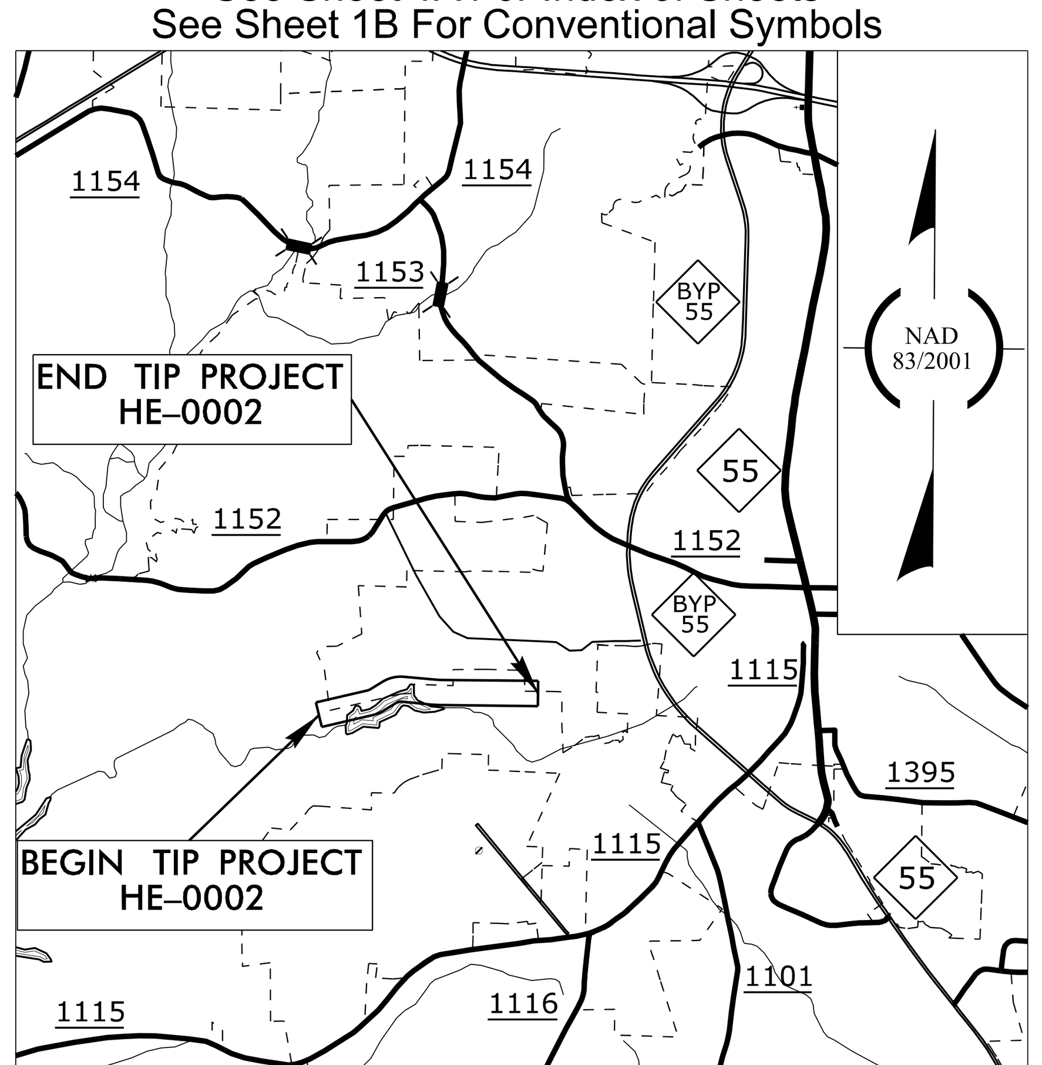
09/08/99

TIP PROJECT: HE-0002

CONTRACT: C204898

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



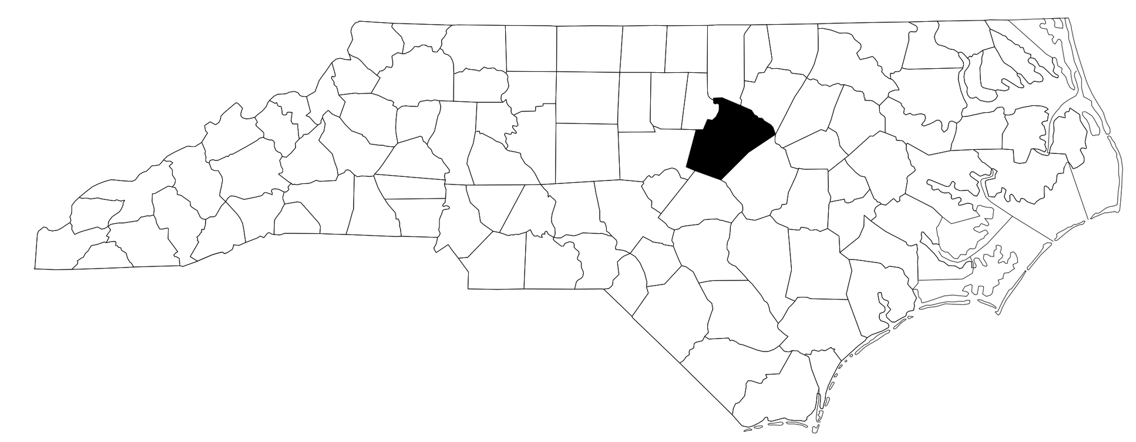
VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

LOCATION: *HOLLY SPRINGS BUSINESS PARK SOUTHERN ACCESS ROAD FROM FUJI DIOSYNTH BIOTECHNOLOGIES PROPERTY & SEWER PUMP STATION TO 110 FEET WEST OF THE BUMGARDNER ROAD EXTENSION INTERSECTION*

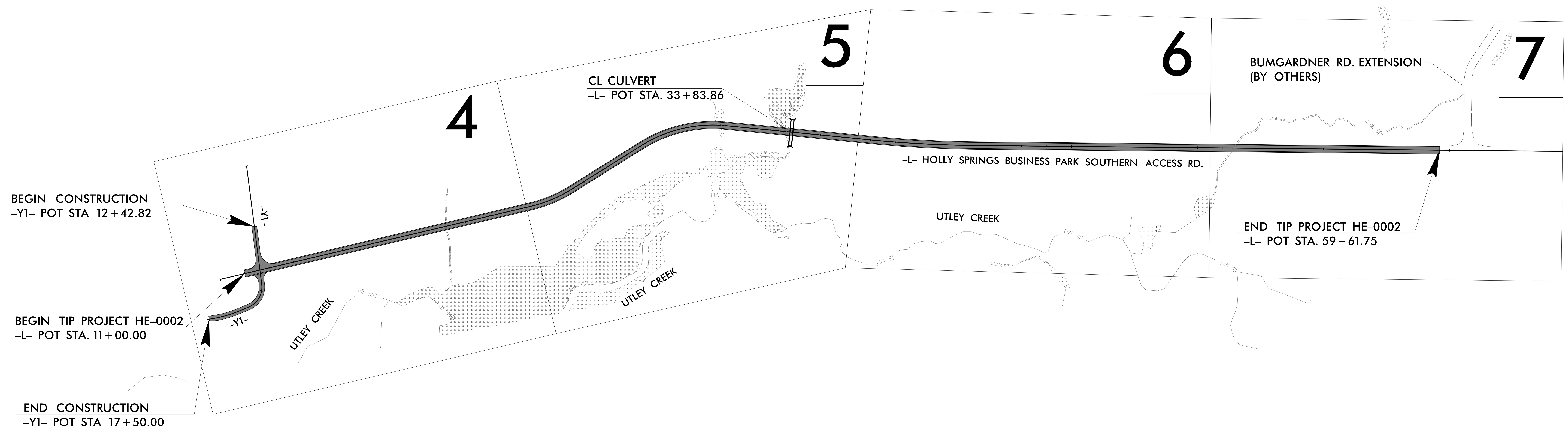
TYPE OF WORK: *GRADING, DRAINAGE, PAVING, AND CULVERT*



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HE-0002	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
49745.1.1	N/A	PE
49745.2.1	N/A	R/W
49745.2.2	N/A	UTIL.
49745.3.1	N/A	CONST.

NAD 83/2001



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 2025 = 8,000
ADT 2045 = 10,700
K = 13 %
D = N/A %
T = N/A % *
V = 40 MPH
* TTST =N/A DUAL N/A
FUNC CLASS = LOCAL
REGIONAL TIER

PROJECT LENGTH

PROJECT LENGTH FOR TIP PROJECT HE-0002

LENGTH ROADWAY	=	0.921 MILES
TOTAL LENGTH	=	0.921 MILES

NCDOT CONTACT: TRACY N. PARROTT, P.E.

PREPARED IN THE OFFICE OF:

CDM Smith

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

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 22, 2023

LETTING DATE:
JUNE 17, 2025

DAVID Z. KEISER, P.E.
PROJECT ENGINEER

ADAM M. CONRAD, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

Signed by:
Ana Passman
F48A5E6081784A6
SIGNATURE: P.E.

NORTH CAROLINA SEAL 026306 ENGINEER ANA M. PASSMAN 4/30/2025

ROADWAY DESIGN ENGINEER

DocuSigned by:
David Z. Keiser
5FFD0B2D25FB4D4...
SIGNATURE: P.E.

NORTH CAROLINA SEAL 033400 ENGINEER DAVID Z. KEISER 4/30/2025

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

5/26/20

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A -1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-5	ROADWAY SPECIAL DETAILS
2D-1 THRU 2D-2	DRAINAGE DETAIL SHEETS
3B-1	ROADWAY SUMMARIES
3D-1 THRU 3D-2	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
3P-1	PARCEL INDEX SHEET
4 THRU 7	PLAN SHEETS
8 THRU 12	PROFILE SHEETS
RW-01 THRU RW-7	SURVEY CONTROL, EXISTING CENTERLINES, RIGHT OF WAY, EASEMENT, AND PROPERTY TIES
PMP-1 THRU PMP-5	PAVEMENT MARKING PLANS
EC-1 THRU EC-11	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
SIGN-1 THRU SIGN-6	SIGNING PLANS
UO-1 THRU UO-5	UTILITIES BY OTHERS PLANS
X-1	CROSS-SECTION SHEET INDEX
X-1A	CROSS-SECTION SUMMARY SHEET
X-2 THRU X-58	CROSS-SECTIONS
C-1 THRU C-5	CULVERT PLANS

EFF. 01-16-2024
REV.

2024 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Contracts Standards and Development Unit - N. C. Department of Transportation - Raleigh, N. C., Dated January 16, 2024 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
225.06 Method of Grading Sight Distance at Intersections
DIVISION 3 - PIPE CULVERTS
300.01 Method of Pipe Installation (Use Details in Lieu of Standards for Sheets 1 and 2 of 2)
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
815.02 Subsurface Drain
838.01 Concrete Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.11 Brick Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.21 Reinforced Concrete Endwall - for Single 54" Pipe 90 Skew
838.27 Reinforced Concrete Endwall - for Single 60" Pipe 90 Skew
838.45 Notes for Reinforced Concrete Endwall - Std. Dwg 838.21 thru 838.40
838.51 Reinforced Brick Endwall - for Single 54" Pipe 90 Skew
838.57 Reinforced Brick Endwall - for Single 60" Pipe 90 Skew
838.75 Notes for Reinforced Brick Endwall - Std. Dwg 838.51 thru 838.70
840.00 Concrete Base Pad for Drainage Structures
840.17 Concrete Grated Drop Inlet Type 'A' - 12" thru 72" Pipe
840.22 Frames and Wide Slot Sag Grates
840.25 Anchorage for Frames - Brick or Concrete or Precast
840.26 Brick Grated Drop Inlet Type 'A' - 12" thru 72" Pipe
840.31 Concrete Junction Box - 12" thru 66" Pipe
840.32 Brick Junction Box - 12" thru 66" Pipe
840.45 Precast Drainage Structures
840.54 Manhole Frame and Cover
840.66 Drainage Structure Steps
862.01 Guardrail Placement (Use Details in Lieu of Standards for Sheets 4 and 6 of 15)
862.02 Guardrail Installation (Use Detail in Lieu of Standard for Sheet 5 of 9)
876.01 Rip Rap in Channels and Ditches
876.02 Guide for Rip Rap at Pipe Outlets
876.04 Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES: 2024 SPECIFICATIONS
EFFECTIVE: 01-16-2024
REVISED:

GRADE LINE:
GRADING AND SURFACING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

NOTE: THE GRADE LINE FOR THIS PROJECT WAS INITIALLY SET AT THE SURFACE OF THE 10" AGGREGATE BASE COURSE IN ANTICIPATION OF THE ASPHALT PAVEMENT STRUCTURE BEING CONSTRUCTED UNDER A SEPARATE PROJECT. MORE RECENTLY, IT WAS DETERMINED THE ASPHALT PAVEMENT STRUCTURE WOULD BE CONSTRUCTED AS PART OF THE INITIAL CONSTRUCTION CONTRACT. HOWEVER, THE GRADE LINE AND CROSS SECTIONS WERE NOT REVISED.

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.

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.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY PROGRESS AND TOWN OF HOLLY SPRINGS.

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.

