

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MCDOWELL COUNTY

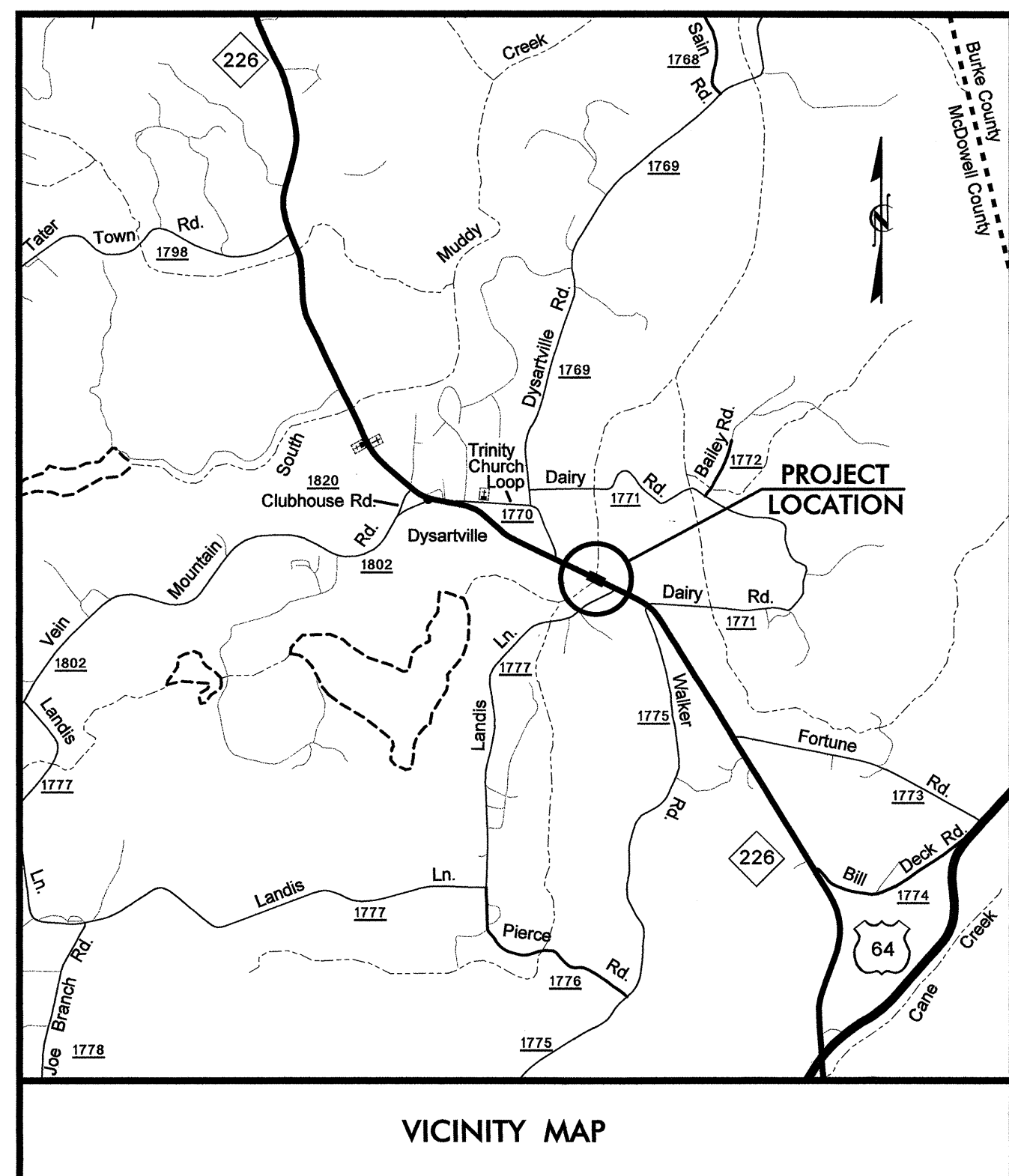
LOCATION: BRIDGE #37 OVER HOPPER CREEK
ON NC 226

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

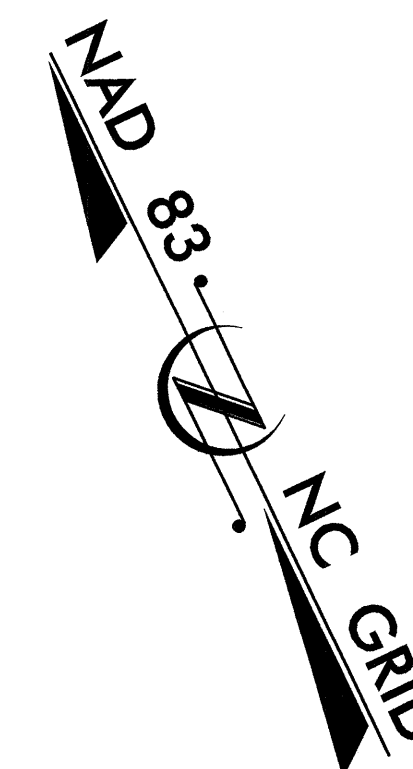
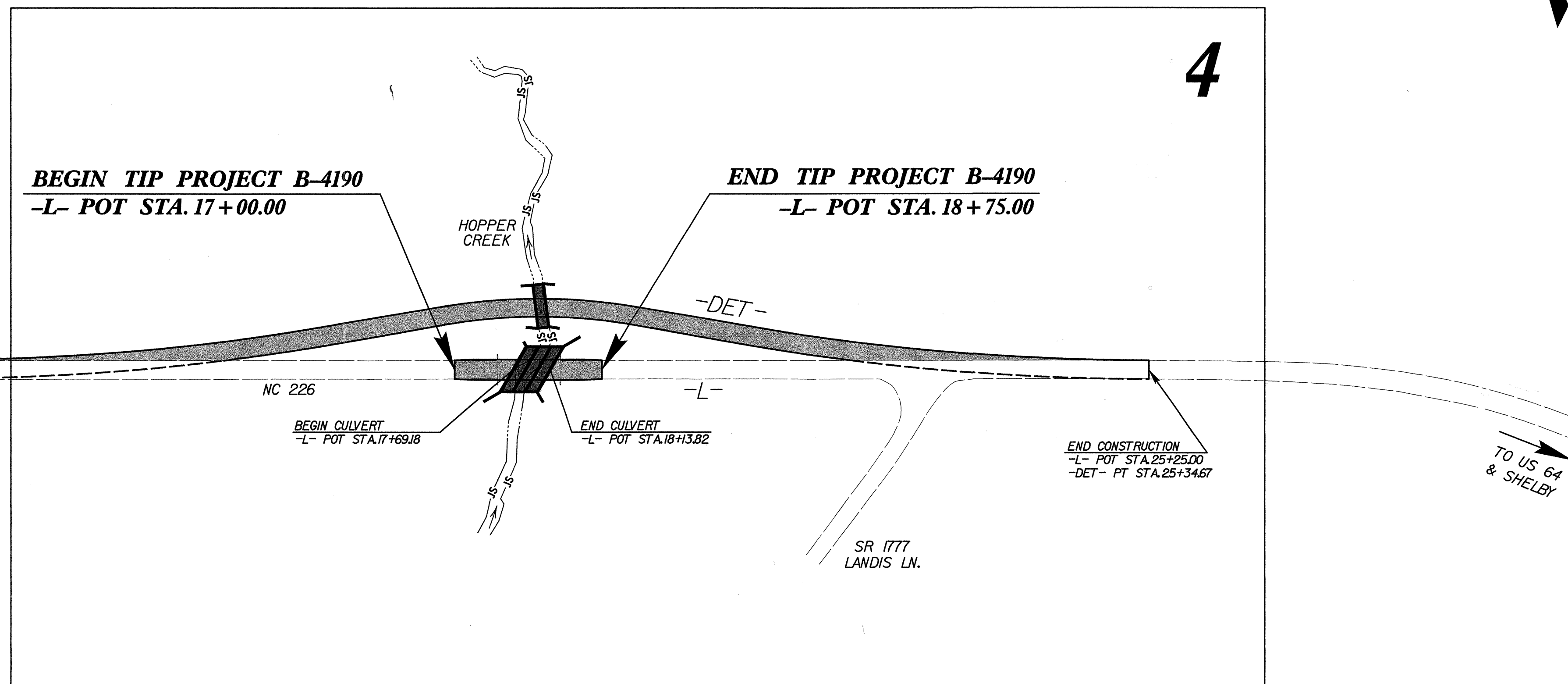
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4190	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33537.1.1	BRSTP-0226 (9)	PE	
33537.2.1	BRSTP-0226 (9)	R/W, UTILITIES	
33537.3.1	BRSTP-0226 (9)	CONSTRUCTION	

TIP PROJECT: B-4190

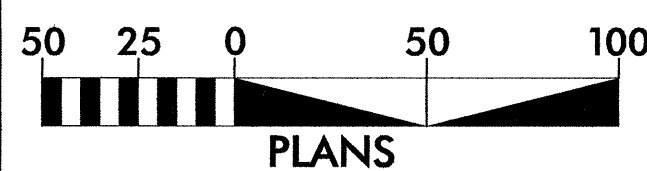
CONTRACT: C202550



VICINITY MAP



GRAPHIC SCALES



DESIGN DATA

ADT 2010 = 2,520
ADT 2030 = 3,560
DHV = 10 %
D = 60 %
T = 8 % *
V = 60 MPH
* (TTST 3% + DUAL 5%)
FUNCT CLASS = RURAL MAJOR COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4190 = 0.025 mile
LENGTH STRUCTURE TIP PROJECT B-4190 = 0.008 mile
TOTAL LENGTH TIP PROJECT B-4190 = 0.033 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:
SEPTEMBER 23, 2009

LETTING DATE:
JUNE 15, 2010

ROBERT W. PORTER, JR PE
PROJECT ENGINEER

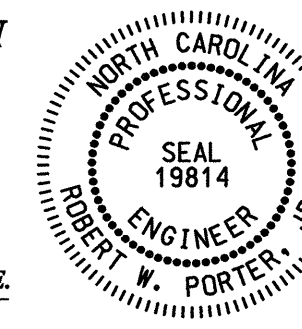
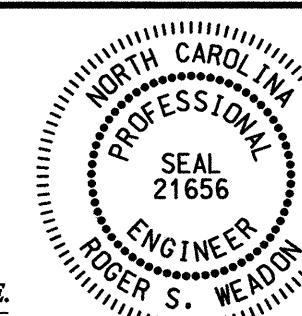
KEVIN S. HUTCHENS
PROJECT DESIGN ENGINEER

