

SOIL STABILIZATION PLANS

THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7

STEAMBOAT SPRINGS, ROUTT COUNTY, COLORADO

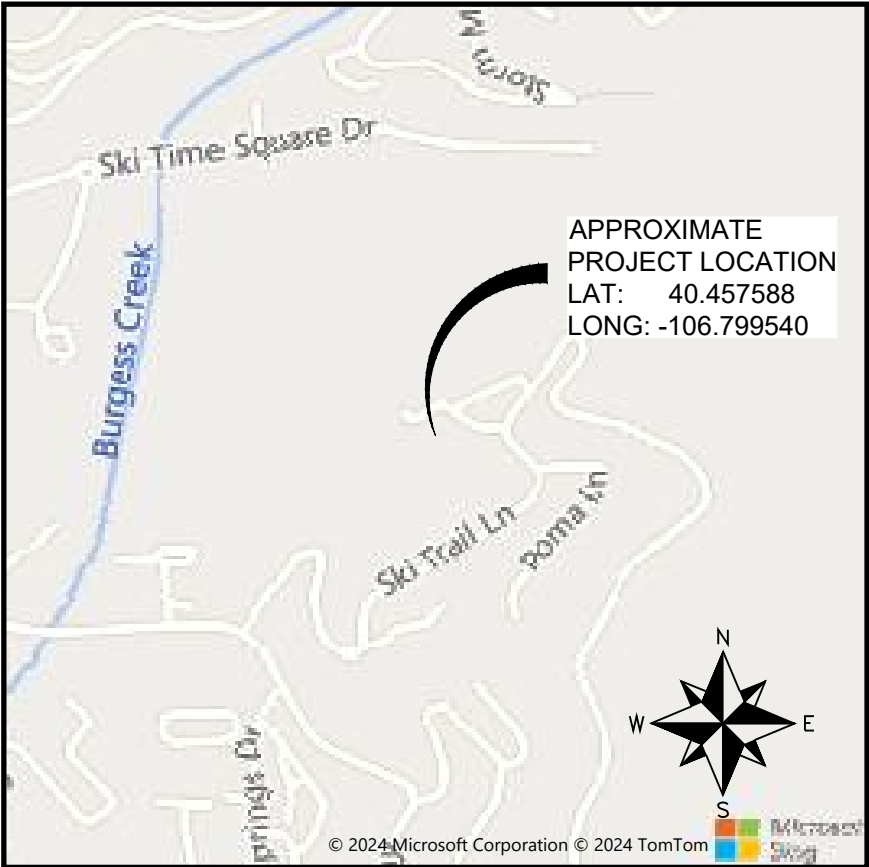
CLIENT:
STEAMBOAT ESQUIAR, LP.

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04/01/2025

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VICINITY MAP
(NOT TO SCALE)

SHEET REVISIONS			PROJECT NAME: THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7							<div> Geostabilization International® 4475 E 74th Ave, Suite 100 Commerce City, CO 80022 USA Phone: 855.579.0536 Fax: 970.245.7737 www.geostabilization.com</div> <div></div>	
DATE	DESCRIPTION	NO									
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			FHT	FHT	EL/MWL	05/08/2024	166127629	240057CO0N	C-01		

THE CONTRACTOR WILL PROVIDE AND INSTALL THE SPECIFIED SOIL NAILS AND SLOPE SURFACE TREATMENT PER THE CONSTRUCTION DOCUMENTS. THE ANTICIPATED CONSTRUCTION SEQUENCE IS AS FOLLOWS:

1. DELINEATE LIMITS OF STABILIZATION. NOTIFY LOCAL UTILITIES PROVIDERS TO LOCATE AND MARK POTENTIAL UNDERGROUND FACILITIES. DAYLIGHTING OF UTILITIES IN POTENTIAL CONFLICT, AS NECESSARY. BY OTHERS
2. PREPARE THE WORK AREA FOR STABILIZATION CONSTRUCTION, BY OTHERS
 - 2.1. ESTABLISH TRAFFIC CONTROL, BY OTHERS.
 - 2.2. PREPARE SITE ACCESS, BY OTHERS.
3. EXCAVATE, REMOVE, AND DISPOSE OF SPOILS MATERIAL GENERATED DURING EXCAVATION, BY OTHERS.
4. MARK THE LOCATIONS OF THE PROPOSED SOIL NAILS WITH SURVEY MARKING PAINT.
5. INSTALLATION OF SOIL NAILS. NAILS WILL BE GROUTED DURING DRILLING UNLESS DIRECTED OTHERWISE BY GSI ENGINEER.
6. INSTALL SURFACE TREATMENT PER THE CONSTRUCTION DOCUMENTS.

- THE SITE WILL BE ORGANIZED AND CLEAR OF ANY TRASH OR DEBRIS. ALL TRASH WILL BE PLACED IN A PROPER CONTAINER AND REMOVED AT THE END OF EACH WORK DAY.

- ALL SAFETY PLANS FOR LIFTING, HEARING, DUST CONTROL, PPE ETC. WILL BE IN PLACE AND FOLLOWED ACCORDINGLY. PPE INCLUDES SAFETY VEST, STEEL TOED SHOES, HARD HAT, SAFETY GLASSES, RESPIRATOR DURING DUST PRODUCING ACTIVITIES, AND GLOVES.
- ALL FIELD PERSONNEL SHALL ATTEND SITE SPECIFIC ORIENTATION PRIOR TO BEING ON SITE, AS REQUIRED.
- DAILY PRE/POST JOB BRIEFINGS WILL BE HELD AND DOCUMENTED; ALL ON SITE PERSONNEL WILL BE REQUIRED TO REVIEW AND SIGN.

- TEMPORARY SHORING SHOTCRETE FACING AND SOIL NAILS DESIGNED IN GENERAL ACCORDANCE WITH FHWA-NHI-14-007, SOIL NAIL WALLS REFERENCE MANUAL, DATED FEBRUARY 2015.
- GLOBAL STABILITY MODELED IN ROCSCIENCE SLIDE2 SOFTWARE FOR GLOBAL FACTOR OF SAFETY OF 1.3. CONSERVATIVE SOIL STRENGTH PARAMETERS WERE SELECTED BASED ON SUBSOIL AND FOUNDATION INVESTIGATION, THE ASTRID, 2410 SKI TRAIL LANE, STEAMBOAT SPRINGS, COLORADO, DATED DECEMBER 22, 2022. TRAFFIC SURCHARGE OF 250 PSF USED WHERE APPLICABLE.