ROCK:

ROCK IS ANTICIPATED BETWEEN -L- STA. 52+75 TO -L- STA. 58+25. BLASTING MAY BE REQUIRED FOR EXCAVATION ON THE PROJECT. SEE SECTION 220 OF THE STANDARD SPECIFICATIONS AND IF APPLICABLE, ROCK BLASTING PROVISION.

HE-0002
4RD1 1A

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

DIVISION 5

ROADWAY DESIGN ENGINEER

Docusigned by:
David L. Meiser
5FFD0B2025FB4D4...

PREPARED BY

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

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9/10/2021

HE-0002
4RD1 | 1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin (EIP)
- Computed Property Corner
- Existing Concrete Monument (ECM)
- Parcel/Sequence Number
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary
- Proposed Wetland Boundary
- Existing Endangered Animal Boundary
- Existing Endangered Plant Boundary
- Existing Historic Property Boundary
- Known Contamination Area: Soil
- Potential Contamination Area: Soil
- Known Contamination Area: Water
- Potential Contamination Area: Water
- Contaminated Site: Known or Potential

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
- Buffer Zone 1
- Buffer Zone 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch
- False Sump

RAILROADS:

- Standard Gauge
- RR Signal Milepost
- Switch
- RR Abandoned
- RR Dismantled

RIGHT OF WAY & PROJECT CONTROL:

- Primary Horiz Control Point
- Primary Horiz and Vert Control Point
- Secondary Horiz and Vert Control Point
- Vertical Benchmark
- Existing Right of Way Monument
- Proposed Right of Way Monument (Rebar and Cap)
- Proposed Right of Way Monument (Concrete)
- Existing Permanent Easement Monument
- Proposed Permanent Easement Monument (Rebar and Cap)
- Existing C/A Monument
- Proposed C/A Monument (Rebar and Cap)
- Proposed C/A Monument (Concrete)
- Existing Right of Way Line
- Proposed Right of Way Line
- Existing Control of Access Line
- Proposed Control of Access Line
- Proposed ROW and CA Line
- Existing Easement Line
- Proposed Temporary Construction Easement
- Proposed Temporary Drainage Easement
- Proposed Permanent Drainage Easement
- Proposed Permanent Drainage/Utility Easement
- Proposed Permanent Utility Easement
- Proposed Temporary Utility Easement
- Proposed Aerial Utility Easement

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut
- Proposed Slope Stakes Fill
- Proposed Curb Ramp
- 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

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
- Paved Ditch Gutter
- Storm Sewer Manhole
- Storm Sewer

UTILITIES:

** SUE – Subsurface Utility Engineering*
LOS – Level of Service – A,B,C or D (Accuracy)

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
- U/G Power Line Test Hole (SUE – LOS A)*
- U/G Power Line (SUE – LOS B)*
- U/G Power Line (SUE – LOS C)*
- U/G Power Line (SUE – LOS D)*

TELEPHONE:
- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole
- Telephone Pedestal
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole
- U/G Telephone Test Hole (SUE – LOS A)*
- U/G Telephone Cable (SUE – LOS B)*
- U/G Telephone Cable (SUE – LOS C)*
- U/G Telephone Cable (SUE – LOS D)*
- U/G Telephone Conduit (SUE – LOS B)*
- U/G Telephone Conduit (SUE – LOS C)*
- U/G Telephone Conduit (SUE – LOS D)*
- U/G Fiber Optics Cable (SUE – LOS B)*
- U/G Fiber Optics Cable (SUE – LOS C)*
- U/G Fiber Optics Cable (SUE – LOS D)*

WATER:
- Water Manhole
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line Test Hole (SUE – LOS A)*
- U/G Water Line (SUE – LOS B)*
- U/G Water Line (SUE – LOS C)*
- U/G Water Line (SUE – LOS D)*
- Above Ground Water Line

TV:
- TV Pedestal
- TV Tower
- U/G TV Cable Hand Hole
- U/G TV Test Hole (SUE – LOS A)*
- U/G TV Cable (SUE – LOS B)*
- U/G TV Cable (SUE – LOS C)*
- U/G TV Cable (SUE – LOS D)*
- U/G Fiber Optic Cable (SUE – LOS B)*
- U/G Fiber Optic Cable (SUE – LOS C)*
- U/G Fiber Optic Cable (SUE – LOS D)*

GAS:
- Gas Valve
- Gas Meter
- U/G Gas Line Test Hole (SUE – LOS A)*
- U/G Gas Line (SUE – LOS B)*
- U/G Gas Line (SUE – LOS C)*
- U/G Gas Line (SUE – LOS D)*
- Above Ground Gas Line

SANITARY SEWER:
- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line
- Above Ground Sanitary Sewer
- SS Force Main Line Test Hole (SUE – LOS A)*
- SS Force Main Line (SUE – LOS B)*
- SS Force Main Line (SUE – LOS C)*
- SS Force Main Line (SUE – LOS D)*

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

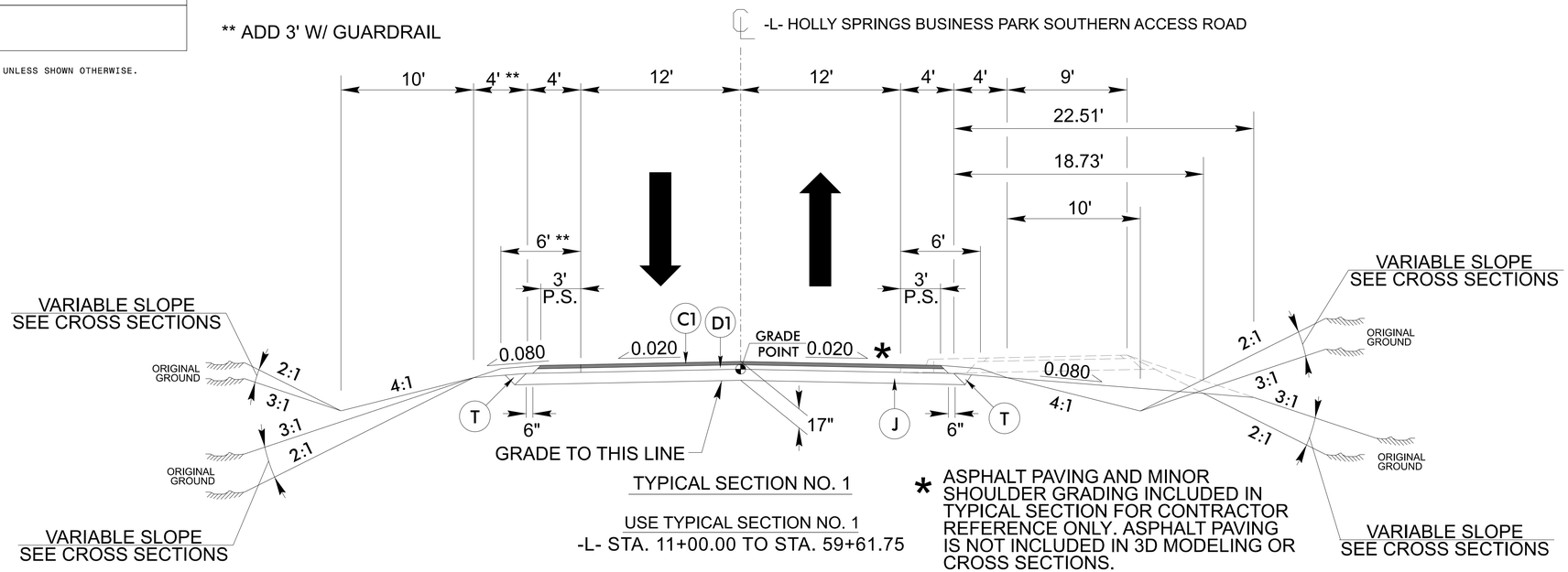
5/26/20

PAVEMENT SCHEDULE (FINAL PAVEMENT DESIGN)	
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF THE TWO LAYERS.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
J	PROP. 10" AGGREGATE BASE COURSE.
T	EARTH MATERIAL.

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

PROPOSED CONSTRUCTION

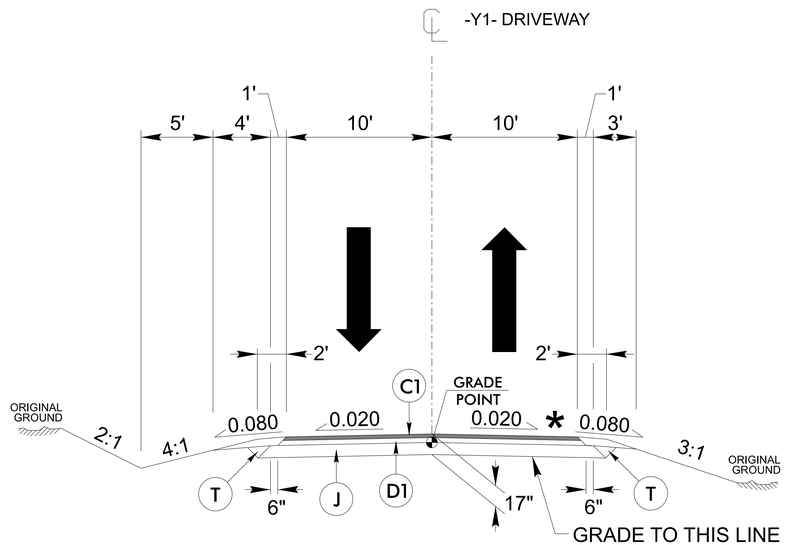
FUTURE CONSTRUCTION



TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1
-L- STA. 11+00.00 TO STA. 59+61.75

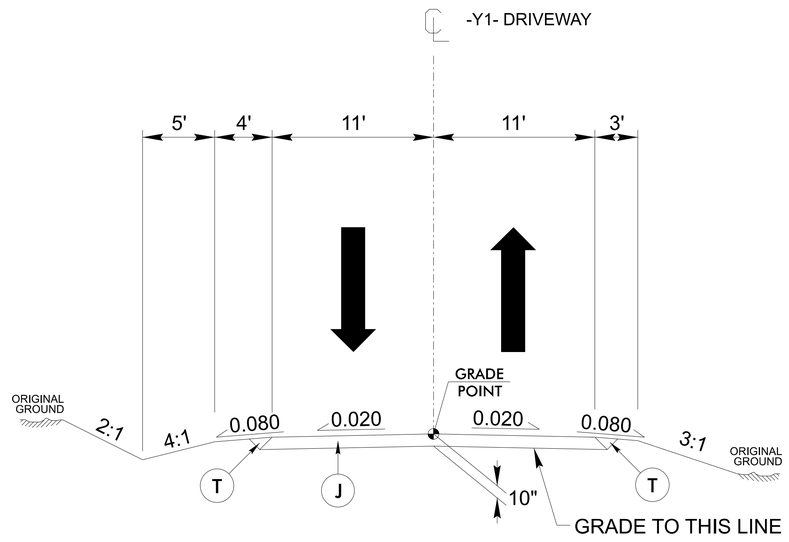
* ASPHALT PAVING AND MINOR SHOULDER GRADING INCLUDED IN TYPICAL SECTION FOR CONTRACTOR REFERENCE ONLY. ASPHALT PAVING IS NOT INCLUDED IN 3D MODELING OR CROSS SECTIONS.



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2
-Y1- STA. 12+42.82 TO STA. 14+00.00

* ASPHALT PAVING AND MINOR SHOULDER GRADING INCLUDED IN TYPICAL SECTION FOR CONTRACTOR REFERENCE ONLY. ASPHALT PAVING IS NOT INCLUDED IN 3D MODELING OR CROSS SECTIONS.



TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3
-Y1- STA. 14+32.34 TO STA. 17+50.00

HE-0002

4RD1 | 2A-1

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

DIVISION 5

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 033400 ENGINEER DAVID R. KEISER
5/5/2025
Docusigned by: David R. Keiser 5FFD0B2025FB4D4...

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 038176 ENGINEER SHIHAI ZHANG
5/5/2025
Docusigned by: Shihai Zhang 245D67F41811435...

