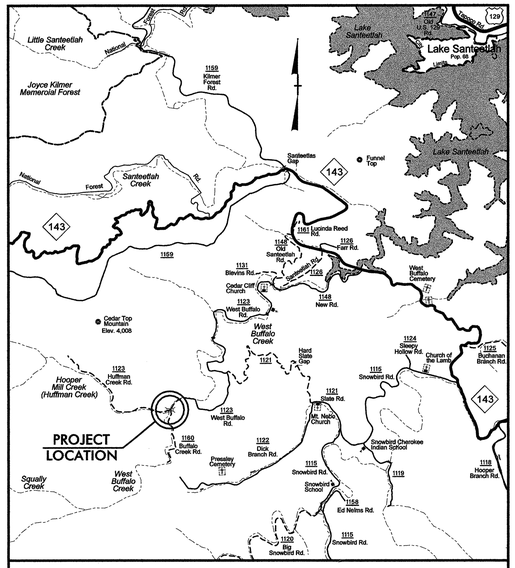
09/08/09

TIP PROJECT: B-4123

CONTRACT: C202261

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Symbology



VICINITY MAP (N.T.S.)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

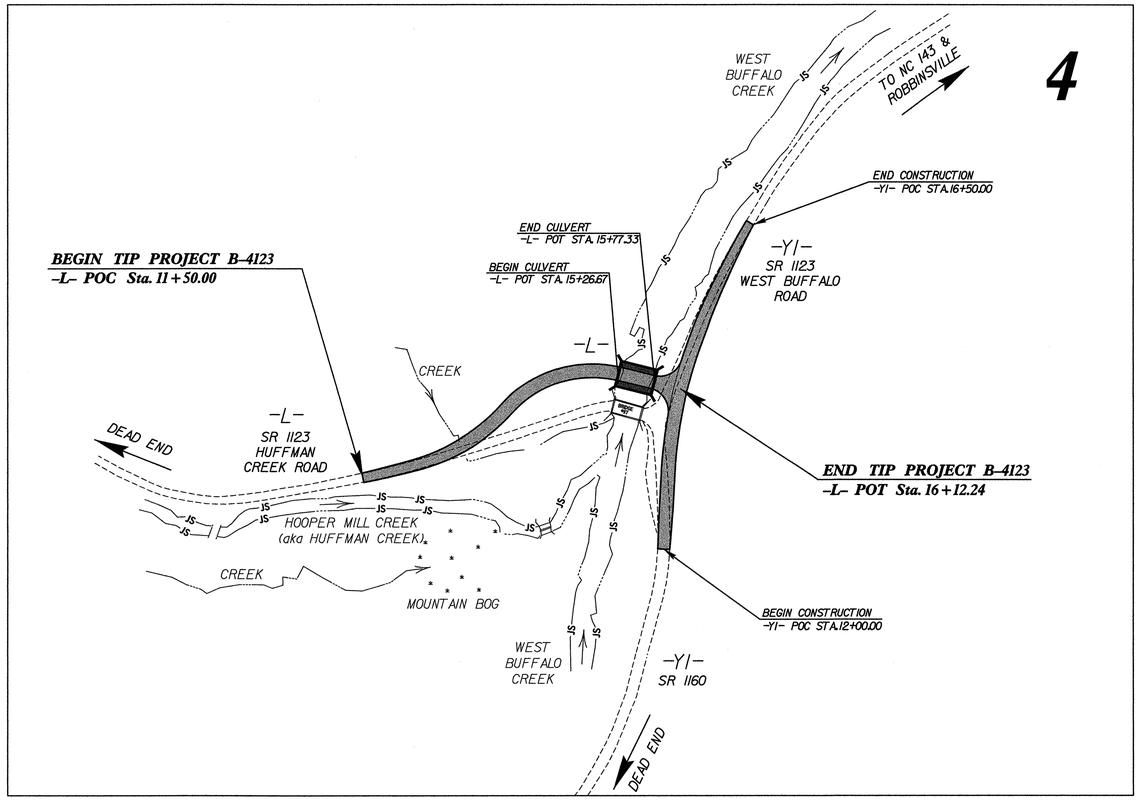
GRAHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4123	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33476.1.1	BRZ-1123 (9)	PE
33476.3.1	BRZ-1123 (9)	R/W, UTILITIES
33476.2.1	BRZ-1123 (9)	CONSTRUCTION

LOCATION: BRIDGE NO. 117 OVER WEST BUFFALO CREEK ON SR 1123 (HUFFMAN CREEK RD.)

TYPE OF WORK: GRADING, DRAINAGE, AND CULVERT



NAD 83/95 NC GRID

NCDOT CONTACT:

MR. DOUG TAYLOR, PE – ENGINEERING COORDINATION – PROJECT ENGINEER – ROADWAY DESIGN UNIT

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2009 = 135
ADT 2029 = 220
DHV = 10 %
D = 60 %
T = 3 % *
V = 25 MPH
* (TTST 1% + DUAL 2%)
FUNC. CLASS = RURAL LOCAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4123	=	*0.078 mile*
LENGTH STRUCTURES TIP PROJECT B-4123	=	*0.010 mile*
TOTAL LENGTH TIP PROJECT B-4123	=	*0.088 mile*

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
By:

M A Engineering Consultants, Inc.
598 East Chatham Street - Suite 137
Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 19, 2008

LETTING DATE:
FEBRUARY 16, 2010

ROBERT W. PORTER, JR PE
PROJECT ENGINEER

KEVIN S. HUTCHENS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21656 ENGINEER ROGER S. WEAKLEY

SIGNATURE: 11/24/09 P.E.

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 19814 ENGINEER ROBERT W. PORTER, JR.

11/24/2009
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

P.E.
STATE HIGHWAY DESIGN ENGINEER

11/19/2009
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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-4123	1-A

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19814 ENGINEER ROBERT W. PORTER, JR.
11-24-09

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

GENERAL NOTES:

2006 SPECIFICATIONS
EFFECTIVE: 07-18-06
REVISED: 07-30-08

GRADING AND SURFACING OR RESURFACING AND WIDENING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

UNDERDRAINS:

UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER.

GUARDRAIL:

THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC NOT SHOWN ON THE PLANS WILL BE PAID FOR AT THE CONTRACT PRICE FOR "TEMPORARY SHORING".

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE:
Power - Duke Power
Telephone - Verizon

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS.

2006 ROADWAY ENGLISH STANDARD DRAWINGS

EFF. 07-18-06
REV. 01-02-07

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated July 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
310.10	Driveway Pipe Construction
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
815.03	Pipe Underdrain and Blind Drain
862.01	Guardrail Placement
862.02	Guardrail Installation
876.02	Guide for Rip Rap at Pipe Outlets

INDEX OF SHEETS

11/9/2009
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3/15/06

PROJECT REFERENCE NO.	SHEET NO.
B-4123	1-B

Note: Not to Scale

****S.U.E. = Subsurface Utility Engineering***

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Proposed Wheel Chair Ramp Curb Cut — WCC
- Curb Cut for Future Wheel Chair Ramp — CCFR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

PROJECT REFERENCE NO.	SHEET NO.
B-4123	1-C
Location and Surveys	

SURVEY CONTROL SHEET B-4123

BL POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
BL1	BL-1	603830.8280	534413.0910	2124.70	OUTSIDE PROJECT LIMITS	
BL2	BL-2	603877.3190	534755.9020	2114.89	12+50.72	12.49 RT
BL3	BL-3	603976.9470	535047.3050	2113.02	15+86.78	8.90 RT
BL4	BL-4	604255.3970	535192.1930	2103.81	OUTSIDE PROJECT LIMITS	
BL5	BL-5	604441.9190	535371.1430	2100.46	OUTSIDE PROJECT LIMITS	

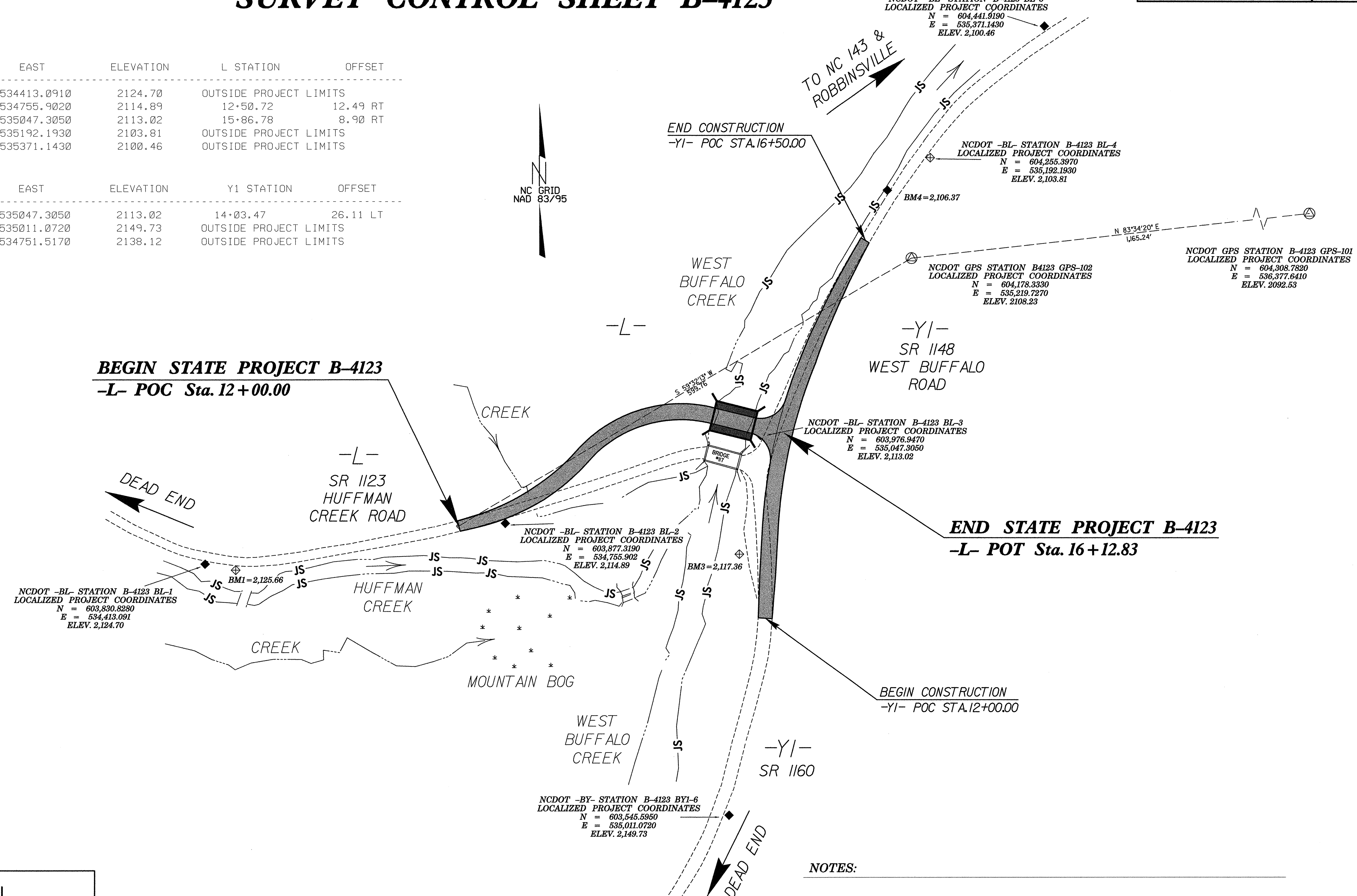
BY1 POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
BY133	BL-3	603976.9470	535047.3050	2113.02	14+03.47	26.11 LT
BY16	BY1-6	603545.5950	535011.0720	2149.73	OUTSIDE PROJECT LIMITS	
BY17	BY1-7	603210.4960	534751.5170	2138.12	OUTSIDE PROJECT LIMITS	

BM1 ELEVATION = 2125.66
N 603824 E 534448
L STATION 10+00
S 77° 54' 55.4" W DIST 59.73
8 INCH SPIKE SET IN 30 INCH PINE

BM2 ELEVATION = 2140.54
N 603335 E 534763
L STATION 11+50 539 RIGHT
8 INCH SPIKE SET IN 30 INCH HEMLOCK

BM3 ELEVATION = 2117.36
N 603842 E 535023
Y1 STATION 12+71 34 LEFT
8 INCH SPIKE SET IN 20 INCH POPLAR

BM4 ELEVATION = 2106.37
N 604292 E 535241
Y1 STATION 17+32
N 45° 16' 53.7" E DIST 37.39
8 INCH SPIKE SET IN 36 INCH RED OAK



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B-4123 "GPS-102" WITH NAD 83/95 STATE PLANE GRID COORDINATES OF NORTHING: 604,178.3330(ft) EASTING: 535,219.7270(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99978044 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B-4123 "GPS-102" TO -L- STATION 12+00.00 IS S 59°32'13" W 599.76' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

BM2=2,140.54

NCDOT -BY- STATION B-4123 BY-7
LOCALIZED PROJECT COORDINATES
N = 603,210.4960
E = 534,751.5170
ELEV. 2,138.12

NOTE: DRAWING NOT TO SCALE

NOTES:

1. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

THE FILES TO BE FOUND ARE AS FOLLOWS:
B4123_LS_CONTROL_080807.TXT
B4123_LS_1C_080807.DGN

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

(triangle symbol) INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

8/2/99

PAVEMENT SCHEDULE	
J	PROPOSED 10" AGGREGATE BASE COURSE
T	EARTH MATERIAL

PAVEMENT EDGE SLOPES AND TRENCH SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

PROJECT REFERENCE NO.	SHEET NO.
B-4123	2
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 19814 ENGINEER ROBERT W. PORTER, JR.

11-24-09

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22898 ENGINEER CLARK S. MORRISON

11/30/09

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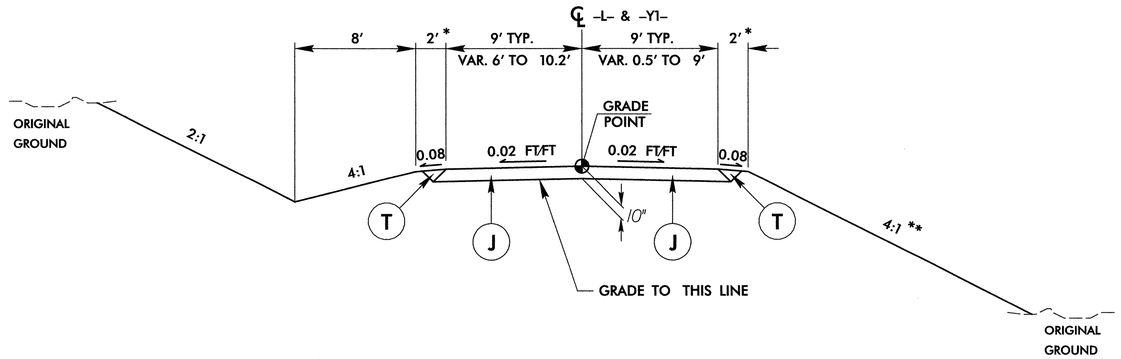
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221



TYPICAL SECTION NO. 1

FROM -L- STA. 11+50.00 TO STA. 16+03.24

FROM -Y1- STA. 12+00.00 TO STA. 16+50.00

NOTES

* – 7' WITH GUARDRAIL (FACE GR MIN. 4' FROM EOP)
** – TYPICAL (SEE CROSS SECTIONS FOR VAR. 2:1 TO 6:1 SLOPE LOCATIONS)

11/9/2009
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PROJECT REFERENCE NO.	SHEET
B-4123	2-A

