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

NORTH CAROLINA PROFESSIONAL SEAL Ø23481 ENGINEER J. DEAN HARDISTER

DocuSigned by:
Dean Hardister
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11/22/2024
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HELENE EMERGENCY REPAIRS

COUNTY HENDERSON

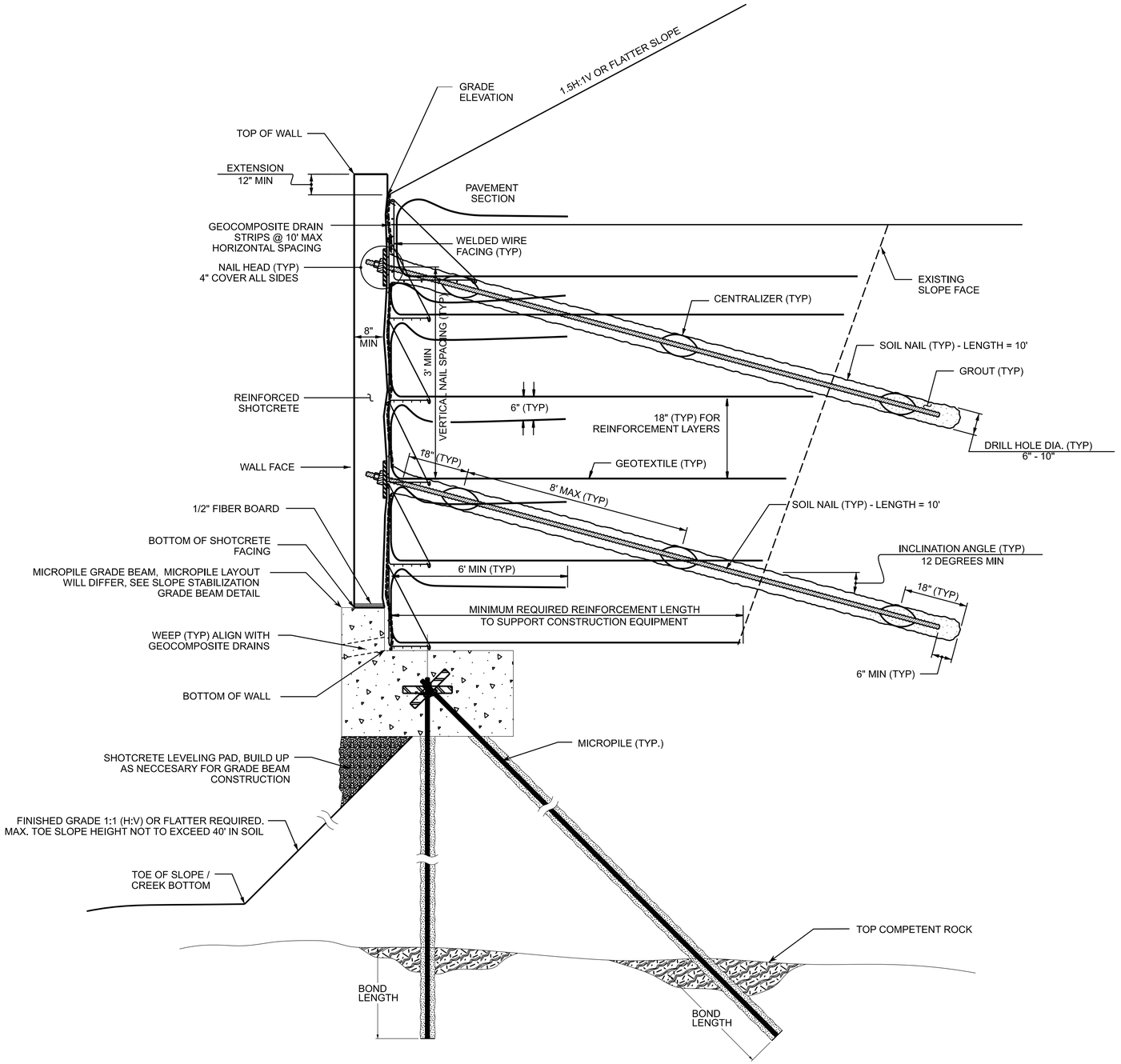
PROJECT DESCRIPTION FIVE SITES ON US 176

ROUTE	SITE #	SITE LATITUDE	SITE LONGITUDE	REPAIR OPTION 1	REPAIR OPTION 2	REPAIR OPTION 3
US 176	201	35.24796407	-82.40425028	CULVERT - Soil Nail Retaining Wall with Shotcrete and 2x3 Micropile Grade Beam. 1.5:1 Rock Slope above Headwall		
	201	35.24796407	-82.40425028	FILL SLOPE - 1:25:1 Rock Embankment with Toe Key		
US 176	203	35.24749288	-82.40149783	FILL SLOPE - Rock Plating		
	203	35.24749288	-82.40149783	CUT SLOPE - OPTIONAL Wire Mesh Slope Stabilization		
US 176	204	35.23367821	-82.39040078	1:25:1 Rock Embankment with Toe Key		
US 176	205	35.23589598	-82.38455758	2:1 Borrow Embankment with Rock Plating		
US 176	946	35.24881869	-82.40699165	Remove Existing Lagging Wall. 1.25:1 Rock Embankment with Toe Key		

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

CONTRACT: DN01075



GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023481 ENGINEER J. DEAN HARDISTER

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NOTES:

FOR SOIL NAIL WALL, SEE SOIL NAIL WALL PROVISION.

FOR MICROPILE GRADE BEAM, SEE SLOPE STABILIZATION GRADE BEAM PLANS AND MICROPILE PROVISION.

FOR MICROPILES, SEE MICROPILE PROVISION.

ESTIMATED SOIL NAIL AVERAGE LENGTH = 20'

ESTIMATED MICROPILE AVERAGE LENGTH = 10'

MINIMUM MICROPILE ROCK BOND LENGTH = 5'

MINIMUM SOIL NAIL ROCK BOND LENGTH = 5'

MINIMUM OVERALL SOIL NAIL AND MICROPILE LENGTH = 10'

CONTRACT NO.: DN01075

DO NOT USE THESE DETAILS UNLESS DIRECTED BY THE ENGINEER

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS

SOIL NAIL RETAINING WALL WITH SHOTCRETE FACING

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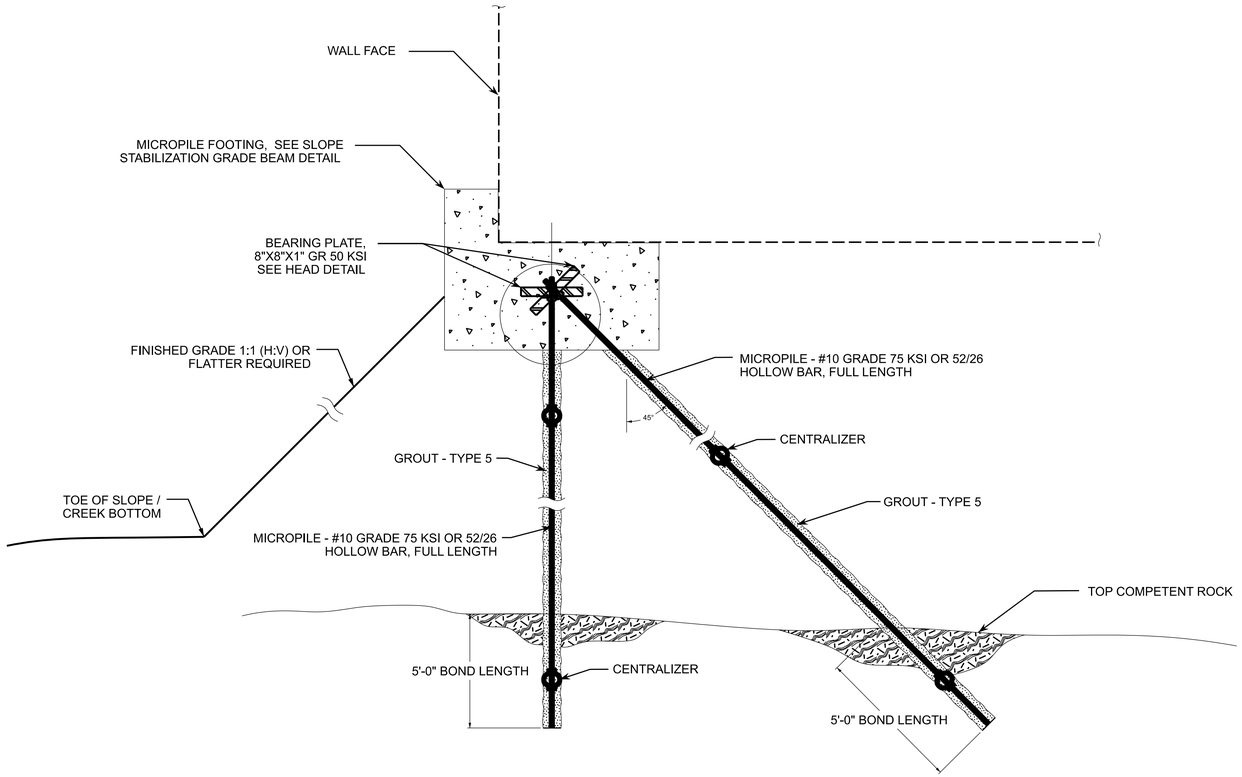
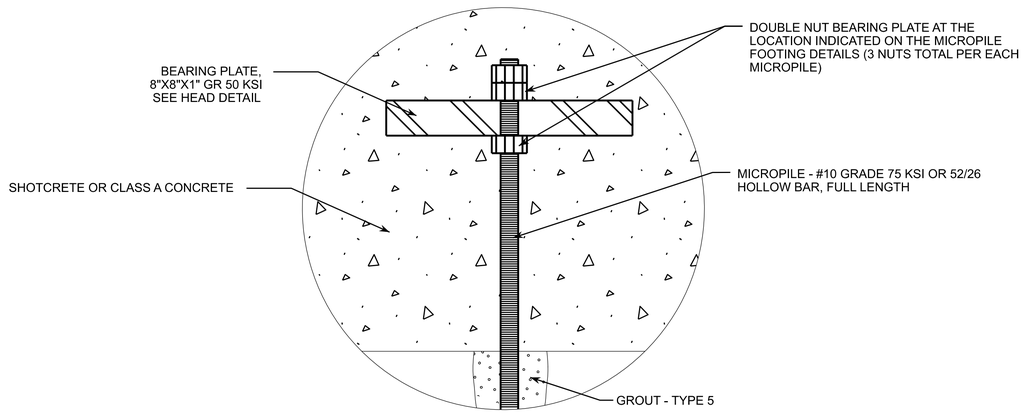
NO.	BY	DATE	NO.	BY	DATE	
1			3			1 OF 2
2			4			



MICROPILE DETAIL



MICROPILE HEAD DETAIL

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028893 ENGINEER MICHAEL H. SIEMENS

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NOTES:

GENERAL NOTES:

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.