- THE SOIL NAIL ELEMENTS SHALL CONSIST OF SELF-DRILLING SOIL NAILS.
- SACRIFICIAL DRILL BITS WILL BE ATTACHED TO THE SOIL NAIL PRIOR TO INSTALLING THE NAIL IN THE GROUND.
- SACRIFICIAL DRILL BITS ARE NOT PERMANENTLY INCORPORATED INTO THE PROJECT AND MAY BE REMOVED AFTER DRILLING OR LEFT AT THE PROJECT FOR THE CONTRACTOR'S CONVENIENCE. SACRIFICIAL DRILL BITS ARE NOT END PRODUCTS. SACRIFICIAL DRILL BITS ARE NOT PRODUCED IN THE UNITED STATES.
- SOIL NAILS WILL BE CONSTRUCTED USING NON-DOMESTIC HOLLOW BAR.
- GSI ENGINEER MAY ELECT TO MODIFY THE NAIL TYPE, LENGTH OR INSTALLATION METHOD, DEPENDING ON ACTUAL DRILLING CONDITIONS.

- THE ROCK ANCHOR ELEMENTS SHALL CONSIST OF EPOXY COATED GRADE 75 #8 ALL-THREAD OF DOMESTIC MANUFACTURE.
- ROCK ANCHORS WILL BE GROUTED IN A 4" HOLE.

- DRAIN STRIPS WILL BE PROVIDED AND INSTALLED BETWEEN THE SOIL NAILS ALONG THE FACE OF THE EXCAVATION. THE DRAIN STRIPS SHALL BE PLACED WITH THE GEOTEXTILE SIDE AGAINST THE GROUND. DRAIN STRIPS WILL BE CONTINUOUS AND ANY SPLICES SHALL BE MADE WITH A ONE-FOOT MINIMUM OVERLAP SUCH THAT THE FLOW OF WATER IS NOT IMPEDED. DRAIN STRIPS SHALL EXTEND BEYOND THE FACE OF THE SHOTCRETE AT THE DOWNHILL FACE.
- DRAIN STRIPS SHALL BE MINIMUM 12" WIDE.

- WELDED WIRE MESH WILL BE PLACED ALONG THE FACE OF THE EXCAVATION WITH A SEPARATION BETWEEN THE WIRE MESH AND THE SOIL AS CALLED OUT IN THE DETAILS.
- NO. 4 REBAR WILL BE TIED TO THE WIRE MESH. VERTICAL BARS WILL EXTEND FOR APPROXIMATELY 36" AND THE HORIZONTAL BARS WILL BE CONTINUOUS (WITH A MINIMUM OF 24" OVERLAP SPLICES) IN THE SHOTCRETE.

- STEEL BEARING PLATES WILL BE PLACED OVER THE NAILS AND ATTACHED WITH A HEX NUT TO SECURE THE WIRE MESH AND REBAR DURING SHOTCRETE PLACEMENT. IF THE SOIL NAILS EXTEND BEYOND THE HEX NUTS OR WELDED PLATES, THEY WILL BE TRIMMED.

- SHOTCRETE WILL BE PLACED FROM THE LOWER PART OF THE AREA UPWARDS TO PREVENT ACCUMULATION OF REBOUND. THE NOZZLE WILL BE ORIENTED A PROPER DISTANCE FROM AND APPROXIMATELY PERPENDICULAR TO THE WORKING FACE SO THAT REBOUND WILL BE MINIMAL AND COMPACTION WILL BE MAXIMIZED. CARE WILL BE TAKEN WHILE ENCASING REINFORCING STEEL AND MESH TO KEEP THE FRONT FACE OF THE REINFORCEMENT CLEAN DURING PLACEMENT OPERATIONS, SO THAT SHOTCRETE BUILDS UP FROM BEHIND, TO ENCASE THE REINFORCEMENT AND PREVENT VOIDS OR POCKETS FROM FORMING.

- DESIGN 28 DAY COMPRESSIVE STRENGTH = 3,000 PSI
- GROUT SLURRY SHALL CONSIST OF A NEAT CEMENT MIXTURE OF CLEAN WATER AND PORTLAND CEMENT. NO ADDITIONAL ADMIXTURES SHALL BE USED UNLESS APPROVED BY GSI ENGINEER.
- THE W/C SHALL RANGE BETWEEN 0.5 AND 0.6 AS DETERMINED BY A MUD BALANCE SP. GR. VALUE BETWEEN 1.83 AND 1.74.



- SHOTCRETE SHALL COMPLY WITH THE REQUIREMENTS OF ACI 506.2, "SPECIFICATIONS FOR MATERIALS, PROPORTIONING AND APPLICATION OF SHOTCRETE", EXCEPT AS OTHERWISE SPECIFIED. SHOTCRETING CONSISTS OF APPLYING ONE OR MORE LAYERS OF CONCRETE CONVEYED THROUGH A HOSE PNEUMATICALLY PROJECTED AT A HIGH VELOCITY AGAINST A PREPARED SURFACE.
- THE WET-MIX PROCESS CONSISTS OF THOROUGHLY MIXING ALL THE INGREDIENTS, INTRODUCING THE MIXTURE INTO THE DELIVERY EQUIPMENT AND DELIVERING IT, BY POSITIVE DISPLACEMENT, TO THE NOZZLE. AIR JET THE WET-MIX SHOTCRETE FROM THE NOZZLE AT HIGH VELOCITY ONTO THE SURFACE.
- GSI STANDARD SHOTCRETE MIX DESIGN SHALL BE USED UNLESS SHOTCRETE TEMPERATURES ARE ANTICIPATED TO REACH AND/OR EXCEED 85°F. IN THIS EVENT, GSI HOT WEATHER MIX MAY BE USED. SET TIME CONTROLLING ADDITIVES (I.E. HYDRATION STABILIZERS, RETARDERS) MAY BE USED PER THE MANUFACTURER SPECIFICATIONS AND UNDER THE DIRECTION OF A GSI ENGINEER.

