This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

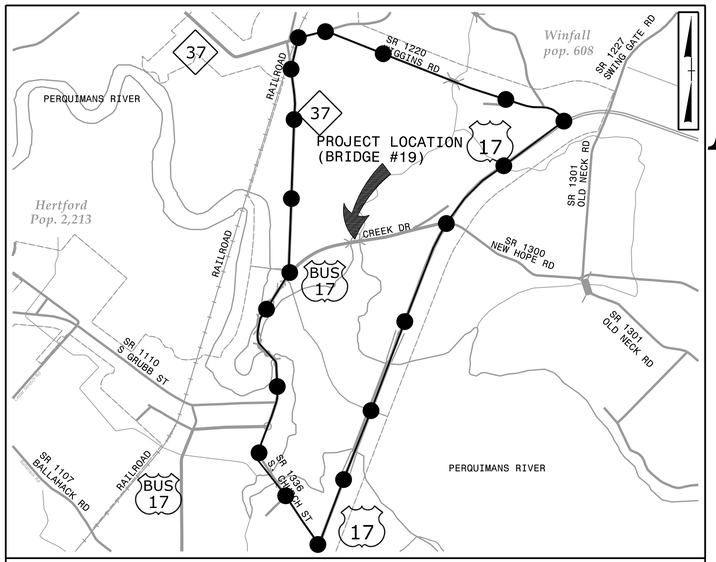
The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

09/08/99

TIP PROJECT: B–5604

CONTRACT:

See Sheet 1A For Index of Sheets



VICINITY MAP
(NOT TO SCALE)

DETOUR ROUTE (APPROXIMATE LENGTH = 8 MILES)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

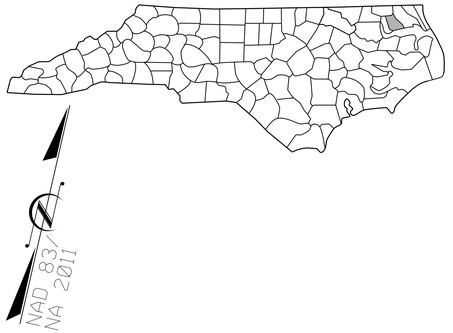
PERQUIMANS COUNTY

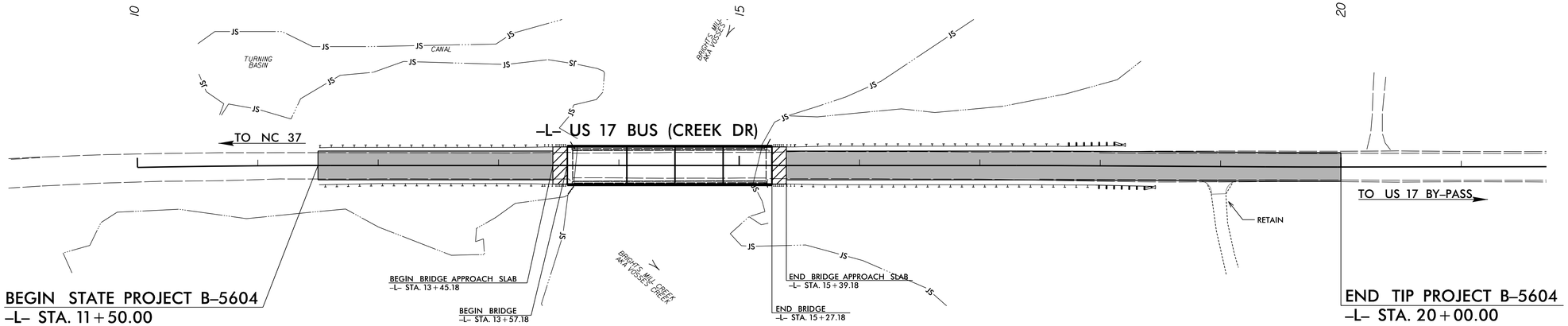
LOCATION: REPLACEMENT OF BRIDGE 19 OVER BRIGHTS MILL CREEK AKA VOSSES CREEK US 17 BUS (CREEK DR.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B–5604	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45559.1.1		





BEGIN STATE PROJECT B–5604
–L– STA. 11+50.00

END TIP PROJECT B–5604
–L– STA. 20+00.00

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 2012 = 3300

FUNC CLASS = MAJOR COLLECTOR

SUB–REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT B–5604	=	0.129 MILES
LENGTH STRUCTURES STATE PROJECT B–5604	=	0.032 MILES
TOTAL LENGTH STATE PROJECT B–5604	=	0.161 MILES

Prepared for:
HIGHWAY DIVISION 1
113 Airport Drive, Suite 100
Edenton, NC 27932

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST, 2017

LETTING DATE:
May 30, 2018

Prepared by:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

L. KEVIN AUSTIN, PE
PROJECT MANAGER

STEPHEN C. BROWDE, PE
ROADWAY PROJECT DESIGN ENGINEER

NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by: David P. Bocker 3/20/2018
93C7A1B94E66497...
P.E.
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 029984 ENGINEER DAVID P. BOCKER

ROADWAY DESIGN ENGINEER

DocuSigned by: Stephen C. Browde 3/20/2018
0E27971E12EA42B...
P.E.
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 15759 ENGINEER STEPHEN C. BROWDE

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

3/19/2018
R:\Roadway\Proj\Perquimans 19_ROY_TSH.dgn
ewilliamson

8/17/99

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-5604	1A

ROADWAY DESIGN ENGINEER

INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARDS

INDEX OF SHEETS

SHEET #	DESCRIPTION
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, & LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL PLAN SHEET SYMBOLS
2A-1 THRU 2A-2	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
1C-1	SURVEY CONTROL SHEET
2C-1 THRU 2C-7	DETAIL FOR GUARDRAIL PLACEMENT, GUARDRAIL LOCATION & STRUCTURE ANCHOR UNITS
3B-1	SUMMARIES OF GUARDRAIL, EARTHWORK, ASPHALT PAVEMENT REMOVAL & SHOULDER BERM GUTTER
3D-1	SUMMARY OF DRAINAGE
4-5	PLAN & PROFILE SHEETS
TMP-1	TRANSPORTATION MANAGEMENT PLAN
EC-1 THRU EC-5	EROSION CONTROL PLANS
X-1 THRU X-9	CROSS-SECTIONS
S-1 THRU S-24	STRUCTURE PLANS

STANDARD SPECIFICATIONS

GENERAL NOTES: 2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED:

GRADE LINE:
GRADING AND SURFACING:

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

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

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.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

END BENTS:

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

RIGHT-OF-WAY MARKERS:

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

LIST OF STANDARD DRAWINGS

EFF. 01-16-2018
REV.

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 4 - MAJOR STRUCTURES	
422.02	Reinforced Bridge Approach Fills - Type II Modified Approach Fill
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
840.00	Concrete Base Pad for Drainage Structures
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
876.02	Guide for Rip Rap at Pipe Outlets

3/19/2018
R:\Roadway\Proj\Perquimans 19_RDY.1A&B.dgn
eallgaier

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
B-5604	1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

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

BOUNDARIES AND PROPERTY:

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

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY & PROJECT CONTROL:

- Secondary Horiz and Vert Control Point
- Primary Horiz Control Point
- Primary Horiz and Vert Control Point
- Exist Permanent 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.)

CALYX
ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333
Formerly Mulkey Engineers & Consultants

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2A-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

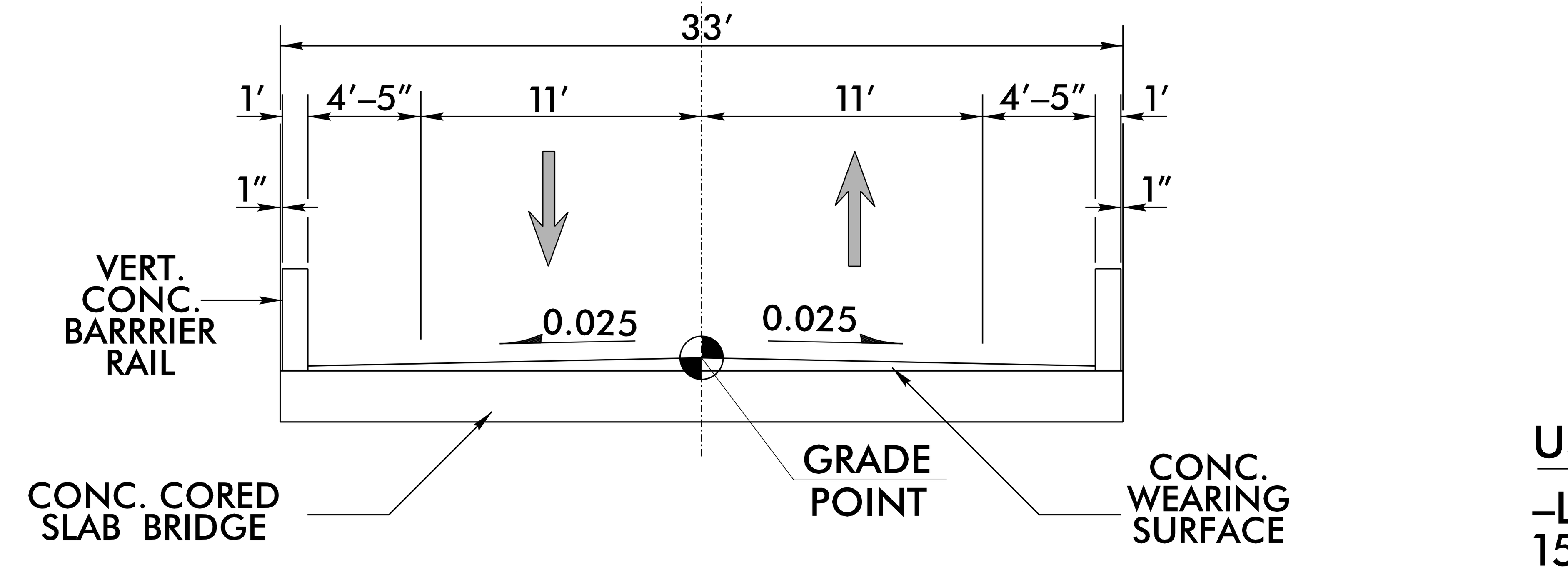
NORTH CAROLINA PROFESSIONAL ENGINEER 15759 STEPHEN C. BROWN — 3/20/2018

PAVEMENT SCHEDULE

C1	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C2	PROP. APPROX. 2.5" ASPHALT CONCRETE SURFACE COURSE TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1.5" IN DEPTH.
E1	PROP. APPROX. 5.5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 627 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 PLACE IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
R	PROP. SHOULDER BERM GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

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

CL -L- (US 17 BUS./CREEK DR.)

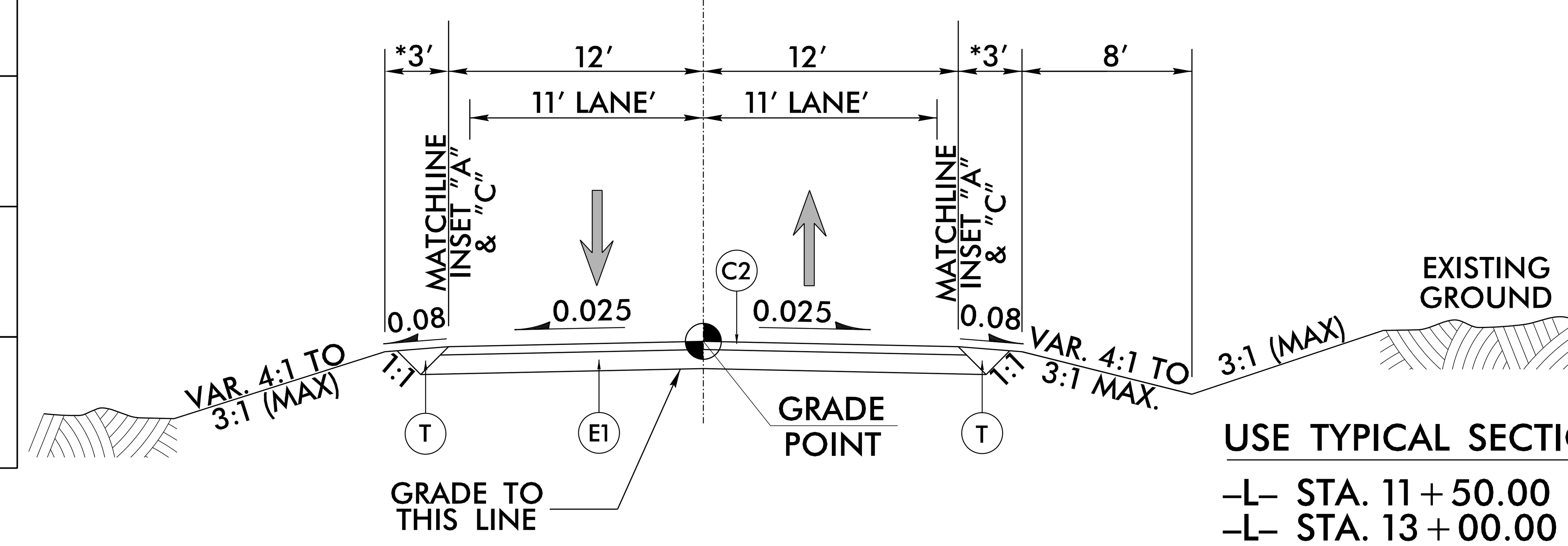


BRIDGE SKETCH NO.1
BRIDGE #19

USE BRIDGE SKETCH NO. 1 AS FOLLOWS:

-L- STA. 13+57.18 (BEGIN BRIDGE) TO 15+27.18 (END BRIDGE)

CL -L- (US 17 BUS./CREEK DR.)



