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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

LIST OF ROADWAY
STANDARDS

EFF. 01-16-2024
REV.

2024 ROADWAY STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Contracts Standards and Development Unit - N. C. Department of Transportation - Raleigh, N. C., Dated January 16, 2024 are applicable to this project and by reference here by are considered a part of these plans:

STD. NO.	TITLE
DIVISION 8 - INCIDENTALS	
862.01	Guardrail Placement (Use Details in Lieu of Standards for Sheets 4, 6, 12, and 14 of 15)
862.02	Guardrail Installation (Use Details in Lieu of Standards for Sheets 5 of 9)
876.03	Drainage Ditches with Class 'A' Rip Rap
876.04	Drainage Ditches with Class 'B' Rip Rap

CONTRACT: DN01091

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

HELENE
EMERGENCY REPAIRS

COUNTY TRANSYLVANIA AND HENDERSON
PROJECT DESCRIPTION 6 SITES ON OLD HENDERSONVILLE HWY, JETER MOUNTAIN RD AND PLEASANT GROVE RD



DocuSigned by:
J. Dean Hardister
6E970DAF500D403

02/17/2025

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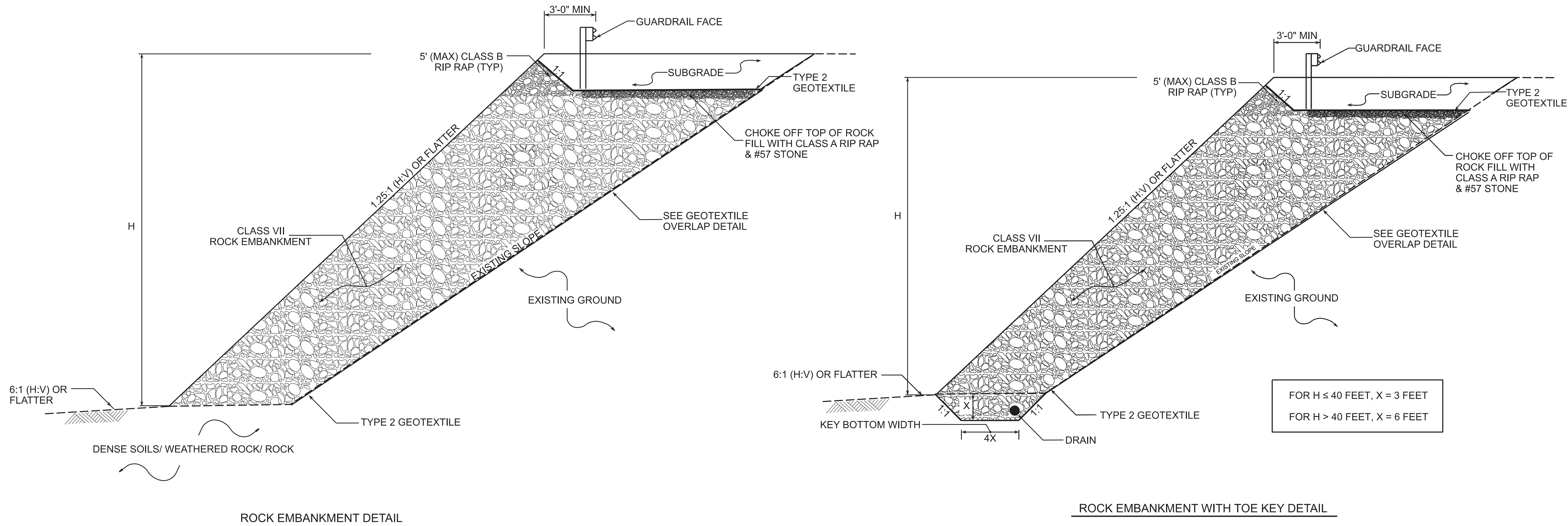
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ROUTE	SITE #	SITE LATITUDE	SITE LONGITUDE	REPAIR OPTION 1	REPAIR OPTION 2	REPAIR OPTION 3
SR-1504 Old Hendersonville Highway	332	35.2761203	-82.63266691	1.25:1 Rock Embankment with Toe Key		
SR-1529 Jeter Mountain Road	608	35.26152209	-82.6238951	Rock Plating		
SR-1529 Jeter Mountain Road	609	35.25982234	-82.62234924	Rock Plating		
SR-1529 Jeter Mountain Road	610	35.2591603	-82.62183272	Soil Nail Retaining Wall with Shotcrete Face + 2x3 Micropile Grade Beam		
SR-1529 Jeter Mountain Road	903	35.2606239	-82.62327791	Clear loose material to edge of pavement + 1.25:1 Rock Embankment with Toe Key		
SR-1201 Pleasant Grove Road	2317	35.27077891	-82.60863884	Soil Nail Retaining Wall with Shotcrete Face + 2x3 Micropile Grade Beam; 1.25:1 Rock Embankment with Toe Key (outside of driveway)		

WHEN MULTIPLE REPAIR OPTIONS ARE AVAILABLE AT A SITE LOCATION, THE CONTRACTOR SHALL PROCEED IN SEQUENTIAL ORDER AND CHOOSE THE FIRST OPTION THAT FITS WITHIN SITE CONSTRAINTS

PRIOR TO CONSTRUCTING THE GEOTECHNICAL REPAIRS, AN ON-SITE MEETING WITH THE PRIME CONTRACTOR, THE GEOTECHNICAL SPECIALTY SUBCONTRACTOR (IF APPLICABLE), THE DIVISION CONSTRUCTION REPRESENTATIVE AND THE GEOTECHNICAL OPERATIONS GROUP REPRESENTATIVE SHALL BE CONDUCTED

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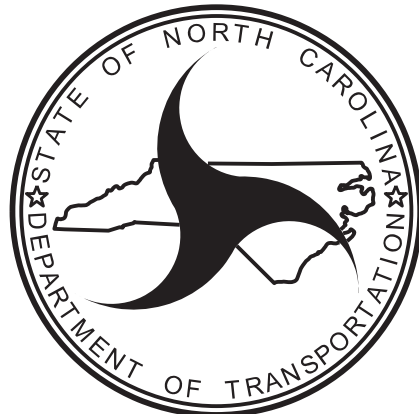
NOTES:

1. THE MAXIMUM ALLOWABLE HEIGHT FOR THE ROCK EMBANKMENT DETAIL IS 80'.
2. FOR ROCK EMBANKMENT, BENCH EXISTING SLOPE IN ACCORDANCE WITH SECTION 235 OF THE STANDARD SPECIFICATIONS, WHERE POSSIBLE.

CONTRACT NO.: DN01091

PREPARED BY: DP	DATE: 10/24
REVIEWED BY:	DATE:

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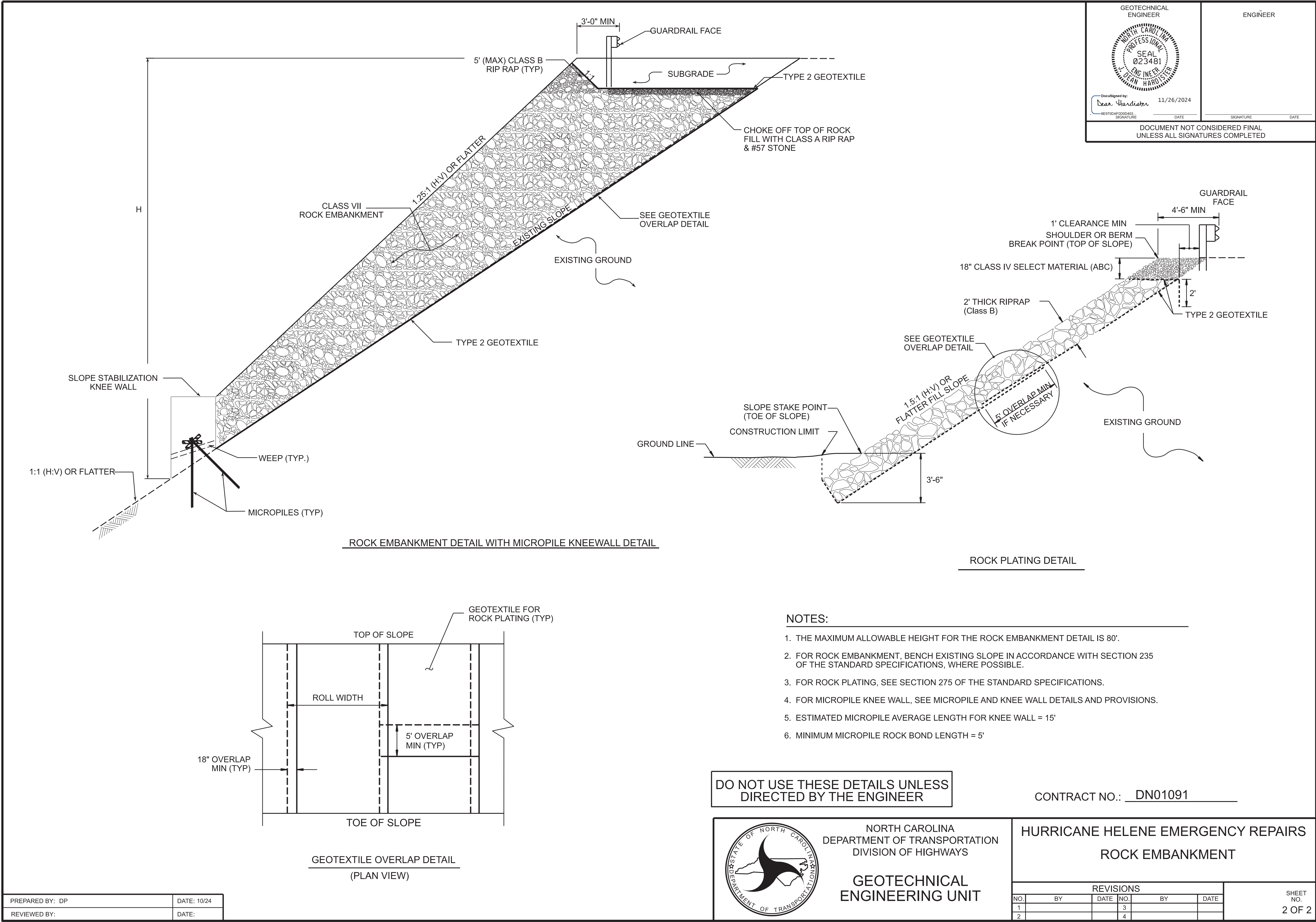
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS
ROCK EMBANKMENT

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET
NO.
1 OF 2



GEOTECHNICAL ENGINEER



DocuSigned by:
Dean Hardister
6E970CAF0000403
SIGNATURE

ENGINEER

11/26/2024

DATE

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NOTES:

1. THE MAXIMUM ALLOWABLE HEIGHT FOR THE ROCK EMBANKMENT DETAIL IS 80'.
2. FOR ROCK EMBANKMENT, BENCH EXISTING SLOPE IN ACCORDANCE WITH SECTION 235 OF THE STANDARD SPECIFICATIONS, WHERE POSSIBLE.
3. FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.
4. FOR MICROPILE KNEE WALL, SEE MICROPILE AND KNEE WALL DETAILS AND PROVISIONS.
5. ESTIMATED MICROPILE AVERAGE LENGTH FOR KNEE WALL = 15'
6. MINIMUM MICROPILE ROCK BOND LENGTH = 5'