GEOTECHNICAL ENGINEER

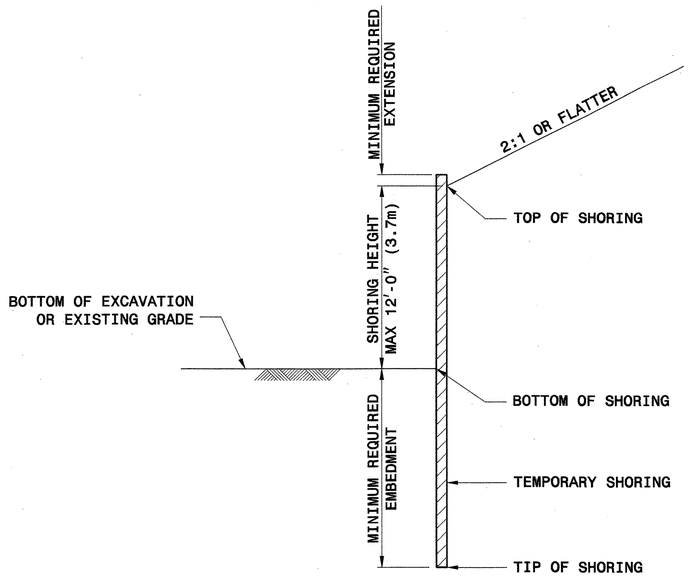
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A HIDDEN

scott a. hidden 3/29/07

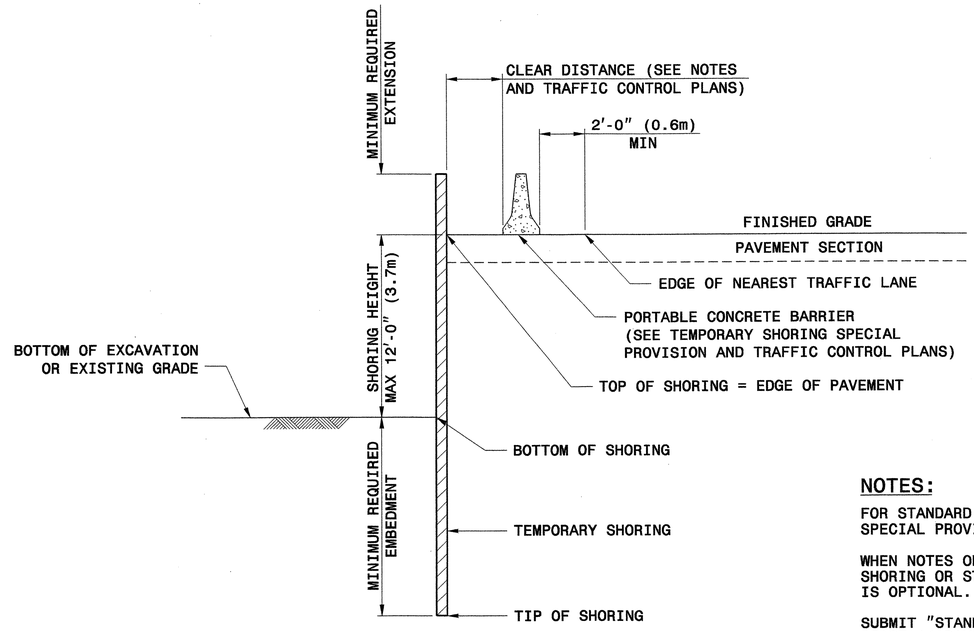
SIGNATURE DATE

ENGINEER

SIGNATURE DATE



SLOPE CASE



SURCHARGE CASE

GROUNDWATER CONDITION	SHORING HEIGHT FT (m)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H PILES WITH TIMBER LAGGING			SHEET PILES		H PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT FT (m)	MINIMUM REQUIRED SECTION MODULUS IN^3/FT (cm^3/m)	MINIMUM REQUIRED EMBEDMENT FT (m)			MINIMUM REQUIRED EMBEDMENT FT (m)	MINIMUM REQUIRED SECTION MODULUS IN^3/FT (cm^3/m)	MINIMUM REQUIRED EMBEDMENT FT (m)		
				HP 10x42 (HP 250x62)	HP 12x53 (HP 310x79)	HP 14x73 (HP 360x108)			HP 10x42 (HP 250x62)	HP 12x53 (HP 310x79)	HP 14x73 (HP 360x108)
GROUNDWATER ELEVATION BELOW TIP OF SHORING	< 6 (1.8)	7.5 (2.3)	3.0 (161)	8.0 (2.4)	8.0 (2.4)	8.0 (2.4)	11.0 (3.4)	10.0 (538)	9.5 (2.9)	9.5 (2.9)	9.5 (2.9)
	7 (2.1)	8.5 (2.6)	4.5 (242)	9.5 (2.9)	9.5 (2.9)	9.5 (2.9)	12.0 (3.7)	12.0 (645)	10.5 (3.2)	10.5 (3.2)	10.5 (3.2)
	8 (2.4)	10.0 (3.0)	6.5 (349)	10.5 (3.2)	10.5 (3.2)	10.5 (3.2)	12.5 (3.8)	14.0 (753)	11.5 (3.5)	11.5 (3.5)	11.5 (3.5)
	9 (2.7)	11.0 (3.4)	9.5 (511)	--	12.0 (3.7)	12.0 (3.7)	13.5 (4.1)	16.5 (887)	--	12.5 (3.8)	12.5 (3.8)
	10 (3.0)	12.5 (3.8)	13.0 (699)	--	--	13.5 (4.1)	14.0 (4.3)	19.5 (1048)	--	13.5 (4.1)	13.5 (4.1)
	11 (3.4)	13.5 (4.1)	17.0 (914)	--	--	14.5 (4.4)	15.0 (4.6)	22.5 (1210)	--	--	14.5 (4.4)
	12 (3.7)	15.0 (4.6)	21.5 (1156)	--	--	16.0 (4.9)	16.0 (4.9)	25.5 (1371)	--	--	15.5 (4.7)
GROUNDWATER ELEVATION BEWTEEN BOTTOM OF SHORING AND TIP OF SHORING	< 6 (1.8)	11.5 (3.5)	4.5 (242)	11.5 (3.5)	11.5 (3.5)	11.5 (3.5)	16.0 (4.9)	12.0 (645)	13.0 (4.0)	13.0 (4.0)	13.0 (4.0)
	7 (2.1)	13.0 (4.0)	7.0 (376)	13.0 (4.0)	13.0 (4.0)	13.0 (4.0)	17.0 (5.2)	14.5 (780)	14.5 (4.4)	14.5 (4.4)	14.5 (4.4)
	8 (2.4)	15.0 (4.6)	10.0 (538)	--	15.0 (4.6)	15.0 (4.6)	18.0 (5.5)	17.0 (914)	--	15.5 (4.7)	15.5 (4.7)
	9 (2.7)	17.0 (5.2)	14.0 (753)	--	17.0 (5.2)	17.0 (5.2)	19.0 (5.8)	20.0 (1075)	--	17.0 (5.2)	17.0 (5.2)
	10 (3.0)	18.5 (5.6)	19.5 (1048)	--	--	18.5 (5.6)	20.0 (6.1)	23.5 (1263)	--	--	18.5 (5.6)
	11 (3.4)	20.5 (6.3)	26.0 (1398)	--	--	--	21.0 (6.4)	28.0 (1505)	--	--	20.0 (6.1)
	12 (3.7)	22.5 (6.9)	33.0 (1774)	--	--	--	22.0 (6.7)	33.0 (1774)	--	--	21.5 (6.6)

NOTE: MINIMUM REQUIRED EXTENSION IS 6" (150mm) FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" (800 mm) FOR "SURCHARGE CASE WITH TRAFFFIC IMPACT".

NOTES:

FOR STANDARD TEMPORARY SHORING, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT STANDARD TEMPORARY SHORING OR STANDARD SHORING, STANDARD TEMPORARY SHORING IS OPTIONAL.

SUBMIT "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 14 DAYS BEFORE BEGINNING SHORING CONSTRUCTION. UP TO THREE LOCATIONS MAY BE INCLUDED ON EACH SELECTION FORM.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING CONDITIONS:
1) MAXIMUM SHORING HEIGHT IS 12'-0" (3.7m).
2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
3) BOTTOM OF EXCAVATION OR EXISTING GRADE IN FRONT OF SHORING IS 6:1 (H:V) SLOPE OR FLATTER.
4) H PILE SPACING IS 6'-0" (1.8m).
5) H PILE EMBEDMENT DEPTHS ARE FOR DRIVEN PILES.
6) TIMBER LAGGING IS A MINIMUM OF 3" (75mm) THICK.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M^3)
FRICTION ANGLE = 30 DEGREES
COHESION = 0 PSF (0 KPA)
GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE THE BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT WITHIN THE EMBEDMENT DEPTH.

VERIFY GROUNDWATER ELEVATION BEFORE BEGINNING SHORING CONSTRUCTION.

IF THE CLEAR DISTANCE AVAILABLE IS LESS THAN THE MINIMUM REQUIRED IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS, SET THE BARRIER AGAINST THE TRAFFIC SIDE OF THE SHORING AND USE THE "SURCHARGE CASE WITH TRAFFIC IMPACT".

AT THE CONTRACTOR'S OPTION, H PILE EMBEDMENT DEPTHS FOR PILES SET IN DRILLED HOLES MAY BE REDUCED BY 25%. FOR PILE EXCAVATION, SEE TEMPORARY SHORING SPECIAL PROVISION.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF THE SHORING. COLLECT AND DIRECT RUNOFF AWAY FROM SHORING.

CONTACT THE ENGINEER IF MINIMUM REQUIRED EMBEDMENT IS NOT ACHIEVED.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 2-20-07

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-B

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

STANDARD TEMPORARY MSE WALL OPTIONS

TEMPORARY MSE WALL OPTION	VENDOR	CONTACT INFORMATION	REINFORCEMENT TYPE	SHEETS
TEMPORARY FABRIC WALL	N/A	N/A	POLYESTER OR POLYPROPYLENE FABRIC	3
HILFIKER TEMPORARY WALL	HILFIKER RETAINING WALLS	1902 HILFIKER LANE, EUREKA, CA 95503-5711 707-443-5093 WWW.HILFIKER.COM	WELDED WIRE MAT	4
SIERRASCAPE TEMPORARY WALL	TENSAR EARTH TECHNOLOGIES, INC	5883 GLENRIDGE DRIVE, SUITE 200 ATLANTA, GA 30328-5363 404-250-1290 WWW.TENSARCORP.COM	GEOGRID	5
RETAINED EARTH TEMPORARY WALL	THE REINFORCED EARTH COMPANY	8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM	WELDED WIRE MESH	6-8
TERRATREL TEMPORARY WALL	THE REINFORCED EARTH COMPANY	8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM	RIBBED STEEL STRIPS	9-11

FOR STANDARD TEMPORARY MSE WALLS, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT TEMPORARY MSE WALLS OR STANDARD SHORING, STANDARD TEMPORARY MSE WALLS ARE OPTIONAL.

WHEN NOTES ON PLANS REQUIRE TEMPORARY MSE WALLS, USE STANDARD TEMPORARY MSE WALLS OR CONTRACTOR DESIGNED TEMPORARY MSE WALLS.

WHEN THE ALIGNMENT OF STANDARD TEMPORARY MSE WALLS RESULTS IN AN INTERIOR ANGLE LESS THAN 90 DEGREES, SUBMIT AN ACUTE CORNER DETAIL FOR THE SPECIFIC SITUATION IN ACCORDANCE WITH THE WALL VENDOR RECOMMENDATIONS. ALSO, SUBMIT A "STANDARD TEMPORARY MSE WALL SELECTION FORM" FOR EACH TEMPORARY MSE WALL LOCATION. SUBMIT THESE ITEMS AT LEAST 14 DAYS BEFORE BEGINNING WALL CONSTRUCTION.

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING CONDITIONS:
1) MAXIMUM WALL HEIGHT IS 28′-0″ (8.5m).
2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
3) EXISTING OR FINISHED GRADE IN FRONT OF WALL IS 6:1 (H:V) SLOPE OR FLATTER.
4) THE GRADE OF THE TOP OF WALL IS LESS THAN 4% FOR RETAINED EARTH AND TERRATREL TEMPORARY WALLS.
5) DESIGN SERVICE LIFE IS 3 YEARS.
6) MATERIAL IN REINFORCED ZONE IS SHORING BACKFILL.
7) MAXIMUM APPLIED BEARING PRESSURE IS 1 TSF (100 KPA) FOR WALL HEIGHTS UP TO 8′-0″ (2.4m), 2 TSF (195 KPA) FOR WALL HEIGHTS BETWEEN 8′-0″ AND 18′-0″ (2.4m AND 5.5m) AND 3 TSF (290 KPA) FOR WALL HEIGHTS OVER 18′-0″ (5.5m).

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMMED SOIL PARAMETERS:
TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M^3)
FRICTION ANGLE = 30 DEGREES
COHESION = 0 PSF (0 KPA)
GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF REINFORCED ZONE.

DO NOT USE STANDARD TEMPORARY MSE WALLS WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT BELOW THE BOTTOM OF REINFORCED ZONE.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF STANDARD TEMPORARY MSE WALLS. COLLECT AND DIRECT RUNOFF AWAY FROM WALLS AND SHORING BACKFILL.

EXCAVATE AS NECESSARY FOR STANDARD TEMPORARY MSE WALLS IN ACCORDANCE WITH THE FOLLOWING FOR THE WALL OPTION CHOSEN:
1) MINIMUM EMBEDMENT OF 18″ (450mm) UNLESS WALL BEARS ON ROCK, CONCRETE OR PAVEMENT AS DETERMINED BY THE ENGINEER
2) VERTICAL STEPS IN INCREMENTS EQUAL TO THE VERTICAL REINFORCEMENT SPACING
3) WITH THE EXCEPTION OF EITHER THE FIRST OR LAST SECTION OF WALL, HORIZONTAL SECTION LENGTHS IN INCREMENTS EQUAL TO THE FOLLOWING:

STANDARD TEMPORARY MSE WALL OPTION	INCREMENT
TEMPORARY FABRIC WALL	9′-0″ (2.7m) MIN (VARIES)
HILFIKER TEMPORARY WALL	10′-0″ (3.0m) MIN (VARIES)
SIERRASCAPE TEMPORARY WALL	18′-7¼″ (5.7m)
RETAINED EARTH TEMPORARY WALL	24′-0″ (7.3m)
TERRATREL TEMPORARY WALL	19′-8″ (6.0m)

DO NOT PLACE SHORING BACKFILL OR FIRST REINFORCEMENT LAYER UNTIL OBTAINING APPROVAL OF THE EXCAVATION DEPTH AND FOUNDATION MATERIAL.

IF APPLICABLE, INSTALL FOUNDATIONS LOCATED WITHIN THE REINFORCED ZONE BEFORE BEGINNING WALL CONSTRUCTION UNLESS DIRECTED OTHERWISE BY THE ENGINEER.

ERECT AND MAINTAIN FACINGS AND FORMS AS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS. STAGGER VERTICAL JOINTS OF FACINGS AND FORMS TO CREATE A RUNNING BOND WHEN POSSIBLE UNLESS SHOWN OTHERWISE ON THESE DETAILS.

PLACE FACINGS AND FORMS AS NEAR TO VERTICAL AS POSSIBLE WITH NO NEGATIVE BATTER. CONSTRUCT STANDARD TEMPORARY MSE WALLS WITH A VERTICAL AND HORIZONTAL TOLERANCE OF 3″ (75mm) WHEN MEASURED WITH A 10′-0″ (3m) STRAIGHT EDGE AND AN OVERALL VERTICAL PLUMBNESS (BATTER) AND HORIZONTAL ALIGNMENT OF LESS THAN 6″ (150mm).

PLACE REINFORCEMENT AT LOCATIONS AND ELEVATIONS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS AND IN SLIGHT TENSION FREE OF KINKS, FOLDS, WRINKLES OR CREASES.

DO NOT SPLICE REINFORCEMENT IN THE REINFORCEMENT DIRECTION (RD), i.e., PARALLEL TO THE WALL FACE. SEAMS ARE ALLOWED IN THE CROSS-REINFORCEMENT DIRECTION (CRD).

CONTACT THE ENGINEER WHEN EXISTING OR FUTURE STRUCTURES SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT. TO AVOID STRUCTURES, DELFECT, SKEW AND MODIFY REINFORCEMENT.

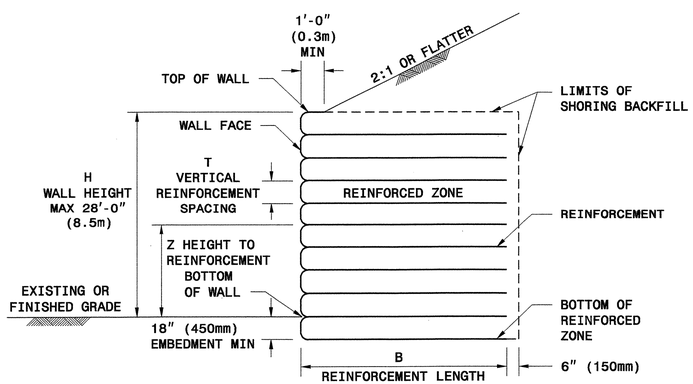
PLACE SHORING BACKFILL IN 8″ TO 10″ (200mm to 250mm) THICK LIFTS AND COMPACT IN ACCORDANCE WITH SUBARTICLE 235-4(C) OF THE STANDARD SPECIFICATIONS. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 3′-0″ (1m) OF THE WALL FACE.

DO NOT DAMAGE REINFORCEMENT WHEN PLACING AND COMPACTING SHORING BACKFILL. DO NOT OPERATE HEAVY EQUIPMENT ON REINFORCEMENT UNTIL IT IS COVERED WITH AT LEAST 10″ (250mm) OF SHORING BACKFILL. DO NOT USE SHEEPSFOOT, GRID ROLLERS OR OTHER TYPES OF COMPACTION EQUIPMENT WITH FEET.