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:

FOR MICROPILE USE TYPE 5 GROUT, SEE SECTION 1003 OF THE STANDARD SPECIFICATIONS.

PROVIDE STEEL PLATES THAT MEET ASTM A572 GRADE 50 KSI.

ALL THREAD MICROPILE REINFORCEMENT SHALL BE MINIMUM GRADE 75 KSI.

MICROPILE NUTS WILL BE MANUFACTORED BY THE BAR MANUFACTURER AND COMPATIBLE WITH THE BAR TYPE SPECIFIED.

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:

WHERE POSSIBLE LEVEL AREA OF MICROPILE FOOTING PRIOR TO DRILLING.

IF REQUIRED, INSTALL AND TEST PILES IN ACCORDANCE AASHTO GUIDLINES AS DIRECTED BY THE ENGINEER.

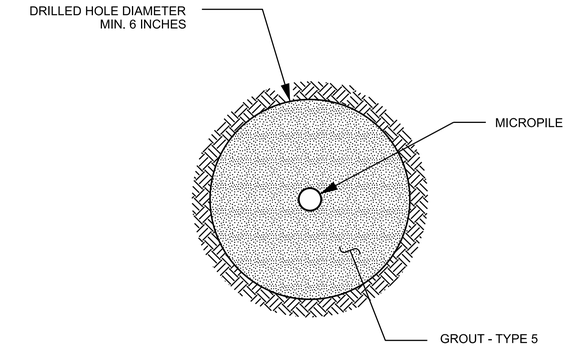
ROTARY FLUSH TEMPORARY CASING TO TOP OF ROCK USING AIR OR WATER AS FLUSHING MEDIUM. CARE SHALL BE TAKEN SO MINIMAL LOSS OF MATERIALS OUTSIDE THE THE TEMPORARY CASING OCCURS.

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.

PLACE GROUT FOR MICROPILES BY TREMIE METHOD FROM BOTTOM OF THE HOLE.

FOR SOLID BAR MICROPILES, INSTALL CENTER CORE REINFORCEMENT STEEL (STEEL MAY BE PLACED PRIOR TO OR IMMEDIATELY AFTER GROUTING).

CUT TOPS OF PILES TO FINAL ELEVATION AND INSTALL PLATES. FOR MICROPILES AND MICROPILE FOOTING, SEE MICROPILE SLOPE STABILIZATION PROVISION.



MICROPILE SECTION

CONTRACT NO.: DN01075

PREPARED BY: MS	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

MICROPILES

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2			4		

SHEET NO. 2 OF 2

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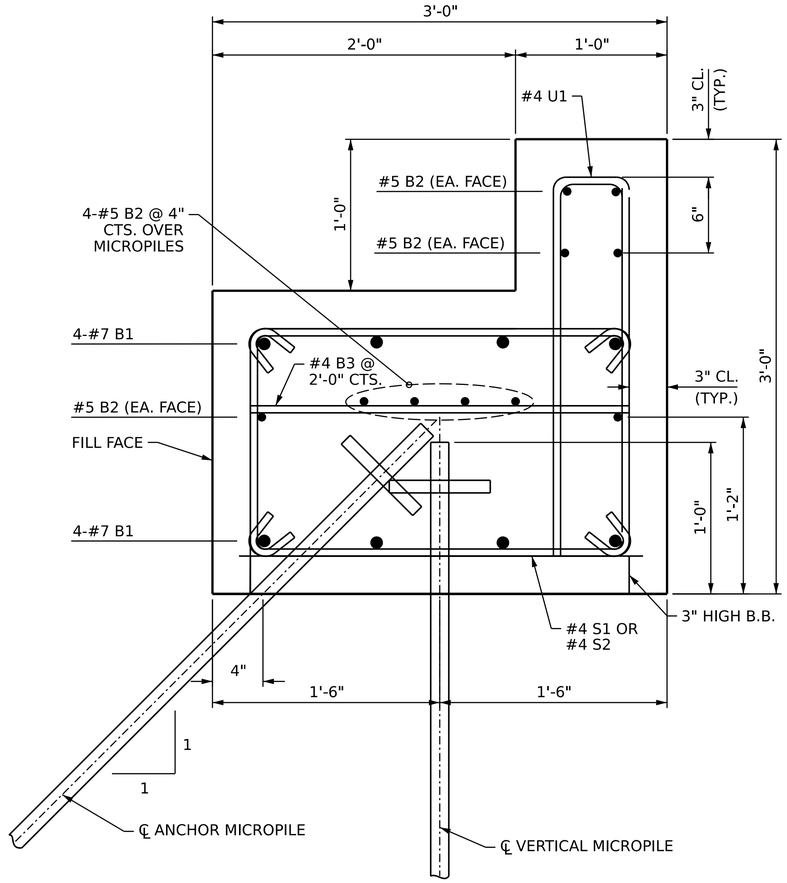
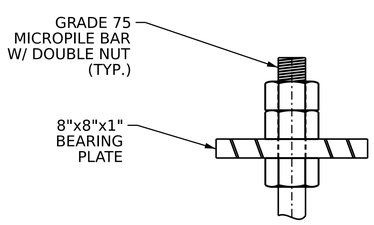
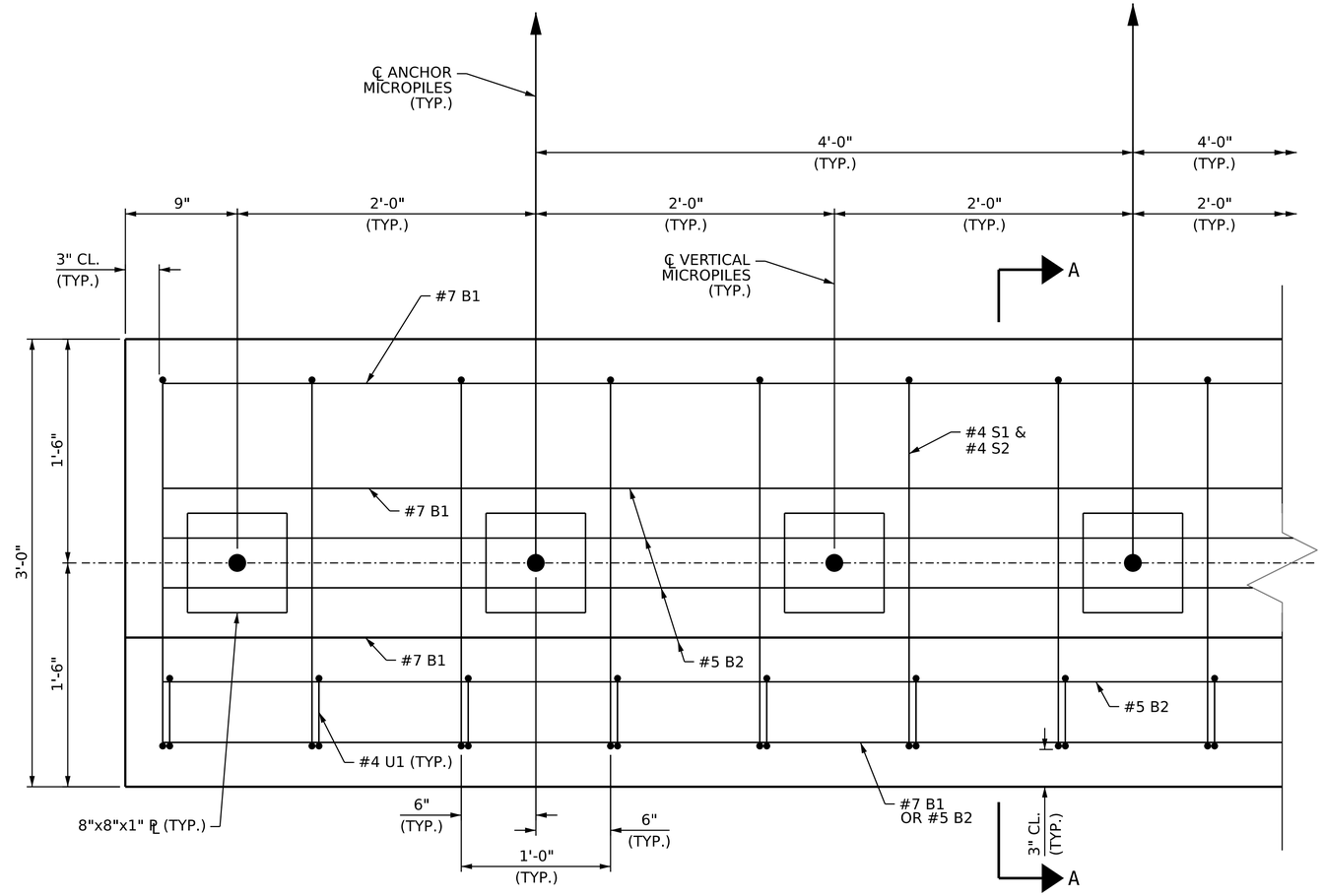


SECTION A-A

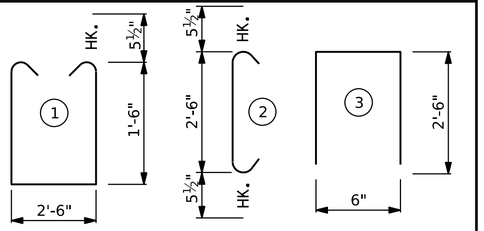


MICROPILE DETAIL



PLAN

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.

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.

