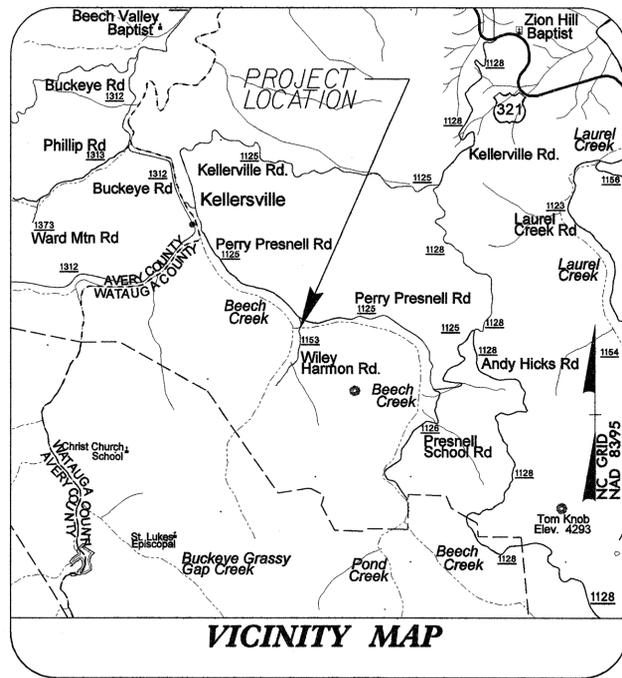


09/08/09

See Sheet 1-A For Index of Sheets



STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**WATAUGA COUNTY**

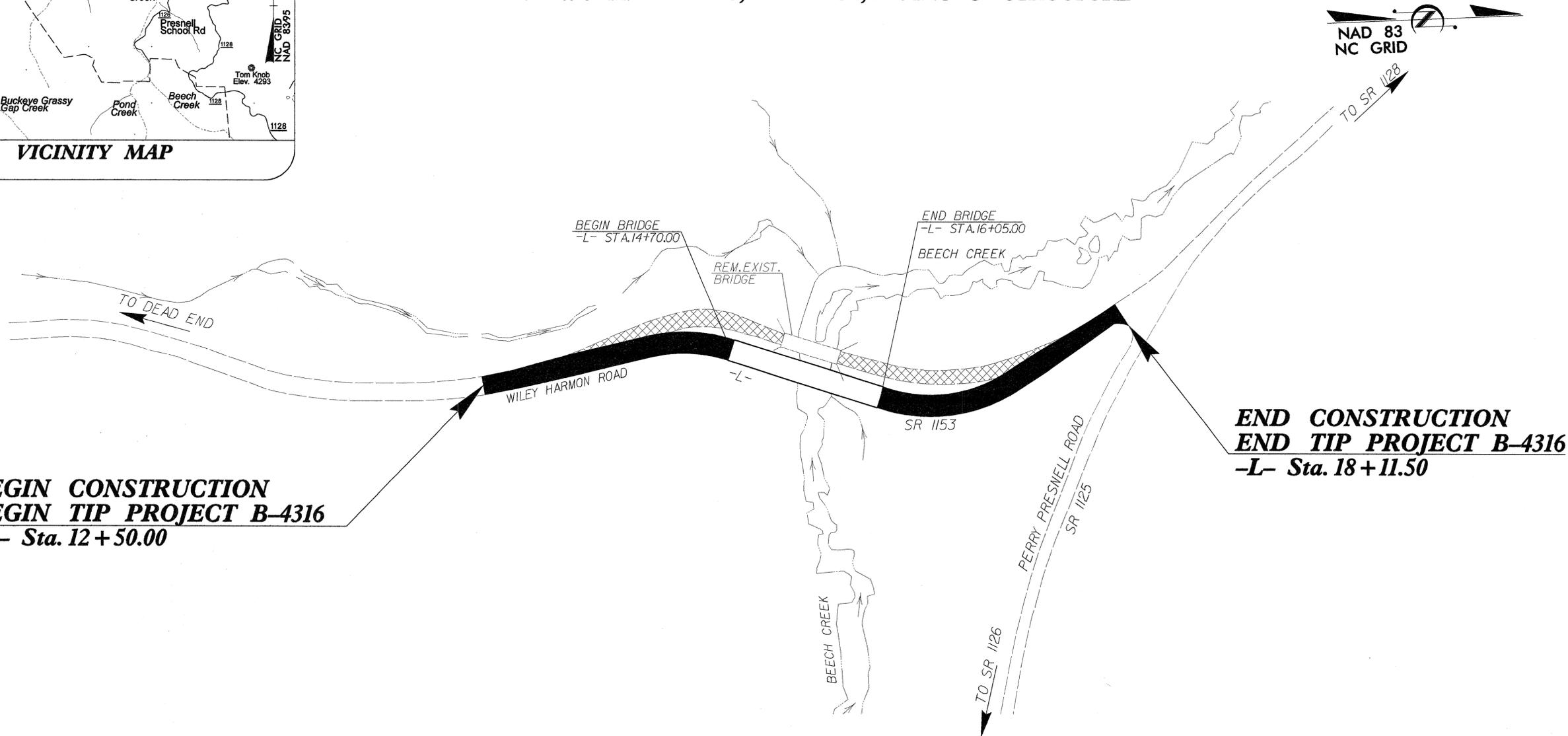
**LOCATION: BRIDGE NO. 320 OVER BEECH CREEK  
ON SR 1153 (WILEY HARMON ROAD)**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4316	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33653.1.1	BRZ-1153(6)	PE	
33653.2.1	BRZ-1153(6)	R/W & UTIL	
33653.3.1	BRZ-1153(6)	CONST.	

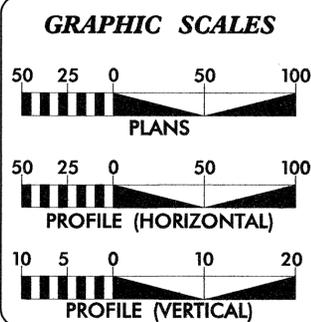
**TIP PROJECT: B-4316**

**CONTRACT: C201809**



**BEGIN CONSTRUCTION  
BEGIN TIP PROJECT B-4316  
-L- Sta. 12+50.00**

**END CONSTRUCTION  
END TIP PROJECT B-4316  
-L- Sta. 18+11.50**



**DESIGN DATA**

ADT 2009 =	160
ADT 2029 =	335
DHV =	12 %
D =	55 %
T =	3 % *
V =	30 MPH
* TTST 1%	DUAL 2%
FUNC. CLASS =	LOCAL

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-4316	= 0.080 MILES
LENGTH STRUCTURE TIP PROJECT B-4316	= 0.026 MILES
TOTAL LENGTH TIP PROJECT B-4316	= 0.106 MILES

**SUNGATE DESIGN GROUP, P.A.**

915 JONES FRANKLIN ROAD  
RALEIGH, NORTH CAROLINA 27606  
TEL: 919 859-2243 FAX: 919 859-6258

Prepared for the North Carolina Department of Transportation in the Office of:

**WETHERILL ENGINEERING**  
559 JONES FRANKLIN ROAD  
SUITE 164  
RALEIGH, N.C. 27606  
Phone: 919 851 8077  
Fax: 919 851 8107

2006 STANDARD SPECIFICATIONS

**RIGHT OF WAY DATE:** EDWARD G. WETHERILL, PE  
PROJECT ENGINEER  
JANUARY 20, 2006

**LETTING DATE:** BOB A. MAY, PE  
PROJECT DESIGN ENGINEER  
March 17, 2009

**NCDOT CONTACT:** DOUG TAYLOR, PE  
ROADWAY DESIGN PROJECT ENGINEER

**HYDRAULICS ENGINEER:** HENRY WELLS, P.E.  
SEAL 09334

**ROADWAY DESIGN ENGINEER:** BOB A. MAY, P.E.  
SEAL 21116

SIGNATURE: [Signature] 11-13-08

**DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA**

STATE HIGHWAY DESIGN ENGINEER

*Carl McMillan* P.E.

3:18:11 PM  
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11/13/2008

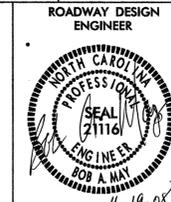
5/28/99

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**WETHERILL ENGINEERING**  
 559 Jones Franklin Rd. Suite 164  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

PROJECT REFERENCE NO. B-4316 SHEET NO. 1-A



# GENERAL NOTES

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 III.

**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.

**END BENTS:**

THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

**UTILITIES:**

UTILITY OWNERS ON THIS PROJECT ARE

BLUE RIDGE EMC  
SKYLINE TELEPHONE MEMBERSHIP CORPORATION

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 CONTRACT.

# INDEX OF SHEETS

Sheet Number	Sheet
1	Title Sheet
1-A	Index of Sheets, General Notes and list of Standards
1-B	Conventional Symbols
1-C	Survey Control Sheets
1-D	Centerline Coordinate List
2	Typical Sections, Pavement Schedule and Miscellaneous Details not covered by Roadway Standards
2-A	Detail of Anchorage for Frames
2-B	Detail of Guardrail Anchor Unit Type- Temporary Retrofit
2-C Thru 2-N	Temporary Shoring Detail
3 Thru 3-B	Summary of Quantities, Summary of Drainage, Summary of Guardrail, Summary of Earthwork and Summary of Pavement Removal
4 Thru 5	Plan and Profile Sheets
TCP-1 Thru TCP-9	Traffic Control Plans
EC-1 Thru EC-5	Erosion Control Plans
RF-1	Reforestation Detail Sheet
SIGN-1 Thru SIGN-3	Signing Plans
UO-1 Thru UO-2	Utilities by Others Plans
X-SUM	Cross-Section Summary Sheet
X-1 Thru X-6	Cross-Sections
S-1 Thru S-19	Structure Plans
2-0	BRIDGE APPROACH FILLS

# LIST OF ROADWAY STANDARDS

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

**2006 ROADWAY ENGLISH STANDARD DRAWINGS**

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
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3	PIPE CULVERTS
300.01	Method of Pipe Installation - Method 'A'
<del>310.10</del>	<del>Driveway Pipe Construction</del>
DIVISION 5	SUBGRADE, BASES AND SHOULDERS
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8	INCIDENTALS
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
815.03	Pipe Underdrain and Blind Drain
840.00	Concrete Base Pad for Drainage Structures
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24	Frames and Narrow Slot Sag Grates
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
846.01	Concrete Curb, Gutter and Curb & Gutter
846.02	Drop Inlet Installation In Expressway Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

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11/19/2008

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	□ EDM
Parcel/Sequence Number	① 23
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	○-----
Proposed Chain Link Fence	□-----
Proposed Barbed Wire Fence	◇-----
Existing Wetland Boundary	-WLB-
Proposed Wetland Boundary	-WLB-
Existing High Quality Wetland Boundary	-HQ WLB-
Existing Endangered Animal Boundary	-EAB-
Existing Endangered Plant Boundary	-EPB-

**BUILDINGS AND OTHER CULTURE:**

Gas Pump Vent or U/G Tank Cap	○
Sign	○
Well	○
Small Mine	⊗
Foundation	□
Area Outline	□
Cemetery	□
Building	□
School	□
Church	□
Dam	□

**HYDROLOGY:**

Stream or Body of Water	-----
Hydro, Pool or Reservoir	-----
River Basin Buffer	-RBB-
Flow Arrow	←
Disappearing Stream	-----
Spring	○
Swamp Marsh	⊗
Proposed Lateral, Tail, Head Ditch	-----
False Sump	▽

**RAILROADS:**

Standard Gauge	-----
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	-----
Proposed Right of Way Line with Iron Pin and Cap Marker	○
Proposed Right of Way Line with Concrete or Granite Marker	○
Existing Control of Access	○
Proposed Control of Access	○
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	○ WPCR
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	-----
Bridge Wing Wall, Head Wall and End Wall	-----
MINOR:	
Head and End Wall	-----
Pipe Culvert	-----
Footbridge	-----
Drainage Box: Catch Basin, DI or JB	□ CB
Paved Ditch Gutter	-----
Storm Sewer Manhole	○
Storm Sewer	-----

**UTILITIES:**

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	○
Power Line Tower	⊗
Power Transformer	⊗
U/G Power Cable Hand Hole	□
H-Frame Pole	●
Recorded U/G Power Line	-----
Designated U/G Power Line (S.U.E.*)	-----

**TELEPHONE:**

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	○
Telephone Booth	□
Telephone Pedestal	□
Telephone Cell Tower	⊗
U/G Telephone Cable Hand Hole	□
Recorded U/G Telephone Cable	-----
Designated U/G Telephone Cable (S.U.E.*)	-----
Recorded U/G Telephone Conduit	-----
Designated U/G Telephone Conduit (S.U.E.*)	-----
Recorded U/G Fiber Optics Cable	-----
Designated U/G Fiber Optics Cable (S.U.E.*)	-----

**WATER:**

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

**TV:**

TV Satellite Dish	⊗
TV Pedestal	□
TV Tower	⊗
U/G TV Cable Hand Hole	□
Recorded U/G TV Cable	-----
Designated U/G TV Cable (S.U.E.*)	-----
Recorded U/G Fiber Optic Cable	-----
Designated U/G Fiber Optic Cable (S.U.E.*)	-----

**GAS:**

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

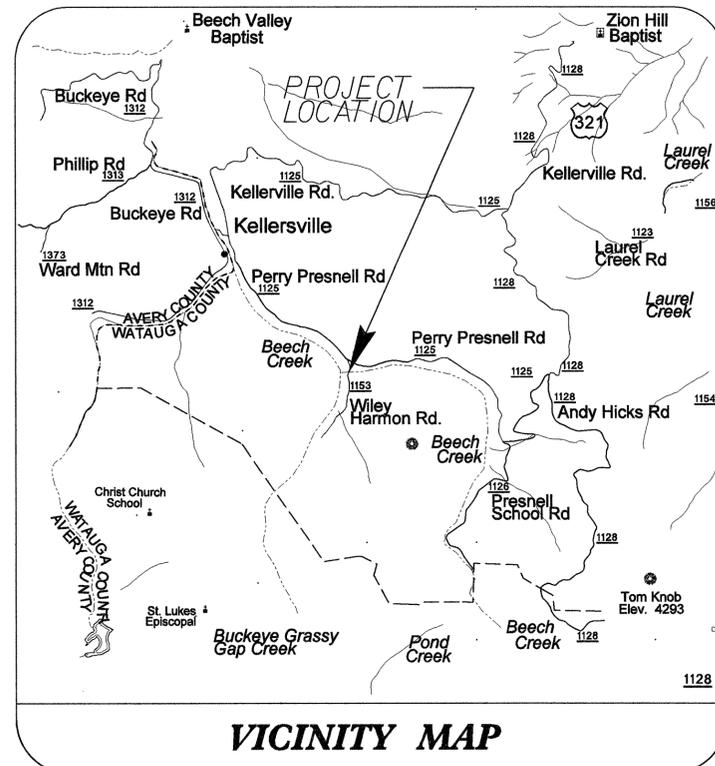
**SANITARY SEWER:**

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

**MISCELLANEOUS:**

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

# SURVEY CONTROL SHEET B-4316



**VICINITY MAP**

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
BL3	(BL-3)		916750.2700	1148448.7680	2978.03'	OUTSIDE PROJECT LIMITS	
B43161	(GPS 4316-1)		916865.8900	1148531.9650	2966.87'	10+90.63	29.06' RT
BL4	(BL-4)		917267.9920	1148457.3690	2915.42'	14+77.79	41.00' LT
BL5	(BL-5)		917452.6260	1148528.6060	2908.30'	16+89.03	5.64' LT
B43162	(GPS 4316-2)		917609.2270	1148423.4940	2910.77'	OUTSIDE PROJECT LIMITS	

BY	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
BY6	(BY-6)		917747.3230	1148305.4490	2898.85'	OUTSIDE PROJECT LIMITS	
BY8	(GPS 4316-2)		917609.2270	1148423.4940	2910.77'	11+72.84	12.32 RT
BY7	(BY-7)		917456.1210	1148756.1240	2949.72'	OUTSIDE PROJECT LIMITS	

\*\*\*\*\*  
 BM1 ELEVATION = 2972.00'  
 N 916760 E 1148408  
 OUTSIDE PROJECT LIMITS  
 8" SPIKE IN ROOT OF A 18" GUM TREE  
 \*\*\*\*\*  
 BM2 ELEVATION = 2900.32'  
 N 917348 E 1148407  
 L STATION 15+36 115' LEFT  
 8" SPIKE IN ROOT OF A 12" POPLAR TREE  
 \*\*\*\*\*



**NC DOT GPS STATION B4316-2**  
**LOCALIZED PROJECT COORDINATES**  
 N = 917609.2270  
 E = 1148423.4940

**BEGIN TIP PROJECT B-4316**  
**-L- Sta. 12+50.00**  
 N = 917030.9623  
 E = 1148510.4691

**END TIP PROJECT B-4316**  
**-L- Sta. 18+11.50**  
 N = 917561.1191  
 E = 1148472.0100

**NC DOT GPS STATION B4316-1**  
**LOCALIZED PROJECT COORDINATES**  
 N = 916865.8900  
 E = 1148531.9650

**DATUM DESCRIPTION**

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4316-1" WITH STATE PLANE GRID COORDINATES OF NORTHING: 916865.8900(ft) EASTING: 1148531.9650(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99988471 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4316-1" TO -L- STATION 12+50.00 IS N 07°25'10" W 166.47' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

