL BE TYPE N UNLESS OTHERWISE NOTED ON DRAWINGS. FASTENERS AND CONNECTING PARTS SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153. BOLTS DENOTED AS A325-SC OR A490-SC SHALL BE SLIP CRITICAL.
 - NUTS SHALL CONFORM TO ASTM A563, DH OR ASTM A194. 2H. PROVIDE WASHERS CONFORMING TO ASTM F436 AT EACH THREADED ROD OR BOLT. NUTS AND WASHERS SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153.
 - BOLT HOLES IN STEEL MEMBERS, WITH THE EXCEPTION OF BASE PLATES, SHALL BE 1/16 INCH LARGER IN DIAMETER THAN THE NOMINAL SIZE OF BOLT USED, UNLESS NOTED OTHERWISE ON DRAWINGS.
 - BOLT HOLES IN STEEL BASE PLATES SHALL BE OF THE SIZE MARKED ON DRAWINGS. PROVIDE WELDED PLATE WASHERS 3"x 3"x 3/8" THICK MINIMUM.
 - ANCHOR BOLTS SHALL BE ROUND BAR STOCK, THREADED, CONFORMING TO ASTM F1554, GRADE 36 UNLESS OTHERWISE NOTED. ANCHOR BOLTS SHALL BE SUPPLIED WITH CORRESPONDING NUTS AND WASHERS. ANCHOR BOLTS SHALL BE HOT-DIP GALVANIZED.
 - STRUCTURAL THREADED RODS SHALL HAVE THREADS CONFORMING TO UNC CLASS 2A (EXTERIOR THREADS) AND 2B (INTERNAL THREADS). THREADED RODS SHALL BE HOT-DIP GALVANIZED.
 - WELDING MATERIALS SHALL CONFORM TO AWS D1.1. ELECTRODES SHALL HAVE A MINIMUM TENSILE STRENGTH OF 70 KSI AND BE LOW-HYDROGEN TYPE.
 - WELD LENGTHS CALLED FOR ON PLANS ARE THE NET EFFECTIVE LENGTHS REQUIRED.
 - AT PARTIAL PENETRATION WELDS THE SIZE GIVEN IS THE MINIMUM EFFECTIVE THROAT. FABRICATOR SHALL PROVIDE PROPER JOINT PREPARATION TO ACHIEVE THE MINIMUM EFFECTIVE THROAT AS REQUIRED BY THE AWS CODE.
 - SPLICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THE MEMBER AT THE POINT OF SPlice. SPLICES SHALL BE MADE ONLY AT LOCATIONS INDICATED ON DRAWINGS. FULL DETAIL AND BACK-UP CALCULATIONS OF SPLICES REQUIRE REVIEW AND APPROVAL BY THE ENGINEER.
 - SHAPE AND SIZE GUSSET PLATES IN SUCH A MANNER AS TO CLEAR ALL ARCHITECTURAL FINISHES AND MECHANICAL FIXTURES (DUCTS, PIPES, ETC.). SUBMIT THE CONFIGURATION OF ALL GUSSET PLATES EXPOSED TO VIEW TO ARCHITECT AND ENGINEER FOR REVIEW AND APPROVAL.
 - CM/GC SHALL PROVIDE ALL NECESSARY TEMPORARY BRACING, GUYING AND CONNECTING MEMBERS REQUIRED TO ERECT THE STRUCTURE, MAINTAIN CORRECT ALIGNMENT AND SAFELY RESIST ALL POSSIBLE COMBINATIONS OF DEAD, CONSTRUCTION, ERECTION, WIND AND OTHER LATERAL LOADS.
 - REFER TO SPECIFICATIONS FOR STEELWORK PROTECTION AND COATINGS.
 - CLEAN AREAS IN ALL LOCATIONS WHERE GALVANIZING IS DAMAGED OR MISSING AND REPAIR GALVANIZING TO COMPLY WITH ASTM A780/A780M. GALVANIZING TO BE REPAIRED AT ALL LOCATIONS WHERE FIELD WELDING IS REQUIRED.

STEEL FRAMING NOTES

- STEEL MEMBERS ARE ASSUMED TO BE DIMENSIONED TO THEIR CENTERLINE UNLESS OTHERWISE INDICATED. STEEL COLUMNS ARE ASSUMED TO BE PLUMB AND STEEL BEAMS ARE ASSUMED TO BE LEVEL UNLESS OTHERWISE INDICATED.
- STEEL MEMBERS NOT LOCATED IN PLAN BY A DIMENSION LINE SHALL BE EQUALLY SPACED BETWEEN DIMENSIONED MEMBERS.

STRUCTURAL STEEL CONNECTIONS

- ALL FASTENERS AND CONNECTING PARTS SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153, EXCEPT A490 BOLTS, WHICH SHALL HAVE A ZINC/ALUMINUM CORROSION PROTECTIVE COATING IN ACCORDANCE WITH F 1136 GRADE 3.
- CM/GC SHALL PROVIDE THE DETAILING FOR ALL STRUCTURAL STEEL CONNECTIONS NOT COMPLETELY DEFINED IN THE DRAWINGS. CM/GC SHALL RETAIN A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH DAKOTA TO DETAIL SUCH CONNECTIONS.
- REFER TO STEEL CONNECTION TYPICAL DETAILS FOR STEEL CONNECTION REQUIREMENTS, MINIMUM REACTIONS AND ADDITIONAL INFORMATION.

SHOTCRETE, GROUT, AND ROCK BOLTS

- REFER TO C-002, CIVIL GENERAL NOTES, FOR SHOTCRETE, GROUT, AND ROCK REINFORCEMENT.

MISCELLANEOUS METALS

- ALL STEEL AND METAL ITEMS AND ELEMENTS NOT SHOWN ON STRUCTURAL DRAWINGS SHALL BE DEFINED AS MISCELLANEOUS METALS.
- FOR SCOPE OF WORK RELATED TO ALL MISCELLANEOUS METALS, THE REQUIREMENTS OF SPECIFICATION SECTION 05500 APPLY.

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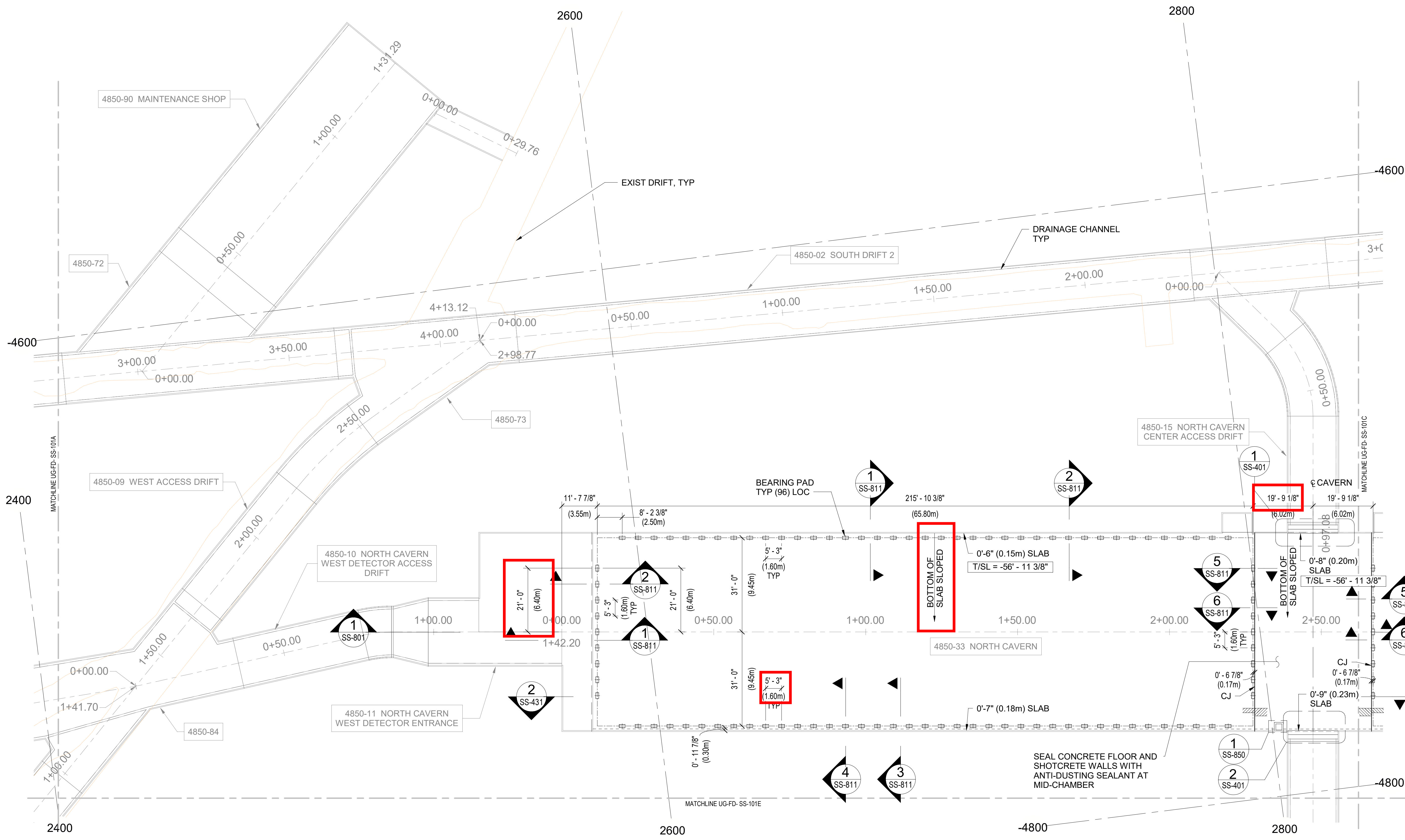



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LBNF - FSCF - EXCAVATION UNDERGROUND STRUCTURAL GENERAL NOTES	
DRAWING NO.	15-1-6
	UG-FD-SS-010
REV.	3

02/08/19

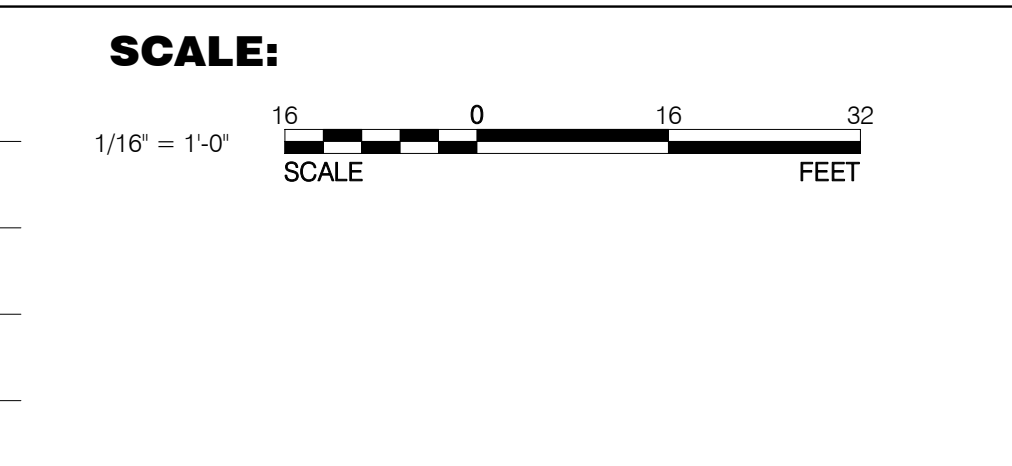
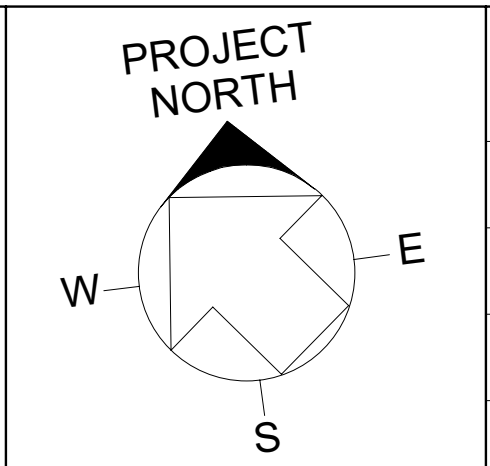


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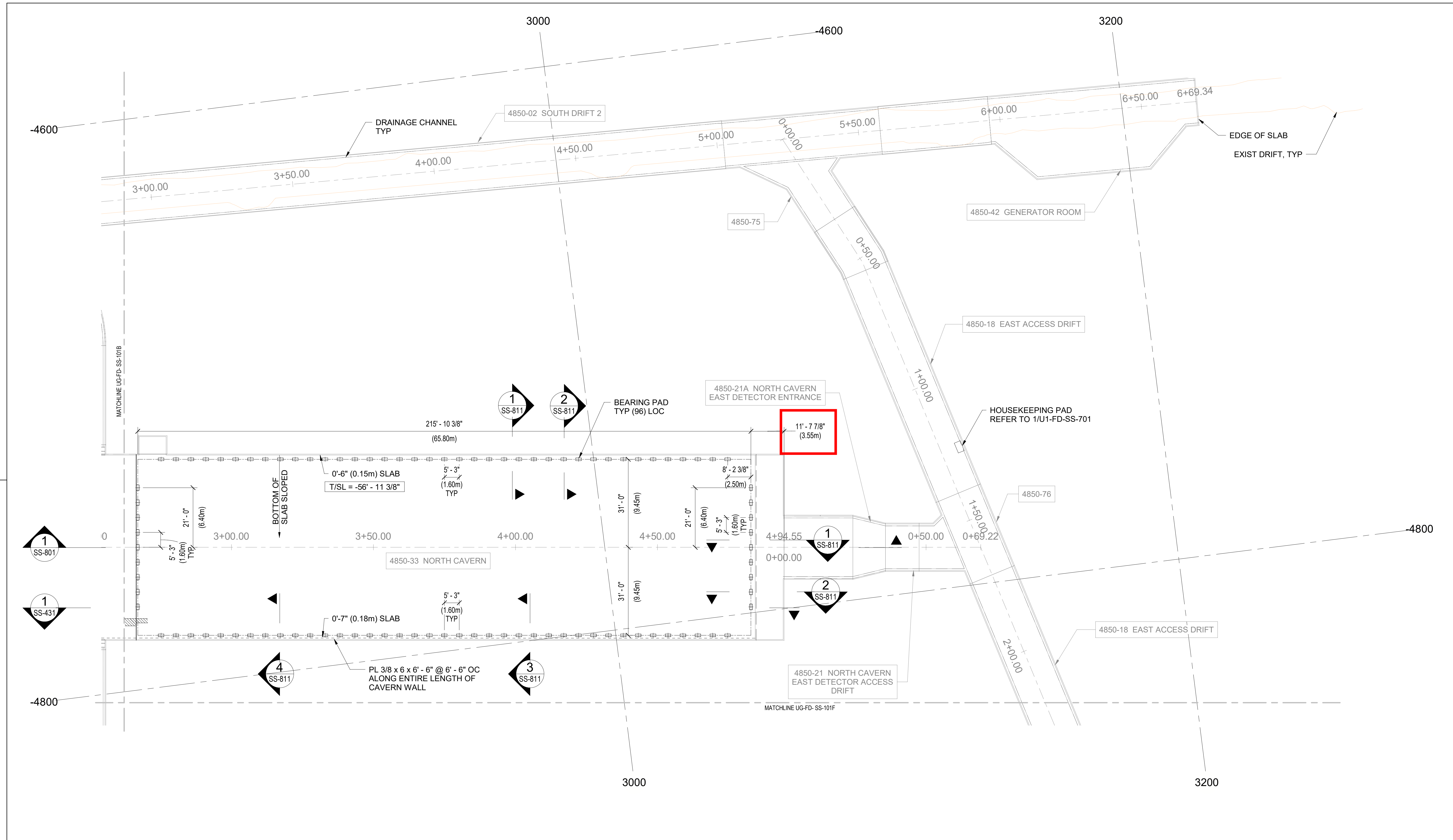
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4910 LEVEL SLAB PLAN
PORTION B

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02/08/19



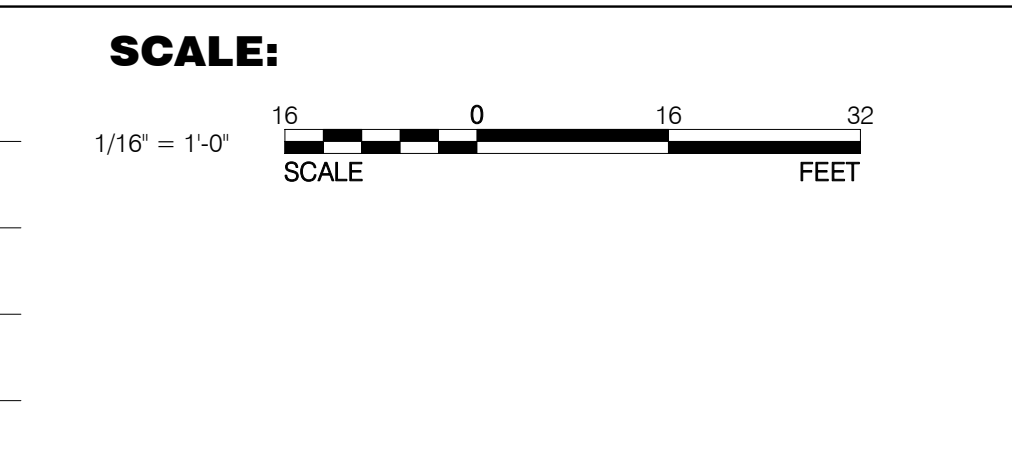
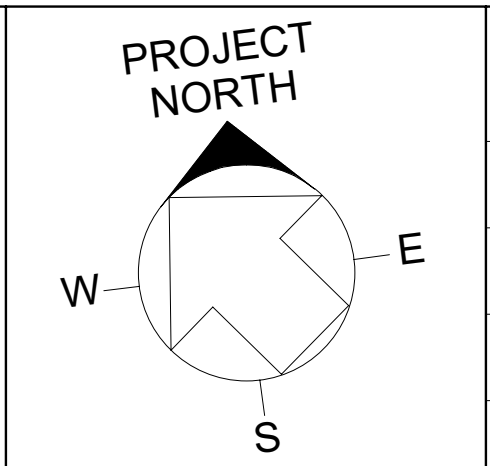
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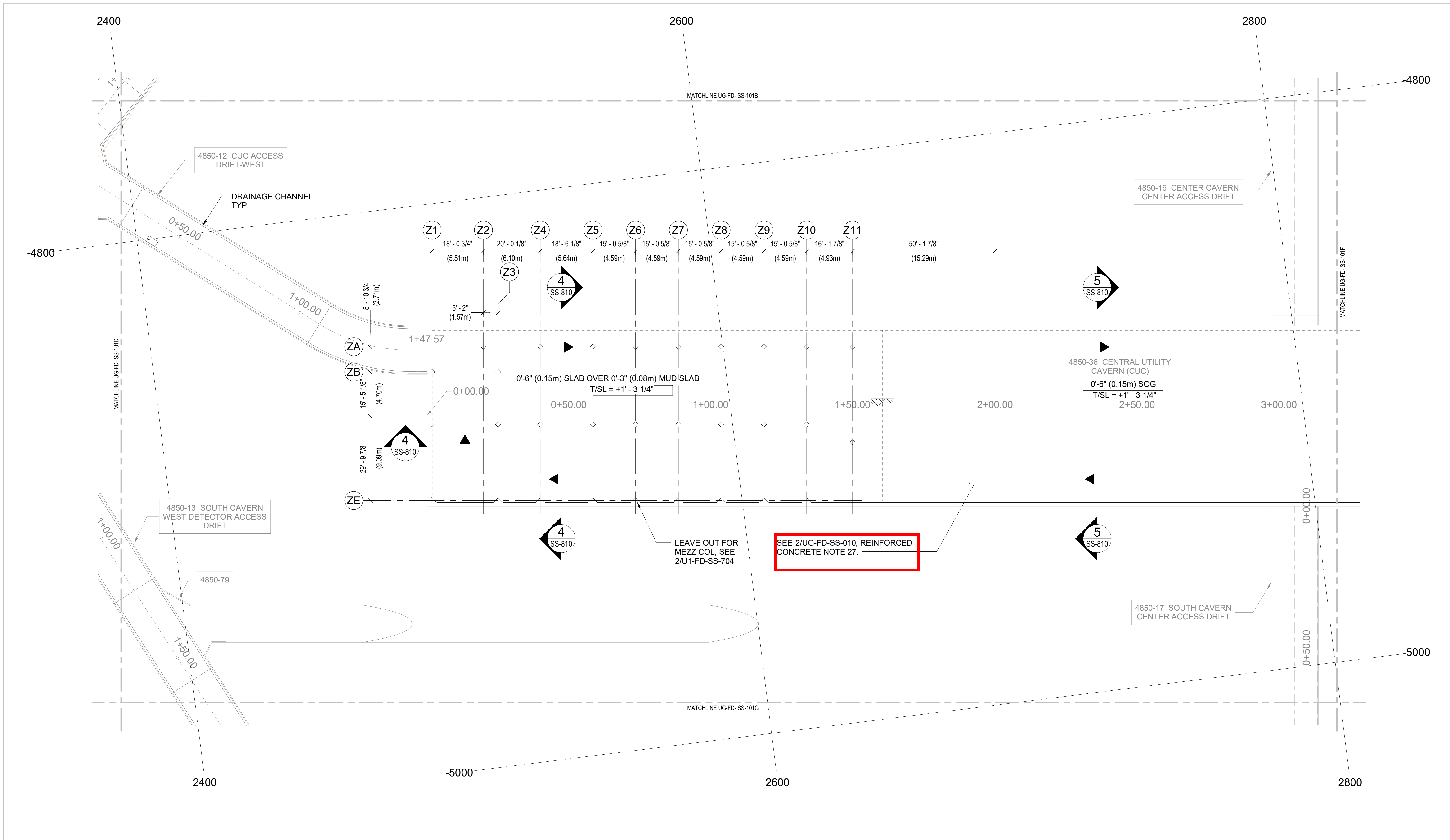
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4910 LEVEL SLAB PLAN
PORTION C

DRAWING NO. **15-1-6 UG-FD-SS-101C** REV. **3**

02/08/19



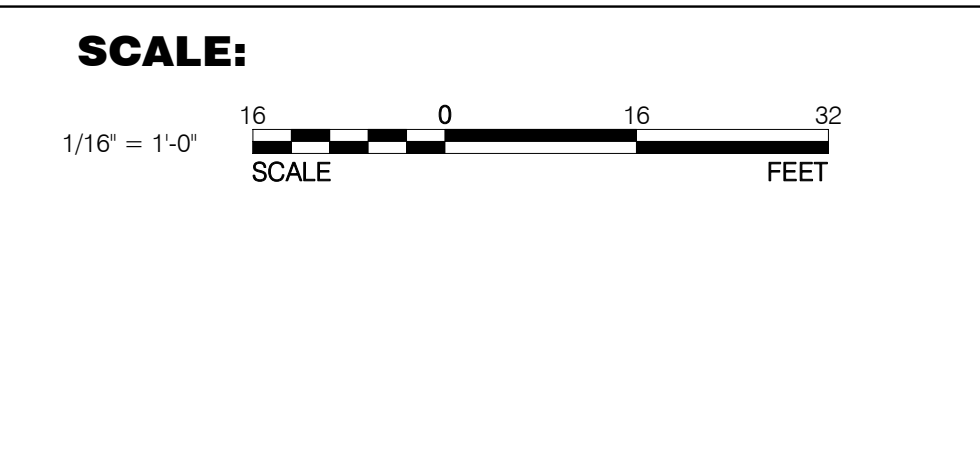
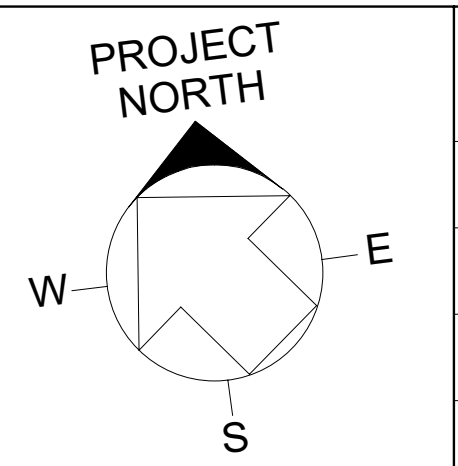
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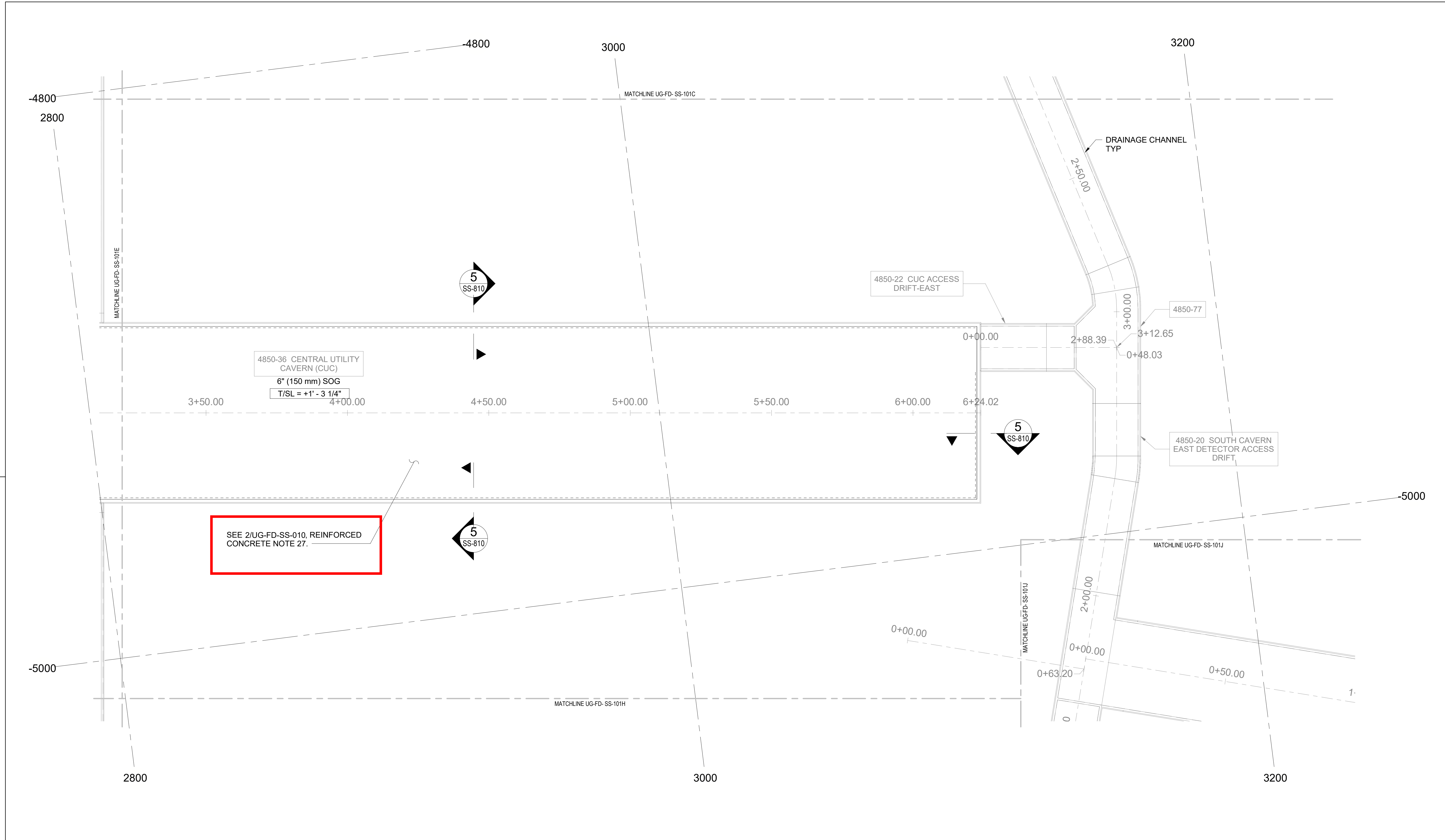
UNDERGROUND, STRUCTURAL

4850 LEVEL SLAB PLAN

PORTION E

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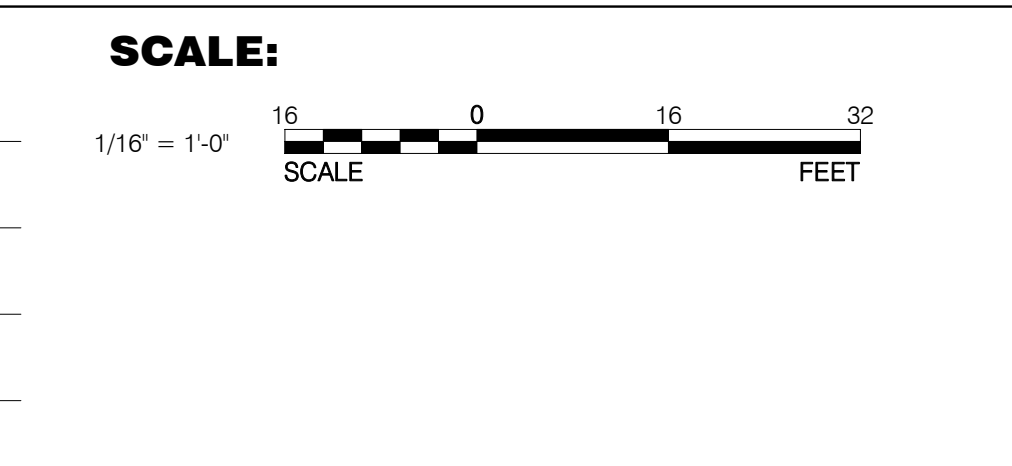
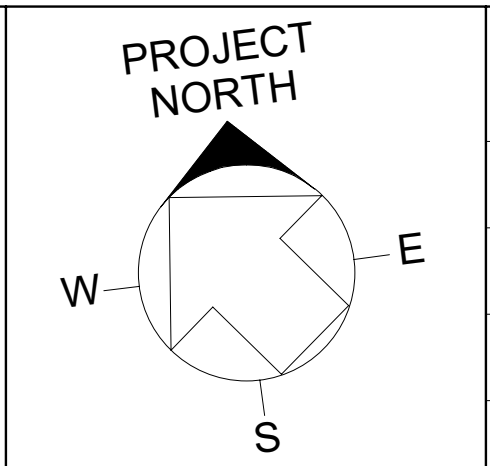
SEE 2/UG-FD-SS-010, REINFORCED CONCRETE NOTE 27.

