CONSTRUCTION DOCUMENTS FOR:

Middle Fork Greenway - Section 3A
Trailhead and Greenway

PROJECT DIRECTORY

DEVELOPER/OWNER(S)
BLUE RIDGE CONSERVANCY
416 AHO ROAD
BLOWING ROCK, NC 28605
(828) 264-2511
CONTACT: WENDY PATOPRSTY

WATAUGA COUNTY
814 W KING STREET, SUITE 205
BOONE, NC 28607
(828) 265-8000
CONTACT: DERON GEOUQUE

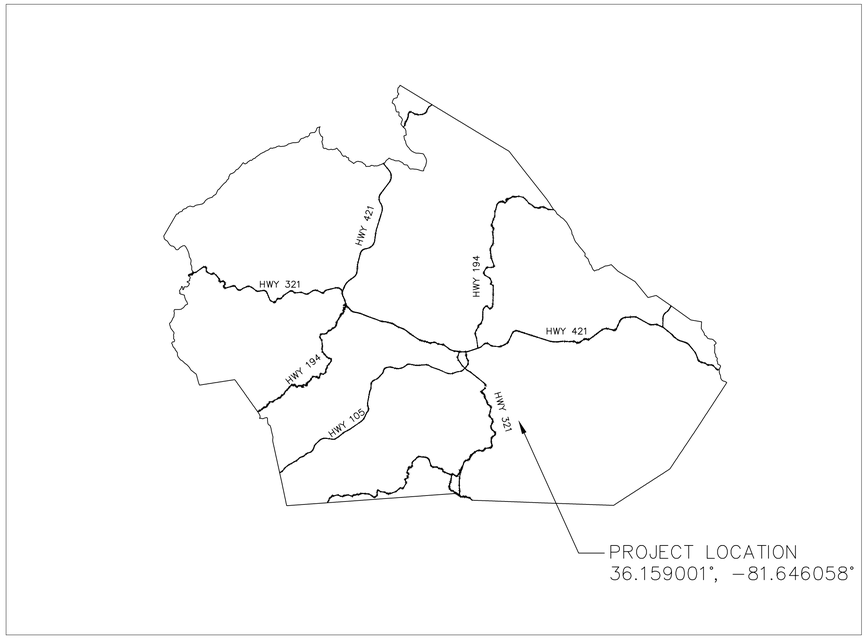
PROJECT PRIME/ENVIRONMENTAL CONSULTANT
INTERFACE ENGINEERING & CONSULTING, PLLC.
476 HIDDEN POND RD
BOONE, NC 28607
(828) 656-4543
CONTACT: CARRIE CAVIN7ESS, PHD, PE

CIVIL ENGINEERING
VALOR ENGINEERING
215 BOONE HEIGHTS DRIVE
SUITE 107
BOONE, NC 28607
(828) 262-9807
CONTACT: JASON GASTON, PE

LANDSCAPE ARCHITECT
DESTINATION BY DESIGN ENGINEERING
136 FURMAN STREET, SUITE 6
BOONE, NC 28607
(828) 386-1866
ALEX GOTHERMAN, PLA

STRUCTURAL ENGINEER
ARETE ENGINEERS, PLLC
7668 VALLEY BLVD.
BLOWING ROCK, NC 28605
(828) 434-0587
ADAM FELMLEE, PE

GEOTECHNICAL ENGINEER
SOLID ROCK ENGINEERING, PLLC
577 GEORGE WILSON ROAD
BOONE, NC 28607
(828) 303-6120
JEFFREY HOLCHIN, PE



VICINITY MAP

CONTACT: CARRIE CAVINESS, PHD, PE
(919) 656-4543

INTERFACE ENVIRONMENTAL CONSULTING, LLC

SHEET INDEX

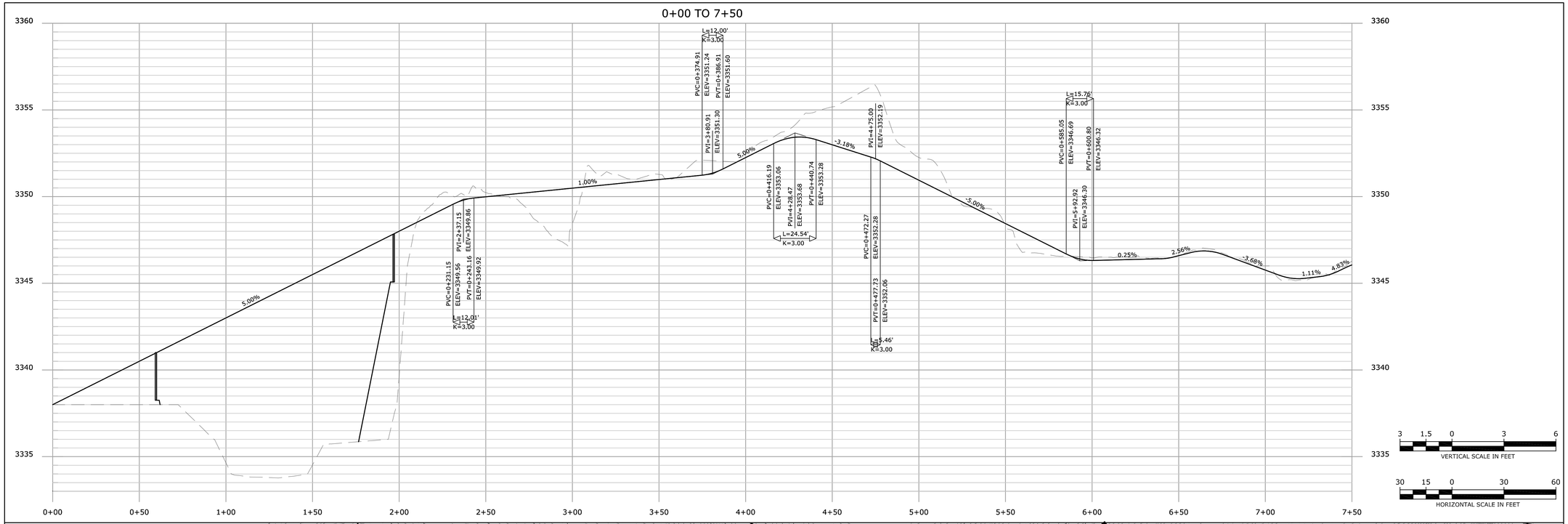
ADDENDUM
SOLID ROCK ENGINEERING:
GEOTECHNICAL REPORT SRE PROJECT # 23-IEC-1

NCDA&CS:
SOIL REPORT FY26-SL002693

ARETE ENGINEERS:
25-627 MIDDLEFORK GREENWAY SECTION #3
GEOTECHNICAL REPORT

	REVISIONS:	
NO.	DESCRIPTION:	BY: DATE:

0+00 TO 7+50



3 1.5 0 3 6
VERTICAL SCALE IN FEET

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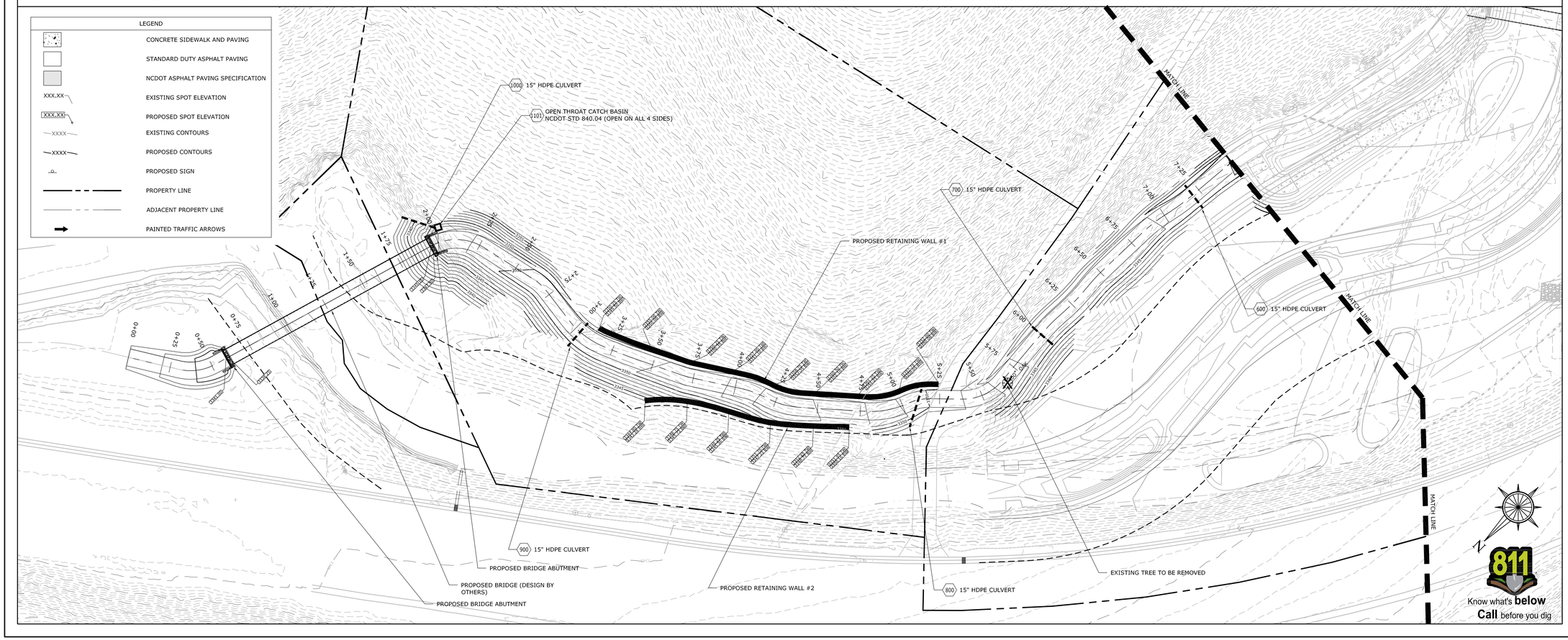
HORIZONTAL SCALE IN FEET



PROJECT:

Middle Fork GREENWAY

Section 3

ADDRESS:
Near 100 Dexter Drive
Blowing Rock, NC 28605

DEVELOPER:

BLUE RIDGE CONSERVANCY
SAVING THE PLACES YOU LOVE

166 Furman Rd Suite C
Boone, NC 28607
CONTACT: Mrs. Wendy Patoprsty

DESIGNERS:

VALOR ENGINEERING

215 Boone Heights Drive, Ste. 107
Boone, NC 28607
828-262-9807
www.valorengineering.com

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035233 ENGINEER JASON GASTON

08/20/25

REVISIONS	DATE

PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25

SHEET TITLE:

STA. 0+00 TO STA. 7+50

SHEET NUMBER: C-1.0

SCALE: 1" = 30'

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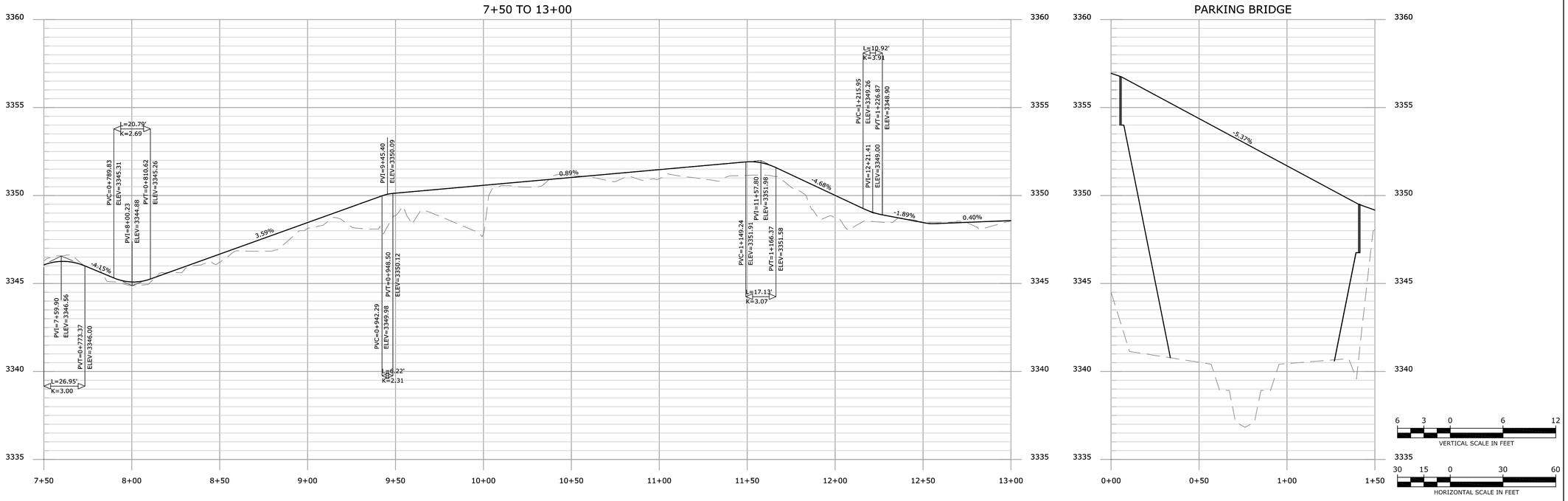
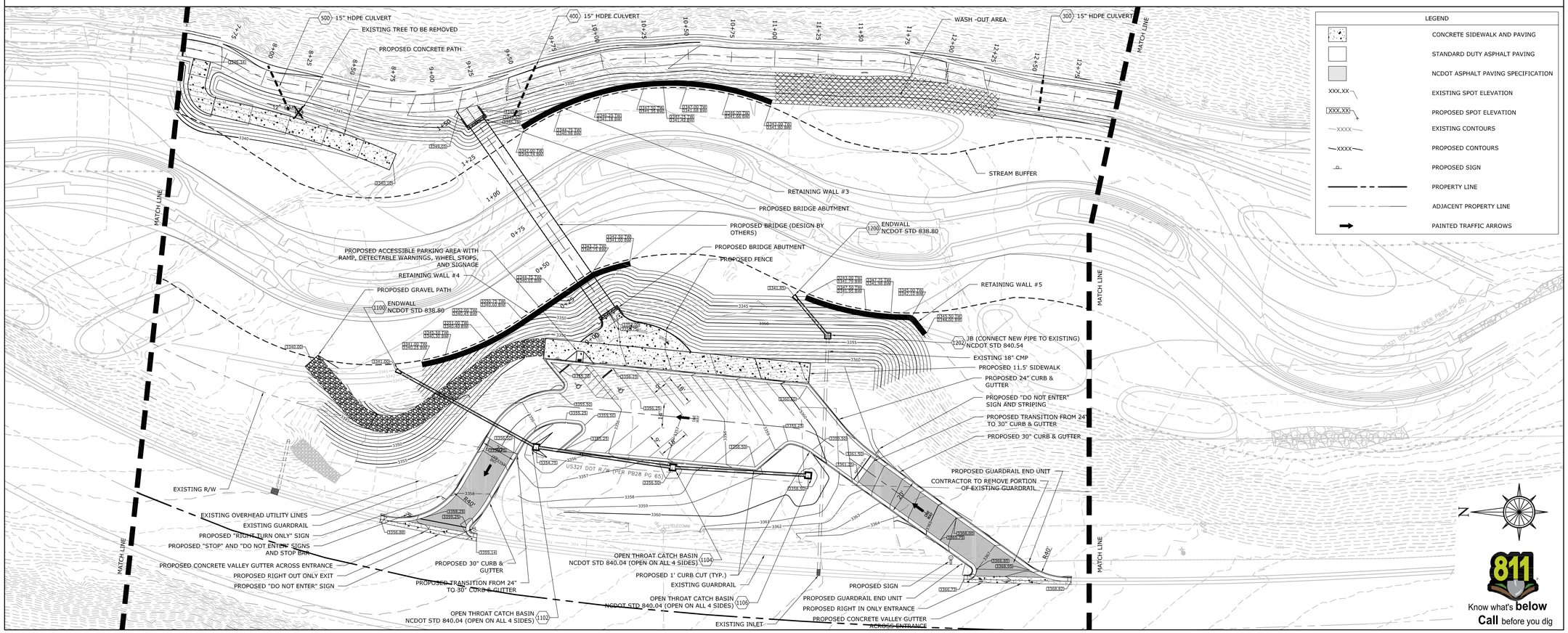
SCALE IN FEET

FILE NUMBER: 119-001





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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035233 ENGINEER JASON GASTON
08/20/25

REVISIONS	DATE

PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25
SHEET TITLE:	STA. 7+50 TO STA. 13+00
SHEET NUMBER:	C-1.1
SCALE:	1" = 30'
FILE NUMBER:	119-001

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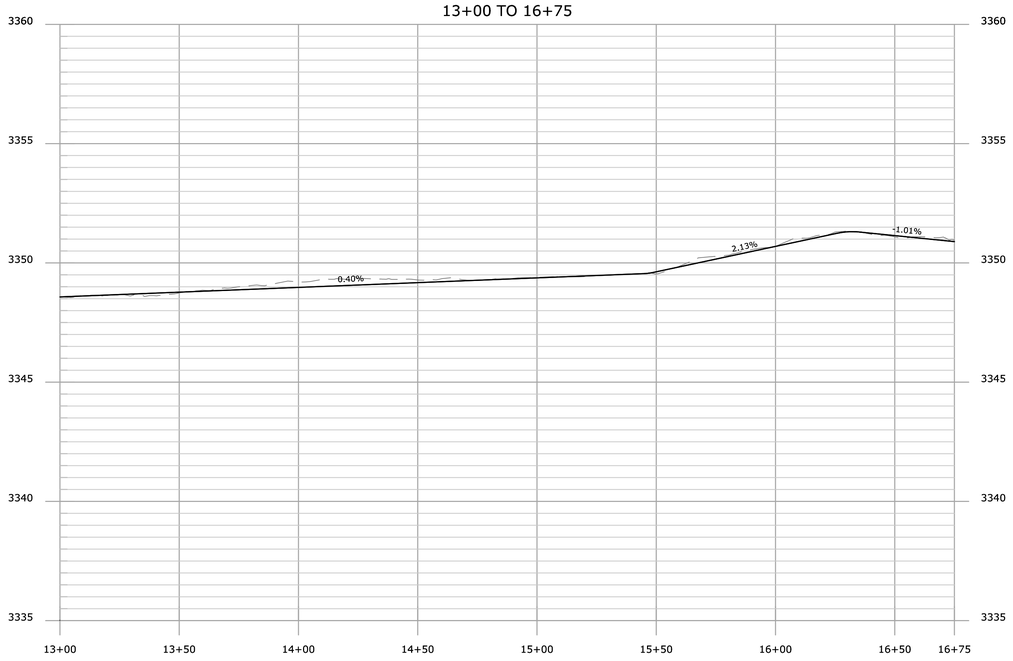

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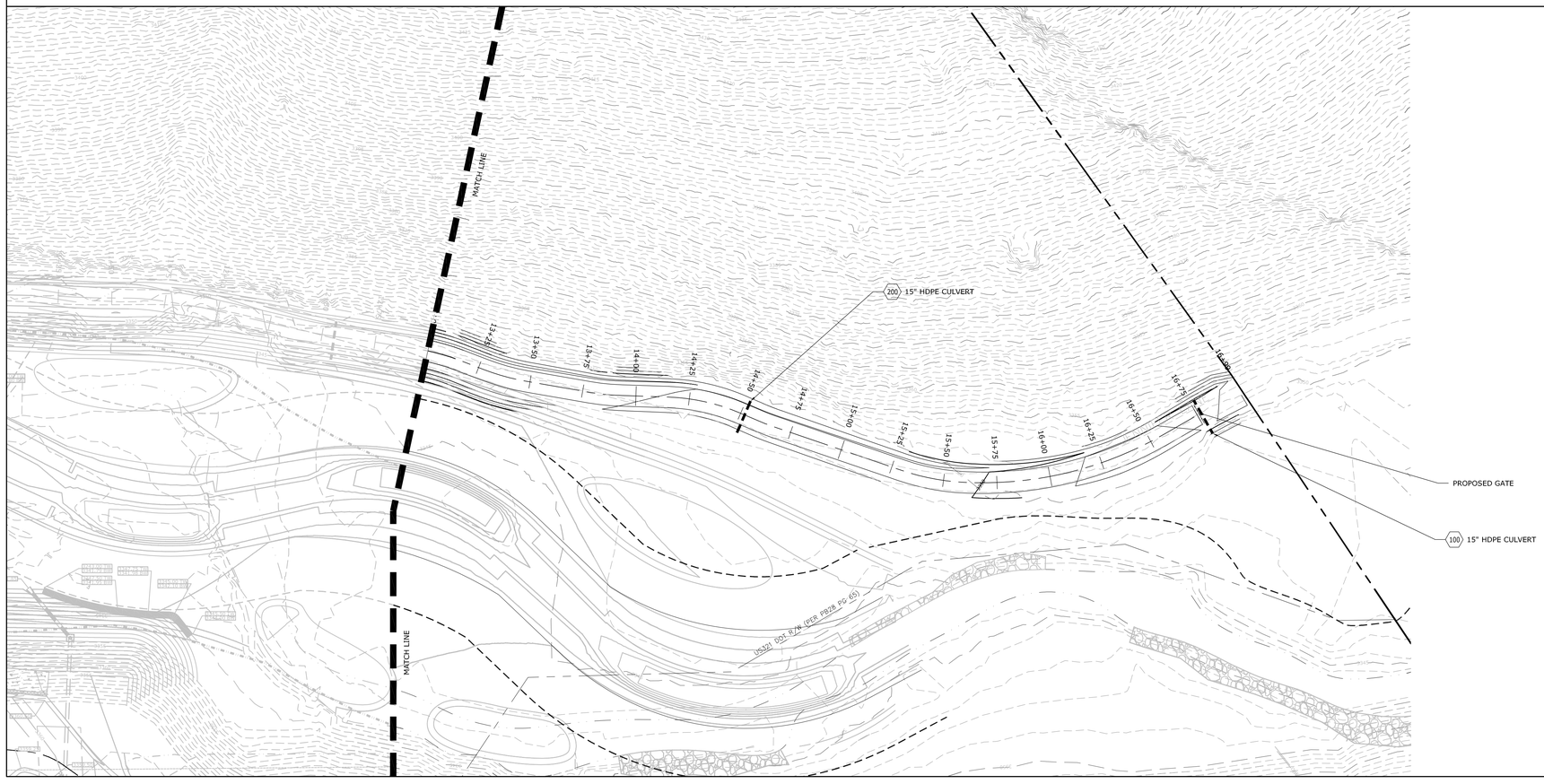
HORIZONTAL SCALE IN FEET



N

811 Know what's **below** **Call** before you dig

PROJECT:

Middle Fork GREENWAY

Section 3

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08/20/25

REVISIONS	DATE

PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25

SHEET TITLE:

STA. 13+00 TO STA. 16+75

SHEET NUMBER: C-1.2

SCALE: 1" = 30'
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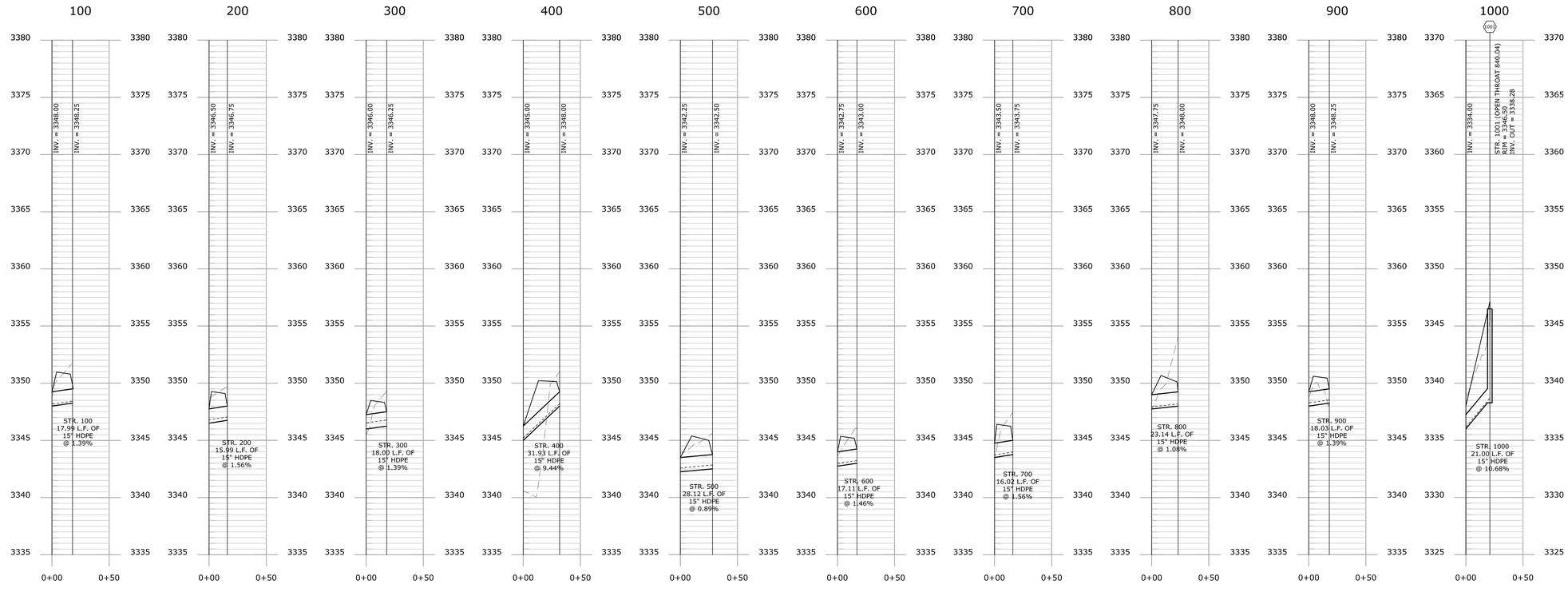
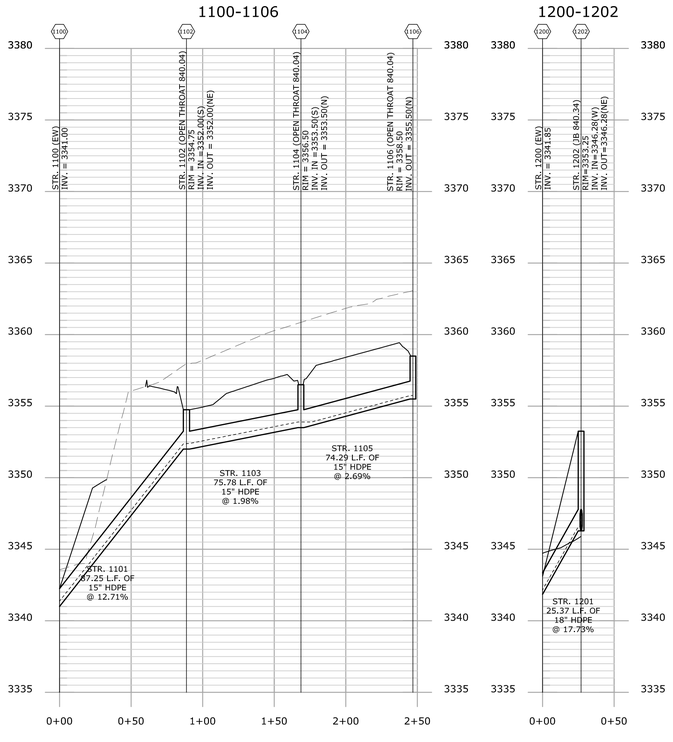
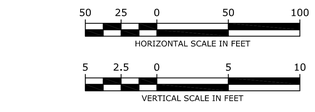
SCALE IN FEET

FILE NUMBER: 119-001

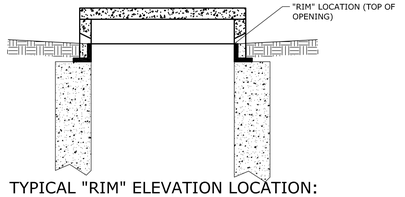




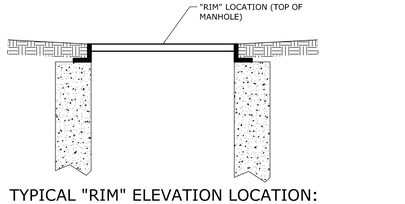


LEGEND	
———	PROPOSED GRADE
— — — — — —	EXISTING GRADE
- - - - - - - - - - - - - - -	HYDRAULIC GRADE LINE (HGL)

NOTES:
1) ALL HDPE IS TO BE SMOOTH LINED CORRUGATED POLYETHYLENE PIPE AASHTO TYPE "S".
2) "FGH" = FRAME, GRATE AND HOOD.
3) "JB" = JUNCTION BOX
4) ALL FGH IN LOW POINTS SHALL HAVE "TYPE E" GRATES.
5) ALL CMP SHALL BE ALUMINIZED TYPE II.



TYPICAL "RIM" ELEVATION LOCATION:
OPEN THROAT INLET



TYPICAL "RIM" ELEVATION LOCATION:
JUNCTION BOX

811 Know what's **below** **Call** before you dig

PROJECT:

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SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035233 ENGINEER JASON GASTON

08/20/25

REVISIONS	DATE

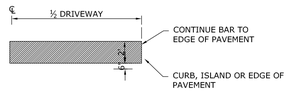
PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25
SHEET TITLE:	

DRAINAGE PROFILES

SHEET NUMBER: C-1.3

SCALE: AS SHOWN

FILE NUMBER: 119-001

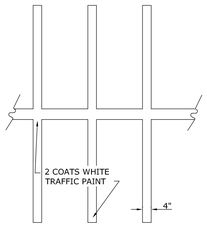


PAINT SHALL BE WHITE PER NCDOT SPECIFICATIONS

THIS STRIPING CONDITION IS FOR PRIVATE ON SITE USE ONLY. REFER TO DOT SPECIFICATIONS OR ALTERNATE DETAILS FOR ROW AND DRIVE WAY APPLICATIONS

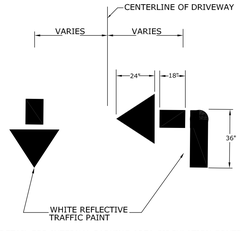
USE THIS DETAIL FOR INTERNAL PARKING AREA CIRCULATION CONTROL.
STOP BARS ADJACENT TO THE RIGHT OF WAY OR WITHIN A RIGHT OF WAY SHALL MEET THE LOCAL JURISDICTIONAL CRITERIA.

1 STOP BAR WITH STRIPE DETAIL
NOT TO SCALE



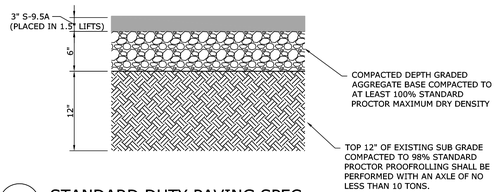
NOTE: SEE SITE DEVELOPMENT PLAN FOR PARKING DIMENSIONS & LAYOUT

2 PAVEMENT STRIPING DETAIL
NOT TO SCALE

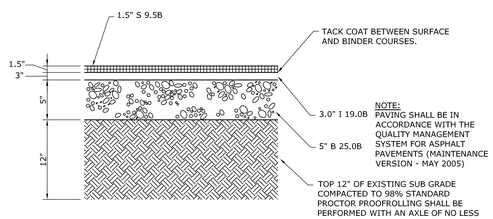


USE THIS DETAIL FOR INTERNAL PARKING AREA CIRCULATION CONTROL. PAVEMENT MARKINGS ADJACENT TO THE RIGHT OF WAY OR WITHIN A RIGHT OF WAY SHALL MEET THE LOCAL JURISDICTIONAL CRITERIA.

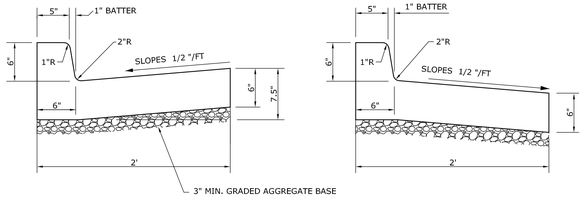
3 DRIVEWAY TRAFFIC FLOW DIRECTIONAL ARROW DETAIL
NOT TO SCALE



4 STANDARD DUTY PAVING SPEC
NOT TO SCALE

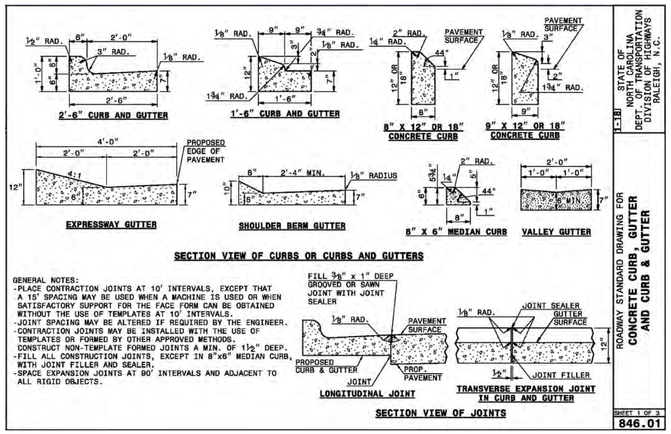


5 NCDOT PAVING SPEC
NOT TO SCALE

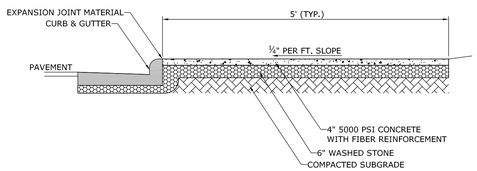


1.) 1/2 "PRE FORMED EXPANSION JOINTS REQUIRED AT ALL STRUCTURES AND RADIUS POINTS.
2.) MAXIMUM DISTANCE BETWEEN EXPANSION JOINTS = 40.0'
3.) MAXIMUM DISTANCE DUMMY JOINTS = 40.0'
4.) CONCRETE STRENGTH = 3000 P.S.I., SLOPE = 2" MAX. FINISH SHALL BE SMOOTHED AND EVENED WITH WOODEN FLOAT.

6 24" CONCRETE CURB AND GUTTER
NOT TO SCALE

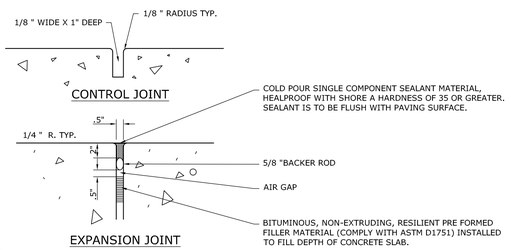


7 30" NCDOT CONCRETE CURB AND GUTTER
NOT TO SCALE

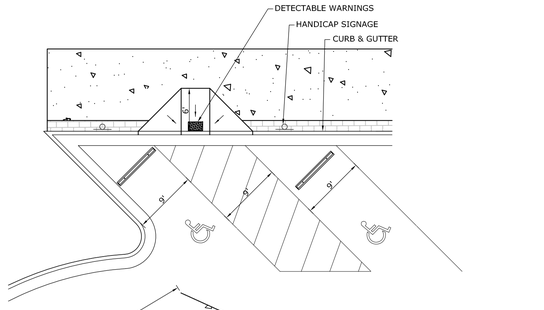


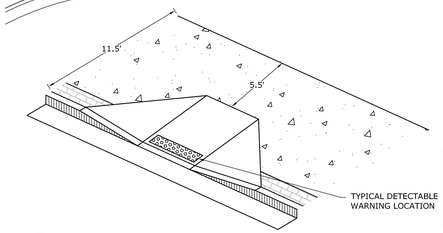
1.) EXPANSION JOINT WILL BE REQUIRED AT ALL CONSTRUCTION JOINTS, CURBS, & SIDEWALKS.
2.) CONTROL JOINTS TO BE AT 5' INTERVALS FOR SIDEWALK.

8 CONCRETE SIDEWALK DETAIL
NOT TO SCALE



9 CONTROL AND EXPANSION JOINTS FOR SIDEWALK
NOT TO SCALE

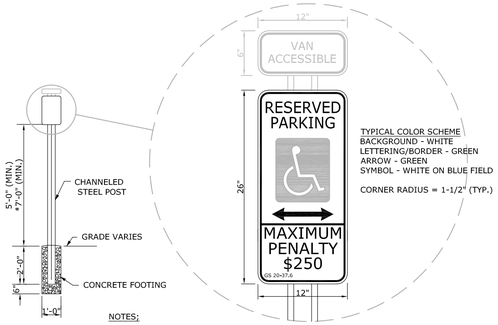




PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	0.65"	1.50"
F	0.45"	0.80"
G	0.90"	1.40"

10 ACCESSIBLE RAMP & PARKING
NOT TO SCALE



NOTES;
1) * SIGN TO BE MOUNTED A MIN. OF 7'-0" FROM GRADE IF ADJACENT TO PEDESTRIAN PATH.
2) WHEN SIGN IS TO BE MOUNTED ON THE SIDE OF A BLDG., HEIGHTS ARE REGULATED AS STATED ABOVE.

11 POLE/WALL MOUNTED ACCESSIBLE PARKING SIGN (R7-8E)
NOT TO SCALE

12 30" R1-1 "STOP" SIGN
NOT TO SCALE

13 24" x 30" R3-5R "RIGHT TURN ONLY" SIGN
NOT TO SCALE

14 30" R5-1 "DO NOT ENTER" SIGN
NOT TO SCALE

15 30" R3-2 "NO LEFT TURN" SIGN
NOT TO SCALE

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SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035233 JASON GASTON
08/20/25

REVISIONS	DATE

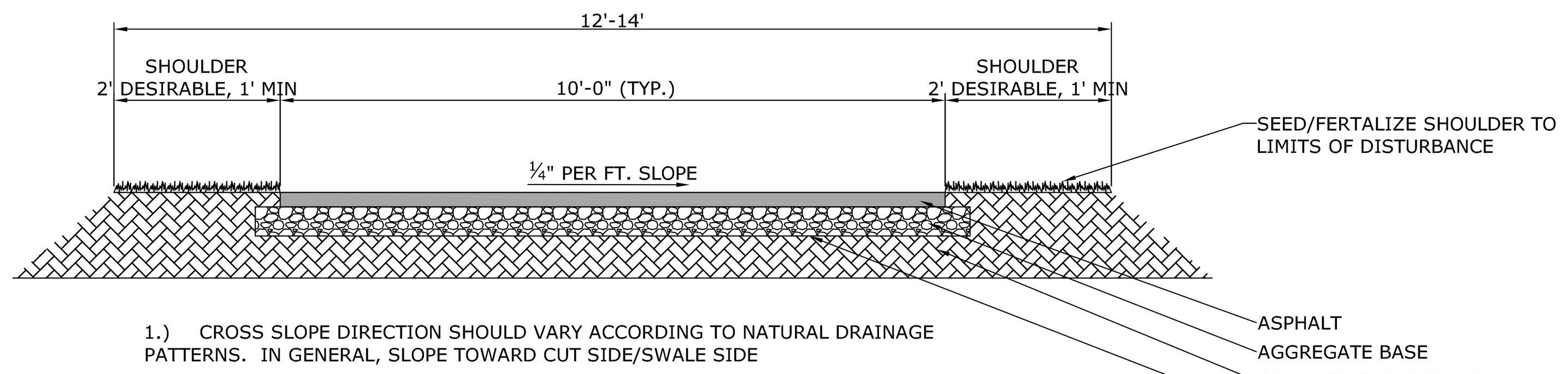
PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25
SHEET TITLE:	

CIVIL DETAILS

SHEET NUMBER: C-2.0

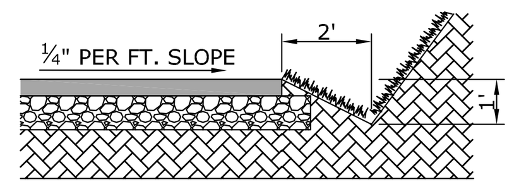
SCALE: NTS

FILE NUMBER: 119-001



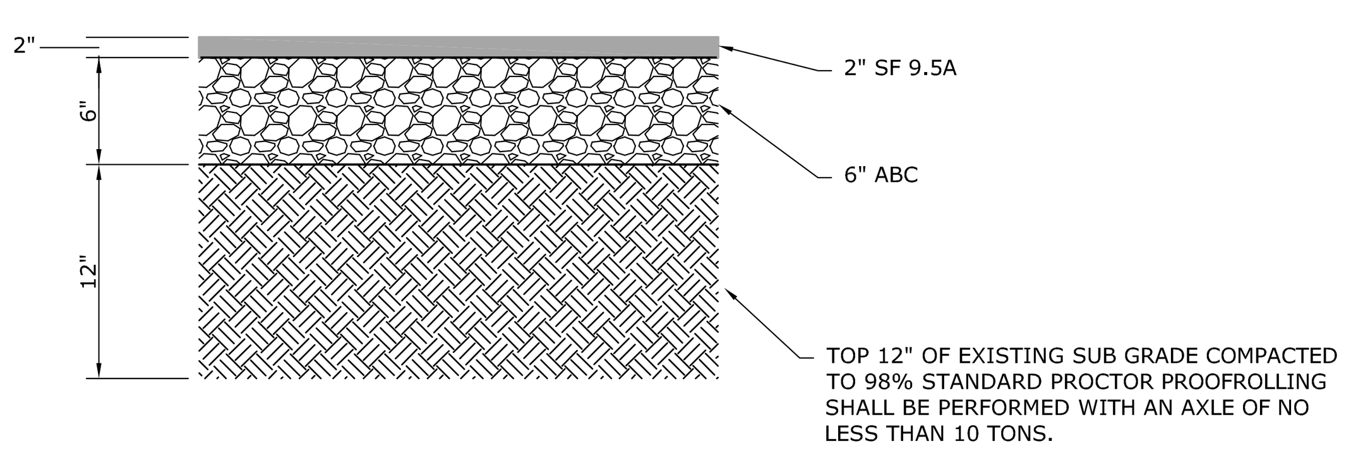
1 10' ASPHALT GREENWAY CROSS SECTION

NOT TO SCALE



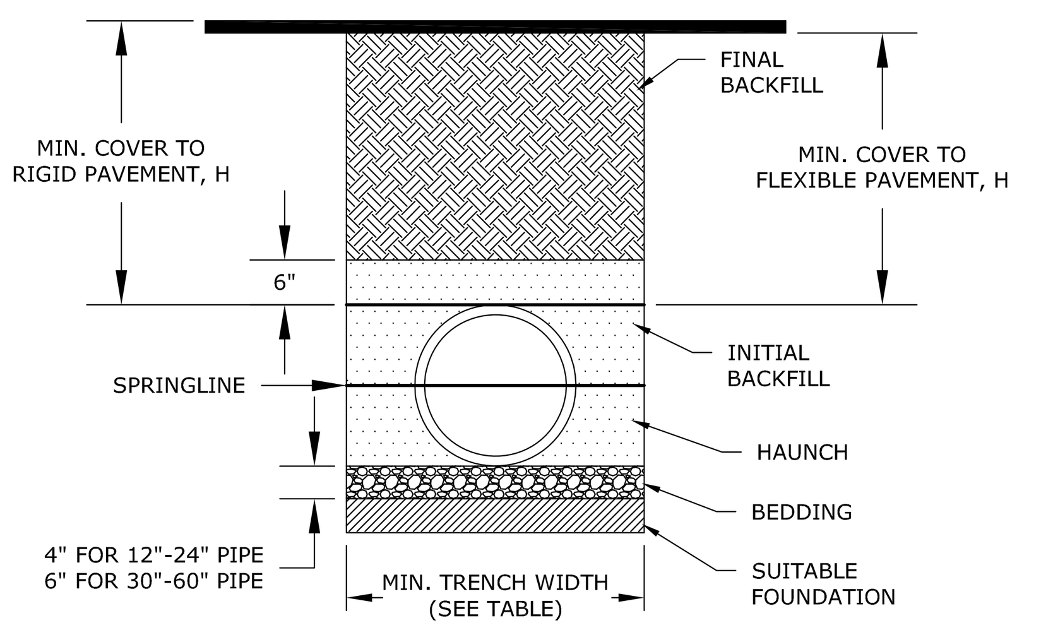
2 2' SWALE ALONG CUT SIDE OF BANK

NOT TO SCALE



3 GREENWAY STANDARD DUTY PAVING SPEC

NOT TO SCALE



RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

MINIMUM RECOMMENDED COVER BASED ON LOADING CONDITIONS

PIPE DIAM.	SURFACE LIVE LOADING CONDITION H-25	HEAVY CONSTRUCTION (75T AXLE LOAD) *
12" - 48"	12"	48"
54" - 60"	24"	60"

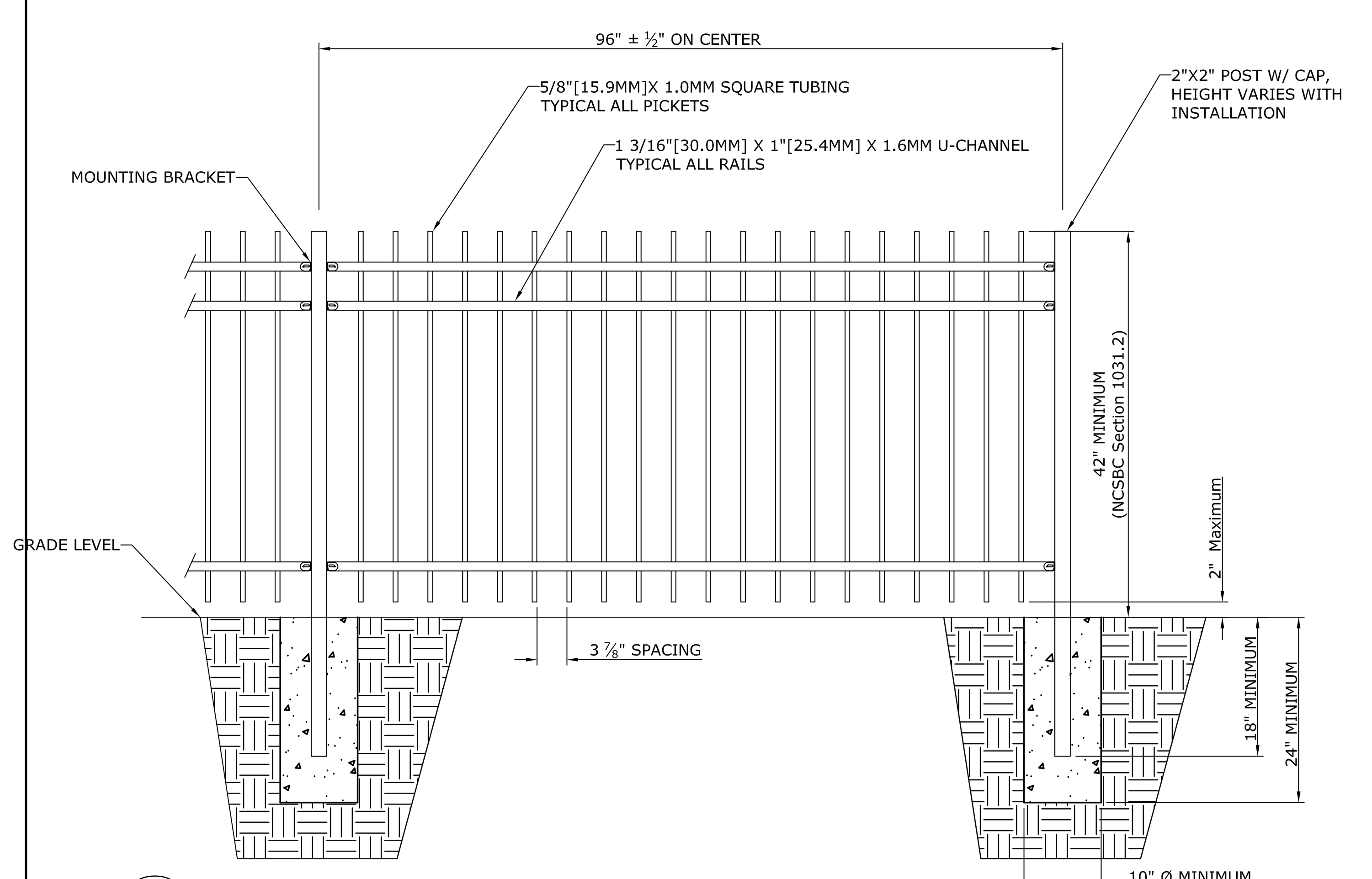
* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

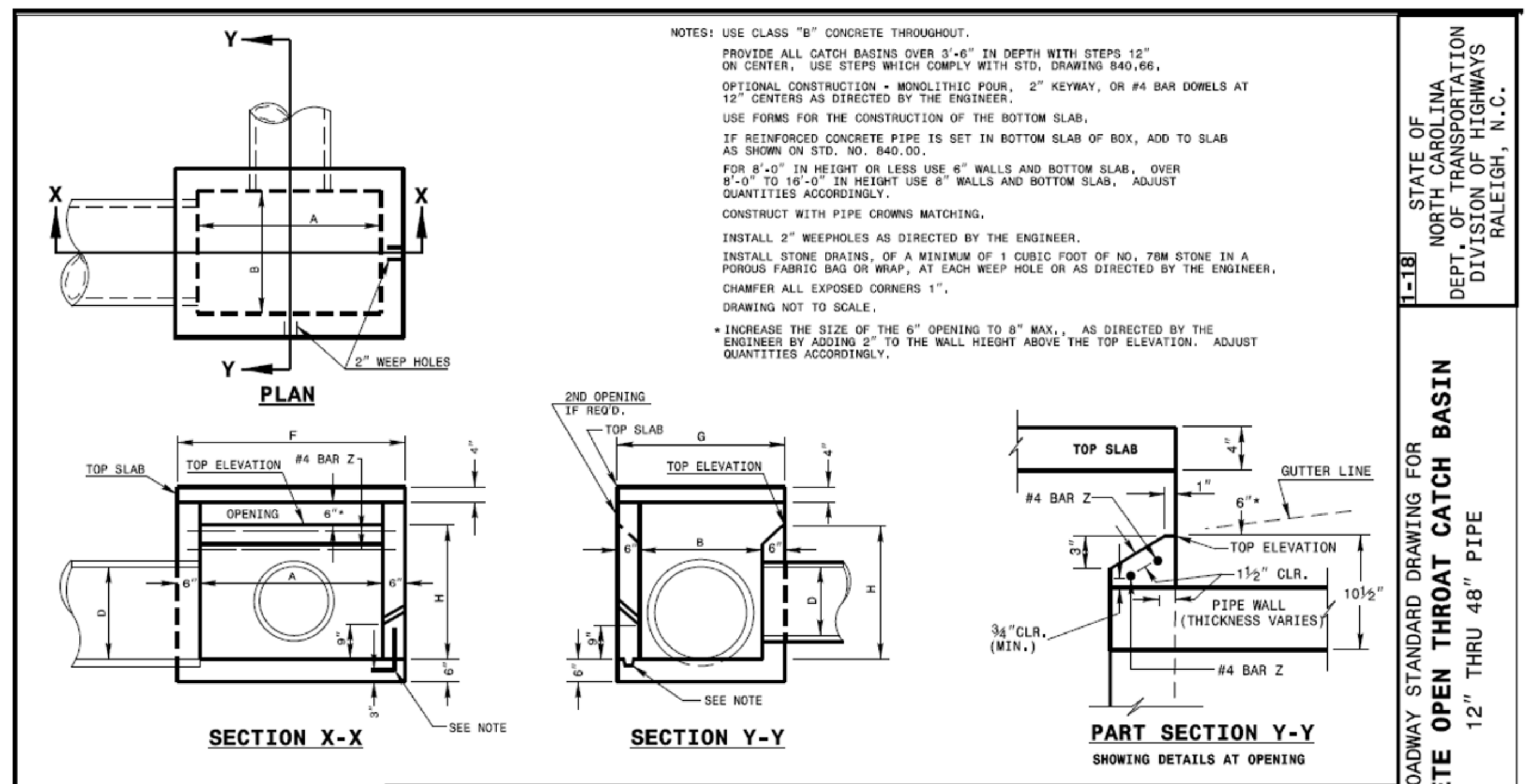
4 HDPE BEDDING DETAIL

NOT TO SCALE



5 SECURITY FENCE (BLACK)

NOT TO SCALE



NOTES: USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.

FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

CONSTRUCT WITH PIPE CROWNS MATCHING.

INSTALL 2" WEEPHOLES AS DIRECTED BY THE ENGINEER.

INSTALL STONE DRAINS, OF A MINIMUM OF 1 CUBIC FOOT OF NO. 78M STONE IN A POROUS FABRIC BAG OR WRAP, AT EACH WEEP HOLE OR AS DIRECTED BY THE ENGINEER.

CHAMFER ALL EXPOSED CORNERS 1".

DRAWING NOT TO SCALE.