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 1 AS FOLLOWS:

-L- STA. 11+50.00 TO 13+00.00
-L- STA. 13+00.00 TO 13+25.00 (LEFT SIDE ONLY)
-L- STA. 18+10.00 TO 18+25.00 (RIGHT SIDE ONLY)
-L- STA. 18+25.00 TO 20+00.00

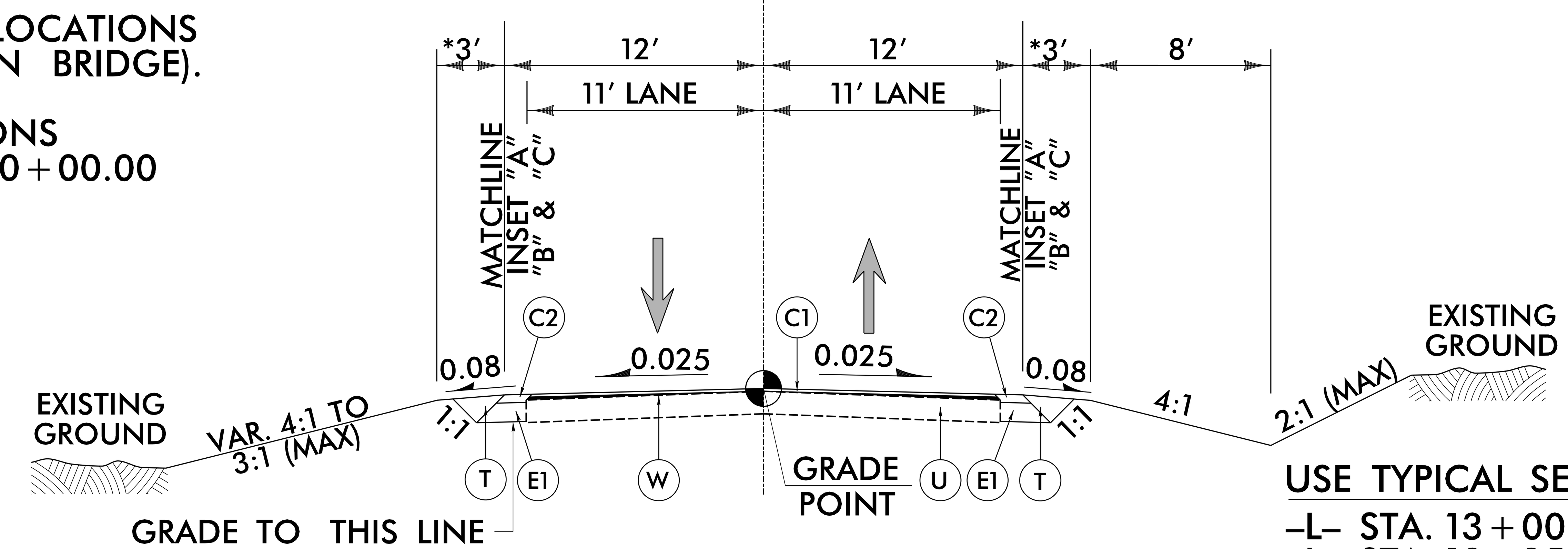
* NOTES

1: SEE SHEET 2A-2 FOR INSETS & WEDGING DETAILS.

2: USE INSETS "A" & "B" FOR GUARDRAIL LOCATIONS STA. 11+50.00 TO STA. 13+57.18 (BEGIN BRIDGE).

3: USE INSET "C" FOR GUARDRAIL LOCATIONS STA. 15+27.18 (END BRIDGE) TO STA. 20+00.00

CL -L- (US 17 BUS./CREEK DR.)



TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 2 AS FOLLOWS:

-L- STA. 13+00.00 TO 13+25.00 (RIGHT SIDE ONLY)
-L- STA. 13+25.00 TO 13+57.18 (BEGIN BRIDGE)
-L- STA. 15+27.18 (END BRIDGE) TO 18+10.00
-L- STA. 18+10.00 TO 18+25.00 (LEFT SIDE ONLY)

6/2/99
3/19/2018
R:\Roadway\Proj\Perquimans 19_RDY_TYP.dgn

CALYX
ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

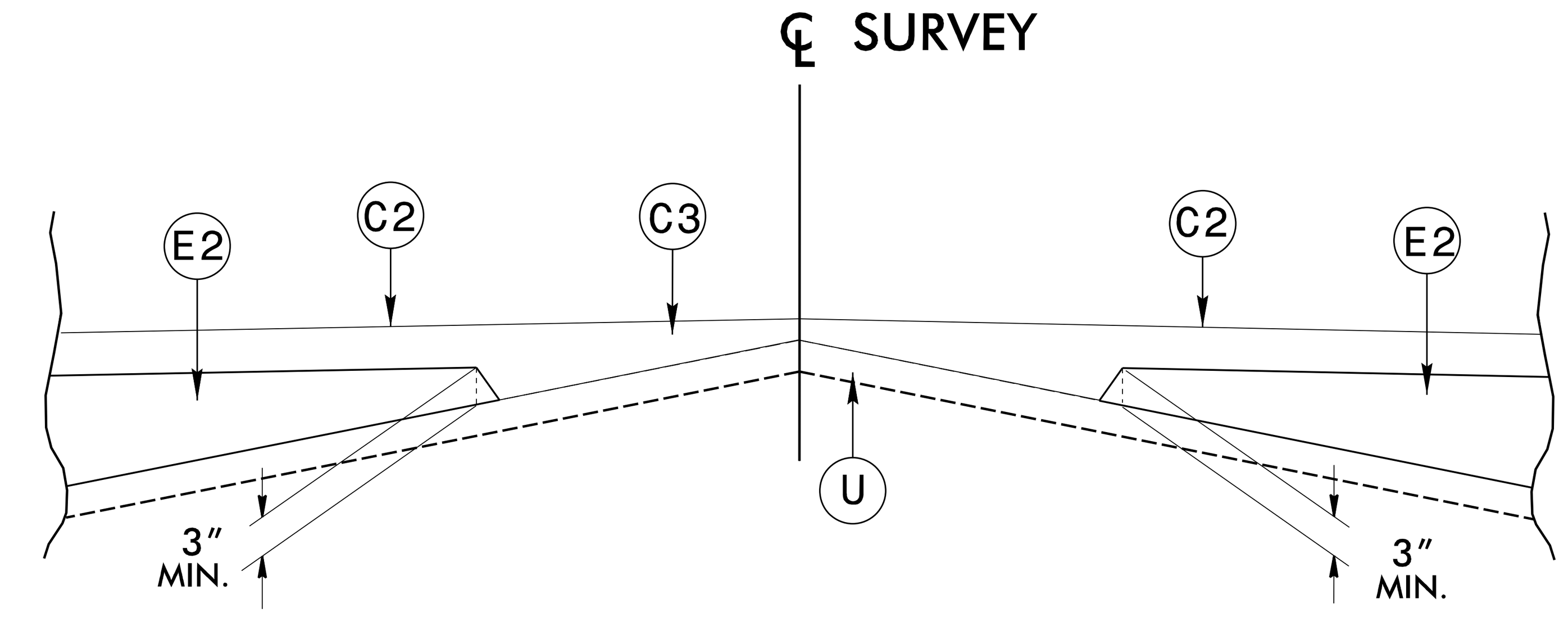
PROJECT REFERENCE NO.	SHEET NO.
B-5604	2A-2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 15759 ENGINEER STEPHEN C. BROWN
9/20/2018

PAVEMENT SCHEDULE

C1	1.5″ S9.5B
C2	3″ S9.5B
C3	VARIABLE DEPTH S9.5B
E1	6″ B25.0C
E2	VARIABLE DEPTH B25.0C
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

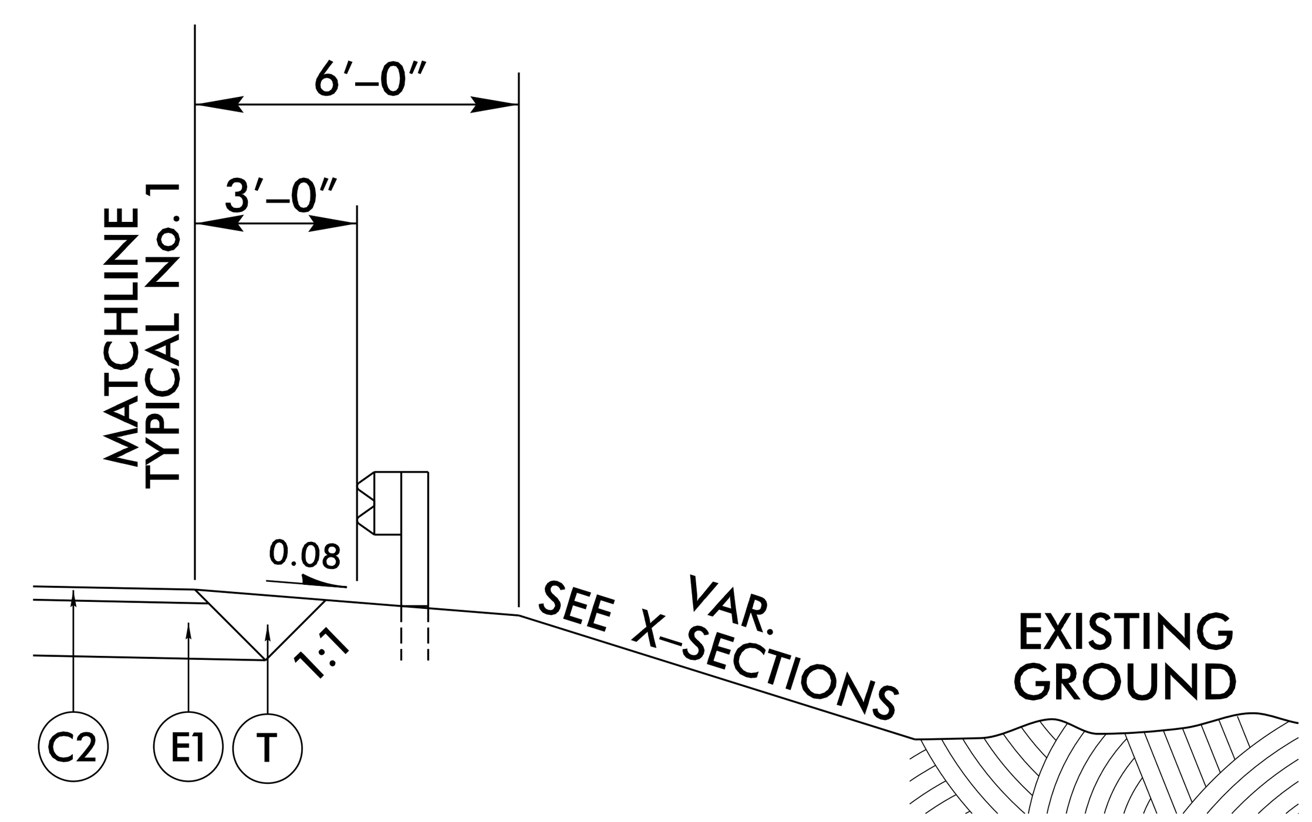
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



Detail Showing Method of Wedging on Roadway

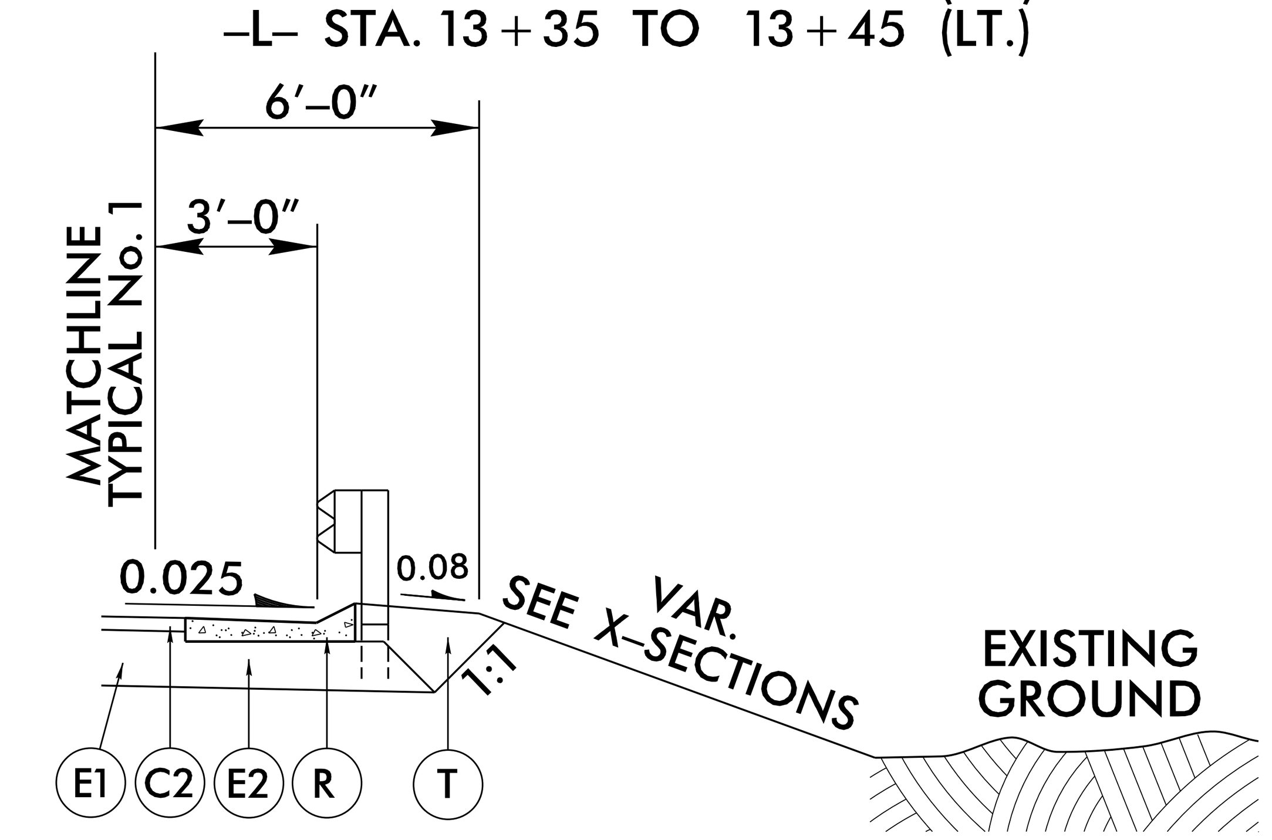
INSET "A"

USE INSET "A" FOR GUARDRAIL LOCATIONS BETWEEN STA. 11+50.93 TO STA. 13+57.18 (BEGIN BRIDGE)