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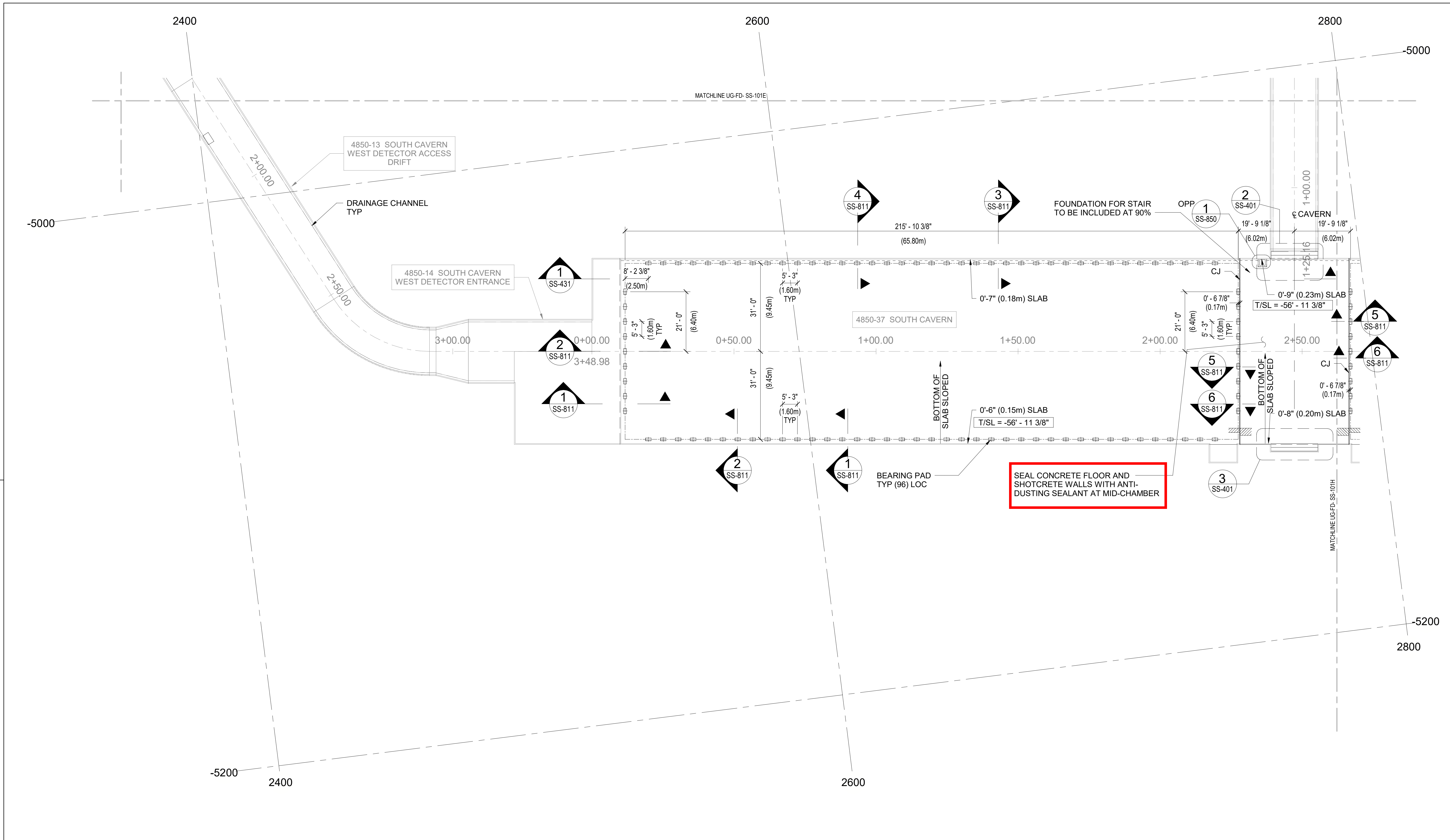
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4910 LEVEL SLAB PLAN
PORTION F

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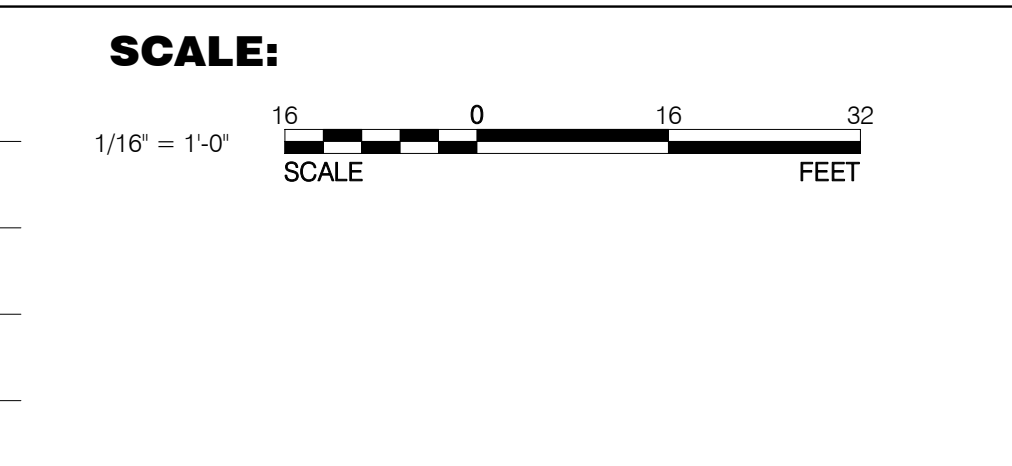
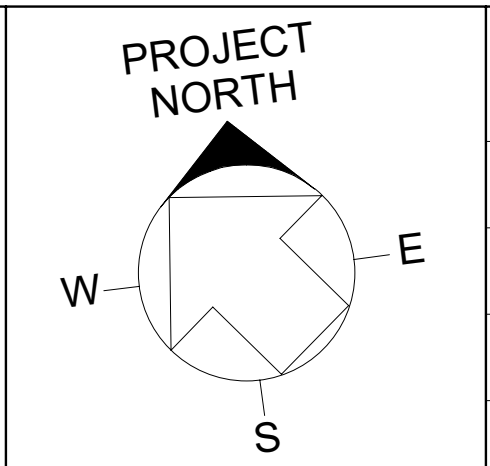


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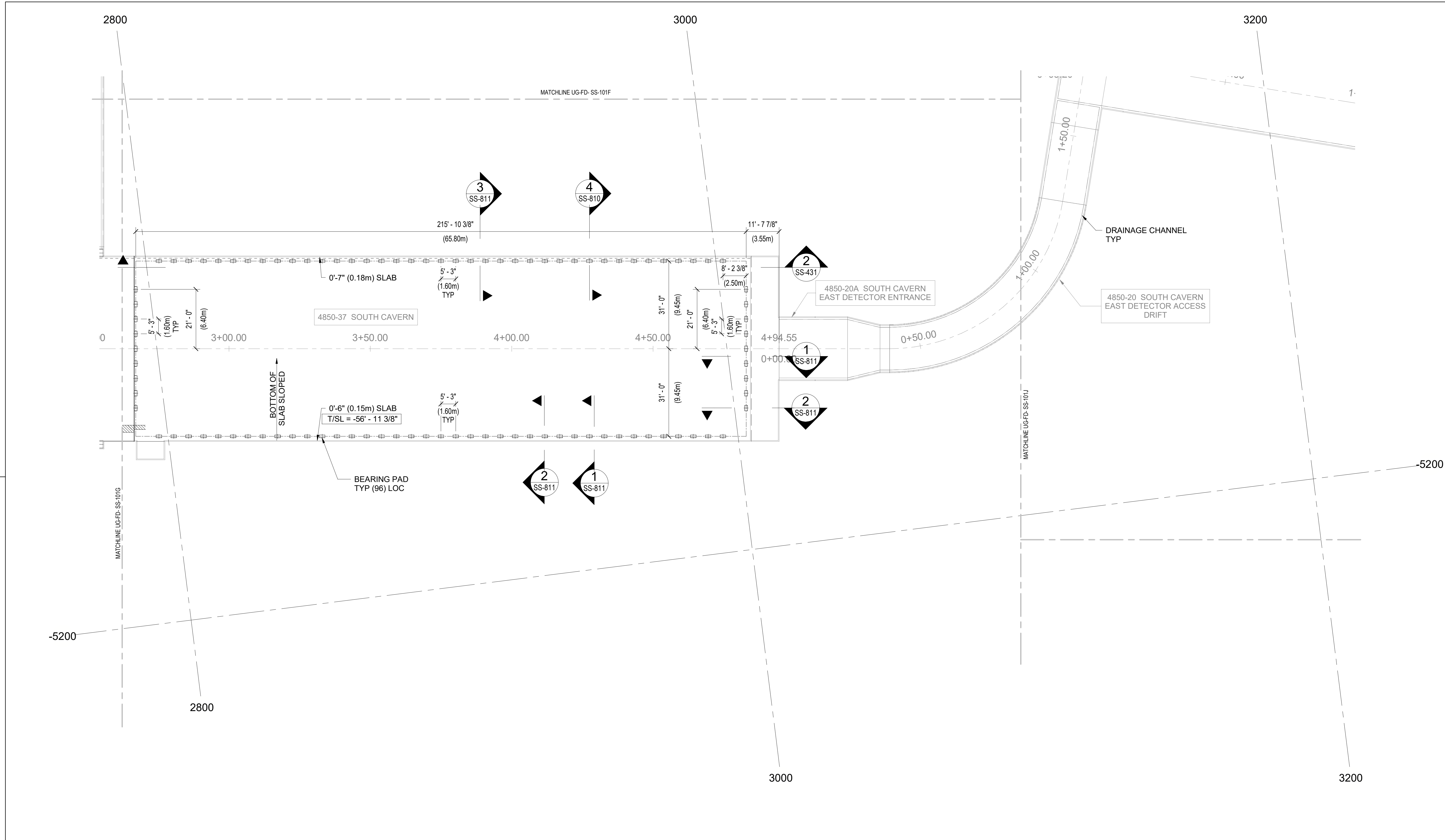
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LBNF - FSCF - EXCAVATION
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4910 LEVEL SLAB PLAN
PORTION G

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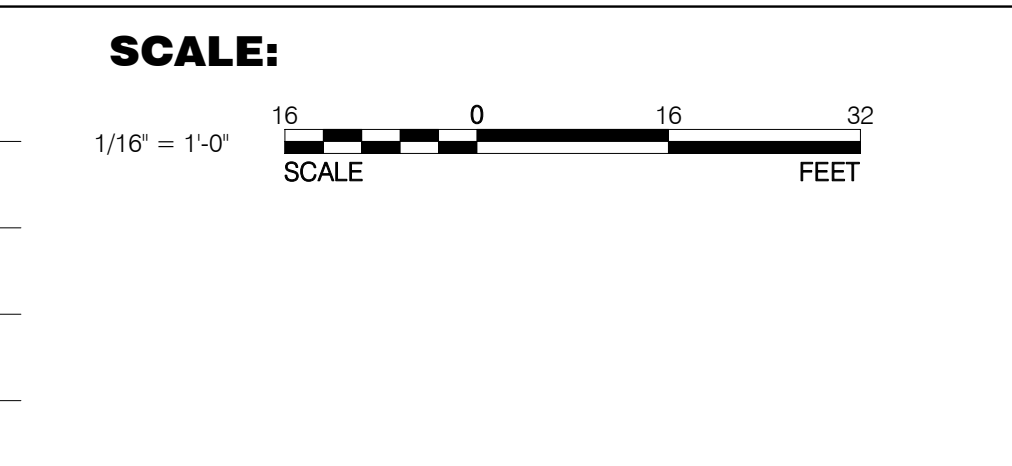
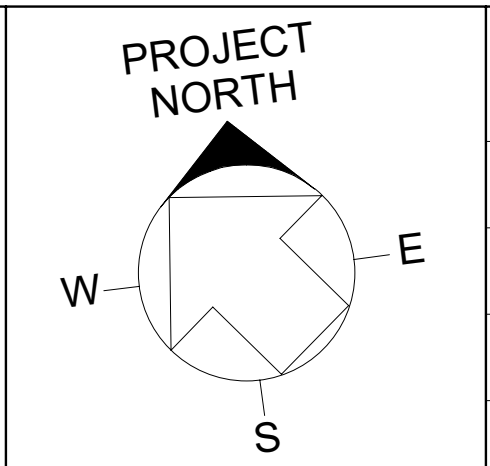


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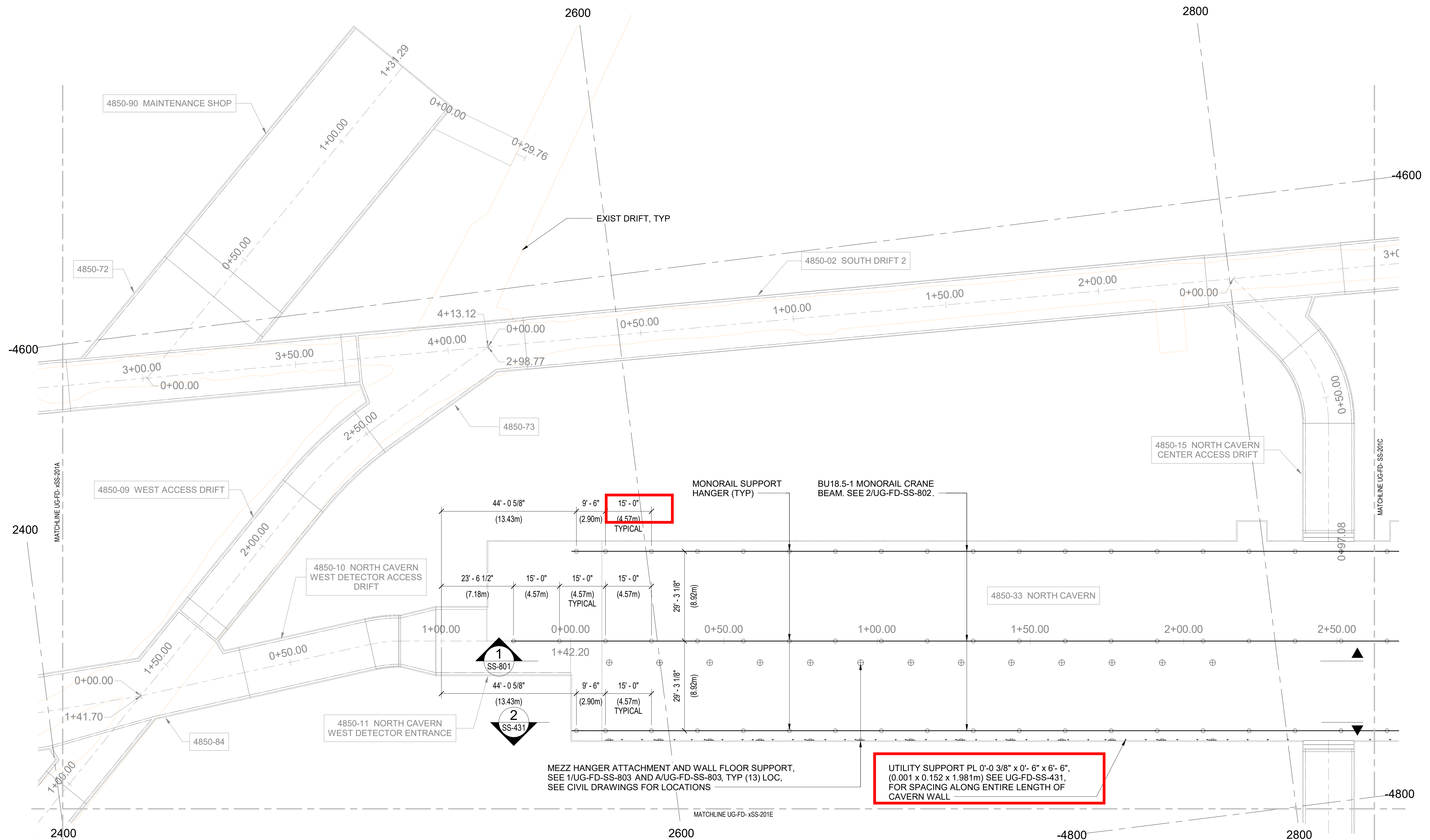
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LBNF - FSCF - EXCAVATION
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4850 LEVEL SLAB PLAN
PORTION H

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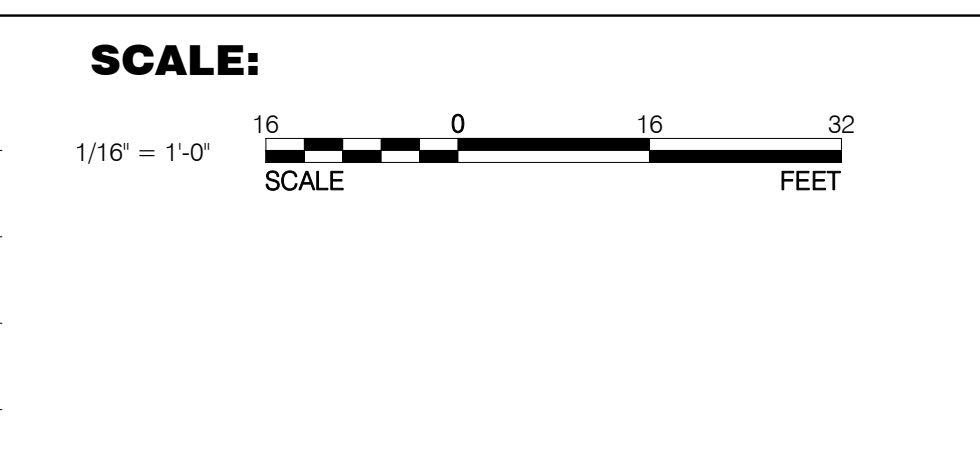
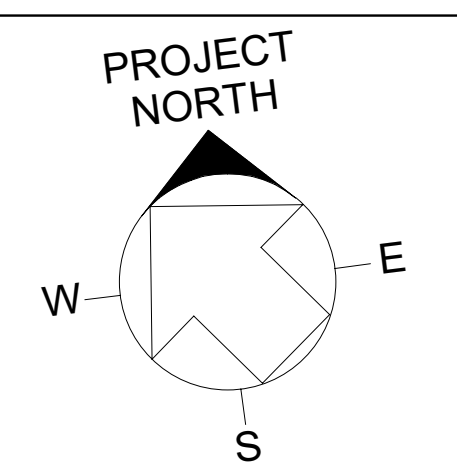
NOTES:
 1. FOR EXPERIMENT CAVERN LIFTING EYES, SEE 2/UG-FD-SS-803
 SEE CIVIL DRAWINGS FOR LIFTING EYE LOCATIONS.

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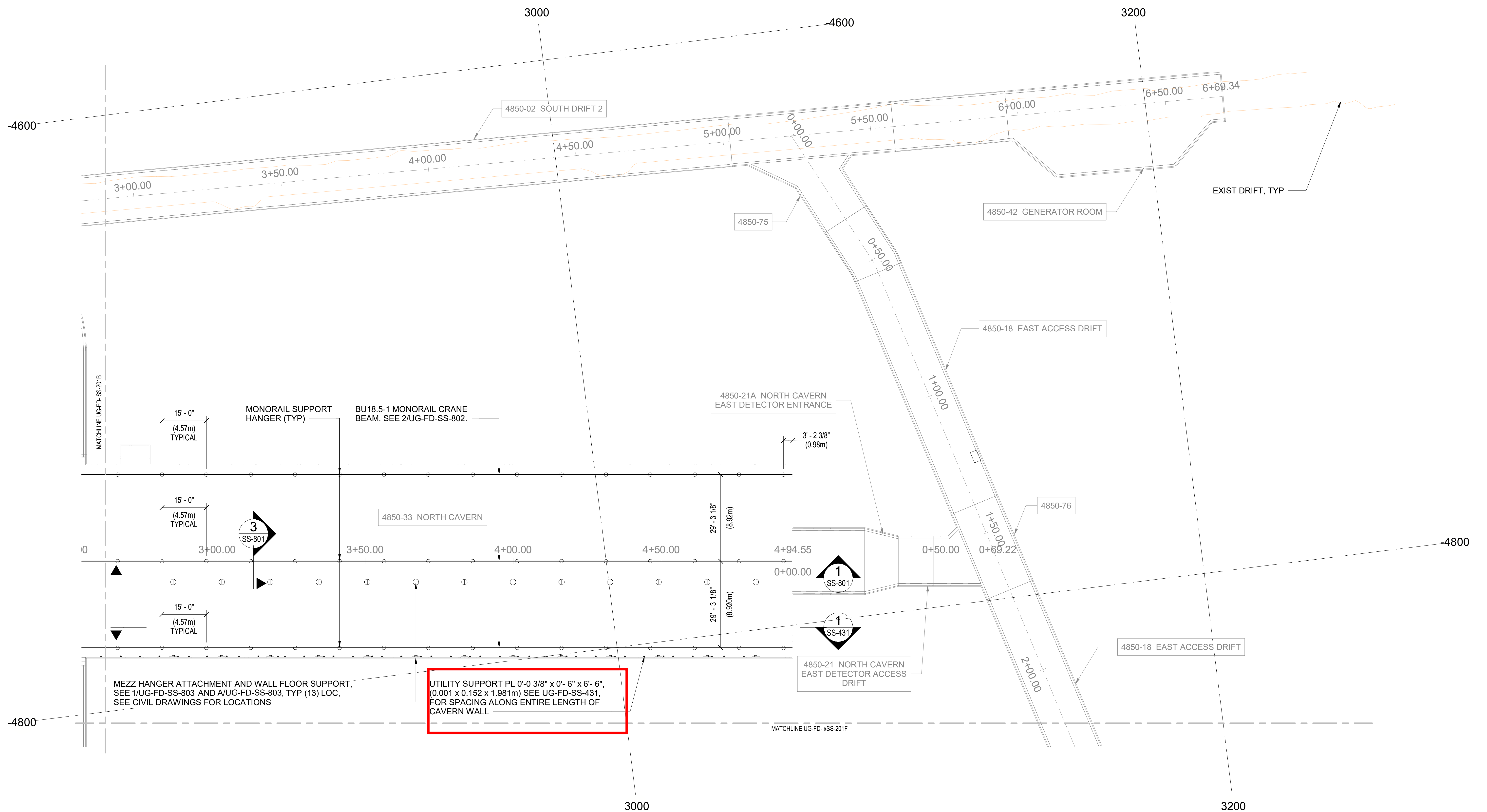


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LBNF - FSCF - EXCAVATION
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4850 LEVEL PLAN
PORTION B