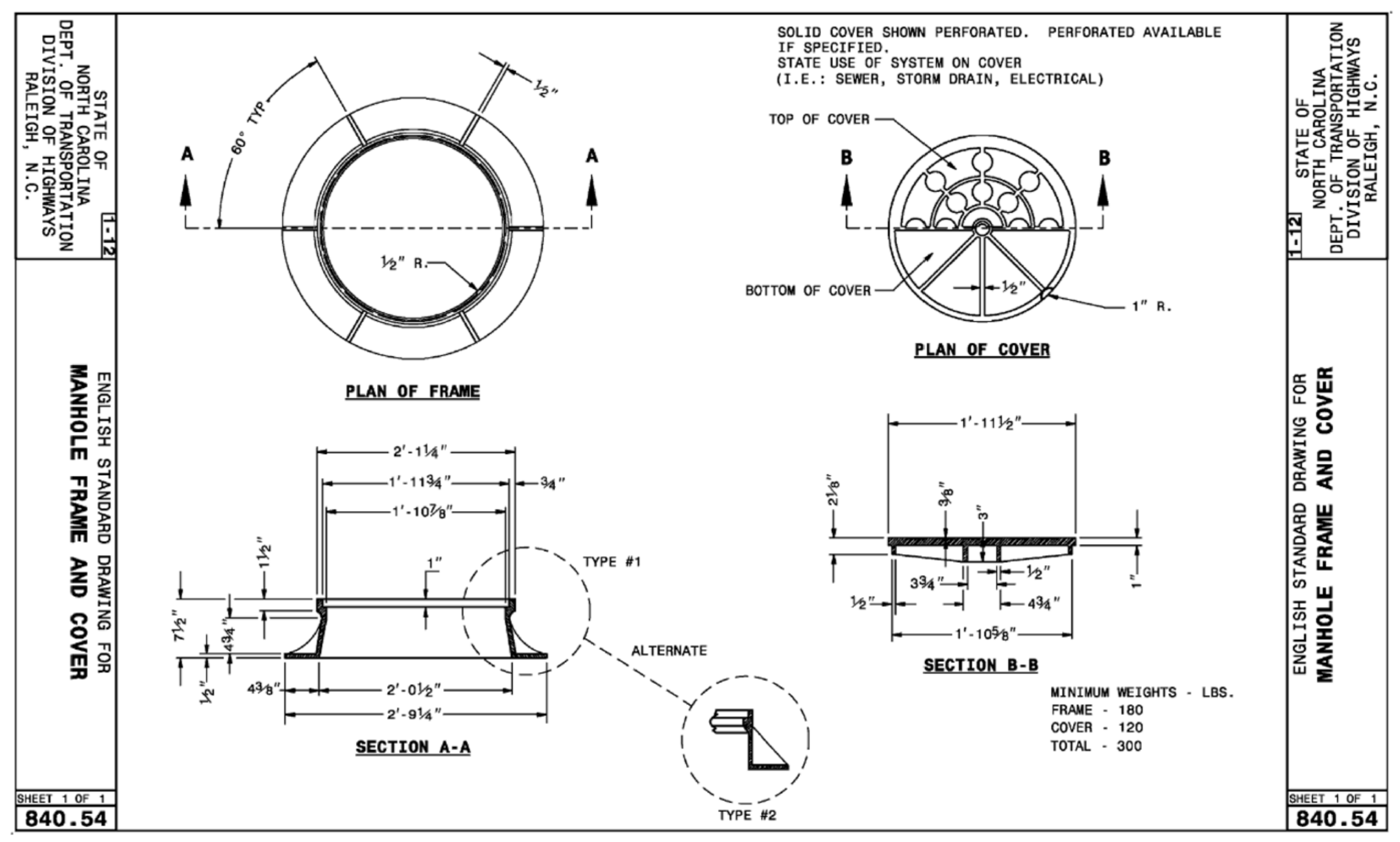
* INCREASE THE SIZE OF THE 6" OPENING TO 8" MAX., AS DIRECTED BY THE ENGINEER BY ADDING 2" TO THE WALL HIEGHT ABOVE THE TOP ELEVATION. ADJUST QUANTITIES ACCORDINGLY.

MIN. DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN (BASED ON MIN. HEIGHT, H)

DIM'S OF BOX & PIPE: PIPE D	SPAN A	WIDTH B	HEIGHT H	REINFORCING BARS - X NO.	BARS - X LENGTH	BARS - Y NO.	BARS - Y LENGTH	BARS - Z NO.	BARS - Z LENGTH	TOP & BOT. SLAB DIMENSIONS F	G	CU. YDS. CONC. IN BOX TOP SLAB	BOT. SLAB	WALL/FT. HT.	TOTAL QUANTITIES BOX & SLABS LBS. REINF.	YD³ (MIN H)	DEDUCTION ONE PIPE C.S.	R.C.	DED. ONE 6" THROAT OPENING YD³
12"	3'-6"	2'-3"	1'-10"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.046	0.015	0.032	0.046
15"	3'-6"	2'-3"	2'-1"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.108	0.023	0.036	0.046
18"	4'-0"	2'-8"	2'-4"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.379	0.033	0.049	0.053
24"	4'-0"	2'-8"	2'-10"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.521	0.059	0.085	0.053
30"	4'-0"	3'-6"	3'-4"	5	4'-3"	9	4'-9"	2	4'-9"	5'-0"	4'-6"	0.278	0.417	0.315	43	1.916	0.092	0.127	0.053
36"	4'-6"	4'-0"	3'-10"	5	4'-9"	10	5'-3"	2	5'-3"	5'-6"	5'-0"	0.340	0.510	0.352	51	2.390	0.132	0.178	0.059
42"	5'-0"	4'-6"	4'-4"	5	5'-3"	12	5'-9"	2	5'-9"	6'-0"	5'-6"	0.407	0.611	0.389	64	2.914	0.180	0.243	0.066
48"	5'-0"	5'-0"	4'-10"	5	5'-9"	13	5'-9"	2	5'-9"	6'-0"	6'-0"	0.444	0.666	0.407	68	3.298	0.235	0.317	0.066

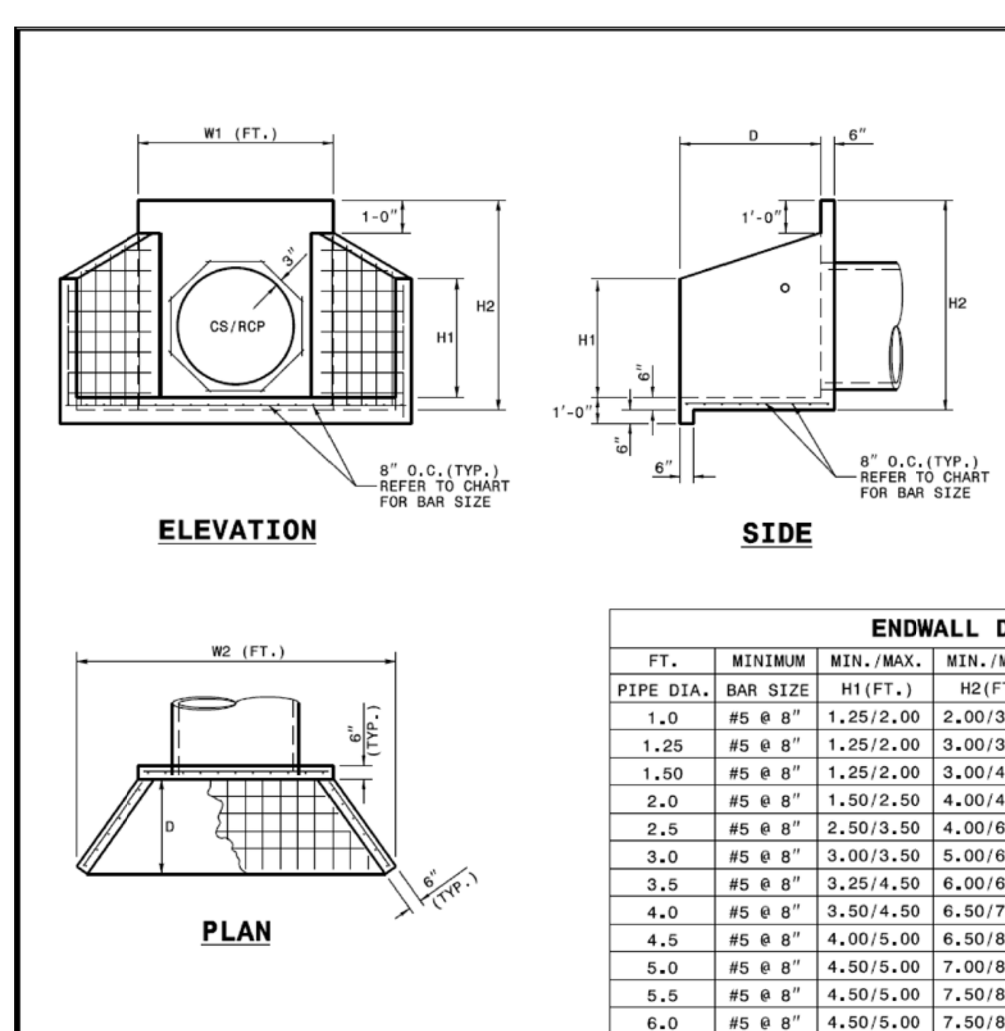
6 OPEN THROAT CATCH BASSIN (NCDOT STD. 840.04)

NOT TO SCALE



7 JUNCTION BOX TOP (NCDOT STD. 840.54)

NOT TO SCALE



NOTES:

* THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.01, 838.11, 838.21, 838.27, 838.33, 838.39, 838.51, 838.57, 838.63 AND 838.69.
* INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
* USE 4000 PSI CONCRETE.
* PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
* PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
* PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
* ALL ELEMENTS PRECAST TO MEET ASTM C913.
* WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
* CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

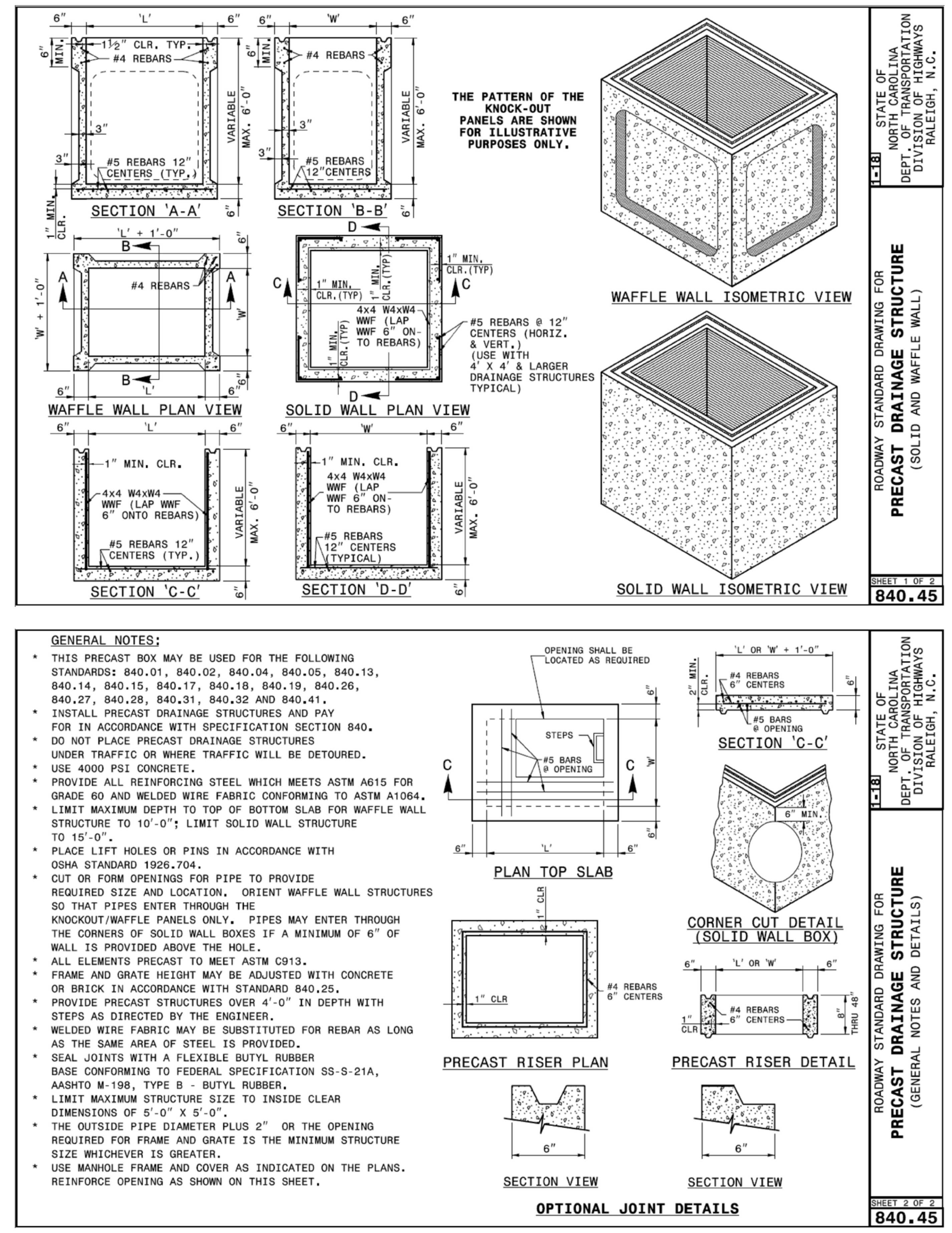
NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT. PIPE DIA.	MINIMUM BAR SIZE	MIN./MAX. H1(FT.)	MIN./MAX. H2(FT.)	MIN./MAX. D (FT.)	MIN./MAX. W1	MIN./MAX. W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

8 CONCRETE ENDWALL (NCDOT STD. 838.80)

NOT TO SCALE

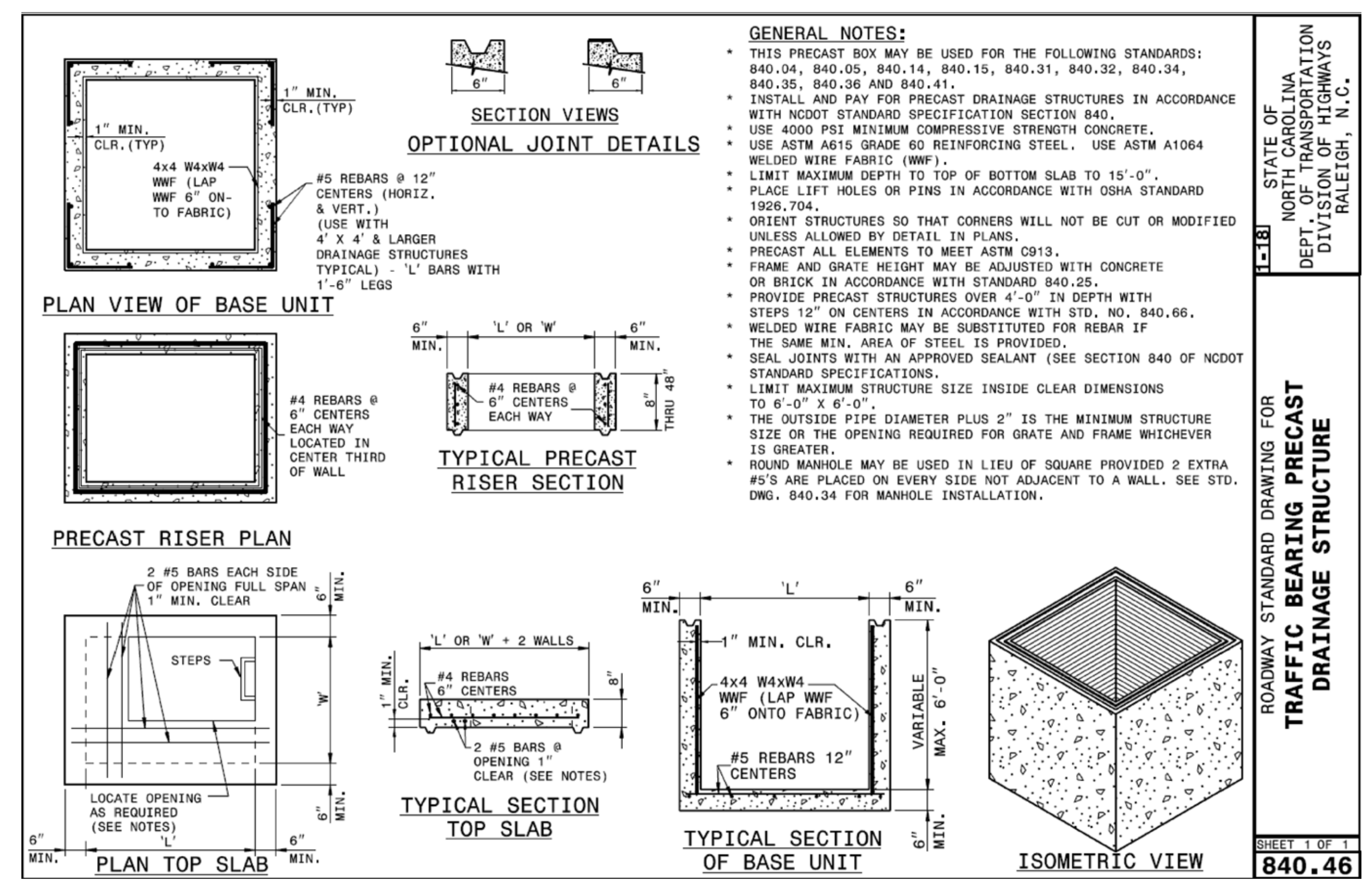


GENERAL NOTES:

* THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.01, 840.02, 840.04, 840.05, 840.13, 840.14, 840.15, 840.17, 840.18, 840.19, 840.26, 840.27, 840.28, 840.31, 840.32 AND 840.41.
* INSTALL PRECAST DRAINAGE STRUCTURES AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 840.
* DO NOT PLACE PRECAST DRAINAGE STRUCTURES UNDER TRAFFIC OR WHERE TRAFFIC WILL BE DETOURED.
* USE 4000 PSI CONCRETE.
* PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A1064.
* LIMIT MAXIMUM DEPTH TO TOP OF BOTTOM SLAB FOR WAFFLE WALL STRUCTURE TO 10'-0"; LIMIT SOLID WALL STRUCTURE TO 15'-0".
* PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
* CUT OR FORM OPENINGS FOR PIPE TO PROVIDE REQUIRED SIZE AND LOCATION. ORIENT WAFFLE WALL STRUCTURES SO THAT PIPES ENTER THROUGH THE KNOCKOUT/WAFFLE PANELS ONLY. PIPES MAY ENTER THROUGH THE CORNERS OF SOLID WALL BOXES IF A MINIMUM OF 6" OF WALL IS PROVIDED ABOVE THE HOLE.
* ALL ELEMENTS PRECAST TO MEET ASTM C913.
* FRAME AND GRATE HEIGHT MAY BE ADJUSTED WITH CONCRETE OR BRICK IN ACCORDANCE WITH STANDARD 840.25.
* PROVIDE PRECAST STRUCTURES OVER 4'-0" IN DEPTH WITH STEPS AS DIRECTED BY THE ENGINEER.
* WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
* SEAL JOINTS WITH A FLEXIBLE BUTYL RUBBER BASE CONFORMING TO FEDERAL SPECIFICATION SS-S-21A, AASHTO M-198, TYPE B - BUTYL RUBBER.
* LIMIT MAXIMUM STRUCTURE SIZE TO INSIDE CLEAR DIMENSIONS OF 5'-0" X 5'-0".
* THE OUTSIDE PIPE DIAMETER PLUS 2" OR THE OPENING REQUIRED FOR FRAME AND GRATE IS THE MINIMUM STRUCTURE SIZE WHICHEVER IS GREATER.
* USE MANHOLE FRAME AND COVER AS INDICATED ON THE PLANS. REINFORCE OPENING AS SHOWN ON THIS SHEET.

9 PRECAST DRAINAGE BOX

NOT TO SCALE



GENERAL NOTES:

* THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.04, 840.05, 840.14, 840.15, 840.31, 840.32, 840.34, 840.35, 840.36 AND 840.41.
* INSTALL AND PAY FOR PRECAST DRAINAGE STRUCTURES IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTION 840.
* USE 4000 PSI MINIMUM COMPRESSIVE STRENGTH CONCRETE.
* USE ASTM A615 GRADE 60 REINFORCING STEEL. USE ASTM A1064 WELDED WIRE FABRIC (WWF).
* LIMIT MAXIMUM DEPTH TO TOP OF BOTTOM SLAB TO 15'-0".
* PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
* ORIENT STRUCTURES SO THAT CORNERS WILL NOT BE CUT OR MODIFIED UNLESS ALLOWED BY DETAIL IN PLANS.
* PRECAST ALL ELEMENTS TO MEET ASTM C913.
* FRAME AND GRATE HEIGHT MAY BE ADJUSTED WITH CONCRETE OR BRICK IN ACCORDANCE WITH STANDARD 840.25.
* PROVIDE PRECAST STRUCTURES OVER 4'-0" IN DEPTH WITH STEPS 12" ON CENTERS IN ACCORDANCE WITH STD. NO. 840.66.
* WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR IF THE SAME MIN. AREA OF STEEL IS PROVIDED.
* SEAL JOINTS WITH AN APPROVED SEALANT (SEE SECTION 840 OF NCDOT STANDARD SPECIFICATIONS.
* LIMIT MAXIMUM STRUCTURE SIZE INSIDE CLEAR DIMENSIONS TO 6'-0" X 6'-0".
* THE OUTSIDE PIPE DIAMETER PLUS 2" IS THE MINIMUM STRUCTURE SIZE OR THE OPENING REQUIRED FOR GRATE AND FRAME WHICHEVER IS GREATER.
* ROUND MANHOLE MAY BE USED IN LIEU OF SQUARE PROVIDED 2 EXTRA #5'S ARE PLACED ON EVERY SIDE NOT ADJACENT TO A WALL. SEE STD. DWG. 840.34 FOR MANHOLE INSTALLATION.

10 PRECAST DRAINAGE BOX (TRAFFIC BEARING)

NOT TO SCALE

PROJECT:

Middle Fork GREENWAY

Section 3

ADDRESS:
Near 100 Dexter Drive
Blowing Rock, NC 28605

DEVELOPER:

BLUE RIDGE CONSERVANCY — SAVING THE PLACES YOU LOVE

166 Furman Rd Suite C
Boone, NC 28607

CONTACT: Mrs. Wendy Patoprsty

DESIGNERS:

VALOR ENGINEERING

215 Boone Heights Drive, Ste. 107
Boone, NC 28607
828-262-9807
www.valorengineering.com

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035233 ENGINEER JASON GASTON

08/20/25

REVISIONS	DATE

PROJECT MANAGER:	JEG
DRAWING BY:	JEG
JURISDICTION:	WATAUGA COUNTY
DATE:	08/20/25
SHEET TITLE:	CIVIL DETAILS
SHEET NUMBER:	C-2.1
SCALE:	NTS
FILE NUMBER:	119-001

M.F.G. SECTION 3

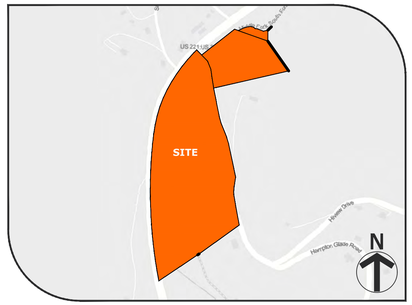
SHEET INDEX

Middle Fork Greenway

A Blue Ridge Conservancy Project

SECTION 3

BLOWING ROCK, WATAUGA COUNTY, NC 28605



VICINITY MAP

PROJECT TEAM

CLIENT:
BLUE RIDGE CONSERVANCY
416 AHO ROAD
BLOWING ROCK, NC 28607
WENDY PATOPRSTY
M.F.G. DIRECTOR

PRIME CONSULTANT/ ENVIRONMENTAL:
INTERFACE ENVIRONMENTAL CONSULTING
476 HIDDEN POND ROAD
BOONE, NC 28607
CARRIE CAVINESS, PhD
(828) 773-5523

LANDSCAPE ARCHITECT:
DESTINATION BY DESIGN ENGINEERING
136 FURMAN STREET, SUITE 6
BOONE, NC 28607
ALEX GOTHERMAN, PLA
(828) 386-1866

CIVIL ENGINEER:
VALOR ENGINEERING
215 BOONE HEIGHTS DRIVE,STE. 107
BOONE, NC 28607
JASON GASTON, PE
(828) 262-9807

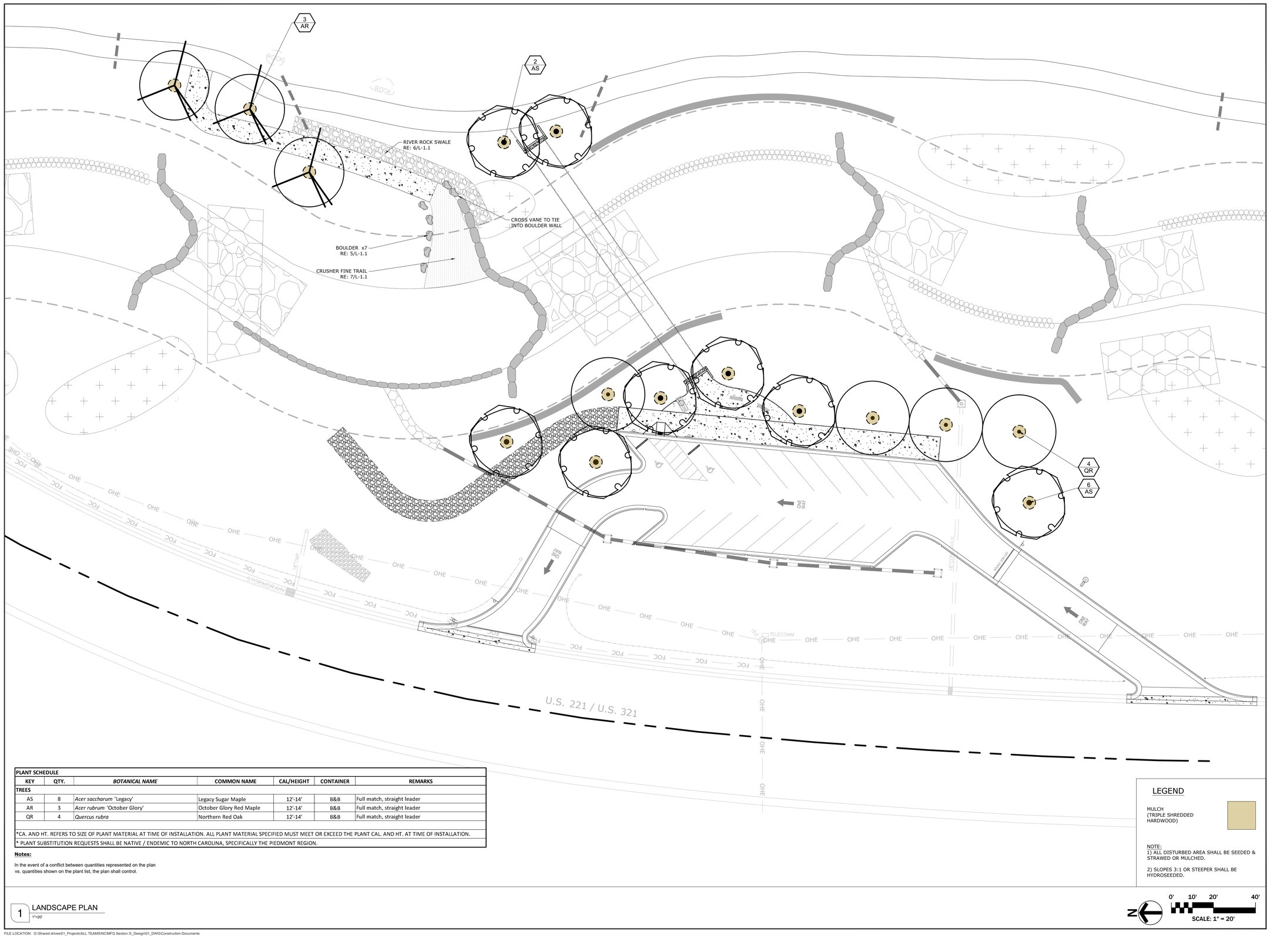
STREAM RESTORATION:
JENNINGS ENVIRONMENTAL, PLLC
56 CENTRAL AVE STE 102
ASHEVILLE, NC 28801
---
(919) 600-4790

CALL OR CLICK 811 BEFORE YOU DIG — SAFE DIGGING PARTNER

REV. NO.	DESCRIPTION:	DATE:
X	RELEASED FOR BIDDING	xx/xx/xxxx

RELEASED FOR BIDDING - XX/XX/XXXX

M.F.G. SECTION 3



PLANT SCHEDULE

KEY	QTY.	*BOTANICAL NAME*	COMMON NAME	CAL/HEIGHT	CONTAINER	REMARKS
TREES						
AS	8	*Acer saccharum* 'Legacy'	Legacy Sugar Maple	12'-14'	B&B	Full match, straight leader
AR	3	*Acer rubrum* 'October Glory'	October Glory Red Maple	12'-14'	B&B	Full match, straight leader
QR	4	*Quercus rubra*	Northern Red Oak	12'-14'	B&B	Full match, straight leader
*CA. AND HT. REFERS TO SIZE OF PLANT MATERIAL AT TIME OF INSTALLATION. ALL PLANT MATERIAL SPECIFIED MUST MEET OR EXCEED THE PLANT CAL. AND HT. AT TIME OF INSTALLATION.						
* PLANT SUBSTITUTION REQUESTS SHALL BE NATIVE / ENDEMIC TO NORTH CAROLINA, SPECIFICALLY THE PIEDMONT REGION.						

Notes:

In the event of a conflict between quantities represented on the plan vs. quantities shown on the plant list, the plan shall control.

LEGEND

MULCH
(TRIPLE SHREDDED HARDWOOD)

NOTE:
1) ALL DISTURBED AREA SHALL BE SEEDED & STRAWED OR MULCHED.

2) SLOPES 3:1 OR STEEPER SHALL BE HYDROSEEDED.

1 LANDSCAPE PLAN
1"=20'

N

0' 10' 20' 40'
SCALE: 1" = 20'

FILE LOCATION: G:\Shared drives\01_Projects\ALL TEAMS\NC\MFG Section 3_Design\01_DWG\Construction Documents

PROJECT

Middle Fork Greenway
A Blue Ridge Conservancy Project

MIDDLE FORK GREENWAY SECTION 3

CLIENT: BLUE RIDGE CONSERVANCY
Wendy Patoprsty, M.F.G Director

416 Aho Road
Watauga County
Blowing Rock, NC 28607

LANDSCAPE ARCHITECT

DESTINATION BY DESIGN

136 Furman Rd, Suite 6, Boone, NC 28607
(828) 386-1866
dbdplanning.com

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT CHARLES A GOTHERMAN
LA No. 2007

NOT FOR CONSTRUCTION

12/02/25

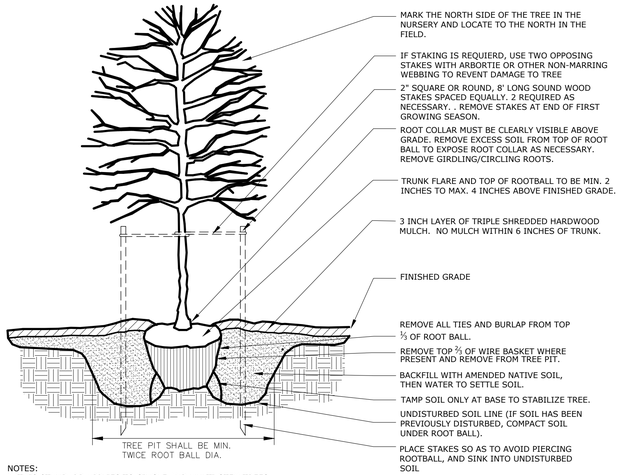
REVISIONS DATE

PROJECT MANAGER: CAG
DRAWING BY: IV
JURISDICTION: WATAUGA COUNTY, NC

SHEET TITLE:

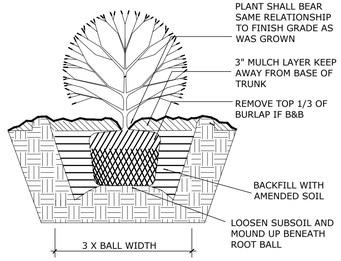
LANDSCAPE & GROUNDCOVER PLAN

SHEET NUMBER:
L-1.0

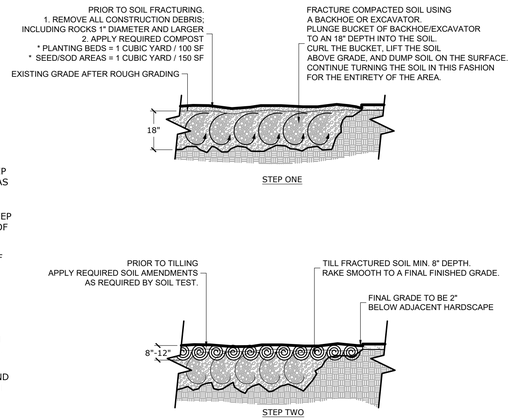


NOTES:
1. THIS STANDARD APPLIES TO SINGLE AND MULTI-STEM TREES.
2. NO SYNTHETIC FABRIC IS ALLOWED ON ROOT BALL.
3. REMOVE ALL BALL TIES OR STRAPPING FROM ROOT BALL.
4. DO NOT INSTALL TREES DURING PERIODS OF WET OR FROZEN SOIL CONDITIONS.
5. SOAK ROOT BALL AND PLANT PIT IMMEDIATELY BEFORE AND AFTER INSTALLATION.
6. SET TREE PLUMB IN ALL DIRECTIONS.
7. THE CONTRACTOR IS RESPONSIBLE FOR KEEPING THE TREE UPRIGHT AND PLUMB IN ALL DIRECTIONS. DO NOT STAKE TREES EXCEPT WHERE NECESSARY TO KEEP TREE UPRIGHT. IF STAKED, STAKE ONLY AS SHOWN.
8. TREES PLANTED ON STEEP SLOPES SHALL BE STAKED.

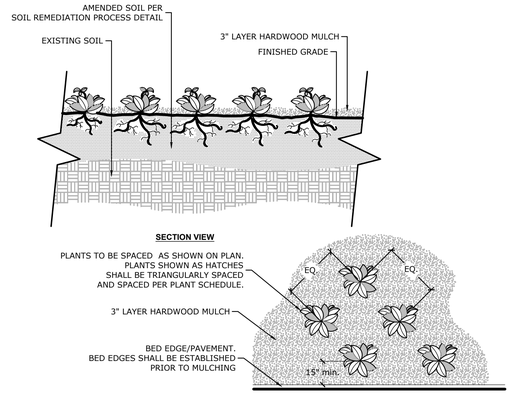
1 TYPICAL TREE PLANTING
N.T.S.



2 TYPICAL SHRUB PLANTING
N.T.S.



3 SOIL REMEDIATION PROCESS
N.T.S.



NOTES:
1. SEE PLANT SCHEDULE FOR SPECIES, SIZE, AND SPACING DIMENSION.
2. SMALL ROOTS (¼" OR LESS) THAT GROW AROUND, UP, OR DOWN THE ROOT BALL PERIPHERY ARE CONSIDERED A NORMAL CONDITION IN CONTAINER PRODUCTION AND ARE ACCEPTABLE HOWEVER THEY SHOULD BE ELIMINATED AT THE TIME OF PLANTING. ROOTS ON THE PERIPHERY CAN BE REMOVED AT THE TIME OF PLANTING.
3. SETTLE SOIL AROUND ROOT BALL OF EACH PLANT PRIOR TO MULCHING.

4 TYPICAL PLANT SPACING LALYOUT
N.T.S.

LANDSCAPE NOTES

General

1. Submission of bid indicates the contractor has verified site conditions and quantities of plants and other material necessary to complete the work as set forth by these drawings and specifications.
2. Contractor shall locate all underground utilities prior to construction and shall be responsible for the protection of these utilities during installation, and shall promptly repair and restore at no additional cost to the owner if damage occurs during installation. Contractor shall become thoroughly familiar with the full set of construction drawings and specifications for coordination with utilities, architecture, features, etc.
3. Contractor shall be responsible for their own take offs and quantities. The quantities on the plant list serve only as a guide to the owner and Landscape Architect; this includes sod and mulch quantities.
4. In the event of a conflict between quantities represented on the plan vs. quantities shown on the plant list, the plan shall control.

Soil

1. A soil test shall be performed prior to construction 1) to determine nutrient status and pH of soil 2) to determine the soil texture in the top 6" - 12" of soil, and then amend the soil based on the results of the tests.
2. Grading shall be subject to the approval of the Landscape Architect. All disturbed areas shall be fine graded and raked smooth, removing all rocks over 1" and any debris.
3. If water-logged, clayey, compacted or similarly poorly drained soils are discovered during construction, it should be brought to the attention of the Landscape Architect for remedial action.
4. It should be anticipated that the first five feet around the building perimeter will be compacted and foundation beds should be tilled/ripped and improved to sustain vigorous, healthy plant growth.
5. Weeds are to be adequately and properly treated and removed prior to landscape installation. All soil amendments should be certified as weed-free from the supplier.

Plants

1. All plant material shall be Grade #1 or better according to the latest American Standard for Nursery Stock (ANSI Z60.1) Plant size is to take precedence over container size.
2. All plants shall meet size, container, and spacing specifications. Any material not meeting specifications shall be removed and replaced at the contractor's expense.
3. All plants will be required to be full and healthy. Contractor shall arrange for plant approval prior to delivery, either by samples. photos, or nursery visits.
4. Substitutions to plant material shall be avoided to the greatest extent possible. In the event that material specified on the plant schedule is not available, requests for substitution, including a minimum of 3 alternatives, shall be submitted to the Landscape Architect for approval.
5. Plant layouts shall be per the landscape plan. Any variations from the plans in layout, spacing, or quantities shall be submitted to the Landscape Architect for approval prior to installation. If plant material deviating from layout is installed prior to Landscape Architect's approval, contractor will be subject to relocating the material at the Landscape Architect's request and the contractor's own expense.
6. Landscape material is to be maintained by the contractor (including mowing, pruning, watering and weeding) until project closeout. Contractor must provide a warranty on all plant material (trees, shrubs, perennials, groundcover, vines, and turfgrass) for a period of (1) one year. Warranty period begins at project closeout.
7. All plants shall be handled so that roots are adequately protected at all times. During shipment, the entire plant shall be protected with a suitable covering. Plant material suffering from wind burn or other wind damage is not acceptable.
8. No plant shall be bound with rope or wire as not to damage the bark, break branches, or destroy its natural shape. No plant material required to be balled and burlapped shall be accepted if the ball is cracked or broken either before or during the process of planting, or when burlap, staves, ropes or platform required have been removed.

Trees

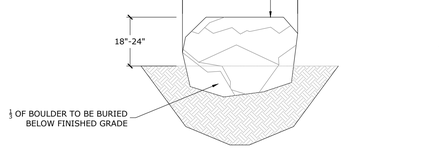
1. All trees and shrubs are to be positioned straight and plumb regardless of the slope of the ground in which they are planted. Berms are to be constructed at right angles to the tree or shrub or in a manner in which they will most effectively serve the purpose of retaining water at the base of the plant.
2. Trees shall be maintained in a straight and plumb position during warranty period.
3. Prior to construction beginning, trees to be retained shall have protective tree barriers.
4. Plants designated "B&B" in the plant list shall be balled and burlapped and meet or exceed the standards set forth within ANSI Z60.1.
5. The root balls of "B&B" plants which cannot be planted immediately on delivery shall be heeled in with moist soil or mulch, to protect from drying winds and sun. All plants shall be watered as necessary until final acceptance.

Permanent Vegetative Cover (Lawns)

1. All disturbed areas, not including mulch beds, shall be permanently stabilized with a well-established turf type ground cover.
2. 4" of topsoil shall be provided and tilled into a depth of 6" prior to establishing turf type permanent stabilization.
3. Soil preparation: Thoroughly disk and scarify area to be seeded or sodded to a depth of at least 6". Remove all objects similar to, but not limited to, rocks 2" and larger, concrete, roots, construction debris, etc., that will interfere with vegetation establishment or maintenance operations.
4. Fertilizer: Apply 40 to 50 pounds of ground limestone per 1,000 sq. ft.. or as recommended by a soil test. Apply 1 pound of nitrogen per 1,000 sq. ft. using a starter type fertilizer. Spread lime and fertilizer uniformly over all areas immediately before final land preparation and mix thoroughly with the soil.
5. Seeded areas: Contractor shall submit seed tags of selected blends (including varieties; percent of germination; and crop seed, inert matter, and weed seed percentages) to the Landscape Architect for approval. Prior to seeding, the area shall be raked smooth leaving the area smooth and level and free of any debris, rocks, sticks, roots, trash, weeds, leaves, etc. Apply a uniform 1/2" to 3/4" layer of thrashed rye, oat, or wheat straw. Apply straw/mulch on all seeded areas immediately following seeding operations. Saturate area with fine water spray within two hours of planting. During the first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below area. Maintain a cover of mulch until seeds have germinated and seedlings have reached a height to begin mowing operations.
6. Sodding: Sod shall be from a quality producer and product must meet requirements set forth by the Turfgrass Council of North Carolina. Prior to laying sod the area shall be raked smooth leaving the area smooth and level and free of any debris, rocks, sticks, roots, trash, weeds, leaves, etc. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by the landscape architect prior to delivery time. Do not lay sod if dormant or if ground is frozen or muddy. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass. Saturate sod with fine water spray within two hours of planting. During the first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.
7. Slopes: All sodded slopes greater than 3:1 shall be stapled to hold sod in place. Seeded slopes greater than 3:1 shall be covered with straw mat. All drainage swales are to receive a 6' wide band of sod. Provide a 3' wide band of sod around all drainage inlets.
8. Establishment: Well rooted permanent vegetative cover of at least 90%, measured in any given 5' X 5' sample area, is required. Contractor shall anticipate areas of the project that will finish prior to substantial completion or as work progresses and work towards establishing permanent cover throughout the construction process. If permanent vegetative cover is not established within thirty (30) days of initial application or has been disturbed, damaged, or eroded, areas shall be reapplied to establish adequate cover. The site will not be considered substantially complete until 90% coverage has been established and accepted by the Landscape Architect.
9. Maintenance: The contractor is responsible for maintenance of all areas until the project has been closed out and turned over to the owner. Fescue lawn areas shall be maintained at a height of 4" and Bermuda lawn areas shall be maintained at a height of 2.5". No more than 1/3 of the height of the grass shall be removed during mowing. Contractor shall adhere to the "Carolina Lawns: A Guide to Maintaining Quality Turf in the Landscape" publication produced by NC State Extension when maintaining the areas, which includes but is not limited to, irrigation, mowing, pest control, fertilization, etc.

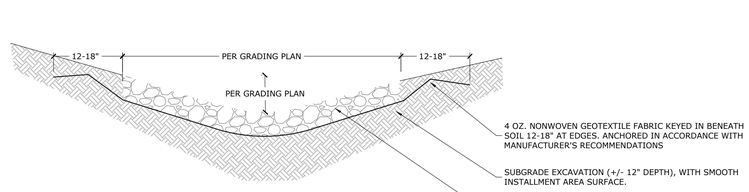
Mulch Notes

1. All plant beds shall have a mechanically trenched bed edge between all landscape beds and adjacent turf areas. Trench shall be 4-6" deep with a vertical edge on the turf side and gently sloping back on the bed side. Install mulch so that the vertical edge holds all mulch in place and prevents migration into the adjacent turf. Bed edges adjacent to hardscape surfaces shall have a turn down edge to prevent mulch from washing over the edge.
2. All plant beds shall be dressed with a 3" layer of shredded hardwood mulch. Mulch shall be partially decomposed hardwood mulch and be of sufficient character as not to be easily displaced by wind or water runoff.
3. Mulch is to be kept away from tree trunks a minimum of 3".
4. All steep sloped planting areas shall be covered with straw matting and mulched. Staples or pins are to be used to ensure that straw matting stays in place after planting is complete

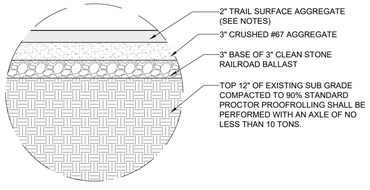


NOTE:
1. CONTRACTOR TO PROVIDE SOURCE FOR LANDSCAPE ARCHITECT TO TAG SELECTION

5 BOULDER DETAIL
N.T.S.



6 RIVER ROCK SWALE
N.T.S.



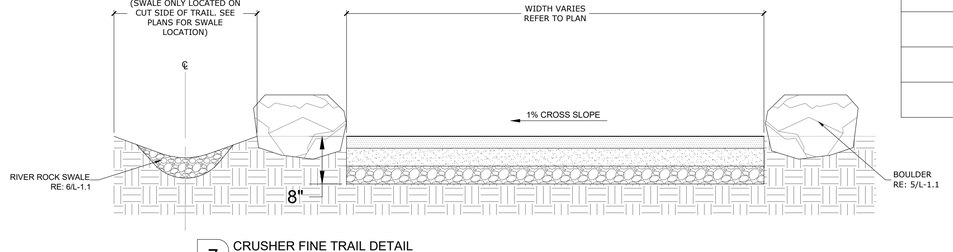
NOTES:
1) Prior to installing the crushed rock (aggregate) surfacing material, the trail bed shall be shaped to reflect the same linear grade and cross slope as the desired finished surface. The trail bed shall be uniformly smooth and compacted to a rate of 90 percent.
2) The application shall be performed in three separate 3-inch lifts. Each lift shall be shaped to the proper linear grade and cross slope prior to compaction. Compaction shall be performed by using either a viberplate compactor or a vibratory roller and shall achieve a minimum compaction rate of 90 percent. The crushed rock shall be kept moist to achieve the maximum rate of compaction.
3) The finished surface of the trail tread shall be uniformly smooth without holes or concave depressions that can trap water.
4) 2" Trail Surface Aggregate (TSA) can be made using a traditional sieve gradations, or using a "recipe approach" that mixes existing aggregate gradations. See the following options:

Option 1: TSA Recipe:

Combine existing aggregates and water in the ratio
- 1 part AASHTO #8
- 4 parts unwashed AASHTO #10 (or B3 sand)
- 1 part minus #200 fines (collector fines)

Option 2: TSA Gradation:

Sieve Size	TSA Percent Passing
1/2"	100 %
3/8"	96-100 %
#4	75-90 %
#8	55-75 %
#16	35-50 %
#200	12-20 %



7 CRUSHER FINE TRAIL DETAIL
N.T.S.

FILE LOCATION: G:\Shared drives\01_Projects\ALL TEAMS\NC\MFG Section 3_Design\01_DWG\Construction Documents

PROJECT

Middle Fork Greenway
A Blue Ridge Conservancy Project

MIDDLE FORK GREENWAY SECTION 3

CLIENT: BLUE RIDGE CONSERVANCY
Wendy Patoprsty, M.F.G Director
416 Aho Road
Watauga County
Blowing Rock, NC 28607

LANDSCAPE ARCHITECT

DESTINATION BY DESIGN

136 Furman Rd, Suite 6, Boone, NC 28607
(828) 386-1866
dbdplanning.com

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT CHARLES A GOTHERMAN No. 2007
CONSTRUCTION

12/02/25

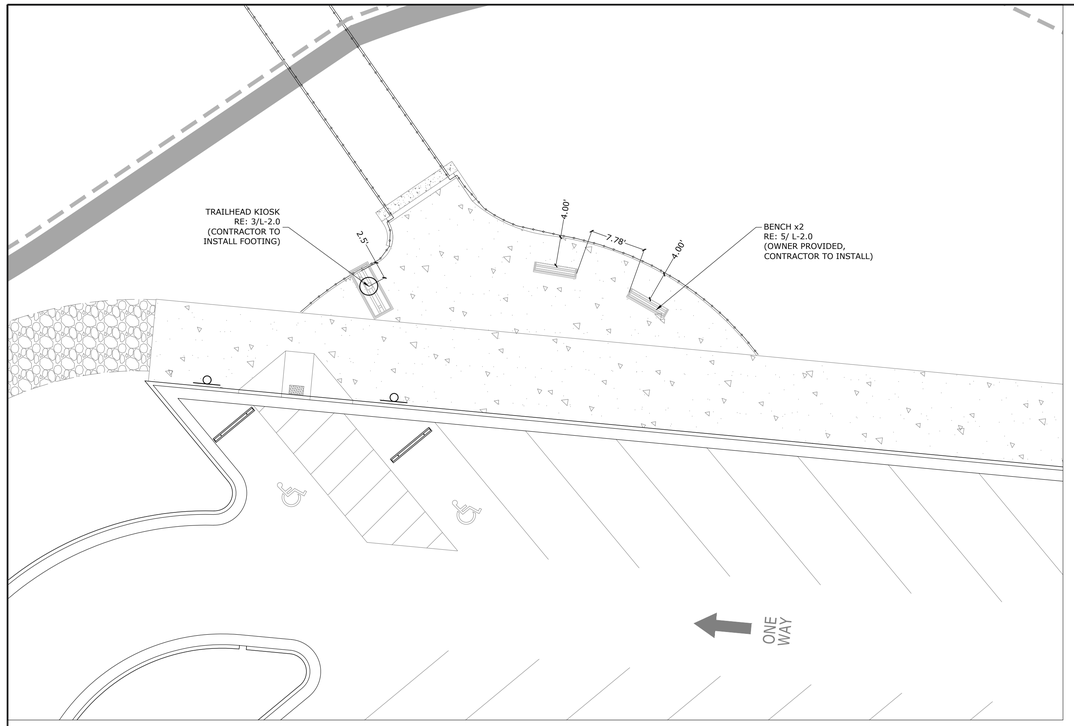
REVISIONS DATE

PROJECT MANAGER: CAG
DRAWING BY: IV
JURISDICTION: WATAUGA COUNTY, NC

SHEET TITLE:

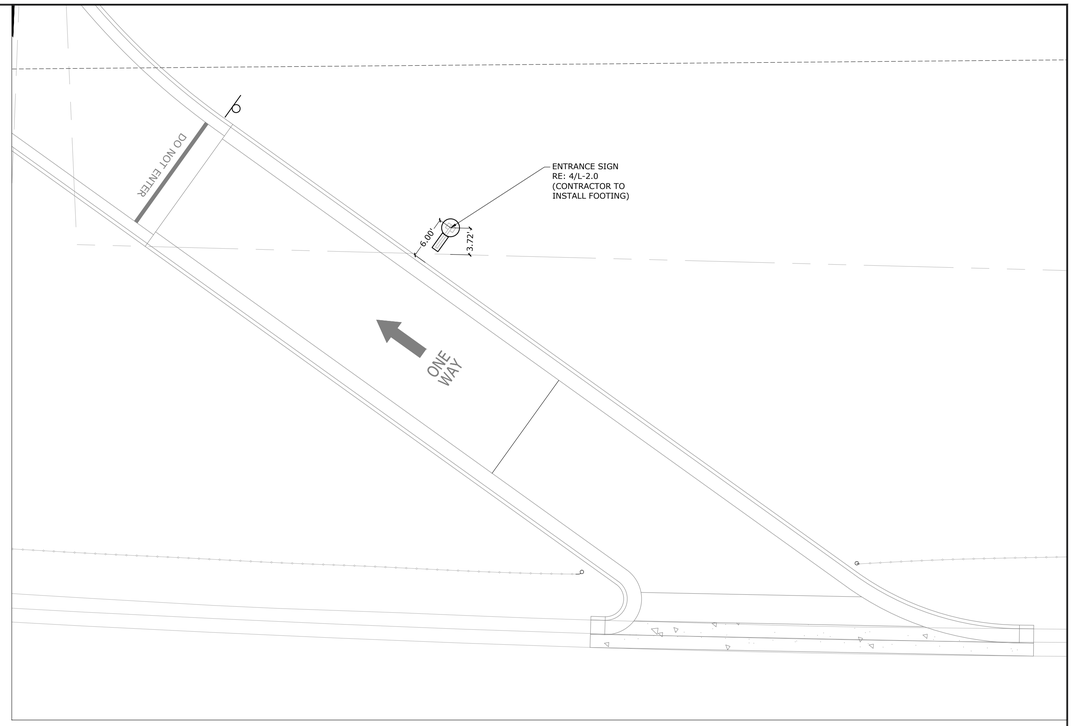
LANDSCAPE NOTES & DETAILS

SHEET NUMBER: L-1.1



1 KIOSK & FURNISHINGS
1"=10'

N 0' 5' 10' 20'
SCALE: 1" = 10'



2 ENTRANCE SIGN
1"=10'

N 0' 5' 10' 20'
SCALE: 1" = 10'

CONTRACTOR TO PROVIDE FOUNDATION. SEE STRUCTURAL

FRONT VIEW

3 TRAILHEAD KIOSK
NTS

NOTE:
1. TRAILHEAD KIOSK IMAGES FOR REFERENCE ONLY.
2. CONTRACTOR TO PROVIDE FOUNDATION. (SEE STRUCTURAL)
3. SIGN FABRICATION & INSTALLATION BY OWNER. CONTRACTOR TO COORDINATE WITH OWNER'S SIGN FABRICATOR.

CONTRACTOR TO PROVIDE FOUNDATION. SEE STRUCTURAL

FRONT VIEW

4 ENTRANCE SIGN
NTS

NOTE:
1. ENTRANCE SIGN IMAGES FOR REFERENCE ONLY.
2. CONTRACTOR TO PROVIDE FOUNDATION. (SEE STRUCTURAL)
3. SIGN FABRICATION & INSTALLATION BY OWNER. CONTRACTOR TO COORDINATE WITH OWNER'S SIGN FABRICATOR.

FRONT VIEW

5 BENCH
NTS

NOTE:
1. BENCHES PROVIDED BY OWNER. IMAGES FOR REFERENCE ONLY.
2. CONTRACTOR TO PROVIDE MOUNTING HARDWARE AND INSTALL PER MANUFACTURER'S INSTRUCTIONS.