HYDRAULICS
ENGINEER

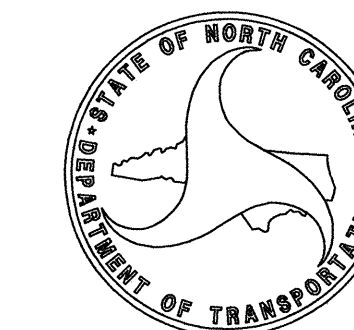
Robert W. Porter, Jr. 3/22/10 P.E.
SIGNATURE:

ROADWAY DESIGN
ENGINEER

3/22/10
Robert W. Porter, Jr. P.E.
SIGNATURE:



DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

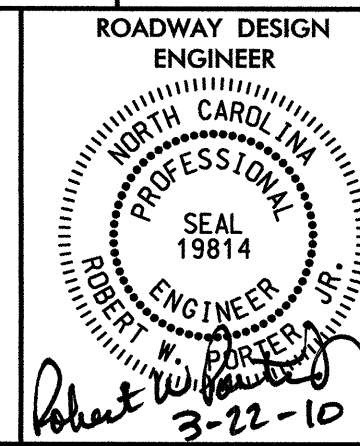



Robert W. Porter, Jr. P.E.
STATE HIGHWAY DESIGN ENGINEER

03/22/2010

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8/17/99

PROJECT REFERENCE NO. B-4190	SHEET NO. 1-A
ROADWAY DESIGN ENGINEER  ROBERT W. PORTNEY ENGINEER	
 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 11.

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 WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

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 - Rutherford Electric Membership Corporation
 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 CONTRACT.

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 Superlevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.03	Method of Structural Plate Pipe and Pipe Arch Installation - Method 'A'
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
862.01	Guardrail Placement
862.02	Guardrail Installation
866.02	Woven Wire Fence - with Wood Post
876.01	Rip Rap in Channels
876.04	Drainage Ditches with Class 'B' Rip Rap

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1-B	CONVENTIONAL SYMBOLS
1-C	SURVEY CONTROL SHEET
2	PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAILS
2-A	DETOUR PLAN SHEET
2-B	DETOUR PROFILE SHEET
2-C	DETAIL OF REINFORCED SANDBAG HEADWALL
3	SUMMARY OF QUANTITIES
3-A	SUMMARIES OF EARTHWORK, PAVEMENT REMOVAL, DRAINAGE, AND GUARDRAIL
4	PLAN SHEET
5	PROFILE SHEET
TCP-1 THRU TCP-7	TRAFFIC CONTROL PLANS
PMP-1 THRU PMP-3	PAVEMENT MARKING PLANS
EC-1 THRU EC-7	EROSION CONTROL PLANS
RF-1	REFORESTATION PLAN
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTION SUMMARY
X-1 THRU X-9	CROSS-SECTIONS
C-1 THRU C-7	CULVERT PLANS

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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	○
Property Corner	-----
Property Monument	EGM
Parcel/Sequence Number	(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 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	▭
Jurisdictional Stream	JS
Buffer Zone 1	BZ 1
Buffer Zone 2	BZ 2
Flow Arrow	←
Disappearing Stream	→
Spring	○
Wetland	⋈
Proposed Lateral, Tail, Head Ditch	▭
False Sump	▭

RAILROADS:

Standard Gauge	-----
RR Signal Milepost	CSX TRANSPORTATION 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	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	XXXX

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	⊕
Storm Sewer	S

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	PH
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	⊕
Telephone Booth	⊕
Telephone Pedestal	⊕
Telephone Cell Tower	⊕
U/G Telephone Cable Hand Hole	PH
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	⊕
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	⊕
TV Tower	⊗
U/G TV Cable Hand Hole	PH
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	⊕
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.

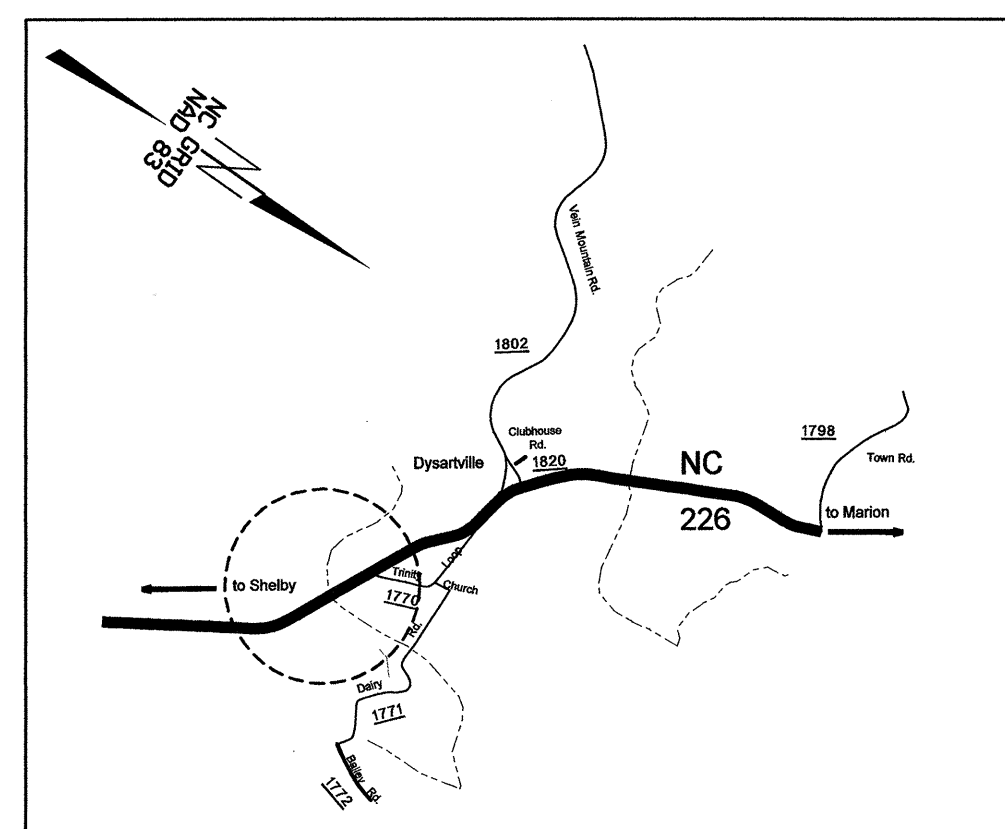
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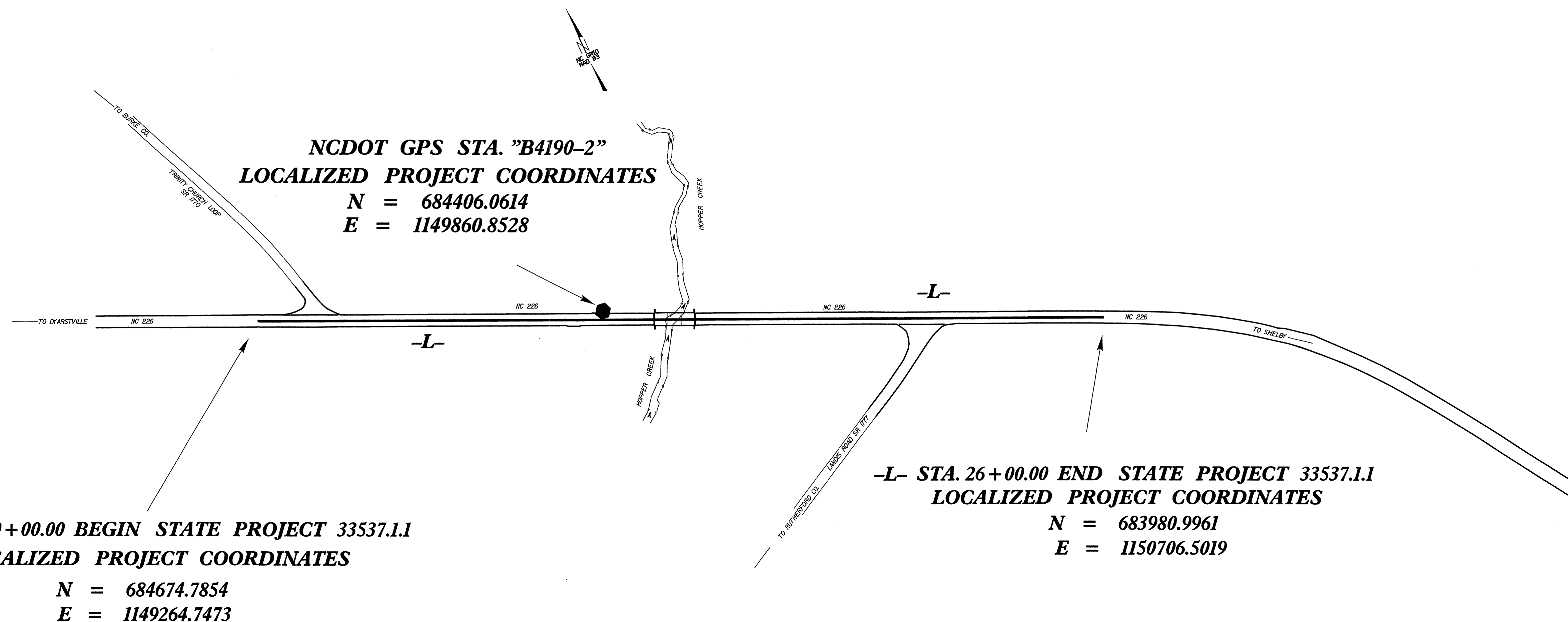
PROJECT REFERENCE NO.	SHEET NO.
33537.1.1	1-C
Location and Surveys	

SURVEY CONTROL SHEET B-4190



VICINITY MAP

BL POINT	DESC.	NORTH	EAST	ELEV.	L STATION	OFFSET
1	BL-1	684081.9566	1150457.5275	1175.68	13+31.87	16.98 RT
B-4190-2	B-4190-2	684406.0164	1149860.8528	1160.25	6+53.69	16.30 LT
3	BL-3	684667.3688	1149326.6666	1179.88	0+59.01	20.17 LT