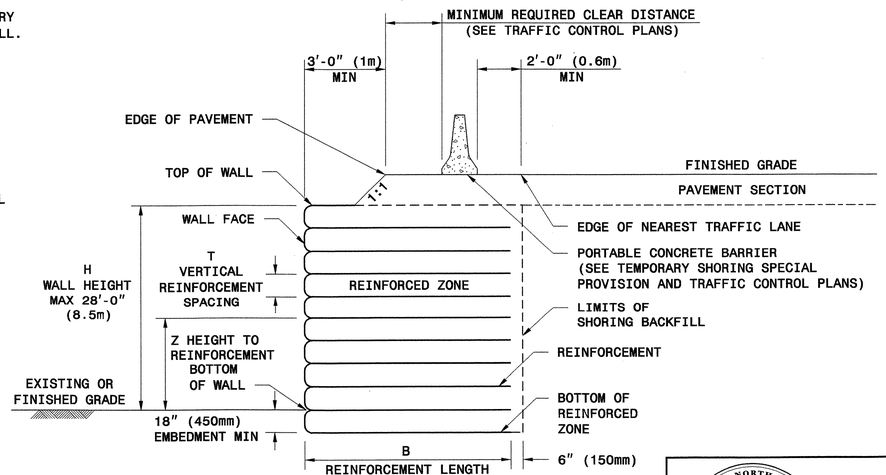
COVER REINFORCING AND RETENTION FABRIC WITH AT LEAST 3″ (75mm) OF SHORING BACKFILL. PLACE TOP REINFORCEMENT LAYER BETWEEN 4″ AND 24″ (100mm and 600mm) BELOW TOP OF WALL DEPENDING ON WALL OPTION.

BENCH STANDARD TEMPORARY MSE WALLS INTO THE SIDES OF EXCAVATIONS WHERE APPLICABLE.

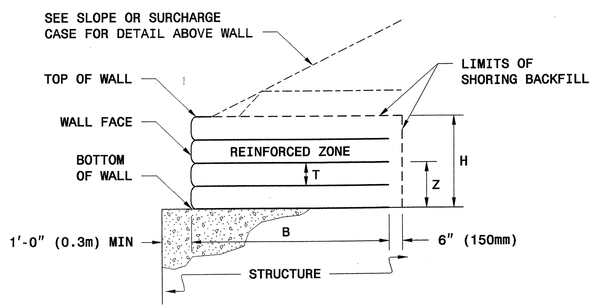
IF THE TOP OF WALL IS WITHIN 5′-0″ (1.5m) OF FINISHED GRADE, REMOVE TOP FORM OR FACING AND INCORPORATE THE TOP REINFORCEMENT LAYER INTO THE FILL WHEN PLACING FILL IN FRONT OF THE WALL. STANDARD TEMPORARY MSE WALLS REMAIN IN PLACE PERMANENTLY UNLESS REQUIRED OTHERWISE.



SLOPE CASE



SURCHARGE CASE



TEMPORARY MSE WALL ON STRUCTURE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS

SHEET 1 OF 11 DATE: 2-20-07

PROJECT REFERENCE NO.	SHEET
B-4123	2-C

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

scott a. hidden 3/29/07
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

HOW TO USE THIS SHEET:

- FOR ALL WALL OPTIONS, DETERMINE MINIMUM REQUIRED REINFORCEMENT LENGTH (B) FROM TABLE AT RIGHT BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE
- FOR STANDARD TEMPORARY FABRIC WALL, SEE SHEET 3 FOR FABRIC STRENGTH REQUIREMENTS BASED ON WALL HEIGHT (H)
- FOR ALL OTHER WALL OPTIONS, DETERMINE REINFORCEMENT TYPE FROM TABLES BELOW FOR EACH HEIGHT TO REINFORCEMENT (Z) BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE

MINIMUM REQUIRED REINFORCEMENT LENGTH B (FT)

(FOR ALL WALL OPTIONS)

WALL HEIGHT H (FT)	<8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28
SLOPE CASE	8	11	13	14	16	18	20	22	24	25	27
SURCHARGE CASE	8	9	11	12	14	15	16	18	19	21	22

TERRATREL TEMPORARY WALL
(STRIPS PER LEVEL PER PANEL)

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT-INCHES)
												3	27 - 8
											3	3	26 -10
											3	3	25 - 2
										3	3	3	23 - 6
									3	3	3	3	21 -10
								3	3	3	3	3	20 - 2
							3	3	3	3	3	3	18 - 6
						3	3	3	3	3	3	3	16 -10
						3	3	3	3	3	3	3	15 - 2
					4	3	3	3	3	3	3	3	13 - 6
				4	4	3	3	3	3	3	3	3	11 -10
			5	4	4	3	3	3	3	3	3	3	10 - 2
		5	5	4	4	3	3	3	3	3	3	3	8 - 6
	5	5	5	4	4	3	3	3	3	3	3	3	6 -10
	5	5	5	4	4	3	3	3	3	3	3	3	5 - 2
5	5	5	5	4	4	3	3	3	3	3	3	3	3 - 6
5	5	5	5	4	4	3	3	3	3	3	3	3	1 -10
5	5	5	5	4	4	3	3	3	3	3	3	3	0 - 2
5	5	5	5	4	4	3	3	3	3	3	3	3	-0 - 8

SLOPE AND SURCHARGE CASES

SIERRASCAPE TEMPORARY WALL
(GEOGRID TYPE)

11 = UX1100MSE
14 = UX1400MSE
15 = UX1500MSE
16 = UX1600MSE
17 = UX1700MSE

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												11	26.5
											11	11	25.5
											11	11	24
										11	11	11	22.5
									11	11	11	15	21
								11	11	11	14	15	19.5
							11	11	11	14	15	15	18
						11	11	11	14	15	15	15	16.5
					11	11	11	11	14	15	15	15	15
					11	11	11	15	15	15	15	15	13.5
				11	11	11	15	15	15	15	15	16	12
			11	11	11	11	15	15	15	15	15	16	10.5
		11	11	11	11	15	15	15	15	15	16	16	9
	11	11	11	11	14	15	15	15	15	16	16	16	7.5
	11	11	11	11	14	15	15	15	16	16	16	16	6
11	11	11	11	15	15	15	15	15	16	16	16	17	4.5
11	11	11	11	14	15	15	15	15	16	16	16	17	3
11	11	11	11	14	15	15	15	16	16	16	17	17	1.5
11	11	11	14	15	15	15	15	16	16	17	17	17	0
11	11	11	14	15	15	15	15	16	16	17	17	17	-1.5

SLOPE CASE

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												11	26.5
												11	25.5
											11	11	24
											11	11	22.5
										11	11	11	21
									11	11	11	11	19.5
								11	11	11	11	15	18
							11	11	11	11	15	15	16.5
						11	11	11	11	11	15	15	15
						11	11	11	11	15	15	15	13.5
					11	11	11	11	15	15	15	15	12
				11	11	11	11	15	15	15	15	15	10.5
			11	11	11	11	15	15	15	15	15	15	9
		11	11	11	11	15	15	15	15	15	15	16	7.5
	11	11	11	11	15	15	15	15	15	15	16	16	6
11	11	11	11	11	14	15	15	15	15	15	16	16	4.5
11	11	11	11	11	14	15	15	15	15	16	16	16	3
11	11	11	11	15	15	15	15	15	15	16	16	17	1.5
11	11	11	14	15	15	15	15	15	16	16	17	17	0
11	11	11	14	15	15	15	15	15	16	16	17	17	-1.5

SURCHARGE CASE

HILFIKER TEMPORARY WALL
(WELDED WIRE MAT TYPE)

4.5 = W4.5 x W3.5
7.0 = W7.0 x W3.5
9.5 = W9.5 x W4.0

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												4.5	26
											4.5	7.0	24
										4.5	7.0	7.0	22
									4.5	7.0	7.0	7.0	20
								4.5	7.0	7.0	7.0	7.0	18
							4.5	7.0	7.0	7.0	7.0	7.0	16
						4.5	7.0	7.0	7.0	7.0	7.0	9.5	14
					4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	12
				4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	10
			4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	8
		4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	6
	4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	4
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	7.0	2
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	1
7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	7.0	7.0	0
7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	-1.5

SLOPE CASE

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												4.5	26
											4.5	7.0	24
										4.5	7.0	7.0	22
									4.5	7.0	7.0	7.0	20
								4.5	7.0	7.0	7.0	7.0	18
							4.5	7.0	7.0	7.0	7.0	7.0	16
						4.5	7.0	7.0	7.0	7.0	7.0	7.0	14
					4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	12
				4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	10
			4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	8
		4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	6
	4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	4
4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	7.0	2
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	1
7.0	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	-1.5

SURCHARGE CASE

NOTES FOR HILFIKER TEMPORARY WALL

1) CAP MAT AT TOP OF WALL IS NOT INCLUDED IN TABLES.
2) REINFORCEMENT IS NOT REQUIRED AT 1' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 24'.
3) REINFORCEMENT IS NOT REQUIRED AT 3' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26'.
4) REINFORCEMENT IS NOT REQUIRED AT 1' LEVEL FOR SURCHARGE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26'.

RETAINED EARTH TEMPORARY WALL
(WELDED WIRE MESH TYPE)

3X1 = 3W8 x W8 x 1.0'
3X2 = 3W8 x W8 x 2.0'

H (FT) <4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT-INCHES)
												3X1	27 - 6
												3X1	26 -10
											3X1	3X2	25 - 2
										3X1	3X1	3X2	23 - 6
									3X1	3X1	3X2	3X2	21 -10
								3X1	3X1	3X2	3X2	3X2	20 - 2
							3X1	3X1	3X2	3X2	3X2	3X2	18 - 6
						3X1	3X2	3X2	3X2	3X2	3X2	3X2	16 -10
						3X1	3X2	3X2	3X2	3X2	3X2	3X2	15 - 2
					3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	13 - 6
				3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	11 -10
			3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	10 - 2
		3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	8 - 6
		3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	6 -10
	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	5 - 2
3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3 - 6
3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	1 -10
3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	0 - 2
3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	-1 - 6

SLOPE AND SURCHARGE CASES

GEOTECHNICAL ENGINEERING UNIT
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MSE WALL REINFORCEMENT TABLES - ENGLISH UNITS

SHEET 2 OF 11 DATE: 2-20-07

PROJECT REFERENCE NO.	SHEET
B-4123	2-D

GEOTECHNICAL ENGINEER

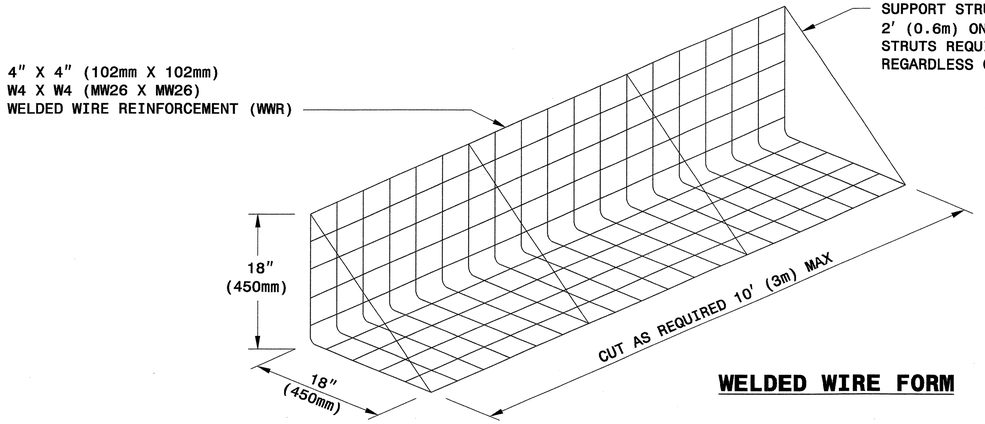
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A HIDDEN

Scott A. Hidden 3/29/07

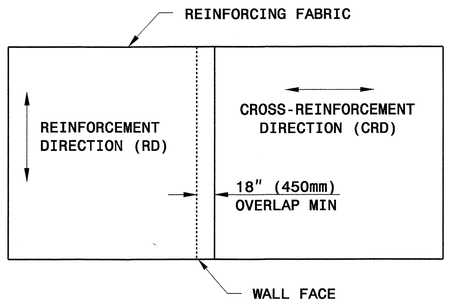
SIGNATURE DATE

ENGINEER

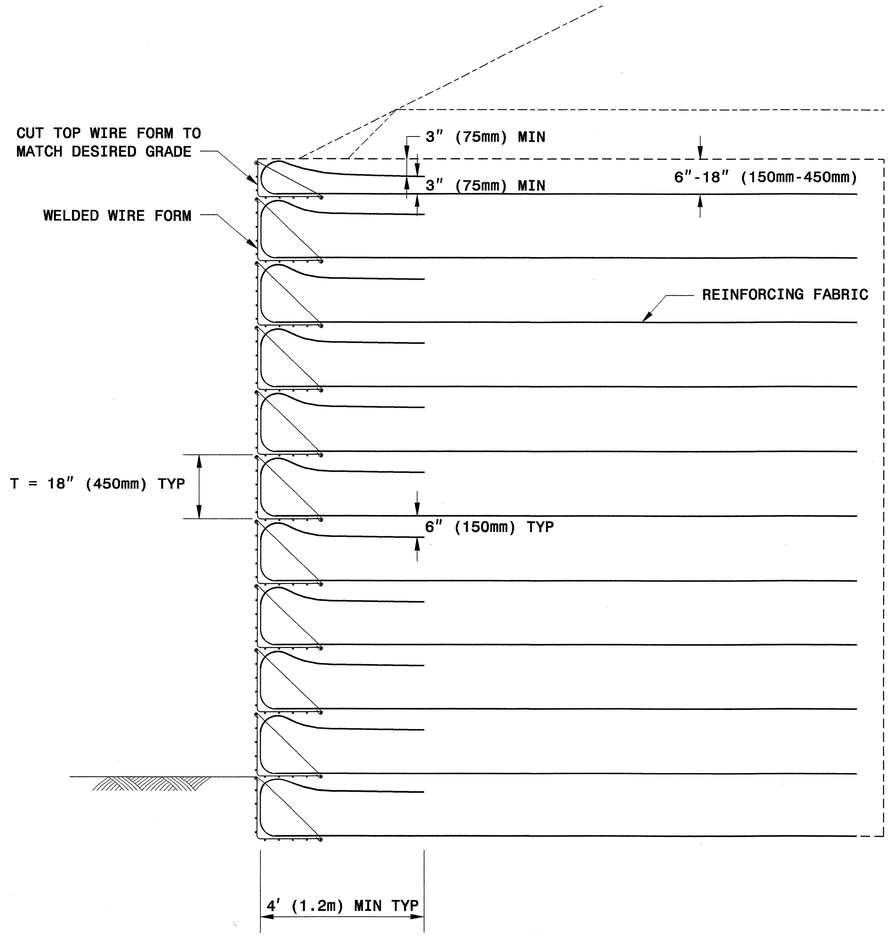
SIGNATURE DATE



WELDED WIRE FORM



PLAN VIEW OF FABRIC OVERLAP



TYPICAL SECTION

MINIMUM REQUIRED REINFORCING FABRIC STRENGTH FOR RD*
(SLOPE AND SURCHARGE CASES)

WALL HEIGHT H FEET (M)	POLYESTER WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M)	POLYPROPYLENE WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M)
4 (1.2)	200 (35)	200 (35)
6 (1.8)	200 (35)	200 (35)
8 (2.4)	200 (35)	200 (35)
10 (3.0)	200 (35)	230 (40)
12 (3.7)	220 (39)	264 (46)
14 (4.3)	248 (43)	297 (52)
16 (4.9)	276 (48)	330 (58)
18 (5.5)	304 (53)	364 (64)
20 (6.1)	332 (58)	397 (70)
22 (6.7)	359 (63)	431 (76)
24 (7.3)	387 (68)	464 (81)
26 (7.9)	415 (73)	497 (87)
28 (8.5)	443 (78)	531 (93)