PROJECT

Middle Fork Greenway
A Blue Ridge Conservancy Project

MIDDLE FORK GREENWAY SECTION 3

CLIENT: BLUE RIDGE CONSERVANCY
Wendy Patoprsty, M.F.G Director

416 Aho Road
Watauga County
Blowing Rock, NC 28607

LANDSCAPE ARCHITECT

DESTINATION BY DESIGN

136 Furman Rd, Suite 6, Boone, NC 28607
(828) 386-1866
dbdplanning.com

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT
No. 2087
CHARLES A GOTHERMAN
CONSTRUCTION

12/02/25

REVISIONS DATE

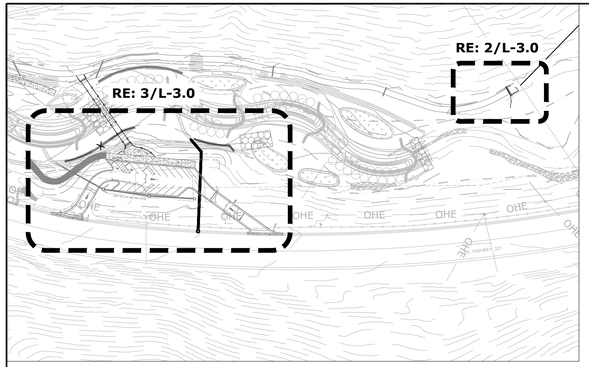
PROJECT MANAGER: CAG
DRAWING BY: IV
JURISDICTION: WATAUGA COUNTY, NC

SHEET TITLE:

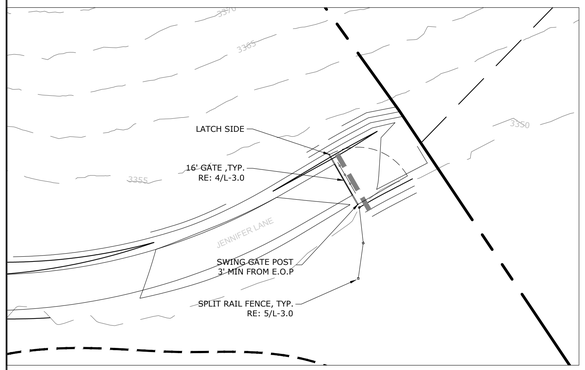
FURNISHING & SIGNAGE PLAN

SHEET NUMBER: L-2.0

FILE LOCATION: G:\Shared drives\01_Projects\ALL TEAMS\NC\MFG Section 3_Design\01_DWG\Construction Documents

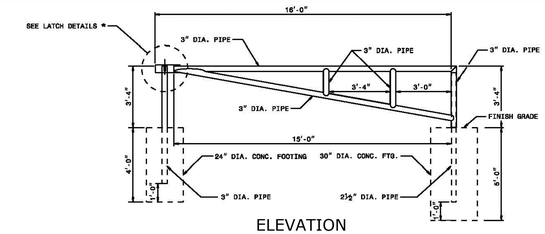


1 SITE KEY PLAN
NTS

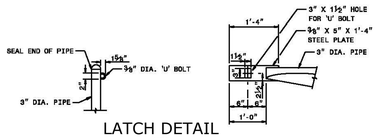


2 SPLIT RAIL FENCE AND GATE LAYOUT
1"=20'

0' 10' 20' 40'
SCALE: 1" = 20'



ELEVATION
NTS

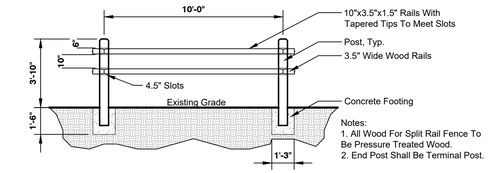


LATCH DETAIL
NTS

GENERAL NOTES:

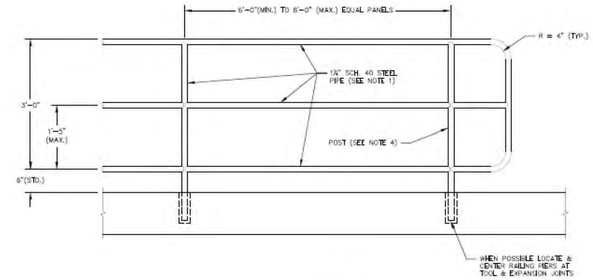
1. All Steel Shall Be ASTM A36 Steel.
2. All Pipe Sizes are O.D.
3. Concrete Shall Be Minimum Class 'B'.
4. Gate Shall Be Located As Directed By The Landscape Architect.
5. ¼" Fillet Welds On All Connections. Weld In Accordance With The AWS D1.1 Structural Welding Code- Steel.
6. Gate Shall Be Galvanized Or Painted Per NCDOT Standard Specifications Section 1076 Or Section 442.
7. Gate Shall Be Paid For Per Each Installation.

4 SINGLE SWING GATE
NTS

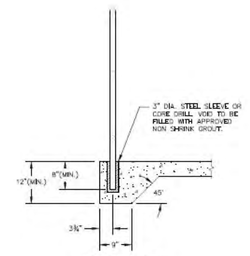


Notes:
1. All Wood For Split Rail Fence To Be Pressure Treated Wood.
2. End Post Shall Be Terminal Post.

5 WOODEN SPLIT RAIL FENCE
NTS

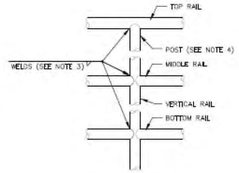


PLAN VIEW

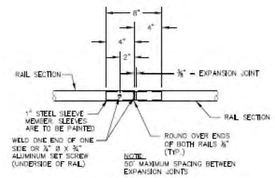


SECTION VIEW

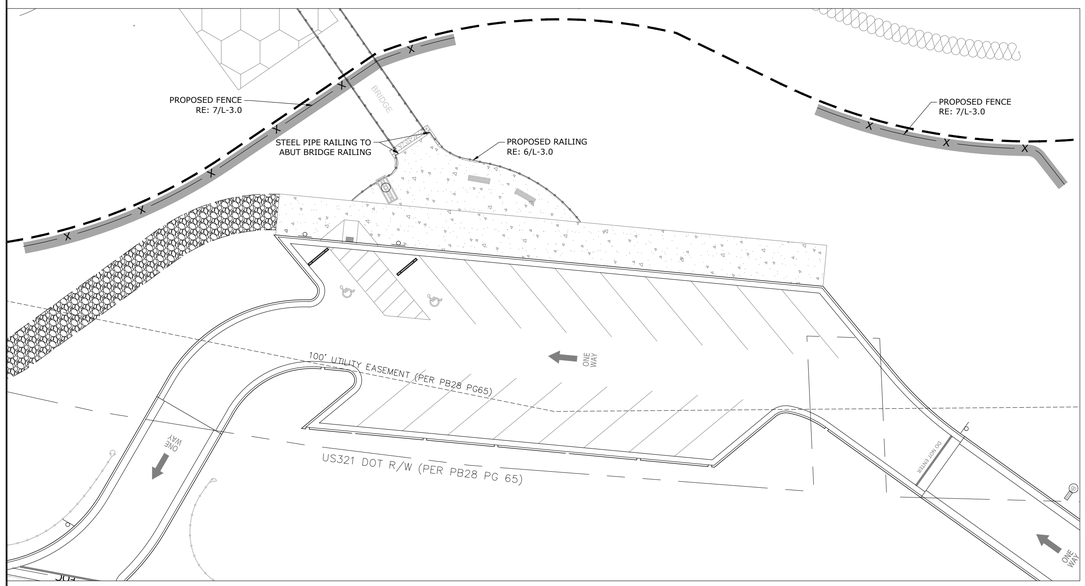
NOTES:
1. CONSTRUCT PROPOSED STEEL PIPE RAIL OF 1 ½" SCHEDULE 40 PLAIN END STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A53.
2. CONSTRUCT STEEL PIPE IN ACCORDANCE WITH SECTION 1074 OF THE NCDOT STANDARD SPECIFICATION.
3. WELD IN ACCORDANCE WITH ARTICLE 1072-18 OF THE STANDARD SPECIFICATIONS.
4. ALL POST SECTIONS ARE TO BE CONSTRUCTED PLUMB, NOT PERPENDICULAR TO THE SIDEWALK.
5. USE APPROVED NON-SHRINK GROUT IN ACCORDANCE WITH SECTION 1003 OF THE NCDOT STANDARD SPECIFICATIONS FOR HANDRAIL FOOTINGS.
6. PLACEMENT OF HANDRAIL IN RELATION TO WALL AND SIDEWALK MAY BE MODIFIED AS DIRECTED BY THE ENGINEER.
7. PIPE SURFACE TO BE PREPARED BEFORE PRIMING IN ACCORDANCE WITH THE SOCIETY FOR PROTECTIVE COATING SPECIFICATIONS.
8. PIPE TO BE DELIVERED TO WORK SITE PRIMED (PAINTED).



RAIL CONNECTION

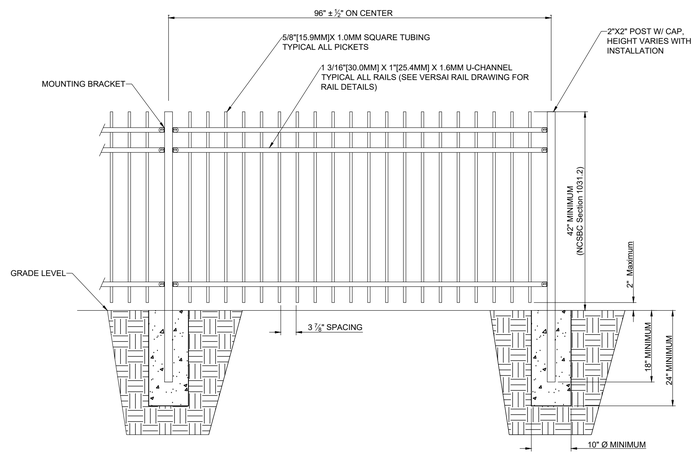


RAILING EXPANSION JOINT



3 FENCING LAYOUT
1"=20'

0' 10' 20' 40'
SCALE: 1" = 20'



6 STEEL PIPE RAILING, TYP
NTS

7 FENCING, TYP
NTS

PROJECT

Middle Fork Greenway
A Blue Ridge Conservancy Project

MIDDLE FORK GREENWAY SECTION 3

CLIENT: BLUE RIDGE CONSERVANCY
Wendy Patoprsty, M.F.G Director
416 Aho Road
Watauga County
Blowing Rock, NC 28607

LANDSCAPE ARCHITECT

DESTINATION BY DESIGN

136 Furman Rd, Suite 6, Boone, NC 28607
(828) 386-1866
dbdplanning.com

NORTH CAROLINA LANDSCAPE ARCHITECT LICENSE 1357 CHARLES A GOTHERMAN

NOT FOR CONSTRUCTION

12/02/25

REVISIONS DATE

PROJECT MANAGER: CAG
DRAWING BY: IV
JURISDICTION: WATAUGA COUNTY, NC

SHEET TITLE:

FENCING PLAN & DETAILS

SHEET NUMBER:
L-3.0

FILE LOCATION: G:\Shared drives\01_Projects\ALL TEAMS\NC\MFG Section 3_Design\01_DWG\Construction Documents

LEGEND

- 1' CONTOUR (EXISTING)
- 5' CONTOUR (EXISTING)
- 1' CONTOUR (PROPOSED)
- 5' CONTOUR (PROPOSED)
- DRAINAGE AREAS
- PARCEL BOUNDARY
- TRAIL CENTERLINE ALIGNMENT
- PROPOSED WETLAND WOUS
- MIDDLE FORK NEW RIVER TOB
- PROPOSED PIPE
- EXISTING PIPE
- TRAIL CENTERLINE ALIGNMENT
- SLOPE MATTING
- SILT FENCE
- WATTLE BREAK
- STONE APRON
- LIMITS OF DISTURBANCE
- HARDWARE CLOTH AND GRAVEL INLET PROTECTION
- CONSTRUCTION ACCESS
- RETAINING WALL
- SLOPE DRAIN
- 25' TROUT BUFFER
- TEMPORARY DIVERSION

MFNR STREAM RESTORATION END STA 26+00

NORTH EXTENT MATCHLINE

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAIL, X4.2

EXISTING MF GREENWAY AT STERLING CREEK PARK

25FT TROUT BUFFER

WATAUGA COUNTY PIN 2818988488000

US HWY 321

WHITENER, ET AL PIN 2818989056000

WHITENER, ET AL PIN 2818977790000

TEMPORARY STREAM CROSSING (FORD) #1 AT EXISTING STREAM TO FACILITATE STREAM RESTORATION. TO BE DECOMMISSIONED ONCE RESTORATION IS COMPLETE.

SEE STREAM RESTORATION DETAILS, SHEET E5.4

PROPOSED PERMANENT BRIDGE #2. SEE STRUCTURAL PLANS (ARETE ENGINEERING)

WATAUGA COUNTY PIN 2818974835000

SEE STRUCTURAL PLANS FOR STONE SPECIFICATIONS AT ABUTMENT FILLSLOPE (ARETE ENGINEERING)

TEMPORARY DIVERSION 1

PERMANENT DIVERSION 2

TEMPORARY STREAM CROSSING (FORD) #2. TO REMAIN IN PLACE THROUGH PHASE II CONSTRUCTION.

DEXTER DRIVE

DEXTER DRIVE BRIDGE MAY NOT BE USED FOR ACCESS OR CONSTRUCTION

BLUE RIDGE CONSERVANCY PIN 2818973649000

SOUTH EXTENT MATCHLINE

SEE STREAM RESTORATION DETAILS, SHEET E5.4

PROPOSED PERMANENT PIPES AND RIP RAP APRONS ALONG TRAIL SEE ESC DETAILS, SHEET X4.4–X4.5

SEE STRUCTURAL PLANS FOR STONE SPECIFICATIONS AT ABUTMENT FILLSLOPE (ARETE ENGINEERING)

MATTING ON ALL SLOPES 3:1 OR GREATER DETAIL/NOTES – SHEET X4.6

PERMANENT DIVERSION 5

MICHAEL J SHORE PIN 2818975222000

PERMANENT DIVERSION 3

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAIL, SHEET X4.2

NORTH EXTENT MATCHLINE

PERMANENT DIVERSION 1

US HWY 321

NC DOT ROW

PROPOSED PERMANENT BRIDGE #1. SEE STRUCTURAL PLANS (ARETE ENGINEERING)

PERMANENT DIVERSION 4

RETAINING WALL. SEE GEOTECHINCAL PLANS (SOLID ROCK ENGINEERING)

PROPOSED TRAILHEAD AT EXISTING FILL PAD SEE CIVIL PLANS (VALOR ENGINEERING)

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAIL, X4.2

BLUE RIDGE CONSERVANCY PIN 2818960853000

DEXTER LANE

TEMPORARY STREAM CROSSINGS (FORDS) #3 AND #4 AT EXISTING STREAM TO FACILITATE STREAM RESTORATION. TO BE DECOMMISSIONED ONCE RESTORATION IS COMPLETE.

SEE STREAM RESTORATION DETAILS, SHEET E5.4

EXISTING GUARDRAIL

LIMITS OF DISTURBANCE

US HIGHWAY 321

MFNR STREAM RESTORATION START STA 0+00. SEE STREAM RESTORATION PLANS (JENNINGS ENVIRONMENTAL)

SUSAN BARE PIN 2818962520000

PROPOSED GREENWAY TRAIL SEE CIVIL PLANS (VALOR ENGINEERING)

MORRIS DEXTER HAMPTON PIN 2818869171000

SOUTH EXTENT MATCHLINE

NOT FOR CONSTRUCTION

SHEET X0

N W E S

SCALE: 1"=70'

0 50 100 Feet

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

OVERALL
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

REVISIONS	DATE

PREPARED BY:

INTERFACE ENVIRONMENTAL CONSULTING, LLC

476 HIDDEN POND ROAD
BOONE, NC 28607
919–656–4543

IEC

NOT FOR CONSTRUCTION

LEGEND

- 1' CONTOUR (EXISTING)
- 5' CONTOUR (EXISTING)
- 1' CONTOUR (PROPOSED)
- 5' CONTOUR (PROPOSED)
- DRAINAGE AREAS
- PARCEL BOUNDARY
- TRAIL CENTERLINE ALIGNMENT
- PROPOSED WETLAND WOUS
- MIDDLE FORK NEW RIVER TOB
- PROPOSED PIPE
- EXISTING PIPE
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- SLOPE MATTING
- SILT FENCE
- WATTLE BREAK
- STONE APRON
- LIMITS OF DISTURBANCE
- HARDWARE CLOTH AND GRAVEL INLET PROTECTION
- CONSTRUCTION ACCESS
- RETAINING WALL
- SLOPE DRAIN
- 25' TROUT BUFFER
- TEMPORARY DIVERSION

NORTH EXTENT MATCHLINE

CONSTRUCTION ENTRANCE SEE ESC DETAILS. SHEET X4.2

25FT TROUT BUFFER

US HWY 321

STREAM CROSSING #1, DECOMMISSIONED ONCE BRIDGE #2 IS INSTALLED SEE FORD DETAIL, STREAM RESTORATION SHEET E5.4

PROPOSED BRIDGE #2 (ARETE ENGINEERING)

SILT FENCE WITH WATTLES RIVER SIDE OF ALL DISTURBED AREAS SEE ESC DETAILS, SHEET X4.2

WATTLES AT BRIDGE ABUTMENTS SEE ESC DETAILS, SHEET X4.2

PERMANENT DIVERSION 2 TRAIL STA 2+00 TO 2+50 WITH WATTLE CHECK DAM SEE ESC DETAILS, SHEETS X4.4–X4.5

WATTLES AT BASE OF BRIDGE FILL SEE ESC DETAILS, SHEET X4.2

TEMPORARY DIVERSION 1 SEE ESC DETAILS

WATTLE CHECK DAMS SEE ESC DETAILS, SHEET X4.4

MATTING ON ALL SLOPES 3:1 OR GREATER SEE ESC DETAILS, SHEET X4.6

WATTLES DOWNSLOPE OF RETAINING WALLS SEE ESC DETAIL, SHEET X4.2

DEXTER DRIVE MAY NOT BE USED FOR CONSTRUCTION

PROPOSED PERMANENT PIPES AND RIP RAP APRONS ALONG TRAIL SEE ESC DETAILS, SHEET X4.4–X4.5

PERMANENT DIVERSION 1 TRAIL STA 5+50 TO 11+75 WITH WATTLE CHECK DAMS SEE ESC DETAILS, SHEET X4.4–X4.5

SEQUENCE OF CONSTRUCTION PHASE I:

1. OBTAIN APPROVAL OF EROSION CONTROL PLAN FROM NCDEQ LAND QUALITY SECTION, WINSTON SALEM REGIONAL OFFICE.
2. NOTIFY THE NCDEQ LAND QUALITY INSPECTOR AT LEAST 48 HOURS BEFORE PROJECT STARTS.
3. NO MAJOR GRADING ACTIVITIES ARE TO TAKE PLACE DURING WET WEATHER OR PERIODS OF PREDICTED WET WEATHER.
4. MARK ALL EXISTING UTILITIES AT THE PROJECT SITE. MAINTAIN MARKINGS FOR THE DURATION OF CONSTRUCTION.
5. ESTABLISH CONSTRUCTION ENTRANCES (3) AT EXISTING EDGE OF PAVEMENT ALONG US HWY 321.
6. ESTABLISH SILT FENCING, STOCKPILES, STAGING, AND ALL ESC MEASURES FOR STREAM RESTORATION AS GIVEN ON STREAM RESTORATION E–SHEETS (PROVIDED BY JENNINGS ENVIRONMENTAL).
7. INSTALL STREAM CROSSINGS #1–4 WITH WATTLES AS SEEN ON THE ESC PLANS.
8. COMPLETE STREAM RESTORATION WORK AS GIVEN ON STREAM RESTORATION SHEETS (PROVIDED BY JENNINGS ENVIRONMENTAL) AND STABILIZE WITH MATTING AND SEEDING. REFER TO TEMPORARY AND PERMANENT SEEDING SPECIFICATIONS FOR STREAM RESTORATION PROVIDED BY JENNINGS ENVIRONMENTAL.

SEQUENCE OF CONSTRUCTION PHASE II:

9. ONCE STREAM RESTORATION IS COMPLETE AND STABILIZED, ESTABLISH STOCKPILE LOCATIONS, AND STAGING AREAS FOR THE GREENWAY AND TRAILHEAD.
10. INSTALL ALL SILT FENCING AND WATTLES BREAKS ALONG CONSTRUCTION ACCESS ROADS, STOCKPILES, AND STAGING AREAS, INCLUDING ALL NECESSARY GRADING FOR CONSTRUCTION ACCESS ROADS.
11. INSTALL EARTHEN BERM AND SLOPE DRAIN ON EXISTING FILL PAD. INSTALL TEMPORARY DIVERSION 1 (TD 1) ABOVE THE CUT SLOPE ON RIVER RIGHT BRIDGE 2 ABUTMENT.
12. BEGIN WORK ON THE GREENWAY PORTION OF THE SITE, BEGINNING WITH SEQUENCE #13 BELOW. STREAM CROSSINGS #1, #3 AND #4 MAY BE DECOMMISSIONED WHEN NO LONGER NECESSARY FOR STREAM RESTORATION WORK.
13. INSTALL ADDITIONAL SILT FENCING AND ALL WATTLES IN ACCORDANCE WITH THE CIVIL DESIGN AS SEEN ON ESC PLANS. SILT FENCING SHOULD BE PLACED ADJACENT TO ALL DISTURBED AREAS, ON THE STREAM SIDE OF THE DISTURBANCE, WITH WATTLE BREAKS PLACED EVERY 200FT MIN AND ADJACENT TO STREAM CROSSINGS, BRIDGE ABUTMENTS, AND AGAINST WETLAND WOUS.
14. CONSTRUCT THE RIVER–RIGHT PORTION OF THE GREENWAY TRAIL, BRIDGE ABUTMENTS, RETAINING WALLS, AND RIVER ACCESSES FROM STA 0+00 TO STA 16+75 ACCORDING TO THE CIVIL PLANS (PROVIDED BY VALOR ENGINEERING AND GEOTECHINAL PLANS PROVIDED BY SOLID ROCK ENGINEERING). BRIDGES MAY BEEN INSTALLED AT ANYTIME ONCE ABUTMENTS ARE PREPARED PER STRUCTURAL PLANS (PROVIDED BY ARETE ENGINEERING). DECOMMISSION STREAM CROSSING #2 WHEN ALL TRAIL WORK IS COMPLETE AND STABILIZED.
15. ALL EROSION CONTROL MEASURES TO BE MAINTAINED DURING THE CONSTRUCTION PERIOD (SEE MAINTENANCE NOTES). MAKE NECESSARY REPAIRS DAILY AND/OR AS DIRECTED BY THE ENGINEER. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE TO ESC MEASURES AT ALL TIMES.

SHEET X1.0

N W E S

SCALE: 1"=40'

0 50 100 Feet

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

NORTH EXTENT PHASE I & II
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

REVISIONS	DATE

PREPARED BY:

INTERFACE ENVIRONMENTAL CONSULTING, LLC

476 HIDDEN POND ROAD
BOONE, NC 28607
919–656–4543

IEC

NOT FOR CONSTRUCTION

CONSTRUCTION ACCESS RD

WRAP SLOPE DRAIN APRON IN CURLEX SEE ESC DETAILS, SHEET X4.4–X4.5

TEMPORARY EARTHEN BERM SEE ESC DETAILS, SHEET X4.3

TEMPORARY SLOPE DRAIN SEE ESC DETAILS, SHEET X4.3 AND X4.5

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAILS, SHEET X4.2

US HWY 321

EXISTING GUARD RAIL

NCDOT ROW

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAILS, SHEET X4.2

TEMPORARY STREAM CROSSINGS #3 AND #4 AT EXISTING STREAM TO FACILITATE RESTORATION. TO BE DECOMMISSIONED ONCE RESTORATION IS COMPLETE. SEE STREAM RESTORATION DETAILS, SHEET E5.4

SOUTH EXTENT MATCHLINE

SILT FENCE W/ WATTLES DOWNSLOPE OF ALL DISTURBED AREAS SEE ESC DETAILS, SHEET X4.2

LIMITS OF DISTURBANCE

PERMANENT DIVERSION 3 (BETWEEN TRAIL AND RIVER ACCESS) SEE ESC DETAILS, SHEETS X4.5–X4.5

WATTLES AT END OF PEDESTRIAN ACCESS TRAIL SEE ESC DETAILS, SHEET X4.2

WATTLES AT BRIDGE FILL SEE ESC DETAILS, SHEET X4.2

PERMANENT BRIDGE #1 (ARETE ENGINEERING)

NORTH EXTENT MATCHLINE

RETAINING WALL (SOLID ROCK ENGINEERING)

WATTLES AT BASE OF RETAINING WALL SEE ESC DETAILS, SHEET X4.2

MATTING ON ALL SLOPES 3:1 OR GREATER SEE ESC DETAILS, SHEET X4.6

PERMANENT DIVERSION 1 TRAIL STA 5+50 TO 11+75 WITH WATTLE CHECK DAMS SEE ESC DETAILS, SHEETS X4.4–X4.5

PROPOSED PERMANENT PIPES AND RIP RAP APRONS ALONG TRAIL SEE ESC DETAILS, SHEET X4.4–X4.5

LEGEND

- 1' CONTOUR (EXISTING)
- 5' CONTOUR (EXISTING)
- 1' CONTOUR (PROPOSED)
- 5' CONTOUR (PROPOSED)
- DRAINAGE AREAS
- PARCEL BOUNDARY
- TRAIL CENTERLINE ALIGNMENT
- PROPOSED WETLAND WOUS
- MIDDLE FORK NEW RIVER TOB
- PROPOSED PIPE
- EXISTING PIPE
- TRAIL CENTERLINE ALIGNMENT
- SLOPE MATTING
- SILT FENCE
- WATTLE BREAK
- STONE APRON
- LIMITS OF DISTURBANCE
- HARDWARE CLOTH AND GRAVEL INLET PROTECTION
- CONSTRUCTION ACCESS
- RETAINING WALL
- SLOPE DRAIN
- 25' TROUT BUFFER

SEQUENCE OF CONSTRUCTION PHASE I:

1. OBTAIN APPROVAL OF EROSION CONTROL PLAN FROM NCDEQ LAND QUALITY SECTION, WINSTON SALEM REGIONAL OFFICE.
2. NOTIFY THE NCDEQ LAND QUALITY INSPECTOR AT LEAST 48 HOURS BEFORE PROJECT STARTS.
3. NO MAJOR GRADING ACTIVITIES ARE TO TAKE PLACE DURING WET WEATHER OR PERIODS OF PREDICTED WET WEATHER.
4. MARK ALL EXISTING UTILITIES AT THE PROJECT SITE. MAINTAIN MARKINGS FOR THE DURATION OF CONSTRUCTION.
5. ESTABLISH CONSTRUCTION ENTRANCES (3) AT EXISTING EDGE OF PAVEMENT ALONG US HWY 321.
6. ESTABLISH SILT FENCING, STOCKPILES, STAGING, AND ALL ESC MEASURES FOR STREAM RESTORATION AS GIVEN ON STREAM RESTORATION E–SHEETS (PROVIDED BY JENNINGS ENVIRONMENTAL).
7. INSTALL STREAM CROSSINGS #1–4 WITH WATTLES AS SEEN ON THE ESC PLANS.
8. COMPLETE STREAM RESTORATION WORK AS GIVEN ON STREAM RESTORATION SHEETS (PROVIDED BY JENNINGS ENVIRONMENTAL) AND STABILIZE WITH MATTING AND SEEDING. REFER TO TEMPORARY AND PERMANENT SEEDING SPECIFICATIONS FOR STREAM RESTORATION PROVIDED BY JENNINGS ENVIRONMENTAL.

SEQUENCE OF CONSTRUCTION PHASE II:

9. ONCE STREAM RESTORATION IS COMPLETE AND STABILIZED, ESTABLISH STOCKPILE LOCATIONS, AND STAGING AREAS FOR THE GREENWAY AND TRAILHEAD.
10. INSTALL ALL SILT FENCING AND WATTLES BREAKS ALONG CONSTRUCTION ACCESS ROADS, STOCKPILES, AND STAGING AREAS, INCLUDING ALL NECESSARY GRADING FOR CONSTRUCTION ACCESS ROADS.
11. INSTALL EARTHEN BERM AND SLOPE DRAIN ON EXISITNG FILL PAD. INSTALL TEMPORARY DIVERSION 1 (TD 1) ABOVE THE CUT SLOPE ON RIVER RIGHT BRIDGE 2 ABUTMENT.
12. BEGIN WORK ON THE GREENWAY PORTION OF THE SITE, BEGINNING WITH SEQUENCE #13 BELOW. STREAM CROSSINGS #1, #3 AND #4 MAY BE DECOMMISSIONED WHEN NO LONGER NECESSARY FOR STREAM RESTORATION WORK.
13. INSTALL ADDITIONAL SILT FENCING AND ALL WATTLES IN ACCORDANCE WITH THE CIVIL DESIGN AS SEEN ON ESC PLANS. SILT FENCING SHOULD BE PLACED ADJACENT TO ALL DISTURBED AREAS, ON THE STREAM SIDE OF THE DISTURBANCE, WITH WATTLE BREAKS PLACED EVERY 200FT MIN AND ADJACENT TO STREAM CROSSINGS, BRIDGE ABUTMENTS, AND AGAINST WETLAND WOUS.
14. CONSTRUCT THE RIVER–RIGHT PORTION OF THE GREENWAY TRAIL, BRIDGE ABUTMENTS, RETAINING WALLS, AND RIVER ACCESSES FROM STA 0+00 TO STA 16+75 ACCORDING TO THE CIVIL PLANS (PROVIDED BY VALOR ENGINEERING AND GEOTECHINAL PLANS PROVIDED BY SOLID ROCK ENGINEERING). BRIDGES MAY BEEN INSTALLED AT ANYTIME ONCE ABUTMENTS ARE PREPARED PER STRUCTURAL PLANS (PROVIDED BY ARETE ENGINEERING). DECOMMISSION STREAM CROSSING #2 WHEN ALL TRAIL WORK IS COMPLETE AND STABILIZED.
15. ALL EROSION CONTROL MEASURES TO BE MAINTAINED DURING THE CONSTRUCTION PERIOD (SEE MAINTENANCE NOTES). MAKE NECESSARY REPAIRS DAILY AND/OR AS DIRECTED BY THE ENGINEER. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE TO ESC MEASURES AT ALL TIMES.

SHEET X1.1

SCALE: 1"=40'

0 50 100 Feet

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

SOUTH EXTENT PHASE I & II
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

REVISIONS DATE

PREPARED BY:

INTERFACE ENVIRONMENTAL CONSULTING, LLC
476 HIDDEN POND ROAD
BOONE, NC 28607
919–656–4543

IEC

NOT FOR CONSTRUCTION

WATTLES DOWNSLOPE OF RETAINING WALLS SEE ESC DETAILS, X4.2

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAILS, SHEET X4.2

EXISTING GUARD RAIL

NCDOT ROW

HARDWARE CLOTH & GRAVEL INLET PROTECTION SEE ESC DETAILS, SHEET X4.3

CONSTRUCTION ENTRANCE (US HWY 321) SEE ESC DETAILS, SHEET X4.2

TEMPORARY EARTHEN BERM SEE ESC DETAILS, SHEET X4.3

MATTING ON ALL SLOPES 3:1 OR GREATER SEE ESC DETAILS, SHEET X4.6

SILT FENCE W/ WATTLES DOWNSLOPE OF ALL DISTURBED AREAS SEE ESC DETAILS, SHEET X4.2

LIMITS OF DISTURBANCE

US HWY 321

STREAM CROSSING #2

LEGEND

- 1' CONTOUR (EXISTING)
- 5' CONTOUR (EXISTING)
- 1' CONTOUR (PROPOSED)
- 5' CONTOUR (PROPOSED)
- DRAINAGE AREAS
- PARCEL BOUNDARY
- TRAIL CENTERLINE ALIGNMENT
- PROPOSED WETLAND WOUS
- MIDDLE FORK NEW RIVER TOB
- PROPOSED PIPE
- EXISTING PIPE
- TRAIL CENTERLINE ALIGNMENT
- SLOPE MATTING
- SILT FENCE
- WATTLE BREAK
- STONE APRON
- LIMITS OF DISTURBANCE
- HARDWARE CLOTH AND GRAVEL INLET PROTECTION
- CONSTRUCTION ACCESS
- RETAINING WALL
- SLOPE DRAIN
- 25' TROUT BUFFER
- TEMPORARY DIVERSION

RETAINING WALL (SOLID ROCK ENGINEERING)

PERMANENT BRIDGE #1 (ARETE ENGINEERING)

NORTH EXTENT MATCHLINE

WATTLES ADJACENT TO BRIDGE ABUTMENTS SEE ESC DETAILS, SHEET X4.2

EXTEND RA-400 TO TOP OF STREAMBANK

WATTLES DOWNSLOPE OF RETAINING WALLS SEE ESC DETAILS, SHEET X4.2

SILT FENCE W/ WATTLES DOWNSLOPE OF ALL DISTURBED AREAS SEE ESC DETAILS, SHEET X4.2

PROPOSED PERMANENT PIPES AND RIP RAP APRONS ALONG TRAIL SEE ESC DETAILS, SHEET X4.4-X4.5

SOUTH EXTENT MATCHLINE

SEQUENCE OF CONSTRUCTION PHASE II:

1. CONTINUE CONSTRUCTION WITH THE TRAILHEAD AND PARKING AREA BY FIRST GRADING FROM THE EXISTING FILL PAD TO US HWY 321 AND INSTALLING PIPE AND INLET NETWORKS WITH ASSOCIATED HARDWARE CLOTH & GRAVEL INLET PROTECTION, THEN COMPLETE FILL PAD GRADING. MAINTAIN EARTHEN BERM AT THE TOP OF THE FILL PAD SLOPE AS IT TRANSITIONS FROM EXISTING TO PROPOSED FILL PAD CONDITIONS IN ORDER TO MAINTAIN POSITIVE DRAINAGE TO PROPOSED INLETS AT ALL TIMES.
2. COMPLETE SITE CONSTRUCTION ACCORDING TO CIVIL SITE PLANS. APPLY PERMANENT SEEDING AND STABILIZATION MEASURES (MATTING) AFTER FINAL GRADE IS ACHIEVED.
3. ALL DISTURBED AREAS WITHIN THE 25FT STREAM BUFFER MUST BE STABILIZED WITH SEED AND MATTING AT THE END OF EACH WORKING DAY. ALL OTHER DISTURBED AREAS SHALL BE STABILIZED WITH SEED AND MATTING WITHIN THE 7 SAY TIMEFRAME. SEE ESC DETAILS FOR TEMPORARY SEED AND MATTING REQUIREMENTS.
4. STOCKPILE SOIL/TOPSOIL ON-SITE AS NECESSARY AND/OR REMOVE OFF-SITE TO AN APPROVED RECLAMATION SITE (SEE MATERIAL NOTES).
5. ALL EROSION CONTROL MEASURES TO BE MAINTAINED DURING THE CONSTRUCTION PERIOD (SEE MAINTENANCE NOTES). MAKE NECESSARY REPAIRS AS REQUIRED AND/OR AS DIRECTED BY THE ENGINEER. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE TO ESC MEASURES AT ALL TIMES.
6. REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER SITE IS STABILIZED. EROSION CONTROL STRUCTURES SHALL NOT BE REMOVED UNTIL DISTURBED AREAS ARE STABILIZED.

SHEET X2

N W E S

SCALE: 1"=40'

0 50 100 Feet

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

SOUTH EXTENT PHASE II
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

REVISIONS	DATE

PREPARED BY:

INTERFACE ENVIRONMENTAL CONSULTING, LLC

476 HIDDEN POND ROAD
BOONE, NC 28607
919-656-4543

IEC

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those un-attended days (are this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- **They are 25 gallons or more,**
- **They are less than 25 gallons but cannot be cleaned up within 24 hours,**
- **They cause sheen on surface waters (regardless of volume), or**
- **They are within 100 feet of surface waters (regardless of volume).**

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours,*** an oral or electronic notification. • ***Within 7 calendar days,*** a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours,*** an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses (40 CFR 122.41(m)(3))	• ***A report at least ten days before the date of the bypass, if possible.*** The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses (40 CFR 122.41(m)(3))	• ***Within 24 hours,*** an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment(40 CFR 122.41(l)(7))	• ***Within 24 hours,*** an oral or electronic notification. • ***Within 7 calendar days,*** a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6).
	• Division staff may waive the requirement for a written report on a case-by-case basis.

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING | EFFECTIVE: 04/01/19

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Site Area Description	Required Ground Stabilization Timeframes: Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

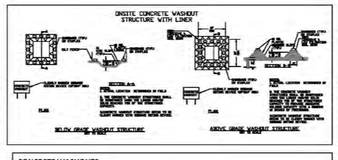
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING | EFFECTIVE: 04/01/19

SPILLS AND NON-STORMWATER CONTINGENCIES

CONSTRUCTION VEHICLES SHALL CLEAN MUD FROM THEIR TIRES AND BODY ON-SITE SO THAT THE SEDIMENT WILL FLOW TO THE WASH PIT NEAR THE CONSTRUCTION EXIT AND/OR THE SEDIMENT CONTROL DEVICES. ANY SEDIMENT THAT ENDS UP IN THE STREET OR OTHER PLACES OFFSITE SHALL BE CLEANED UP WITH A SHOVEL AND BROOM OR BE WASHED NOT OTHER MEANS BEFORE THE NEXT RAINFALL BUT SHALL AWAY USING WATER. THE CLEANED UP SEDIMENT SHALL BE PLACED BACK ONSITE OR TAKEN TO ANOTHER SITE WITH AN APPROVED AND FUNCTIONING SEDIMENT CONTROL PLAN.

VEHICLES AND EQUIPMENT SHALL BE FUELED ONSITE NEAR THE CONSTRUCTION EXIT IN A DESIGNATED CONTAINMENT AREA. CLEAN UP ANY FUEL SPILL IMMEDIATELY. CONTAMINATED SOILS WILL BE PLACED ON HEAVY PLASTIC AND COVERED OR PLACED IN APPROVED CONTAINERS TO PREVENT CONTACT WITH STORMWATER. ALL FUEL TANKS SHALL BE STORED IN THE CONTAINMENT AREA. ALL OIL, OTHER VEHICLE FLUIDS, SOLVENTS, PAINT, ETC. SHALL BE STORED IN A CONSTRUCTION TRAILER OR OTHER APPROVED CONTAINER.

ABSORBENT MATERIAL (FOR LAND BASED SPILLS), BOOMS (FOR SPILLS INTO WATERWAYS), AND OTHER HAZARDOUS MATERIAL CLEANUP TOOLS AS NECESSARY SHALL BE AVAILABLE FOR IMMEDIATE USE IF AN ONSITE SPILL OCCURS. IF A SPILL OF HAZARDOUS MATERIALS OCCURS, THE SPILL SHALL BE CONTAINED IMMEDIATELY AND THEN COMPLETELY CLEANED UP. IF THE SPILL HAS ENTERED A WATER SOURCE, SINKHOLE, STORM DRAIN, OR OTHER STORMWATER CONVEYANCE, THE LOCAL GOVERNMENTAL AUTHORITY SHALL BE CONTACTED IMMEDIATELY. ANY CONTAMINATED MATERIAL FROM THE CLEANUP SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL STATE LAWS.

READY-MIX CONCRETE TRUCKS SHALL WASH OUT THEIR EQUIPMENT INTO A DESIGNATED WASH PIT NEAR THE CONSTRUCTION EXIT. THIS WASH PIT IS TO TRAP THE CONCRETE AND ITS WASH. THE CONTRACTOR SHALL MAINTAIN THIS PIT(S) AS NECESSARY TO ALWAYS HAVE AT LEAST 50%%% VOLUME. ANY MATERIAL REMOVED FROM THE WASH PIT SHALL BE USED FOR FILL MATERIAL ONSITE OR DISPOSED OF IN ACCORDANCE WITH ALL STATE AND FEDERAL REGULATIONS. WASH FROM THE CONCRETE TRUCKS AND ANY OVERFLOW FROM THE WASH PIT SHALL BE ALLOWED TO DISCHARGE TO A SEDIMENT BASIN, TRAP, POND, NOT STORM DRAIN, DITCH, STREAM, OTHER STORMWATER CONVEYANCE, OR TO WATERS OF THE STATE INCLUDING BOTH SURFACE AND GROUNDWATER.

ALL HAZARDOUS MATERIALS SUCH AS EMPTY OR PARTIALLY EMPTY PAINT CANS, OIL CANS, FILTERS, CLEANING FLUID, ETC. SHALL BE DISPOSED OF BY TAKING THEM TO A PERMITTED HAZARDOUS MATERIAL DISPOSAL SITE IN ACCORDANCE WITH STATE LAWS.

THE WASHING OF PAINT TOOLS OR OTHER HAZARDOUS MATERIAL EQUIPMENT MUST BE PERFORMED AND DISPOSED OF IN ACCORDANCE WITH ALL STATE AND FEDERAL REGULATIONS. THE CLEANING RESIDUE BE NOT FROM SUCH EQUIPMENT IS HAZARDOUS AND CAN DISCHARGED ONTO THE GROUND OR INTO A SEDIMENT BASIN, TRAP, POND, STORM DRAIN, DITCH, STREAM, OTHER STORMWATER CONVEYANCE, OR TO WATERS OF THE STATE INCLUDING BOTH SURFACE AND GROUNDWATER AND SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE LAWS.

LITTER, CONSTRUCTION MATERIALS, CONSTRUCTION DEBRIS, CONSTRUCTION CHEMICALS, AND OTHER HAZARDOUS MATERIALS EXPOSED TO STORM WATER SHALL BE PICKED UP PRIOR TO ANTICIPATED STORM EVENTS OR BEFORE BEING CARRIED OFF OF THE SITE BY WIND (E.G., FORECASTED BY LOCAL WEATHER REPORTS), OR OTHERWISE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORM WATER DISCHARGES. LITTER, CONSTRUCTION MATERIALS, CONSTRUCTION DEBRIS, CONSTRUCTION CHEMICALS, AND OTHER HAZARDOUS MATERIALS SHALL NOT BE ALLOWED TO ENTER A SEDIMENT BASIN, TRAP, POND, STORM DRAIN, DITCH, STREAM, OTHER STORMWATER CONVEYANCE, OR TO WATERS OF THE STATE. THIS CAN BE ACCOMPLISHED BY SCREENING OUTFALLS, DAILY PICKUP OR CLEANUP, OR OTHER METHODS.

AFTER THEIR USE, MATERIALS USED FOR EROSION PREVENTION AND SEDIMENT CONTROL SHOULD BE REMOVED OR OTHERWISE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORM WATER DISCHARGES. CONTRACTOR IS RESPONSIBLE FOR LITTER CONTROL AND CLEANUP. SEDIMENT CONTROLS SHALL BE PROVIDED FOR ANY WATER DISTRIBUTION OR WASTE DISPOSAL SYSTEM ONSITE INCLUDING SANITARY SEWER OR SEPTIC SYSTEMS.

MATERIAL NOTES

1. ANY OFF-SITE BORROW AND/OR WASTE REQUIRED FOR THE PROJECT MUST COME FROM A SITE WITH AN APPROVED EROSION CONTROL PLAN, A SITE REGULATED UNDER THE MINING ACT OF 1971, OR A LANDFILL REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT.
2. TRASH OR DEBRIS FROM DEMOLITION ACTIVITIES OR GENERATED BY ANY ACTIVITIES ON SITE MUST BE DISPOSED OF AT A FACILITY REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT OR PER DIVISION OF SOLID WASTE MANAGEMENT OR DIVISION OF WATER RESOURCES RULES AND REGS.

STABILIZATION NOTES

1. STABILIZE ALL 3:1 OR STEEPER SLOPES WITH EROSION CONTROL MATTING (NORTH AMERICAN GREEN SC150BN UNLESS OTHERWISE SPECIFIED) AND TEMP/AMEND/PERMANENT SEEDING. INSTALL PER MANUFACTURER'S SPECIFICATIONS GIVEN IN DETAIL ON SHEET X-4.4.
2. NO MORE THAN 200 LF OF LINEAR GREENWAY SHALL BE CONSTRUCTED WITHOUT TEMPORARY STABILIZATION SUPERSEDED THE 7 DAY STABILIZATION REQUIREMENT.
3. STABILIZE DIVERSIONS WITH EROSION CONTROL MATTING (NORTH AMERICAN GREEN SC150BN UNLESS OTHERWISE SPECIFIED) AND TEMP/AMEND/PERMANENT SEEDING. INSTALL PER MANUFACTURER'S SPECIFICATIONS GIVEN IN DETAIL ON SHEET X-4.4.
4. TEMP/AMEND/PERMANENT SEEDING SPECIFICATIONS GIVEN IN DETAIL ON SHEETS E6.2 AND X-4.6. STABILIZE ALL DISTURBED AREAS WITHIN THE 25' TROUT BUFFER AT THE END OF EACH WORKING DAY AND ALL OTHER DISTURBED AREAS WITHIN 7 DAYS AND AFTER EACH SIGNIFICANT RAINFALL (1/2" OR GREATER) (GIVEN IN THE STABILIZATION TIMEFRAMES TABLE).

MAINTENANCE SCHEDULE/PLANS

1. INSPECT ALL ESC MEASURES AT THE END OF EACH WORKING DAY, AND AFTER EACH SIGNIFICANT RAINFALL EVENT (1/2" OR GREATER), AND REPAIR EACH DAY AS NECESSARY.
2. MAINTAIN ALL CONSTRUCTION ENTRANCES IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING OF STONE MAY BE NECESSARY. ANY MATERIAL TRACKED ONTO ROADWAY MUST BE CLEANED UP IMMEDIATELY.
3. MAINTAIN ALL TEMPORARY BERMS AS NECESSARY TO SPECIFIED HEIGHT, THICKNESS, AND SIDESLOPES.
4. MAINTAIN THE TEMPORARY SLOPE DRAIN BY REMOVING ACCUMULATED SEDIMENT/DEBRIS TO ENSURE CLOGGING DOES NOT OCCUR.
5. MAINTAIN SILT FENCES VIA SEDIMENT REMOVAL AS BULGES OCCUR OR WHEN SEDIMENT REACHES 50% OF FABRIC HEIGHT. REPAIR ANY TORN OR DISLODGE FENCE IMMEDIATELY.
6. COVER OR PROTECT STOCKPILES WITH TEMPORARY SEDIMENT BARRIERS OR ANCHORED COVERINGS BEFORE ANTICIPATED PRECIPITATION AND INSPECT/REPAIR DAILY.
7. MAINTAIN WATTLE BREAKS, WATTLES, AND INLET PROTECTION BY REMOVING ACCUMULATED SEDIMENT/DEBRIS UPSLOPE/DOWNSLOPE. REPLACE MEASURES IMMEDIATELY IF CLOGGED OR TORN.
8. INSPECT RIPRAP APRONS AND INLET PROTECTION STRUCTURES FOR EROSION LATERALLY OR BENEATH STONE. REPLACE STONE AS NECESSARY IF DISLODGING OCCURS.
9. REPLACE MATTING AND STAPLES IF TORN OR DISLODGED FROM GROUND SURFACE.
10. RESEED AND PROVIDE SOIL AMENDMENTS AS NECESSARY TO MAINTAIN VEGETATED SURFACES.

ESC CONTACT: CARRIE CAVINESS OR SARAH KILBY WITH INTERFACE ENVIRONMENTAL CONSULTING – (919) 656-4543.

SPECIAL CONDITIONS

- MECHANICAL EQUIPMENT SHALL NOT IMPACT OR TRAVERSE WATERBODIES/WETLANDS, ASIDE FROM APPROVED IMPACTS FROM NCDEQ (401) AND USACE (404) ACTIVE PERMITS FOR THE PROJECT.
- PER USACE PROJECT SPECIFIC SPECIAL CONDITIONS: TREE REMOVAL SHOULD BE AVOIDED BETWEEN APRIL 1 AND SEPTEMBER 30 ANNUALLY TO AVOID SUMMER OCCUPANCY SEASON FOR THE INDIANA BAT AND THE NLEB. IN-STREAM ACTIVITIES SHOULD BE AVOIDED BETWEEN OCTOBER 15 AND APRIL 15 TO MINIMIZE IMPACTS TO TROUT REPRODUCTION.

ENGINEER & CONTRACTOR RESPONSIBILITIES

- TO NOTIFY THE NCDEQ LAND QUALITY INSPECTOR AT LEAST 48 HOURS BEFORE PROJECT STARTS,
- NO MAJOR GRADING ACTIVITIES OR BASIN CONSTRUCTION ARE TO TAKE PLACE DURING WET WEATHER OR PERIODS OF PREDICTED WET WEATHER,
- THAT ALL WORK WITHIN STREAMS, WETLANDS, OR RIPARIAN BUFFERS MUST BE STABILIZED AT THE END OF EACH WORK DAY.
- CLEARLY MARK UTILITY LINES AND MAINTAIN THROUGHOUT CONSTRUCTION UNTIL EQUIPMENT IS REMOVED FROM SITE. MINIMIZE ENCROACHMENTS NEAR GAS LINE/EASEMENT.
- INSTALL INLET PROTECTION BY THE END OF EACH WORK DAY FOR ALL CONSTRUCTED STORMWATER CULVERT INLETS,
- NOTIFY THE NCDEQ LAND QUALITY INSPECTOR WHEN PROJECT IS READY FOR CLOSEOUT INSPECTION,
- FILE FOR NPDES NCG010000 e-NOTICE OF TERMINATION (e-NOI) WHEN A FINAL CLOSEOUT INSPECTION REPORT IS RECEIVED FROM NCDEQ LAND QUALITY SECTION. G.S. 113A-57 (3).

STABILIZATION TIMEFRAMES
(Effective Aug. 3, 2011)

SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, slopes	7 days	None
High Quality Water (HQW) Zones	7 days	None
Slopes steeper than 3:1	7 days	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed.
Slopes 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

PREPARED BY:
INTERFACE ENVIRONMENTAL CONSULTING, LLC
476 HIDDEN POND ROAD
BOONE, NC 28607
919-656-4543

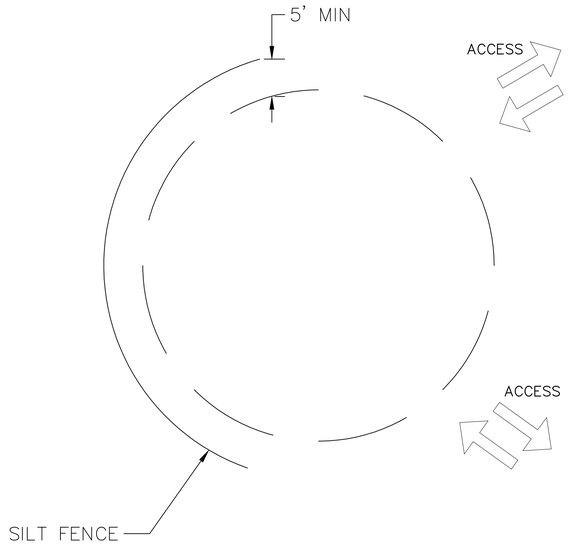
REVISIONS | DATE

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET X4.1

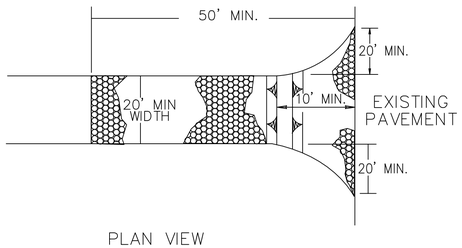


NOTES:
1. SOIL STOCKPILES MUST BE LOCATED AS SPECIFIED ON THE APPROVED ESC PLAN.
2. DOWNSLOPE AREAS OF THE STOCKPILE MUST BE PROTECTED WITH SILT FENCE OR ADDITIONAL PROTECTIONS AS SPECIFIED BY THE ENGINEER.
3. SILT FENCE SHALL BE LOCATED A MIN OF 5 FT FROM THE TOE OF THE STOCKPIILE.
4. ACCESS TO STOCKPILE AREAS SHALL BE DICTATED BY THE LOCATION OF ADJACENT SILT FENCE AND SITE DRAINAGE PATTERNS. THIS WILL BE SPECIFIED BY THE ENGINEER ON A PROJECT BY PROJECT BASIS.
5. PROTECT TOPSOIL STOCKPILES BY TEMP SEEDING NO MORE THAN 21 CALENDAR DAYS AFTER THE FORMATION OF THE STOCKPILE.

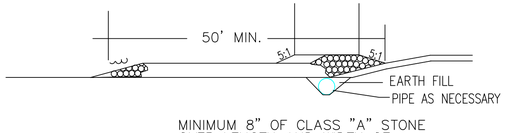
SOIL/TOPSOIL STOCKPILE

NOT TO SCALE

NOT TO SCALE



PLAN VIEW



MINIMUM 8" OF CLASS "A" STONE OVER LENGTH AND WIDTH OF STRUCTURE

PROFILE VIEW

NOTES:
1. LOCATE CONSTRUCTION ENTRANCES AT EVERY POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR LEAVES A CONSTRUCTION SITE. VEHICLES LEAVING THE SITE MUST TRAVEL OVER THE ENTIRE LENGTH OF THE STABILIZED CONSTRUCTION EXIT.
2. MAINTAIN IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING OF STONE MAY BE NECESSARY.
3. ANY MATERIAL TRACKED ONTO ROADWAY MUST BE CLEANED UP IMMEDIATELY.

