09/08/49

TIP PROJECT: U-5887

CONTRACT: C204631

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

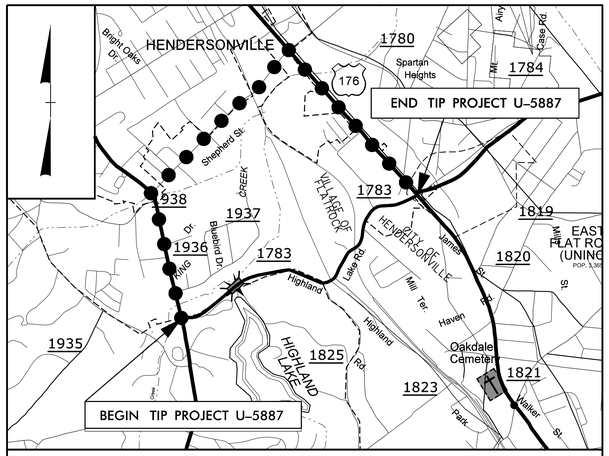
HENDERSON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5887	1	-

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44634.1.1	NA	PE
44634.2.1	NA	R/W UTIL.
44634.3.1	NA	CONST.

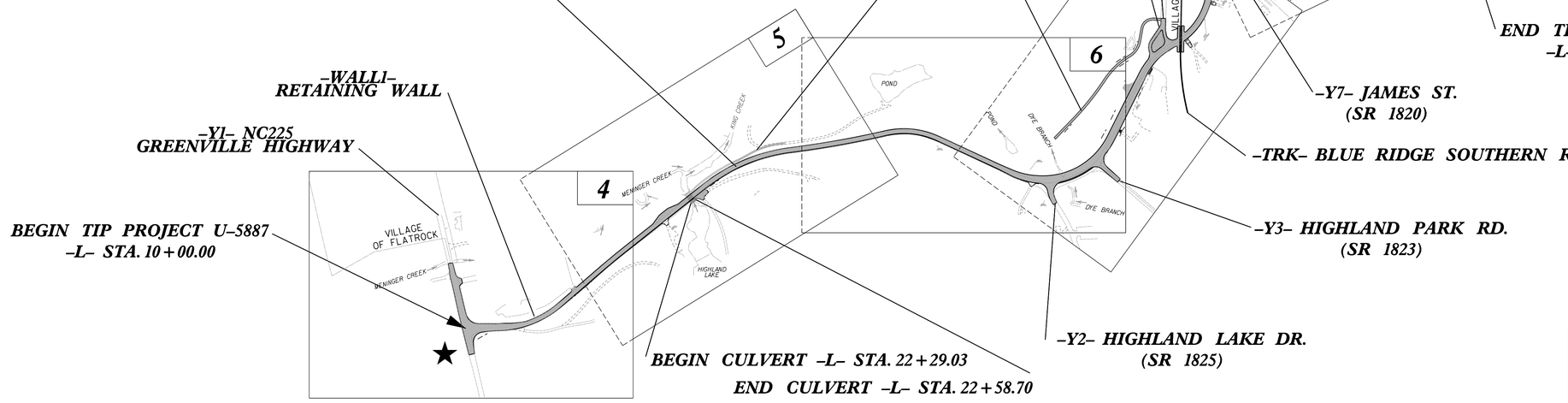
LOCATION: SR 1783 (NORTH HIGHLAND LAKE ROAD) FROM NC225 TO WEST OF US 176

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNALS, SIGNING, CULVERT, AND RETAINING WALLS



VICINITY MAP (N.T.S)

OFF-SITE DETOUR



★ PROPOSED TRAFFIC SIGNAL

☆ EXISTING TRAFFIC SIGNAL

Design exceptions on this project for horizontal and vertical curves.

V&M Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Atlanta, GA 770-627-3590

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 2010 = 6700
ADT 2040 = 7200
T = 5 % *
V = 35 MPH
* TTST = 2% DUAL 3%
K = 9 %
D = 55 %
FUNC CLASS = MAJOR COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5887 = 1.058 MILES

LENGTH CULVERT TIP PROJECT U-5887 = 0.006 MILES

TOTAL LENGTH OF TIP PROJECT U-5887 = 1.064 MILES

Prepared in the Office of:
VAUGHN & MELTON, INC.
1318-F PATTON AVENUE ASHEVILLE, NC 28806 PHONE (828)253-2796

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JUNE 30, 2019

LETTING DATE: MAY 18, 2021

REECE M. SCHULER, P.E., P.L.S
PROJECT ENGINEER

JARED PHILPOT, E.I.
PROJECT DESIGN ENGINEER

BARRY MOSTELLER
PROJECT TEAM LEAD

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER

P.E.

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

3/11/2021 3:31:57 AM
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PROJECT REFERENCE NO.	SHEET NO.
U-5887	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

INDEX OF SHEETS

GENERAL NOTES:

2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED:

GRADE LINE:
GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II. CONTRACTOR TO REMOVE ANY DEBRIS LEFT BY THE UTILITY CONSTRUCTION DURING THE CLEARING AND GRUBBING PHASE.

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

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.02 USING 3 FOOT RADII OR RADII AS SHOWN ON THE PLANS. LOCATIONS OF DRIVES WILL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. ALL DRIVEWAYS WILL BE REPAIRED TO MATCH EXISTING MATERIAL, AND BUILT TO THE RIGHT OF WAY LINE OR 15', WHICHEVER IS CLOSEST.

GUARDRAIL:

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

TEMPORARY SHORING:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY, AT&T, MORRIS BROADBAND AND HENDERSONVILLE WATER AND SEWER.

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

DOMINION ENERGY - SAMANTHA WARD (704) 810-3216

DUKE ENERGY - BOB MABRY (828) 698-2055

AT&T - SCOTT ADDINGTON (828) 287-7138

MORRIS BROADBAND - JASPER DUNCAN (828) 697-3600

HENDERSONVILLE WATER & SEWER - ADAM STEURER (828) 697-3073

RIGHT-OF-WAY MARKERS:

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

CURB RAMPS:

CURB RAMPS ARE SHOWN ON THE PLANS AT APPROXIMATE LOCATIONS.
CONSTRUCT ALL CURB RAMPS ACCORDANCE WITH STD 848.05 and/or 848.06.

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	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
815.03	Pipe Underdrain and Blind Drain
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 12"thru 54"
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.17	Concrete Grated Drop Inlet Type 'A' - 12" thru 72" Pipe
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24	Frames and Narrow SLot Sag Grates
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.26	Brick Grated Drop Inlet Type 'A' - 12" thru 72"
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36"
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.32	Brick Junction Box
840.45	Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
846.01	Concrete Curb, Gutter and Curb & Gutter
846.03	Funnel Drain Installation In Shoulder Berm Gutter
848.01	Concrete Sidewalk
848.02	Driveway Turnout - Radius Type
848.04	Street Turnout
848.05	Curb Ramps (Proposed Curb & Gutter)
848.06	Curb Ramps (Existing Curb & Gutter)
852.01	Concrete Islands
862.01	Guardrail Placement
862.02	Guardrail Installation (Special Detail for Sheet 6 of 8)
862.03	Structure Anchor Units (Special Detail for Type III Anchor Units Sheets 1 of 7 and 2 of 7)
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
U-5887	1B

9/3/2020

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 Easement 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.

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-1
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER

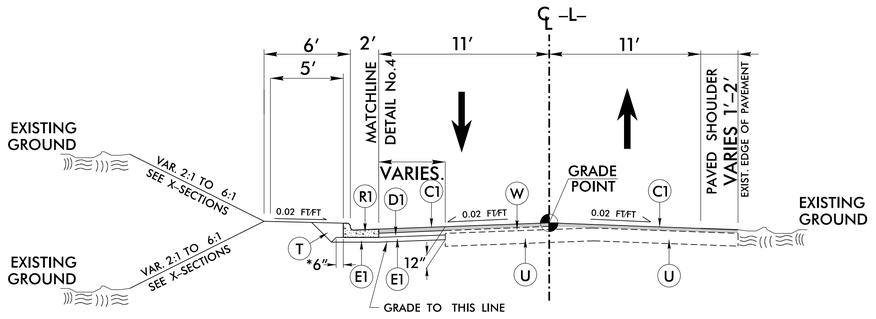
3/24/2021

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER

3/24/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

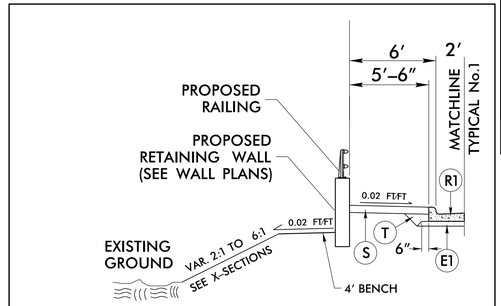


TYPICAL SECTION NO. 1

–L– STA. 10+00.00 TO 15+59.71

* NOTE: 1′ IF USING J1

NOTE: WHEN NEW FULL DEPTH PAVEMENT IS ADJACENT TO EXISTING PAVEMENT AND WIDTH OF E1 IS 6′ OR GREATER, USE (J1) IN LIEU OF (E1)



DETAIL No. 4

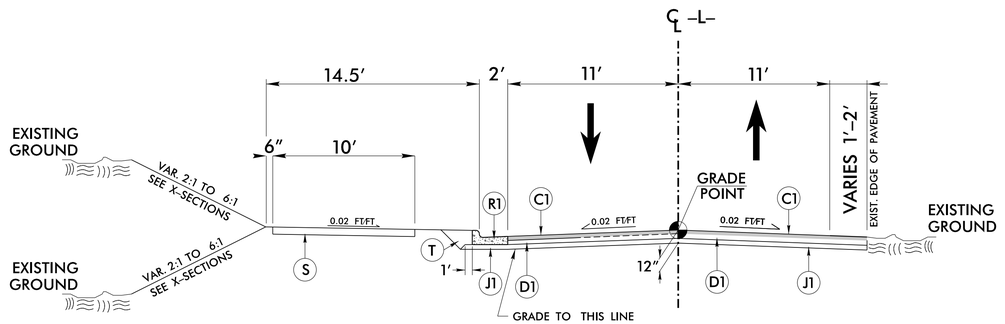
–L– STA. 11+25.00 TO –L– STA. 11+81.65 OFFSET IS 30′–0″
–L– STA. 11+81.65 TO –L– STA. 12+81.65 OFFSET VARIES FROM 30′–0″ TO 19′–0″
–L– STA. 12+81.65 TO –L– STA. 13+30.00 OFFSET IS 19′–0″
NOTE: SEE WALL AND ROADWAY PLANS FOR FULL EXTENT OF RETAINING WALL.

TYPICAL SECTION NO. 2

–L– STA. 15+59.71 TO 22+75.00

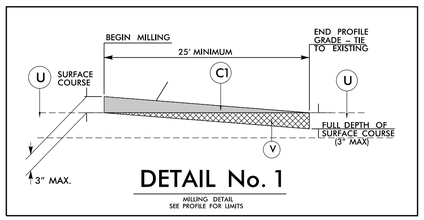
SIDEWALK THROUGH –L– STA. 22+29.49 TO 22+75.00 LT. ONLY

* NOTE: 1′ IF USING J1



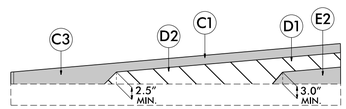
TYPICAL SECTION NO. 3

–L– STA. 22+75.00 TO 24+86.34



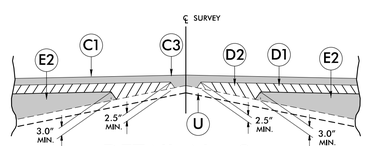
DETAIL No. 1

MILLING DETAIL
SEE PROFILE FOR LIMITS



DETAIL No. 2

Wedging Detail For Resurfacing



DETAIL No. 3

Detail Showing Method of Wedging

FINAL PAVEMENT SCHEDULE

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.
C2	PROP. APPROX. 2″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2″ 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 PLACED IN LAYERS NOT LESS THAN 2½″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.
E1	PROP. APPROX. 5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 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 5½″ IN DEPTH.
J1	5″ AGGREGATE BASE COURSE.
K	1″ SELECT GRANULAR MATERIAL, CLASS III
N	GEOTEXTILE FOR SOIL STABILIZATION (TYPE IV)
R1	2′-6″ CONCRETE CURB AND GUTTER.
R2	5″ MONOLITHIC CONCRETE ISLAND.
S	4″ CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V	VAR. MILLING BITUMINOUS PAVEMENT, 0″ TO 3″.
V1	MILLING BITUMINOUS PAVEMENT, 2″ DEPTH.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAILS).

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

3/24/2021 2:10:35 PM
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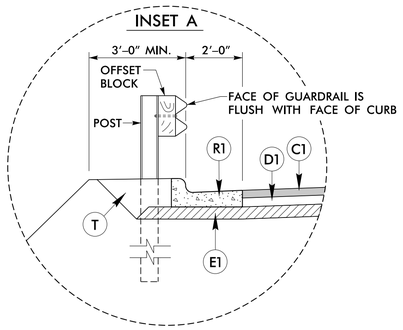
User: mshelton

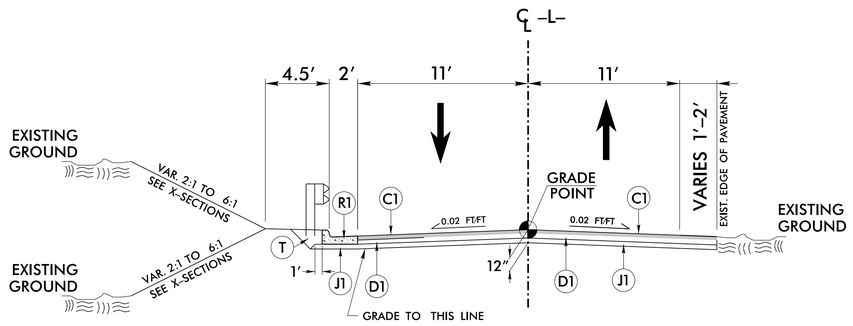
8/17/99

REVISIONS

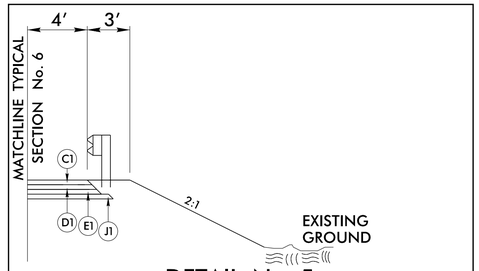


INSET A
NOT TO SCALE
–L– STA. 25+11.50 TO –L– STA. 41+66.87 LT

NOTE: WHEN NEW FULL DEPTH PAVEMENT IS ADJACENT TO EXISTING PAVEMENT AND WIDTH OF (E1) IS 6' OR GREATER, USE (J1) IN LIEU OF (E1)



TYPICAL SECTION NO. 4
–L– STA. 24+86.34 TO 31+70.00
–L– STA. 34+10.00 TO 40+39.84



DETAIL No. 5
–L– STA. 40+39.84 TO 42+49.50

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-2
R/W SHEET NO.	

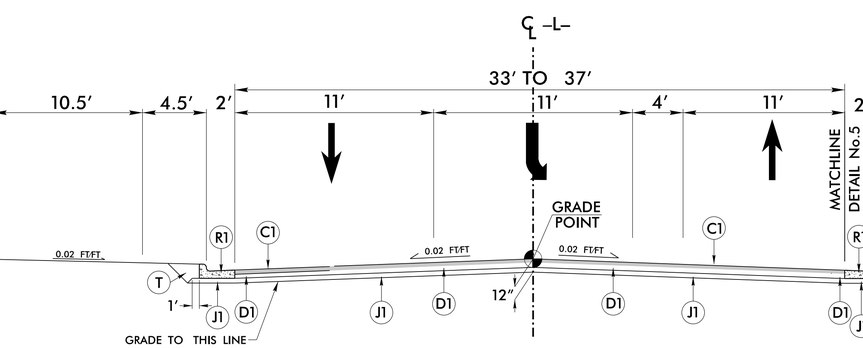
ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER — Docusigned by: Mark R. Scheduler — 3/24/2021

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER — Signed by: Mark R. Scheduler — 3/24/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION NO. 5
–L– STA. 31+70.00 TO 34+10.00
* NOTE: 1' IF USING J1

TYPICAL SECTION NO. 6
–L– STA. 40+39.84 TO 44+00.00

FINAL PAVEMENT SCHEDULE

C1	3" TYPE S9.5C
C2	2" TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4" TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5" TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5" AGGREGATE BASE COURSE
K	1" SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2'-6" CONCRETE CURB AND GUTTER
R2	5" MONOLITHIC CONCRETE ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2" MILLING
W	WEDGING

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

3/24/2021 2:10:35 PM
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User: mpilson

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-3
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26250 ENGINEER Robert R. Schuler
3/24/2021

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26250 ENGINEER Robert R. Schuler
3/24/2021

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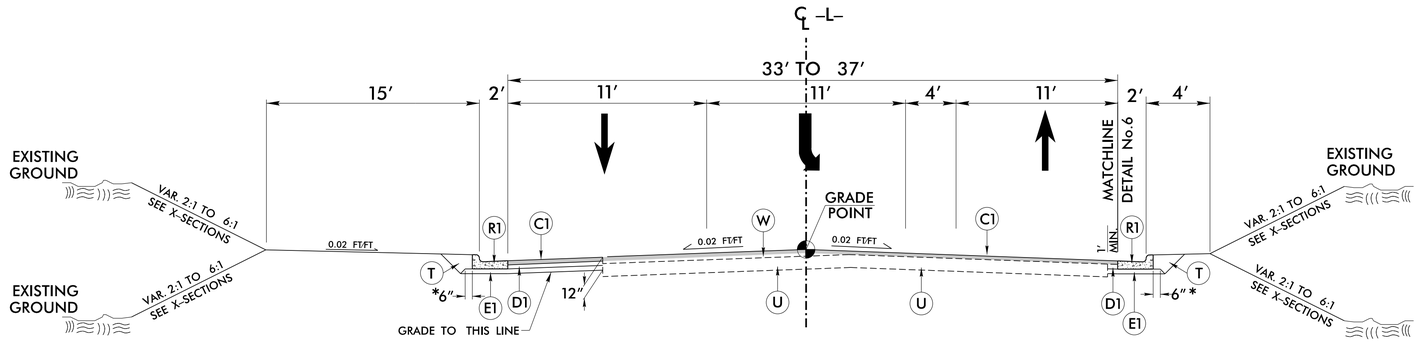
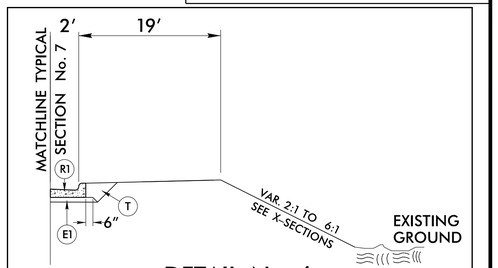


TYPICAL SECTION NO. 7

–L– STA. 44+00.00 TO 49+72.74

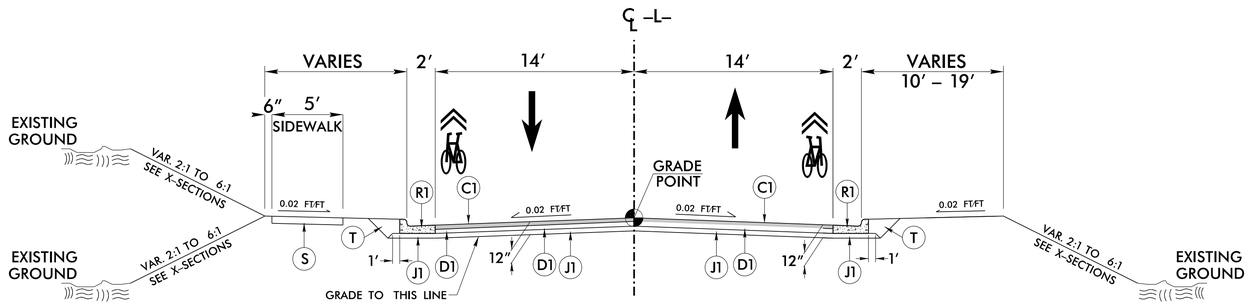
* NOTE: 1′ IF USING J1

NOTE: WHEN NEW FULL DEPTH PAVEMENT IS ADJACENT TO EXISTING PAVEMENT AND WIDTH OF E1 IS 6′ OR GREATER, USE (J1) IN LIEU OF (E1)



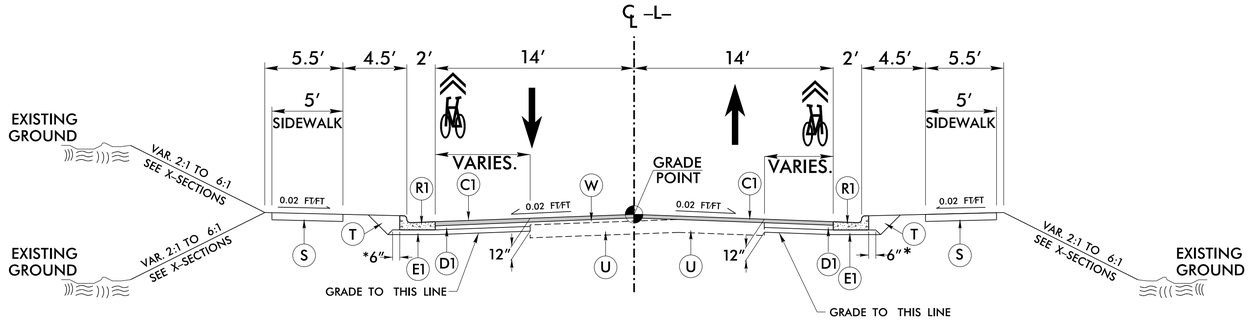
DETAIL No. 6

–L– STA. 49+00.00 TO 50+12.25



TYPICAL SECTION NO. 8

–L– STA. 49+72.74 TO 53+60.00



TYPICAL SECTION NO. 9

–L– STA. 53+60.00 TO 58+00.00

* NOTE: 1′ IF USING J1

FINAL PAVEMENT SCHEDULE

C1	3″ TYPE S9.5C
C2	2″ TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4″ TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5″ TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5″ AGGREGATE BASE COURSE
K	1″ SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2′-6″ CONCRETE CURB AND GUTTER
R2	5″ MONOLITHIC CONCRETE ISLAND
S	4″ CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2″ MILLING
W	WEDGING

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

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User: rschuler

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26990 ENGINEER Kevin R. Schuler

3/24/2021

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26990 ENGINEER Kevin R. Schuler

3/24/2021

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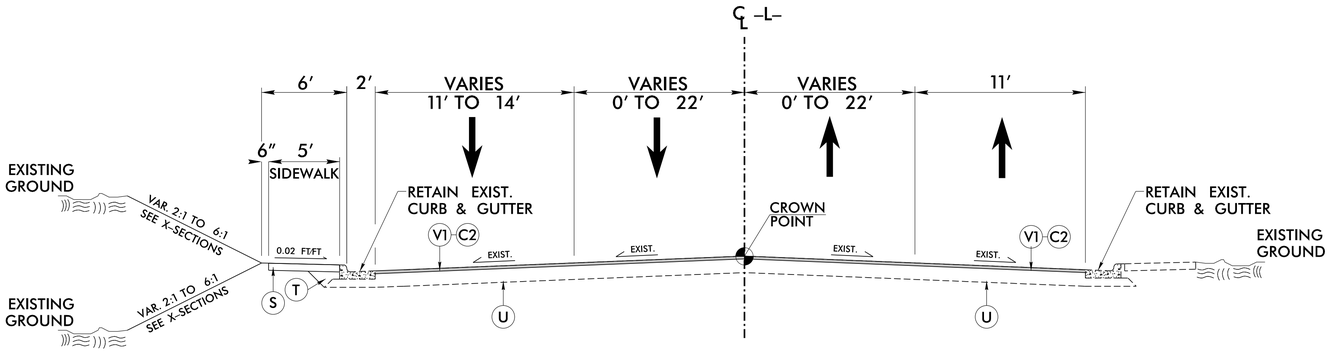
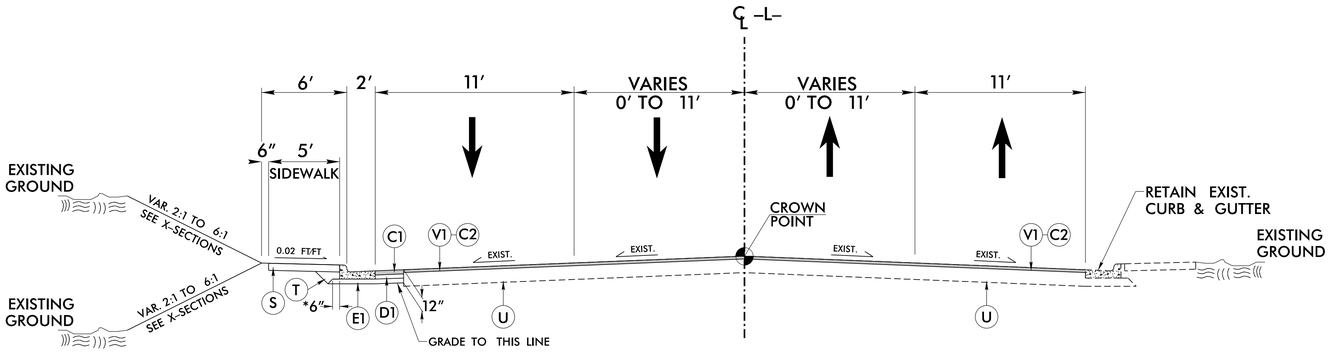
REVISIONS