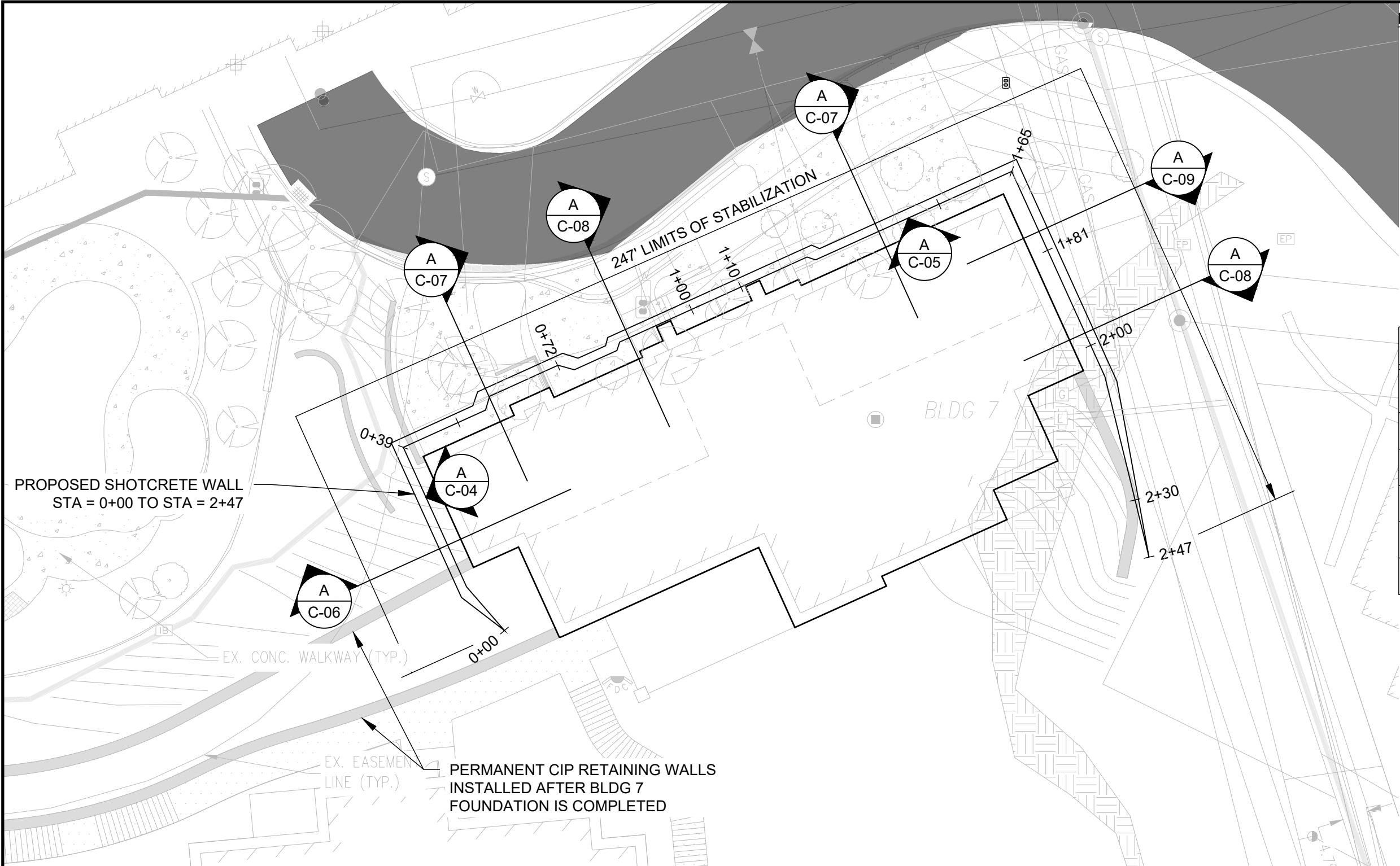
MATERIAL	WEIGHT PER CUBIC YARD
3/8" ROCK	650 LBS
SAND	1800 LBS
CEMENT	750 LBS
WATER	300 LBS
FLY ASH	150 LBS
AIR ENTRAINMENT	6% (1.6 FT ³)
0.40 TO 0.50 WATER/CEMENT RATIO	

MATERIAL	WEIGHT PER CUBIC YARD
3/8" ROCK	600 LBS
SAND	1,800 LBS
CEMENT	700 LBS
WATER	315 LBS
FLY ASH	300 LBS
AIR ENTRAINMENT	6% (1.6 FT ³)
0.40 TO 0.50 WATER/CEMENT RATIO	

04/01/2025

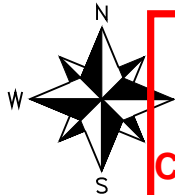
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			DRAWN BY: FHT	DESIGNED BY: FHT	CHECKED BY: EL/MWL	DATE: 05/08/2024	PURSUIT NUMBER: 166127629	PROJECT NUMBER: 240057CO0N	SHEET C-02		

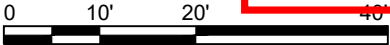


- NOTES:
1. LIMITS OF STABILIZATION ARE APPROXIMATE.

ESTIMATED QUANTITIES			
PAY ITEM	QTY	QTY (AB)	UNIT
8" NOM. SHOTCRETE FACING	4800	-	SF
18' SELF-DRILLING SOIL NAIL	55	-	EA
16' SELF-DRILLING SOIL NAIL	36	-	EA
8' SELF-DRILLING SOIL NAIL	59	-	EA
8' SOLID BAR ROCK ANCHOR	52	-	EA



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PROJECT NAME: <i>THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7</i>						
SHEET TITLE: <i>SITE PLAN</i>						
DRAWN BY: FHT	DESIGNED BY: FHT	CHECKED BY: EL/MWL	DATE: 05/08/2024	PURSUIT NUMBER: 166127629	PROJECT NUMBER: 240057CO0N	SHEET C-03