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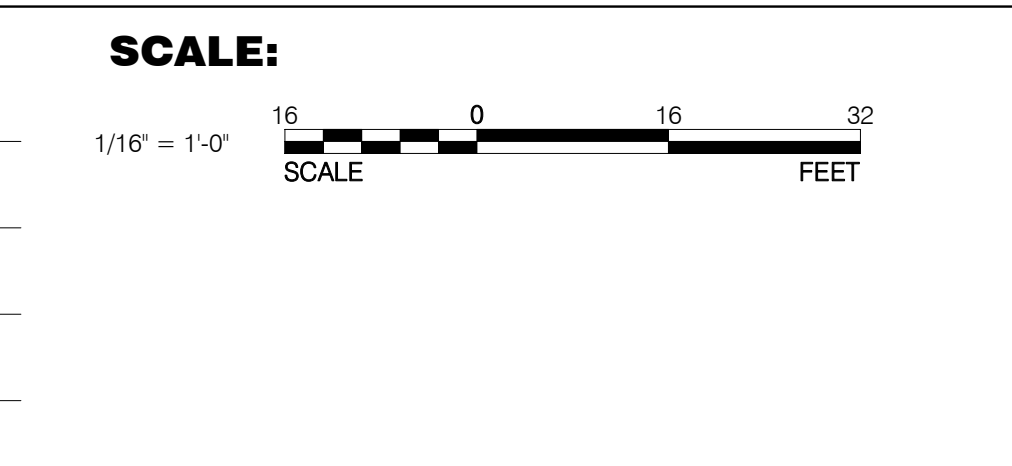
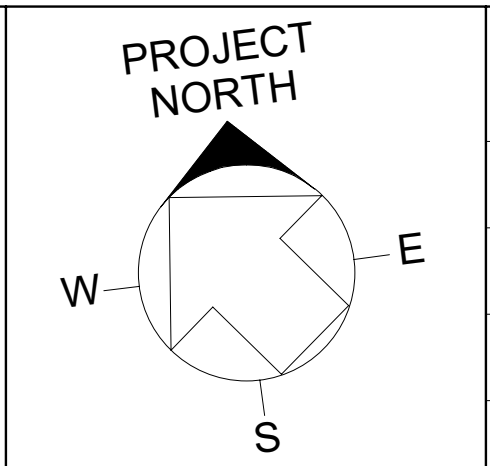
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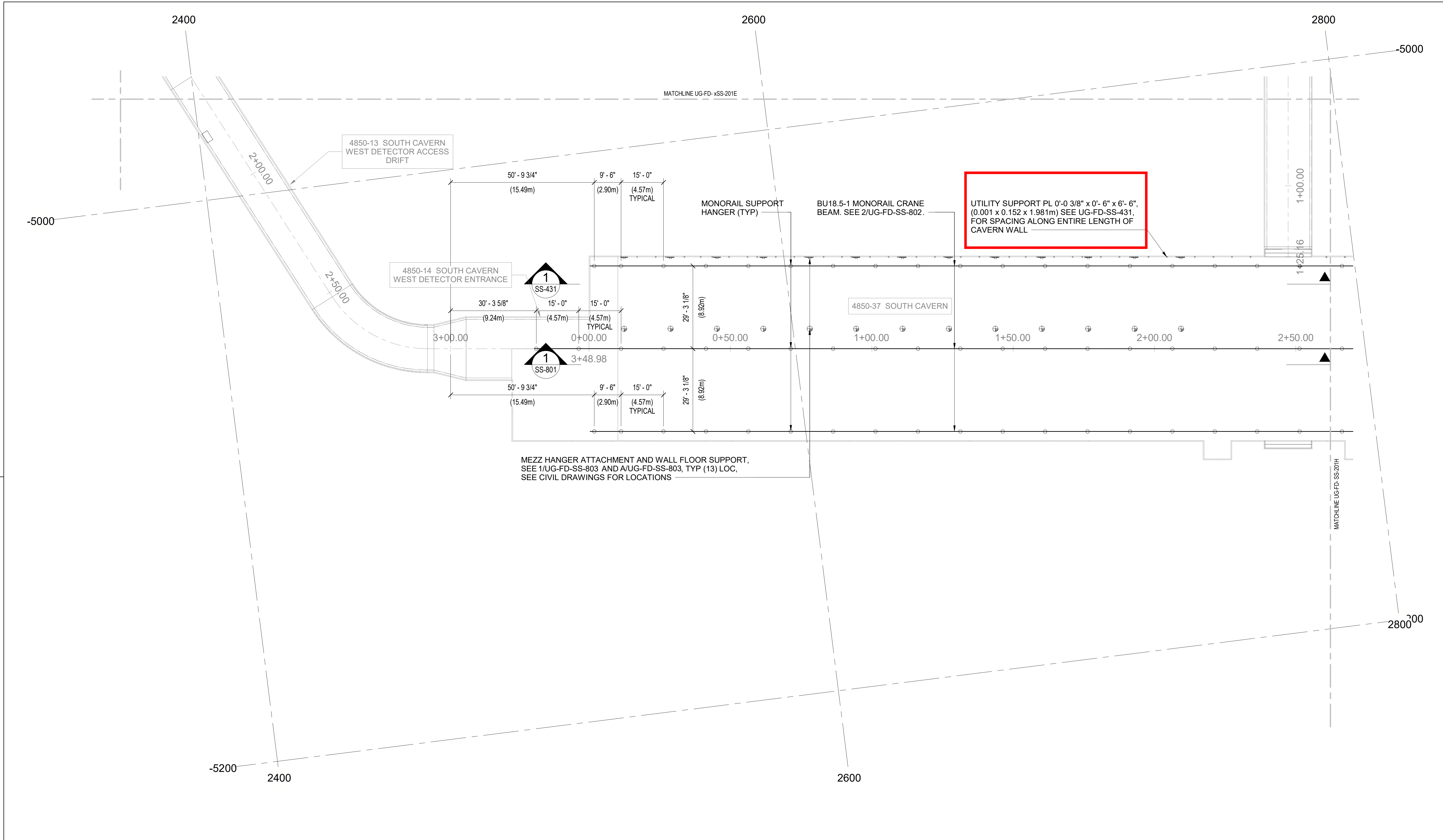
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CHECKED	IB	ARUP

LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4850 LEVEL PLAN
PORTION C

DRAWING NO. **15-1-6 UG-FD-SS-201C** REV. **2**

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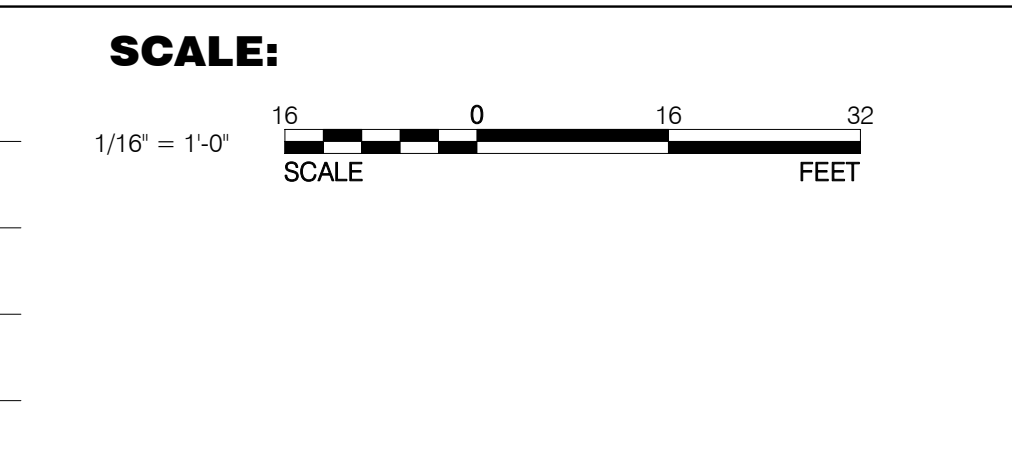
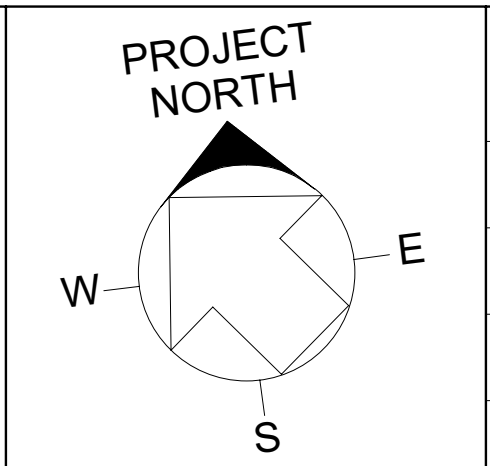


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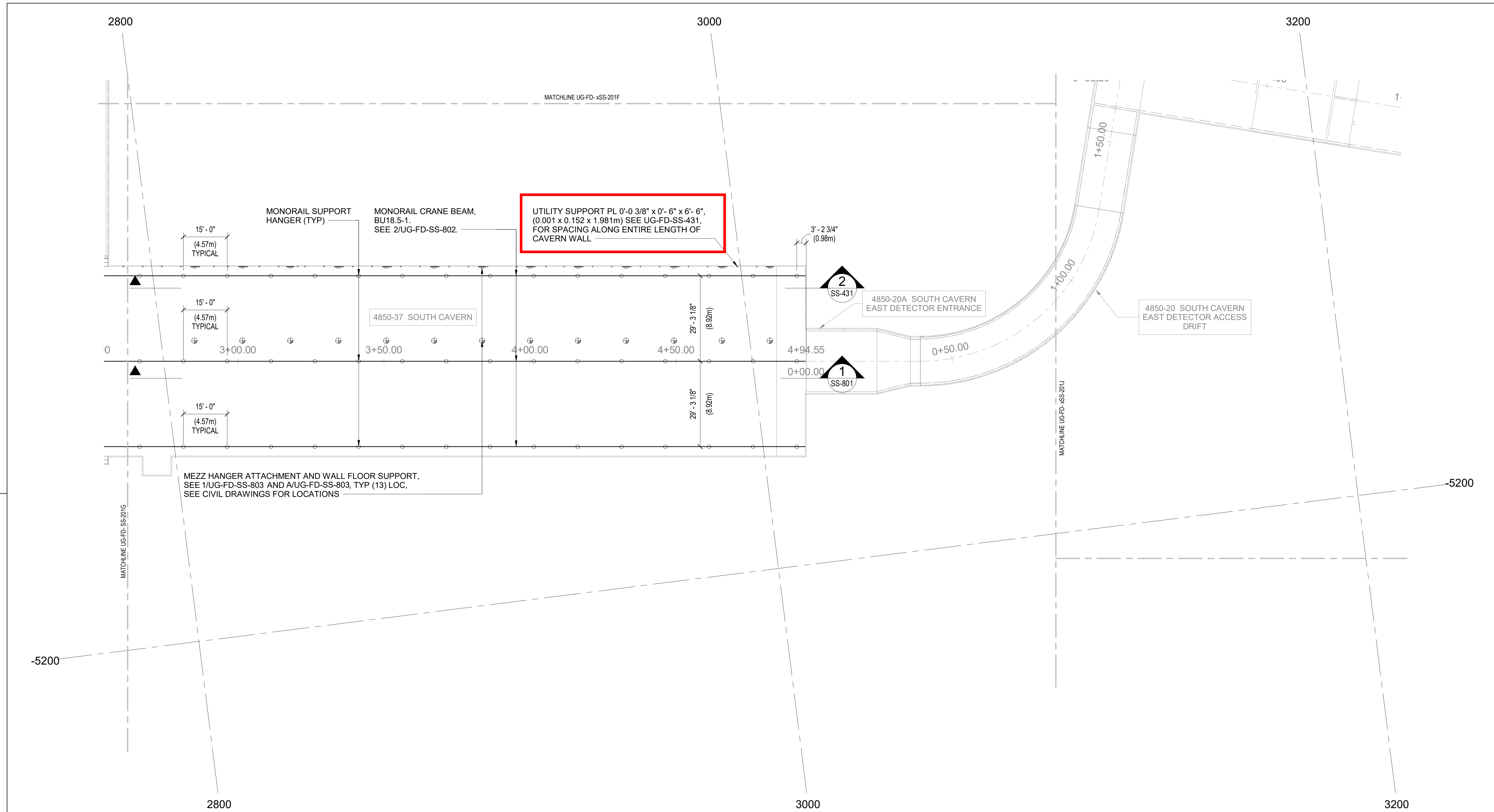


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LBNF - FSCF - EXCAVATION
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4850 LEVEL PLAN
PORTION G

DRAWING NO. **15-1-6 UG-FD-SS-201G** REV. **2**

02/08/19



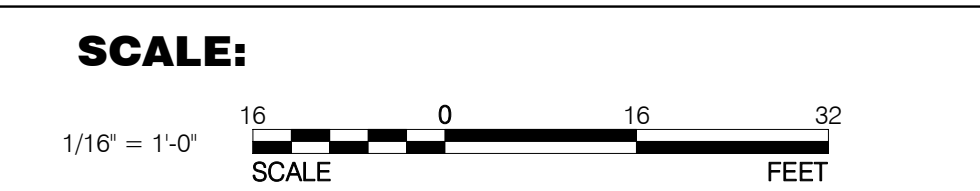
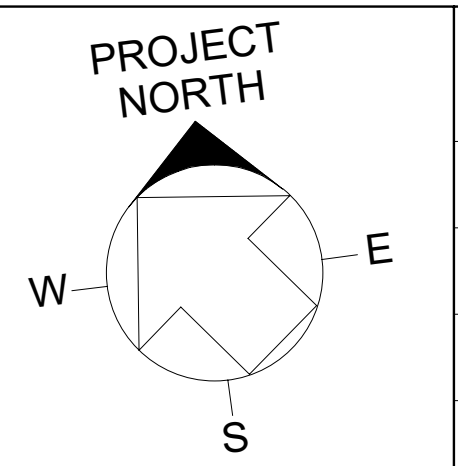
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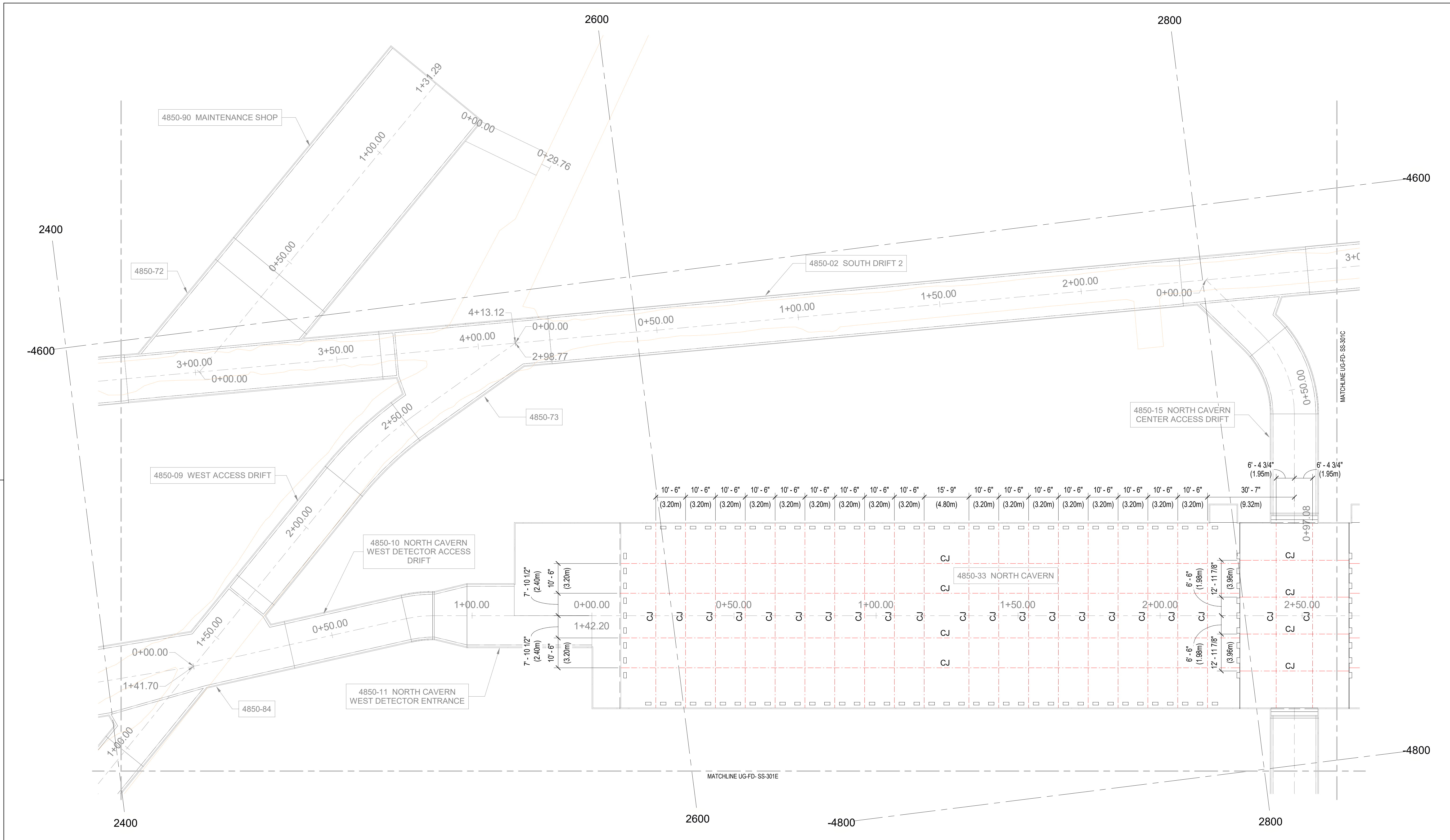


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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4850 LEVEL PLAN
PORTION H

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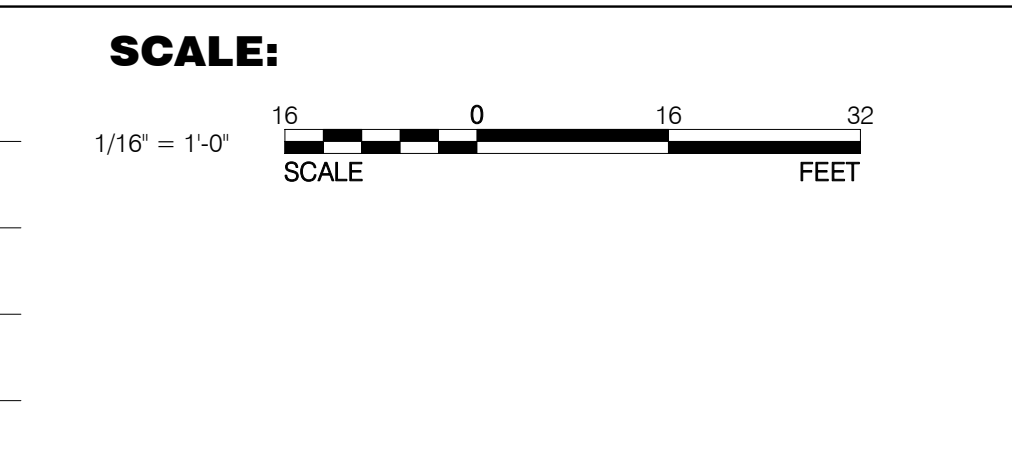
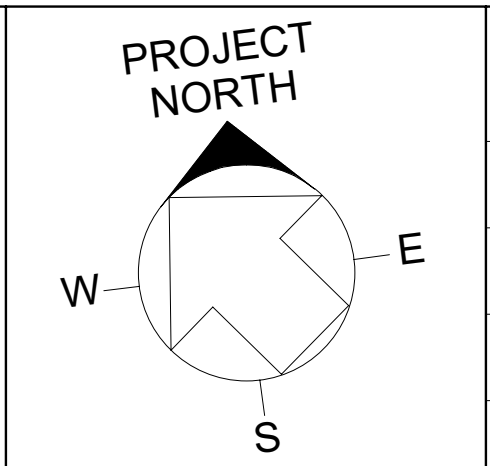
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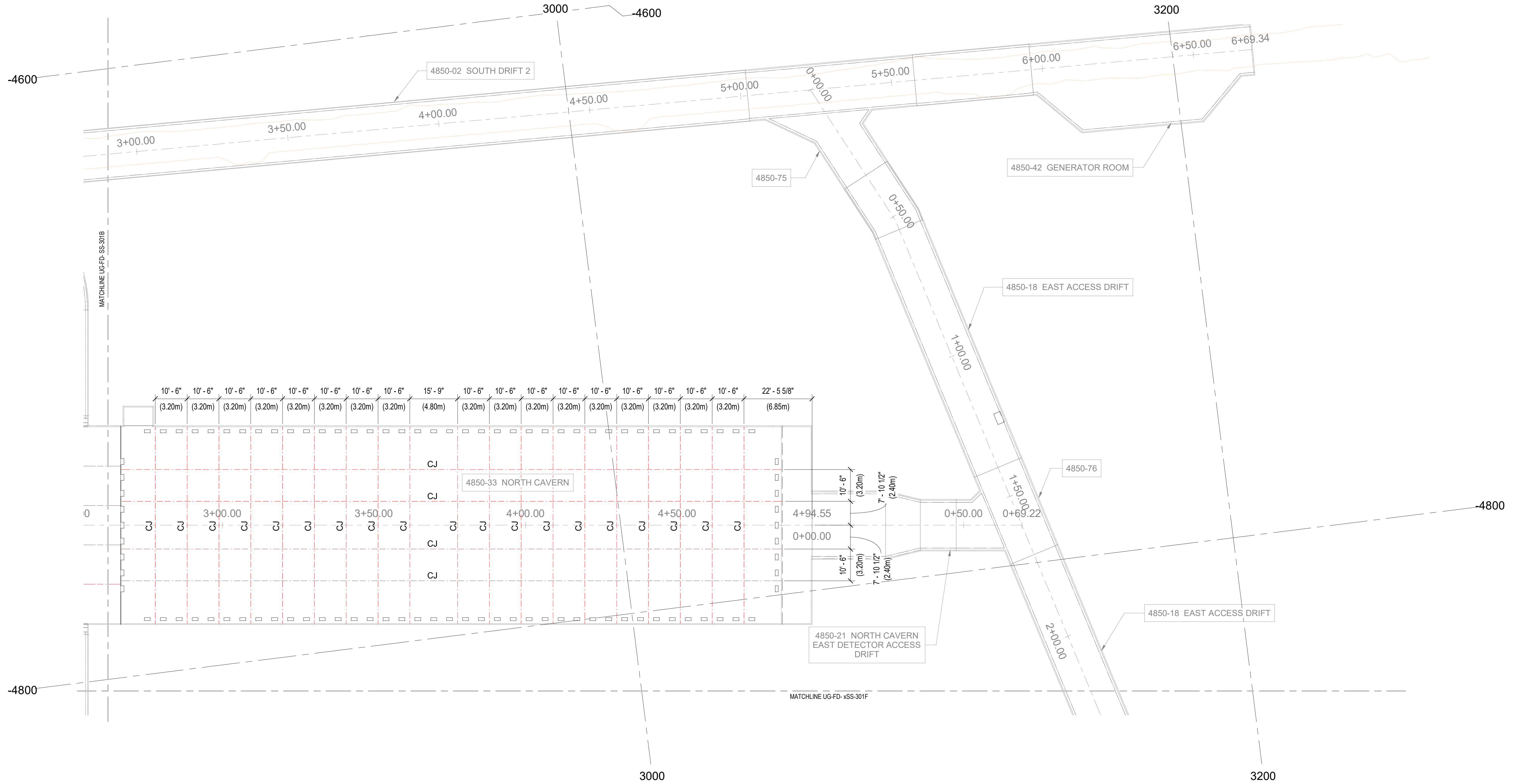
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4850 LEVEL SLAB JOINT PLAN
PORTION B

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02/08/19



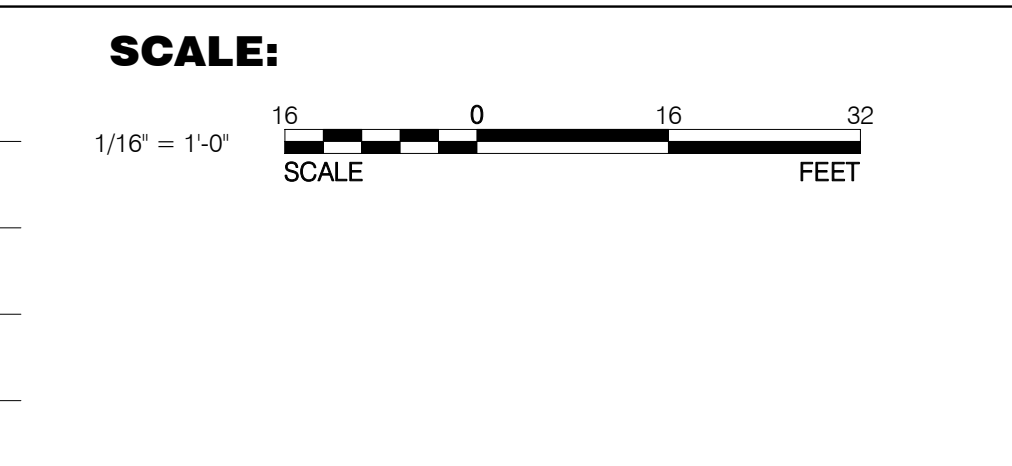
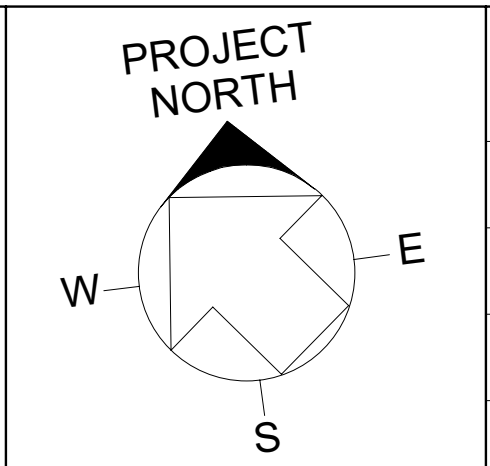
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REV.	DATE	DESCRIPTION	REVISIONS
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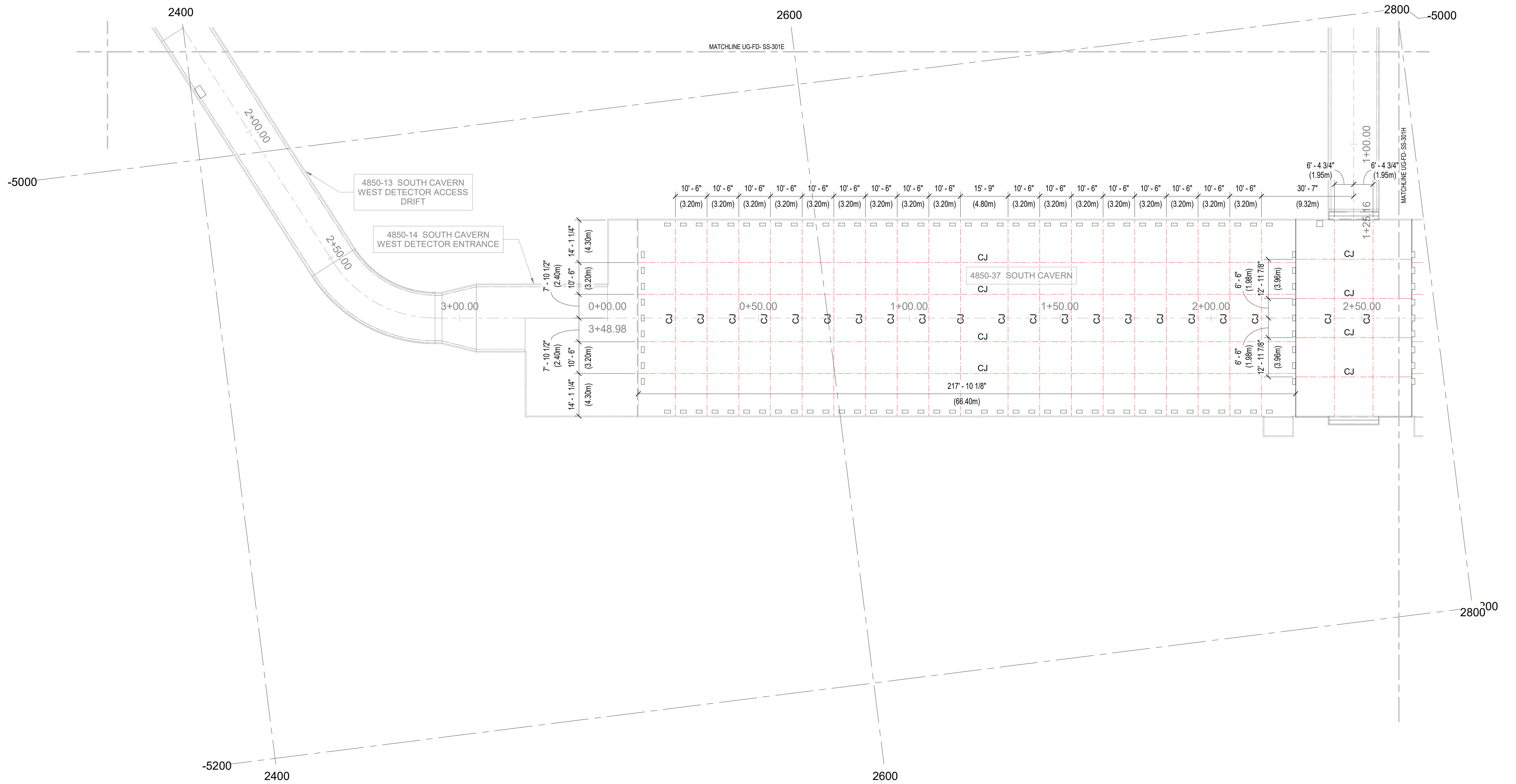
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UNDERGROUND, STRUCTURAL
4850 LEVEL SLAB JOINT PLAN
PORTION C