PREPARED BY

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

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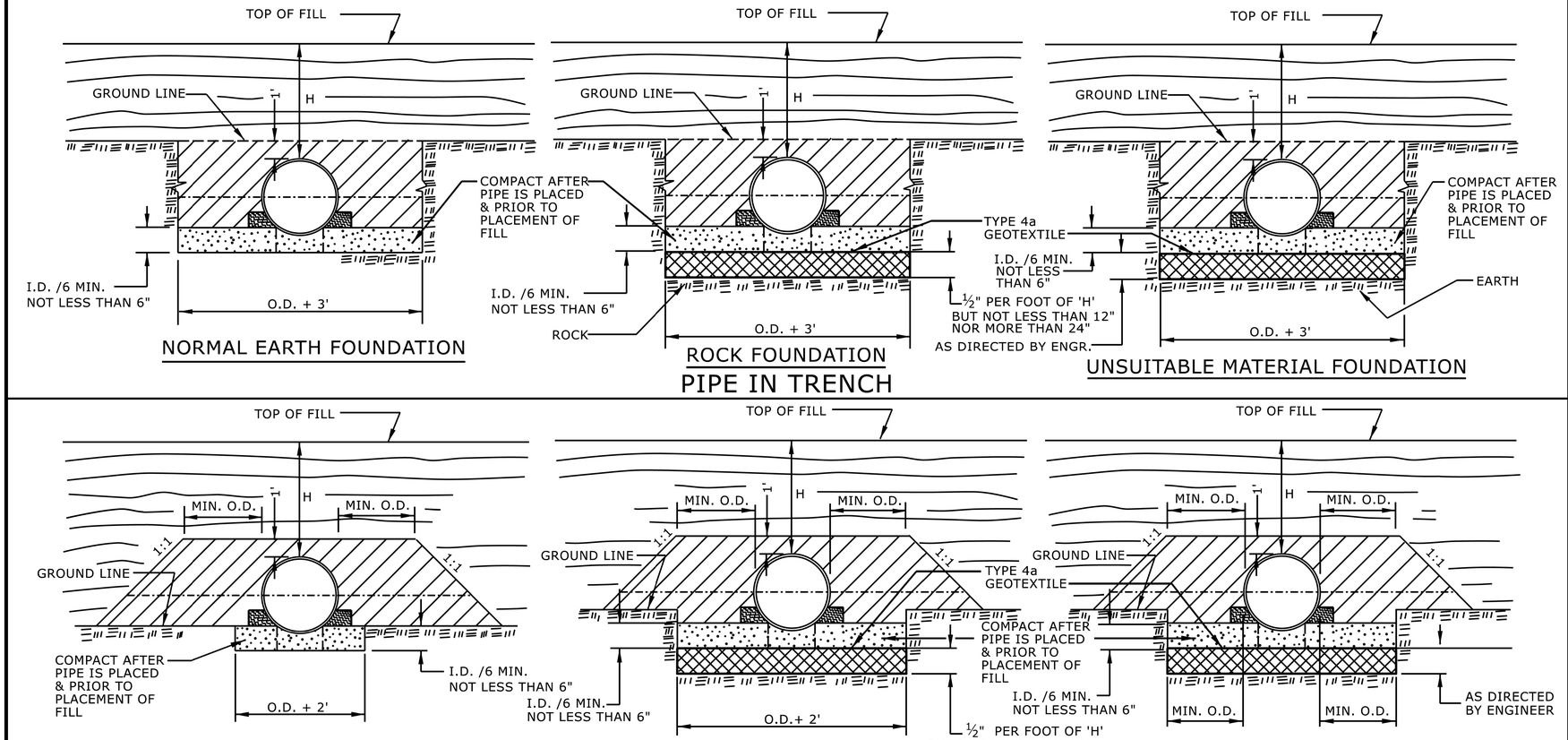
PROJECT REFERENCE NO.	SHEET NO.
HE-0002	2C-1



GENERAL NOTES:

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

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

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

APPROVED SUITABLE LOCAL MATERIAL.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

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

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

REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

SPRINGLINE OF PIPE

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

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.

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

ROADWAY DETAIL DRAWING FOR

METHOD OF PIPE INSTALLATION

FLEXIBLE PIPE

SHEET 1 OF 2

300.01

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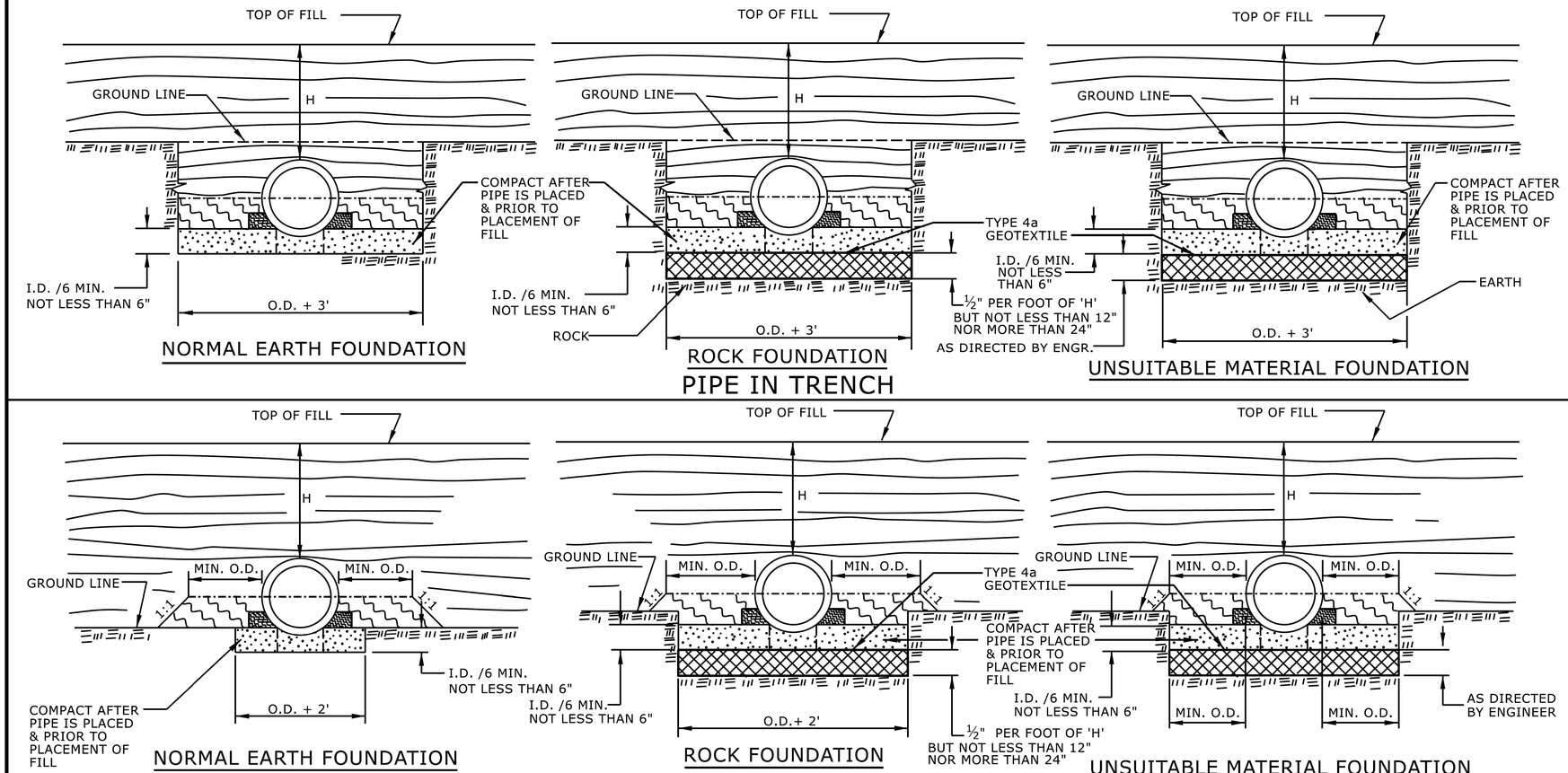
UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

ORIGINAL BY: S.CALHOUN DATE: 7-25-2024
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
HE-0002	2C-2



GENERAL NOTES:

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

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

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

APPROVED SUITABLE LOCAL MATERIAL.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

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

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

REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

SPRINGLINE OF PIPE

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

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.

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

ROADWAY DETAIL DRAWING FOR

METHOD OF PIPE INSTALLATION

RIGID PIPE

SHEET 2 OF 2

300.01

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033144 NICOLE M. HACKLER 4/29/2025

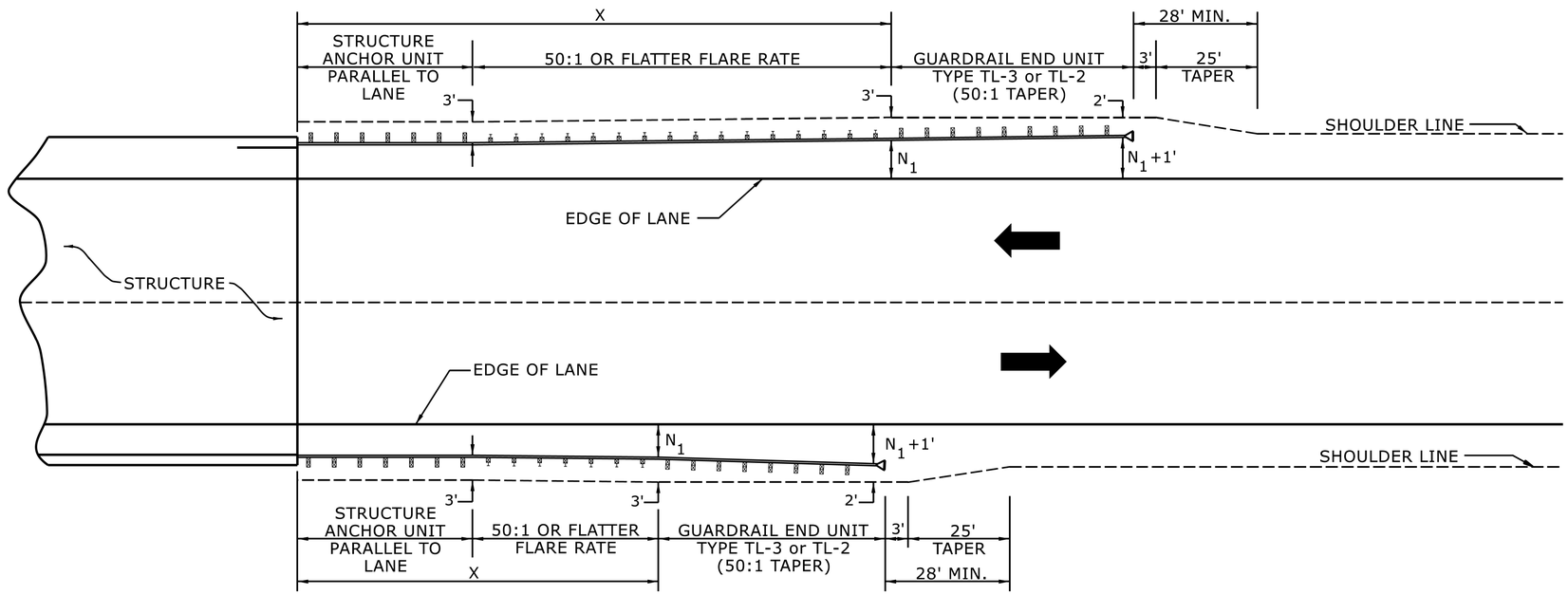
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

ORIGINAL BY: S.CALHOUN DATE: 7-25-2024
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
HE-0002	2C-3



USE FLARE RATE AS THE CONTROL IF THE "N_1" DISTANCE IS NOT OBTAINED.
("N_1" IS BASED ON SHOULDER WIDTHS IN THE ROADWAY DESIGN MANUAL)

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

FOR POSTED SPEEDS ≥ 45MPH USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45MPH USE GREU TYPE TL-2

GUARDRAIL LENGTH OF NEED (X) IS CALCULATED BASED ON THE AASHTO ROADSIDE DESIGN GUIDE.

LENGTHS AND OFFSETS FOR PROPOSED GUARDRAIL AT TWO LANE - TWO WAY LOCATIONS

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033144 NICOLE N. HACKLER 5/29/2025

SHEET 4 OF 15

862D01

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AND DEVELOPMENT UNIT
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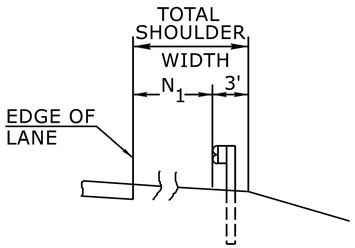
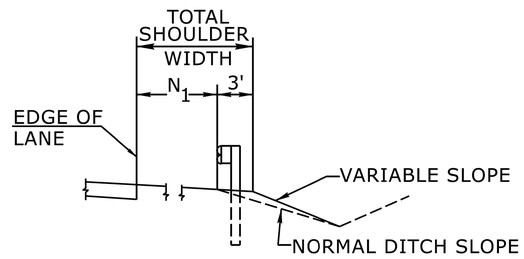
ORIGINAL BY: S.CALHOUN DATE: 7-25-2024
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
HE-0002	2C-4

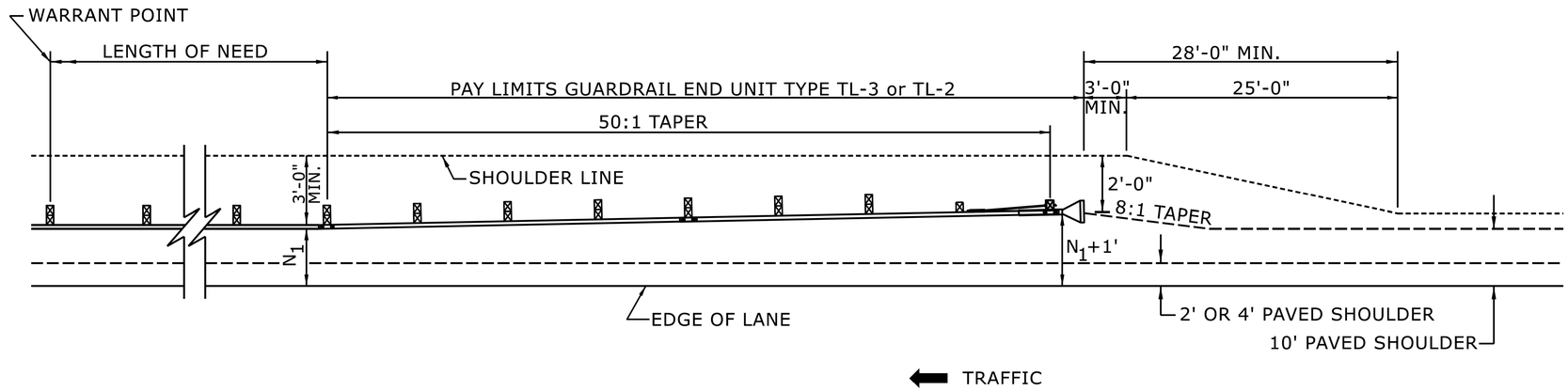


FILL SECTION



CUT SECTION

"N_1"= DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.



FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 15

862D01

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033144 NICOLE M. TACKLER 8/29/2025

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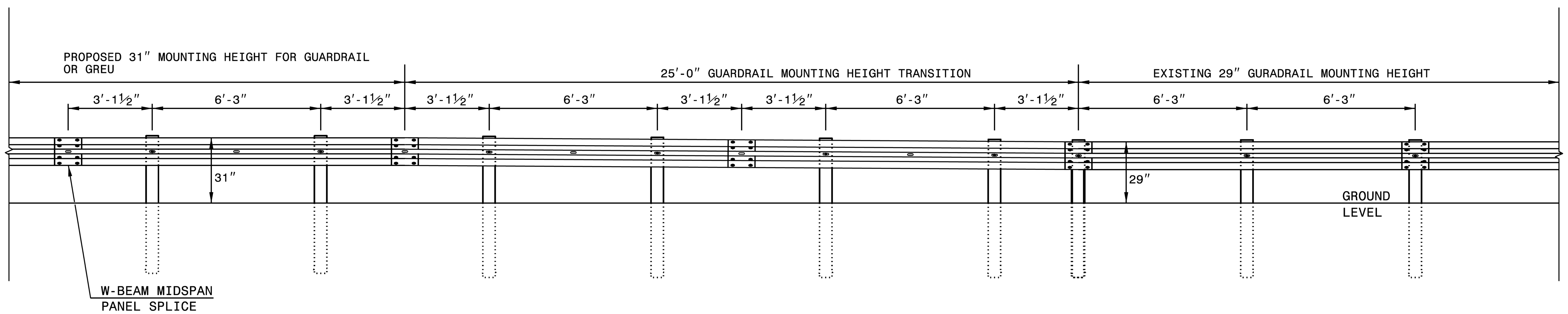
FILE SPEC.:

Docusign Envelope ID: 6605066C-8479-41EE-A27B-59241C180546

PROJECT REFERENCE NO.	SHEET NO.
HE-0002	2C-5

NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 29″, USE AN ADDITIONAL 12′-6″ LONG SECTION OF GUARDRAIL, FOR EVERY 1″ OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 31″ GUARDRAIL.



ELEVATION VIEW

TRANSITION FROM 29″ TO 31″ W-BEAM GUARDRAIL MOUNTING HEIGHT

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 5 OF 9
862D02

NORTH CAROLINA PROFESSIONAL SEAL 033144 ENGINEER

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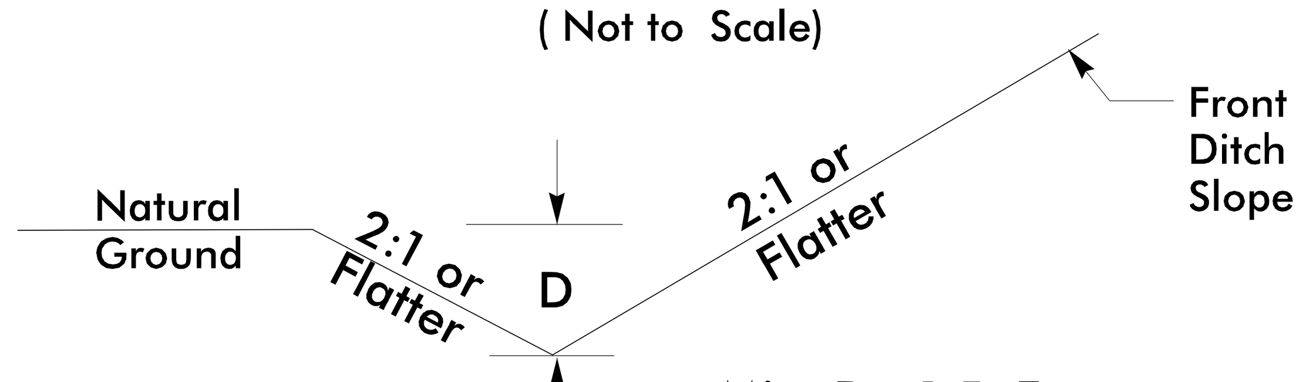
FILE SPEC.:

05-FEB-2025 07:53
U:\Special Details Revisions\862D02 Detail\862D02.dgn
$$$$USERNAME$$$$

5/26/28

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DITCH DETAILS

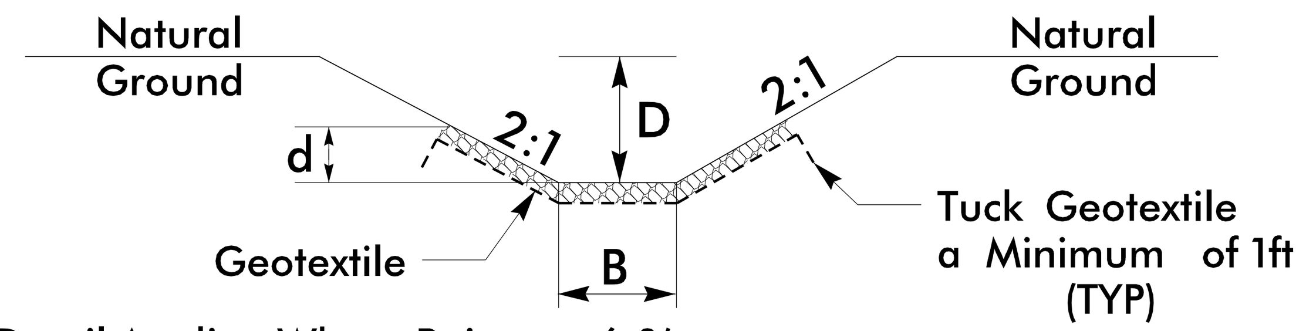
DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



Min. D = 1.5 Ft.

FROM –L– STA. 12 + 00 TO STA. 12 + 30 LT
–L– STA. 54 + 00 TO STA. 57 + 00 LT
–Y1– STA. 13 + 25 TO STA. 13 + 79 LT

DETAIL C
STANDARD BASE DITCH
(Not to Scale)



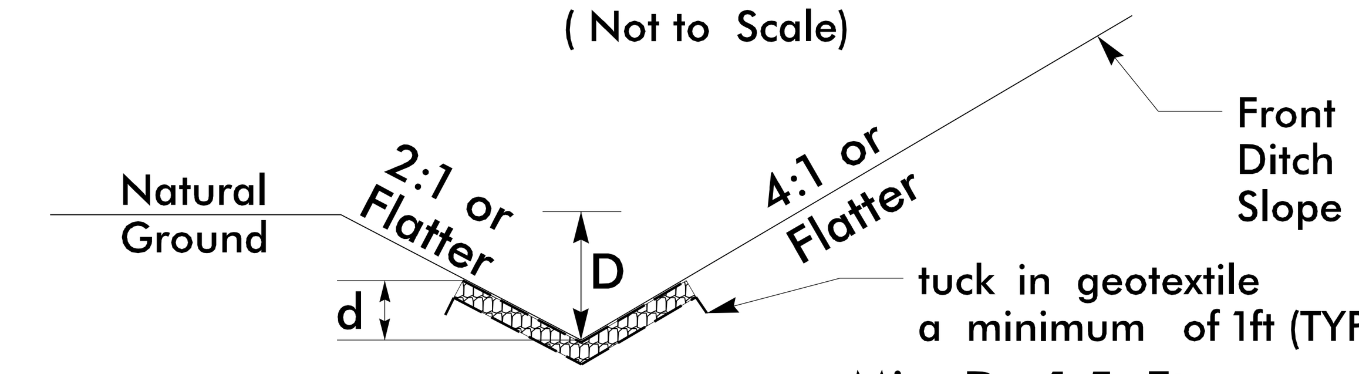
Detail Applies When B is < 6.0' for Class 1 and 2 Rip–Rap; And All Widths for Class B Rip–Rap

Min. D = 2 Ft.
d = 2 Ft.
B = 3 Ft.

Type of Liner = Class 1 Rip–Rap, Keyed–In

FROM –Y1– STA. 13 + 25 RT TO STA. 15 + 79 RT

DETAIL E
STANDARD CUT DITCH
(Not to Scale)

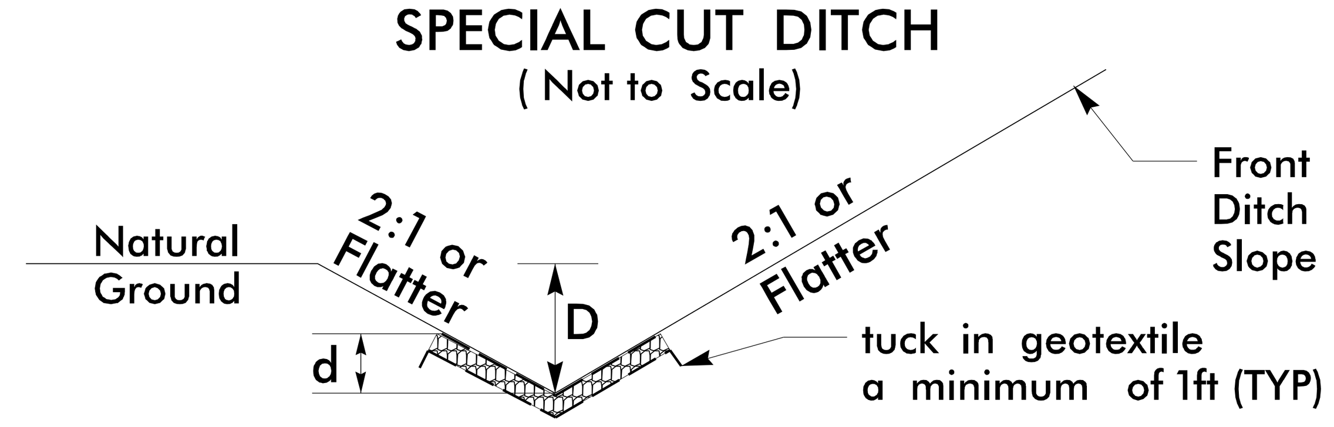


Min. D = 1.5 Ft.
Max. d = 1.0 Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 12 + 30 TO STA. 14 + 50 LT

DETAIL A–A
SPECIAL CUT DITCH
(Not to Scale)

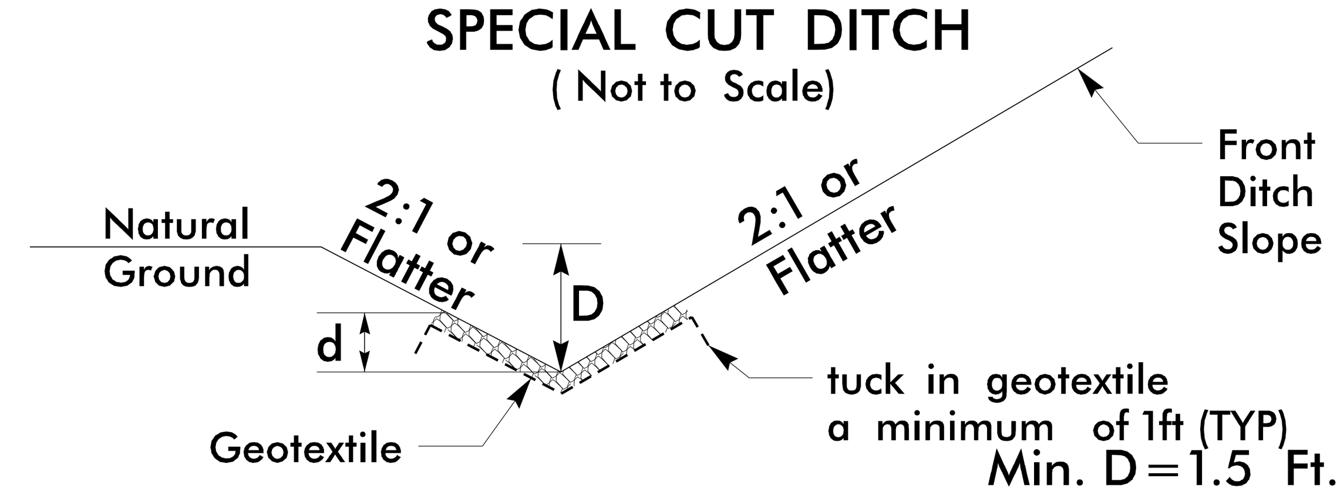


Min. D = 1.5 Ft.
Max d = 1.0 Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 38 + 50 TO STA. 40 + 00 LT

DETAIL A–B
SPECIAL CUT DITCH
(Not to Scale)