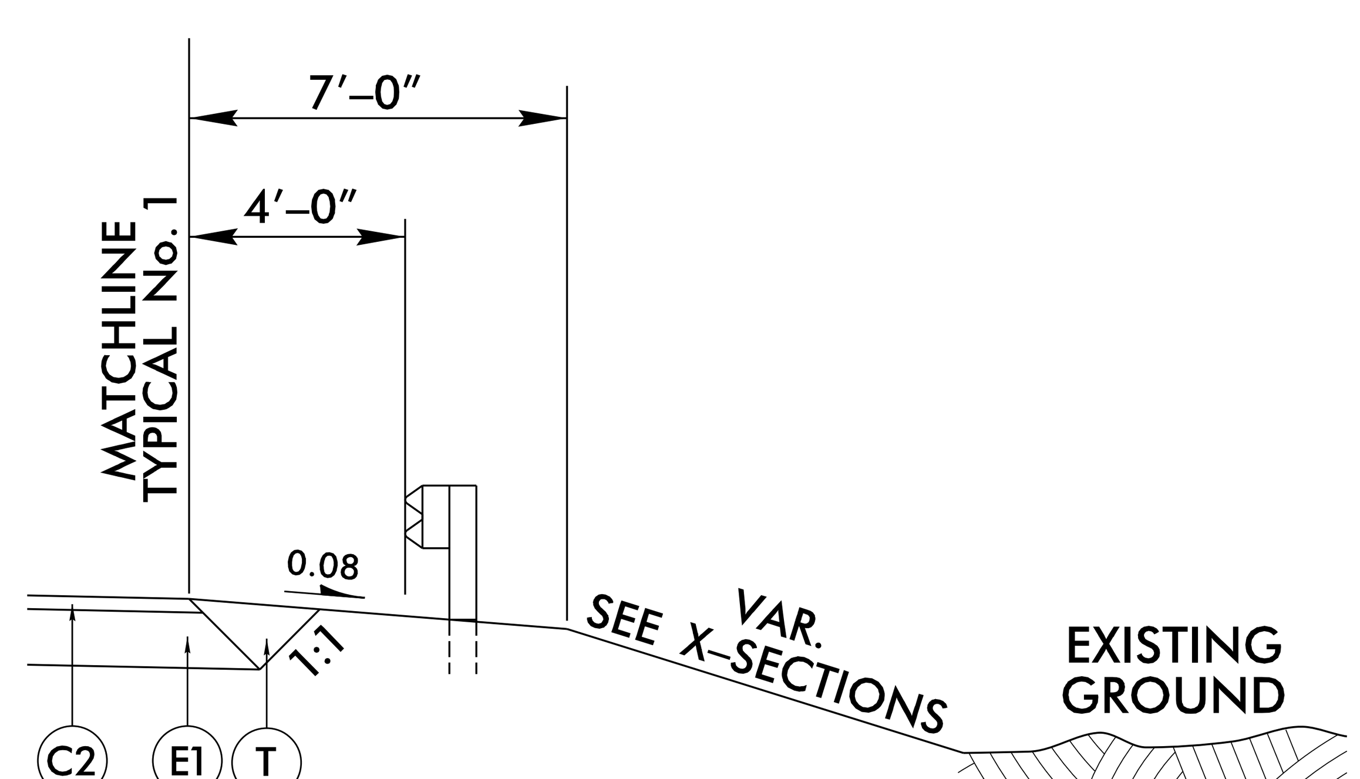
INSET "B"

SHOULDER BERM LOCATIONS:
-L- STA. 13+35 TO 13+45 (RT.)
-L- STA. 13+35 TO 13+45 (LT.)



INSET "C"

USE INSET "B" FOR GUARDRAIL LOCATIONS BETWEEN STA. 15+27.18 (END BRIDGE) AND STA. 18+50.00



6/2/99

3/19/2018
R:\Roadway\Proj\Perquimans 19_RDY_TYP.dgn

PROJECT REFERENCE NO.	SHEET NO.
B–5604	IC–1
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET B–5604

CONTROL DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
B56041	GPSMON	902268.1880	2749543.4410	5.81	OUTSIDE PROJECT LIMITS	
BL3	BL-3	902395.3590	2750268.9620	2.97	15+37.59	23.45 LT
B56042	GPSMON	902471.1110	2750997.8860	7.60	OUTSIDE PROJECT LIMITS	

BENCHMARK DATA

BM1 ELEVATION = 1.63'
N 902,301 E 2,750,454
BL STATION 14+10.96 112.87'RIGHT
RR SPIKE IN BASE OF 12" CEDAR

NC GRID
NAD 83 NA 2011

–L– STA 11+50
BEGIN CONSTRUCTION
LOCALIZED PROJECT COORDINATES
N = 902,310.6570
E = 2,749,890.0172

–L– STA 20+00
END CONSTRUCTION
LOCALIZED PROJECT COORDINATES
N = 902,444.3809
E = 2,750,729.4298

NCDOT GPS STATION "B5604–1"
LOCALIZED PROJECT COORDINATES
N = 902,268.1880
E = 2,749,543.4410

PC Sta. 19+37.08
PT Sta. 19+97.07
POT Sta. 22+52.30

TO NC 37
US 17 BUS (CREEK DR) – 24' BST
N 80° 51' 51.3" E
N 81° 12' 56.2" E
N 80° 47' 09.6" E
TO US 17 BY-PASS

PC Sta. 10+00.00
PT Sta. 11+60.51
PC Sta. 17+30.32
PT Sta. 17+79.38

NCDOT BASELINE STATION "BL–3"
LOCALIZED PROJECT COORDINATES
N = 902,395.3590
E = 2,750,268.9620

NCDOT GPS STATION "B5604–2"
LOCALIZED PROJECT COORDINATES
N = 902,471.1110
E = 2,750,997.8860

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "B56041" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 902,268.111(FT) EASTING: 2,749,543.441(FT) ELEVATION: 5.81(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999842638
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B56041" TO -L- STATION 11+50 IS N 83° 00' 49.97" E 349.17'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

NOTE: DRAWING NOT TO SCALE

NOTES:

THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
HTTP://WWW.NCDOT.GOV/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

THE FILES TO BE FOUND ARE AS FOLLOWS:
TIP B5604_LS_CONTROL.TXT

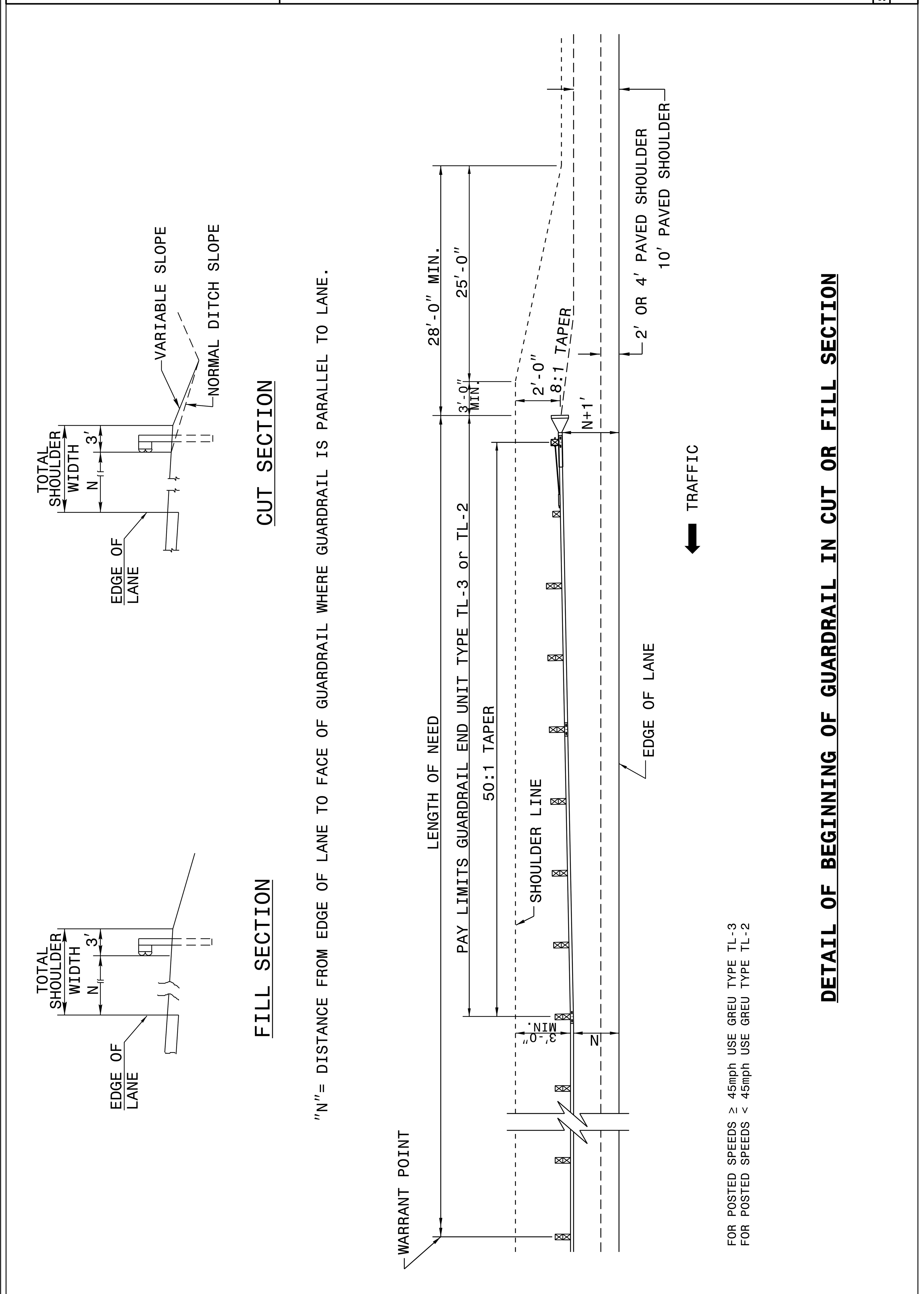
SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-1

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT
SHEET 6 OF 11 862D01

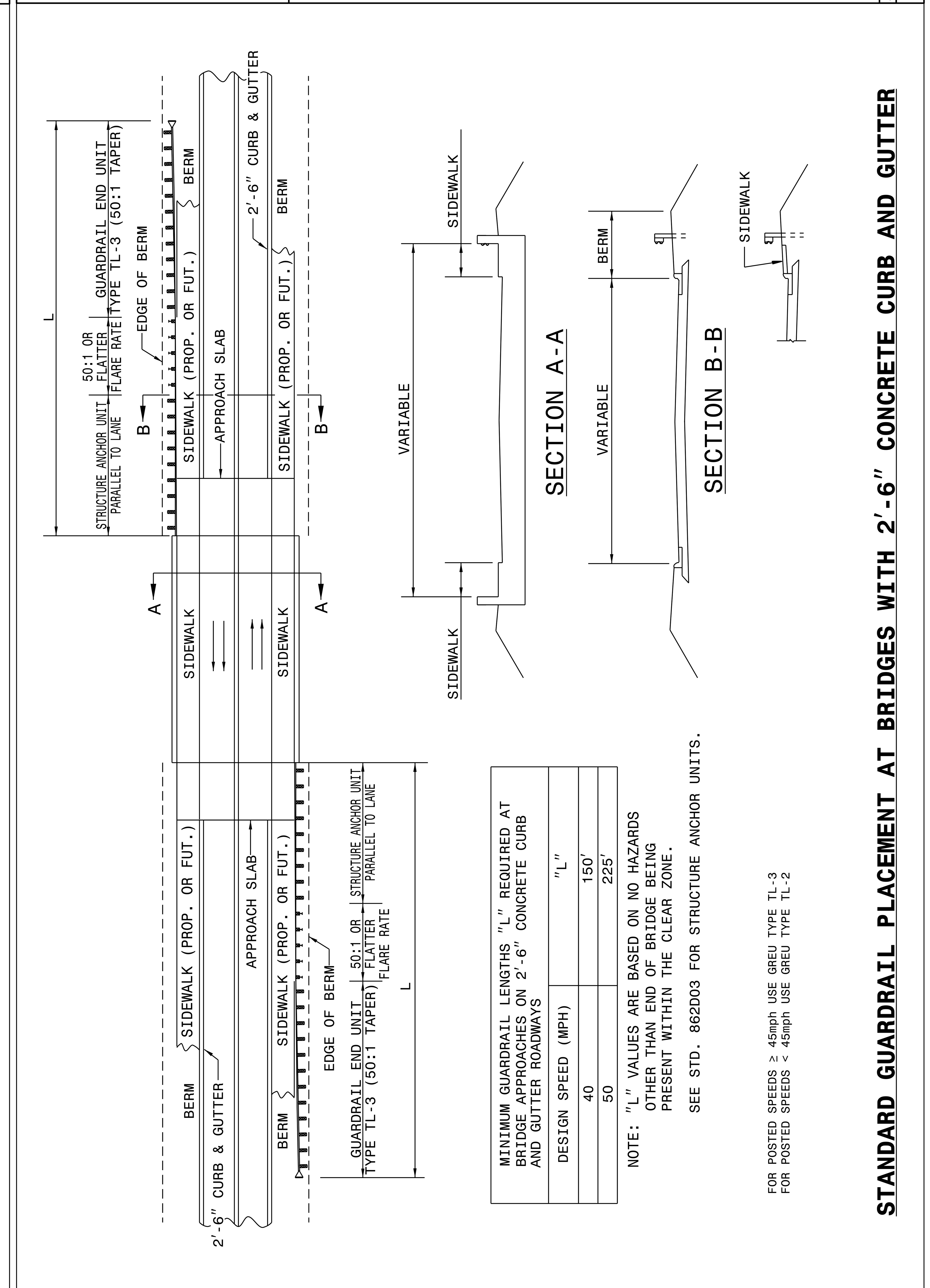
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT
SHEET 5 OF 11 862D01



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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 11
862D01



MINIMUM GUARDRAIL LENGTHS "L" REQUIRED AT BRIDGE APPROACHES ON 2'-6" CONCRETE CURB AND GUTTER ROADWAYS

DESIGN SPEED (MPH)	"L"
40	150'
50	225'

NOTE: "L" VALUES ARE BASED ON NO HAZARDS OTHER THAN END OF BRIDGE BEING PRESENT WITHIN THE CLEAR ZONE.