NOTES:

1. 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/](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/)

THE FILES TO BE FOUND ARE AS FOLLOWS:
 B4190_LS_CONTROL_090804.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 NCGS HARN POSITIONS

 BM1 ELEVATION = 1160.04
 N 684335 E 1149934
 L STATION 7+51 16 RIGHT
 CHISELED SQUARE WITH PUNCH HOLE IN WING WALL

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "DAIRY"
 WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
 NORTHING: 683766.5200(±) EASTING: 1151066.5800(±)
 ELEVATION: 1203.11(±)
 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999781493
 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "DAIRY" TO -L- STATION 10+00.00 IS
 2017.81' N 63 14' 54"
 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

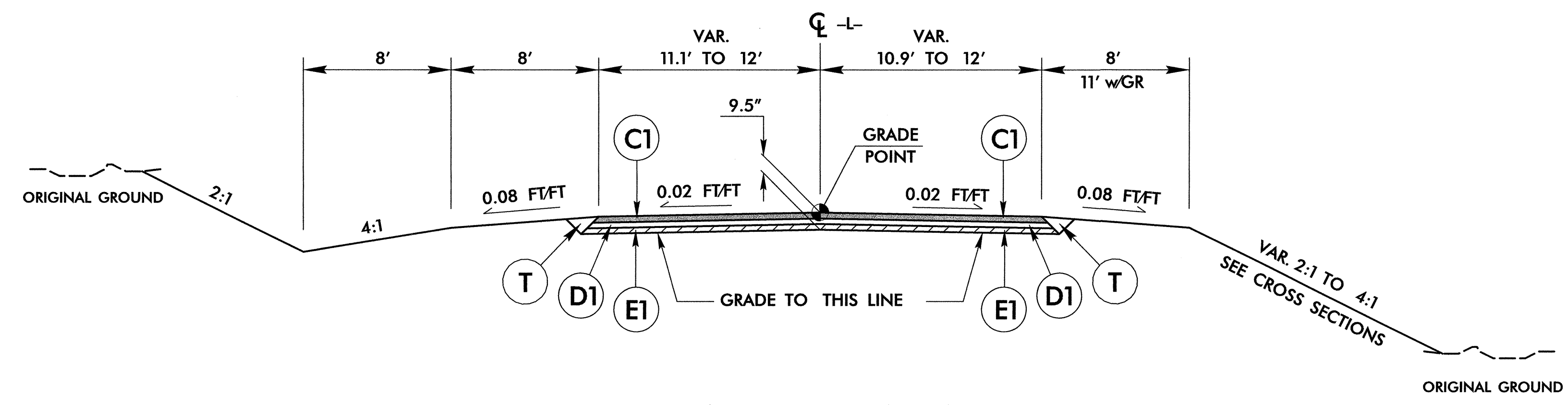
NOTE: DRAWING NOT TO SCALE

B-2/99

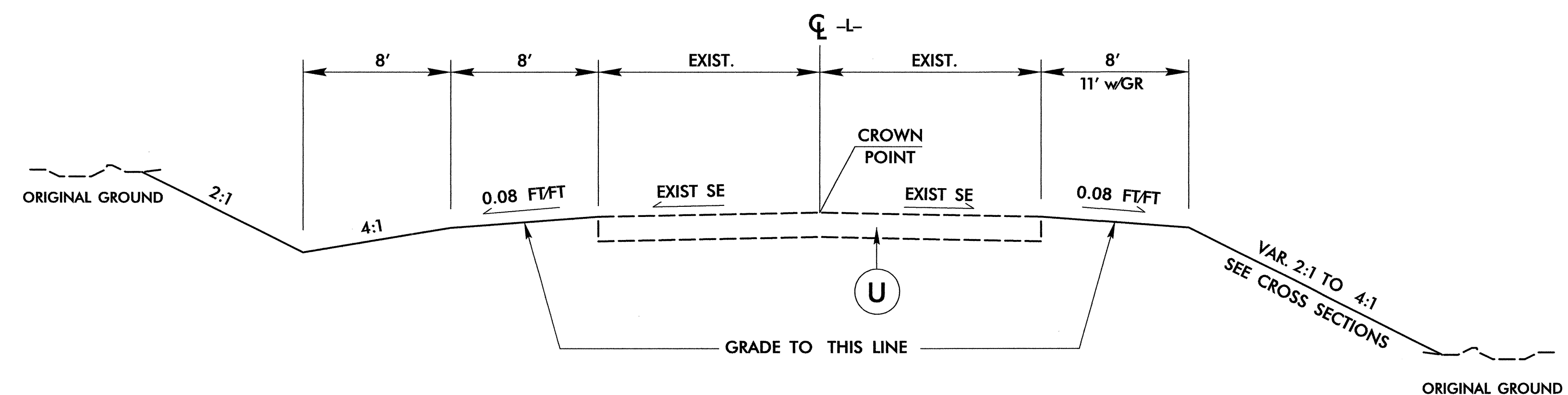
PAVEMENT SCHEDULE	
C1	PROP. APPROX. 3.0" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS PER SQUARE YARD IN TWO LAYERS.
D1	PROP. APPROX. 2.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS PER SQUARE YARD.
E1	PROP. APPROX. 4.0" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS PER SQUARE YARD.
J	PROP. 8" AGGREGATE BASE COURSE
P	PRIME COAT (AT THE RATE OF 0.35 GAL. PER SQUARE YARD)
T	EARTH MATERIAL
U	EXISTING PAVEMENT

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

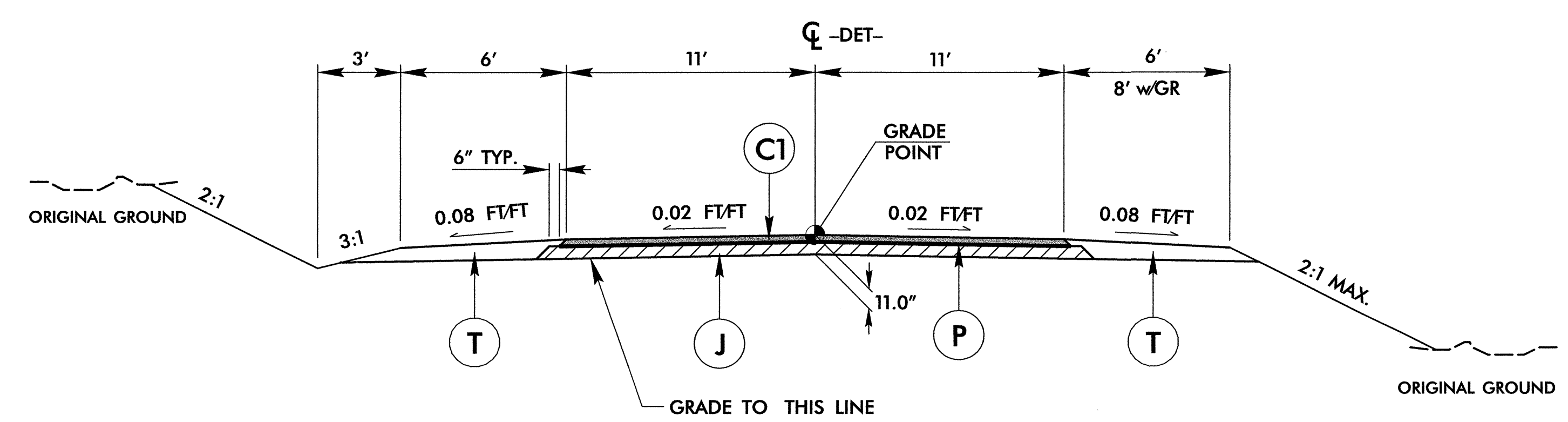
PROJECT REFERENCE NO. B-4190	SHEET NO. 2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19814 ROBERT W. ROBERTS	PAVEMENT DESIGN ENGINEER NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22896 CLARK S. MORRISON
<p>M A Engineering Consultants, Inc. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221</p>	



TYPICAL SECTION NO. 1
FROM -L- STA. 17+00.00 TO STA. 18+75.00



TYPICAL SECTION NO. 2
FROM -L- LT. STA. 11+35.00 TO STA. 17+00.00
FROM -L- LT. STA. 18+75.00 TO STA. 25+00.00
FROM -L- RT. STA. 16+05.00 TO STA. 17+00.00
FROM -L- RT. STA. 18+75.00 TO STA. 22+25.00

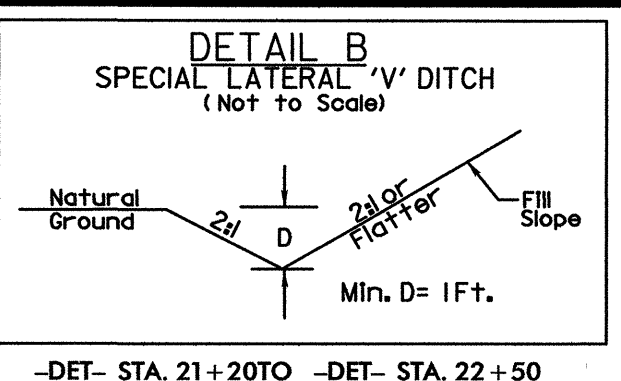
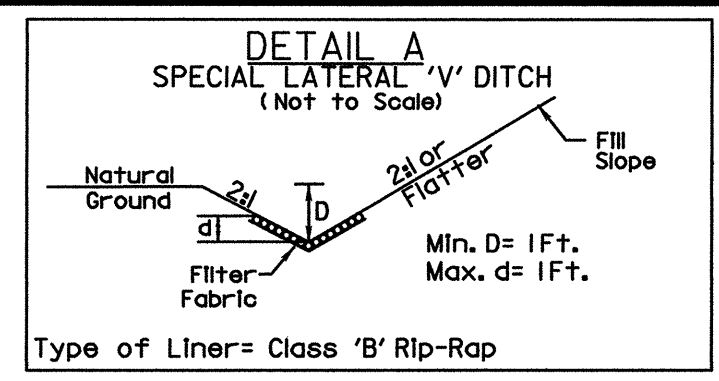