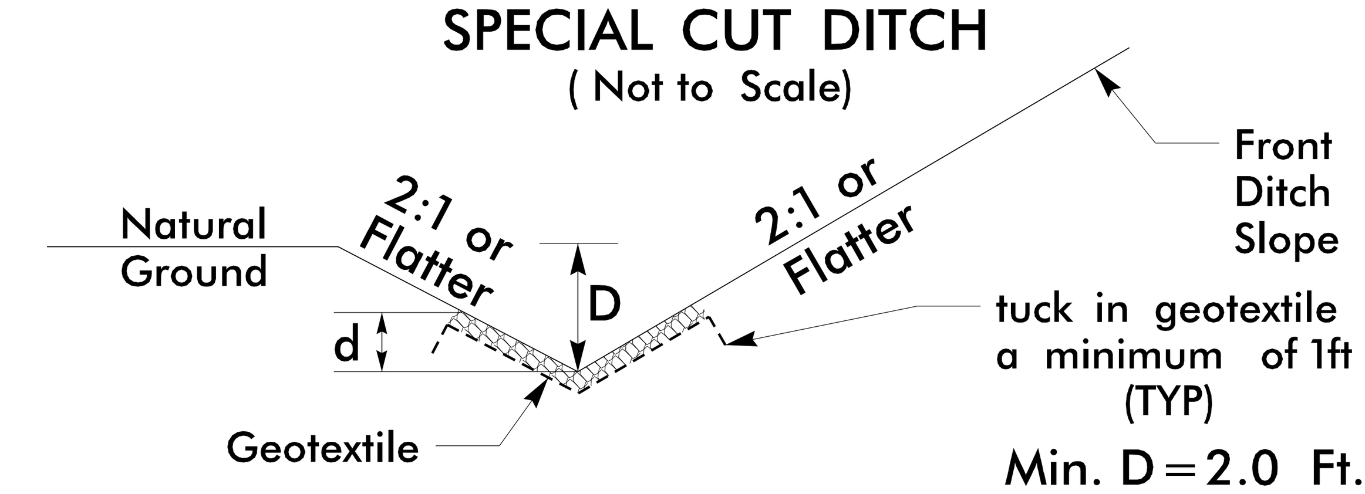


Min. D = 1.5 Ft.
Max. d = 1.0 Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 24 + 50 TO STA. 25 + 50 LT
–L– STA. 50 + 00 TO STA. 51 + 00 LT

DETAIL A–C
SPECIAL CUT DITCH
(Not to Scale)

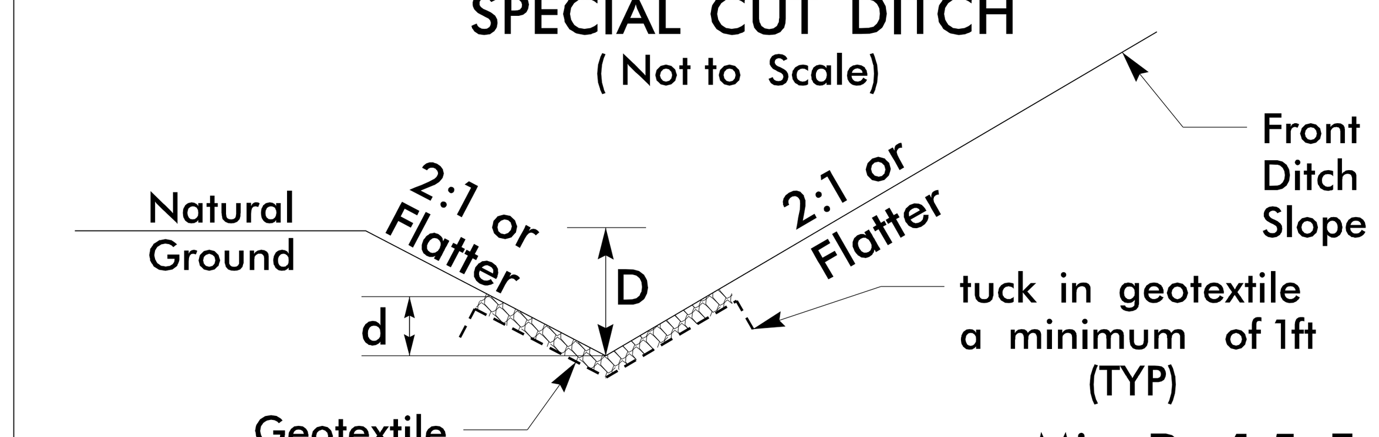


Min. D = 2.0 Ft.
Max. d = 1.5 Ft.

Type of Liner = Class 1 Rip–Rap

FROM –L– STA. 46 + 50 TO STA. 48 + 00 LT
–L– STA. 53 + 00 TO 53 + 50 LT

DETAIL A–D
SPECIAL CUT DITCH
(Not to Scale)

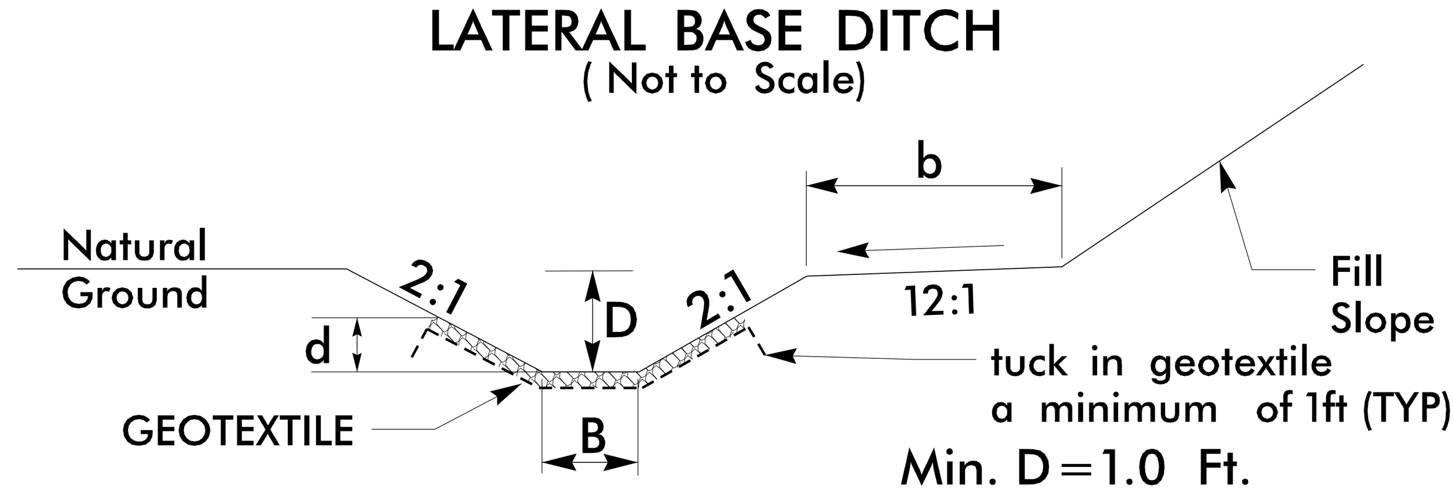


Min. D = 1.5 Ft.
Max. d = 1.0 Ft.

Type of Liner = Class 1 Rip–Rap

FROM –L– STA. 30 + 00 TO STA. 30 + 79 LT
–L– STA. 35 + 00 TO STA. 36 + 50 LT

DETAIL D–B
LATERAL BASE DITCH
(Not to Scale)



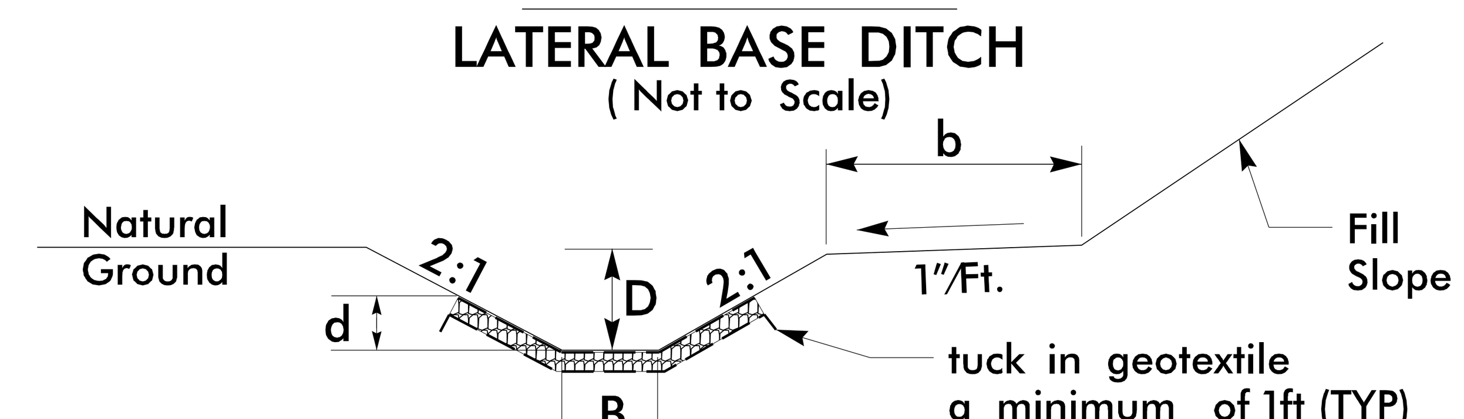
Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
B = 2.0 Ft.
b = 2.0 Ft.

*When B is < 6.0'

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 18 + 00 TO STA. 19 + 21 LT
–L– STA. 19 + 43 TO STA. 21 + 00 LT
–L– STA. 51 + 00 TO STA. 51 + 50 RT
–L– STA. 51 + 50 TO STA. 52 + 18 LT

DETAIL D–D
LATERAL BASE DITCH
(Not to Scale)

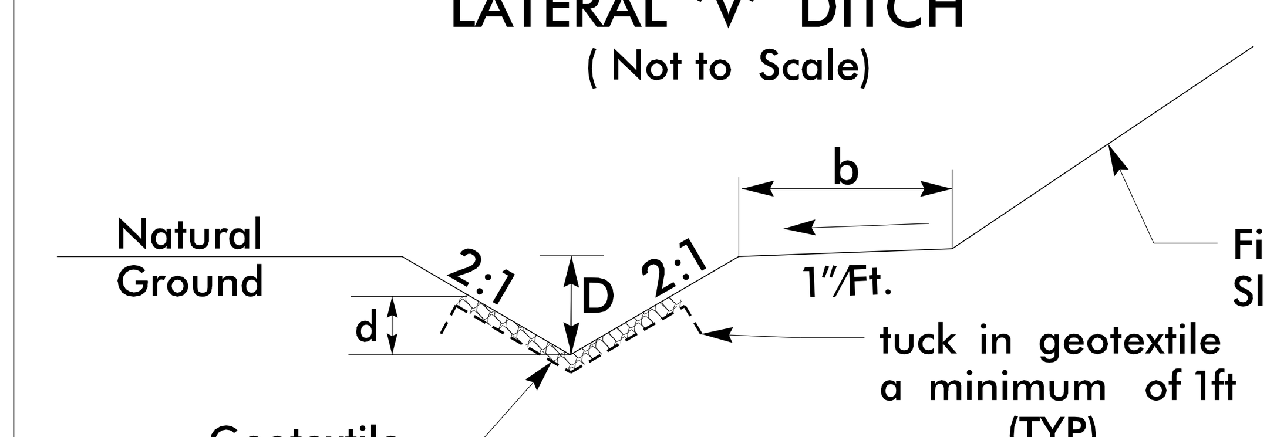


Min. D = 1.5 Ft.
Max. d = 1.0 Ft.
B = 2.0 Ft.
b = VARIES Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 37 + 71 TO STA. 38 + 50 LT

DETAIL F–B
LATERAL 'V' DITCH
(Not to Scale)

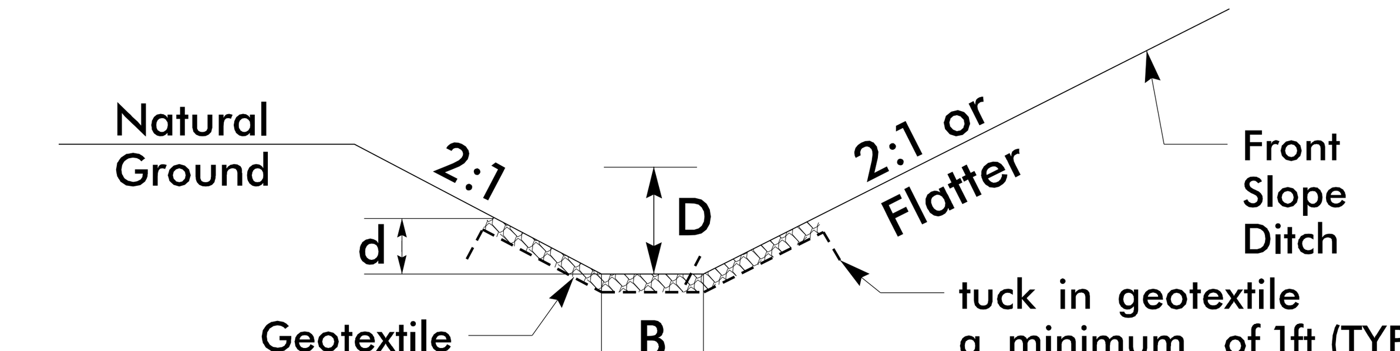


Min. D = 1.5 Ft.
Max. d = 1.0 Ft.
b = VARIES

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 51 + 00 TO STA. 51 + 50 LT

DETAIL A–E
SPECIAL CUT BASE DITCH
(Not to Scale)