**NOTES:**

THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:  
[HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/B4316\\_LS\\_CONTROL\\_071220.TXT](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/B4316_LS_CONTROL_071220.TXT)  
 SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.  
 ⊕ 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 USER SERVICE (OPUS)

**NOTE: DRAWING NOT TO SCALE**

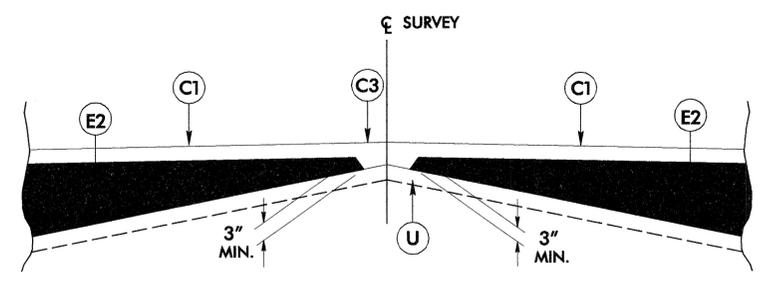
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 10/13/2008



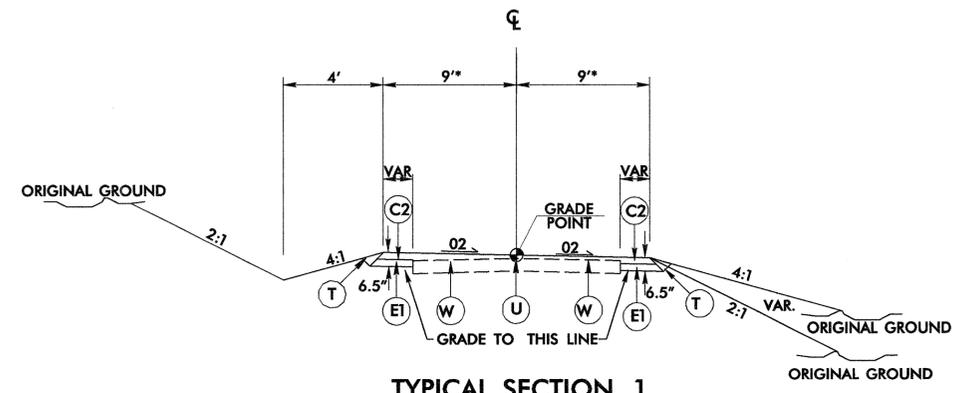
PROJECT REFERENCE NO. B-4316	SHEET NO. 2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	PAVEMENT DESIGN ENGINEER 
 559 Jones Franklin Rd. Suite 164 Raleigh, N.C. 27606 Phone: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1 1/4" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD.
C2	PROP. APPROX. 2 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1" IN DEPTH OR GREATER THAN 1 1/2" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5 1/2" IN DEPTH.
R	CONCRETE EXPRESSWAY GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT, SEE WEDGING DETAIL

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



Detail Showing Method of Wedging



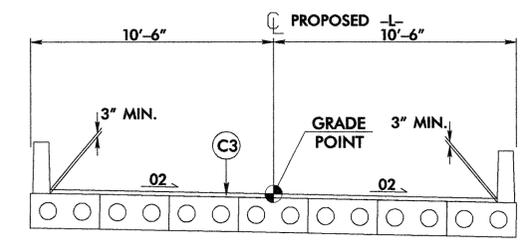
TYPICAL SECTION 1

-L- STA. 12+78.63 TO -L- STA. 13+73.31  
 -L- STA. 16+87.74 TO -L- STA. 17+85.66

\* IN GUARDRAIL LOCATIONS INCREASE SHOULDER WIDTH 3'

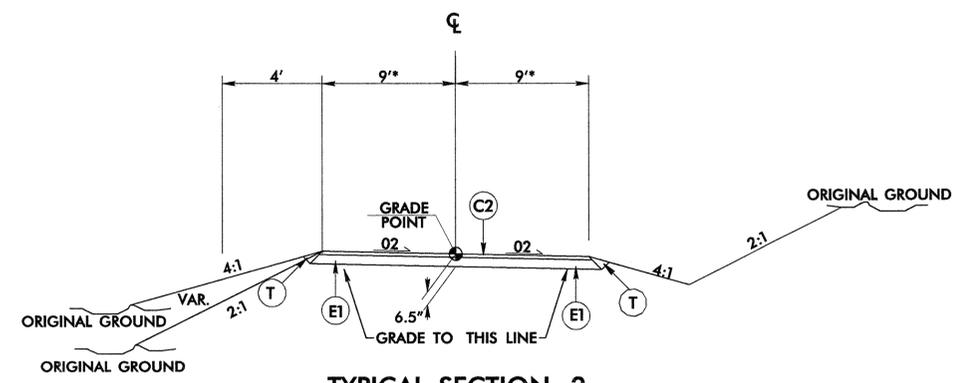
TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1  
 -L- STA. 12+50.00 TO -L- STA. 12+78.63

TRANSITION FROM TYPICAL SECTION NO. 1 TO EXISTING  
 -L- STA. 17+85.66 TO -L- STA. 18+11.50



TYPICAL SECTION 3

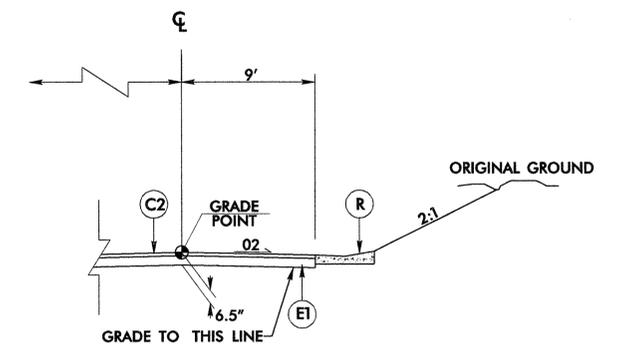
-L- STA. 14+70.00 TO -L- STA. 16+05.00



TYPICAL SECTION 2

-L- STA. 13+73.31 TO -L- STA. 14+70.00 (BEGIN BRIDGE)  
 -L- STA. 16+05.00 (END BRIDGE) TO -L- STA. 16+87.31

\* IN GUARDRAIL LOCATIONS INCREASE SHOULDER WIDTH 3'

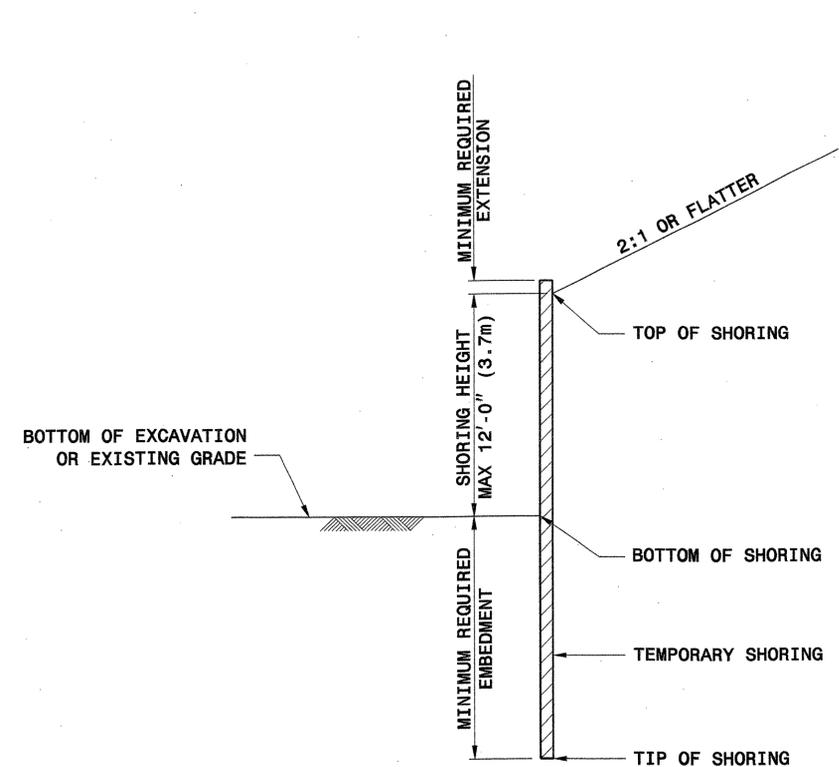


TYPICAL SECTION NO. 2A

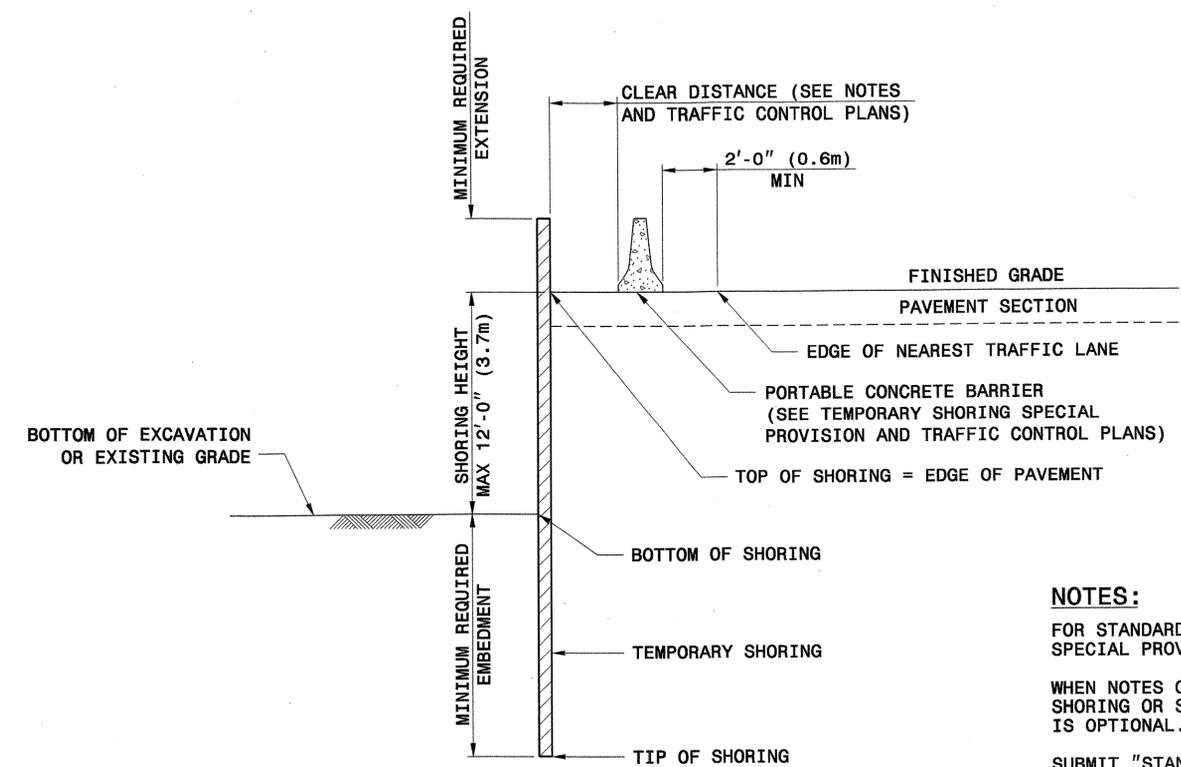
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 2  
 -L- STA. 13+90.00 TO -L- STA. 14+70.00 RIGHT







**SLOPE CASE**



**SURCHARGE CASE**

**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<sup>3</sup>)  
 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.

GROUNDWATER CONDITION	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT						SURCHARGE CASE WITH TRAFFIC IMPACT					
	SHORING HEIGHT FT (m)	SHEET PILES		H PILES WITH TIMBER LAGGING			MINIMUM REQUIRED EMBEDMENT FT (m)	SHEET PILES		H PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT FT (m)	MINIMUM REQUIRED SECTION MODULUS IN <sup>3</sup> /FT (cm <sup>3</sup> /m)	MINIMUM REQUIRED EMBEDMENT FT (m)				MINIMUM REQUIRED SECTION MODULUS IN <sup>3</sup> /FT (cm <sup>3</sup> /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 BETWEEN 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 TRAFFIC IMPACT".



**GEOTECHNICAL ENGINEERING UNIT**  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD DRAWING NO. 1801.01

**STANDARD TEMPORARY SHORING**

DATE: 2-20-07

# STANDARD TEMPORARY MSE WALL OPTIONS

**PROJECT REFERENCE NO.** SHEET

B-4316

2-D

GEOTECHNICAL ENGINEER

ENGINEER



*Scott A. Hadden 3/29/07*  
SIGNATURE DATE

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 ASSUMED SOIL PARAMETERS:

- TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M<sup>3</sup>)
- 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'-7 1/4" (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, DEFLECT, SKEW AND MODIFY REINFORCEMENT.

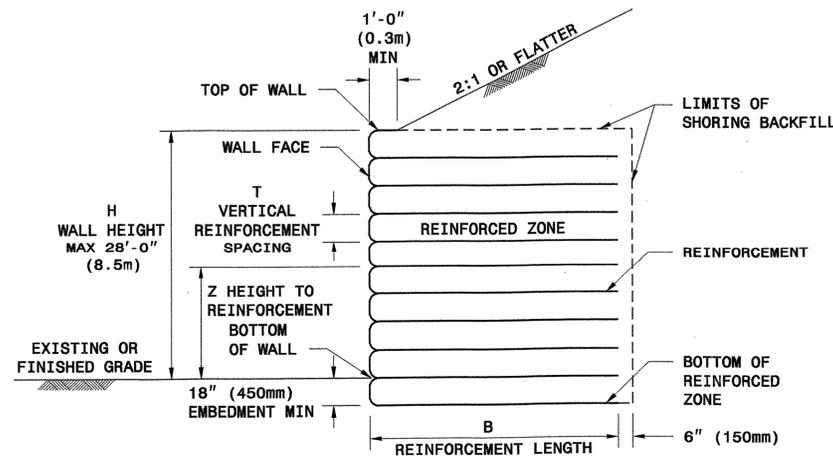
PLACE SHORING BACKFILL IN 8" TO 10" (200mm to 250mm) THICK LIFTS AND COMPACT IN ACCORDANCE WITH SUBARTICLE 235-4(C) OF THE STANDARD SPECIFICATIONS. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 3'-0" (1m) OF THE WALL FACE.

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.

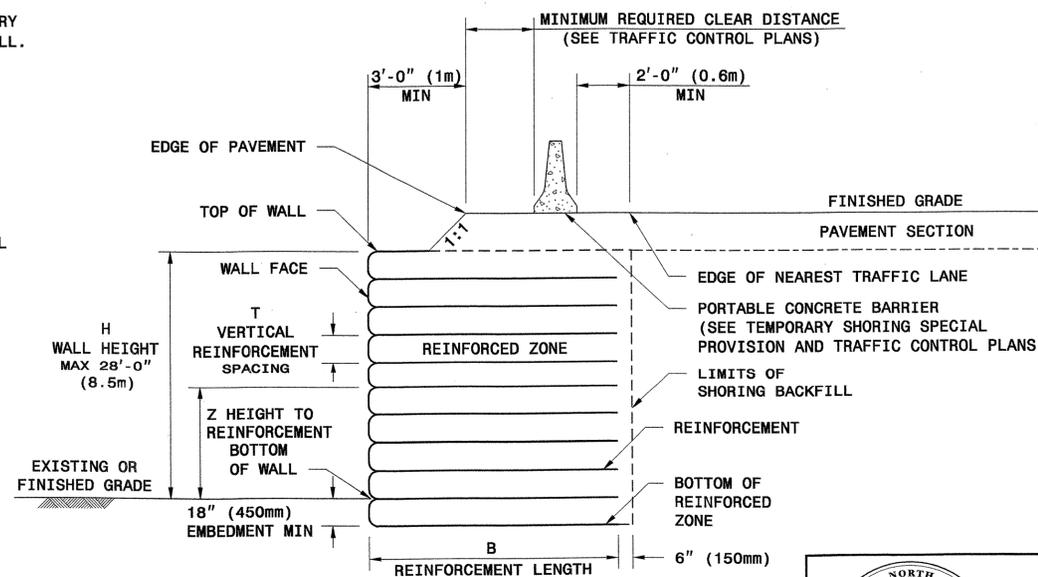
COVER REINFORCING AND RETENTION FABRIC WITH AT LEAST 3" (75mm) OF SHORING BACKFILL. PLACE TOP REINFORCEMENT LAYER BETWEEN 4" AND 24" (100mm and 600mm) BELOW TOP OF WALL DEPENDING ON WALL OPTION.