CONSTRUCTION SPECIFICATIONS:
1. PROVIDE A MINIMUM LENGTH OF 50'.
2. PROVIDE A MINIMUM WIDTH OF 20'. THE ENDS SHOULD BE FLARED AT THE EXISTING ROAD OR PAVEMENT TO PROVIDE AN ADEQUATE TURNING RADIUS. MAXIMUM SIDESLOPE OF STONE IS 3:1.
3. PLACE NCDOT TYPE 2 GEOTEXTILE OVER EXISTING GROUND PRIOR TO PLACING STONE.
4. ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED THROUGH ENTRANCE TO MAINTAIN POSITIVE DRAINAGE. PIPE INSTALLED THROUGH STABILIZED CONSTRUCTION ENTRANCE SHALL BE PROTECTED WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 6" OF STONE OVER PIPE. WHEN THE ENTRANCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY A PIPE WILL NOT BE NECESSARY. PIPE SHOULD BE SIZED ACCORDING TO THE AMOUNT OF RUNOFF TO BE CONVEYED.

CONSTRUCTION ENTRANCE

NOT TO SCALE

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REVISIONS DATE

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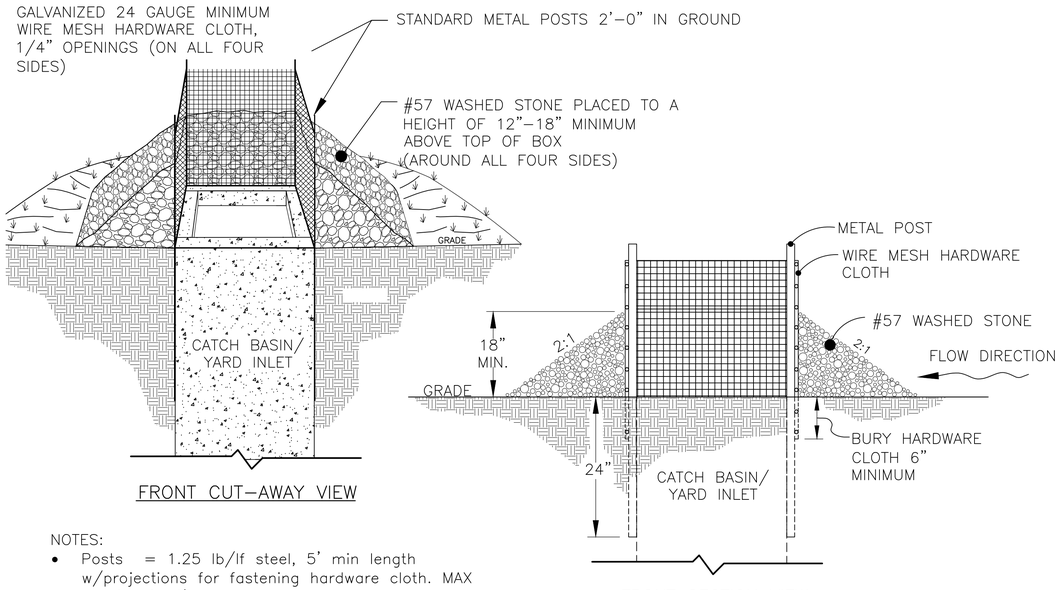
MIDDLE FORK GREENWAY 3 ESC

DETAILS

MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

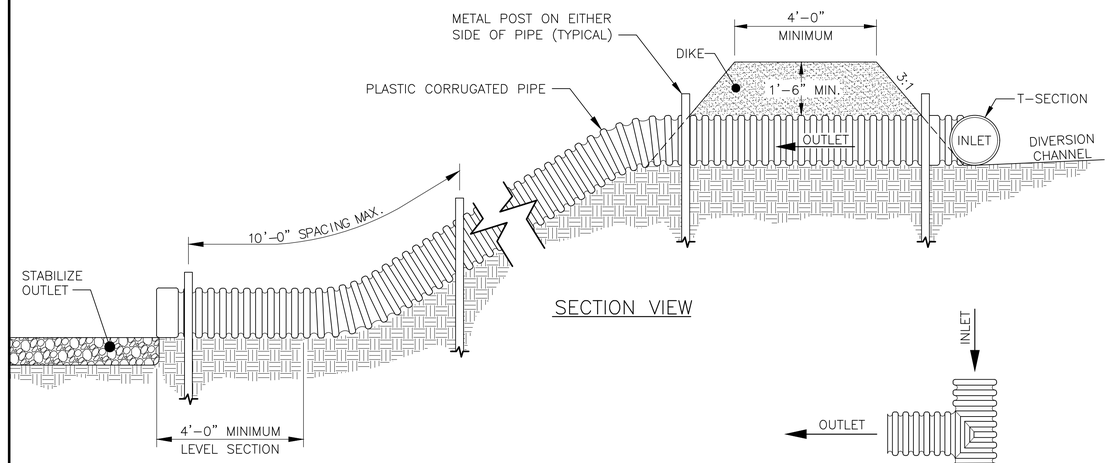
SHEET X4.2



NOTES:
- Posts = 1.25 lb/lf steel, 5' min length w/projections for fastening hardware cloth. MAX spacing is 4'.
- Hardware Cloth = 19 gauge wire mesh. Provide a flap of cloth projecting away from inlet to aid in removal.

HARDWARE CLOTH & GRAVEL INLET PROTECTION

NOT TO SCALE

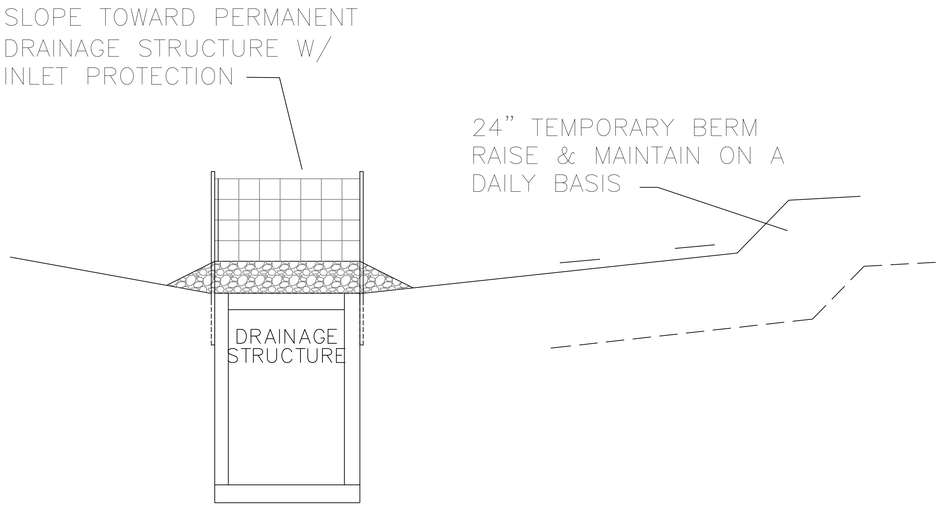


NOTES:
1. TEMPORARY DIVERSION: GENERALLY, USE AN EARTHEN DIVERSION WITH A DIKE RIDGE TO DIRECT SURFACE RUNOFF INTO THE TEMPORARY SLOPE DRAIN. MAKE THE HEIGHT OF THE RIDGE OVER THE DRAIN CONDUIT A MINIMUM OF 1.5 FEET AND AT LEAST 6 INCHES HIGHER THAN THE ADJOINING RIDGE ON EITHER SIDE. THE LOWEST POINT OF THE DIVERSION RIDGE SHOULD BE A MINIMUM OF 1 FOOT ABOVE THE TOP OF THE DRAIN SO THAT DESIGN FLOW CAN FREELY ENTER THE PIPE.
2. OUTLET PROTECTION: PROTECT THE OUTLET OF THE SLOPE DRAIN FROM EROSION.
3. MINIMUM OF 10 INCH PIPE OR GREATER BASED ON AREA OF DRAINAGE.

STANDARD TEMPORARY SLOPE DRAIN

(MODIFIED FROM TOWN OF CARY, NC DETAILS)

NOT TO SCALE



TEMPORARY EARTHEN BERM

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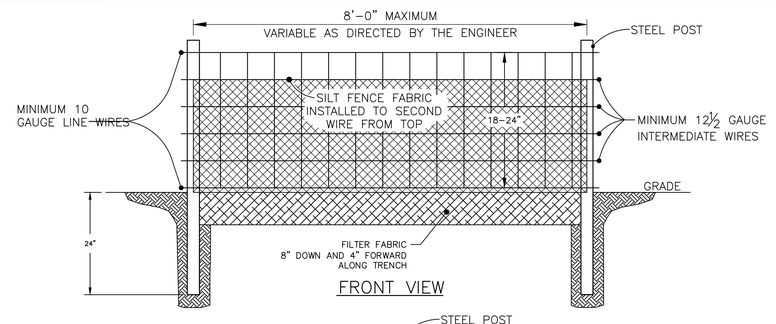
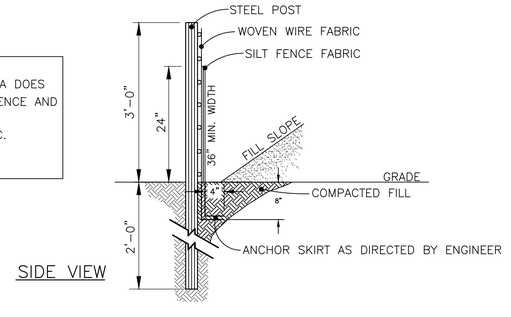


NOTES:
1) USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE PER 100 ft. OF FENCE AND NEVER IN AREAS OF CONCENTRATED FLOW.
2) OVERLAP 12 INCHES WHEN SPLICING FABRIC.



STANDARD TEMPORARY SILT FENCE

(MODIFIED FROM TOWN OF CARY, NC DETAILS)

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BOONE, NC 28607
919-656-4543

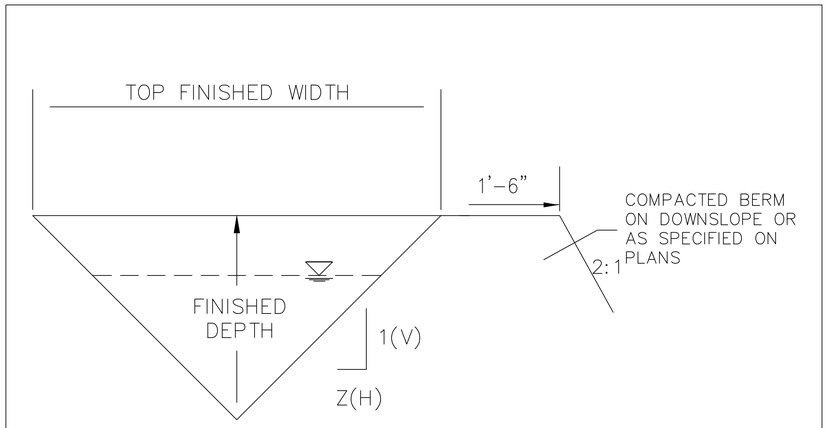
DATE
REVISIONS

PREPARED FOR: BLUE RIDGE CONSERVANCY

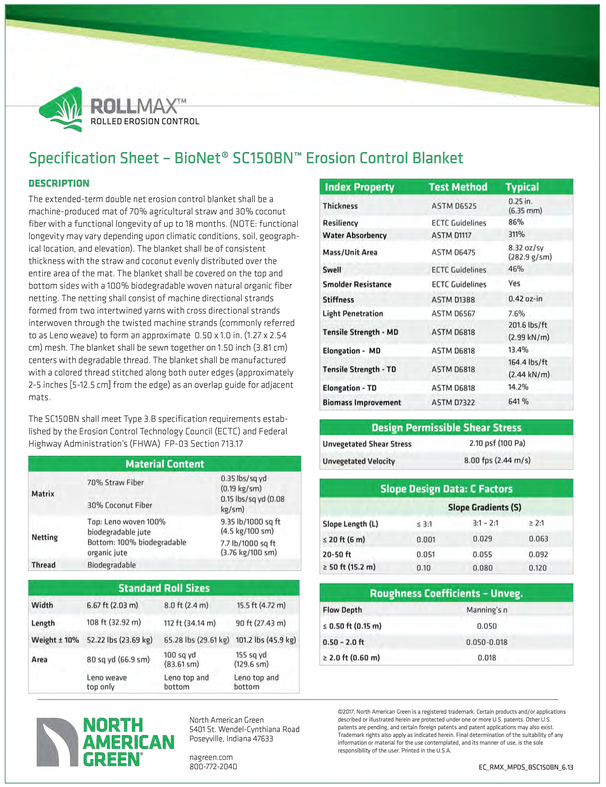
MIDDLE FORK GREENWAY 3 ESC

DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET
X4.3



DIVERSION DITCHES



ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – BioNet® SC150BN™ Erosion Control Blanket

DESCRIPTION

The extended-term double net erosion control blanket shall be a machine-produced mat of 70% agricultural straw and 30% coconut fiber with a functional longevity of up to 18 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with a 100% biodegradable woven natural organic fiber netting. The netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the twisted machine strands (commonly referred to as Leno weave) to form an approximate 0.50 x 1.0 in. (1.27 x 2.54 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The SC150BN shall meet Type 3.B specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.17

Material Content		
Matrix	70% Straw Fiber	0.35 lbs/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top: Leno woven 100% biodegradable jute	9.35 lb/1000 sq ft (4.5 kg/100 sm)
	Bottom: 100% biodegradable organic jute	7.7 lb/1000 sq ft (3.76 kg/100 sm)
Thread	Biodegradable	

Standard Roll Sizes			
Width	6.67 ft (2.03 m)	8.0 ft (2.4 m)	15.5 ft (4.72 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)	90 ft (27.43 m)
Weight ± 10%	52.22 lbs (23.69 kg)	65.28 lbs (29.61 kg)	101.2 lbs (45.9 kg)
Area	80 sq yd (66.9 sm)	100 sq yd (83.61 sm)	155 sq yd (129.6 sm)
	Leno weave top only	Leno top and bottom	Leno top and bottom

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.25 in. (6.35 mm)
Resiliency	ECTC Guidelines	86%
Water Absorbency	ASTM D1117	311%
Mass/Unit Area	ASTM D6475	8.32 oz/sy (282.9 g/sm)
Swell	ECTC Guidelines	46%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	0.42 oz-in
Light Penetration	ASTM D6567	7.6%
Tensile Strength - MD	ASTM D6818	201.6 lbs/ft (2.99 kN/m)
Elongation - MD	ASTM D6818	13.4%
Tensile Strength - TD	ASTM D6818	164.4 lbs/ft (2.44 kN/m)
Elongation - TD	ASTM D6818	14.2%
Biomass Improvement	ASTM D7322	641 %

Design Permissible Shear Stress	
Unvegetated Shear Stress	2.10 psf (100 Pa)
Unvegetated Velocity	8.00 fps (2.44 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.001	0.029	0.063
20-50 ft	0.051	0.055	0.092
≥ 50 ft (15.2 m)	0.10	0.080	0.120

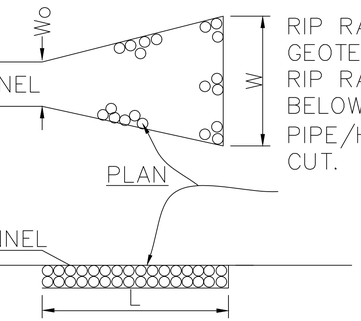
Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.050
0.50 – 2.0 ft	0.050 -0.018
≥ 2.0 ft (0.60 m)	0.018

NORTH AMERICAN GREEN®

North American Green
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633

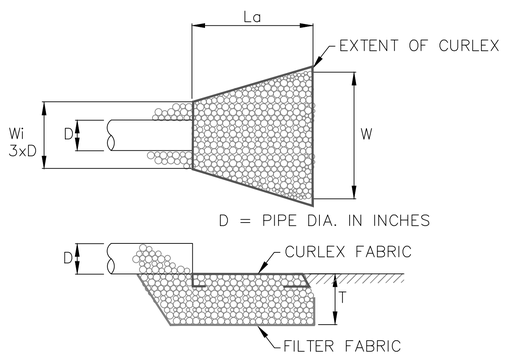
nagreen.com
800-772-2040

EC_RMX_MPDS_BSC150BN_6.13



RIP RAP PLACED ON GEOTEXTILE. TOP OF RIP RAP TO BE AT OR BELOW FLOW LINE OF PIPE/HEADWALL/CURB CUT.

SECTION

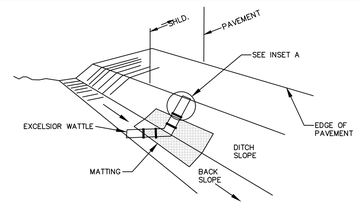


CURLEX ADDITION – IF SPECIFIED

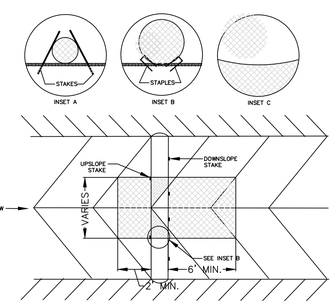
RIP-RAP APRON/OUTLET PROTECTION DETAIL

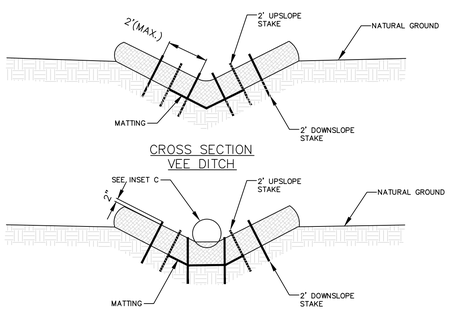
NOT TO SCALE

NOTES:
1. USE MINIMUM 12 INCH DIAMETER FIBER WATTLE.
2. USE 2 FT. WOODEN STAKES WITH A 2 IN. X 2 IN. NOMINAL CROSS SECTION
3. ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.
4. INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.
5. PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.
6. INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.
7. INSTALL MATTING IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.



ISOMETRIC VIEW





TEMPORARY WATTLE CHECK DAM

NOT TO SCALE

PREPARED BY:
IEC
INTERFACE ENVIRONMENTAL CONSULTING, LLC
476 HIDDEN POND ROAD
BOONE, NC 28607
919-656-4543

REVISIONS | DATE

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC

DETAILS

MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET X4.4

25-YR PIPE CHART

PIPE ID	UPSTREAM ID	DOWNSTREAM ID	PIPE LENGTH (ft)	PIPE SIZE (in)	MATERIAL	SLOPE (%)	TOTAL FLOW (cfs)	Capacity (cfs)	Velocity (ft/s)
100	N/A	N/A	17.99	15	HDPE	1.39	0.32	7.62	3.35
200	N/A	N/A	15.99	15	HDPE	1.56	1.00	8.08	4.74
300	N/A	N/A	18.00	15	HDPE	1.39	2.86	7.61	6.02
400	N/A	N/A	31.93	15	HDPE	9.44	1.21	19.84	9.64
500	N/A	N/A	28.12	15	HDPE	0.89	1.02	6.09	3.88
600	N/A	N/A	17.11	15	HDPE	1.46	0.60	7.81	4.03
700	N/A	N/A	16.02	15	HDPE	1.56	0.45	8.07	3.83
800	N/A	N/A	23.14	15	HDPE	1.08	0.34	6.71	3.10
900	FREE_ENT	FREE_EXT	18.03	15	HDPE	1.39	0.86	7.61	4.37
1000	N/A	N/A	32.76	15	HDPE	10.68	1.21	37.08	10.09
1101	1102	1000	87.25	15	HDPE	12.71	2.78	23.03	13.44
1103	1104	1102	75.78	15	HDPE	1.98	1.93	9.09	6.17
1105	1106	1104	74.29	15	HDPE	2.69	0.85	10.60	5.54
1201	1202	1200	25.37	18	HDPE	17.73	3.80	44.23	16.37

RIP RAP APRON SCHEDULE*

APRON	OUTLET	Q_{25} (cfs)	V_{25} (f/s)	D_{50} (in)	D_{max} (in)	L_a (ft)**	W_i (ft)	W_o (ft)	D (in)
RA-1	SLOPE DRAIN 1	2.76	27.50	2	3	25	3.75	28.75	4.5
RA-2***	TD 1	2.50	5.22	6	9	10	3.75	13.75	13.5
RA-100	PIPE 100	0.32	3.35	6	9	10	3.75	13.75	13.5
RA-200	PIPE 200	1.00	4.74	6	9	10	3.75	13.75	13.5
RA-300	PIPE 300	2.86	6.02	6	9	10	3.75	13.75	13.5
RA-400**	PIPE 400	1.21	9.64	6	9	10	3.75	13.75	13.5
RA-600	PIPE 600	0.46	4.03	6	9	10	3.75	13.75	13.5
RA-700	PIPE 700	0.45	3.83	6	9	10	3.75	13.75	13.5
RA-800	PIPE 800	0.27	3.10	6	9	10	3.75	13.75	13.5
RA-900	PIPE 900	0.86	4.37	6	9	10	3.75	13.75	13.5
RA-1000	PIPE 1000	1.21	10.09	6	9	10	3.75	13.75	13.5

*RIP RAP APRONS FROM PIPES TO REMAIN: REMOVE RA-1 WHEN PHASE I CONSTRUCTION IS COMPLETE
**EXTEND APRON TO TOE OF FILL SLOPE WHERE NECESSARY
***RA-2 BASED OFF 10YR QPEAK

PERMANENT DIVERSION CALCULATIONS/SPECIFICATIONS

Channel ID	Drainage Area	Q_{25} (cfs)	V_{25} (fps)	Max Slope	Max Slope (%)	Length (ft)	Finished Bottom Width	Finished Top Width	Finished Depth	LINER (or EQUIV)
PD-1	1.63	2.86	2.89	0.047	4.68	1125	N/A	2.0	1.0	NAG SC150BN OR EQUIV.
PD-2	0.69	1.21	2.39	0.050	5.00	110	N/A	2.0	1.0	NAG SC150BN OR EQUIV.
PD-3	0.47	0.82	2.65	0.039	3.90	105	N/A	2.0	1.0	CLASS B STONE
PD-4	0.57	3.80	1.97	0.017	1.7	50	2	6.0	1.0	CLASS B STONE
PD-5	0.70	4.41	3.40	0.069	6.9	29	2	6.0	1.0	CLASS B STONE

TEMPORARY DIVERSION CALCULATIONS/SPECIFICATIONS

Channel ID	Drainage Area	Q_{10} (cfs)	V_{10} (fps)	Max Slope	Max Slope (%)	Length (ft)	Finished Bottom Width	Finished Top Width	Finished Depth	LINER (or EQUIV)
TD-1	1.62	2.50	5.2	0.281	28.1	57	N/A	2.0	1.0	CLASS B STONE

RATIONAL METHOD Qpeak CALCULATIONS (25-YR)

Drainage Area ID	Drains To	Area (ac)	C	Peak Flow (Q, cfs)
1	Temporary Slope Drain 1, RA 1	0.52	0.6	2.76
2*	TD 1, RA 2	1.62	0.25	2.50
100	PD 1, Pipe 100, RA 100	0.23	0.2	0.32
200	PD 1, Pipe 200, RA 200	0.57	0.25	1.00
300	PD 1, Pipe 300, RA 300	1.63	0.25	2.86
400	PD 1, Pipe 400, RA 400	0.69	0.25	1.21
500	PD 1, Pipe 500, PD 3	0.47	0.25	0.82
600	PD 1, Pipe 600, RA 600	0.12	0.55	0.46
700	PD 1, Pipe 700, RA 700	0.08	0.8	0.45
800	PD 2, Pipe 800, RA 800	0.13	0.3	0.27
900	PD 2, Pipe 900, RA 900	0.49	0.25	0.86
1000	PD 2, Inlet 1001, Pipe 1000, RA 1000	0.69	0.25	1.21
1102	Inlet 1102, Pipe 1101, RA 1100	0.37	0.75	2.44
1104	Inlet 1104, Pipe 1101, RA 1100	0.17	0.75	1.12
1106	Inlet 1106, Pipe 1101, RA 1100	0.16	0.6	0.84
1204	Inlet 1202, Pipe 1201, RA 1200, PD-5	0.57	0.95	3.80

Intensity - 25 yr, (5 minute, NOAA - 8.80 in/hr) (10 min, NOAA - 7.01 in/hr) Blowing Rock, NC Station.
*10yr Qpeak for Drainage Area 2

TEMPORARY SLOPE DRAIN SCHEDULE

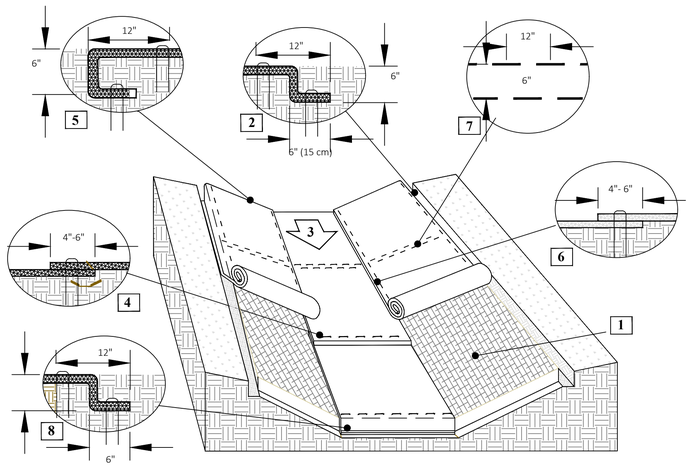
Drainage Area	Area (acres)	Q_{25} (cfs)	HW/D	Pipe Type	Pipe Size
1	0.52	2.76	0.70	HDPE	15"

PREPARED BY:
IEC
INTERFACE ENVIRONMENTAL CONSULTING, LLC
476 HIDDEN POND ROAD
BOONE, NC 28607
919-656-4543

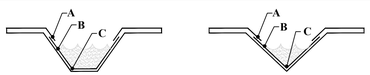
DATE
REVISIONS

PREPARED FOR: BLUE RIDGE CONSERVANCY
MIDDLE FORK GREENWAY 3 ESC
CALCULATIONS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET
X4.5



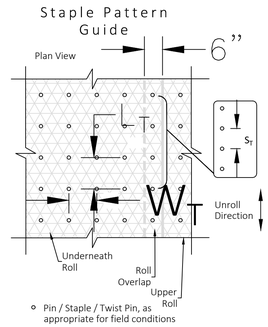
CRITICAL POINTS
A. Overlaps and Seams
B. Projected Water Line
C. Channel Bottom/Side Slope Vertices



NOTES:
*Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

INSTRUCTIONS

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPS), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. GROUND SURFACE MUST BE FREE OF DEBRIS, ROCKS, CLAY CLODS AND RAKED SMOOTH SUFFICIENT TO ALLOW INTIMATE CONTACT OF THE RECP WITH THE SOIL OVER THE ENTIRETY OF THE INSTALLATION.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECPS IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECPS EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. USE SHOREMAX MAT AT THE CHANNEL/CULVERT OUTLET AS SUPPLEMENTAL SCOUR PROTECTION AS NEEDED. ANCHOR THE RECPS WITH A ROW OF STAPLES/STAKES/PINS APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO THE COMPACTED SOIL AND FOLD THE REMAINING 12" (30 CM) PORTION OF RECPS BACK OVER THE SEED AND COMPACTED SOIL. SECURE RECPS OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES/PINS SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECPS.
3. ROLL CENTER RECPS IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECPS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES/PINS IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
4. PLACE CONSECUTIVE RECPS END-OVER-END (SHINGLE STYLE) WITH A 4"- 6" (10 - 15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE RECPS.
5. FULL LENGTH EDGE OF RECPS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES/PINS SPACED AT S_T APART IN A 6" (15 CM) DEEP X 6"(15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECPS MUST BE OVERLAPPED APPROXIMATELY 4"- 6" (10 - 15 CM) AND SECURED WITH STAPLES/STAKES/PINS AT S_T.
7. IN HIGH FLOW CHANNEL APPLICATIONS A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 -12M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 6" (15 CM) APART AND 12" (30 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECPS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES/PINS SPACED AT S_T APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
9. FASTENERS SHOULD PROVIDE A MINIMUM OF TWENTY POUNDS OF PULLOUT RESISTANCE. SIX-INCH (10 CM) X ONE-INCH (2.5 CM) ELEVEN GAUGE STAPLES ARE TYPICALLY ADEQUATE. IN LOOSE SOILS, LONGER STAPLES MAY BE NECESSARY, TWIST PINS CAN PROVIDE THE GREATEST PULLOUT RESISTANCE. IN HARD OR ROCKY SOILS, STRAIGHT PINS MAY BY USED WHERE STAPLES OR TWIST PINS ARE REFUSED, PROVIDED THE MINIMUM PULLOUT REQUIREMENTS ARE MET. BIO-DEGRADABLE FASTENERS SHALL NOT BE USED WITH VMAX (TRM) OR TMAX (HPTRM) MATERIALS.



○ Pin / Staple / Twist Pin, as appropriate for field conditions

	Staple Pattern
Dimension	E
W_T	20"
L_T	20"
S_T	18"
Nominal Frequency	3.8 / SY

SEEDING NOTES

ALL DISTURBED AREAS SHALL BE SEEDED WITH THE APPROPRIATE SEED/AMENDMENT MIXTURE AND TACKING (INSTALLER TO SPECIFY). RESEED AS NECESSARY TO ESTABLISH A VIGOROUS GROUNDCOVER OF TEMPORARY AND PERMANENT GRASS.

SEE SHEET E-6.2 FOR TEMPORARY AND PERMANENT SEED MIXES SPECIFIC TO STREAM RESTORATION AREAS.

TEMPORARY SEEDING SPECIFICATIONS

SEEDING MIXTURE:

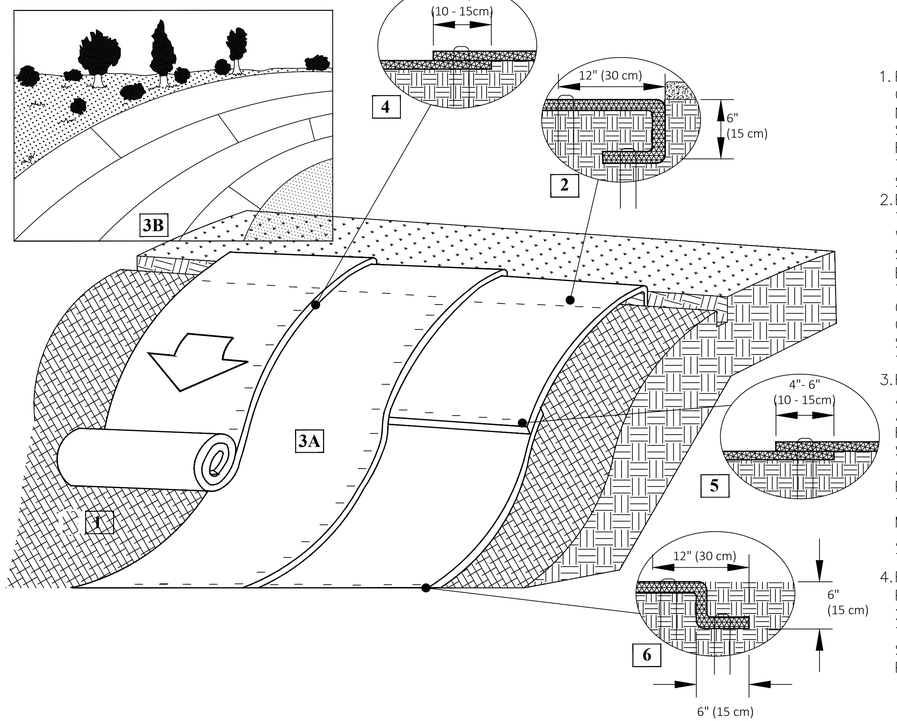
SPECIES	RATE (lb/acre)
RYE (grain)	120
GERMAN MILLET	120

SEEDING DATES:
RYE – AUG 15 TO MAY 1
MILLET – MAY 1 TO AUG 15

SOIL ADMENDMENTS:
FOLLOW RECOMMENDATIONS OF SOIL TESTS

MULCH:
APPLY 4000lb/ac STRAW. ANCHOR STRAW BY TACKING w/ ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK w/ BLADES SER NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE:
RE-FERTILIZE IF GROWTH IS NOT FULLY ADEQUATE, RE-SEED, RE-FERTILIZE AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.



INSTRUCTIONS

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPS), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. GROUND SURFACE MUST BE FREE OF DEBRIS, ROCKS, CLAY CLODS AND RAKED SMOOTH SUFFICIENT TO ALLOW INTIMATE CONTACT OF THE RECP WITH THE SOIL OVER THE ENTIRETY OF THE INSTALLATION.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECPS IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. ANCHOR THE RECPS WITH A ROW OF STAPLES/STAKES/PINS SPACED AT S_T APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING AND FOLD THE ROLL OVER DOWNSLOPE. SECURE RECPS OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES/PINS SPACED AT S_T APART ACROSS THE WIDTH OF THE RECPS.
3. ROLL THE RECPS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE. RECPS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES/PINS IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. CONSECUTIVE RECPS SPLICED DOWN THE SLOPE MUST OVERLAPPED WITH THE UPSTREAM MAT ATOP THE DOWNSTREAM MAT (SHINGLE STYLE). AT THE TERMINAL END, SECURE EACH MAT ACROSS THE WIDTH WITH A ROW OF STAPLES/STAKES/PINS.
4. FASTENERS SHOULD PROVIDE A MINIMUM OF TWENTY POUNDS OF PULLOUT RESISTANCE. SIX-INCH (10 CM) X ONE-INCH (2.5 CM) ELEVEN GAUGE STAPLES ARE TYPICALLY ADEQUATE. IN LOOSE SOILS, LONGER STAPLES MAY BE NECESSARY, TWIST PINS CAN PROVIDE THE GREATEST PULLOUT RESISTANCE.

STABILIZATION MATTING INSTALLATION

NOT TO SCALE

CUT / FILL SLOPES, OPEN AREAS & SWALES

PERMANENT SEEDING SPECIFICATION

SEEDING MIXTURE:

SPECIES	RATE (lb/ac)
TALL FESCUE	175-200 (3 lb/1000 sq ft)
KENTUCKY BLUEGRASS	20 (1 lb/1000 sq ft)

NURSE PLANTS:
BETWEEN MAY 1 AND AUG 15, ADD 10 lb/ac GERMAN MILLET OR 15 lb/ac SUDANGRASS, PRIOR TO MAY 1 OR AFTER AUG 15, ADD 40 lb/ac RYE (GRAIN).

SOIL ADMENDMENTS:
APPLY LIME AND FERTILIZE ACCORDING TO SOIL TEST

MULCH:
USE CHANNEL LINING MATERIAL TO COVER THE BOTTOM OF DITCHES. THE LINING SHOULD EXTEND ABOVE THE HIGHEST CALCULATED DEPTH OF FLOW. ON CHANNEL SIDE SLOPES ABOVE THE HEIGHT, AND IN DRAINAGES NOT REQUIRING TEMPORARY LININGS, APPLY 4000 lb/ac

MULCH AND ANCHORING MATERIALS MUST NOT BE ALLOWED TO WASH DOWN SLOPE WHERE THEY CAN CLOG DRAINAGE DEVICES.
GRAIN STRAW AND ANCHOR STRAW BY STAPLING NETTING OVER THE TOP.

MAINTENANCE:
INSPECT AND REPAIR MULCH FREQUENTLY. RE-FERTILIZE IN LATE WINTER ACCORDING TO SOIL TESTS OR APPLY 150 lb/ac 10-10-10 FERTILIZER (3 lb/1000 sq ft). MOW REGULARLY TO A HEIGHT OF 2" TO 4".

PREPARED BY:
INTERFACE ENVIRONMENTAL CONSULTING, LLC
476 HIDDEN POND ROAD
BOONE, NC 28607
919-656-4543

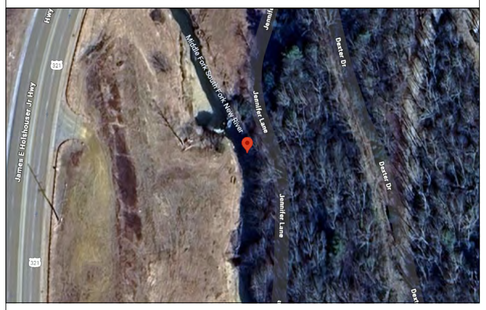
REVISIONS | DATE

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3 ESC
DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET X4.6

VICINITY MAP



ABBREVIATIONS

A	AREA
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ADH.	ADHESIVE
AGG.	AGGREGATE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALT.	ALTERNATE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPRH.	APPROACH
APPROX.	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
BOT.	BOTTOM
BRG.	BEARING
CTS.	CENTERS
CIPL	CAST IN PLACE
C/L	CENTERLINE
CON.	CONNECTION
CONC.	CONCRETE
COORD.	COORDINATE
DGN.	DESIGN
DIM.	DIMENSION
DWG.	DRAWING
EA.	EACH
EL.	ELEVATION
ENGR.	ENGINEER
EXIST.	EXISTING
F TO F	FACE TO FACE
FDN.	FOUNDATION
FT.	FEET
GALV.	GALVANIZED
GR.	GRADE
HORIZ.	HORIZONTAL
IN.	INCH
LB.	POUND
LONG.	LONGITUDINAL
MAX.	MAXIMUM
MIN.	MINIMUM
O/C	ON CENTER
OD	OUTSIDE DIAMETER
PAR.	PARALLEL
PVC	POLYVINYL CHLORIDE
REINF.	REINFORCEMENT
SCH.	SCHEDULE
STD.	STANDARD
STL.	STEEL
STR.	STRUCTURE
W.W.F.	WELDED WIRE FABRIC

SHEET INDEX

ARETÉ ENGINEERS

MIDDLEFORK GREENWAY SECTION 3
UPSTREAM BRIDGE ABUTMENT DESIGN

TYPE OF WORK: STRUCTURE

DESIGN DATA:

SPECIFICATIONS — A.A.S.H.T.O. GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES, DECEMBER 2009

A.A.S.H.T.O LRFD BRIDGE DESIGN SPECIFICATIONS

LIVE LOAD	90 PSF PEDESTRIAN LOAD
IMPACT ALLOWANCE	N/A
STRESS IN EXTREME FIBER OF	
STRUCUTRAL STEEL – AASHTO M270 GRADE 36	36,000 LBS. PER SQ. IN.
– AASHTO M270 GRADE 50W	50,000 LBS. PER SQ. IN.
– AASHTO M270 GRADE 50	50,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION – GRADE 60	60,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	3,000 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER – TREATED OR UNTREATED EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	60 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS: AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP. CONCRETE SHALL BE CURED IN COMPLIANCE WITH NCDOT SPECIFICATIONS.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS, UNLESS OTHERWISE NOTES, SHALL BE EMBEDDED A MINIMUM OF 6" INTO EXISITNG CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

CONSTRUCTION SEQUENCE:

PLACE BACKFILL IN ACCORDANCE WITH NCDOT SPECIFICATIONS. PLACE BACKFILL ABOVE THE BEARING SEAT AFTER THE PREFABRICATED FRP BRIDGE IS SET ON THE END BENTS.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACE IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

LAP SPLICES SHALL BE A MINIMUM LENGTH OF 40 X DIAMETER OF BAR.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HERON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON THE PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CHAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CHAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CHAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

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NORTH CAROLINA PROFESSIONAL 02/06/26 SEAL 057706 ENGINEER WILL HOLLIFIELD

MFG SECTION 3 ABUTMENT DESIGN (UPSTREAM BRIDGE)
FOR
INTERFACE ENVIRONMENTAL CONSULTING, LLC
AT
LAT: 36.1591667, LONG: -81.645277

DATE	
DRAWN BY	WMH
CHECK BY	AGF
EOR	WMH
PROJECT NO.	53999

SHEET CONTENTS

COVER SHEET / STANDARD NOTES

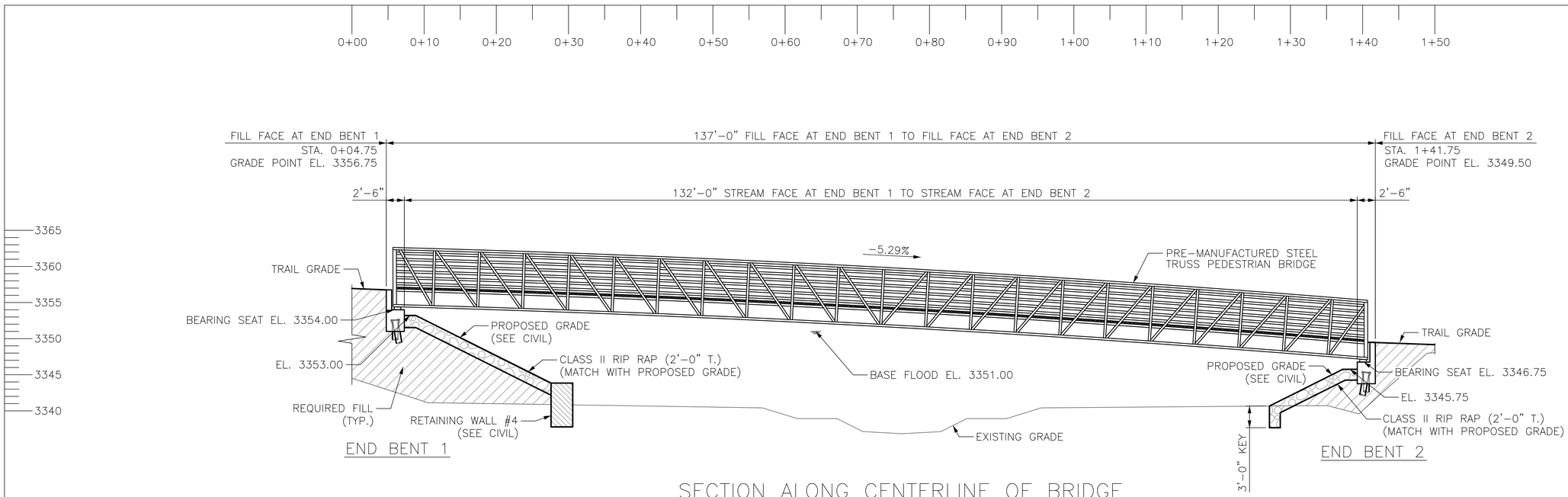
REVISIONS:

SHEET NO.

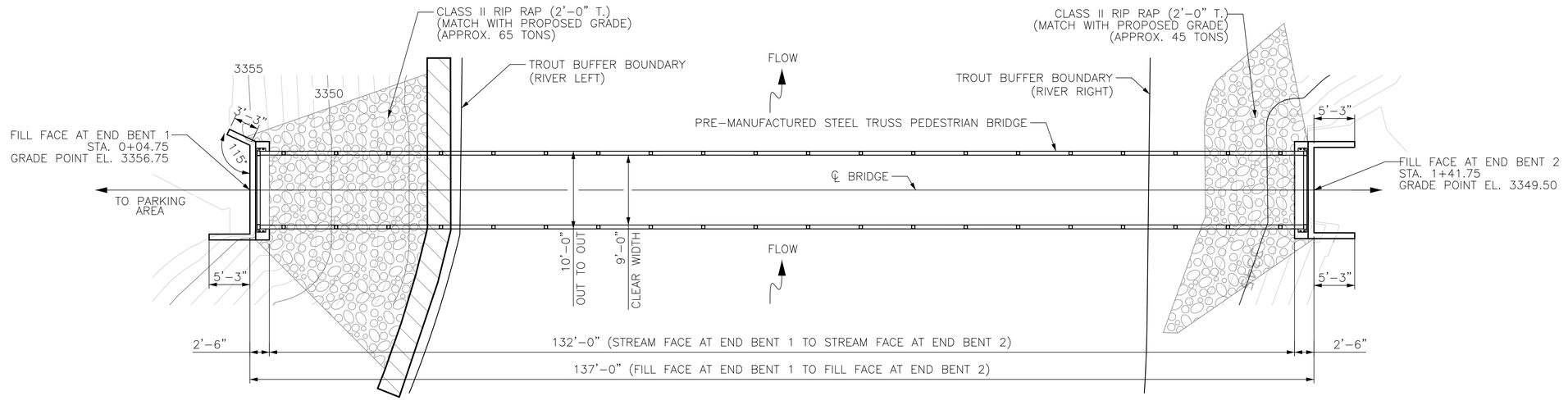
S-1

TOTAL SHEETS

8



SECTION ALONG CENTERLINE OF BRIDGE



PLAN VIEW OF BRIDGE

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SHEET CONTENTS

BRIDGE ELEVATION &
PLAN

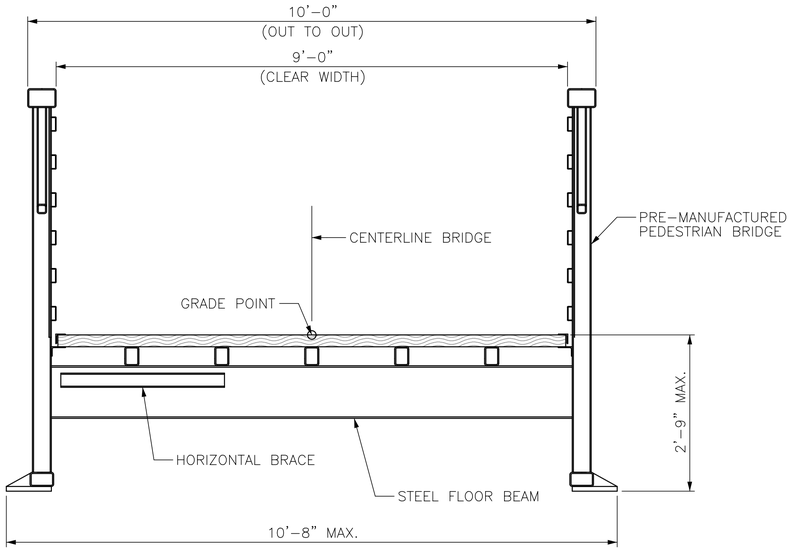
REVISIONS:

SHEET NO.

S-2

TOTAL SHEETS

8



TYPICAL SECTION (PRE–MANUFACTURED BRIDGE)

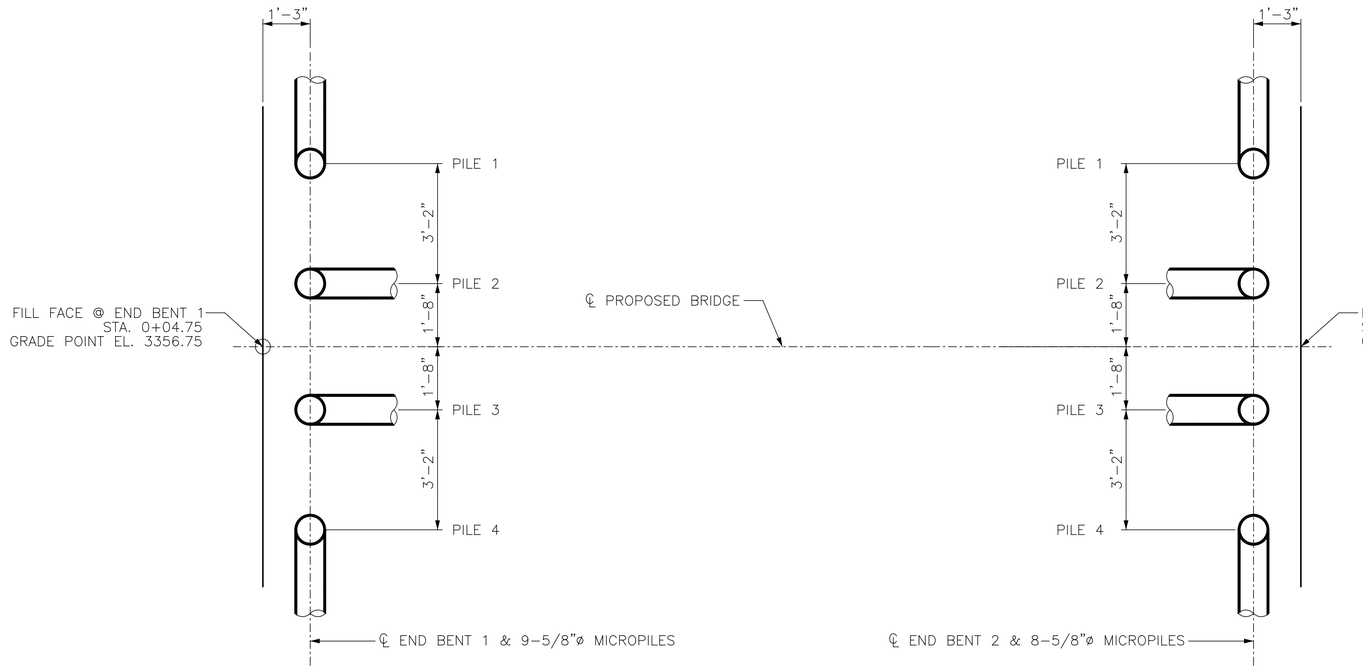
BEGIN STATION (FILL FACE)	END STATION (FILL FACE)	BACKWALL WIDTH	END CLEARANCE	GRADE	HORIZONTAL BRIDGE LENGTH (PLAN LENGTH)
0+04.75	1+41.75	9"	2"	–5.29%	135'–2"

PREMANUFACTERED PEDESTRIAN BRIDGE NOTES

1. BRIDGE LOADING & GEOMETRY IS ESTIMATED. AFTER SHOP DRAWINGS FOR THE PREMANUFACTURED PEDESTRIAN BRIDGE ARE SUBMITTED, CONSTRUCTION ADMINISTRATOR SHALL FORWARD SHOP DRAWINGS TO ARETÉ ENGINEERS FOR VERIFICATION THAT THE SUBSTRUCTURE CAN SUPPORT CALCULATED BRIDGE LOADS.
2. PREMANUFACTURED PEDESTRIAN BRIDGE DESIGN PER AASHTO LRFD GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES (LATEST EDITION)
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. FABRICATOR OF PREMANUFACTURED PEDESTRIAN BRIDGE SHALL INDICATE THE LOCATION OF DRAINAGE HOLES FOR THE BRIDGE TUBULAR MEMBERS IN THE SHOP DRAWINGS.
5. FOR ADDITIONAL INFORMATION, SEE SPECIAL PROVISIONS.
6. FABRICATOR OF PREMANUFACTURED PEDESTRIAN BRIDGE MUST MAINTAIN THE MAX. BACKWALL HEIGHT AS SHOWN IN THE PLANS.
7. FABRICATOR OF PREMANUFACTURED PREDESTRIAN BRUDGE INCLUDE BACKWALL COVER PLATE TO FOR EXPANSION.

MICROPILE NOTES:

1. FOR MICROPILE INFORMATION AND OTHER SUBSTRUCTURE DESIGN CONSIDERATIONS, SEE STAMPED GEOTECHNICAL REPORT.
2. MINIMUM BOND LENGTH OF 10 FEET IS REQUIRED FOR ALL PILES AT END BENTS 1 AND 2.
3. PENETRATION OF AT LEAST 5 FEET INTO WEATHERED ROCK OR CRYSTALLINE ROCK IS REQUIRED FOR REINFORCEMENT CASINGS.
4. USE REINFORCEMENT CASINGS WITH YIELD STRENGTHS OF AT LEAST 80 KSI AND A MINIMUM WALL THICKNESS OF 0.5" FOR ALL MICROPILES.
5. BATTERED MICROPILES AT ALL LOCATIONS ARE TO BE BATTERED AT 2:12.
6. MICROPILES ARE TYPICALLY DESIGNED BY THE MICROPILE DRILLING CONTRACTOR BASED ON THEIR AVAILABLE DRILLING EQUIPMENT AND MATERIAL AVAILABILITY. MICROPILES SHOULD BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH APPLICABLE SECTIONS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, LATEST EDITION AND FHWA NHI–05–039 MICROPILE DESIGN AND CONSTRUCTION REFERENCE MANUAL. A LOAD TESTING PROGRAM THAT INCLUDES BOTH PRE–PRODUCTION VERIFICATION TESTING AND PRODUCTION PROOF TESTING IS REQUIRED. LOAD TESTING CRITERIA SHOULD FOLLOW RECOMMENDATIONS OUTLINES IN FHWA NH–05–039.
7. DEVIATION FROM PIPE SIZE AND ROD DIAMETER MUST BE APPROVED BY ENGINEER OF RECORD UPON RECEIPT OF SUBMITTALS.