CONTRACT NO.: DN01075

NORTH CAROLINA PROFESSIONAL SEAL 057104 ENGINEER GLEN AYES

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11/22/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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1			3			TOTAL SHEETS
2			4			

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

11/20/2024
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GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023481 ENGINEER J. DEAN HARDISTER

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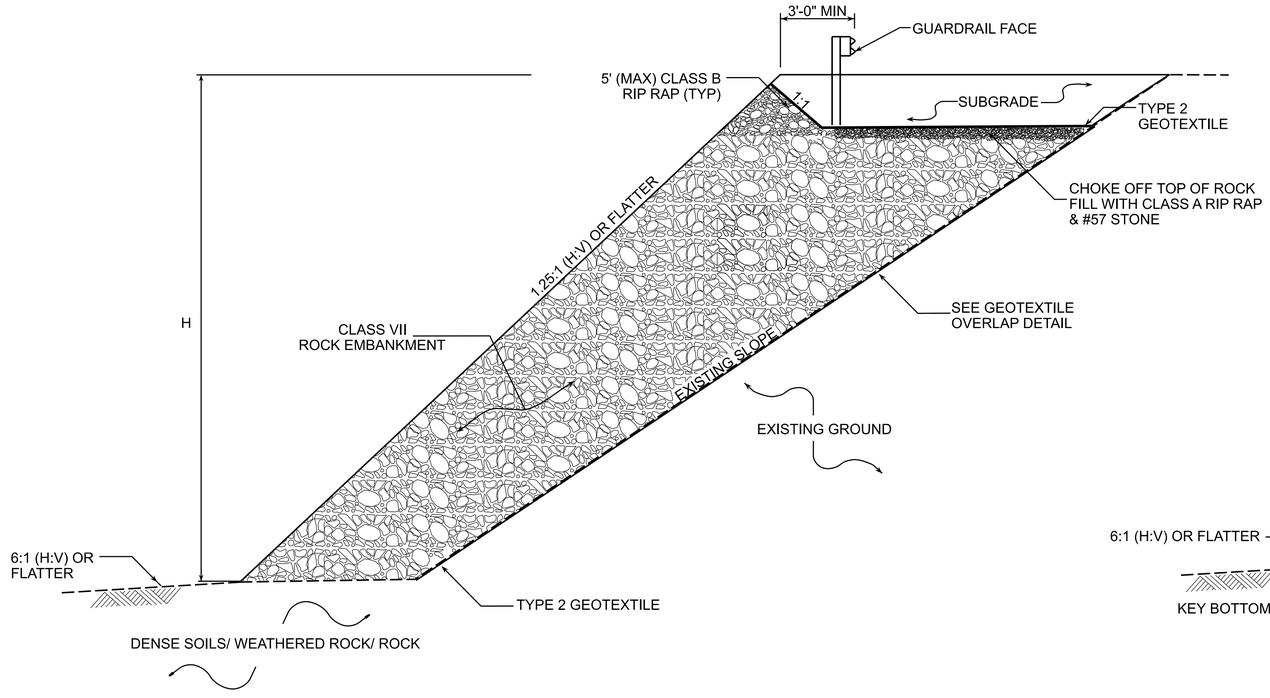
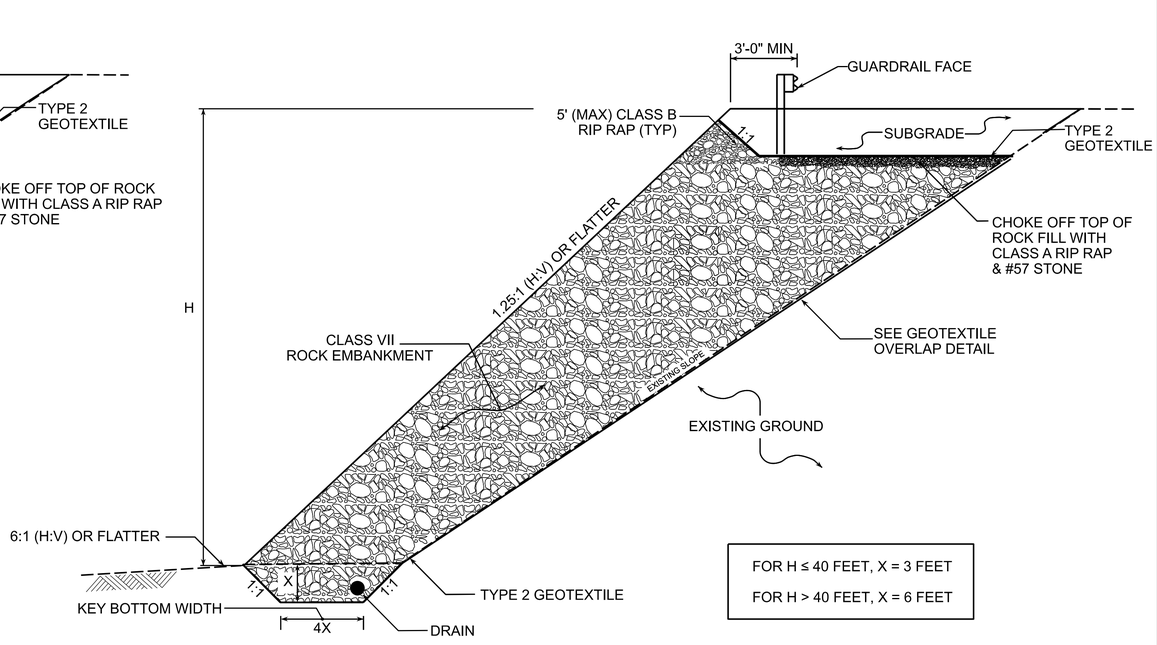


ROCK EMBANKMENT DETAIL



ROCK EMBANKMENT WITH TOE KEY DETAIL

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.: DN01075

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS

ROCK EMBANKMENT

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SHEET NO. 1 OF 2

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023481 ENGINEER J. DEAN HARDISTER

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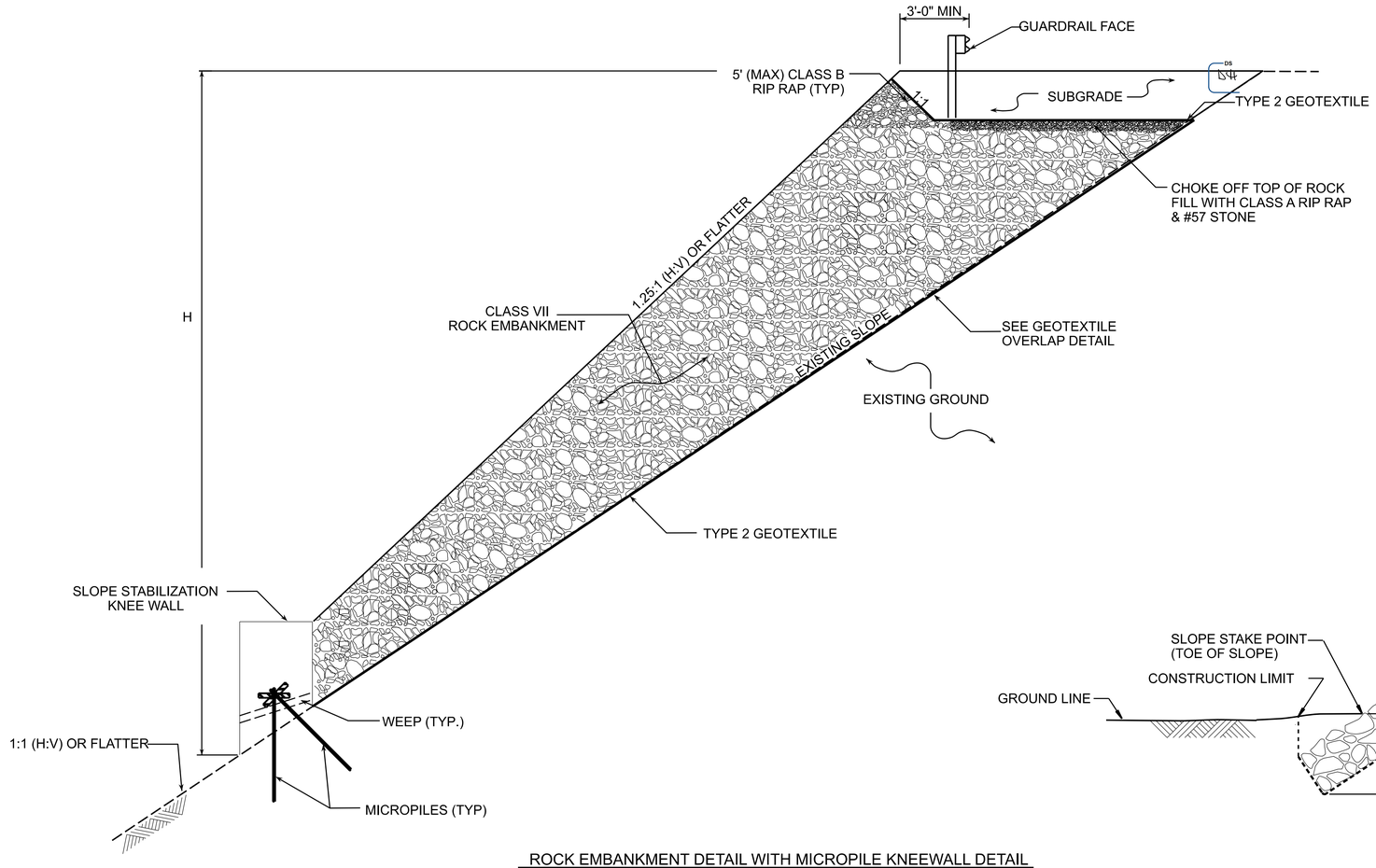
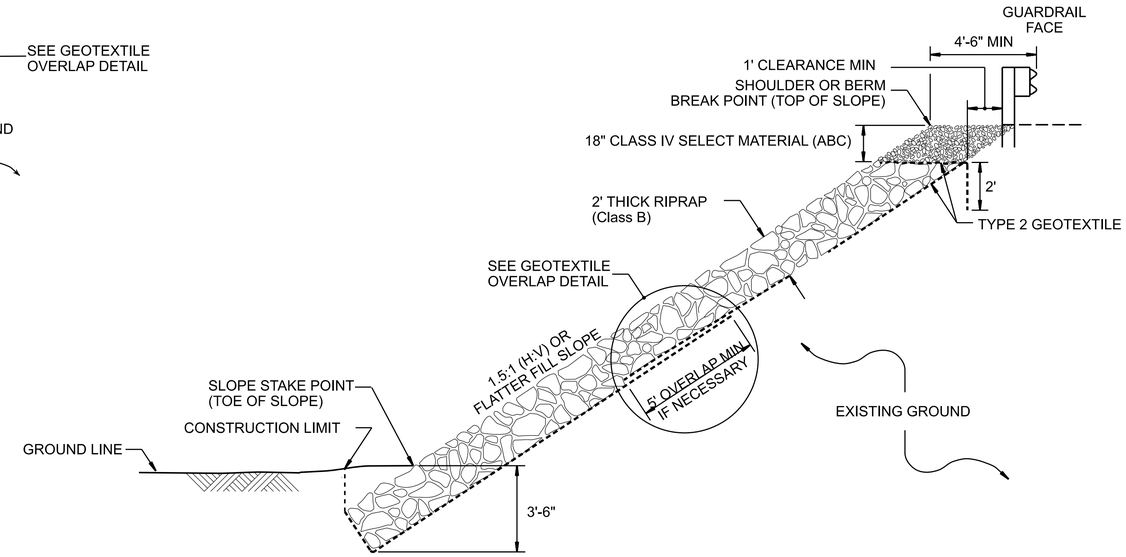
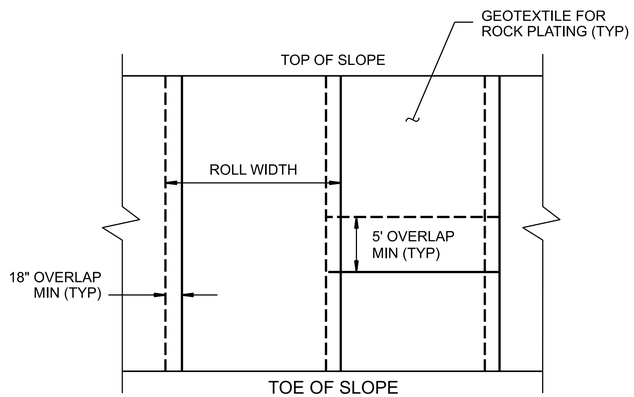