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CONTRACT NO.: DN01091



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS
ROCK EMBANKMENT

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO.
2 OF 2



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SITE NO.	ESTIMATED SOIL NAIL AVERAGE LENGTH
610	15
2317	25

CONTRACT NO.: DN01091



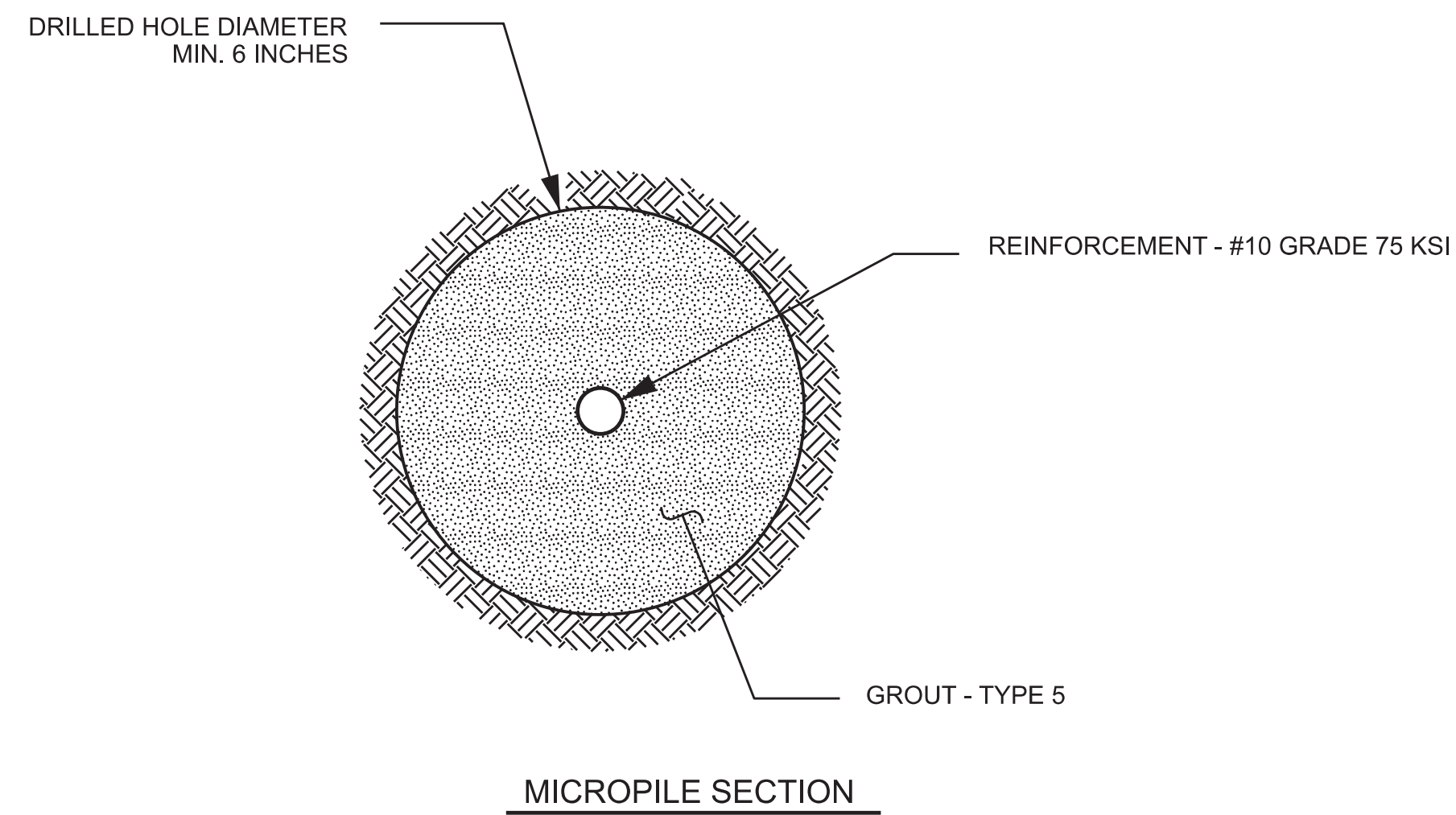
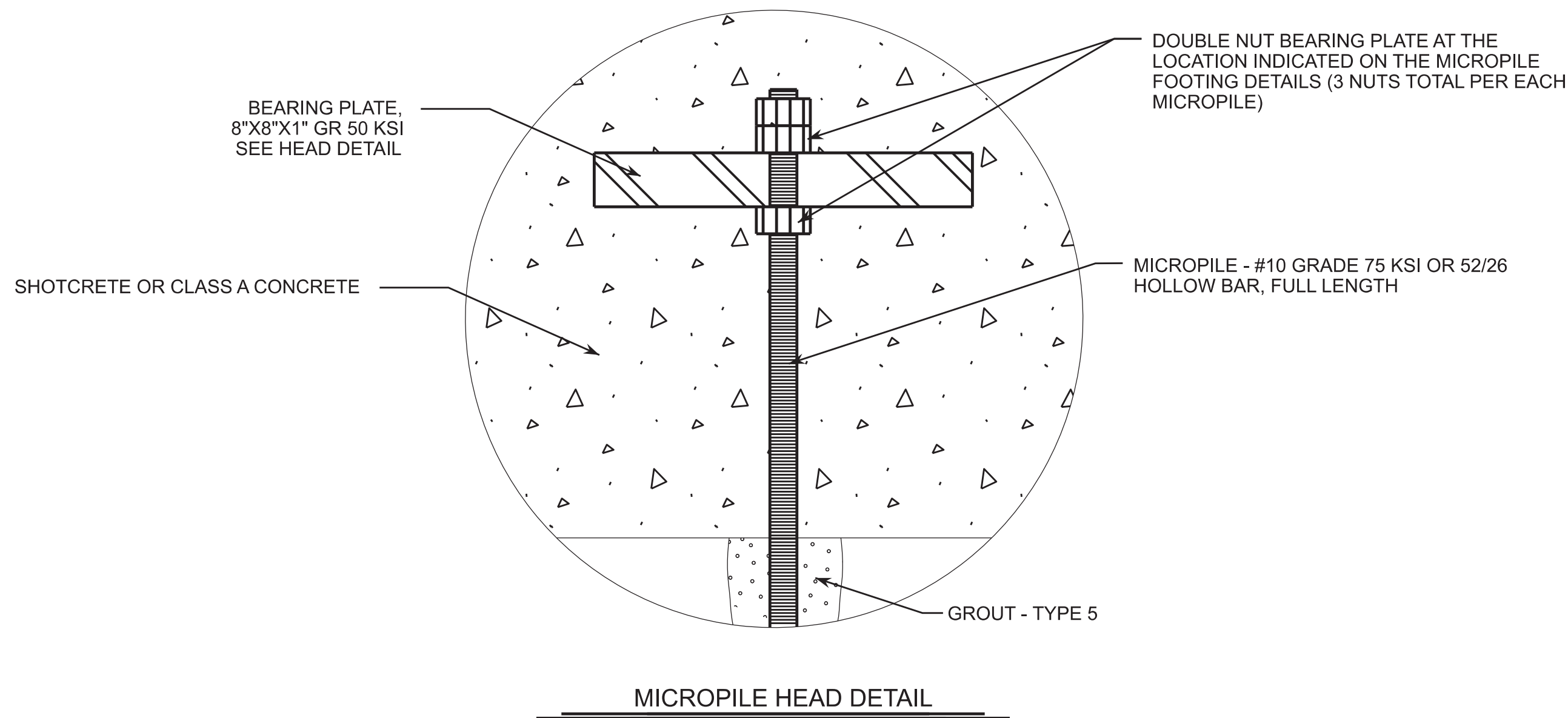
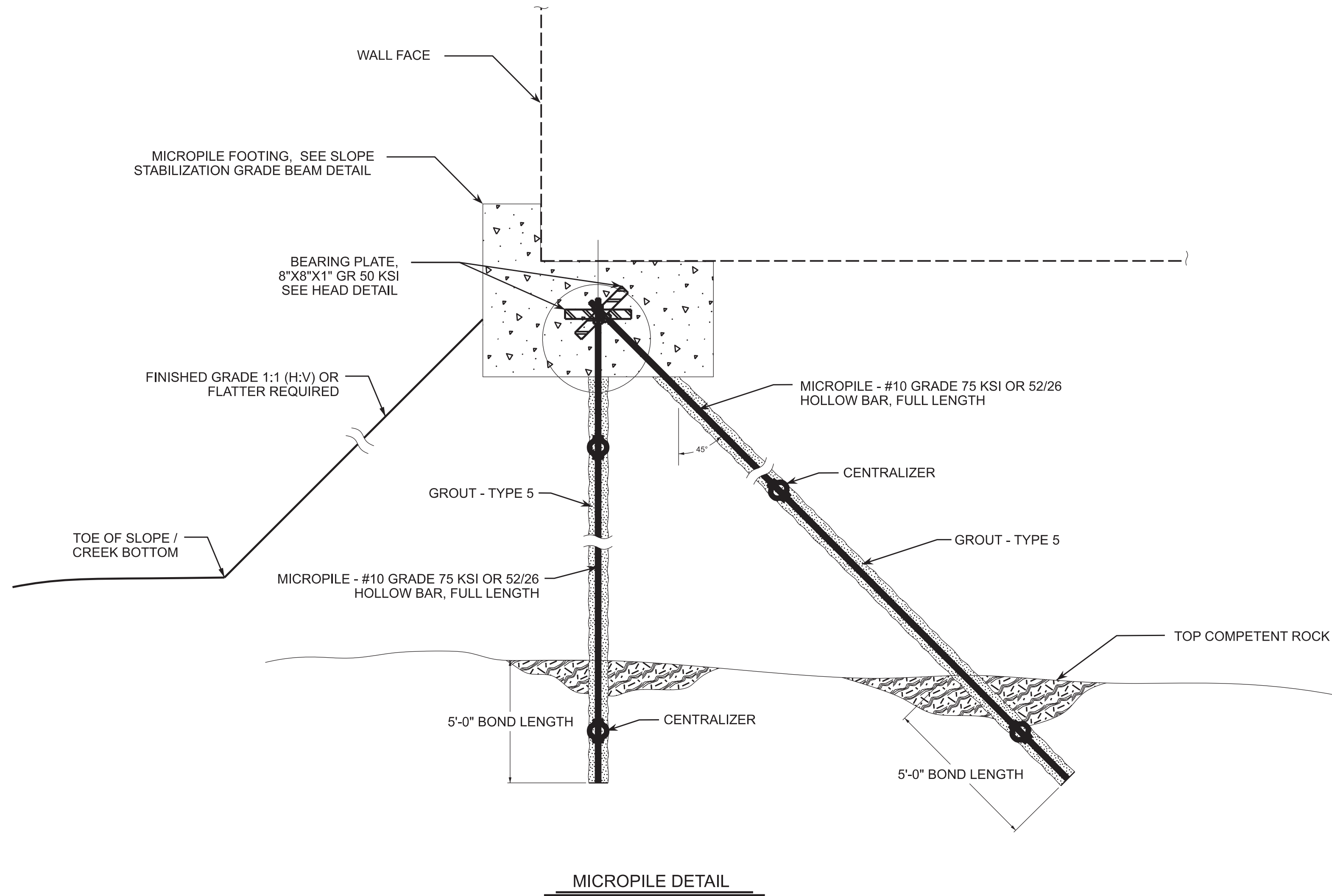
HURRICANE HELENE EMERGENCY REPAIRS
SOIL NAIL RETAINING WALL
WITH SHOTCRETE FACING

REVISIONS					
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1			3		
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SHEET
NO.
1 OF 2

DO NOT USE THESE DETAILS UNLESS
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PREPARED BY: MS	DATE: 10/24
REVIEWED BY:	DATE:



NOTES:

GENERAL NOTES:

1. THE MICROPILES HAVE BEEN DESIGNED IN GENERAL ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. THE MICROPILE FOUNDATIONS HAVE BEEN DESIGNED TO SUPPORT A LOAD OF 60 KIPS IN COMPRESSION AND TENSION.
2. LAYOUT OF THE PILES SHALL BE BY THE GENERAL CONTRACTOR. MICROPILE LAYOUT IS BASED ON PILE LOCATION AT THE BOTTOM OF THE MICROPILE CAP. GENERAL CONTRACTOR SHALL LAY OUT PILES BASED ON DRILLING ELEVATION SUCH THAT THE MICROPILE LOCATION WILL BE AT THE PLANNED LOCATION AT THE BOTTOM OF THE PILE CAP.

MATERIAL SPECIFICATIONS:

1. FOR MICROPILE USE TYPE 5 GROUT, SEE SECTION 1003 OF THE STANDARD SPECIFICATIONS.
2. PROVIDE STEEL PLATES THAT MEET ASTM A572 GRADE 50 KSI.
3. ALL THREAD MICROPILE REINFORCEMENT SHALL BE MINIMUM GRADE 75 KSI.
4. MICROPILE NUTS WILL BE MANUFACTURED BY THE BAR MANUFACTURER AND COMPATIBLE WITH THE BAR TYPE SPECIFIED.
5. CENTRALIZERS- PLASTIC, STAINLESS STEEL, OR OTHER NON-DELETERIOUS MATERIAL WHICH WILL MAINTAIN SHAPE AND LOCATION TO KEEP REINFORCEMENT BAR IN CENTRAL PORTION OF THE DRILL HOLE.

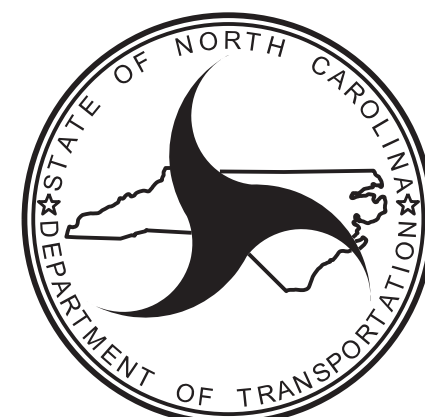
TYPICAL MICROPILE CONSTRUCTION SEQUENCE:

1. WHERE POSSIBLE LEVEL AREA OF MICROPILE FOOTING PRIOR TO DRILLING.
2. IF REQUIRED, INSTALL AND TEST PILES IN ACCORDANCE AASHTO GUIDLINES AS DIRECTED BY THE ENGINEER.
3. ROTARY FLUSH TEMPORARY CASING TO TOP OF ROCK USING AIR OR WATER AS FLUSHING MEDIUM. CARE SHALL BE TAKEN SO MINIMAL LOSS OF MATERIALS OUTSIDE THE THE TEMPORARY CASING OCCURS.
4. USE ROTARY PERCUSSIVE DRILLING TO DRILL ROCK SOCKET TO REQUIRED DEPTH. MINIMUM BOND LENGTH IS 5 FEET INTO COMPETENT ROCK, WITH A MINIMUM OVERALL LENGTH OF AT LEAST 10 FT.
5. PLACE GROUT FOR MICROPILES BY TREMIE METHOD FROM BOTTOM OF THE HOLE.
6. FOR SOLID BAR MICROPILES, INSTALL CENTER CORE REINFORCEMENT STEEL (STEEL MAY BE PLACED PRIOR TO OR IMMEDIATELY AFTER GROUTING).
7. CUT TOPS OF PILES TO FINAL ELEVATION AND INSTALL PLATES. FOR MICROPILES AND MICROPILE FOOTING, SEE MICROPILE SLOPE STABILIZATION PROVISION.