8/17/99



TYPICAL SECTION NO. 10

–L– STA. 58+00.00 TO 62+87.39

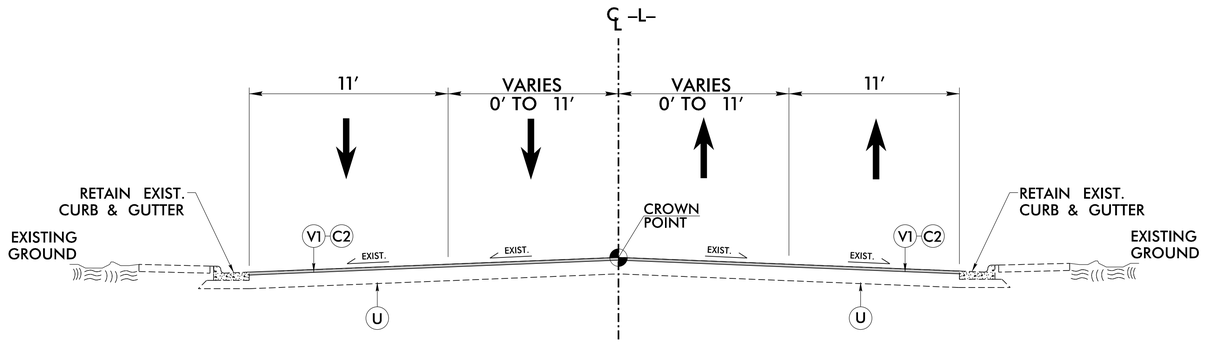


TYPICAL SECTION NO. 11

–L– STA. 62+87.39 TO 64+11.04

* NOTE: 1′ IF USING J1

NOTE: WHEN NEW FULL DEPTH PAVEMENT IS ADJACENT TO EXISTING PAVEMENT AND WIDTH OF E1 IS 6′ OR GREATER, USE (J1) IN LIEU OF (E1)



TYPICAL SECTION NO. 12

–L– STA. 64+11.04 TO 66+16.58

FINAL PAVEMENT SCHEDULE

C1	3″ TYPE S9.5C
C2	2″ TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4″ TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5″ TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5″ AGGREGATE BASE COURSE
K	1″ SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2′-6″ CONCRETE CURB AND GUTTER
R2	5″ MONOLITHIC CONCRETE ISLAND
S	4″ CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2″ MILLING
W	WEDGING

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

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User: rschuler

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

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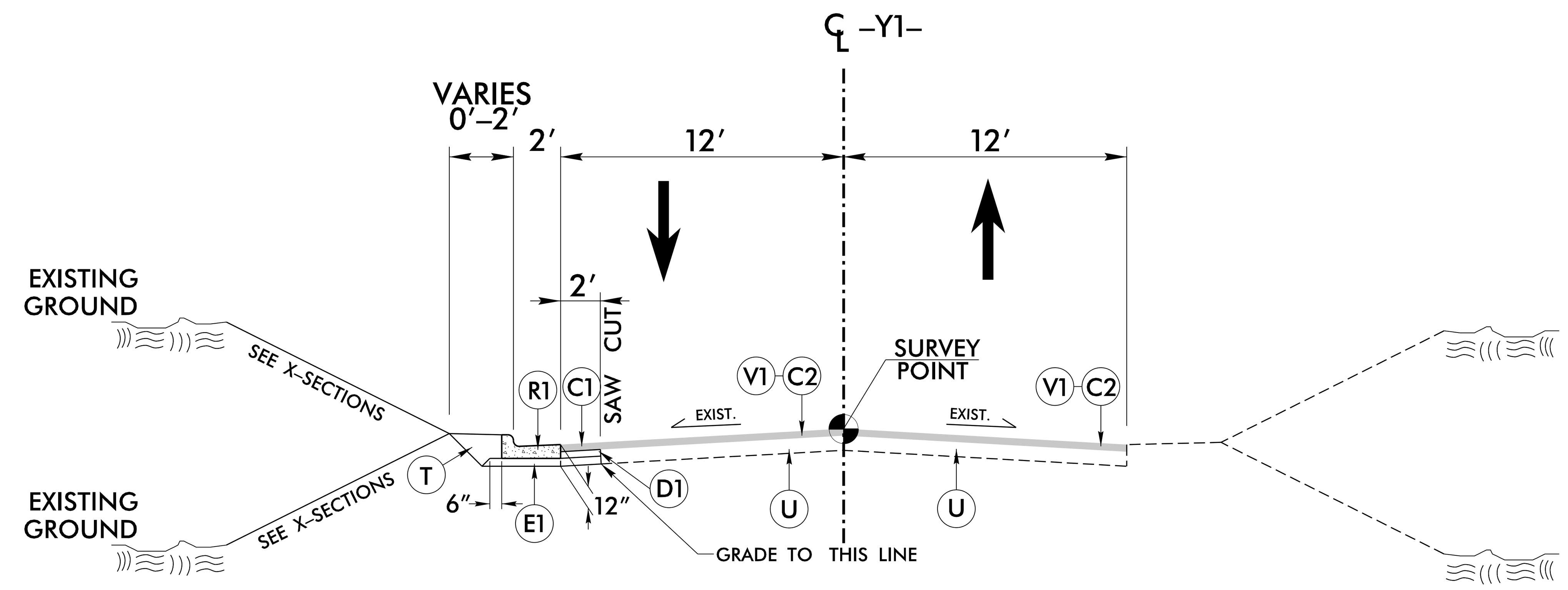
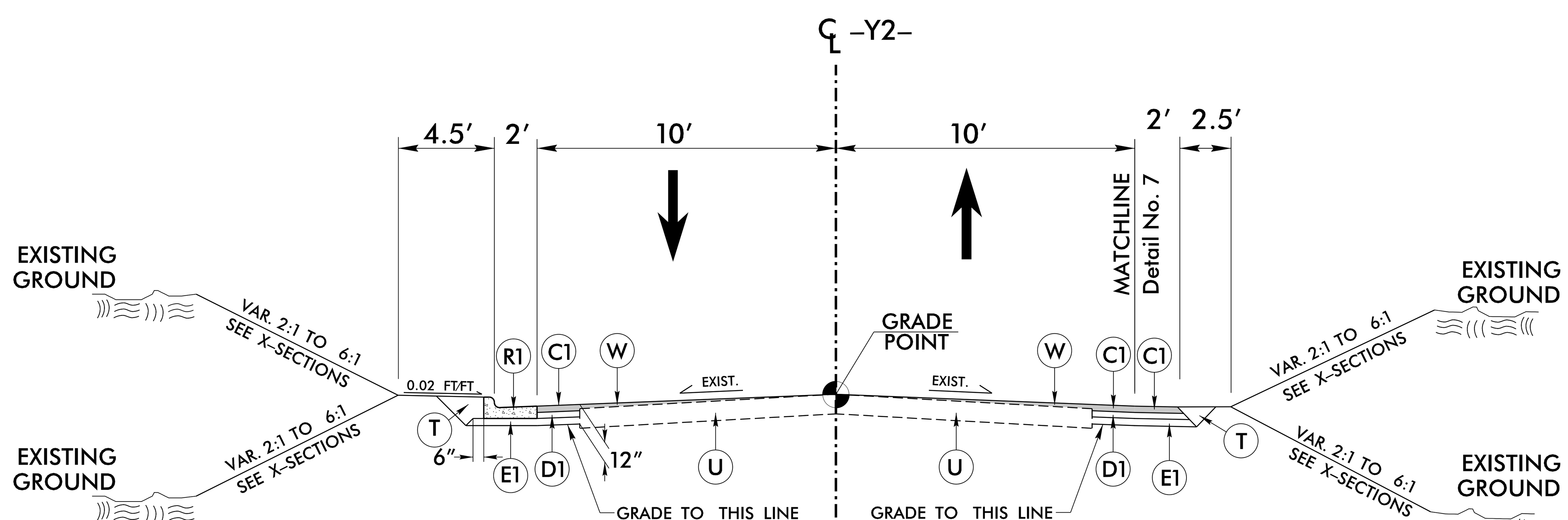
REVISIONS



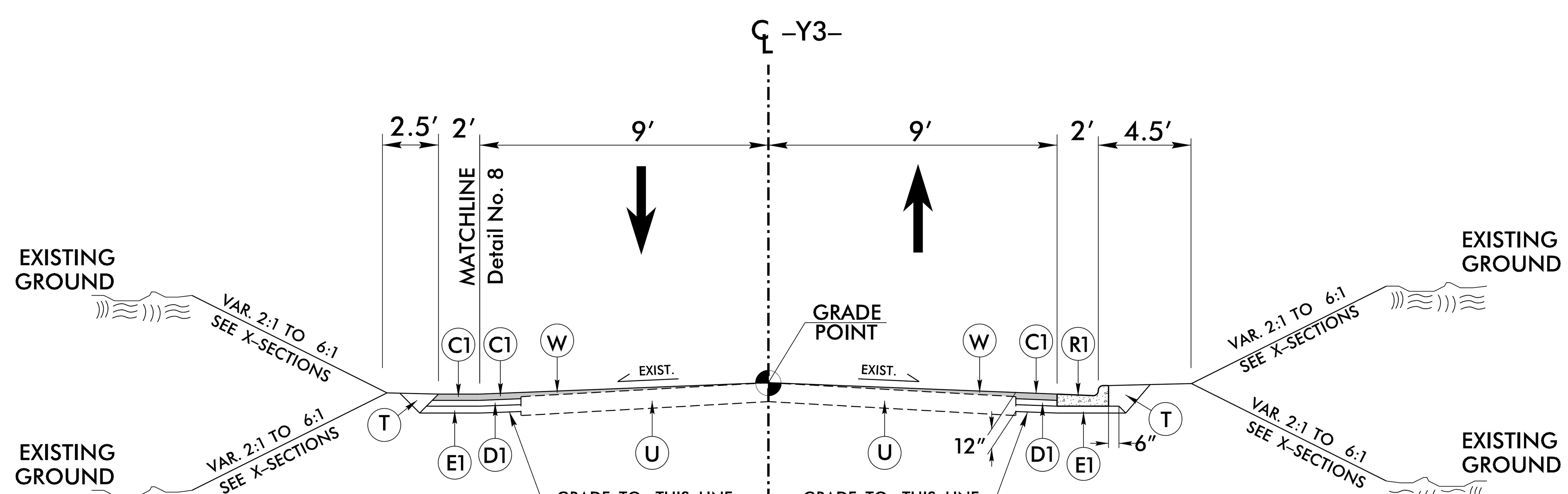
TYPICAL SECTION NO. 13

-Y1- STA. 12+29.64 TO 16+61.80



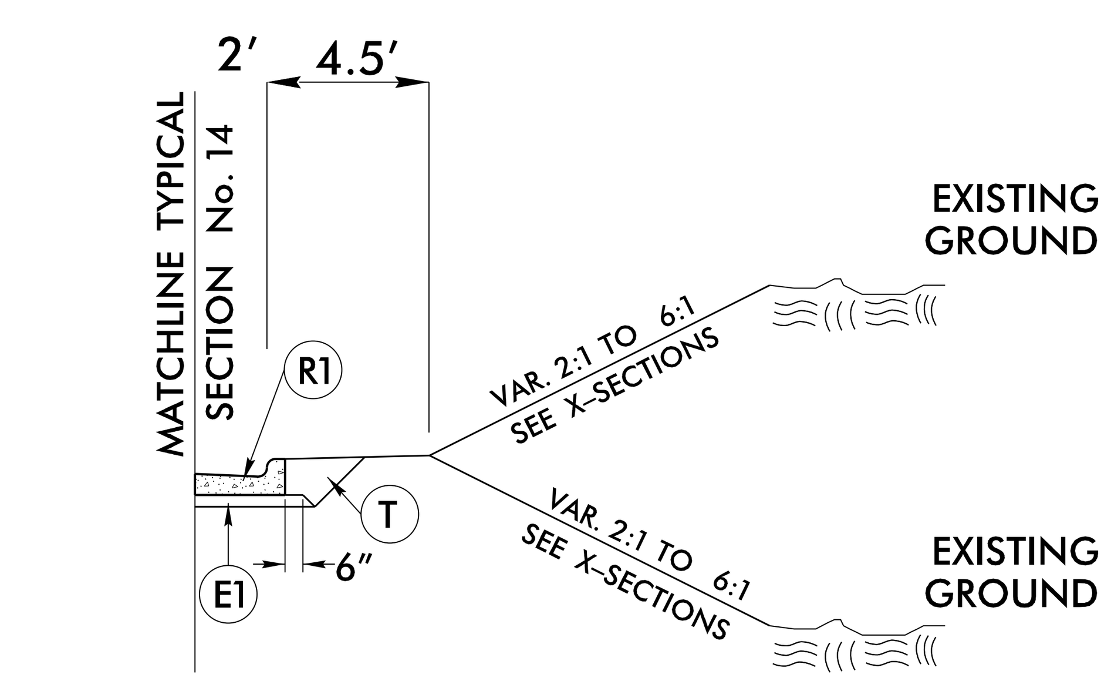
TYPICAL SECTION NO. 14

-Y2- STA. 10+19.55 TO 11+17.59



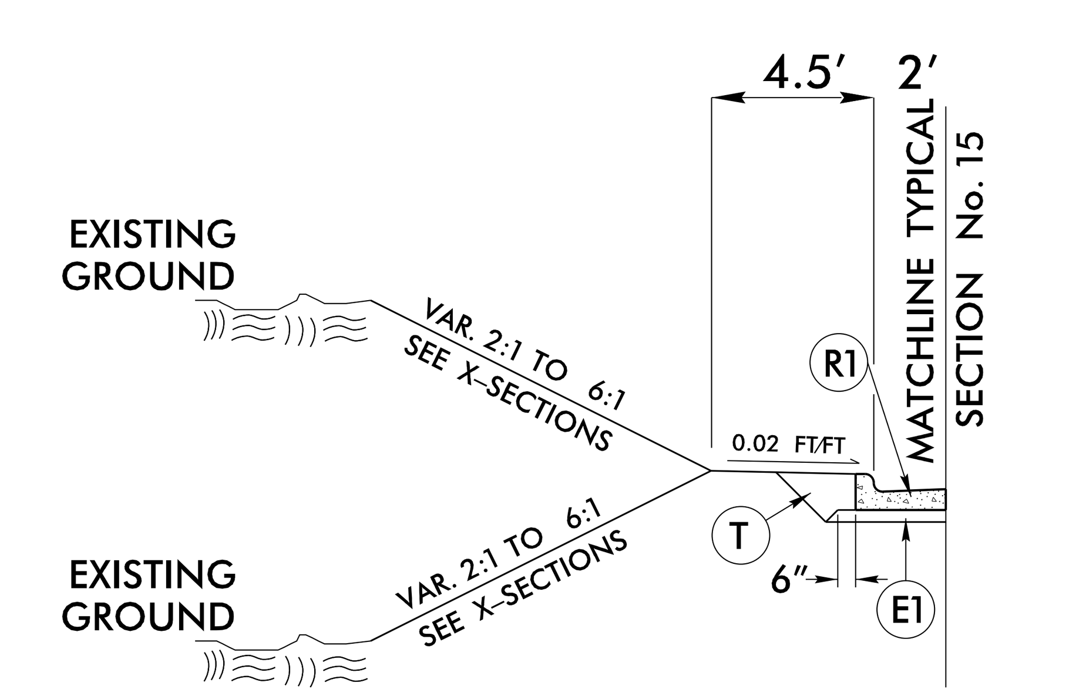
TYPICAL SECTION NO. 15

-Y3- STA. 10+20.11 TO 11+50.00



DETAIL No. 7

-Y2- STA. 10+19.55 TO 10+54.23



DETAIL No. 8

-Y3- STA. 10+20.11 TO 10+66.65

FINAL PAVEMENT SCHEDULE

C1	3" TYPE S9.5C
C2	2" TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4" TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5" TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5" AGGREGATE BASE COURSE
K	1" SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2'-6" CONCRETE CURB AND GUTTER
R2	5" MONOLITHIC CONCRETE ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2" MILLING
W	WEDGING

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

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PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-6
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

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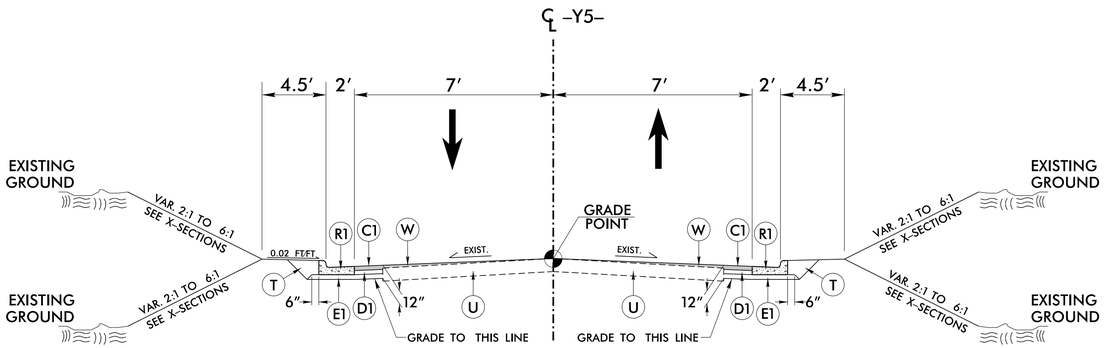
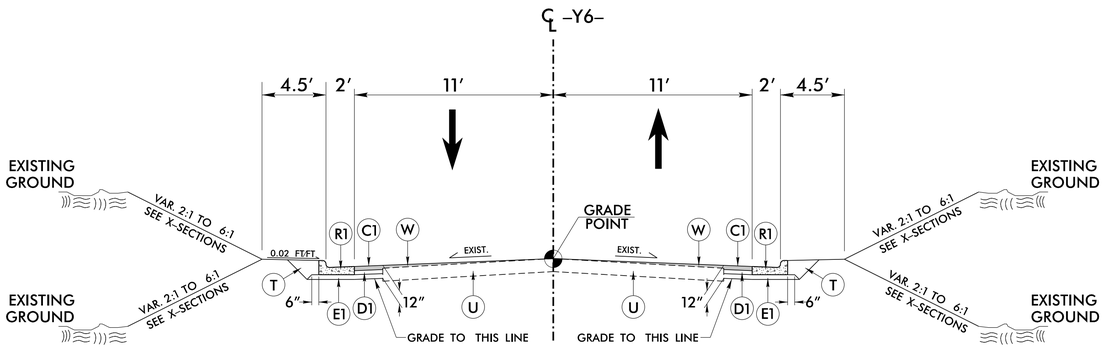
REVISIONS

8/17/99



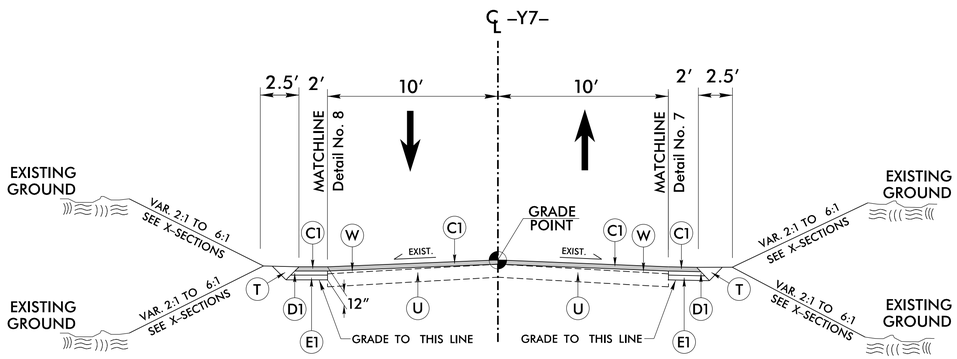
TYPICAL SECTION NO. 16

–Y5– STA. 10+21.94 TO 11+61.93



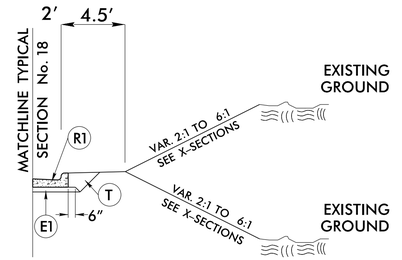
TYPICAL SECTION NO. 17

–Y6– STA. 11+60.00 TO 12+80.71



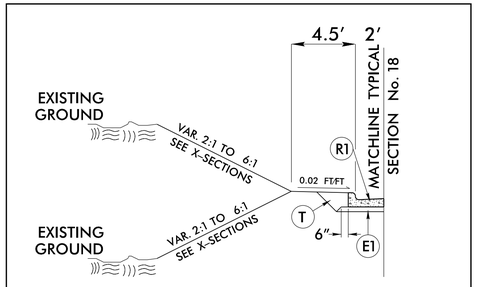
TYPICAL SECTION NO. 18

–Y7– STA. 10+14.02 TO 11+00.00



DETAIL No. 7

–Y7– STA. 10+14.02 TO 10+65.29



DETAIL No. 8

–Y7– STA. 10+14.02 TO 10+48.81

FINAL PAVEMENT SCHEDULE

C1	3″ TYPE S9.5C
C2	2″ TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4″ TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5″ TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5″ AGGREGATE BASE COURSE
K	1″ SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2′-6″ CONCRETE CURB AND GUTTER
R2	5″ MONOLITHIC CONCRETE ISLAND
S	4″ CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2″ MILLING
W	WEDGING

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

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User:jcpollard

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2A-7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

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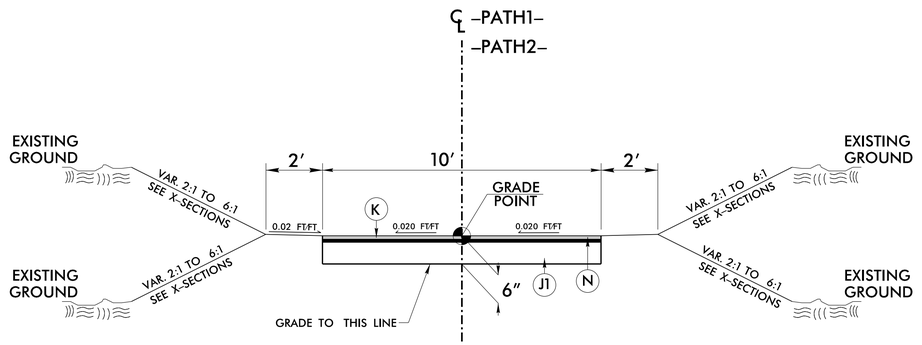

TYPICAL SECTION NO. 19

–PATH1– STA. 10+00.00 TO 15+77.77

–PATH2– STA. 10+00.00 TO 17+71.81

FINAL PAVEMENT SCHEDULE	
C1	3″ TYPE S9.5C
C2	2″ TYPE S9.5C
C3	VAR. TYPE S9.5C
D1	4″ TYPE I19.0C
D2	VAR. TYPE I19.0C
E1	5″ TYPE B25.0C
E2	VAR. TYPE B25.0C
J1	5″ AGGREGATE BASE COURSE
K	1″ SELECT GRANULAR MAT. (CL. III)
N	GEO. FOR SOIL STAB. (TYPE IV)
R1	2′-6″ CONCRETE CURB AND GUTTER
R2	5″ MONOLITHIC CONCRETE ISLAND
S	4″ CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	VAR. MILLING
V1	2″ MILLING
W	WEDGING

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

REVISIONS

8/17/99

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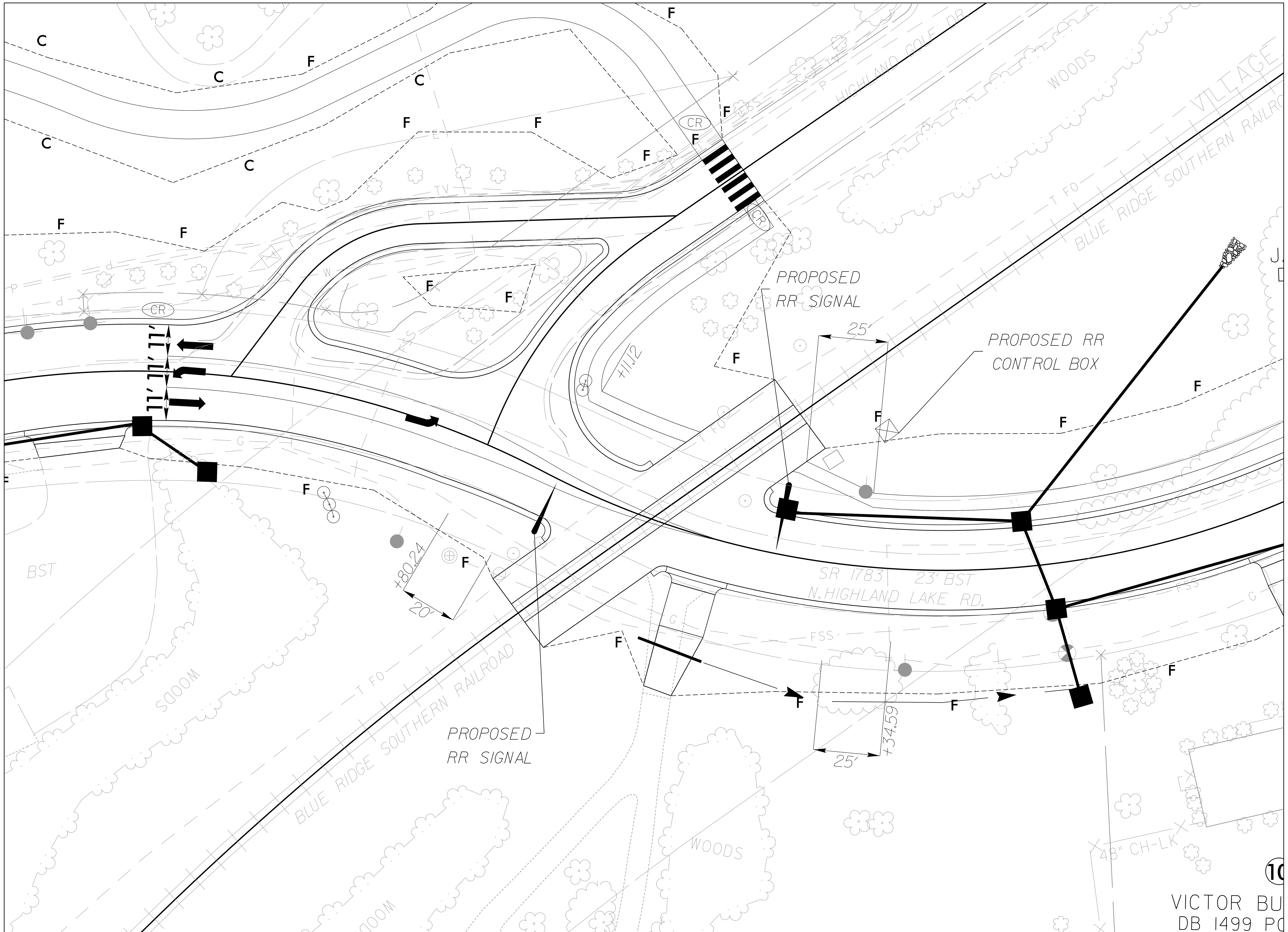
PROJECT REFERENCE NO.	SHEET NO.
U-5887	2B-1

ROADWAY DESIGN ENGINEER

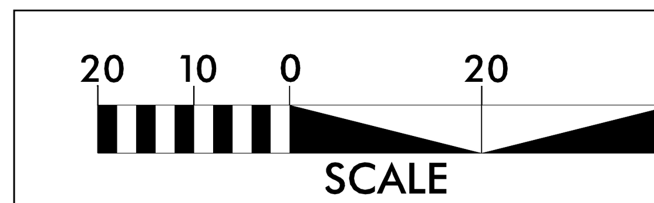


RAILROAD CROSSING DETAIL

-L- NORTH HIGHLAND LAKE ROAD, -TRK- BLUE RIDGE SOUTHERN RAILROAD

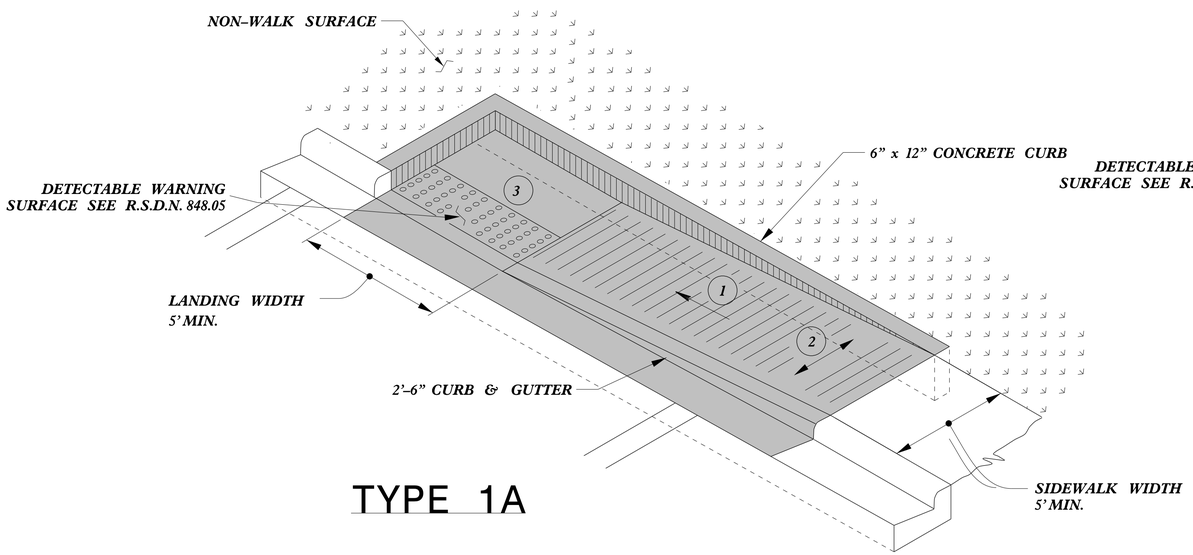
SEE SHEET 7 FOR FULL PLAN VIEW

SCALE : 1" = 20'

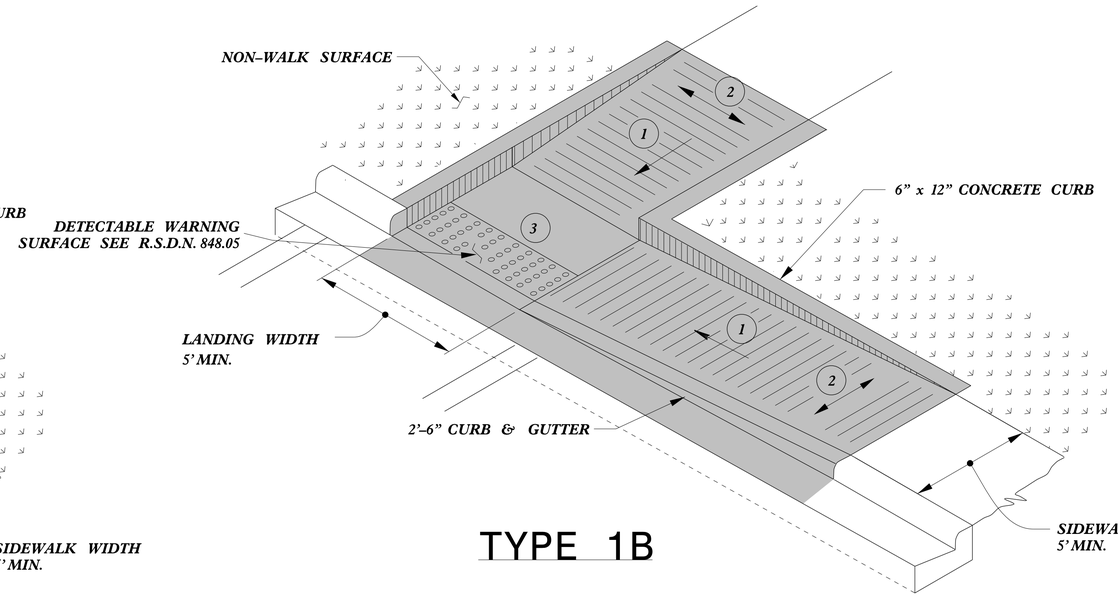


5/14/99

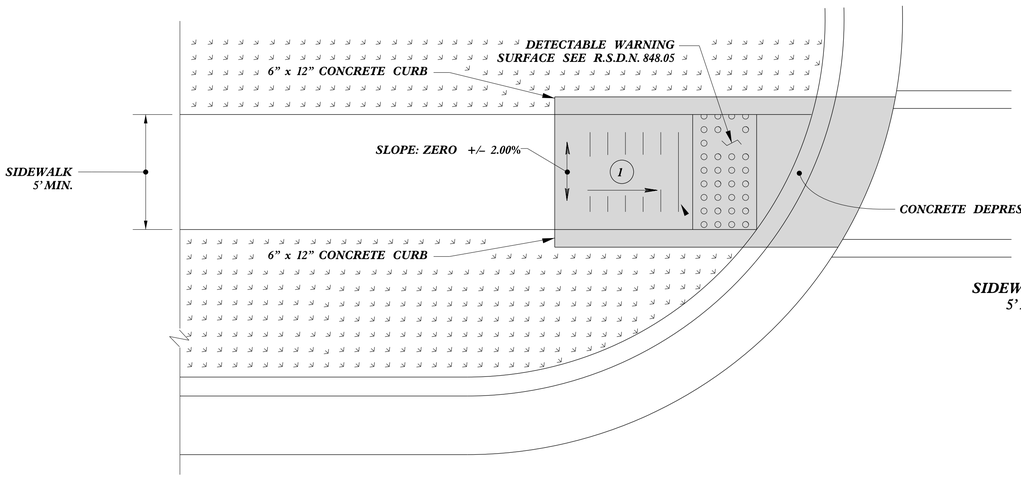
PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-1



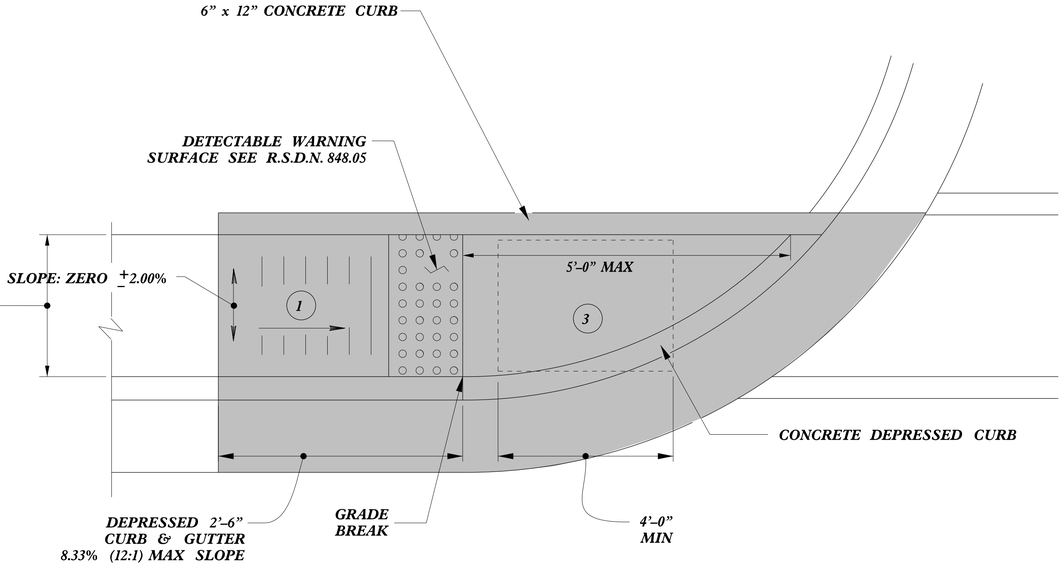
TYPE 1A



TYPE 1B



TYPE 1 Modified



TYPE 1

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'–0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

PAY LIMITS FOR 1 CURB RAMP

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

DocuSigned by: Joel S. Howerton 873F3D17DCDC45F...

8/6/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CONTRACT STANDARDS AND DEVELOPMENT UNIT

Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

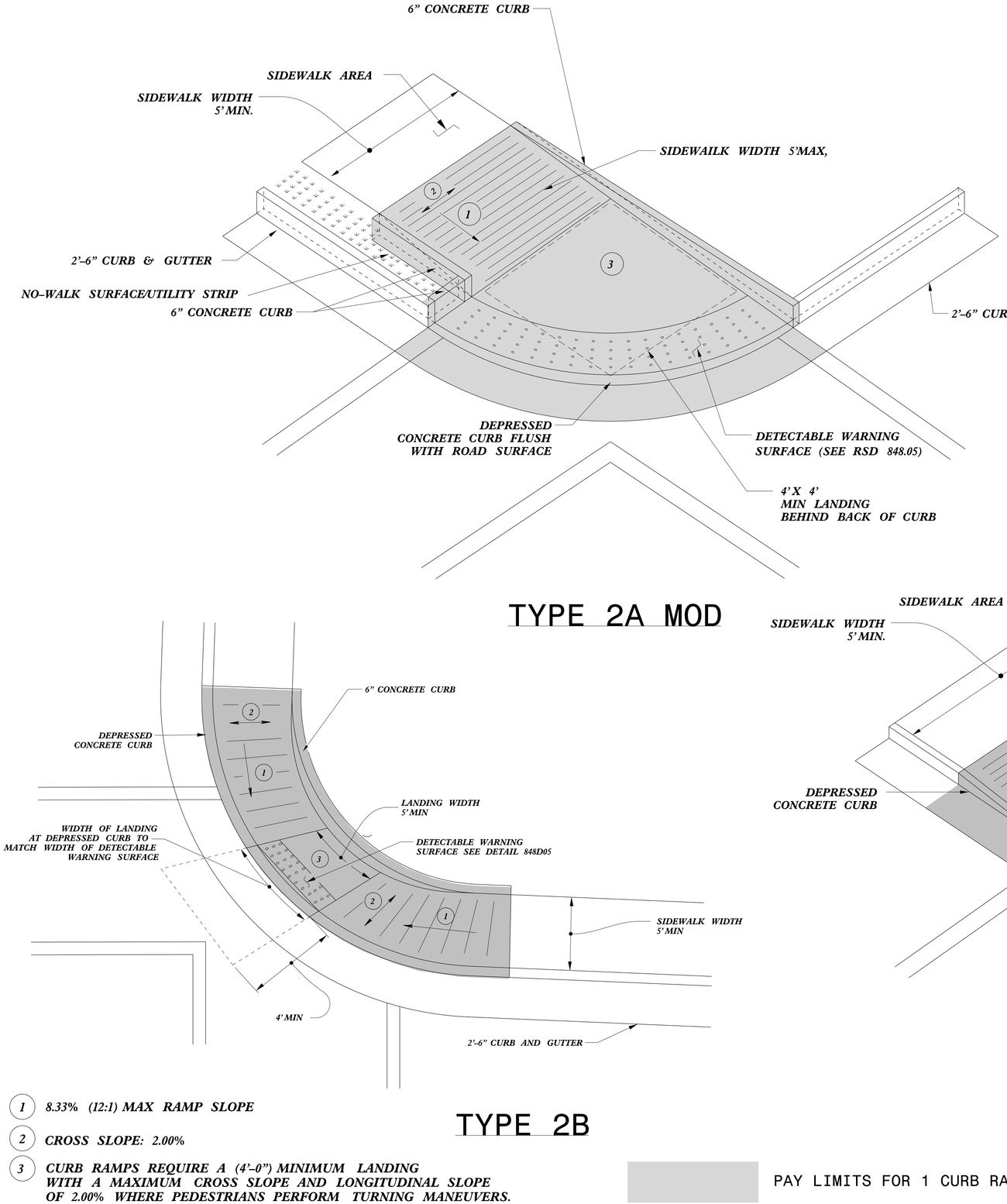
Directional Ramps

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

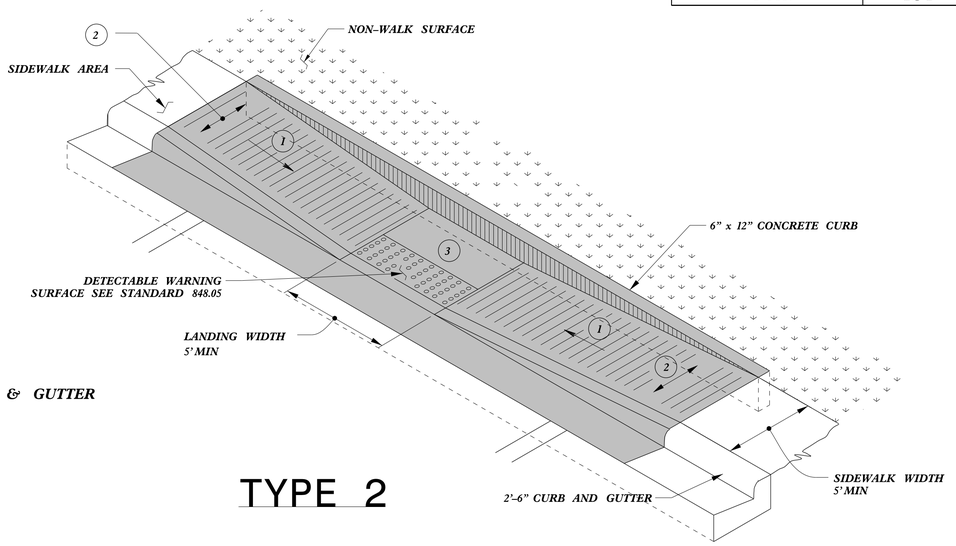
$$$$USERNAME$$$$ $$$$TIME$$$$ $$$$SYSTEM$$$$ $$$$DESIGN$$$$ $$$$DATE$$$$

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-2

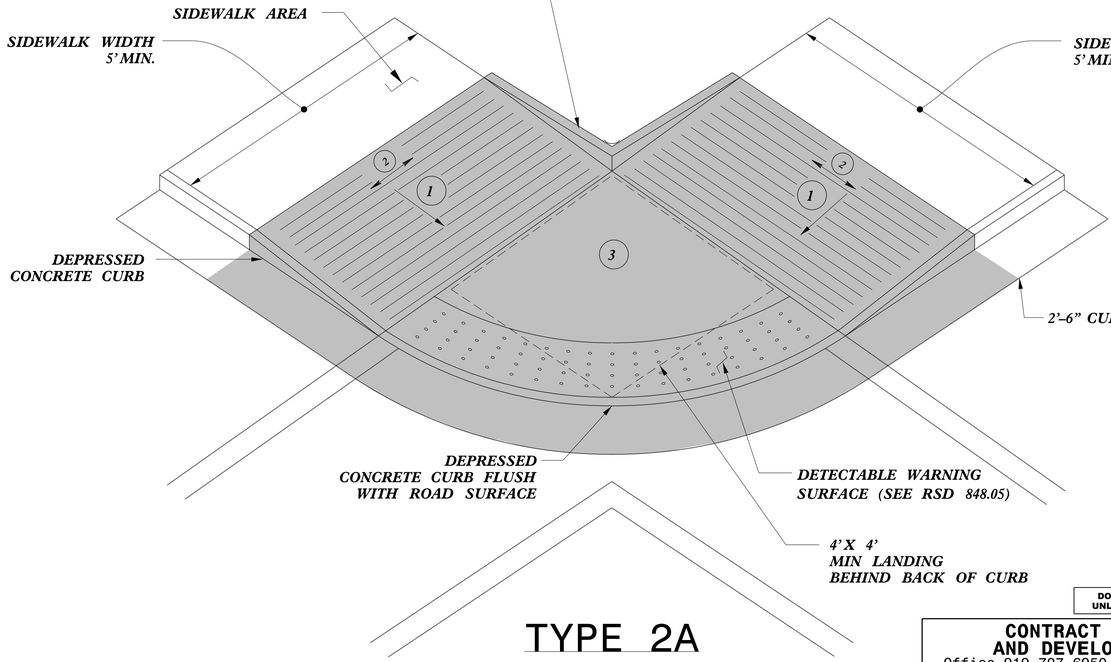


TYPE 2A MOD



TYPE 2

TYPE 2B



TYPE 2A

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

PAY LIMITS FOR 1 CURB RAMP

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

DocuSigned by: Joel S. Howerton 873F3D17DCDC45F...

8/6/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

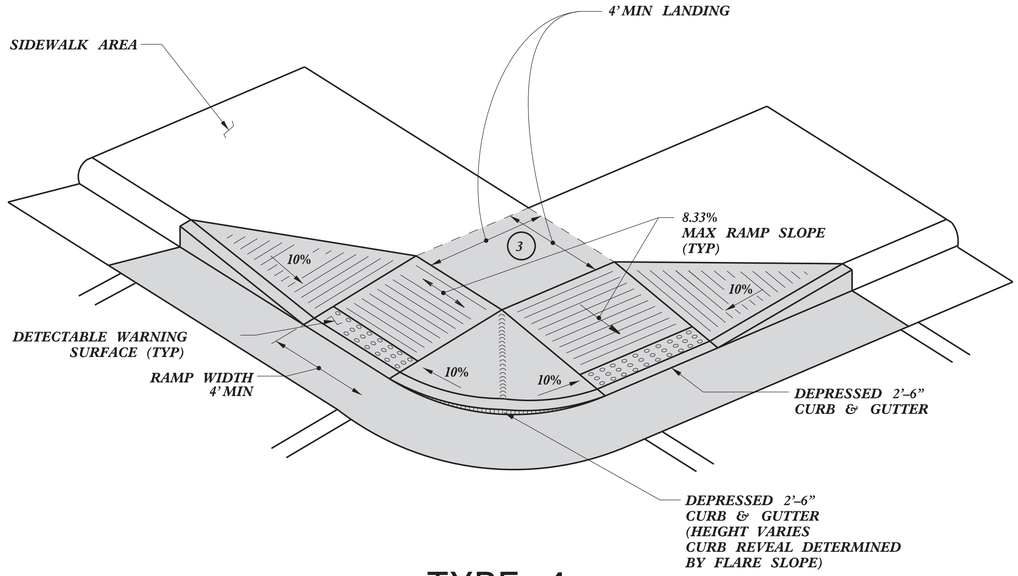
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

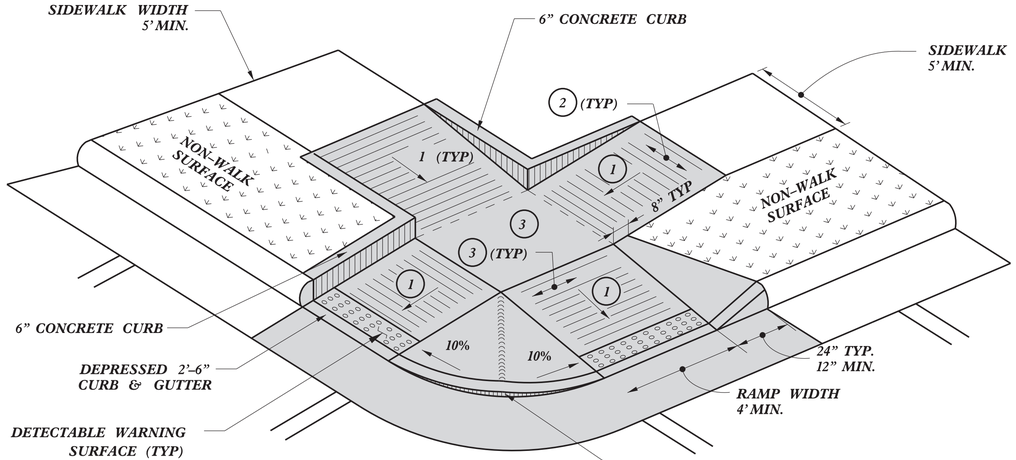
$$$$USERNAME$$$$ $$$$TIME$$$$ $$$$DGNS$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-3

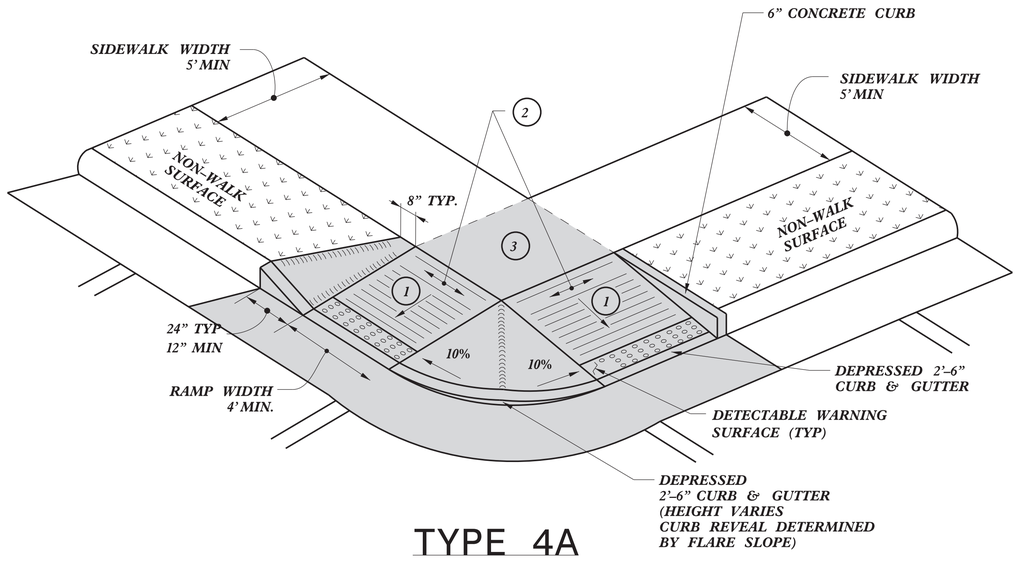


TYPE 4

PAY LIMITS FOR CURB RAMP



TYPE 5



TYPE 4A

(1) *8.33% (12:1) MAX RAMP SLOPE*

(2) *CROSS SLOPE: 2.00%*

(3) *CURB RAMPS REQUIRE A (4'–0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.*

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

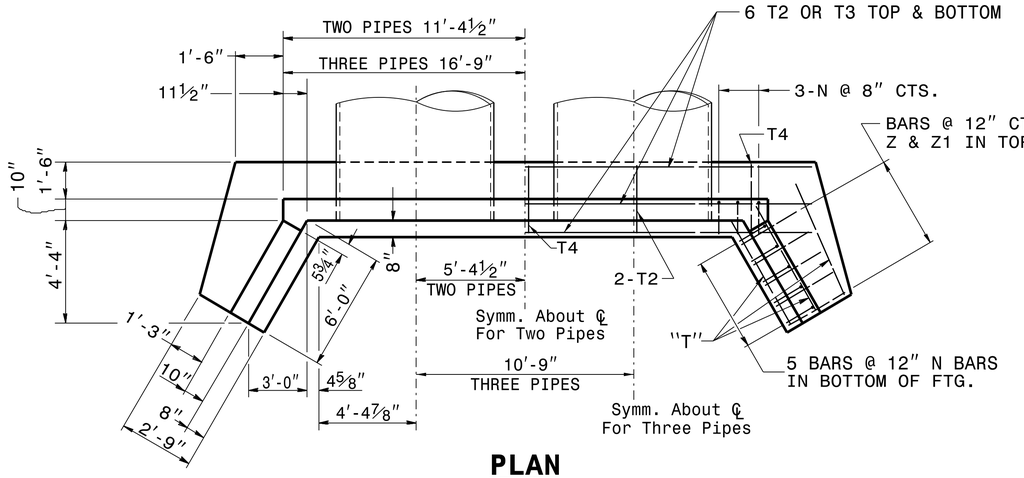
CONTRACT STANDARDS
AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

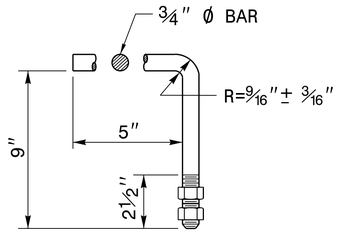
Shared Landing

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-4



PLAN



HOOK BOLT

NOTE: CONSTRUCT HOOK BOLTS (ANCHORS) AT 2'-0" CTS. ALONG THE CIRCUMFERENCE OF THE 95"X 67" CMP. EMBED THE HOOK BOLTS 6" IN DEPTH. THE GALVANIZED ¾" DIA. HOOK BOLTS MUST MEET ASTM A-307 OR ASTM A-836. BOTH BOLTS AND NUTS MUST BE IN ACCORDANCE WITH ASTM A-153 FOR GALVANIZING.

NOTES:

ALL CONCRETE TO BE CLASS "A".

ALL REINFORCING STEEL SHALL BE ASTMA615-GRADE 60.

ALL REINFORCING STEEL SHALL BE DEFORMED BARS. WHERE SPLICING OF REINFORCMENT IS NECESSARY, BARS ARE TO BE LAPPED 45 DIAMETERS. ALL DIMENSIONS RELATIVE TO REINFORCEMENT ARE TO CENTERS OF BARS.

THE FOOTING, CURTAIN WALL AND 4" OF WALL ARE TO BE POURED IN ONE OPERATION ALLOWING NO TIME FOR INITIAL SET TO TAKE PLACE BETWEEN THEM. THE REMAINING WALL SHALL THEN BE POURED IN ONE OPERATION.

ALL EXPOSED CORNERS ARE TO BE CHAMFERED 1".

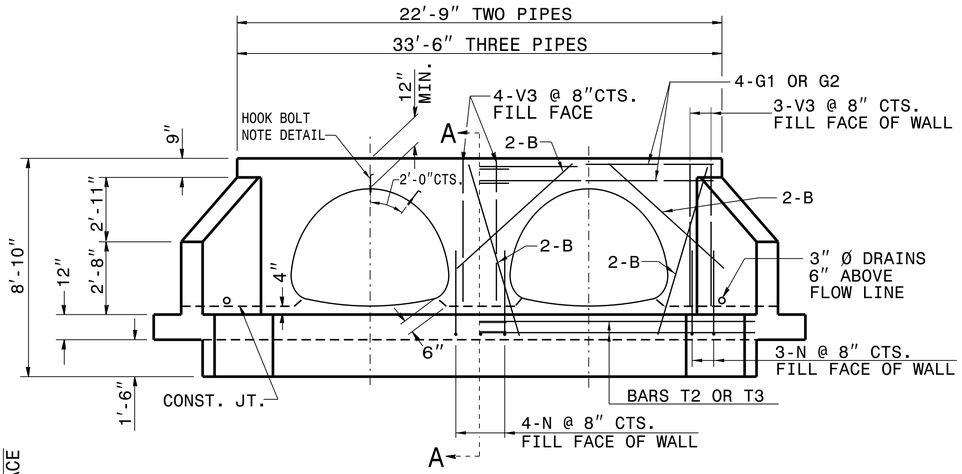
3" DIAMETER DRAINS SHALL BE PLACED IN WALL AS SHOWN AND BE 6" ABOVE NORMAL FLOW LINE.

ALL MATERIAL AND WORKMANSHIP AS PER N.C.DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.

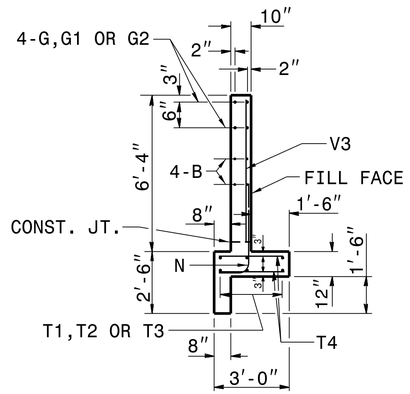
THE EXTRA BARS ARE PROVIDED FOR HOLDING REINFORCING STEEL IN CORRECT POSITION IN WING.

BILL OF MATERIAL FOR ENDWALL

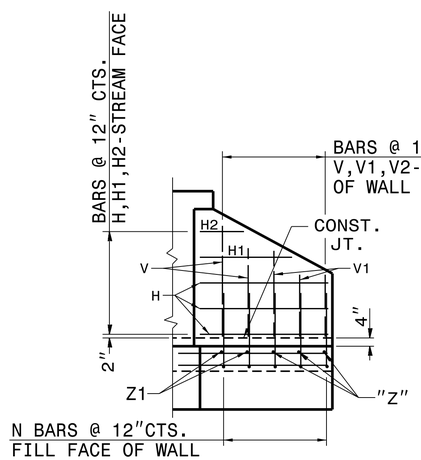
REINF. STEEL			1 PIPES		2 PIPES		3 PIPES	
BAR	SIZE	LENGTH	NO.	WEIGHT	NO.	WEIGHT	NO.	WEIGHT
B	#4	6'-6"	8	35	16	69	24	104
G	#5	11'-9"	4	49	-	-	-	-
G1	#5	12'-6"	-	-	8	104	-	-
G2	#5	17'-9"	-	-	-	-	8	148
H	#4	7'-0"	10	47	10	47	10	47
H1	#4	5'-6"	2	7	2	7	2	7
H2	#4	4'-0"	4	11	4	11	4	11
N	#4	4'-1"	16	44	20	55	24	65
T	#4	5'-0"	6	20	6	20	6	20
T1	#4	15'-0"	6	60	-	-	-	-
T2	#4	14'-0"	-	-	12	112	-	-
T3	#4	18'-3"	-	-	-	-	12	146
T4	#4	2'-9"	4	7	7	13	10	18
V	#4	4'-3"	6	17	6	17	6	17
V1	#4	3'-0"	6	12	6	12	6	12
V2	-	-	-	-	-	-		-
V3	#4	5'-10"	6	23	10	39	14	55
Z	#4	3'-6"	6	14	6	14	6	14
Z1	#4	4'-1"	4	11	4	11	4	11
REINF. STEEL LBS.				357		531		675
CON./R.C. CU. YDS.			6.2		8.6		11.0	



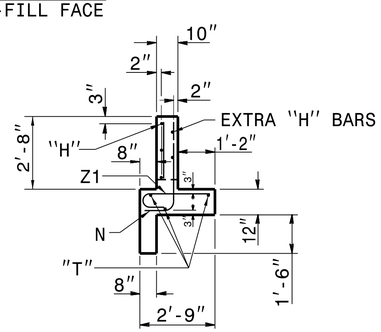
ELEVATION



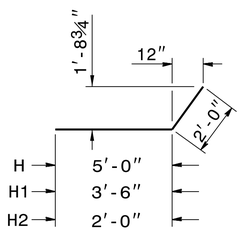
SECTION - AA



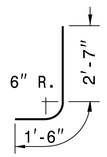
WING ELEVATION



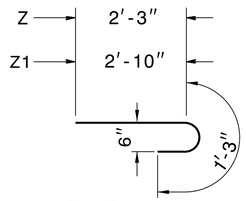
END OF WING



"H" BARS



"N" BARS



"Z" BARS

"H", "N", & "Z" BAR DIMENSIONS ARE OUT TO OUT.

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

DETAIL OF REINFORCED CONCRETE ENDWALL FOR 95"X 67" (Pipe Arch)-90°

ORIGINAL BY:		DATE:
MODIFIED BY:	rnbritt	DATE: 5-04-07
CHECKED BY:		DATE:
FILE SPEC.	details/nbritt/english/r4071endwpiparch95x67.dgn	

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

07-MAY-2018 11:16
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jhowerton
AT CSD-292595

24-APR-2019 07:24
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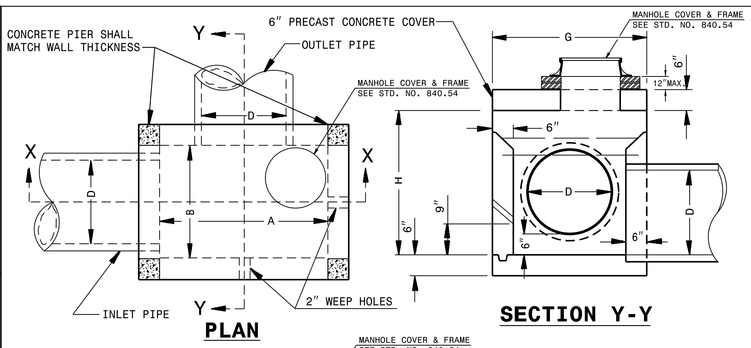
jhowerton AT CSD-292595

5/14/99

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

ENGLISH DETAIL DRAWING FOR

CONCRETE CATCH BASIN (3 OR 4 SIDE OPEN THROAT) (MANHOLE OPTIONAL)

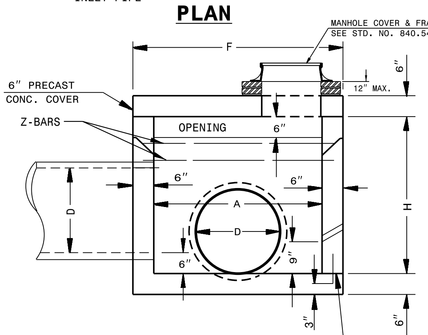


PLAN

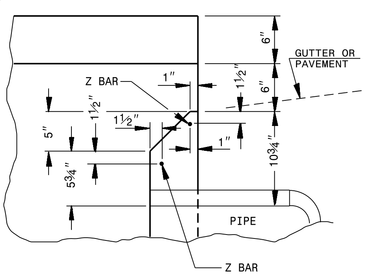
SECTION Y-Y

GENERAL NOTES:

ALL CATCH BASINS OVER 3'-6" IN DEPTH TO BE PROVIDED WITH STEPS 12" ON CENTERS. STEPS SHALL BE IN ACCORDANCE WITH STD. 840.66.
ALL EXPOSED CORNERS TO BE CHAMFERED 1".
CLASS "B" CONCRETE TO BE USED THROUGHOUT.
2" PIPE WEEPHOLES TO BE PLACED AS DIRECTED BY ENGINEER.
THE 6" OPENING SHOWN MAY BE INCREASED TO 8" MAXIMUM IF DEEMED TO BE NECESSARY BY THE ENGINEER.
OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #5 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.
FORMS ARE TO BE USED FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
IF REINFORCED CONCRETE PIPE IS SET IN BASE SLAB OF BOX, ADD TO BASE AS SHOWN ON STD. DWG. 840.00.
A STONE DRAIN CONSISTING OF 1 CUBIC FOOT OF NO. 78M STONE CONTAINED IN A BAG OF POROUS FABRIC SHALL BE PLACED AT EACH WEEP HOLE.
FOR 8' IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8' IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. QUANTITIES TO BE ADJUSTED ACCORDINGLY.
DIMENSIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.

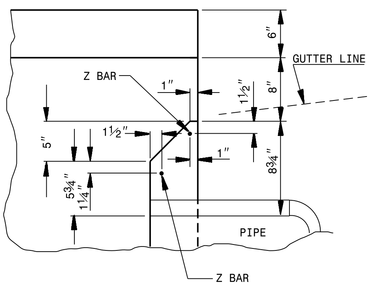


SECTION X-X



PART SECTION Y-Y

SHOWING METHOD OF CONSTRUCTION FOR 6" OPENING



PART SECTION Y-Y

SHOWING METHOD OF CONSTRUCTION IF INCREASED OPENING IS USED

MIN. DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN (BASED ON MIN. HEIGHT, H)

DIM'S OF BOX & PIPE				*REINFORCING*						*TOP & BOT. SLAB DIMENSIONS*		*CU. YDS. CONC. IN BOX*			*TOTAL QUANTITIES BOX & SLABS*		*DEDUCTION ONE PIPE*		*DED. ONE 6" THROAT OPENING*
PIPE	*SPAN*	*WIDTH*	*HEIGHT*	*BARS - X*		*BARS - Y*		*BARS - Z*											
D	A	B	H	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	F	G	TOP SLAB	BOT. SLAB	WALL/FT. HT.	LBS. REINF.	YD³ (MIN H)	C.S.	R.C.	YD³
12"	3'-6"	2'-3"	1'-10"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.046	0.015	0.032	0.046
15"	3'-6"	2'-3"	2'-1"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.108	0.023	0.036	0.046
18"	4'-0"	2'-8"	2'-4"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.379	0.033	0.049	0.053
24"	4'-0"	2'-8"	2'-10"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.521	0.059	0.085	0.053
30"	4'-0"	3'-6"	3'-4"	5	4'-3"	9	4'-9"	2	4'-9"	5'-0"	4'-6"	0.278	0.417	0.315	43	1.916	0.092	0.127	0.053
36"	4'-6"	4'-0"	3'-10"	5	4'-9"	10	5'-3"	2	5'-3"	5'-6"	5'-0"	0.340	0.510	0.352	51	2.390	0.132	0.178	0.059
42"	5'-0"	4'-6"	4'-4"	5	5'-3"	12	5'-9"	2	5'-9"	6'-0"	5'-6"	0.407	0.611	0.389	64	2.914	0.180	0.243	0.066
48"	5'-0"	5'-0"	4'-10"	5	5'-9"	13	5'-9"	2	5'-9"	6'-0"	6'-0"	0.444	0.666	0.407	68	3.298	0.235	0.317	0.066

SHEET 1 OF 2

840D04

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

ENGLISH DETAIL DRAWING FOR

CONCRETE CATCH BASIN (3 OR 4 SIDE OPEN THROAT) (MANHOLE OPTIONAL)

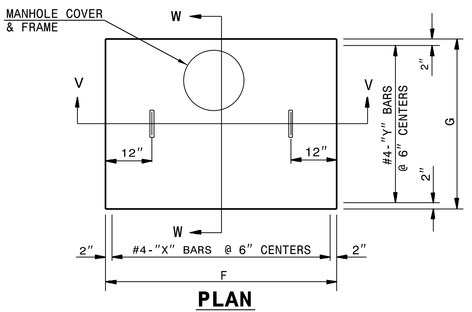
SHEET 1 OF 2

840D04

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

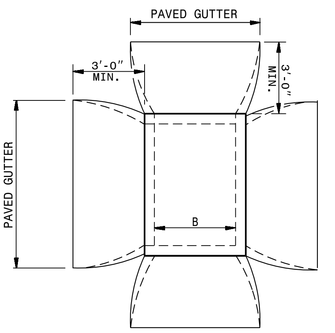
ENGLISH DETAIL DRAWING FOR

CONCRETE CATCH BASIN (3 OR 4 SIDE OPEN THROAT) (MANHOLE OPTIONAL)

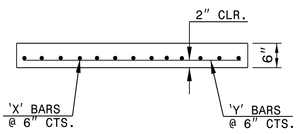


PLAN

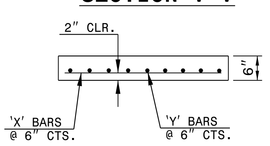
PLAN OF PRECAST COVER



PLAN OF CATCH BASIN IN MEDIAN STRIP



SECTION V-V



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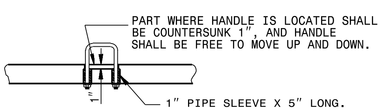
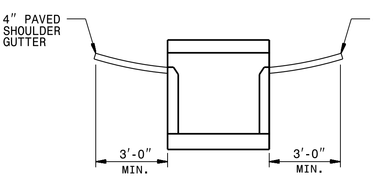


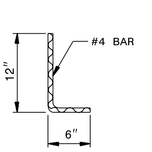
PART SECTION

THRU COVER SHOWING HANDLE

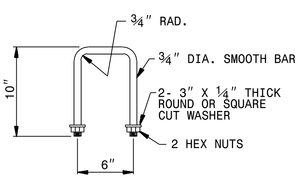


SECTION OF CATCH BASIN MEDIAN STRIP

DETAIL SHOWING METHOD OF PLACING CATCH BASIN AND PAVED SHOULDER GUTTER



DOWEL



DETAIL OF HANDLE

SHEET 2 OF 2

840D04

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

ENGLISH DETAIL DRAWING FOR

CONCRETE CATCH BASIN (3 OR 4 SIDE OPEN THROAT) (MANHOLE OPTIONAL)

SHEET 2 OF 2

840D04

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MODIFIED BY: rnbritt DATE:
CHECKED BY: DATE: 07-03-2014
FILE SPEC.: details/rbritt/english/hydro/840d04.dgn

PROJECT REFERENCE NO. U-5887
SHEET NO. 2C-5

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-6

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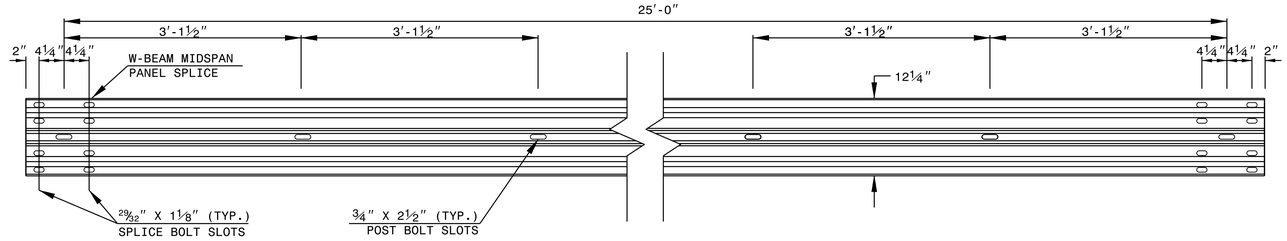
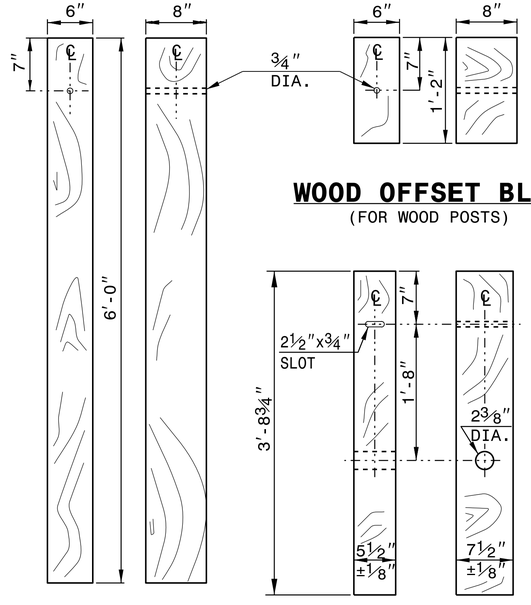
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02



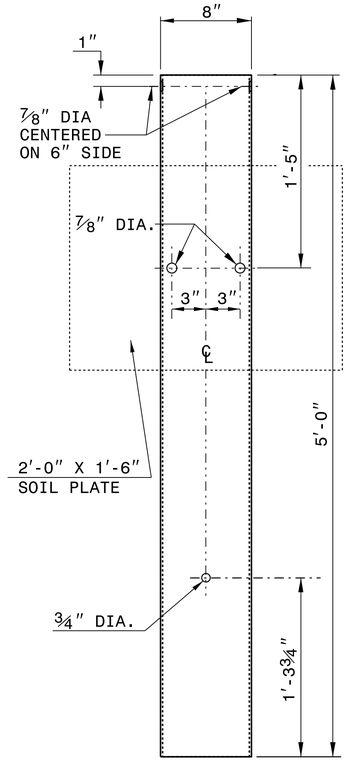
STANDARD W-BEAM GUARDRAIL



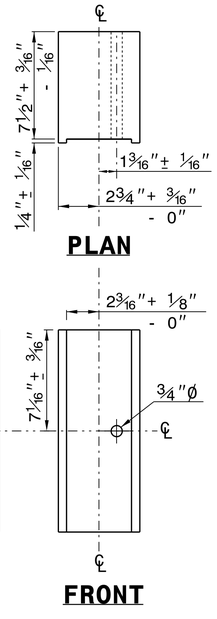
WOOD OFFSET BLOCK
(FOR WOOD POSTS)

STANDARD LINE POST

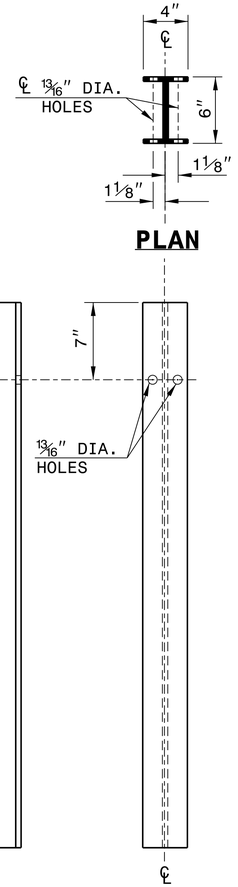
SHORT WOOD BREAKAWAY POST



STEEL TUBE
TS 6"x8"x0.1875"



ROUTED OFFSET BLOCK



"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 JOHN S. HOWERTON

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: _____
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FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-7

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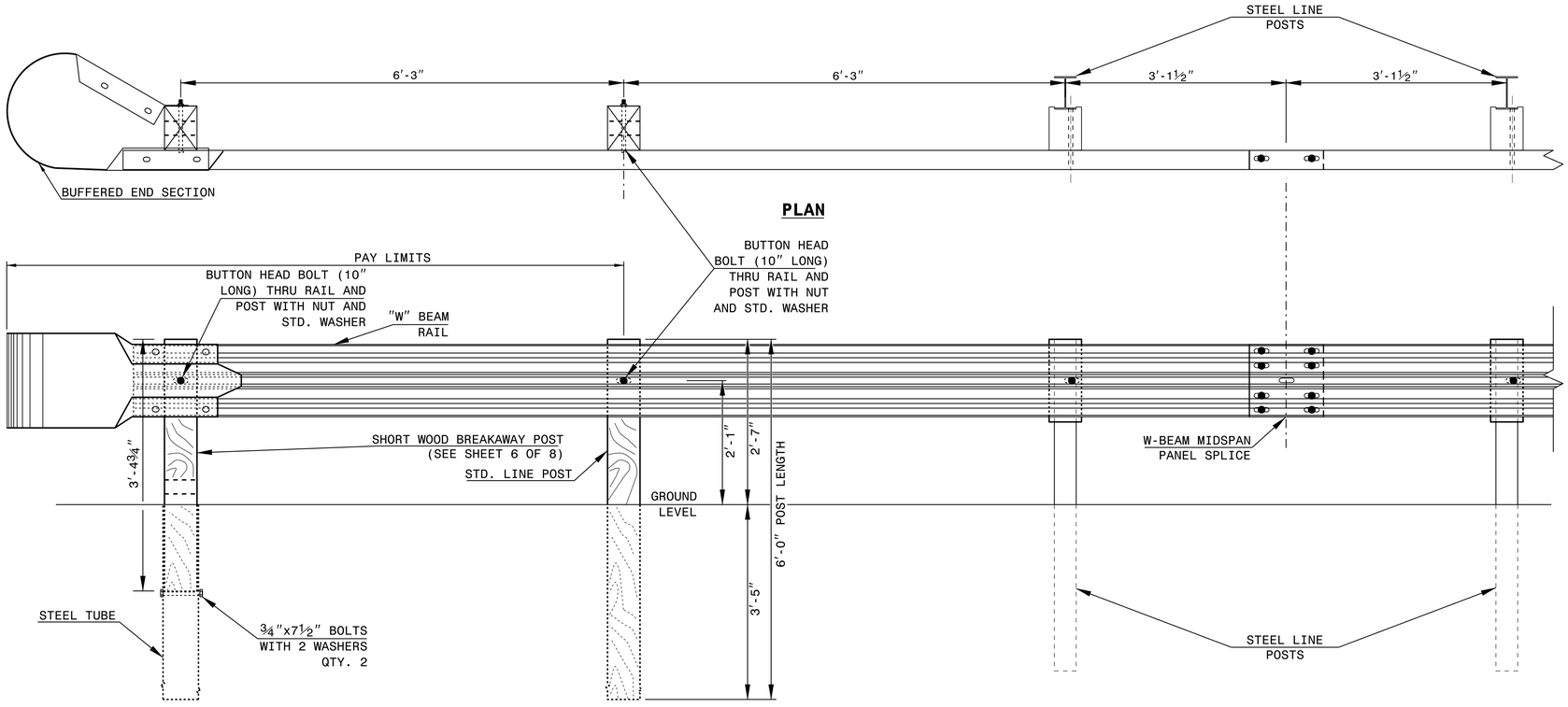
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION



TRAILING END UNIT ASSEMBLY

A.T.-1 SYSTEM

SHEET OF

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET OF

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER DANIEL S. HOWERTON

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

A.T.-1 SYSTEM

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U-5887	2C-8

STATE OF
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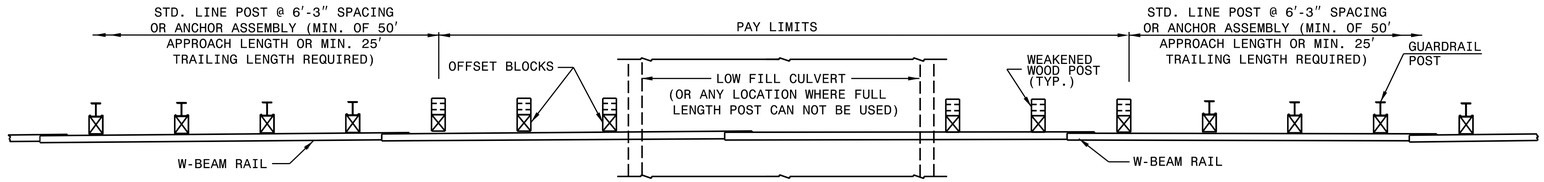
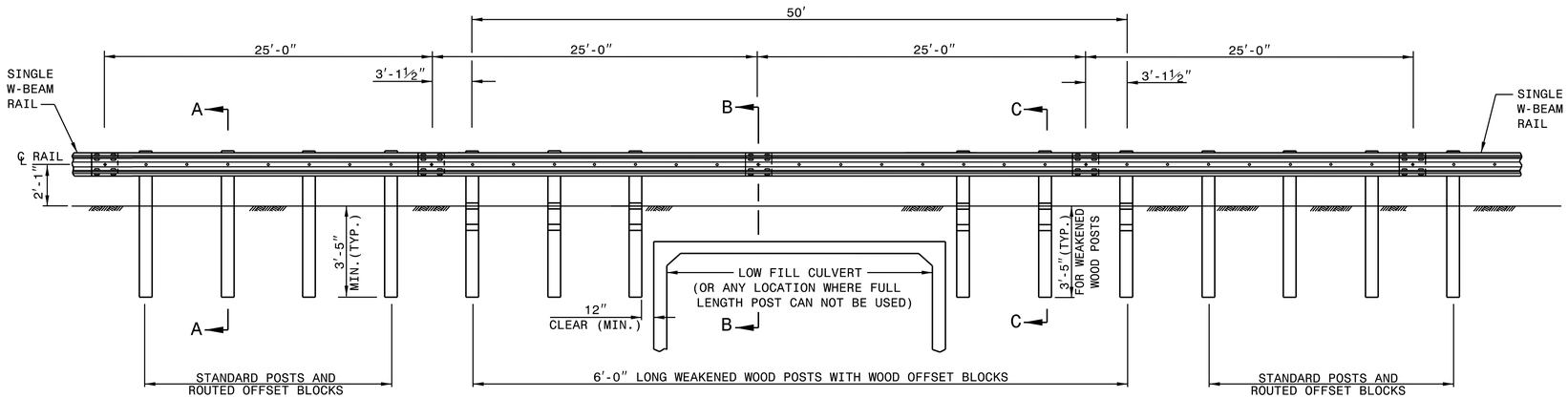
RALEIGH, N.C.

SPECIAL DETAIL FOR
GUARDRAIL PLACEMENT
25'-0" CLEAR SPAN

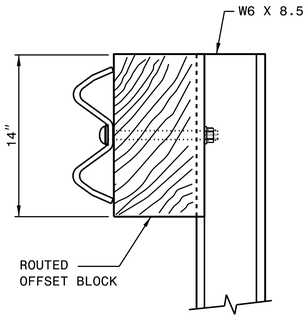
SHEET - OF -
862D01



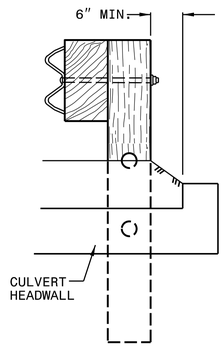
PLAN



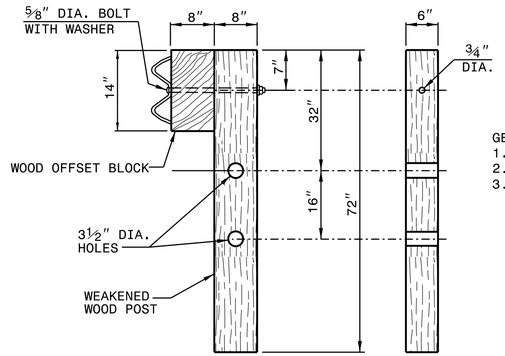
ELEVATION
25'-0" GUARDRAIL SPAN



SECTION A-A



SECTION B-B



SECTION C-C **FRONT**
WEAKENED WOOD POST

GENERAL NOTES:
1. LAP RAIL IN THE DIRECTION OF TRAFFIC FLOW.
2. SEE ROADWAY PLANS FOR LOCATIONS AND CONTINUATION OF RAIL OR END SECTIONS.
3. MINIMUM DISTANCE OF 5 FEET BEHIND THE GUARDRAIL SHOULD BE CLEAR OF ANY FIXED-OBJECT HAZARDS THAT COULD SNAG AN IMPACTING VEHICLE.

STATE OF
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RALEIGH, N.C.

SPECIAL DETAIL FOR
GUARDRAIL PLACEMENT
25'-0" CLEAR SPAN

SHEET - OF -
862D01

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON

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

25'-0" CLEAR SPAN GUARDRAIL PLACEMENT

ORIGINAL BY: _____ DATE: _____
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

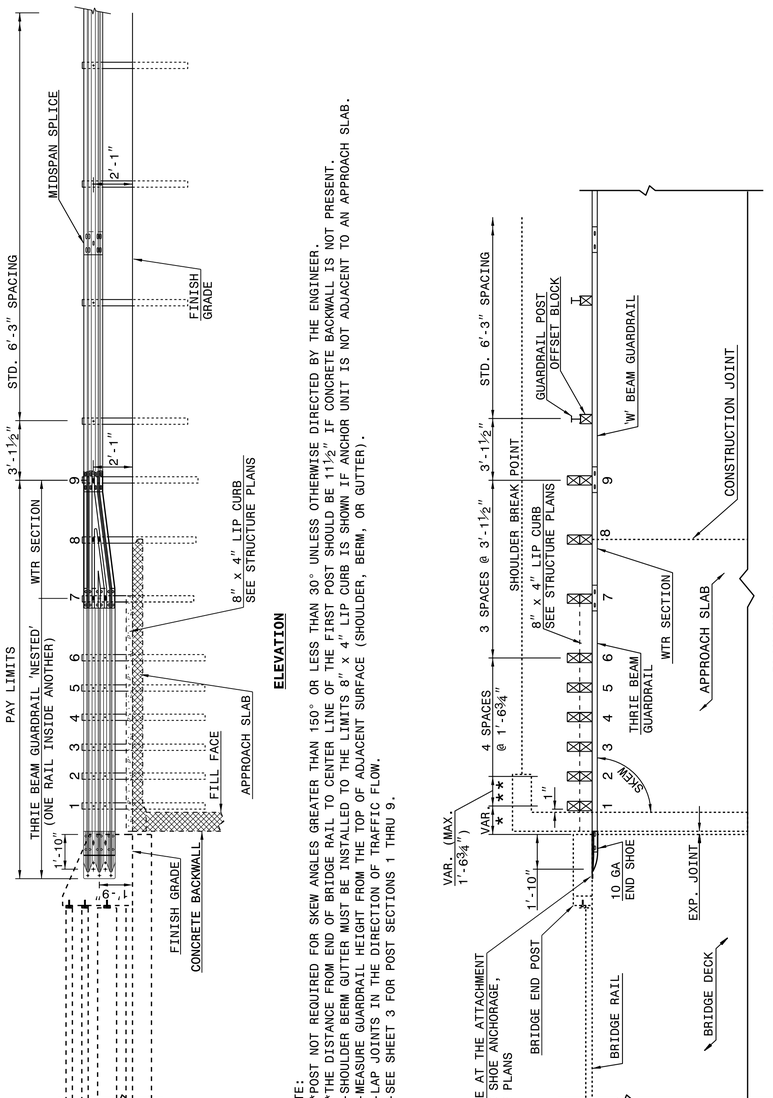
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2C-9

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

PLAN VIEW

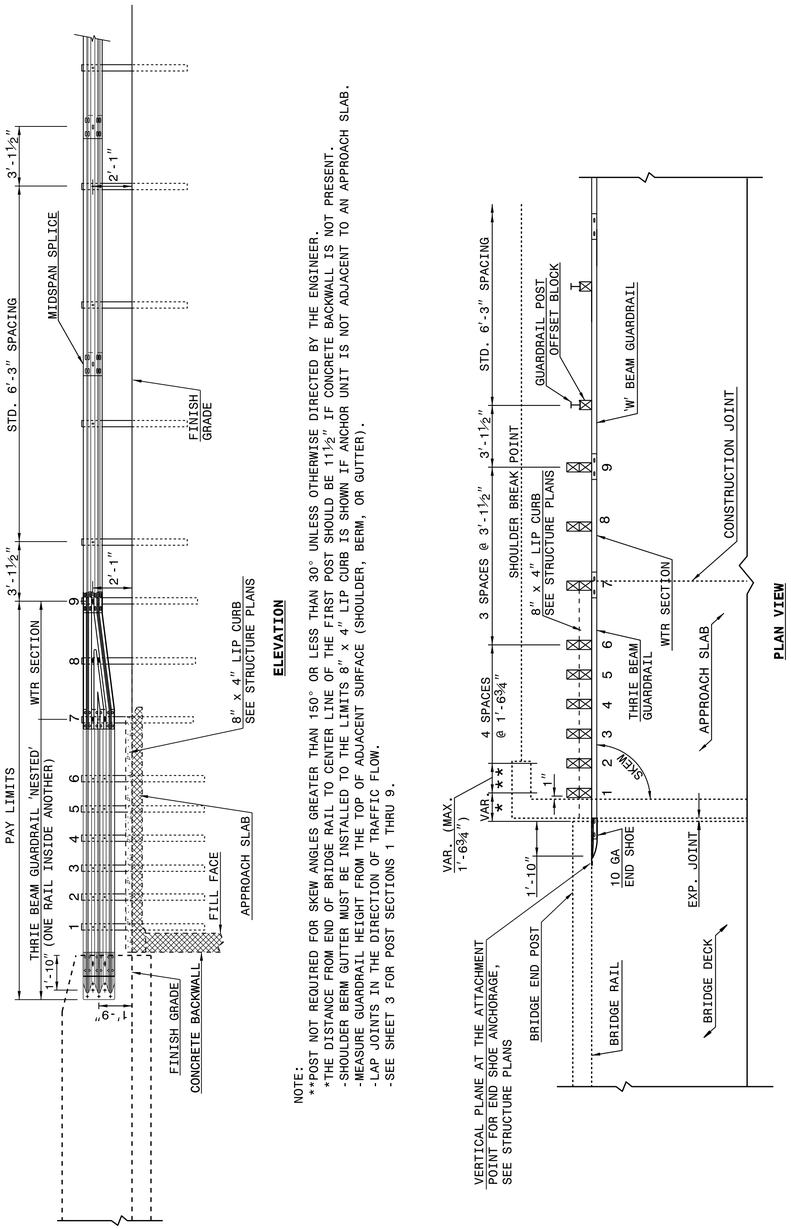
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

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.

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 - SUB REGIONAL TIER

SHEET 2 OF 7
862D03



ELEVATION

PLAN VIEW

GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

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.
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-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-SEE SHEET 3 FOR POST SECTIONS 1 THRU 9.

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

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

SEE TITLE BLOCK

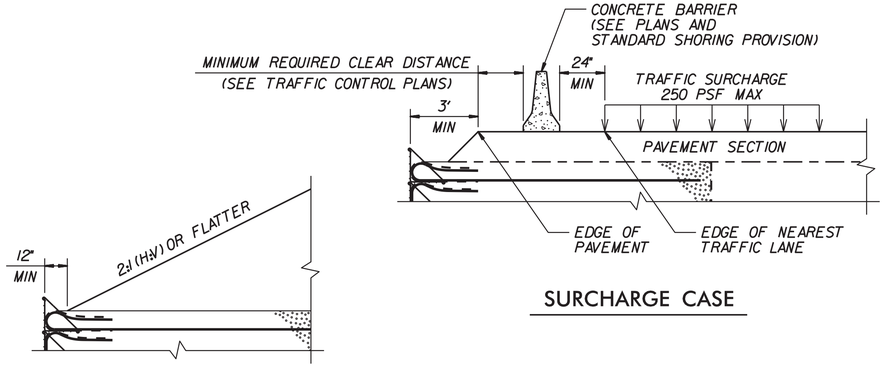
ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2G-1

GEOTECHNICAL ENGINEER — SIGNATURE / DATE

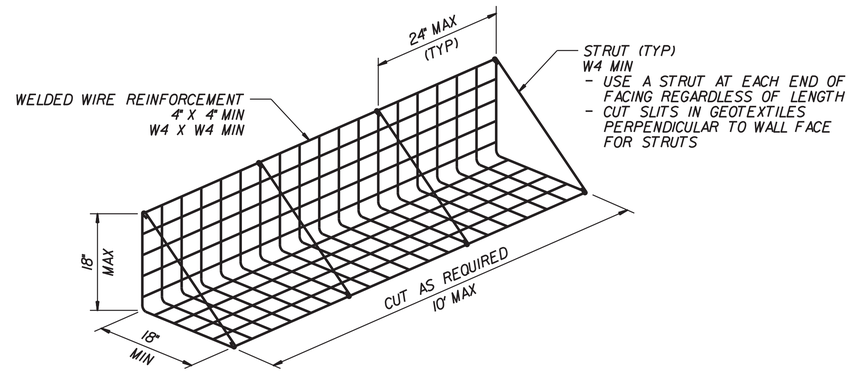
ENGINEER — SIGNATURE / DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

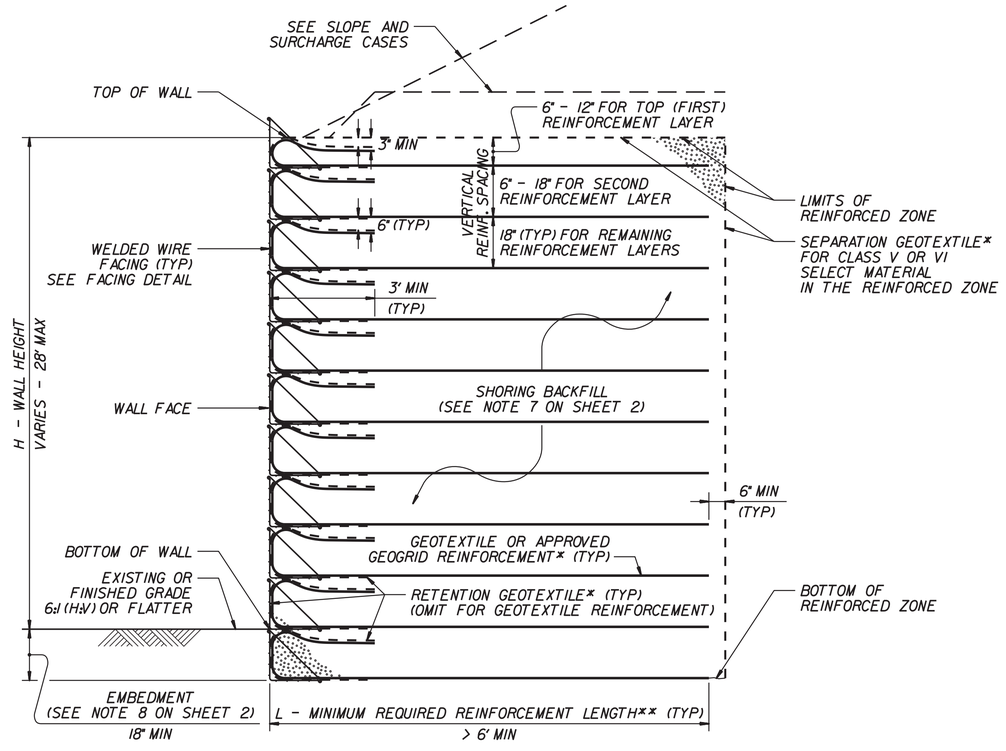


SURCHARGE CASE

SLOPE CASE

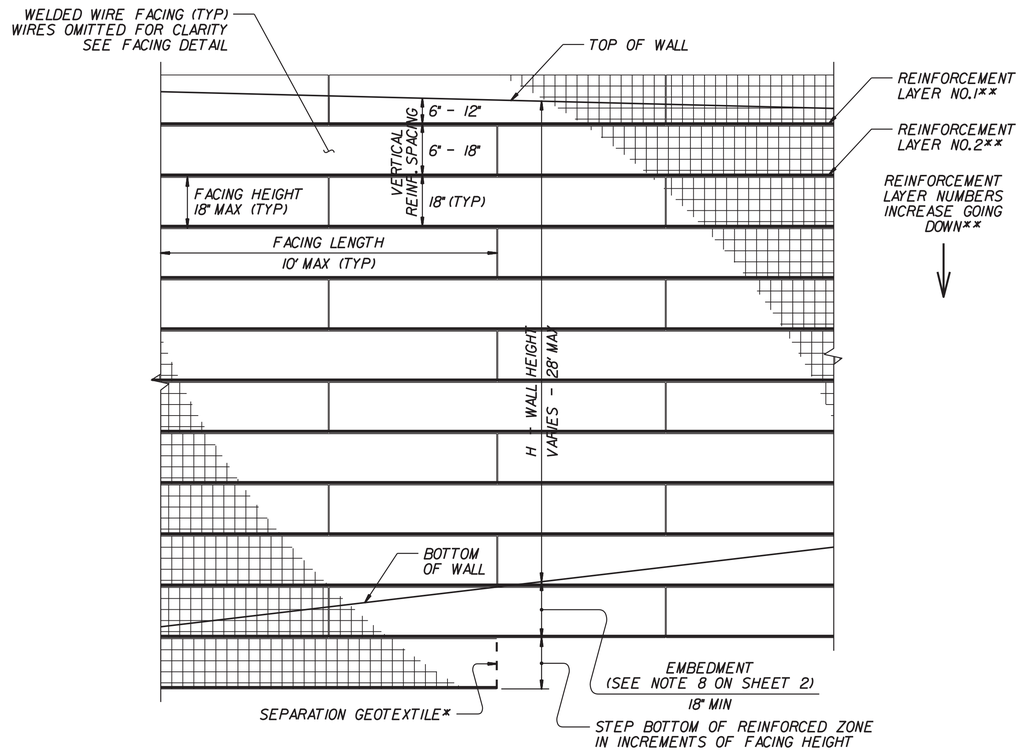


FACING DETAIL



STANDARD TEMPORARY WALL

(FOR STANDARD TEMPORARY WALLS ON STRUCTURES, SEE TEMPORARY WALL ON STRUCTURE DETAIL ON SHEET 2.)
*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.



STANDARD TEMPORARY WALL – PARTIAL ELEVATION

*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 1 OF 3

DATE: 11-19-13

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2G-2

GEOTECHNICAL ENGINEER — SIGNATURE — DATE

ENGINEER — SIGNATURE — DATE

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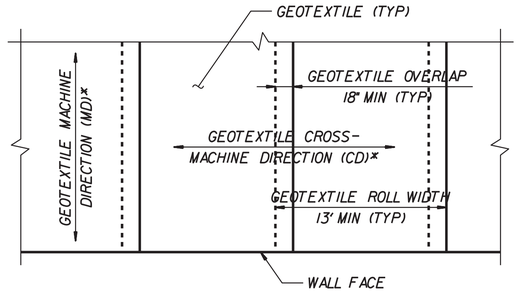
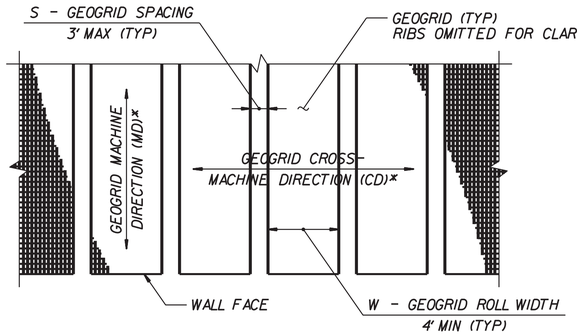


GEOTEXTILE PLACEMENT

(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



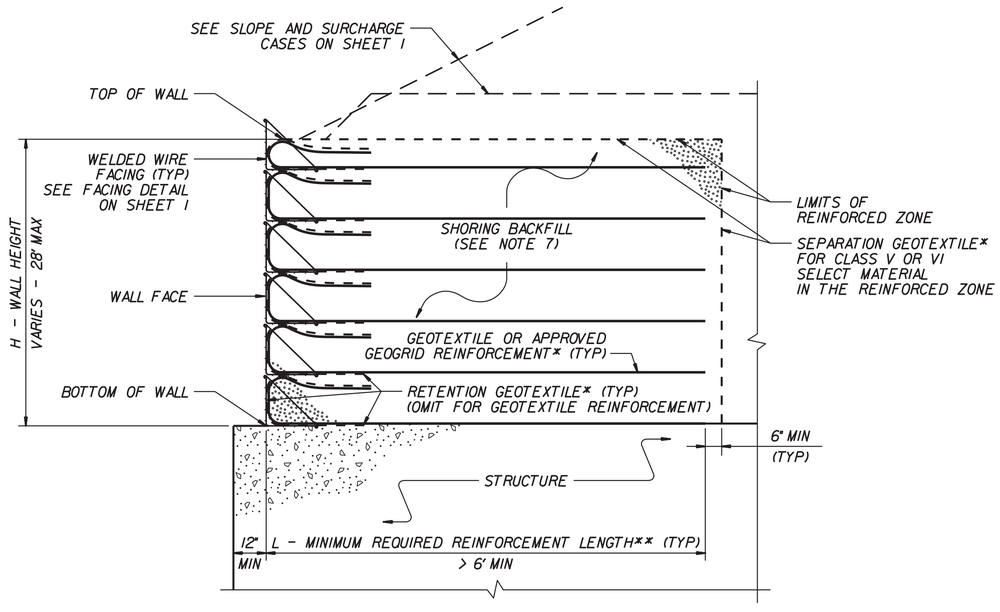
GEOGRID PLACEMENT

(80% COVERAGE MIN FOR GEOGRID REINFORCEMENT – $\frac{W}{W+S}$ x 100 $\geq$ 80%, SEE NOTE 11)

GEOSYNTHETIC PLACEMENT DETAILS

(PLAN VIEW)

*SEE NOTE 12.



TEMPORARY WALL ON STRUCTURE DETAIL

*SEE GEOSYNTHETIC PLACEMENT DETAILS.

**SEE REINFORCEMENT TABLES ON SHEET 3.

NOTES:

1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY WALLS AS NOTED IN THE PLANS.
2. FOR STANDARD TEMPORARY WALLS, SEE STANDARD SHORING PROVISION.
3. STANDARD TEMPORARY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
   UNIT WEIGHT, γ = 120 PCF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 PSF
4. DO NOT USE STANDARD TEMPORARY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE STANDARD TEMPORARY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW TEMPORARY WALLS.
6. USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, ASSUME GROUNDWATER DEPTH IS LESS THAN 7' BELOW BOTTOM OF REINFORCED ZONE. DO NOT USE STANDARD TEMPORARY WALLS IF GROUNDWATER IS ABOVE BOTTOM OF REINFORCED ZONE.
7. DO NOT USE A-2-4 SOIL FOR STANDARD TEMPORARY WALLS AROUND CULVERTS OR IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS FOR SLOPE CASES. DO NOT USE CLASS VI SELECT MATERIAL IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS WITH GEOTEXTILE REINFORCEMENT.
8. EMBEDMENT IS NOT REQUIRED FOR STANDARD TEMPORARY WALLS ON STRUCTURES OR ROCK AS DETERMINED BY THE ENGINEER.
9. DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH STANDARD TEMPORARY WALL.
10. GEOGRIDS ARE TYPICALLY APPROVED FOR ULTIMATE TENSILE STRENGTHS IN THE MACHINE DIRECTION (MD) AND CROSS-MACHINE DIRECTION (CD) OR SHORT-TERM DESIGN STRENGTHS FOR A 3-YEAR DESIGN LIFE IN THE MD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Manual.aspx
    DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SHORING BACKFILL AS FOLLOWS:

MATERIAL TYPE	SHORING BACKFILL
BORROW	A-2-4 SOIL
FINE AGGREGATE	CLASS II, TYPE I OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL

    IF THE WEBSITE DOES NOT LIST A SHORT-TERM DESIGN STRENGTH FOR AN APPROVED GEOGRID, USE A SHORT-TERM DESIGN STRENGTH EQUAL TO THE ULTIMATE TENSILE STRENGTH DIVIDED BY 3.5 FOR THE GEOGRID REINFORCEMENT.
11. FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
12. AT THE CONTRACTOR'S OPTION, REINFORCEMENT MAY BE INSTALLED WITH THE MD PARALLEL TO THE WALL FACE IF BOTH OF THE FOLLOWING CONDITIONS OCCUR:
    - W (REINFORCEMENT ROLL WIDTH) ≥ (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
    - REINFORCEMENT STRENGTH IN CD ≥ MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
13. SUBMIT A "STANDARD TEMPORARY WALL SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY WALL CONSTRUCTION. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
14. DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
15. FOR STANDARD TEMPORARY WALLS WITH PILE FOUNDATIONS IN THE REINFORCED ZONE, DRIVE PILES THROUGH REINFORCEMENT AFTER CONSTRUCTING TEMPORARY WALLS.
16. DO NOT SPLICE OR OVERLAP REINFORCEMENT SO SEAMS ARE PARALLEL TO THE WALL FACE.
17. CONTACT THE ENGINEER WHEN EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT.
18. FOR STANDARD TEMPORARY WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
19. FOR STANDARD TEMPORARY WALLS WITH TOP OF WALL WITHIN 5' OF FINISHED GRADE, REMOVE TOP FACING AND INCORPORATE TOP REINFORCEMENT LAYER INTO FILL WHEN PLACING FILL IN FRONT OF WALL.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD TEMPORARY WALL SHEET 2 OF 3

DATE: 11-19-13

PROJECT REFERENCE NO.	SHEET NO.
U-5887	2G-3

GEOTECHNICAL ENGINEER — SIGNATURE — DATE

ENGINEER — SIGNATURE — DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SLOPE OR SURCHARGE CASE	GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)	H – WALL HEIGHT (FT)																								
			< 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
SLOPE CASE	> 0	CLASS II,TYPE I, CLASS III,CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	8	9	11	12	13	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26	27	27
SURCHARGE CASE	> 0 TO 7 FOR H < 20' > 0 TO 10 FOR H ≥ 20'	ALL SHORING BACKFILL TYPES	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21	22
	> 7 FOR H < 20' > 10 FOR H ≥ 20'	A-2-4 SOIL	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21
		CLASS II,TYPE I OR CLASS III SELECT MATERIAL	6	6	7	7	8	8	9	10	10	11	11	12	12	13	14	15	15	16	16	17	17	18	18	19	20
		CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	7	7	8	8	9	9	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19

L – MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)

(FOR ALL REINFORCEMENT TYPES)

REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400	2400
2	2400	2400	2400	2400	2400
3	2400	2400	2400	2400	2400
4	2400	2400	2500	2400	2400
5	2500	2400	3000	2400	2400
6	3000	2400	3500	2800	2400
7	3500	2700	4000	3200	2600
8	4000	3100	4500	3600	2900
9	4500	3500	5000	4000	3200
10	5000	3900	5500	4400	3500
11	5500	4300	6000	4800	3800
12	6000	4700	6500	5200	4100
13	6500	5100	7000	5600	4400
14	7000	5400	7500	6000	4700
15	7500	5800	8000	6400	5000
16	8000	6200	8500	6800	5300
17	8500	6600	9000	7200	5600
18	9000	7000	9500	7600	5900
19	9500	7400	10000	8000	6200
20	10000	7800	10500	8400	6500

GEOTEXTILE REINFORCEMENT
ULTIMATE TENSILE STRENGTH (LB/FT)

REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL	A-2-4 SOIL	CLASS II,TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL
1	240	200	340	290	240
2	380	310	520	430	350
3	530	420	700	570	460
4	690	550	870	720	570
5	860	690	1050	860	680
6	1030	830	1220	1000	790
7	1200	970	1400	1150	900
8	1370	1110	1580	1290	1010
9	1550	1240	1750	1430	1120
10	1720	1380	1930	1580	1230
11	1890	1520	2100	1720	1340
12	2060	1660	2280	1860	1450
13	2240	1800	2450	2010	1560
14	2410	1940	2630	2150	1670
15	2580	2080	2800	2290	1780
16	2750	2220	2980	2440	1890
17	2930	2360	3160	2580	2000
18	3100	2500	3330	2720	2110
19	3270	2640	3510	2860	2220
20	3440	2780	3690	3000	2330

GEOGRID REINFORCEMENT
SHORT–TERM DESIGN STRENGTH (LB/FT)

(SEE NOTE 10 ON SHEET 2.)

WALL HEIGHT (H) + EMBEDMENT (FT)	NUMBER OF REINFORCEMENT LAYERS*
2.5 – 4	3
4 – 5.5	4
5.5 – 7	5
7 – 8.5	6
8.5 – 10	7
10 – 11.5	8
11.5 – 13	9
13 – 14.5	10
14.5 – 16	11
16 – 17.5	12
17.5 – 19	13
19 – 20.5	14
20.5 – 22	15
22 – 23.5	16
23.5 – 25	17
25 – 26.5	18
26.5 – 28	19
28 – 29.5	20

*BASED ON VERTICAL REINFORCEMENT SPACING SHOWN ON SHEET 1.

MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD

(SEE NOTE 9 ON SHEET 2.)
*SEE PARTIAL ELEVATION ON SHEET 1 FOR REINFORCEMENT LAYER NUMBERING.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD TEMPORARY WALL SHEET 3 OF 3

DATE: 11-19-13

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

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	25' CLEAR SPAN GUARDRAIL SECTIONS	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GREU TL-2	TYPE III	XIII	CAT-1	VI MOD	BIC	AT-1	EA	G	NG				
L	13+30.00	14+95.84	LT.	156.25'			14+95.84		7.50'								1	1												SEE NOTE 1 BELOW.
L	21+21.96	22+72.43	RT.	131.25'	25.00'		21+21.96		10.00'								1						1					242.00'		SEE NOTE 1 BELOW.
L	25+11.50	41+66.87	LT.	1640.32'			41+66.87		2.00'								2											2,205.00'	1	SEE NOTE 1 BELOW.
L	40+32.31	42+41.72	RT.	158.11'	129.39'		40+32.31		4.00'														2							SEE NOTES 1 AND 2 BELOW.
SUBTOTAL				2,085.93	154.39'												4	1					3					2,447.00'	1	
DEDUCTIONS																														
GREU TL-2 4@25'				-100'																										
TYPE III 1@18.75'				-18.75'			ADDITONAL GUARDRAIL POSTS = 10 EACH																							
AT-1 3@6.25'				-18.75'																										
25' CLEAR SPAN 1@25'				-25.00'																										
TOTAL				1,923.43'	154.39'																									
SAY				1,925.00'	162.50'												4	1					3					2,447.00'	1	

NOTES:
1. ALL GUARDRAIL ON PROJECT TO BE POWDER COATED BROWN.
2. OMIT ONE GUARDRAIL POST OVER THE PROPOSED CULVERT (-L- STA. 40+90 RT) AND PROVIDE 25' OF NESTED GUARDRAIL AS SHOWN ON STD DWG 846.03, SHEET 1 OF 2.

SUMMARY OF EARTHWORK
IN CUBIC YARDS

STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
10+00.00 -L-	22+29.03 -L-	727	2,906	2,179	
13+50.00 -Y1-	17+50.00 -Y1-	84			84
SUBTOTALS:		811	2,906	2,179	84
22+58.70 -L-	40+79.18 -L-	842	5,049	4,207	
10+19.55 -Y2-	11+17.59 -Y2-	62	9		53
SUBTOTALS:		904	5,057	4,206	52
40+87.32 -L-	66+16.58 -L-	1,388	5,847	4,459	
10+20.11 -Y3-	11+50.00 -Y3-	12	95	83	
10+21.94 -Y5-	11+61.93 -Y5-	13	128	115	
11+60.00 -Y6-	12+80.71 -Y6-	6	81	75	
10+14.02 -Y7-	11+00.00 -Y7-	117			117
10+00.00 -PATH2-	17+71.81 -PATH2-	248	1,201	953	
SUBTOTALS:		1,784	7,350	5,683	117
TOTAL		3,499	15,313	12,068	253
WASTE IN LIEU OF BORROW				-253	-253
PROJECT TOTALS:		3,499	15,313	11,815	
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT				591	
GRAND TOTALS:		3,499	15,313	12,405	
SAY:		3,500		12,410	

SUMMARY OF EXISTING ASPHALT PAVEMENT REMOVAL

IN SQUARE YARDS					
LINE	LOCATION	ASPHALT REMOVAL	ASPHALT BREAK-UP	CONCRETE REMOVAL	CONCRETE BREAKUP
-L-	14+62.64 TO 23+27.90	402.56			
-L-	24+77.65 TO 26+17.73	65.29			
-L-	31+89.67 TO 38+17.06	145.21			
-L-	38+80.65 TO 40+23.33	506.47			
-L-	40+28.99 TO 42+52.15	706.74			
	TOTAL	1,826.27			
	SAY	1,830.00			

CONTINGENCY ITEMS:
INCIDENTAL STONE = 50 TONS
UNDERCUT EXCAVATION = 50 CY
SELECT GRANULAR MATERIAL = 50 CY
GEOTEXTILE FOR SOIL STABILIZATION = 50 SY

Approximate quantities only. Unclassified excavation, borrow excavation, fine grading, clearing and grubbing, and removal of existing pavement will be paid for at the contract lump sum price for "grading".

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.

WKS-1903PY-13

COMPUTED BY: CSE DATE: 3/8/2021

CHECKED BY: JCF DATE: 3/8/2021

PROJECT NO.	SHEET NO.
U-5887	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	OFFSET	STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %
Y1 16+74	18 LT	0401		2125.3			
		0401	0402		2123.1	2121.2	0.3
Y1 16+08	22 LT	0402		2124.2			
		0402	0404		2121.2	2120.1	0.5
L 11+50	18 RT	0403		2124.0			
		0403	0413		2121.3	2121.1	
L 10+49	33 RT	0404		2123.1			
		0404	0405		2120.1	2118.7	0.5
L 10+50	25 LT	0405		2121.7			
		0405	0406		2118.7	2116.0	0.6
Y1 14+73	18 LT	0406		2119.0			
		0406	0407		2116.0	2114.2	0.7
Y1 13+57	18 LT	0407		2117.2			
		0407	0408		2114.2	2113.7	0.8
Y1 13+57	25 LT	0408		2116.5			
		0408	0409		2113.5	2113.2	0.3
L 15+34	13 LT	0410		2117.8			
		0410	0412		2114.8	2111.2	
L 17+20	15 RT	0411		2115.0			
		0411	0412		2113.5	2110.9	0.3
L 17+52	13 LT	0412		2114.2			
		0412	0501		2110.4	2109.0	
L 11+23	14 RT	0413		2125.4			
		0413	0404		2121.1	2120.1	
L 18+41	13 LT	0501		2112.7			
		0501	0501A		2109.0	2108.2	
L 20+28	13 LT	0501A		2113.5			
		0501A	0503		2108.2	2106.0	
L 21+16	27 LT	0503		2109.7			
		0503	0504		2106.0	2105.9	
L 24+59	19 RT	0505		2109.7			
		0505	0506		2108.3	2105.6	
L 28+15	20 RT	0508		2107.5			
		0508	0513		2104.5	2104.2	
L 28+74	20 RT	0510		2108.0			
		0510	0511		2105.0	2104.8	
L 28+74	13 LT	0511		2109.5			
		0511	0513		2104.8	2103.6	
L 27+92	13 LT	0513		2110.4			
		0513	0509		2103.1	2102.3	0.3
PATH1 15+08	5 RT	0514	0515		2104.5	2104.4	
L 31+02	15 RT	0601		2111.3			
		0601	0620		2107.8	2106.7	0.7
L 31+98	15 RT	0602		2112.3			
		0602	0601		2108.8	2107.8	0.4
L 35+24	13 LT	0608		2113.4			
		0608	0619		2109.0	2108.5	1.6
L 35+24	21 RT	0609		2112.3			
		0609	0608		2109.3	2109.0	0.3
L 39+68	43 RT	0612		2114.3			

Pipes (SIZE / THICKNESS OR GAUGE):

FROM	TO	Side Drain Pipe (RCP, CSP, CAAP, HDPE, or PVC) 12	15	18	24	30	36	42	48	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C. S. PIPE 15 .064	18 .064	24 .064	30 .079	36 .079	42 .109	48 .109	R. C. PIPE CLASS III 15	18	24	30	36	42	48	PIPE REMOVAL LIN. FT.	REMARKS
0401	0402																					64								
0402	0404																					32								
0403	0413																					28								
0404	0405																					56							71	
0405	0406																					64								
0406	0407																					116								
0407	0408																					8								
0408	0409																						60							
0410	0412																					216								
0411	0412																						44							
0412	0501																							88						
0413	0404																					76								
0501	0501A																							188						
0501A	0503																							88						
0503	0504																							24						
0505	0506																						80						95	
0508	0513																						40						38	
0510	0511																						32							
0511	0513																								80					
0513	0509																								60					
0514	0515																					16								
0601	0620																							28						
0602	0601																							92						
0608	0619															16														
0609	0608																						32							
SHEET TOTALS																16						676	288	508	140				204	

Structures:

STRUCTURE	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	3-Sided Open Throat Catch Basin, See Special Detail 2	CONCRETE BRIDGE APPROACH D.I. STD. 840.13	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. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	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	G.D.I. (N.S. SAG) FRAME W/ GRATE STD. 840.24	G.D.I. (N.S. SAG) FRAME W/ 2 GRATES STD. 840.24	G.D.I. (N.S. FLAT) FRAME W/ GRATE STD. 840.29	G.D.I. (N.S. FLAT) FRAME W/ 2 GRATES STD. 840.29	J.B. STD. 840.31 OR STD. 840.32	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	TEMP STEEL PLATE COVER MASONRY DRAINAGE	FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	CONCRETE AND BRICK PIPE PLUG STD. 840.71 CY
0401				1														1							1									
0402				1			1		1																									
0403				1														1							1									
0404				1			1		1																									
0405				1			1		1																									
0406				1			1		1																									
0407				1			1		1																									
0408				1														1							1									
0410				1			1			1																								
0411																																		
0412				1			1			1																								0.065
0413				1			1		1																									
0501				1			1			1																								
0501A				1			1			1																								
0503				1			1	1																										
0505																																		
0508				1														1							1									
0510				1														1							1									
0511				1			1	1																										
0513				1	2.3		1			1																								
0601				1													1								1									
0602				1													1							1	1									
0608				1			1	1																										
0609				1														1							1									0.065
0612				1														1							1									
SHEET TOTALS				23	2.3		14	3	6	5							2	7						1	9									0.130

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

WKS-1903PY-13

COMPUTED BY:	CSE	DATE:	3/8/2021
CHECKED BY:	JCF	DATE:	3/8/2021

PROJECT NO.	SHEET NO.
U-5887	3D-2

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	OFFSET	STRUCTURE NUMBER FROM	TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %
		0612	0613		2111.3	2108.5	
L 40+36	43 RT	0613		2112.4			
		0613	0614		2108.0	2107.7	
L 40+36	19 LT	0614		2111.7			
		0614	0615		2107.7	2107.6	
L 31+01	13 LT	0620		2112.1			
		0620	0511		2106.7	2104.8	0.7
L 40+97	19 LT	0621		2111.5			
		0621	0622		2105.6	2104.6	
PATH2 10+35	14 RT	0624	OUT		2107.3	2107.0	
L 42+88	40 RT	0701		2113.0			
		0701	0623		2110.0	2109.5	
L 43+06	19 LT	0703		2116.5			
		0703	0725		2113.2	2110.0	
L 44+51	19 LT	0705		2123.2			
		0705	0706		2120.5	2120.2	
L 44+51	22 RT	0706		2123.4			
		0706	0701		2119.7	2110.0	
L 47+59	19 RT	0707		2137.6			
		0707	0730		2133.8	2126.5	
L 47+85	34 RT	0708		2138.3			
		0708	0707		2134.8	2133.8	
L 49+55	41 RT	0709		2147.4			
		0709	0710		2145.9	2145.5	0.5
L 49+93	16 LT	0711		2145.9			
		0711	0712		2142.8	2138.4	
L 50+81	16 LT	0712		2146.1			
		0712	0713		2136.1	2135.6	
L 50+89	16 RT	0714		2147.5			
		0714	0712		2136.7	2136.6	
L 51+85	16 RT	0715		2146.9			
		0715	0714		2142.1	2141.8	
L 50+94	48 RT	0716		2140.8			
		0716	0714		2136.8	2136.7	
L 51+87	40 RT	0717		2145.0			
		0717	0715		2142.3	2142.1	
L 52+15	40 RT	0718		2145.5			
		0718	0717		2142.8	2142.3	
Y7 10+82	17 RT	0719		2148.0			
		0719	0720		2145.0	2142.9	
Y7 10+55	12 LT	0720		2146.2			
		0720	0722		2142.9	2141.0	
L 54+23	59 RT	0721		2145.2			
		0721	0722		2143.7	2141.0	
L 54+22	16 RT	0722		2144.2			
		0722	0723		2140.1	2139.8	
L 54+29	16 LT	0723		2145.8			
L 52+79	16 LT	0724		2145.1			
		0724	0723A		2142.1	2141.9	
L 42+07	19 LT	0725		2113.3			

Side Drain Pipe (RCP, CSP, CAAP, HDPE, or PVC) and C. S. PIPE (SIZE / THICKNESS OR GAUGE)

FROM	TO	SD 12	SD 15	SD 18	SD 24	SD 30	SD 36	SD 42	SD 48	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C.S. 15 (.064)	C.S. 18 (.064)	C.S. 24 (.064)	C.S. 30 (.079)	C.S. 36 (.079)	C.S. 42 (.109)	C.S. 48 (.109)
0612	0613																				
0613																					
0613	0614																				
0614																					
0614	0615																				
0620																					
0620	0511																				
0621																					
0621	0622																				
0624	OUT		52																		
0701																					
0701	0623																				
0703																					
0703	0725																				
0705																					
0705	0706																				
0706																					
0706	0701																				
0707																					
0707	0730																				
0708																					
0708	0707																				
0709																					
0709	0710			24																	
0711																					
0711	0712																				
0712																					
0712	0713																				
0714																					
0714	0712																				
0715																					
0715	0714																				
0716																					
0716	0714																				
0717																					
0717	0715																				
0718																					
0718	0717																				
0719																					
0719	0720																				
0720																					
0720	0722																				
0721																					
0721	0722																				
0722																					
0722	0723																				
0723																					
0724																					
0724	0723A																				
0725																					
SHEET TOTALS			52	24																	

R. C. PIPE CLASS III, Endwalls and QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)); FRAME, GRATES, AND HOOD STD. 840.03

FROM	TO	R.C. 15	R.C. 18	R.C. 24	R.C. 30	R.C. 36	R.C. 42	R.C. 48	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	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	GRATE TYPE E	GRATE TYPE F	GRATE TYPE G
0612	0613		76															
0613												1						
0613	0614			60														
0614												1			1	1		
0614	0615			40														
0620												1	0.3		1		1	
0620	0511			228														
0621												1	0.9		1		1	
0621	0622		36															
0624	OUT																	
0701												1						
0701	0623				152													
0703												1			1		1	
0703	0725		92															
0705												1			1		1	
0705	0706		40															
0706												1			1			1
0706	0701			172														
0707												1			1			1
0707	0730			156														
0708												1						
0708	0707			28														
0709																		
0709	0710																	
0711												1			1		1	
0711	0712	84																
0712												1	5.0	0.1	1			1
0712	0713					116												
0714												1	5.0	0.8	1		1	
0714	0712				32													
0715												1			1		1	
0715	0714	100																
0716												1						
0716	0714				32													
0717												1						
0717	0715	24																
0718												1						
0718	0717	28																
0719												1						
0719	0720		40															
0720												1			1		1	
0720	0722		92															
0721																		
0721	0722		44															
0722												1			1		1	
0722	0723		32															
0723												1	1.0		1			1
0724												1			1			1
0724	0723A	44																
0725												1			1		1	
SHEET TOTALS		280	452	684	216	116						23	12.2	0.9	16	1	10	5

FROM	TO	CONCRETE TRANSITIONAL SECTION: D.I. STD. 852.04 OR STD. 852.06	CONCRETE TRANSITIONAL SECTION: C.B. STD. 852.05	3-Sided Open Throat Catch Basin, See Special Detail 2	CONCRETE BRIDGE APPROACH D.I. STD. 840.13	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. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	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	G.D.I. (N.S. SAG) FRAME W/ GRATE STD. 840.24	G.D.I. (N.S. SAG) FRAME W/ 2 GRATES STD. 840.24	G.D.I. (N.S. FLAT) FRAME W/ GRATE STD. 840.29	G.D.I. (N.S. FLAT) FRAME W/ 2 GRATES STD. 840.29	J.B. STD. 840.31 OR STD. 840.32	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	TEMP STEEL PLATE COVER MASONRY DRAINAGE	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
0612	0613																										
0613																			1		1						
0613	0614																										
0614																											
0614	0615																										
0620																											
0620	0511																										
0621																											
0621	0622																										
0624	OUT																										
0701								1								1											
0701	0623																									51	
0703																											
0703	0725																										
0705																											
0705	0706																										
0706																											
0706	0701																									21	
0707																						1					
0707	0730																									72	
0708								1								1											
0708	0707																									40	
0709																											
0709	0710																									30	
0711																											
0711	0712																										
0712																											
0712	0713																										
0714																						1					
0714	0712																										
0715																						1					
0715	0714																									41	
0716				1																							
0716	0714																									20	
0717									1							1											
0717	0715																										
0718									1							1											
0718	0717																									40	
0719									1							1											
0719	0720																									125	
0720																											
0720	0722																										
0721																								0.4465			
0721	0722																									32	
0722																											
0722	0723																										
0723																											
0724																											
0724	0723A																										
0725																											
SHEET TOTALS				1				2	3							5			1		1	3		0.4465		472	

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

WKS-1903PY-13

COMPUTED BY:	CSE	DATE:	3/8/2021
CHECKED BY:	JCF	DATE:	3/8/2021

PROJECT NO.	SHEET NO.
U-5887	3D-3

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 %
		0725	0621		2110.0	2105.6	
L 45+98	22 RT	0730		2130.2			
		0730	0706		2126.5	2119.7	
L 55+14	16 RT	0801		2144.5			
		0801	0722		2140.4	2140.1	
L 56+73	16 RT	0803		2144.8			
		0803	0801		2141.1	2140.4	
L 57+59	16 RT	0804		2144.6			
		0804	0803		2141.4	2141.1	
L 58+45	18 RT	0805		2146.1			
		0805	0804		2143.1	2141.6	

FROM	TO	Side Drain Pipe (RCP, CSP, CAAP, HDPE, or PVC) 12	15	18	24	30	36	42	48		DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C. S. PIPE 15 (.064)	18 (.064)	24 (.064)		30 (.079)			36 (.079)			42 (.109)	48 (.109)	
0725	0621																											
0730																												
0730	0706																											
0801																												
0801	0722																											
0803																												
0803	0801																											
0804																												
0804	0803																											
0805																												
0805	0804																											
SHEET TOTALS																												
PROJECT TOTALS			52	24													16											

FROM	TO	R. C. PIPE CLASS III 15	18	24	30	36	42	48		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	
0725	0621		104																	
0730													1			1			1	
0730	0706			148																
0801													1			1	1			
0801	0722		88																	
0803													1			1			1	
0803	0801		156																	
0804													1			1			1	
0804	0803		80																	
0805													1			1			1	
0805	0804	80																		
SHEET TOTALS		80	428	148									5			5	1		4	
PROJECT TOTALS		1036	1168	1340	356	116							51	15.7		35	5	16	14	

FROM	TO	CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	CONCRETE TRANSITIONAL SECTION C.B. STD. 852.05	3-Sided Open Throat Catch Basin, See Special Detail 2	CONCRETE BRIDGE APPROACH D.I. STD. 840.13	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. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	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	G.D.I. (N.S. SAG) FRAME W/ GRATE STD. 840.24	G.D.I. (N.S. SAG) FRAME W/ 2 GRATES STD. 840.24	G.D.I. (N.S. FLAT) FRAME W/ GRATE STD. 840.29	G.D.I. (N.S. FLAT) FRAME W/ 2 GRATES STD. 840.29	J.B. STD. 840.31 OR STD. 840.32	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	TEMP STEEL PLATE COVER MASONRY DRAINAGE	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
0725	0621																										
0730																											
0730	0706																										
0801																											
0801	0722																										
0803																											
0803	0801																										
0804																											
0804	0803																										
0805																											
0805	0804																										
SHEET TOTALS																											
PROJECT TOTALS				1				4	10						1	14			1		1	3		0.4465	0.130	676	

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

WKS-1903PY-13

COMPUTED BY:	CSE	DATE:	3/8/2021
CHECKED BY:	JCF	DATE:	3/8/2021

PROJECT NO.	SHEET NO.
U-5887	3D-4

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 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 %	C. S. PIPE 54	60	66	72	78	84		R. C. PIPE CLASS III 54	60	66	72	78	84		95" x 67" C.S. PIPE ARCH CULVERTS, 0.109" THICK		
L 40+91	91 RT	0616		2110.2																				
		0616	0617		2104.6	2103.1																84		
SHEET TOTALS																						84		
PROJECT TOTALS																						84		

LINE & STATION	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	QUANTITIES FOR DRAINAGE STRUCTURES 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	OPEN THROAT C.B. STD. 840.04 OR STD. 840.05	CONCRETE BRIDGE APPROACH D.I. STD. 840.13	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. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	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	G.D.I. (N.S. SAG) FRAME W/ GRATE STD. 840.24	G.D.I. (N.S. SAG) FRAME W/ 2 GRATES STD. 840.24	G.D.I. (N.S. FLAT) FRAME W/ GRATE STD. 840.29	G.D.I. (N.S. FLAT) FRAME W/ 2 GRATES STD. 840.29
L 40+91		12.400																										
SHEET TOTALS		12.400																										
PROJECT TOTALS		12.400																										

NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)

LINE & STATION	DRIVEWAY D.I. STD. 840.30	FRAME W/ GRATE FOR DRIVEWAY STD. 840.30	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	STEEL FRAME WITH TWO GRATES STD. 840.37	TEMP STEEL PLATE COVER MASONRY DRAINAGE		SPRING BOX STD. 840.41		M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	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.		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 40+91																									41	See Special Detail Sheet 2C-4
SHEET TOTALS																									41	
PROJECT TOTALS																									41	

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

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5887	3P-1
R/W SHEET NO.	___

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER

DocuSigned by: Reece M. Schuler
16634024C7824FC...

PARCEL NUMBER	PARCEL OWNER	PARCEL INFO.	PLAN SHEET
1	SUSAN T. RINDALL	DB 1534 PG 601	4
2	TRUSTEES OF PINECREST PRESBYTERIAN CHURCH	DB 812 PG 821 DB 822 PG 785	4,5
3	MARTHA WHALEY CORNWALL	DB 1679 PG 633	4
4	THE VILLAGE OF FLAT ROCK	DB 1538 PG 202	5,6,7
5	ADDISON BROWN	DB 1664 PG 371 DB 823 PG 95	5
6	KERRY P. LINDSEY	DB 1499 PG 564 DB 823 PG 95	5,6
7	HIGHLAND LAKE INC.	DB 999 PG 99	6,7
8	JIMMY DALE FREEMAN	DB 1250 PG 120	7
9	MILDRED H. COOPER	DB 1318 PG 562	7
10	VICTOR BULLARD	DB 1499 PG 600	7
11	JAMES GILLILAND	DB 1059 PG 646	7
12	CHARLES GUDGER	DB 1499 PG 600	7
13	MARK R. GMYREK	DB 1322 PG 368	7
14	INGLES MARKET INC.	DB 861 PG 253	7,8
15	ROWN LLC	DB 1383 PG 132	8
16	MEADOW GARDEN ASSOCIATES	DB 652 PG 157	8
17	SCP 2007-C27-079 A DELAWARE LL COMPANY	DB 1383 PG 132	8

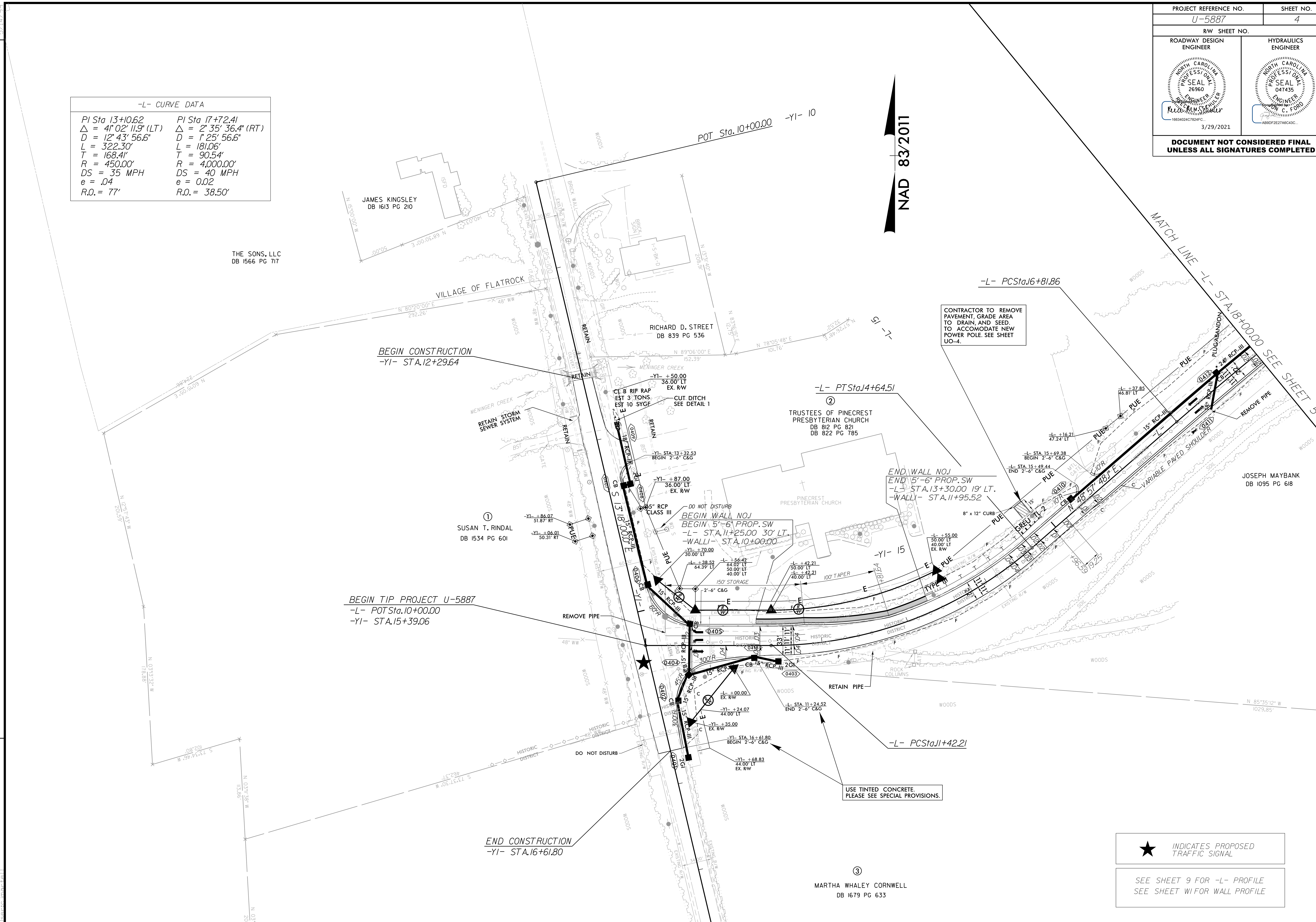
PROJECT REFERENCE NO.	SHEET NO.
U-5887	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER — 3/29/2021
NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER — C. FORD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- CURVE DATA

PI Sta 13+10.62	PI Sta 17+72.41
Δ = 41° 02' 11.9" (LT)	Δ = 2° 35' 36.4" (RT)
D = 12° 43' 56.6"	D = 1° 25' 56.6"
L = 322.30'	L = 181.06'
T = 168.41'	T = 90.54'
R = 450.00'	R = 4,000.00'
DS = 35 MPH	DS = 40 MPH
e = .04	e = 0.02
R.O. = 77'	R.O. = 38.50'



★ INDICATES PROPOSED TRAFFIC SIGNAL

SEE SHEET 9 FOR -L- PROFILE
SEE SHEET W1 FOR WALL PROFILE

REVISIONS

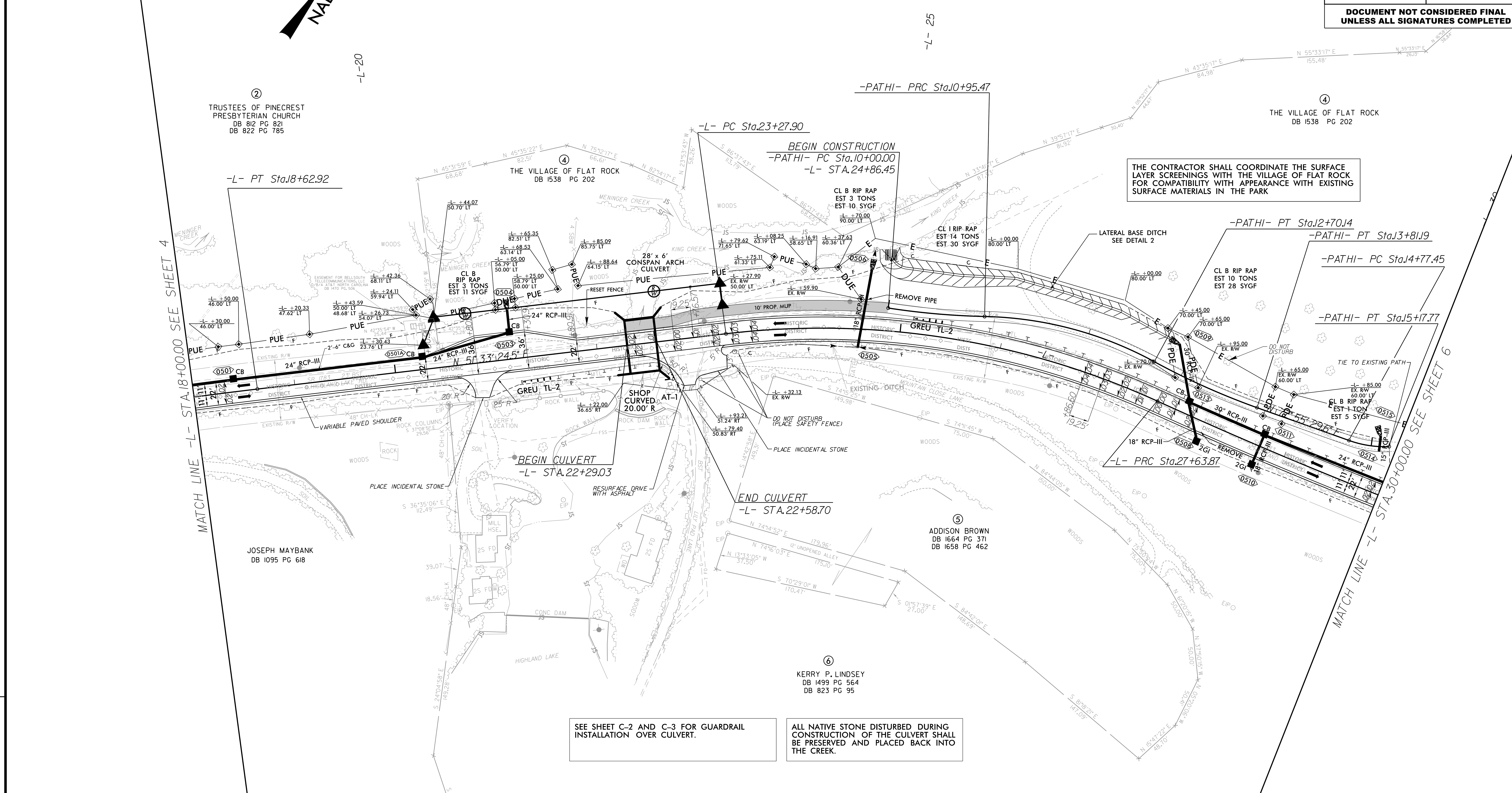
3/29/2021 10:18:01 AM

PROJECT REFERENCE NO.	SHEET NO.
U-5887	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER	NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-PATHI- CURVE DATA				-L- CURVE DATA	
PI Sta 10+47.80	PI Sta 11+84.51	PI Sta 13+25.78	PI Sta 14+97.86	PI Sta 25+51.45	PI Sta 29+89.65
△ = 7° 35' 17.9" (LT)	△ = 27° 23' 07.2" (RT)	△ = 8° 57' 36.7" (LT)	△ = 21° 49' 55.1" (LT)	△ = 31° 13' 26.0" (RT)	△ = 5° 40' 53.6" (LT)
D = 7° 56' 55.5"	D = 15° 40' 39.3"	D = 8° 04' 09.0"	D = 54° 08' 33.3"	D = 7° 09' 43.1"	D = 1° 15' 33.3"
L = 95.47'	L = 174.68'	L = 111.04'	L = 40.32'	L = 435.97'	L = 451.19'
T = 47.80'	T = 89.04'	T = 55.63'	T = 20.41'	T = 223.54'	T = 225.78'
R = 720.82'	R = 365.46'	R = 710.06'	R = 105.82'	R = 800.00'	R = 4,550.00'
				DS = 40 MPH	DS = 40 MPH
				e = 0.04	e = 0.02
				R.O. = 77'	R.O. = 38.50'

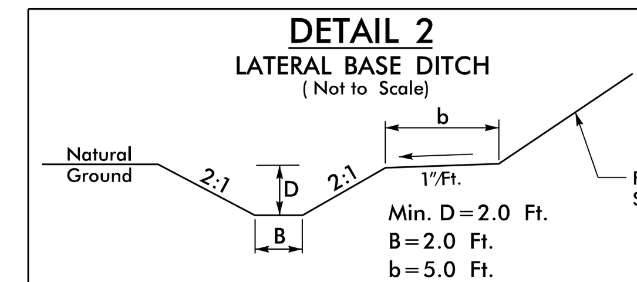
NAD 83/2011



SEE SHEET C-2 AND C-3 FOR GUARDRAIL INSTALLATION OVER CULVERT.

ALL NATIVE STONE DISTURBED DURING CONSTRUCTION OF THE CULVERT SHALL BE PRESERVED AND PLACED BACK INTO THE CREEK.

DETAIL 2
LATERAL BASE DITCH
(Not to Scale)



FROM LT STA. 24+72 TO LT STA. 27+60

SEE C1 THRU C21 FOR CULVERT
SEE SHEET 9 FOR -L- PROFILE
SEE SHEET 14 FOR -PATHI- PROFILE

REVISIONS

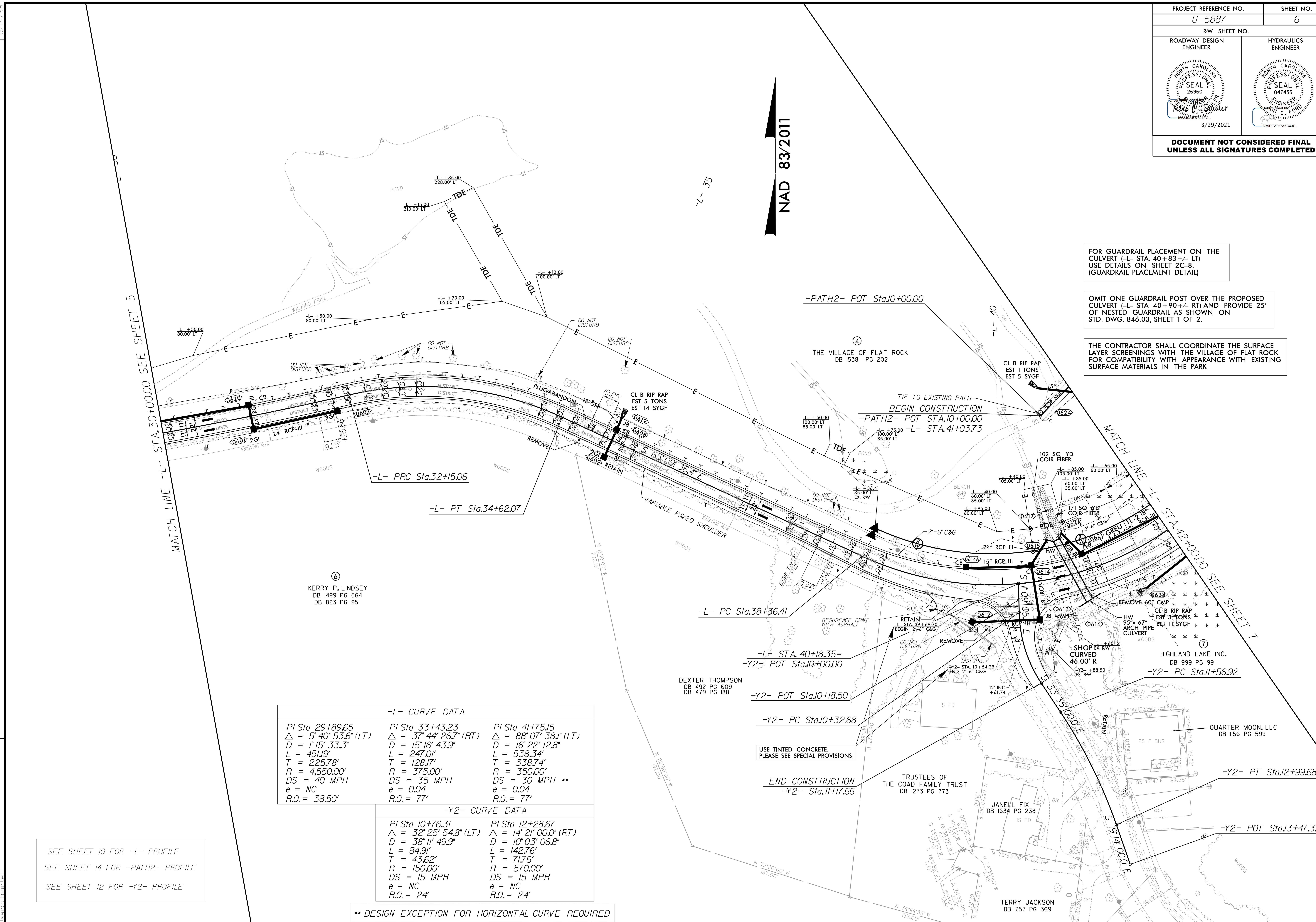
5/14/99

3/15/2021 9:28:06 AM

PROJECT REFERENCE NO.	SHEET NO.
U-5887	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SEAL 26960 — 3/29/2021	SEAL 047435

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS



FOR GUARDRAIL PLACEMENT ON THE CULVERT (-L- STA. 40+83+/- LT) USE DETAILS ON SHEET 2C-8. (GUARDRAIL PLACEMENT DETAIL)

OMIT ONE GUARDRAIL POST OVER THE PROPOSED CULVERT (-L- STA 40+90+/- RT) AND PROVIDE 25' OF NESTED GUARDRAIL AS SHOWN ON STD. DWG. 846.03, SHEET 1 OF 2.

THE CONTRACTOR SHALL COORDINATE THE SURFACE LAYER SCREENINGS WITH THE VILLAGE OF FLAT ROCK FOR COMPATIBILITY WITH APPEARANCE WITH EXISTING SURFACE MATERIALS IN THE PARK

-L- CURVE DATA

PI Sta 29+89.65	PI Sta 33+43.23	PI Sta 41+75.15
△ = 5° 40' 53.6" (LT)	△ = 37° 44' 26.7" (RT)	△ = 88° 07' 38.1" (LT)
D = 1° 15' 33.3"	D = 15° 16' 43.9"	D = 16° 22' 12.8"
L = 451.19'	L = 247.01'	L = 538.34'
T = 225.78'	T = 128.17'	T = 338.74'
R = 4,550.00'	R = 375.00'	R = 350.00'
DS = 40 MPH	DS = 35 MPH	DS = 30 MPH **
e = NC	e = 0.04	e = 0.04
R.O. = 38.50'	R.O. = 77'	R.O. = 77'

-Y2- CURVE DATA

PI Sta 10+76.31	PI Sta 12+28.67
△ = 32° 25' 54.8" (LT)	△ = 14° 21' 00.0" (RT)
D = 38° 11' 49.9"	D = 10° 03' 06.8"
L = 84.91'	L = 142.76'
T = 43.62'	T = 71.76'
R = 150.00'	R = 570.00'
DS = 15 MPH	DS = 15 MPH
e = NC	e = NC
R.O. = 24'	R.O. = 24'

** DESIGN EXCEPTION FOR HORIZONTAL CURVE REQUIRED

SEE SHEET 10 FOR -L- PROFILE
SEE SHEET 14 FOR -PATH2- PROFILE
SEE SHEET 12 FOR -Y2- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-5887	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHALLER

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 5/14/99

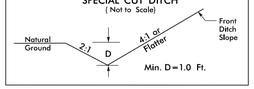
NAD 83/2011

-PATH2- CURVE DATA			
PI Sta 12+38.85	PI Sta 14+37.36	PI Sta 15+61.28	PI Sta 17+06.54
Δ = 10° 33' 37.4" (LT)	Δ = 25° 27' 53.2" (RT)	Δ = 48° 42' 05.1" (LT)	Δ = 81° 33' 18.9" (RT)
D = 4° 29' 37.6"	D = 15° 54' 55.8"	D = 57° 17' 44.8"	D = 114° 35' 29.6"
L = 235.00'	L = 160.00'	L = 85.00'	L = 71.17'
T = 117.83'	T = 81.34'	T = 45.26'	T = 43.12'
R = 1,275.00'	R = 360.00'	R = 100.00'	R = 50.00'

SEE SHEET 10 FOR -L- PROFILE
SEE SHEET 12 FOR -Y3- PROFILE
SEE SHEET 12 FOR -Y5- PROFILE
SEE SHEET 13 FOR -Y6- PROFILE
SEE SHEET 13 FOR -Y7- PROFILE
SEE SHEET 14 FOR -PATH2- PROFILE

③ THE VILLAGE OF FLAT ROCK DB 1538 PG 202

DETAIL 5 SPECIAL CUT DITCH (Not to Scale)



FROM PATH 2 STA. 11+00 TO STA. 14+50 RT

THE CONTRACTOR SHALL COORDINATE THE SURFACE LAYER SCREENINGS WITH THE VILLAGE OF FLAT ROCK FOR COMPATIBILITY WITH APPEARANCE WITH EXISTING SURFACE MATERIALS IN THE PARK

-PATH2- PC Sta.11+21.02
-PATH2- PRC Sta.13+56.02
-PATH2- PT Sta.16+01.02
-PATH2- PRC Sta.15+16.02
-PATH2- PT Sta.17+34.59
-PATH2- POT Sta.17+71.81
-Y6 POT Sta.10+00.00
-TRK- PT STA.10+00.00
-L- PC Sta.47+04.34
-PATH2- PC Sta.16+63.42
-Y5- PT Sta.11+39.47
BEGIN CONSTRUCTION -Y6- STA.11+60.00
-L- PRC Sta.53+43.00
-L- PT Sta.43+74.75
-Y5- STA.10+00.00= -Y6- STA.11+86.46
-L- STA.53+30.36= PT Sta.10+00.00
-Y6 PC Sta.12+00.31
-L- PCC Sta.51+71.70
-L- STA.42+00.00 SEE SHEET 6
MATCH LINE -L- STA.55+00.00 SEE SHEET 8
-Y6- PT Sta.12+88.01
-L- STA.48+83.56= -Y6- POT Sta.12+94.91
-L- STA.47+89.80= -Y5- PT Sta.11+79.50
-L- STA.42+49.50= -Y3- POT Sta.10+00.00
-L- STA.49+46.80= -TRK- STA.13+43.54
-Y7- PC Sta.10+14.79
-Y7 PT Sta.10+88.72
END CONSTRUCTION -Y7- STA.11+00.00
END CONSTRUCTION -Y3- STA.11+50.00
-TRK- PT STA.13+84.79
-L- PRC Sta.49+05.30
-TRK- PRC STA.15+10.01
-TRK- PRC STA.16+84.72
-Y7 POT Sta.13+23.89

HIGHLAND GOLF VILLAS HOMEOWNERS ASSOC. INC. DB 1150 PG 499

⑮ ROWN, LLC DB 1383 PG 132

MARK R. GMYREK DB 1322 PG 368 ⑬ RESET FENCE

JAMES GILLESPIE DB 1059 PG 646 ⑪

⑭ INGLES MARKETS INC. DB 861 PG 253

⑩ VICTOR BULLARD DB 1499 PG 600

CHARLES GUDGER DB 1499 PG 600 ⑫

⑨ MILDRED H. COOPER DB 1318 PG 562

DONALD HUNTER DB 678 PG 503

⑧ JIMMY DALE FREEMAN DB 1250 PG 120

⑦ HIGHLAND LAKE INC. DB 999 PG 99

SHOP CURVED 41.00' R AT -1

RETAIN STORM SEWER SYSTEM

CL B RIP RAP EST 11 TONS EST 28 SYCF

CL B RIP RAP EST 3 TONS EST 10 SYGF

CUT DITCH SEE DETAIL 4

SPECIAL CUT DITCH SEE DETAIL 5

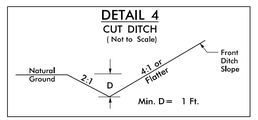
RESET FENCE 2'-6" C&G

REMOVE PIPE

COLLAR AND EXTEND & INLET

RETAIN PIPE

DETAIL 4 CUT DITCH (Not to Scale)



FROM RT STA. 49+76 TO RT STA. 50+95

-Y5- CURVE DATA	-Y6- CURVE DATA	-Y7- CURVE DATA
PI Sta 11+16.71	PI Sta 12+45.45	PI Sta 10+52.77
Δ = 51° 05' 31.9" (LT)	Δ = 33° 29' 53.9" (RT)	Δ = 32° 35' 04.2" (RT)
D = 104° 10' 26.9"	D = 38° 11' 49.9"	D = 44° 04' 25.2"
L = 49.04'	L = 87.70'	L = 73.93'
T = 26.29'	T = 45.14'	T = 38.00'
R = 55.00'	R = 150.00'	R = 130.00'
DS = SC	DS = SC	DS = SC
e = NC	e = NC	e = NC
R.O. = 24'	R.O. = 24'	R.O. = 24'

-L- CURVE DATA			
PI Sta 48+08.49	PI Sta 50+47.67	PI Sta 52+75.13	PI Sta 54+76.00
Δ = 37° 08' 33.1" (RT)	Δ = 50° 02' 43.2" (LT)	Δ = 6° 29' 13.7" (LT)	Δ = 21° 16' 34.3" (RT)
D = 18° 28' 57.0"	D = 18° 47' 07.8"	D = 3° 08' 22.2"	D = 11° 01' 06.3"
L = 200.96'	L = 266.40'	L = 206.63'	L = 193.10'
T = 104.15'	T = 142.37'	T = 103.43'	T = 97.67'
R = 310.00'	R = 305.00'	R = 1,825.00'	R = 550.00'
DS = 30 MPH **	DS = 30 MPH **	DS = 40 MPH	DS = 35 MPH
e = 0.04	e = 0.04	e = 0.02	e = 0.04
R.O. = 77'	R.O. = 77'	R.O. = 38.50'	R.O. = 77'

PARCEL ⑪ WILL BE A TOTAL TAKE

R=5' AND OFFSET 15' FOR 2'-6" C&G AT -TRK-

** DESIGN EXCEPTION FOR HORIZONTAL CURVE REQUIRED

3/10/2021 11:35 PM
U-5887
Design Import
dgn_PSH7.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5887	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SEAL 26960 NORTH CAROLINA PROFESSIONAL ENGINEER REECE M. SCHULER	SEAL 047435 NORTH CAROLINA PROFESSIONAL ENGINEER JON C. FORD

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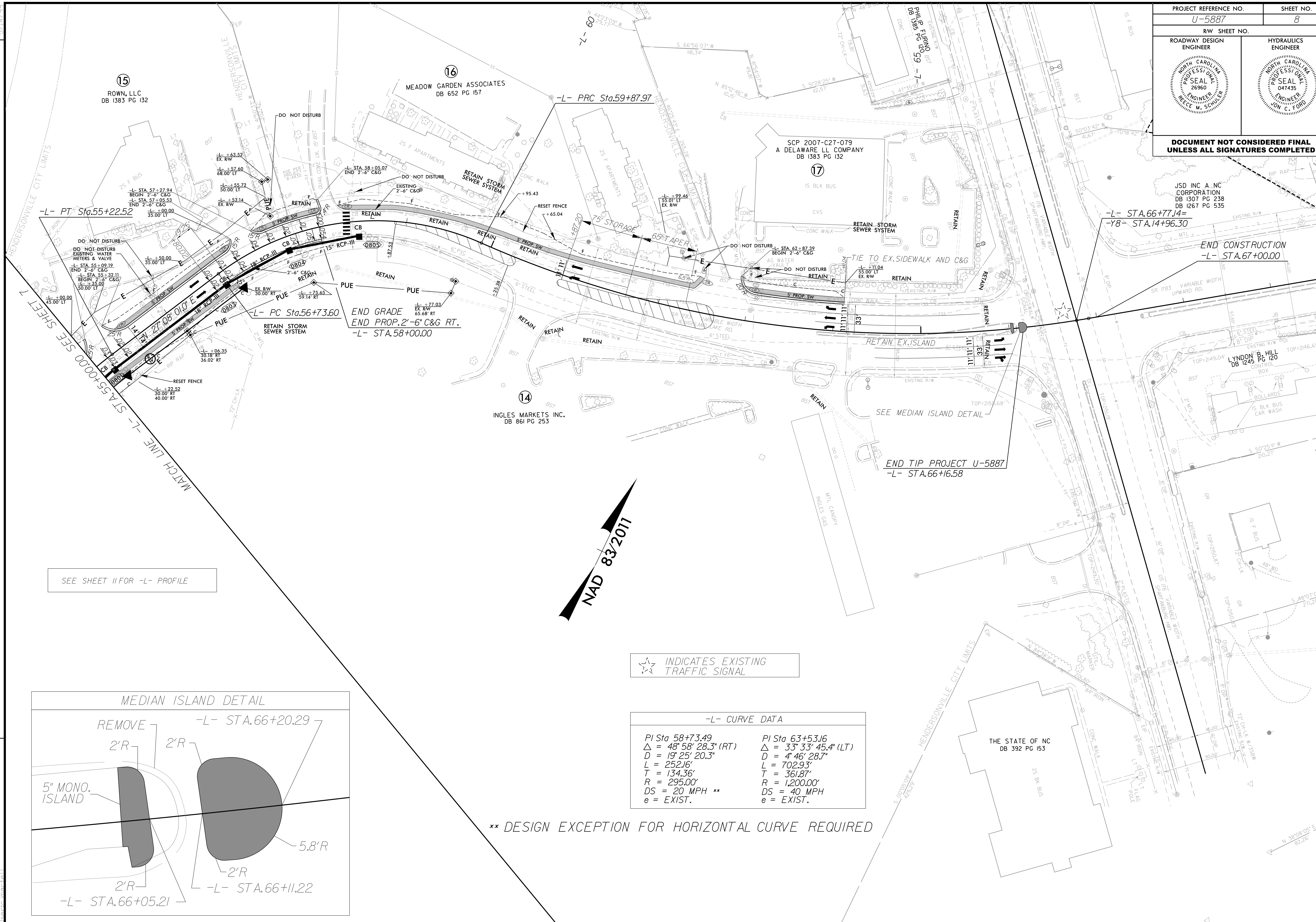

SEE SHEET 11 FOR -L- PROFILE

☆ INDICATES EXISTING TRAFFIC SIGNAL

-L- CURVE DATA

PI Sta 58+73.49	PI Sta 63+53.16
Δ = 48° 58' 28.3" (RT)	Δ = 33° 33' 45.4" (LT)
D = 19° 25' 20.3"	D = 4° 46' 28.7"
L = 252.16'	L = 702.93'
T = 134.36'	T = 361.87'
R = 295.00'	R = 1,200.00'
DS = 20 MPH **	DS = 40 MPH
e = EXIST.	e = EXIST.

** DESIGN EXCEPTION FOR HORIZONTAL CURVE REQUIRED

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
U-5887	9

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER RECE M. SCHULER

DocuSigned by: Rece M. Schuler
166340240C7824FC...

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD

DocuSigned by:
AB90F2E27A6C43C...

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-L-

BEGIN TIP PROJECT U-5887
BEGIN GRADE
-L- STA.10+00.00
ELEV.= 2,120.98

PI = 10+20.00
EL = 2,120.93'
VC = 35'
*K = 8
DS = 15 MPH

PI = 11+75.00
EL = 2,127.28'
VC = 180'
*K = 24
DS = 30 MPH

PI = 13+50.00
EL = 2,121.33'
VC = 150'
K = 86
DS = 45 MPH

(-)10.3000%
(+)4.0967%
(+)4.0967%
(-)13.4000%
(-)13.4000%
(-)11.6500%
(-)11.6500%

PROPOSED GRADE
EXISTING GRADE

-L- STA.11+25.00
-WALLI- STA.10+00.00

-L- STA.13+30.00
-WALLI- STA.11+95.52

MATCH LINE -L- STA.18+00.00 SEE BELOW

* DESIGN EXCEPTION FOR VERTICAL CURVES

SEE SHEET 4 FOR -L- PLAN

SEE SHEET 5 FOR -L- PLAN
SEE STRUCTURE PLANS FOR CULVERT

-L-

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1000	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2108.1	FT
BASE DISCHARGE	= 1500	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2111.2	FT
OVERTOPPING DISCHARGE	= 1350	CFS
OVERTOPPING FREQUENCY	= 50+	YRS
OVERTOPPING ELEVATION	= 2110.8	FT
W.S.ELEVATION AT DATE OF SURVEY	= 2102.9	FT
DRAINAGE AREA	= 3.8	SQ.MI.

PI = 20+50.00
EL = 2,109.78'
VC = 350'
K = 146
DS = 60 MPH

PI = 24+00.00
EL = 2,112.40'
VC = 150'
K = 130
DS = 60 MPH

PI = 29+10.00
EL = 2,110.36'
VC = 150'
K = 97
DS = 50 MPH

MATCH LINE -L- STA.18+00.00 SEE ABOVE

MATCH LINE -L- STA.18+00.00 SEE SHEET 10

(-)1.6500%
(+)0.7500%
(+)0.7500%
(-)0.4000%
(-)0.4000%
(+)1.1500%

PROPOSED GRADE
EXISTING GRADE

-L- STA.24+86.34
-PATH- STA.10+00.00

PROP. 18" RCP
STA. 24+61.25
INV. =2106.93'

(+) 0.4388%

PROP. 28' X 6' PRECAST CONSPAN ARCH CULVERT
STA. 22+44.41
INV. =2101.65'

BEGIN LATERAL BASE DITCH (LT)
-L- STA.24+72.00
EL = 2101.00'

END LATERAL BASE DITCH (LT)
-L- STA.27+66.00
EL = 2102.29'

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PROJECT REFERENCE NO.	SHEET NO.
U-5887	10

ROADWAY DESIGN ENGINEER — SEAL 26960, REECE M. SCHULER (DocuSigned by: Reece M. Schuler)

HYDRAULICS ENGINEER — SEAL 047435, JON C. FORD (DocuSigned by)

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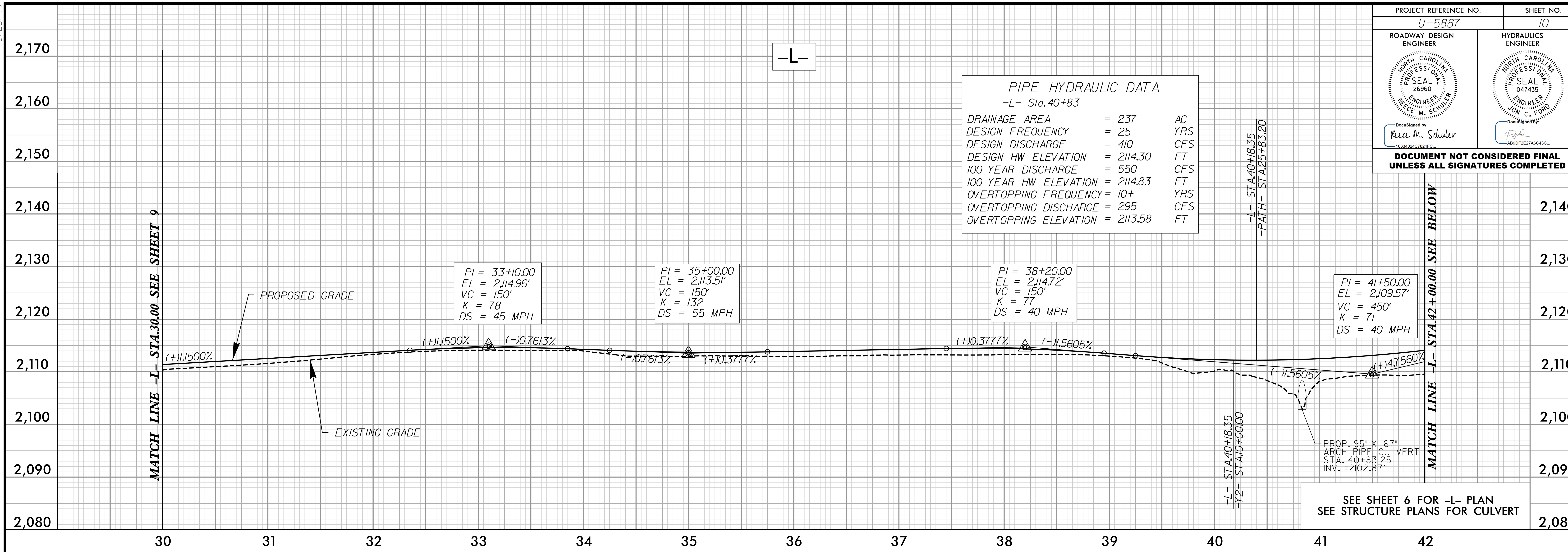

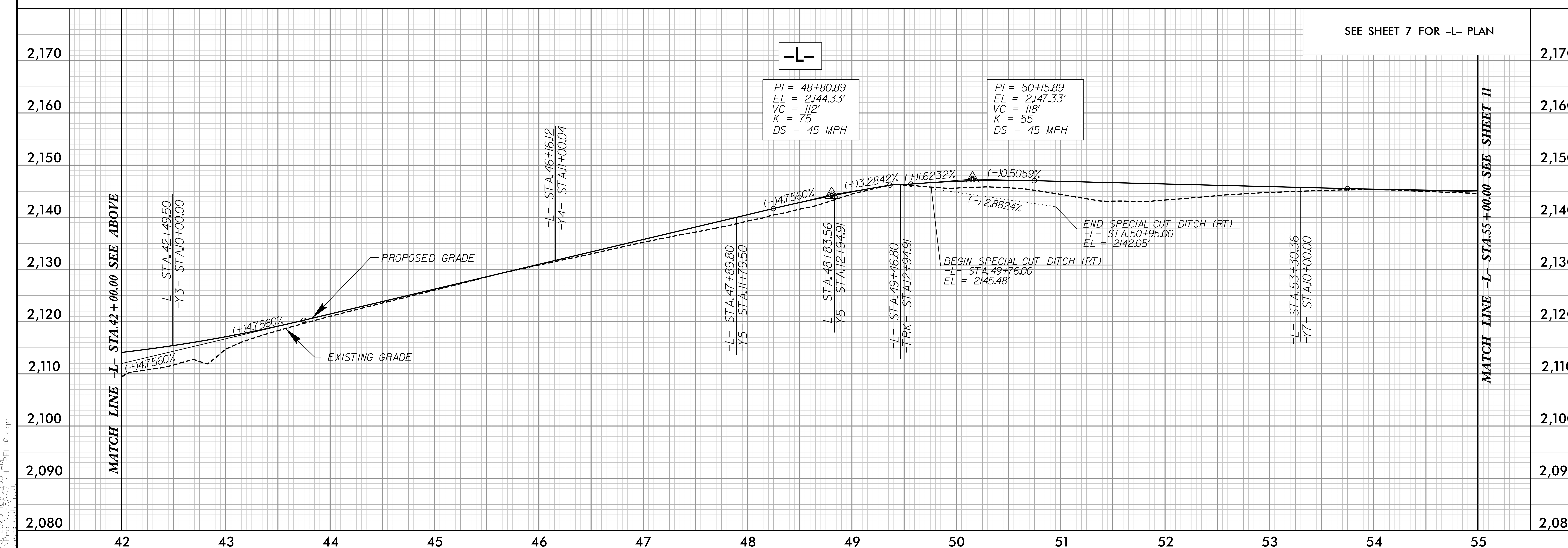

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5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5887	11

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER

DocuSigned by: Reece M. Schuler
166340247824FC...

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD

DocuSigned by:
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–L–

PI = 55+87.50
EL = 2,144.43'
VC = 425'
K = 343
DS = 65 MPH

PROPOSED GRADE

(–)0.5059%

(+)0.7327%

MATCH LINE –L– STA.55+00.00 SEE SHEET 10

END GRADE
BEGIN MILLING & RESURFACING
USING TYPICAL SECTION No. 6
–L– STA.58+00.00
ELEV. = 2,145.99'

EXISTING GRADE

END TIP PROJECT U-5887
END MILLING & RESURFACING
–L– STA.66+16.58
ELEV. = 2,150.62

SEE SHEET 8 FOR –L– PLAN

2,250 2,240 2,230 2,220 2,210 2,200 2,190 2,180 2,170 2,160 2,150 2,140 2,130 2,120 2,110 2,100 2,090 2,080 2,070 2,060 2,050

55 56 57 58 59 60 61 62 63 64 65 66 67

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User:scpollard

PROJECT REFERENCE NO.	SHEET NO.
U-5887	12

ROADWAY DESIGN ENGINEER — 11/3/2020

HYDRAULICS ENGINEER — 11/3/2020

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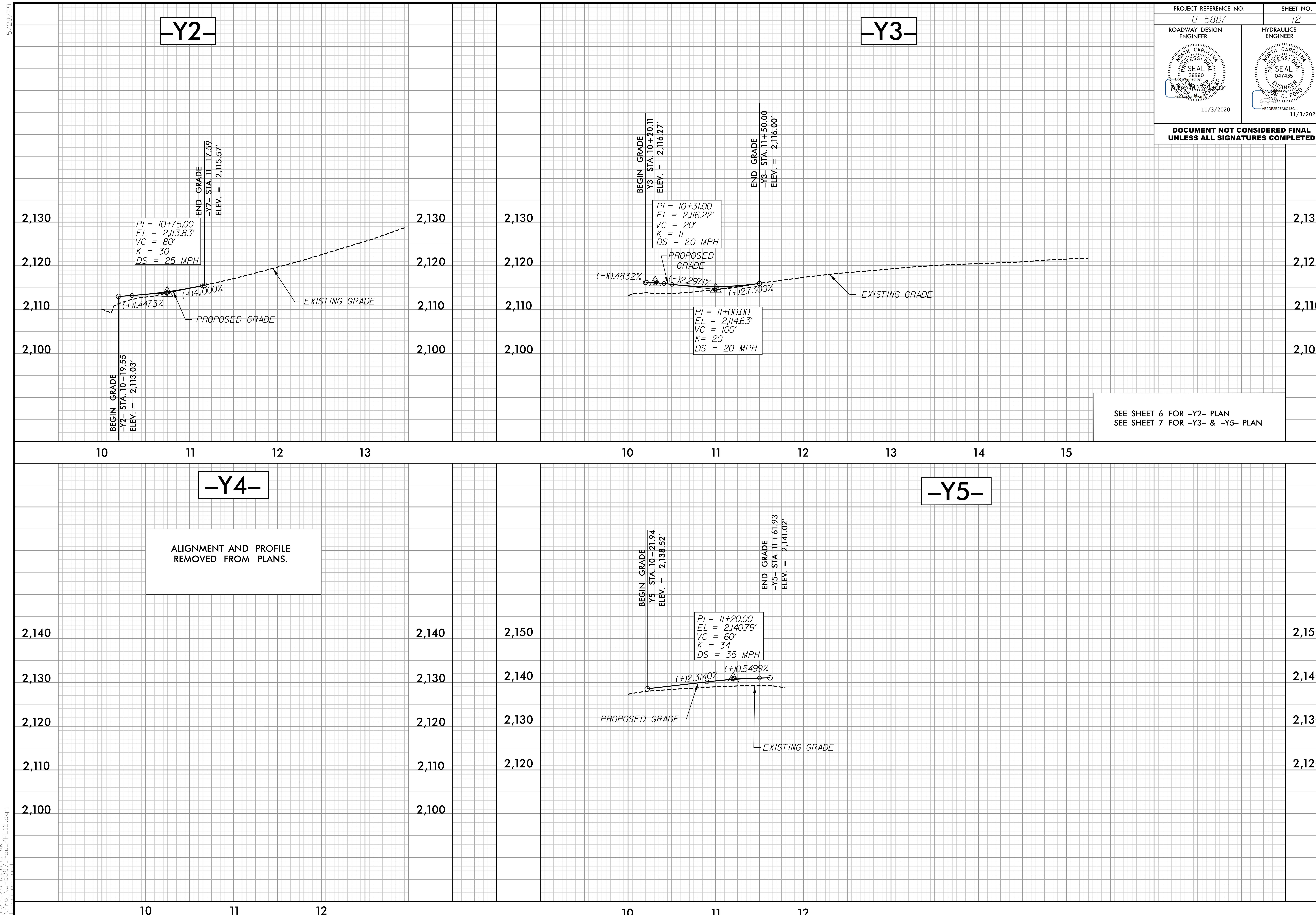

PROJECT REFERENCE NO.	SHEET NO.
U-5887	13

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 26960 REECE M. SCHULER — DocuSigned by: Reece M. Schuler

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047435 JON C. FORD — DocuSigned by:

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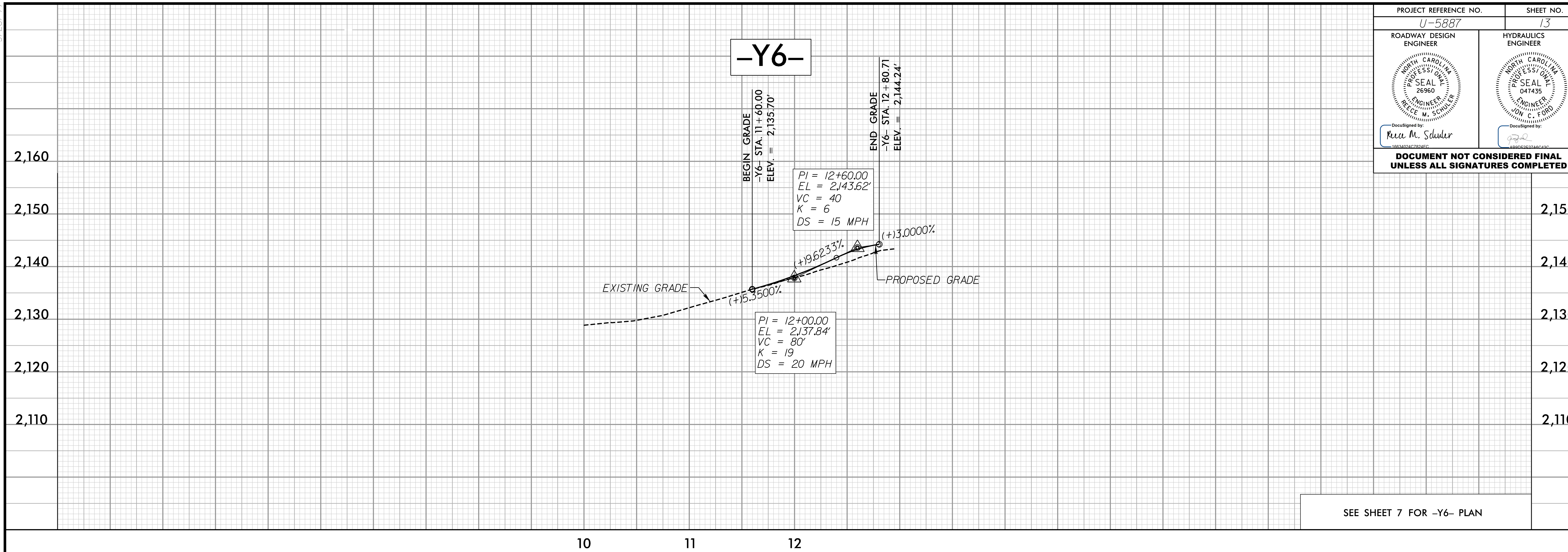

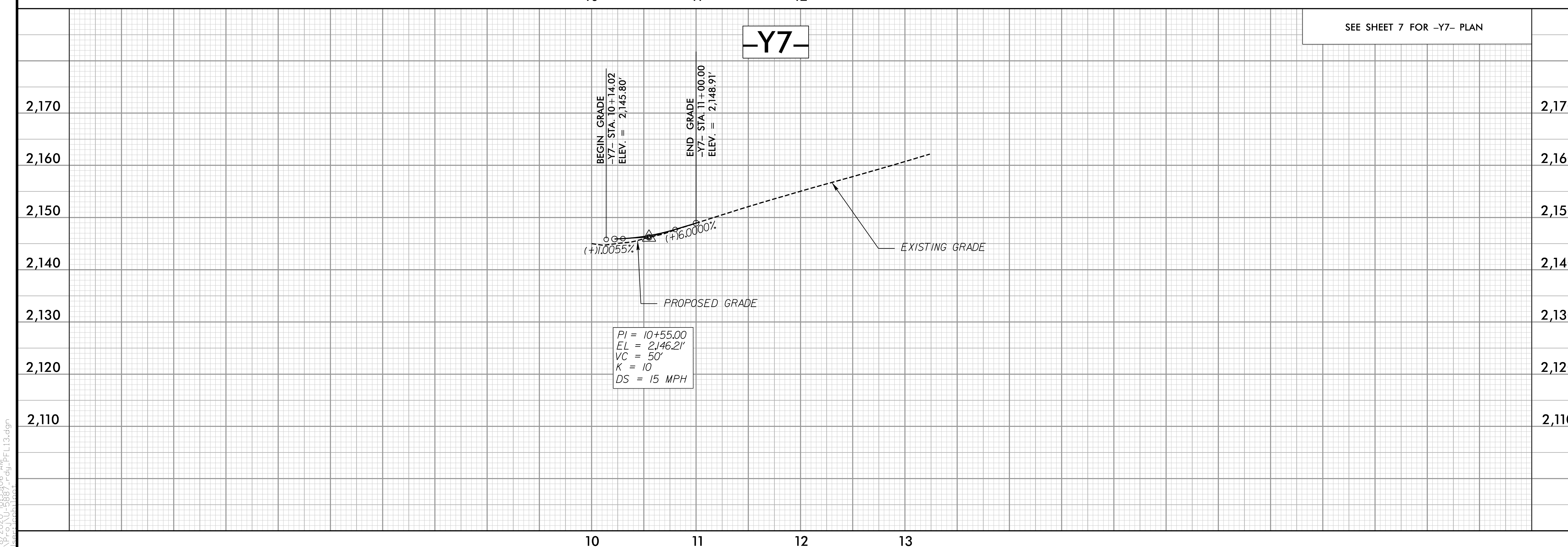

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PROJECT REFERENCE NO.	SHEET NO.
U-5887	14

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 26960 ENGINEER REECE M. SCHULER	NORTH CAROLINA PROFESSIONAL SEAL 047435 ENGINEER JON C. FORD
DocuSigned by: Reece M. Schuler 16634024C7824FC...	DocuSigned by: AB9DF2E27A6C43C...

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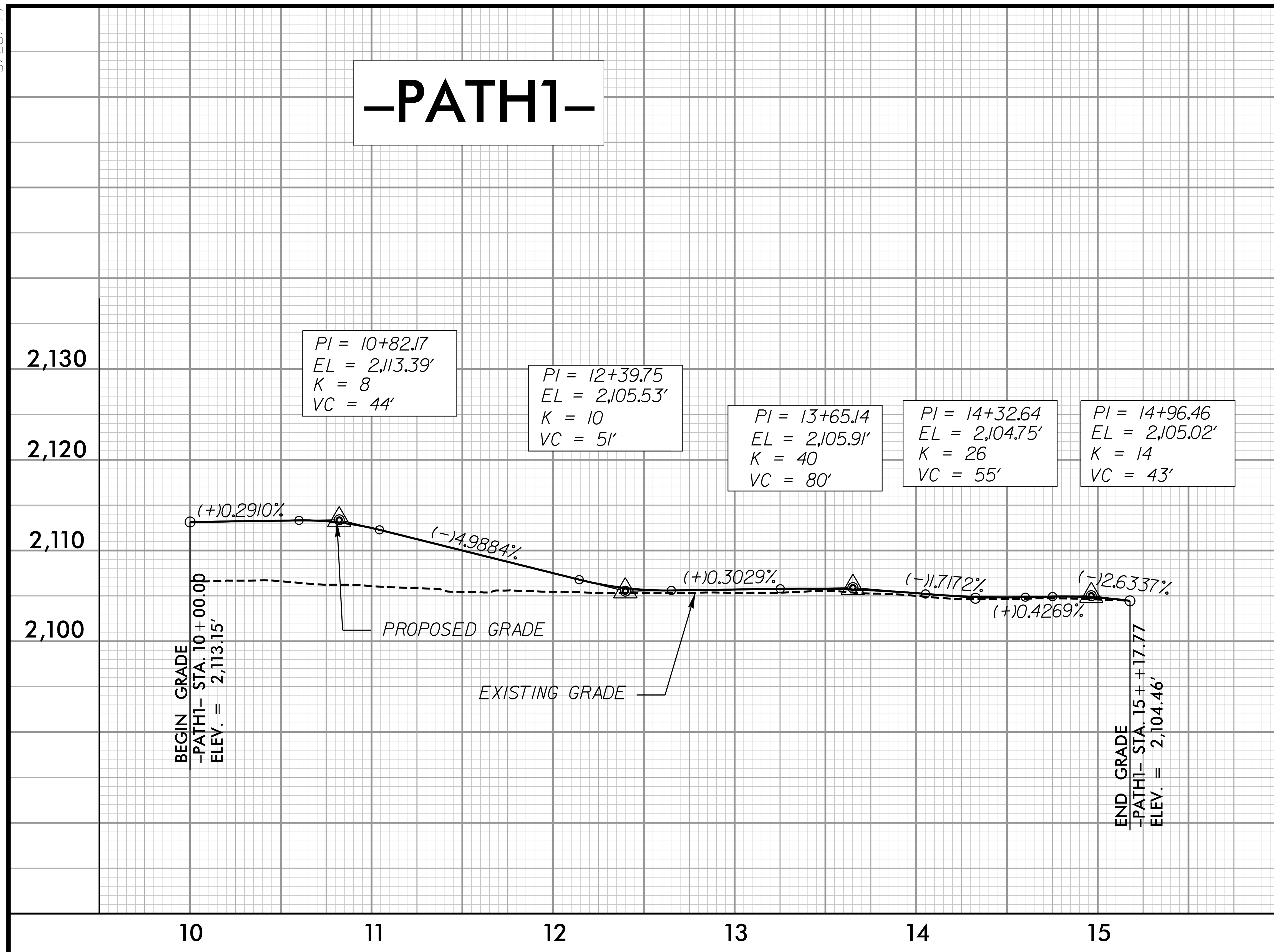
-PATH1-



-PATH2-

SEE SHEET 5 FOR -PATH1- PLAN
SEE SHEET 6 & 7 FOR -PATH2- PLAN

-PATH2-