END BENT 1 — END BENT 2

FOUNDATION LAYOUT

SUMMARY OF MICROPILE INFORMATION/INSTALLATION

EB1	CASING O.D. (IN)	MIN. REINFORCEMENT BAR	ANTICIPATED BEDROCK EL. (FT)	FACTORED RESISTANCE PER PILE (KIPS)	UPLIFT RESISTANCE (KIPS)
PILE 1–4	9.625	#11	3323	150	80
EB2	CASING O.D. (IN)	MIN. REINFORCEMENT BAR	ANTICIPATED BEDROCK EL. (FT)	FACTORED RESISTANCE PER PILE (KIPS)	UPLIFT RESISTANCE (KIPS)
PILE 1–4	8.625	#11	3333	150	80

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SHEET CONTENTS

BRIDGE CROSS SECTION / FOUNDATION LAYOUT

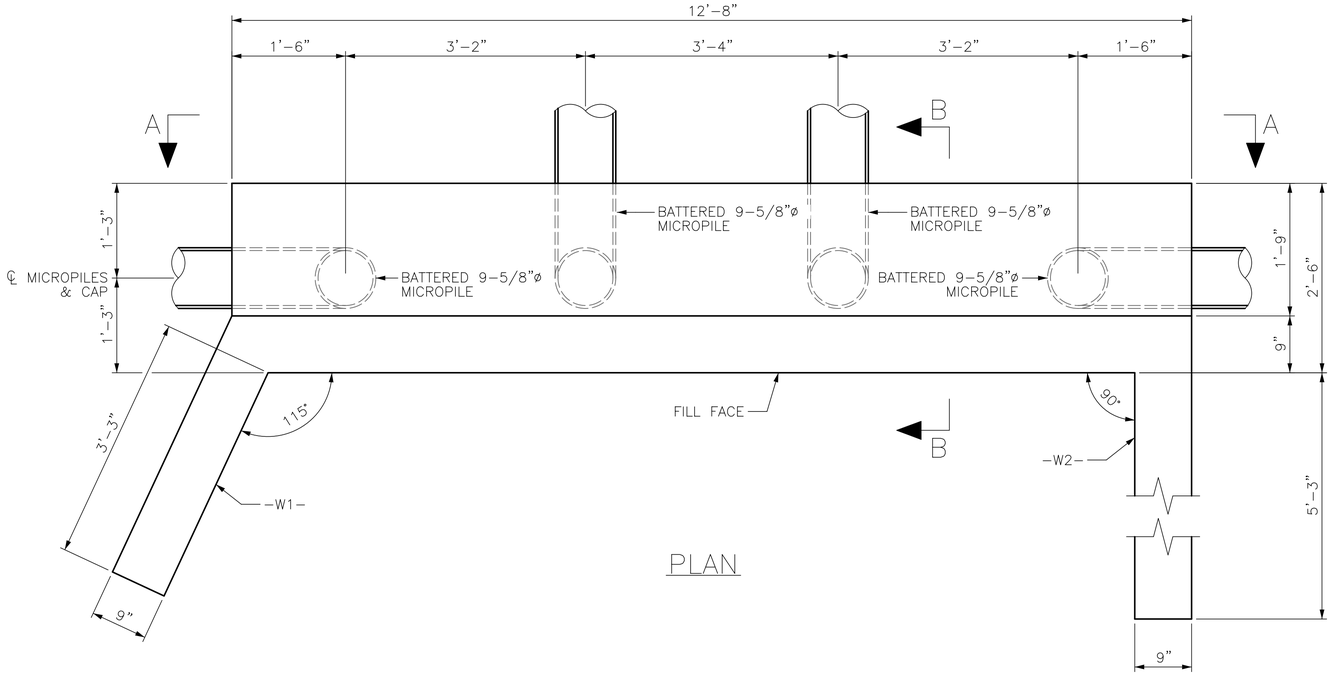
REVISIONS:

SHEET NO.

S–3

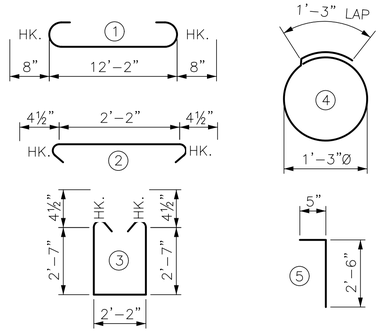
TOTAL SHEETS

8



PLAN

BAR TYPES



BILL OF MATERIAL (END BENT 1)

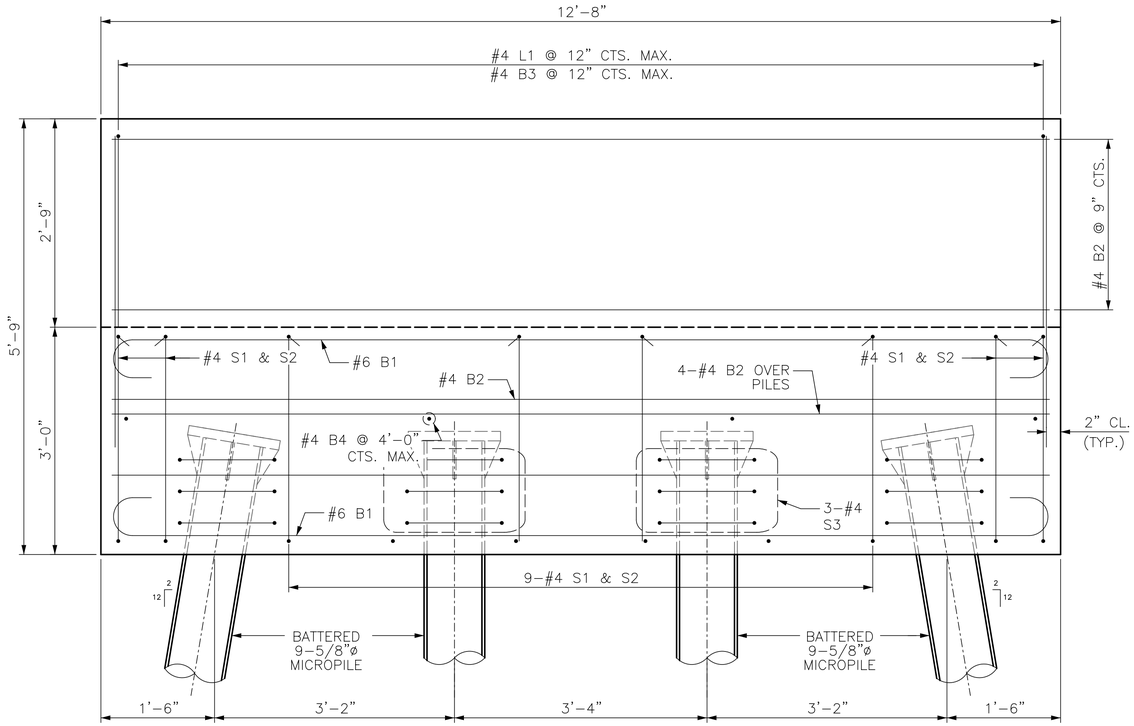
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#6	1	13'-6"	162
B2	16	#4	STR	12'-4"	132
B3	14	#4	STR	4'-2"	39
B4	4	#4	STR	2'-2"	6
S1	13	#4	2	2'-11"	25
S2	13	#4	3	8'-1"	70
S3	12	#4	4	5'-2"	41
L1	14	#4	5	2'-11"	27

REINFORCING STEEL (FOR END BENT 1) 503 LBS.

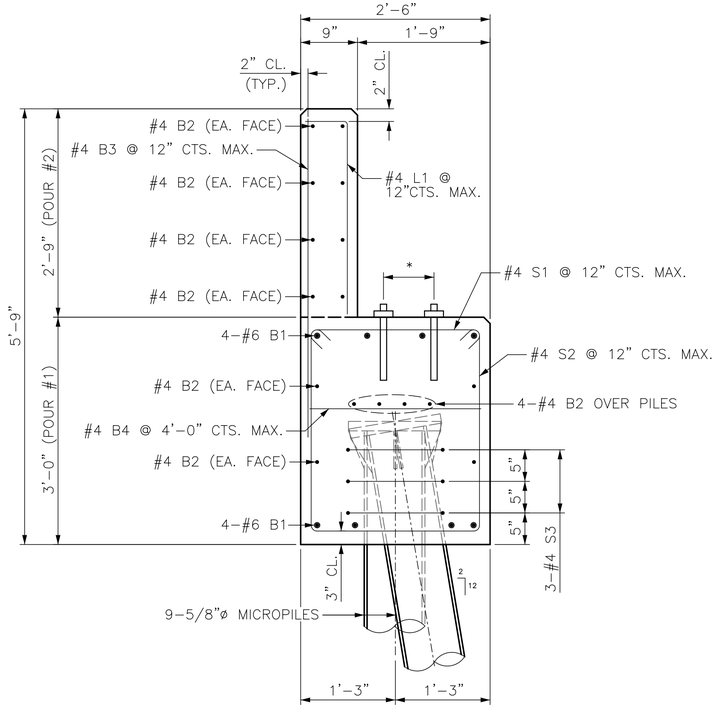
CLASS A CONCRETE BREAKDOWN (FOR END BENT 1)

POUR #1 (CAP & LOWER WINGS)	4.23 C.Y.
POUR #2 (BACKWALL & UPPER WINGS)	1.62 C.Y.
TOTAL CLASS A CONCRETE	5.85 C.Y.

"*" DIMENSIONS PROVIDED BY FABRICATOR OR PREMANUFACTURED PREDESTRIAN BRIDGE.



ELEVATION (A-A)



SECTION (B-B)

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ENGINEER
WILL HOLLIFIELD

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SHEET CONTENTS

END BENT 1

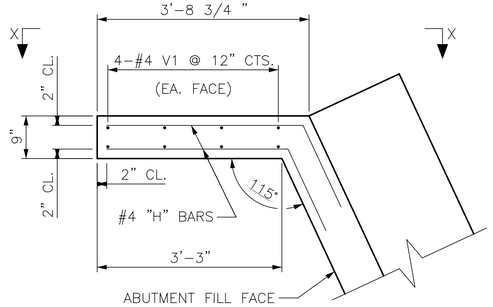
REVISIONS:

SHEET NO.

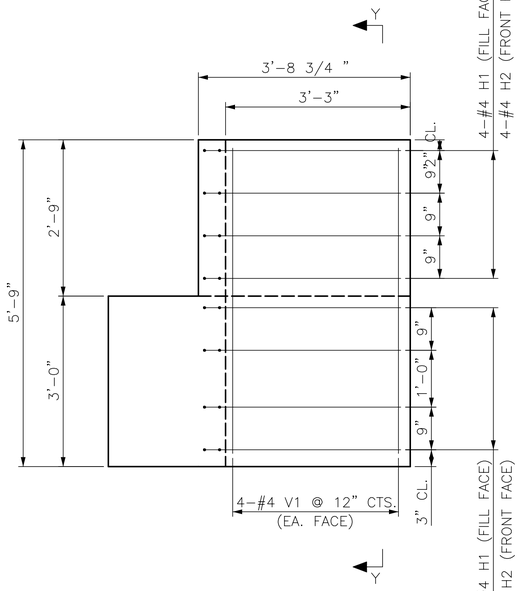
S-4

TOTAL SHEETS

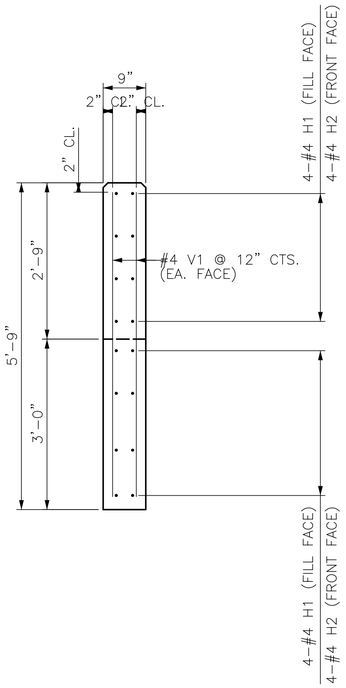
8



-W1- PLAN



-W1- ELEVATION (X-X)

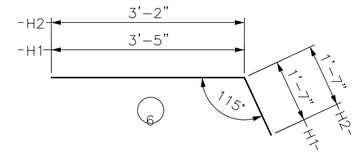


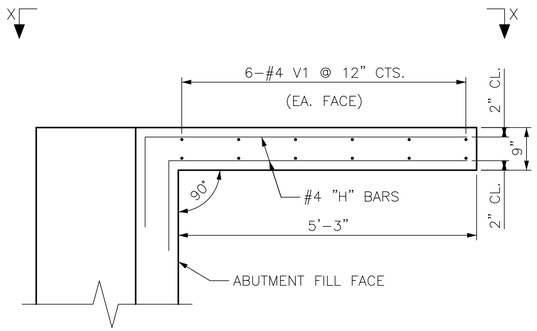
-W1- SECTION Y-Y)

BILL OF MATERIAL (-W1-)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	6	5'-0"	27
H2	8	#4	6	4'-9"	25
V1	8	#4	STR	5'-4"	29
REINFORCING STEEL (FOR -W1-)					81 LBS.

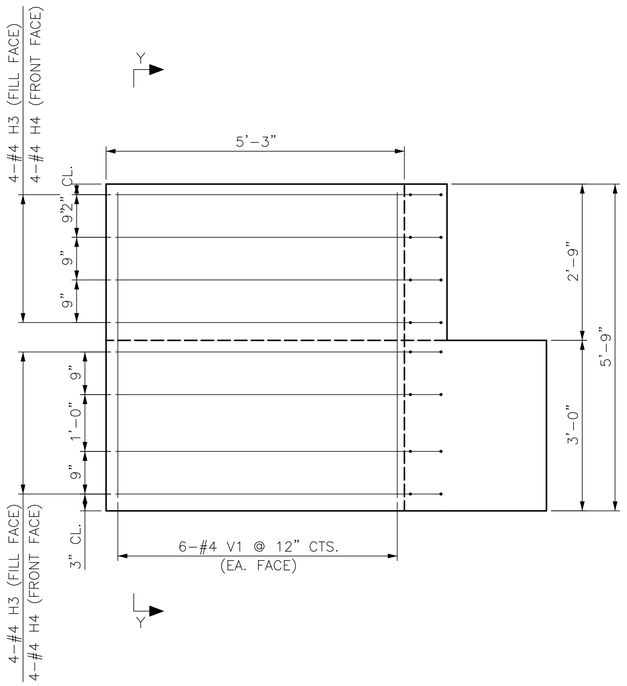
NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES

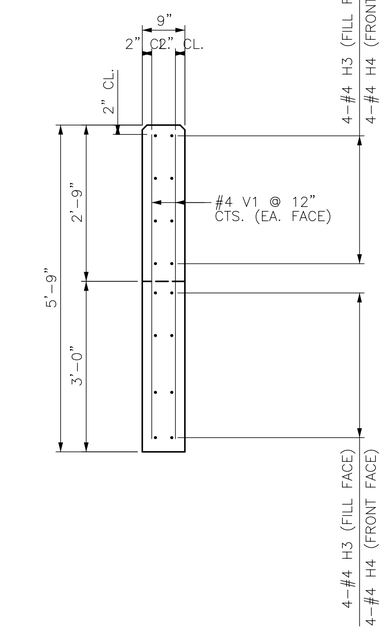




-W2- PLAN



-W2- ELEVATION (X-X)

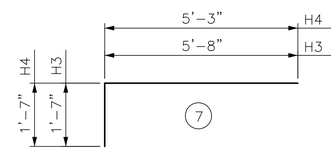


-W2- SECTION Y-Y)

BILL OF MATERIAL (-W2-)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'-3"	39
H4	8	#4	7	6'-10"	37
V1	12	#4	STR	5'-4"	43
REINFORCING STEEL (FOR -W2-)					118 LBS.

NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES



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SHEET CONTENTS

WINGWALLS
-W1- & -W2-

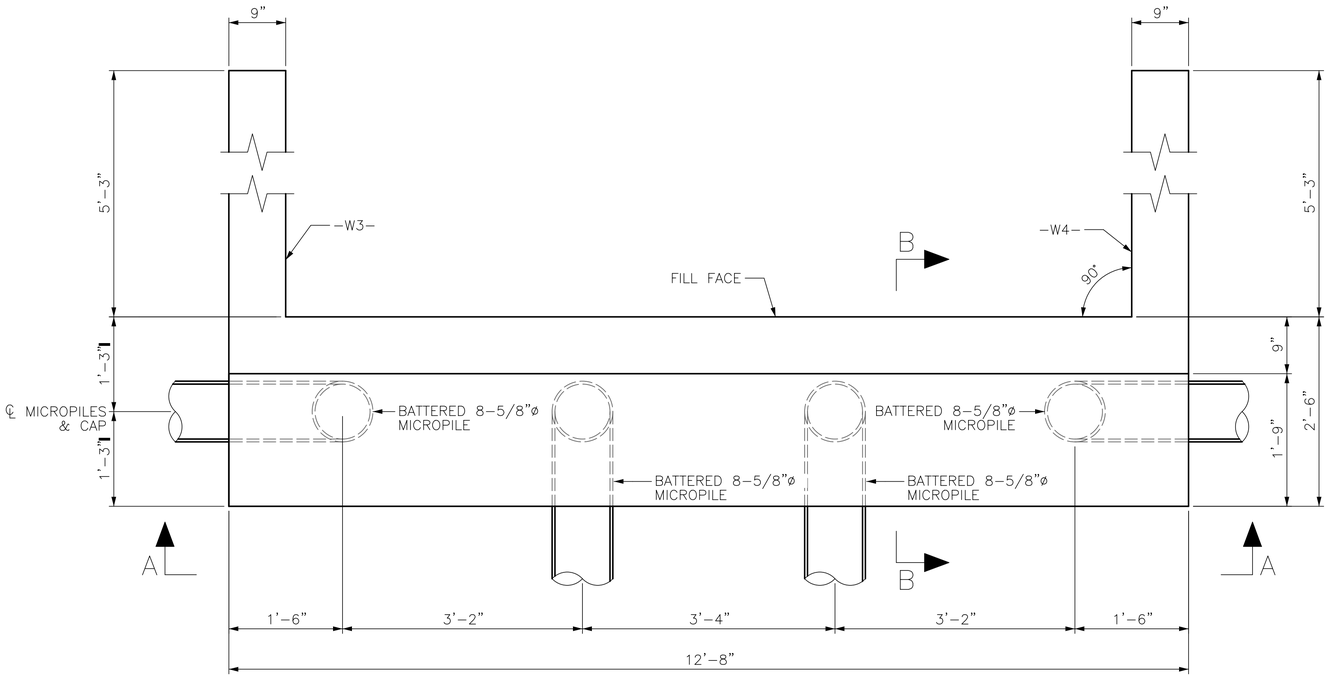
REVISIONS:

SHEET NO.

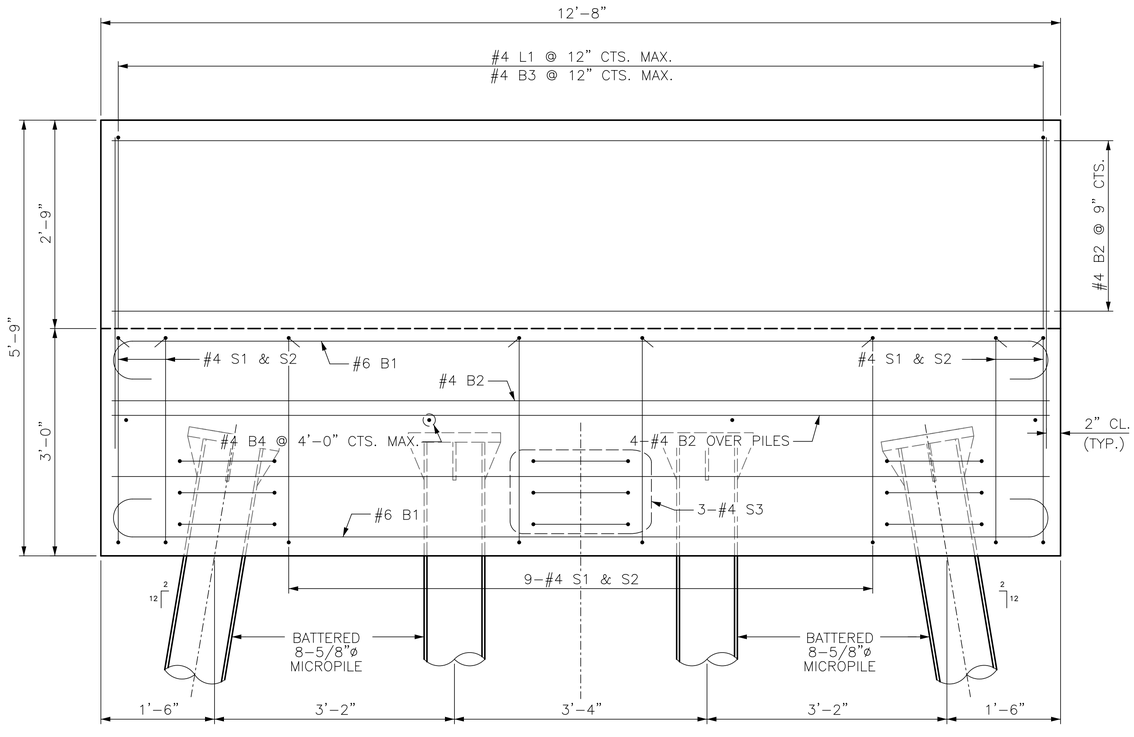
S-5

TOTAL SHEETS

8

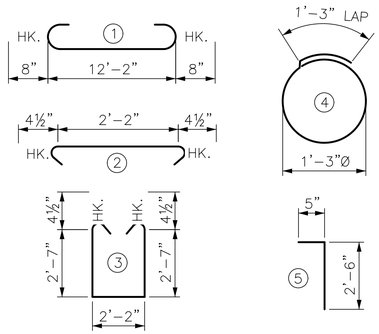


PLAN



ELEVATION (A-A)

BAR TYPES



BILL OF MATERIAL (END BENT 2)

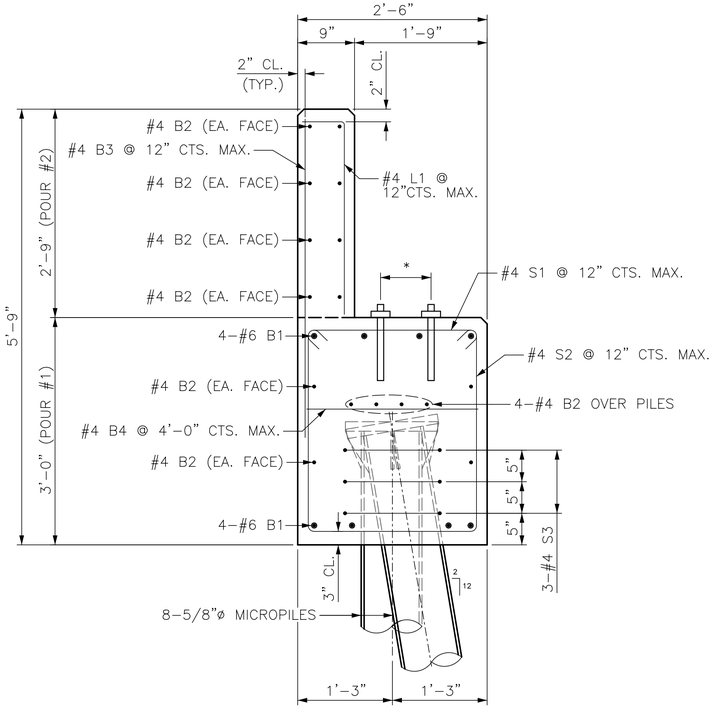
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#6	1	13'-6"	162
B2	16	#4	STR	12'-4"	132
B3	14	#4	STR	4'-2"	39
B4	4	#4	STR	2'-2"	6
S1	13	#4	2	2'-11"	25
S2	13	#4	3	8'-1"	70
S3	12	#4	4	5'-2"	41
L1	14	#4	5	2'-11"	27

REINFORCING STEEL (FOR END BENT 2) 503 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT 2)

POUR #1 (CAP & LOWER WINGS)	4.39 C.Y.
POUR #2 (BACKWALL & UPPER WINGS)	1.77 C.Y.
TOTAL CLASS A CONCRETE	6.16 C.Y.

"*" DIMENSIONS PROVIDED BY FABRICATOR OR PREMANUFACTURED PREDESTRIAN BRIDGE.



SECTION (B-B)

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SHEET CONTENTS

END BENT 2

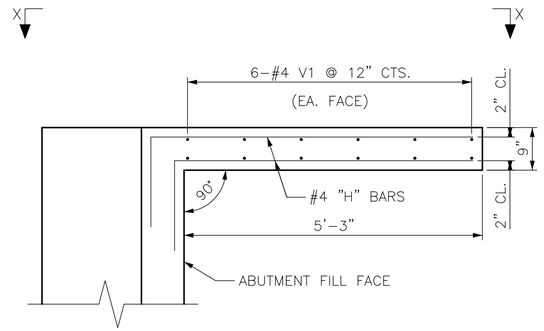
REVISIONS:

SHEET NO.

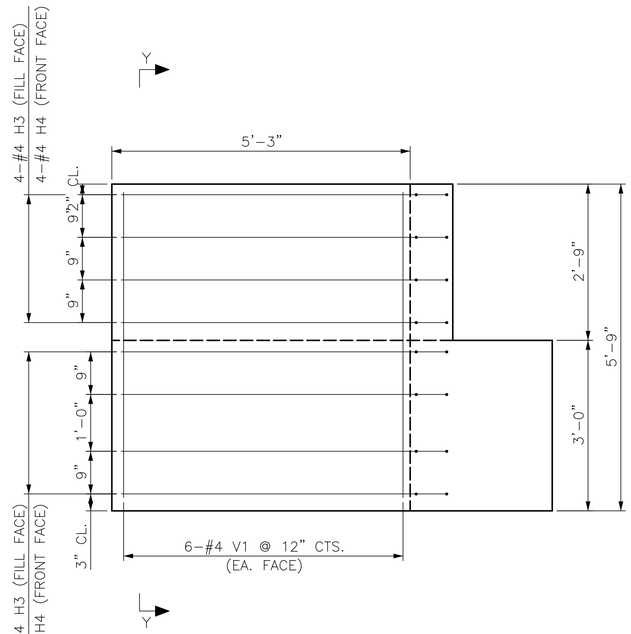
S-6

TOTAL SHEETS

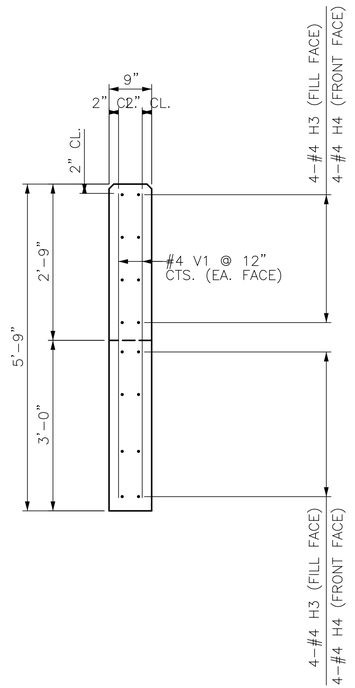
8



–W3– PLAN



–W3– ELEVATION (X–X)

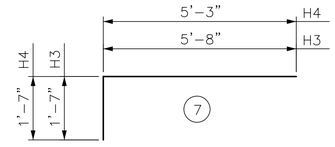


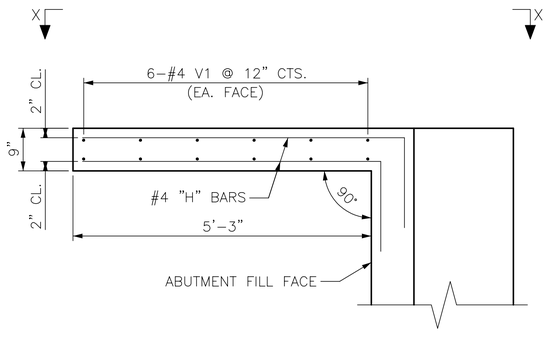
–W3– SECTION Y–Y)

BILL OF MATERIAL (–W3–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W3–)					118 LBS.

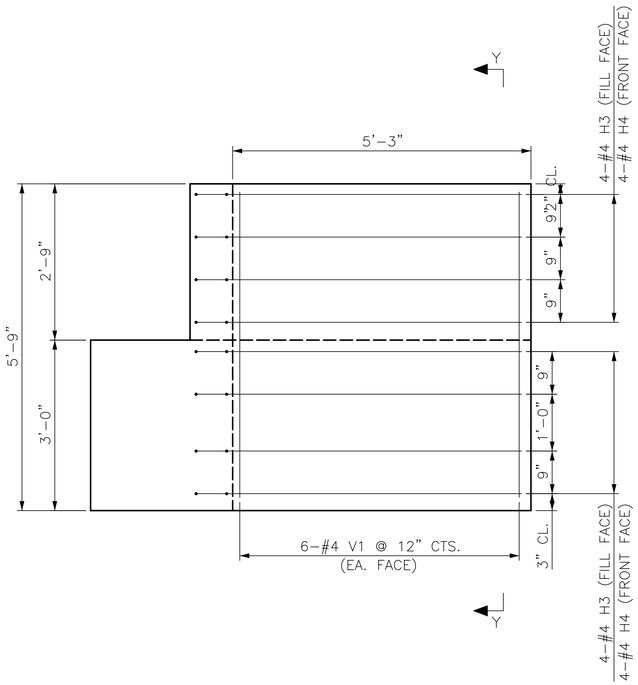
NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES

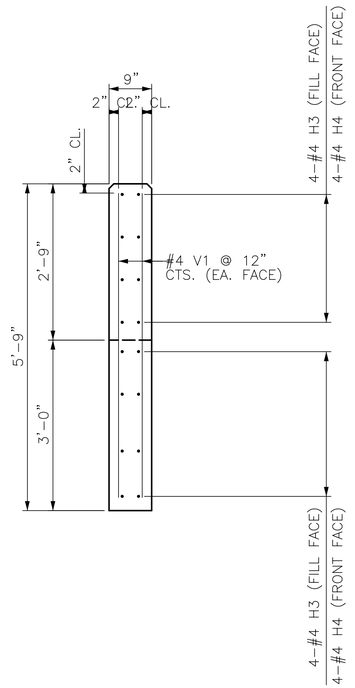




–W4– PLAN



–W4– ELEVATION (X–X)



–W4– SECTION (Y–Y)

BILL OF MATERIAL (–W4–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W4–)					118 LBS.

NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES

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NORTH CAROLINA PROFESSIONAL
02/06/26
SEAL
057706
ENGINEER
WILL HOLLIFIELD

MFG SECTION 3 ABUTMENT DESIGN (UPSTREAM BRIDGE)
FOR
INTERFACE ENVIRONMENTAL CONSULTING, LLC
AT
LAT: 36.1591667, LONG: –81.645277

DATE	
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CHECK BY	AGF
EOR	WMH
PROJECT NO.	53999

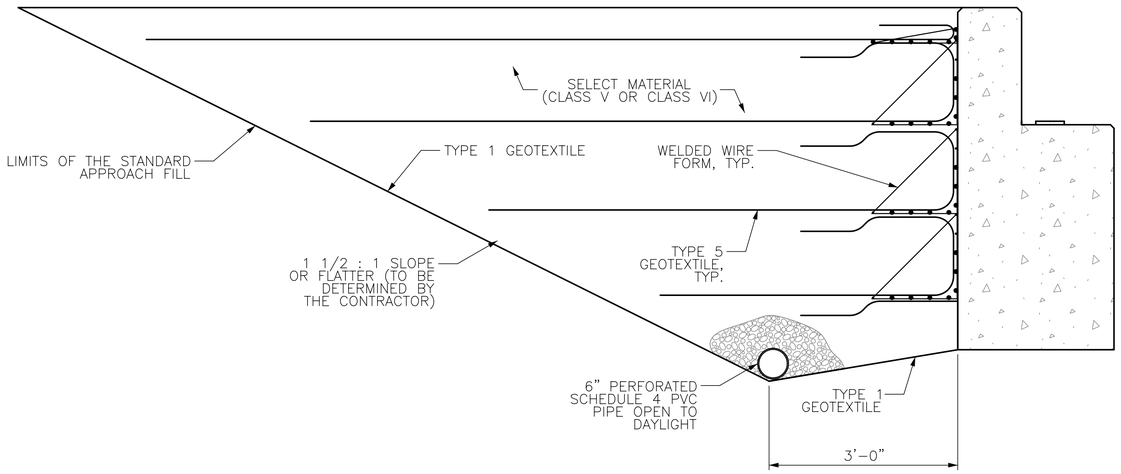
SHEET CONTENTS

WINGWALLS
–W3– & –W4–

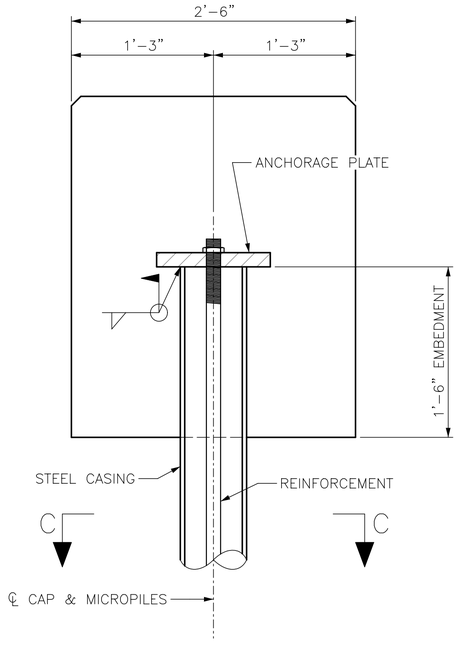
REVISIONS:

SHEET NO.
S–7

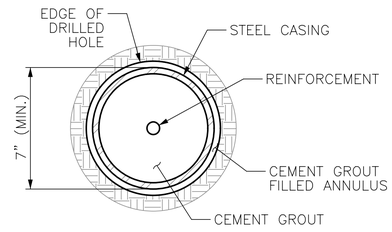
TOTAL SHEETS
8



APPROACH FILL DETAIL



TYP.MICROPILE ANCHORAGE DETAIL



TYP. MICROPILE DETAIL (SECTION C-C)

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SHEET CONTENTS

ADDITIONAL DETAILS

REVISIONS:

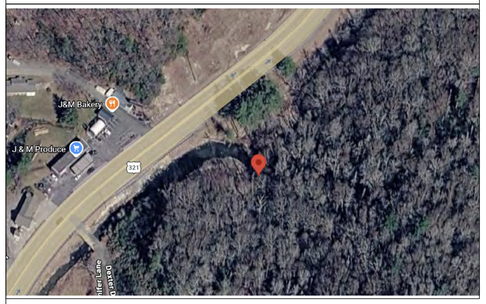
SHEET NO.

S-8

TOTAL SHEETS

8

VICINITY MAP



ABBREVIATIONS

A	AREA
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ADH.	ADHESIVE
AGG.	AGGREGATE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALT.	ALTERNATE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPRH.	APPROACH
APPROX.	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
BOT.	BOTTOM
BRG.	BEARING
CTS.	CENTERS
CIPL	CAST IN PLACE
C/L	CENTERLINE
CON.	CONNECTION
CONC.	CONCRETE
COORD.	COORDINATE
DGN.	DESIGN
DIM.	DIMENSION
DWG.	DRAWING
EA.	EACH
EL.	ELEVATION
ENGR.	ENGINEER
EXIST.	EXISTING
F TO F	FACE TO FACE
FDN.	FOUNDATION
FT.	FEET
GALV.	GALVANIZED
GR.	GRADE
HORIZ.	HORIZONTAL
IN.	INCH
LB.	POUND
LONG.	LONGITUDINAL
MAX.	MAXIMUM
MIN.	MINIMUM
O/C	ON CENTER
OD	OUTSIDE DIAMETER
PAR.	PARALLEL
PVC	POLYVINYL CHLORIDE
REINF.	REINFORCEMENT
SCH.	SCHEDULE
STD.	STANDARD
STL.	STEEL
STR.	STRUCTURE
W.W.F.	WELDED WIRE FABRIC

SHEET INDEX

ARETÉ ENGINEERS

MIDDLEFORK GREENWAY SECTION 3

DOWNSTREAM BRIDGE ABUTMENT DESIGN

TYPE OF WORK: STRUCTURE

DESIGN DATA:

SPECIFICATIONS — A.A.S.H.T.O. GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES, DECEMBER 2009

A.A.S.H.T.O LRFD BRIDGE DESIGN SPECIFICATIONS

LIVE LOAD	90 PSF PEDESTRIAN LOAD
IMPACT ALLOWANCE	N/A
STRESS IN EXTREME FIBER OF STRUCUTRAL STEEL – AASHTO M270 GRADE 36	36,000 LBS. PER SQ. IN.
– AASHTO M270 GRADE 50W	50,000 LBS. PER SQ. IN.
– AASHTO M270 GRADE 50	50,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION – GRADE 60	60,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	3,000 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER – TREATED OR UNTREATED EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	60 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS: AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP. CONCRETE SHALL BE CURED IN COMPLIANCE WITH NCDOT SPECIFICATIONS.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1–1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS, UNLESS OTHERWISE NOTES, SHALL BE EMBEDDED A MINIMUM OF 6" INTO EXISITNG CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

CONSTRUCTION SEQUENCE:

PLACE BACKFILL IN ACCORDANCE WITH NCDOT SPECIFICATIONS. PLACE BACKFILL ABOVE THE BEARING SEAT AFTER THE PREFABRICATED FRP BRIDGE IS SET ON THE END BENTS.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACE IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

LAP SPLICES SHALL BE A MINIMUM LENGTH OF 40 X DIAMETER OF BAR.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HERON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON THE PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CHAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CHAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CHAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

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MFG SECTION 3 ABUTMENT DESIGN (DOWNSTREAM BRIDGE)
FOR
INTERFACE ENVIRONMENTAL CONSULTING, LLC
AT
LAT: 36.160833, LONG: –81.644166

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EOR	WMH
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SHEET CONTENTS

COVER SHEET / STANDARD NOTES

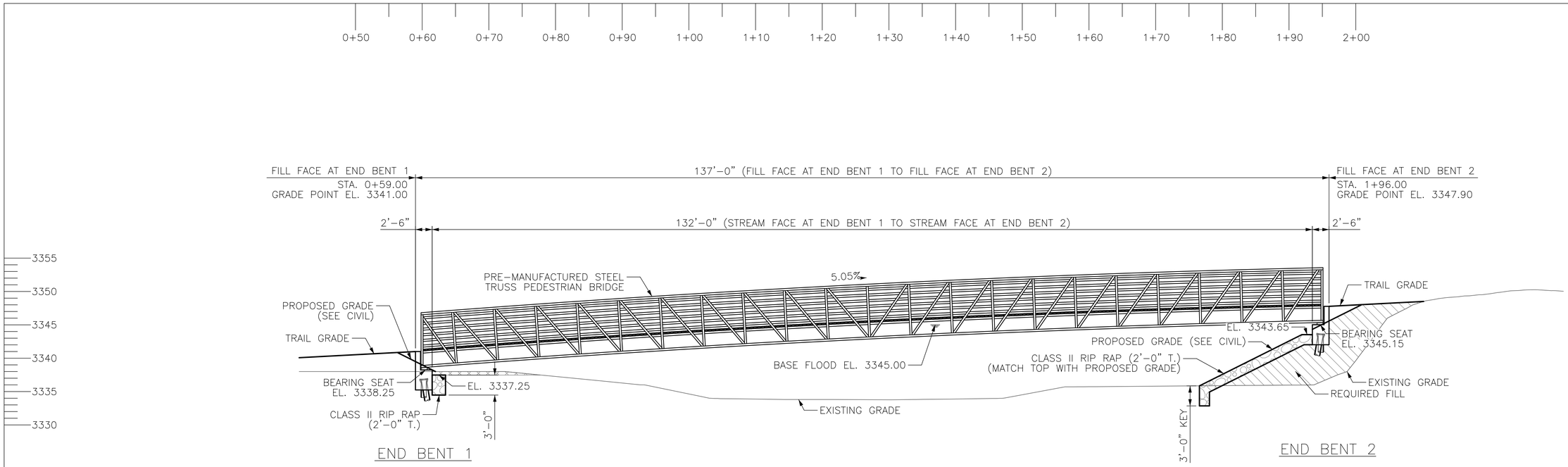
REVISIONS:

SHEET NO.

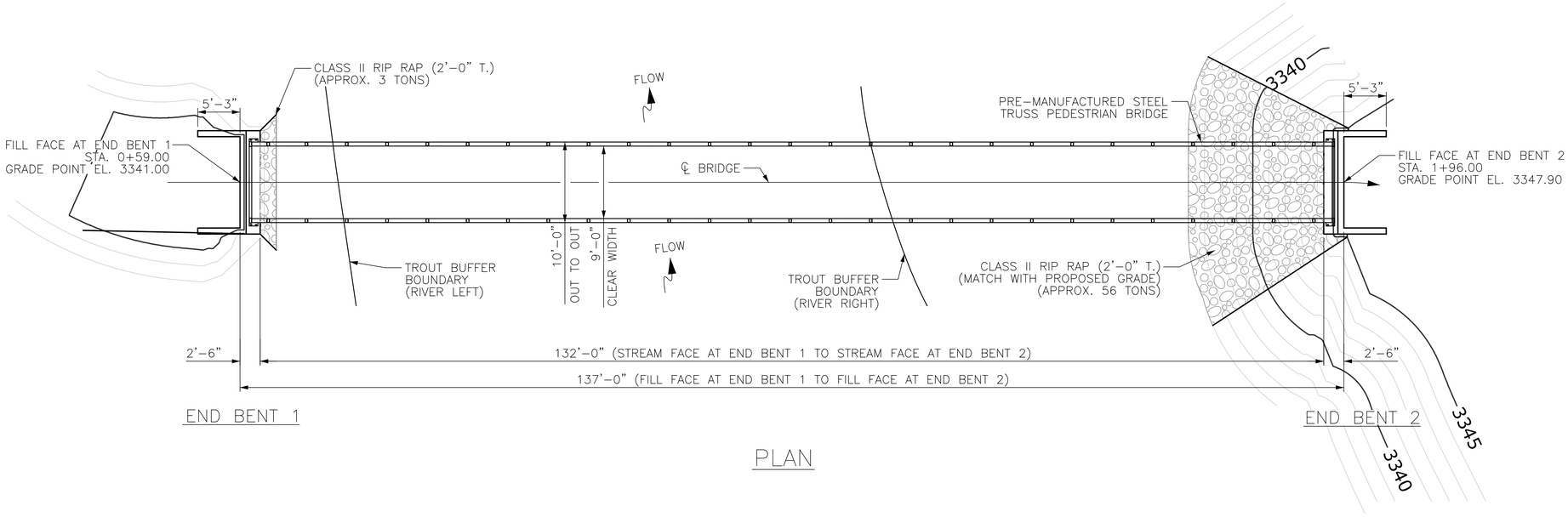
S–1

TOTAL SHEETS

8



SECTION ALONG CENTERLINE OF BRIDGE



PLAN

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SHEET CONTENTS

BRIDGE ELEVATION & PLAN

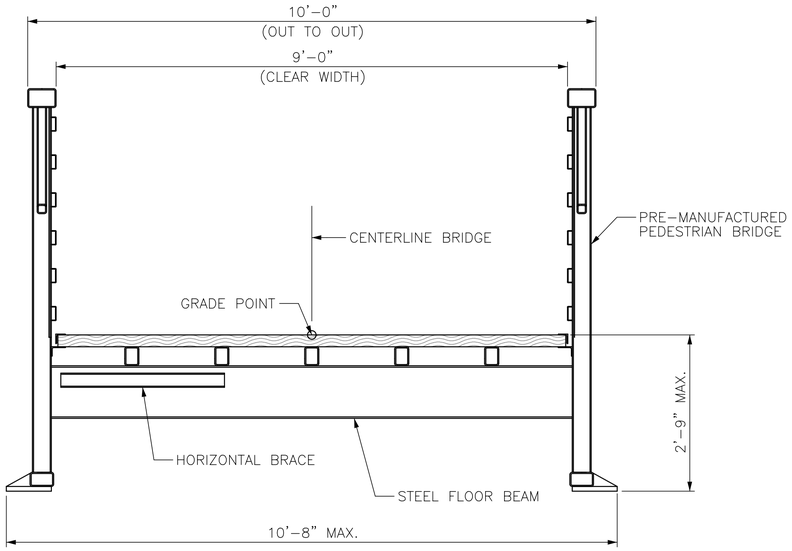
REVISIONS:

SHEET NO.

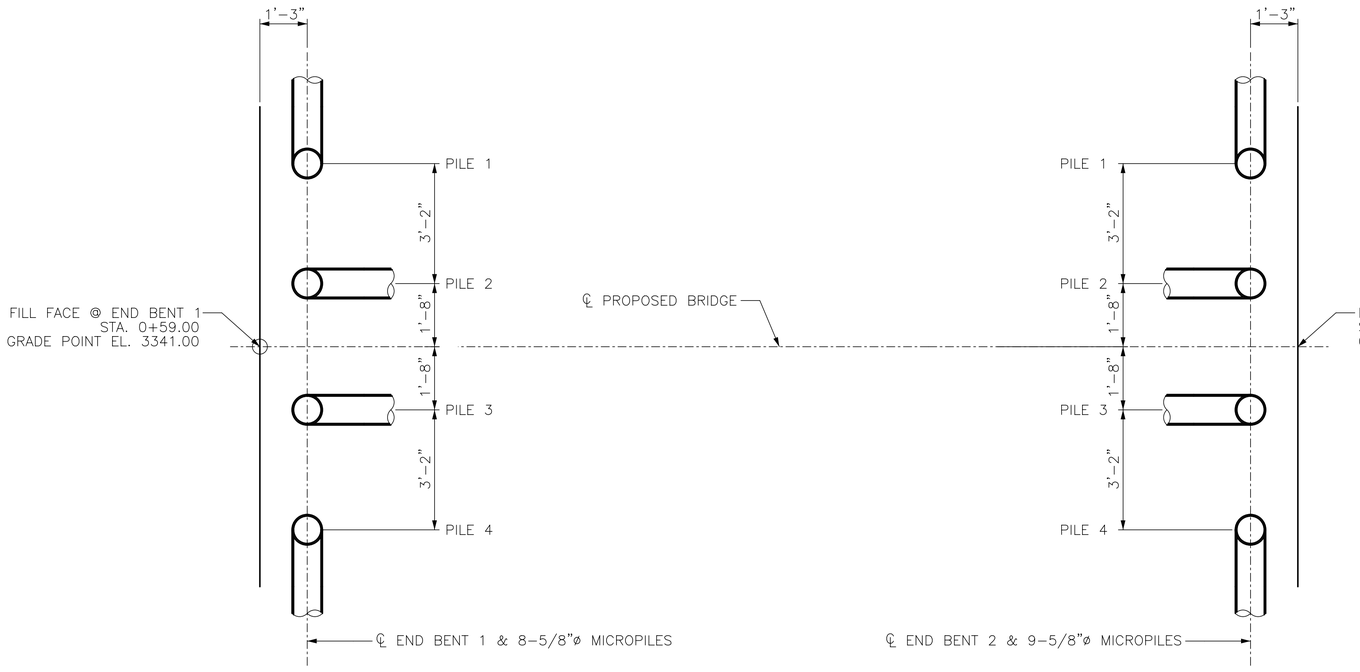
S–2

TOTAL SHEETS

8



TYPICAL SECTION (PRE-MANUFACTURED BRIDGE)



END BENT 1 END BENT 2

FOUNDATION LAYOUT

BEGIN STATION (FILL FACE)	END STATION (FILL FACE)	BACKWALL WIDTH	END CLEARANCE	GRADE	HORIZONTAL BRIDGE LENGTH (PLAN LENGTH)
0+59.00	1+96.00	9"	2"	+5.05%	135'-2"

PREMANUFACTERED PEDESTRIAN BRIDGE NOTES

1. BRIDGE LOADING & GEOMETRY IS ESTIMATED. AFTER SHOP DRAWINGS FOR THE PREMANUFACTURED PEDESTRIAN BRIDGE ARE SUBMITTED, CONSTRUCTION ADMINISTRATOR SHALL FORWARD SHOP DRAWINGS TO ARETÉ ENGINEERS FOR VERIFICATION THAT THE SUBSTRUCTURE CAN SUPPORT CALCULATED BRIDGE LOADS.
2. PREMANUFACTURED PEDESTRIAN BRIDGE DESIGN PER AASHTO LRFD GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES (LATEST EDITION)
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. FABRICATOR OF PREMANUFACTURED PEDESTRIAN BRIDGE SHALL INDICATE THE LOCATION OF DRAINAGE HOLES FOR THE BRIDGE TUBULAR MEMBERS IN THE SHOP DRAWINGS.
5. FOR ADDITIONAL INFORMATION, SEE SPECIAL PROVISIONS.
6. FABRICATOR OF PREMANUFACTURED PEDESTRIAN BRIDGE MUST MAINTAIN THE MAX. BACKWALL HEIGHT AS SHOWN IN THE PLANS.
7. FABRICATOR OF PREMANUFACTURED PREDESTRIAN BRUDGE INCLUDE BACKWALL COVER PLATE FOR EXPANSION.

MICROPILE NOTES:

1. FOR MICROPILE INFORMATION AND OTHER SUBSTRUCTURE DESIGN CONSIDERATIONS, SEE STAMPED GEOTECHNICAL REPORT.
2. MINIMUM BOND LENGTH OF 10 FEET IS REQUIRED FOR ALL PILES AT END BENTS 1 AND 2.
3. PENETRATION OF AT LEAST 5 FEET INTO WEATHERED ROCK OR CRYSTALLINE ROCK IS REQUIRED FOR REINFORCEMENT CASINGS.
4. USE REINFORCEMENT CASINGS WITH YIELD STRENGTHS OF AT LEAST 80 KSI AND A MINIMUM WALL THICKNESS OF 0.5" FOR ALL MICROPILES.
5. BATTERED MICROPILES AT ALL LOCATIONS ARE TO BE BATTERED AT 2:12.
6. MICROPILES ARE TYPICALLY DESIGNED BY THE MICROPILE DRILLING CONTRACTOR BASED ON THEIR AVAILABLE DRILLING EQUIPMENT AND MATERIAL AVAILABILITY. MICROPILES SHOULD BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH APPLICABLE SECTIONS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, LATEST EDITION AND FHWA NHI-05-039 MICROPILE DESIGN AND CONSTRUCTION REFERENCE MANUAL. A LOAD TESTING PROGRAM THAT INCLUDES BOTH PRE-PRODUCTION VERIFICATION TESTING AND PRODUCTION PROOF TESTING IS REQUIRED. LOAD TESTING CRITERIA SHOULD FOLLOW RECOMMENDATIONS OUTLINES IN FHWA NH-05-039.
7. DEVIATION FROM PIPE SIZE AND ROD DIAMETER MUST BE APPROVED BY ENGINEER OF RECORD UPON RECEIPT OF SUBMITTALS.

SUMMARY OF MICROPILE INFORMATION/INSTALLATION

EB1	CASING O.D. (IN)	MIN. REINFORCEMENT BAR	ANTICIPATED BEDROCK EL. (FT)	FACTORED RESISTANCE PER PILE (KIPS)	UPLIFT RESISTANCE (KIPS)
PILE 1-4	8.625	#11	3321	150	80
EB2	CASING O.D. (IN)	MIN. REINFORCEMENT BAR	ANTICIPATED BEDROCK EL. (FT)	FACTORED RESISTANCE PER PILE (KIPS)	UPLIFT RESISTANCE (KIPS)
PILE 1-4	9.625	#11	3316	150	80

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SHEET CONTENTS

BRIDGE CROSS SECTION / FOUNDATION LAYOUT

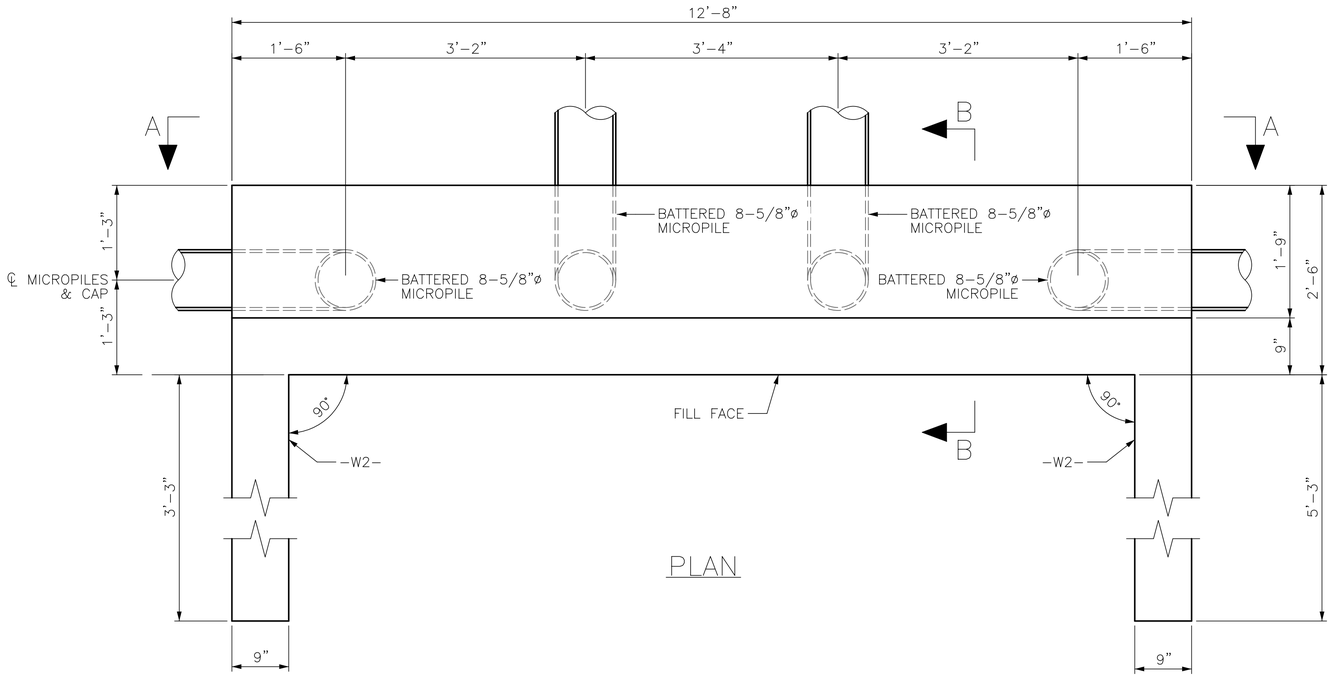
REVISIONS:

SHEET NO.