CONTRACT NO.: DN01091

PREPARED BY: MS	DATE: 10/24
REVIEWED BY:	DATE:

DO NOT USE THESE DETAILS UNLESS
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NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS
MICROPILES

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET
NO.
2 OF 2



NOTES

DESIGN ASSUMPTIONS:

- ANCHOR/VERTICAL MICROPILE LOAD OF 55 KIPS.
- VERTICAL LOAD OF 4.6 KIPS/SQFT.
- LATERAL LOAD OF 4.9 KIPS/SQFT.

INVERT ALTERNATE STIRRUPS AS SHOWN.

STIRRUPS MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR MICROPILES.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE
MCP DETAILS.

BEARING PLATES SHALL BE GRADE 50 STEEL.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL			
BAR	SIZE	TYPE	LENGTH
B1	#7	STR.	-
B2	#5	STR.	-
B3	#4	STR.	2'-6"
-	-	-	-
S1	#4	1	6'-5"
S2	#4	2	3'-5"
-	-	-	-
U1	#4	3	5'-6"
REINFORCING STEEL =			45 LBS./LIN.FT.
CLASS A CONCRETE =			0.3 CU.YD./LIN.FT.

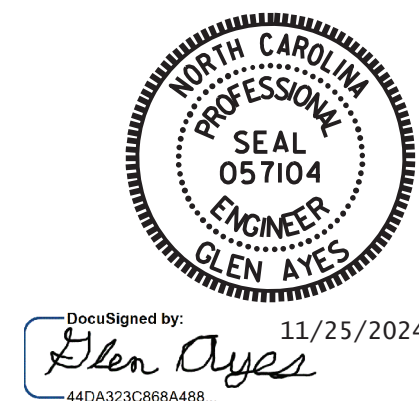
DRAWN BY : NAP DATE : 11/24
 CHECKED BY : G. AYES DATE : 11/24
 DESIGN ENGINEER OF RECORD: G. AYES DATE : 11/24

11/20/2024
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napierce

CONTRACT NO.: DN01091

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SLOPE STABILIZATION
2'-0" X 3'-0"
GRADE BEAM**



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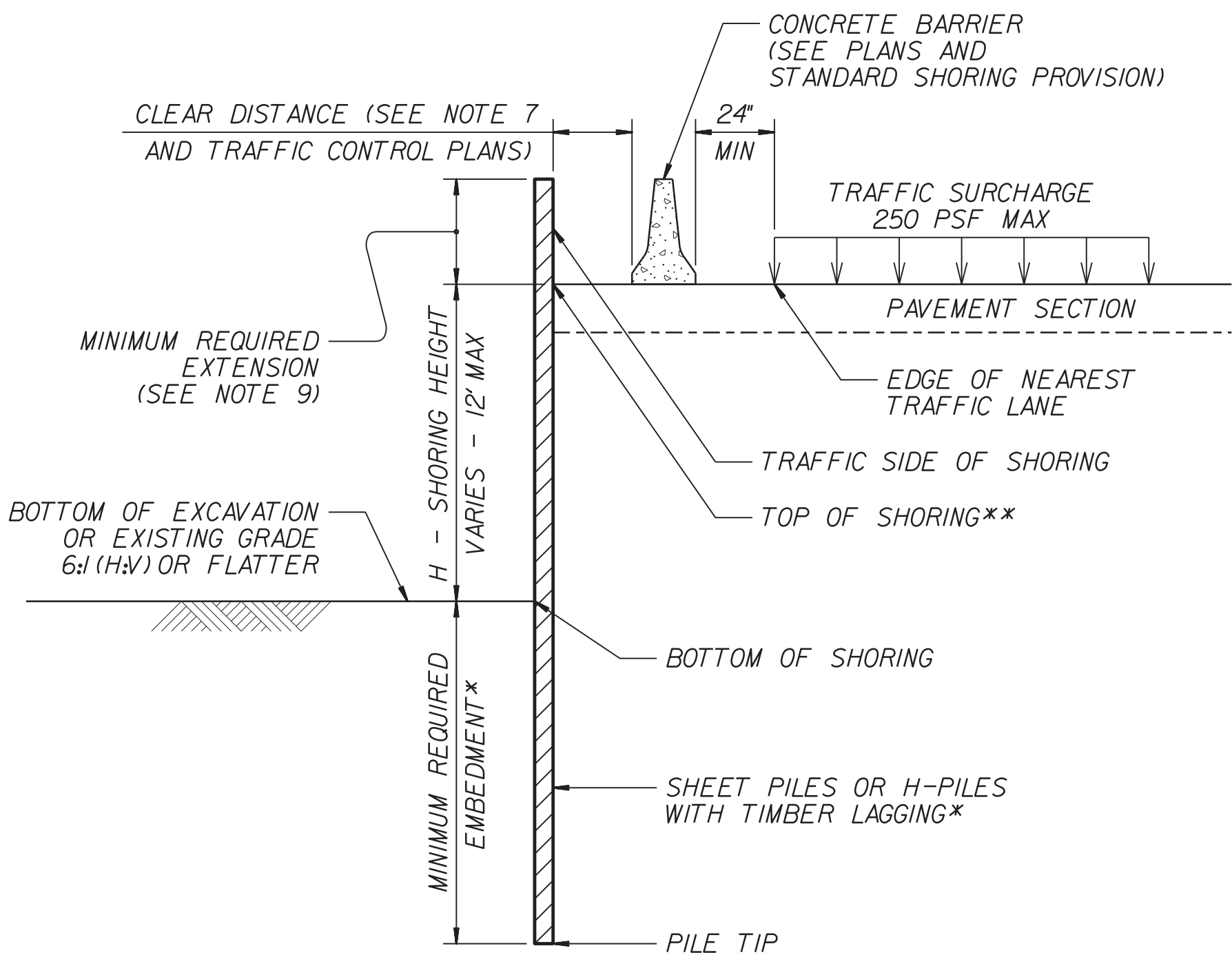
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ³ /FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)			MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ³ /FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)		
				HP 10x42	HP 12x53	HP 14x73			HP 10x42	HP 12x53	HP 14x73
GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP	< 6	11.5	4.5	11.5	11.5	11.5	16.0	12.0	13.0	13.0	13.0
	7	13.0	7.0	13.0	13.0	13.0	17.0	14.5	14.5	14.5	14.5
	8	15.0	10.0	--	15.0	15.0	18.0	17.0	--	15.5	15.5
	9	17.0	14.0	--	17.0	17.0	19.0	20.0	--	17.0	17.0
	10	18.5	19.5	--	--	18.5	20.0	23.5	--	--	18.5
	11	20.5	26.0	--	--	--	21.0	28.0	--	--	20.0
	12	22.5	33.0	--	--	--	22.0	33.0	--	--	21.5
GROUNDWATER ELEVATION BELOW PILE TIP	< 6	7.5	3.0	8.0	8.0	8.0	11.0	10.0	9.5	9.5	9.5
	7	8.5	4.5	9.5	9.5	9.5	12.0	12.0	10.5	10.5	10.5
	8	10.0	6.5	10.5	10.5	10.5	12.5	14.0	11.5	11.5	11.5
	9	11.0	9.5	--	12.0	12.0	13.5	16.5	--	12.5	12.5
	10	12.5	13.0	--	--	13.5	14.0	19.5	--	13.5	13.5
	11	13.5	17.0	--	--	14.5	15.0	22.5	--	--	14.5
	12	15.0	21.5	--	--	16.0	16.0	25.5	--	--	15.5

MINIMUM REQUIRED EMBEDMENT AND SECTION MODULUS

*DO NOT USE H-PILES WITH TIMBER LAGGING FOR
GROUNDWATER CONDITION, SHORING HEIGHT AND H-PILE
SIZE SHOWN IF MINIMUM REQUIRED EMBEDMENT IS "--".

NOTES:

- AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
- FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
- STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, γ = 120 PCF
FRICTION ANGLE, ϕ = 30 DEGREES
COHESION, c = 0 PSF
- DO NOT USE STANDARD TEMPORARY SHORING IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
- DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS WITHIN THE EMBEDMENT DEPTH.
- USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, USE "GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP" FOR GROUNDWATER CONDITION. DO NOT USE STANDARD TEMPORARY SHORING IF GROUNDWATER IS ABOVE BOTTOM OF SHORING.
- AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN THE MINIMUM REQUIRED FOR CONCRETE BARRIER, SET BARRIER NEXT TO AND UP AGAINST TRAFFIC SIDE OF PILES AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
- AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN 4' FOR TEMPORARY GUARDRAIL, ATTACH GUARDRAIL TO TRAFFIC SIDE OF PILES AS SHOWN IN THE PLANS AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
- MINIMUM REQUIRED EXTENSION IS 6" FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".
- MINIMUM REQUIRED EMBEDMENT FOR H-PILES WITH TIMBER LAGGING IS BASED ON DRIVEN H-PILES AT MAXIMUM 6' SPACING. AT THE CONTRACTOR'S OPTION, EMBEDMENT DEPTHS MAY BE REDUCED BY 25% FOR DRILLED-IN H-PILES.
- SUBMIT A "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY SHORING CONSTRUCTION. UP TO 3 SHORING LOCATIONS MAY BE INCLUDED ON EACH FORM. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM:
connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
- CONTACT THE ENGINEER IF PILES DO NOT ATTAIN THE MINIMUM REQUIRED EMBEDMENT.