ROCK EMBANKMENT DETAIL WITH MICROPILE KNEEWALL DETAIL



ROCK PLATING DETAIL



GEOTEXTILE OVERLAP DETAIL
(PLAN VIEW)

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'

DO NOT USE THESE DETAILS UNLESS DIRECTED BY THE ENGINEER

CONTRACT NO.: DN01075

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS

ROCK EMBANKMENT

REVISIONS					
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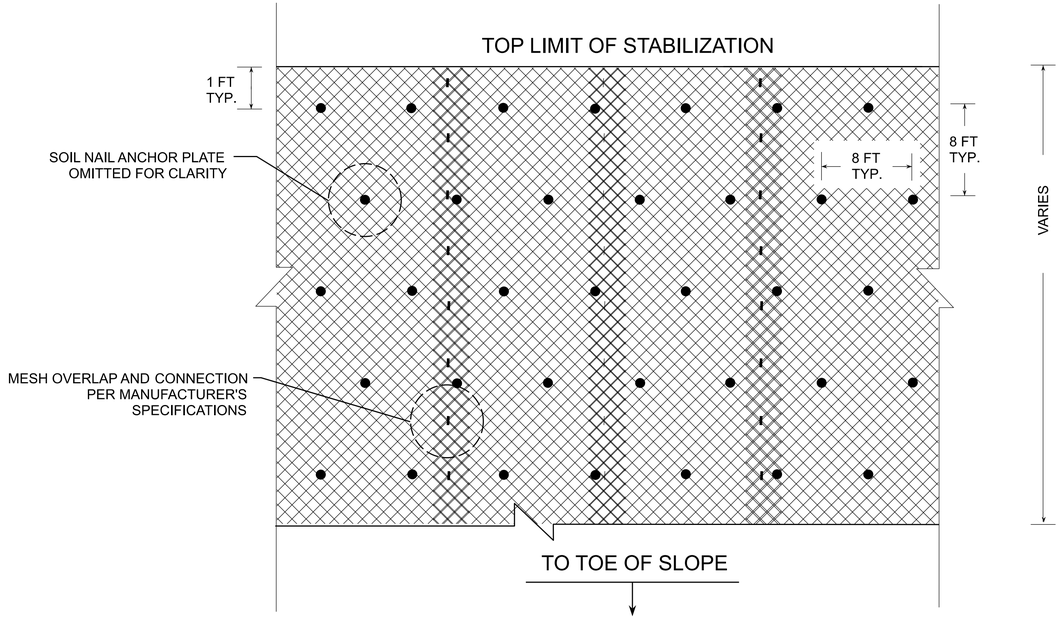
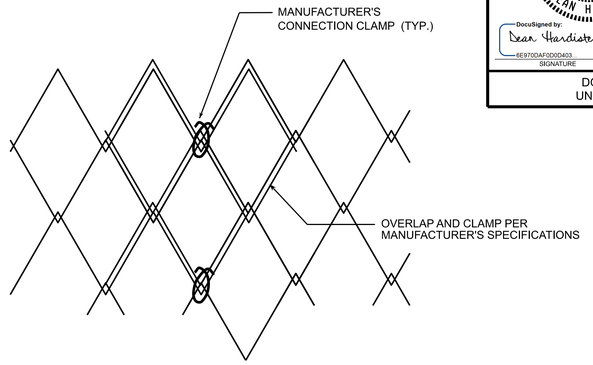
SHEET NO. 2 OF 2



FACE DETAIL



MESH OVERLAP & CONNECTION DETAIL

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023481 ENGINEER JOSEPH DEAN HARDISTER

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NOTES:

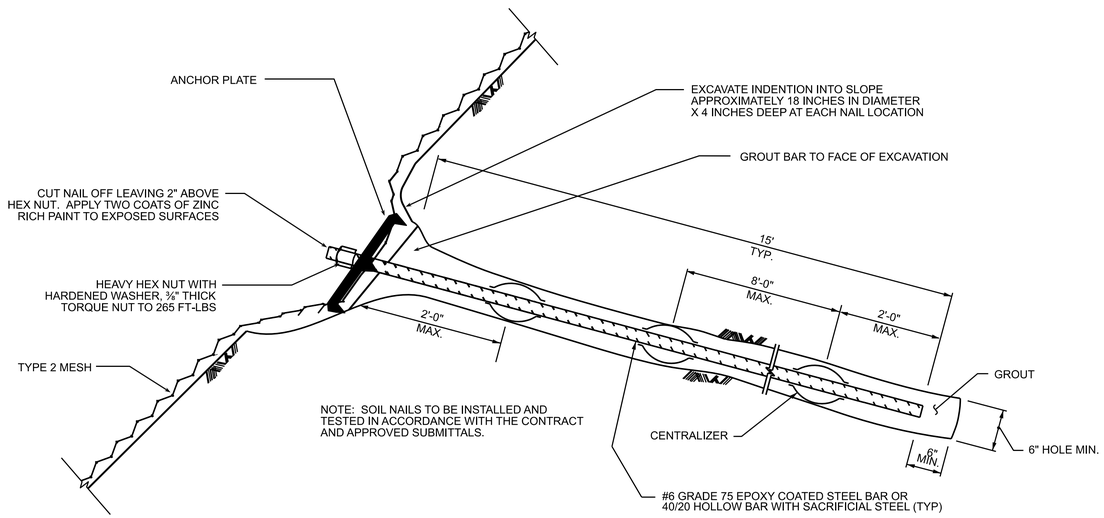
WIRE MESH SHALL BE INSTALLED ON SLOPES AS DIRECTED BY THE ENGINEER. AREAS TO BE ANCHORED MUST BE APPROVED BY THE ENGINEER PRIOR TO ORDERING MATERIALS OR BEGINNING CONSTRUCTION.

SOIL NAIL LENGTH = 15 FT (TYP)

DESIGN TEST LOAD (DTL) = 15 KIPS (1 k/ft)

INSTALL NAILS INTO SLOPE WITH AN INCLINATION OF 75 TO 90 DEGREES TO THE SLOPE.

VERIFICATION TESTS ARE NOT REQUIRED.



TYPICAL SECTION

CONTRACT NO.: DN01075

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

HURRICANE HELENE EMERGENCY REPAIRS

WIRE MESH SLOPE STABILIZATION

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

PROJECT REFERENCE NO.	SHEET NO.
DN01075	2G-1

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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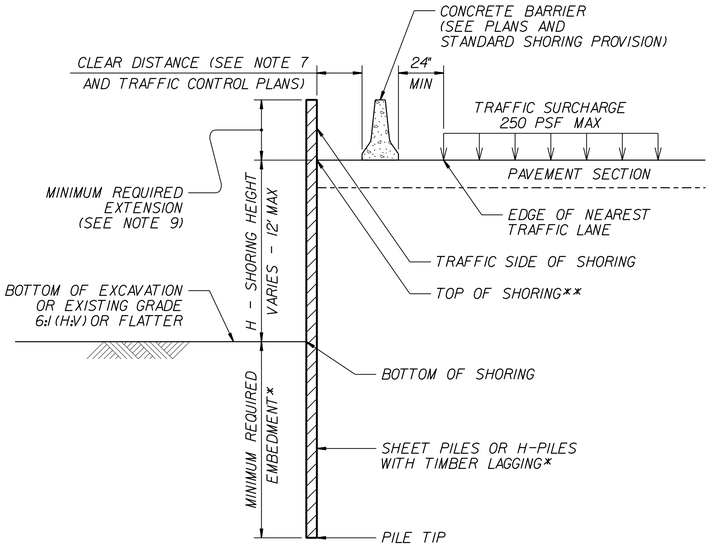
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (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 BEWTEEN 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 "--".

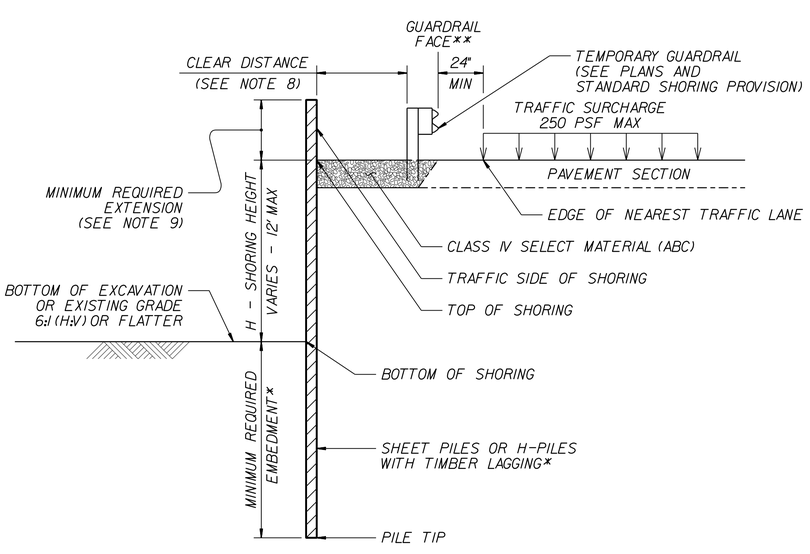
NOTES:

1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
2. FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
3. 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
4. DO NOT USE STANDARD TEMPORARY SHORING IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS WITHIN THE EMBEDMENT DEPTH.
6. 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.
7. 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".
8. 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".
9. MINIMUM REQUIRED EXTENSION IS 6" FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".
10. 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.
11. 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
12. CONTACT THE ENGINEER IF PILES DO NOT ATTAIN THE MINIMUM REQUIRED EMBEDMENT.