SEE STD. 862D03 FOR STRUCTURE ANCHOR UNITS.

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 5 OF 11
862D01

Joel S. Howerton 022966 3/20/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

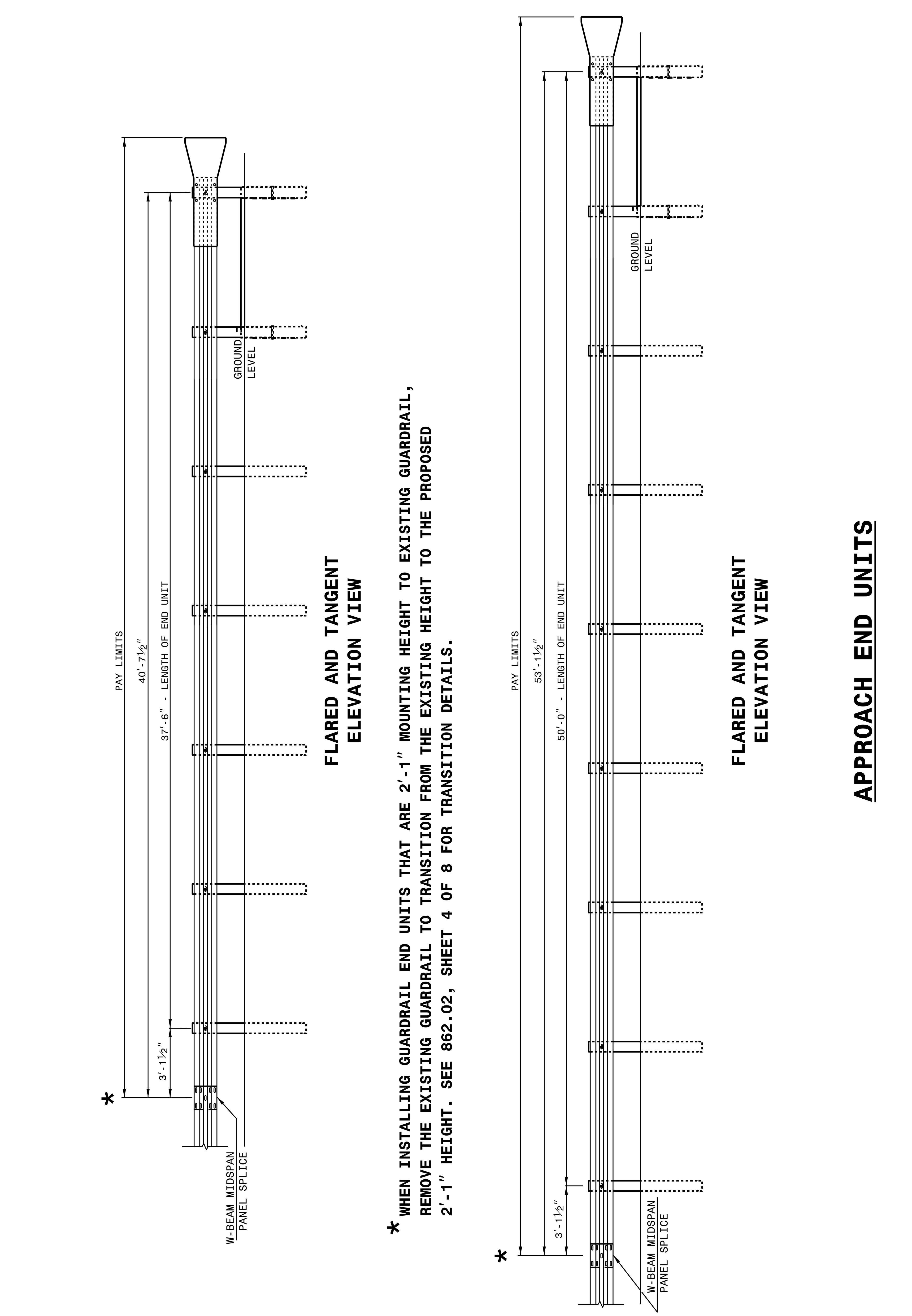
SEE TITLE BLOCK

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

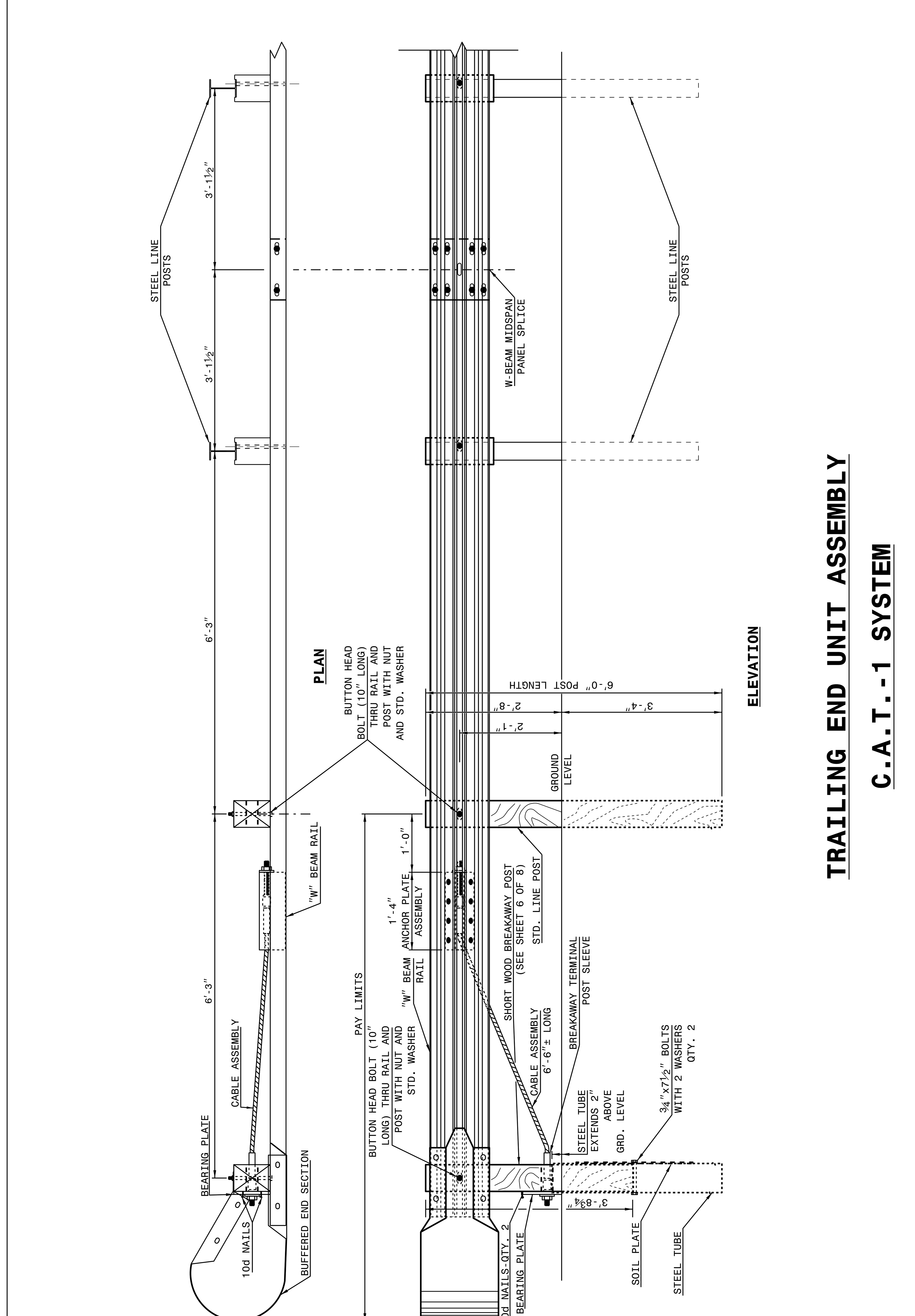
04-MAY-2017 15:15
S:\Contracts\Special Details\jhowerton\Standard Drawings\2012 Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d03\862d01.dgn
jhowerton AT CSD-292595

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-2

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. — ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION — SHEET 2 OF 8 862D02
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. — ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION — SHEET 1 OF 8 862D02



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 2 OF 8 **862D02**



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 1 OF 8 **862D02**

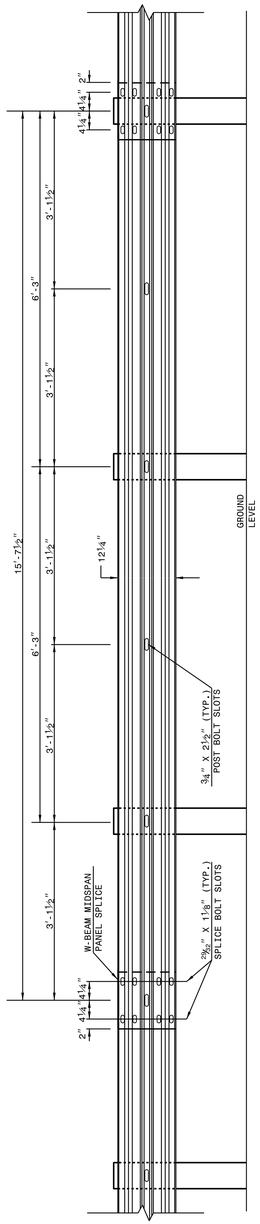
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

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

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-3



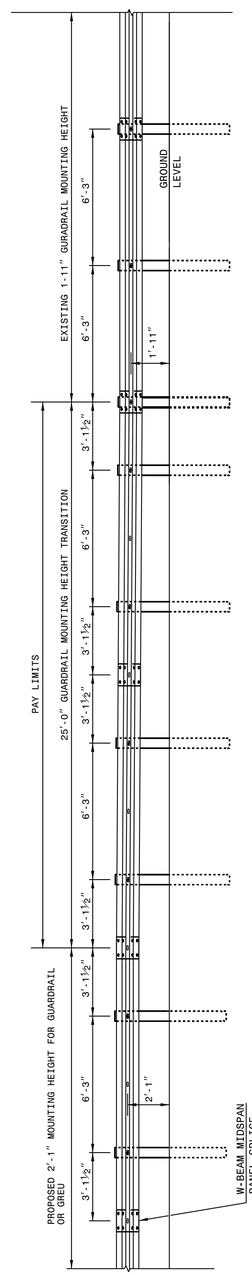
15'-7½" W-BEAM GUARDRAIL PANEL

NOTE: USE 5 SPACE 15'-7½" W-BEAM GUARDRAIL PANEL AT THE DOWNSTREAM END OF AN END UNIT OR EXISTING GUARDRAIL THAT DOES NOT OFFSET THE W-BEAM PANEL SPLICE TO MIDSPAN

NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 1'-11", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL, FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 2'-1" GUARDRAIL.

ELEVATION VIEW

TRANSITION FROM OR 1'-11" TO 2'-1" W-BEAM GUARDRAIL MOUNTING HEIGHT



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 Joel S. Howerton
Digitally signed by: Joel S. Howerton
DN: cn=Joel S. Howerton, o=NCDOT, ou=Engineering, email=jshowerton@ncdot.gov, c=US
Date: 2018.03.20 14:24:26
3/20/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

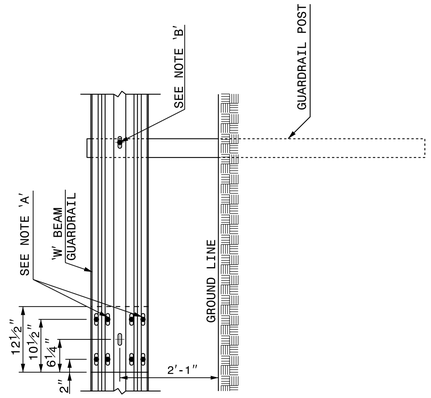
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

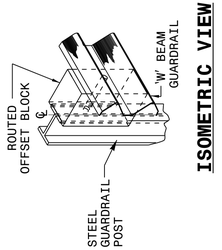
ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-4

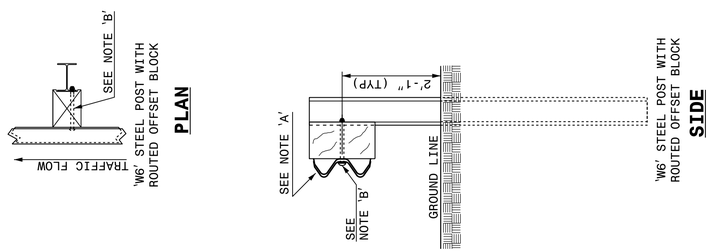
FRONT - MID SPAN SPLICE



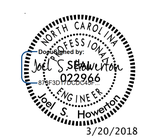
ISOMETRIC VIEW



TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES



NOTES:
A - 5/8" DIA. BUTTON HEAD SPLICE BOLT 1¼" LONG (8 REQ. PER SPLICE JOINT).
B - 5/8" DIA. BUTTON HEAD BOLT 7½"/9" LONG WITH NUT FOR BOLTING 6"/8" ROUTED OFFSET BLOCK TO STEEL POSTS.
C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

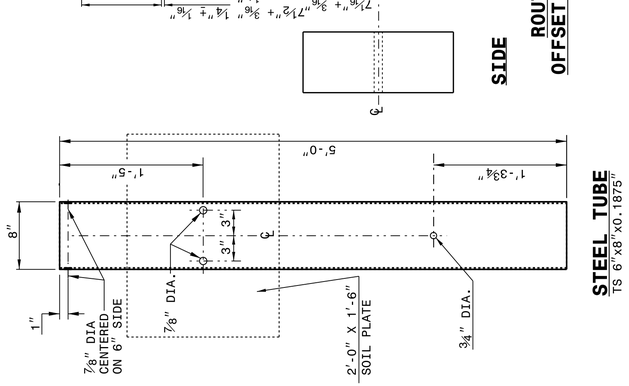
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