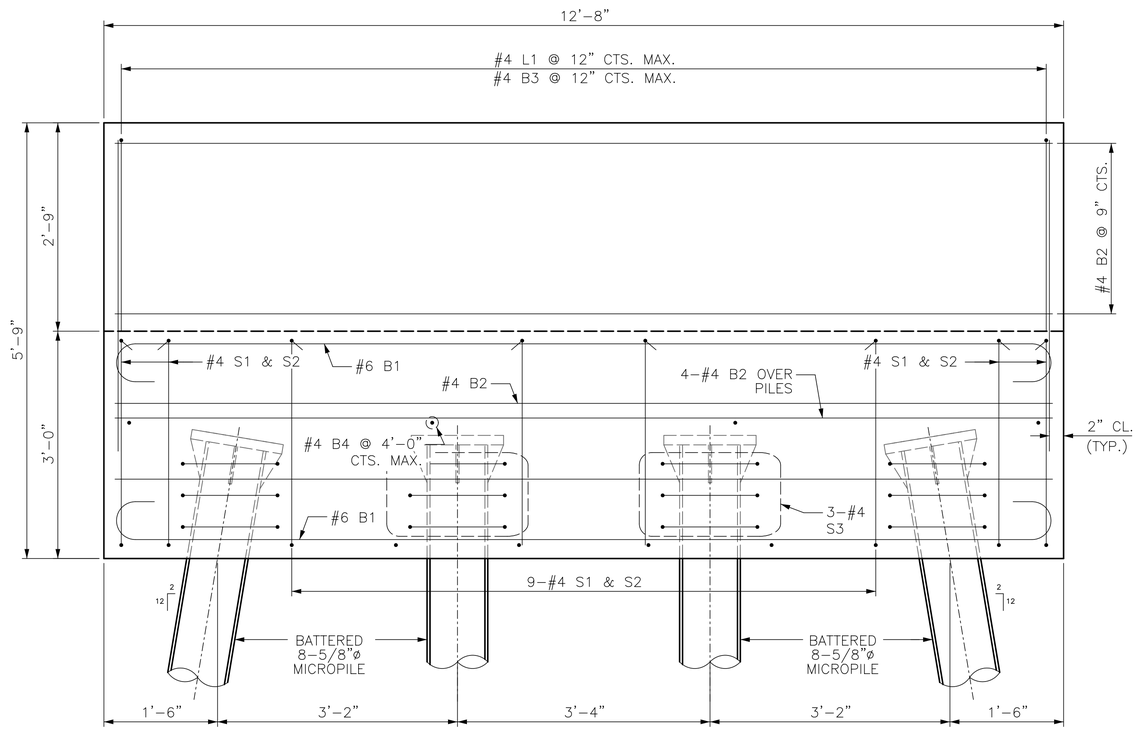
S-3

TOTAL SHEETS

8

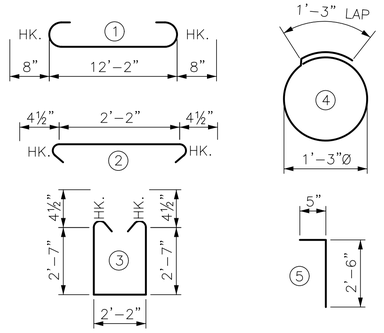


PLAN



ELEVATION (A-A)

BAR TYPES



BILL OF MATERIAL (END BENT 1)

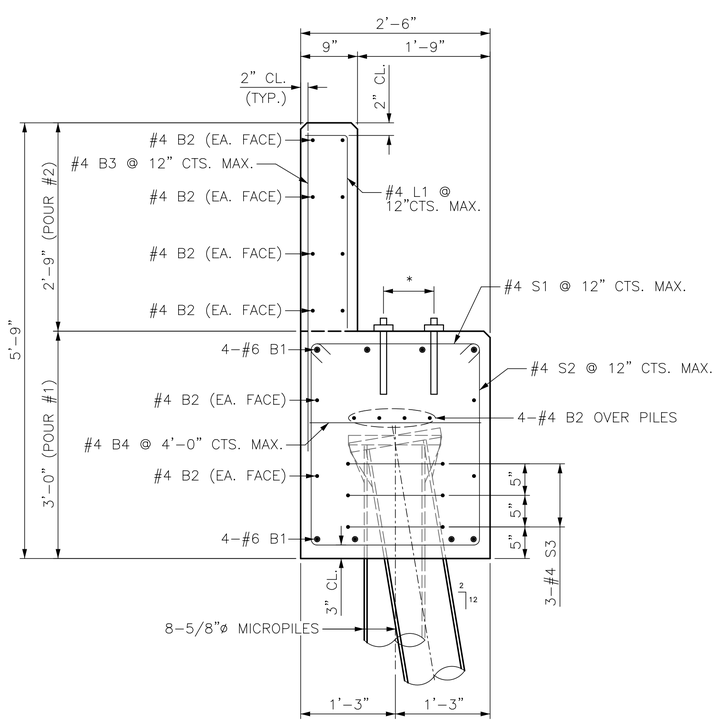
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#6	1	13'-6"	162
B2	16	#4	STR	12'-4"	132
B3	14	#4	STR	4'-2"	39
B4	4	#4	STR	2'-2"	6
S1	13	#4	2	2'-11"	25
S2	13	#4	3	8'-1"	70
S3	12	#4	4	5'-2"	41
L1	14	#4	5	2'-11"	27

REINFORCING STEEL (FOR END BENT 1) 503 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT 1)

POUR #1 (CAP & LOWER WINGS)	4.23 C.Y.
POUR #2 (BACKWALL & UPPER WINGS)	1.62 C.Y.
TOTAL CLASS A CONCRETE	5.85 C.Y.

"*" DIMENSIONS PROVIDED BY FABRICATOR OR PREMANUFACTURED PREDESTRIAN BRIDGE.



SECTION (B-B)

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SHEET CONTENTS

END BENT 1

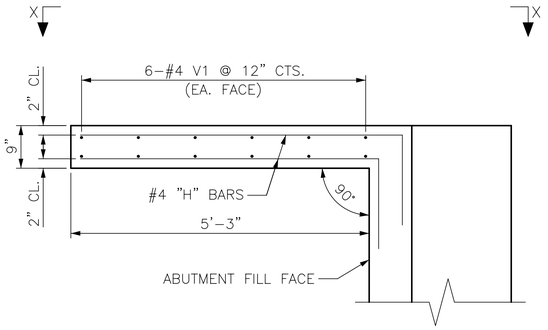
REVISIONS:

SHEET NO.

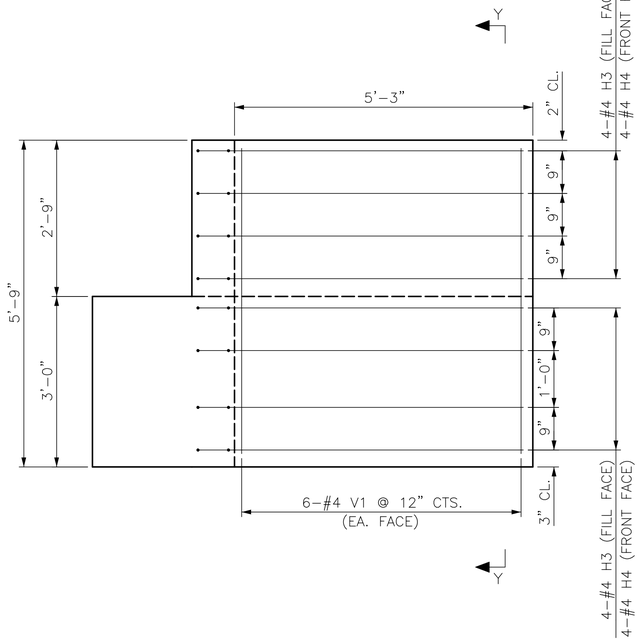
S-4

TOTAL SHEETS

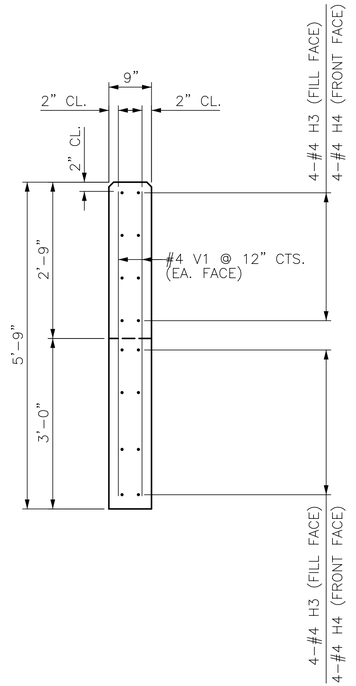
8



–W1– PLAN



–W1– ELEVATION (X–X)

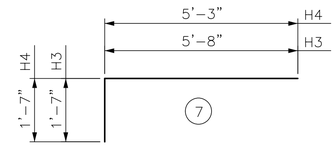


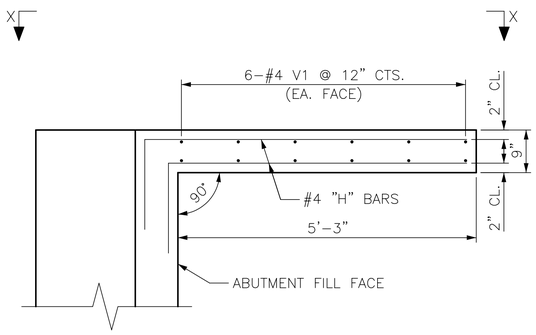
–W1– SECTION Y–Y)

BILL OF MATERIAL (–W4–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W4–)					118 LBS.

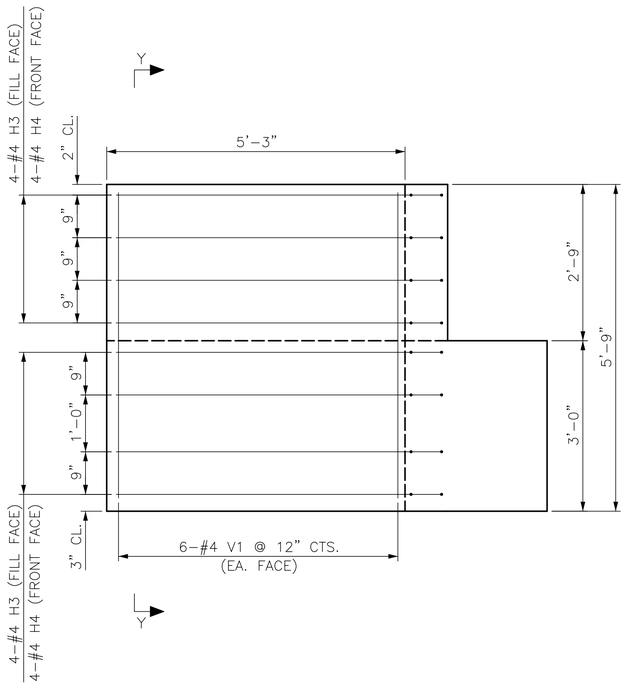
NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES

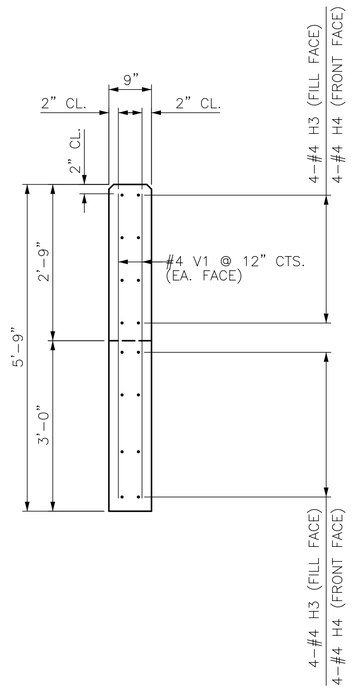




–W2– PLAN



–W2– ELEVATION (X–X)

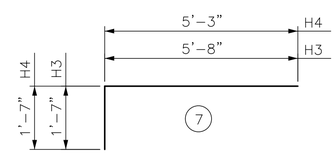


–W2– SECTION Y–Y)

BILL OF MATERIAL (–W3–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W3–)					118 LBS.

NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES



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FIRM LICENSE No. P–1357

NORTH CAROLINA PROFESSIONAL 02/06/26 SEAL 057706 ENGINEER WILL HOLLIFIELD

MFG SECTION 3 ABUTMENT DESIGN (DOWNSTREAM BRIDGE)
FOR
INTERFACE ENVIRONMENTAL CONSULTING, LLC
AT
LAT: 36.160833, LONG: –81.644166

DATE	
DRAWN BY	WMH
CHECK BY	AGF
EOR	WMH
PROJECT NO.	53999

SHEET CONTENTS

WINGWALLS
–W1– & –W2–

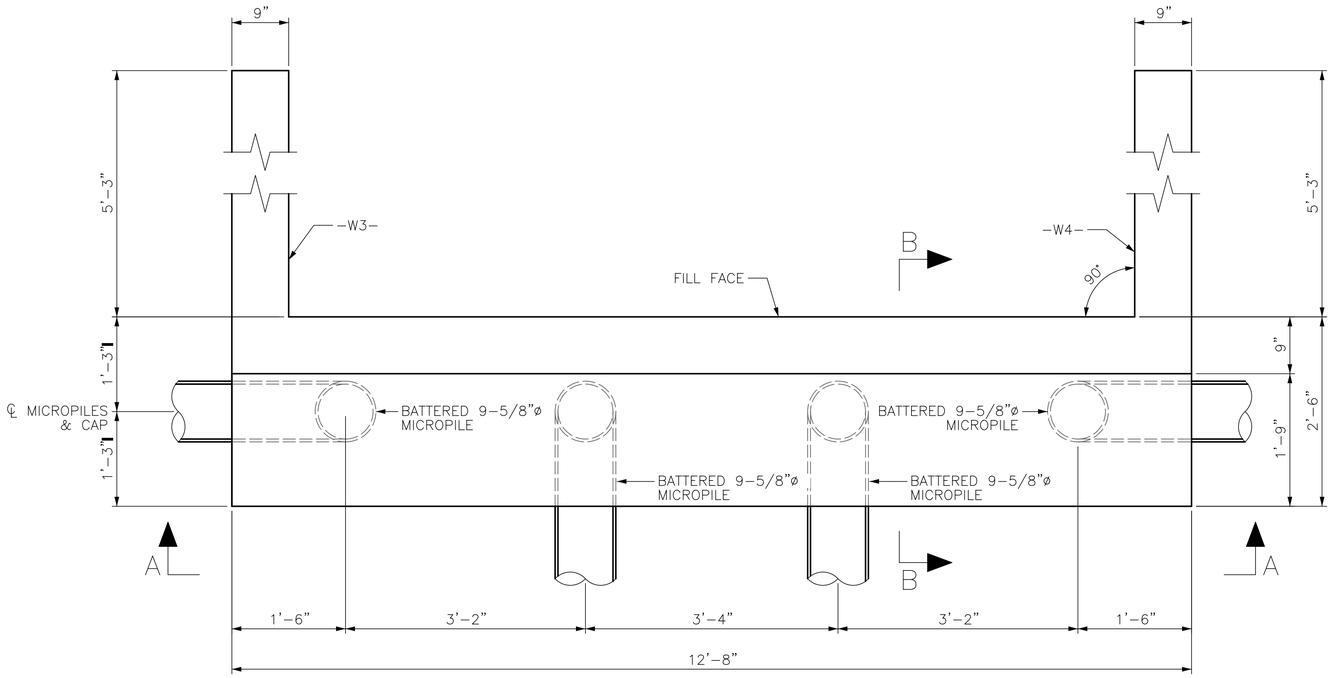
REVISIONS:

SHEET NO.

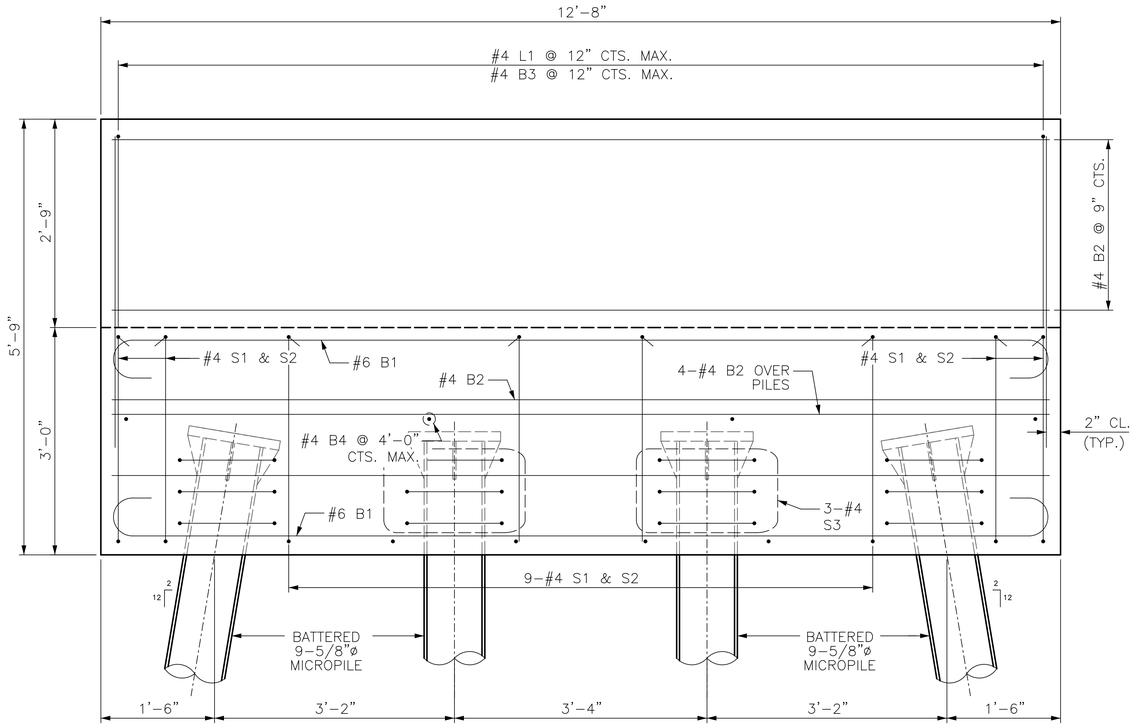
S–5

TOTAL SHEETS

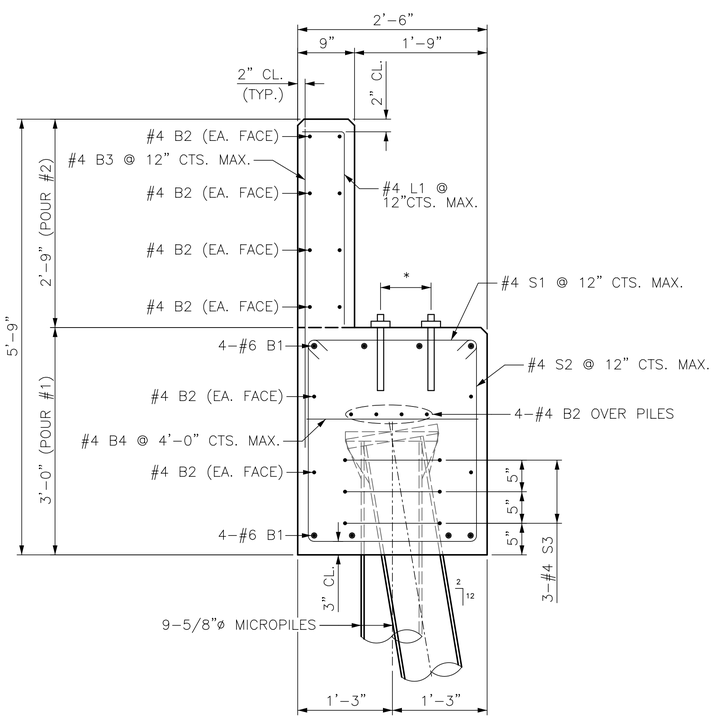
8



PLAN

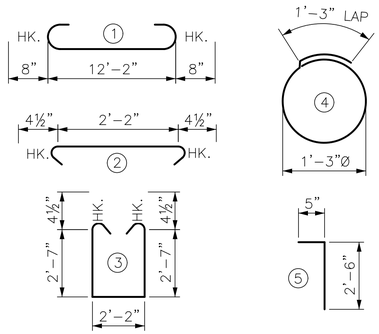


ELEVATION (A-A)



SECTION (B-B)

BAR TYPES



BILL OF MATERIAL (END BENT 2)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#6	1	13'-6"	162
B2	16	#4	STR	12'-4"	132
B3	14	#4	STR	4'-2"	39
B4	4	#4	STR	2'-2"	6
S1	13	#4	2	2'-11"	25
S2	13	#4	3	8'-1"	70
S3	12	#4	4	5'-2"	41
L1	14	#4	5	2'-11"	27

REINFORCING STEEL (FOR END BENT 2) 503 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT 2)

POUR #1 (CAP & LOWER WINGS)	4.39 C.Y.
POUR #2 (BACKWALL & UPPER WINGS)	1.77 C.Y.
TOTAL CLASS A CONCRETE	6.16 C.Y.

"*" DIMENSIONS PROVIDED BY FABRICATOR OR PREMANUFACTURED PREDESTRIAN BRIDGE.

Aretē ENGINEERS
ARETÉ ENGINEERS, PLLC
7668 Valley Blvd.
Ste. 104-242
Blowing Rock, NC 28605
FIRM LICENSE No. P-1357

NORTH CAROLINA PROFESSIONAL 02/06/26 SEAL 057706 ENGINEER WILL HOLLIFIELD

MFG SECTION 3 ABUTMENT DESIGN (DOWNSTREAM BRIDGE)
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PROJECT NO.	53999

SHEET CONTENTS

END BENT 2

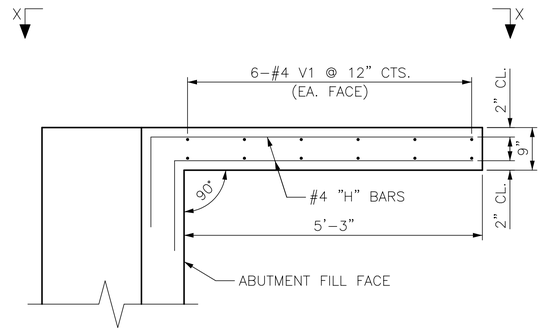
REVISIONS:

SHEET NO.

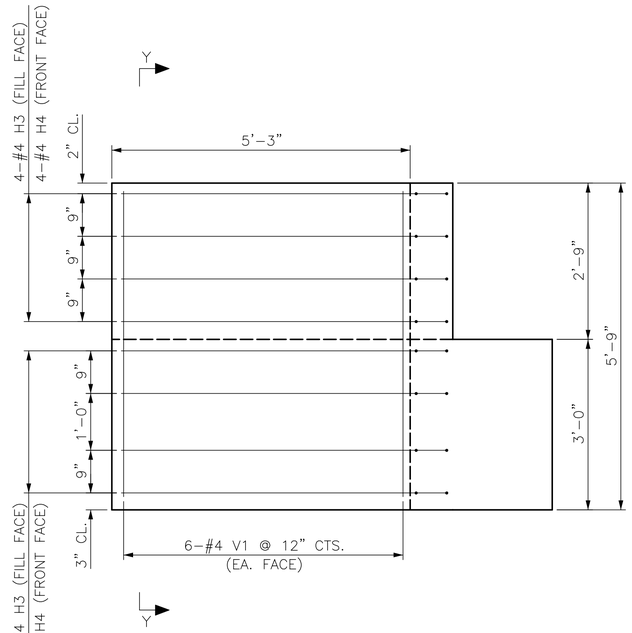
S-6

TOTAL SHEETS

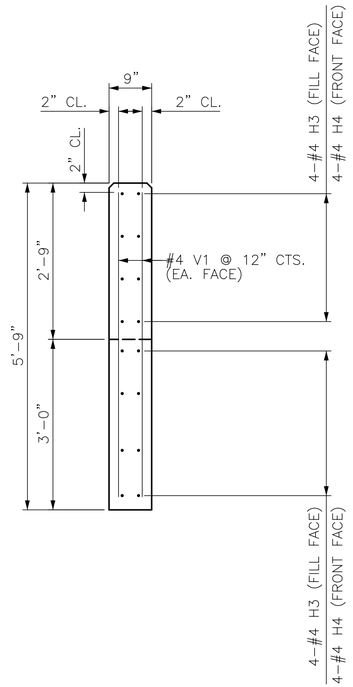
8



–W3– PLAN



–W3– ELEVATION (X–X)

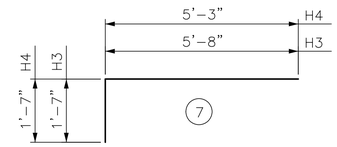


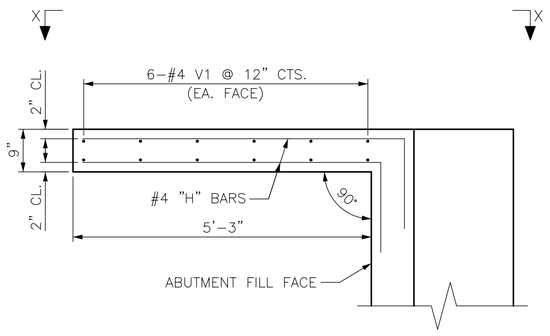
–W3– SECTION Y–Y)

BILL OF MATERIAL (–W3–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W3–)					118 LBS.

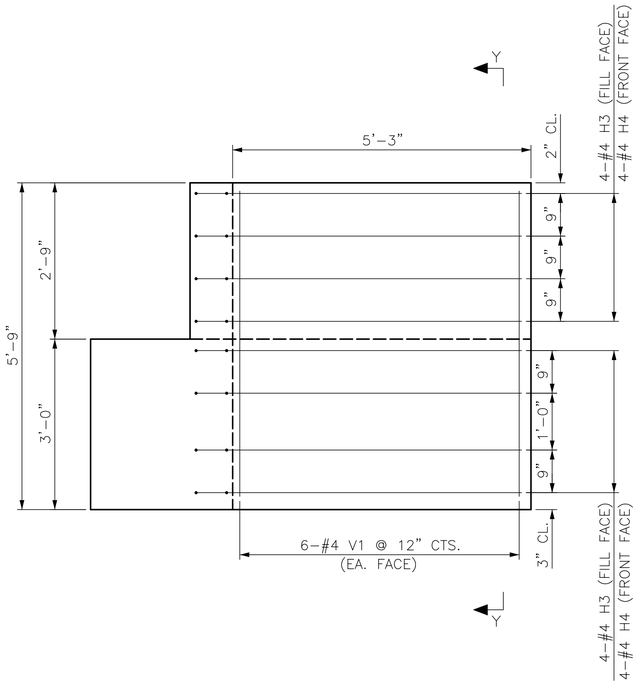
NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES

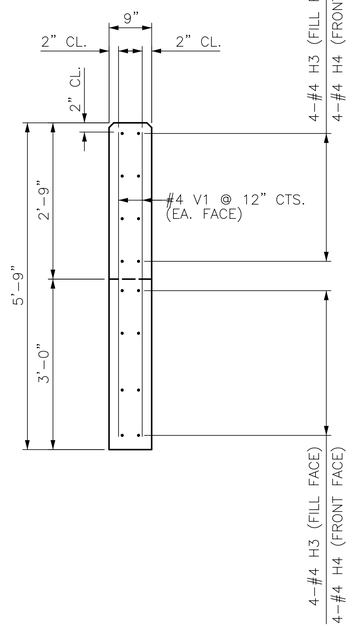




–W4– PLAN



–W4– ELEVATION (X–X)

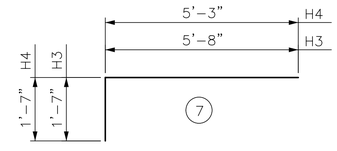


–W4– SECTION Y–Y)

BILL OF MATERIAL (–W4–)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H3	8	#4	7	7'–3"	39
H4	8	#4	7	6'–10"	37
V1	12	#4	STR	5'–4"	43
REINFORCING STEEL (FOR –W4–)					118 LBS.

NOTE: WINGWALL CLASS A CONCRETE QUANTITIES INCLUDED IN END BENT QUANTITIES.

BAR TYPES



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Blowing Rock, NC 28605
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NORTH CAROLINA PROFESSIONAL SEAL 057706 ENGINEER WILL HOLLIFIELD 02/06/26

MFG SECTION 3 ABUTMENT DESIGN (DOWNSTREAM BRIDGE)
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INTERFACE ENVIRONMENTAL CONSULTING, LLC
AT
LAT: 36.160833, LONG: –81.644166

DATE	
DRAWN BY	WMH
CHECK BY	AGF
EOR	WMH
PROJECT NO.	53999

SHEET CONTENTS

WINGWALLS
–W3– & –W4–

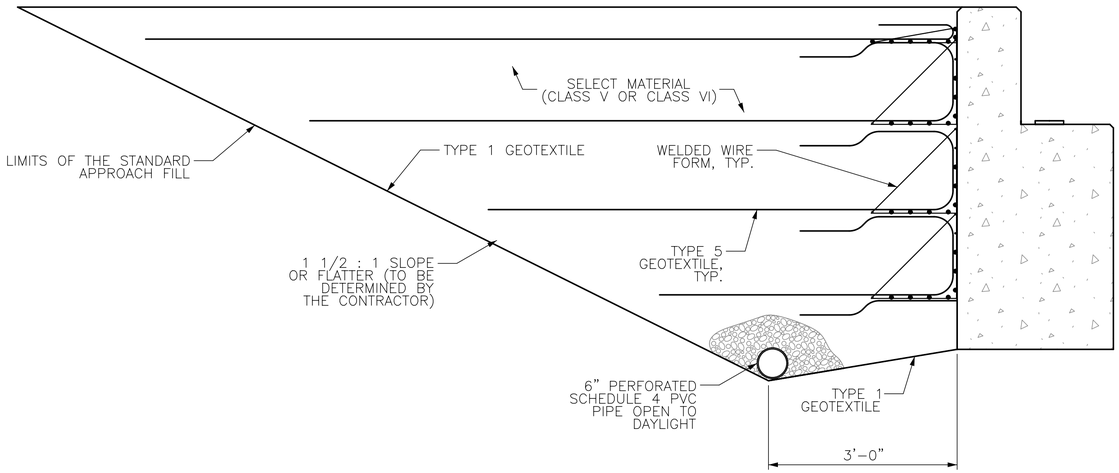
REVISIONS:

SHEET NO.

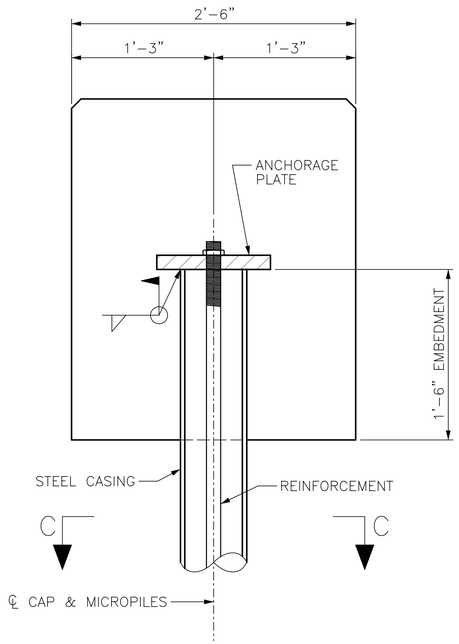
S–7

TOTAL SHEETS

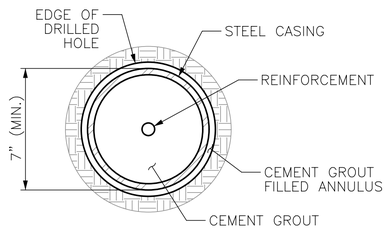
8



APPROACH FILL DETAIL



TYP. MICROPILE ANCHORAGE DETAIL



TYP. MICROPILE DETAIL (SECTION C-C)

Areté ENGINEERS
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7668 Valley Blvd.
PO Box 743
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FIRM LICENSE No. P-1357

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 057706 WILL HOLLIFIELD 02/06/26

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DATE	
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CHECK BY	AGF
EOR	WMH
PROJECT NO.	53999

SHEET CONTENTS

ADDITIONAL DETAILS

REVISIONS:

SHEET NO.

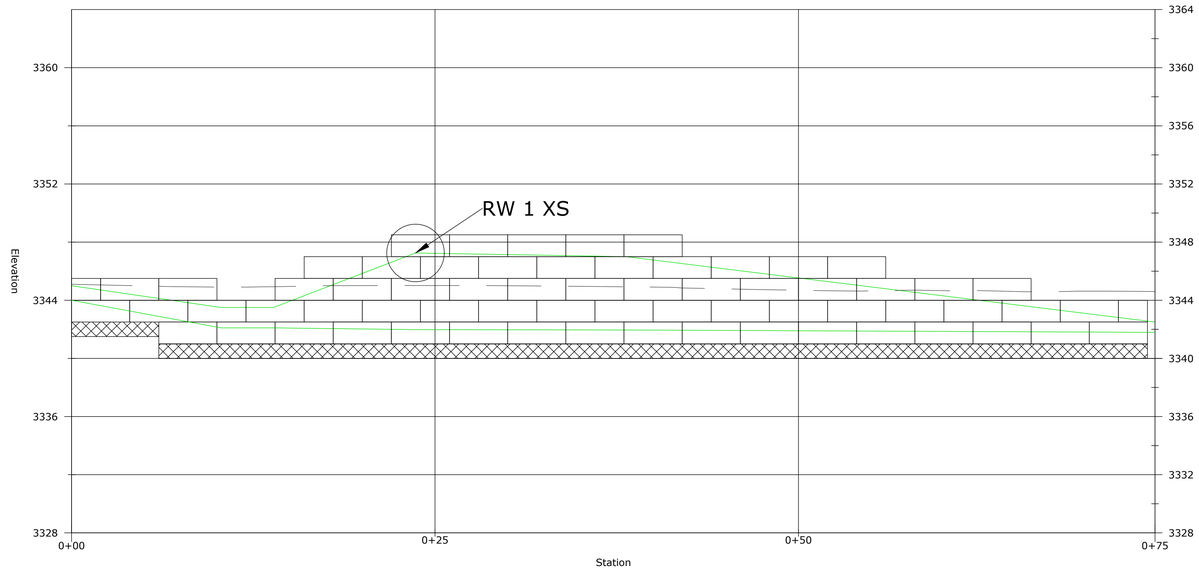
S-8

TOTAL SHEETS

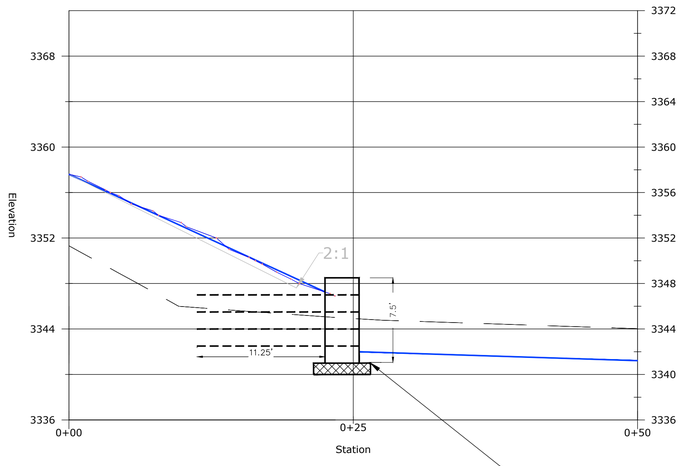
8

EXISTING GROUND
PROPOSED WALL

RETAINING WALL 1
LONGITUDINAL PROFILE



RETAINING WALL 1



EXISTING GROUND
PROPOSED GROUND
PROPOSED WALL

BOTTOM OF 1ST COURSE = 1' BELOW GRADE.
12" COMPACTED ABC FOUNDATION, EXTENDING 12" BEYOND EACH SIDE OF BLOCK.

NOTES:
1. USE 12" OF COMPACTED ABC GRAVEL FOR A BASE; SUBGRADE MUST HAVE A MINIMUM OF 2,500psf BEARING CAPACITY
2. BOTTOM OF FIRST BLOCK TO BE 12" BELOW GRADE
3. USE WIDER BLOCKS FOR THE FIRST 4 COURSES
4. USE CAP BLOCK FOR TOP COURSE
5. GEOGRID LENGTH TO BE 1.5 x WALL HEIGHT
6. START FILL SLOPE 12" DOWN FROM THE BACK OF CAP BLOCK

SOLID ROCK ENGINEERING ™

PREPARED BY:
SOLID ROCK ENGINEERING, PLLC
577 GEORGE WILSON ROAD, SUITE 5
BOONE, NC 28607
828-303-6120

NORTH CAROLINA PROFESSIONAL ENGINEER 50450 JEFFREY D. HOLCHIN
5-5-25

PREPARED FOR: BLUE RIDGE CONSERVANCY

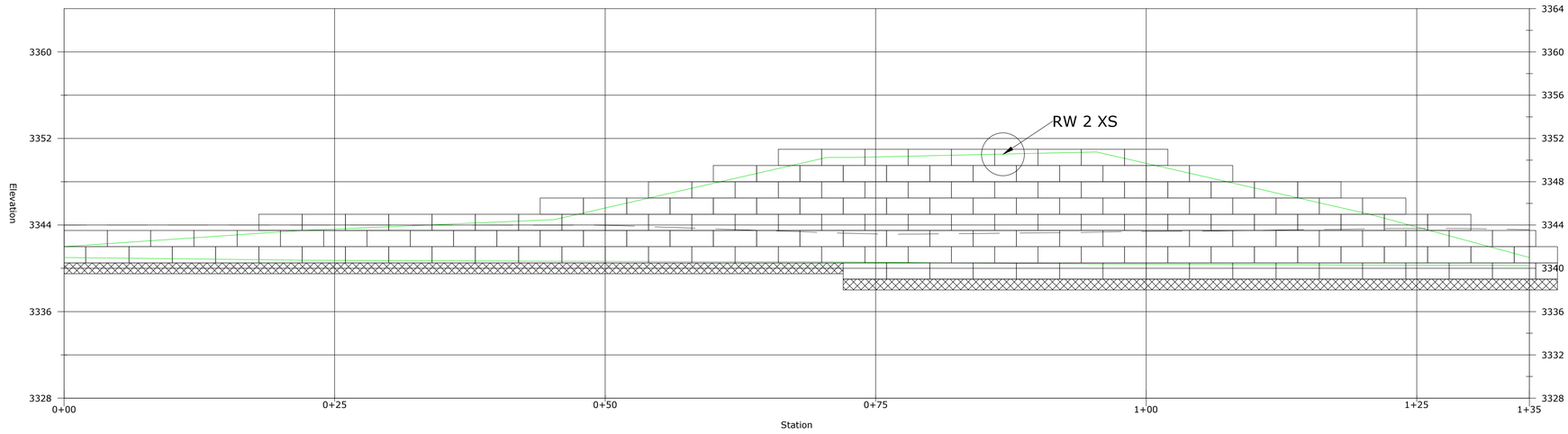
MIDDLE FORK GREENWAY 3

DETAILS

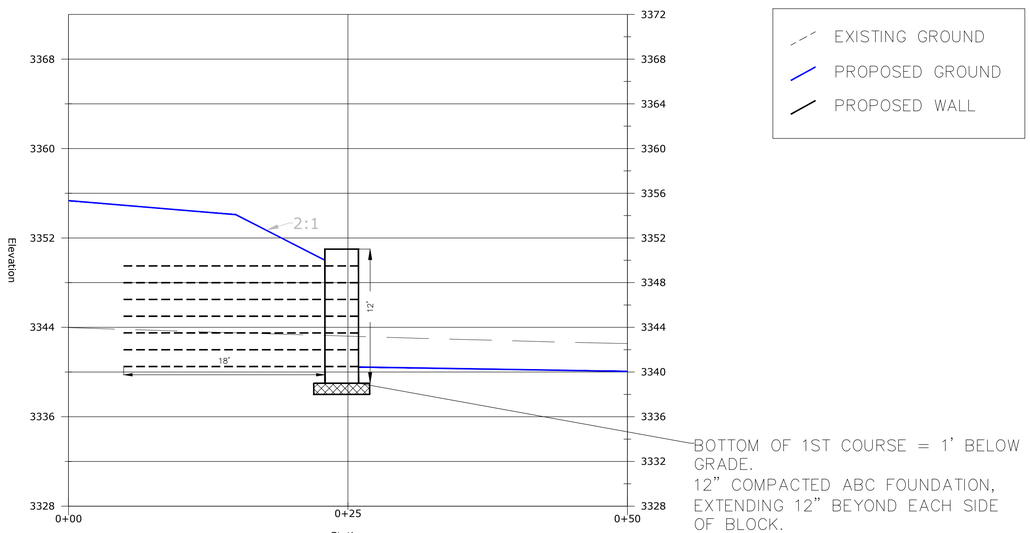
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET 1/6

RETAINING WALL 2
LONGITUDINAL PROFILE



RETAINING WALL 2



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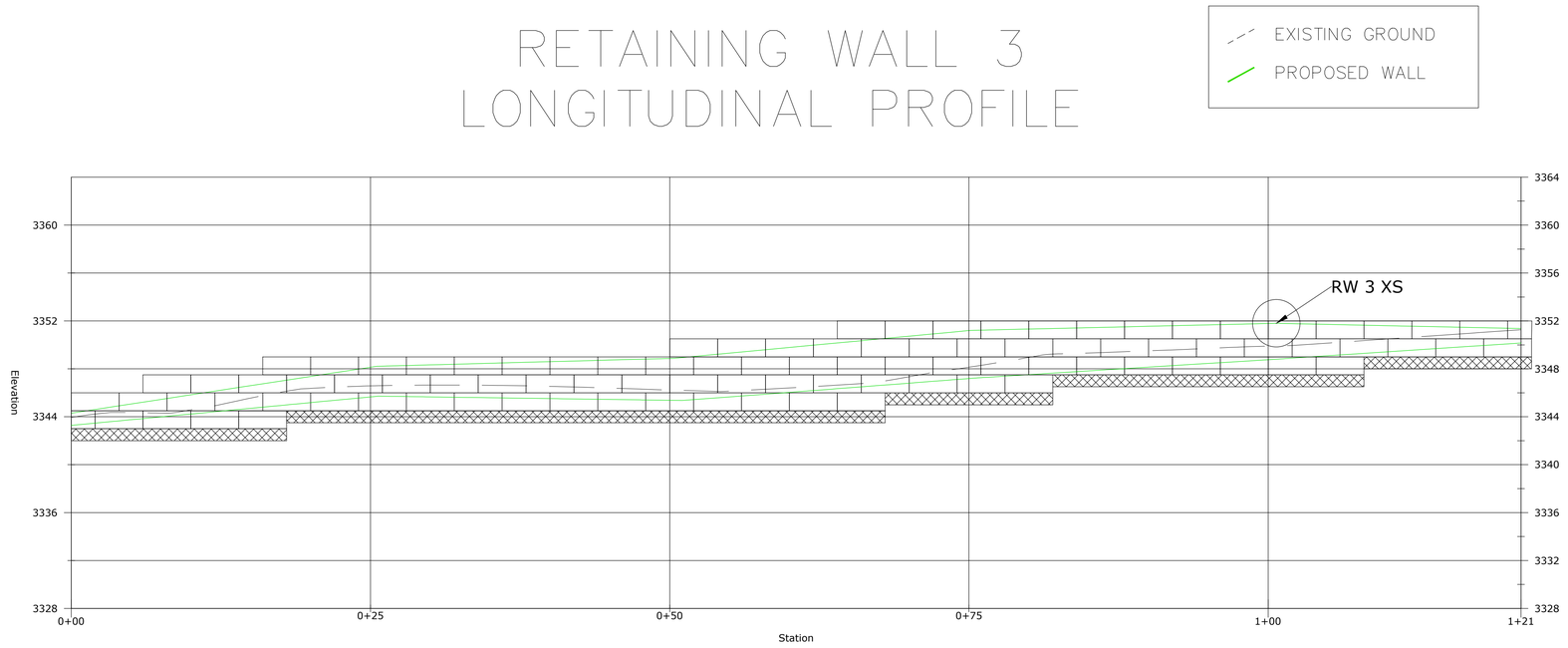
828-303-6120

NORTH CAROLINA PROFESSIONAL ENGINEER 55450 JEFFREY D. HOLCHIN
5-5-25

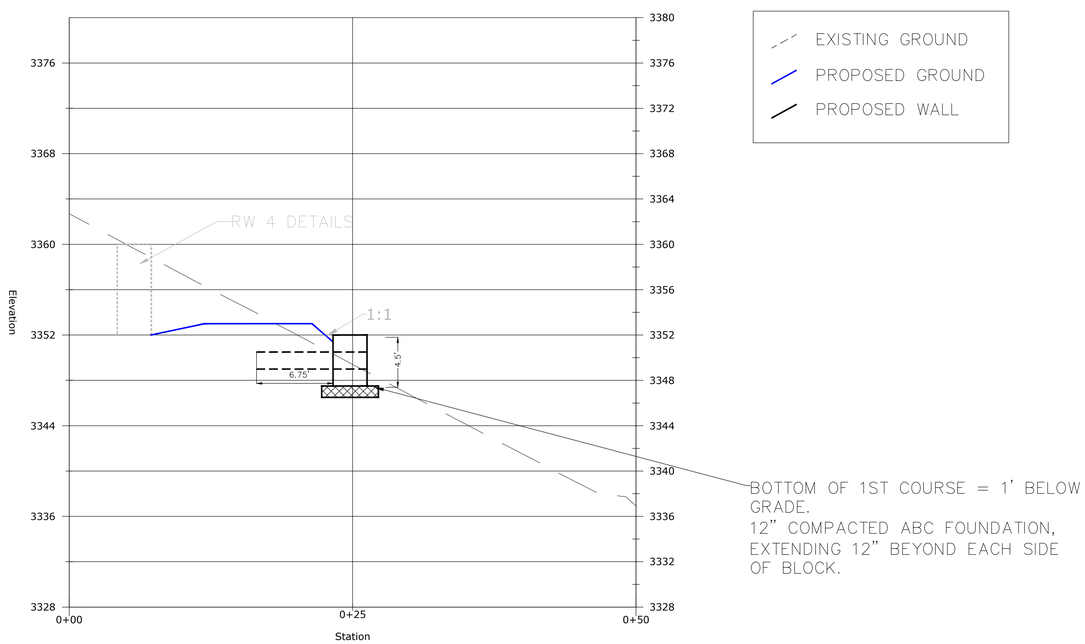
PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3
DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

RETAINING WALL 3
LONGITUDINAL PROFILE



RETAINING WALL 3



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828-303-6120

5-5-25
NORTH CAROLINA PROFESSIONAL ENGINEER 50450 JEFFREY D. HOLCOMB

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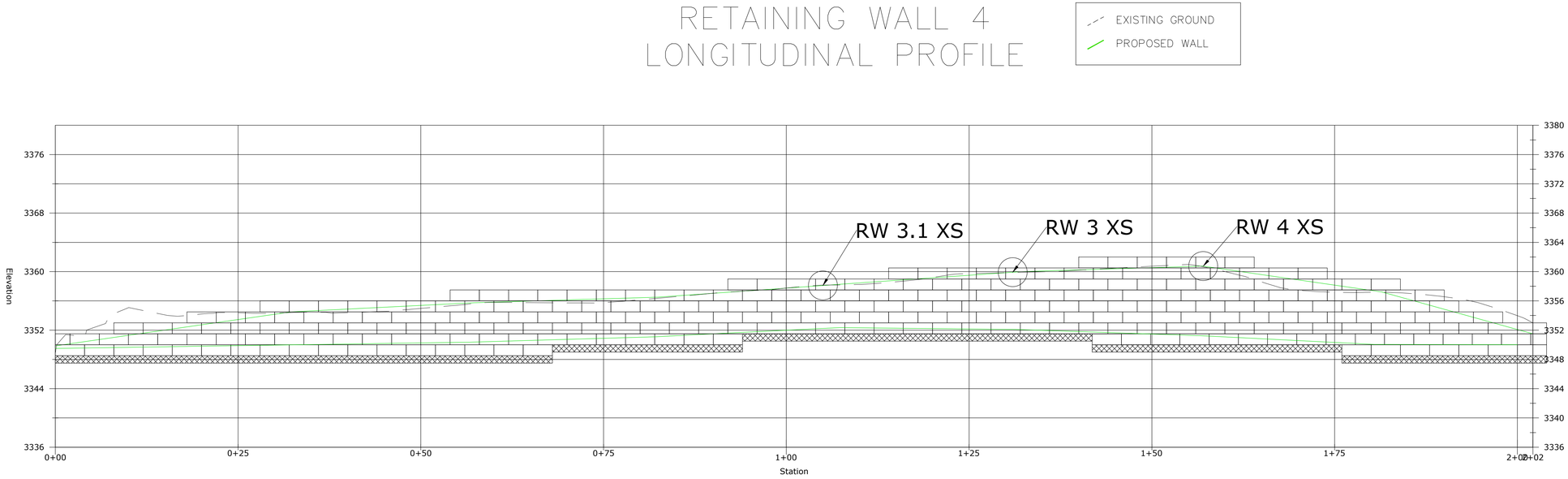
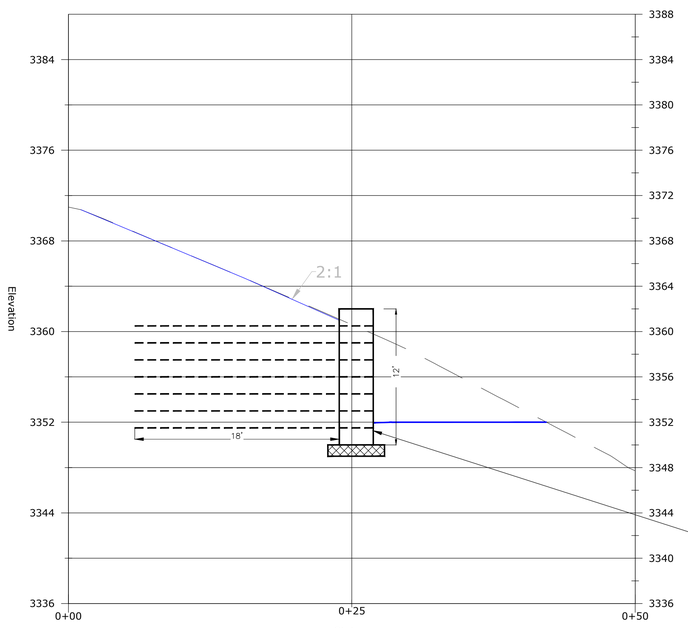
MIDDLE FORK GREENWAY 3
DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

RETAINING WALL 4
LONGITUDINAL PROFILE



RETAINING WALL 4



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BOONE, NC 28607
828-303-6120

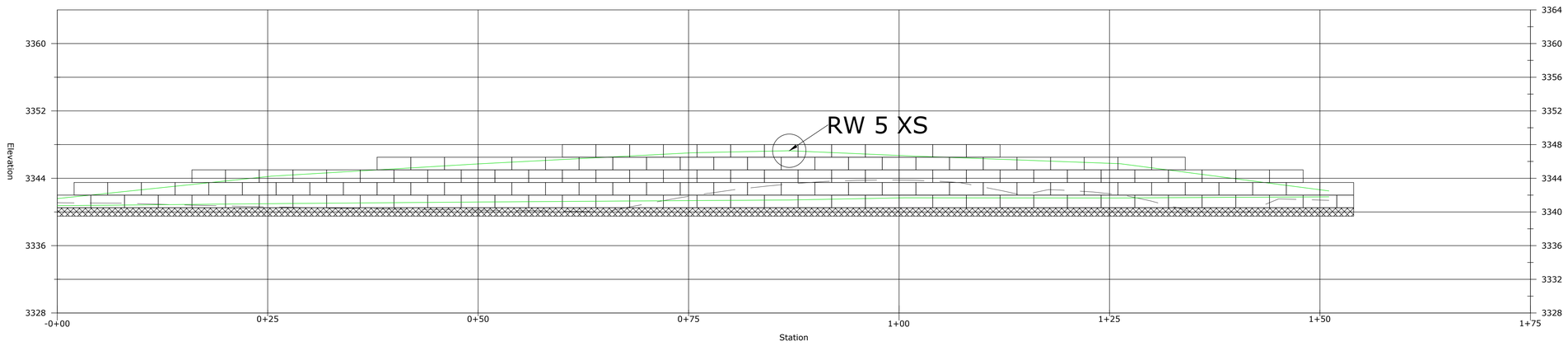
5-5-25
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20450 JEFFREY D. HOLCHIN

PREPARED FOR: BLUE RIDGE CONSERVANCY

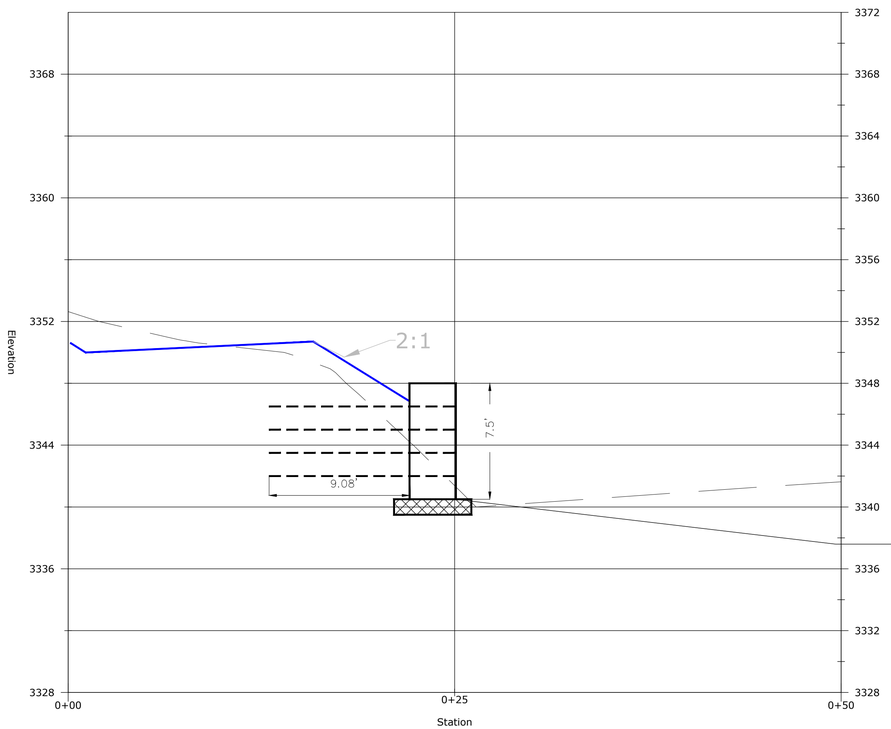
MIDDLE FORK GREENWAY 3
DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