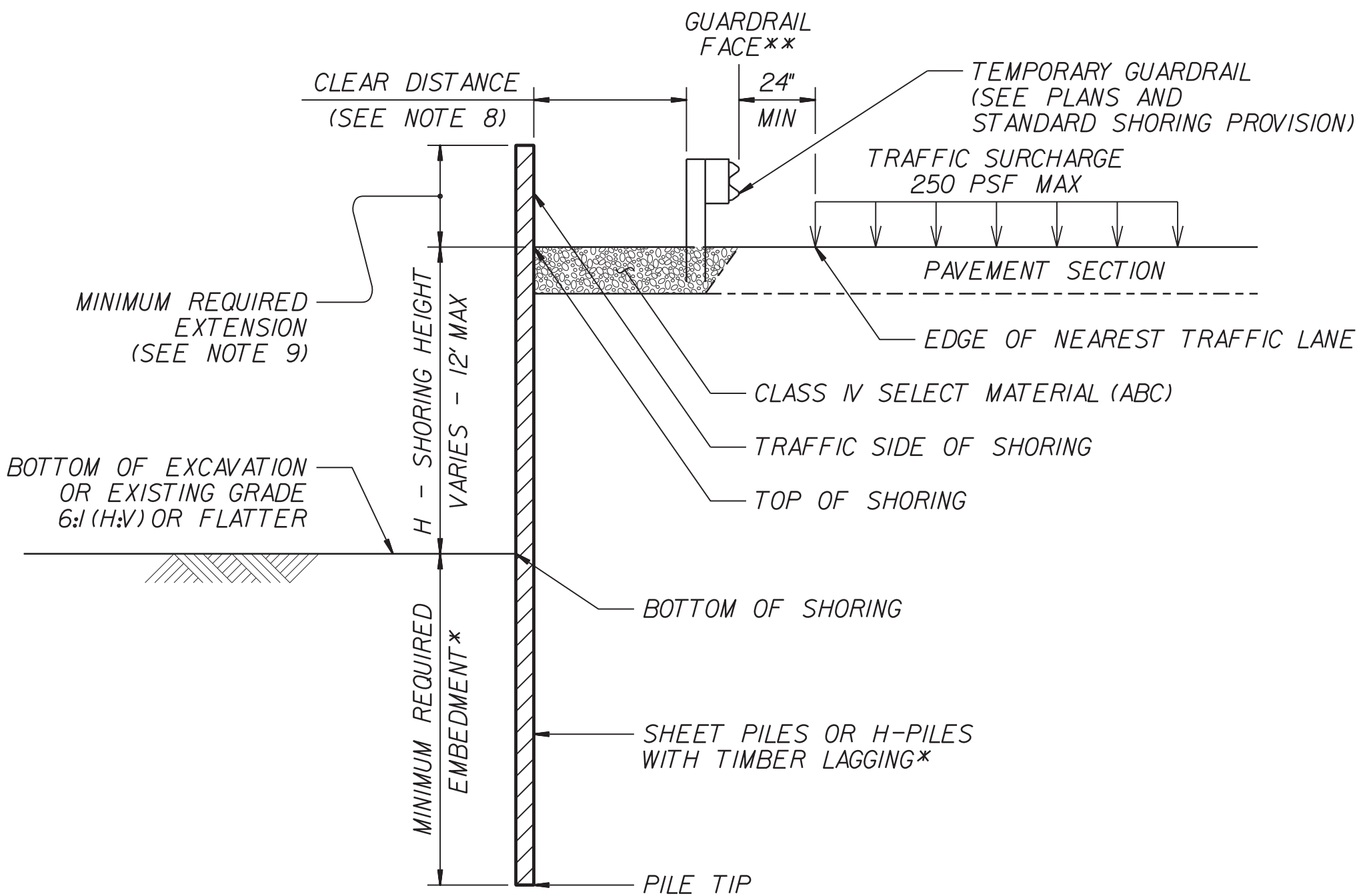


CONCRETE BARRIER

**TOP OF SHORING =
EDGE OF PAVEMENT

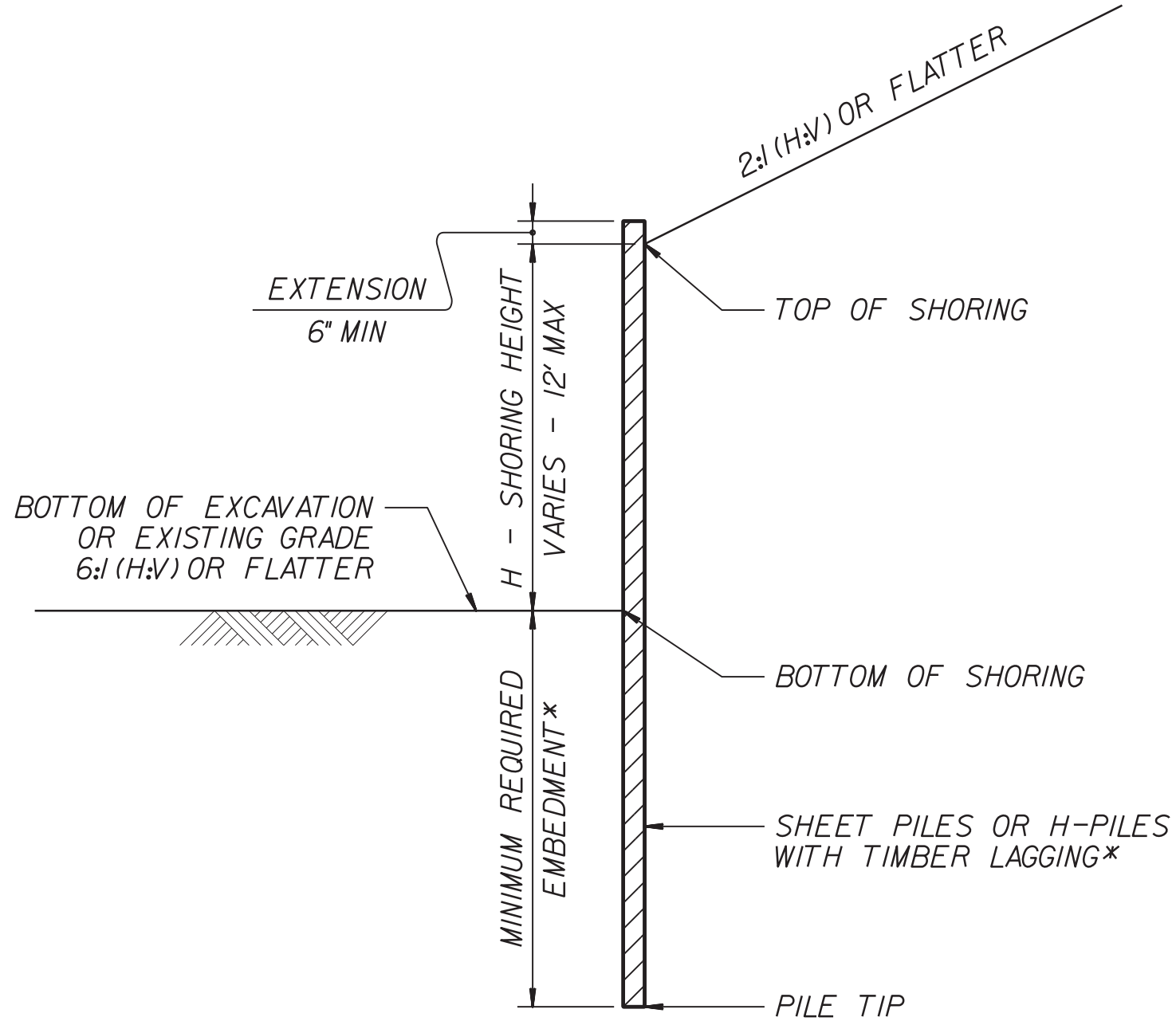
STANDARD TEMPORARY SHORING

(SURCHARGE CASE)
*SEE TABLE ABOVE.



TEMPORARY GUARDRAIL

**GUARDRAIL FACE =
EDGE OF PAVEMENT



STANDARD TEMPORARY SHORING

(SLOPE CASE)
*SEE TABLE ABOVE.

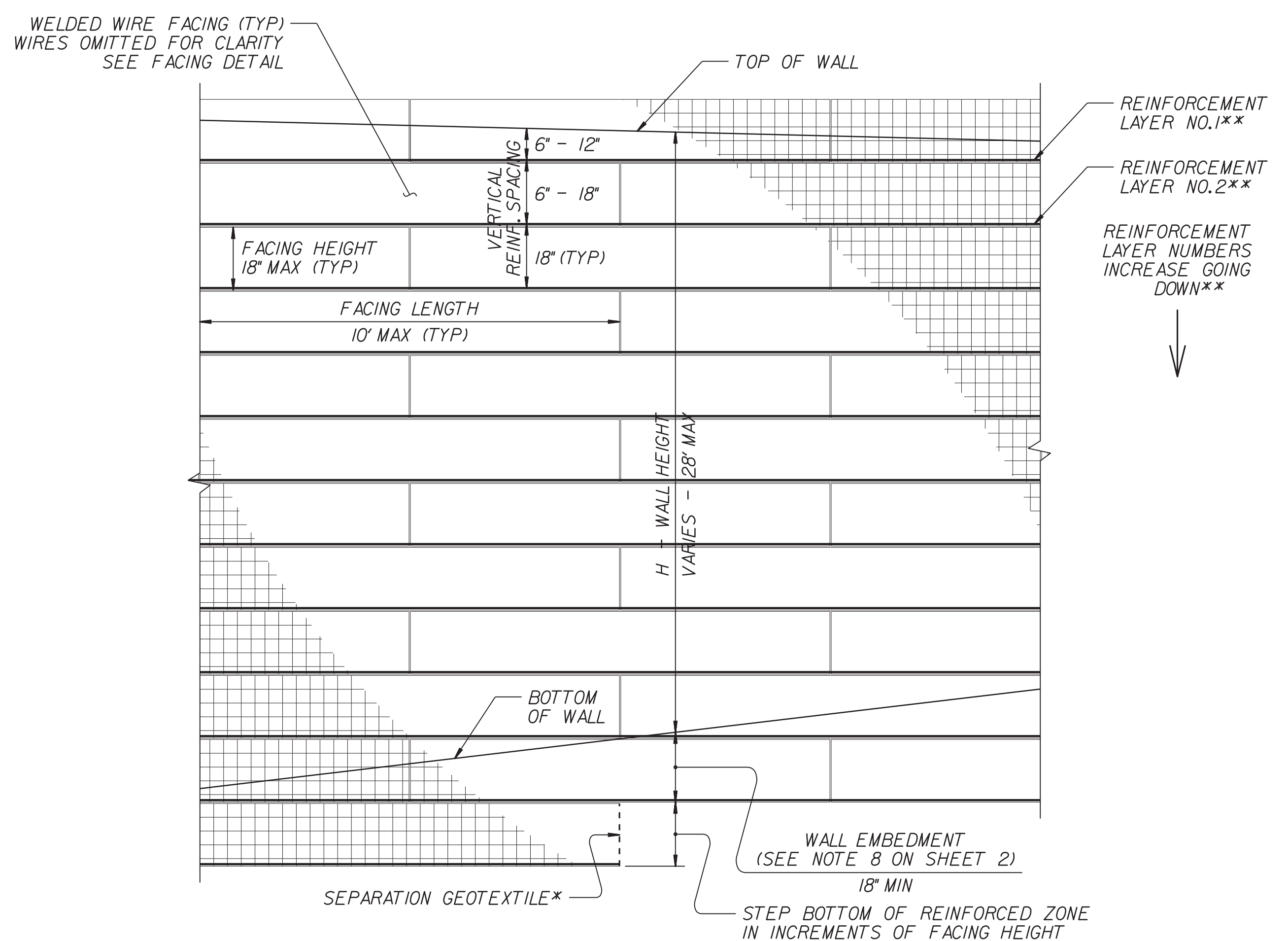
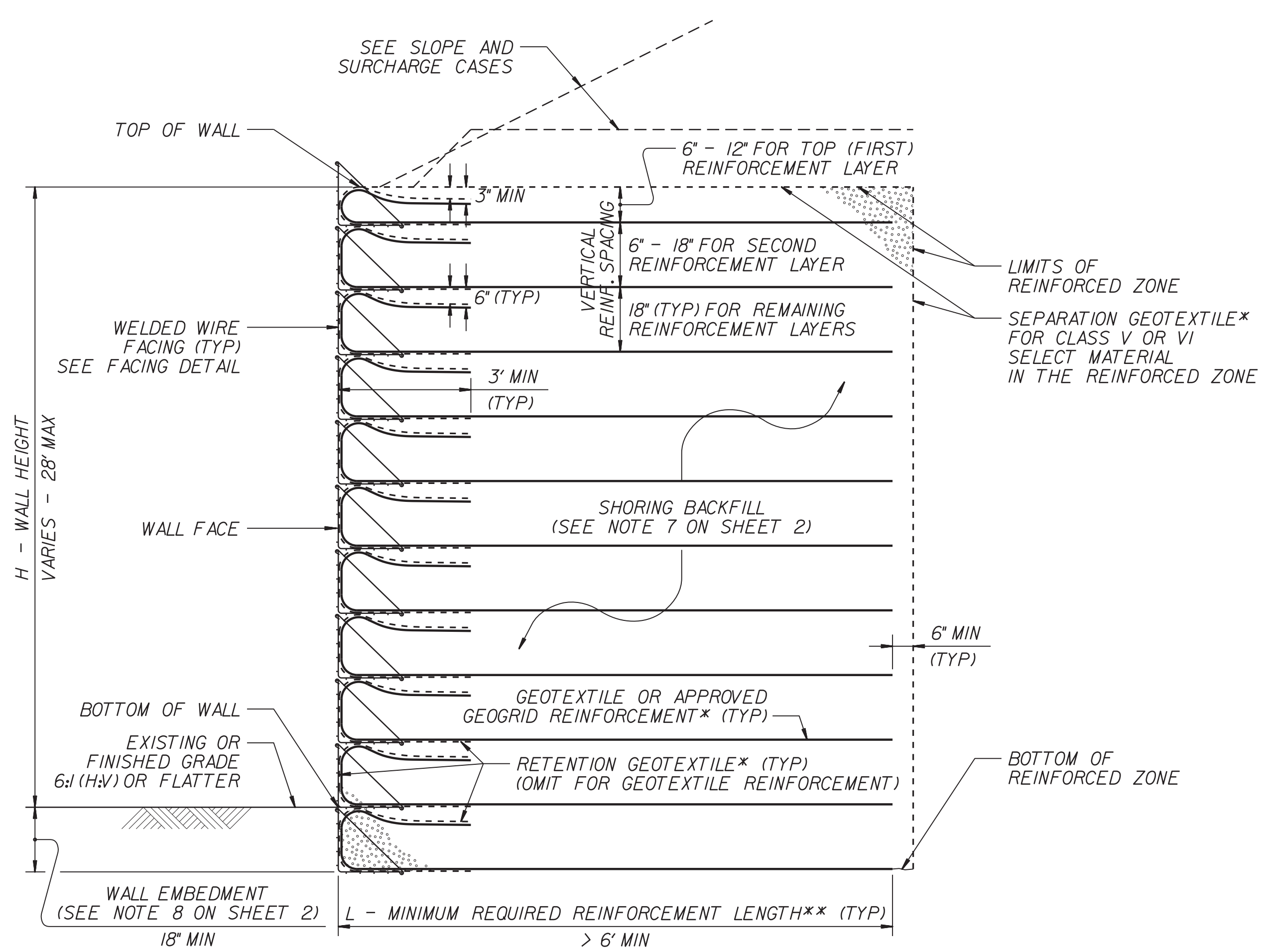
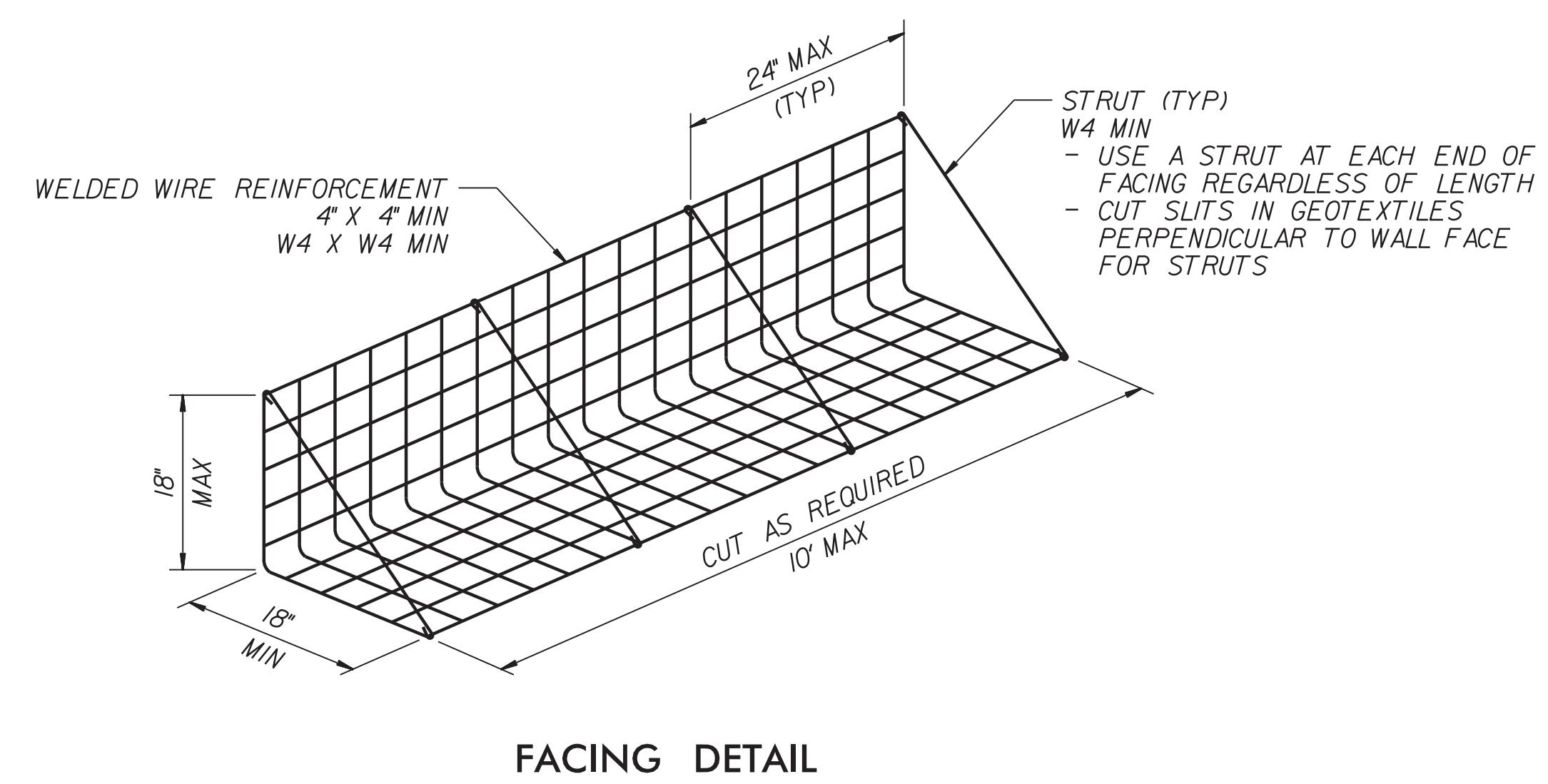
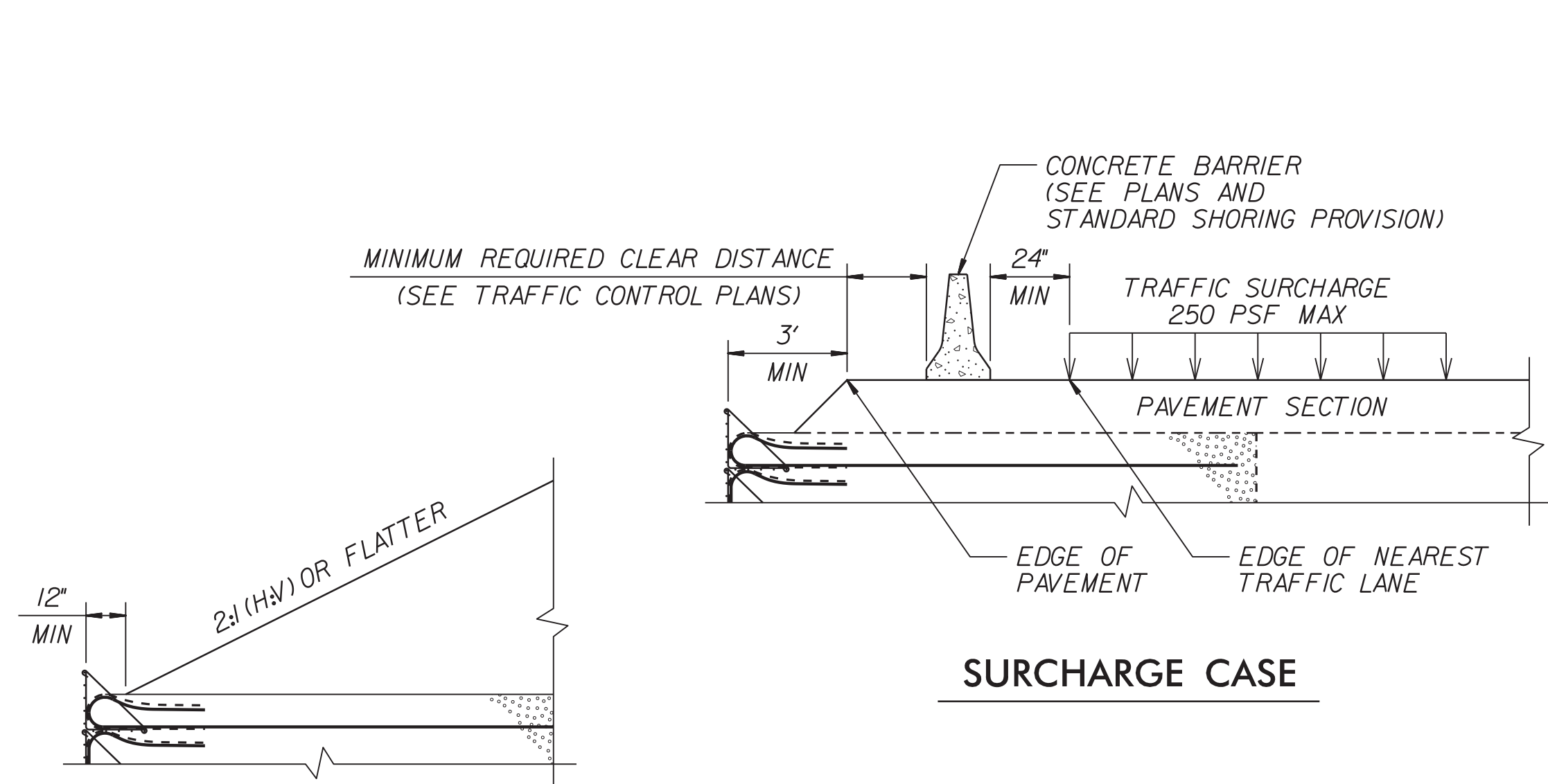