TYPICAL SECTION NO. 3
FROM -DET- STA. 10+75.00 TO STA. 13+20.46 (WIDEN USING EX. EOP ELEV. & EX. SUPERELEVATION)
FROM -DET- STA. 13+20.46 TO STA. 22+84.24
FROM -DET- STA. 22+84.24 TO STA. 25+34.67 (WIDEN USING EX. EOP ELEV. & EX. SUPERELEVATION)

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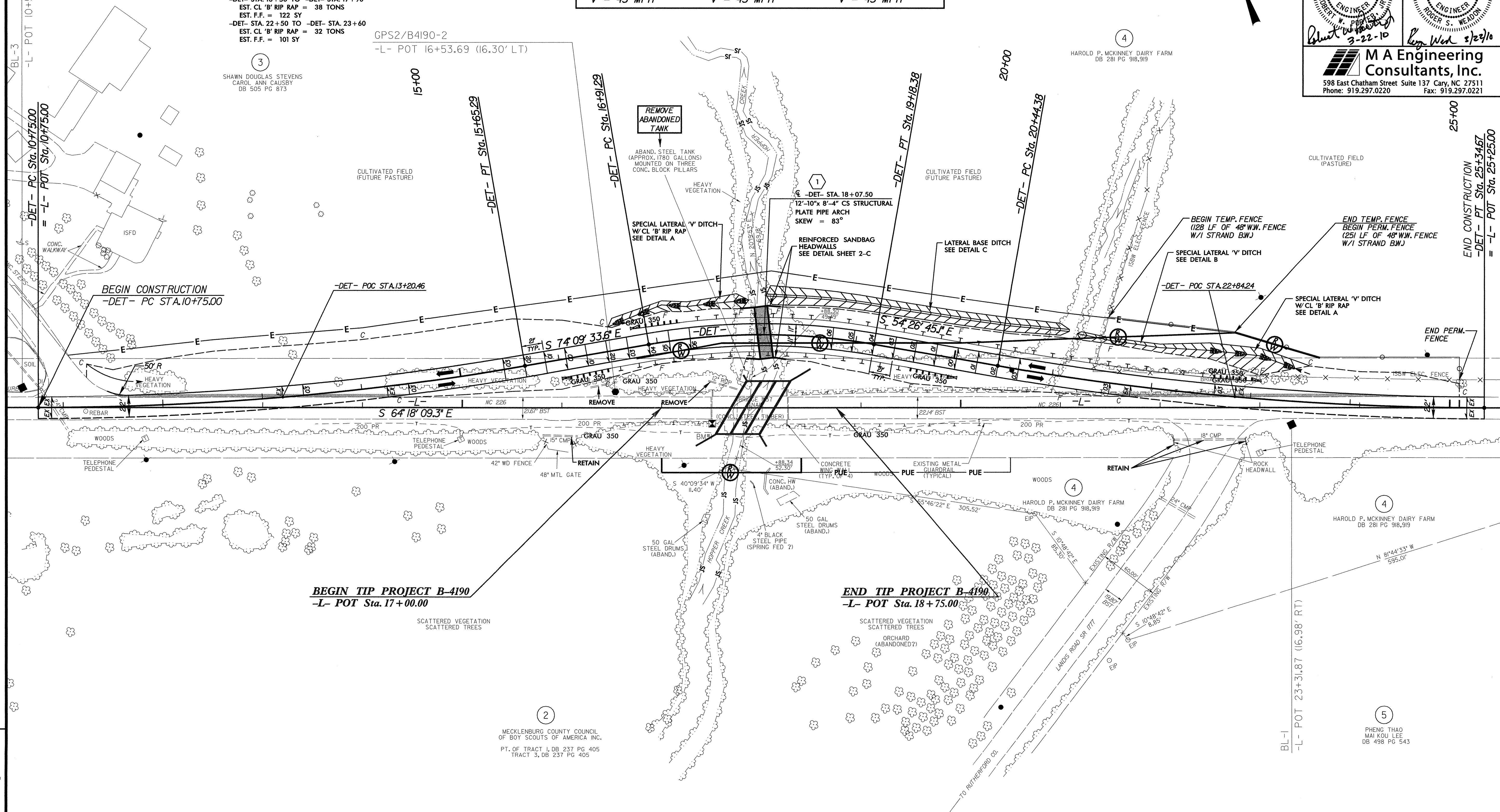
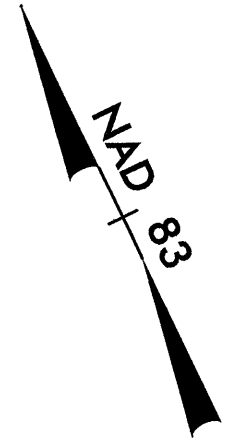
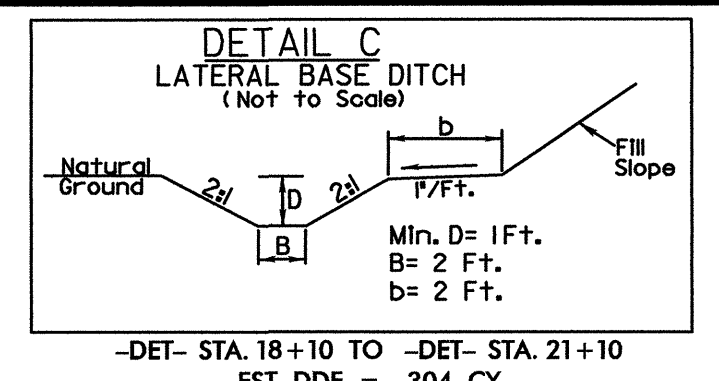
8/17/99

PROJECT REFERENCE NO. B-4190	SHEET NO. 2-A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER
M A Engineering Consultants, Inc. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	



-DET-

PI Sta 13+20.75	PI Sta 18+05.97	PI Sta 22+90.13
$\Delta = 9' 51" 24.2" (LT)$	$\Delta = 19' 42" 48.5" (RT)$	$\Delta = 9' 51" 24.2" (LT)$
$D = 2' 00" 37.4"$	$D = 8' 40" 52.2"$	$D = 2' 00" 37.4"$
$L = 490.29'$	$L = 227.08'$	$L = 490.29'$
$T = 245.75'$	$T = 114.67'$	$T = 245.75'$
$R = 2,850.00'$	$R = 660.00'$	$R = 2,850.00'$
$SE = 0.03$	$SE = 0.06$	$SE = 0.03$
$RO = 63'$	$RO = 126'$	$RO = 63'$
$V = 45 \text{ MPH}$	$V = 45 \text{ MPH}$	$V = 45 \text{ MPH}$



REVISIONS

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NOTE:
SEE SHEET 2-B FOR DETOUR PROFILE.
SEE SHEET 4 FOR -L- PLAN.
SEE SHEET 5 FOR -L- PROFILE.

DETOUR SHEET

5/28/99

BM#1
CHISELED SQUARE WITH
PUNCH HOLE IN WING WALL
-L- STA. 17+50.75 (15.77' RT)
ELEV. 1,160.04'

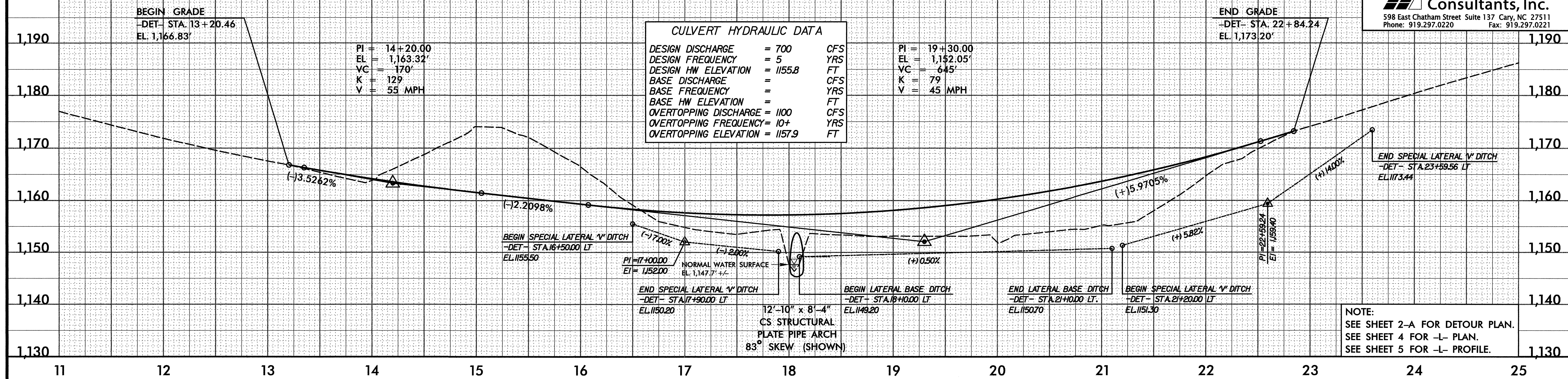
EXISTING GROUND - - -
PROPOSED GRADE - - -
PROP. LEFT DITCH - - -
PROP. RIGHT DITCH - - -

PROJECT REFERENCE NO. B-4190
SHEET NO. 2-B

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19814
ROBERT W. PORTER
3-22-10
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 21656
ROGER S. WEADON
3/22/10