*RD = REINFORCEMENT DIRECTION

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

TEMPORARY
FABRIC WALL

SHEET 3 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-E

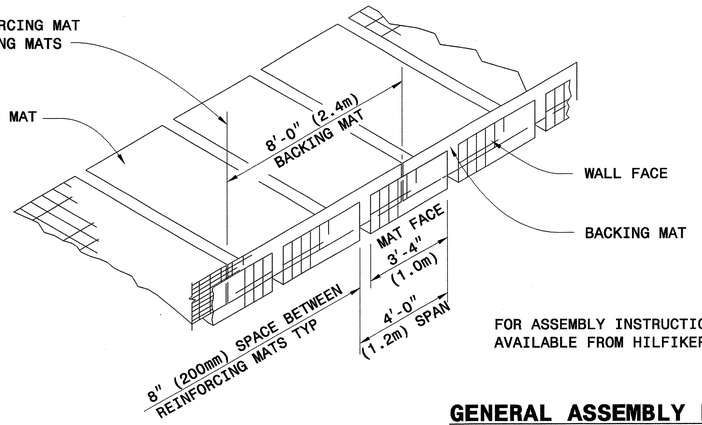
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07
SIGNATURE DATE

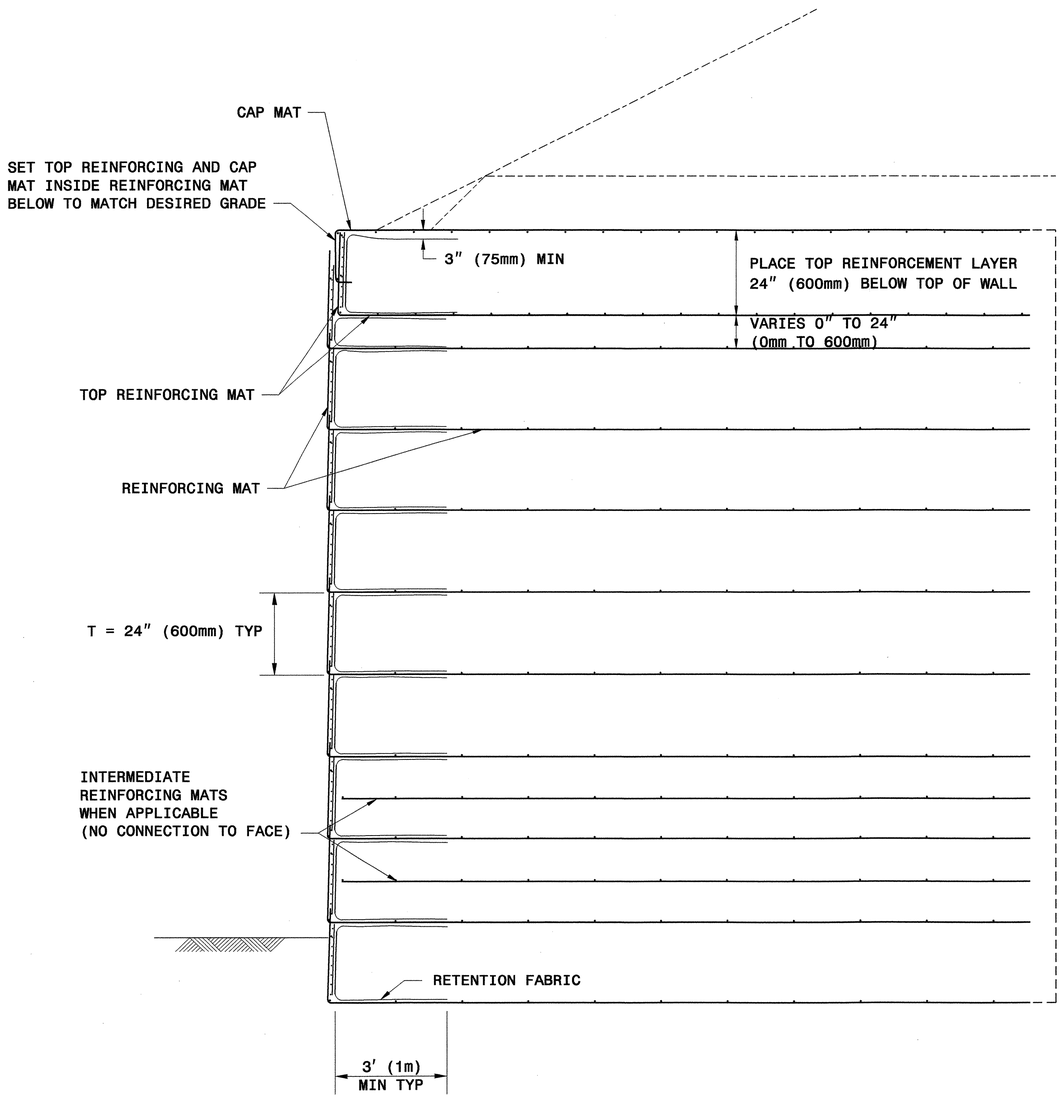
ENGINEER

SIGNATURE DATE

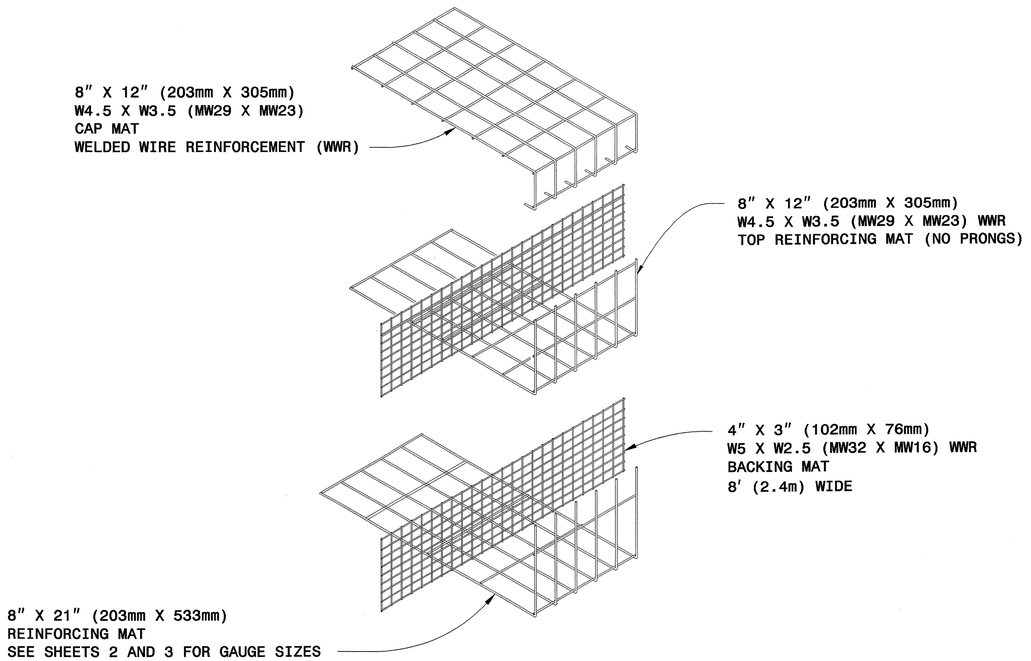


FOR ASSEMBLY INSTRUCTIONS, SEE WELDED WIRE WALL CONSTRUCTION GUIDE AVAILABLE FROM HILFIKER WEBSITE AT WWW.HILFIKER.COM/WWW

GENERAL ASSEMBLY DETAIL



TYPICAL SECTION



WALL COMPONENTS

HILFIKER RETAINING WALLS

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

HILFIKER
TEMPORARY WALL

SHEET 4 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-F

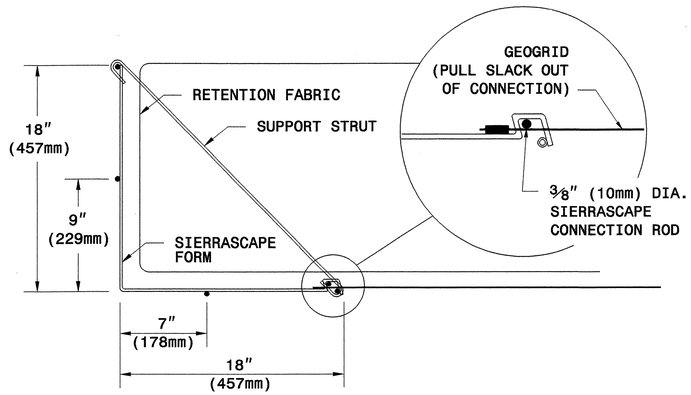
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

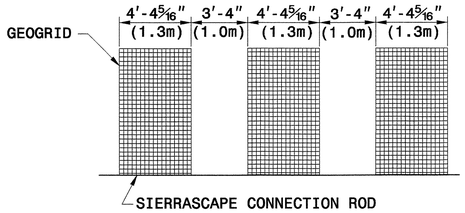
Scott A. Hidden 3/29/07
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

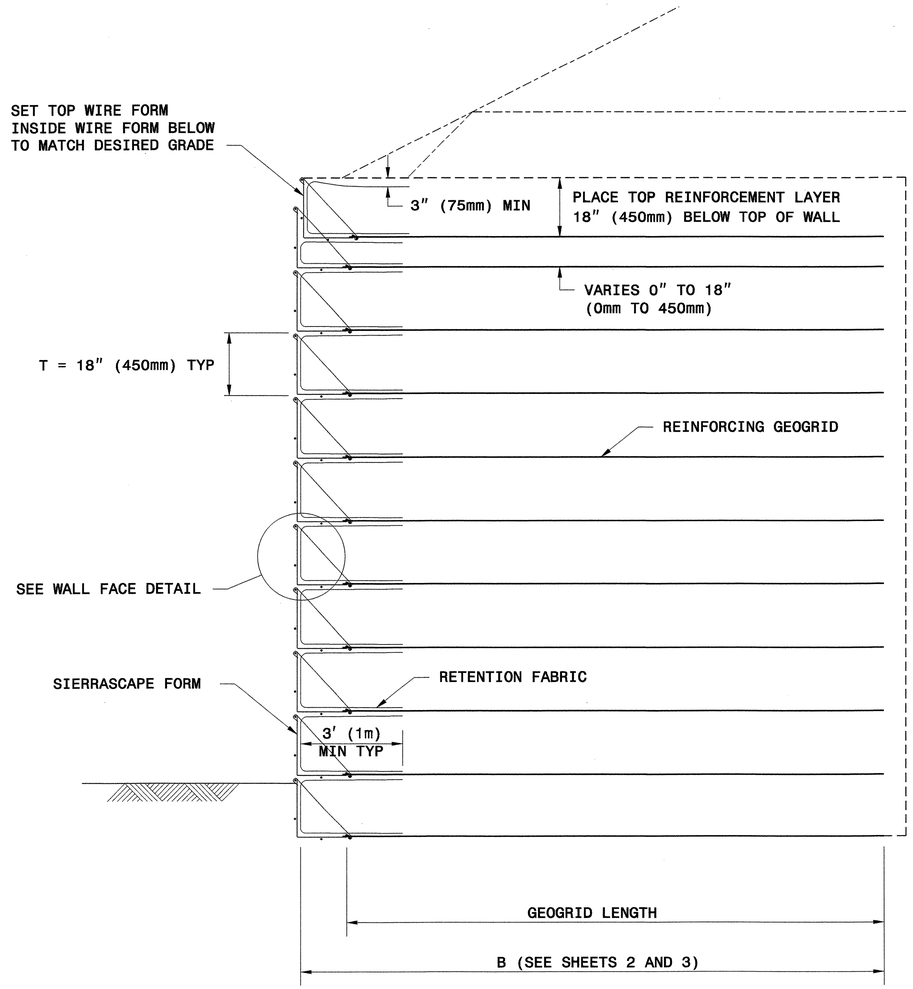


WALL FACE DETAIL

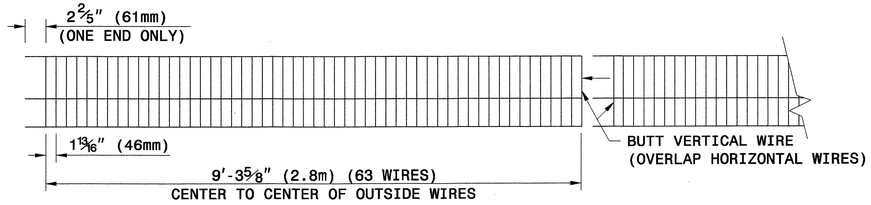


PLACE ALTERNATE LAYERS OF GEOGRID IN STAGGERED PATTERN
SUCH THAT THE LAYER ABOVE IS CENTERED OVER SPACE BELOW

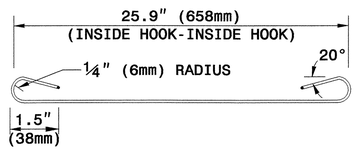
TYPICAL GEOGRID COVERAGE



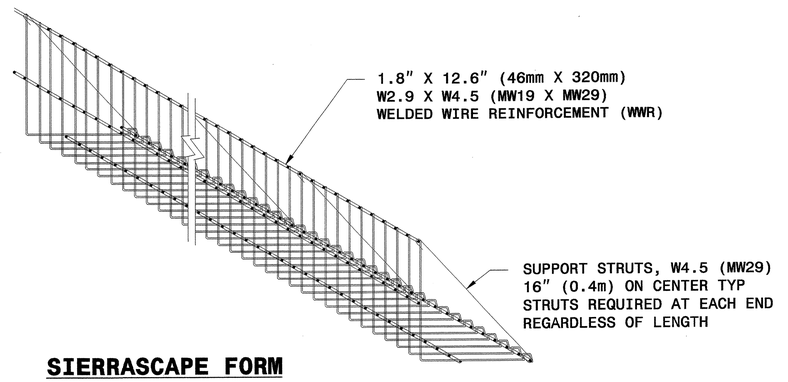
TYPICAL SECTION



ELEVATION VIEW



SUPPORT STRUT



SIERRASCAPE FORM

WALL COMPONENTS

TENSAR®
TENSAR EARTH TECHNOLOGIES, INC.

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

SIERRASCAPE
TEMPORARY WALL

SHEET 5 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
B-4123	2-G

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

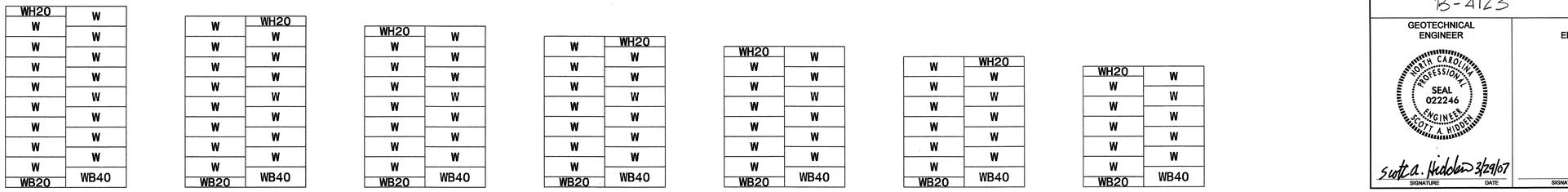
Scott A. Hidden 3/29/07

SIGNATURE DATE

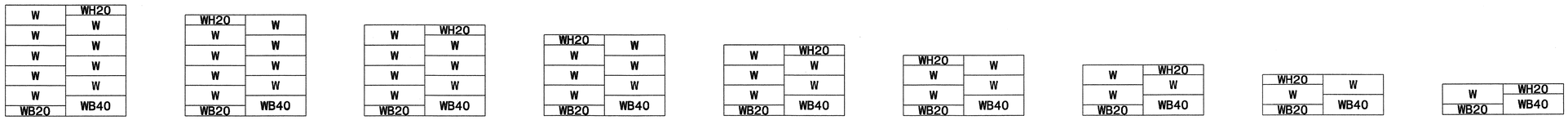
ENGINEER

SIGNATURE DATE

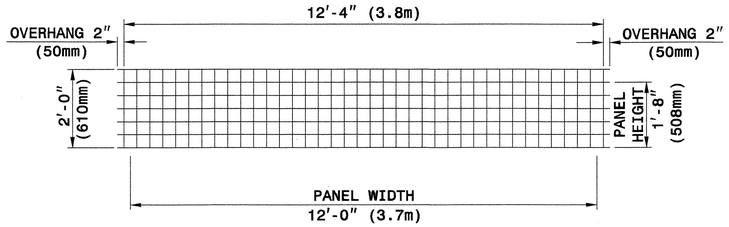
PANEL LAYOUTS



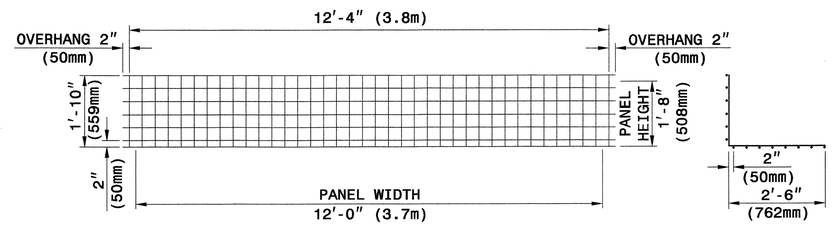
H - WALL HEIGHT							
(FEET-INCHES)	< 28 - 0	< 27 - 0	< 25 - 4	< 23 - 8	< 22 - 0	< 20 - 4	< 18 - 8
(METER)	< 8.5	< 8.2	< 7.7	< 7.2	< 6.7	< 6.2	< 5.7