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GEOTECHNICAL
ENGINEERING UNIT

STANDARD DETAIL NO. 1801.01

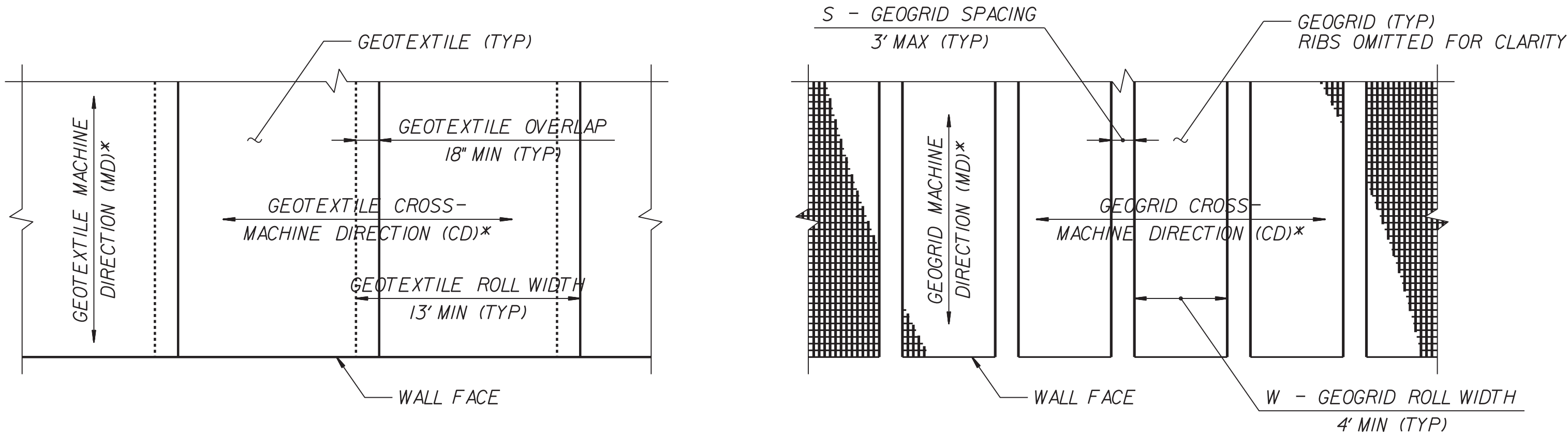
STANDARD
TEMPORARY SHORING



STANDARD TEMPORARY WALL - PARTIAL ELEVATION

*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.

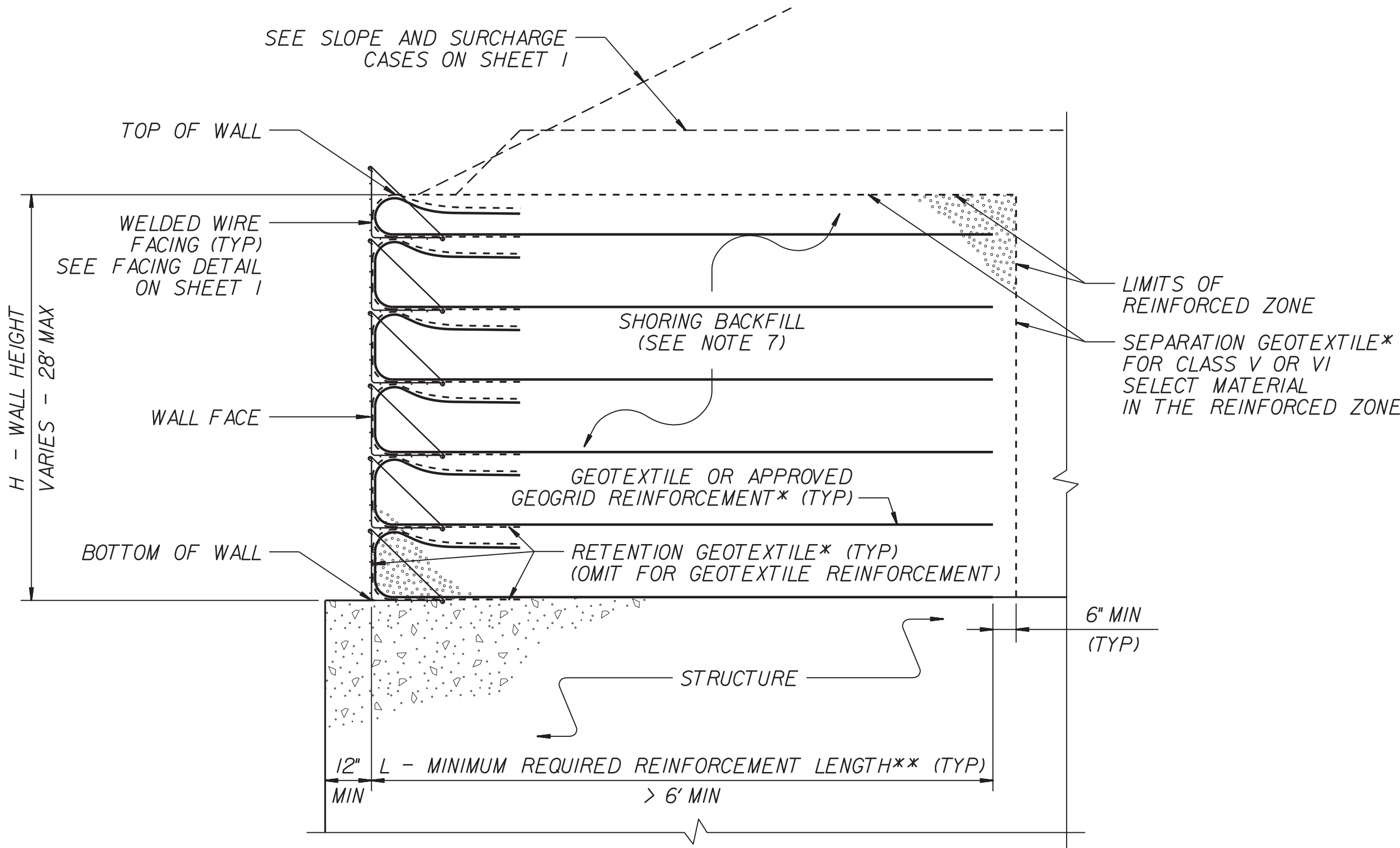
**SEE REINFORCEMENT TABLES ON SHEET 3.



GEOTEXTILE PLACEMENT
(100% COVERAGE MIN FOR
GEOTEXTILE REINFORCEMENT)

GEOGRID PLACEMENT
(80% COVERAGE MIN FOR
GEOGRID REINFORCEMENT –
 $\frac{W}{W+S} \times 100 \geq 80\%$,
SEE NOTE 11)

GEOSYNTHETIC PLACEMENT DETAILS
(PLAN VIEW)
*SEE NOTE 12.



TEMPORARY WALL ON STRUCTURE DETAIL
*SEE GEOSYNTHETIC PLACEMENT DETAILS.
**SEE REINFORCEMENT TABLES ON SHEET 3.