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

-DET-



CULVERT HYDRAULIC DATA

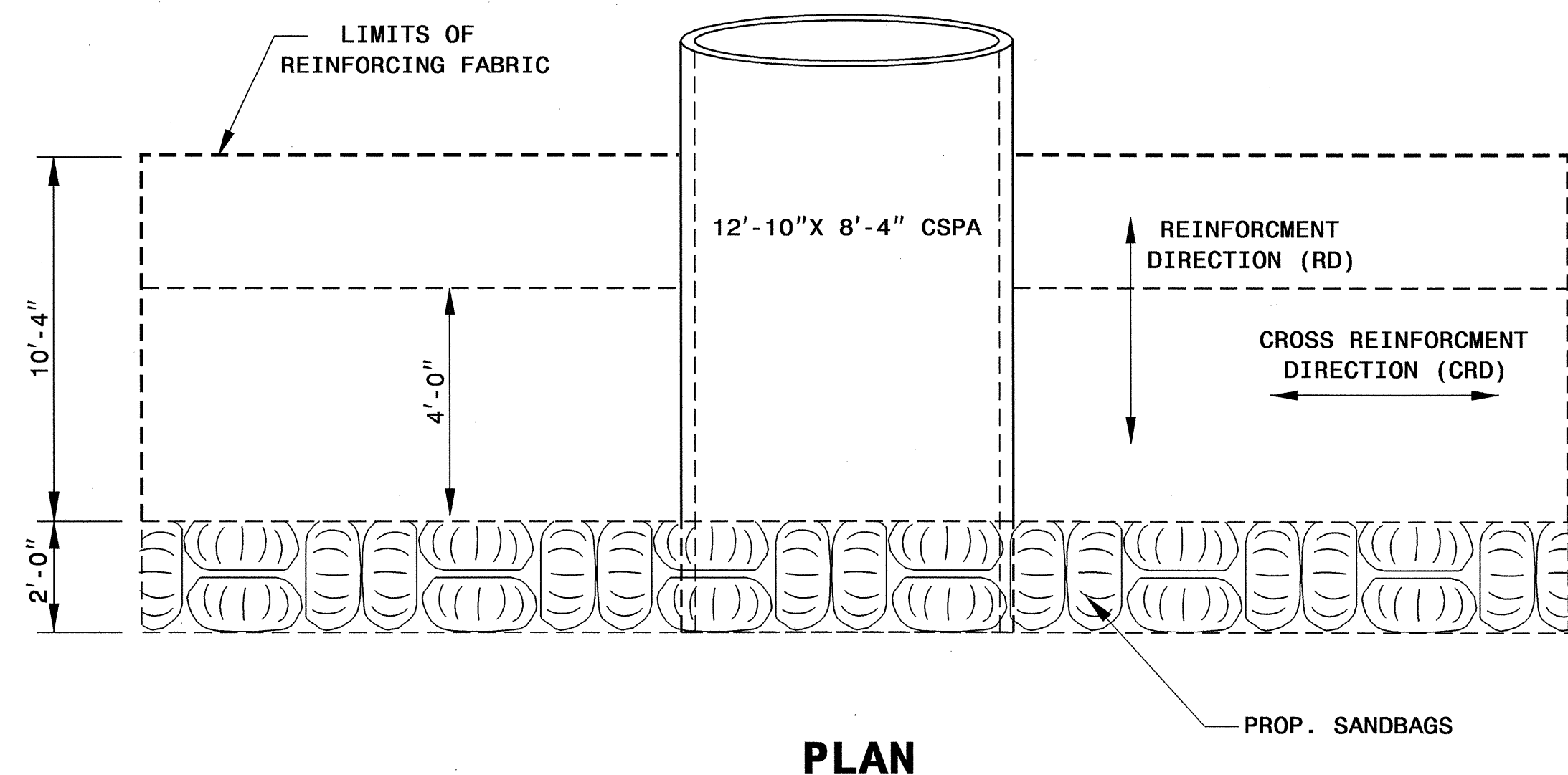
DESIGN DISCHARGE	= 700	CFS
DESIGN FREQUENCY	= 5	YRS
DESIGN HW ELEVATION	= 1155.8	FT
BASE DISCHARGE	=	CFS
BASE FREQUENCY	=	YRS
BASE HW ELEVATION	=	FT
OVERTOPPING DISCHARGE	= 1100	CFS
OVERTOPPING FREQUENCY	= 10+	YRS
OVERTOPPING ELEVATION	= 1157.9	FT

PI = 14+20.00
EL = 1,163.32'
VC = 170'
K = 129
V = 55 MPH

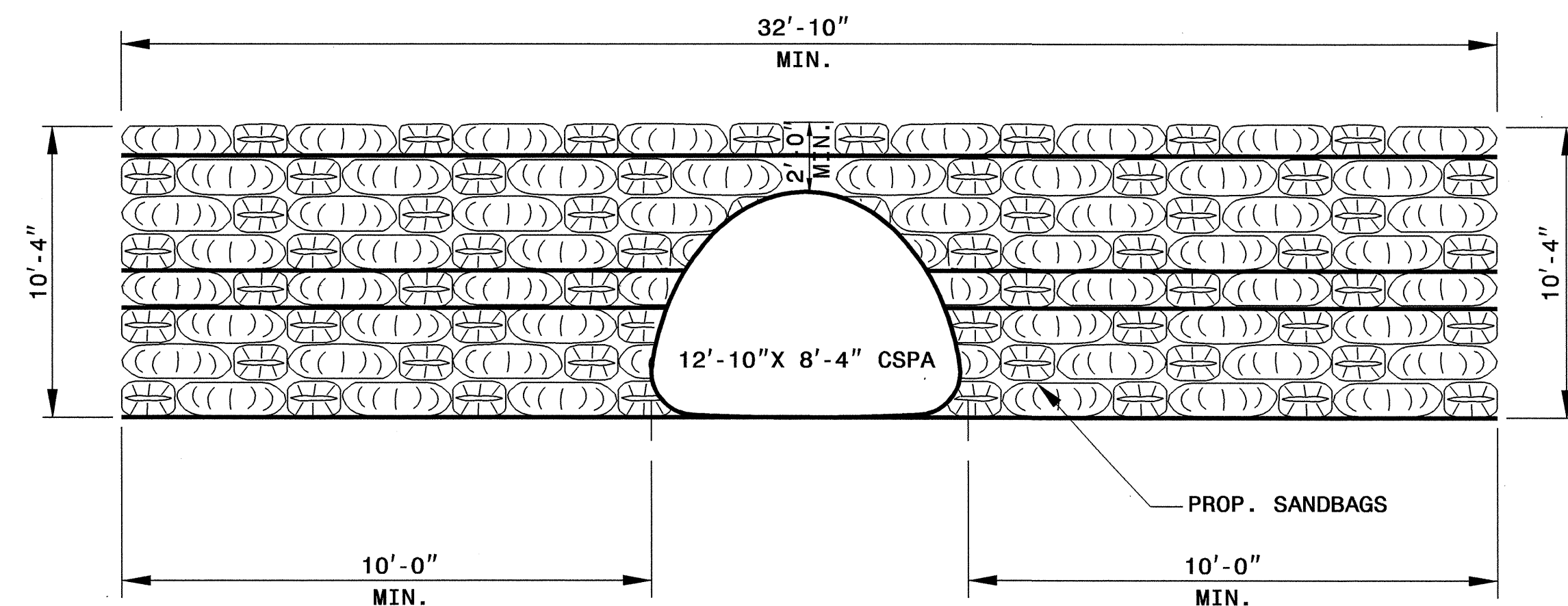
PI = 19+30.00
EL = 1,152.05'
VC = 645'
K = 79
V = 45 MPH

NOTE:
SEE SHEET 2-A FOR DETOUR PLAN.
SEE SHEET 4 FOR -L- PLAN.
SEE SHEET 5 FOR -L- PROFILE.

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PLAN



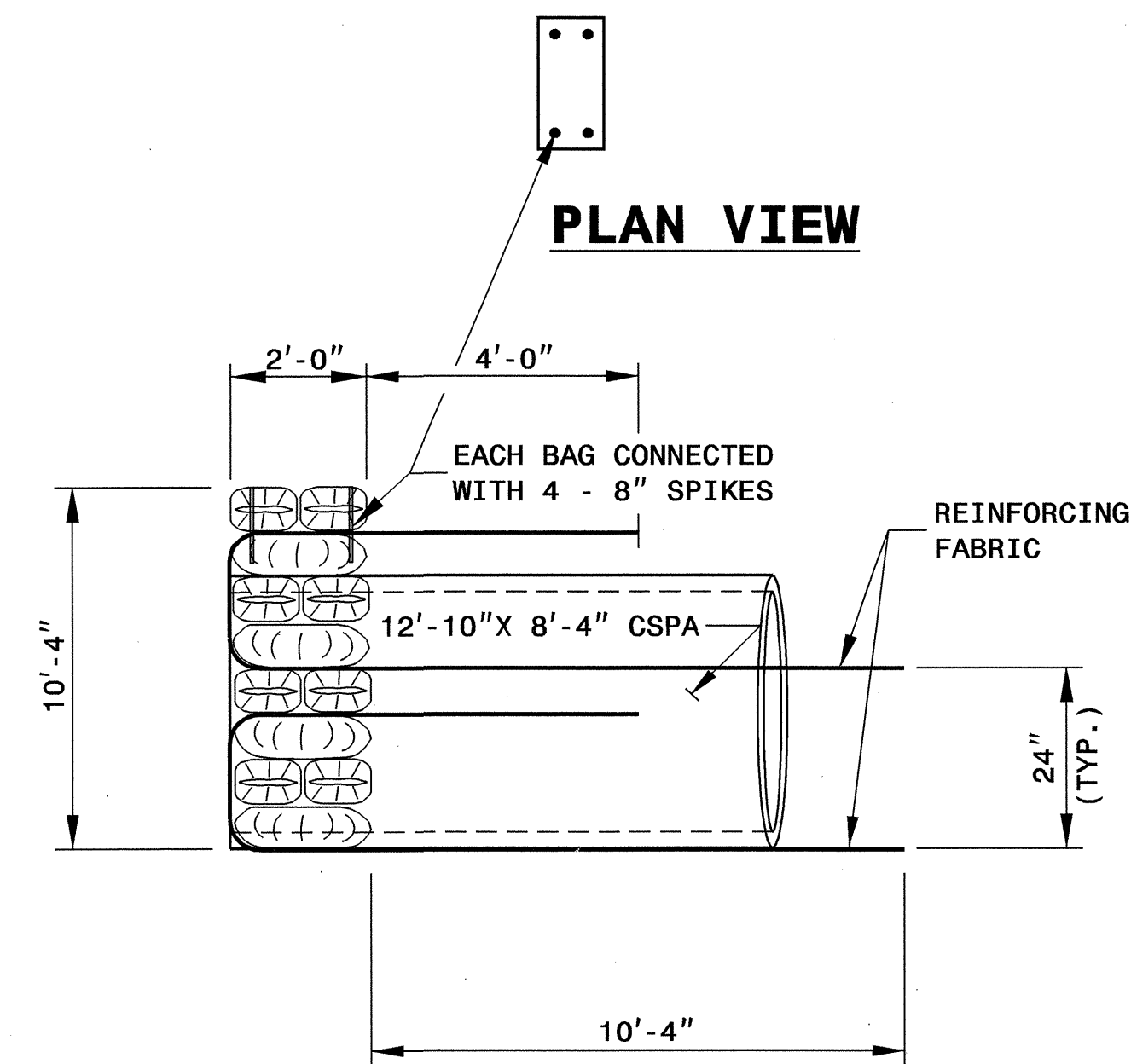
FRONT ELEVATION

REINFORCING FABRIC		
WALL HEIGHT H (ft)	REINF. LENGTH B (ft)	ULTIMATE TENSILE STRENGTH (lb/ft)
< 4	6	2400
4 TO 6	6	3000
6 TO 8	= H	3600
8 TO 10	= H	4500

TOTAL AREA SANDBAG HEADWALLS = 340 S.F.