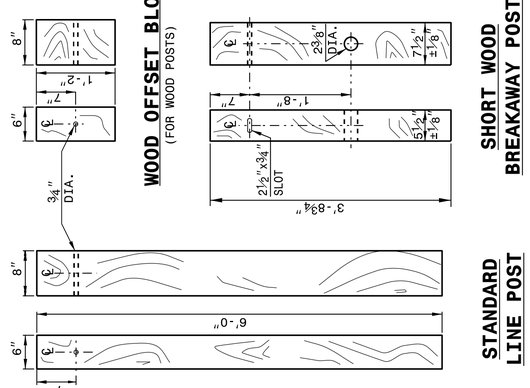
ORIGINAL BY:	J HOWERTON	DATE:	06-22-12
MODIFIED BY:		DATE:	
CHECKED BY:		DATE:	
FILE SPEC.:			

SYSTEM PARTS

STEEL TUBE
TS 6"x8"x0.1875"



STANDARD LINE POST

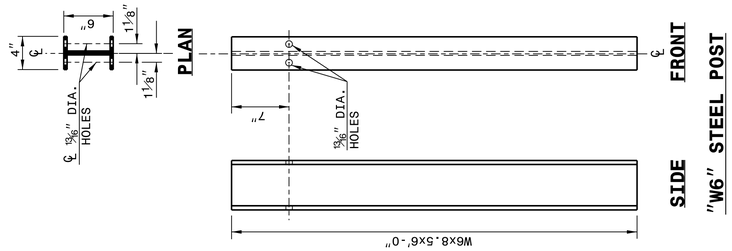


SHORT WOOD BREAKAWAY POST

WOOD OFFSET BLOCK
(FOR WOOD POSTS)

ROUTED OFFSET BLOCK

SIDE "W6" STEEL POST

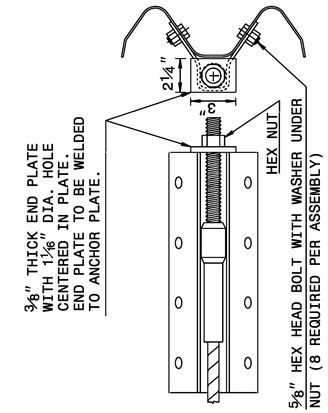


PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-5

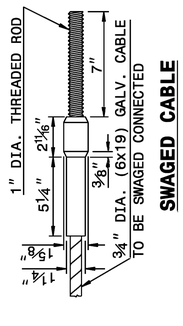
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

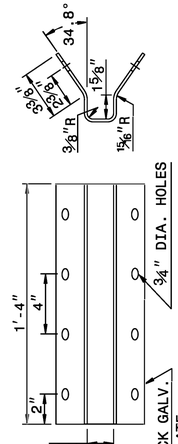
SHEET 7 OF 8
862D02



ANCHOR PLATE ASSEMBLY



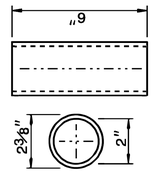
SWAGED CABLE



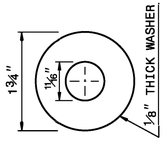
ANCHOR PLATE

CABLE ASSEMBLY

SYSTEM PARTS

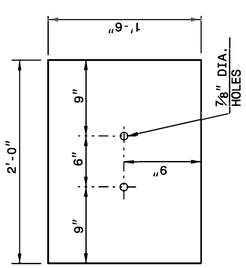


BREAKAWAY TERMINAL POST SLEEVE



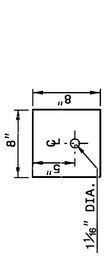
DETAIL OF STANDARD WASHER

STANDARD WASHER: TYPICAL USE UNDER NUT WITH WOOD POST



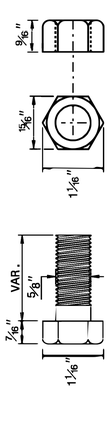
SOIL PLATE

¼" THICK PLATE

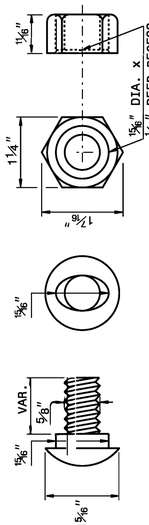


BEARING PLATE

⅝" THICK PLATE



DETAIL OF STANDARD HEX BOLT AND NUT



DETAIL OF BUTTON HEAD BOLT AND NUT

SYSTEM PARTS

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

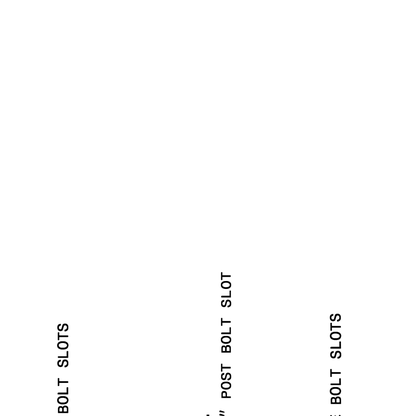
SEE TITLE BLOCK

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

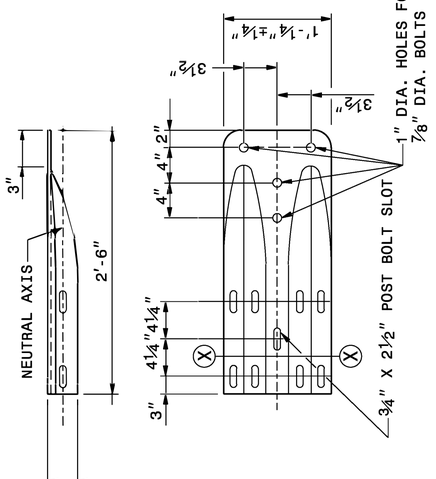
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 8 OF 8
862D02

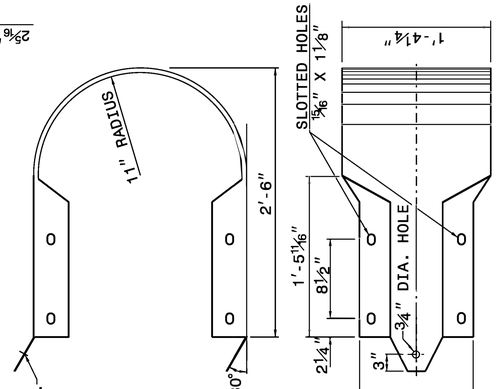


SECTION X-X



TYPICAL END SHOE

SYSTEM PARTS - GENERAL USE



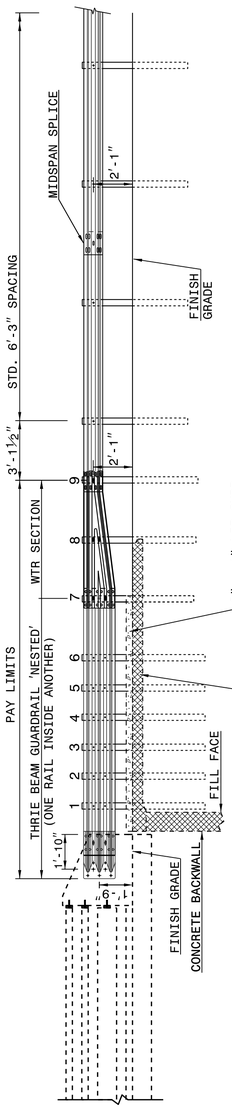
BUFFERED END SECTION

SYSTEM PARTS - GENERAL USE

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-6

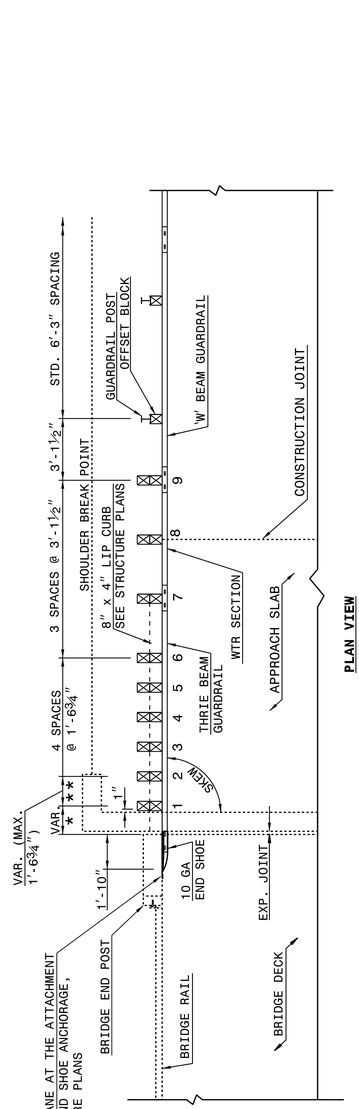
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

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



ELEVATION

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

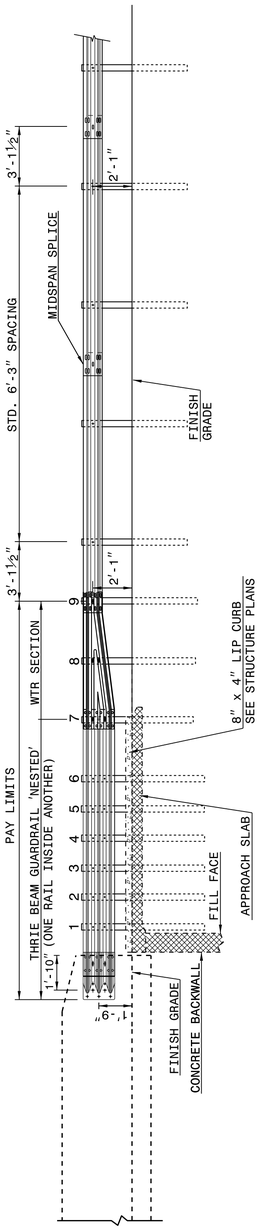


PLAN VIEW

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

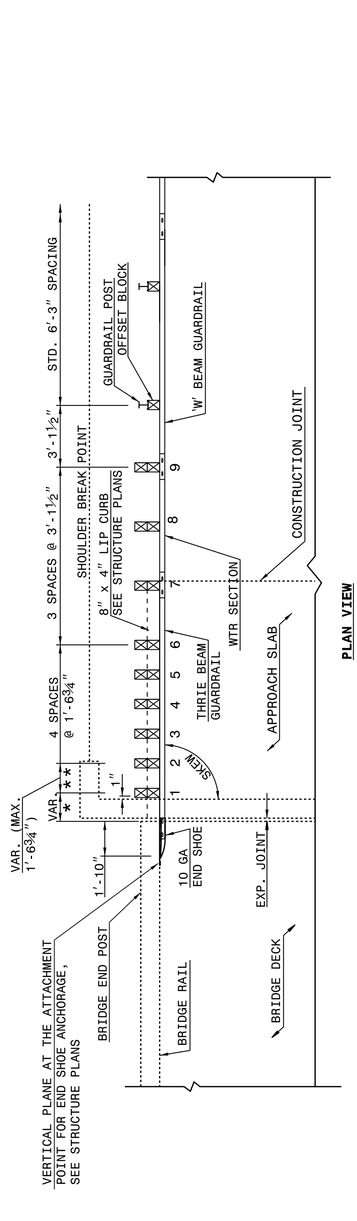
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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



ELEVATION

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



PLAN VIEW

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

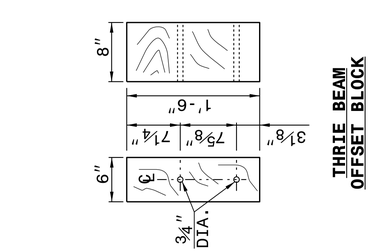
ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: _____

PROJECT REFERENCE NO.	SHEET NO.
B-5604	2C-7

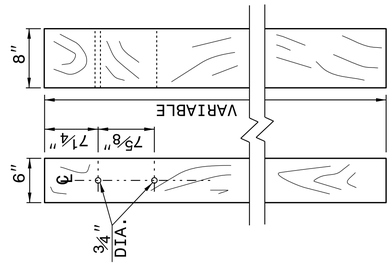
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

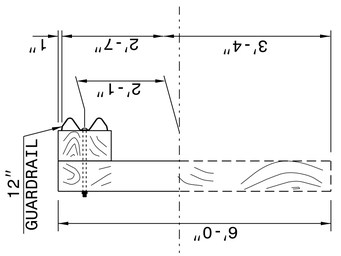
SHEET 3 OF 7
862D03



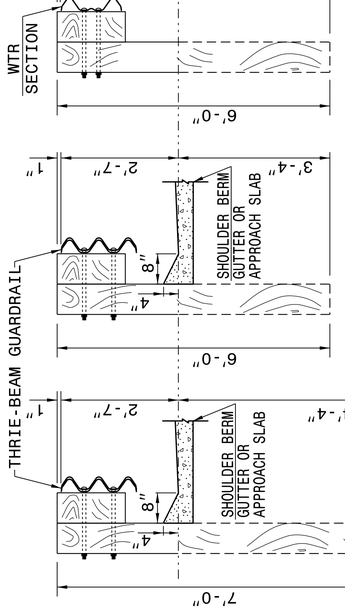
THRIE BEAM
OFFSET BLOCK



THRIE BEAM
LINE POST



SECTION OF 'W'
BEAM POST 9

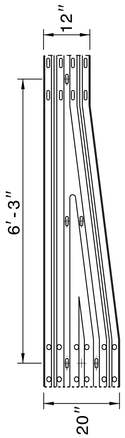


SECTION OF WTR
BEAM POST 8

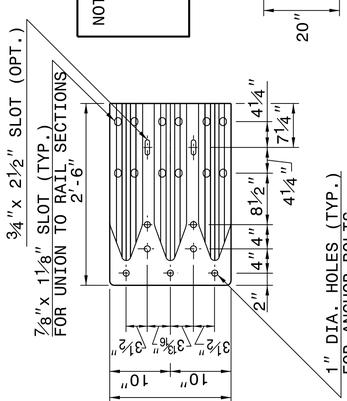
SECTION OF THRIE
BEAM POST 7

SECTION OF THRIE BEAM
POSTS 1 THRU 6

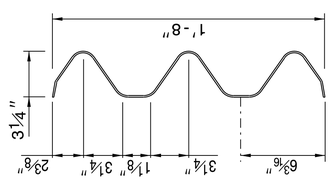
NOTE: THE MID POST AND OFFSET BLOCK OF THE WTR SECTION WILL REQUIRE SPECIAL BOLT HOLE DRILLING IN THE THRIE BEAM OFFSET BLOCK AND LINE POST.



WTR SECTION
ELEVATION VIEW



END SHOE

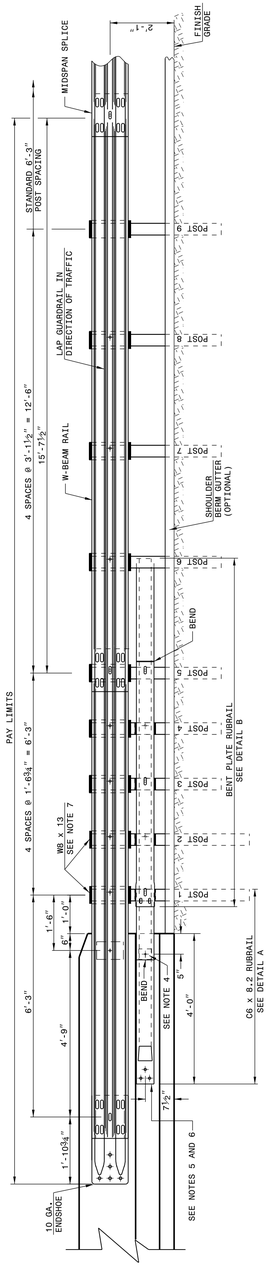


THRIE-BEAM
SECTION

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

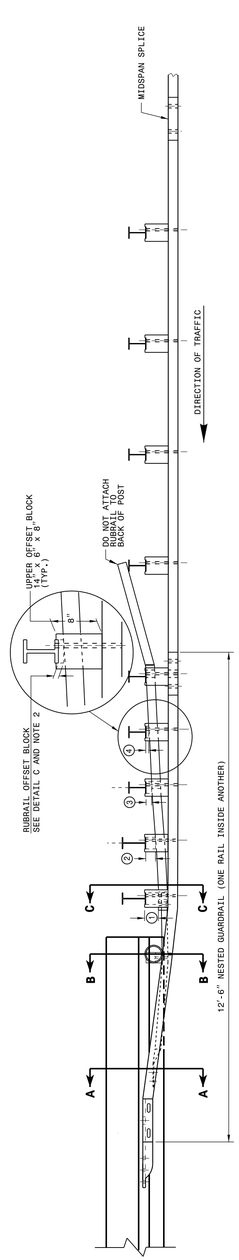
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03



ELEVATION

GENERAL NOTES:
1) POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL.
2) RUBRAIL BLOCKOUTS LOCATED ON POSTS 1 THROUGH 4 ARE OFFSET DRILLED AND SECURED WITH ⅝" BUTTONHEAD BOLTS (SEE CHART FOR BOLT LENGTHS). SECURE BLOCKS ONLY TO POSTS 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL IS SECURED WITH A ⅝" x 4½" BUTTONHEAD BOLT.
3) STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE X 12" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO RAIL ELEMENT ONLY. USE ⅜" x 3" FLAT WASHER UNDER BOLT HEAD AND NUT.
4) SEE DETAIL D FOR SLOPED RUBRAIL BLOCKOUT. BLOCKOUT IS ATTACHED TO RAIL ELEMENT ONLY. USE ⅜" x 3" LAG BOLT WITH FLAT WASHER. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
5) SHOP FABRICATE THE C6 x 8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE F SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER OR BRIDGE RAIL.
6) ANCHORAGE:
   (a) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR RUBRAIL USING THREE ⅝" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS. MAXIMUM PROJECTION FOR BOLTS IS ½".
   (b) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD DOWN PLATE (SEE STD. DWG. 862.04). A BOLT INSERT ASSEMBLY IS ALLOWED ON PRECAST REINFORCED CONCRETE BARRIER (SEE STD. DWG. 857.01). INSTALL THE W-BEAM END SHOE BEHIND THE RETURN W-BEAM RAIL ELEMENT.
   (c) AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE AND RUBRAIL AS DETAILED ON THE STRUCTURE PLANS AND SHOP DRAWINGS.
7) POSTS 1 AND 2 ARE W6 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.



PLAN

GUARDRAIL ANCHOR UNIT TYPE B-77

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03

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.:			

COMPUTED BY:	E. Martin	DATE:	9/27/2017
CHECKED BY:	S. Browde	DATE:	11/21/17

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
B-5604	3B-1

GUARDRAIL SUMMARY

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL

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

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 CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	TYPE III	XI	GREU TL-3	M-350	XIII	CAT-1	VI MOD	BIC	AT-1	G	NG				
-L-	11+50.93	13+57.18	LT	206.25				13+57.18	3'	6'	50'		1'		1													
-L-	11+50.93	13+57.18	RT	206.25			13+57.18		3'	6'		50'		1'	1													
-L-	15+27.18	18+20.93	LT	293.75				15+27.18	4'	7'	50'		1'		1		1											
-L-	15+27.18	18+45.93	RT	318.75			15+27.18		4'	7'		50'		1'	1		1											
GUARDRAIL TOTALS:				**1025.00**											**4**		**2**											
		ANCHOR DEDUCTIONS:																										
		TYPE III: 4 @ 18.75' EA		75.00																								
		GREU TL-3: 2 @ 50' EA		100.00																								
		CAT-1: @ 6.25' EA		0.00																								
		ANCHOR TOTALS:		**175.00**																								
		GUARDRAIL GRAND TOTALS:		**850.00**											4		2											
			SAY:	**875**																								
		ADDITIONAL GUARDRAIL POSTS = 5																										

ASPHALT PAVEMENT REMOVAL SUMMARY

LINE	STATION	STATION	LOCATION	AREA	SQ. YDS.
-L-	11+50.00	13+00.00	CL	3,255.65	361.74
-L-	13+00.00	13+25.00	LT	260.87	28.99
-L-	18+10.00	18+25.00	RT	194.13	21.57
-L-	18+25.00	20+00.00	CL	4,445.11	493.90
				TOTAL	906.20
				SAY	**910**

SHOULDER BERM GUTTER SUMMARY

LINE	STATION	STATION	LOCATION	LENGTH
-L-	13+35.00	13+45.00	LT	10.00
-L-	13+35.00	13+45.00	RT	10.00
			TOTAL	20.00
			SAY	**25**

EARTHWORK SUMMARY

LINE	STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
-L-	11+50.00	13+57.18	113	88	0	25
-L-	15+27.18	20+00.00	119	529	410	0
PROJECT TOTALS:			232	617	410	25
Waste in Lieu of Borrow					-25	0
PROJECT TOTALS:			232	617	385	25
5% to Replace Top Soil on Borrow Pit					19	0
GRAND TOTALS:			232		404	25
SAY:			**250**		**420**	

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

COMPUTED BY:	JR HOPSON, PE	DATE:	11/17/2017
CHECKED BY:	DP BOCKER, PE	DATE:	11/20/2017

PROJECT NO.	SHEET NO.
B-5604	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.

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

STATION	LOCATION (LT, RT, OR CL)'	STRUCTURE NO.		TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	SIDE DRAIN PIPE (RCP, CSP, CAAP, HDPE, or PVC)								DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
SIZE								12"	15"	18"	24"	30"	36"	42"	48"				
THICKNESS OR GAUGE		FROM	TO																
-L- 13+40	LT	0401		4.22															
		0401	0402		1.22	1.14													
-L- 13+40	RT	0403		4.22															
		0403	0404		1.22	1.14													
SHEET TOTALS								0	0	0	0	0	0	0	0	0	0	0	0

STATION	STRUCTURE NO.		C.S. PIPE								R.C. PIPE CLASS III								R.C. PIPE CLASS IV							
SIZE			12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"
THICKNESS OR GAUGE	FROM	TO	.064	.064	.064	.064	.079	.079	.109	.109																
-L- 13+40	0401																									
	0401	0402																		20						
-L- 13+40	0403																									
	0403	0404																		20						
SHEET TOTALS			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0

STATION	STRUCTURE NO.		18" R.C. PIPE (CLASS V)	***" RC PIPE CULVERTS, CONTRACTOR DESIGN	***" RC PIPE CULVERTS, CONTRACTOR DESIGN	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS		QUANTITIES FOR DRAINAGE STRUCTURES	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. FT.		C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE			CONCRETE TRANSITIONAL SECTION	
	FROM	TO						R.C.P.	C.S.P.	PER EACH (0' THRU 5.0')	A 5.0' THRU 10.0'	B 10.0' AND ABOVE		E	F	G	DROP INLET	CATCH BASIN
-L- 13+40	0401									1								
	0401	0402																
-L- 13+40	0403									1								
	0403	0404																
SHEET TOTALS			0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0

STATION	STRUCTURE NO.		D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME WITH TWO GRATES STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR 840.26	G.D.I. TYPE "B" STD. 840.18 OR 840.27	G.D.I. TYPE "D" STD. 840.19 OR 840.28	T.B.D.I. STD. 840.35	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	G.D.I. FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32					SIDE DRAIN PIPE ELBOWS NO. & SIZE	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
	FROM	TO																			
-L- 13+40	0401							1			1										
	0401	0402																			
-L- 13+40	0403							1			1										
	0403	0404																			
SHEET TOTALS			0	0	0	0	0	2	0	0	2	0	0	0	0	0	4@15"	0	0	0	

ABBREVIATIONS

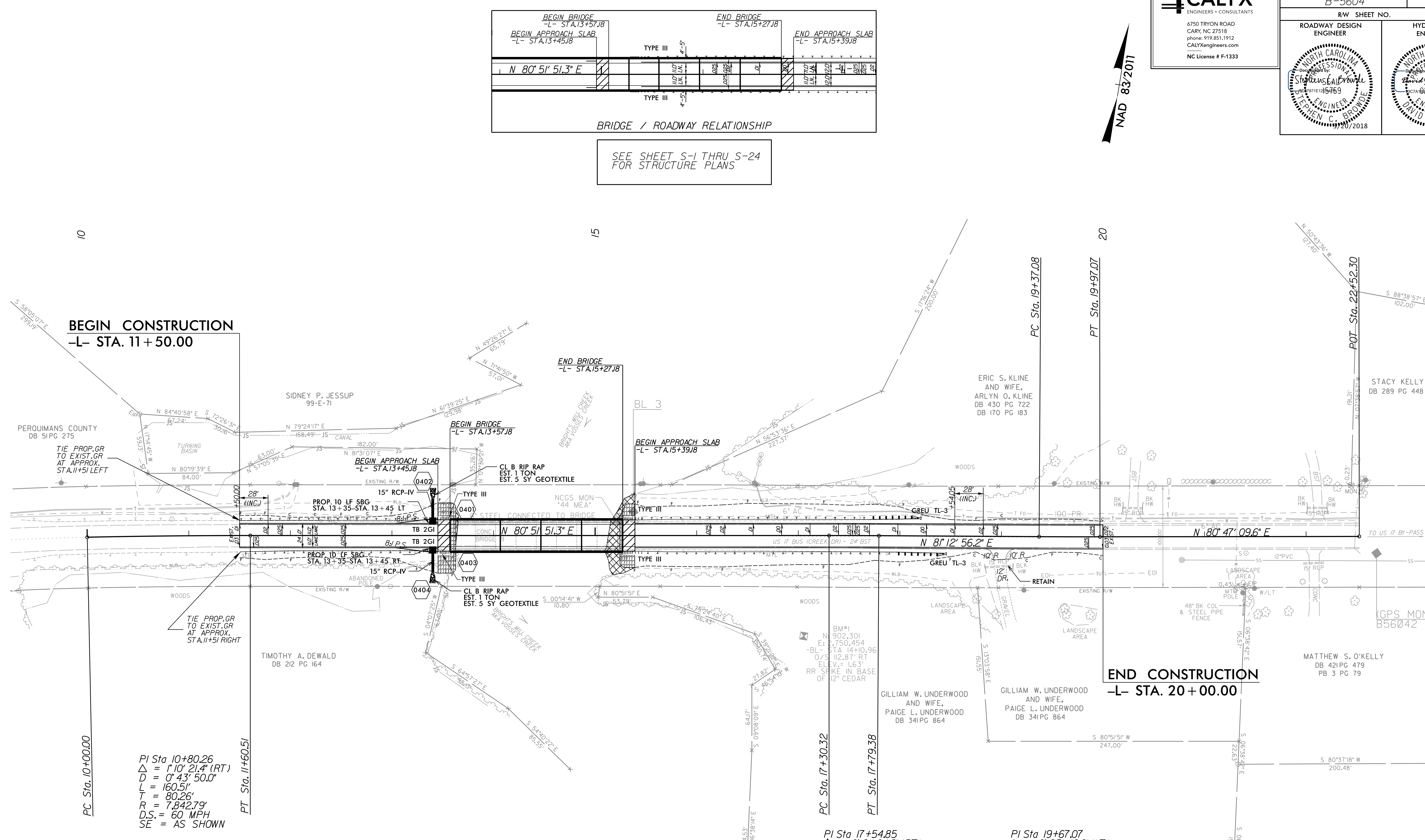
C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
	DROP INLET
D.I.	GRATED DROP INLET
G.D.I.	(NARROW SLOT)
G.D.I.(N.S.)	JUNCTION BOX
J.B.	MANHOLE
M.H.	TRAFFIC BEARING
T.B.D.I.	DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

8/17/99

REVISIONS

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO.	SHEET NO.
B-5604	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
9/20/2018	9/20/2018


BEGIN BRIDGE -L- STA.13+57.18
END BRIDGE -L- STA.15+27.18
BEGIN APPROACH SLAB -L- STA.13+45.18
END APPROACH SLAB -L- STA.15+39.18
TYPE III
N 80° 51' 51.3" E
BRIDGE / ROADWAY RELATIONSHIP
SEE SHEET S-1 THRU S-24 FOR STRUCTURE PLANS
NAD 83/2011
BEGIN CONSTRUCTION
-L- STA. 11+50.00
SIDNEY P. JESSUP
99-E-71
PERQUIMANS COUNTY
DB 51 PG 275
TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 LEFT
TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 RIGHT
PROP. 10 LF SBG STA. 13+35-STA. 13+45 LT
PROP. 10 LF SBG STA. 13+35-STA. 13+45 RT
15" RCP-IV
CL B RIP RAP EST. 1 TON EST. 5 SY GEOTEXTILE
NCGS MON "44 MEA"
BL 3
N 81° 12' 56.2" E
N 80° 47' 09.6" E
GREU TL-3
ERIC S. KLINE AND WIFE, ARLYN O. KLINE DB 430 PG 722 DB 170 PG 183
STACY KELLY DB 289 PG 448
TIMOTHY A. DEWALD DB 212 PG 164
GILLIAM W. UNDERWOOD AND WIFE, PAIGE L. UNDERWOOD DB 341 PG 864
MATTHEW S. O'KELLY DB 421 PG 479 PB 3 PG 79
K & W OF HERTFORD, INC. DB 182 PG 897 PC 2 SL 20 (MAP*8)
BM#1 N 902,301 E 2,750,454 -BL- STA 14+10.96 O/S 112.87' RT ELEV.= 1.63' RR SPIKE IN BASE OF 12" CEDAR
END CONSTRUCTION
-L- STA. 20+00.00
(GPS MON) B56042
PC Sta. 10+00.00
PT Sta. 11+60.51
PC Sta. 17+30.32
PT Sta. 17+79.38
PC Sta. 19+37.08
PT Sta. 19+97.07
POT Sta. 22+52.30
PI Sta 10+80.26
Δ = 1° 10' 21.4" (RT)
D = 0° 43' 50.0"
L = 160.51'
T = 80.26'
R = 7,842.79'
D.S. = 60 MPH
SE = AS SHOWN
PI Sta 17+54.85
Δ = 0° 21' 04.8" (RT)
D = 0° 42' 58.3"
L = 49.06'
T = 24.53'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN
PI Sta 19+67.07
Δ = 0° 25' 46.6" (LT)
D = 0° 42' 58.3"
L = 59.98'
T = 29.99'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "B56041"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 902,268.188(ft) EASTING: 2,749,543.441(ft)
ELEVATION: 5.81(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999842638
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B56041" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

NOTE: FOR -L- PROFILE SEE SHEET 5

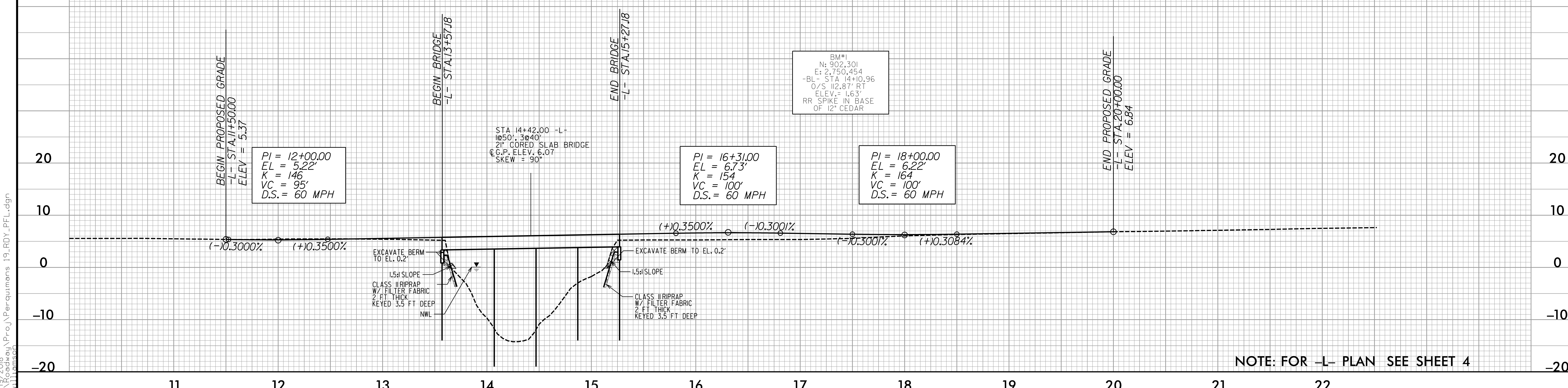
3/19/2018
R:\Roadway\Proj\Perquimans 19_RDY_PSH04.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-5604	5

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 15759 ENGINEER STEPHEN C. BROWDE DocuSigned by: Stephen C. Browde 0E27971E12EA42B... 3/20/2018	NORTH CAROLINA PROFESSIONAL SEAL 029984 ENGINEER DAVID P. BOCKER DocuSigned by: David P. Bocker 93C7A1B94E66490... 3/20/2018

BRIDGE HYDRAULIC DATA

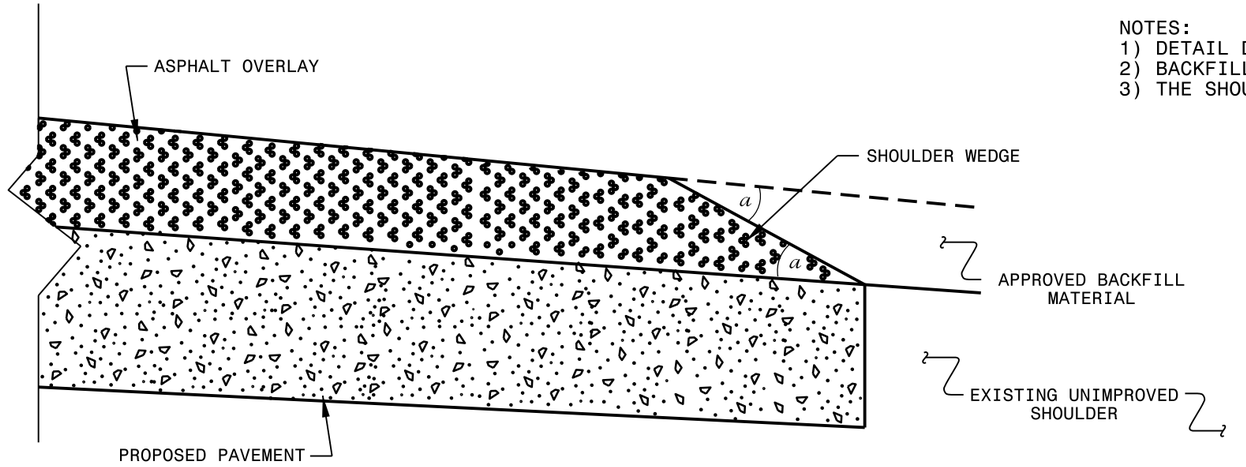
DESIGN DISCHARGE	=	1600	CFS
DESIGN FREQUENCY	=	50	YR
DESIGN HW ELEVATION	=	2.5	FT
BASE DISCHARGE	=	2000	CFS
BASE FREQUENCY	=	100	YR
BASE HW ELEVATION	=	3.5	FT
OVERTOPPING DISCHARGE	=	3600	CFS
OVERTOPPING FREQUENCY	=	>500	YR
OVERTOPPING ELEVATION	=	5.3	FT
DATE OF SURVEY	=	12/13/2016	
W.S.ELEVATION AT DATE OF SURVEY	=	0J	FT



NOTE: FOR -L- PLAN SEE SHEET 4

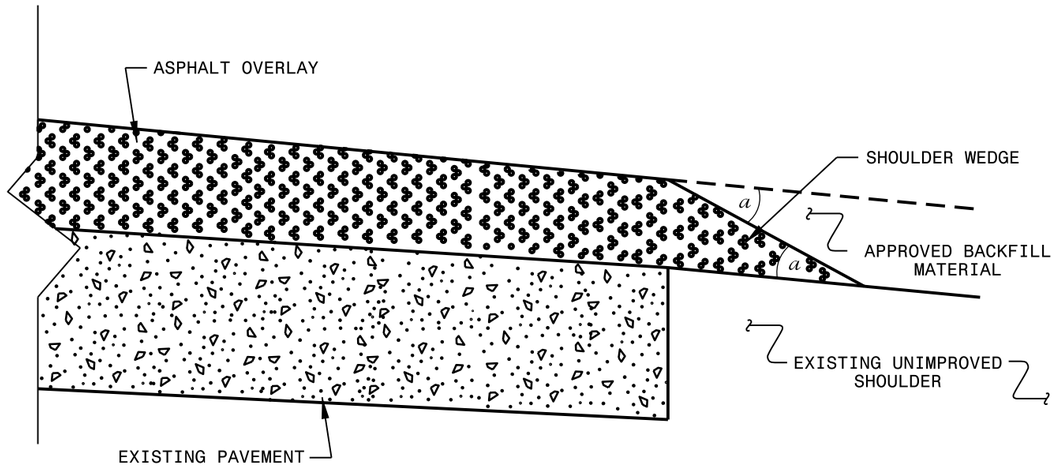
PROJECT REFERENCE NO.	SHEET NO.
B-5604	2-C

NOTES:
1) DETAIL DOES NOT APPLY TO OGAFC AND ULTRA-THIN BONDED WEARING COURSE.
2) BACKFILL SHOULDER WITH APPROVED MATERIAL.
3) THE SHOULDER WEDGE DEVICE MAY BE DISENGAGED AT PAVED DRIVEWAYS AND SIDE STREETS.



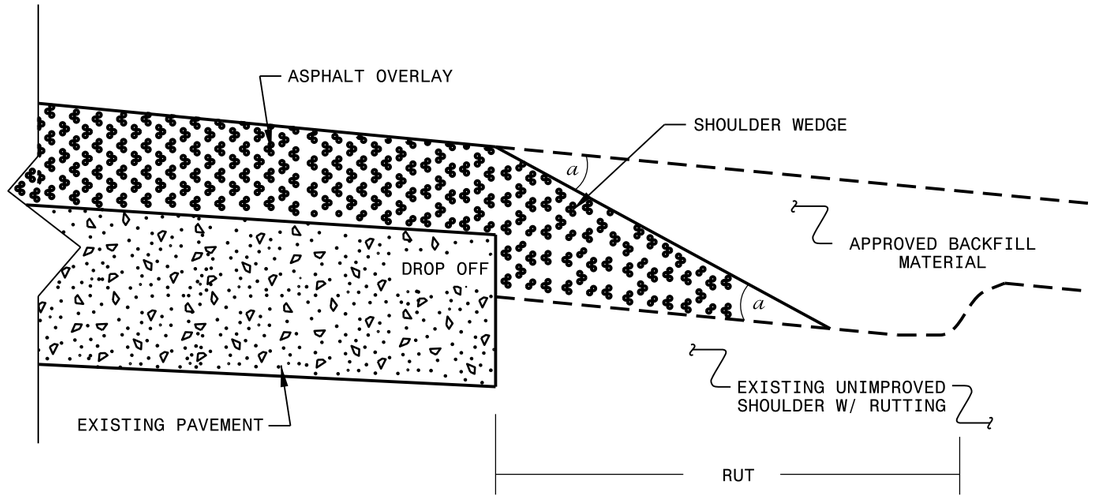
SHOULDER WEDGE DETAIL

(Resurfacing Projects w/ Widening or with Existing Paved Shoulder having no dropoffs)



SHOULDER WEDGE DETAIL

(Resurfacing Projects w/ NO Widening)



SHOULDER WEDGE DETAIL

(Resurfacing Adjacent to Rutted Shoulder)

- SHOULDER WEDGE ANGLE = 30°

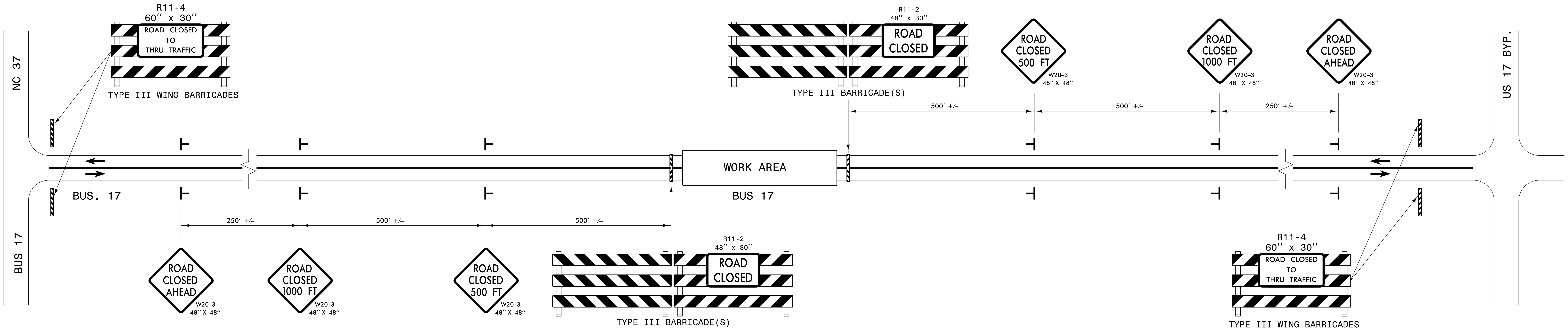
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SHOULDER WEDGE DETAILS

ORIGINAL BY:	T.SPELL	DATE:	7-19-11
MODIFIED BY:		DATE:	10/16/12
CHECKED BY:		DATE:	
FILE SPEC.:	s:usr/details/stand/shoulderwedgedetail.dgn		