EXISTING GROUND
PROPOSED WALL

RETAINING WALL 5
LONGITUDINAL PROFILE



RETAINING WALL 5



EXISTING GROUND
PROPOSED GROUND
PROPOSED WALL

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6. START FILL SLOPE 12" DOWN FROM THE BACK OF CAP BLOCK

SOLID ROCK ENGINEERING™

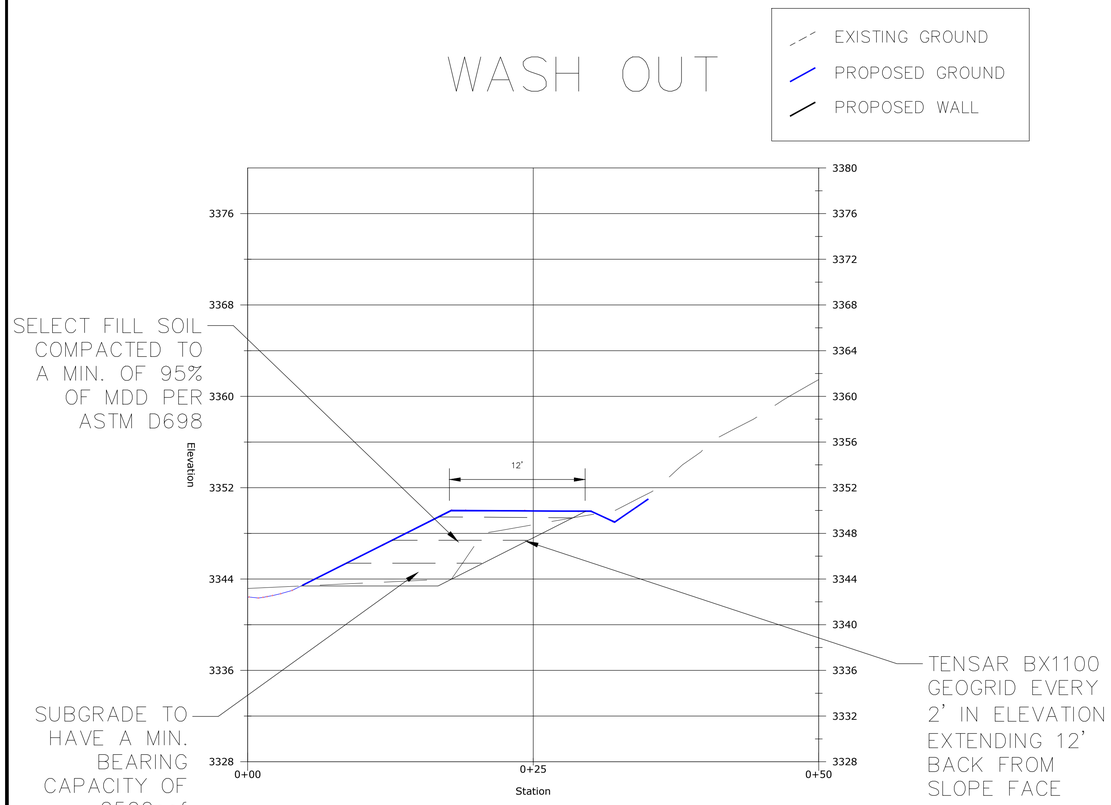
PREPARED BY:
SOLID ROCK ENGINEERING, PLLC
577 GEORGE WILSON ROAD, SUITE 5
BOONE, NC 28607
828-303-6120

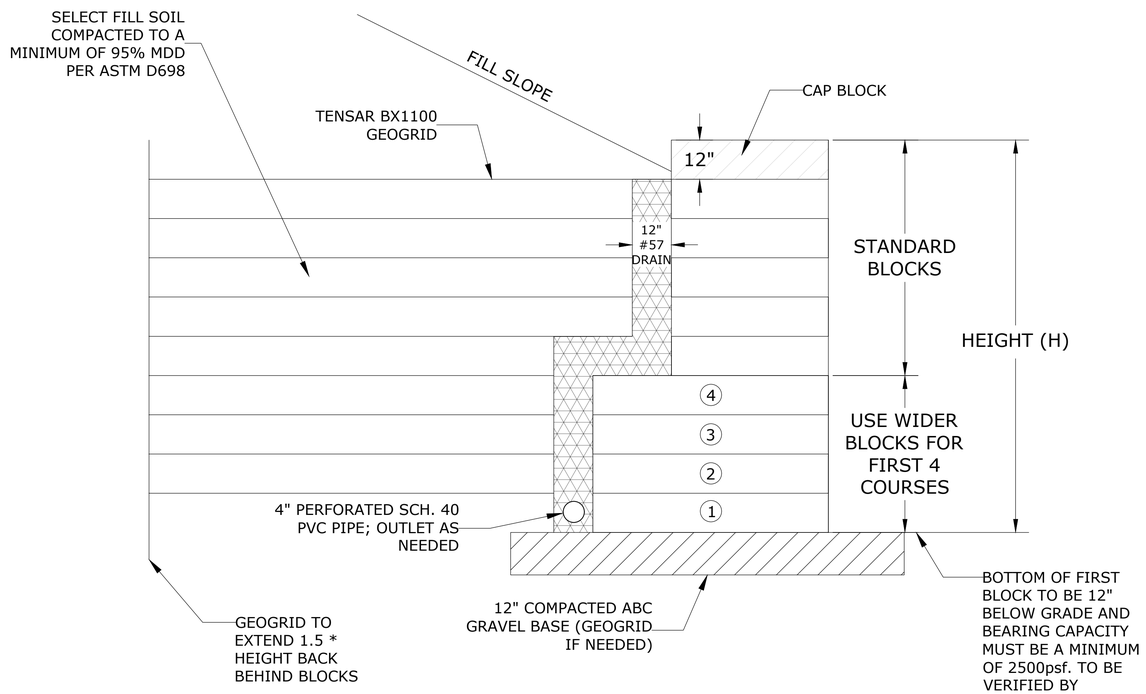
NORTH CAROLINA PROFESSIONAL ENGINEER 20450 JEFFREY D. HOLLIN
5-5-25

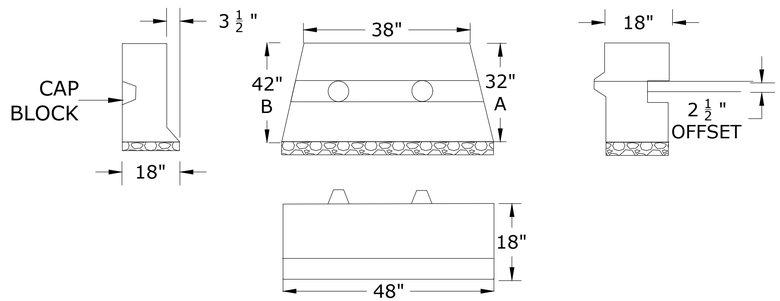
PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3
DETAILS
MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

WASH OUT







TYPICAL LOVEN-BLOCK RETAINING WALL DETAIL

NTS

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577 GEORGE WILSON ROAD, SUITE 5
BOONE, NC 28607
828-303-6120

5-5-25
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20450 JEFFREY D. HOLCHIN

PREPARED FOR: BLUE RIDGE CONSERVANCY

MIDDLE FORK GREENWAY 3

DETAILS

MIDDLE FORK GREENWAY
WATAUGA COUNTY, NC

SHEET 6/6

SOLID ROCK ENGINEERING, PLLC

NCBELS #P-1523

WWW.SOLIDROCKENGINEERINGNC.COM

JEFFREY D. HOLCHIN, P.E. FOUNDER, OWNER & PRINCIPAL ENGINEER

September 5, 2023

Carrie Caviness, PhD
Interface Environmental Consulting, LLC.
476 Hidden Pond Rd
Boone, NC 28607

Re: Report of Geotechnical Evaluation of Fill Pad, Bottom Land and Ridge Areas
Middle Fork Greenway - Section 3
Boone, North Carolina
SRE Project # 23-IEC-1

Dear Ms. Caviness, PhD:

Solid Rock Engineering, PLLC (SRE) is pleased to provide this report of geotechnical evaluation of three areas of the Middle Fork Greenway – Section 3 project. The purpose of this engineering evaluation was to (1) define the subsurface conditions at the three areas and (2) provide engineering recommendations related to design and construction at those areas. This work was authorized by you on July 24, 2023 per SRE proposal 23-IEC-1p dated May 16, 2023. The following report sections describe the project, provide details of the SRE field work for the geotechnical evaluation, describe the encountered subsurface conditions, and provide our conclusions and engineering recommendations for the project.

GENERAL PROJECT DESCRIPTION

The following photos were taken during a site visit on April 18, 2023 and show (1) the sloping Rhododendron-covered ridge section of the trail where test pits are needed to help determine the trail grading, (2) the floodplain area where auger borings are needed to locate the bedrock for the new stream alignment, and (3) the exiting fill pad where test borings are needed to evaluate the fill quality in the future parking area. The attached site plan shows these three areas.

Rhododendron-ridge section of trail	Floodplain area
	

.

Fill pad area	Fill pad area
	

SITE GEOTECHNICAL FIELD WORK

The field work for this geotechnical evaluation was performed in three separate periods using two different subcontractors. On August 4, 2023, five (5) test pits were excavated by Brian Hefter at the expected trail alignment on the sloping Rhododendron-covered ridge section of trail. On August 7 and 8, 2023, four (4) soil SPT test borings were drilled by Site Exploration Services at the existing fill pad area. Finally, on August 11, 2023, five (5) auger borings were drilled by Site Exploration Services at the floodplain area. The attached site plan shows the locations of the test pits, SPT test borings and the auger borings in red ink.

Creating access trail for test pits	Test pit excavation
	

SPT Drilling at the fill pad	Auger Drilling at floodplain area
	

Drilling was performed by subcontractor Site Exploration Services (a drilling subcontractor from Walkertown, NC) using a track-mounted Geoprobe model 6620 DT drill rig that utilizes continuous-flight hollow stem augers (HSA). Augers only were used in the floodplain area to locate bedrock. At the fill pad area, soil samples were obtained inside the augers at regular intervals (which are listed on the boring logs) by means of the split-barrel sampling procedures in accordance with ASTM Specification D-1586; a 2-inch O.D., split-barrel sampler was driven into the soil a distance of 18 inches at a time by means of an automatic hammer. The number of blows required to drive the sampler through the final 12-inch interval is termed the Standard Penetration Test "N" value and is indicated in the following table. This value can be used to provide an indication of the in-place relative density of cohesionless soils – in simple terms, low values are "bad" while high values are "good." SPT test borings were used because they provide soil samples for visual examination and a general measurement of the soil's density. Measurements of the approximate groundwater location were attempted during the drilling process, immediately after each test boring was drilled and right before the boreholes were backfilled with soil cuttings, but they may not be accurate due to the short duration of the drilling operation. The drill cuttings were used to backfill the test boreholes at the completion of the drilling operation. The ground surface elevation at each boring and test pit was determined by a surveyor but not yet provided to SRE. Representative portions of each SPT sample were sealed in airtight containers, made available to SRE, examined, and classified by Mr. Holchin. The soil samples were visually classified in general accordance with the Unified Soil Classification System (USCS), per ASTM D2487. Laboratory testing of a recovered bulk soil sample from SPT boring B-2 was performed to classify the soil and obtain compaction parameters; test results are attached. These soil samples will be held for 60 days and then discarded, unless otherwise directed by you. Raw "field logs" with data and notes provided by the driller as well as formal boring logs prepared by SRE are attached to this report. This photo shows a driven spoon after it was "split" open:

SUMMARY OF ENCOUNTERED SUBSURFACE CONDITIONS AT THE THREE AREAS

The fill pad contained various material types, including silt, sand, rocks and concrete rubble. The fill is relatively clean but not well compacted, as shown by the wide range of SPT N values. We could not penetrate a layer of rocks and/or concrete rubble in the fill pad to evaluate the underlying natural soil. Groundwater was not detected in the fill pad. The following table summarizes the soil test boring data at the fill pad:

Boring #	Fill soil thickness (ft)	Depth to competent material (ft)	Total boring depth (ft)	SPT N Data (1)	Groundwater Detected? Bedrock encountered?
B-1	10.1+	?	10.1	Fill: 10,9,7,12	No No
B-2	9.2+	?	9.2	Fill: 17,9,14,50+	No No
B-3	12.5+	?	12.5	Fill: 20,15,10,27	No No
B-4	7.5+	?	7.5	Auger only	No No

Notes: **(1)** SPT "N" values are the sum of the second and third blow counts - N values from 0-4 indicate "very loose" soils, N values from 5-10 indicate "loose" soils, N values from 11-30 indicate "medium dense" soils, N values greater than 30 indicate "dense" soils; and N values greater than 50 indicate "very dense" soils.

A bulk soil sample taken from boring B-2 was classified as a sandy silt (ML), with a mdd of 110.6 pcf and OMC of 15.3%. The lab test results are attached to this report.

The typical subsurface profile in the bottomland/floodplain area includes surficial asphalt and gravel (it must have been a parking area), over layers of weak alluvial silt and cobbles, resting on partially weathered bedrock. Locating the groundwater level during the short interval that the borehole is open is not very accurate, but we detected groundwater at depths ranging from 1.5 to 4.5 feet. The following table summarizes the results from the five auger borings in the floodplain area:

Boring #	Depth to bedrock (ft.)	Encountered soils	Groundwater depth (ft)
AB-1	8.5	Asphalt and gravel/silt/cobbles/silt/PWR	1.5
AB-2	8.4	Asphalt and gravel/silt/cobbles/silt/PWR	3.0
AB-3	8.0	Asphalt and gravel/silt/cobbles/silt/PWR	2.3
AB-4	5.4	Asphalt and gravel/silt/cobbles/PWR	Dry
AB-5	9.9	Asphalt and gravel/silt/cobbles/silt/PWR	4.5

The boreholes were backfilled with the drill cuttings upon completion of drilling.

The typical subsurface profile from the five test pits at the sloping Rhododendron-covered ridge trail includes surficial root mat and thin topsoil, underlain by a layer of sandy silt with rocks that rests on partially weathered bedrock (PWR); there was also a layer of-gray silt at TP-2. The depths to top of harder PWR ranged from 2-5 feet. All test pits were dug to the top of partially weathered bedrock – hard bedrock was likely several feet deeper, perhaps as much as 3-5 feet based on local experience with large excavators and dozers. Groundwater was not encountered in the test pits. The following table summarizes the results of the five test pits on the sloping rhododendron-covered ridge at the expected trail alignment:

Test Pit #	Depth to top of bedrock (ft)	Encountered soils	Any groundwater?
TP-1	3.0	0-6"=rootmat+blk topsoil; 6"-24"=brn sandy silt w/rocks; 24-36"=soft PWR; harder PWR at 36"	No
TP-2	5.0	0-6"=rootmat+blk topsoil; 6"-30"=tan sandy silt w/rocks; 30-60"=gray silt; top of PWR at 60"	No
TP-3	4.0	0-6"=rootmat+blk topsoil; 6"-36"=brn sandy silt w/rocks; 36-48"=soft PWR; harder PWR at 48"	No
TP-4	2.0	0-6"=rootmat+blk topsoil; 6"-12"=brn sandy silt w/rocks; 12-24"=soft PWR; harder PWR at 24"	No
TP-5	2.0	0-6"=rootmat+blk topsoil; 6"-24"=brn sandy silt w/rocks; harder PWR at 24"	No

The test pits were backfilled upon completion of documentation (photos and measurements), and grass seed with a straw cover was applied to the disturbed areas. The following photos show the test pits upon completion of excavation:

TP-1

TP-2

TP-3

TP-4

TP-5	EXPOSED BEDROCK NEAR TP-5
	

SRE CONCLUSIONS AND ENGINEERING RECOMMENDATIONS

The following conclusions are based upon site reconnaissance, results from the five test pits at the sloping Rhodendrum-covered ridge trail area, the five auger-borings in the bottomland/floodplain area, and four SPT-borings in the fill pad area of the project, lab testing of a bulk sample from boring B-2 from the fill pad, and SRE experience with similar projects in the area.

1. The soil and soft bedrock overburden thickness at the sloping rhododendron-covered ridge along the expected trail alignment ranges from 2-5 feet, but SRE concludes that an additional 3-5 feet of the PWR could be excavated with a large excavator with rock teeth or a powerful dozer, if needed to reach the final grades of the trail. Groundwater is not an issue at this location. This soil can be re-used as a structural fill.
2. The typical depth to top of bedrock at the bottomland/floodplain area ranges from 5.4 to 9.9 feet. The surface fill material includes asphalt and gravel, underlain by layers of alluvial silt and cobbles. Hard bedrock was encountered in each boring, which caused auger refusal. Groundwater will be an issue during the stream re-alignment excavation work in this area – dewatering measures will be needed, along with some type of erosion protection for the soft silt layer.
3. The soil test borings could not penetrate the fill pad due to large rocks and/or concrete rubble within the fill, at depths ranging from 7.5 to 12 feet; the fill pad appears to be at least 15 thick, so we were not able to evaluate the underlying natural soils. The fill materials included sandy silt with rocks (ML) and silty sand

with rocks (SM) – both are good fill materials. The SPT N values within the fill ranged from as low as 7 (loose) to as high as 27 (medium dense), with most N values above 10 (medium dense); this indicates a moderate compactive effort during the fill placement (dozer and truck tires only – no actual compactor was likely used). This corresponds with SRE observations when this fill placement operation was in progress several years ago. The fill pad has been in place for several years so some settlement has already occurred. SRE concludes that the fill pad can support a lightly-loaded building with wider-than-normal foundations with minimal risk of excessive total and differential settlement. The fill pad can also support asphalt pavement (with some geogrid reinforcement) with minimal risk of excessive total and differential settlement. Groundwater was not encountered in the fill pad and should not be a factor.

SRE offers the following recommendations for the design and construction of a lightly-loaded structure and asphalt pavement on the existing fill pad:

1. Shallow Foundations for a building on the fill pad can be designed for an allowable bearing capacity of 2500 psf but the width should be increased by 50% (to 4.0 feet max) to further reduce the contact pressure and minimize the settlement risk. Likewise, SRE recommends increasing the size of the required reinforcing steel by at least one size increment to help span over spot-settlement areas (for example, if the design calculations call for #4 bars, then use #5 bars).
2. Standard slab-on-grade construction can be considered for a building on the fill pad with a k value of 100 pci. SRE recommends undercutting the upper 12 inches of surficial fill soil, placement of a biaxial BX1100 or RX1100 geogrid, and placement of a compacted suitable fill soil or ABC gravel, to be topped with at least 6 inches of clean #57 gravel under the concrete slab; additional steel reinforcement in the slab, usually double the required amount, is recommended to help resist settlement stresses from the existing fill soils.
3. For the asphalt pavement areas at the fill pad, SRE recommends undercutting the upper 12 inches of existing fill soil, compacting the exposed subgrade with a large vibratory sheepsfoot roller, proofrolling to locate any weak areas, then placement of a biaxial BX1100 or RX1100 geogrid, and replacement of the undercut with a compacted suitable fill soil or ABC gravel, with at least 6 inches of clean #57 gravel under the pavement.
4. For any new fill placement, all fill soils should be compacted to at least 95 percent of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method, with a moisture content within +/- 3% of the optimum moisture content (OMC). Acceptable fill soils should be soil that has less than 5 percent organic content and a liquid limit and plasticity index less than 50 and 20, respectively. Soils with USCS group symbols of SP, SW, SM, SC, CL, and ML are recommended for use as controlled fill, although it is important to note that silty and clayey soils are very moisture sensitive and not as strong as sandy soils. Silty non-plastic soils such as ML do not resist erosion very well. Loose lift thicknesses will vary depending on the size of the compaction

equipment: 8 to 12 inches for large self-propelled compactors, 6 to 8 inches for smaller self-propelled compactors, and 4-6 inches for remote-controlled compactors and hand-operated equipment (plate tampers, wacker-packers, or jumping jacks). Rocks are permitted within the fill, but the size of the rock should not exceed the lift thickness, and "nesting" of rocks should not be allowed. All fill soils should be placed in horizontal loose lifts and compacted with adequately sized equipment. Benching into existing slopes may be required to tie the new fill into the existing slope. Vibratory smooth-drum rollers are appropriate for cohesionless/coarse-grained soils while sheepsfoot rollers are appropriate for cohesive/fine-grained soils. If earthwork is performed during winter months or after inclement weather, the subgrade soil conditions could potentially be more unstable due to wet soil conditions, which could potentially require stabilization or undercutting. Positive site drainage should be maintained during earthwork operations to prevent the ponding of water on exposed subgrades. Soil subgrades should be protected from inclement weather (rain especially) by 'sealing' the subgrades prior to forecast inclement weather. 'Sealing' can be performed by rolling with a smooth steel-drum roller without vibration. Ruts should not be created during the 'sealing' operation. Prior to the placement of additional fill, the 'sealed' subgrade should be scarified.

5. Construction quality control (CQC) and inspection should be performed at regular intervals throughout the course of the project by qualified and experienced QC personnel. SRE can perform certain special inspections, such as to monitor and verify adequate fill placement and compaction, monitor undercut work, check and verify foundation subgrades for adequate bearing capacity, check and verify foundation and retaining wall reinforcing steel, monitor proofrolls, and perform limited foundation concrete testing.

Thank you for hiring SRE to provide professional engineering services for this project. Let us know if there are any questions about this report, or if SRE can provide additional engineering services for this project.

Sincerely,

SOLID ROCK ENGINEERING, PLLC

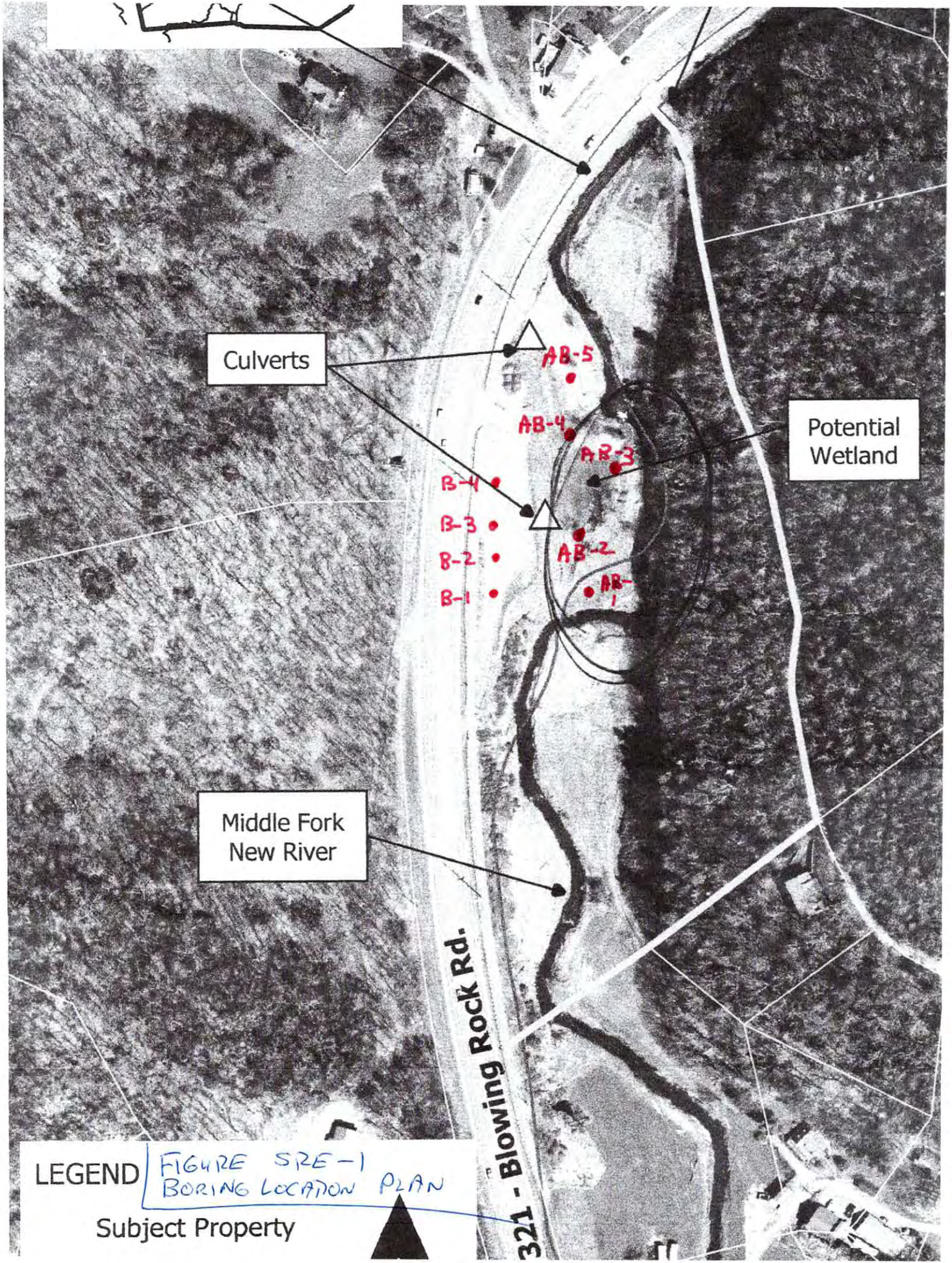
9-5-23

NORTH CAROLINA PROFESSIONAL SEAL 20450 ENGINEER JEFFREY D. HOLCHIN

Jeffrey D. Holchin., P.E., D.GE
Principal Geotechnical Engineer
(jeffholchinsre@gmail.com)

Attachment: Figure SRE-1 – Overall site plan with test boring locations
Figure SRE-2 showing the test pit locations
Lab Test Results from Southern Engineering – fill pad sample from B-2

Test Pit and Boring Location Plans


Culverts
AB-5
AB-4
AB-3
B-4
B-3
B-2
B-1
AB-2
AB-1
Potential Wetland
Middle Fork New River
321 - Blowing Rock Rd.
LEGEND
Subject Property
FIGURE SKE-1
BORING LOCATION PLAN

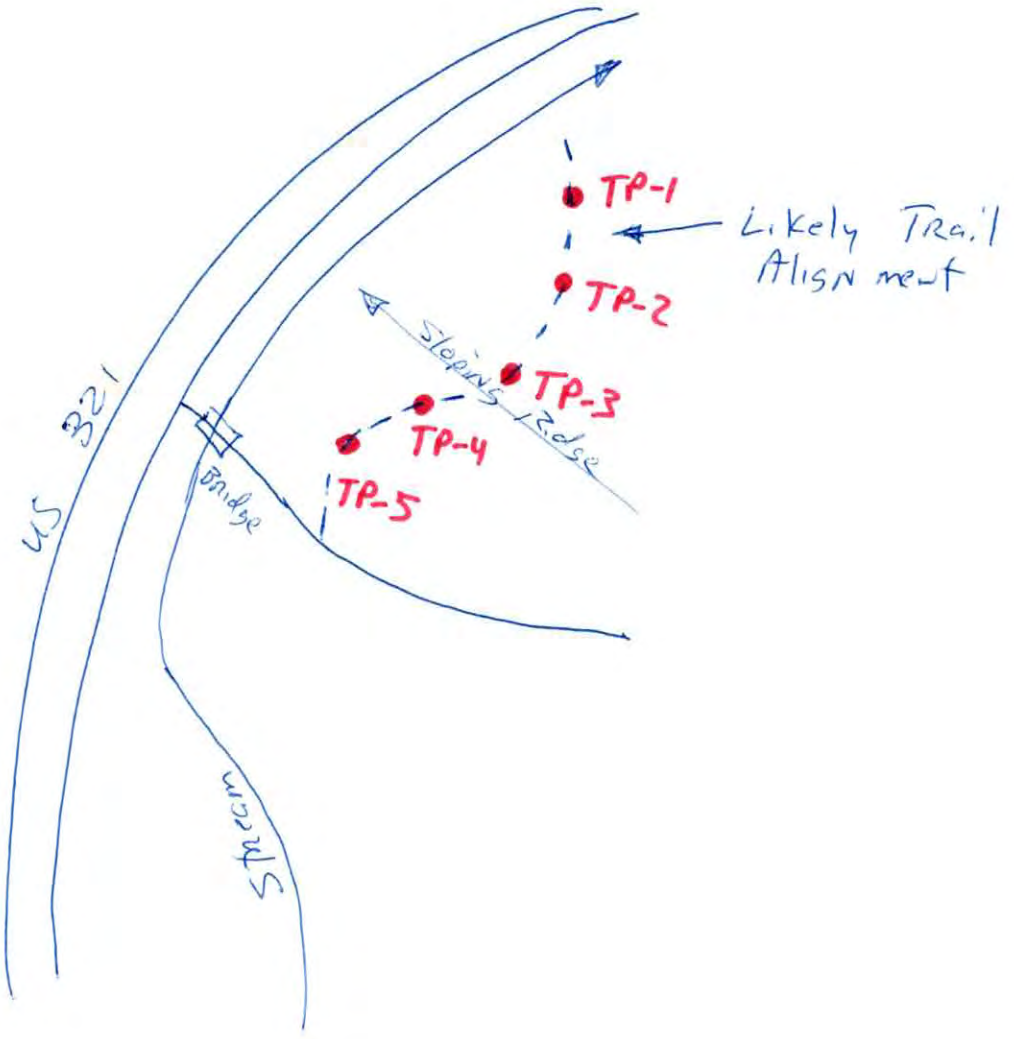


FIGURE SIZE - 2 N.T.S.

TEST PIT LOCATION PLAN

Middle Fork Greenway - Section 3

BOONE, NC

BY: Solid Rock Engineering 9/5/23

Boring Logs
(from SRE and Driller)

PROJECT: MF6 - Section 3 — Blowing Rock NC — BORING B-1

DRILLER: Forrest W/ Site Exploration — Date Drilled: 8/8/23

RIG: Geoprobe 6620-DT Track-mounted — Elevation: N/A.

METHOD: HSA + SPT — Total Depth: 10.1'

Water Level: ■ DRY

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Sample Depth	GW	Blow Count 6"	6"	6"	SPT PLOT (10 20 30 40 50)	N Value
1		1-2.5		3	5	5		10
2		3.5-5		4	4	5		9
3		6-7.5		2	4	3		7
4		8.5-10		3	3	9		12

FILL - Brown, Tan, Gray, White silty fine SAND (SM) and Sandy NON-plastic SILT (ML), some ROCKS, moist, loose to medium dense 10.1'

END of BORING @ 10.1' (Auger Refusal)

NOTES:
1. This log is one of 4 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Project: MF6 - Section 3 | Blowing Rock NC | BORING B-2

DRILLER: Forrest Wl Site Exploration | Date Drilled: 8/8/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + SPT | Total Depth: 9.2'

Water Level: DRY

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Sample Depth	GW	Blow Count 6"	6"	6"	SPT PLOT (10 20 30 40 50)	N Value
1	1	1-2.5		3	6	11		17
5	2	3.5-5		4	4	5		9
	3	6-7.5		5	7	7		14
	4	8.5-10		15	50*			50+

FILL - Brown, tan, grey sandy NONplastic SILT w/ Rocks (ML), moist. loose to dense

9.2'

END of Boring = 9.2' (Auger Refusal)

10
15
20
25
30
35

NOTES:
1. This log is one of 4 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Project: MFG - Section 3 — Blowing Rock NC — BORING B-3

DRILLER: Forrest W/ Site Exploration — Date Drilled: 8/7/23

RIG: Geoprobe 6620-DT Track-mounted — Elevation: N/A.

METHOD: HSA + SPT — Total Depth: 12.5'

Water Level: DRY

NOTES:
1. Locations selected by SRE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Sample Depth	GW	Blow Count 6"	6"	6"	SPT PLOT (10 20 30 40 50)	N Value
0	1	1-2.5		5	10	10		20
5	2	3.5-5		6	8	7		15
	3	6-7.5		5	5	5		10
10	4	8.5-10		3	3	24		27
	5	12-13.5		50/1"				50+
15								
20								
25								
30								
35								

FILL - Brown, tan and grey silty SAND (SM) and sandy non-plastic SILT w/ rocks (ML), moist - loose to dense

12.5'

END of BORING = 12.5' (Auger Refusal)

NOTES:
1. This log is one of 4 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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PROJECT: MF6 - Section 3 | Blowing Rock NC | BORING B-4

DRILLER: Forrest W/ Site Exploration | Date Drilled: 8/8/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + ~~SPT~~ (Auger Only) | Total Depth: 7.5'

Water Level: | Sample Depth GW

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value
0						
5						
10						
15						
20						
25						
30						
35						

FILL - Brown tan Cobbles and silty fine SAND w/ cobbles (SM), moist - medium dense

7.5'

END of Boring = 7.5' (Auger Refusal)

Note: SPT sampling was not performed due to Rocks in fill.

NOTES:
1. This log is one of 4 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING B-1

Client: Solid Rock Engineering Project Number: _____

Project Name: Hwy 321 Fill Pad Drill Date: 8/8/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: 1/2" Topsoil

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
S-1	1	2.5	3	5	5	X	17"	Yellow-Brown to Gray-brown Gravelly Silt w/Sand, trace clay, moist → FILL
S-2	3.5	5	4	4	5	X	18"	Gray-brown to Light Gray-brown Silty Sand w/Gravel, moist → FILL
S-3	6	7.5	2	4	3	X	18"	Dull Brown to Gray-brown Silty Sand, trace Gravel, moist → FILL
S-4	8.5	10	3	3	9	X	18"	White to Tan to Gray-brown to Dark Gray-brown Silty Sand, trace Gravel, moist to wet → FILL
								Auger refusal @ 10.1'

Notes: Significant organics observed in cuttings from ~3 to 4'. Frequent cobbles and occassional boulders in FILL material. Auger refusal @ 10.1' on hard material (possible concrete).

Water Level – During Drilling: Not Enc. Water Level – Upon Completion: Dry

Cave-in Depth: 6.8' Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING B-2

Client: Solid Rock Engineering Project Number:

Project Name: Hwy 321 Fill Pad Drill Date: 8/8/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: E. Hoffman

Surface Material Type/Thickness: 1/2" Topsoil

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
S-1	1	2.5	3	6	11	X	18"	Light Gray-Brown to Dark Yellow-Brown Silty Sand w/ Gravel, moist → FILL
S-2	3.5	5	4	4	5	X	18"	Gray-Brown to Dull Dark Brown Sand → FILL
S-3	6	7.5	5	7	7	X	18"	Red-Brown to Dark Gray-Brown to Yellow-Gray-Brown Sand → FILL
S-4	8.5	9.2	15	50/3"	X	X	3"	Dull Brown to Gray-Brown Silty Gravel w/ Sand, moist → FILL
								Auger refusal @ 9.2' Spoon refusal @ 9.2'

Notes: Thick plastic debris observed in cuttings from ~2 to 3'. Small piece of woody matter observed in cutting from around 7'. Frequent cobbles & occasional boulder. Auger refusal on probable concrete debris.

Water Level – During Drilling: Not Enc. Water Level – Upon Completion: Dry

Cave-in Depth: 5.4' Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING B-03

Client: Solid Rock Engineering
Project Number:
Project Name: Hwy 321 Fill Pad
Drill Date: 8/7/23
Drill Rig: Geoprobe 6620DT Track Mounted
Driller: F. Hoffman
Surface Material Type/Thickness: 1/2" Topsoil

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
S-1	1	2.5	5	10	10	X	17"	Dull Dark Brown to Gray-Brown Silty Sand w/ Gravel, moist → FILL
S-2	3.5	5	6	8	7	X	17"	Dark brown to Gray-brown to Red-Brown to Orange same → FILL
S-3	6	7.5	5	5	5	X	18"	Gray-brown Silty Sand, trace Gravel & clay, moist → FILL
S-4	8.5	10	3	3	24	X	14"	Dark Brown to Gray-brown Silty Sand w/ dark gray to black Gravel, moist → FILL
S-5	12.2	12.5	50/4"	X	X	X	3"	Dark Gray-Brown Silty Sand w/ Concrete fragments @ bottom of spoon, dry to moist
								Auger refusal @ 12.2' Spoon refusal @ 12.5'

Notes: Hard drilling (boulders & large cobbles) from ~9.5 to refusal @ 12.2'.

Water Level – During Drilling: Not Enc.
Water Level – Upon Completion: Dry
Cave-in Depth: 8.2'
Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING B-4

Client: Solid Rock Engineering Project Number: _____

Project Name: Hwy 321 Fill Pad Drill Date: 8/8/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: No Topsoil

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
—	0'	5'						Mainly cobbles w/ Silty Sand & gravel FILL
—	5	7.3						Silty Sand w/ cobbles & gravel FILL
—	7.3	7.5						Hard obstruction (likely large boulder)
								Auger refusal @ 7.5'

Notes: _____

Water Level – During Drilling: — Water Level – Upon Completion: —

Cave-in Depth: 4.2' Drilling Method: HSA

Project: MF6 - Section 3 | Blowing Rock NC | Auger Boring AB-1

DRILLER: Forrest W/ Site Exploration | Date Drilled: 8/11/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + ~~SPT~~ only | Total Depth: 8.5'

Water level: 1.5' | Sample Depth GW

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value

Topsoil / Asphalt / Gravel base 1.0'

Soft dark alluvial silt, some cobbles - wet 4.0'

Cobbles - possible alluvial w/ some dark silt, wet 7.5'

Soft dark silt, wet 8.5'

End of Boring @ 8.5' (Auger Refusal)

5 10 15 20 25 30 35

NOTES:
1. This log is one of 5 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Auger

PROJECT: MFG - Section 3 | Blowing Rock NC | BORING AB-2

DRILLER: Forrest w/ Site Exploration | Date Drilled: 8/11/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + ~~SPT~~ only | Total Depth: 8.4'

Water level: 3.0' | Sample Depth GW

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value
0						
		Topsoil + Asphalt + gravel 0.5'				
		Soft dark Alluvial SILT, more cobbles, v. moist 3.9'				
5		Cobbles - possible Alluvial w/ some dark silt, wet 7.2'				
		Soft dark SILT, wet 8.4'				
		END of BORING @ 8.4' (Auger Refusal)				
10						
15						
20						
25						
30						
35						

NOTES:
1. This log is one of 5 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil description based on the USCS.
5. Groundwater location is approximate and may vary over time.

SOLID ROCK ENGINEERING, PLLC
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Founder & Principal Engineer
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SUITE ~~#~~ 5
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Email: jeffholchinspe@gmail.com

PROJECT: MF6 - Section 3 | Blowing Rock NC | Auger BORING AB-3

DRILLER: Forrest W/ Site Exploration | Date Drilled: 8/11/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + ~~SPT~~ only | Total Depth: 8.0'

Water level: 7.3' | Sample Depth GW

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value
5						
10						
15						
20						
25						
30						
35						

Topsoil + Asphalt + gravel — 0.5'

Cobbles + dark silt — 1.3'

Soft dark Alluvial silt, trace cobbles, wet — 4.7'

Cobbles - possible Alluvial w/ dark silt, wet — 7.6'

Gray PWR — 8.0'

End of Boring @ 8.0' (Auger Refusal)

NOTES:
1. This log is one of 5 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Project: MF6 - Section 3 — Blowing Rock NC

Auger Boring AB-4

DRILLER: Forrest W/ Site Exploration

Date Drilled: 8/11/23

RIG: Geoprobe 6620-DT Track-mounted

Elevation: N/A.

METHOD: HSA + SPT

Total Depth: 5.4'

Water Level: dry?

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Sample Depth	GW	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value

Topsoil + Asphalt + gravel 0.5'

Soft dark Alluvial SILT, Mafic cobbles, moist 3.3'

Cobbles - possible Alluvial, w/ dark SILT, wet 5.4'

END of Boring @ 5.4' (Auger Refusal)

5 10 15 20 25 30 35

NOTES:
1. This log is one of 5 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Project: MF6 – Section 3 | Blowing Rock NC | Auger BORING AB-5

DRILLER: Forrest W/ Site Exploration | Date Drilled: 8/11/23

RIG: Geoprobe 6620-DT Track-mounted | Elevation: N/A.

METHOD: HSA + ~~SRT~~ only | Total Depth: 9.9'

Water level: 4.5' | Sample Depth GW

NOTES:
1. Locations selected by SIZE.
2. Boreholes backfilled w/ cuttings.

Depth (ft)	Sample #	Blow Count 6"	6"	6"	SPT PLOT 10 20 30 40 50	N Value
0						
					Topsoil + Asphalt + Gravel 1.0'	
					Soft dark Alluvial SILT, moist 5.0'	
5					Cobbles – possible Alluvial w/ dark silt, wet 7.9'	
					Soft dark Alluvial silt, wet 9.9'	
10					End of Boring @ 9.9' (Auger Refusal)	
15						
20						
25						
30						
35						

NOTES:
1. This log is one of 5 total.
2. See boring location plan.
3. Soil Sampling done per ASTM D-1586.
4. Soil Description based on the USCS.
5. Groundwater location is approximate and may vary over time.

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Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING AB-1

Client: Solid Rock Engineering Project Number: —

Project Name: Hwy 321 Fill Pad Drill Date: 8/11/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: —

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
	0"	8"						Topsoil
	8"	11"						Remnant Asphalt/Base
	11"	4.0'						Soil w/ occassional cobbles - soft
	4.0'	7.5'						Cobbles w/ soil - possible river bottom or colluvial deposits
	7.5'	8.1'						Soil w/ occassional cobbles
	8.1'	8.5'						Weathered Rock
								Auger Refusal @ 8.5'

Notes: Water level encountered ~ 0.5'; Water level @ ~1.5' after augers removed

Water Level – During Drilling: — Water Level – Upon Completion: —

Cave-in Depth: — Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING AB-2

Client: Solid Rock Engineering Project Number: _____

Project Name: Hwy 321 Fill Pad Drill Date: 8/11/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: _____

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
	0"	4"						Topsoil
	4"	6"						Remnant Asphalt/Base
	6"	3.9'						Soil - Soft w/ occassional cobbles
	3.9'	7.2'						Cobbles w/ Soil - Possible River Bottom or Colluvial Deposits
	7.2'	8.1'						Soil w/ occassional cobbles
	8.1'	8.4'						Weathered Rock
								Auger Refusal @ 8.4'

Notes: Water level @ 3.0' after augers pulled.

Water Level – During Drilling: — Water Level – Upon Completion: —

Cave-in Depth: — Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING AB-3

Client: Solid Rock Engineering Project Number: —

Project Name: Hwy 321 Fill Pad Drill Date: 8/11/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: —

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
	0"	6"						Remnant asphalt and base
	6"	1.3'						Cobbles w/ Soil - FILL?
	1.3'	4.7'						Soil - Soft w/ occasional cobbles
	4.7'	7.6'						Cobbles w/ Soil - Possible River Bottom or Colluvial Deposits
	7.6'	8.0'						Weathered Rock
								Auger Refusal @ 8.0'

Notes: Water level @ 2.3' after augers pulled

Water Level – During Drilling: — Water Level – Upon Completion: —

Cave-in Depth: — Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING AB-4

Client: Solid Rock Engineering Project Number: _____

Project Name: Hwy 321 Fill Pad Drill Date: 8/11/23

Drill Rig: Geoprobe 6620DT Track Mounted Driller: F. Hoffman

Surface Material Type/Thickness: —

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
	0"	4"						Topsoil
	4"	6"						Hard - possible remnant asphalt/base
	6"	3.3'						Soil w/ occasional cobbles
	3.3'	5.1'						Cobbles w/ Soil - possible river bottom alluvial deposits
	5.1'	5.4'						Weathered Rock
								Auger Refusal @ 5.4'

Notes: No water after augers pulled.

Water Level – During Drilling: — Water Level – Upon Completion: —

Cave-in Depth: — Drilling Method: HSA

Site Exploration Services, LLC
Walkertown, NC

BORING LOG – BORING AB-5

Client: Solid Rock Engineering
Project Number: _____
Project Name: Hwy 321 Fill Pad
Drill Date: 8/11/23
Drill Rig: Geoprobe 6620DT Track Mounted
Driller: F. Hoffman
Surface Material Type/Thickness: _____

Sample No.	Depth		Blow Count per 6-inch Interval				Rec (in.)	Description
	From	To	1	2	3	4		
	0"	6"						Topsoil
	6"	7"						Soil
	7"	11"						Hard - Possible Remnant Asphalt and Base
	11"	5'						Soil - S.A.A.
	5'	7.9'						Cobbles & Soil - Possible River Bottom or Colluvial Deposits
	7.9'	9.4'						Soil - Occassional cobbles
	9.4'	9.9'						Weathered Rock
								Auger Refusal @ 9.9'

Notes: Water @ 4.5' after augers pulled.

Water Level – During Drilling: —
Water Level – Upon Completion: —
Cave-in Depth: —
Drilling Method: HSA

Lab Testing Results from soil sample at B-2 in fill pad

SOUTHERN ENGINEERING
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Southern Engineering and Testing, P.C.
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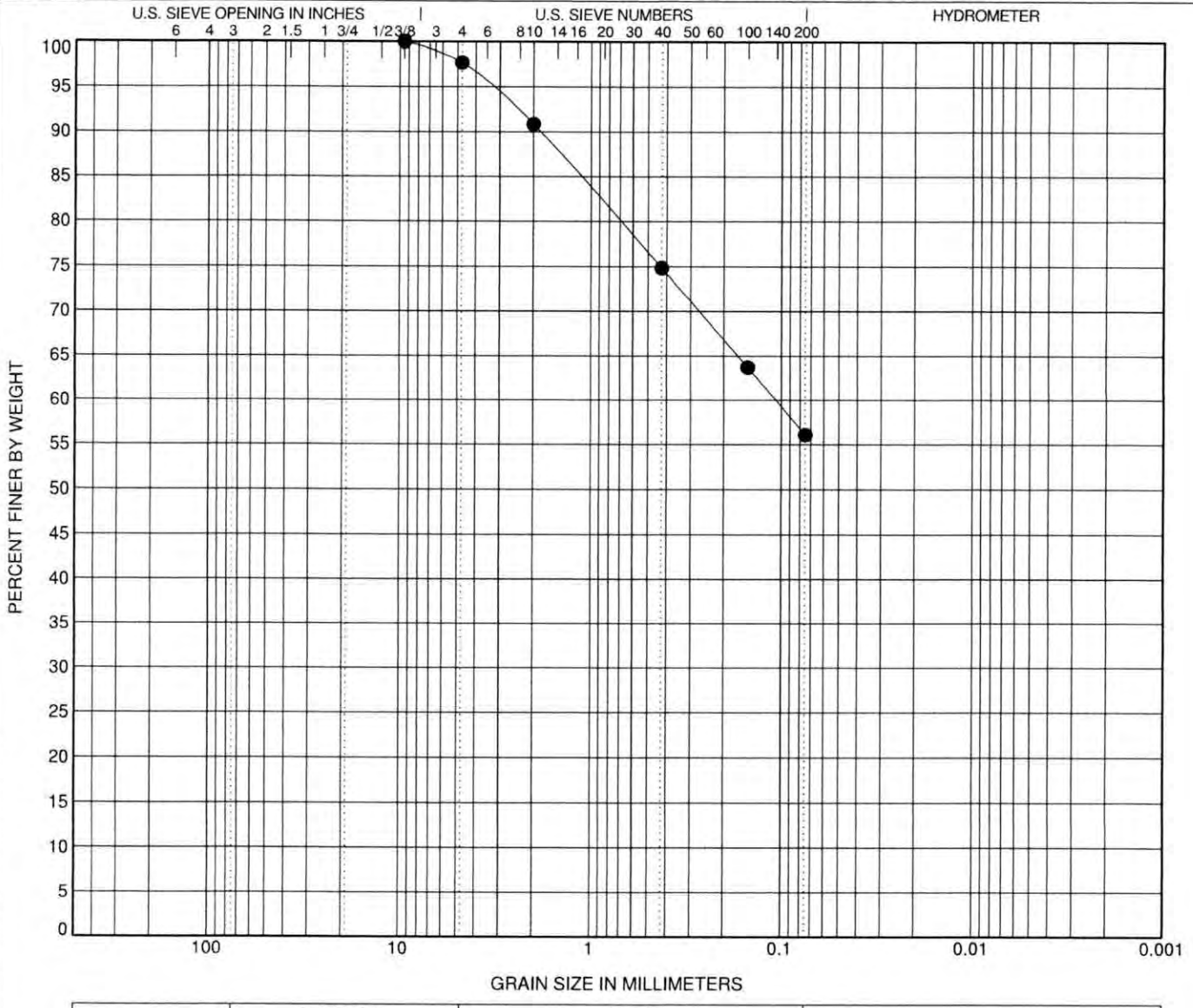
Charlotte, NC 28216
Telephone: 7045570070
Fax: 7049103516

GRAIN SIZE DISTRIBUTION

CLIENT Solid Rock Engineering, PLLC **PROJECT NAME** SRE On-Call

PROJECT NUMBER 20-374 **PROJECT LOCATION** Boone, North Carolina



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	23-160	5.0	**SANDY SILT(ML)**	34	25	9		
			MF 6 - Section 3, 13-2, 0-5-ft B-2					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	23-160	5.0	9.5	0.107			2.3	41.6	56.1	

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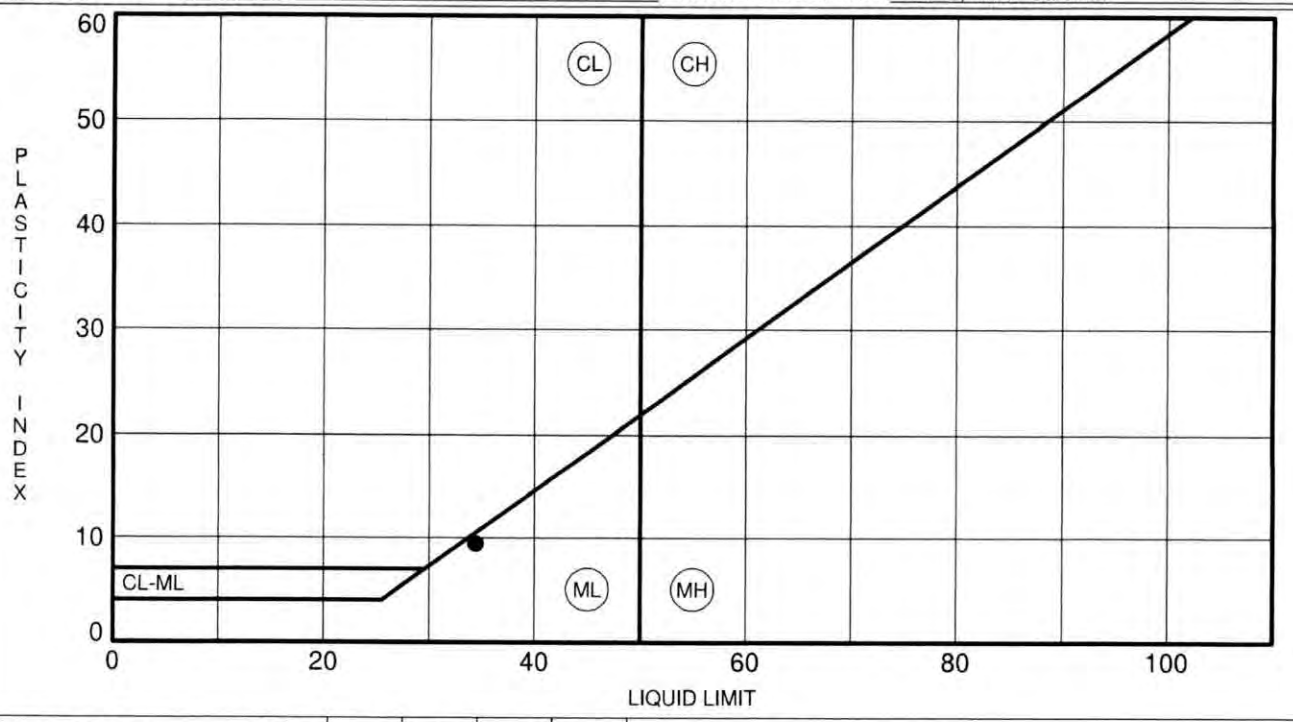
ATTERBERG LIMITS' RESULTS

CLIENT Solid Rock Engineering, PLLC
PROJECT NAME SRE On-Call
PROJECT NUMBER 20-374
PROJECT LOCATION Boone, North Carolina



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**23-160**	**5.0**	**34**	**25**	**9**	**56.1**	**SANDY SILT(ML)**
							MF 6 - Section 3, 13-2, 0-5-ft B-2

ATTERBERG LIMITS - GINT STD US LAB.GDT - 8/18/23 16:13 - C:\SP\SET\SET - DOCUMENTS\GINT\PROJECTS\20-374.GPJ

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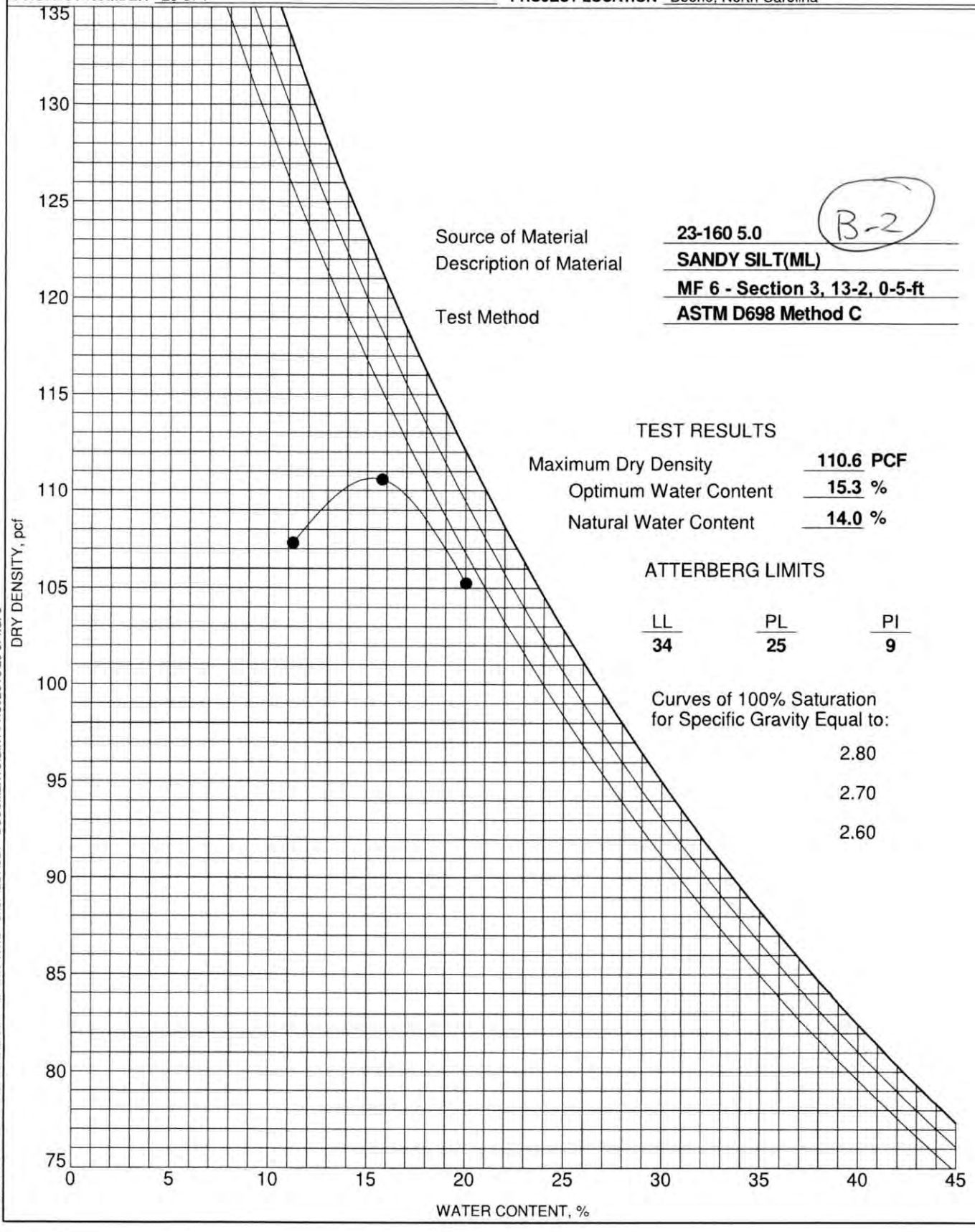
MOISTURE-DENSITY RELATIONSHIP

CLIENT Solid Rock Engineering, PLLC
PROJECT NAME SRE On-Call
PROJECT NUMBER 20-374
PROJECT LOCATION Boone, North Carolina



B-2

Source of Material: **23-160 5.0**
Description of Material: **SANDY SILT(ML)**
MF 6 - Section 3, 13-2, 0-5-ft
Test Method: **ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density	**110.6 PCF**
Optimum Water Content	**15.3 %**
Natural Water Content	**14.0 %**

ATTERBERG LIMITS

LL	PL	PI
34	**25**	**9**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/18/23 16:12 - C:\SP\SET\SET - DOCUMENTS\GINT\PROJECTS\20-374.GPJ

NCDA&CS Agronomic Division **Phone: (919) 664-1600** **Website: www.ncagr.gov/Divisions/Agronomic-Services** **Report No.** FY26-SL002693

Predictive

Soil Report

Mehlich-3 Extraction

Soil Testing Section

Client: Wendy Patoprsty
368 Westbrook Dr
Boone, NC 28607

Sampled County : Watauga

Advisor: Jim Hamilton
971 W. King St.
Boone, NC 28607

Client ID: 571463

Advisor ID: 520103

Sampled: **Received:** 08/21/2025 **Completed:** 08/29/2025 **Farm:**

Sample ID: MFGAP

Lime History:

Recommendations: Crop	Lime (tons/acre)	Nutrients (lb/acre) N	P_2O_5	K_2O	Mg	S	Mn	Zn	Cu	B	More Information
1 - Switchgrass	0.0	120-160	0	40	0	20	0	0	0	0	Note: 12
2 -	0.0										

Test Results [units- W/V in g/cm^3; CEC, Ac, and Na in meq/100 cm^3]: **Soil Class:** Mineral

HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	S-I	Mn-I	Mn-AI1	Mn-AI2	Zn-I	Zn-AI	Cu-I	Na	ESP	SS-I	NO_3-N
0.36	1.07	5.7	73	1.5	5.8	58	44	54	15	22	454	293		206	206	80	0.1	2		

North Carolina Tobacco Trust Fund Commission

Reprogramming of the laboratory-information-management system that makes this report possible is being funded through a grant from the North Carolina Tobacco Trust Fund Commission.