- GENERAL NOTES:**
- REINFORCED SANDBAG HEADWALLS ARE BASED ON THE FOLLOWING ASSUMPTIONS:
 - TRAFFIC SURCHARGE IS 240 PSF OR LESS AND BACKSLOPE IS 2:1 OR FLATTER.
 - GRADE IN FRONT OF WALL IS 6:1 OR FLATTER.
 - MAXIMUM APPLIED BEARING PRESSURE IS LESS THAN 1 TSF.
 - REINFORCED SANDBAG HEADWALLS ARE BASED ON THE FOLLOWING IN-SITU SOIL PARAMETERS:
 - UNIT WEIGHT = 120 PCF
 - FRICTION ANGLE = 30 DEGREES

DO NOT USE REINFORCED SANDBAG HEADWALL DETAIL WHEN ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT BELOW BOTTOM OF PIPE.
 - DO NOT PLACE SANDBAGS UNTIL OBTAINING APPROVAL OF THE EXCAVATION DEPTH AND FOUNDATION MATERIAL.
 - PLACE REINFORCING FABRICS IN SLIGHT TENSION FREE OF KINKS, FOLDS, WRINKLES AND CREASES. DO NOT SPLICE REINFORCING FABRICS IN THE REINFORCEMENT DIRECTION (RD). SEAMS ARE ALLOWED IN THE CROSS-REINFORCEMENT DIRECTION (CRD).
 - BACKFILL SANDBAG HEADWALLS IN ACCORDANCE WITH SECTION 235 OF THE STANDARD SPECIFICATIONS EXCEPT DO NOT BACKFILL WITH ROCK, BROKEN PAVEMENT OR SIMILAR MATERIAL. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 3 ft OF SANDBAGS. DO NOT DAMAGE REINFORCING FABRICS WHEN PLACING AND COMPACTING BACKFILL. DO NOT OPERATE HEAVY EQUIPMENT ON REINFORCING FABRICS UNTIL THEY ARE COVERED WITH AT LEAST 10" OF BACKFILL.
 - #4 REINFORCING BARS (GRADE 60) 24" LONG MAY BE SUBSTITUTED FOR 8" SPIKES. DRIVE #4 BAR THRU 4 BAGS MAXIMUM.
 - HEADWALL DIMENSIONS MAY BE ADJUSTED FOR SINGLE, DOUBLE OR MORE PIPES AS SHOWN IN PLANS.
 - FOR REINFORCED SANDBAG HEADWALLS, SEE SANDBAG HEADWALLS PROVISION.



SIDE ELEVATION



CONTRACT STANDARDS AND DEVELOPMENT UNIT
 PLANS AND STANDARDS SECTION
 Office 919-250-4128 FAX 919-250-4119

DETAIL OF REINFORCED SANDBAG HEADWALL

ORIGINAL BY: rnbr/yt DATE: 03-05-10
 MODIFIED BY: J.S.H. DATE: 3/3/10
 CHECKED BY: J.S.H. DATE: 3/3/10
 FILE SPEC.: de/s/nbritt/eng11sh/bridge/b4190reinforced_sandbagheadwall.dgn

NOT TO SCALE

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS
SUMMARY OF QUANTITIES

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS
 ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C202550

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0000400000-N	801	Lump Sum		CONSTRUCTION SURVEYING
0022000000-E	225	12,600	CY	UNCLASSIFIED EXCAVATION
0038000000-E	SP	20	CY	SHALLOW UNDERCUT
0050000000-E	226	1	ACR	SUPPLEMENTARY CLEARING & GRUB-BING
0063000000-N	SP	Lump Sum		GRADING
0080000000-E	SP	20	TON	CLASS IV SUBGRADE STABILIZATION
0134000000-E	240	710	CY	DRAINAGE DITCH EXCAVATION
0196000000-E	270	750	SY	FABRIC FOR SOIL STABILIZATION
0234000000-E	SP	100	CY	GENERIC GRADING ITEM SELECT GRANULAR MATERIAL
0320000000-E	SP	90	SY	FOUNDATION CONDITIONING FABRIC
0330000000-E	SP	10	TON	GENERIC DRAINAGE ITEM FOUNDATION CONDITIONING MATERIAL, MINOR STRS
0938000000-E	320	52	LF	*** X *** CS STRUCTURAL PLATE PIPE ARCH, ** GAUGE (154" X 100", 12)
0995000000-E	340	111	LF	PIPE REMOVAL
1121000000-E	520	1,271	TON	AGGREGATE BASE COURSE
1220000000-E	545	50	TON	INCIDENTAL STONE BASE
1489000000-E	610	113	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B
1498000000-E	610	70	TON	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B
1519000000-E	610	500	TON	ASPHALT CONC SURFACE COURSE, TYPE S9.5B
1560000000-E	620	39	TON	ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22
1693000000-E	654	25	TON	ASPHALT PLANT MIX, PAVEMENT REPAIR
2000000000-N	806	9	EA	RIGHT OF WAY MARKERS
2022000000-E	815	45	CY	SUBDRAIN EXCAVATION
2033000000-E	815	35	CY	SUBDRAIN FINE AGGREGATE

ItemNumber	Sec #	Quantity	Unit	Description
2044000000-E	815	200	LF	6" PERFORATED SUBDRAIN PIPE
2055000000-E	815	6	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)
2199000000-E	SP	340	SF	SANDBAG HEADWALL
2473000000-N	SP	2	EA	GENERIC DRAINAGE ITEM ROCK INLET SILL
3030000000-E	862	762.5	LF	STEEL BM GUARDRAIL
3150000000-N	862	10	EA	ADDITIONAL GUARDRAIL POSTS
3270000000-N	SP	4	EA	GUARDRAIL ANCHOR UNITS, TYPE 350
3360000000-E	863	818	LF	REMOVE EXISTING GUARDRAIL
3380000000-E	862	837.5	LF	TEMPORARY STEEL BM GUARDRAIL
3389100000-N	SP	4	EA	GUARDRAIL ANCHOR UNITS, TYPE 350 TEMPORARY
3503000000-E	866	410	LF	WOVEN WIRE FENCE, 47" FABRIC
3509000000-E	866	20	EA	4" TIMBER FENCE POSTS, 7'-6" LONG
3515000000-E	866	20	EA	5" TIMBER FENCE POSTS, 8'-0" LONG
3563000000-E	SP	130	LF	TEMP *** WOVEN WIRE FENCE, COMPLETE W/POSTS (48")
3628000000-E	876	30	TON	RIP RAP, CLASS I
3649000000-E	876	110	TON	RIP RAP, CLASS B
3656000000-E	876	1,750	SY	FILTER FABRIC FOR DRAINAGE
4400000000-E	1110	220	SF	WORK ZONE SIGNS (STATIONARY)
4405000000-E	1110	96	SF	WORK ZONE SIGNS (PORTABLE)
4410000000-E	1110	72	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)
4430000000-N	1130	30	EA	DRUMS
4435000000-N	1135	125	EA	CONES
4445000000-E	1145	48	LF	BARRICADES (TYPE III)

ItemNumber	Sec #	Quantity	Unit	Description
4450000000-N	1150	960	HR	FLAGGER
4480000000-N	1165	1	EA	TMIA
4650000000-N	1251	18	EA	TEMPORARY RAISED PAVEMENT MARKERS
4810000000-E	1205	27,007	LF	PAINT PAVEMENT MARKING LINES (4")
4847000000-E	1205	5,452	LF	POLYUREA PAVEMENT MARKING LINES (4", *****) (STANDARD GLASS BEADS)
4905000000-N	1253	17	EA	SNOWPLOWABLE PAVEMENT MARKERS
6000000000-E	1605	2,000	LF	TEMPORARY SILT FENCE
6006000000-E	1610	225	TON	STONE FOR EROSION CONTROL, CLASS A
6009000000-E	1610	270	TON	STONE FOR EROSION CONTROL, CLASS B
6012000000-E	1610	135	TON	SEDIMENT CONTROL STONE
6015000000-E	1615	10.5	ACR	TEMPORARY MULCHING
6018000000-E	1620	300	LB	SEED FOR TEMPORARY SEEDING
6021000000-E	1620	2	TON	FERTILIZER FOR TEMPORARY SEEDING
6024000000-E	1622	375	LF	TEMPORARY SLOPE DRAINS
6027000000-N	1622	5	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS
6029000000-E	SP	950	LF	SAFETY FENCE
6030000000-E	1630	900	CY	SILT EXCAVATION
6036000000-E	1631	10,500	SY	MATTING FOR EROSION CONTROL
6037000000-E	SP	100	SY	COIR FIBER MAT
6038000000-E	SP	600	SY	PERMANENT SOIL REINFORCEMENT MAT
6042000000-E	1632	100	LF	1/4" HARDWARE CLOTH
6069000000-E	1638	135	CY	STILLING BASINS
6070000000-N	SP	3	EA	SPECIAL STILLING BASINS
6071010000-E	SP	110	LF	WATTLE
6071020000-E	SP	30	LB	POLYACRYLAMIDE (PAM)
6071030000-E	SP	775	LF	COIR FIBER BAFFLES
6071050000-E	SP	7	EA	*** SKIMMER (1-1/2")
6084000000-E	1660	9	ACR	SEEDING & MULCHING
6087000000-E	1660	6	ACR	MOWING
6090000000-E	1661	100	LB	SEED FOR REPAIR SEEDING
6093000000-E	1661	0.25	TON	FERTILIZER FOR REPAIR SEEDING
6096000000-E	1662	175	LB	SEED FOR SUPPLEMENTAL SEEDING
6108000000-E	1665	5.25	TON	FERTILIZER TOPDRESSING
6111000000-E	SP	175	LF	IMPERVIOUS DIKE
6114500000-N	SP	10	MHR	SPECIALIZED HAND MOWING
6117000000-N	SP	12	EA	RESPONSE FOR EROSION CONTROL
6120000000-E	SP	175	CY	CULVERT DIVERSION CHANNEL
6123000000-E	1670	0.5	ACR	REFORESTATION