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

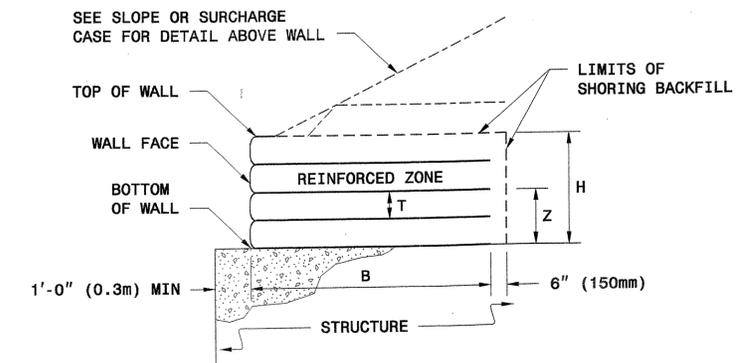
IF THE TOP OF WALL IS WITHIN 5'-0" (1.5m) OF FINISHED GRADE, REMOVE TOP FORM OR FACING AND INCORPORATE THE TOP REINFORCEMENT LAYER INTO THE FILL WHEN PLACING FILL IN FRONT OF THE WALL. STANDARD TEMPORARY MSE WALLS REMAIN IN PLACE PERMANENTLY UNLESS REQUIRED OTHERWISE.



**SLOPE CASE**



**SURCHARGE CASE**



**TEMPORARY MSE WALL ON STRUCTURE**



**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

GEOTECHNICAL ENGINEER ENGINEER

Scott A. Hadden 3/21/07

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
SLOPE AND SURCHARGE CASES	Z (FT-INCHES)													
	27 - 8													3
	26 - 10													3
	25 - 2													3
	23 - 6													3
	21 - 10													3
	20 - 2													3
	18 - 6													3
	16 - 10													3
	15 - 2													3
	13 - 6													3
	11 - 10													3
10 - 2													3	
8 - 6													3	
6 - 10													3	
5 - 2													3	
3 - 6													3	
1 - 10													3	
0 - 2													3	
-0 - 8													3	

SIERRASCAPE TEMPORARY WALL (GEOGRID TYPE)

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

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
SLOPE CASE	Z (FT)													
	26.5													11
	25.5													11
	24													11
	22.5													11
	21													11
	19.5													11
	18													11
	16.5													11
	15													11
	13.5													11
	12													11
10.5													11	
9													11	
7.5													11	
6													11	
4.5													11	
3													11	
1.5													11	
0													11	
-1.5													11	

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
SLOPE CASE	Z (FT)													
	26													4.5
	24													4.5
	22													4.5
	20													4.5
	18													4.5
	16													4.5
	14													4.5
	12													4.5
	10													4.5
	8													4.5
	6													4.5
4													4.5	
3													4.5	
2													4.5	
1													4.5	
0													4.5	
-1.5													4.5	

RETAINED EARTH TEMPORARY WALL (WELDED WIRE MESH TYPE)

3X1 = 3WB x W8 x 1.0'  
3X2 = 3WB 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
SLOPE AND SURCHARGE CASES	Z (FT-INCHES)													
	27 - 6													3X1
	26 - 10													3X1
	25 - 2													3X1
	23 - 6													3X1
	21 - 10													3X1
	20 - 2													3X1
	18 - 6													3X1
	16 - 10													3X1
	15 - 2													3X1
	13 - 6													3X1
	11 - 10													3X1
10 - 2													3X1	
8 - 6													3X1	
6 - 10													3X1	
5 - 2													3X1	
3 - 6													3X1	
1 - 10													3X1	
0 - 2													3X1	
-1 - 6													3X1	

NOTES FOR HILFIKER TEMPORARY WALL

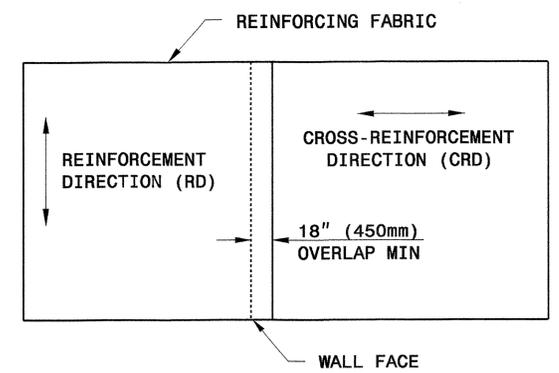
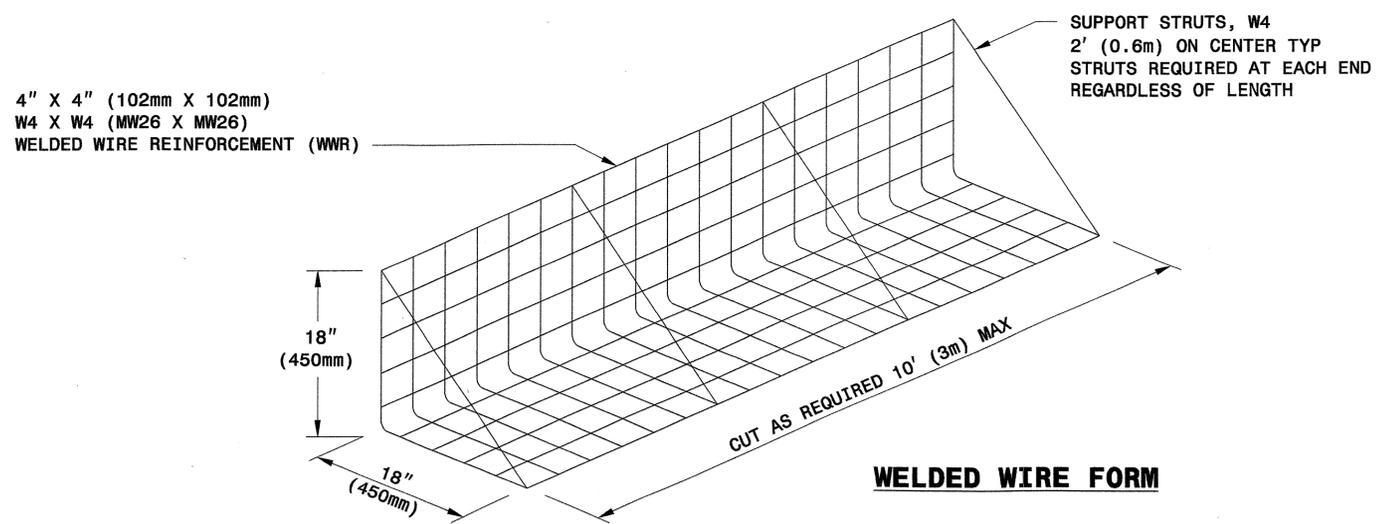
- 1) CAP MAT AT TOP OF WALL IS NOT INCLUDED IN TABLES.
- 2) REINFORCEMENT IS NOT REQUIRED AT 1' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 24'.
- 3) REINFORCEMENT IS NOT REQUIRED AT 3' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26'.
- 4) REINFORCEMENT IS NOT REQUIRED AT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

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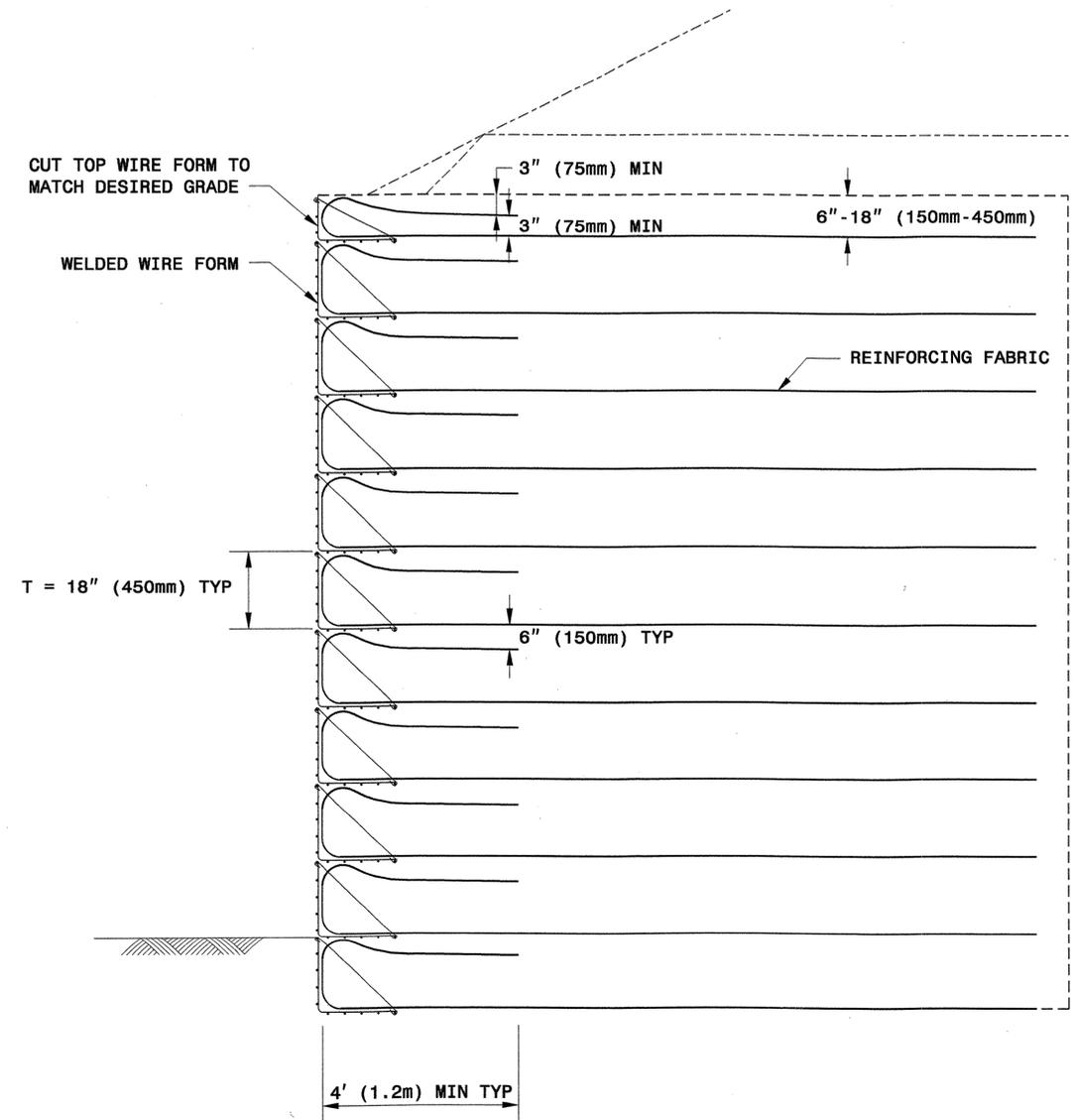
STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MSE WALL REINFORCEMENT TABLES - ENGLISH UNITS

SHEET 2 OF 11 DATE: 2-20-07



**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

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RALEIGH

STANDARD DRAWING NO. 1801.02

**TEMPORARY  
FABRIC WALL**

SHEET 3 OF 11      DATE: 12-19-06

GEOTECHNICAL ENGINEER

ENGINEER



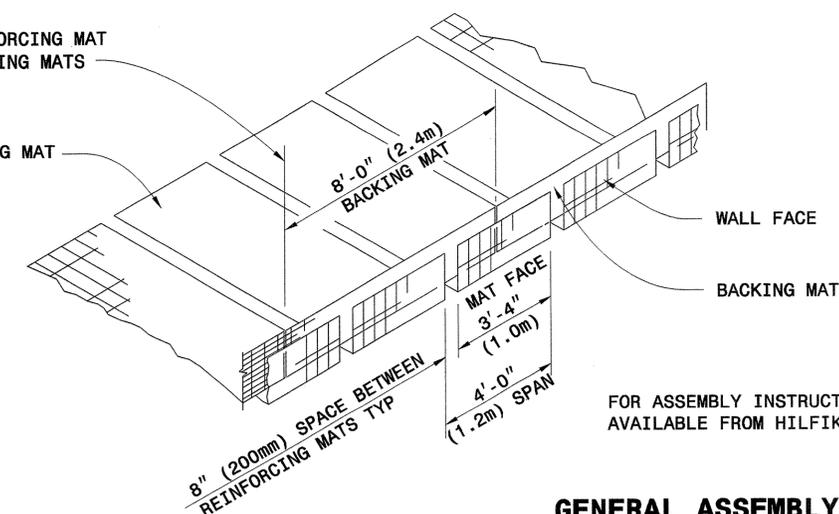
Scott A. Hadden 3/29/07

SIGNATURE DATE

SIGNATURE DATE

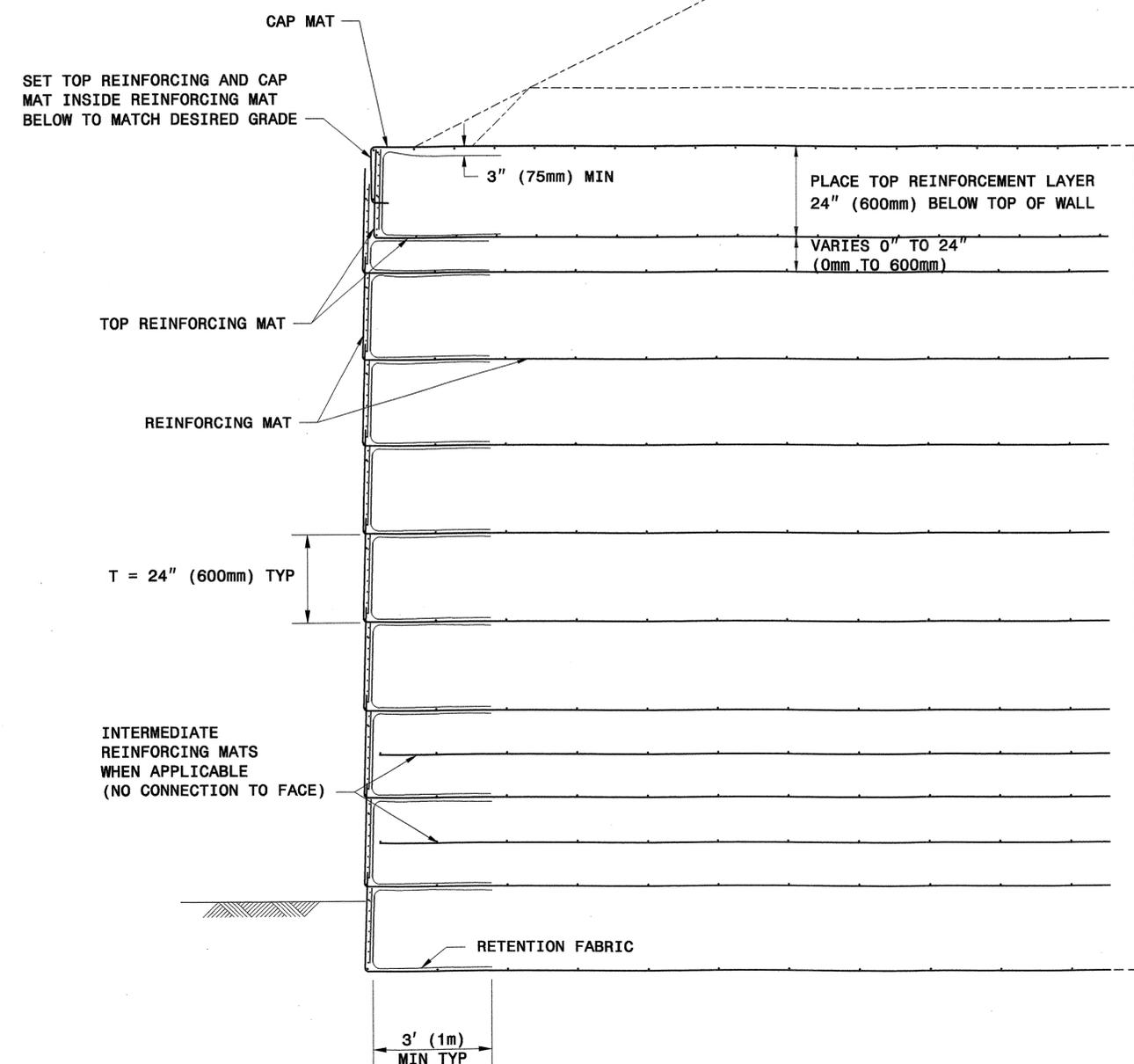
CENTERLINE OF REINFORCING MAT  
FACE = EDGE OF BACKING MATS