DRAWING NO. **15-1-6 UG-FD-SS-301C** REV. **1**

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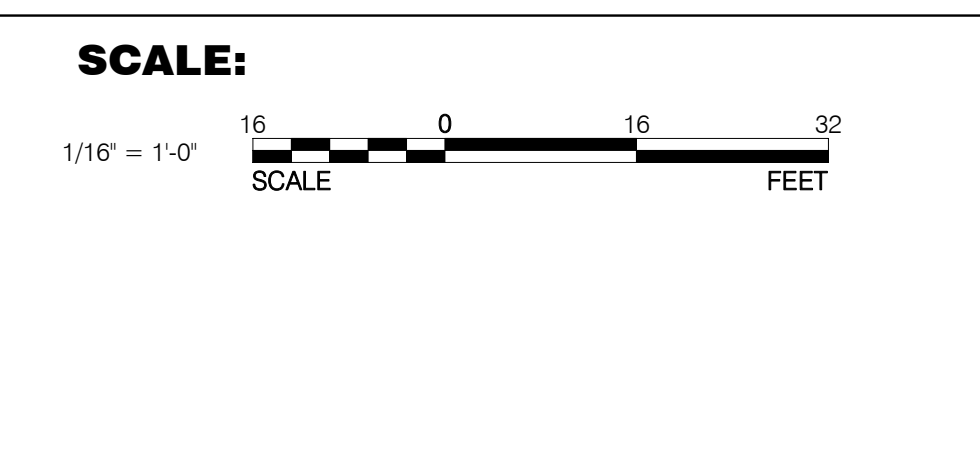
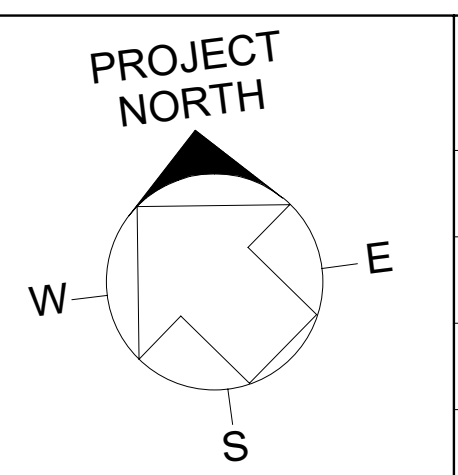


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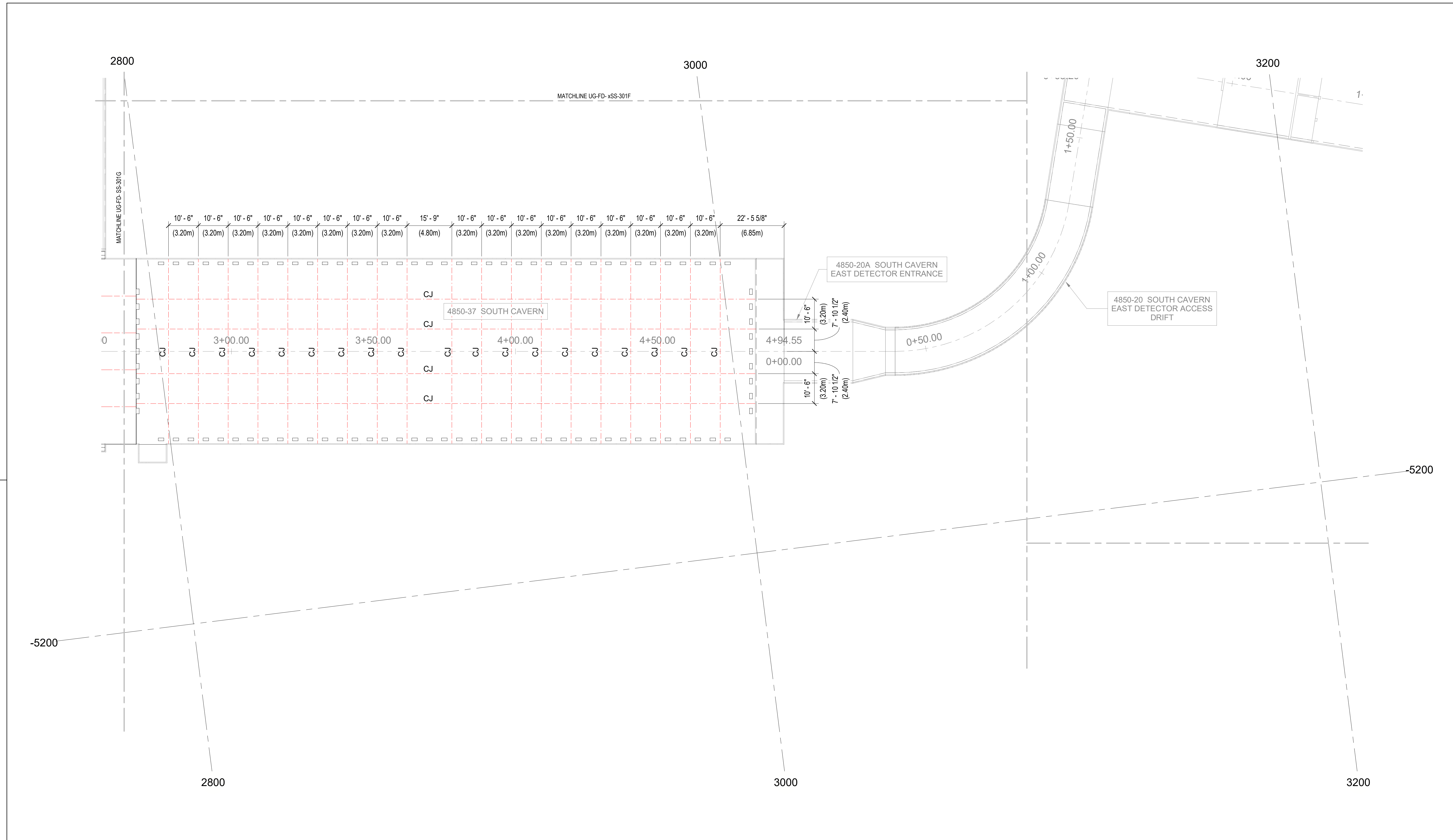
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4850 LEVEL SLAB JOINT PLAN
PORTION G

DRAWING NO. **15-1-6 UG-FD-SS-301G** REV. **1**

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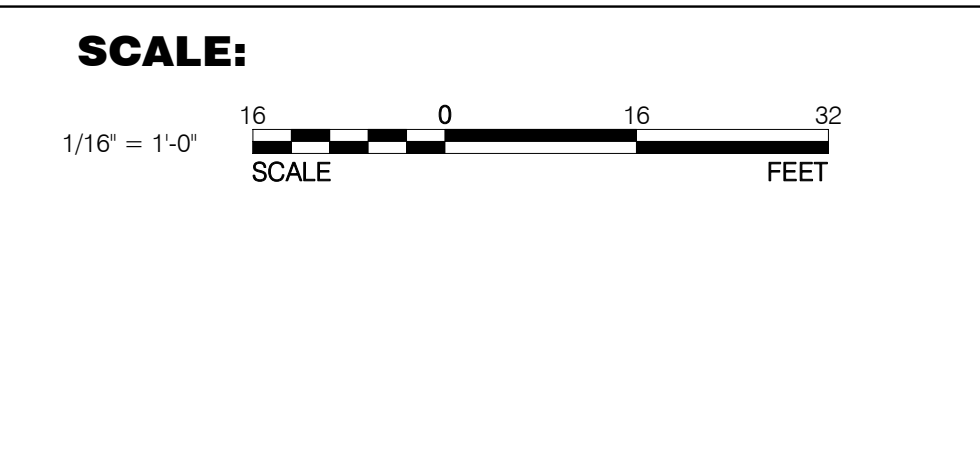
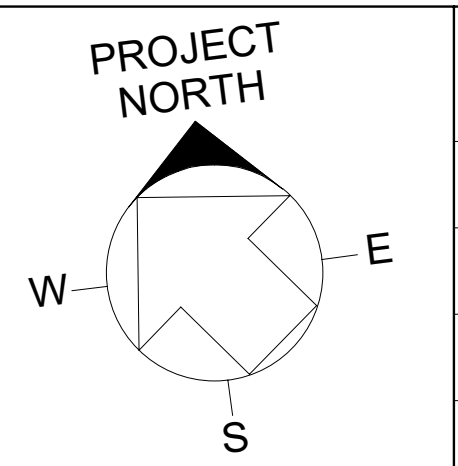


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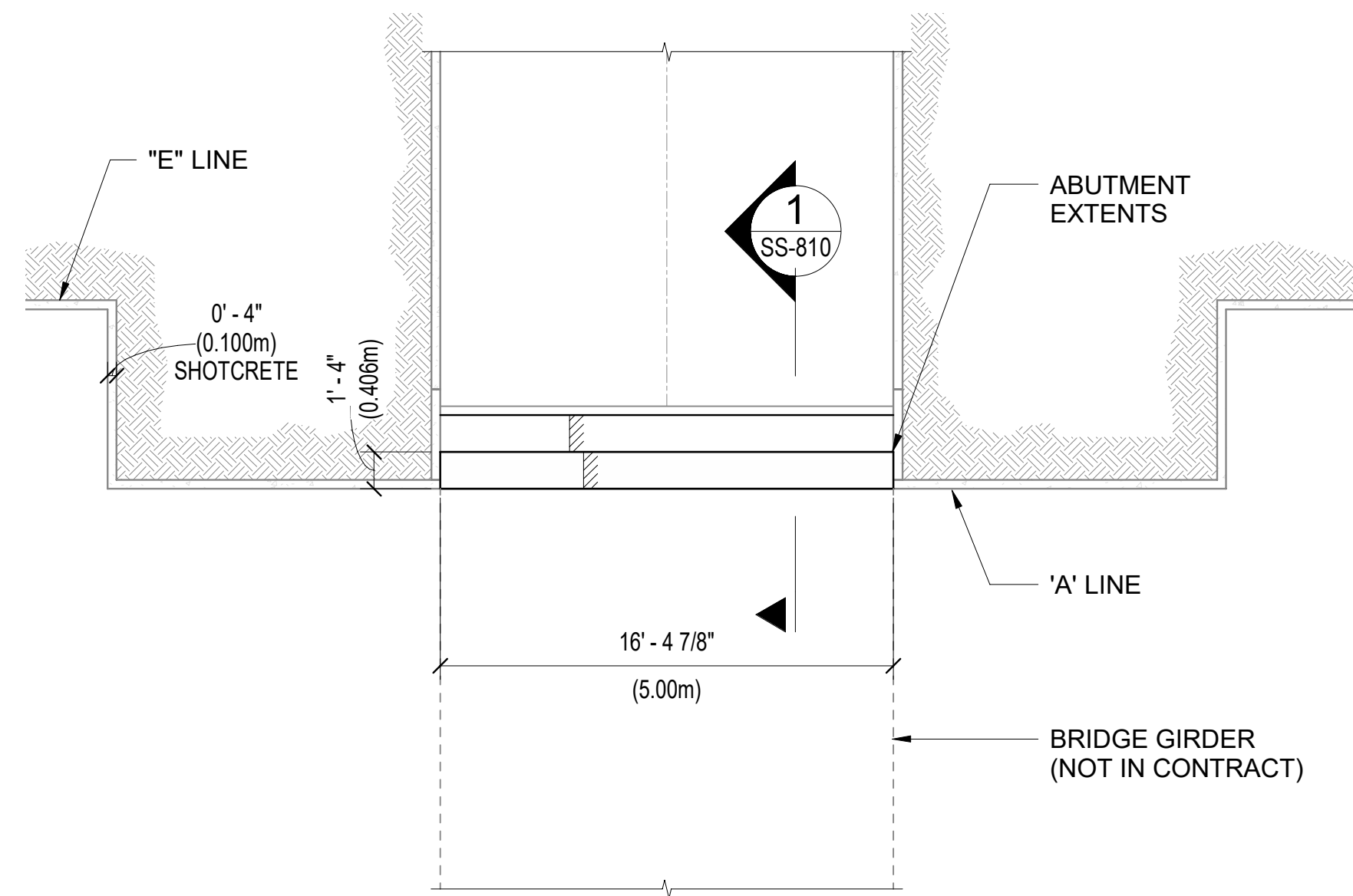


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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
4850 LEVEL SLAB JOINT PLAN
PORTION H

DRAWING NO. **15-1-6 UG-FD-SS-301H** REV. **1**

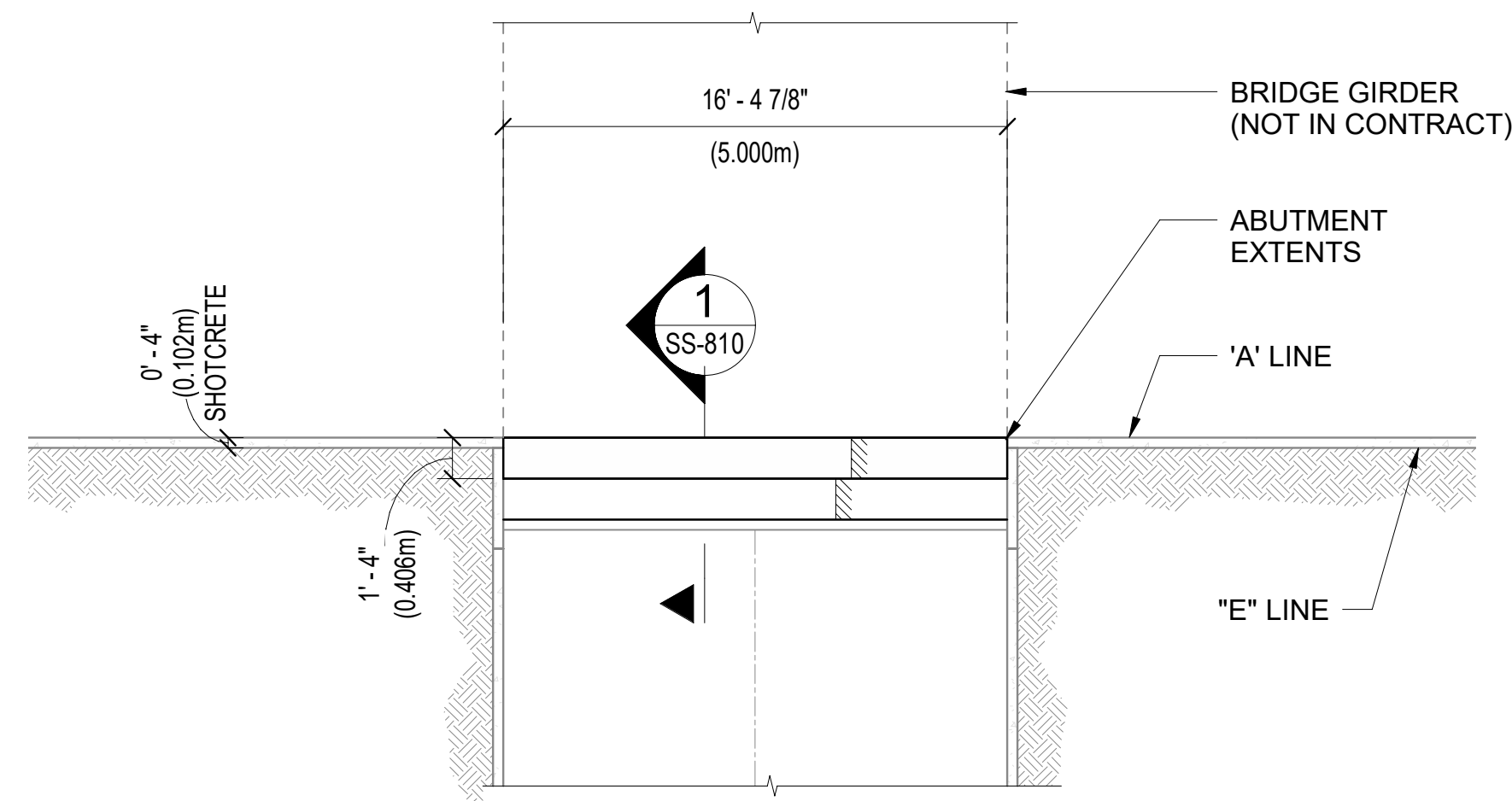
02/08/19



PARTIAL PLAN

SCALE: 3/16" = 1'-0"

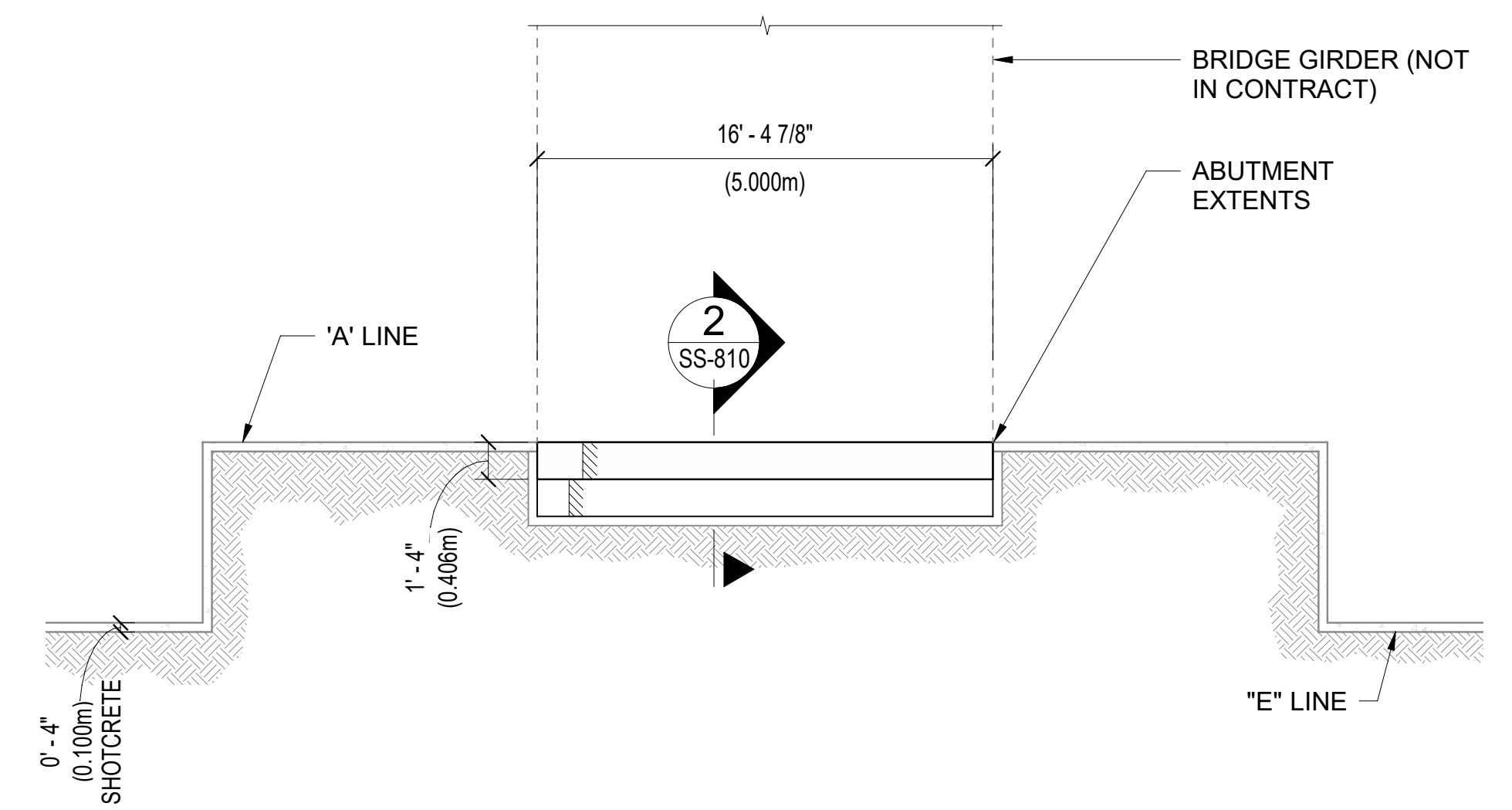
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PARTIAL PLAN

SCALE: 3/16" = 1'-0"

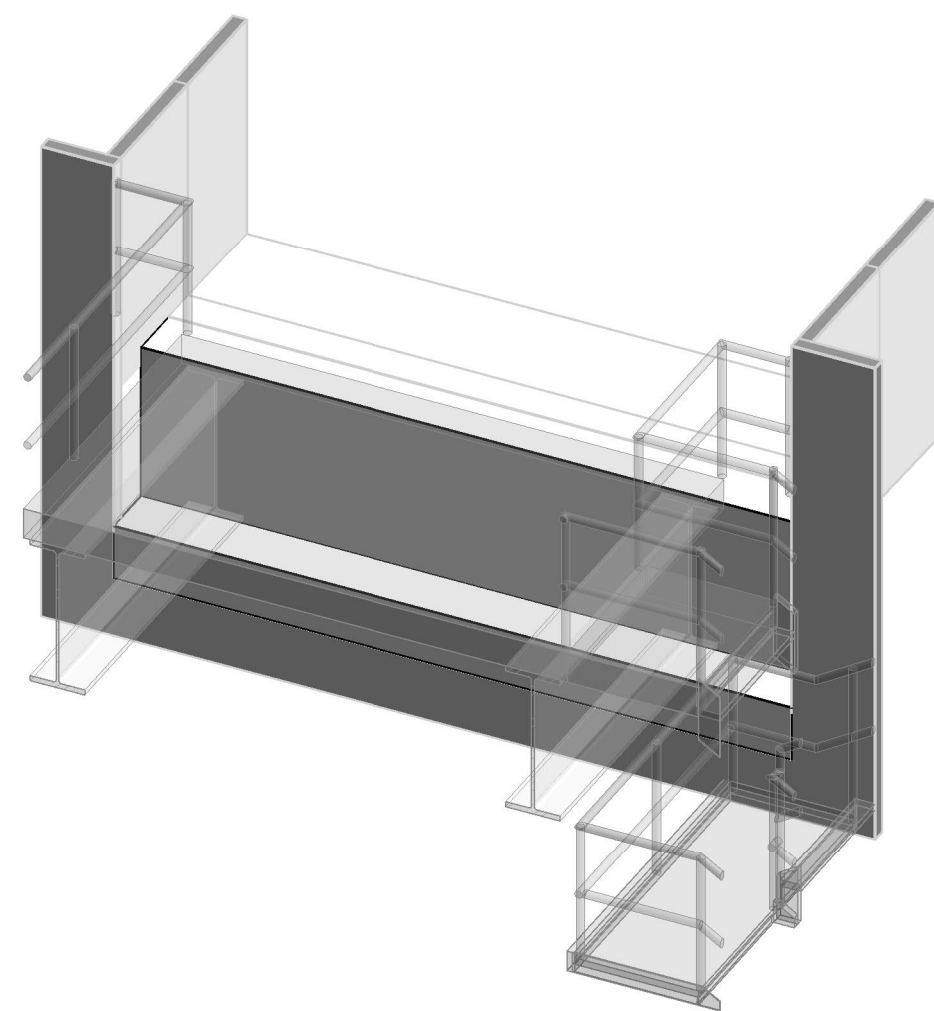
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PARTIAL PLAN

SCALE: 3/16" = 1'-0"

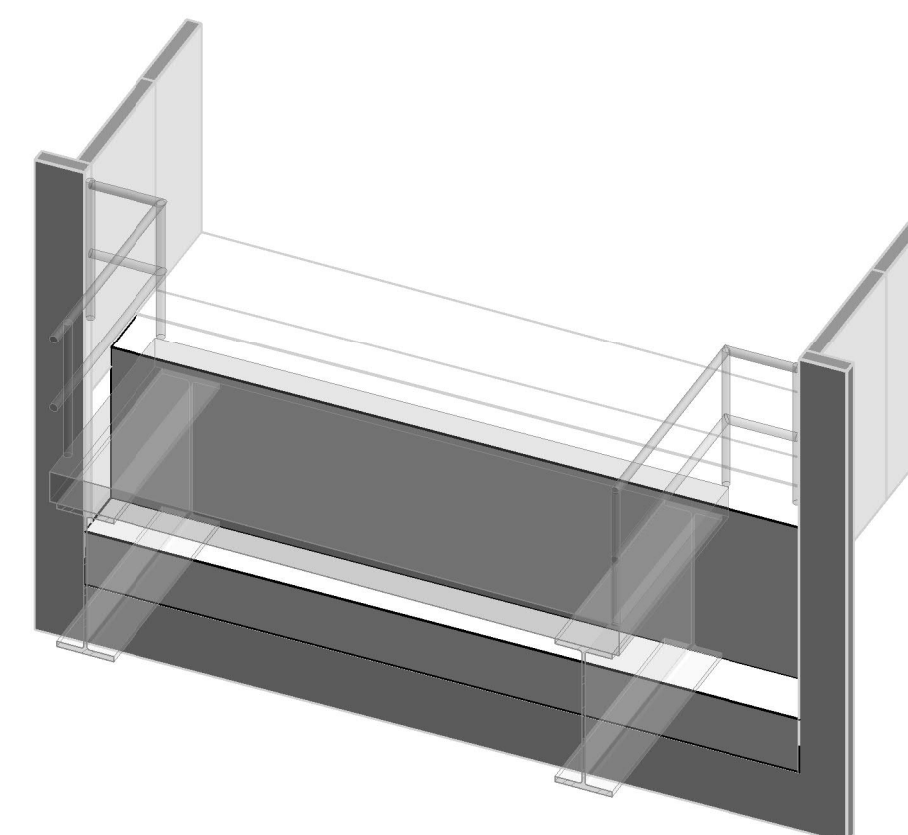
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NORTHCAVERN/SOUTH WALL AND SOUTH CAVERN/NORTH WALL ABUTMENT