- NOTES:
1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY WALLS AS NOTED IN THE PLANS.
 2. FOR STANDARD TEMPORARY WALLS, SEE STANDARD SHORING PROVISION.
 3. STANDARD TEMPORARY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, $\gamma = 120$ PCF
FRICTION ANGLE, $\phi = 30$ DEGREES
COHESION, $c = 0$ PSF
 4. DO NOT USE STANDARD TEMPORARY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
 5. DO NOT USE STANDARD TEMPORARY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW TEMPORARY WALLS.
 6. USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, ASSUME GROUNDWATER DEPTH IS LESS THAN 7' BELOW BOTTOM OF REINFORCED ZONE. DO NOT USE STANDARD TEMPORARY WALLS IF GROUNDWATER OR FLOOD ELEVATION IS ABOVE BOTTOM OF REINFORCED ZONE.
 7. DO NOT USE A-2-4 SOIL FOR STANDARD TEMPORARY WALLS AROUND CULVERTS OR IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS FOR SLOPE CASES. DO NOT USE CLASS VI SELECT MATERIAL IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS WITH GEOTEXTILE REINFORCEMENT.
 8. WALL EMBEDMENT IS NOT REQUIRED FOR STANDARD TEMPORARY WALLS ON STRUCTURES OR ROCK AS DETERMINED BY THE ENGINEER.
 9. DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH STANDARD TEMPORARY WALL.
 10. GEOGRIDS FOR GEOGRID REINFORCEMENT ARE APPROVED FOR SHORT TERM DESIGN STRENGTHS (3-YEAR DESIGN LIFE) IN THE MD AND CD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Products.aspx. DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SHORING BACKFILL AS FOLLOWS:

MATERIAL TYPE	SHORING BACKFILL
BORROW	A-2-4 SOIL
FINE AGGREGATE	CLASS II, TYPE I OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL

11. FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
12. AT THE CONTRACTOR'S OPTION, REINFORCEMENT MAY BE INSTALLED WITH THE MD PARALLEL TO THE WALL FACE IF BOTH OF THE FOLLOWING CONDITIONS OCCUR:
- W (REINFORCEMENT ROLL WIDTH) $\geq$ (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
- REINFORCEMENT STRENGTH IN CD $\geq$ MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
13. SUBMIT A "STANDARD TEMPORARY WALL SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY WALL CONSTRUCTION. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
14. DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
15. FOR STANDARD TEMPORARY WALLS WITH PILE FOUNDATIONS IN THE REINFORCED ZONE, DRIVE PILES THROUGH REINFORCEMENT AFTER CONSTRUCTING TEMPORARY WALLS.
16. DO NOT SPLICE OR OVERLAP REINFORCEMENT SO SEAMS ARE PARALLEL TO THE WALL FACE.
17. CONTACT THE ENGINEER WHEN EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT.
18. FOR STANDARD TEMPORARY WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
19. FOR STANDARD TEMPORARY WALLS WITH TOP OF WALL WITHIN 5' OF FINISHED GRADE, REMOVE TOP FACING AND INCORPORATE TOP REINFORCEMENT LAYER INTO FILL WHEN PLACING FILL IN FRONT OF WALL.

PROJECT REFERENCE NO.
DN01091

SHEET NO.
2G-4

GEOTECHNICAL ENGINEER



DocuSigned by:
*Scott A. Hadden*11/26/2024

7780CA8B89F00D0 SIGNATURE

ENGINEER

DATE

SIGNATURE

DATE

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WALL HEIGHT (H) + WALL EMBEDMENT (FT)	NUMBER OF REINFORCEMENT LAYERS*
2.5 - 4	3
4 - 5.5	4
5.5 - 7	5
7 - 8.5	6
8.5 - 10	7
10 - 11.5	8
11.5 - 13	9
13 - 14.5	10
14.5 - 16	11
16 - 17.5	12
17.5 - 19	13
19 - 20.5	14
20.5 - 22	15
22 - 23.5	16
23.5 - 25	17
25 - 26.5	18
26.5 - 28	19
28 - 29.5	20

*BASED ON VERTICAL REINFORCEMENT SPACING SHOWN ON SHEET 1.

SLOPE OR SURCHARGE CASE	GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)	H - WALL HEIGHT (FT)																									
			< 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
SLOPE CASE	> 0	CLASS II,TYPE I, CLASS III,CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	8	9	11	12	13	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26	27	27	
SURCHARGE CASE	> 0 TO 7 FOR H < 20' > 0 TO 10 FOR H ≥ 20'	ALL SHORING BACKFILL TYPES	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21	22	
	> 7 FOR H < 20' > 10 FOR H ≥ 20'	A-2-4 SOIL	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21	
		CLASS II,TYPE I OR CLASS III SELECT MATERIAL	6	6	7	7	8	8	9	10	10	11	11	12	12	13	14	15	15	16	16	17	17	18	18	19	20	
		CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	7	7	8	8	9	9	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19	

L – MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)
(FOR ALL REINFORCEMENT TYPES)

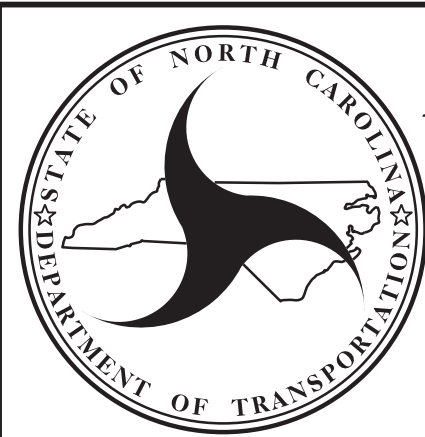
REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400	2400
2	2400	2400	2400	2400	2400
3	2400	2400	2400	2400	2400
4	2400	2400	2500	2400	2400
5	2500	2400	3000	2400	2400
6	3000	2400	3500	2800	2400
7	3500	2700	4000	3200	2600
8	4000	3100	4500	3600	2900
9	4500	3500	5000	4000	3200
10	5000	3900	5500	4400	3500
11	5500	4300	6000	4800	3800
12	6000	4700	6500	5200	4100
13	6500	5100	7000	5600	4400
14	7000	5400	7500	6000	4700
15	7500	5800	8000	6400	5000
16	8000	6200	8500	6800	5300
17	8500	6600	9000	7200	5600
18	9000	7000	9500	7600	5900
19	9500	7400	10000	8000	6200
20	10000	7800	10500	8400	6500

GEOTEXTILE REINFORCEMENT
ULTIMATE TENSILE STRENGTH (LB/FT)

REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL	A-2-4 SOIL	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL
1	240	200	340	290	240
2	380	310	520	430	350
3	530	420	700	570	460
4	690	550	870	720	570
5	860	690	1050	860	680
6	1030	830	1220	1000	790
7	1200	970	1400	1150	900
8	1370	1110	1580	1290	1010
9	1550	1240	1750	1430	1120
10	1720	1380	1930	1580	1230
11	1890	1520	2100	1720	1340
12	2060	1660	2280	1860	1450
13	2240	1800	2450	2010	1560
14	2410	1940	2630	2150	1670
15	2580	2080	2800	2290	1780
16	2750	2220	2980	2440	1890
17	2930	2360	3160	2580	2000
18	3100	2500	3330	2720	2110
19	3270	2640	3510	2860	2220
20	3440	2780	3690	3000	2330

GEOGRID REINFORCEMENT
SHORT-TERM DESIGN STRENGTH (LB/FT)
(SEE NOTE 10 ON SHEET 2.)

MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD
(SEE NOTE 9 ON SHEET 2.)
*SEE PARTIAL ELEVATION ON SHEET 1
FOR REINFORCEMENT LAYER NUMBERING.



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 3 OF 3

SUMMARY OF QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE					1491000000-E	1523000000-E	1575000000-E
				LENGTH	WIDTH	BEGIN MP	END MP	BASE COURSE, B25.0C	SURFACE COURSE, S9.5C	ASPHALT BINDER FOR PLANT MIX
				MI	FT			TONS	TONS	TONS
DF18314.2045240	Henderson	1	SR-1201 / PLEASANT GROVE CHURCH RD	0.04	18	1.08	1.12			
TOTAL FOR MAP NO. 1 (SITE 2317)				0.04						
TOTAL FOR PROJ NO. DF18314.2045240				0.04						
DF18314.2088055	Transylvania	2	SR-1504 / OLD HENDERSONVILLE HWY	0.08	18	0.06	0.14	4	3	0.5
TOTAL FOR MAP NO. 2 (SITE 332)				0.08				4	3	0.5
TOTAL FOR PROJ NO. DF18314.2088055				0.08				4	3	0.5
DF18314.2088059	Transylvania	3	SR-1529 / JETER MOUNTAIN RD	0.08	18	0.76	0.84	5	3	0.5
TOTAL FOR MAP NO. 3 (SITE 608)				0.08				5	3	0.5
TOTAL FOR PROJ NO. DF18314.2088059				0.08				5	3	0.5
DF18314.2088060	Transylvania	4	SR-1529 / JETER MOUNTAIN RD	0.09	18	1.04	1.13	28	15	2
TOTAL FOR MAP NO. 4 (SITE 609)				0.09				28	15	2
TOTAL FOR PROJ NO. DF18314.2088060				0.09				28	15	2
DF18314.2088061	Transylvania	5	SR-1529 / JETER MOUNTAIN RD	0.06	18	1.13	1.19	28	10	2
TOTAL FOR MAP NO. 5 (SITE 610)				0.06				28	10	2
TOTAL FOR PROJ NO. DF18314.2088061				0.06				28	10	2
DF18314.2088091	Transylvania	6	SR-1529 / JETER MOUNTAIN RD	0.04	18	0.89	0.93			
TOTAL FOR MAP NO. 6 (903)				0.04						
TOTAL FOR PROJ NO. DF18314.2088091				0.04						
GRAND TOTAL				0.39				65	31	5

SUMMARY OF QUANTITIES

								6000000000-E	6006000000-E	6009000000-E	6012000000-E	6029000000-E	6036000000-E	6042000000-E	6071010000-E	6084000000-E	6117000000-N	6117500000-N
PROJECT NO	COUNTY	MAP NO	ROUTE	LENGTH	WIDTH	BEGIN MP	END MP	TEMPORARY SILT FENCE	STONE FOR EROSION CONTROL, CLASS A	STONE FOR EROSION CONTROL, CLASS B	SEDIMENT CONTROL STONE	SAFETY FENCE	MATTING FOR EROSION CONTROL	1/4" HARDWARE CLOTH	WATTLE	SEED & MULCHING	RESPONSE FOR EROSION CONTROL	CONCRETE WASHOUT STRUCTURE
				MI	FT			LF	TON	TON	TON	LF	SY	LF	LF	AC	EA	EA
DF18314.2045240	Henderson	1	SR-1201 / PLEASANT GROVE CHURCH RD	0.04	18	1.08	1.12	400	15	15	15	100	1,875	75	30	0.40	3	1
TOTAL FOR MAP NO. 1 (SITE 2317)				0.04				400	15	15	15	100	1,875	75	30	0.40	3	1
TOTAL FOR PROJ NO. DF18314.2045240				0.04				400	15	15	15	100	1,875	75	30	0.40	3	1
DF18314.2088055	Transylvania	2	SR-1504 / OLD HENDERSONVILLE HWY	0.08	18	0.06	0.14						400			0.10		
TOTAL FOR MAP NO. 2 (SITE 332)				0.08									400			0.10		
TOTAL FOR PROJ NO. DF18314.2088055				0.08									400			0.10		
DF18314.2088059	Transylvania	3	SR-1529 / JETER MOUNTAIN RD	0.08	18	0.76	0.84	100	25	25	25	100	50	30	30	0.20	3	1
TOTAL FOR MAP NO. 3 (SITE 608)				0.08				100	25	25	25	100	50	30	30	0.20	3	1
TOTAL FOR PROJ NO. DF18314.2088059				0.08				100	25	25	25	100	50	30	30	0.20	3	1
DF18314.2088060	Transylvania	4	SR-1529 / JETER MOUNTAIN RD	0.09	18	1.04	1.13	300	50	50	50		1,800	25	30	0.20	3	
TOTAL FOR MAP NO. 4 (SITE 609)				0.09				300	50	50	50		1,800	25	30	0.20	3	
TOTAL FOR PROJ NO. DF18314.2088060				0.09				300	50	50	50		1,800	25	30	0.20	3	
DF18314.2088061	Transylvania	5	SR-1529 / JETER MOUNTAIN RD	0.06	18	1.13	1.19	200	30	30	30	100	600	30	30	0.25	3	1
TOTAL FOR MAP NO. 5 (SITE 610)				0.06				200	30	30	30	100	600	30	30	0.25	3	1
TOTAL FOR PROJ NO. DF18314.2088061				0.06				200	30	30	30	100	600	30	30	0.25	3	1
DF18314.2088091	Transylvania	6	SR-1529 / JETER MOUNTAIN RD	0.06	18	1.13	1.19	200	30	30	30	100	200	20	30	0.10	3	1
TOTAL FOR MAP NO. 6 (903)				0.06				200	30	30	30	100	200	20	30	0.10	3	1