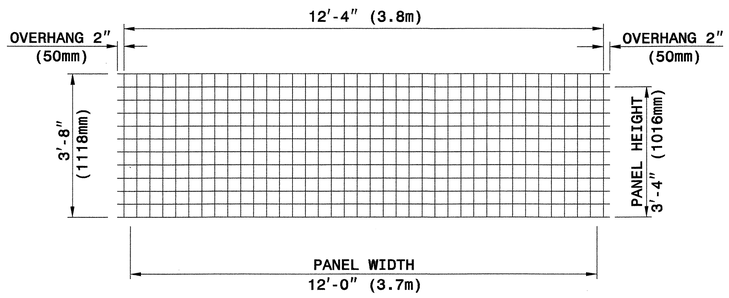
(FEET-INCHES)	< 17 - 0	< 15 - 4	< 13 - 8	< 12 - 0	< 10 - 4	< 8 - 8	< 7 - 0	< 5 - 4	< 3 - 8
(METER)	< 5.2	< 4.7	< 4.2	< 3.7	< 3.2	< 2.6	< 2.1	< 1.6	< 1.1



TYPE WH20

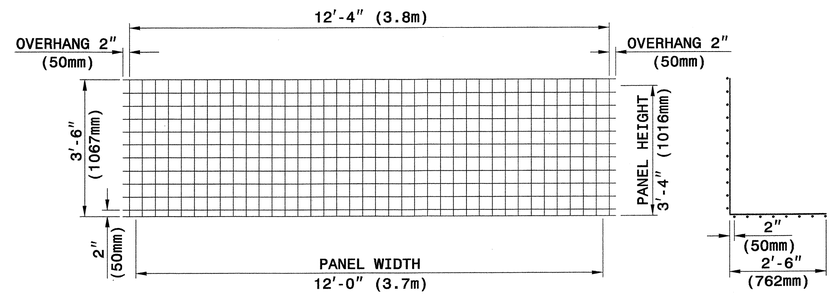


TYPE WB20 **SECTION**



TYPE W

WELDED WIRE FACINGS



TYPE WB40 **SECTION**

WELDED WIRE FORMS

PANEL TYPES (WELDED WIRE FACINGS AND FORMS)

4″ X 4″ (100mm X 100mm), W8 X W8 (MW52 X MW52) WELDED WIRE REINFORCEMENT (WWR)

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH TEMPORARY WALL

SHEET 6 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
B-4123	2-H

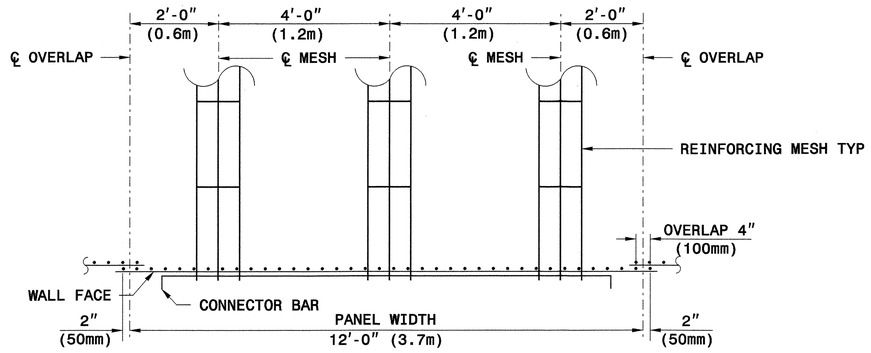
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07
SIGNATURE DATE

ENGINEER

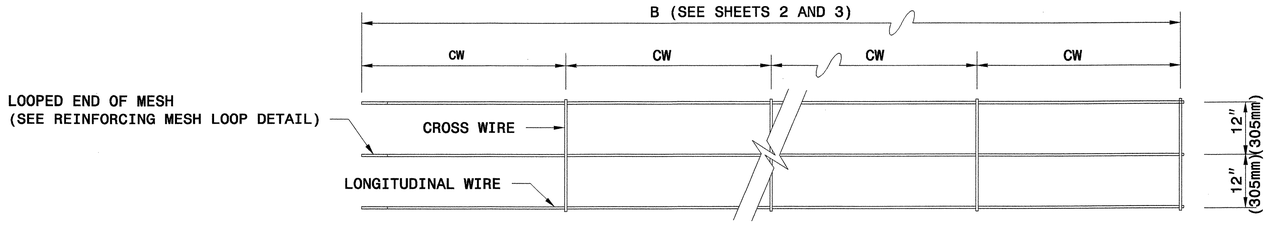
SIGNATURE DATE



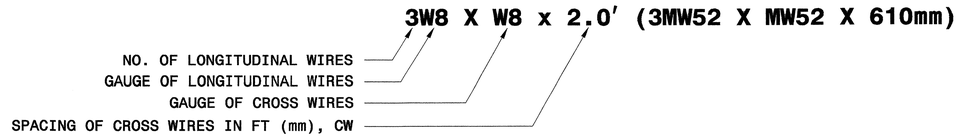
REINFORCING MESH PLACEMENT DETAIL
(PLAN VIEW)

½" (13mm) DIA. BAR

CONNECTOR BAR

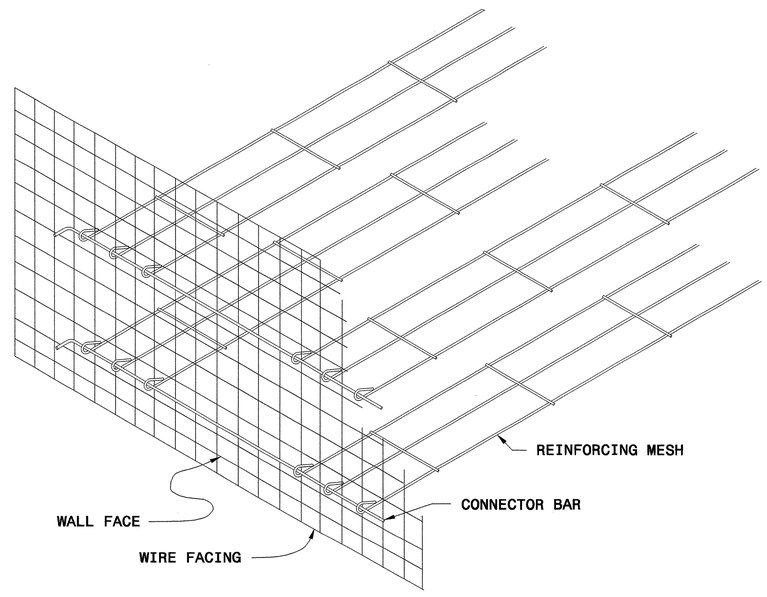


IF REINFORCEMENT LENGTH IS NOT AN INCREMENT OF 2'-0" (610mm) MAKE CW EQUAL TO 12" (305mm) AT THE END OF THE REINFORCING MESH OPPOSITE THE LOOPED END

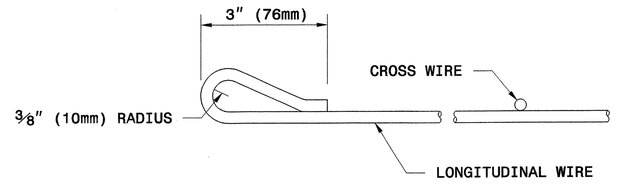


REINFORCING MESH DESIGNATION

REINFORCING MESH



GENERAL ASSEMBLY DETAIL



REINFORCING MESH LOOP DETAIL

The Reinforced Earth Company

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH TEMPORARY WALL

SHEET 7 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-I

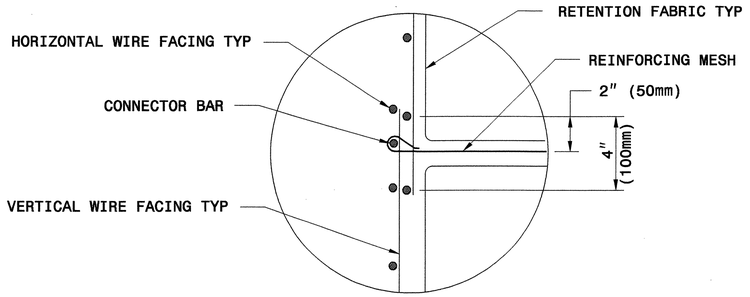
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

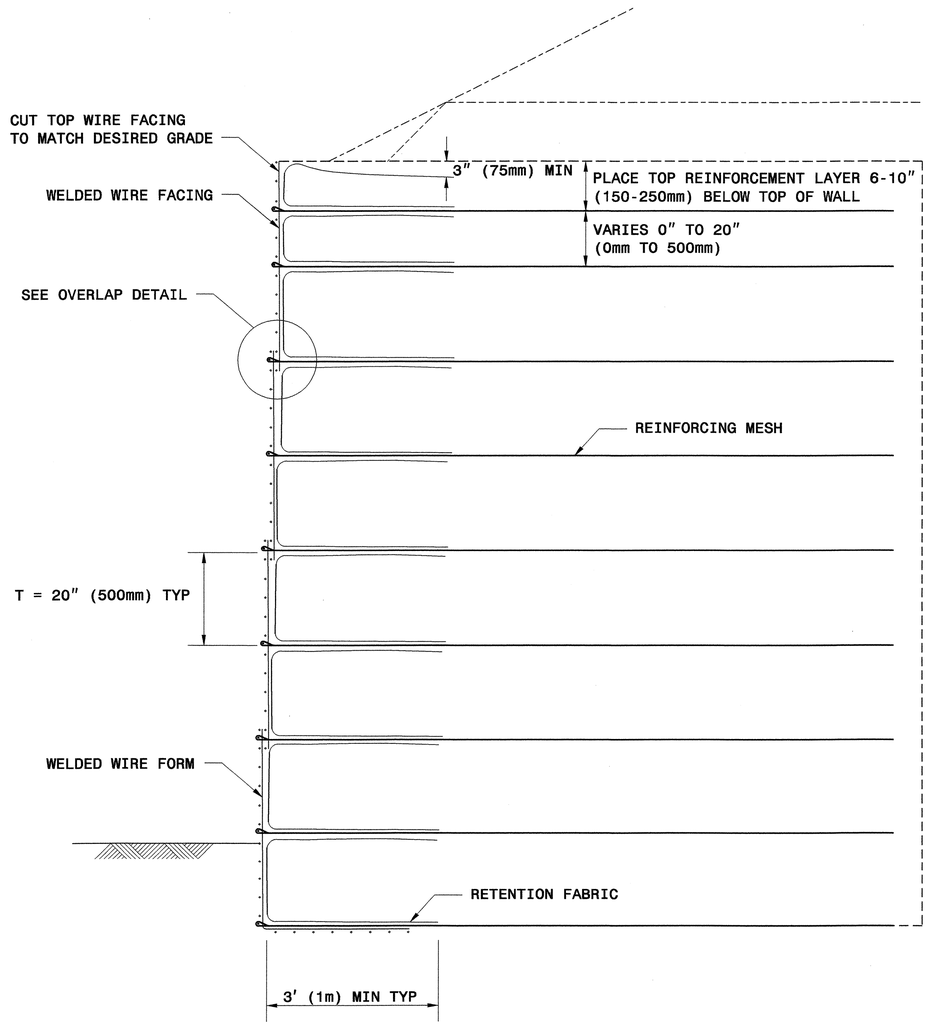
Scott A. Hidden 3/29/07
SIGNATURE DATE

ENGINEER

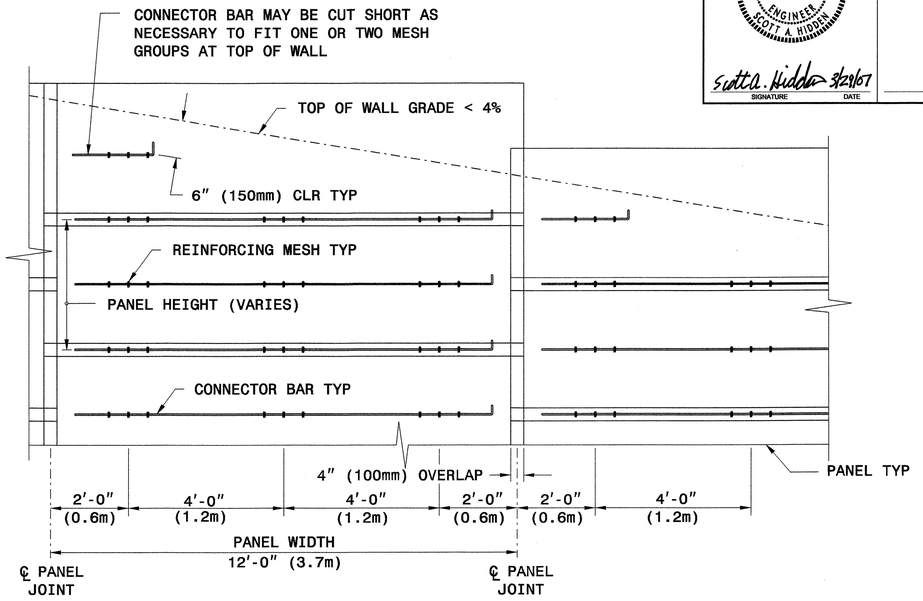
SIGNATURE DATE



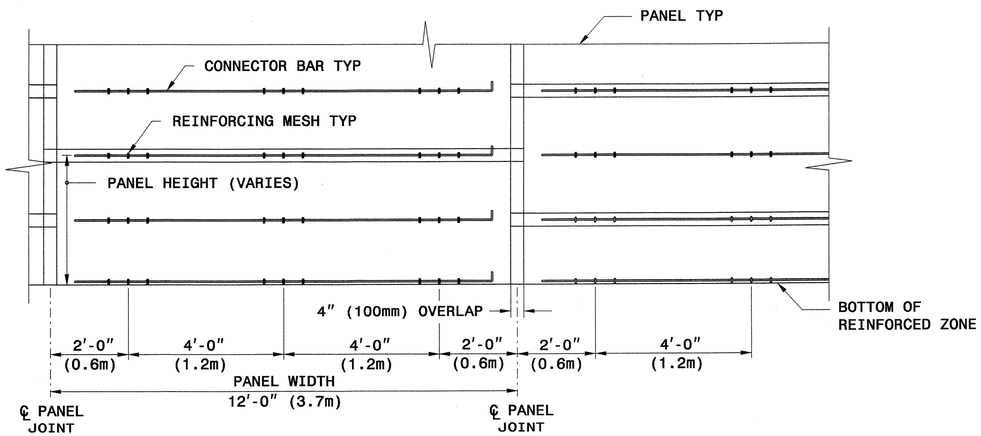
OVERLAP DETAIL



TYPICAL SECTION



TYPICAL ELEVATION @ TOP OF WALL
(WIRES NOT SHOWN FOR CLARITY)



TYPICAL ELEVATION @ BOTTOM OF WALL
(WIRES NOT SHOWN FOR CLARITY)

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH TEMPORARY WALL

SHEET 8 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-J

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A HIDDEN

Scott A. Hidden 3/29/07

SIGNATURE DATE

ENGINEER

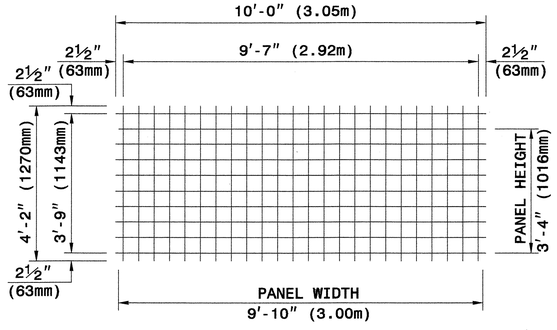
SIGNATURE DATE

PANEL LAYOUTS

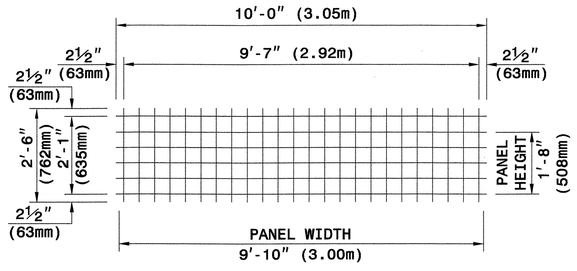
H - WALL HEIGHT

(FEET-INCHES)	< 28 - 0	< 27 - 8	< 26 - 0	< 24 - 4	< 22 - 8	< 21 - 0	< 19 - 4
(METER)	< 8.5	< 8.4	< 7.9	< 7.4	< 6.9	< 6.4	< 5.9