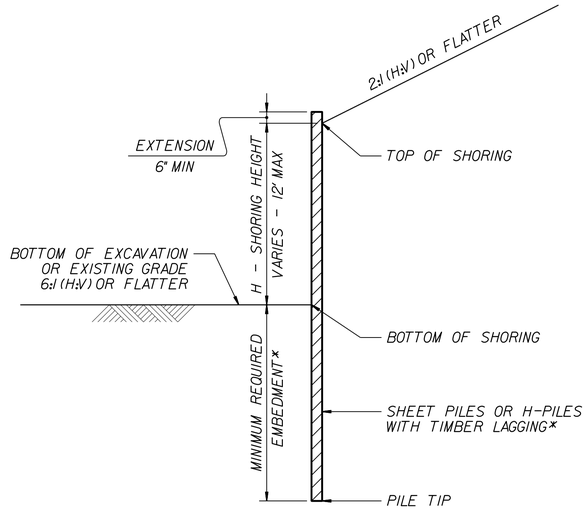
CONCRETE BARRIER

**TOP OF SHORING = EDGE OF PAVEMENT



TEMPORARY GUARDRAIL

**GUARDRAIL FACE = EDGE OF PAVEMENT



STANDARD TEMPORARY SHORING

(SLOPE CASE)
*SEE TABLE ABOVE.

STANDARD TEMPORARY SHORING

(SURCHARGE CASE)
*SEE TABLE ABOVE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 11-19-13

PROJECT REFERENCE NO.	SHEET NO.
DN01075	2G-2

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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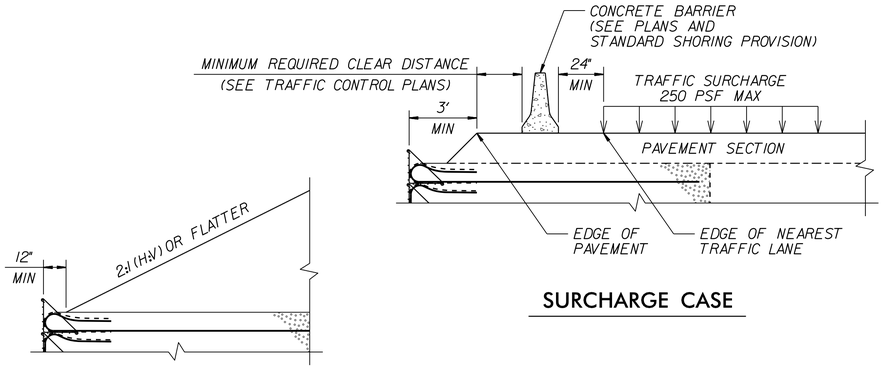
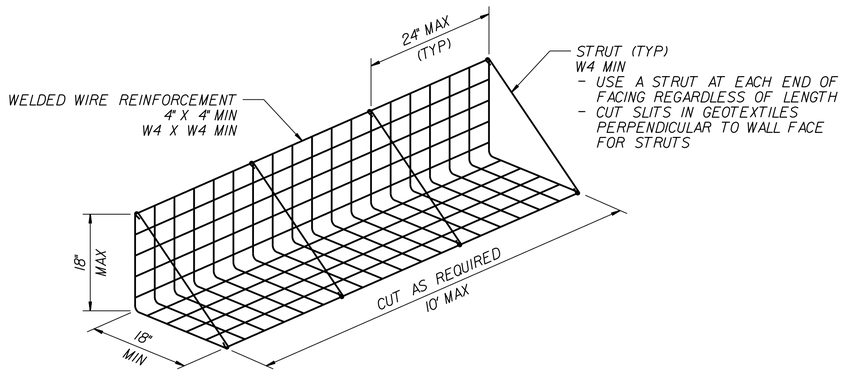
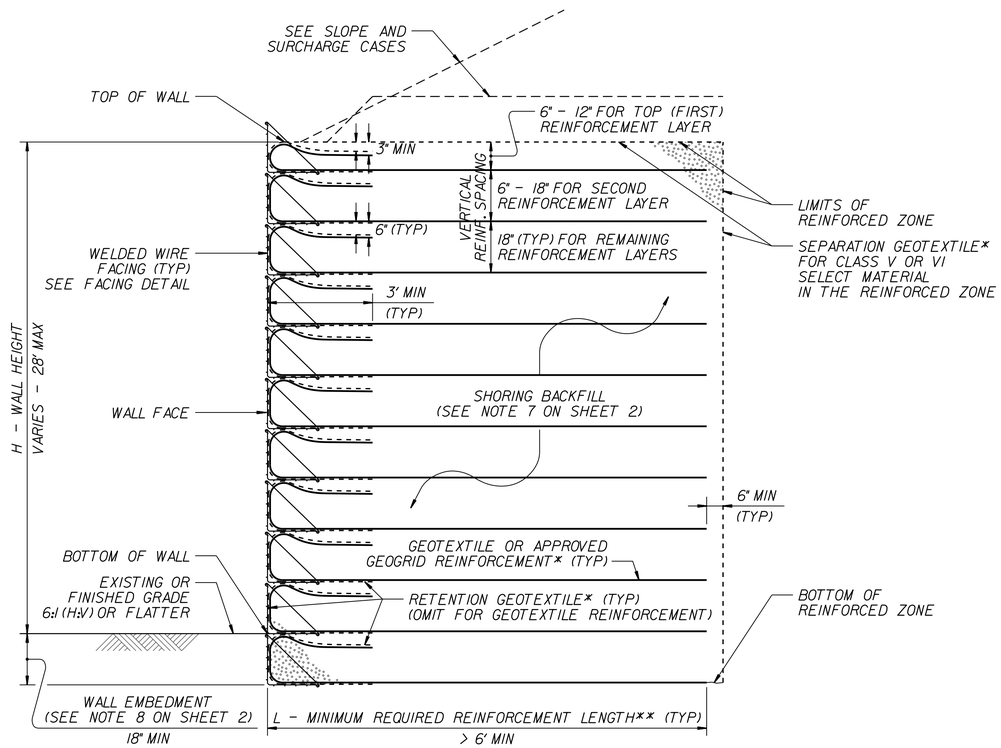


SURCHARGE CASE

SLOPE CASE

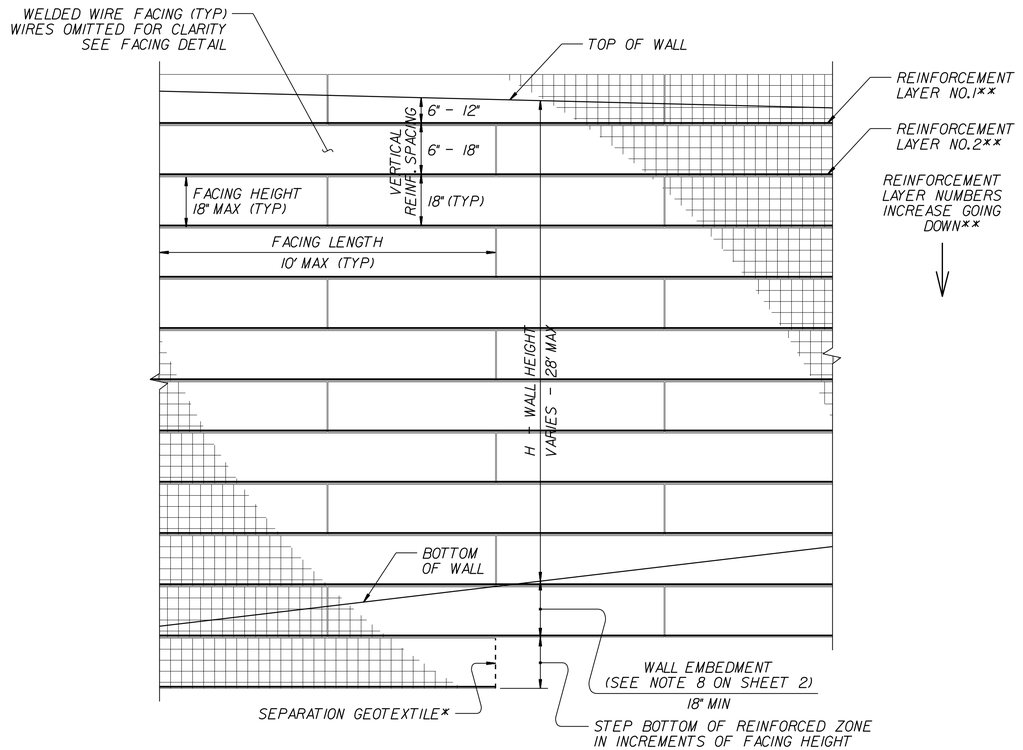


FACING DETAIL



STANDARD TEMPORARY WALL

(FOR STANDARD TEMPORARY WALLS ON STRUCTURES, SEE TEMPORARY WALL ON STRUCTURE DETAIL ON SHEET 2.)
*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.



STANDARD TEMPORARY WALL – PARTIAL ELEVATION

*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 1 OF 3

DATE: 11-19-13

PROJECT REFERENCE NO.	SHEET NO.
DN01075	2G-3

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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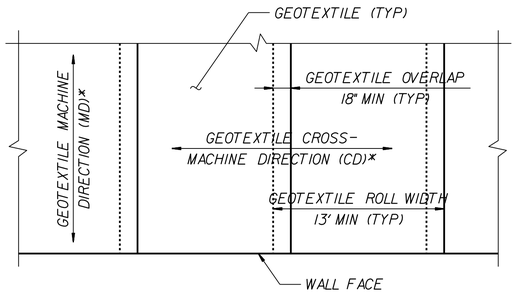
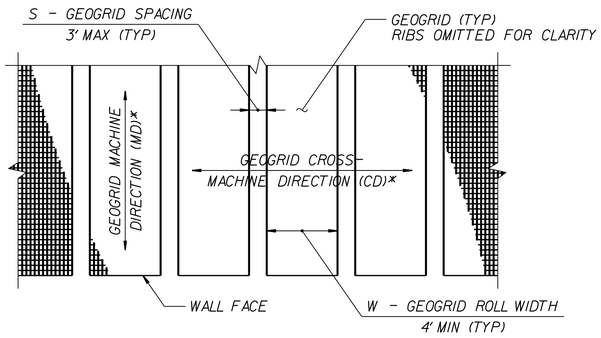


GEOTEXTILE PLACEMENT

(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)