SCALE:

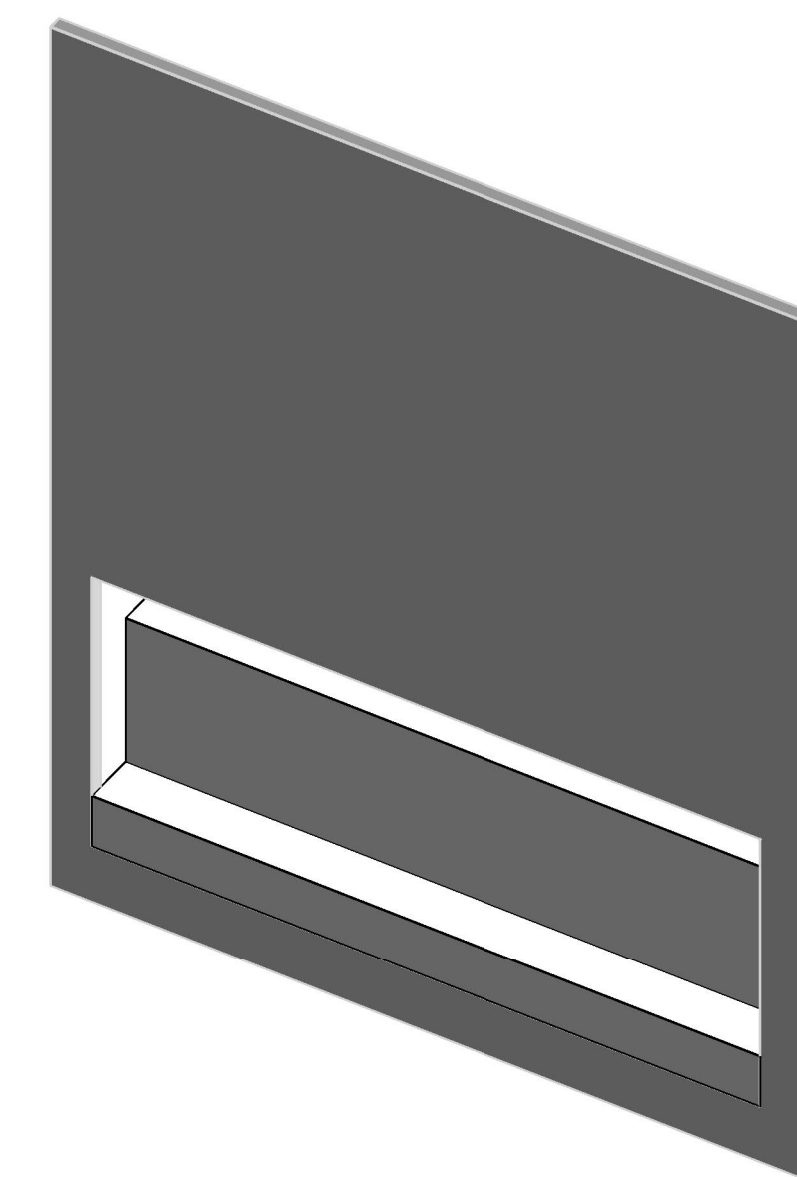
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NORTH CAVERN/NORTH WALL ABUTMENT

SCALE:

5



SOUTH CAVERN/SOUTH WALL ABUTMENT

SCALE:

6

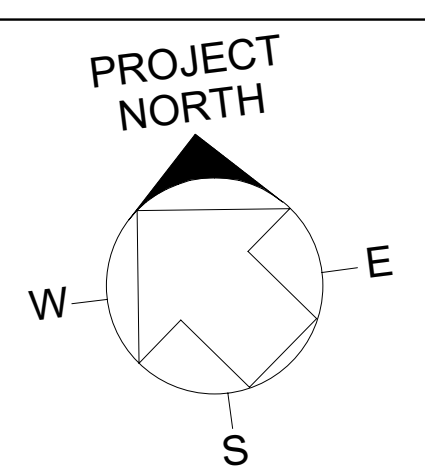
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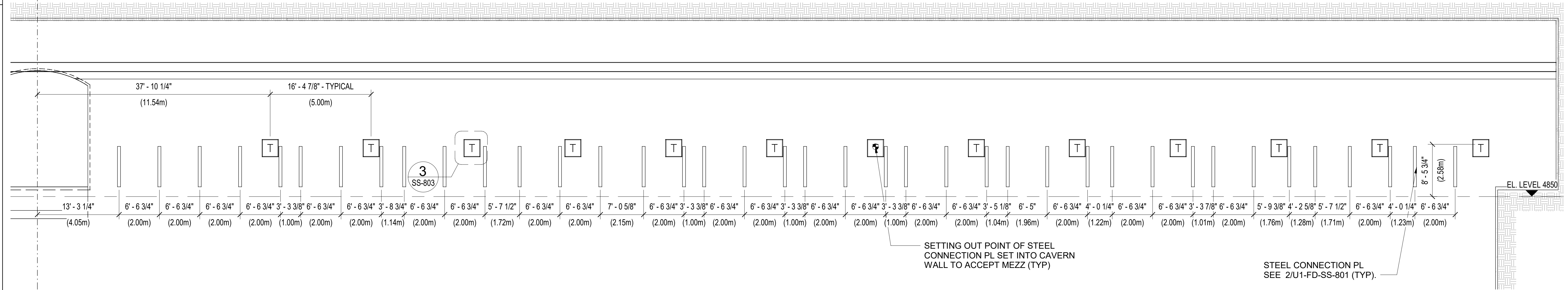
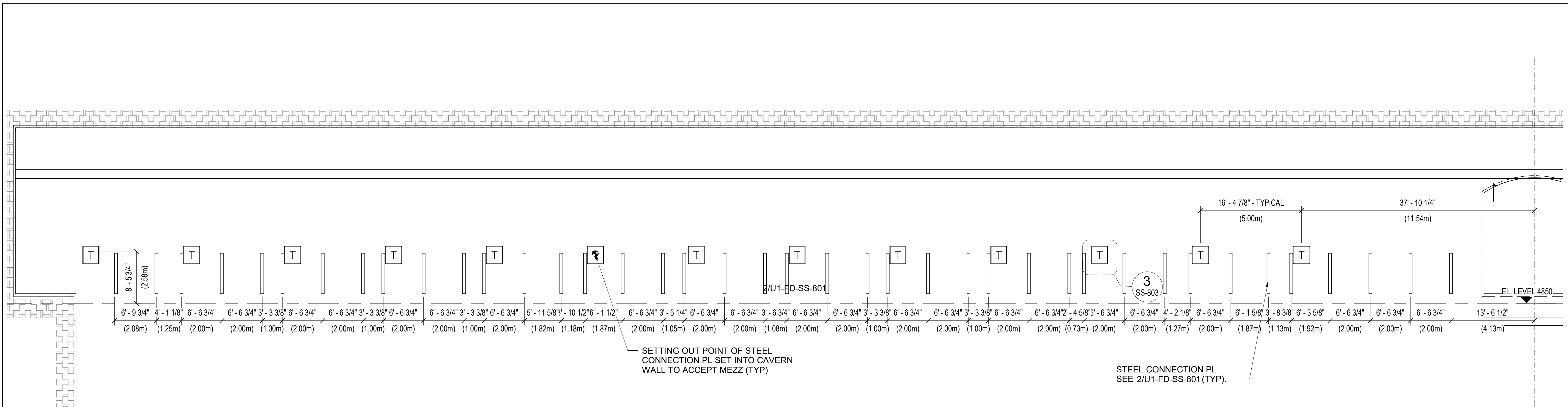
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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
STRUCTURAL PART PLANS
BRIDGE ABUTMENT

DRAWING NO. **15-1-6** **UG-FD-SS-401** REV. **2**

02/08/19



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REV.	DATE	DESCRIPTION	REVISIONS
2	02/08/19	90% FD SUBMISSION	
1	11/02/18	60% FD SUBMISSION	

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SCALE:
 1/8" = 1'-0"

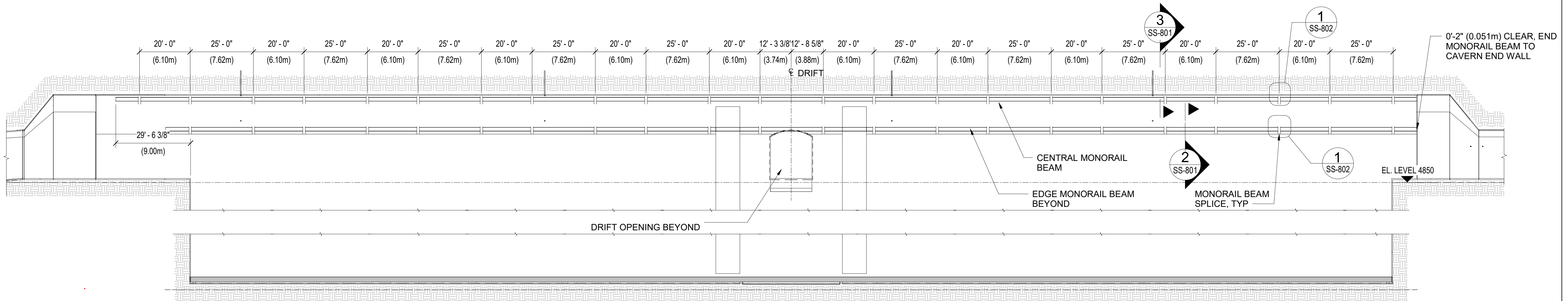
SCALE FEET

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LBNF - FSCF - EXCAVATION
UNDERGROUND, STRUCTURAL
STRUCTURAL SECTIONS
SHEET 1 OF 1

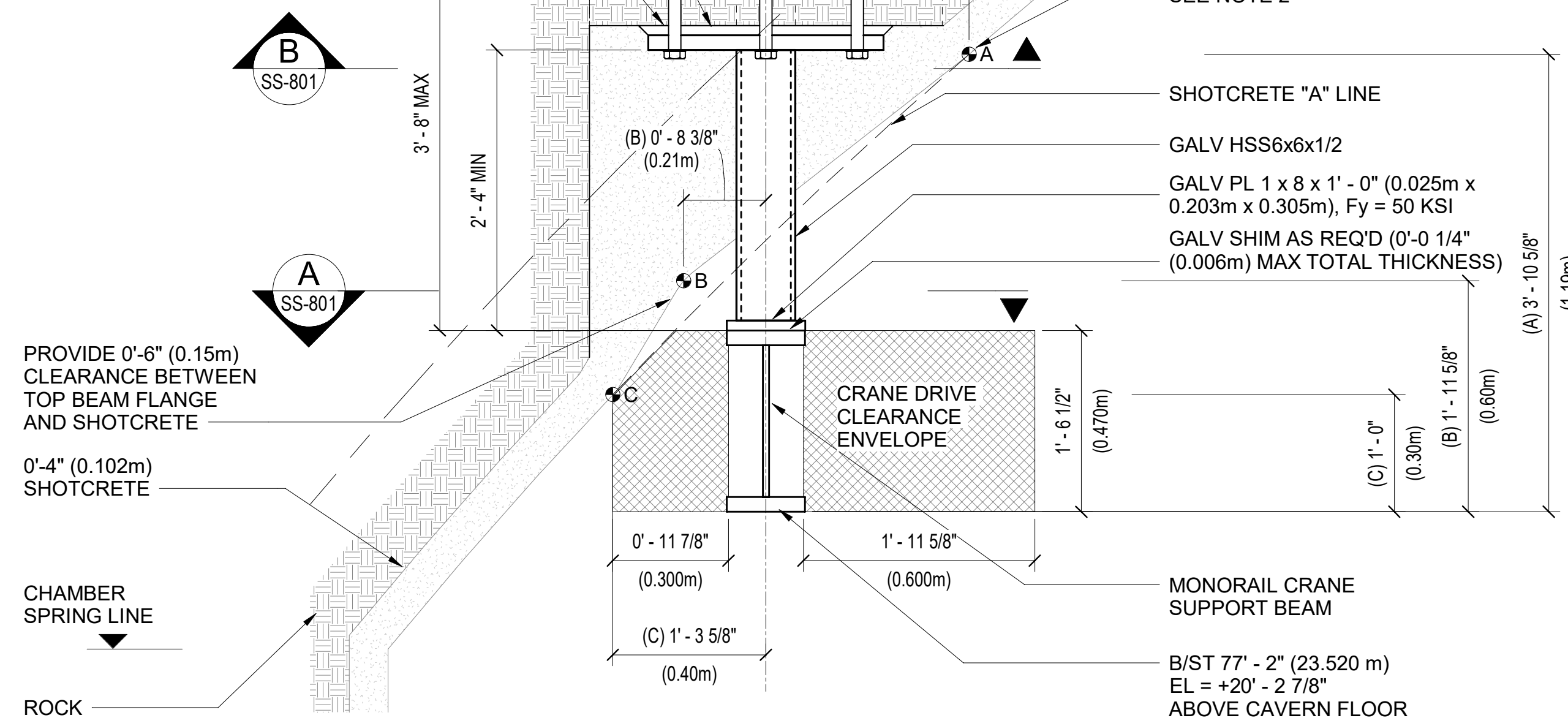
DRAWING NO. **15-1-6** **UG-FD-SS-431** REV. **2**

02/08/19



PROVIDE 3' - 0" x 3' - 0" (0.914m x 0.914m) NOTCH OUT OF ROCK CENTERED ON MONORAIL BEAM SUPPORT. CENTER NOTCH BETWEEN EXISTING ROCK REINFORCEMENT. BACKFILL NOTCH WITH SHOTCRETE AFTER INSTALLING BASEPLATE AND HSS

USE HIGH-BUILD EPOXY REPAIR MORTAR. MIN STRENGTH 5000 PSI. TO PROVIDE SMOOTH BEARING SURFACE (GRIND SMOOTH AS NECESSARY FOR FULL BEARING)



- NOTES:**
- SEE UG-FD-SS-200 SERIES FOR SUPPORT LOCATIONS.
 - A, B AND C WORKPOINTS SET OUT THE SHOTCRETE CLEARANCE LINE.
 - REFER TO 3/UG-FD-SS-802 FOR ADDITIONAL MONORAIL BEAM NOTES

TYPICAL MONORAIL CRANE BEAM SUPPORT

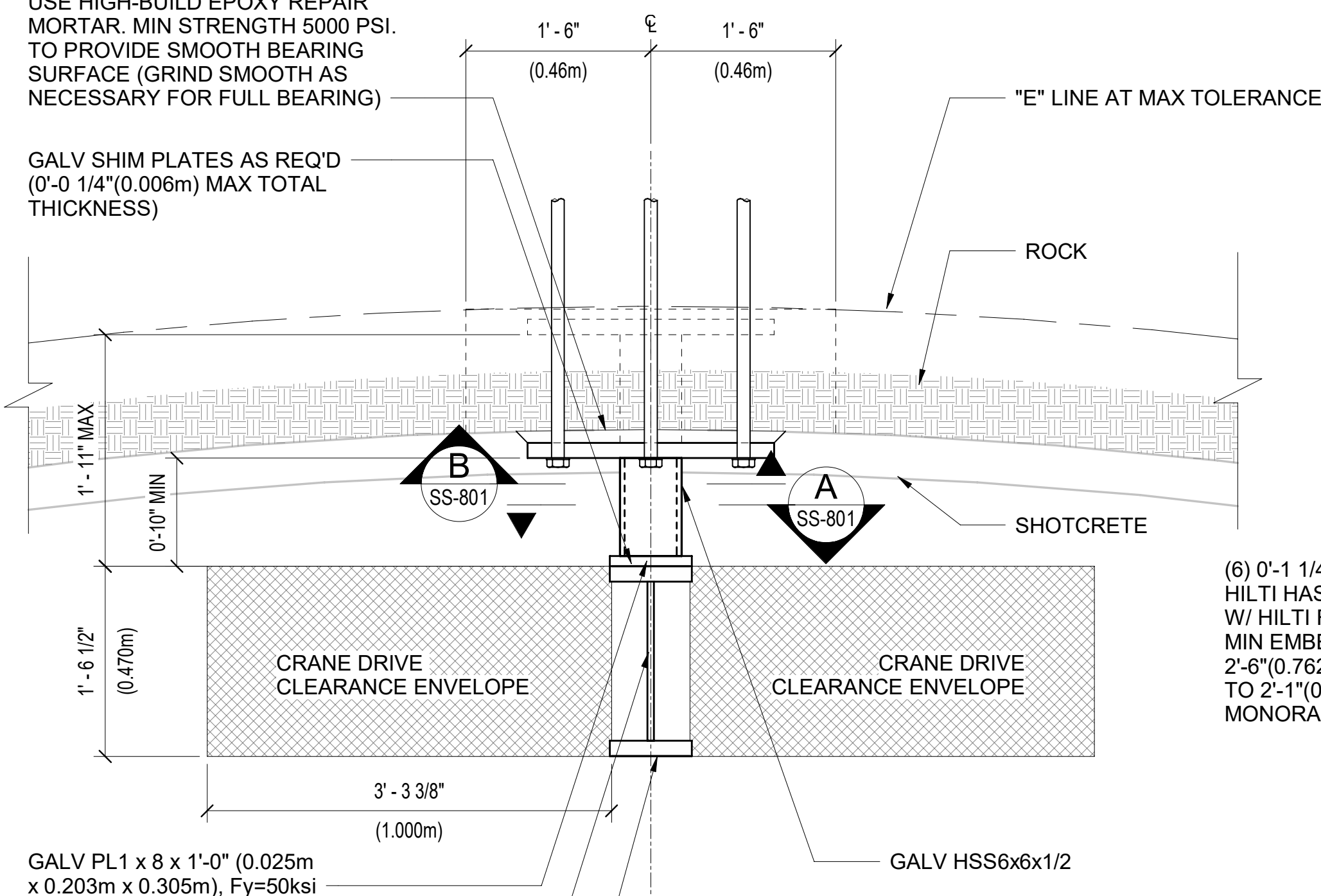
SCALE: 1" = 1'-0"

CHAMBERS 1-4 LONGITUDINAL SECTION

SCALE: 1" = 20'-0"

USE HIGH-BUILD EPOXY REPAIR MORTAR. MIN STRENGTH 5000 PSI. TO PROVIDE SMOOTH BEARING SURFACE (GRIND SMOOTH AS NECESSARY FOR FULL BEARING)

GALV SHIM PLATES AS REQ'D (0'-0 1/4" (0.006m) MAX TOTAL THICKNESS)



- NOTES:**
- SEE UG-FD-SS-200 SERIES FOR SUPPORT LOCATIONS.
 - REFER TO 3/UG-FD-SS-802 FOR ADDITIONAL MONORAIL BEAM NOTES

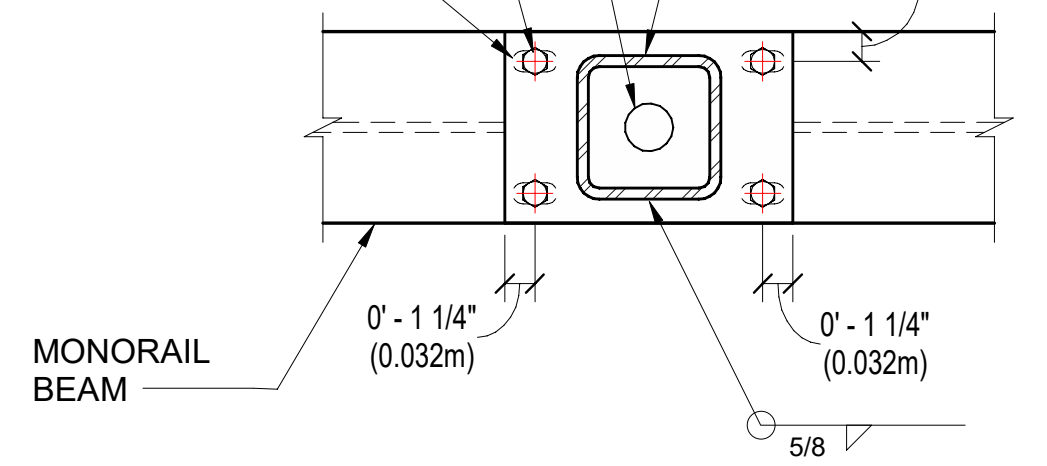
CENTRAL MONORAIL CRANE BEAM SUPPORT

SCALE: 1" = 1'-0"

PROVIDE 0'-2" (0.051m) DIA VENT HOLE IN PL FOR GALVANIZING

(4) 0'-0 3/4" (0.019m) DIA A490-SC BOLTS

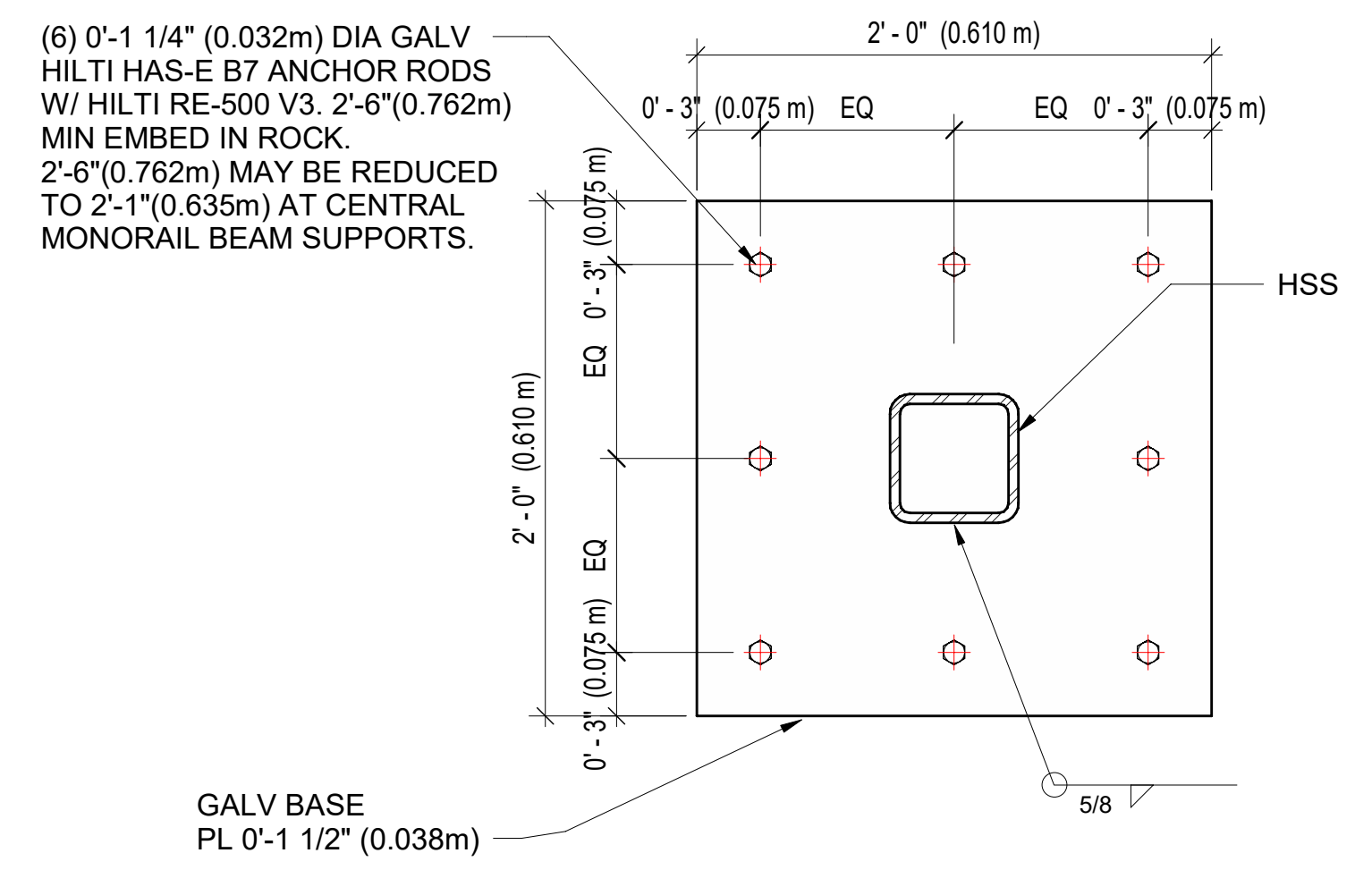
LSL BOLT HOLES IN BEAM FOR TOLERANCE



DETAIL

SCALE: 1 1/2" = 1'-0"

(6) 0'-1 1/4" (0.032m) DIA GALV HILTI HAS-E B7 ANCHOR RODS W/ HILTI RE-500 V3. 2'-6" (0.762m) MIN EMBED IN ROCK. 2'-6" (0.762m) MAY BE REDUCED TO 2'-1" (0.635m) AT CENTRAL MONORAIL BEAM SUPPORTS.