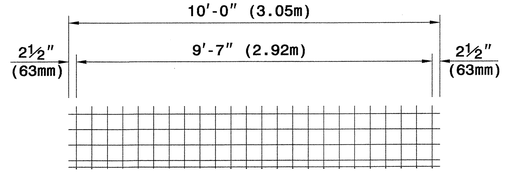
(FEET-INCHES)	< 17 - 8	< 16 - 0	< 14 - 4	< 12 - 8	< 11 - 0	< 9 - 4	< 7 - 8	< 6 - 0	< 4 - 4
(METER)	< 5.4	< 4.9	< 4.4	< 3.9	< 3.4	< 2.8	< 2.3	< 1.8	< 1.3



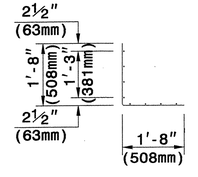
TYPE A



TYPE B



WELDED WIRE FORM



SECTION

WELDED WIRE FACINGS

PANEL TYPES (WELDED WIRE FACINGS AND FORM

5" X 5" (125mm X 125mm), W5 X W5 (MW32 X MW32) WELDED WIRE REINFORCEMENT (WWR)

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

SHEET 9 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-K

GEOTECHNICAL ENGINEER

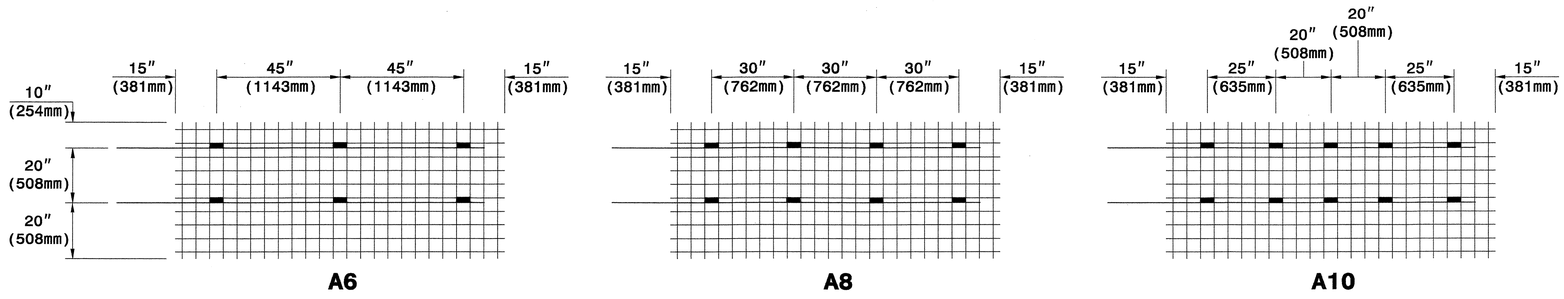
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

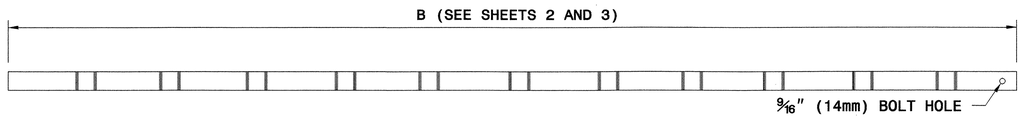


KEY: A8

NUMBER OF REINFORCING STRIPS

PANEL TYPE

CONNECTOR ROD AND REINFORCING STRIP PLACEMENT DIAGRAMS



REINFORCING STRIP - 2" X 5/32" (50mm X 4mm)

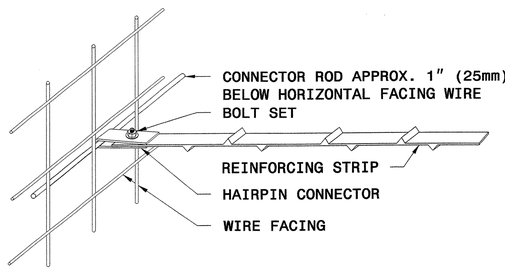
½" (13mm) DIA. ROD

CONNECTOR ROD

½" (13mm) BOLT WITH NUT AND WASHER

BOLT SET

HAIRPIN CONNECTOR



STRIP TO FACING CONNECTION

WALL COMPONENTS

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

SHEET 10 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

PROJECT REFERENCE NO.	SHEET
B-4123	2-L

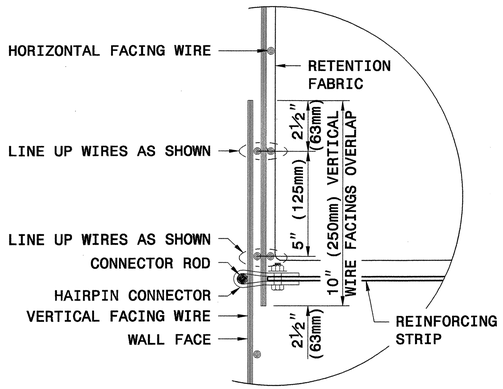
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07
SIGNATURE DATE

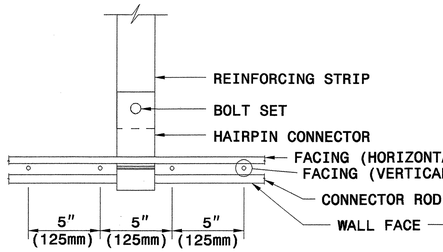
ENGINEER

SIGNATURE DATE

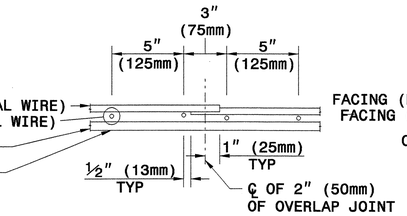


OVERLAP FACINGS VERTICALLY ONE FULL 5" (125mm) WIRE SQUARE DISREGARDING HALF SQUARES AT EDGES

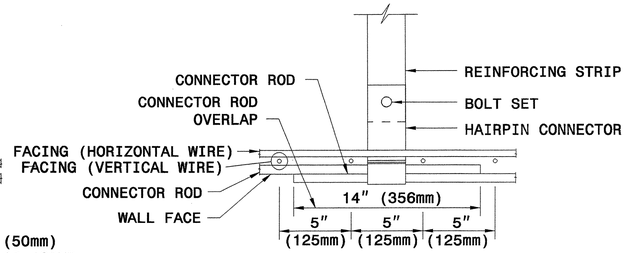
VERTICAL OVERLAP DETAIL



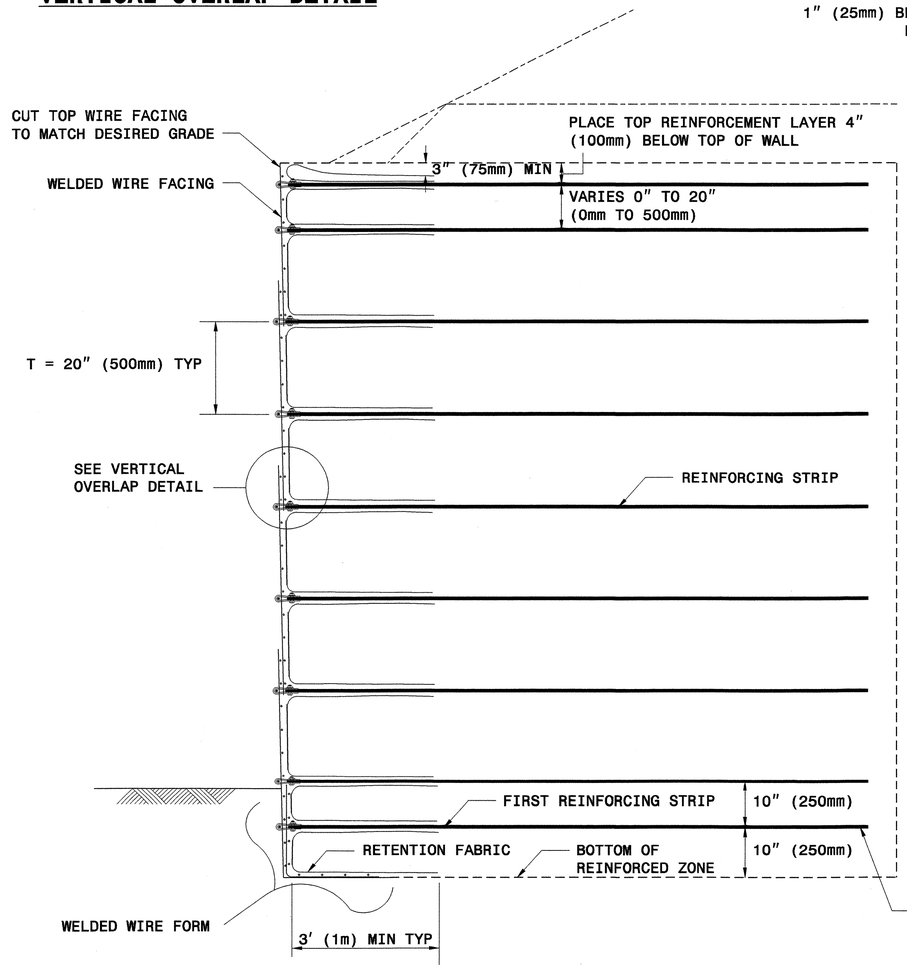
PLAN DETAIL 'A'
STRIP CONNECTION



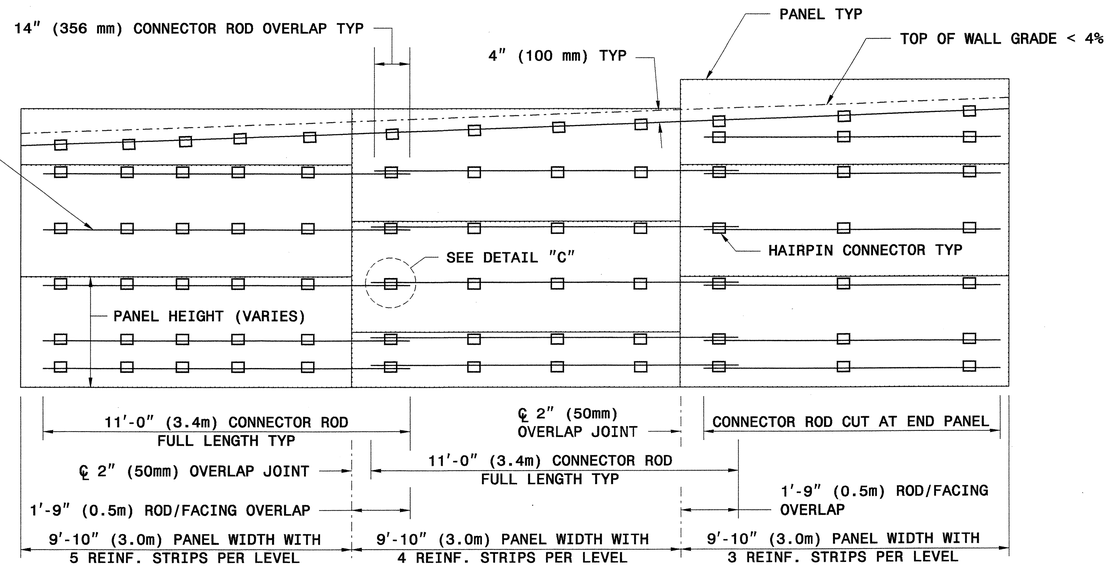
PLAN DETAIL 'B'
HORIZONTAL OVERLAP DETAIL



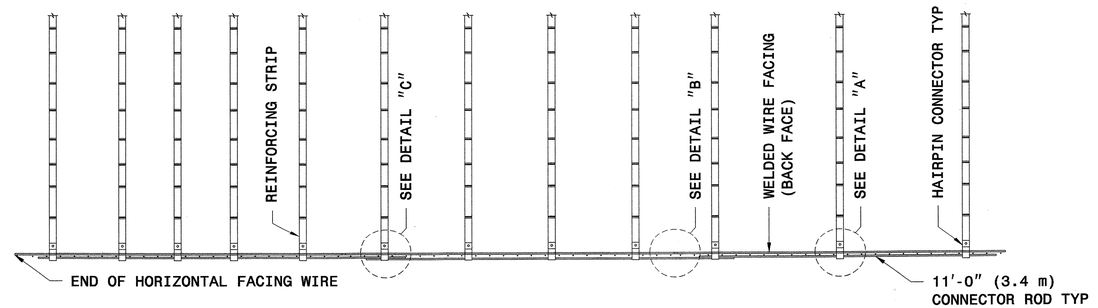
PLAN DETAIL 'C'
STRIP CONNECTION WITH HORIZONTAL OVERLAP DETAIL



TYPICAL SECTION



TYPICAL ELEVATION
(WIRES NOT SHOWN FOR CLARITY)



TYPICAL PLAN

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL
TEMPORARY WALL

SHEET 11 OF 11 DATE: 12-19-06

C221427 3/29/2007 std no 1801 shidden GE-Oce34bond

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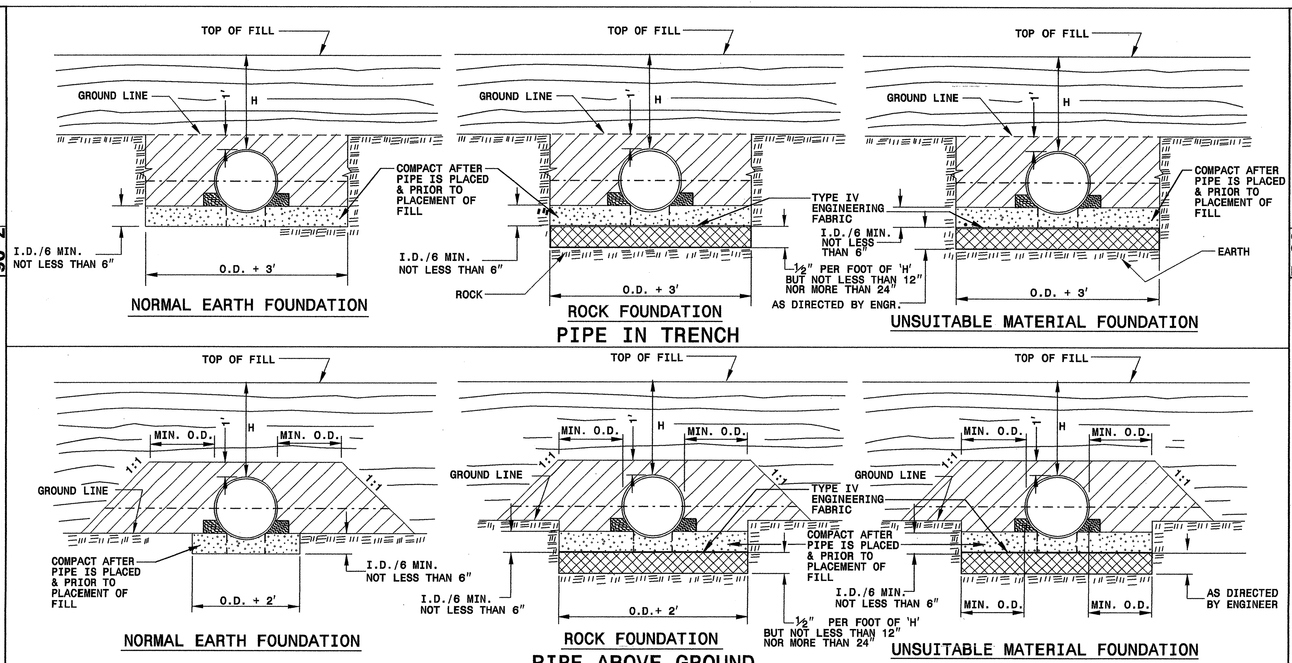
5/14/99

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FLEXIBLE PIPE



GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.

APPROVED SUITABLE LOCAL MATERIAL.