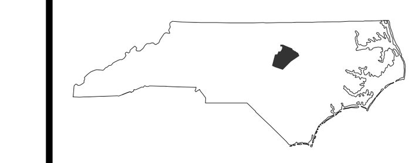
Min. D = 1.5 Ft.
Max. d = 1.0 Ft.
B = 2.0 Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 51 + 50 TO STA. 53 + 50 RT

HE-0002
4RDI | 2D-1

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



DIVISION 5

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 026306 ENGINEER
4/30/2025
Signed by: Ana Passmore

PREPARED BY

CDM Smith

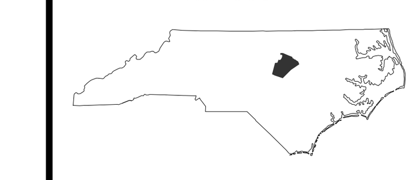
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/26/28

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DITCH DETAILS

HE-0002
4RDI | 2D-2

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



DIVISION 5

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 026306 ENGINEER
4/30/2025
Signed by: Ana Passman

PREPARED BY

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

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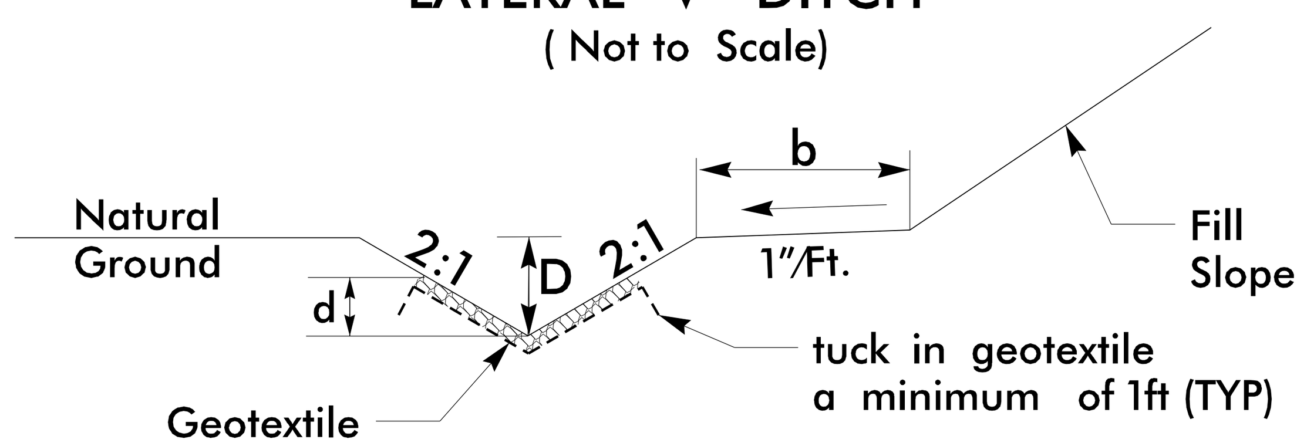
DETAIL F–C

LATERAL 'V' DITCH
(Not to Scale)



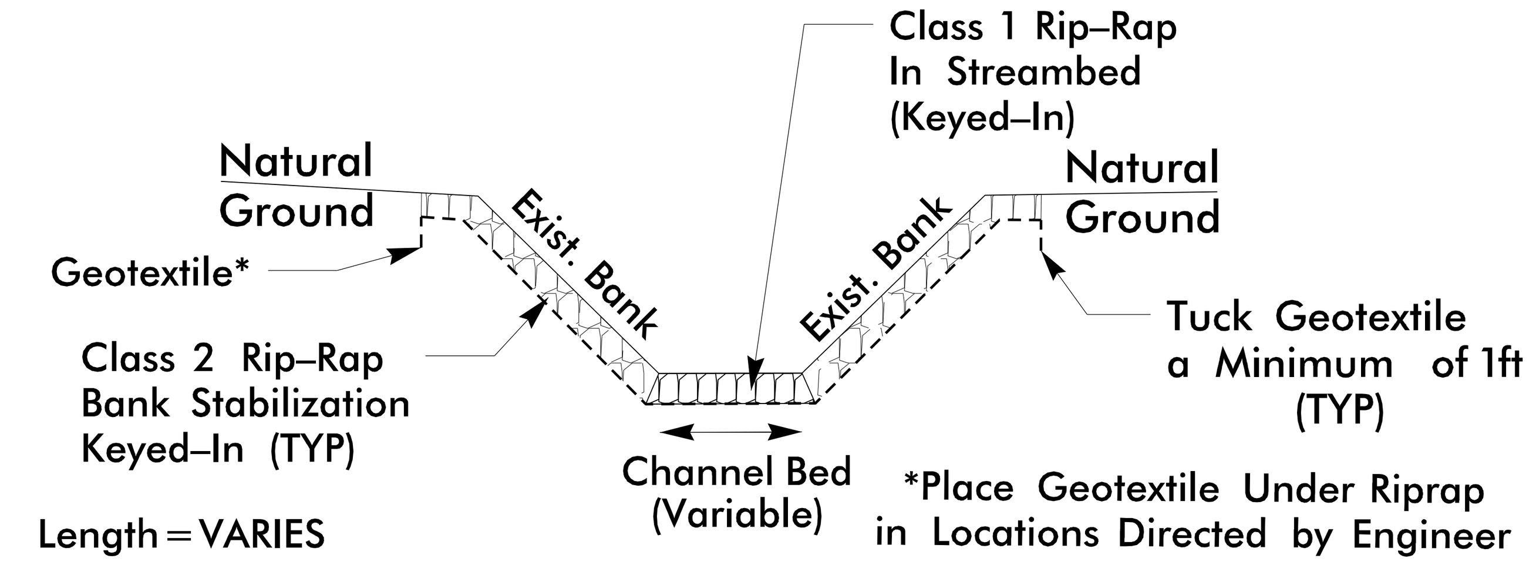
Min. D = 1.5 Ft.
Max. d = 1.0 Ft.
b = Varies

Type of Liner = Class 1 Rip–Rap

FROM –L– STA. 33+84 TO STA. 35+00 LT
–L– STA. 48+00 TO STA. 48+85 LT
–L– STA. 52+26 TO STA. 53+00 LT

DETAIL U

INLET/OUTLET CHANNEL IMPROVEMENTS
(Not to Scale)



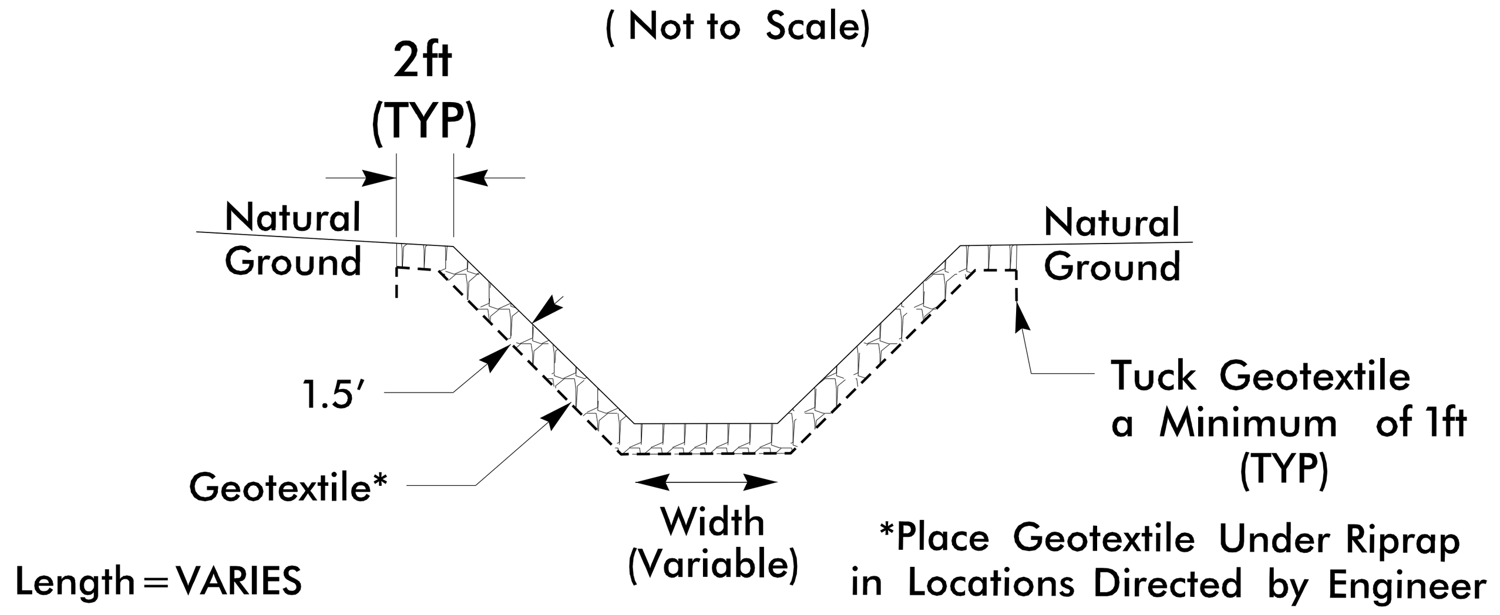
Length = VARIES

*Place Geotextile Under Riprap in Locations Directed by Engineer

–L– STA. 19+25 LT/RT
–L– STA. 33+84 LT/RT
–L– STA. 51+60 LT/RT

DETAIL R

PIPE STABILIZATION
(Not to Scale)



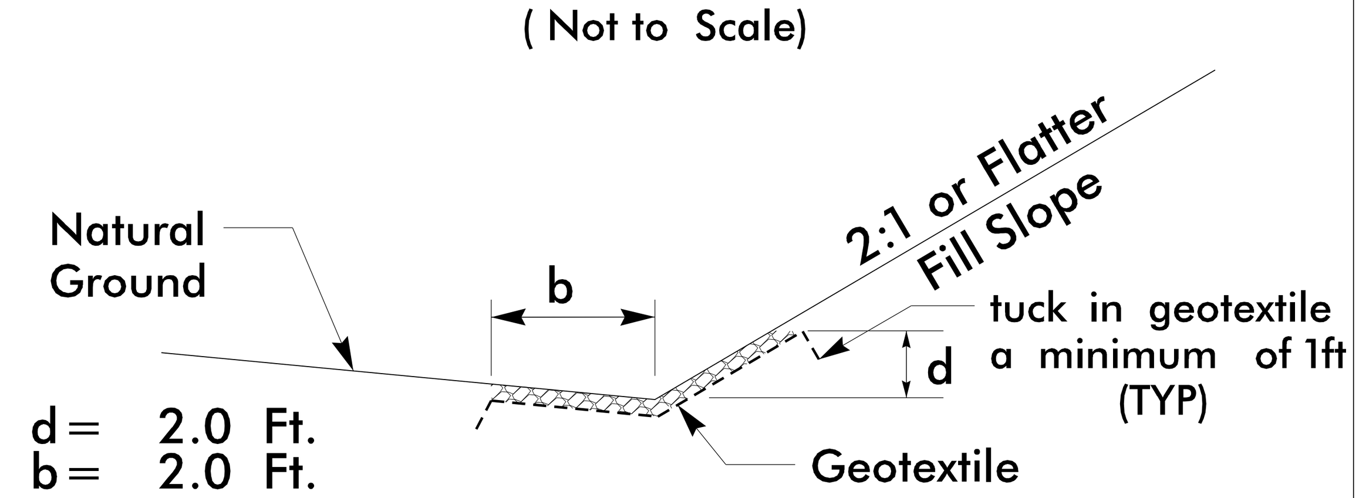
Length = VARIES
Type of Liner = Class 1 Rip–Rap – Keyed–In

*Place Geotextile Under Riprap in Locations Directed by Engineer

–L– STA. 27+75 LT/RT
–L– STA. 48+25 RT

DETAIL T

TOE PROTECTION
(Not to Scale)