Thank you for using agronomic services to manage nutrients and safeguard environmental quality.

- *Steve Troxler, Commissioner of Agriculture*

Understanding the Soil Report: explanation of measurements, abbreviations and units

Recommendations

Lime

If testing finds that soil pH is too low for the crop(s) indicated, a ***lime recommendation*** will be given in units of either ton/acre or lb/1000 sq ft. For best results, mix the lime into the top 6 to 8 inches of soil several months before planting. For no-till or established plantings where this is not possible, apply no more than 1 to 1.5 ton/acre (50 to 75 lb/1000 sq ft) at one time, even if the report recommends more. You can apply the rest in similar increments every six months until the full rate is applied. If Mg is recommended and lime is needed, use dolomitic lime.

Fertilizer

Each nutrient recommendation ***for field crops or other large areas*** are listed separately in units of lb/acre unless otherwise specified. Recommendations for N (and sometimes for B) are based on research/field studies for the crop being grown, not on soil test results. Recommendations for K and P will depend on K-I and P-I soil test results and the crop to be grown. Generally, at K-I and P-I values > 50, recommendations will be minimal. If Mg is needed and no lime is recommended, 0-0-22 (11.5% Mg) is an excellent source; 175 to 250 lb/acre alone or in a fertilizer blend will usually satisfy crop needs. Soluble salt levels (SS-I) appear only on reports for diagnostic/problem samples.

Farmers and other commercial producers should pay special attention to ***micronutrient levels***. If *$*, *pH$*, *$pH*, *C* or *Z* notations appear on the soil report in the recommendation section, refer to NCDA&CS *$Note: Secondary Nutrients and Micronutrients*. Various NCDA&CS *crop notes* also address lime and fertilizer needs.

Recommendations ***for small areas, such as home lawns/gardens,*** are listed in units of lb/1000 sq ft. If you cannot find the exact fertilizer grade recommended on the report, visit NCDA&CS *Fertilizer Substitutions* to find information that may help you choose a comparable alternate. For more information, read NCSU publication, *A Homeowner's Guide to Fertilizer.* In general, homeowners do not need to be concerned about micronutrients.

Test Results

The first seven parameters [soil class, HM%, W/V, CEC, BS%, Ac and pH] describe the soil and its degree of acidity. The remaining 16 parameters [P-I, K-I, Ca%, Mg%, Mn-I, Mn-AI1, Mn-AI2, Zn-I, Zn-AI, Cu-I, S-I, SS-I, Na, ESP, SS-I, NO_3-N (not routinely available)] indicate levels of plant nutrients or other fertility measurement. Visit NCDA&CS *Understand Your Report* for more information.

Report Abbreviations

Ac	exchangeable acidity
B	boron
BS%	% CEC occupied by basic cations
Ca%	% CEC occupied by calcium
CEC	cation exchange capacity
Cu-I	copper index
ESP	exchangeable sodium percent
HM%	percent humic matter
K-I	potassium index
K_2O	potash
Mg%	% CEC occupied by magnesium
MIN	mineral soil class
Mn	manganese
Mn-AI1	Mn-availability index for crop 1
Mn-AI2	Mn-availability index for crop 2
Mn-I	manganese index
M-O	mineral-organic soil class
N	nitrogen
Na	sodium
NO_3-N	nitrate nitrogen
ORG	organic soil class
pH	current soil pH
P-I	phosphorus index
P_2O_5	phosphate
S-I	sulfur index
SS-I	soluble salt index
W/V	weight per volume
Zn-AI	zinc availability index

GEOTECHNICAL ENGINEERING REPORT

Middle Fork Greenway Section #3
Highway 321
Blowing Rock, North Carolina

CVET Project No. 25-626

February 5, 2026

PREPARED FOR:

Areté Engineers, PLLC

PREPARED BY:

CATAWBA VALLEY
ENGINEERING & TESTING

GEOTECHNICAL • CONSTRUCTION MATERIALS • ENVIRONMENTAL

CATAWBA VALLEY
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SC Firm No. 5201
VA Firm No. F2134437
TN Firm No. 10724
Massachusetts

February 5, 2026

Adam Felmlee, PE
Areté Engineers, PLLC
PO Box 745
Blowing Rock, North Carolina 28605
adam@areteengineers.com

Re: Geotechnical Engineering Report
Middle Fork Greenway Section 3
Hwy 321
Blowing Rock, North Carolina
CVET Project No.: 25-626

Dear Mr. Felmlee:

Catawba Valley Engineering and Testing (CVET) is pleased to submit to you our Geotechnical Engineering Report for the two new pedestrian bridges for the Middle Fork Greenway Section 3 in Blowing Rock, North Carolina. This report presents the findings of our subsurface exploration and geotechnical recommendations for design and construction of the project.

CVET appreciates the opportunity to provide our geotechnical engineering services for this project. If you have any questions regarding the contents of this report, or if we can provide additional services for the project such as construction materials testing or special inspection observations, please do not hesitate to contact us.

Sincerely,

CATAWBA VALLEY ENGINEERING AND TESTING, P.C

NORTH CAROLINA PROFESSIONAL SEAL 058594 ENGINEER CODY DOBBINS

Neill A. Belk, PhD, PE
Senior Engineer
NC 052399

02/05/26

Cody Dobbi
Vice Preside
NC 058594

AASHTO ACCREDITED

Geotechnical Engineering

Environmental Services

CMT/Special Inspections

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE OF SERVICE

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions at the site, collect representative samples of soil for examination in our laboratory, and provide recommendations for design and construction of the two (2) new pedestrian bridges along the Middle Fork Greenway located along Highway 321 in Blowing Rock, North Carolina. CVET's scope of service (authorized by Areté on November 24, 2025) included the following items:

- Advancing of four (4) soil test boring at the site;
- NQ-sized wireline rock coring;
- Preparation of boring logs and boring location plan;
- Evaluation of the encountered subsurface conditions at the site; and
- Preparation of this geotechnical report.

The Geoprofessional Business Association (GBA) organization has prepared important information for studies of the type performed, and we have included their document for your review in Appendix A. An assessment of the environmental aspects, regulated wetlands, groundwater recharge, or stormwater runoff conditions at the site is beyond the scope of this study.

2.0 PROJECT INFORMATION

We understand that two (2) new pedestrian bridges will be installed to facilitate the continuance of the Middle Fork Greenway, along the Middle Fork South Fork New River in Blowing Rock, North Carolina. Both bridges will be constructed of single-span, wooden deck on structural steel I-Beams having a span length of 142 feet. The civil drawings show additional earthwork and site retaining walls beyond the bridge abutment locations. Our investigation was limited to the bridge abutments; therefore, our recommendations are for the bridge abutment foundations only.

Bridge-1 will be located on the northern portion of the Section 3 construction, approximately 400 feet northeast of the intersection of Highway 321 and Dexter Dr. The bridge will cross over the Middle Fork South Fork New River which flows generally south to north. Based upon the civil construction drawings, Bridge-1, end bent-1 (west bank) will be constructed at approximately station 0+55 (elev. 3341ft) and end bent-2 (east bank) will be constructed at approximately 1+97 (elev. 3347 ft). The proposed Bridge-1 is bound by Highway 321 to the west, the river to the north and south, and steep mountain terrain to the east.

Bridge-2 will be located on the southern portion of Section 3 of the Middle Fork Greenway Project, approximately 450 feet south of the intersection of Highway 321 and Dexter Dr. Based upon the civil construction drawings, Bridge-2, end bent-1 (west bank) will be

constructed at approximately elev. 3356ft and end bent-2 (east bank) will be constructed at approximately elev. 3349 ft near approximate station 9+25. The proposed Bridge-1 is bound by Highway 321 to the west, the river to the north and south, and steep mountain terrain to the west.

3.0 EXPLORATION PROCEDURES

Exploration procedures for this project included drilling test borings at the site and laboratory testing of representative soil samples at our laboratory in Hickory, North Carolina.

3.1 Field Exploration

CVET drilled four (4) soil test borings (denoted B01 through B04) at the locations indicated on Figure 2 – Boring Location Plan in Appendix B. CVET advanced the borings on January 21, 2025, and January 22, 2025, to depths ranging from approximately 17 to 31 feet below existing ground surface (bgs). CVET personnel noted the exploration locations utilizing hand-held GPS, and these locations should be considered accurate to the degree in which they were located. We approximated boring elevations based on the provided civil drawings generated by Valor Engineering and dated August 20, 2025; therefore, the boring locations and elevations on Figure 2 and Figure 3, and the boring logs (Appendix C) should be considered approximate.

CVET performed SPT drilling with a Geoprobe track-mounted drill rig using continuous-flight hollow stem augers (HSA). We obtained soil samples by means of the split-barrel sampling procedures performed in general accordance with ASTM D1586 in which a 2-inch O.D., split-barrel sampler was driven into the soil a distance of 18 inches by means of an automatic hammer. The number of blows required to drive the sampler through the final 12-inch interval is termed the Standard Penetration Test (SPT) "N" value and is shown for each sample on the boring logs. This value can be used to provide an indication of the in-place relative density of cohesionless soils or relative consistency of cohesive soils. Note N-values presented in this report and on the individual boring logs are field measured and have not been corrected for hammer energy (presented on logs) or overburden.

CVET performed wire-line rock coring with a Geoprobe track-mounted drill rig utilizing NQ-size steel casing and a hollow steel tube (core barrel) equipped with a coring bit that collects the rock cores as the drilling progresses. We performed coring in general accordance with ASTM D2113.

CVET selected representative portions of each SPT sample, sealed them in airtight containers, and returned the samples to our laboratory in Hickory, North Carolina for classification and storage. See the individual soil test boring logs in Appendix C for more

details. Note that the soil samples will be discarded after 60 days from this report date, unless otherwise directed by Areté Engineers, PLLC.

3.2 Laboratory Testing

CVET geotechnical personnel examined and visually classified the soil in general accordance with the Unified Soil Classification System (USCS) (ASTM D2487).

4.0 SUBSURFACE CONDITIONS

The subsurface conditions at the site are described in the following paragraphs.

4.1 Site Geology

The site is located in the Blue Ridge Physiographic Province. The Blue Ridge is a deeply dissected mountainous area of numerous steep mountain ridges, intermontane basins, and valleys that intersect and give the area its rugged mountain character. The Blue Ridge contains the highest elevations and the most rugged topography in the Appalachian Mountain system of eastern North America. The North Carolina portion of the Blue Ridge is about 200 hundred miles long and ranges from 15 to 55 miles wide. The Blue Ridge consists primarily of complexly folded and faulted igneous and metamorphic rocks, which date to the Precambrian and Paleozoic eras and represent parts of the basement rock of the North American continent. Extensive weathering over time has reduced the bedrock in-place to form overburden residual soils that range from clay topsoil to sandy silts and silty sand that grade with depth back to saprolite and partially-weathered-bedrock. Based on the 1985 North Carolina Geologic Map, the site is underlain by Blowing Rock Gneiss described as: Unconformity; abundant white potassic feldspar megacrysts in finely banded biotite schist, locally calcareous; interlayered with quartz-feldspar schist, calcareous biotite schist, phyllite, black slate, calcareous quartzite, sulfidic greenstone, and siliceous tuff.

Alluvial Soil
Alluvium is a water-deposited soil material typically found near existing waterways and flood plains. These materials may be found in an unconsolidated state (loose or soft density/consistency) and can be prone to excessive settlement when loaded, or to sliding if graded to inclinations steeper than its current slope inclination.

Colluvial Soil
Colluvial soil deposits are found along and near the base of slopes and drainage ways and may be deposited by a combination of gravity, relatively slow creep, or stormwater flow. Colluvial soils typically contain variably-sized soil and rock fragments. These soil deposits are typically unstable and are also susceptible to water infiltration that may trigger slope instability.

4.2 Soils

The soil boring logs are included in Appendix C. The subsurface soils generally consist of alluvial soil and/or colluvial soil overlying bedrock. The generalized subsurface conditions are described below.

CVET encountered 3 to 4 inches of surficial topsoil in the soil test borings.

Undocumented fill soils were encountered in soil test boring B03 underlying the surficial topsoil stratum and extended to a depth of 4.0 feet below existing site grades before transitioning into alluvial soils. The fill mainly consists of sandy silt with trace organic material. The SPT-N Value within the fill soil was 6 blows per foot (bpf), indicating loose soils consistencies.

CVET encountered alluvial/colluvial soils in borings B01 and B02 directly underlying the topsoil layer and below the undocumented fill soil in test boring B03. The alluvial extended to depths of approximately 21.0 feet bgs. The alluvial/colluvial soils generally consists of silty sand (SM) with varying amounts of rock fragments and sandy silt (ML). The SPT N-Value within the cohesionless alluvial/colluvial soil ranges from 1 to greater than 50 blows per foot (bpf), indicating very loose to very dense relative soil density. The elevated blow counts are likely attributed to gravel and large boulders nested within the alluvial soils.

CVET encountered auger refusal conditions at 10 feet bgs in boring B02. This would typically indicate bedrock; however, based on the rock core recovery in boring B02 from 10 to 21 feet bgs and the proximity to the existing creek, we expect the material within this depth interval to be alluvium or colluvium.

CVET encountered residual soils from the ground surface in soil test boring B04. The residuum mainly consists of silty sand with rock fragments. The SPT N-Value within the cohesionless soil is greater than 50 blows per foot (bpf), indicating very dense relative soil density.

4.3 Partially Weathered Bedrock and Bedrock

CVET encountered partially weathered bedrock in boring B04 at a depth of 2.5 feet bgs. CVET cored auger refusal material in boring B02 and B03. We have included a summary of our rock coring efforts in the following tables. While we included coring recovery and rock quality designation (RQD) from 10 to 20 feet in boring B02, we do not consider that material to be bedrock. We have also included photographs of the rock cores in Appendix C.

Boring number	Approximate Depth to PWR (feet)	Approximate Depth to Bedrock (feet)
B01	-	17.0
B02	-	20.0
B03	-	21.0
B04	2.5	16.0

Boring number	Starting Depth (feet)	Core Length (inches)	Recovery (inches)	RQD Length (inches)
B02	10.0	60	24 (40%)	12 (20%)
B02	15.0	60	24 (40%)	0 (0%)
B02	20.0	60	26 (43%)	10 (17%)
B03	21.0	60	58 (97%)	30 (50%)
B03	26.0	60	60 (100%)	11 (18%)

4.4 Groundwater

Due to the method of coring and introduction of drill water into the coring process, we cannot comment on a stabilized groundwater depth at the time of drilling. Groundwater tends to run along the interface between residual soil and partially weathered rock and in seams of partially weathered rock and unweathered bedrock. We expect groundwater is near the Middle Fork South Fork New River water level.

Soil moisture and groundwater conditions vary depending on conditions such as temperature, precipitation, and season. Therefore, soil moisture and groundwater location at other times of the year may vary from those observed at the time of this subsurface exploration and as described in this report. If the location of the groundwater elevation is important at this site, we recommend the installation of temporary observation wells.

5.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The boring indicates the site will create challenges for the proposed bridge design and construction. The bouldery colluvial/alluvial soil is not suitable for bridge bearing. We recommend founding the bridge abutments on permanent cased drilled-in micropiles. The drilled-in foundations should be extended through any new and existing fill and existing alluvial and colluvial soils and bear within the underlying bedrock.

The following recommendations are for the construction of the proposed development based on the results of our investigation and our understanding of the project, subsurface exploration, site observations, and experience in similar geologic settings. The recommendations stated herein shall not be applied to any other project, or used in conjunction with any other recommendation, and shall be used explicitly for this project.

5.1 Site Preparation

Site preparation should consist of removing the surface layer, razing of all existing structures and their foundations, relocation or proper abandonment of any existing utilities, as applicable, along with removing all other soft or unsuitable material from proposed bridge area. All trees and accompanying root balls within the bridge abutment footprint shall be removed and backfilled with structural fill. Site preparation operations should extend a minimum of 5 feet beyond the planned limits of the abutment areas. These limits should also extend beyond the perimeter of structural fill slopes, as applicable, laterally equal the depth of necessary structural fill to achieve finished grades.

Once stripping and rough excavation has been accomplished, the exposed subgrade should be evaluated by proofrolling. Proofrolling consists of driving the appropriate equipment, typically a dump truck with axle weights of 10 or 20 tons for single and double axles respectively, over the subgrade at a walking pace. The proofrolling equipment should first make overlapping passes across the subgrade in one direction, followed by passes in a perpendicular direction. We recommend that the proofrolling be observed by the geotechnical engineer or his qualified representative. If proofrolling cannot be completed due to the constraints of the project area, we recommend the excavation face and subgrade be evaluated by the geotechnical engineer or his qualified representative before new abutment backfill is placed.

Based upon the presence of the encountered alluvial/colluvial soils and elevated groundwater elevations, areas of instability are anticipated during compaction operations. We recommend following the guidelines set forth by the site geotechnical report for earthwork, compaction and suitable backfill material.

Any unstable areas to receive structural fill within the referenced abutments shall be undercut and replaced with approved structural fill soil, as directed by CVET or a qualified geotechnical engineer. If conditions revealed during site preparation operations vary from those described in this report, the on-site geotechnical engineer shall contact the engineer of this report to discuss potential options to address the varying site conditions.

5.2 Earthwork

Based upon review of the civil site drawings, we anticipate that up to 12 feet of fill will be required to facilitate abutment construction. Site preparation and earthwork shall be in accordance with recommendations prepared by the site geotechnical engineer of

record. We recommend all new site fill and retaining walls below the abutments be placed and allowed to settle prior to micropile foundation installation (see Section 5.5) to prevent settlement-induced downdrag on the micropiles.

5.3 Groundwater Control

Due the drilling methods used to advance the subsurface tooling, we did not encounter groundwater within the depth of exploration during the time of drilling. We anticipate groundwater to be at or near the Middle Fork South Fork New River water elevation. Groundwater also tends to run along the interface between residual soil and partially weathered rock and in seams of partially weathered rock and unweathered bedrock; therefore, we anticipate groundwater control will be necessary to facilitate to new fill placement and abutment construction. Groundwater control is the purposeful drawdown of the groundwater levels to facilitate necessary construction. Temporary dewatering operations consist of well points and sump pumps, while permanent dewatering operations typically consist of French underdrains which discharge by means of gravity flow into the site storm drainage system. Temporary dewatering may also consist of temporary stream diversion either by cofferdam and/or pump-around. Deep foundation designers and contractors should also consider groundwater in the design and construction of deep foundation elements.

Note that soil moisture and groundwater conditions vary depending on conditions such as temperature, precipitation, and season. Therefore, soil moisture and groundwater location at other times of the year may vary from those observed at the time of this subsurface exploration and as described in this report.

5.4 Foundations

Given the depth of rock/boulder fill and the depth alluvial/colluvial soil, we do not expect shallow footings are a feasible foundation solution for this project. We expect the abutments will bear on a deep foundation system consisting of drilled-in micropiles socketed into the underlying bedrock.

Micropiles are typically less than 12 inches in diameter and are either cased on uncased depending on loading and subsurface conditions. Micropiles tend to be efficient for heavy axial loading conditions and with nominal lateral loading conditions. We recommend micropiles consist of a permanent casing installed through the overlying fill and overburden and socketed into the underlying bedrock. The permanent casing should also extend below the design scour depth. The pile should be reinforced with a central threaded reinforcing bar extending for the full-length of the bond zone. We recommend the central reinforcing bar be no less than 1-inch nominal diameter.

Micropiles are typically designed by the micropile drilling contractor based on their available drilling equipment and material availability. Micropiles should be designed and

constructed in accordance with applicable sections of *AASHTO LRFD Bridge Design Specifications*, latest edition and *FHWA NHI-05-039 Micropile Design and Construction Reference Manual*. We recommend utilizing a load test program that includes both pre-production verification testing and production proof testing. Load testing and acceptance criteria should follow recommendations outlined in *FHWA NHI-05-039*.

Micropiles should be spaced no closer than 3 pile diameters or 3 feet, whichever is more, from center-to-center. Lateral pile analysis should consider reduced p-y modifiers in accordance with *AASHTO LRFD Bridge Design Specifications* to account for lateral group effects. The following table may be used for soil inputs for lateral pile and group analysis. Note the depths and values presented in the following table are for soils below existing ground surface; therefore, the depths should be adjusted for grade-raised fill placement at each abutment. Parameters in the table below for new grade raised fill soils assume that the new structural fill will be tested and approved by a qualified CMT firm during placement.

Soil Type / Depth Range (bgs)	Moist Unit Weight (1) (pcf)	Cohesion, C (1) (psf)	Phi angle (1) (°)	Modulus of Horizontal Subgrade Reaction, k (1) (pci)	Uniaxial Compressive Strength, q_u (1)(psi)
Fill/Alluvial/Colluvial/Residual / 0 to 21 feet	110/47.6(2)	0	28	25/20(2)	-
PWR(3)/ 3 to 16 feet	135/72.6(2)	0	36	225/125(2)	
Bedrock / >16 feet	145/82.6(2)	-	-	-	1,000

(1) Value estimated based on published correlations and laboratory testing
(2) Value if below water table
(3) Encountered in boring B04 only

Based on the relatively poor quality of the recovered bedrock, we recommend modeling the bedrock using "Weak Rock (Reese)" p-y curve for lateral pile/group analysis. We recommend utilizing the unit weight and uniaxial compressive strength in the previous table. Additionally, we recommend utilizing initial modulus of rock mass of 50,000 psi and RQD of 15% for analysis.

We recommend the foundation designer include an analysis stage that includes high water due to flood level with and without scoured soils. Additionally, due to the toe slope below the abutments, we recommend utilizing an additional reduction of lateral resistance (in addition to p-y modifiers for lateral group effects) based on the finished slope inclination for sloping ground in front of the piles in the direction of lateral loading.

Typically, base resistance of micropiles is not considered given the relatively small end bearing area. We recommend a factor of safety of 2.0 on the ultimate bond strength if

a load testing program as described above is implemented. If a load program is not utilized, we recommend a minimum factor of safety of 3.0 on the ultimate bond strength. For preliminary sizing purposes only (not to be used for final design), we recommend a minimum bond zone length be designed with an ultimate bond strength not to exceed 50 psi bearing in bedrock. The ultimate bond strength should be confirmed by pre-production load testing. Higher bond strength may be used if pre-production testing includes a sacrificial test to bond failure or tested to a higher bond strength. We recommend a minimum bond length be no less than 10 feet into bedrock. Soil seams of six inches or less may be allowed within the bond length; but they may not be included in determining the length of the bond zone. If soil seams greater than six inches thick are encountered, logging of the bond length will begin again once competent rock is encountered. A maximum of two seams per bond zone may be allowed, with a minimum of 12 inches between seams, based on the quality of the rock in the bond zone.

5.5 Scour

Without final drawings, it is undetermined whether a scour analysis is required for the proposed bridge. Abutment foundations located near waterways will be subject to abutment scour effects as well as lateral hydraulic pressure from flowing water (with and without debris) during high water events. We understand that each bridge abutment will be below or near the 100-year flood level. We recommend that the hydraulic engineer perform a scour potential analysis to estimate the scour depth for piers and abutments. Depending on stream flows, it may be warranted to use riprap to armor the abutments against scour. Generally, we anticipate the upper 15 to 20 feet bgs (i.e., depth to top of competent rock) will likely scour. Ultimately, the design scour depth should be considered in the analysis for foundations. The foundation design should factor scour depth into analyses (i.e., axial and lateral resistance within the depth of predicted scour should be ignored). The structural engineer will also need to consider the additional unbraced length of piles/shafts due to scour and the effects of stream/debris pressure on the bridge.

5.6 Seismic Site Classification

Based on the borings, it is our opinion that a Seismic Site Classification of "C" is appropriate for this site. We based our opinion on SPT N-values and anticipated shear wave velocity of the underlying bedrock in general accordance with *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures*.

5.7 Construction Materials Testing and Special Inspections

Construction materials testing (CMT) and inspections should be performed at regular intervals throughout the course of the project. CVET is qualified for this work and would be pleased to provide these services during construction.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of Areté Engineers, PLLC and their agents for specific application to the referenced property, in accordance with generally accepted soils and foundation engineering practices. No warranties, express or implied, are intended or made. The recommendations presented in this report are based on the specific test borings and laboratory testing performed as part of our scope of service, and do not reflect variations in subsurface conditions that may exist between test boring locations or in unexplored portions of the site. Note that the soil data presented in this report is for the specific time of this subsurface exploration. While the type of material encountered in the test borings will not likely change significantly over time, the properties of the materials can and will change over time, including soil moisture content, density, consistency, SPT "N" values, etc. Fluctuations in the groundwater level can have a significant impact on the material properties, as can seasonal changes. Site safety, excavation support related to OSHA requirements, and construction dewatering requirements are the responsibility of others, not CVET. In the event changes are made to the proposed construction plans, design or location of the project as described within this report, the recommendations provided in this report shall not be considered valid unless CVET is given the opportunity to review the changes, and either verifies or modifies the recommendations contained in this report in writing.

APPENDIX A – GEOPROFESSIONAL BUSINESS ASSOCIATION PAMPHLET

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

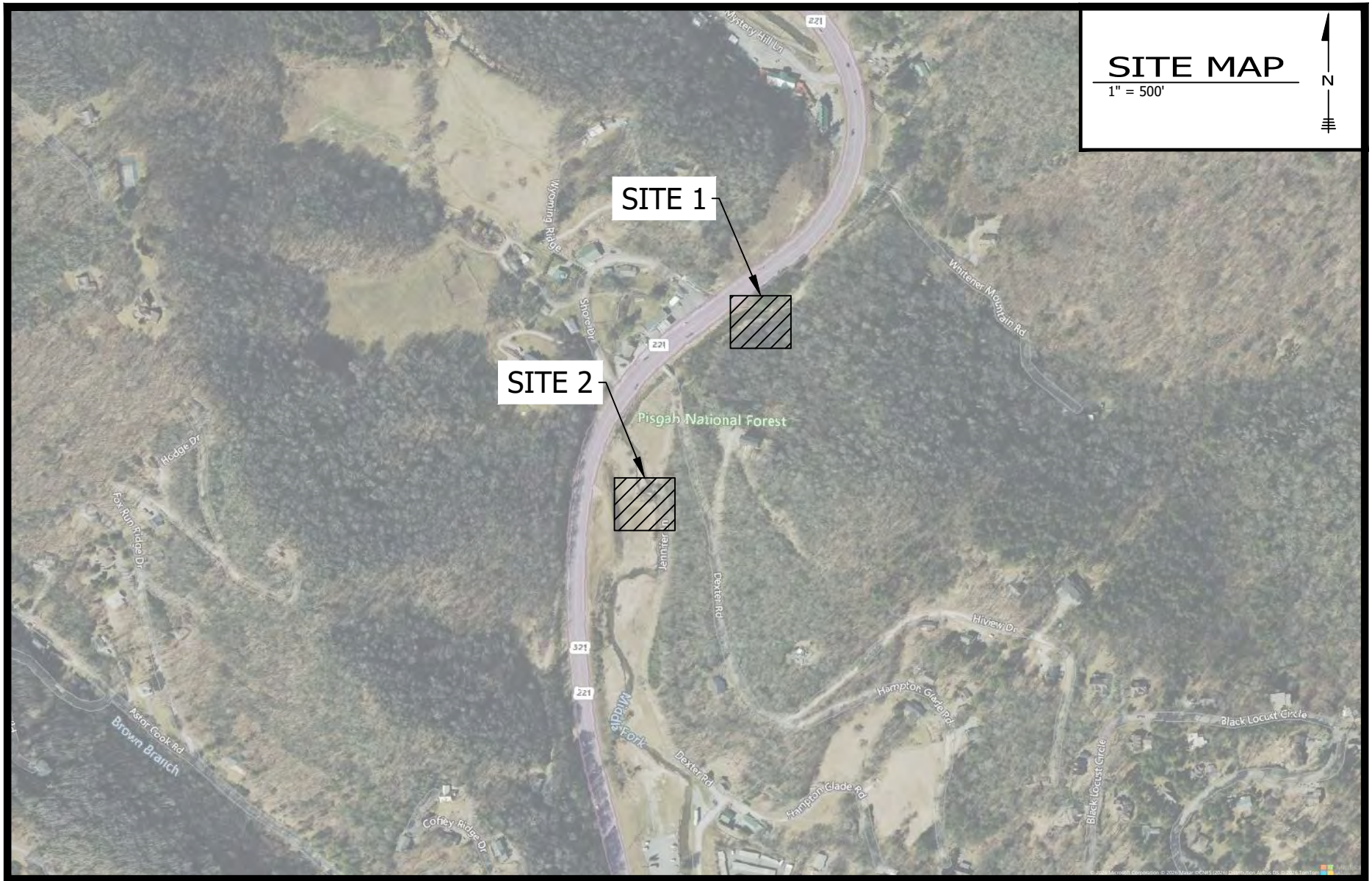
Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B – PROJECT FIGURES



CATAWBA VALLEY
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TELE: 828-578-9972

ARETE – MIDDLEFORK GREENWAY SECTION #3

HWY 321
BLOWING ROCK, NC 28605

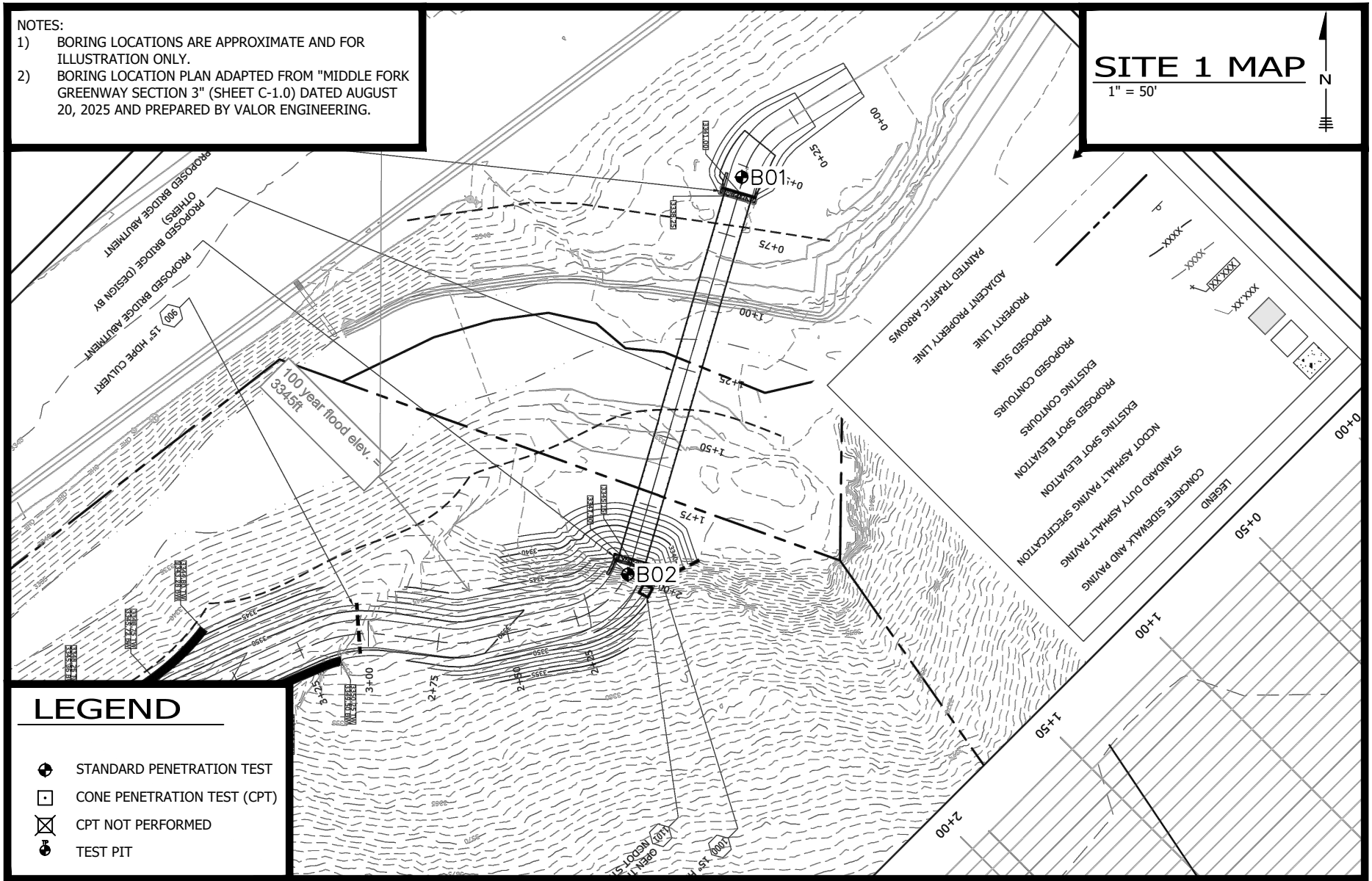
DRAWN BY	PROJECT NO.
SBS	25-626
DATE	SHEET NO.
01/21/2026	FIG. 1

NOTES:
1) BORING LOCATIONS ARE APPROXIMATE AND FOR ILLUSTRATION ONLY.
2) BORING LOCATION PLAN ADAPTED FROM "MIDDLE FORK GREENWAY SECTION 3" (SHEET C-1.0) DATED AUGUST 20, 2025 AND PREPARED BY VALOR ENGINEERING.

SITE 1 MAP

1" = 50'

N



LEGEND

- STANDARD PENETRATION TEST
- CONE PENETRATION TEST (CPT)
- CPT NOT PERFORMED
- TEST PIT

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ARETE – MIDDLEFORK GREENWAY SECTION #3

HWY 321
BLOWING ROCK, NC 28605

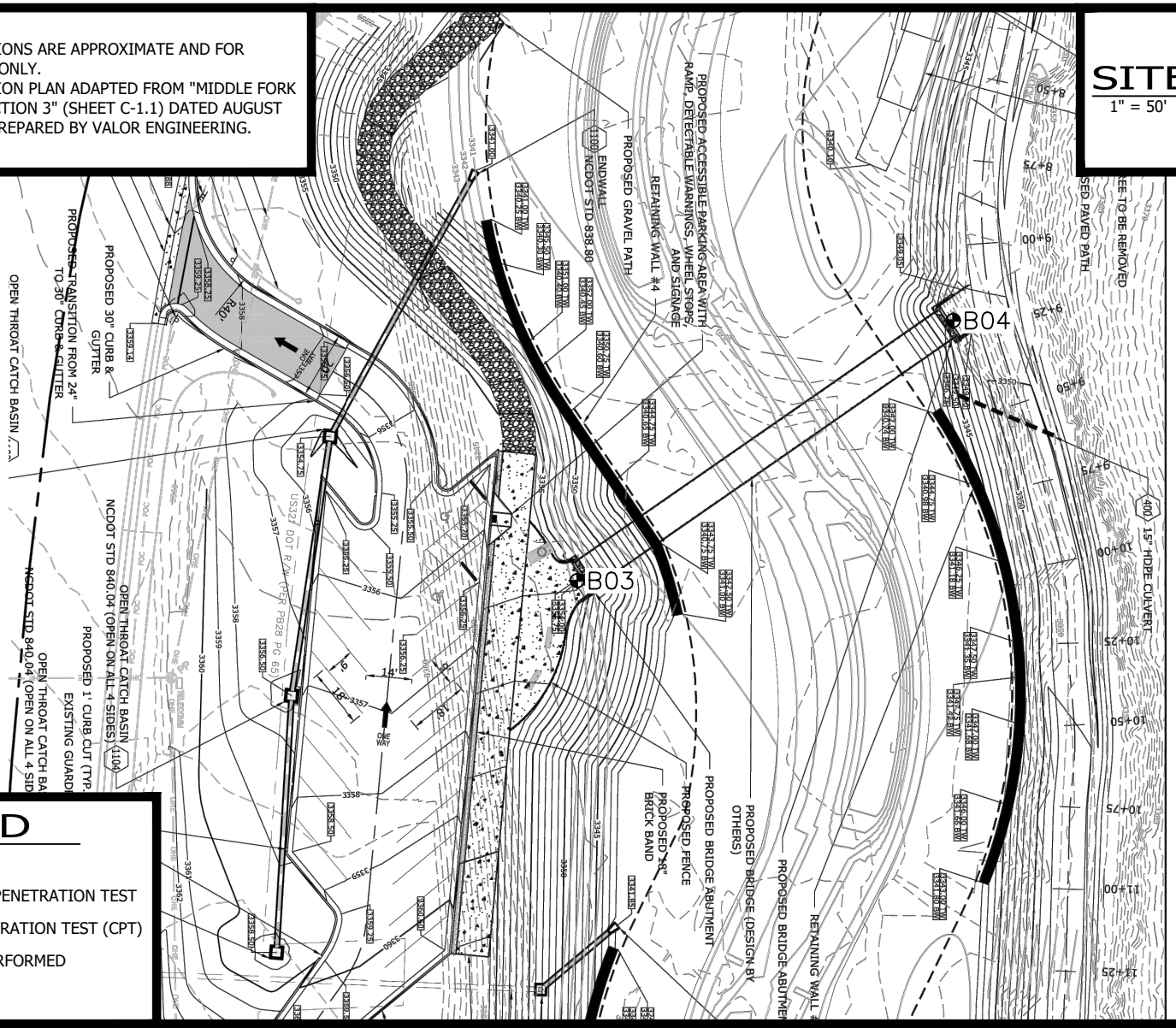
DRAWN BY	PROJECT NO.
SBS	25–626
DATE	SHEET NO.
01/21/2026	FIG. 2A

NOTES:
1) BORING LOCATIONS ARE APPROXIMATE AND FOR ILLUSTRATION ONLY.
2) BORING LOCATION PLAN ADAPTED FROM "MIDDLE FORK GREENWAY SECTION 3" (SHEET C-1.1) DATED AUGUST 20, 2025 AND PREPARED BY VALOR ENGINEERING.

SITE 2 MAP

1" = 50'

N



LEGEND

- STANDARD PENETRATION TEST
- CONE PENETRATION TEST (CPT)
- CPT NOT PERFORMED

CATAWBA VALLEY ENGINEERING & TESTING

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ARETE – MIDDLEFORK GREENWAY SECTION #3

HWY 321
BLOWING ROCK, NC 28605

DRAWN BY	PROJECT NO.
SBS	25-626
DATE	SHEET NO.
01/21/2026	FIG. 2B

Description	Elevation	Northing	Easting
B01	3338	887957.50	1219471.54
B02	3336	887816.66	1219431.15
B03	3344	887207.69	1218976.69
B04	3349	887286.89	1219091.18

BORING LOCATIONS AND ELEVATIONS ARE APPROXIMATE. BORING ELEVATIONS ARE ADAPTED FROM "MIDDLE FORK GREENWAY SECTION 3" (SHEETS C–1.0 AND C–1.1) DATED AUGUST 20, 2025 AND PREPARED BY VALOR ENGINEERING.

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ARETE – MIDDLEFORK GREENWAY SECTION #3

HWY 321
BLOWING ROCK, NC 28605

DRAWN BY	PROJECT NO.
SBS	25–626
DATE	SHEET NO.
01/21/2026	FIG. 3

APPENDIX C – BORING LOGS

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressure meter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HSA	Hollow Stem Auger	WS	Wash Sample
REC	Rock Sample Recovery %	RQD	Rock Quality Designation %

II. Correlation of Penetration Resistance to Soil Properties

Standard penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler, as specified in ASTM D 1586. The blow count is commonly referred to as the N-value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

Density	*Adjective Form*
Under 4 blows/ft	Very Loose
5 to 10 blows/ft	Loose
11 to 30 blows/ft	Medium Dense
31 to 50 blows/ft	Dense
Over 51 blows/ft	Very Dense

Particle Size Identification		
Boulders		8 inches and larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch
	Medium	0.42 to 2.0 mm
	Fine	0.074 to 0.42 mm
Silt and Clay		0.0 to 0.074 mm

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to Slight	0-4
3 to 4	Soft	0.25-0.49	Slight	5-7
5 to 8	Medium Stiff	0.50-0.99	Medium	8-22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
31 to 50	Hard	4.00-8.00		
Over 51	Very Hard	Over 8.00		

III. Water Level Measurement Symbols

WL Water Level	BCR Before Casing Removal	DCI Dry Cave-in
WS While Sampling	ACR After Casing Removal	WCI Wet Cave-in
WD While Drilling	▽ Est. Groundwater Level	▽ Est. Seasonal High GWT

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

KEY TO SYMBOLS

CATAWBA VALLEY ENGINEERING & TESTING
1490 S. Center St./PO Box 747 Hickory, NC 28603 828 578 9972

CLIENT Arete Engineers
PROJECT NAME Middle Fork Greenway Seciton 3
PROJECT NUMBER 25-626
PROJECT LOCATION Blowing Rock, North Carolina

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


ALLUVIAL: Alluvial Soil


ALLUVIAL/FILL: Alluvial material/ also has Fill (made ground) characteristics


BEDROCK: Bedrock


PWR: Partially Weathered Rock


SM: USCS Silty Sand


STONE: Stone


TOPSOIL: Topsoil

SAMPLER SYMBOLS


Rock Core


Split Spoon

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

CATAWBA VALLEY ENGINEERING & TESTING
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BORING NUMBER B01

CLIENT Arete Engineers
PROJECT NAME Middle Fork Greenway Seciton 3
PROJECT NUMBER 25-626
PROJECT LOCATION Blowing Rock, North Carolina
DATE STARTED 1/21/26 **COMPLETED** 1/21/26
GROUND ELEVATION 3338 ft MSL **HOLE SIZE** 2.25 inches
DRILLING CONTRACTOR CVET
GROUND WATER LEVELS:
DRILL RIG NUMBER 3 **HAMMER EFFICIENCY** 93%
TIME OF BORING ---
DRILLING METHOD 2.25 Hollow Stem Auger
END OF BORING ---
LOGGED BY RP **CHECKED BY** CBD
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PLASTICITY INDEX	MOISTURE CONTENT
0	TOPSOIL (3") 3337.8 (SM) ALLUVIAL: Silty Sand with Varying Size Rock Fragments, Grey, Brown, Wet, Medium Dense	SS 1	0	2-1-1 (2)		
		SS 2	83	1-3-8 (11)		
5		SS 3	83	9-12-10 (22)		
	3329.5 (SM) ALLUVIAL: Silty SAND with Lesser Gravel and Trace Organics, Grey, Tan, Moist, Very Dense	SS 4	100	40-50/1"		
10						
		SS 5	100	50/1"		
15						
	3321.0 Refusal at 17.0 feet. Bottom of borehole at 17.0 feet.	SS 6		50/0"		

▲ SPT N VALUE ▲
20 40 60 80

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BORING NUMBER B02

CLIENT Arete Engineers
PROJECT NAME Middle Fork Greenway Seciton 3
PROJECT NUMBER 25-626
PROJECT LOCATION Blowing Rock, North Carolina
DATE STARTED 1/21/26 **COMPLETED** 1/22/26
GROUND ELEVATION 3336 ft MSL **HOLE SIZE** 2.25 inches
DRILLING CONTRACTOR CVET
GROUND WATER LEVELS:
DRILL RIG NUMBER 3 **HAMMER EFFICIENCY** 93%
TIME OF BORING ---
DRILLING METHOD 2.25 Hollow Stem Auger
END OF BORING ---
LOGGED BY RP **CHECKED BY** CBD
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PLASTICITY INDEX	MOISTURE CONTENT	▲ SPT N VALUE ▲
0		TOPSOIL (4") 3335.7						
		(SM) ALLUVIAL: Silty SAND with Large ROck Fragements, Brown, Tan, Grey, Wet, Very Loose to Very Dense	SS 1	50	0-1-0 (1)			
			SS 2	39	3-4-7 (11)			
5			SS 3	78	19-16-20 (36)			
			SS 4	100	50/2"			>>
10		3326.0						
		ALLUVIAL: Boulders and Cobbles	RC 1	40 (20)				
15		3321.0						
		ALLUVIAL: Boulders and Cobbles	RC 2	40 (0)				
20		3316.0						
		BEDROCK: Recovery = 26 inches (43%) RQD = 10 inches (17%) Poor Quality	RC 3	43 (17)				
25		3311.0						

Refusal at 10.0 feet.
Bottom of borehole at 25.0 feet.

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BORING NUMBER B03

CLIENT Arete Engineers
PROJECT NAME Middle Fork Greenway Seciton 3
PROJECT NUMBER 25-626
PROJECT LOCATION Blowing Rock, North Carolina
DATE STARTED 1/21/26 **COMPLETED** 1/22/26
GROUND ELEVATION 3344 ft MSL **HOLE SIZE** 2.25 inches
DRILLING CONTRACTOR CVET
GROUND WATER LEVELS:
DRILL RIG NUMBER 3 **HAMMER EFFICIENCY** 93%
TIME OF BORING ---
DRILLING METHOD 2.25 Hollow Stem Auger
END OF BORING ---
LOGGED BY RP **CHECKED BY** CBD
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)
0	TOPSOIL (3") 3343.8			
	(ML) FILL/ALLUVIAL: Sandy SILT with Trace Organics, Dark-Brown, Black, Dry, Loose	SS 1	83	3-3-3 (6)
	3340.0	SS 2	78	6-11-10 (21)
5	(SM) ALLUVIAL: Silty SAND with Large Rock Fragments, Tan, Brown, Black, Wet, Medium Dense to Very Dense	SS 3	83	6-8-13 (21)
		SS 4	100	47-50/2"
10				
		SS 5	100	50/5"
15				
		SS 6	100	50/5"
20	3323.0			
	BEDROCK: Recovery = 58 inches (97%) RQD = 36 inches (60%) Fair Quality	SS 7 RC 1	97 (50)	50/0"
25	3318.0			
	BEDROCK: Recovery = 60 inches (100%) RQD = 11 inches (18%) Poor Quality	RC 2	100 (18)	
30	3313.0			

▲ SPT N VALUE ▲
20 40 60 80
>>
>>
>>

Refusal at 21.0 feet.
Bottom of borehole at 31.0 feet.

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BORING NUMBER B04

CLIENT Arete Engineers
PROJECT NAME Middle Fork Greenway Seciton 3
PROJECT NUMBER 25-626
PROJECT LOCATION Blowing Rock, North Carolina
DATE STARTED 1/21/26 **COMPLETED** 1/21/26
GROUND ELEVATION 3349 ft MSL **HOLE SIZE** 2.25 inches
DRILLING CONTRACTOR CVET
GROUND WATER LEVELS:
DRILL RIG NUMBER 3 **HAMMER EFFICIENCY** 93%
TIME OF BORING ---
DRILLING METHOD 2.25 Hollow Stem Auger
END OF BORING ---
LOGGED BY RP **CHECKED BY** CBD
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PLASTICITY INDEX	MOISTURE CONTENT	▲ SPT N VALUE ▲
0		STONE (3") 3348.8						
		(SM) RESIDUAL: Silty SAND with Gravel, Grey, Tan, Dry, Very Dense	SS 1	100	27-41-50/5"			>>
		3346.5 (SM) PARTIALLY WEATHERED BEDROCK: Silty SAND with Large Rock Fragments, Tan, Grey, Dry	SS 2	100	50/5"			>>
5			SS 3	100	50/1"			>>
			SS 4	100	50/1"			>>
10								
			SS 5	100	50/1"			>>
15		3333.0						
		Refusal at 16.0 feet. Bottom of borehole at 16.0 feet.	SS 6		50/0"			>>

20 40 60 80

Project Name: Arete Middle Fork Greenway Section #3
Location: Blowing Rock, NC
CVET Project No.: 25-626

Photograph 1 – Boring B02, 10 feet to 25 feet bgs

Photograph 2 –Boring B03, 21 feet to 31 feet bgs