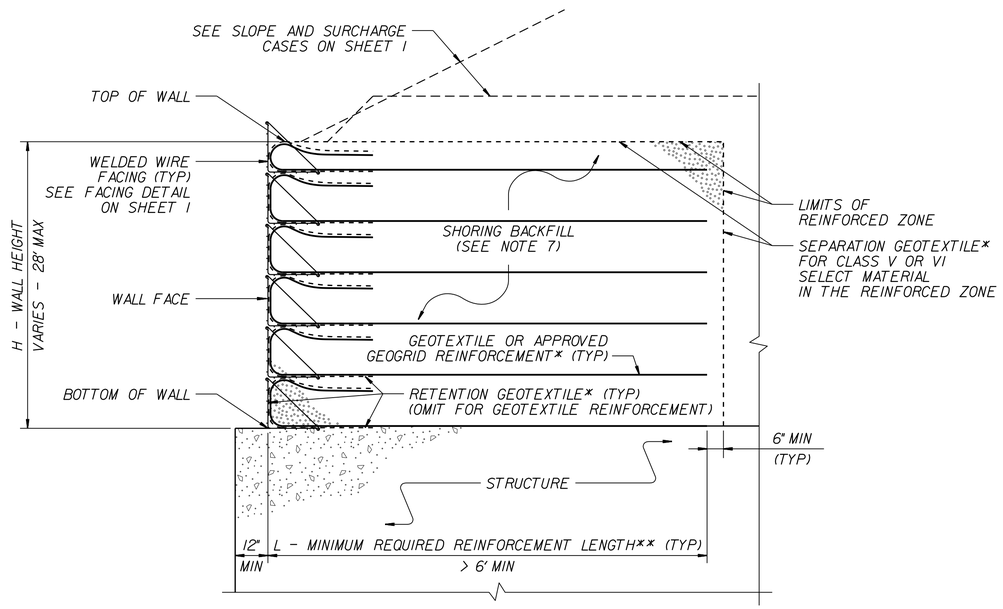


GEOGRID PLACEMENT

(80% COVERAGE MIN FOR GEOGRID REINFORCEMENT – $\frac{W}{W+S}$ x 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, γ = 120 PCF
   FRICTION ANGLE, ϕ = 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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD TEMPORARY WALL
SHEET 2 OF 3

DATE: 10-19-21

PROJECT REFERENCE NO.	SHEET NO.
DN01075	2G-4

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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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.)

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.

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

DATE: 11-19-13

SUMMARY OF QUANTITIES

									8252000000-E	0106000000-E	0222000000-E	0314000000-E	1077000000-E	8802015110-N	8834000000-N		8839000000-E		8853000000-E
PROJECT NO	COUNTY	MAP NO	ROUTE	LANES	LENGTH	WIDTH	BEGIN MP	END MP	REINFORCING STEEL (RETAINING WALL)	BORROW EXCAVATION	GEOTEXTILE FOR ROCK EMBANKMENTS	SELECT MATERIAL, CLASS VII	#57 STONE	SOIL NAIL PROOF TESTS	Soil Nail, Average Length	WIRE BASKET FORMS	GEOCOMPOSITE DRAINS	SOIL NAIL, ADD'L LENGTH OVER AVG	SHOTCRETE
					MI	FT			LB	CY	SY	TON	TON	EA	EA	EA	LF	LF	CY
18314.1045012	Henderson	201	US-176	2	0.06	24	5.66	5.72	1,200	1,500	380	200	50	16	12	250	300	20	8
TOTAL FOR MAP NO. 201					**0.06**				**1,200**	**1,500**	**380**	**200**	**50**	**16**	**12**	**250**	**300**	**20**	**8**
TOTAL FOR PROJ NO. 18314.1045012					**0.06**				**1,200**	**1,500**	**380**	**200**	**50**	**16**	**12**	**250**	**300**	**20**	**8**
8314.1045013	Henderson	202	US-176	2	0.06	24	5.86	5.92											
TOTAL FOR MAP NO. 202					**0.06**														
TOTAL FOR PROJ NO. 18314.1045013					**0.06**														
18314.1045014	Henderson	203	US-176	2	0.06	24	5.92	5.98			300	725	150						
TOTAL FOR MAP NO. 203					**0.06**						**300**	**725**	**150**						
TOTAL FOR PROJ NO. 18314.1045014					**0.06**						**300**	**725**	**150**						
18314.1045015	Henderson	204	US-176	2	0.22	24	7.21	7.43											
TOTAL FOR MAP NO. 204					**0.22**														
TOTAL FOR PROJ NO. 18314.1045015					**0.22**														
18314.1045016	Henderson	205	US-176	2	0.08	24	7.61	7.69											
TOTAL FOR MAP NO. 205					**0.08**														
TOTAL FOR PROJ NO. 18314.1045016					**0.08**														
18314.1045021	Henderson	207	US-176	2	0.26	24	8.18	8.44											
TOTAL FOR MAP NO. 207					**0.26**														
TOTAL FOR PROJ NO. 18314.1045021					**0.26**														
18314.1045018	Henderson	211	US-176	2	0.13	24	8.62	8.75											
TOTAL FOR MAP NO. 211					**0.13**														
TOTAL FOR PROJ NO. 18314.1045018					**0.13**														
18314.1045019	Henderson	212	US-176	2	0.12	24	8.75	8.87											
TOTAL FOR MAP NO. 212					**0.12**														
TOTAL FOR PROJ NO. 18314.1045019					**0.12**														
18314.1045020	Henderson	213	US-176	2	0.08	24	8.93	9.01			90	80	20						
TOTAL FOR MAP NO. 213					**0.08**						**90**	**80**	**20**						
TOTAL FOR PROJ NO. 18314.1045020					**0.08**						**90**	**80**	**20**						
18314.1045100	Henderson	946	US-176	2	0.08	24	5.42	5.5			35	30	10						
TOTAL FOR MAP NO. 946					**0.08**						**35**	**30**	**10**						
TOTAL FOR PROJ NO. 18314.1045100					**0.08**						**35**	**30**	**10**						
GRAND TOTAL					**1.15**				**1,200**	**1,500**	**805**	**1,035**	**230**	**16**	**12**	**250**	**300**	**20**	**8**

SUMMARY OF QUANTITIES

									1491000000-E	1523000000-E	1575000000-E
PROJECT NO	**COUNTY**	**MAP NO**	**ROUTE**	**LANES**	**LENGTH**	**WIDTH**	**BEGIN MP**	**END MP**	**BASE COURSE, B25.0C**	**SURFACE COURSE, S9.5C**	**ASPHALT BINDER FOR PLANT MIX**
					MI	**FT**			**TONS**	**TONS**	**TONS**
18314.1045012	Henderson	201	US-176	2	0.06	24	5.66	5.72			
TOTAL FOR MAP NO. 201					**0.06**						
TOTAL FOR PROJ NO. 18314.1045012					**0.06**						
8314.1045013	Henderson	202	US-176	2	0.06	24	5.86	5.92			
TOTAL FOR MAP NO. 202					**0.06**						
TOTAL FOR PROJ NO. 18314.1045013					**0.06**						
18314.1045014	Henderson	203	US-176	2	0.06	24	5.92	5.98			
TOTAL FOR MAP NO. 203					**0.06**						
TOTAL FOR PROJ NO. 18314.1045014					**0.06**						
18314.1045015	Henderson	204	US-176	2	0.22	24	7.21	7.43			
TOTAL FOR MAP NO. 204					**0.22**						
TOTAL FOR PROJ NO. 18314.1045015					**0.22**						
18314.1045016	Henderson	205	US-176	2	0.08	24	7.61	7.69	38	20	3
TOTAL FOR MAP NO. 205					**0.08**				**38**	**20**	**3**
TOTAL FOR PROJ NO. 18314.1045016					**0.08**				**38**	**20**	**3**
18314.1045021	Henderson	207	US-176	2	0.26	24	8.18	8.44	8	3	1
TOTAL FOR MAP NO. 207					**0.26**				**8**	**3**	**1**
TOTAL FOR PROJ NO. 18314.1045021					**0.26**				**8**	**3**	**1**
18314.1045018	Henderson	211	US-176	2	0.13	24	8.62	8.75			
TOTAL FOR MAP NO. 211					**0.13**						
TOTAL FOR PROJ NO. 18314.1045018					**0.13**						
18314.1045019	Henderson	212	US-176	2	0.12	24	8.75	8.87			
TOTAL FOR MAP NO. 212					**0.12**						
TOTAL FOR PROJ NO. 18314.1045019					**0.12**						
18314.1045020	Henderson	213	US-176	2	0.08	24	8.93	9.01	18	10	1
TOTAL FOR MAP NO. 213					**0.08**				**18**	**10**	**1**
TOTAL FOR PROJ NO. 18314.1045020					**0.08**				**18**	**10**	**1**
18314.1045100	Henderson	946	US-176	2	0.08	24	5.42	5.5	4	2	
TOTAL FOR MAP NO. 946					**0.08**				**4**	**2**	
TOTAL FOR PROJ NO. 18314.1045100					**0.08**				**4**	**2**	
GRAND TOTAL					**1.15**				**68**	**35**	**5**