SUMMARY OF EARTHWORK
 IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
PHASE 1					
-DET- 10+75.00 TO 25+34.67	7,402		5,557		1,845
TOTAL (PHASE 1)	7,402		5,557	0	1,845
PHASE 2					
-L- 17+00.00 TO 18+75.00	141		713	572	0
-L- RT. 18+75.00 TO 22+25.00	0		620	620	0
SUBTOTAL (PHASE 2)	141		1,333	1,192	0
WASTE (FROM PHASE 1) TO REPLACE BORROW				-1,192	-1,192
TOTAL (PHASE 2)	141		1,333	0	-1,192
PHASE 3					
-L- LT. 11+35.00 TO 17+00.00					
-L- LT. 18+75.00 TO 25+00.00	5,046		938	0	4,108
-DET- 11+35.00 TO 25+00.00 (DETOUR REMOVAL)					
TOTAL (PHASE 3)	5,046		938	0	4,108
TOTAL (ALL PHASES)	12,589		7,828	0	4,761
EST. LOSS DUE TO CLEARING & GRUBBING	-50				-50
GRAND TOTAL	12,539		7,828	0	4,711
SAY	12,600				4,800

SELECT GRANULAR MATERIAL (CLASS II OR III) = 100 CY (CONTINGENCY ITEMS PER 'GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS' LETTER DATED JULY 9, 2009 AND EMAIL FROM SHANE CLARK DATED APRIL 26, 2010)
 ESTIMATED SHALLOW UNDERCUT = 20 CY
 ESTIMATED CLASS IV SUBGRADE STABILIZATION = 20 TONS
 EST. SHOULDER BORROW = 600 CY

APPROXIMATE QUANTITIES ONLY. CLEARING AND GRUBBING, SHOULDER BORROW, FINE GRADING, AND REMOVAL OF EXISTING PAVEMENT 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.

SUMMARY OF PAVEMENT REMOVAL
 IN SQUARE YARDS

LOCATION	ASPHALT REMOVAL	ASPHALT BREAK-UP	CONCRETE REMOVAL	CONCRETE BREAK-UP
-L- STA. 17+00 TO 17+50 CL	123			
-L- STA. 18+27 TO 18+75 CL	118			
-DET- STA. 11+44 TO 14+25 CL	291			
-DET- STA. 14+25 TO 21+79 CL	1,842			
-DET- STA. 21+79 TO 25+03 CL	288			
GRAND TOTAL	2,662			
SAY	2,670			

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 54" & OVER)

STATION	LOCATION (L, RT, OR CL)	STRUCTURE NO.	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE)	BITUMINOUS COATED C.S. PIPE TYPE B				STRUCTURAL PLATE PIPE				REINFORCED ENDWALLS		MASONRY DRAINAGE STRUCTURES CUBIC YARDS	154" x 100" CS STRUCTURAL PLATE PIPE ARCH, 12 GAUGE	REINFC. CONC. FLARED END SECTIONS NO. & SIZE	CORR. STEEL FLARED END SECTIONS NO. & SIZE	REINFC. CONC. ELBOWS NO. & SIZE	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "8" C.Y. STD 84072	PIPE REMOVAL LIN.FT.	REMARKS			
								54"	60"	66"	72"	78"	84"	54"	60"	66"	72"										60"	66"	72"
-L- 16+41	LT							.109	.138	.166	.138	.166	.138	.166	.138	.166	12	10	12	10	12	10						27	
-L- 17+62	LT																											32	
-DET- 18+07.50	CL	1		1145.39	1145.60																						52	TEMPORARY DETOUR STRUCTURE	
TOTAL																											111		

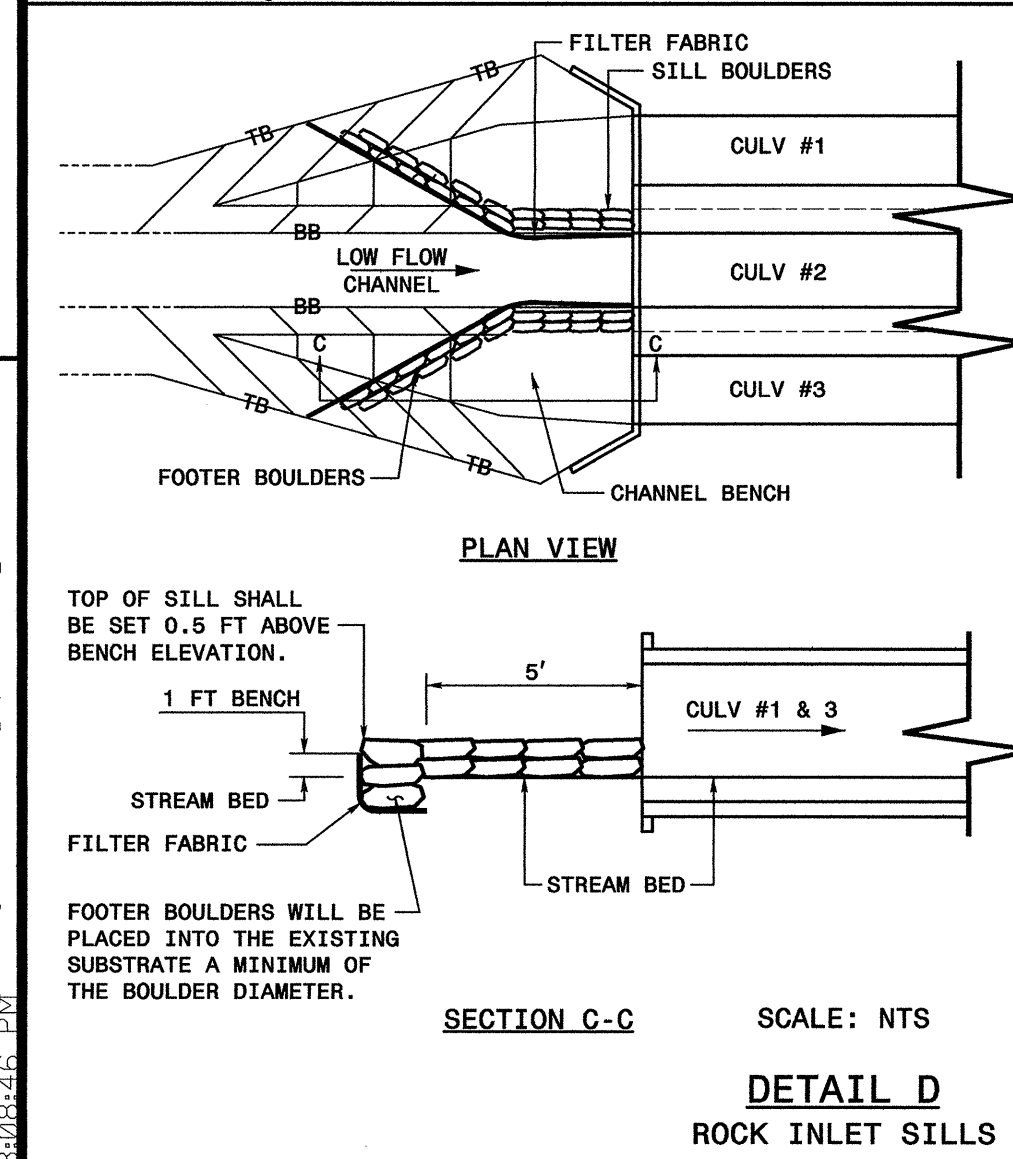
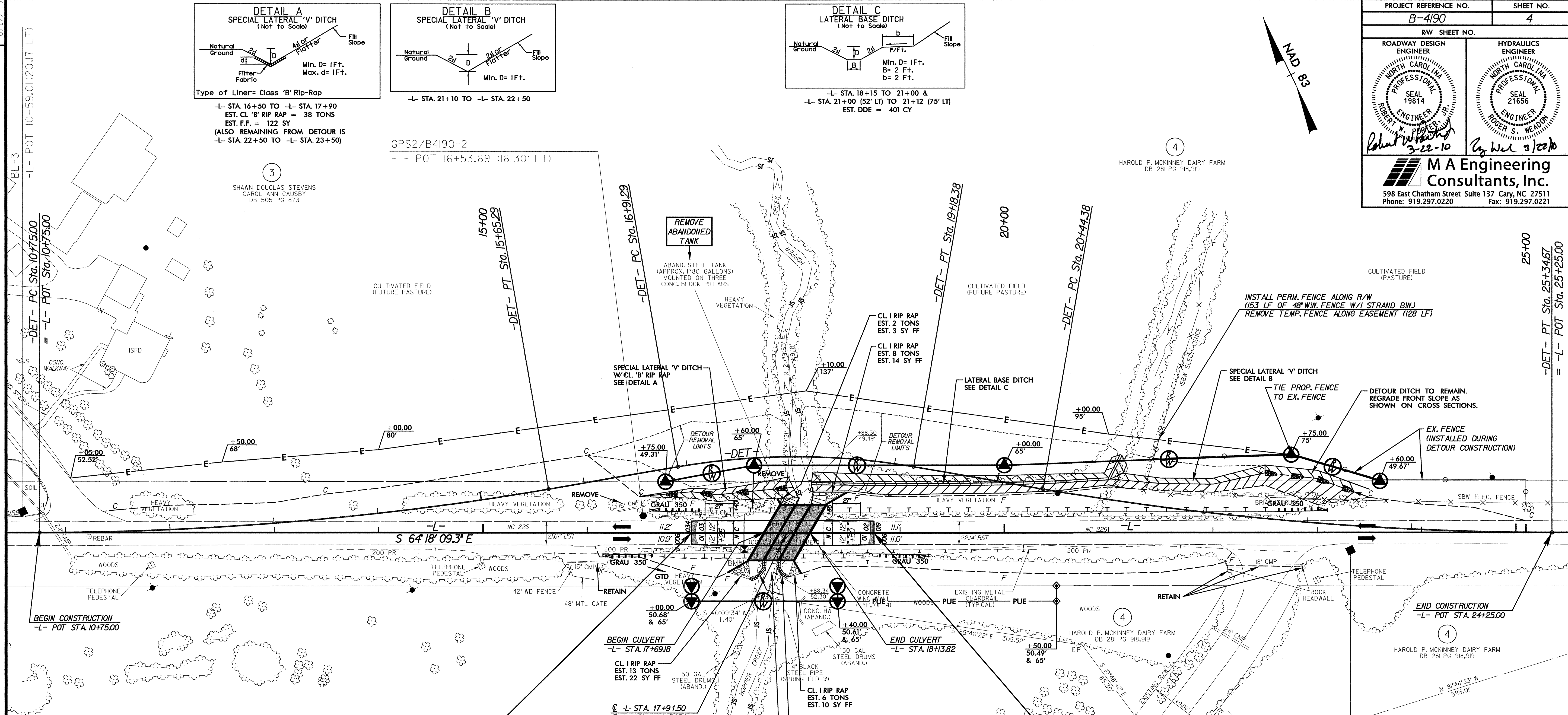
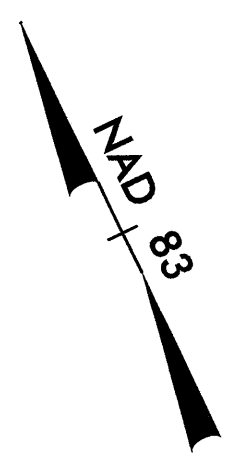
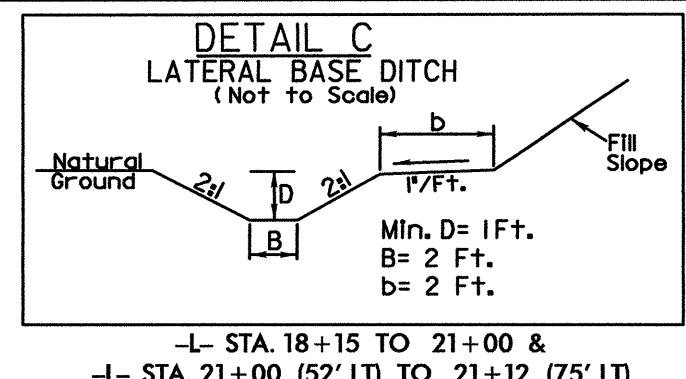
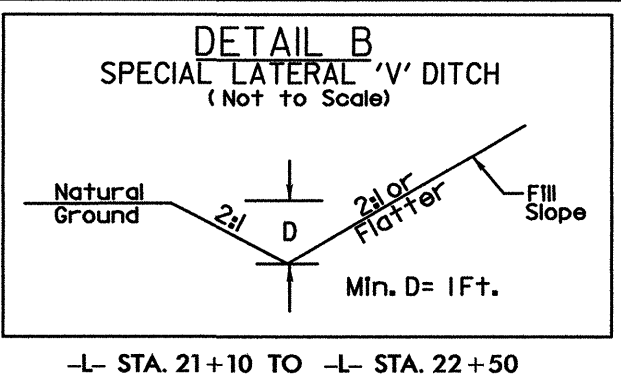
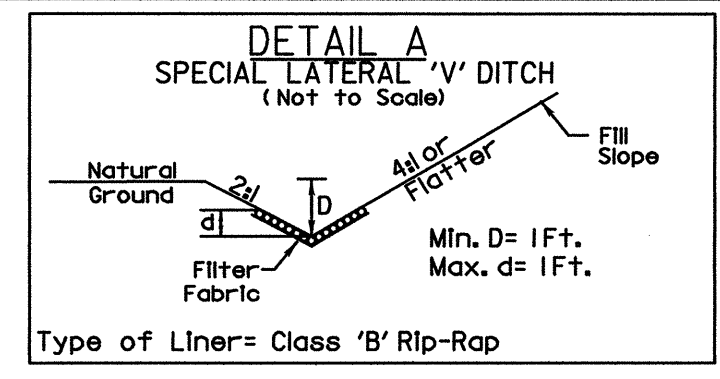
GUARDRAIL SUMMARY