SUMMARY OF QUANTITIES

ROUTE	MAP NO	LENGTH	WIDTH	BEGIN MP	END MP	0314000000-E SELECT MATERIAL, CLASS VII	0222000000-E GEOTEXTILE FOR ROCK EMBANKMENTS TYPE 2	1077000000-E #57 STONE	2044000000-E 6" PERFORATED SUBDRAIN PIPE	2077000000-E 6" OUTLET PIPE	8834000000-N MICROPILE, AVG LENGTH		8839000000-E MICROPILE PROOF TEST	8834000000-N MICROPILE, ADDITIONAL LENGTH OVER AVERAGE			SOIL NAIL FOR SITE NO. 610, AVERAGE LENGTH	SOIL NAIL FOR SITE NO. 2317, AVERAGE LENGTH	SOIL NAIL PROOF TESTS	8839000000-E SOIL NAIL, ADDITIONAL LENGTH OVER AVERAGE	8834000000-N WIRE BASKET FORMS	8839000000-E GEOCOMPOSITE DRAINS	8853000000-E BORROW	8853000000-E SHOTCRETE	8252000000-E REINFORCING STEEL (RETAINING WALL)
		MI	FT			TON	SY	TON	LF	LF	EA	EA	LF	EA	EA	EA	LF	EA	LF	CY	CY	LB			
	SR-1201 / PLEASANT GROVE CHURCH RD R MAP NO. 1 (SITE 2317)	1	0.04	18	1.08	1.12	6,000	1,600	250	120	60	65	4	288			EA	162	9	200	310	350	1,050	120	11,675
ROJ NO. DF18314.2045240		0.04				6,000	1,600	250	120	60	65	4	288				162	9	200	310	350	1,050	120	11,675	
SR-1504 / OLD HENDERSONVILLE HWY R MAP NO. 2 (SITE 332)	2	0.08	18	0.06	0.14	1,000	240		60	20															
ROJ NO. DF18314.2088055		0.08				1,000	240		60	20															
		0.08				1,000	240		60	20															
SR-1529 / JETER MOUNTAIN RD R MAP NO. 3 (SITE 608)	3	0.08	18	0.76	0.84	263	135	40																	
ROJ NO. DF18314.2088059		0.08				263	135	40																	
		0.08				263	135	40																	
SR-1529 / JETER MOUNTAIN RD R MAP NO. 4 (SITE 609)	4	0.09	18	1.04	1.13	780	580	100																	
ROJ NO. DF18314.2088060		0.09				780	580	100																	
		0.09				780	580	100																	
SR-1529 / JETER MOUNTAIN RD R MAP NO. 5 (SITE 610)	5	0.06	18	1.13	1.19	2,250	560	150	60	20	25	2	75	26		2	20	80	50	360	15	1,600			
ROJ NO. DF18314.2088061		0.06				2,250	560	150	60	20	25	2	75	26		2	20	80	50	360	15	1,600			
		0.06				2,250	560	150	60	20	25	2	75	26		2	20	80	50	360	15	1,600			
SR-1529 / JETER MOUNTAIN RD FOR MAP NO. 6 (903)	5	0.04	18	0.89	0.93	1,120	450	50																	
ROJ NO. DF18314.2088091		0.04				1,120	450	50																	
		0.04				1,120	450	50																	
GRAND TOTAL		0.39				11,413	3,565	590	240	100	90	6	363	26		11	220	390	400	1410	135	13,275			

SUMMARY OF QUANTITIES

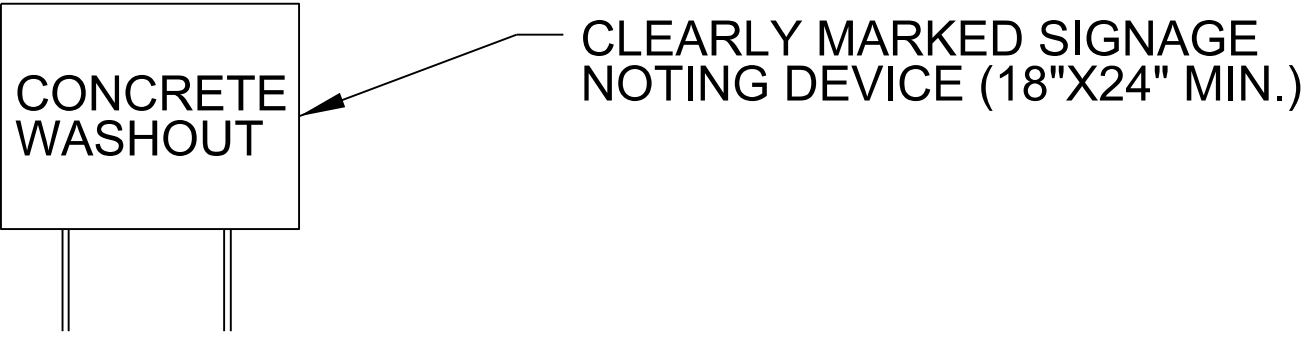
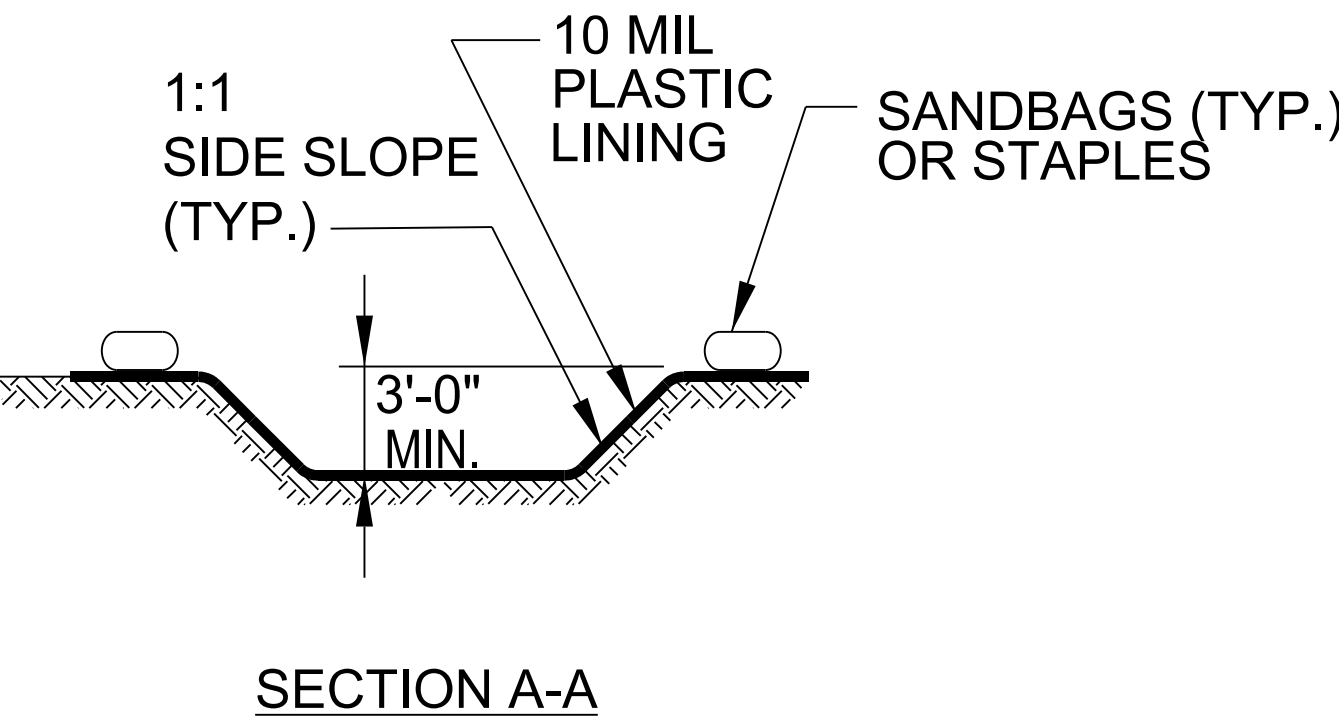
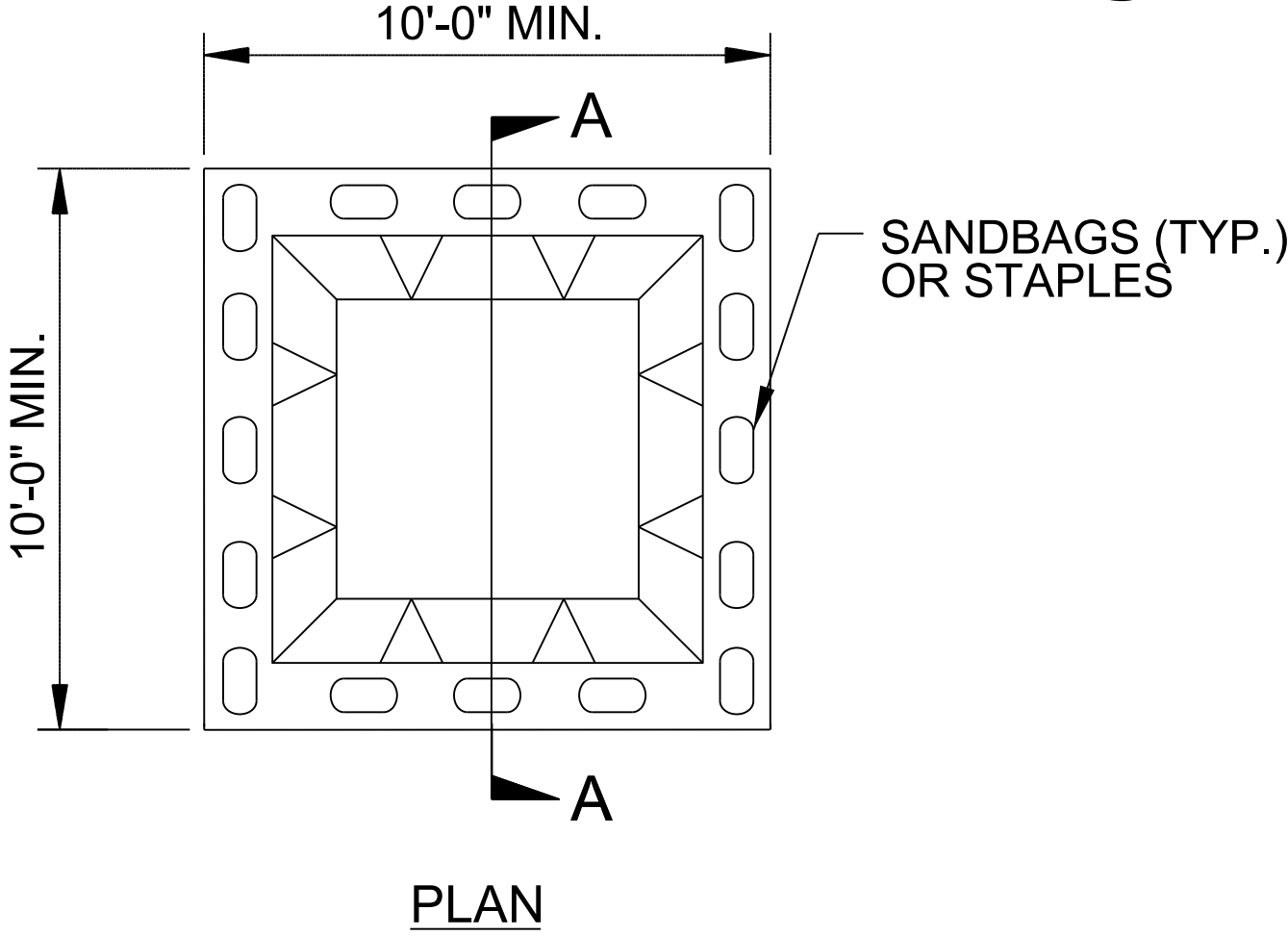
PROJECT NO	COUNTY	MAP NO	ROUTE	LENGTH	WIDTH	BEGIN MP	END MP	0000400000-N	0043000000-N	0134000000-E	0414000000-E	0996000000-N	1099700000-E	1220000000-E	2209000000-E	3642000000-E	3649000000-E
								CONSTRUCTION SURVEYING	GRADING	DRAINAGE DITCH EXCAVATION	60" RC PIPE CULVERTS, CLASS III	PIPE CLEAN OUT	CLASS IV SUBGRADE STABILIZATION	INCIDENTAL STONE BASE	ENDWALLS	RIP RAP, CLASS A	RIP RAP, CLASS B
				MI	FT			LS	LS	CY	LF	EA	TON	TONS	CY	TON	TON
DF18314.2045240	Henderson	1	SR-1201 / PLEASANT GROVE CHURCH RD	0.04	18	1.08	1.12	0.16	0.16	33		1		260		250	250
TOTAL FOR MAP NO. 1 (SITE 2317)				0.04				0.16	0.16	33		1		260		250	250
TOTAL FOR PROJ NO. DF18314.2045240				0.04				0.16	0.16	33		1		260		250	250
DF18314.2088055	Transylvania	2	SR-1504 / OLD HENDERSONVILLE HWY	0.08	18	0.06	0.14	0.20	0.20		64	1	10	7	11.2	50	50
TOTAL FOR MAP NO. 2 (SITE 332)				0.08				0.20	0.20		64	1	10	7	11.2	50	50
TOTAL FOR PROJ NO. DF18314.2088055				0.08				0.20	0.20		64	1	10	7	11.2	50	50
DF18314.2088059	Transylvania	3	SR-1529 / JETER MOUNTAIN RD	0.08	18	0.76	0.84	0.16	0.16				30	65		40	40
TOTAL FOR MAP NO. 3 (SITE 608)				0.08				0.16	0.16				30	65		40	40
TOTAL FOR PROJ NO. DF18314.2088059				0.08				0.16	0.16				30	65		40	40
DF18314.2088060	Transylvania	4	SR-1529 / JETER MOUNTAIN RD	0.09	18	1.04	1.13	0.16	0.16			1	100	26		100	100
TOTAL FOR MAP NO. 4 (SITE 609)				0.09				0.16	0.16			1	100	26		100	100
TOTAL FOR PROJ NO. DF18314.2088060				0.09				0.16	0.16			1	100	26		100	100
DF18314.2088061	Transylvania	5	SR-1529 / JETER MOUNTAIN RD	0.06	18	1.13	1.19	0.16	0.16				100	30		150	150
TOTAL FOR MAP NO. 5 (SITE 610)				0.06				0.16	0.16				100	30		150	150
TOTAL FOR PROJ NO. DF18314.2088061				0.06				0.16	0.16				100	30		150	150
DF18314.2088091	Transylvania	6	SR-1529 / JETER MOUNTAIN RD	0.04	18	0.89	0.93	0.16	0.16				100				100
TOTAL FOR MAP NO. 6 (903)				0.04				0.16	0.16				100				100
TOTAL FOR PROJ NO. DF18314.2088091				0.04				0.16	0.16				100				100
GRAND TOTAL				0.39				1.00	1.00	33	64	3	340	388	11.2	590	690