SUMMARY OF QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	LANES	LENGTH	WIDTH	BEGIN MP	END MP	6000000000-E TEMPORARY SILT FENCE	6006000000-E STONE FOR EROSION CONTROL, CLASS A	6009000000-E STONE FOR EROSION CONTROL, CLASS B	6012000000-E SEDIMENT CONTROL STONE	6030000000-E SILT EXCAVATION	6036000000-E MATTING FOR EROSION CONTROL	6042000000-E 1/4" HARDWARE CLOTH	6071010000-E WATTLE	6084000000-E SEED & MULCHING	6084000000-E SAFETY FENCE	SEED & MULCHING SEED & MULCHING	6117500000-N CONCRETE WASHOUT STRUCTURE
					MI	FT			LF	TON	TON	TON	CY	SY	LF	LF	AC	LF	EA	EA
18314.1045012	Henderson	201	US-176	2	0.06	24	5.66	5.72	150	50	50	50		1,200	40	40	0.50	100.00	5	1
TOTAL FOR MAP NO. 201					**0.06**				**150**	**50**	**50**	**50**		**1,200**	**40**	**40**	**0.50**	**100.00**	**5**	**1**
TOTAL FOR PROJ NO. 18314.1045012					**0.06**				**150**	**50**	**50**	**50**		**1,200**	**40**	**40**	**0.50**	**100.00**	**5**	**1**
8314.1045013	Henderson	202	US-176	2	0.06	24	5.86	5.92						100			0.10		1	
TOTAL FOR MAP NO. 202					**0.06**									**100**			**0.10**		**1**	
TOTAL FOR PROJ NO. 18314.1045013					**0.06**									**100**			**0.10**		**1**	
18314.1045014	Henderson	203	US-176	2	0.06	24	5.92	5.98	150	25	25	25		1,200	50	50	0.25		2	
TOTAL FOR MAP NO. 203					**0.06**				**150**	**25**	**25**	**25**		**1,200**	**50**	**50**	**0.25**		**2**	
TOTAL FOR PROJ NO. 18314.1045014					**0.06**				**150**	**25**	**25**	**25**		**1,200**	**50**	**50**	**0.25**		**2**	
18314.1045015	Henderson	204	US-176	2	0.22	24	7.21	7.43						1,200		50	0.25		2	
TOTAL FOR MAP NO. 204					**0.22**									**1,200**		**50**	**0.25**		**2**	
TOTAL FOR PROJ NO. 18314.1045015					**0.22**									**1,200**		**50**	**0.25**		**2**	
18314.1045016	Henderson	205	US-176	2	0.08	24	7.61	7.69	50	10	10	10		50		50	0.10		2	
TOTAL FOR MAP NO. 205					**0.08**				**50**	**10**	**10**	**10**		**50**		**50**	**0.10**		**2**	
TOTAL FOR PROJ NO. 18314.1045016					**0.08**				**50**	**10**	**10**	**10**		**50**		**50**	**0.10**		**2**	
18314.1045021	Henderson	207	US-176	2	0.26	24	8.18	8.44	75	15	15	15		550		20	0.70		2	
TOTAL FOR MAP NO. 207					**0.26**				**75**	**15**	**15**	**15**		**550**		**20**	**0.70**		**2**	
TOTAL FOR PROJ NO. 18314.1045021					**0.26**				**75**	**15**	**15**	**15**		**550**		**20**	**0.70**		**2**	
18314.1045018	Henderson	211	US-176	2	0.13	24	8.62	8.75						800		40	0.80		4	
TOTAL FOR MAP NO. 211					**0.13**									**800**		**40**	**0.80**		**4**	
TOTAL FOR PROJ NO. 18314.1045018					**0.13**									**800**		**40**	**0.80**		**4**	
18314.1045019	Henderson	212	US-176	2	0.12	24	8.75	8.87						5,000			1.00			
TOTAL FOR MAP NO. 212					**0.12**									**5,000**			**1.00**			
TOTAL FOR PROJ NO. 18314.1045019					**0.12**									**5,000**			**1.00**			
18314.1045020	Henderson	213	US-176	2	0.08	24	8.93	9.01	100	15		15	10	250	15	20	0.10		2	
TOTAL FOR MAP NO. 213					**0.08**				**100**	**15**		**15**	**10**	**250**	**15**	**20**	**0.10**		**2**	
TOTAL FOR PROJ NO. 18314.1045020					**0.08**				**100**	**15**		**15**	**10**	**250**	**15**	**20**	**0.10**		**2**	
18314.1045100	Henderson	946	US-176	2	0.08	24	5.42	5.5	100	15	15	15		100	20	30	0.10		2	
TOTAL FOR MAP NO. 946					**0.08**				**100**	**15**	**15**	**15**		**100**	**20**	**30**	**0.10**		**2**	
TOTAL FOR PROJ NO. 18314.1045100					**0.08**				**100**	**15**	**15**	**15**		**100**	**20**	**30**	**0.10**		**2**	
GRAND TOTAL					**1.15**				**625**	**130**	**115**	**130**	**10**	**10,450**	**125**	**300**	**3.90**	**100.00**	**22**	**1**

SUMMARY OF QUANTITIES

									0000400000-N	0043000000-N	0134000000-E	0156000000-E	1099700000-E	1111000000-E	1112000000-E	1121000000-E	1220000000-E	3635000000-E	3642000000-E	3649000000-E	6138000000-E
PROJECT NO	**COUNTY**	**MAP NO**	**ROUTE**	**LANES**	**LENGTH**	**WIDTH**	**BEGIN MP**	**END MP**	**CONSTRUCTION SURVEYING**	**GRADING**	**DRAINAGE DITCH EXCAVATION**	**REMOVAL OF EXISTING ASPHALT PAVEMENT**	**CLASS IV SUBGRADE STABILIZATION**	**CLASS IV AGGREGATE STABILIZATION**	**GEOTEXTILE FOR SUBGRADE STABILIZATION**	**AGGREGATE BASE COURSE**	**INCIDENTAL STONE BASE**	**RIP RAP, CLASS II**	**RIP RAP, CLASS A**	**RIP RAP, CLASS B**	**VEGETATIVE DEBRIS REMOVAL AND DISPOSAL**
					MI	**FT**			**LS**	**LS**	**CY**	**SY**	**TON**	**TON**	**SY**	**TONS**	**TONS**	**TON**	**TON**	**TON**	**CY**
18314.1045012	Henderson	201	US-176	2	0.06	24	5.66	5.72	0.10	0.10			50				10	650	50	50	25
TOTAL FOR MAP NO. 201					**0.06**				**0.10**	**0.10**			**50**				**10**	**650**	**50**	**50**	**25**
TOTAL FOR PROJ NO. 18314.1045012					**0.06**				**0.10**	**0.10**			**50**				**10**	**650**	**50**	**50**	**25**
8314.1045013	Henderson	202	US-176	2	0.06	24	5.86	5.92	0.10	0.10	100						10				
TOTAL FOR MAP NO. 202					**0.06**				**0.10**	**0.10**	**100**						**10**				
TOTAL FOR PROJ NO. 18314.1045013					**0.06**				**0.10**	**0.10**	**100**						**10**				
18314.1045014	Henderson	203	US-176	2	0.06	24	5.92	5.98	0.10	0.10	50						10		150	150	
TOTAL FOR MAP NO. 203					**0.06**				**0.10**	**0.10**	**50**						**10**		**150**	**150**	
TOTAL FOR PROJ NO. 18314.1045014					**0.06**				**0.10**	**0.10**	**50**						**10**		**150**	**150**	
18314.1045015	Henderson	204	US-176	2	0.22	24	7.21	7.43	0.10	0.10	300						10				50
TOTAL FOR MAP NO. 204					**0.22**				**0.10**	**0.10**	**300**						**10**				**50**
TOTAL FOR PROJ NO. 18314.1045015					**0.22**				**0.10**	**0.10**	**300**						**10**				**50**
18314.1045016	Henderson	205	US-176	2	0.08	24	7.61	7.69	0.10	0.10						45	10				30
TOTAL FOR MAP NO. 205					**0.08**				**0.10**	**0.10**						**45**	**10**				**30**
TOTAL FOR PROJ NO. 18314.1045016					**0.08**				**0.10**	**0.10**						**45**	**10**				**30**
18314.1045021	Henderson	207	US-176	2	0.26	24	8.18	8.44	0.10	0.10	30		30				20	200			
TOTAL FOR MAP NO. 207					**0.26**				**0.10**	**0.10**	**30**		**30**				**20**	**200**			
TOTAL FOR PROJ NO. 18314.1045021					**0.26**				**0.10**	**0.10**	**30**		**30**				**20**	**200**			
18314.1045018	Henderson	211	US-176	2	0.13	24	8.62	8.75	0.10	0.10	43			30			10				30
TOTAL FOR MAP NO. 211					**0.13**				**0.10**	**0.10**	**43**			**30**			**10**				**30**
TOTAL FOR PROJ NO. 18314.1045018					**0.13**				**0.10**	**0.10**	**43**			**30**			**10**				**30**
18314.1045019	Henderson	212	US-176	2	0.12	24	8.75	8.87	0.10	0.10	19						10				50
TOTAL FOR MAP NO. 212					**0.12**				**0.10**	**0.10**	**19**						**10**				**50**
TOTAL FOR PROJ NO. 18314.1045019					**0.12**				**0.10**	**0.10**	**19**						**10**				**50**
18314.1045020	Henderson	213	US-176	2	0.08	24	8.93	9.01	0.10	0.10		55	40		55	18	10	120	20	20	
TOTAL FOR MAP NO. 213					**0.08**				**0.10**	**0.10**		**55**	**40**		**55**	**18**	**10**	**120**	**20**	**20**	
TOTAL FOR PROJ NO. 18314.1045020					**0.08**				**0.10**	**0.10**		**55**	**40**		**55**	**18**	**10**	**120**	**20**	**20**	
18314.1045100	Henderson	946	US-176	2	0.08	24	5.42	5.5	0.10	0.10		20			20	15	10		10	10	30
TOTAL FOR MAP NO. 946					**0.08**				**0.10**	**0.10**		**20**			**20**	**15**	**10**		**10**	**10**	**30**
TOTAL FOR PROJ NO. 18314.1045100					**0.08**				**0.10**	**0.10**		**20**			**20**	**15**	**10**		**10**	**10**	**30**
GRAND TOTAL					**1.15**				**1**	**1**	**542**	**75**	**120**	**30**	**75**	**78**	**110**	**970**	**230**	**230**	**215**

Sign Summary

Route	Site	Sign	MUTCD	Quantity	Size	5‘ U Channel Stub Quantity	U-Channel Post Size	Post Quantity
US 176	201	None						
US 176	202	Left Turn Advisory	W1-1	1	36"x36"	1	10'	1
US 176	203	None						
US 176	204	45 MPH Speed Limit	R2-1	1	24"x36"	1	8'	1
US 176	205	Tractor Sign	W11-5	1	36"x36"	1	10'	1
US 176	205	Intersection Warning	W2-1	1	36"x36"	1	10'	1
US 176	205	35 Speed Advisory	W13-1P	1	18"x18"	0	0	0
US 176	207	None						
US 176	208	None						
US 176	210	None						
US 176	211	Stop	R1-1	1	30"x30"	1	8'	1
US 176	211	35 MPH Ahead	W3-5	1	36"x36"	1	10'	1