UNDISTURBED EARTH MATERIAL

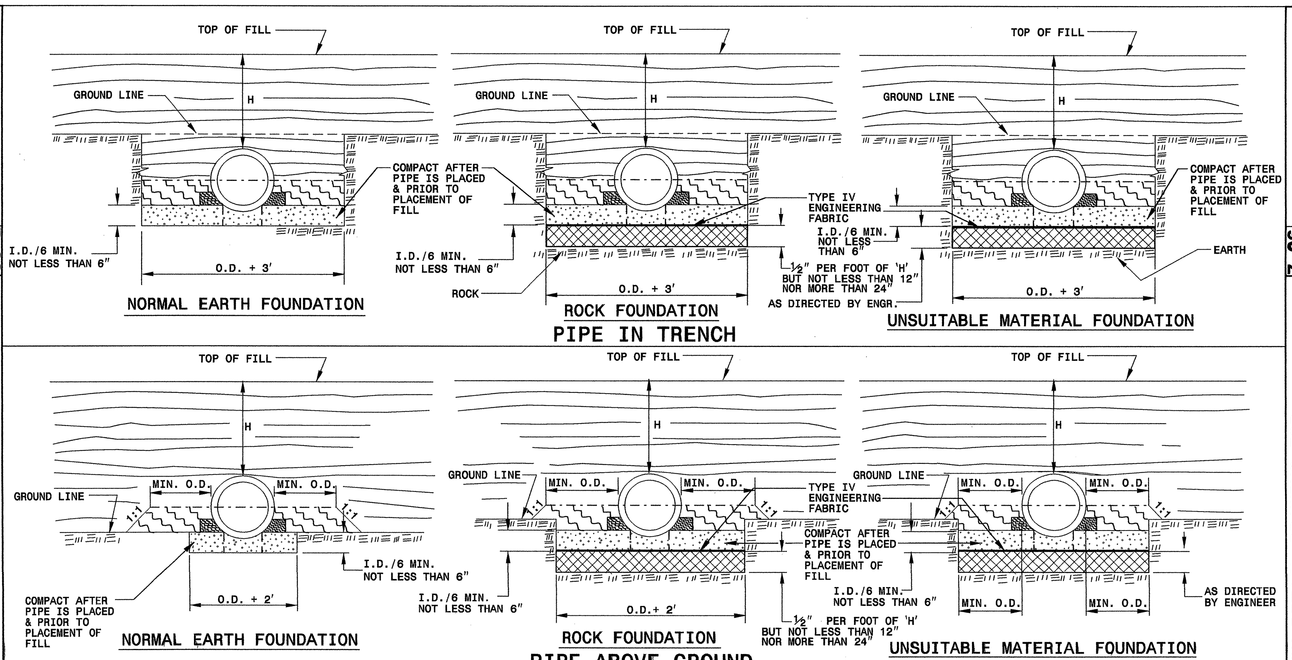
SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

SHEET 1 OF 3
300D01

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
RIGID PIPE



GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, BELOW SPRINGLINE.

APPROVED SUITABLE LOCAL MATERIAL ABOVE SPRINGLINE.

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

SHEET 2 OF 3
300D01

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128
FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: KKempf DATE: 5-15-09
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC: p:\ericward\stds\stdstoretable\30001\0300d01.dgn

PROJECT REFERENCE NO. B-4123
SHEET NO. 2-M

5/14/99

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH DETAIL DRAWING FOR

METHOD OF PIPE INSTALLATION

FILL HEIGHT TABLES

SHEET 3 OF 3

300D01

FLEXIBLE PIPE

Round Corrugated Steel Pipe
2 2/3 x ½ corrugation **

Diameter (inches)	Minimum cover (inches)	Maximum Height of Cover (feet) (Ga) 16	14	12	10	8
12	12	204	256			
15	12	162	204			
18	12	135	169	239		
21	12	115	145	204		
24	12	100	126	178		
30	12	79	100	142		
36	12	65	83	117	152	
42	12	55	70	100	130	160
48	12	48	61	87	113	139
54	12		54	77	100	123
60	12			69	90	111
66	12				81	100
72	12				74	91
78	12					81
84	12					69

Round Corrugated Aluminum Pipe
2 2/3 x ½ corrugation **

Diameter (inches)	Minimum cover (inches)	Maximum Height of Cover (feet) (Ga) 16	14	12	10	8
12	12	123	155	218	281	344
15	12	98	123	174	224	275
18	12	81	102	144	187	228
21	12	69	87	123	160	195
24	12	60	76	108	139	171
27	12		67	95	123	151
30	12		60	85	111	136
36	12		50	71	92	113
42	12			60	78	96
48	12			52	68	84
54	12			46	50	74
60	12				50	62
66	12					51
72	12					41

** FOR DIFFERENT CORRUGATIONS AND ARCH PIPES REFER TO ROADWAY DESIGN MANUAL OR MANUFACTURERS SPECIFICATION.

HDPE - * (Minimum fill) 2′ for pipe diameters ≥ 12″ and ≤ 60″
* (Maximum fill) 20′ for pipe diameters ≤ 24″
17′ for pipe diameters ≥ 30″ and ≤ 60″

PVC - * (Minimum fill) 2′ for pipe diameters ≥ 12″ and ≤ 36″
* (Maximum fill) 30′ for pipe diameters ≥ 12″ and ≤ 36″

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

CSP - AASHTO M36
CAAP - AASHTO M196
HDPE - AASHTO M294
PVC - ASTM F949 or AASHTO M304

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1′ MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

RIGID PIPE

RCP - * (Minimum fill) 1′ for Class IV & CLASS V
2′ for Class III & Class II

* (Maximum fill) 10′ - Class II pipe
20′ - Class III pipe
30′ - Class IV pipe
40′ - Class V pipe

(For fills > 40′ & < 80′ use LRFD Direct Design Method)

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

RCP - AASHTO M170

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1′ MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH DETAIL DRAWING FOR

METHOD OF PIPE INSTALLATION

FILL HEIGHT TABLES

SHEET 3 OF 3

300D01

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128
FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: KKemp DATE: 5-15-09
MODIFIED BY: DATE:
CHECKED BY: DATE: 7/9/09
FILE SPEC: s:\contracts\contracts\stds\stdstodetails\30001\0300d01.dgn

PROJECT REFERENCE NO. B-4123
SHEET NO. 2-N

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-4123	3

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF QUANTITIES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C202261

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0036000000-E	225	120	CY	UNDERCUT EXCAVATION
0043000000-N	226	Lump Sum		GRADING
0050000000-E	226	1	ACR	SUPPLEMENTARY CLEARING & GRUB-BING
0080000000-E	SP	100	TON	CLASS IV SUBGRADE STABILIZA-TION
0134000000-E	240	50	CY	DRAINAGE DITCH EXCAVATION
0195000000-E	265	100	CY	SELECT GRANULAR MATERIAL
0196000000-E	270	100	SY	FABRIC FOR SOIL STABILIZATION
0199000000-E	SP	430	SF	TEMPORARY SHORING
0320000000-E	SP	90	SY	FOUNDATION CONDITIONING FABRIC
0330000000-E	SP	30	TON	GENERIC DRAINAGE ITEM FOUNDATION CONDITIONING MATE-RIAL, MINOR STRS
0986000000-E	SP	28	LF	GENERIC PIPE ITEM 15" SIDE DRAIN PIPE
0986000000-E	SP	122	LF	GENERIC PIPE ITEM 18" CS PIPE CULVERTS, 0.064" THICK
0986000000-E	SP	66	LF	GENERIC PIPE ITEM 24" CS PIPE CULVERTS, 0.064" THICK
0986000000-E	SP	38	LF	GENERIC PIPE ITEM 30" CS PIPE CULVERTS, 0.079" THICK
0995000000-E	340	146	LF	PIPE REMOVAL
1121000000-E	520	1,066	TON	AGGREGATE BASE COURSE
1220000000-E	545	250	TON	INCIDENTAL STONE BASE
2022000000-E	815	25	CY	SUBDRAIN EXCAVATION
2033000000-E	815	20	CY	SUBDRAIN FINE AGGREGATE
2044000000-E	815	100	LF	6" PERFORATED SUBDRAIN PIPE
2055000000-E	815	3	EA	6" SUBDRAIN PIPE WYES, TEES, & ELBOWS
2066000000-N	815	1	EA	CONCRETE PAD FOR SUBDRAIN PIPE OUTLET
2077000000-E	815	6	LF	6" OUTLET PIPE (SUBDRAINS)

ItemNumber	Sec #	Quantity	Unit	Description
3030000000-E	862	150	LF	STEEL BM GUARDRAIL
3045000000-E	862	100	LF	STEEL BM GUARDRAIL, SHOP CURVED
3150000000-N	862	5	EA	ADDITIONAL GUARDRAIL POSTS
3165000000-N	SP	3	EA	GUARDRAIL ANCHOR UNITS, TYPE ********** (350 TL-2)
3210000000-N	862	1	EA	GUARDRAIL ANCHOR UNITS, TYPE CAT-1
3649000000-E	876	5	TON	RIP RAP, CLASS B
3656000000-E	876	962	SY	FILTER FABRIC FOR DRAINAGE
4400000000-E	1110	72	SF	WORK ZONE SIGNS (STATIONARY)
4405000000-E	1110	112	SF	WORK ZONE SIGNS (PORTABLE)
4410000000-E	1110	30	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)
4430000000-N	1130	54	EA	DRUMS
4435000000-N	1135	54	EA	CONES
4445000000-E	1145	24	LF	BARRICADES (TYPE III)
4450000000-N	1150	800	HR	FLAGGER
4507000000-E	SP	78	LF	WATER FILLED BARRIER
4516000000-N	1180	54	EA	SKINNY DRUM
6000000000-E	1605	250	LF	TEMPORARY SILT FENCE
6006000000-E	1610	420	TON	STONE FOR EROSION CONTROL, CLASS A
6009000000-E	1610	230	TON	STONE FOR EROSION CONTROL, CLASS B
6012000000-E	1610	540	TON	SEDIMENT CONTROL STONE
6015000000-E	1615	3	ACR	TEMPORARY MULCHING
6018000000-E	1620	100	LB	SEED FOR TEMPORARY SEEDING
6021000000-E	1620	1.25	TON	FERTILIZER FOR TEMPORARY SEED-ING
6024000000-E	1622	200	LF	TEMPORARY SLOPE DRAINS
6027000000-N	1622	4	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS

ItemNumber	Sec #	Quantity	Unit	Description
6029000000-E	SP	900	LF	SAFETY FENCE
6030000000-E	1630	450	CY	SILT EXCAVATION
6036000000-E	1631	9,500	SY	MATTING FOR EROSION CONTROL
6037000000-E	SP	30	SY	COIR FIBER MAT
6038000000-E	SP	320	SY	PERMANENT SOIL REINFORCEMENT MAT
6042000000-E	1632	2,000	LF	1/4" HARDWARE CLOTH
6070000000-N	SP	3	EA	SPECIAL STILLING BASINS
6071010000-E	SP	70	LF	WATTLE
6071020000-E	SP	20	LB	POLYACRYLAMIDE (PAM)
6071030000-E	SP	320	LF	COIR FIBER BAFFLES
6071050000-E	SP	2	EA	**" SKIMMER (1-1/2")
6084000000-E	1660	5	ACR	SEEDING & MULCHING
6087000000-E	1660	2	ACR	MOWING
6090000000-E	1661	50	LB	SEED FOR REPAIR SEEDING
6093000000-E	1661	0.25	TON	FERTILIZER FOR REPAIR SEEDING
6096000000-E	1662	50	LB	SEED FOR SUPPLEMENTAL SEEDING
6108000000-E	1665	1.25	TON	FERTILIZER TOPDRESSING
6111000000-E	SP	160	LF	IMPERVIOUS DIKE
6114500000-N	SP	10	MHR	SPECIALIZED HAND MOWING
6117000000-N	SP	27	EA	RESPONSE FOR EROSION CONTROL
6123000000-E	1670	0.25	ACR	REFORESTATION

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COMPUTED BY:	KSH	DATE:	06-22-2009
CHECKED BY:	RWP	DATE:	11-19-2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-4123	3-A

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

SUMMARY OF EARTHWORK
IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- 11+50.00 TO 16+03.83	175		1,245	1,070	0
-Y1- 12+00.00 TO 16+50.00	980		118	0	862
SUBTOTAL	1,155		1,363	1,070	862
WASTE TO REPLACE BORROW				-862	-862
TOTAL	1,155		1,363	208	0
EST. LOSS DUE TO CLEARING AND GRUBBING	-40			40	
PROJECT TOTAL	1,115		1,363	248	0
EST. 5% TO REPLACE TOPSOIL ON BORROW PIT				12	
GRAND TOTAL	1,115		1,363	260	0
SAY	1,200			300	

EST. SELECT GRANULAR MATERIAL (CL II or III) = 100 CY
EST. GRADE POINTS UNDERCUT = 20 CY
EST. UNDERCUT = 100 CY
EST. CLASS IV SUBGRADE STABILIZATION = 100 TONS

THESE CONTINGENCY ITEMS & QUANTITIES ARE PER THE 'GEOTECHNICAL REPORT – DESIGN RECOMMENDATIONS' LETTER DATED AUGUST 29, 2008.

APPROXIMATE QUANTITIES ONLY. CLEARING AND GRUBBING, UNCLASSIFIED EXCAVATION, BORROW EXCAVATION, AND FINE GRADING WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING".

NOTE: Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48" & UNDER)

STATION	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL
-L- 12+85	CL		1		2112.4	2110.8	
-L- 13+48	LT		2				
-L- 14+35	CL		3		2111.0	2110.0	
-L- 14+37	RT		4		2109.5	2109.0	
-Y1- 13+12	CL		5		2115.0	2113.4	
-Y1- 15+50	CL		6		2104.5	2103.7	
TOTALS							

DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC)

STATION	12"	15"	18"	24"	30"	36"	42"	48"
-L- 12+85								
-L- 13+48								
-L- 14+35								
-L- 14+37								
-Y1- 13+12								
-Y1- 15+50								
TOTALS								

C.S. PIPE (UNLESS NOTED OTHERWISE) — SIZE / THICKNESS OR GAUGE

STATION	12" .064	15" .064	18" .064	24" .064	24"	30" .079	30"	36" .079	36"	42" .109	42"	48" .109	48"
-L- 12+85						38							
-L- 13+48		28											
-L- 14+35			52										
-L- 14+37			26										
-Y1- 13+12				66									
-Y1- 15+50			44										
TOTALS		28	122	66		38							

CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE); ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS.; QUANTITIES FOR DRAINAGE STRUCTURES (* TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B'))

STATION	12"	15"	18"	24"	30"	36"	42"	48"	_" CONTRACTOR DESIGN PIPE	_" CONTRACTOR DESIGN PIPE	_" CONTRACTOR DESIGN PIPE	R.C.P.	C.S.P.	PER EACH (0' THRU 5.0')	LIN. *FT. A: 5.0' THRU 10.0'	LIN. *FT. B: 10.0' AND ABOVE
-L- 12+85																
-L- 13+48																
-L- 14+35																
-L- 14+37																
-Y1- 13+12																
-Y1- 15+50																
TOTALS																

STATION	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME & GRATE STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR 840.26	G.D.I. TYPE "B" STD. 840.18 OR 840.27	G.D.I. TYPE "D" STD. 840.19 OR 840.28	G.D.I. FRAME WITH GRATE STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	M.H. FRAME & COVER STD. 840.54	DO NOT USE PVC	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	CORR. STEEL ELBOWS NO. & SIZE	PIPE REMOVAL LIN.FT.	REMARKS
-L- 12+85																					26	
-L- 13+48																						
-L- 14+35																					22	
-L- 14+37																					26	TEMPORARY PIPE
-Y1- 13+12																					72	
-Y1- 15+50																						
TOTALS																					146	

ABBREVIATIONS

C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
G.D.I. (N.S.)	GRATED DROP INLET (NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL.
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.