REINFORCING MAT



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

**GENERAL ASSEMBLY DETAIL**



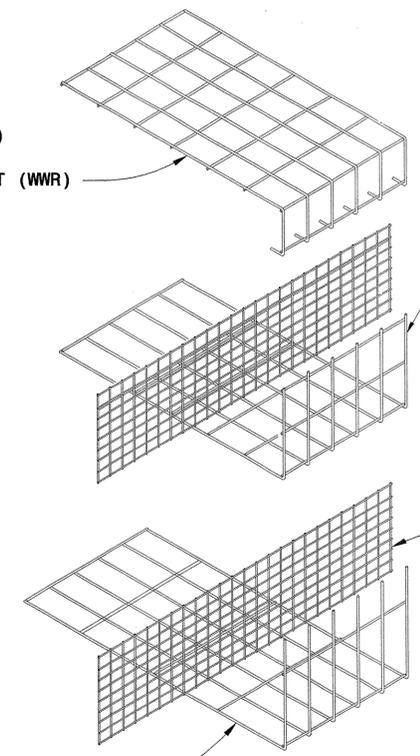
**TYPICAL SECTION**

8" X 12" (203mm X 305mm)  
W4.5 X W3.5 (MW29 X MW23)  
CAP MAT  
WELDED WIRE REINFORCEMENT (WWR)

8" X 12" (203mm X 305mm)  
W4.5 X W3.5 (MW29 X MW23) WWR  
TOP REINFORCING MAT (NO PRONGS)

4" X 3" (102mm X 76mm)  
W5 X W2.5 (MW32 X MW16) WWR  
BACKING MAT  
8' (2.4m) WIDE

8" X 21" (203mm X 533mm)  
REINFORCING MAT  
SEE SHEETS 2 AND 3 FOR GAUGE SIZES



**WALL COMPONENTS**



**GEOTECHNICAL ENGINEERING UNIT**  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

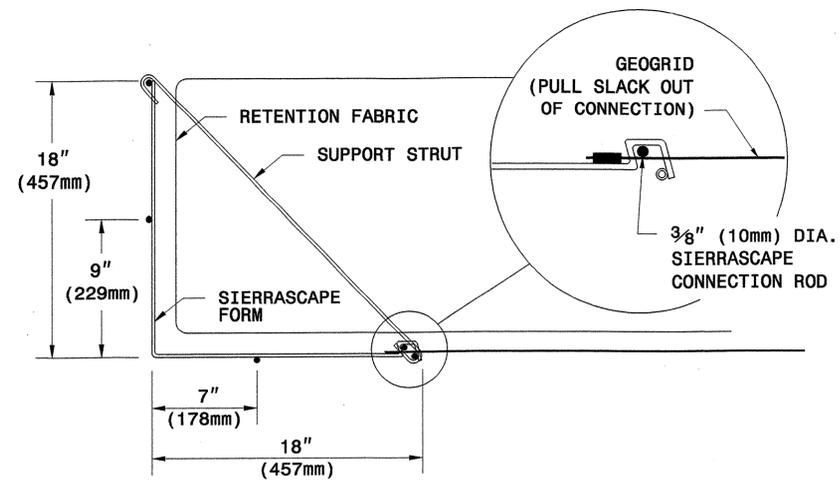
STANDARD DRAWING NO. 1801.02  
**HILFIKER TEMPORARY WALL**  
SHEET 4 OF 11 DATE: 12-19-06

GEOTECHNICAL ENGINEER ENGINEER

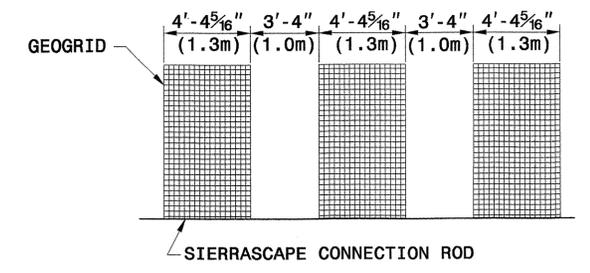


Scott A. Hadden 3/29/07  
SIGNATURE DATE

SIGNATURE DATE



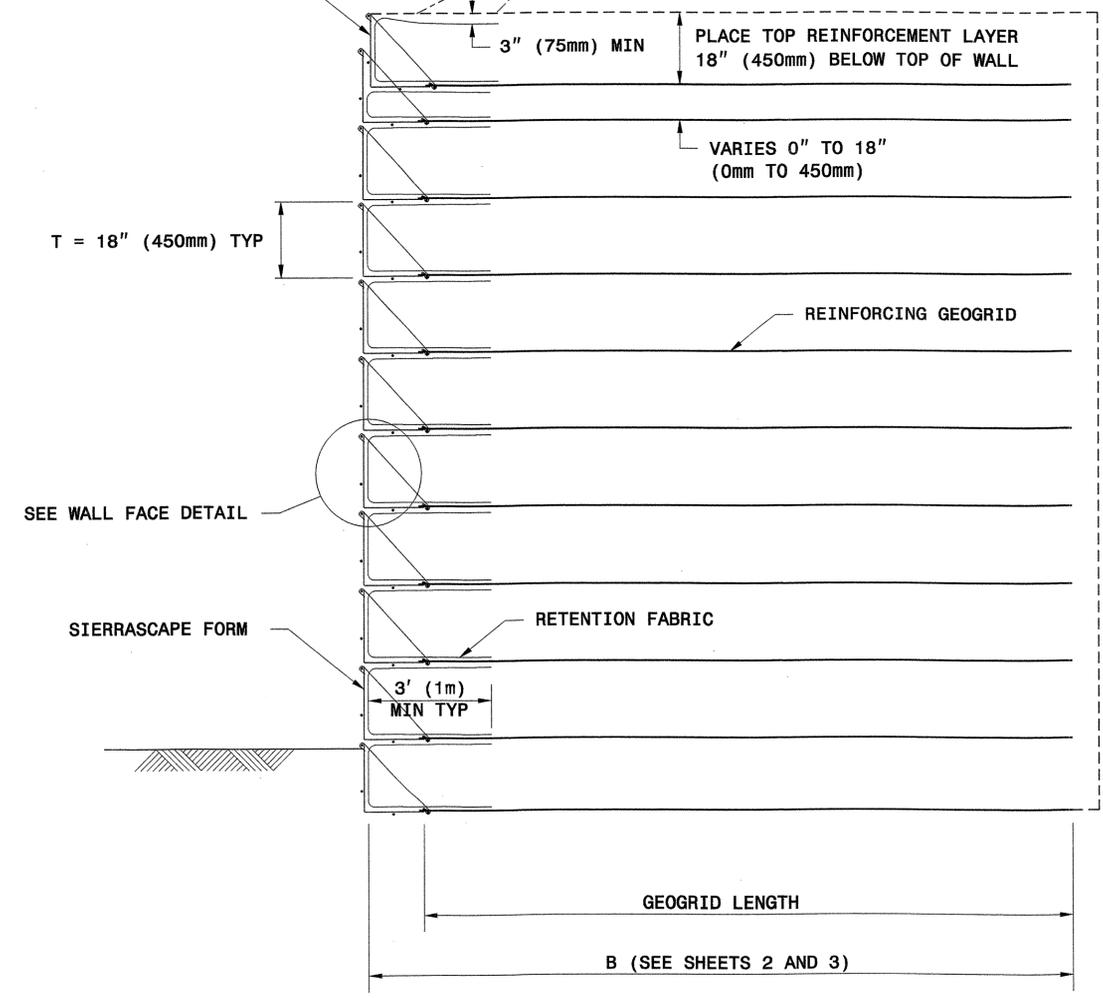
**WALL FACE DETAIL**



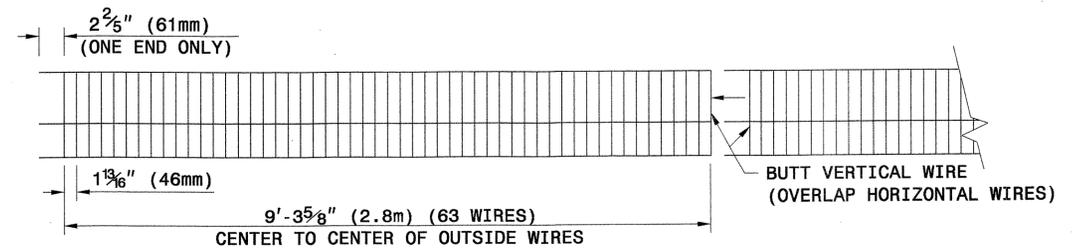
PLACE ALTERNATE LAYERS OF GEOGRID IN STAGGERED PATTERN SUCH THAT THE LAYER ABOVE IS CENTERED OVER SPACE BELOW

**TYPICAL GEOGRID COVERAGE**

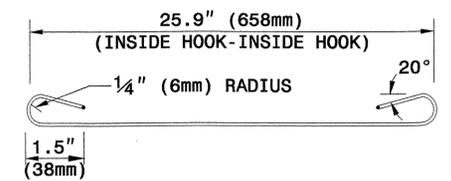
SET TOP WIRE FORM INSIDE WIRE FORM BELOW TO MATCH DESIRED GRADE



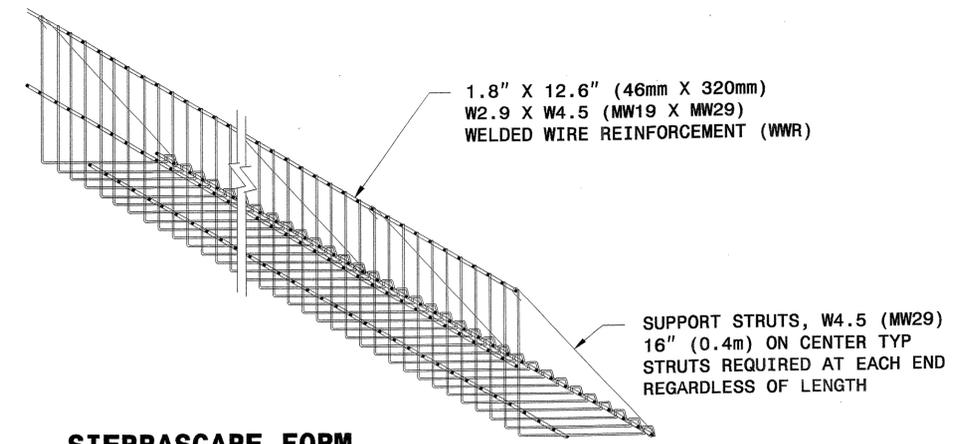
**TYPICAL SECTION**



**ELEVATION VIEW**



**SUPPORT STRUT**



**SIERRASCAPE FORM**

**WALL COMPONENTS**



**GEOTECHNICAL ENGINEERING UNIT**  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD DRAWING NO. 1801.02

**SIERRASCAPE TEMPORARY WALL**

GEOTECHNICAL ENGINEER

ENGINEER

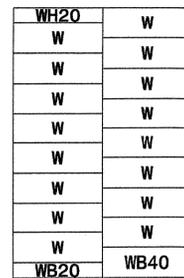


Signature: Scott A. Hidden  
Date: 3/29/07

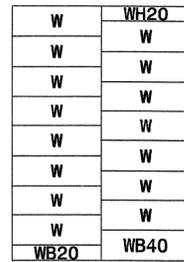
SIGNATURE DATE

**PANEL LAYOUTS**

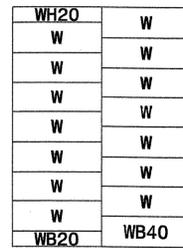
H - WALL HEIGHT  
(FEET-INCHES)  
(METER)



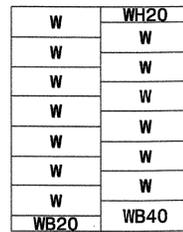
< 28 - 0  
< 8.5



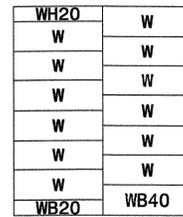
< 27 - 0  
< 8.2



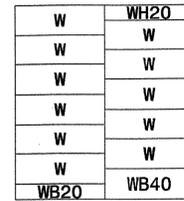
< 25 - 4  
< 7.7



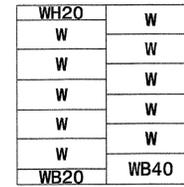
< 23 - 8  
< 7.2



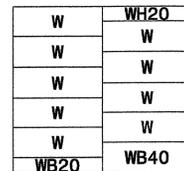
< 22 - 0  
< 6.7



< 20 - 4  
< 6.2

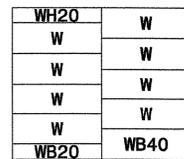


< 18 - 8  
< 5.7

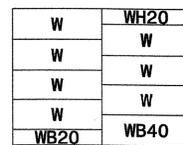


(FEET-INCHES)  
(METER)

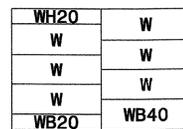
< 17 - 0  
< 5.2



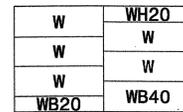
< 15 - 4  
< 4.7



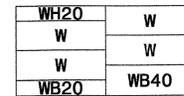
< 13 - 8  
< 4.2



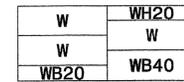
< 12 - 0  
< 3.7



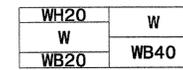
< 10 - 4  
< 3.2



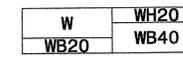
< 8 - 8  
< 2.6



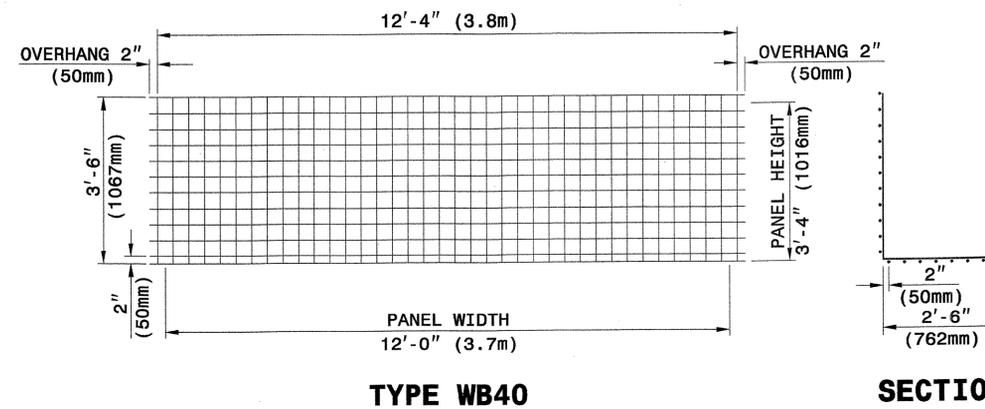
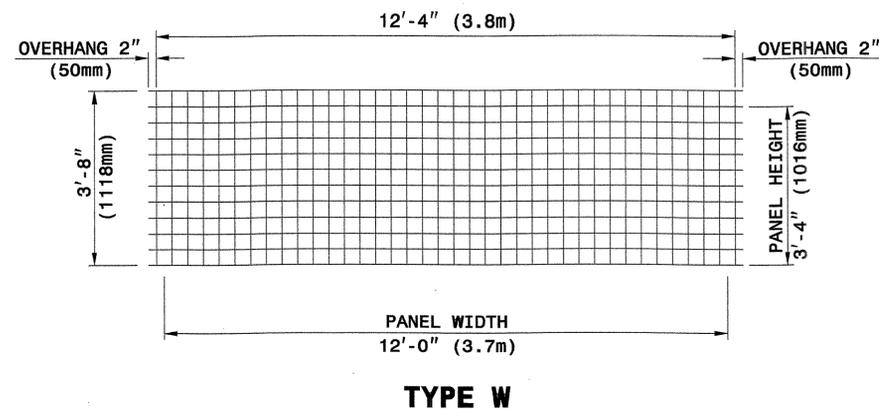
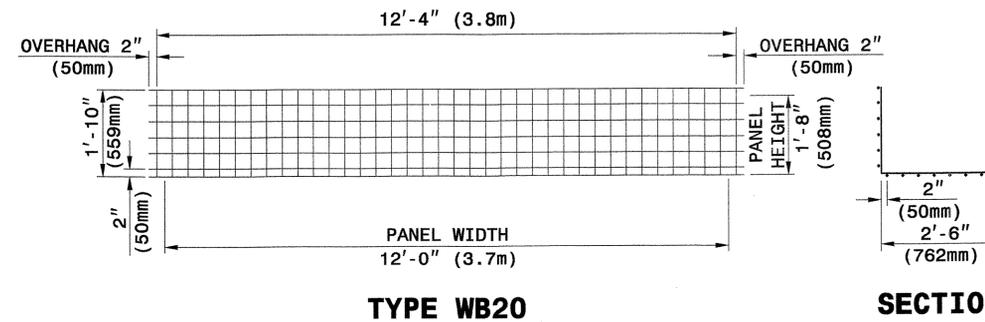
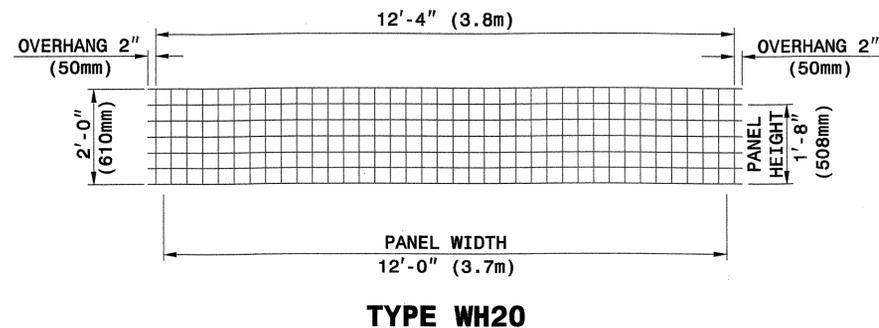
< 7 - 0  
< 2.1