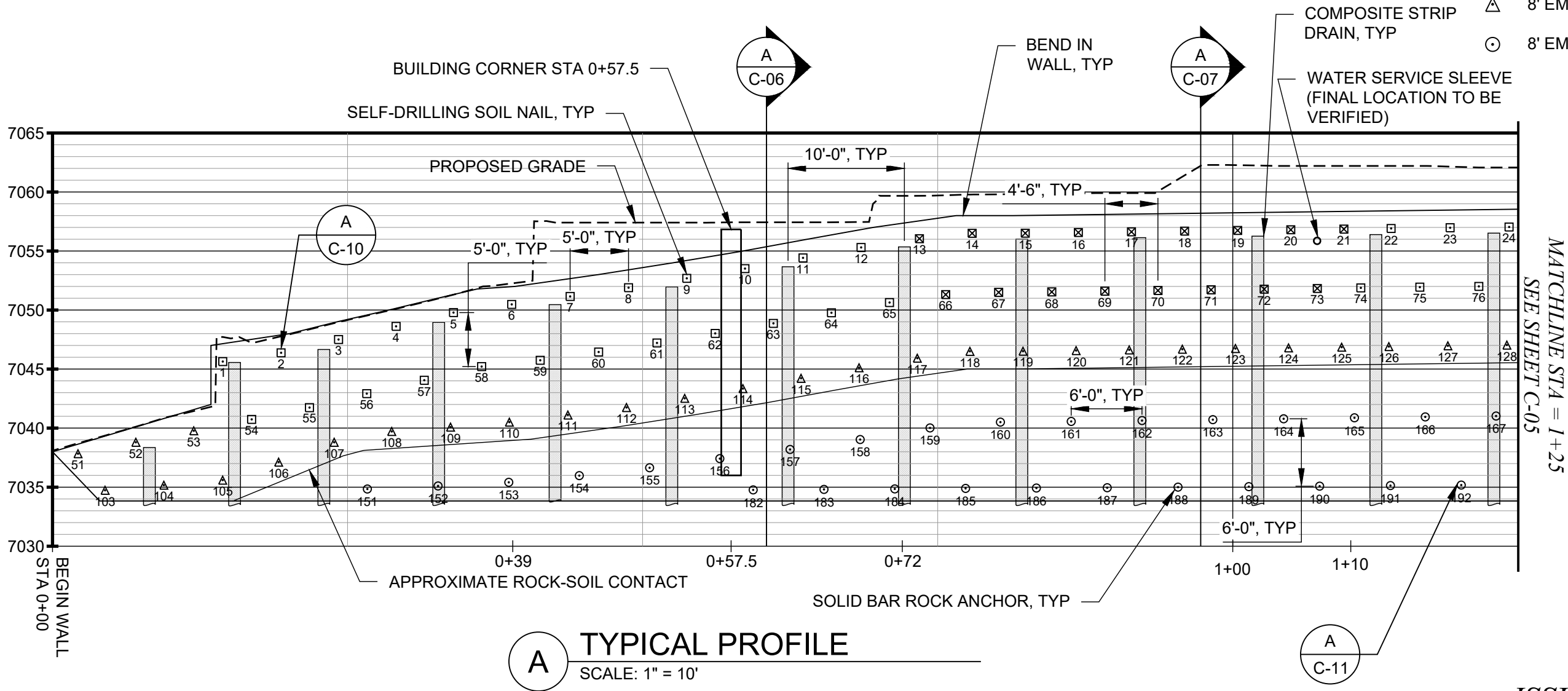


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NOTES:
1. NAIL LOCATIONS SHOWN ARE APPROXIMATE.

- LEGEND:
- 18' EMBEDMENT SOIL NAIL
 - 16' EMBEDMENT SOIL NAIL
 - 8' EMBEDMENT SOIL NAIL
 - 8' EMBEDMENT ROCK ANCHOR



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PROJECT NAME: <i>THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7</i>						
SHEET TITLE: <i>PROFILE VIEWS</i>						
DRAWN BY: FHT	DESIGNED BY: FHT	CHECKED BY: EL/MWL	DATE: 05/08/2024	PURSUIT NUMBER: 166127629	PROJECT NUMBER: 240057CO0N	SHEET C-04

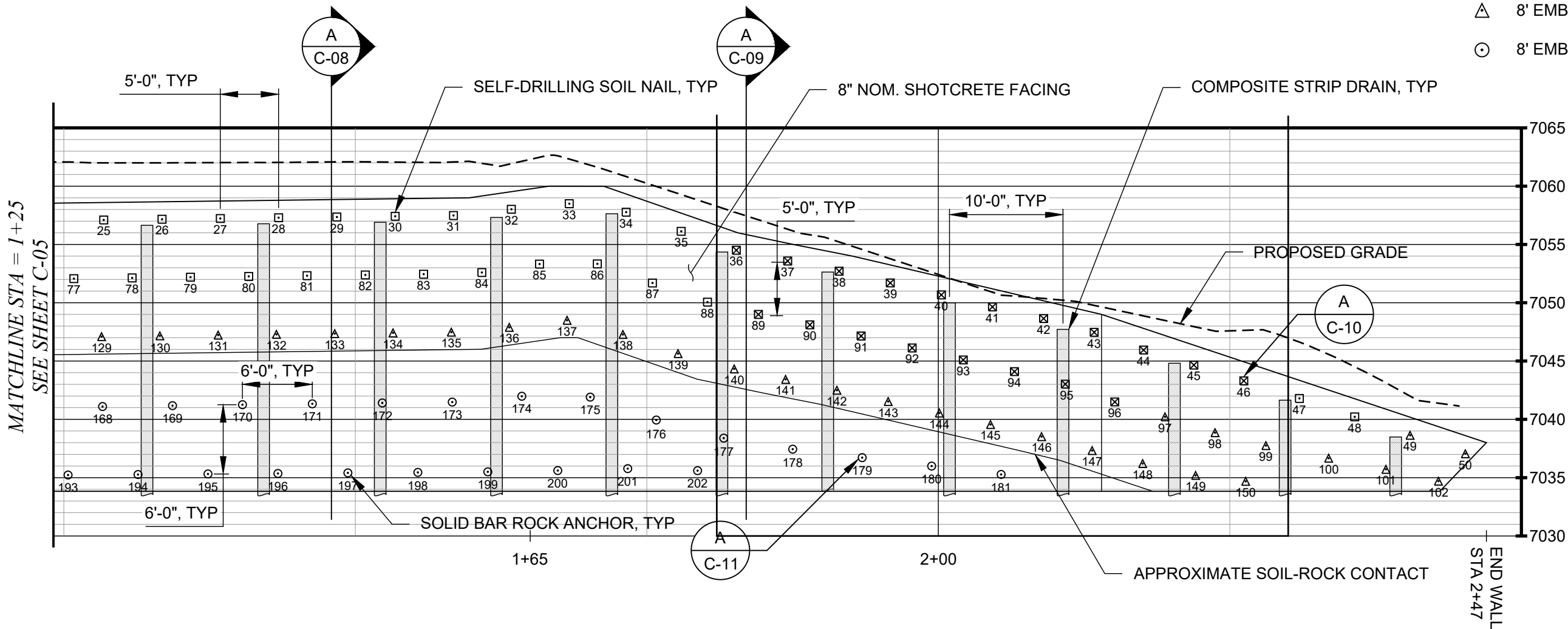


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NOTES:
1. NAIL LOCATIONS SHOWN ARE APPROXIMATE.

- LEGEND:
- 18' EMBEDMENT SOIL NAIL
 - 16' EMBEDMENT SOIL NAIL
 - 8' EMBEDMENT SOIL NAIL
 - 8' EMBEDMENT ROCK ANCHOR



A TYPICAL PROFILE
SCALE: 1" = 10'

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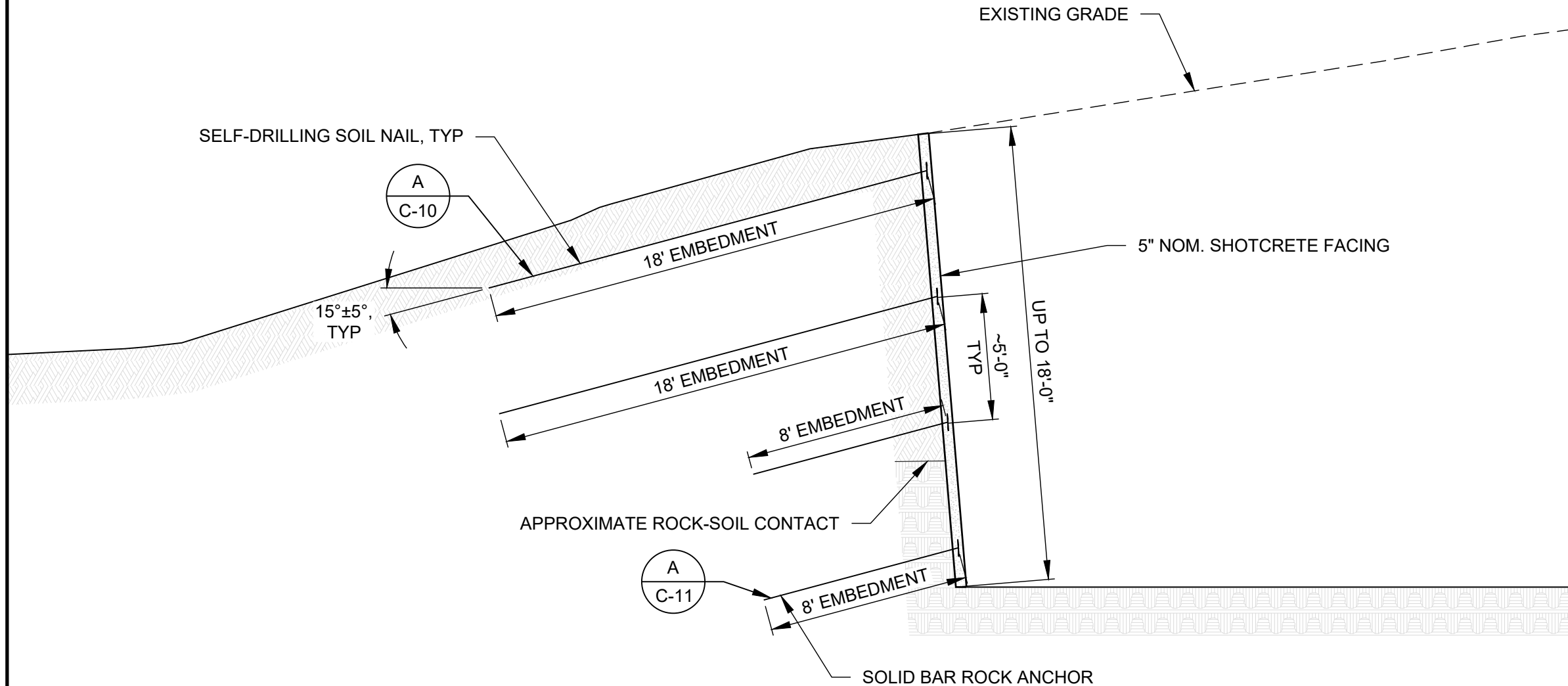
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SHEET TITLE: <i>PROFILE VIEWS</i>						
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NOTES:
1. EXCAVATE SLOPE AT 1H:12V.




A TYPICAL SECTION
SCALE: 1" = 5'