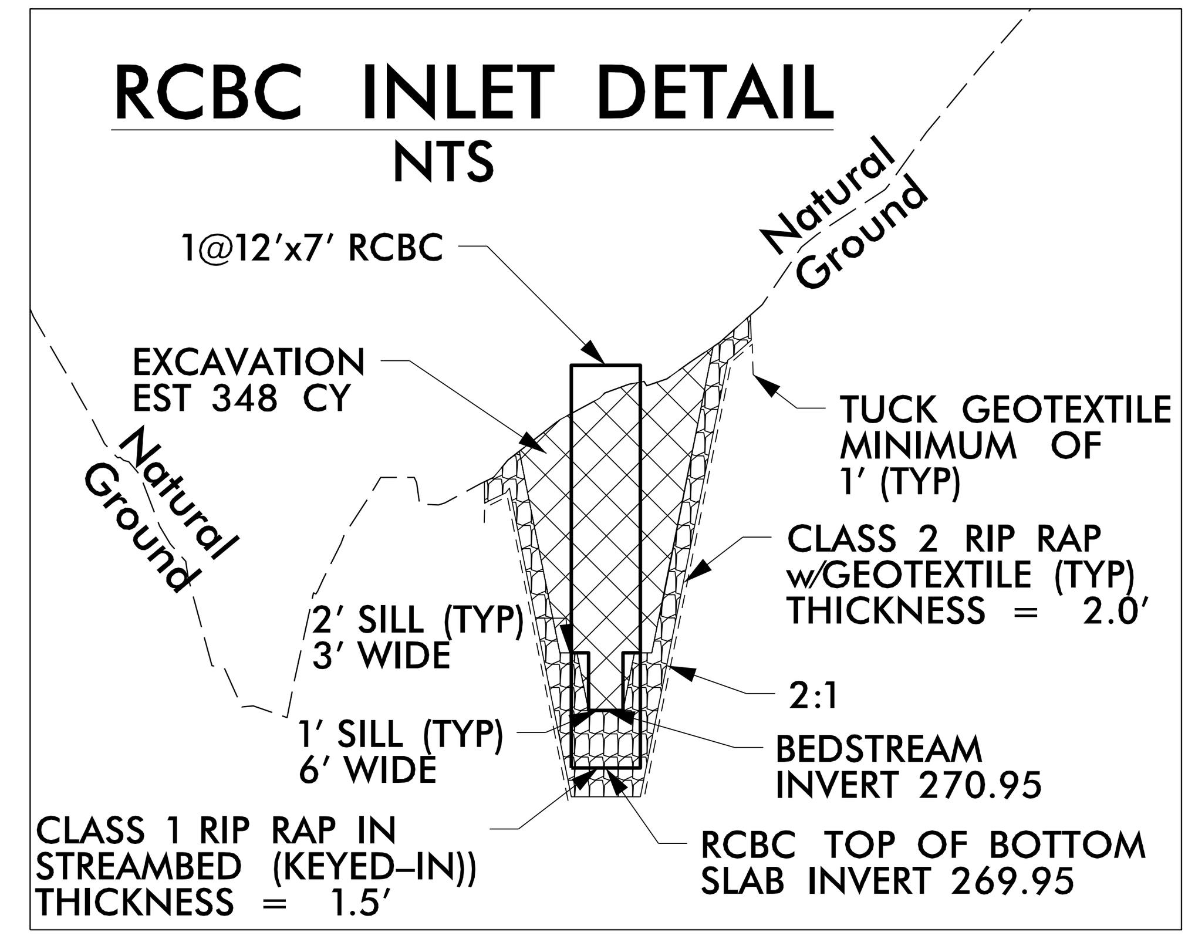
d = 2.0 Ft.
b = 2.0 Ft.

Type of Liner = Class 'B' Rip–Rap

FROM –L– STA. 18+48 TO STA. 19+10 RT
–L– STA. 19+29 TO STA. 20+95 RT
–L– STA. 27+47 TO STA. 27+78 LT
–L– STA. 27+88 TO STA. 28+07 LT
–L– STA. 30+38 TO STA. 30+87 RT
–L– STA. 31+03 TO STA. 31+50 RT
–L– STA. 30+91 TO STA. 32+27 LT
–L– STA. 32+62 TO STA. 33+71 RT
–L– STA. 32+77 TO STA. 33+71 LT
–L– STA. 33+96 TO STA. 36+44 RT
–L– STA. 37+00 TO STA. 37+73 LT
–L– STA. 48+27 TO STA. 49+42 RT
–L– STA. 48+88 TO STA. 49+52 LT
–Y1– STA. 12+53 TO STA. 13+25 RT
–Y1– STA. 14+85 TO STA. 15+71 RT
–Y1– STA. 15+87 TO STA. 16+20 RT
–Y1– STA. 14+65 TO STA. 15+80 LT
–Y1– STA. 15+88 TO STA. 17+50 LT

RCBC INLET DETAIL

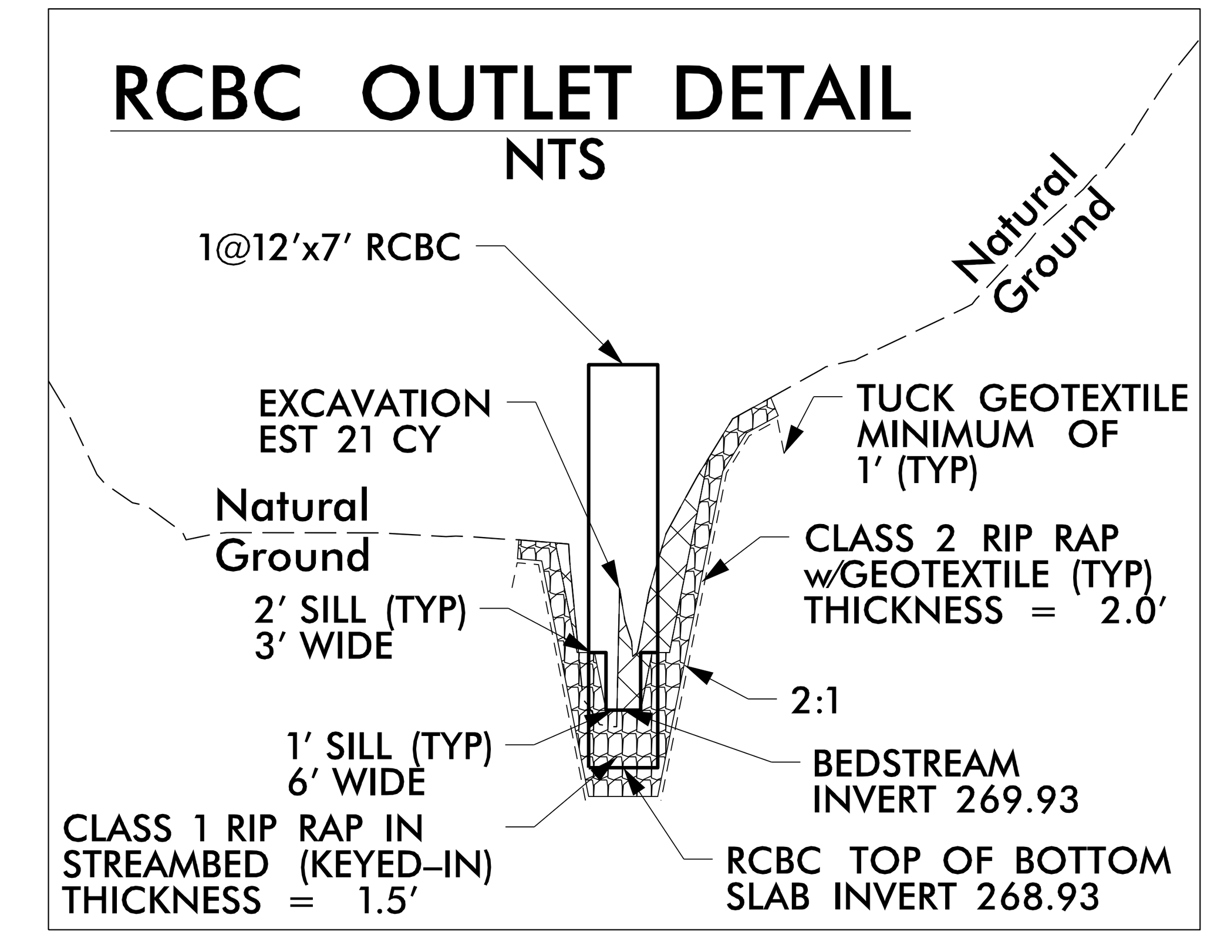
NTS



–L– STA. 33+84 LT

RCBC OUTLET DETAIL

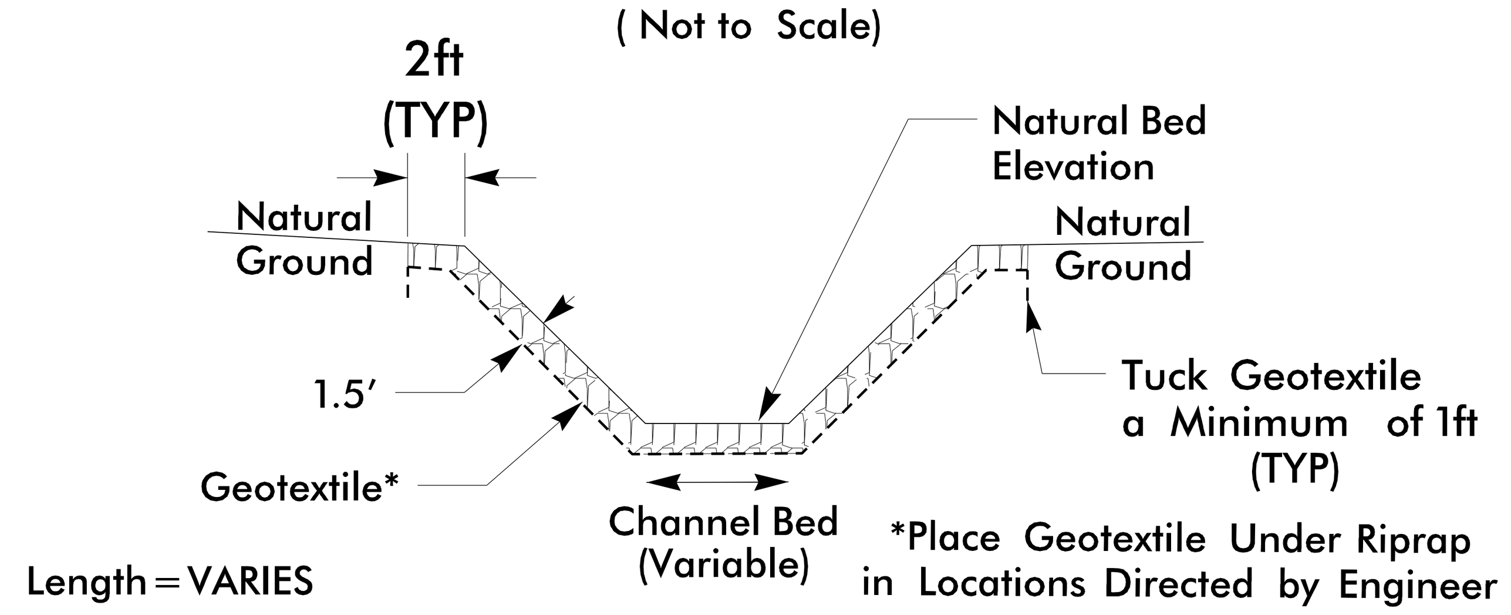
NTS



–L– STA. 33+84 RT

DETAIL S

PIPE CHANNEL STABILIZATION
(Not to Scale)



Length = VARIES
Type of Liner = Class 1 Rip–Rap – Keyed–In

*Place Geotextile Under Riprap in Locations Directed by Engineer

–L– STA. 30+79 LT

DETAIL Z

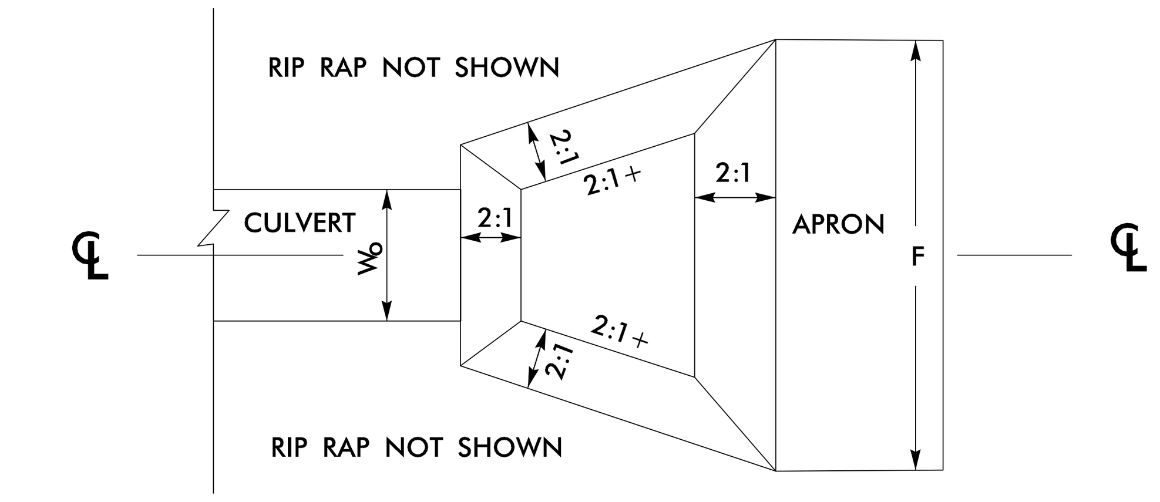
RIP–RAPPED ENERGY DISSIPATOR BASIN

DIM. (ft)	RIP RAP BASIN #1		
	1		
A	3.5'		
B	2.3'		
C	4.5'		
D	1.0'		
E	5.0'		
F	18'		
G	12'		