< 5 - 4  
< 1.6



< 3 - 8  
< 1.1



**WELDED WIRE FACINGS**

**WELDED WIRE FORMS**

**PANEL TYPES (WELDED WIRE FACINGS AND FORMS)**

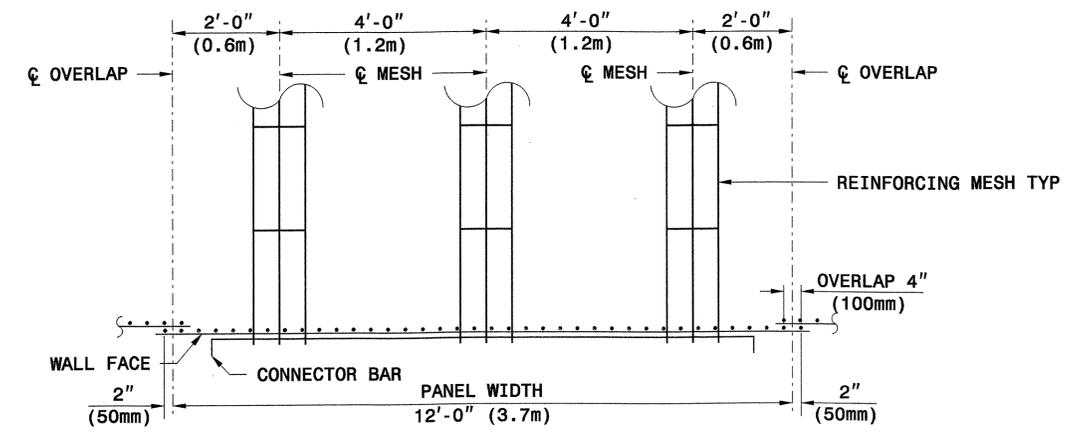
4" X 4" (100mm X 100mm), W8 X W8 (MW52 X MW52) WELDED WIRE REINFORCEMENT (WWR)



**GEOTECHNICAL ENGINEERING UNIT**  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH  
TEMPORARY WALL



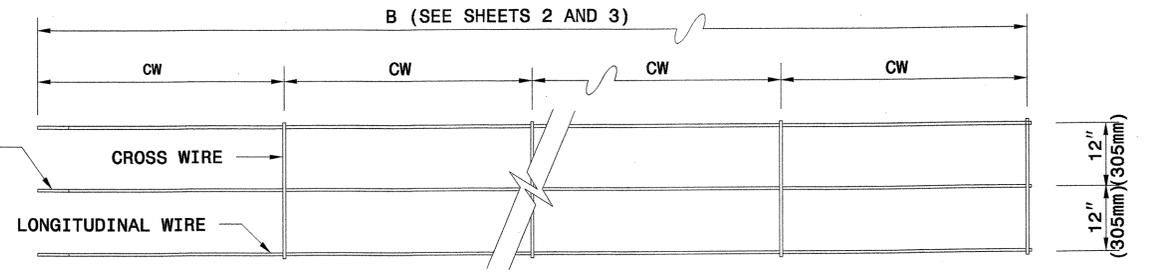
**REINFORCING MESH PLACEMENT DETAIL  
(PLAN VIEW)**



**1/2" (13mm) DIA. BAR**

**CONNECTOR BAR**

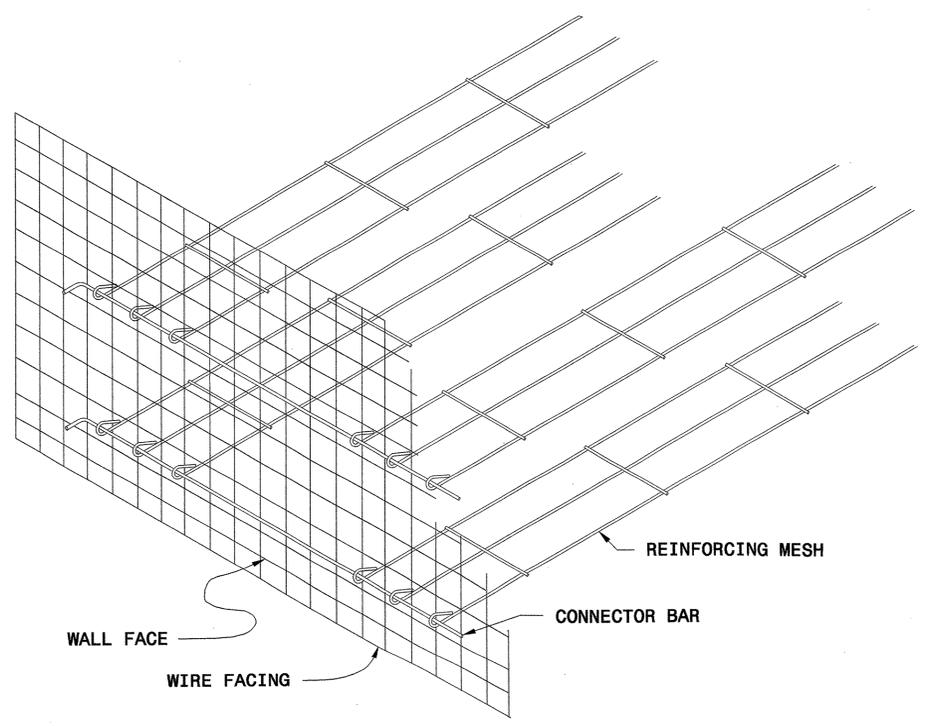
LOOPED END OF MESH  
(SEE REINFORCING MESH LOOP DETAIL)



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

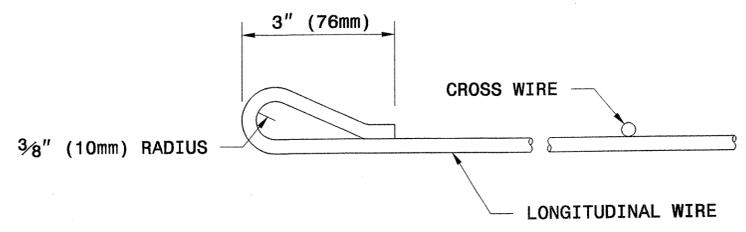
**3W8 X W8 X 2.0' (3MW52 X MW52 X 610mm)**  
 NO. OF LONGITUDINAL WIRES  
 GAUGE OF LONGITUDINAL WIRES  
 GAUGE OF CROSS WIRES  
 SPACING OF CROSS WIRES IN FT (mm), CW

**REINFORCING MESH DESIGNATION**



**GENERAL ASSEMBLY DETAIL**

**REINFORCING MESH**



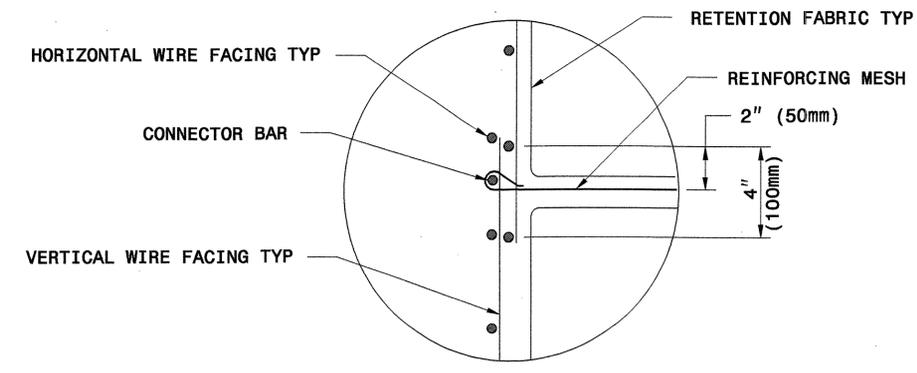
**REINFORCING MESH LOOP DETAIL**



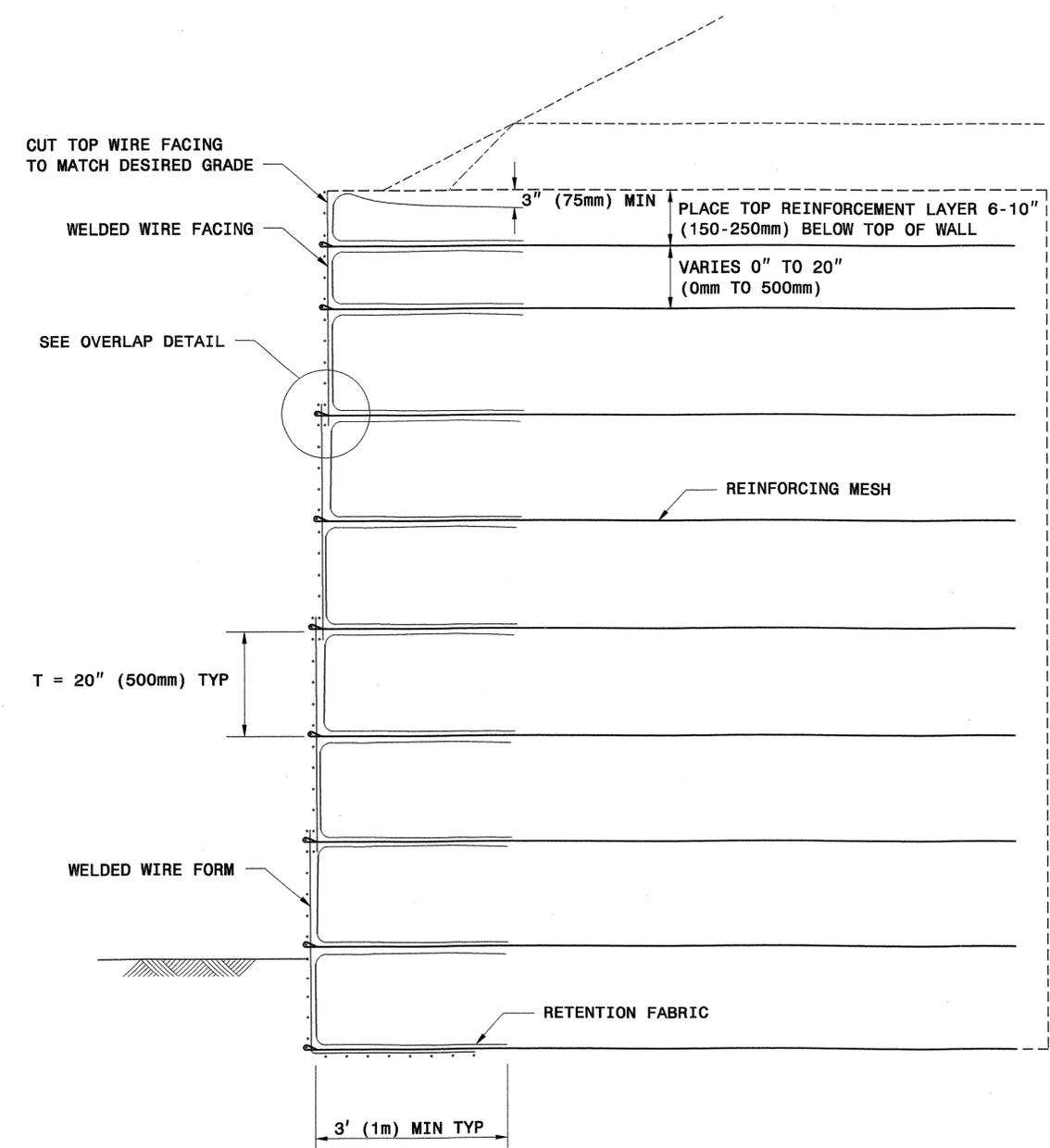
**GEOTECHNICAL ENGINEERING UNIT**  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD DRAWING NO. 1801.02  
**RETAINED EARTH TEMPORARY WALL**  
 SHEET 7 OF 11 DATE: 12-19-06

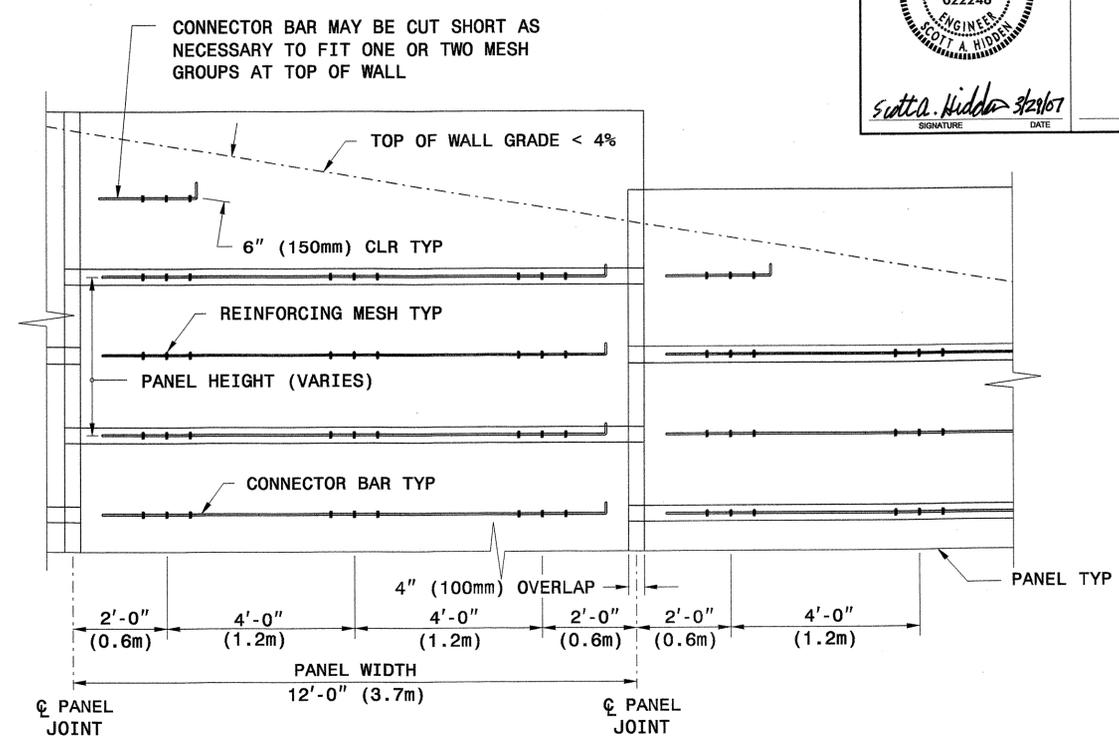
GEOTECHNICAL ENGINEER  SCOTT A. HADDEN SIGNATURE DATE	ENGINEER SIGNATURE DATE
---	----------------------------



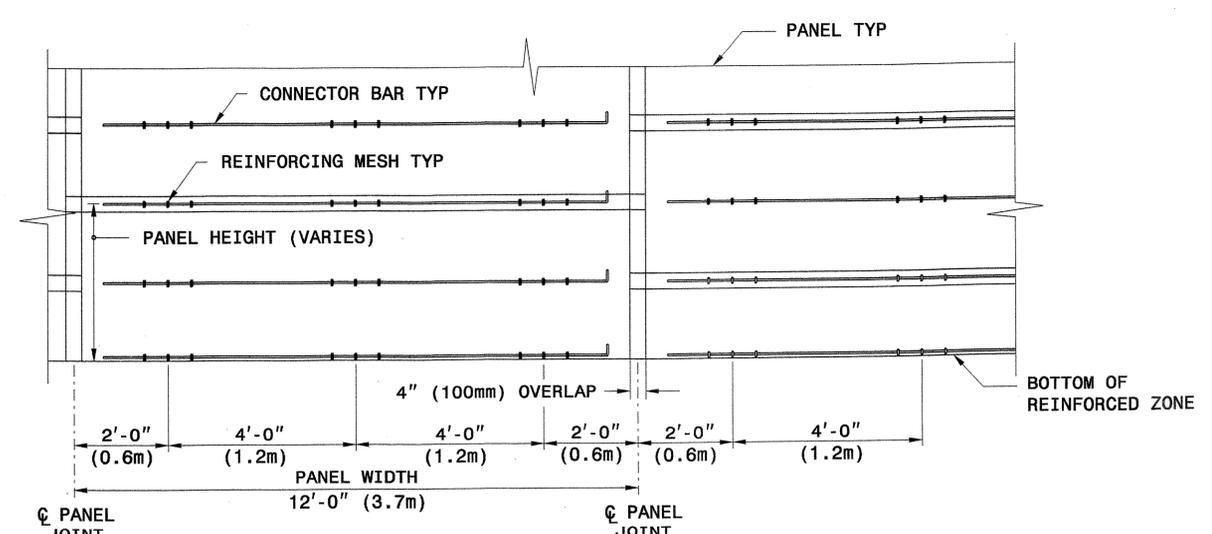
**OVERLAP DETAIL**



**TYPICAL SECTION**



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



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



**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

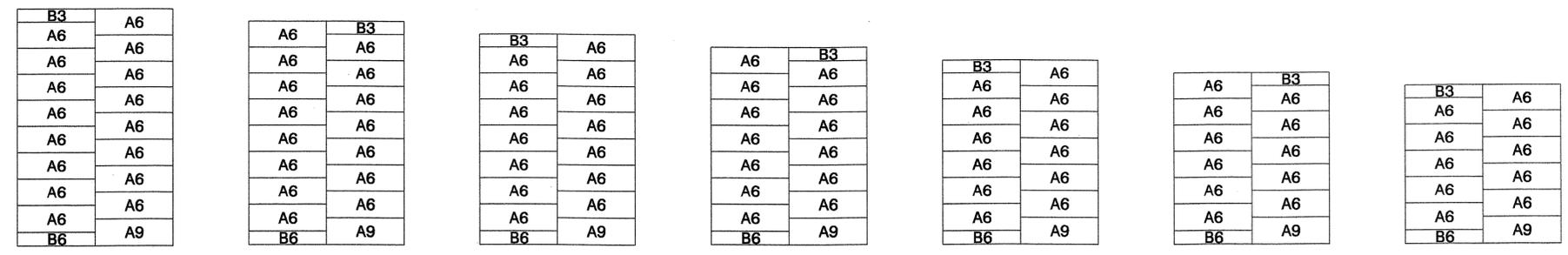
GEOTECHNICAL ENGINEER

ENGINEER

Scott A. Hadden 3/29/07

**PANEL LAYOUTS**

H - WALL HEIGHT  
(FEET-INCHES)  
(METER)