DETAIL

SCALE: 1 1/2" = 1'-0"

2/8/2019 6:33:29 PM

REV.	DATE	DESCRIPTION	REVISIONS
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SCALE:

1"=1'-0"
 SCALE 0 1 2 FEET

1"=20'-0"
 SCALE 0 20 40 FEET

1 1/2"=1'-0"
 SCALE 0 1 1 FEET

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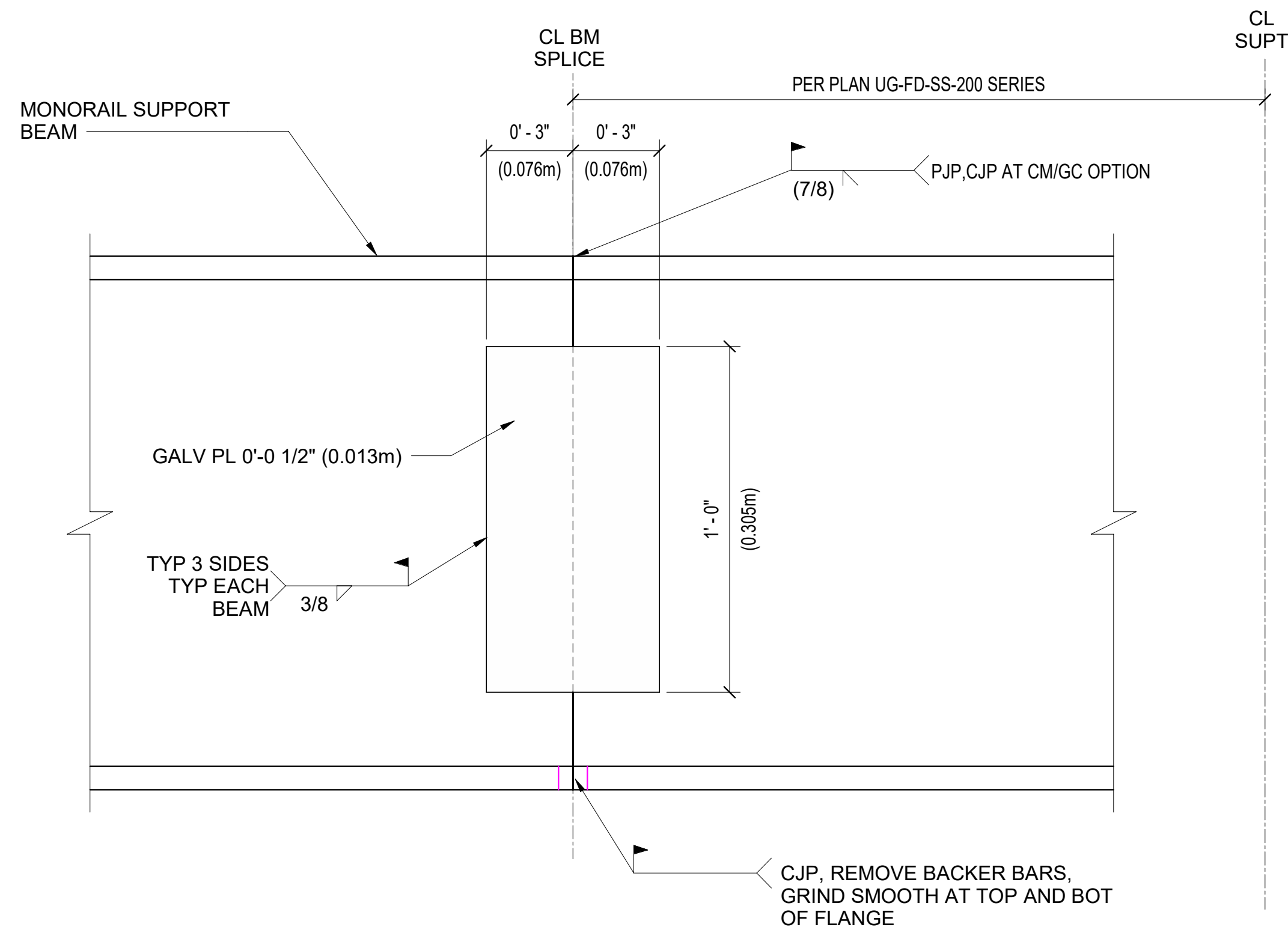
LBNF - FSCF - EXCAVATION

UNDERGROUND, EXC 4850 LEVEL

TYPICAL CHAMBER MONORAIL PLAN AND SECTIONS, SHEET 1 OF 2

DRAWING NO. **15-1-6** **UG-FD-SS-801** REV. **3**

02/08/19

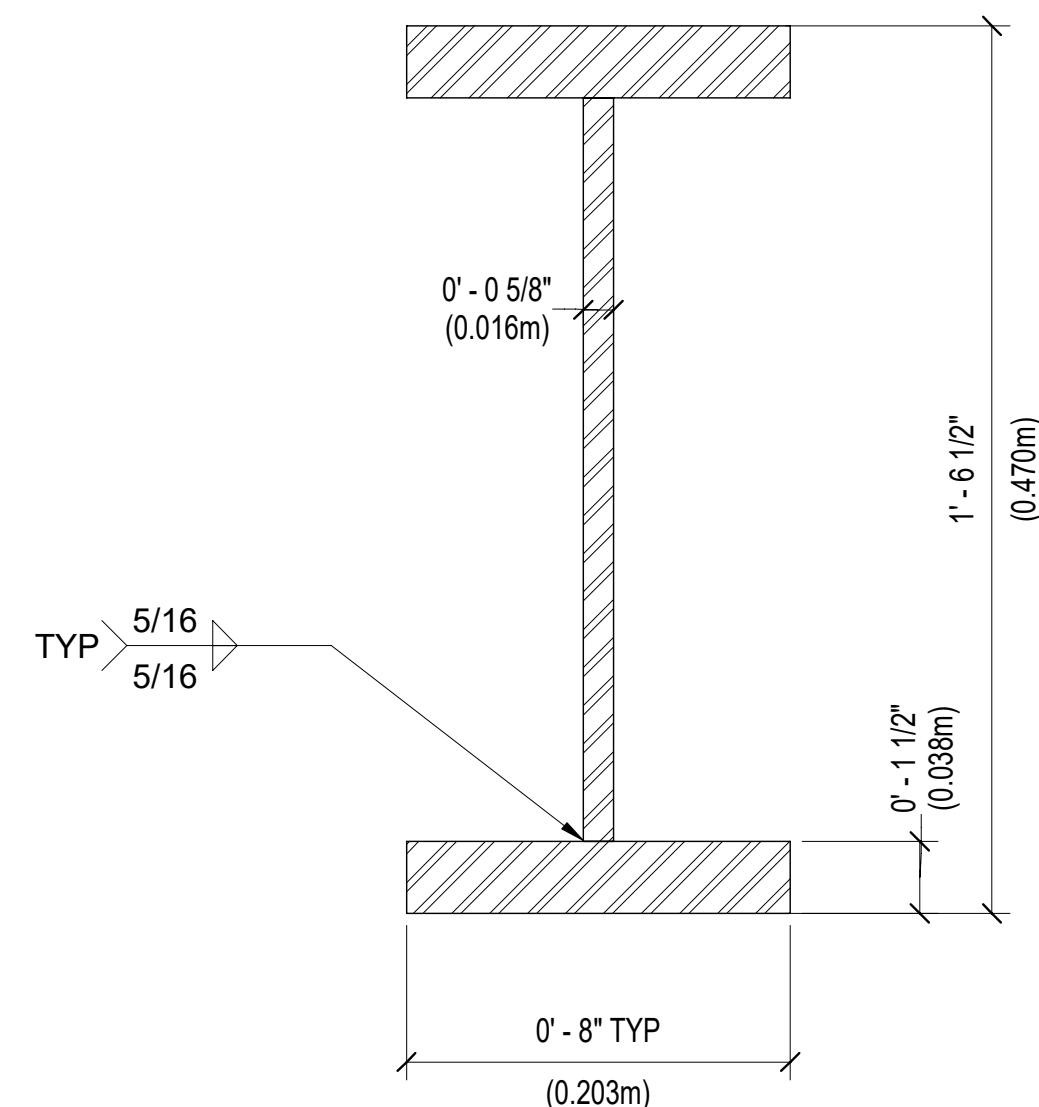


NOTES:

1. CM/GC TO SURVEY AS-BUILT SUPPORT LOCATIONS AND COORDINATE BEAM FABRICATION AND ERECTION PRIOR TO AND THROUGHOUT ERECTION.

TYPICAL MONORAIL BEAM SPLICE 1

SCALE: 3" = 1'-0"



BU18.5-1

TYPICAL MONORAIL BUILT-UP BEAM

SCALE: 3" = 1'-0"

NOTES:

1. MONORAIL CRANE BEAMS SHOWN ARE PROVISIONAL AND ARE TO BE RECONFIRMED AFTER THE HOIST SUPPLIER PROVIDES FINAL WORKING LOADS AND BEAM FLANGE REQUIREMENTS.
2. LATERAL STABILITY OF BEAM TO BE CONFIRMED ONCE SUPPLIER HAS PROVIDED LOADINGS.
3. MONORAIL BEAM IS DESIGNED FOR AN ULTIMATE LOAD OF 46.2 US SHORT TONS (42 METRIC TONS), INCLUDING DYNAMIC EFFECTS.
4. SEE 4/UG-FD-SS-802 FOR CRANE LOAD ASSUMPTIONS.

MONORAIL BEAM NOTES

SCALE: 12" = 1'-0"

CRANE ASSUMPTIONS

MONORAIL BEAM LOCATION	CRANE TYPE	MAXIMUM CRANE PAYLOAD	MONORAIL BEAM REQUIREMENTS		CRANE TROLLEY		CRANE FUNCTIONS			
			MAX ULTIMATE LOAD MONORAIL BEAM	MAX FLANGE BOTTOM WIDTH	MIN # WHEELS PER TROLLEY	MIN LENGTH OF TROLLEY	LIFTING RANGE (MINIMUM)	CRANE LIFTING SPEED	CRANE TRAVELLING SPEED	POWER REQUIRED
			US SHORT TONS (METRIC TONS)	US SHORT TONS (METRIC TONS)	IN (mm)	IN (mm)	(ft) m	fpm (mpm)	fpm (mpm)	
CENTER	MONORAIL CRANE	16.5 (15.0)	30.0 (27.2)	8 (200)	8	60 (1524)	32 (9.754)	15 (4.572)	75 (22.860)	TBD
CENTER	MONORAIL CRANE	16.5 (15.0)	30.0 (27.2)	8 (200)	8	60 (1524)	32 (9.754)	15 (4.572)	75 (22.860)	TBD
OUTER	BRIDGE CRANE	20.0 (18.2)	42.0 (38.0)	8 (200)	8	60 (1524)	20 (6.096)	19 (5.791)	75 (22.860)	TBD

NOTES:

1. MONORAIL CRANE IS ASSUMED TO BE AFFIXED TO A TROLLEY WHICH HANGES BELOW THE BEAM. THE TROLLEY WHEELS ARE ASSUMED TO DISTRIBUTE LOAD EQUALLY TO EACH SIDE OF THE BEAM FLANGE.
2. BRIDGE CRANE TYPE IS AN OVERHEAD CRANE MOUNTED ON A TRAVELLING BRIDGE WHICH SPANS BETWEEN THE TWO OUTER MONORAIL BEAMS. THE CRANE BRIDE IS ASSUMED TO HANG BELOW THE STRUCTURAL SUPPORT BEAMS, WITH A TROLLEY AT EACH END OF THE BRIDGE. THE TROLLEY WHEELS ARE ASSUMED TO DISTRIBUTE LOAD EQUALLY TO EACH SIDE OF THE BEAM FLANGE.
3. ALL CRANES SUPPORTED BY THE MONORAIL BEAMS SHALL BE HAVE JOINED CONTROL SYSTEM WHICH MONITORS THE MOVEMENTS AND LOCATIONS OF ALL SYSTEMS SIMULTANEOUSLY.
4. EACH CRANE SHALL HAVE ONE ELECTRICAL CONNECTION, AND SHALL BE POWERED BY CONTINUOUS BUSBAR FIXED TO THE STRUCTURAL MONORAIL BEAM. ALL TRAVELLING ELECTRICAL COMPONENTS REQUIRED FOR THE CRANE TO MOVE SHALL BE SUPPLIED BY THE CRANE INSTALLER.
5. MAXIMUM ULTIMATE LOAD INCLUDES THE CRANE PAYLOAD, THE WEIGHT OF THE CRANE AND TROLLEY, AND THE WEIGHT OF THE BRIDGE BEAM AND TROLLEY (BRIDGE CRANE ONLY), WITH LOAD FACTORS IN ACCORDANCE WITH THE CODE. THE NOTED LOADS DO NOT INCLUDE MAGNIFICATION FOR DYNAMIC EFFECTS.
6. EACH MONORAIL BEAM LINE IS ASSUMED TO BE LOADED BY ONE CRANE AT A TIME. MULTIPLE CRANES OPERATING ON THE SAME MONORAIL BEAM LINE MAY OCCUR IF EITHER THE LOADS OCCUR AT A MINIMUM OF 25'-0" (7.620m) APART, OR IF THE TOTAL ULTIMATE LOAD TO THE MONORAIL BEAM DOES NOT EXCEED THE ULTIMATE LOAD INDICATED IN THE TABLE.
7. INDIVIDUAL FIXATION OF EACH CRANE RAIL SHALL BE TESTED TO 150% OF THE NOMINAL RATED CAPACITY OF THE CRANE.

CRANE AND MONORAIL BEAM ASSUMPTIONS & REQUIREMENTS 4

SCALE: N.T.S.

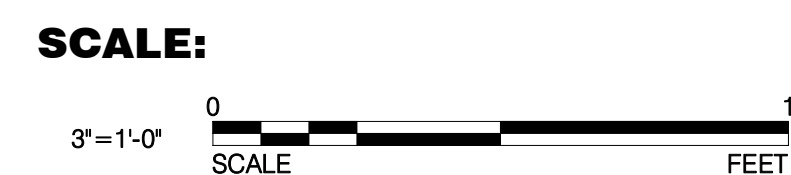
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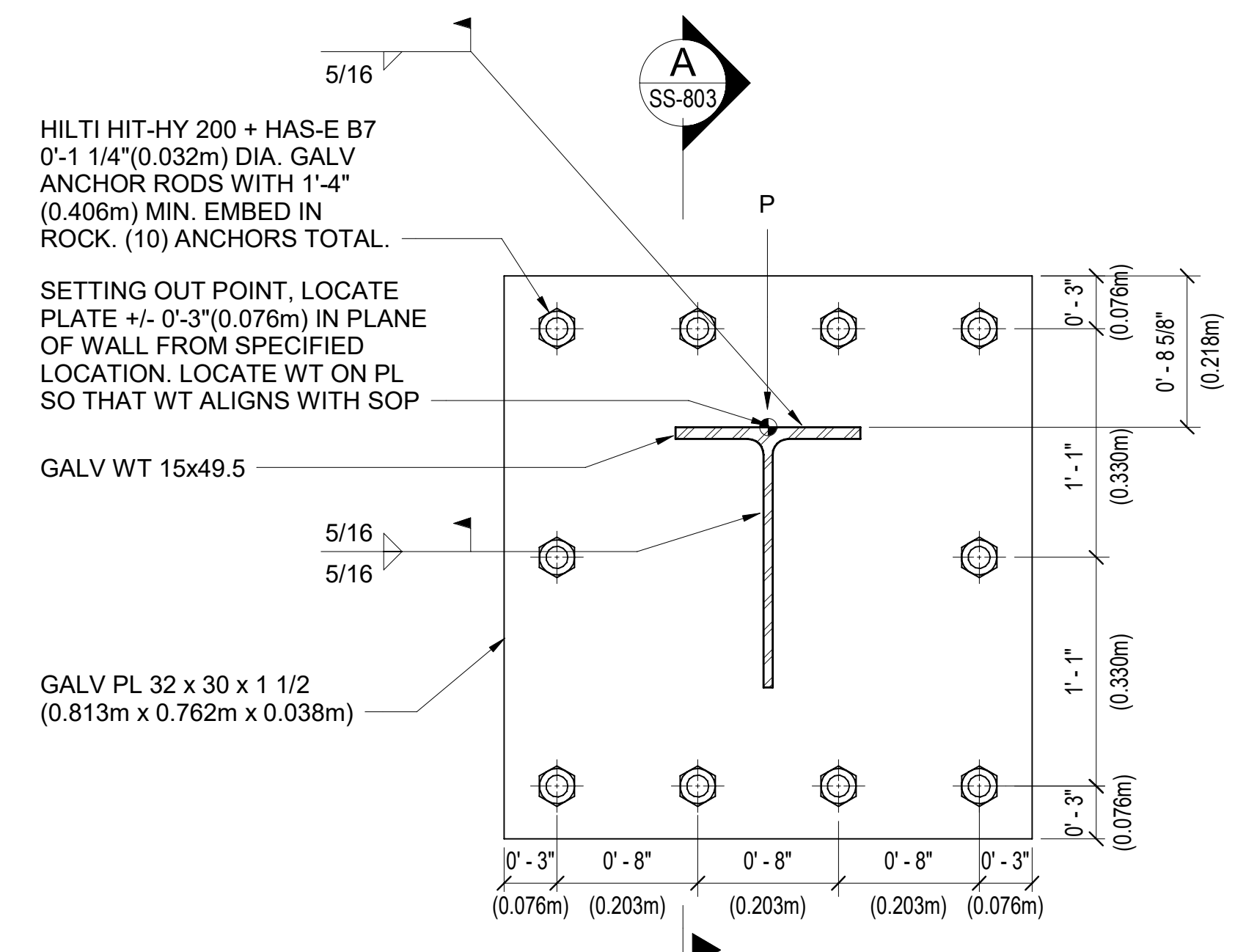
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LBNF - FSCF - EXCAVATION
UNDERGROUND, EXC 4850 LEVEL
TYPICAL CHAMBER MONORAIL
PLAN AND SECTIONS, SHEET 2 OF 2

DRAWING NO. **15-1-6** **UG-FD-SS-802** REV. **2**

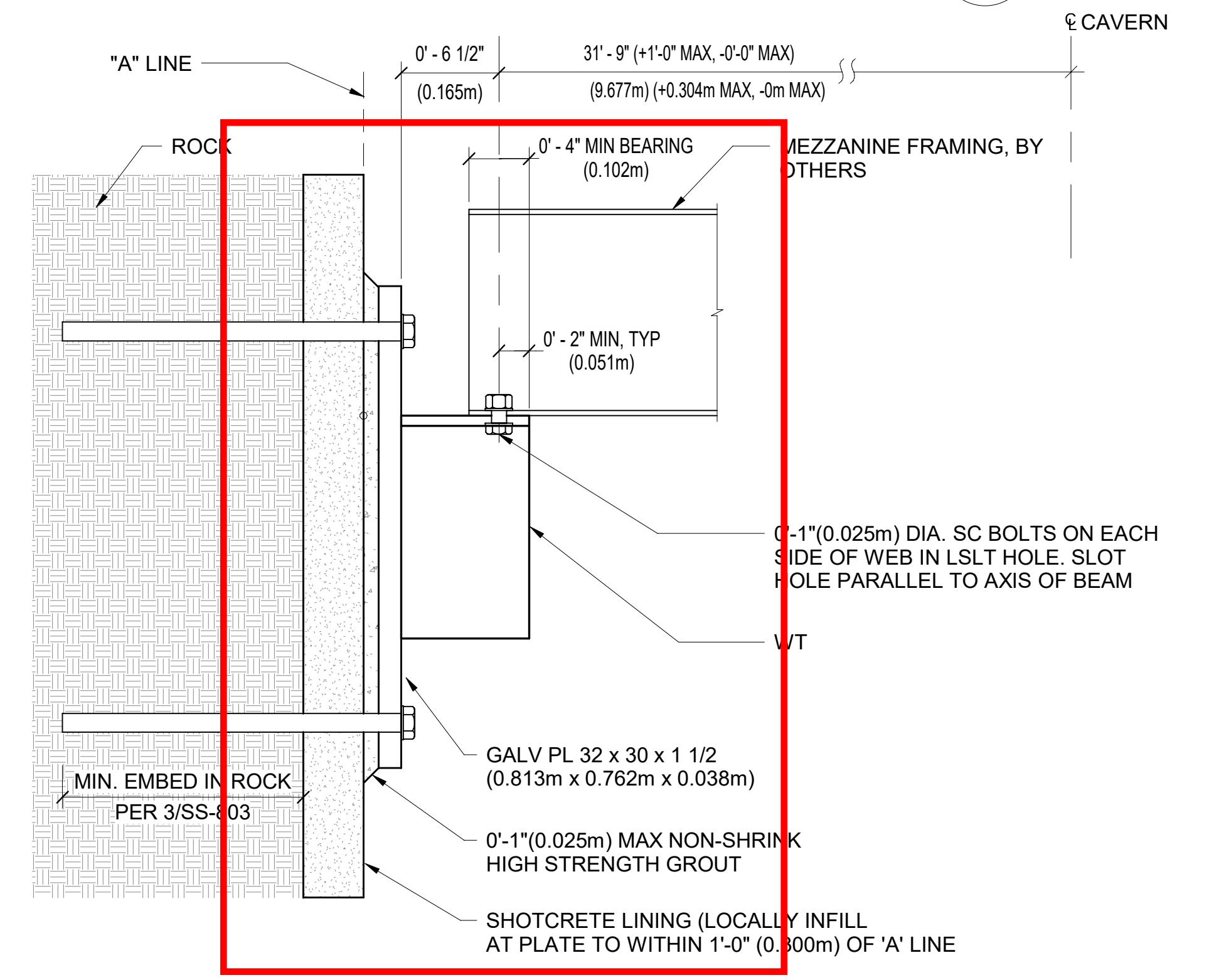
02/08/19



NOTES:
 1. MEZZANINE SUPPORT IS DESIGNED FOR AN ULTIMATE LOAD, P, OF 35.3 US SHORT TONS (32 METRIC TONS)

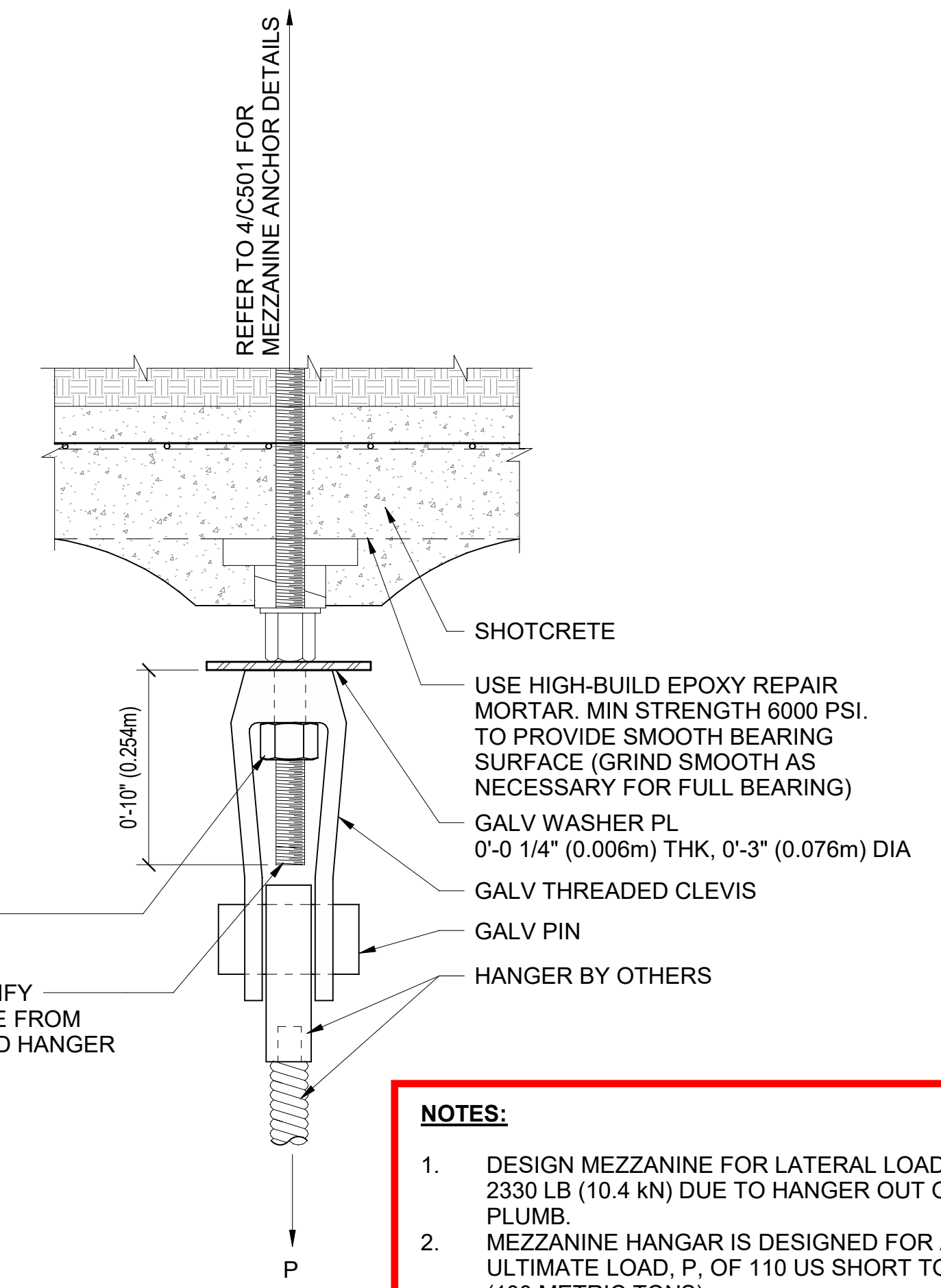
MEZZANINE SUPPORT ELEVATION 3

SCALE: 1 1/2" = 1'-0"



SECTION A

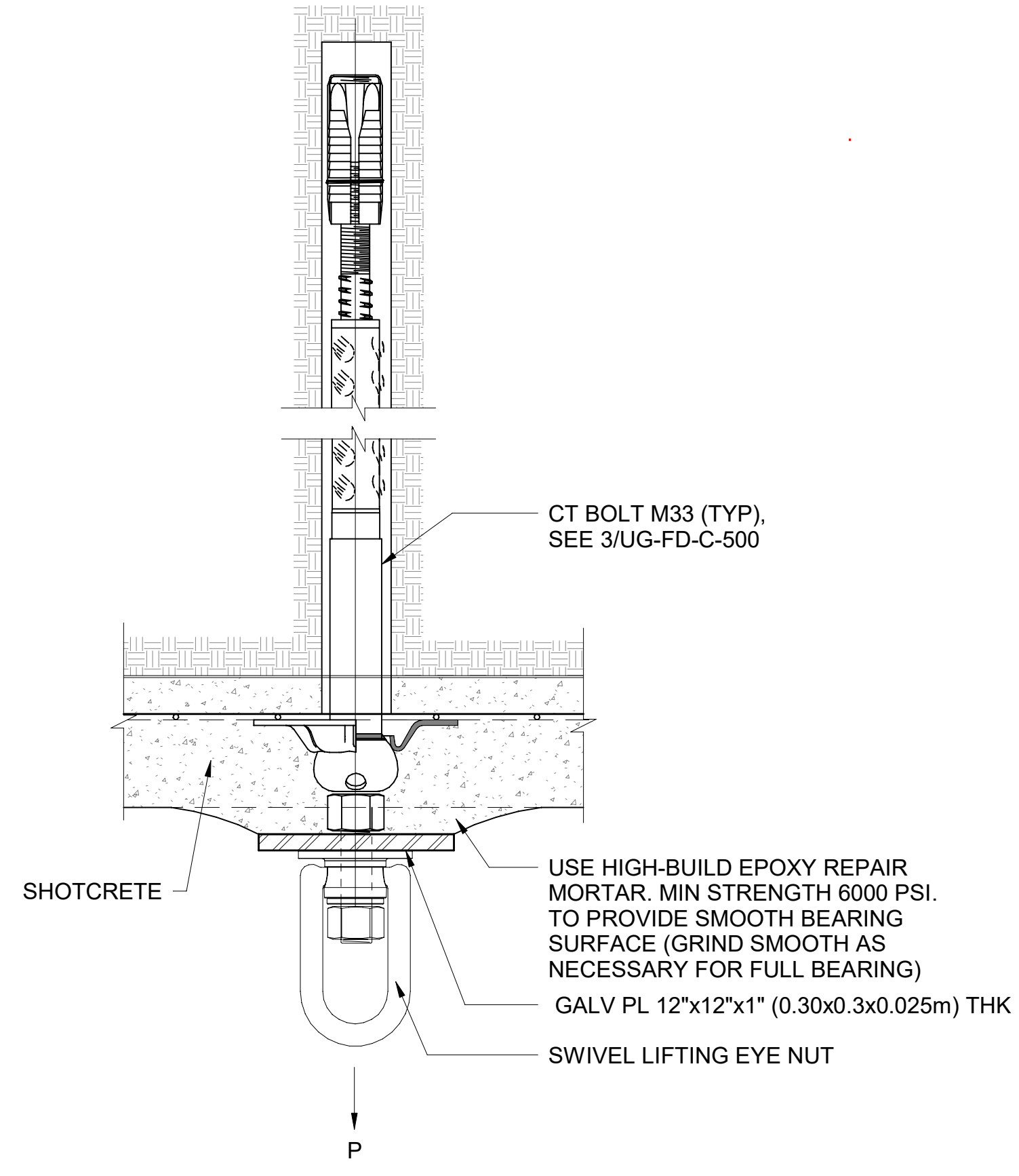
SCALE: 1 1/2" = 1'-0"



NOTES:
 1. DESIGN MEZZANINE FOR LATERAL LOAD OF 2330 LB (10.4 kN) DUE TO HANGER OUT OF PLUMB.
 2. MEZZANINE HANGAR IS DESIGNED FOR AN ULTIMATE LOAD, P, OF 110 US SHORT TONS (100 METRIC TONS) FOR ANCHOR MATERIAL AND TESTING SPECIFICATION, REFER TO SECTION 31 72 13.