SUMMARY OF QUANTITIES

										4457000000-N	4424500000-N	4465000000-N	4470000000-N	4490000000-E	4815000000-E	4815000000-E
PROJECT NO	COUNTY		Transylvania	LANES	LANE TYPE	LENGTH	WIDTH	BEGIN MP	END MP	TEMPORARY TRAFFIC CONTROL	TEMPORARY PORTABLE TRAFFIC SIGNAL SYSTEM	TEMPORARY CRASH CUSHIONS	REMOVE & RESET TEMPORARY CRASH CUSHION	PORTABLE CONCRETE BARRIER (ANCHORED)	6" WHITE PAINT	6" YELLOW PAINT
						MI	FT			LS	EA	EA	EA	LF	LF	LF
DF18314.2045240	Henderson		SR-1201 / PLEASANT GROVE CHURCH RD	2	2WU	0.04	18	1.08	1.12	0.16	1					
TOTAL FOR MAP NO. 1 (SITE 2317)						0.04				0.16	1					
TOTAL FOR PROJ NO. DF18314.2045240						0.04				0.16	1					
DF18314.2088055	Transylvania		SR-1504 / OLD HENDERSONVILLE HWY	2	2WU	0.08	18	0.06	0.14	0.20	1				50	50
TOTAL FOR MAP NO. 2 (SITE 332)						0.08				0.20	1				50	50
TOTAL FOR PROJ NO. DF18314.2088055						0.08				0.20	1				50	50
DF18314.2088059	Transylvania		SR-1529 / JETER MOUNTAIN RD	2		0.08	18	0.76	0.84	0.16	1	2	1		100	100
TOTAL FOR MAP NO. 3 (SITE 608)						0.08				0.16	1	2	1		100	100
TOTAL FOR PROJ NO. DF18314.2088059						0.08				0.16	1	2	1		100	100
DF18314.2088060	Transylvania		SR-1529 / JETER MOUNTAIN RD	2	2WU	0.09	18	1.04	1.13	0.16		2		200	100	100
TOTAL FOR MAP NO. 4 (SITE 609)						0.09				0.16		2		200	100	100
TOTAL FOR PROJ NO. DF18314.2088060						0.09				0.16		2		200	100	100
DF18314.2088061	Transylvania		SR-1529 / JETER MOUNTAIN RD	2	2WU	0.06	18	1.13	1.19	0.16					100	100
TOTAL FOR MAP NO. 5 (SITE 610)						0.06				0.16					100	100
TOTAL FOR PROJ NO. DF18314.2088061						0.06				0.16					100	100
DF18314.2088091	Transylvania		SR-1529 / JETER MOUNTAIN RD	2	2WU	0.04	18	0.89	0.93	0.16					75	75
TOTAL FOR MAP NO. 6 (903)						0.04				0.16					75	75
TOTAL FOR PROJ NO. DF18314.2088091						0.04				0.16					75	75
GRAND TOTAL						0.39				1.00	3	4	1	200	425	425

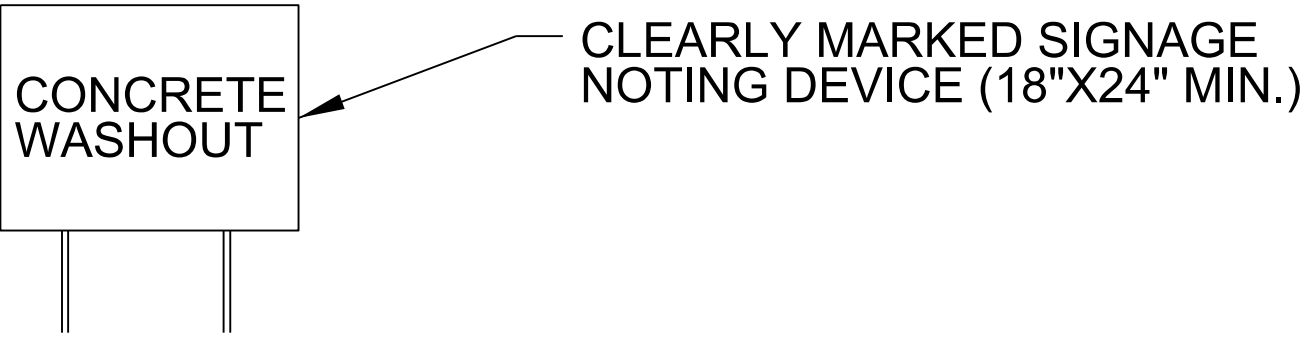
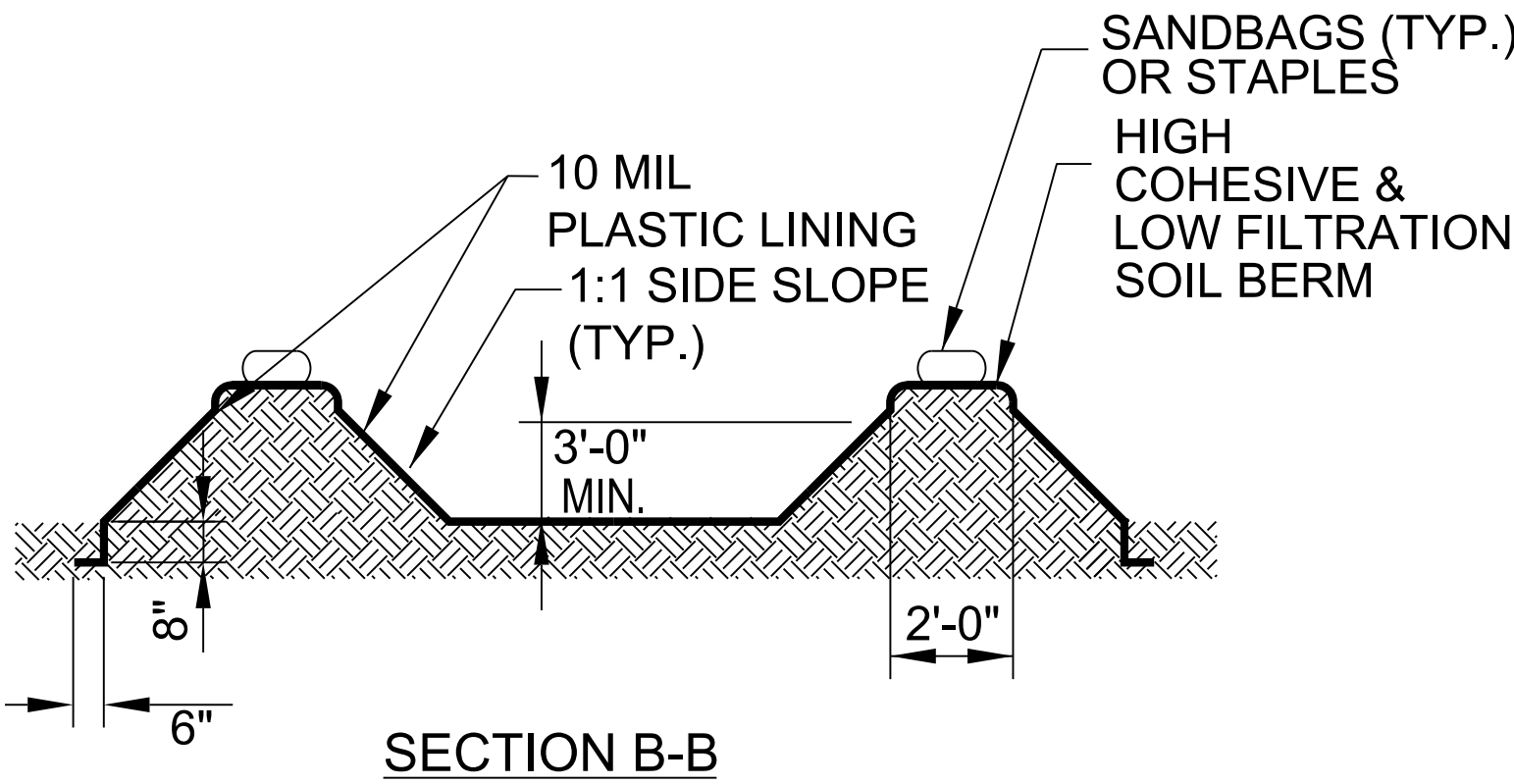
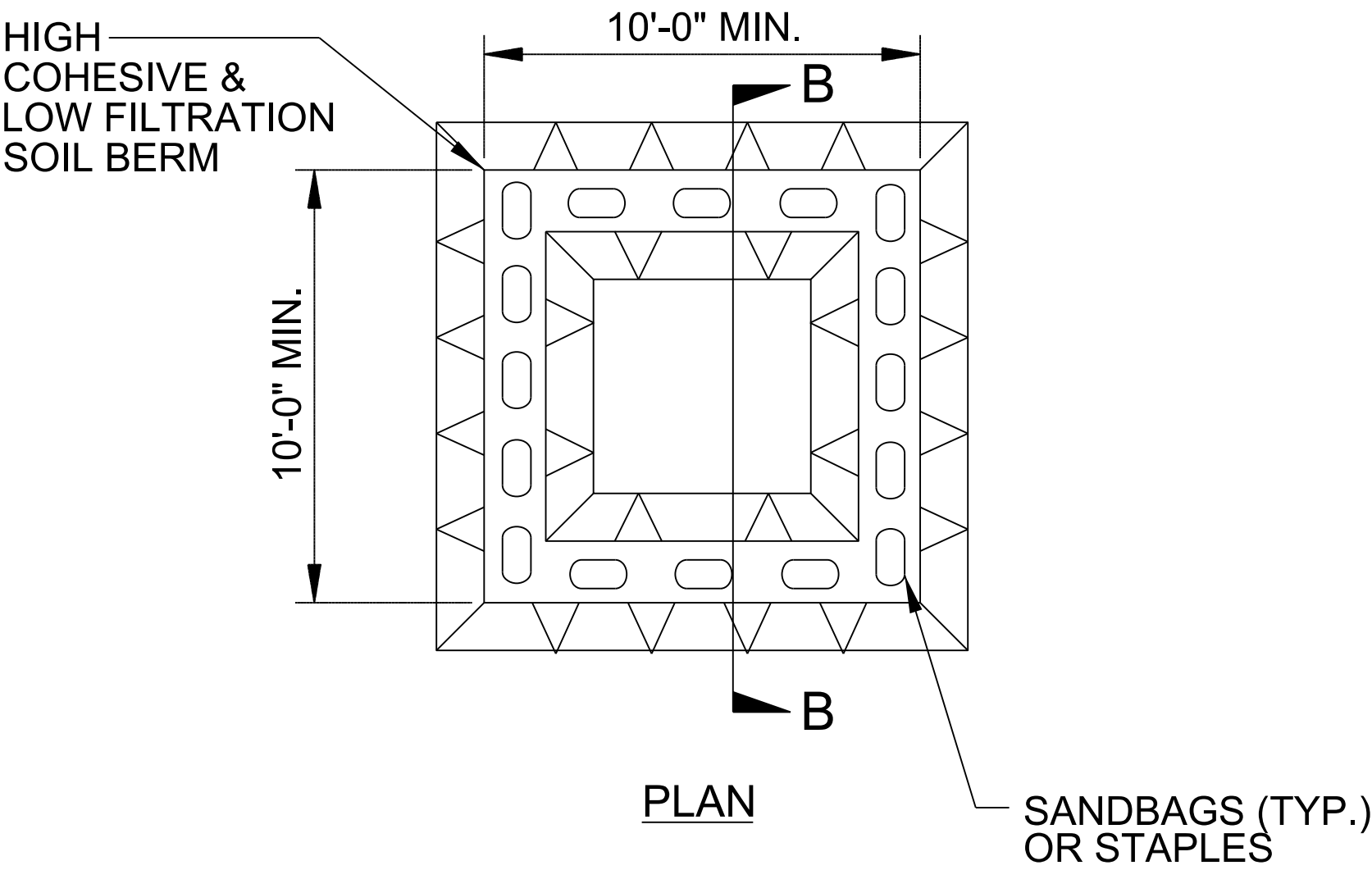
ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER

PROJECT REFERENCE NO.		SHEET NO.
X-XXXX		EC-XX
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER



BELOW GRADE WASHOUT STRUCTURE
NOT TO SCALE

- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.



ABOVE GRADE WASHOUT STRUCTURE
NOT TO SCALE

- NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
 2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
 3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.