< 28 - 0  
< 8.5

< 27 - 8  
< 8.4

< 26 - 0  
< 7.9

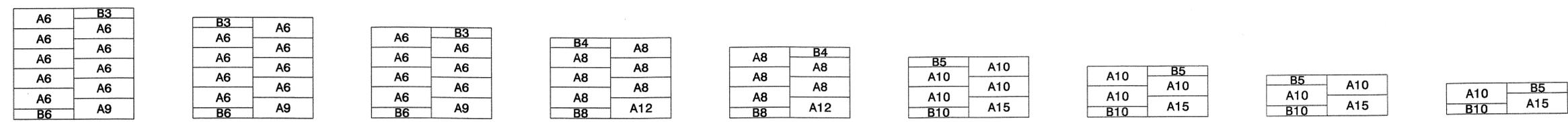
< 24 - 4  
< 7.4

< 22 - 8  
< 6.9

< 21 - 0  
< 6.4

< 19 - 4  
< 5.9

(FEET-INCHES)  
(METER)



< 17 - 8  
< 5.4

< 16 - 0  
< 4.9

< 14 - 4  
< 4.4

< 12 - 8  
< 3.9

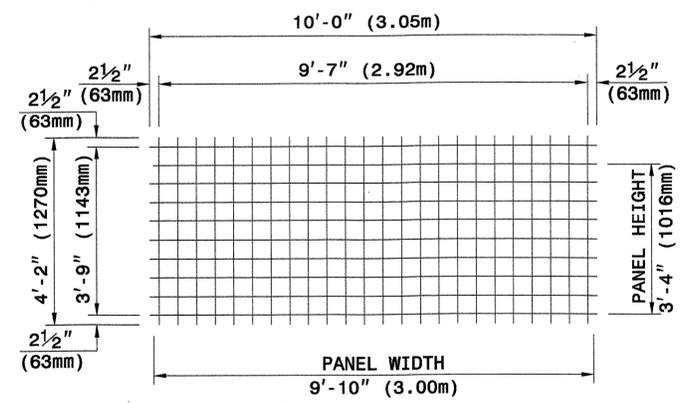
< 11 - 0  
< 3.4

< 9 - 4  
< 2.8

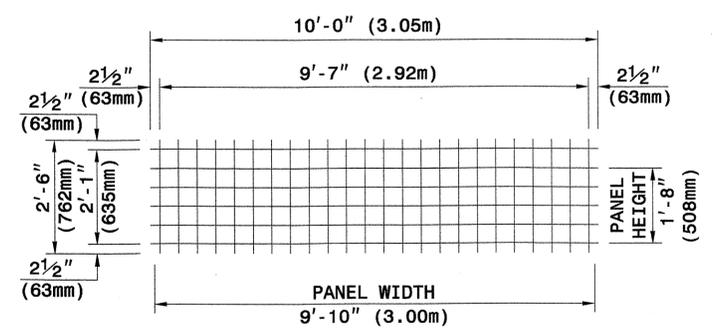
< 7 - 8  
< 2.3

< 6 - 0  
< 1.8

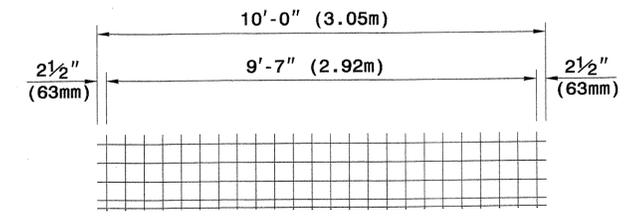
< 4 - 4  
< 1.3



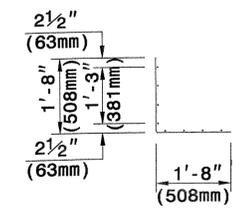
**TYPE A**



**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)



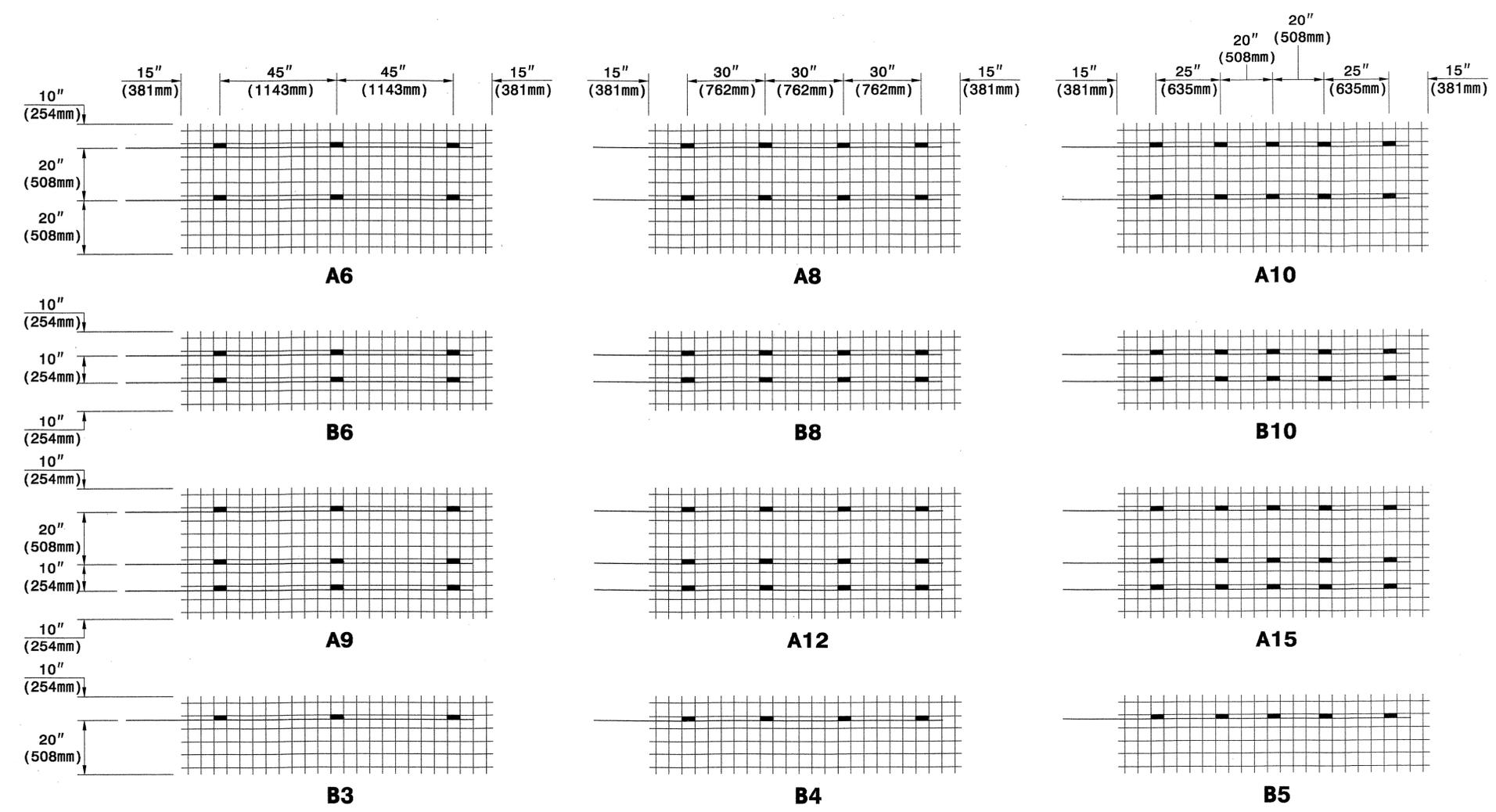
**GEOTECHNICAL ENGINEERING UNIT**

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD DRAWING NO. 1801.02

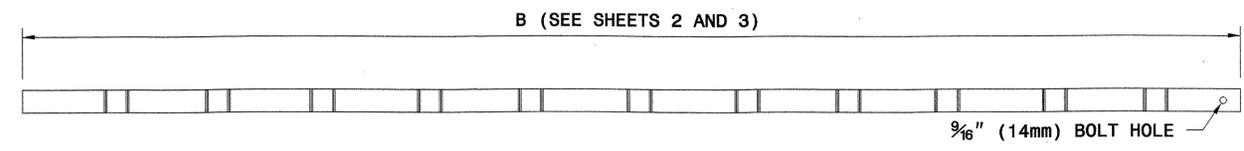
TERRATREL  
TEMPORARY WALL

SHEET 9 OF 11 DATE: 12-19-06

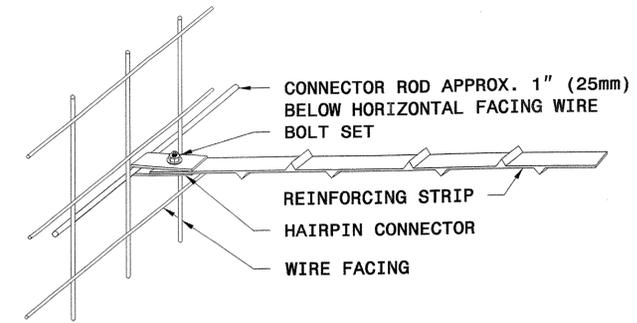


**KEY: A8**  
 NUMBER OF REINFORCING STRIPS  
 PANEL TYPE

**CONNECTOR ROD AND REINFORCING STRIP PLACEMENT DIAGRAMS**



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



**STRIP TO FACING CONNECTION**



**1/2" (13mm) DIA. ROD**  
**CONNECTOR ROD**



**1/2" (13mm) BOLT WITH NUT AND WASHER**  
**BOLT SET**



**HAIRPIN CONNECTOR**

**WALL COMPONENTS**



The Reinforced Earth Company

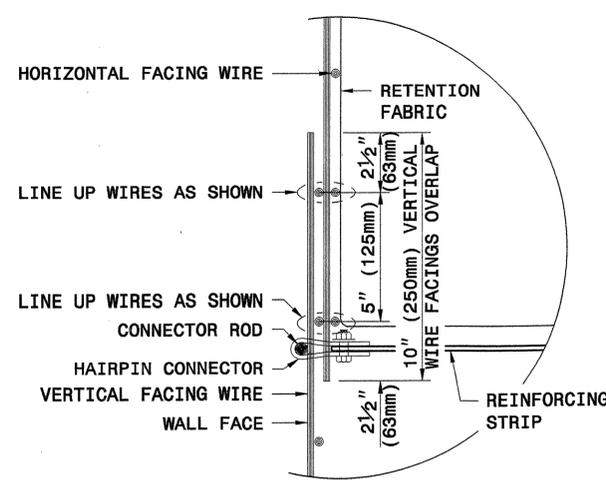


**GEOTECHNICAL ENGINEERING UNIT**  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD DRAWING NO. 1801.02

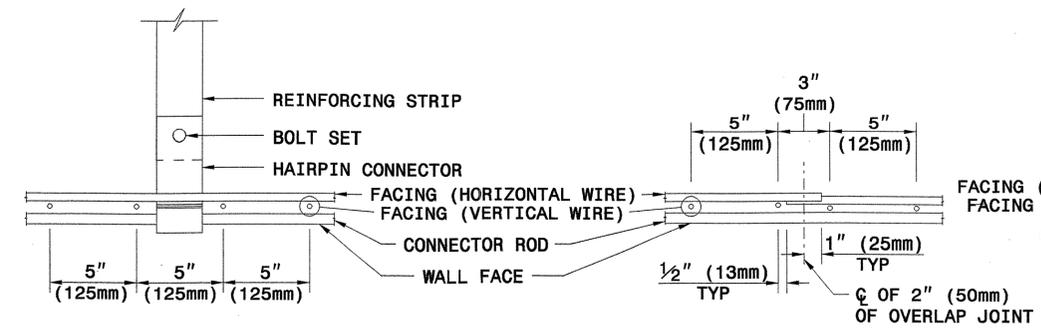
TERRATREL  
 TEMPORARY WALL

SHEET 10 OF 11 DATE: 12-19-06



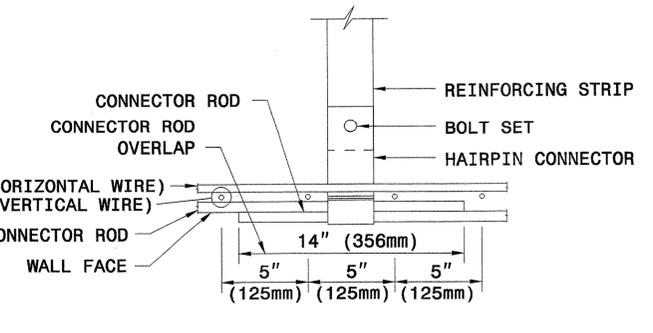
OVERLAP FACINGS VERTICALLY ONE FULL 5" (125mm) WIRE SQUARE DISREGARDING HALF SQUARES AT EDGES