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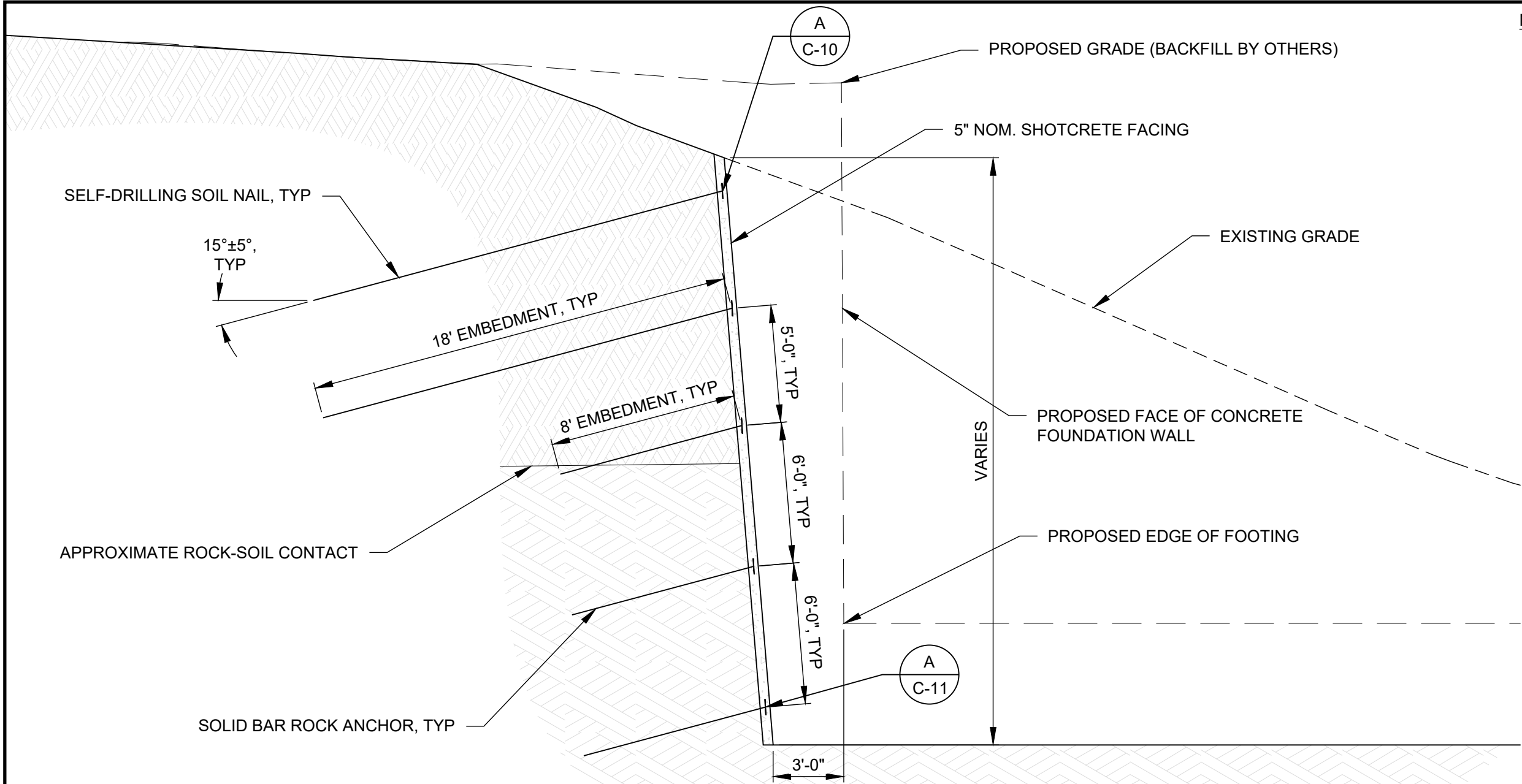
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NOTES:
1. EXCAVATE SLOPE AT 1H:12V.

A TYPICAL SECTION
SCALE: 1" = 5'