MEZZANINE HANGAR CONNECTION DETAIL

SCALE: 1 1/2" = 1'-0"



LIFTING EYE AREA	W.L.L. (P)
MID CHAMBER	4,400 LBS (2 METRIC TONS)
MEZZANINE	22,000 LBS (10 METRIC TONS)

NOTES:
 1. FOR LIFTING EYE MATERIAL AND TESTING SPECIFICATION, REFER TO SECTION 31 72 13.

TYPICAL LIFTING EYE

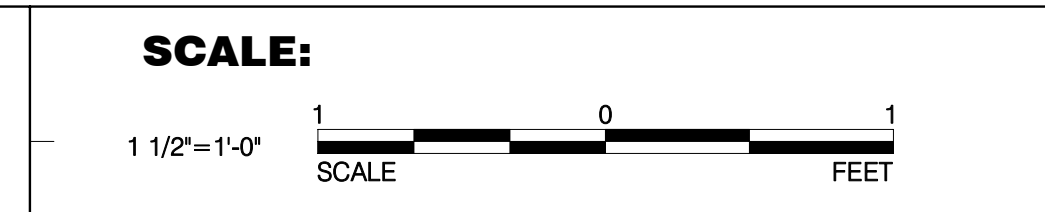
SCALE: 1 1/2" = 1'-0"

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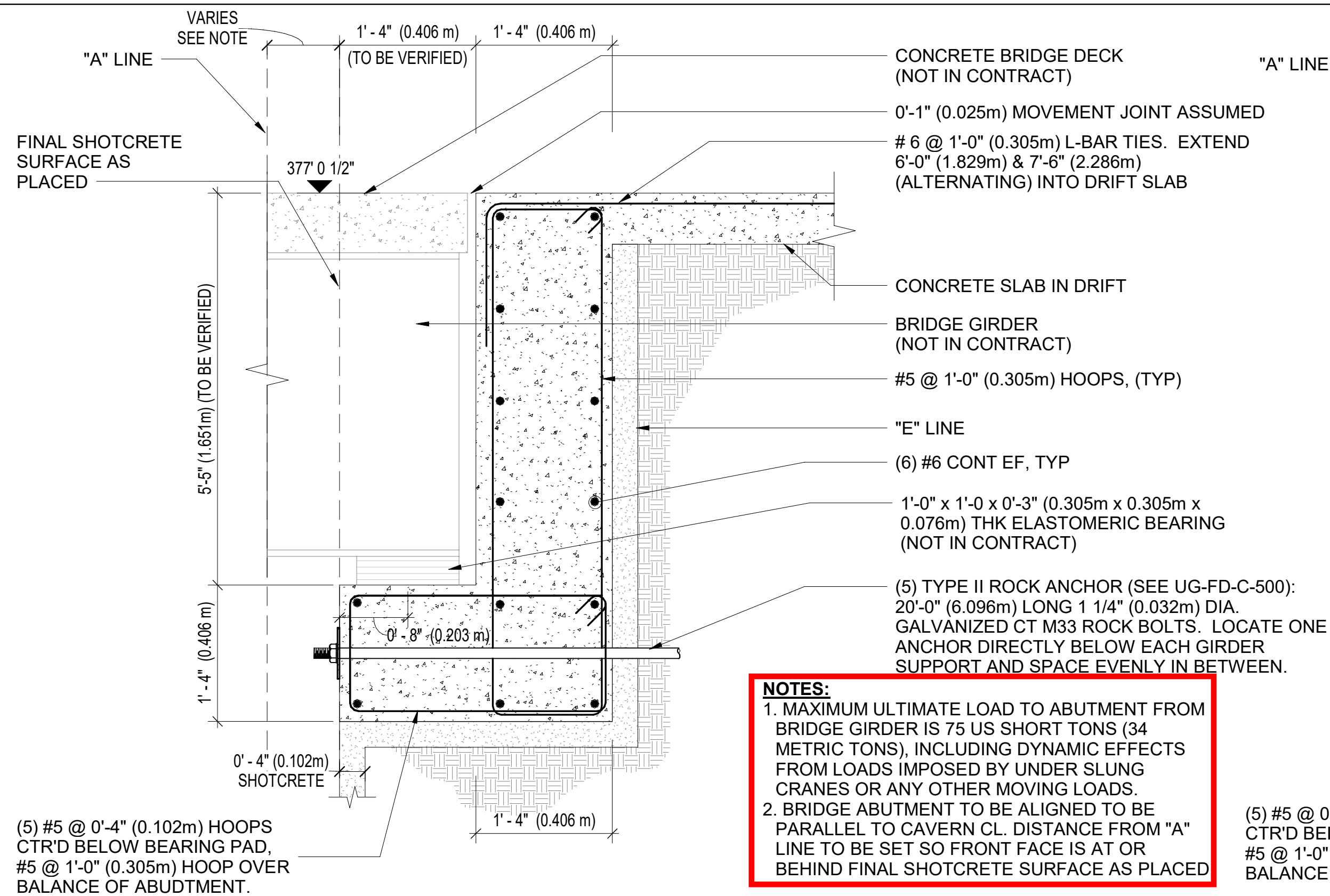
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LBNF - FSCF - EXCAVATION
UNDERGROUND, 4850 LEVEL
STRUCTURAL DETAILS
SHEET 1 OF 1

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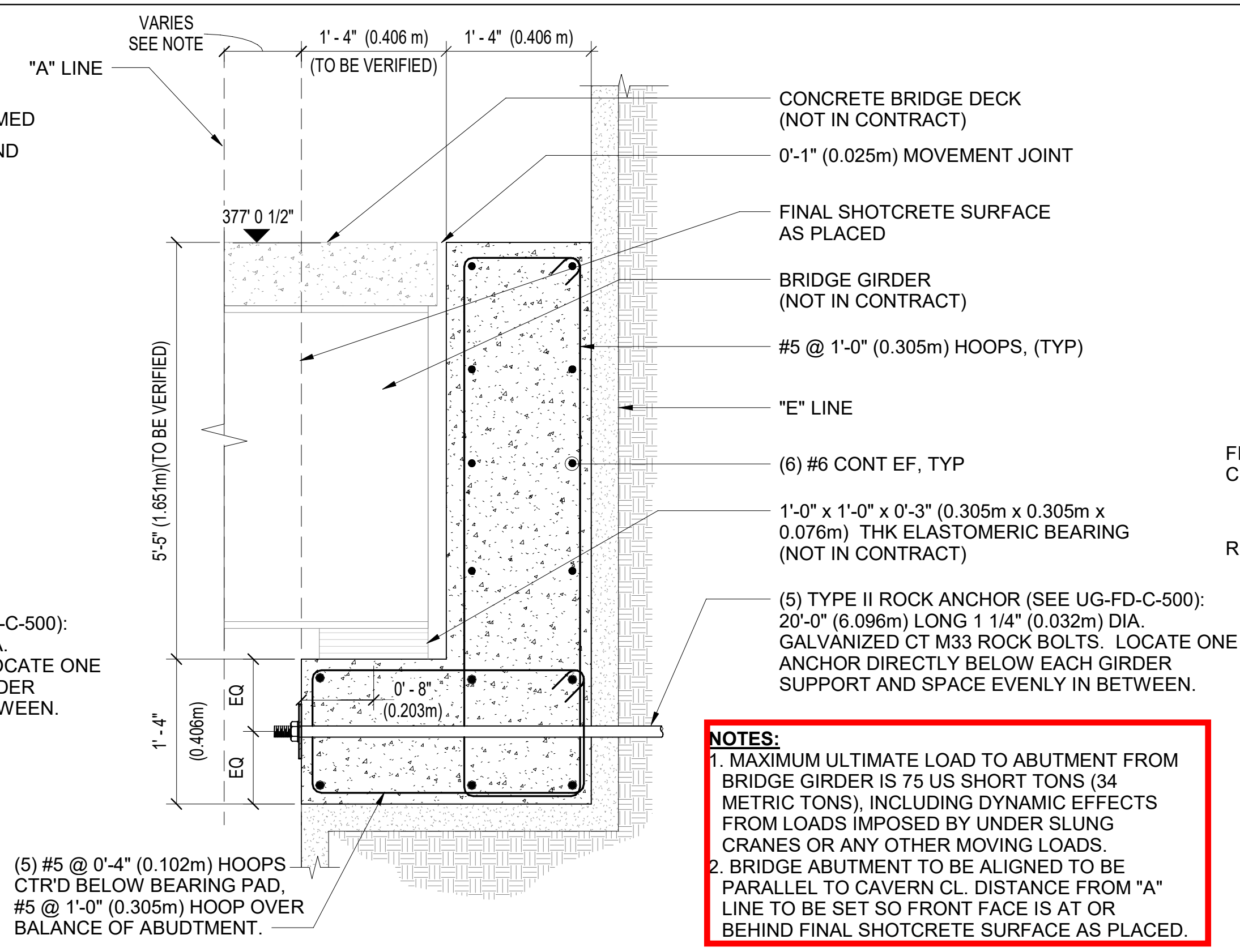
02/08/19



BRIDGE ABUTMENT SECTION AT 4850L

SCALE: 1" = 1'-0"

1
SS-401



BRIDGE ABUTMENT SECTION AT 4850L

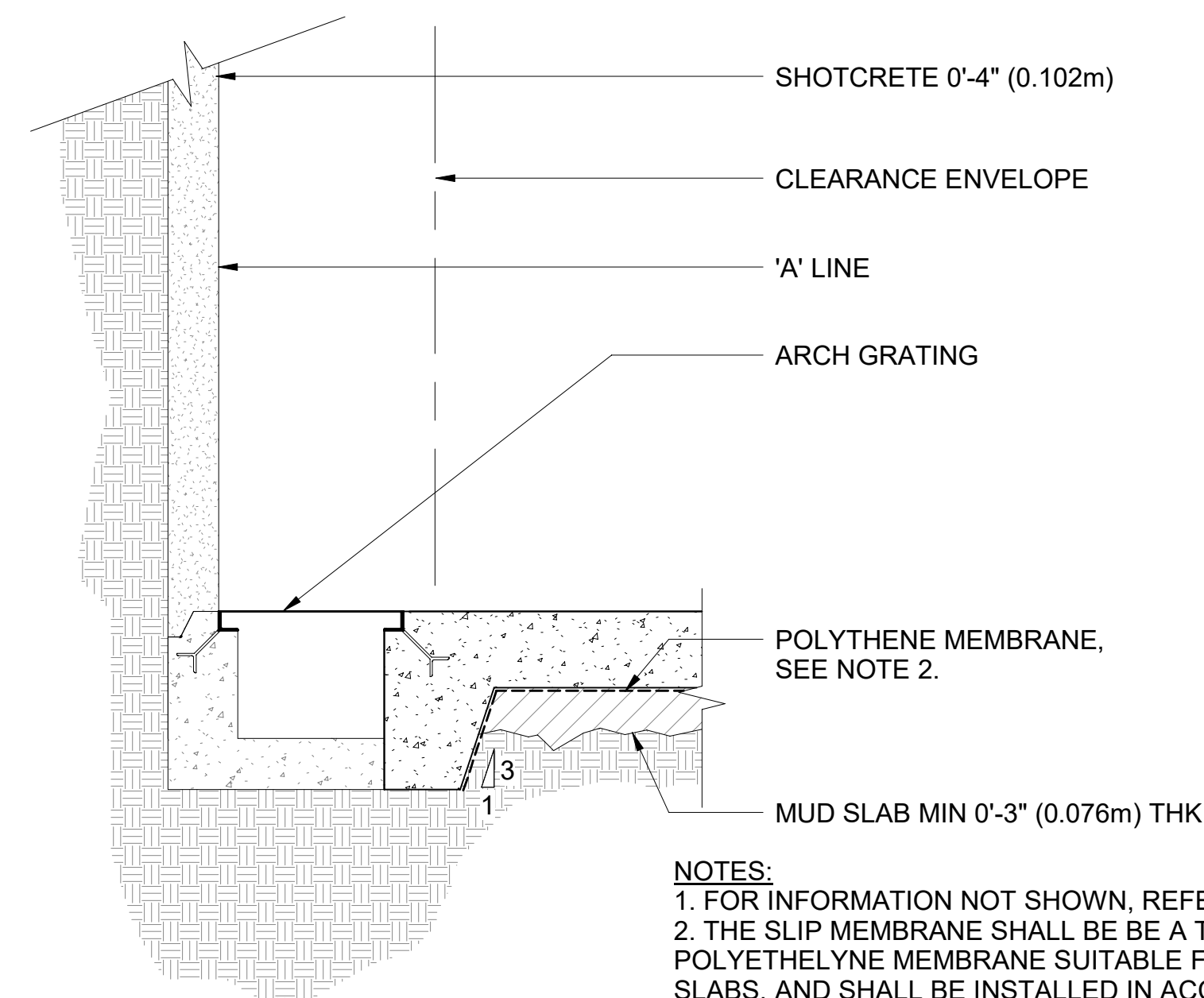
SCALE: 1" = 1'-0"

2
SS-401

TYPICAL DETAIL AT EQUIPMENT SUPPORT POINT

SCALE: 1" = 1'-0"

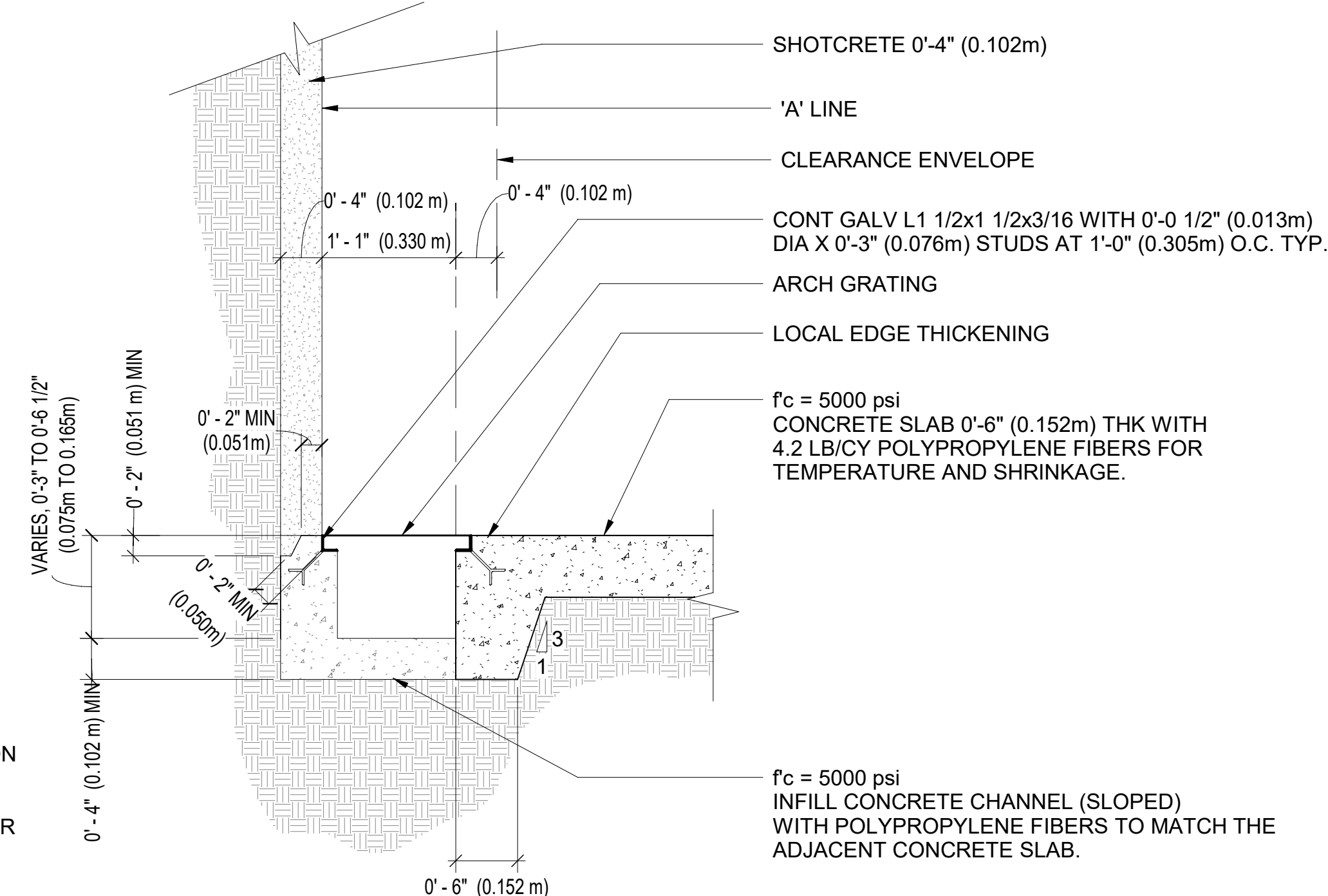
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DETAIL OF CUC SLAB BELOW MEZZANINE

SCALE: 1" = 1'-0"

4



TYPICAL DETAIL OF CUC SLAB

SCALE: 1" = 1'-0"

5

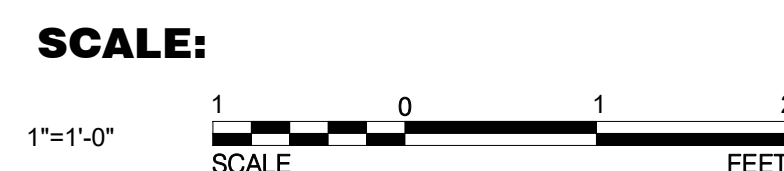
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1	07/27/18	30% FD SUBMISSION

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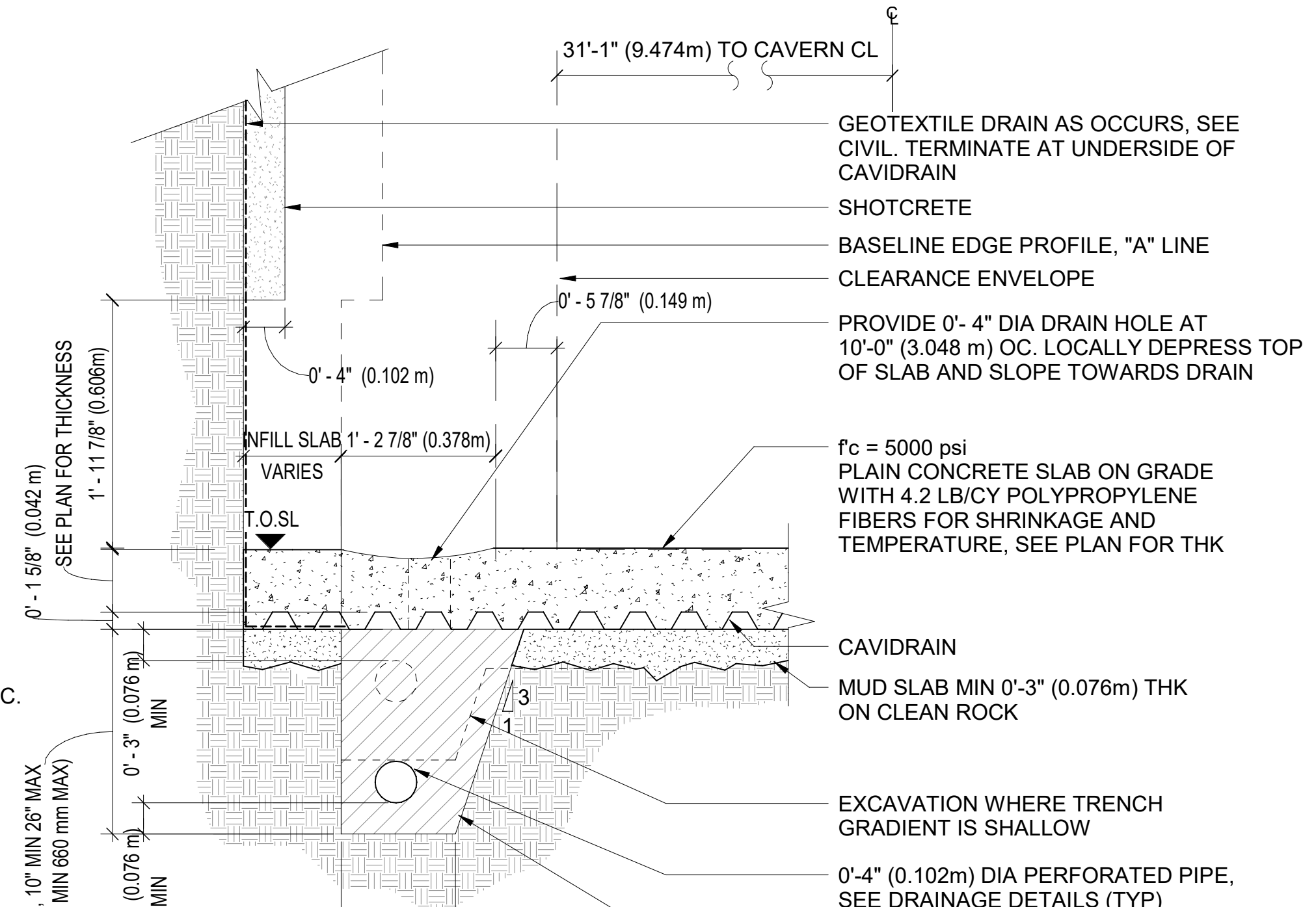
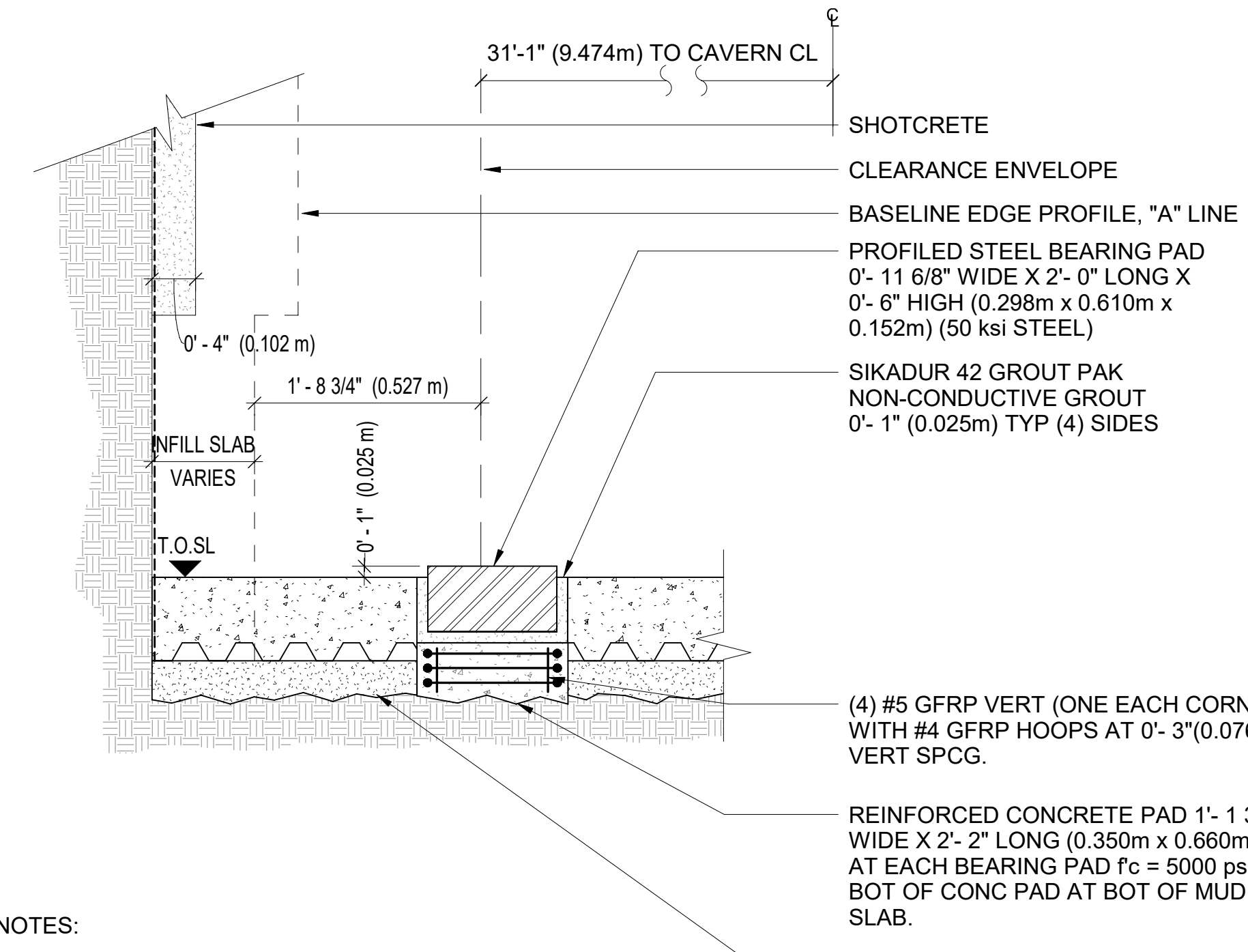
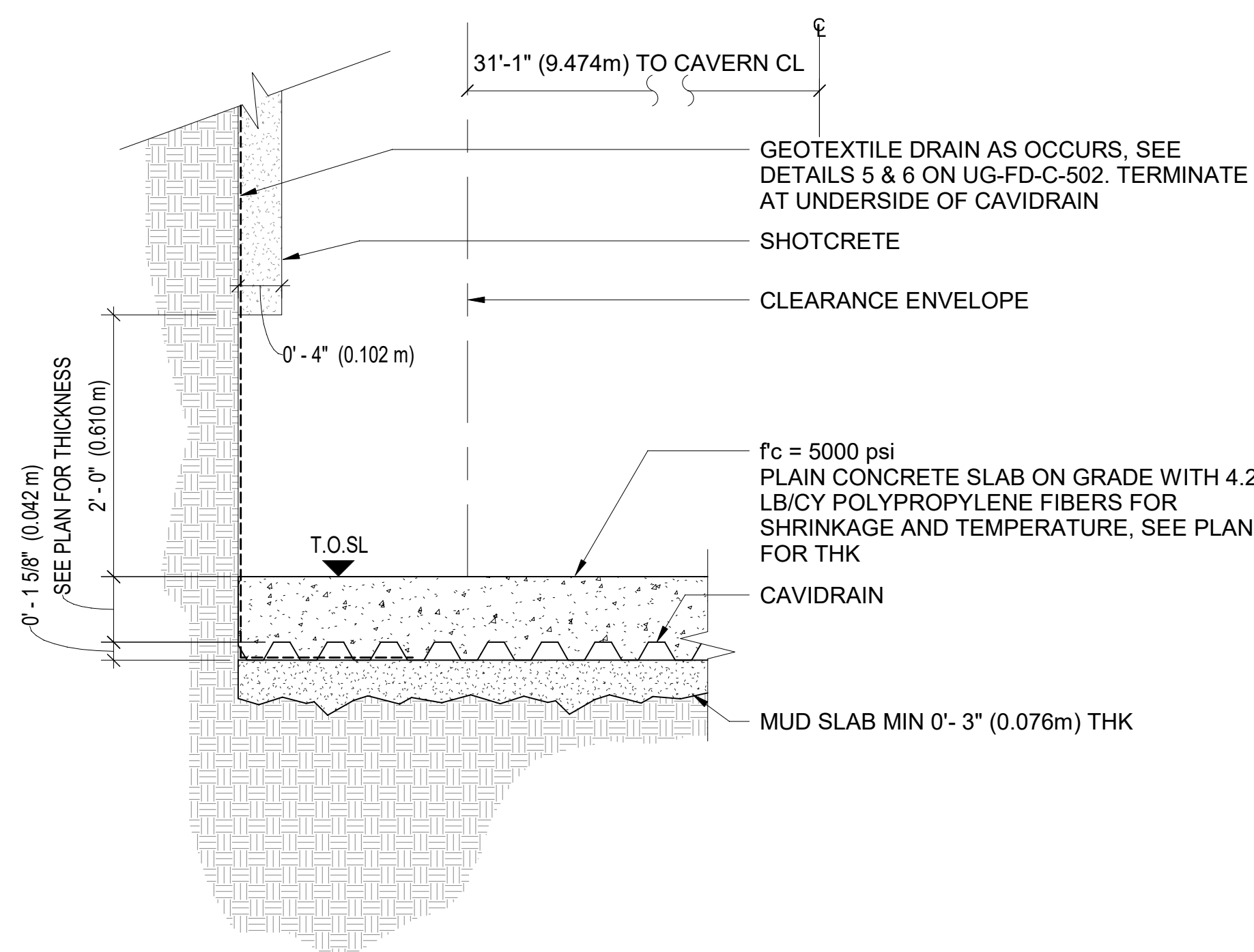
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LBNF - FSCF - EXCAVATION
UNDERGROUND, 4850 LEVEL
CONCRETE SLAB DETAILS
SHEET 1 OF 3