"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.

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS		GRAU 350 (TEMP.)	IMPACT ATTENUATOR TYPE 350	REMOVE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END						
				EA	G	NG	EA	EA			EA	EA	EA	EA						
-L-	16+15	19+28	RT	312.50'					8'	11'	50.00'	50.00'	1.00'	1.00'	2			304'		
-L-	16+60	23+10	LT	650.00'					8'	11'	50.00'	50.00'	1.00'	1.00'	2			514'		
			SUBTOTAL	962.50'																
			LESS ANCHORS	GRAU-350	4 x 50.00' =	-200.00'														
			TOTAL GUARDRAIL (LF)	762.50'											4					818'
			ADDITIONAL GUARDRAIL POSTS: 10 EACH																	
			TOTAL ANCHORS (EA)																	
			TOTAL (LF)																	
TEMPORARY GUARDRAIL																				
-DET-	16+00	20+06	RT	400.00'					6'	8'	50.00'	50.00'	1.00'	1.00'	2					
-DET-	16+75	23+10	LT	637.50'					6'	8'	50.00'	50.00'	1.00'	1.00'	2					
			SUBTOTAL	1037.50'																
			LESS ANCHORS	GRAU 350 (TEMP.)	4 x 50.00' =	-200.00'														
			TOTAL TEMPORARY GUARDRAIL (LF)	837.50'																
			TOTAL TEMPORARY ANCHORS (EA)																	

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PROJECT REFERENCE NO. B-4190		SHEET NO. 4	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
M A Engineering Consultants, Inc. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221			



- NOTES:
1. ALL STONES ARE TO BE STRUCTURE STONE.
 2. GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER, PLUGGING WITH STRUCTURE STONE CLASS A AND NO.57 AND LINING WITH FILTER FABRIC.
 3. DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE ENGINEER.
 4. A DOUBLE FOOTER BOLDER SHALL BE UTILIZED IN SAND BED MATERIAL.
 5. FOOTER BOULDERS AND SILL BOULDERS SHALL BE NATIVE STONE OR SHOT ROCK, CUBICAL OR RECTANGULAR IN NATURE.
 6. ACCEPTABLE BOULDERS SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS: 3' x 2' x 1'.
- FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF STRUCTURE.

NOTE:
 SEE SHEET 5 FOR -L- PROFILE.
 SEE SHEET 2-A FOR DETOUR PLAN.
 SEE SHEET 2-B FOR DETOUR PROFILE.
 FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-7

REVISIONS

8/17/99
 BL-3
 -L- POT 10+59.01 (20.17 LT)
 -DET- PC Sta. 10+75.00
 -L- POT Sta. 10+75.00
 SHAWN DOUGLAS STEVENS
 CAROL ANN CAUSBY
 DB 505 PG 873
 HAROLD P. MCKINNEY DAIRY FARM
 DB 281 PG 918,919
 MECKLENBURG COUNTY COUNCIL
 OF BOY SCOUTS OF AMERICA INC.
 PT. OF TRACT 1, DB 237 PG 405
 TRACT 3, DB 237 PG 405
 PHENG THAO
 MAI KOU LEE
 DB 498 PG 543
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5/28/99

BM#1
CHISELED SQUARE WITH
PUNCH HOLE IN WING WALL
-L- STA. 17+50.75 (15.77' RT)
ELEV. 1,160.04'

EXISTING GROUND ---
PROPOSED GRADE - - -
PROP. LEFT DITCH - - -
PROP. RIGHT DITCH - - -

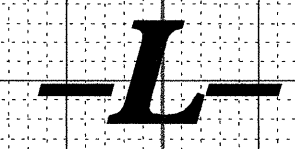
PROJECT REFERENCE NO. B-4190 SHEET NO. 5

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19814
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 21656
3-22-10 3/22/10

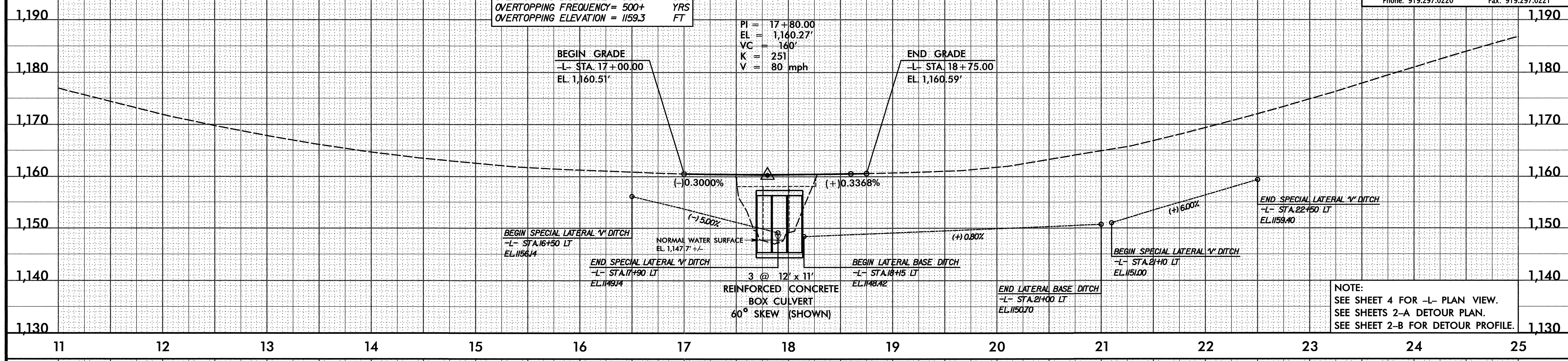
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 2300	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 1156.8	FT
BASE DISCHARGE	= 2600	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 1157.4	FT
OVERTOPPING DISCHARGE	= 3500	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 1159.3	FT



PI = 17+80.00
EL = 1,160.27'
VC = 160'
K = 251
V = 80 mph



NOTE:
SEE SHEET 4 FOR -L- PLAN VIEW.
SEE SHEETS 2-A DETOUR PLAN.
SEE SHEET 2-B FOR DETOUR PROFILE.

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