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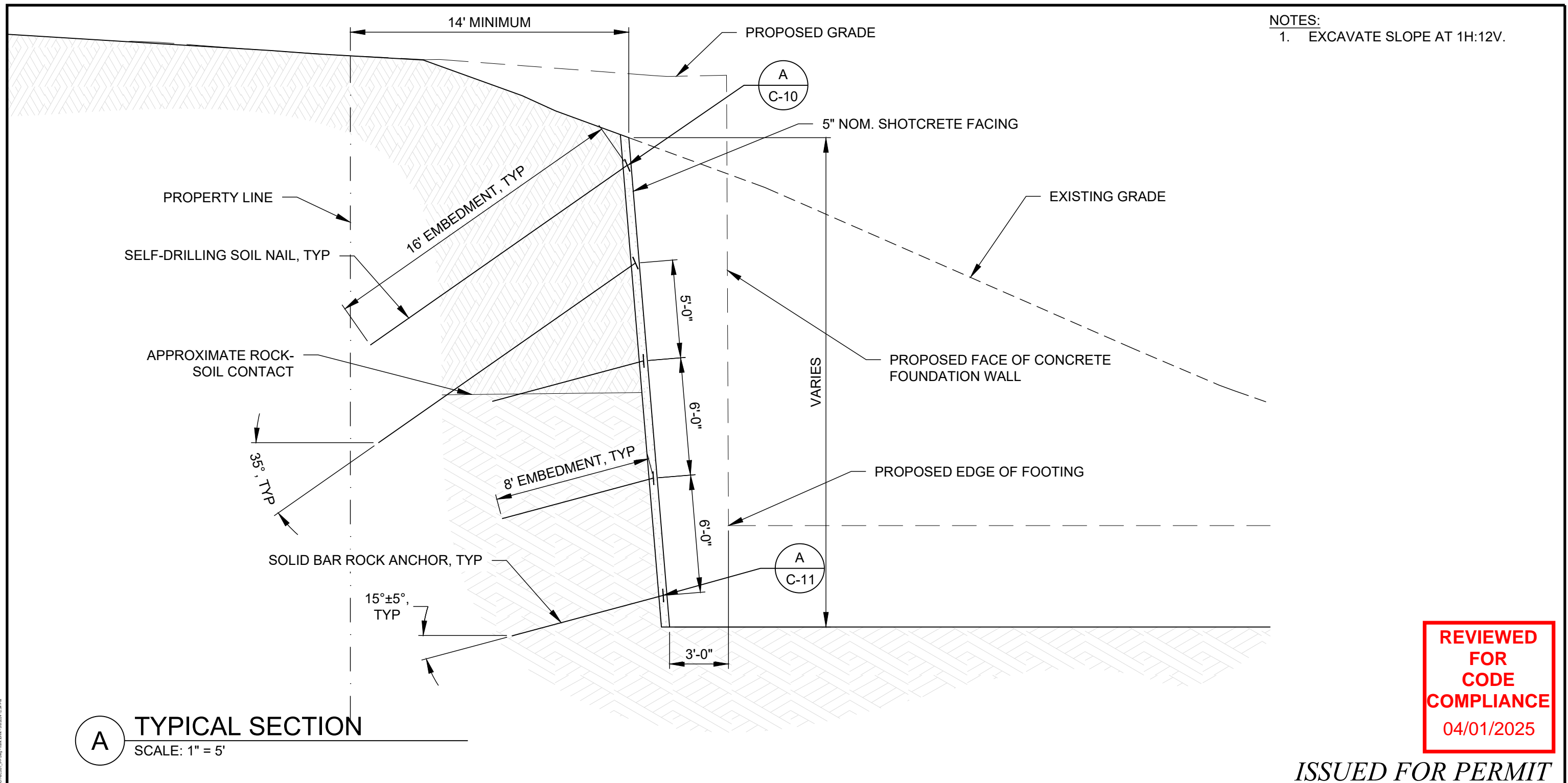
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SHEET TITLE: <i>SECTION VIEWS</i>						
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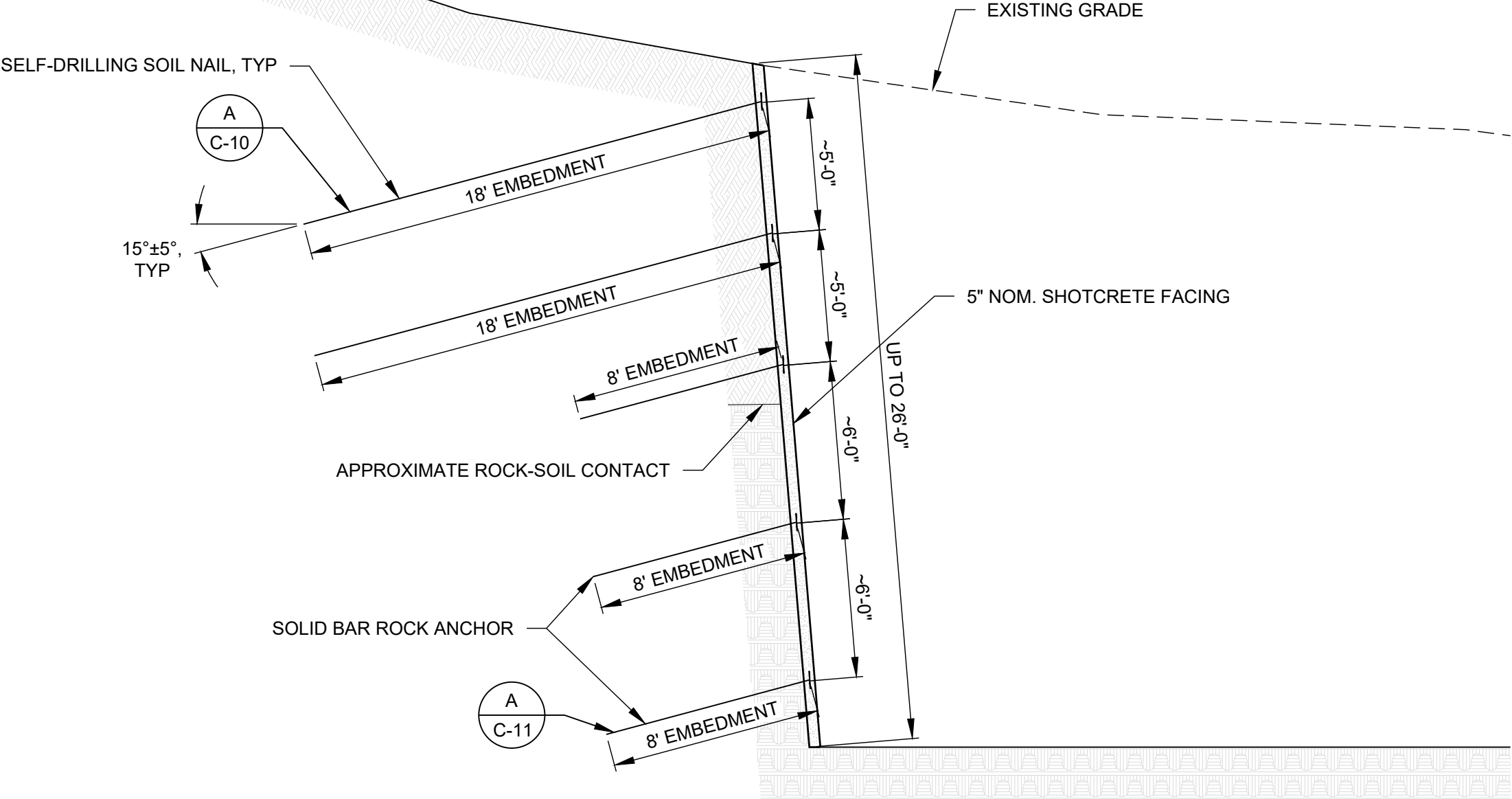
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NOTES:
1. EXCAVATE SLOPE AT 1H:12V.



A TYPICAL SECTION
SCALE: 1" = 5'