DRAWING NO. **15-1-6** **UG-FD-SS-810** REV. **3**

02/08/19



NOTES:
 1. FOR INFORMATION NOT SHOWN REFER TO 3/UG-FD-SS-811
 2. DRAINAGE CHANNEL AND TRENCH OCCUR AT SOUTH WALL OF NORTH CAVERN AND NORTH WALL OF SOUTH CAVERN

TYPICAL DETAIL OF EXPERIMENT CAVERN SLAB BETWEEN PADS

1

SCALE: 1" = 1'-0"

DETAIL AT CONCRETE PADS IN EXPERIMENT CAVERN

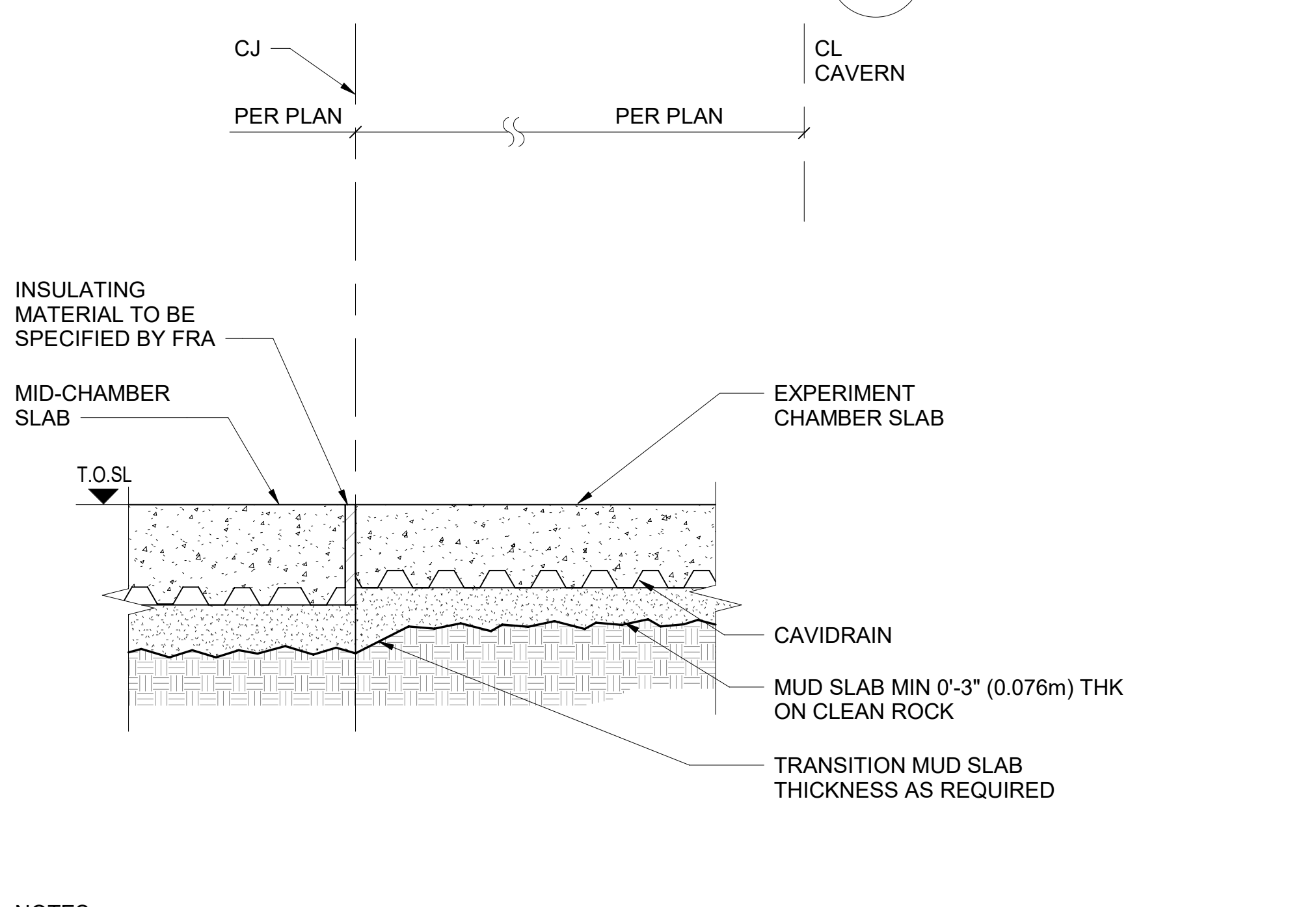
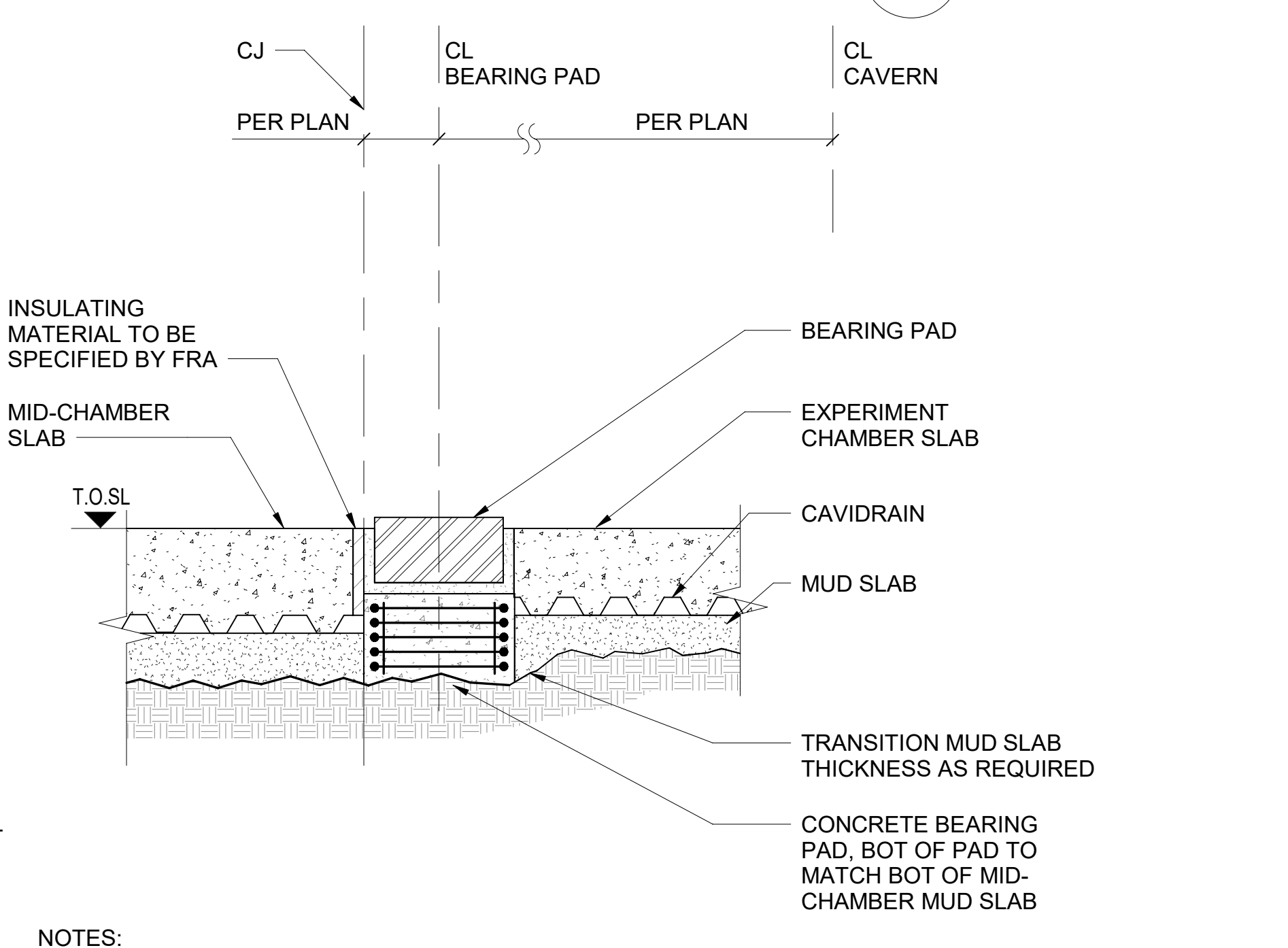
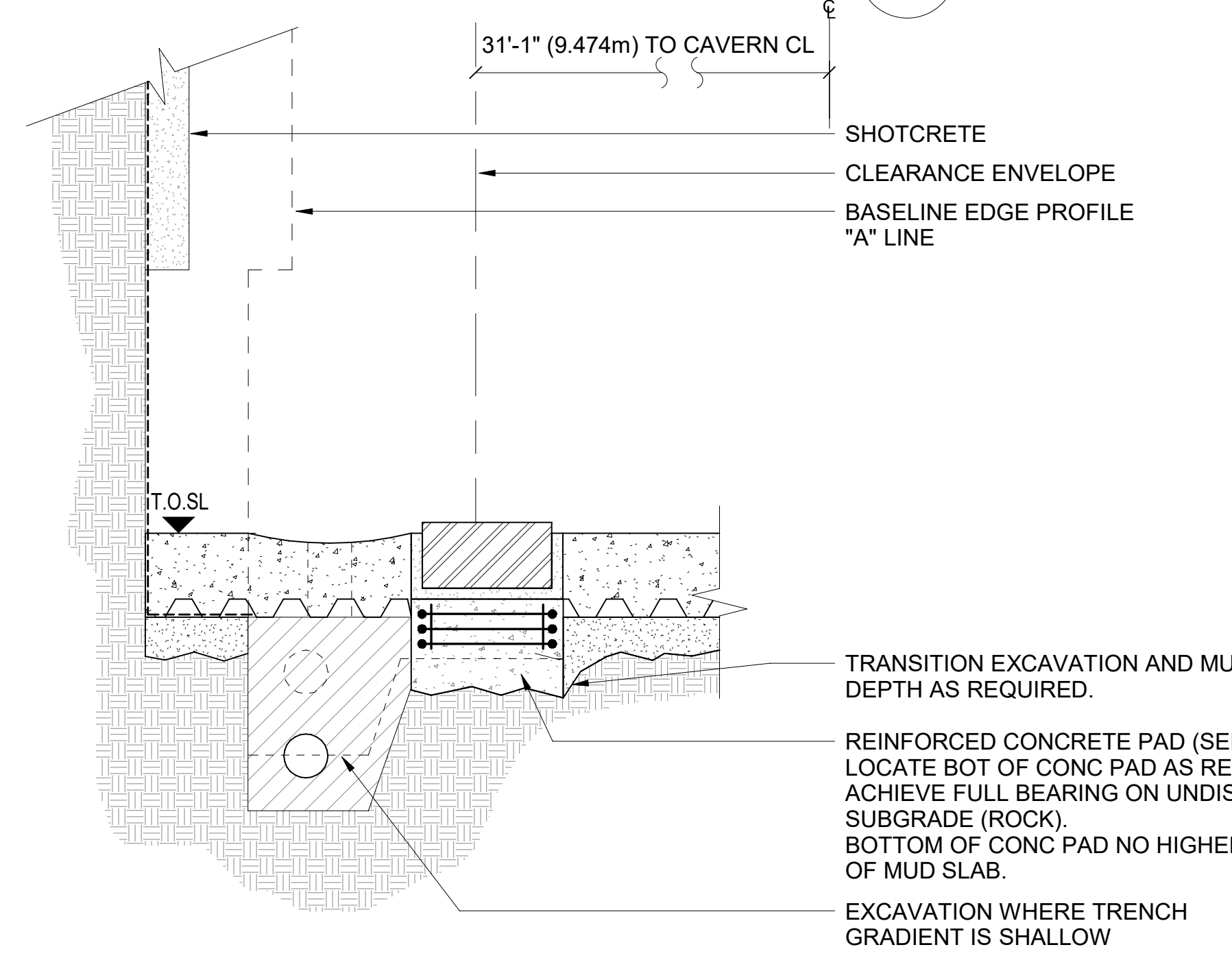
2

SCALE: 1" = 1'-0"

TYPICAL DETAIL OF EXPERIMENT CAVERN SLAB BETWEEN PADS

3

SCALE: 1" = 1'-0"



DRAINAGE DETAIL AT CONCRETE PADS IN EXPERIMENT CAVERN

4

SCALE: 1" = 1'-0"

DETAIL AT EXPERIMENT CAVERN SLAB CJ AT CONCRETE PADS

5

SCALE: 1" = 1'-0"

DETAIL AT EXPERIMENT CAVERN SLAB CJ BETWEEN PADS

6

SCALE: 1" = 1'-0"

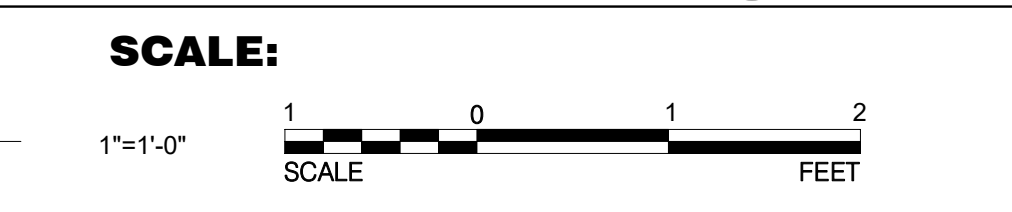
2/8/2019 6:34:28 PM

REV.	DATE	DESCRIPTION
2	02/08/19	90% FD SUBMISSION
1	11/02/18	60% FD SUBMISSION

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 Arup USA Inc
 77 Water Street, New York NY 10005, T 212 896 3000
 www.arup.com

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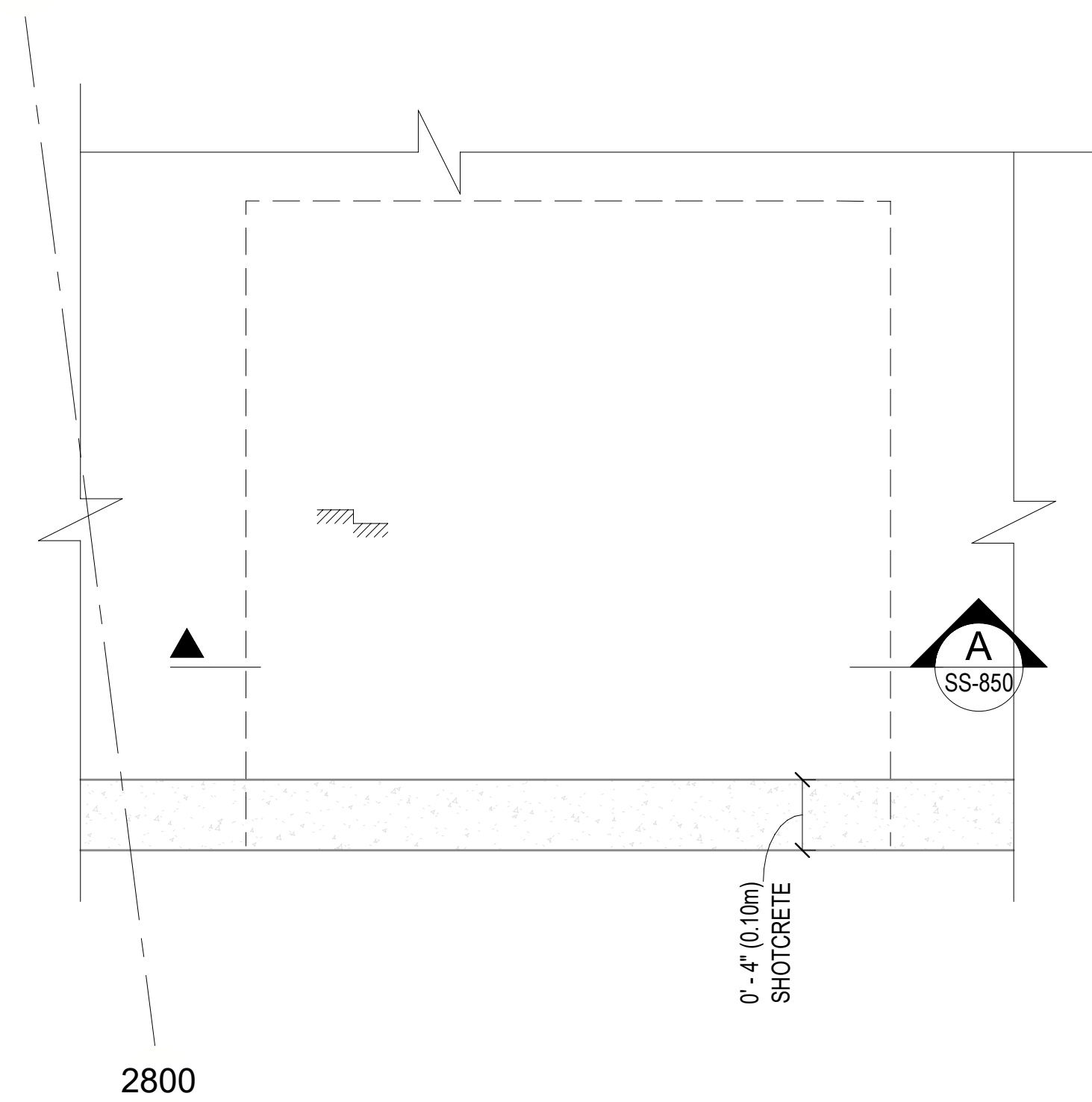
Fermilab Long-Baseline Neutrino Facility		
DESIGNED	KS	ARUP
DRAWN	AF	ARUP
CHECKED	IB	ARUP

LBNF - FSCF - EXCAVATION
UNDERGROUND, 4850 LEVEL
CONCRETE SLAB DETAILS
SHEET 2 OF 3

DRAWING NO. **15-1-6** **UG-FD-SS-811** REV. **2**

02/08/19

2800

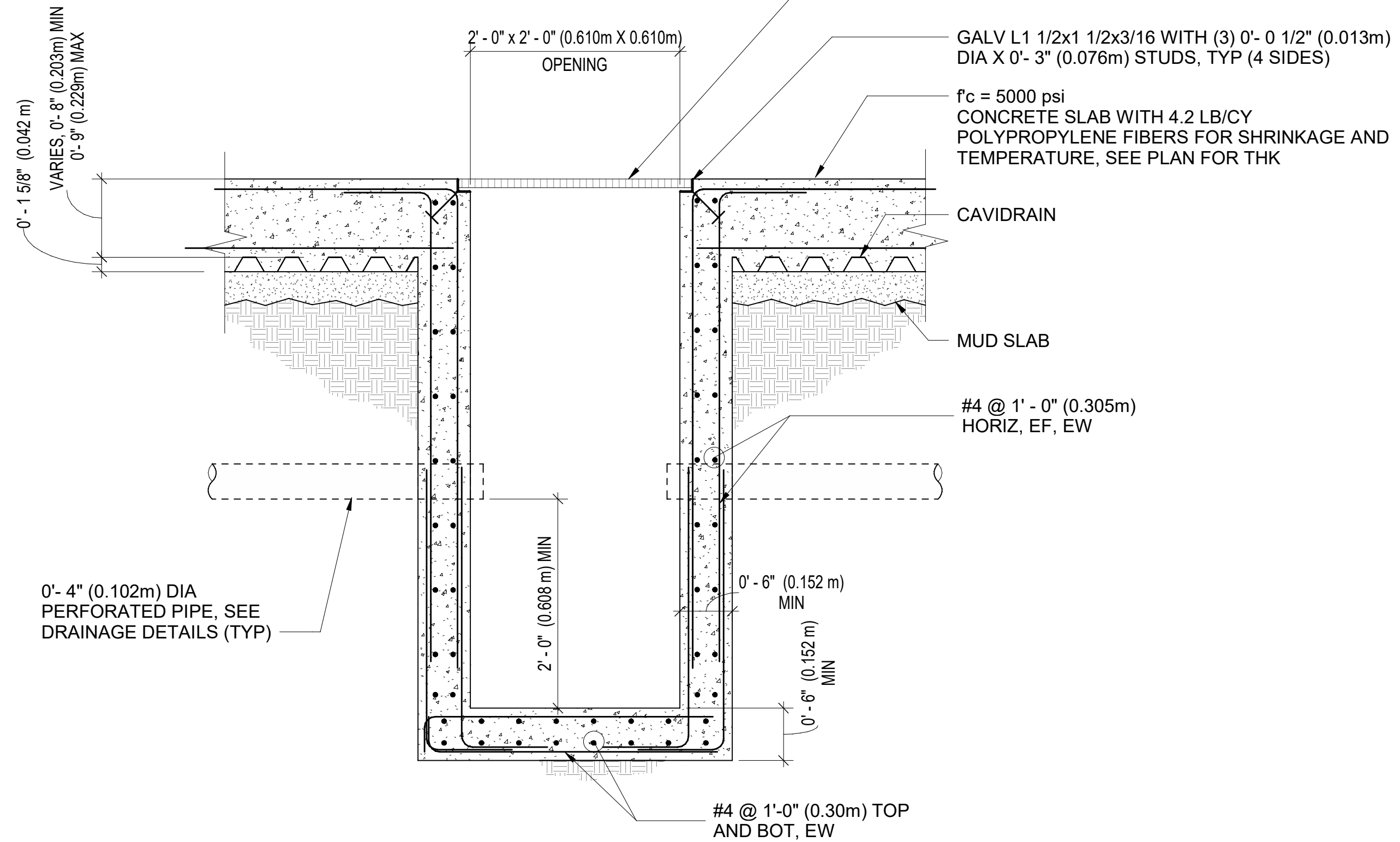


PARTIAL PLAN

SCALE: 1 1/2" = 1'-0"

1

SS-101B



NORTH AND SOUTH CAVERN SUMP

SCALE: 1" = 1'-0"

A

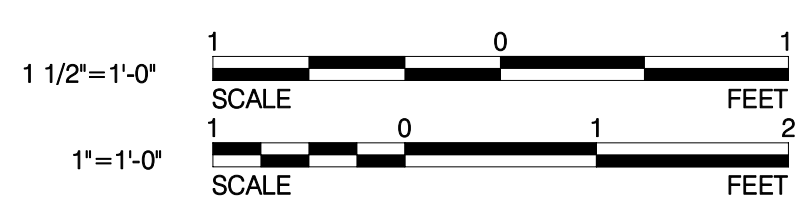
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REV.	DATE	DESCRIPTION	REVISIONS
1	02/08/19	90% FD SUBMISSION	

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SCALE:



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LBNF - FSCF - EXCAVATION
UNDERGROUND, 4850 LEVEL
CONCRETE DETAILS
SHEET 1 OF 2

DRAWING NO. **15-1-6** **UG-FD-SS-850** REV. **1**

02/08/19