**VERTICAL OVERLAP DETAIL**

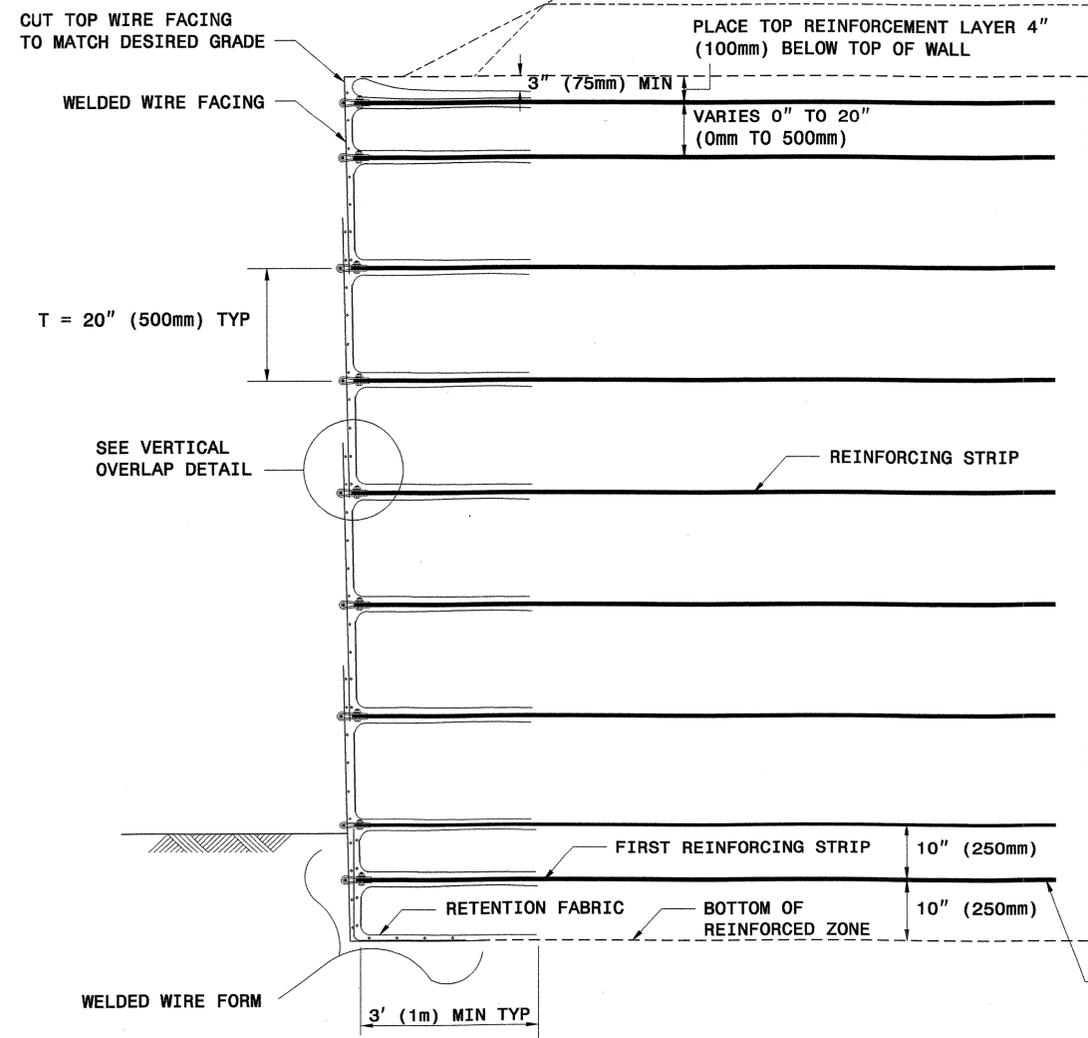


**PLAN DETAIL 'A'**  
STRIP CONNECTION

**PLAN DETAIL 'B'**  
HORIZONTAL OVERLAP DETAIL

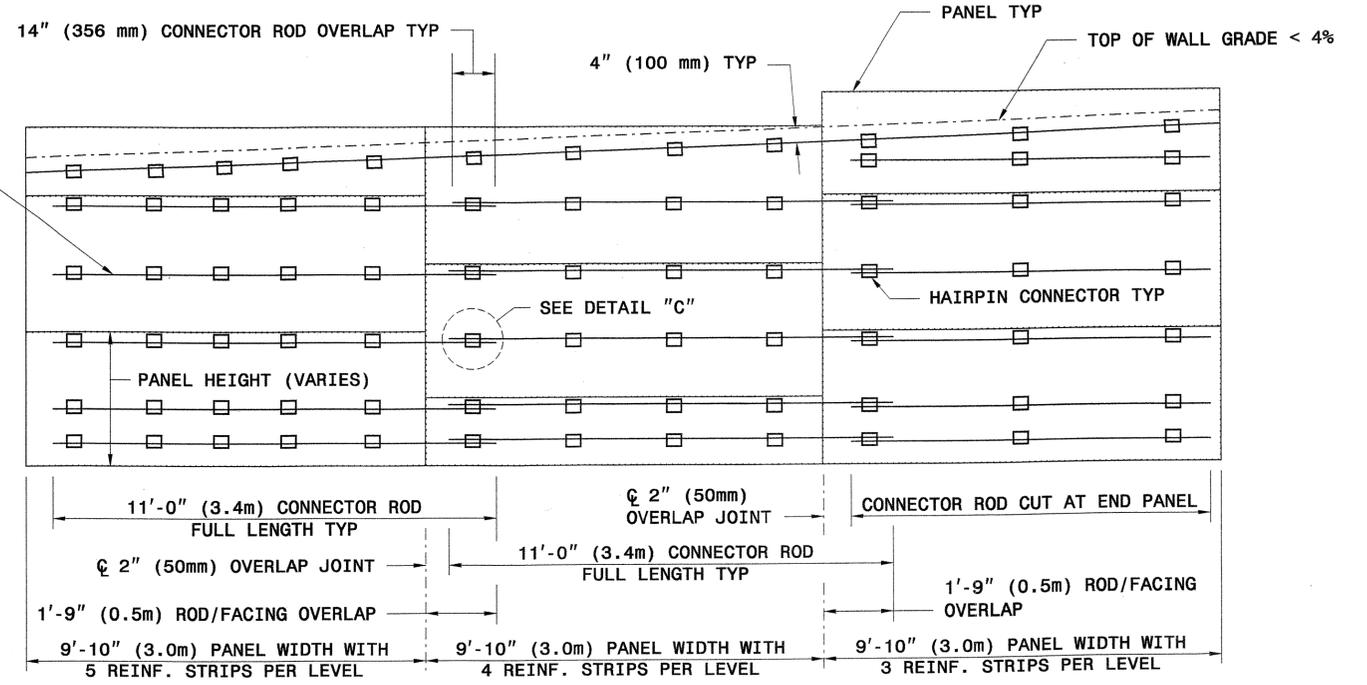


**PLAN DETAIL 'C'**  
STRIP CONNECTION WITH HORIZONTAL OVERLAP DETAIL

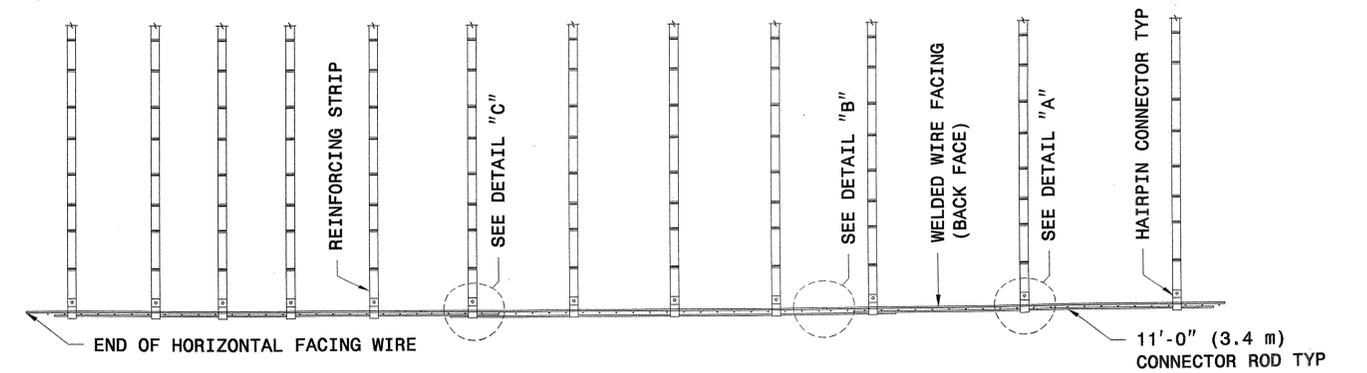


**TYPICAL SECTION**

PLACE LOWEST REINFORCING STRIP 10" (250mm) FROM BOTTOM OF REINFORCED ZONE



**TYPICAL ELEVATION**  
(WIRES NOT SHOWN FOR CLARITY)



**TYPICAL PLAN**

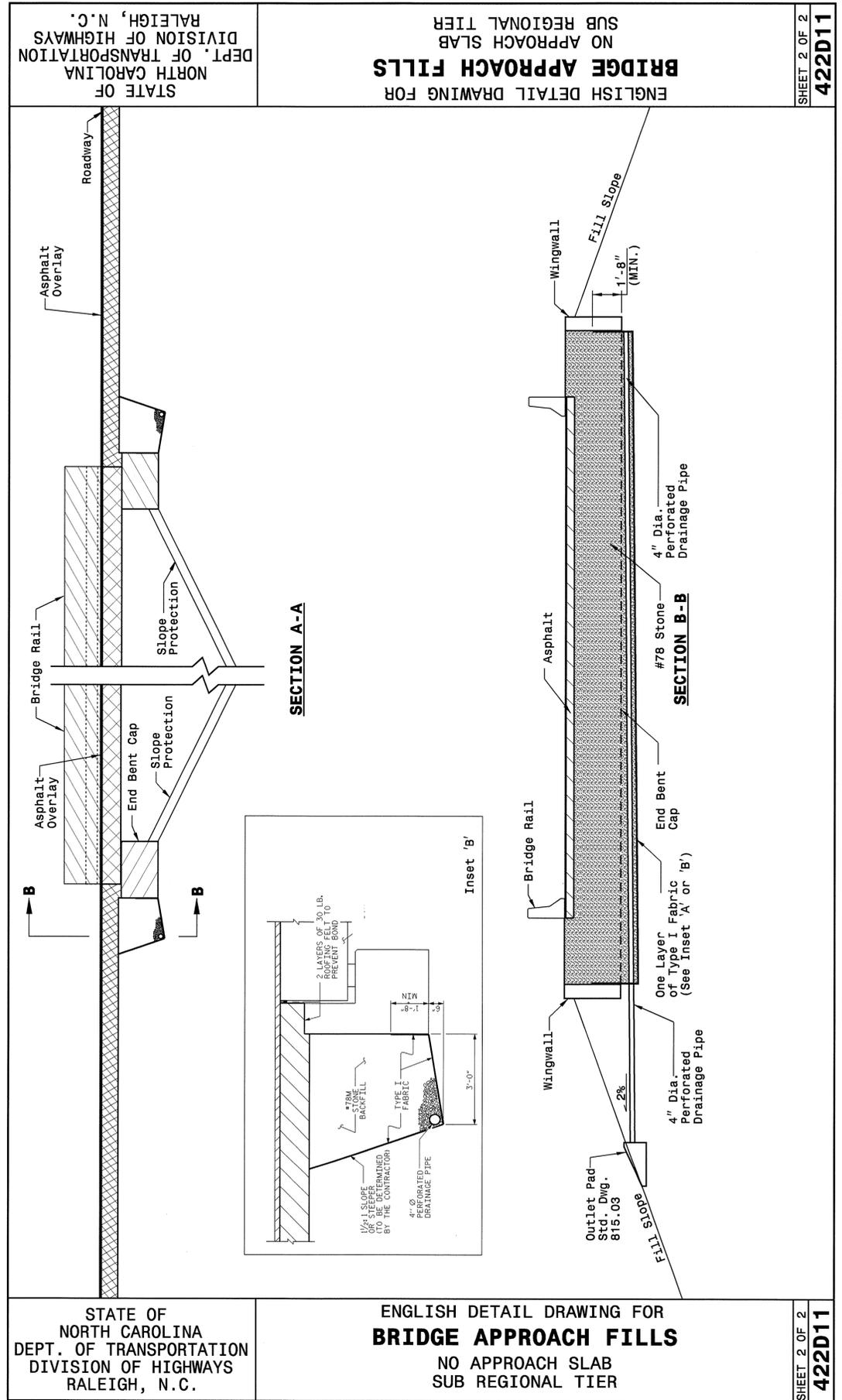
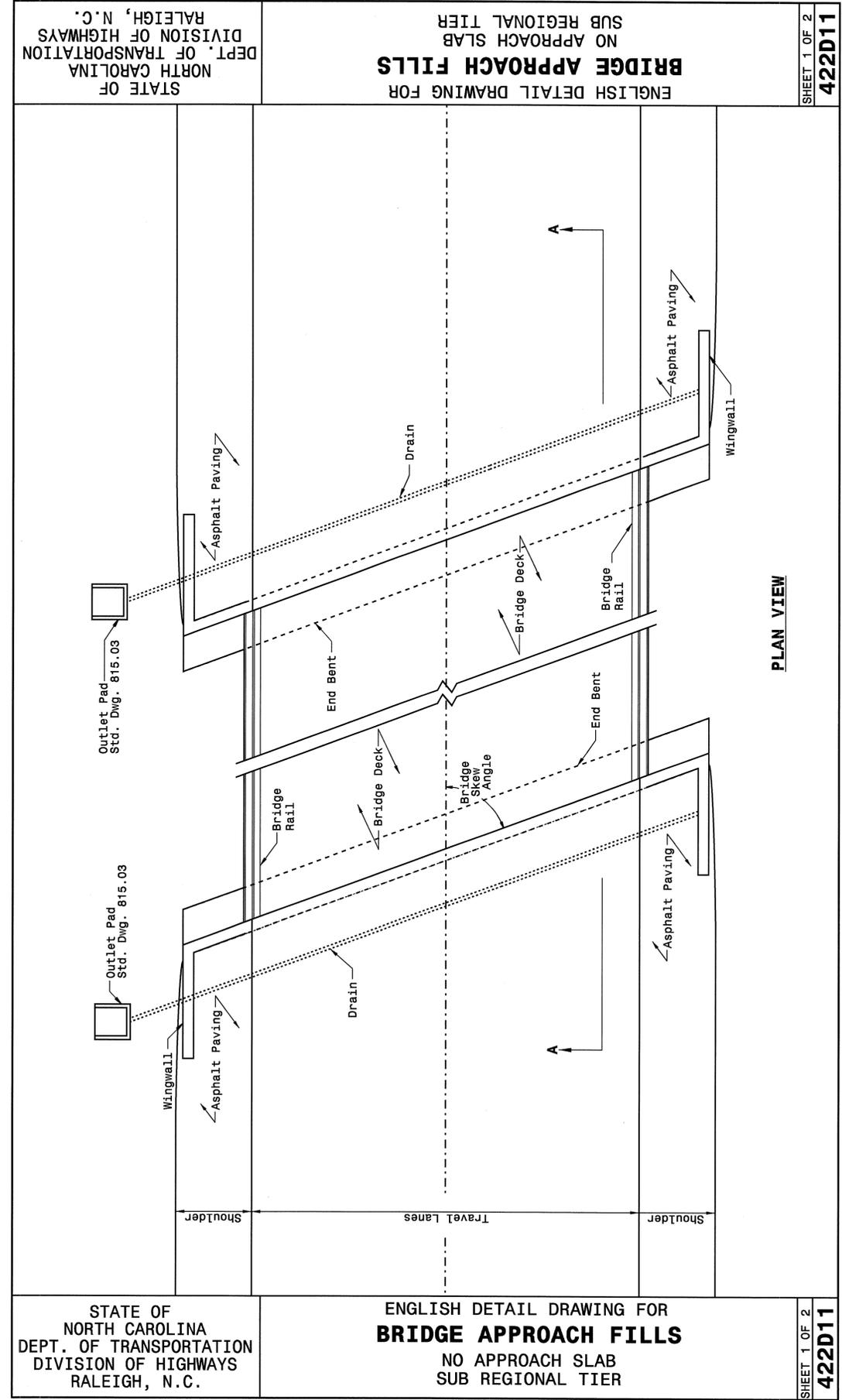
The Reinforced Earth Company



**GEOTECHNICAL ENGINEERING UNIT**  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL  
 TEMPORARY WALL



16-DEC-2008 11:38 s:\projects\contractors\special\_details\vertical\stds\06\stds to special\_details\42211\bridge approach fill sub\_reg\_tier.dgn k Kempf AT P5237489



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

**BRIDGE APPROACH FILLS**  
NO APPROACH SLAB  
SUB REGIONAL TIER

ORIGINAL BY: K. A. Kempf DATE: 6-10-08  
 MODIFIED BY: *[Signature]* DATE: *[Blank]*  
 CHECKED BY: *[Signature]* DATE: 12/16/08  
 FILE SPEC.: k Kempf/english/bridge approach fills.dgn

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**SUMMARY OF QUANTITIES**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C201809

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0000400000-N	801	Lump Sum		CONSTRUCTION SURVEYING
0030000000-N	SP	Lump Sum		BRIDGE APPROACH FILL - SUB REGIONAL TIER, STATION ***** (15+37.5)
0050000000-E	226	1	ACR	SUPPLEMENTARY CLEARING & GRUB-BING
0057000000-E	226	500	CY	UNDERCUT EXCAVATION
0063000000-N	SP	Lump Sum		GRADING
0080000000-E	SP	600	TON	CLASS IV SUBGRADE STABILIZATION
0106000000-E	230	1,450	CY	BORROW EXCAVATION
0195000000-E	265	500	CY	SELECT GRANULAR MATERIAL
0196000000-E	270	500	SY	FABRIC FOR SOIL STABILIZATION
0199000000-E	SP	1,503	SF	TEMPORARY SHORING
0318000000-E	300	19	TON	FOUNDATION CONDITIONING MATERIAL, MINOR STRS
0366000000-E	310	80	LF	15" RC PIPE CULVERTS, CLASS III
0708000000-E	310	64	LF	15" BIT COAT CS PIPE CULVERTS, TYPE B 0.064" THICK
0806000000-E	310	4	EA	15" BIT COAT CS PIPE ELBOWS, TYPE B 0.064" THICK
0995000000-E	340	24	LF	PIPE REMOVAL
1220000000-E	545	50	TON	INCIDENTAL STONE BASE
1489000000-E	610	160	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B
1525000000-E	610	160	TON	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A
1560000000-E	620	18	TON	ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22
2000000000-N	806	7	EA	RIGHT OF WAY MARKERS
2022000000-E	815	68	CY	SUBDRAIN EXCAVATION
2033000000-E	815	51	CY	SUBDRAIN FINE AGGREGATE
2044000000-E	815	300	LF	6" PERFORATED SUBDRAIN PIPE