** Field location of signs to be directed/determined by Division 14 Traffic Engineer*

SUMMARY OF QUANTITIES

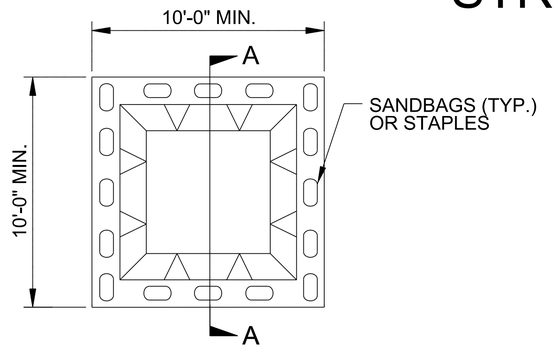
									4400000000-E	4405000000-E	4420000000-N	4424500000-N	4430000000-N	4455000000-N	4465000000-N	4490000000-E	4510000000-N	4815000000-E	4815000000-E
PROJECT NO	COUNTY	MAP NO	ROUTE	LANES	LENGTH	WIDTH	BEGIN MP	END MP	STATIONARY WORK ZONE SIGN	PORTABLE WORK ZONE SIGN	PORTABLE CHANGEABLE MESSAGE SIGN	TEMPORARY PORTABLE TRAFFIC SIGNAL SYSTEM	DRUMS	FLAGGER (DAILY)	TEMPORARY CRASH CUSHIONS	PORTABLE CONCRETE BARRIER (ANCHORED)	LAW ENFORCEMENT	6" WHITE PAINT	6" YELLOW PAINT
					MI	FT			SF	SF	EA	EA	EA	MD	EA	LF	HR	LF	LF
18314.1045012	Henderson	201	US-176	2	0.06	24	5.66	5.72	32	32	1	1	40	15	2	100	40		
TOTAL FOR MAP NO. 201					**0.06**				**32**	**32**	**1**	**1**	**40**	**15**	**2**	**100**	**40**		
TOTAL FOR PROJ NO. 18314.1045012					**0.06**				**32**	**32**	**1**	**1**	**40**	**15**	**2**	**100**	**40**		
8314.1045013	Henderson	202	US-176	2	0.06	24	5.86	5.92	32	32			10	10					
TOTAL FOR MAP NO. 202					**0.06**				**32**	**32**			**10**	**10**					
TOTAL FOR PROJ NO. 18314.1045013					**0.06**				**32**	**32**			**10**	**10**					
18314.1045014	Henderson	203	US-176	2	0.06	24	5.92	5.98	32	32			15	5					
TOTAL FOR MAP NO. 203					**0.06**				**32**	**32**			**15**	**5**					
TOTAL FOR PROJ NO. 18314.1045014					**0.06**				**32**	**32**			**15**	**5**					
18314.1045015	Henderson	204	US-176	2	0.22	24	7.21	7.43	16	16			20	10			24		
TOTAL FOR MAP NO. 204					**0.22**				**16**	**16**			**20**	**10**			**24**		
TOTAL FOR PROJ NO. 18314.1045015					**0.22**				**16**	**16**			**20**	**10**			**24**		
18314.1045016	Henderson	205	US-176	2	0.08	24	7.61	7.69	16	16			20	10			24	200	200
TOTAL FOR MAP NO. 205					**0.08**				**16**	**16**			**20**	**10**			**24**	**200**	**200**
TOTAL FOR PROJ NO. 18314.1045016					**0.08**				**16**	**16**			**20**	**10**			**24**	**200**	**200**
18314.1045021	Henderson	207	US-176	2	0.26	24	8.18	8.44	16	16			10	5			24	60	60
TOTAL FOR MAP NO. 207					**0.26**				**16**	**16**			**10**	**5**			**24**	**60**	**60**
TOTAL FOR PROJ NO. 18314.1045021					**0.26**				**16**	**16**			**10**	**5**			**24**	**60**	**60**
18314.1045018	Henderson	211	US-176	2	0.13	24	8.62	8.75	16	16			20	15			29		
TOTAL FOR MAP NO. 211					**0.13**				**16**	**16**			**20**	**15**			**29**		
TOTAL FOR PROJ NO. 18314.1045018					**0.13**				**16**	**16**			**20**	**15**			**29**		
18314.1045019	Henderson	212	US-176	2	0.12	24	8.75	8.87	16	16	1		10	8			24		
TOTAL FOR MAP NO. 212					**0.12**				**16**	**16**	**1**		**10**	**8**			**24**		
TOTAL FOR PROJ NO. 18314.1045019					**0.12**				**16**	**16**	**1**		**10**	**8**			**24**		
18314.1045020	Henderson	213	US-176	2	0.08	24	8.93	9.01	16	16	1		30	12			24	100	100
TOTAL FOR MAP NO. 213					**0.08**				**16**	**16**	**1**		**30**	**12**			**24**	**100**	**100**
TOTAL FOR PROJ NO. 18314.1045020					**0.08**				**16**	**16**	**1**		**30**	**12**			**24**	**100**	**100**
18314.1045100	Henderson	946	US-176	2	0.08	24	5.42	5.5	16	16			15	5				60	60
TOTAL FOR MAP NO. 946					**0.08**				**16**	**16**			**15**	**5**				**60**	**60**
TOTAL FOR PROJ NO. 18314.1045100					**0.08**				**16**	**16**			**15**	**5**				**60**	**60**
GRAND TOTAL					**1.15**				**208**	**208**	**3**	**1**	**190**	**95**	**2**	**100**	**189**	**420**	**420**

SUMMARY OF QUANTITIES

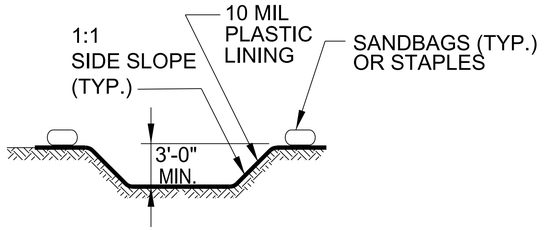
PROJECT NO	COUNTY	MAP NO	ROUTE	LENGTH	BEGIN MP	END MP	3030000000-E STEEL BEAM GUARDRAIL	3360000000-E REMOVE EXISTING GUARDRAIL	4025000000-E CONTRACTOR FURNISHED, TYPE *E SIGN	4072000000-E SUPPORTS, 3-LB STEEL U-CHANNEL	4102000000-N SIGN ERECTION, TYPE E	4155000000-N DISPOSAL OF SIGN SYSTEM, U-CHANNEL
				MI			LF	LF	SF	LF	EA	EA
18314.1045012	Henderson	201	US-176	0.06	5.66	5.72	75	75				
TOTAL FOR MAP NO. 201				**0.06**			**75**	**75**				
TOTAL FOR PROJ NO. 18314.1045012				**0.06**			**75**	**75**				
8314.1045013	Henderson	202	US-176	0.06	5.86	5.92			9.00	15	1	1
TOTAL FOR MAP NO. 202				**0.06**					**9.00**	**15**	**1**	**1**
TOTAL FOR PROJ NO. 18314.1045013				**0.06**					**9.00**	**15**	**1**	**1**
18314.1045014	Henderson	203	US-176	0.06	5.92	5.98	50	50				
TOTAL FOR MAP NO. 203				**0.06**			**50**	**50**				
TOTAL FOR PROJ NO. 18314.1045014				**0.06**			**50**	**50**				
18314.1045015	Henderson	204	US-176	0.22	7.21	7.43	400	400	6.00	13	1	1
TOTAL FOR MAP NO. 204				**0.22**			**400**	**400**	**6.00**	**13**	**1**	**1**
TOTAL FOR PROJ NO. 18314.1045015				**0.22**			**400**	**400**	**6.00**	**13**	**1**	**1**
18314.1045016	Henderson	205	US-176	0.08	7.61	7.69	50	50	20.25	30	2	2
TOTAL FOR MAP NO. 205				**0.08**			**50**	**50**	**20.25**	**30**	**2**	**2**
TOTAL FOR PROJ NO. 18314.1045016				**0.08**			**50**	**50**	**20.25**	**30**	**2**	**2**
18314.1045021	Henderson	207	US-176	0.26	8.18	8.44	150	150				
TOTAL FOR MAP NO. 207				**0.26**			**150**	**150**				
TOTAL FOR PROJ NO. 18314.1045021				**0.26**			**150**	**150**				
18314.1045018	Henderson	211	US-176	0.13	8.62	8.75			15.25	28	2	2
TOTAL FOR MAP NO. 211				**0.13**					**15.25**	**28**	**2**	**2**
TOTAL FOR PROJ NO. 18314.1045018				**0.13**					**15.25**	**28**	**2**	**2**
18314.1045019	Henderson	212	US-176	0.12	8.75	8.87						
TOTAL FOR MAP NO. 212				**0.12**								
TOTAL FOR PROJ NO. 18314.1045019				**0.12**								
18314.1045020	Henderson	213	US-176	0.08	8.93	9.01	230	230				
TOTAL FOR MAP NO. 213				**0.08**			**230**	**230**				
TOTAL FOR PROJ NO. 18314.1045020				**0.08**			**230**	**230**				
18314.1045100	Henderson	946	US-176	0.08	5.42	5.5	150.00	150.00				
TOTAL FOR MAP NO. 946				**0.08**			**150.00**	**150.00**				
TOTAL FOR PROJ NO. 18314.1045100				**0.08**			**150.00**	**150.00**				
GRAND TOTAL				**1.15**			**1,105.00**	**1,105.00**	**50.50**	**86**	**6**	**6**

PROJECT REFERENCE NO.	SHEET NO.
X-XXXX	EC-XX
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

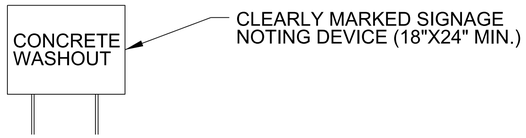
ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



PLAN



SECTION A-A



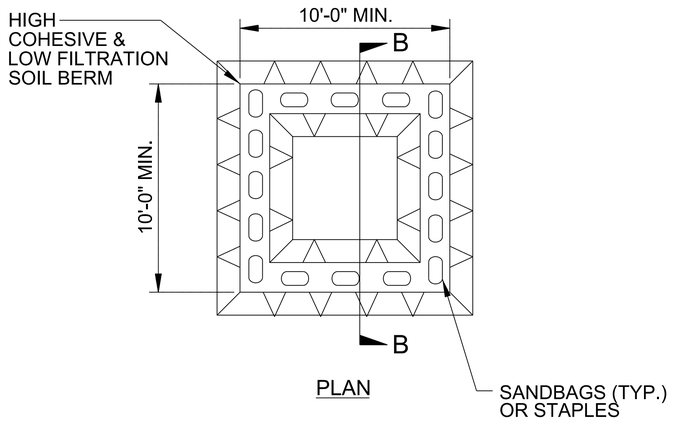
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

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.

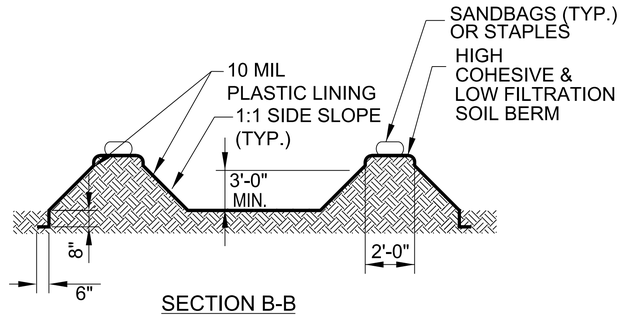
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

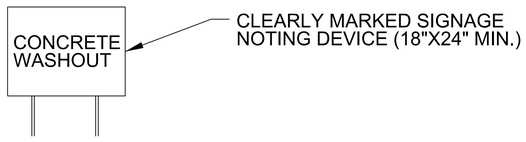
NOT TO SCALE



PLAN



SECTION B-B



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 CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE