09/08/99

TIP PROJECT: B–5642

CONTRACT: C204623

See Sheet IA For Index of Sheets
See Sheet IB For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

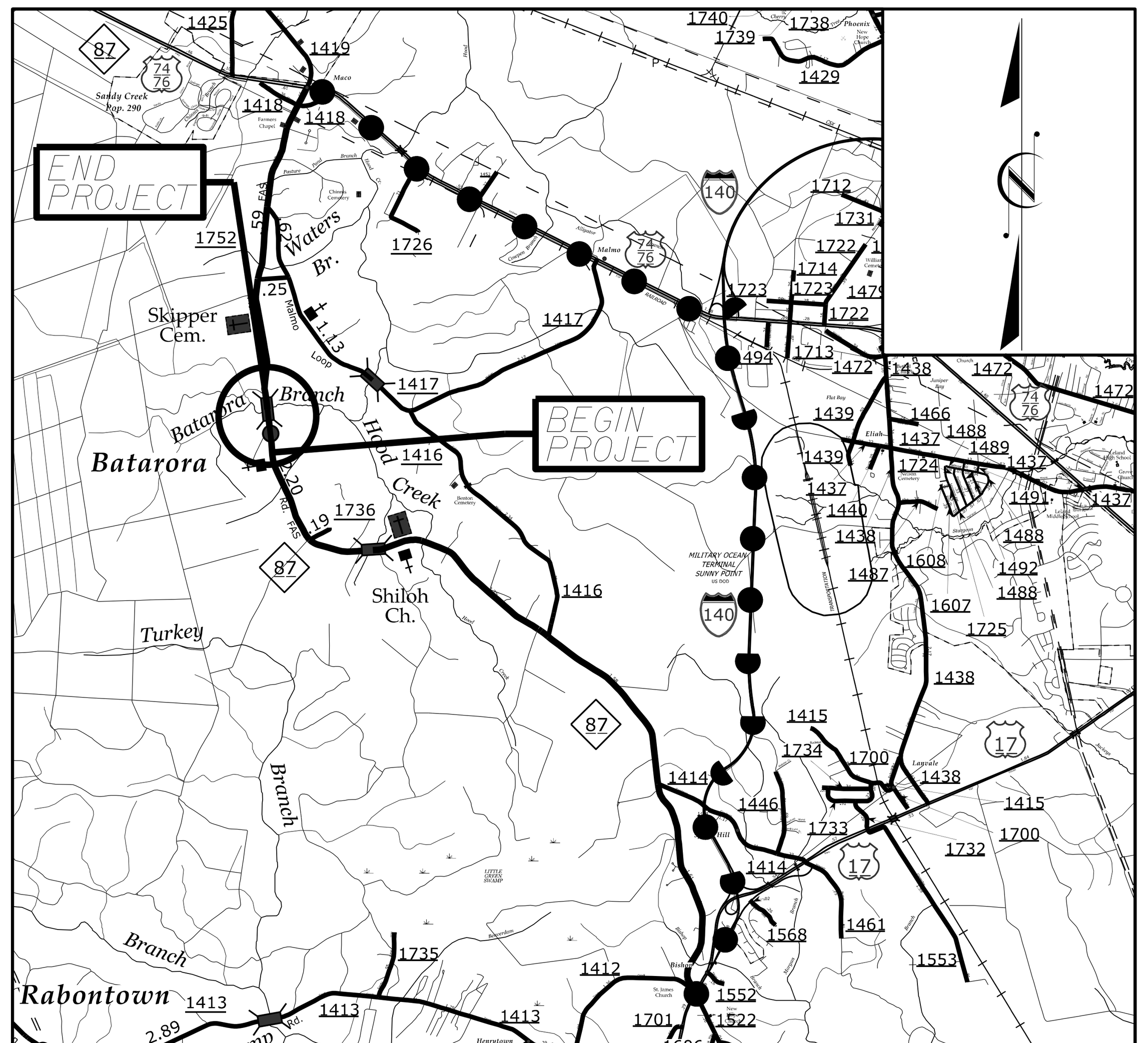
BRUNSWICK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B–5642	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45597.1.1	N/A	P.E.
45597.2.1	N/A	R/W & UTIL.
45597.3.1	N/A	CONST.

LOCATION: REPLACE BRIDGE NO. 65 OVER BATARORA BRANCH ON NC 87 (MACO ROAD)

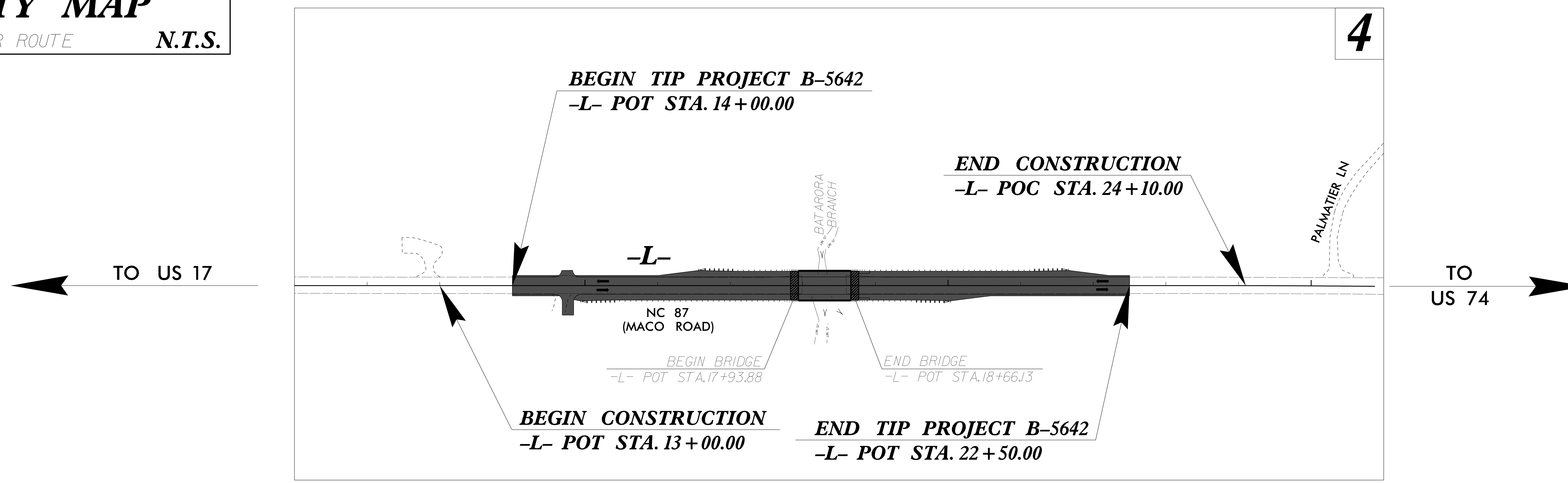
TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE



VICINITY MAP

● ● ● ● ● DETOUR ROUTE **N.T.S.**

NAD 83/
NA 2011



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2021 = 2,150 VPD
ADT 2040 = 3,100 VPD
K = 9%
D = 55%
T = 7%
V = 60 MPH
TTST = 2% DUALS = 5%
FUNC CLASS =
MAJOR COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B–5642	=	*0.147 MILES*
LENGTH BRIDGE TIP PROJECT B–5642	=	*0.014 MILES*
TOTAL LENGTH TIP PROJECT B–5642	=	*0.161 MILES*

Prepared in the Office of:

CDM Smith
CDM Smith Inc.
5400 Glenwood Avenue
Suite 400
Raleigh, NC 27612-3228
NC COA No. F-1255

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 3, 2020

LETTING DATE:
DECEMBER 21, 2021

ADAM M. CONRAD, PE
PROJECT ENGINEER

MONIQUE N. GYANT, EI
PROJECT DESIGN ENGINEER

KRISTY ALFORD, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by: Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON 9/21/2021

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

DocuSigned by: Adam M. Conrad, PE, PMP
0DDC0FFA0FD94AD...

NORTH CAROLINA PROFESSIONAL SEAL 043767 ENGINEER ADAM M. CONRAD 9/21/2021

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

$$$$$$SYSTIME$$$$ $$$$$$$$$DGN$$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

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ROADWAY DESIGN ENGINEER

NORTH CAROLINA SEAL 043767 ENGINEER ADAM M. CONRAD 4/22/2021

Adam M. Conrad, PE, PMP

CDM Smith

CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27612-3228 NC COA No. F-1255

INDEX OF SHEETS

EFF. 01-16-2018
REV. 09-11-2017

2018 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 January, 2018 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
275.01	Rock Plating
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
310.10	Driveway Pipe Construction
DIVISION 4 - MAJOR STRUCTURES	
422.02	Bridge Approach Fills - Type II Modified Approach Fill
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
815.02	Subsurface Drain
840.00	Concrete Base Pad for Drainage Structures
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.45	Precast Drainage Structure
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES:

2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED: 09-11-2017

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 MODIFIED 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

SUBSURFACE DRAINS:

SUBSURFACE DRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.02 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.

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 DUKE ENERGY - POWER TRANSMISSION

DUKE ENERGY - POWER DISTRIBUTION
SPECTRUM - CATV
AT&T - TELEPHONE

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

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

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
B-5642	1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale **S.U.E. = Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Computed Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Existing Historic Property Boundary — HPB
- Known Contamination Area: Soil — S
- Potential Contamination Area: Soil — S
- Known Contamination Area: Water — W
- Potential Contamination Area: Water — W
- Contaminated Site: Known or Potential

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY & PROJECT CONTROL:

- Secondary Horiz and Vert Control Point
- Primary Horiz Control Point
- Primary Horiz and Vert Control Point
- Exist Permanent Easment Pin and Cap
- New Permanent Easement Pin and Cap
- Vertical Benchmark
- Existing Right of Way Marker
- Existing Right of Way Line
- New Right of Way Line — RW
- New Right of Way Line with Pin and Cap — RW
- New Right of Way Line with Concrete or Granite R/W Marker — RW
- New Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- New Control of Access — CA
- Existing Easement Line — E
- New Temporary Construction Easement — E
- New Temporary Drainage Easement — TDE
- New Permanent Drainage Easement — PDE
- New Permanent Drainage / Utility Easement — DUE
- New Permanent Utility Easement — PUE
- New Temporary Utility Easement — TUE
- New Aerial Utility Easement — AUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp — CR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H–Frame Pole
- U/G Power Line LOS B (S.U.E.*) — P
- U/G Power Line LOS C (S.U.E.*) — P
- U/G Power Line LOS D (S.U.E.*) — P

TELEPHONE:

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

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line LOS B (S.U.E*) — W
- U/G Water Line LOS C (S.U.E*) — W
- U/G Water Line LOS D (S.U.E*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- U/G TV Cable LOS B (S.U.E.*) — TV
- U/G TV Cable LOS C (S.U.E.*) — TV
- U/G TV Cable LOS D (S.U.E.*) — TV
- U/G Fiber Optic Cable LOS B (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS C (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS D (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line LOS B (S.U.E.*) — G
- U/G Gas Line LOS C (S.U.E.*) — G
- U/G Gas Line LOS D (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
- SS Forced Main Line LOS B (S.U.E.*) — FSS
- SS Forced Main Line LOS C (S.U.E.*) — FSS
- SS Forced Main Line LOS D (S.U.E.*) — FSS

MISCELLANEOUS:

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

PROJECT REFERENCE NO.	SHEET NO.
B-5642	2A-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 043767 NATHAN M. CONRAD — PE, PMP

CDM Smith — CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27612-3228 NC COA No. F-1255

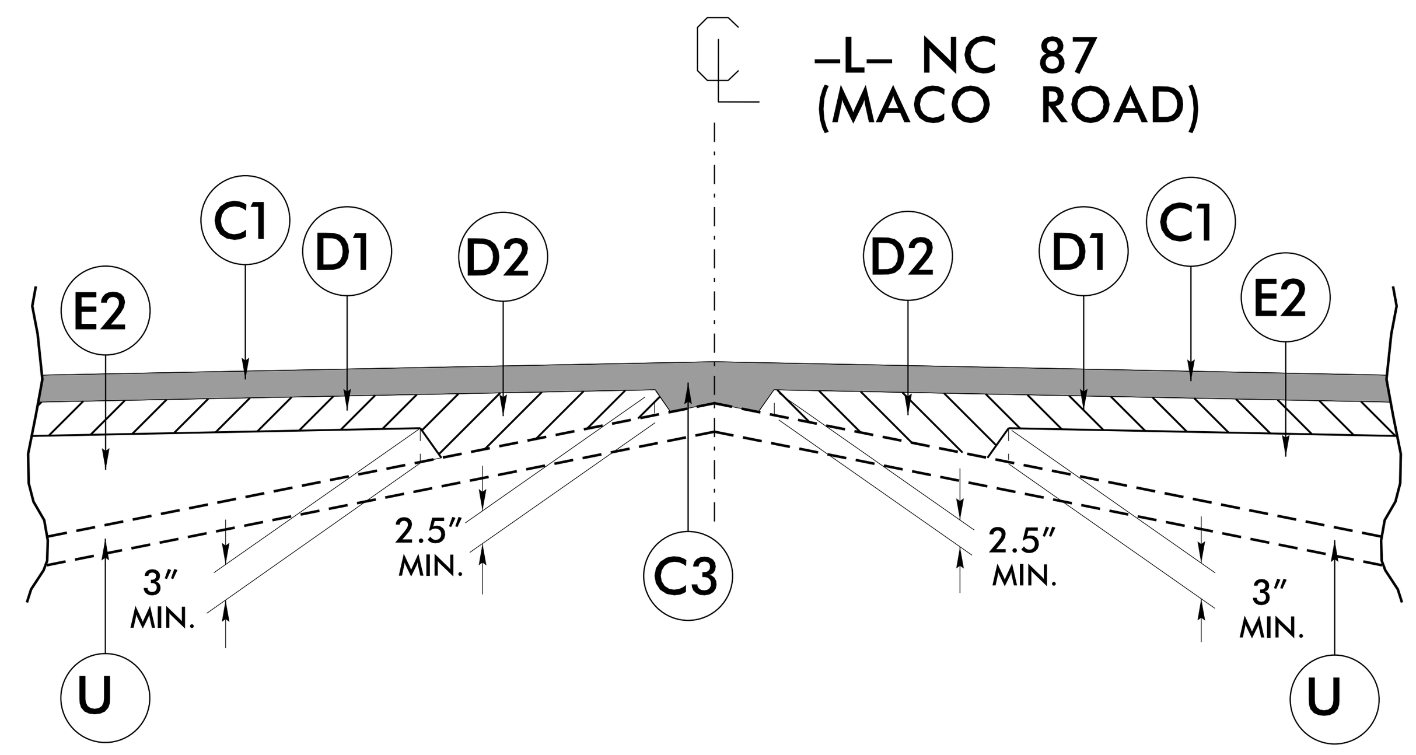
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT SCHEDULE

(FINAL PAVEMENT DESIGN)

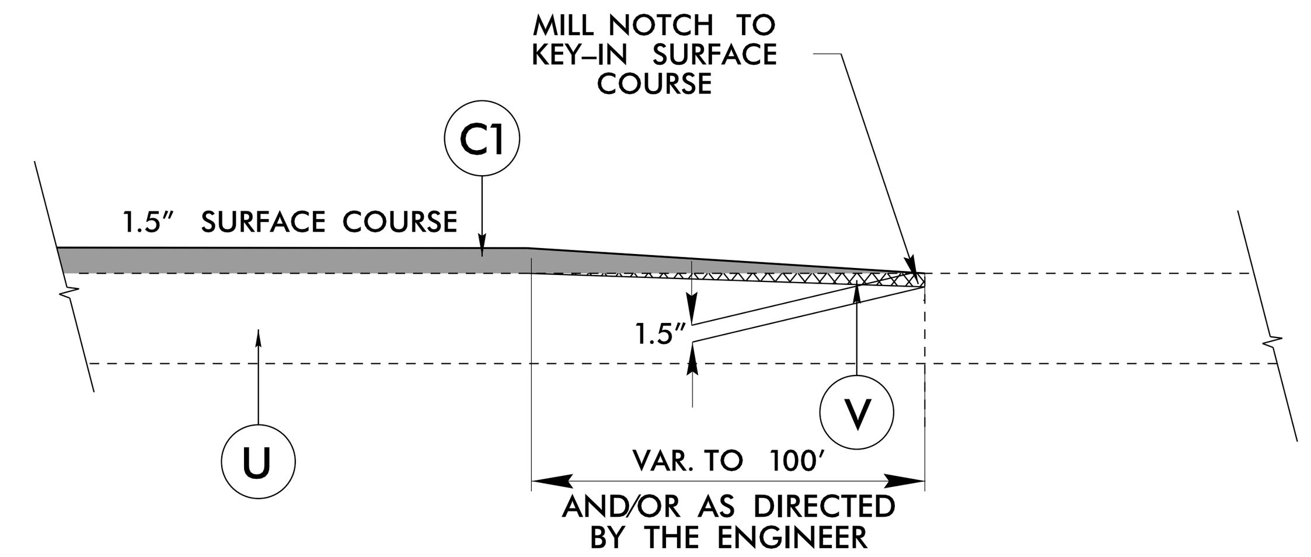
C1	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, 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 1.5" IN DEPTH.
D1	PROP APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D2	PROP VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, 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 5.5" IN DEPTH.
R1	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	INCIDENTAL MILLING
V1	VARIABLE MILLING (0" - 1.50")
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE -L- WEDGING DETAIL)

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

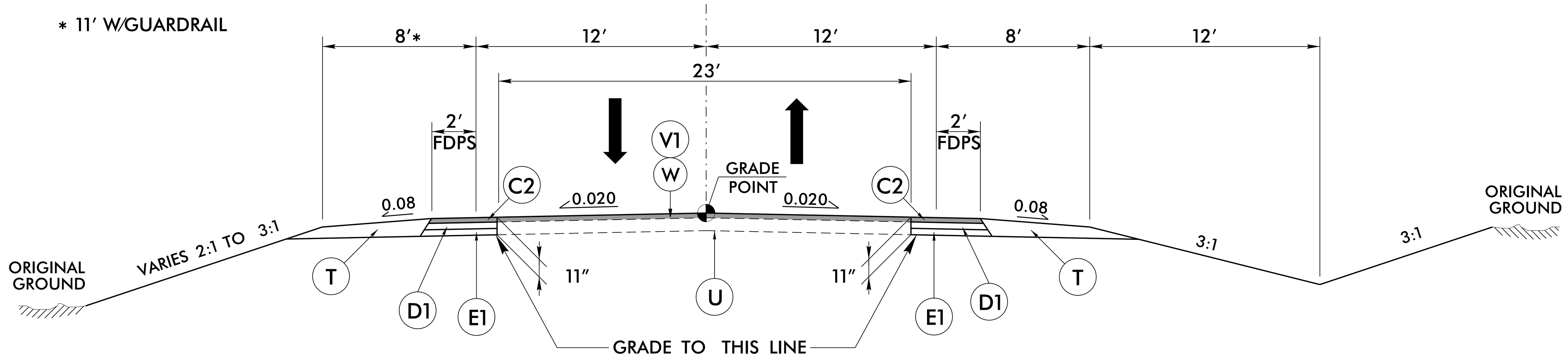


Detail Showing Method Of Wedging – W
-L-

MILLING DETAIL
INCIDENTAL MILLING AT BEGIN/END FOR TIE-INS



-L- STA. 14+00.00 TO STA. 14+37.50
-L- STA. 22+12.50 TO STA. 22+50.00



TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1

-L- STA. 14+00.00 TO STA. 16+93.88
-L- STA. 19+66.13 TO STA. 22+50.00

NOTE: SLOPES STEEPER THAN 3:1 USED WITH ROCK PLATING.

6/2/99

PROJECT REFERENCE NO.	SHEET NO.
B-5642	2A-2

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA 4/27/2021 SEAL 043767 ENGINEER

DocuSigned by: Adam M. Conrad PE, PMP

ADAM M. CONRAD PE, PMP

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NC COA No. F-1255

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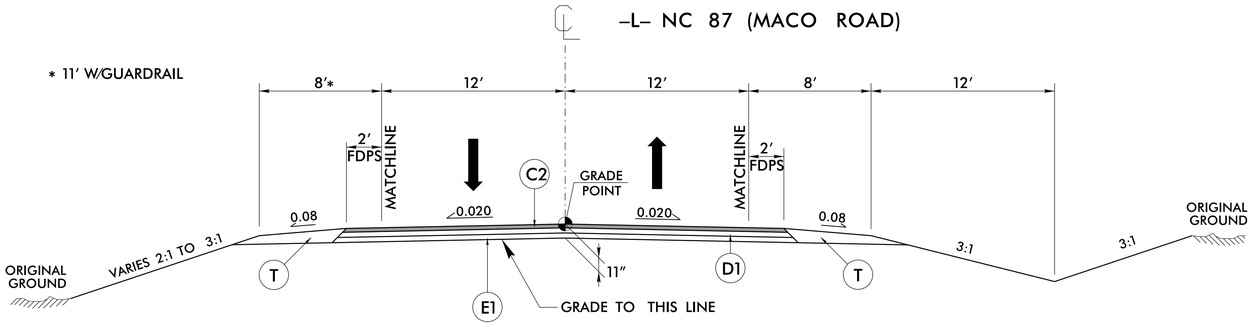


NOTE: SLOPES STEEPER THAN 3:1 USED WITH ROCK PLATING.

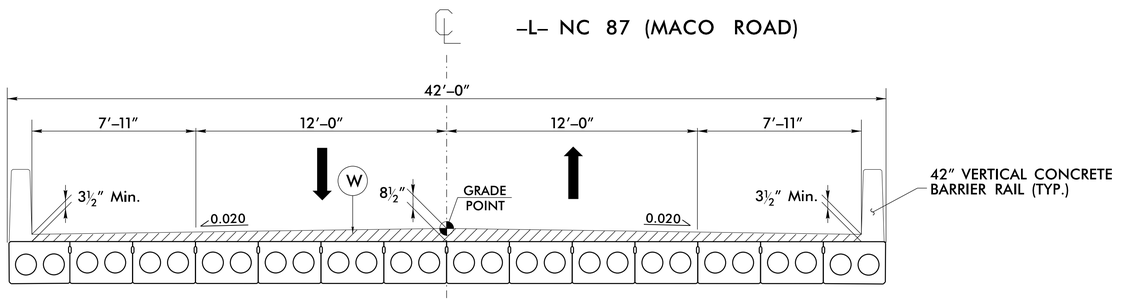
TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2

–L– STA. 16+93.88 TO STA. 17+93.88 (BEGIN BRIDGE)
–L– STA. 18+66.13 (END BRIDGE) TO STA 19+66.13

PAVEMENT SCHEDULE (FINAL PAVEMENT DESIGN)	
C1	1.5″ S9.5B
C2	3″ S9.5B
C3	VAR. S9.5B
D1	4″ I19.0C
D2	VAR. I19.0C
E1	4″ B25.0C
E2	VAR. B25.0C
R1	SBG
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V	INCIDENTAL MILLING
V1	VARIABLE MILLING
W	WEDGING

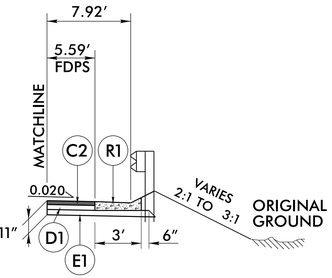
PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE



STRUCTURE TYPICAL SECTION

USE STRUCTURE TYPICAL SECTION

–L– 17+93.88 (BEGIN BRIDGE) TO STA. 18+66.13 (END BRIDGE)



DETAIL A

USE DETAIL A IN CONJUNCTION WITH TYPICAL SECTION NO. 2

–L– STA. 18+77.00 TO STA. 18+92.00 (LT/RT)

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-5023B	2C-1

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

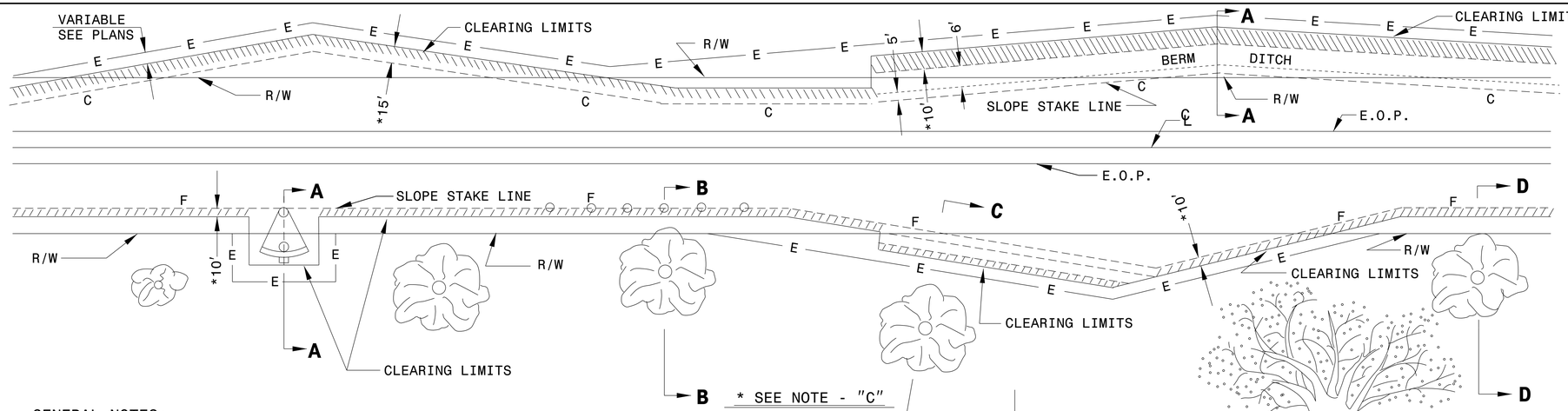
ENGLISH DETAIL DRAWING FOR

METHOD OF CLEARING

MODIFIED METHOD - III

SHEET 1 OF 1

200D03



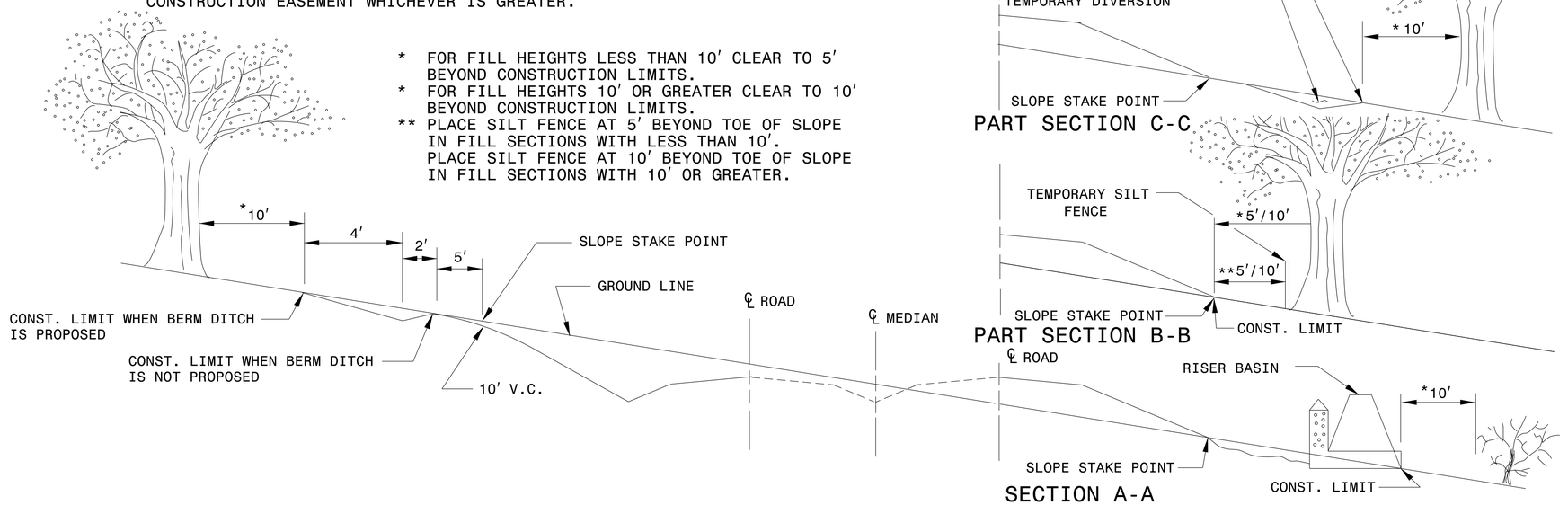
GENERAL NOTES:

1. REMOVE TREES OUTSIDE THE CLEARING LIMIT WHEN, IN THE OPINION OF THE ENGINEER, THE UTILITY OF A TREE WILL BE DESTROYED BY THE CONSTRUCTION OR THE CLEARING OPERATION.
2. CLEAR IN ACCORDANCE WITH THIS STANDARD EXCEPT WHERE ADDITIONAL CLEARING IS REQUIRED FOR SAFETY AS SHOWN ON THE PLANS.

METHOD III CLEARING LIMITS

(A) CUTS -- CLEAR TO CONSTRUCTION LIMITS.
(B) FILLS - CLEAR TO 5'/10' * BEYOND CONSTRUCTION LIMITS, UNLESS SPECIFIED OTHERWISE BY WETLAND PERMIT.
(C) CUTS AND FILLS - WHEN THE CLEARING LIMITS (A AND B) EXCEED THE PROPOSED R/W OR PROPOSED CONSTRUCTION EASEMENTS, THEN CLEAR ONLY TO THE R/W OR CONSTRUCTION EASEMENT WHICHEVER IS GREATER.

* FOR FILL HEIGHTS LESS THAN 10' CLEAR TO 5' BEYOND CONSTRUCTION LIMITS.
* FOR FILL HEIGHTS 10' OR GREATER CLEAR TO 10' BEYOND CONSTRUCTION LIMITS.
** PLACE SILT FENCE AT 5' BEYOND TOE OF SLOPE IN FILL SECTIONS WITH LESS THAN 10'. PLACE SILT FENCE AT 10' BEYOND TOE OF SLOPE IN FILL SECTIONS WITH 10' OR GREATER.



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

ENGLISH DETAIL DRAWING FOR

METHOD OF CLEARING

MODIFIED METHOD - III

SHEET 1 OF 1

200D03

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

DocuSigned by:
Joel S. Howerton
873F3D7DCDC45F...
6/7/2021

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CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY:	T.S.S.	DATE:	FEB.2000
MODIFIED BY:	K.A.K.	DATE:	AUG.2016
CHECKED BY:		DATE:	
FILE SPEC.:	kkempf/english/0200d301.dgn		

$$$$SYSTIME$$$$
$$$$SIGNS$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
B-5642	2C-2

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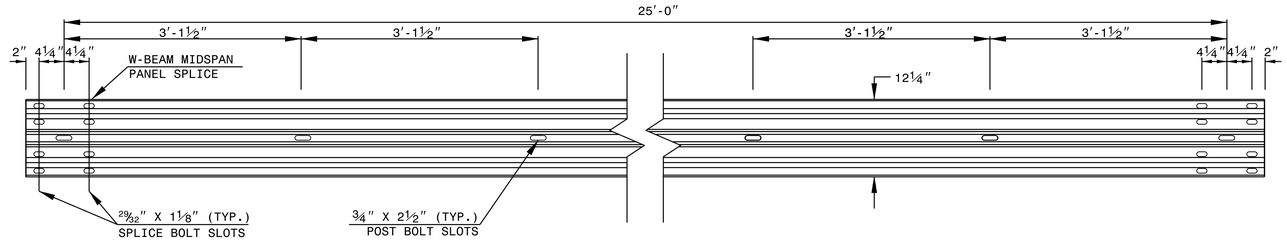
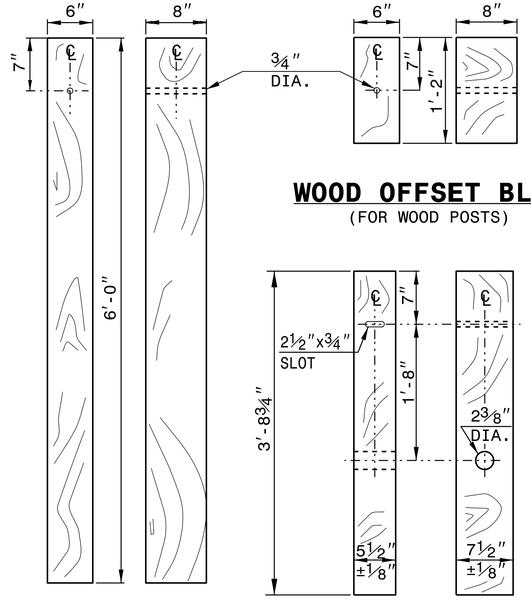
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02



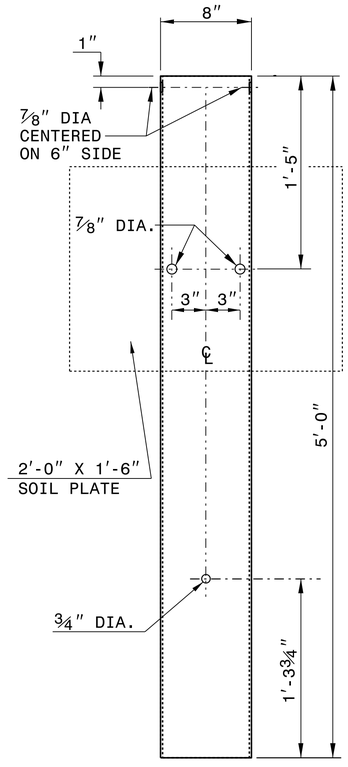
STANDARD W-BEAM GUARDRAIL



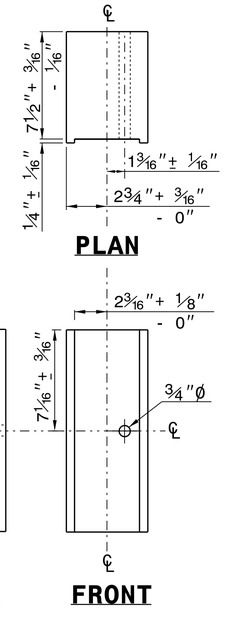
WOOD OFFSET BLOCK
(FOR WOOD POSTS)

STANDARD LINE POST

SHORT WOOD BREAKAWAY POST



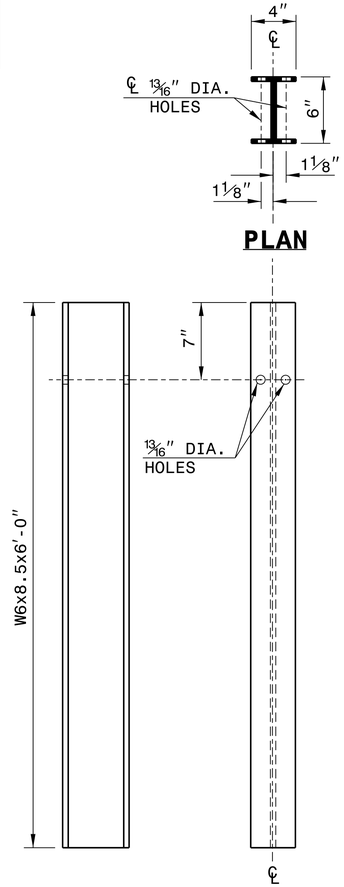
STEEL TUBE
TS 6"x8"x0.1875"



PLAN

SIDE **FRONT**

ROUTED OFFSET BLOCK



PLAN

SIDE **FRONT**

"W6" STEEL POST

SYSTEM PARTS

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON

DocuSigned by:
Joel S. Howerton
37DE3D37DCDC45F...
6/7/2021

CONTRACTS STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J.HOWERTON DATE: 3-7-2018
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

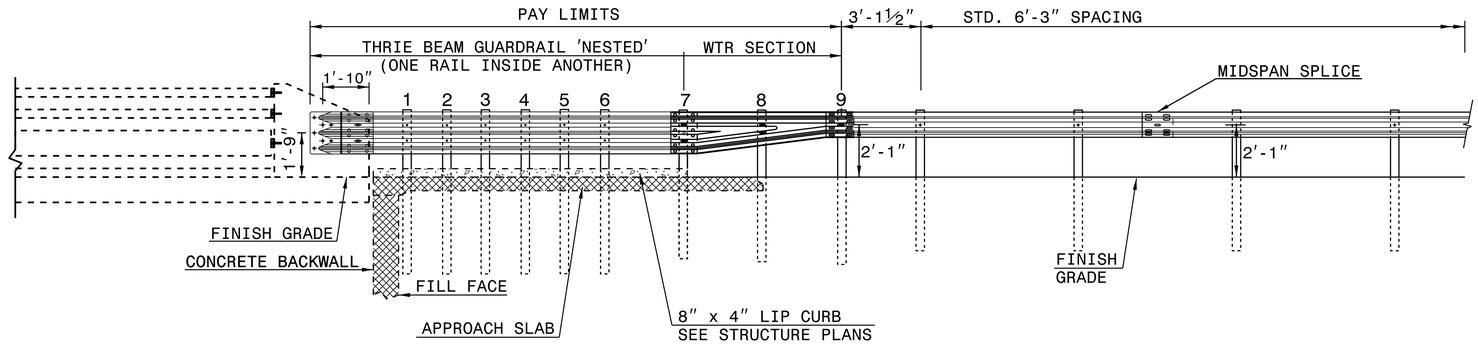
PROJECT REFERENCE NO.	SHEET NO.
B-5642	2C-3

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

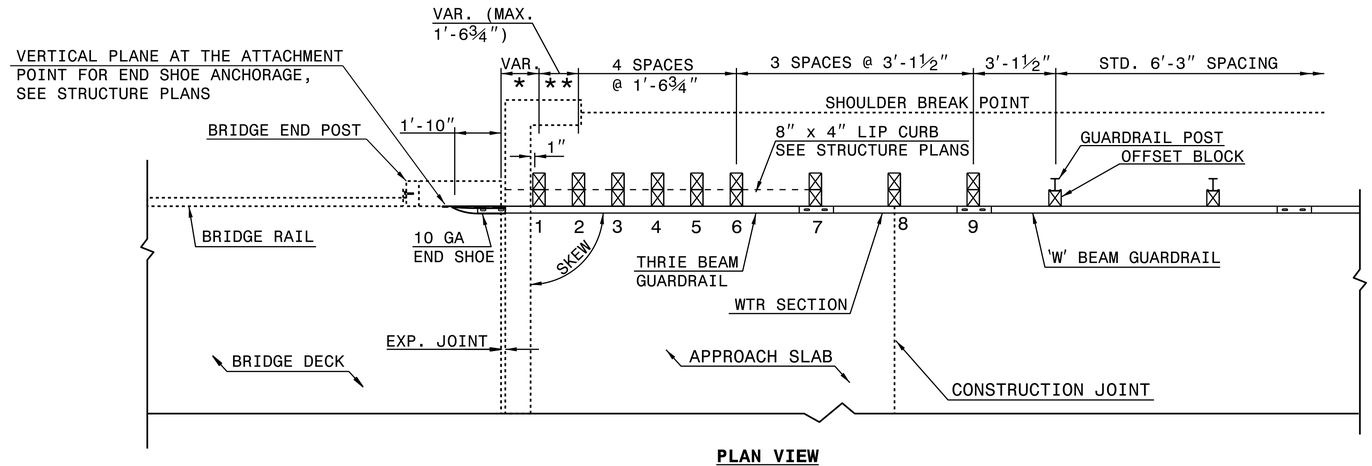
SHEET 1 OF 7

862D03



ELEVATION

NOTE:
**POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
*THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½″ IF CONCRETE BACKWALL IS NOT PRESENT.
-SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8″ x 4″ LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
-MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-SEE SHEET 3 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7

862D03

DocuSigned by: Joel S. Howerton
6/7/2021

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 Joel S. Howerton

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

6/21/00

COMPUTED BY: J. ADORNO DATE: 01/13/2020
CHECKED BY: A. CONRAD DATE: 01/13/2020

PROJECT REFERENCE NO.	SHEET NO.
B-5642	3B-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

GUARDRAIL SUMMARY (LF)

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS								IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	GREU TL-3	III							EA	G	NG				
-L-	14+93.88	17+93.88	RT	300.00			17+93.88		7.92	10.92	50.00		1.00		1	1													
-L-	16+56.38	17+93.88	LT	137.50				17+93.88	7.92	10.92		50.00		1.00	1	1													
-L-	18+66.13	20+03.63	RT	137.50				18+66.13	7.92	10.92		50.00		1.00	1	1													
-L-	18+66.13	21+66.13	LT	300.00			18+66.13		7.92	10.92	50.00		1.00		1	1													
			SUBTOTALS	875.00											4	4													
			TYPE III, 4@18.75'	-75.00																									
			GREU TL-3, 4@50.00'	-200.00																									
			PROJECT TOTALS	600.00											4	4													
			SAY	600.00											4	4													
ADDITIONAL GUARDRAIL POSTS = 10 EA																													

SUMMARY OF EARTHWORK (CY)

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- 14+00.00 - 17+93.88	292		254		38
-L- 18+66.13 - 22+50.00	120		297	177	
SUBTOTAL	412		551	177	38
TOTALS:	412		551	177	38
MATERIAL FOR SHOULDER CONSTRUCTION			175	175	
WASTE IN LIEU OF BORROW				-38	
PROJECT TOTAL	412		726	314	
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT				15	
GRAND TOTAL	412		726	329	
SAY	450			350	

UNDERCUT (CONTINGENCY) = 300 CY
SELECT GRANULAR MATERIAL, CLASS III (CONTINGENCY) = 500 CY

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

Note: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Fine Grading, Clearing and Grubbing, and Removal of Existing Asphalt Pavement will be paid for at the contract lump sum price for "Grading."

SUMMARY OF ASPHALT PAVEMENT REMOVAL (SY)

LINE	STATION - STATION	LOCATION	REMOVAL (SY)
-L-	STA. 16+93.88 TO STA. 17+99.01	CL	268
-L-	STA. 18+59.97 TO STA. 19+66.13	CL	275
GRAND TOTAL			543
SAY			550

SUMMARY OF VARIABLE MILLING (0"-1.50") (SY)

LINE	STATION - STATION	LOCATION	MILLING (SY)
-L-	STA. 14+37.50 TO STA. 16+23.00	CL	475
-L-	STA. 21+23.00 TO STA. 22+12.50	CL	227
GRAND TOTAL			702
SAY			710

SUMMARY OF SHOULDER BERM GUTTER (LF)

LINE	STATION	STATION	LENGTH (LF)
-L- LT	18+77±	18+92±	15
-L- RT	18+77±	18+92±	15
		TOTAL	30
		SAY	30

$$$$DESIGN$$$$ $$$$SYSTIME$$$$ >>$$$$

6/21/00

COMPUTED BY: B. ELAM DATE: 09/10/2020
CHECKED BY: J. DALTON DATE: 09/10/2020

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-5642	3D-1

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

NOTE: Invert Elevations are for Bid Purposes only and shall not be used for project construction stakeout. See "Standard Specifications For Roads and Structures, Section 300–5".

| STATION | LOCATION (LT,RT, OR CL) | STRUCTURE NO. FROM | STRUCTURE NO. TO | TOP ELEVATION | INVERT ELEVATION | INVERT ELEVATION | SLOPE CRITICAL | DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC) SIZE 12" | 15" | 18" | 24" | 30" | 36" | 42" | 48" | DO NOT USE RCP | DO NOT USE CSP | DO NOT USE CAAP | DO NOT USE HDPE | C.S. PIPE THICKNESS OR GAUGE 12" | 15" | 18" | 24" | 36" | 42" | 48" | R.C. PIPE (CLASS III) 15" | 18" | 24" | 30" | 36" | 42" | 48" | R.C. PIPE (CLASS IV) 12" | 15" | 18" | 24" | 30" | 36" | 42" | 48" | *** R.C. PIPE (CLASS 'V') | *** R.C. PIPE CULVERTS, CONTRACTOR DESIGN PIPE | *** R.C. PIPE CULVERTS, CONTRACTOR DESIGN PIPE | | | ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P. | C.S.P. | QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0') | * TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL. 'B') LIN. FT. A 5.0' THRU 10.0' | B 10.0' AND ABOVE | C.B. STD. 840.01 OR STD. 840.02 | FRAME, GRATES AND HOOD STANDARD 840.03 TYPE OF GRATE E | F | G | CONCRETE TRANSITIONAL SECTION CATCH BASIN | DROP INLET | G.D.I. TYPE "B" STD. 840.18 OR 840.27 | G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24 | T.B.D.I. STD. 840.35 | G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29 | M.H. FRAME & COVER STD. 840.54 | T.B.J.B. STD. 840.34 | 15" DRAINAGE PIPE ELBOW | CONC. COLLARS CL. "B" C.Y. STD 840.72 | CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71 | PIPE REMOVAL LIN.FT. | REMARKS |
|---|---|---

COMPUTED BY: Monique Gyant DATE: 10/20/20 .
CHECKED BY: Adam Conrad DATE: 10/20/20 .

(12-17-19)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
B-5642	3G-1

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/SD	LF
CONTINGENCY				SD	200
				TOTAL LF:	200

*UD = Underdrain
*BD = Blind Drain
*SD = Subsurface Drain

SUMMARY OF ROCK PLATING

LINE	Beginning Slope (H:V)	Approx. Station	Ending Slope (H:V)	Approx. Station	Location LT/RT	Rock Plating Detail No. 1/2/3/4	Riprap Class* 1/2/B	Rock Plating SY
-L-	3:1	17+25	2:1	17+86	LT	1		90
-L-	2:1	18+74	3:1	21+50	LT	1		410
-L-	2:1	18+74	3:1	19+75	RT	1		150
							TOTAL SY:	650

*Use Class 1, 2 or B riprap if riprap class is not shown for rock plating location.

PROJECT REFERENCE NO.	SHEET NO.
B-5642	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043767 — ADAM M. CONRAD — 2/27/2021

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 26971 — JOSHUA B. HALTON — 2/26/2021

CDM Smith — CDM Smith Inc., 5400 Glenwood Avenue, Suite 400, Raleigh, NC 27612-3228, NC COA No. F-1255

SUNGATE DESIGN GROUP, P.A. — NC COA No. C-0950

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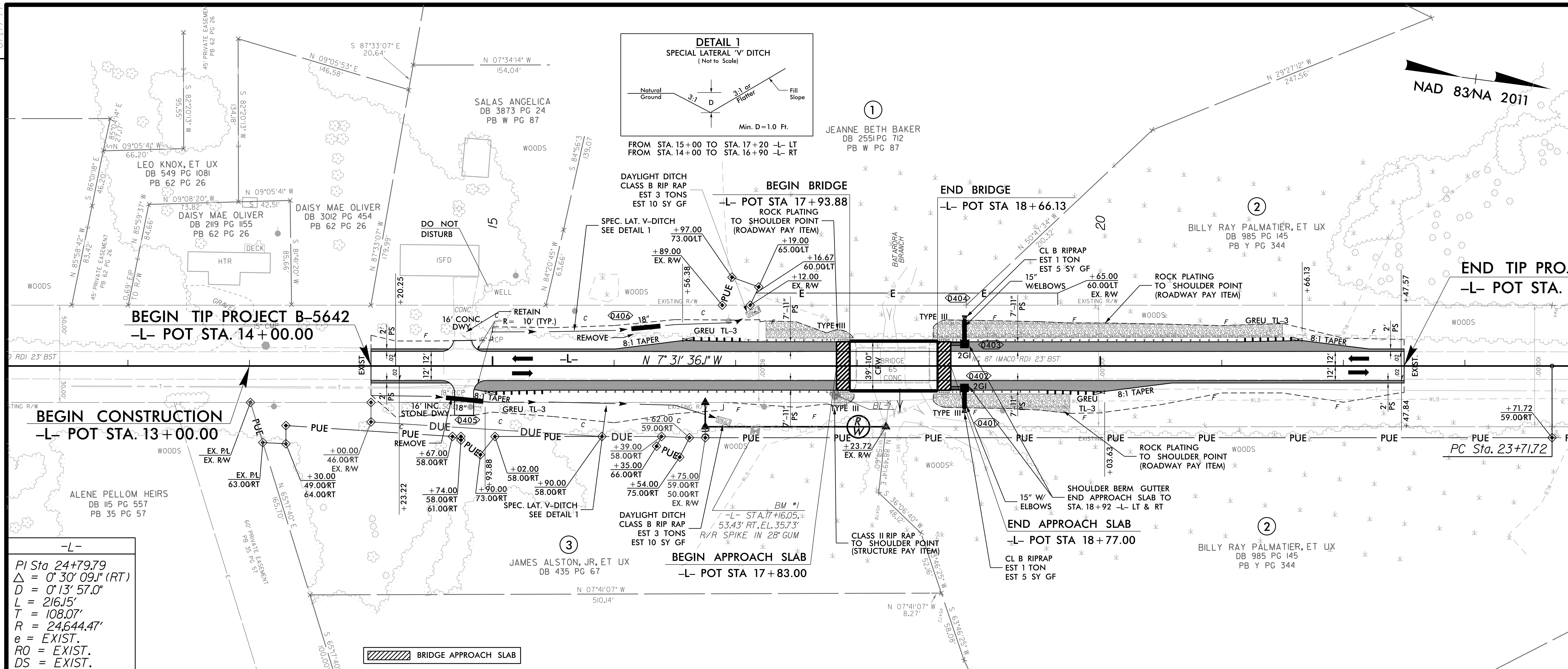
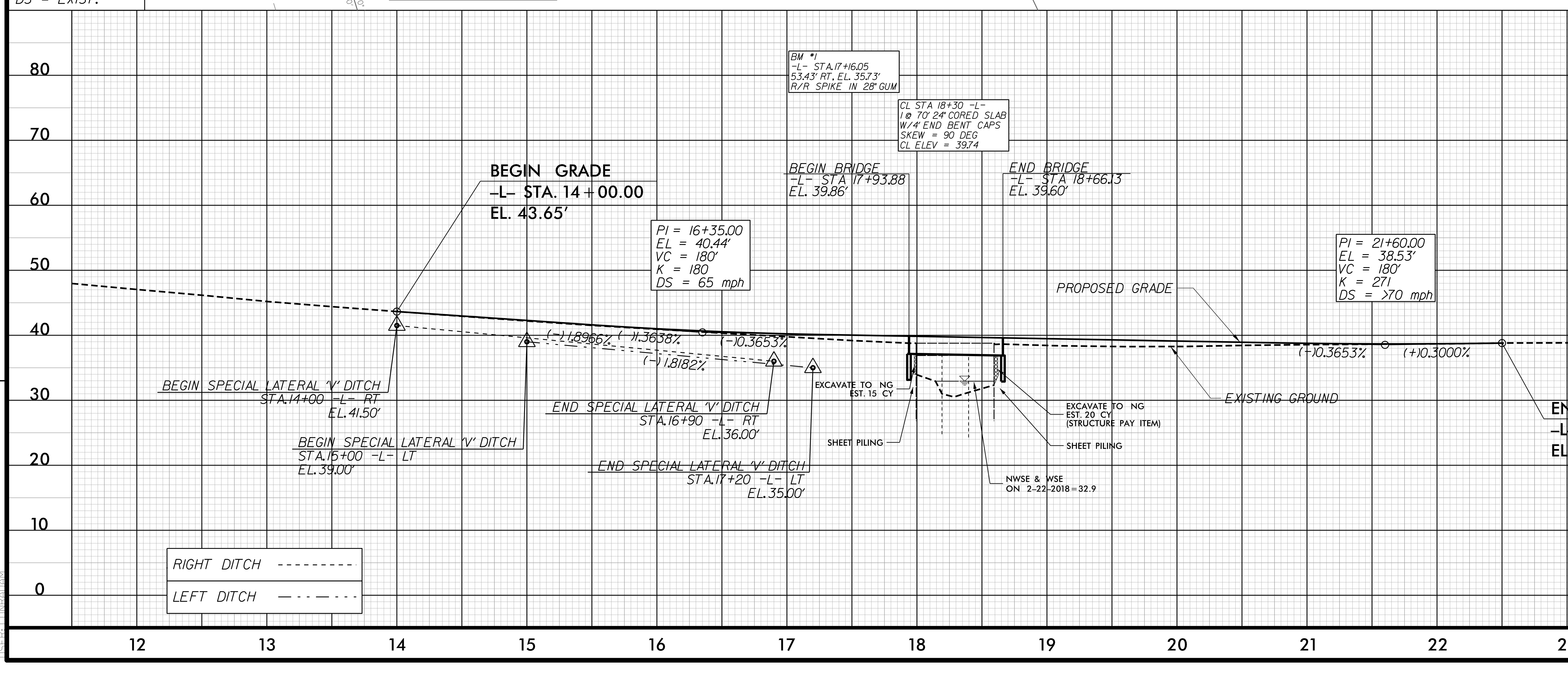


DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
3:1
D
3:1 or Flatter
Fill Slope
Min. D=1.0 Ft.
FROM STA. 15+00 TO STA. 17+20 -L- LT
FROM STA. 14+00 TO STA. 16+90 -L- RT
NAD 83/NA 2011
BEGIN TIP PROJECT B-5642
-L- POT STA. 14+00.00
BEGIN CONSTRUCTION
-L- POT STA. 13+00.00
BEGIN BRIDGE
-L- POT STA 17+93.88
END BRIDGE
-L- POT STA 18+66.13
BEGIN APPROACH SLAB
-L- POT STA 17+83.00
END APPROACH SLAB
-L- POT STA 18+77.00
END TIP PROJECT B-5642
-L- POT STA. 22+50.00
END CONSTRUCTION
-L- POC STA. 24+10.00
LEO KNOX, ET UX
DB 549 PG 1081
PB 62 PG 26
DAISY MAE OLIVER
DB 2119 PG 1155
PB 62 PG 26
DAISY MAE OLIVER
DB 3012 PG 454
PB 62 PG 26
SALAS ANGELICA
DB 3873 PG 24
PB W PG 87
JEANNE BETH BAKER
DB 2551 PG 712
PB W PG 87
BILLY RAY PALMATIER, ET UX
DB 985 PG 145
PB Y PG 344
ALENE PELLOM HEIRS
DB 115 PG 557
PB 35 PG 57
JAMES ALSTON, JR, ET UX
DB 435 PG 67
DAYLIGHT DITCH
CLASS B RIP RAP
EST 3 TONS
EST 10 SY GF
SPEC. LAT. V-DITCH
SEE DETAIL 1
ROCK PLATING
TO SHOULDER POINT
(ROADWAY PAY ITEM)
CL B RIPRAP
EST 1 TON
EST 5 SY GF
CLASS II RIP RAP
TO SHOULDER POINT
(STRUCTURE PAY ITEM)
SHOULDER BERM GUTTER
END APPROACH SLAB TO
STA. 18+92 -L- LT & RT
N 7° 31' 36.1" W
BATARORA BRANCH
GREU TL-3
8:1 TAPER
PUE
DUE
REMOVE
RETAIN 10' (TYP.)
DO NOT DISTURB
PC Sta. 23+71.72
PT Sta. 25+87.87
BM #1
-L- STA.17+16.05
53.43' RT. EL. 35.73'
R/R SPIKE IN 28" GUM
BRIDGE APPROACH SLAB
SEE SHEETS S-1 THRU S-14 FOR STRUCTURE PLANS

-L-
PI Sta 24+79.79
Δ = 0° 30' 09.1" (RT)
D = 0° 13' 57.0"
L = 216.15'
T = 108.07'
R = 24,644.47'
e = EXIST.
RO = EXIST.
DS = EXIST.



BEGIN GRADE
-L- STA. 14+00.00
EL. 43.65'
END GRADE
-L- STA. 22+50.00
EL. 38.80'
PI = 16+35.00
EL = 40.44'
VC = 180'
K = 180
DS = 65 mph
PI = 21+60.00
EL = 38.53'
VC = 180'
K = 271
DS = >70 mph
BEGIN BRIDGE
-L- STA 17+93.88
EL. 39.86'
END BRIDGE
-L- STA 18+66.13
EL. 39.60'
CL STA 18+30 -L-
1 @ 70' 24" CORED SLAB
W/4' END BENT CAPS
SKEW = 90 DEG
CL ELEV = 39.74
(-)1.8966%
(-)1.3638%
(-)0.3653%
(-)1.8182%
(-)0.3653%
(+)0.3000%
PROPOSED GRADE
EXISTING GROUND
BEGIN SPECIAL LATERAL 'V' DITCH
STA.14+00 -L- RT
EL. 41.50'
END SPECIAL LATERAL 'V' DITCH
STA.16+90 -L- RT
EL.36.00'
BEGIN SPECIAL LATERAL 'V' DITCH
STA.15+00 -L- LT
EL.39.00'
END SPECIAL LATERAL 'V' DITCH
STA.17+20 -L- LT
EL.35.00'
EXCAVATE TO NG
EST. 15 CY
EXCAVATE TO NG
EST. 20 CY
(STRUCTURE PAY ITEM)
SHEET PILING
NWSE & WSE
ON 2-22-2018 = 32.9
RIGHT DITCH
LEFT DITCH

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 860	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 35.2	FT
BASE DISCHARGE	= 1050	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 35.6	FT
OVERTOPPING DISCHARGE	= 2600	CFS
OVERTOPPING FREQUENCY	= +500	YRS
OVERTOPPING ELEVATION	= 38.7	FT
DATE OF SURVEY	= 2-22-2018	
W.S. ELEVATION AT DATE OF SURVEY	= 32.9	FT

REVISIONS