ItemNumber	Sec #	Quantity	Unit	Description
2055000000-E	815	9	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)
2275000000-E	SP	5	CY	FLOWABLE FILL
2286000000-N	840	3	EA	MASONRY DRAINAGE STRUCTURES
2366000000-N	840	1	EA	FRAME WITH TWO GRATES, STD 840.24
2367000000-N	840	2	EA	FRAME WITH TWO GRATES, STD 840.29
2535000000-E	846	30	LF	***X*** CONCRETE CURB (9" X 12")
2577000000-E	846	85	LF	CONCRETE EXPRESSWAY GUTTER
3000000000-N	SP	1	EA	IMPACT ATTENUATOR UNIT, TYPE 350
3030000000-E	862	25	LF	STEEL BM GUARDRAIL
3150000000-N	862	5	EA	ADDITIONAL GUARDRAIL POSTS
3165000000-N	SP	3	EA	GUARDRAIL ANCHOR UNITS, TYPE ***** (TL-2)
3180000000-N	862	1	EA	GUARDRAIL ANCHOR UNITS, TYPE ***** (RETROFIT)
3317000000-N	862	3	EA	GUARDRAIL ANCHOR UNITS, TYPE B-77
3649000000-E	876	42	TON	RIP RAP, CLASS B
3656000000-E	876	1,725	SY	FILTER FABRIC FOR DRAINAGE
4072000000-E	903	44	LF	SUPPORTS, 3-LB STEEL U-CHANNEL
4102000000-N	904	5	EA	SIGN ERECTION, TYPE E
4155000000-N	907	6	EA	DISPOSAL OF SIGN SYSTEM, U-CHANNEL
4158000000-N	907	2	EA	DISPOSAL OF SIGN SYSTEM, WOOD
4400000000-E	1110	214	SF	WORK ZONE SIGNS (STATIONARY)
4405000000-E	1110	96	SF	WORK ZONE SIGNS (PORTABLE)
4410000000-E	1110	20	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)

ItemNumber	Sec #	Quantity	Unit	Description
4435000000-N	1135	27	EA	CONES
4445000000-E	1145	36	LF	BARRICADES (TYPE III)
4455000000-N	1150	100	MD	FLAGGER
4465000000-N	1160	2	EA	TEMPORARY CRASH CUSHIONS
4470000000-N	1160	2	EA	RESET TEMPORARY CRASH CUSHIONS
4485000000-E	1170	191	LF	PORTABLE CONCRETE BARRIER
4500000000-E	1170	100	LF	RESET PORTABLE CONCRETE BARRIER
4770000000-E	1205	135	LF	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (IV)
4810000000-E	1205	6,352	LF	PAINT PAVEMENT MARKING LINES (4")
6000000000-E	1605	900	LF	TEMPORARY SILT FENCE
6006000000-E	1610	250	TON	STONE FOR EROSION CONTROL, CLASS A
6009000000-E	1610	100	TON	STONE FOR EROSION CONTROL, CLASS B
6012000000-E	1610	415	TON	SEDIMENT CONTROL STONE
6015000000-E	1615	2.5	ACR	TEMPORARY MULCHING
6018000000-E	1620	100	LB	SEED FOR TEMPORARY SEEDING
6021000000-E	1620	1.25	TON	FERTILIZER FOR TEMPORARY SEEDING
6024000000-E	1622	110	LF	TEMPORARY SLOPE DRAINS
6027000000-N	1622	2	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS
6029000000-E	SP	200	LF	SAFETY FENCE
6030000000-E	1630	320	CY	SILT EXCAVATION
6036000000-E	1631	1,250	SY	MATTING FOR EROSION CONTROL
6037000000-E	SP	30	SY	COIR FIBER MAT
6038000000-E	SP	50	SY	PERMANENT SOIL REINFORCEMENT MAT
6042000000-E	1632	80	LF	1/4" HARDWARE CLOTH
6070000000-N	SP	16	EA	SPECIAL STILLING BASINS
6071030000-E	SP	185	LF	COIR FIBER BAFFLES
6071050000-E	SP	5	EA	*** SKIMMER (1-1/2")
6084000000-E	1660	3.5	ACR	SEEDING & MULCHING
6087000000-E	1660	1	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
6114000000-N	SP	5	HR	SPECIALIZED HAND MOWING
6117000000-N	SP	12	EA	RESPONSE FOR EROSION CONTROL
6123000000-E	1670	0.1	ACR	REFORESTATION

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DIVISION OF HIGHWAYS  
 STATE OF NORTH CAROLINA

**SUMMARY OF EARTHWORK**

IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
SUMMARY 1					
-L- 12+50.00 TO 14+70.00 (BEGIN BRIDGE)	187		422	235	
SUBTOTAL SUMMARY 1	187		422	235	
SUMMARY 2					
-L- 16+05.00(END BRIDGE) TO 17+11.50	2		949	947	
SUBTOTAL SUMMARY 2	2		949	947	
PROJECT SUBTOTAL	189		1371	1182	
LOSS DUE TO CL & GR	(-)150			150	
PROJECT TOTAL	39			1332	
5% TO REPLACE TOPSOIL				67	
GRAND TOTAL	39			1399	
SAY	50			1450	
UNDERCUT EXCAVATION (PER GEOTECH MEMO DATED 2-22-2005) = 500 CY					

NOTE: QUANTITIES ARE APPROXIMATE ONLY. UNCLASSIFIED EXCAVATION, FINE GRADING, CLEARING & GRUBBING, AND REMOVAL OF EXISTING PAVEMENT WILL TO BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING".

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

**PAVEMENT REMOVAL SUMMARY**  
 IN SQUARE YARDS

LOCATION	REMOVAL OF EXIST. ASPHALT PAVEMENT	BREAKING OF EXIST. ASPHALT PAVEMENT	REMOVAL OF EXIST. CONCRETE PAVEMENT	BREAKING OF EXIST. CONCRETE PAVEMENT
-L- 13+04.64 TO EXISTING BRIDGE	221.44			
-L- EXISTING BRIDGE TO 17+82.03	235.01			
PROJECT SUBTOTAL	456.45			
SAY	480.00			

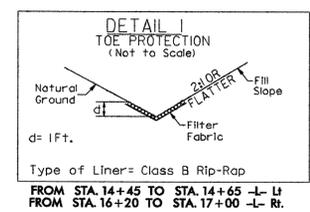
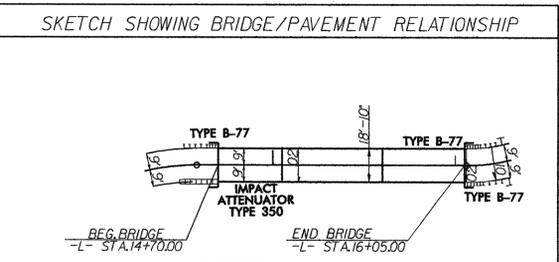
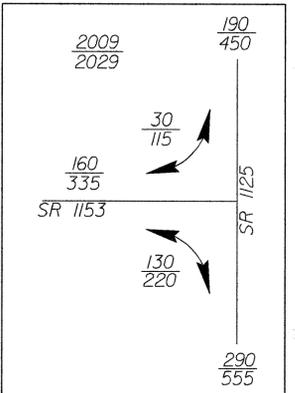
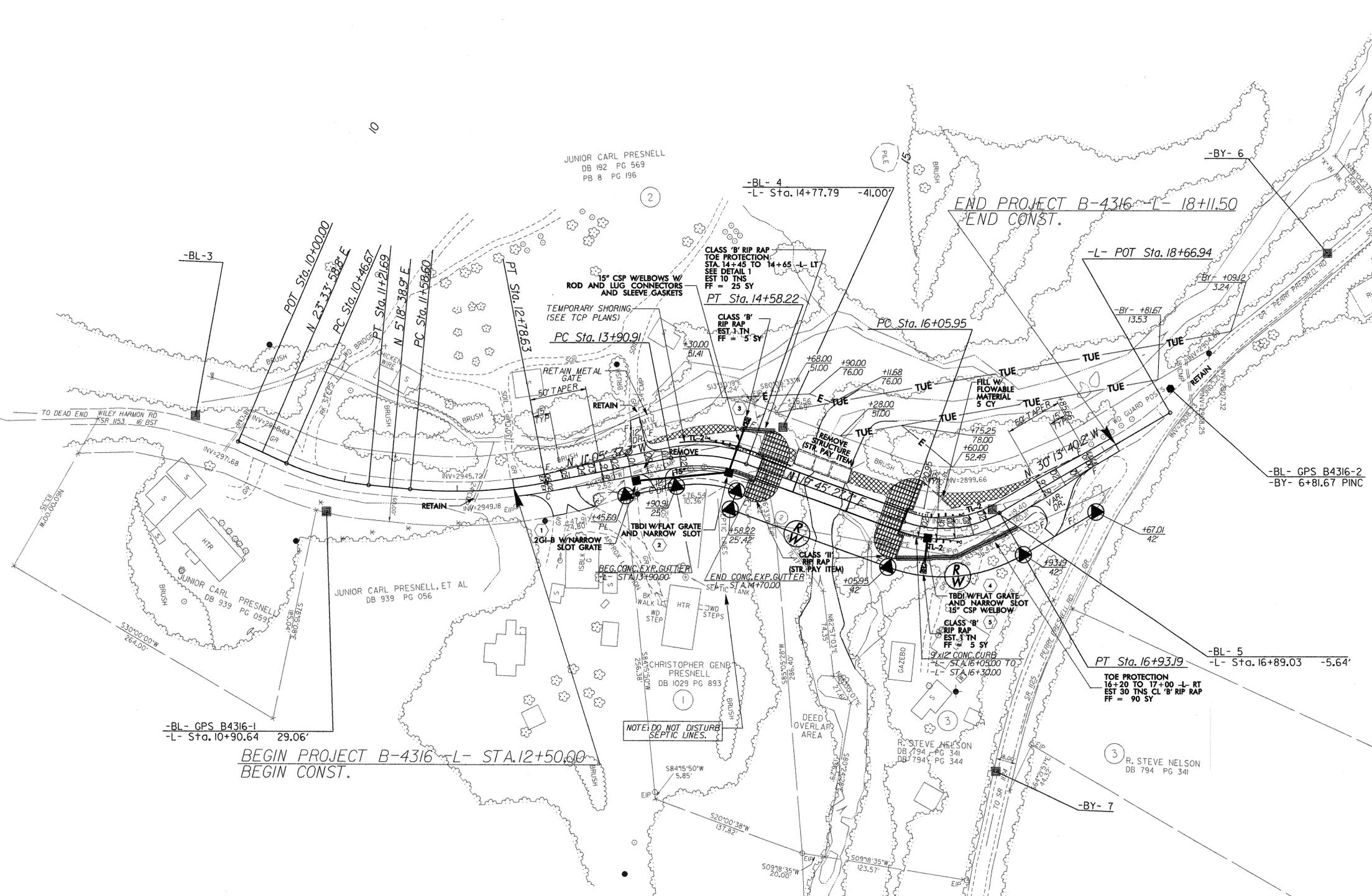


-L-			
PI Sta 10+84.50	PI Sta 12+9.03	PI Sta 14+25.40	PI Sta 16+52.57
$\Delta = 18' 15" 20.0"$ (LT)	$\Delta = 16' 24" 16.2"$ (LT)	$\Delta = 30' 51" 05.0"$ (RT)	$\Delta = 49' 59" 07.8"$ (LT)
D = 24' 20" 00.0"	D = 13' 40" 00.0"	D = 45' 50" 11.8"	D = 57' 17" 44.8"
L = 75.02'	L = 120.03'	L = 67.31'	L = 87.24'
T = 37.83'	T = 60.43'	T = 34.49'	T = 46.62'
R = 235.46'	R = 419.24'	R = 125.00'	R = 100.00'
		SE = 0.02	SE = 0.02
		RO = SEE PLANS	RO = SEE PLANS

NAD 83  
NC GRID

PROJECT REFERENCE NO. B-4316	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
 559 Jones Franklin Rd. Suite 164 Raleigh, N.C. 27606 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>SUNGATE DESIGN GROUP, P.A.</b>  915 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 TEL 919 859-2243 FAX 919 859-6258	

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NOTE: NO DECK DRAINS REQUIRED

SEE SHEET 5 FOR PROFILE  
SEE SHEETS S-1 THRU S-19 FOR STRUCTURE PLANS

5/14/99

BM #1  
8" SPIKE IN ROOT OF A 18" GUM  
N 916760 E 1148408  
-BL- STA.5+00.00 DIST.41.65' LT.  
ELEV. = 2972.00'

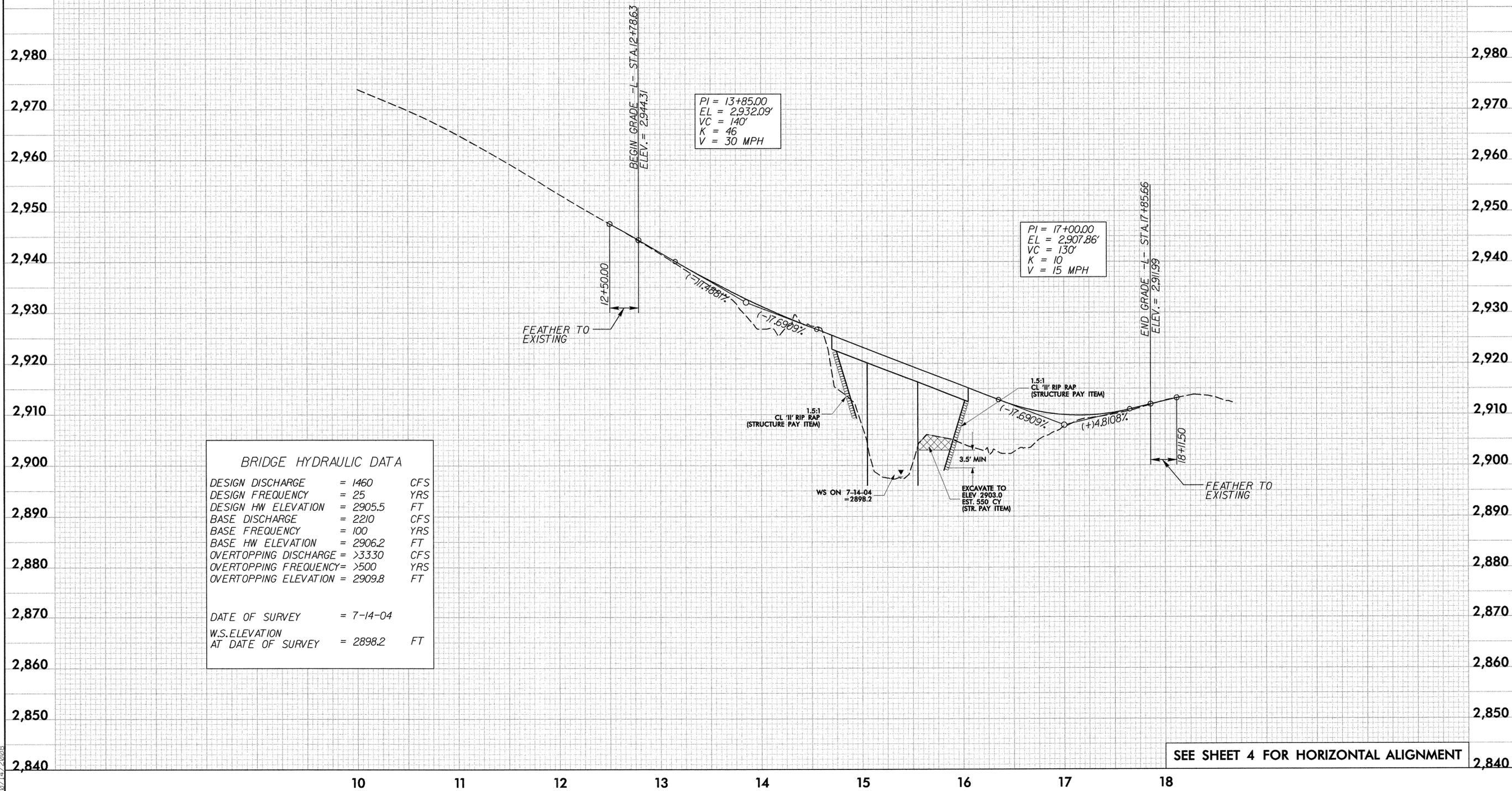
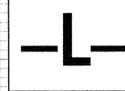
BM #2  
8" SPIKE IN ROOT OF A 12" POPLAR  
N 917348 E 1148407  
-L- STA.15+36.00 DIST.115.00 LT.  
ELEV. = 2900.32'

**WETHERILL ENGINEERING**  
559 Jones Franklin Rd. Suite 164  
Raleigh, N.C. 27606  
Bus: 919 851 8077  
Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

**SUNGATE DESIGN GROUP, P.A.**  
915 JONES FRANKLIN ROAD  
RALEIGH, NORTH CAROLINA 27606  
TEL 919 859-2243 FAX 919 859-6258

PROJECT REFERENCE NO. B-4316	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



BRIDGE HYDRAULIC DATA		
DESIGN DISCHARGE	= 1460	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2905.5	FT
BASE DISCHARGE	= 2210	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2906.2	FT
OVERTOPPING DISCHARGE	= >3330	CFS
OVERTOPPING FREQUENCY	= >500	YRS
OVERTOPPING ELEVATION	= 2909.8	FT
DATE OF SURVEY	= 7-14-04	
W.S. ELEVATION AT DATE OF SURVEY	= 2898.2	FT

SEE SHEET 4 FOR HORIZONTAL ALIGNMENT

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