GUARDRAIL SUMMARY

G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOULDER WIDTH	FLARE LENGTH * APPROACH END	FLARE LENGTH * TRAILING END	W * APPROACH END	W * TRAILING END
-L- /-Y1-	-L- 14+76 RT	-Y1- 13+25 LT	-L- RT /-Y1- LT	150.00	37.50		-L- 15+28.19	-Y1- 13+89.04	4.00	7.00	25.00	25.00	1.00	1.00
-L- /-Y1-	-L- 15+12 LT	-Y1- 14+73 LT	-L- LT /-Y1- LT	81.25	62.50		-Y1- 14+34.96	-L- 15+28.59	4.00	7.00	25.00		1.00	
	SUBTOTAL			231.25	100.00									
	LESS ANCHORS	TL-2	3 x 25.00' =	-75.00										
		CAT-1	1 x 6.25' =	-6.25										
	TOTAL			150.00	100.00		ADDITIONAL GUARDRAIL POSTS = 5 EACH							

SURVEY LINE	BEG. STA.	ANCHORS CAT-1	ANCHORS TYPE 350 TL-2	IMPACT ATTENUATOR TYPE 350 NO.	PERMITTED G	PERMITTED NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
-L- /-Y1-	-L- 14+76 RT		2							SHOP CURVED GR – 37.5' @ 26' R
-L- /-Y1-	-L- 15+12 LT	1	1							SHOP CURVED GR – 25' @ 20' R, 37.5' @ 26' R
	SUBTOTAL	1	3							
	TOTAL									

11/19/2009
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PROJECT REFERENCE NO.	SHEET NO.
B-4123	4

RW SHEET NO.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 19814 ENGINEER ROBERT W. PORTER, JR. — 11-24-09

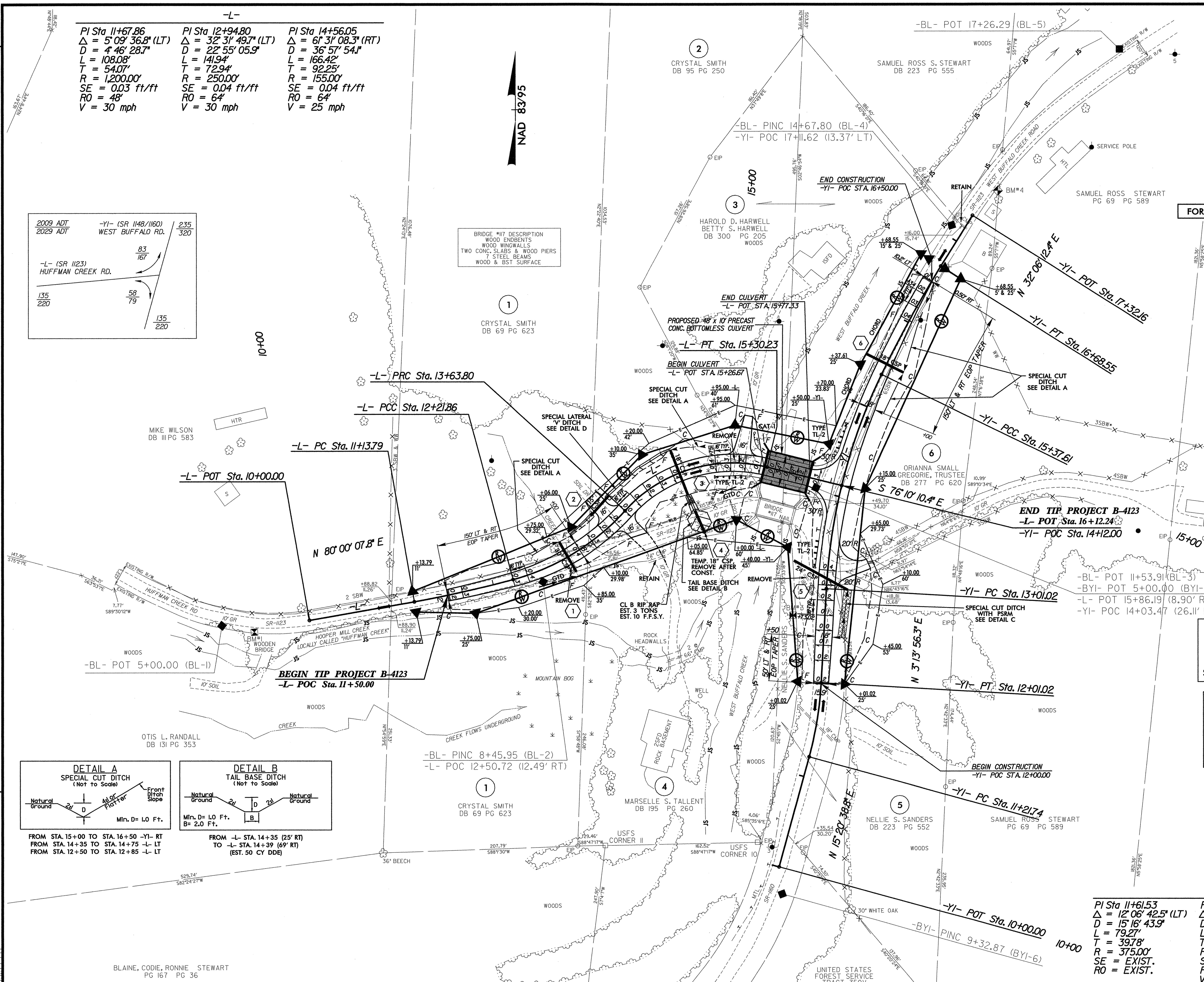
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21656 ENGINEER ROGER S. WEADON — 11/24/09

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

FOR CULVERT PLANS, SEE SHEET C-1 THRU C-4

-L-

PI Sta 11+67.86	PI Sta 12+94.80	PI Sta 14+56.05
Δ = 5°09' 36.8" (LT)	Δ = 32°31' 49.7" (LT)	Δ = 61°31' 08.3" (RT)
D = 4°46' 28.7"	D = 22°55' 05.9"	D = 36°57' 54.1"
L = 108.08'	L = 141.94'	L = 166.42'
T = 54.07'	T = 72.94'	T = 92.25'
R = 1,200.00'	R = 250.00'	R = 155.00'
SE = 0.03 ft/ft	SE = 0.04 ft/ft	SE = 0.04 ft/ft
RO = 48'	RO = 64'	RO = 64'
V = 30 mph	V = 30 mph	V = 25 mph



NAD 83/95
2009 ADT
2029 ADT
-Y1- (SR 1148/1160) WEST BUFFALO RD.
235
320
83
167
-L- (SR 1123) HUFFMAN CREEK RD.
58
79
135
220
BRIDGE #117 DESCRIPTION
WOOD ENDBENTS
WOOD WINGWALLS
TWO CONC. SLABS & WOOD PIERS
7 STEEL BEAMS
WOOD & BST SURFACE
-BL- POT 17+26.29 (BL-5)
CRYSTAL SMITH DB 95 PG 250
SAMUEL ROSS S. STEWART DB 223 PG 555
-BL- PINC 14+67.80 (BL-4)
-Y1- POC 17+11.62 (13.37' LT)
HAROLD D. HARWELL BETTY S. HARWELL DB 300 PG 205
SAMUEL ROSS STEWART PG 69 PG 589
END CONSTRUCTION -Y1- POC STA. 16+50.00
-Y1- POT Sta. 17+32.16
-Y1- PT Sta. 16+68.55
END CULVERT -L- POT STA. 15+77.33
PROPOSED 48" x 10' PRECAST CONC. BOTTOMLESS CULVERT
-L- PT Sta. 15+30.23
BEGIN CULVERT -L- POT STA. 15+26.67
CRYSTAL SMITH DB 69 PG 623
-L- PRC Sta. 13+63.80
-L- PCC Sta. 12+21.86
-L- PC Sta. 11+13.79
-L- POT Sta. 10+00.00
MIKE WILSON DB 111 PG 583
SPECIAL CUT DITCH SEE DETAIL A
SPECIAL LATERAL 'V' DITCH SEE DETAIL D
SPECIAL CUT DITCH SEE DETAIL A
-Y1- PCC Sta. 15+37.61
ORIANNA SMALL GREGORIE, TRUSTEE DB 277 PG 620
S 76°10' 10.4" E
END TIP PROJECT B-4123 -L- POT Sta. 16+12.24
-Y1- POC Sta. 14+12.00
N 80°00' 07.8" E
150' LT & RT EOP TAPER
TEMP. 18" CSP REMOVE AFTER CONST.
TAIL BASE DITCH SEE DETAIL B
CL B RIP RAP EST. 3 TONS EST. 10 F.F.S.Y.
-BL- POT 11+53.91 (BL-3)
-BYI- POT 5+00.00 (BYI-33)
-L- POT 15+86.19 (8.90' RT)
-Y1- POC 14+03.47 (26.11' LT)
-Y1- PC Sta. 13+01.02
SPECIAL CUT DITCH WITH PSRM SEE DETAIL C
N 3°13' 56.3" E
-BL- POT 5+00.00 (BL-1)
BEGIN TIP PROJECT B-4123 -L- POC Sta. 11+50.00
-Y1- PT Sta. 12+01.02
OTIS L. RANDALL DB 131 PG 353
-BL- PINC 8+45.95 (BL-2)
-L- POC 12+50.72 (12.49' RT)
MARSELLE S. TALLENT DB 195 PG 260
NELLIE S. SANDERS DB 223 PG 552
SAMUEL ROSS STEWART PG 69 PG 589
BEGIN CONSTRUCTION -Y1- POC STA. 12+00.00
-Y1- PC Sta. 11+21.74
N 15°20' 38.8" E
USFS CORNER 11
USFS CORNER 10
-Y1- POT Sta. 10+00.00
-BYI- PINC 9+32.87 (BYI-6)
BLAINE, CODIE, RONNIE STEWART PG 167 PG 36
UNITED STATES FOREST SERVICE TRACT 350V

NOTES:

ALL DRIVEWAY RADII 10' UNLESS SHOWN OTHERWISE.

SEE SHEET 5 FOR -L- & -Y1- PROFILES.

DETAIL A — SPECIAL CUT DITCH (Not to Scale)
Natural Ground; 2:1; D; 4:1 or Flatter; Front Ditch Slope; Min. D= 1.0 Ft.
FROM STA. 15+00 TO STA. 16+50 -Y1- RT
FROM STA. 14+35 TO STA. 14+75 -L- LT
FROM STA. 12+50 TO STA. 12+85 -L- LT

DETAIL B — TAIL BASE DITCH (Not to Scale)
Natural Ground; 2:1; D; B; 2:1; Natural Ground; Min. D= 1.0 Ft.; B= 2.0 Ft.
FROM -L- STA. 14+35 (25' RT)
TO -L- STA. 14+39 (69' RT)
(EST. 50 CY DDE)

DETAIL C — SPECIAL CUT DITCH (Not to Scale)
Natural Ground; 2:1; d; D; 4:1 or Flatter; Front Ditch Slope; Min. D= 1.0 Ft.; Max d= 1.0 Ft.
Type of Liner= PSRM
FROM STA. 12+50 TO STA. 13+01 -Y1- RT (EST. 40 SY PSRM)

DETAIL D — SPECIAL LATERAL 'V' DITCH (Not to Scale)
Natural Ground; 2:1; D; 4:1 or Flatter; Fill Slope; Min. D= 1.0 Ft.
FROM STA. 13+00 TO STA. 14+35 -L- LT

-Y1-

PI Sta 11+61.53	PI Sta 14+20.87	PI Sta 16+03.15
Δ = 12°06' 42.5" (LT)	Δ = 22°35' 36.5" (RT)	Δ = 6°16' 39.6" (RT)
D = 15°16' 43.9"	D = 9°32' 57.5"	D = 4°47' 40.7"
L = 79.27'	L = 236.60'	L = 130.93'
T = 39.78'	T = 119.86'	T = 65.53'
R = 375.00'	R = 600.00'	R = 1,195.00'
SE = EXIST.	SE = 0.04 ft/ft	SE = 0.04 ft/ft
RO = EXIST.	RO = 64'	RO = 64'
	V = 40 mph	V = 55 mph

REVISIONS

8/17/99

11/19/2009 r:\roadway\Proj\B4123_Rdy_psh_04.dgn

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-4123	5

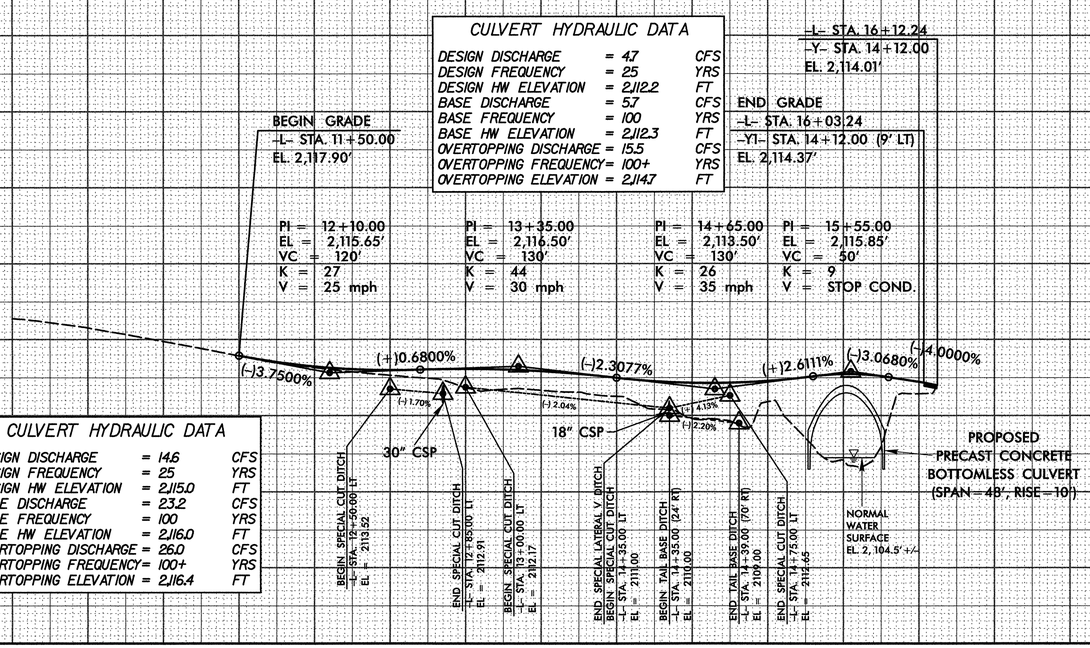
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19814 ENGINEER ROBERT W. PORTER, JR.
11-24-09

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21656 ENGINEER ROGER S. WEAKLEY
11/24/09

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

-L-

BM#1
8" SPIKE SET IN 30" PINE
-BL- STA. 5+33.67 (11.46' RT)
ELEV. 2,125.66'



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 14.6	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2,115.0	FT
BASE DISCHARGE	= 23.2	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2,116.0	FT
OVERTOPPING DISCHARGE	= 26.0	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 2,116.4	FT

CULVERT HYDRAULIC DATA

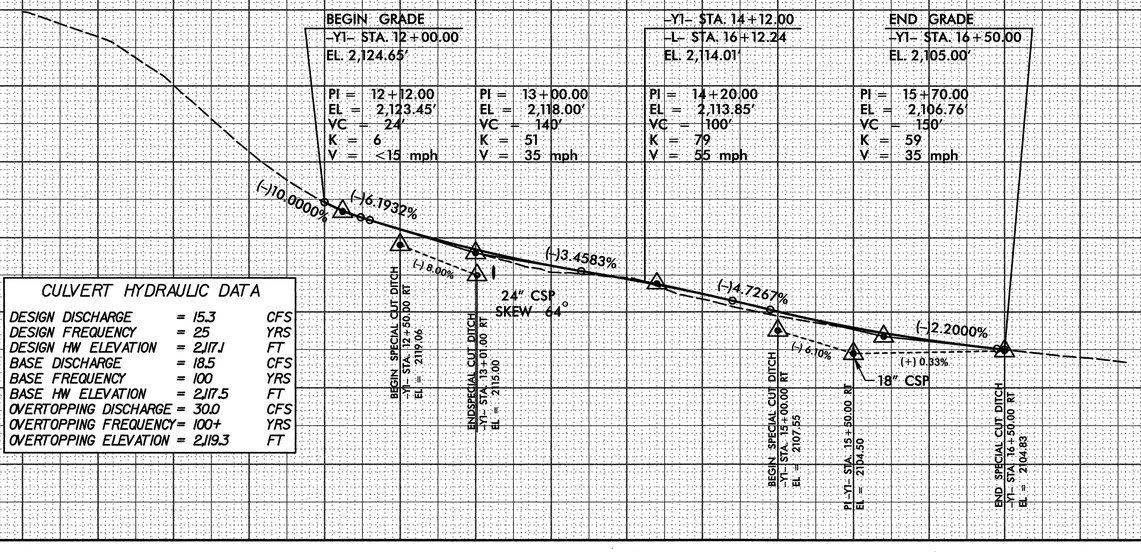
DESIGN DISCHARGE	= 2,360	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2,112.1	FT
BASE DISCHARGE	= 3,520	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2,114.4	FT
OVERTOPPING DISCHARGE	= 3,500	CFS
OVERTOPPING FREQUENCY	= 100	YRS
OVERTOPPING ELEVATION	= 2,114.3	FT

-Y1-

BM#2
8" SPIKE SET IN 30" HEMLOCK
-BY1- STA. 12+51.27 (67.16' RT)
ELEV. 2,140.54'

BM#3
8" SPIKE SET IN 20" POPLAR
-Y1- STA. 12+71.31 (33.66' LT)
ELEV. 2,117.36'

BM#4
8" SPIKE SET IN 36" RED OAK
-BL- STA. 15+28.00 (9.88' RT)
ELEV. 2,106.37'



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 15.3	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2,117.1	FT
BASE DISCHARGE	= 18.5	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2,117.5	FT
OVERTOPPING DISCHARGE	= 30.0	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 2,119.3	FT

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 4.4	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2,107.5	FT
BASE DISCHARGE	= 5.3	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2,108.8	FT
OVERTOPPING DISCHARGE	= 4.7	CFS
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING ELEVATION	= 2,108.2	FT

11/9/2009
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