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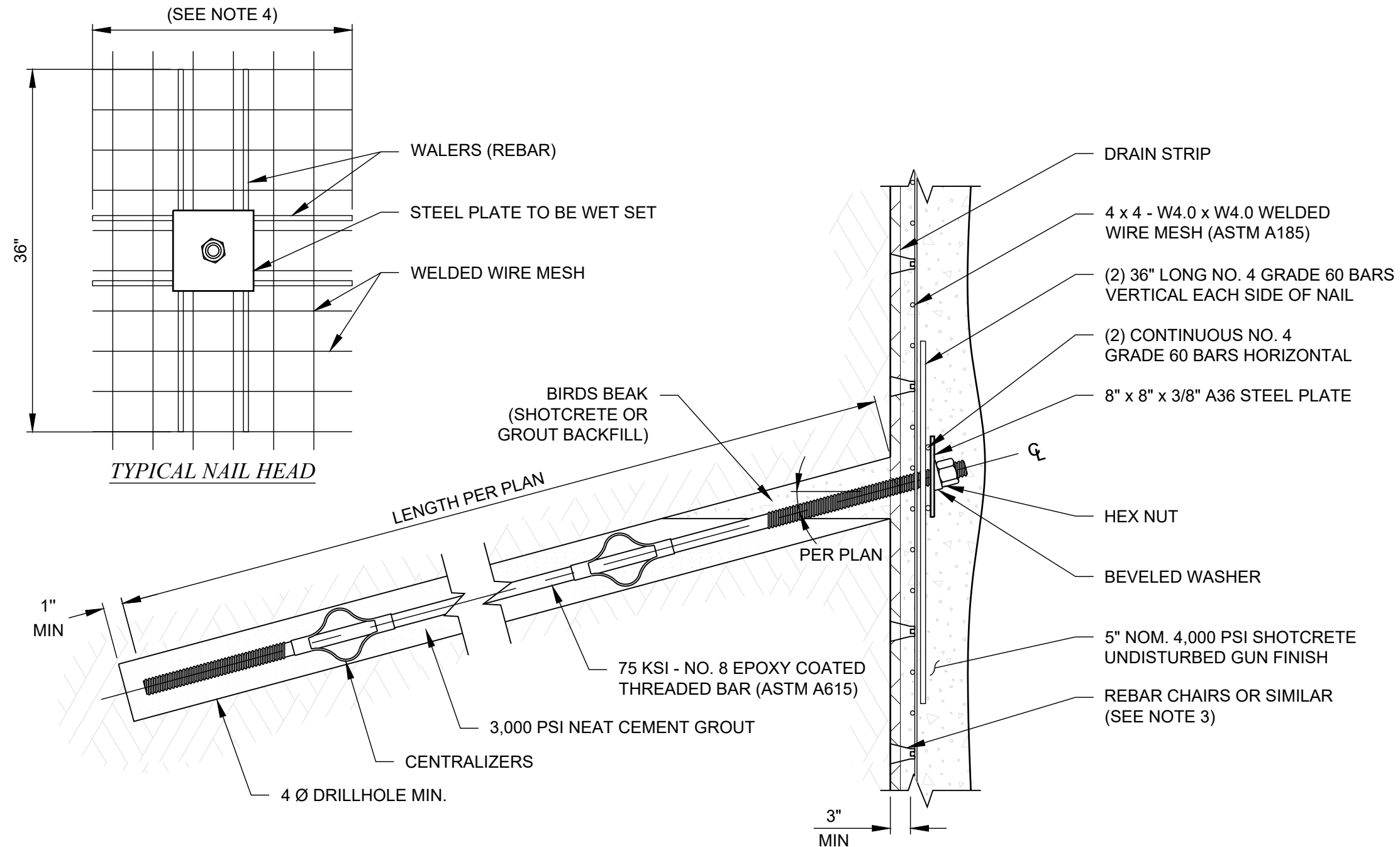
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- NOTES:
- LAP SPLICE LENGTH
 - NO. 4 REBAR - 24" MINIMUM
 - NO. 5 REBAR - 30" MINIMUM
 - WELDED WIRE MESH TO HAVE A MINIMUM OF 8" OVERLAP (2 SQUARES OVERLAP FOR 4 x 4 MESH).
 - REBAR CHAIRS OR EQUIVALENT TO BE USED TO ENSURE SUFFICIENT CONCRETE COVER BETWEEN GROUND SURFACE AND REINFORCEMENT. 2 TO 3 DOBIES PER 5' x 10' SHEET OF MESH, TYPICAL.
 - HORIZONTAL WALERS ARE CONTINUOUS
 - INSTALL CENTRALIZERS ALONG THE LENGTH OF THE SOIL NAIL AT INTERVALS NOT GREATER THAN 8' (2.5m) FROM EACH OTHER. THE CENTRALIZERS ON THE ENDS OF THE NAIL SHALL BE INSTALLED 1.5' (0.5m) FROM THE COLLAR OF THE HOLE AND THE BOTTOM OF THE HOLE.

A **SOLID BAR ROCK ANCHOR DETAIL**
SCALE: 1" = 1'

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NAIL ID	DATE		EMBEDMENT LENGTH (ft)		NAIL ID	DATE		EMBEDMENT LENGTH (ft)		NAIL ID	DATE		EMBEDMENT LENGTH (ft)	
	DRILLED	GROUTED	SOIL	ROCK		DRILLED	GROUTED	SOIL	ROCK		DRILLED	GROUTED	SOIL	ROCK
1					48					95				
2					49					96				
3					50					97				
4					51					98				
5					52					99				
6					53					100				
7					54					101				
8					55					102				
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37					84					131				
38					85					132				
39					86					133				
40					87					134				
41					88					135				
42					89					136				
43					90					137				
44					91					138				
45					92									
46					93									
47					94									

REVIEWED
FOR
CODE
COMPLIANCE
04/01/2025

ISSUED FOR PERMIT

SHEET REVISIONS			PROJECT NAME: THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7						 4475 E 74th Ave, Suite 100 Commerce City, CO 80022 USA Phone: 855.579.0536 Fax: 970.245.7737 www.geostabilization.com	
DATE	DESCRIPTION	NO								
05/08/24	ISSUED FOR PERMIT	IFP								
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			FHT	FHT	EL/MWL	05/08/2024	166127629	240057CO0N	C-12	

NAIL ID	DATE		EMBEDMENT LENGTH (ft)		NAIL ID	DATE		EMBEDMENT LENGTH (ft)		
	DRILLED	GROUTED	SOIL	ROCK		DRILLED	GROUTED	SOIL	ROCK	
139					186					
140					187					
141					188					
142					189					
143					190					
144					191					
145					192					
146					193					
147					194					
148					195					
149					196					
150					197					
151					198					
152					199					
153					200					
154					201					
155					202					
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185										


MUD BALANCE TESTING - SPECIFIC GRAVITY (ASTM D4380)

DATE	NAIL ID*	READING - SP. GR. (1.75-1.84, TYP GSI)**

*APPROXIMATE NAIL NUMBER GROUTED WITH SAMPLED BATCH.
** SAMPLE SHALL BE TAKEN FROM END OF GROUT HOSE.

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FOR
CODE
COMPLIANCE
04/01/2025

ISSUED FOR PERMIT

SHEET REVISIONS			PROJECT NAME:					<div><p>4475 E 74th Ave, Suite 100 Commerce City, CO 80022 USA Phone: 855.579.0536 Fax: 970.245.7737 www.geostabilization.com</p></div>					
DATE	DESCRIPTION	NO	SHEET TITLE:										
05/08/24	ISSUED FOR PERMIT	IFP	THE ASTRID, 2410 SKI TRAIL LANE - BUILDING 7										
			NAIL SCHEDULE										
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			FHT	FHT	EL/MWL	05/08/2024	166127629	240057CO0N	C-13				

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