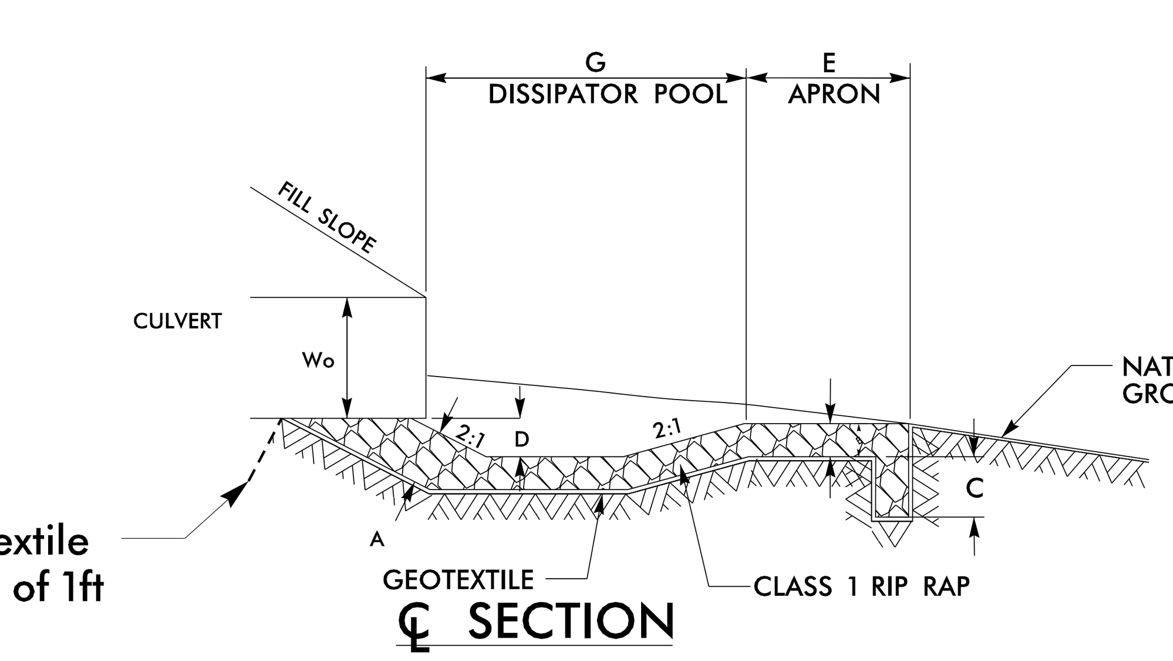
ALL DIMENSIONS APPROXIMATE

BASIN #	1		
EST GEOTEXTILE (SY)	60		
EST TON CL 1 RIPRAP	40		
DDE (CY)	28		

BASIN #	LOCATION (AT OUTLET)
1	15+83 –Y1– LT (STR# 0401)



PLAN



tuck in geotextile
a minimum of 1ft
(TYP)

℄ SECTION

7/08

–Y1– STA. 15+83 LT

COMPUTED BY: K. SABO DATE: 4/8/2025
CHECKED BY: A. CONRAD DATE: 4/8/2025

5/26/28

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-2								EA	G	NG				
-L-	18+25.00	19+75.00	LT	150.00					8.00	11.00	25.00	25.00	0.50	0.50	2														
-L-	30+25.00	34+75.00	LT	450.00					8.00	11.00	25.00	25.00	0.50	0.50	2														
-L-	50+50.00	52+75.00	LT	225.00					8.00	11.00	25.00	25.00	0.50	0.50	2														
			SUBTOTALS	825.00											6														
			GREU TL-2, 6@25.00'	-150.00																									
			CLEAR SPAN, 2@25.00'	-50.00																									
			PROJECT TOTALS	625.00											6														
			SAY	625.00											6														
ADDITIONAL GUARDRAIL POSTS = 5 EA																													

SUMMARY OF EARTHWORK (CY)

LOCATION	UNCLASSIFIED EXCAVATION	ROCK	UNDERCUT	EMBT+%	BORROW	WASTE
-L- 11+00.00 - 40+00.00	5,754			34,423	28,669	
-Y1- 12+42.82 - 17+50.00	473			2,616	2,143	
SUBTOTAL	6,227			37,039	30,812	
-L- 40+00.00 - 59+61.75	25,913	12,000		14,064		11,849
SUBTOTAL	25,913	12,000		14,064		11,849
TOTAL	32,140	12,000		51,103	30,812	11,849
MATERIAL FOR SHOULDER CONSTRUCTION				924	924	
LOSS DUE TO CLEARING & GRUBBING	-4,000				4,000	
ADJUSTMENT FOR 'ORD' DITCH CALC. REMOVAL	-1,070				1,070	
WASTE IN LIEU OF BORROW					-11,849	-11,849
PROJECT TOTAL	27,070	12,000		52,027	24,957	
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT					1,248	
GRAND TOTAL	27,070	12,000		52,027	26,205	
SAY	27,500				26,500	

UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN TOP 3' OF EMBANKMENT OR BACKFILL:
-L- 15+25 TO 18+25 (700 CY), -L- 41+75 TO 44+75 (1,000 CY), -L- 52+75 TO 58+25 - ACCEPTABLE
DEGRADABLE ROCK (12,000 CY) PER GEOTECH.

TOTAL UNCLASSIFIED EXCAVATION - ACCEPTABLE = (13,700 CY)

UNDERCUT EXCAVATION (CONTINGENCY) = 4,000 CY
SELECT GRANULAR MATERIAL (CONTINGENCY) = 3,100 CY
SHALLOW UNDERCUT (CONTINGENCY) = 1,200 CY
DRAINAGE DITCH EXCAVATION = 1,570 CY

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

DL-6V0RK24

COMPUTED BY:	H. Harkerider	DATE:	4/1/2025
CHECKED BY:	A. Passman	DATE:	4/1/2025

PROJECT NO.	SHEET NO.
HE-0002	3D-1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

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

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

LINE & STATION / SIZE / THICKNESS OR GAUGE	OFFSET	STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	R. C. PIPE CLASS III 12	15	18	24	30	36	42	48	54	60	66	72	78	84	R. C. PIPE CLASS IV 12	15	18	24	30	36	42	48	54	60	66	72	78	84	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)) 0' THRU 5' EACH	A: 5' THRU 10' LIN. FT.	B: 10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G	CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATES STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR STD. 840.26	G.D.I. (W.S. SAG) FRAME W/ 2 GRATES STD. 840.22	J.B. STD. 840.31 OR STD. 840.32	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	T.B.D.I. FOR STEEL GRATES STD. 840.36	STEEL FRAME WITH TWO GRATES STD. 840.37	TEMP STEEL PLATE COVER MASONRY DRAINAGE	M.H. FRAME AND COVER STD. 840.54	CONVERT EXISTING C.B. TO J.B.	CONVERT EXISTING C.B. TO D.I.	CONVERT EXISTING D.I. TO J.B.	CONVERT EXISTING J.B. TO D.I.	ADJUST C.B.	ADJUST D.I.	MODIFIED CONC. FLUME	PREFORMED SCOUR HOLE (PER EACH)	ENERGY DISSIPATION BASIN	FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	CONCRETE AND BRICK PIPE PLUG STD. 840.71 CY	PIPE REMOVAL LIN. FT.	REMARKS
-L- 25+03	36 LT	0501																																																																									
		0501	0502		281.5	279.6	0.5				92																																																															
-L- 25+03	47 RT	0502																																																																									3 TONS CLASS 'B' RIP RAP, 11 SY GEOTEXTILE
-L- 27+84	41 LT	0505																																					3.400																																				
		0505	0506		282.8	277.0																					100																																																		
-L- 27+59	62 RT	0506																																					3.400																																					15 TONS CLASS 1 RIP RAP, 30 SY GEOTEXTILE
-L- 30+85	34 LT	0507																																					4.500																																				
		0507	0508		276.3	274.5								56																																																														
-L- 31+00	20 RT	0508		284.4																																						1	4.9												1							1															
		0508	0509		274.5	272.1								72																																																														
-L- 30+95	91 RT	0509																																					4.500																																					20 TONS CLASS 1 RIP RAP, 39 SY GEOTEXTILE
-L- 37+73	65 LT	0601																																																																									
		0601	0602		296.9	288.8					152																																																																		
-L- 37+41	76 RT	0602																																																																										3 TONS CLASS 'B' RIP RAP, 11 SY GEOTEXTILE
-L- 48+84	55 LT	0603																																					3.400																																				
		0603	0604		296.0	290.6							144																																																																
-L- 48+23	70 RT	0604																																					3.400																																					15 TONS CLASS 1 RIP RAP, 30 SY GEOTEXTILE
-L- 31+02	65 RT																																																																										41	
-Y1- 13+80	64 LT	0402		276.0																																						1												1	1																							
		0402	0403		272.0	271.0	0.5																		96																																																						
-Y1- 13+80	61 RT	0403																																																																										
-Y1- 15+79	28 RT	0400																																					3.800																																				
		0400	0401		266.9	265.7	0.5																				64																																																		
-Y1- 15+84	34 LT	0401																																					3.800																																	1					40 TONS CLASS 1 RIP RAP, 60 SY GEOTEXTILE
-Y1- 15+58	3 LT																																																																											26	
SHEET TOTALS											244		144	128											96		164												30.200			2	4.9											1	1	1							1									1				67	
PROJECT TOTALS											244		144	128											96		164												30.200			2	4.9											1	1	1							1									1				67	

ABBREVIATIONS

C.A.A.	CORRUGATED ALUMINIUM ALLOY
C.B.	CATCH BASIN
C.S.	CORRUGATED STEEL
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
H.D.P.E.	HIGH DENSITY POLYETHYLENE
J.B.	JUNCTION BOX
M.H.	MANHOLE
N.S.	NARROW SLOT
P.V.C.	POLYVINYL CHLORIDE
R.C.	REINFORCED CONCRETE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX
W.S.	WIDE SLOT

DL-6V0RK24

COMPUTED BY: H. Harkenrider DATE: 4/1/2025

CHECKED BY: A. Passman DATE: 4/1/2025

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
HE-0002	3D-2

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

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

LINE & STATION / SIZE / THICKNESS OR GAUGE	OFFSET	STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	R. C. PIPE CLASS III 12	15	18	24	30	36	42	48	54	60	66	72	78	84	
-L- 19+30	35 LT	0404																				
		0404	0405		272.8	272.4	0.5									84						
-L- 19+20	46 RT	0405																				
-L- 52+11	52 LT	0701																				
		0701	0702		288.1	286.2																
-L- 51+01	62 RT	0702																				
SHEET TOTALS																84						
PROJECT TOTALS																84						

STRUCTURE (FROM-TO)	R. C. PIPE CLASS IV 12	15	18	24	30	36	42	48	54	60	66	72	78	84					ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)) 0' THRU 5' EACH	A 5' THRU 10' LIN. FT.	B 10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02
0404																				5.000					
0404-0405																									
0405																				5.000					
0701																				5.600					
0701-0702										160															
0702																				5.600					
SHEET TOTALS										160										21.200					
PROJECT TOTALS										160										21.200					

STRUCTURE (FROM-TO)	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G		CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATES STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR STD. 840.26	G.D.I. TYPE "B" STD. 840.18 OR STD. 840.27	G.D.I. (W.S. SAG) FRAME W/ GRATE STD. 840.22	G.D.I. (W.S. SAG) FRAME W/ 2 GRATES STD. 840.22	J.B. STD. 840.31 OR STD. 840.32	ANGLED VANE GRATES AND FRAMES STD. 840.33	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	T.B.D.I. FOR STEEL GRATES STD. 840.36		CONVERT EXISTING C.B. TO J.B.	CONVERT EXISTING C.B. TO D.I.	CONVERT EXISTING D.I. TO J.B.	CONVERT EXISTING J.B. TO D.I.	ADJUST C.B.	ADJUST D.I.			MODIFIED CONC. FLUME	PREFORMED SCOUR HOLE (PER EACH)	ENERGY DISSIPATION BASIN		FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	CONCRETE AND BRICK PIPE PLUG STD. 840.71 CY	PIPE REMOVAL LIN. FT.	REMARKS
0404																																				ENDWALL STD. 838.21
0404-0405																																				
0405																																				33 TONS CLASS 1 RIP RAP, 62 SY GEOTEXTILE
0701																																				ENDWALL STD. 838.27
0701-0702																																				
0702																																				40 TONS CLASS 1 RIP RAP, 75 SY GEOTEXTILE
SHEET TOTALS																																				
PROJECT TOTALS																																				

ABBREVIATIONS

- **C.A.A.** CORRUGATED ALUMINIUM ALLOY
- **C.B.** CATCH BASIN
- **C.S.** CORRUGATED STEEL
- **D.I.** DROP INLET
- **G.D.I.** GRATED DROP INLET
- **H.D.P.E.** HIGH DENSITY POLYETHYLENE
- **J.B.** JUNCTION BOX
- **M.H.** MANHOLE
- **N.S.** NARROW SLOT
- **P.V.C.** POLYVINYL CHLORIDE
- **R.C.** REINFORCED CONCRETE
- **T.B.D.I.** TRAFFIC BEARING DROP INLET
- **T.B.J.B.** TRAFFIC BEARING JUNCTION BOX
- **W.S.** WIDE SLOT

COMPUTED BY: _____J. Holland_____ DATE: _3/5/2025_
CHECKED BY: ___J. Wessell_____ DATE: _3/7/2025

(9-17-24)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
HE-0002	3G-1

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/ SD	LF
CONTINGENCY				SD	1500
				TOTAL LF:	1500

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

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	Station	Station	Aggregate Type* ASU(1/2)/ AST	Aggregate Thickness INCHES [8" for ASU(2)]	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Subgrade Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
CONTINGENCY			ASU (1)	12	1200	2400	3600		
				TOTAL CY/TONS/SY:	1200	2400**	3600**	0	0

*ASU(1/2) = Aggregate Subgrade (Type 1 or 2)
*AST = Aggregate Stabilization
**Total tons of "Class IV Subgrade Stabilization" and total square yards of "Geotextile for Subgrade Stabilization" are only the estimated quantities for ASU(1/2)/AST and may only represent a portion of the subgrade stabilization and geotextile quantities shown in the Item Sheets of the Proposal.