TRAFFIC CONTROL FOR TEMPORARY ROAD CLOSURE

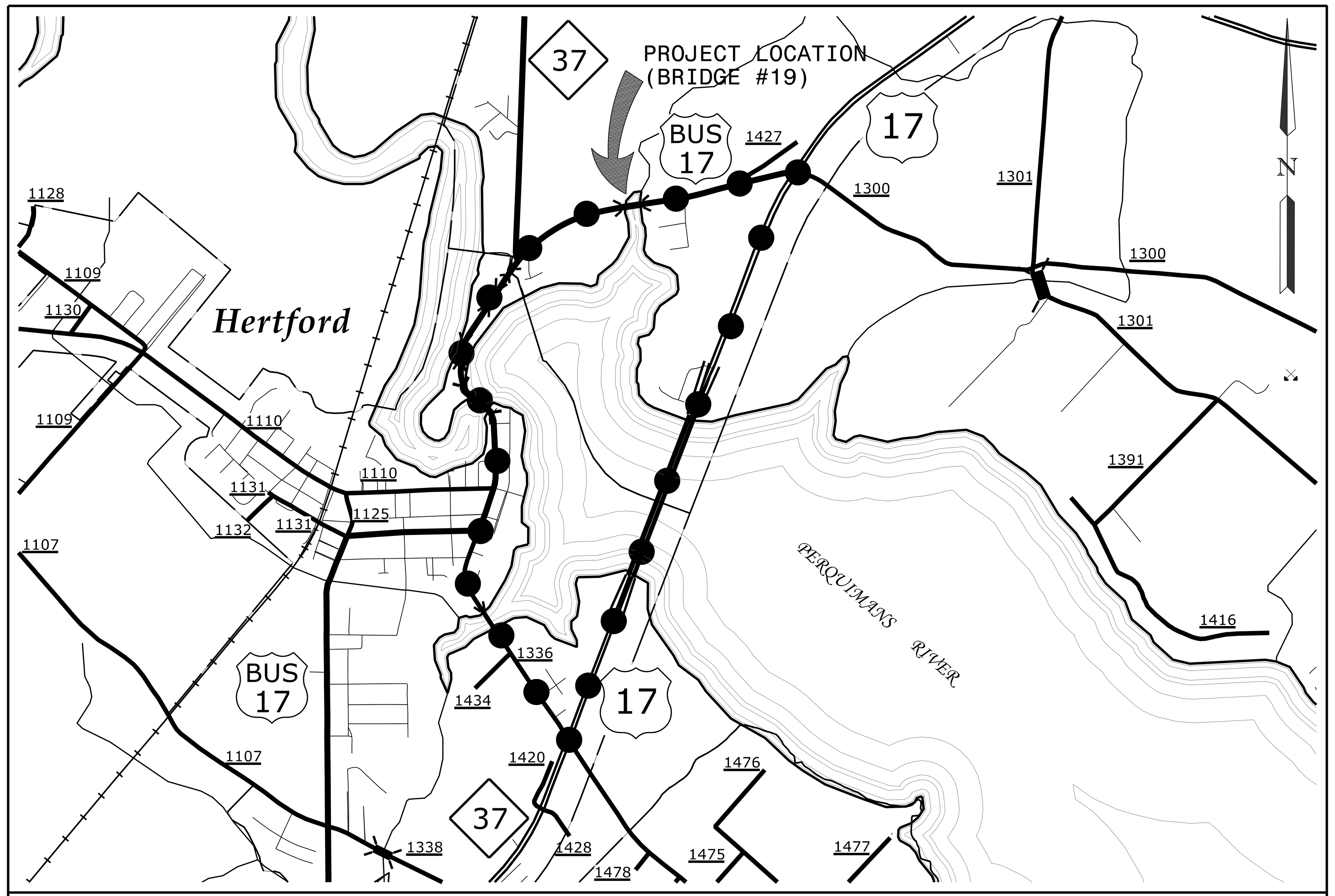
NOTE: WING BARRICADES WITH SIGN R11-3 SHOULD ALSO BE USED AT SIDE ROADS BETWEEN THE DETOUR POINT AND THE POINT OF CLOSURE



LEGEND

STATIONARY SIGN

DIRECTION OF TRAFFIC FLOW



VICINITY MAP

(NOT TO SCALE)

DETOUR ROUTE (APPROXIMATE LENGTH = 4.5 MILES)

GENERAL NOTES

1- INSTALLATION OF TEMPORARY ROUTE MARKERS, DESTINATION SIGNS AND ANY NECESSARY MODIFICATIONS TO EXISTING OR PROPOSED REGULATORY OR WARNING SIGNS WILL BE MADE BY OTHERS (STATE OR CITY FORCES) UNLESS OTHERWISE DESIGNATED IN PLANS. PROVIDE A MINIMUM 21 CALENDAR DAY NOTICE TO STATE FORCES BEFORE A ROADWAY IS CLOSED TO TRAFFIC SUCH THAT NECESSARY PROVISIONS CAN BE MADE TO INFORM LOCAL EMERGENCY AND LAW ENFORCEMENT PERSONNEL, SCHOOLS OR ANY OTHER PARTIES AFFECTED BY THE ROAD CLOSURE.

2- DO NOT INSTALL ADVANCE WARING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINING OF WORK.

3- INSTALL SIGNS BEFORE THE BARRICADES WHEN CLOSING THE ROADWAY TO TRAFFIC. REMOVE BARRICADES BEFORE SIGNS WHEN OPENING THE ROADWAY TO TRAFFIC. INSTALL/REMOVE SIGNS AND BARRICADES WITHIN THE SAME CALENDAR DAY.

4- POSITION WING BARRICADES ON THE SHOULDERS AND SLOPE THE STRIPES DOWNWARD IN THE DIRECTION TOWARD WHICH TRAFFIC MUST TURN IN DETOURING.

5- USE ADDITIONAL TYPE III BARRICADES IN STAGGERED LOCATIONS SUPPLEMENTED WITH SIGN R11-4 "ROAD CLOSED TO THRU TRAFFIC" IN THE EVENT THAT TRAFFIC MUST BE MAINTAINED BEYOND THE DETOUR POINT.

6- DO NOT DISPLAY FRACTIONS OR DECIMALS ON SIGN R11-3 "ROAD CLOSED XX MILES AHEAD".

7- USE PORTABLE SIGNS IF ROAD CLOSURE IS TO BE IMPLEMENTED FOR LESS THAN ONE DAY OR FOR EMERGENCIES.

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

REPLACES BRIDGE NO. 19

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRAFFIC MANAGEMENT PLAN

30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		TMP-1
1			3				TOTAL SHEETS
2			4				

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN — DocuSigned by: L. Kevin Austin — 3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	W. B. ALLEN	DATE :	2/17
CHECKED BY :	L. K. AUSTIN	DATE :	2/17
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	10/17

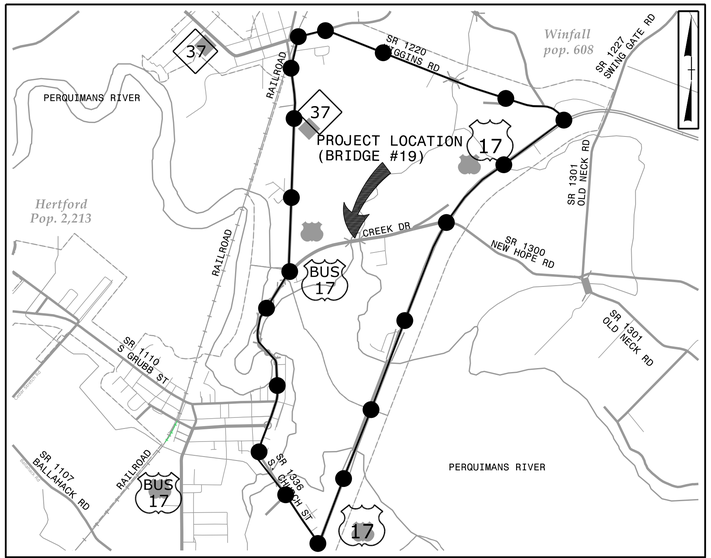
3/5/2018 8:39:55 AM R:\Traffic\TrafficControl\TCP\B5604_SMU_TMP_TCP.dgn

09/08/99

TIP PROJECT: B-5604

CONTRACT:

See Sheet 1A For Index of Sheets



VICINITY MAP
(NOT TO SCALE)

DETOUR ROUTE (APPROXIMATE LENGTH = 8 MILES)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

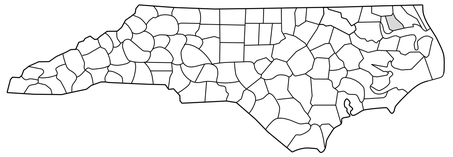
THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5604	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

PERQUIMANS COUNTY

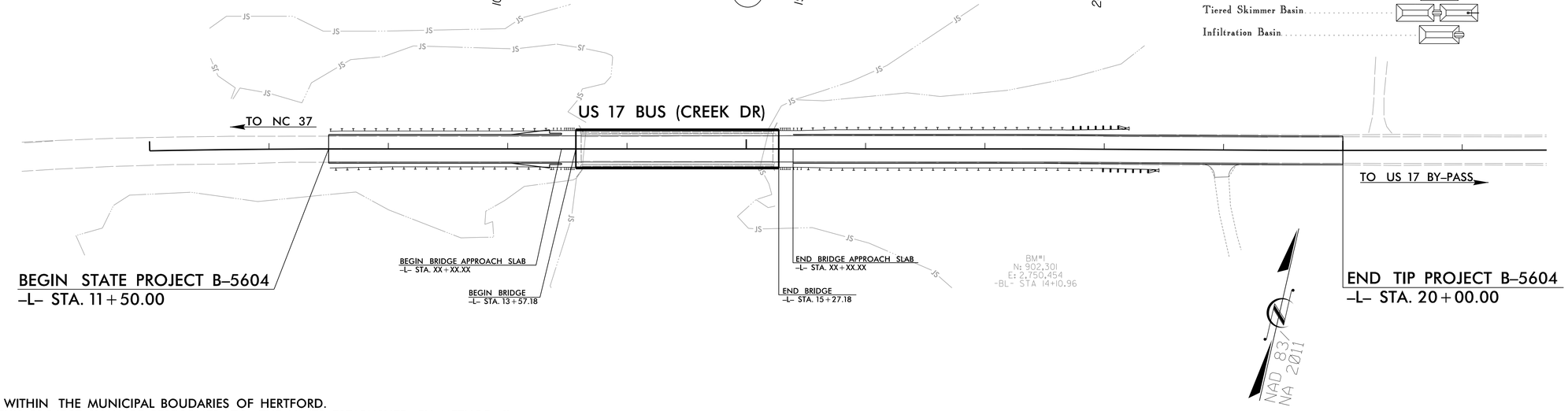


LOCATION: REPLACEMENT OF BRIDGE 19 OVER BRIGHTS MILL CREEK AKA VOSSES CREEK US 17 BUS (CREEK DR.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE

EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	TSD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	
1633.02	Temporary Rock Silt Check Type-B	
	Wattle / Coir Fiber Wattle	SV CFW
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	
1634.01	Temporary Rock Sediment Dam Type-A	
1634.02	Temporary Rock Sediment Dam Type-B	
1635.01	Rock Pipe Inlet Sediment Trap Type-A	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1630.04	Stilling Basin	
1630.06	Special Stilling Basin	1632.03
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
	Type C	C
	Skimmer Basin	
	Tiered Skimmer Basin	
	Infiltration Basin	



BEGIN STATE PROJECT B-5604
-L- STA. 11+50.00

END TIP PROJECT B-5604
-L- STA. 20+00.00

THIS PROJECT IS WITHIN THE MUNICIPAL BOUDARIES OF HERTFORD.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE AUGUST 1, 2016 ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DIVISION OF WATER QUALITY.

Prepared in the Office of:

CALYX
ENGINEERS + CONSULTANTS
Formerly Mulkey Engineers & Consultants
7500 EAST INDEPENDENCE BOULEVARD, SUITE 100
CHARLOTTE, NC 28227
phone: 704.537.7300
CALYXengineers.com
NC License # F-1333

Designed by:

JAMES R. HOPSON, JR., PE ***3736***
NAME *LEVEL III CERTIFICATION NO.*

Reviewed in the Office of:

ROADSIDE ENVIRONMENTAL UNIT
1 South Wilmington St.
Raleigh, NC 27611

2018 STANDARD SPECIFICATIONS

Reviewed by:

ANDREW BLANKENSHIP, PE, CPESC

Roadway Standard Drawings

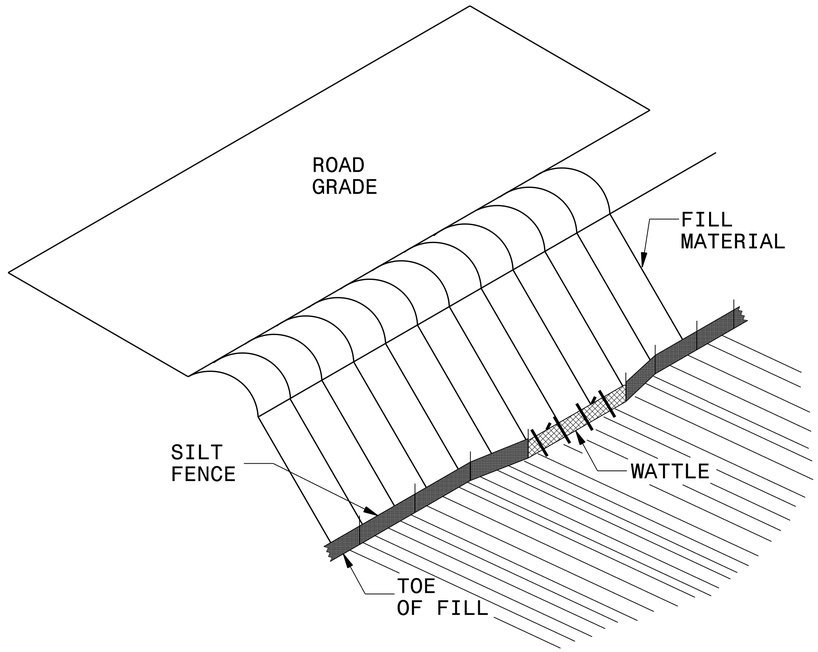
The following roadway english standards as appear in "Roadway Standard Drawings"- Roadway Design Unit – N. C. Department of Transportation – Raleigh, N. C., dated January 2018 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

1604.01	Railroad Erosion Control Detail	1632.01	Rock Inlet Sediment Trap Type A
1605.01	Temporary Silt Fence	1632.02	Rock Inlet Sediment Trap Type B
1606.01	Special Sediment Control Fence	1632.03	Rock Inlet Sediment Trap Type C
1607.01	Gravel Construction Entrance	1633.01	Temporary Rock Silt Check Type A
1622.01	Temporary Berms and Slope Drains	1633.02	Temporary Rock Silt Check Type B
1630.01	Riser Basin	1634.01	Temporary Rock Sediment Dam Type A
1630.02	Silt Basin Type B	1634.02	Temporary Rock Sediment Dam Type B
1630.03	Temporary Silt Ditch	1635.01	Rock Pipe Inlet Sediment Trap Type A
1630.04	Stilling Basin	1635.02	Rock Pipe Inlet Sediment Trap Type B
1630.05	Temporary Diversion	1640.01	Coir Fiber Baffle
1630.06	Special Stilling Basin	1645.01	Temporary Stream Crossing
1631.01	Matting Installation		

3/15/2018
R:\Environmental\Design\B-5604_HYD_EC_TSH_01.dgn
jhopson

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-02
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

SILT FENCE COIR FIBER WATTLE BREAK DETAIL



ISOMETRIC VIEW

NOTES:

USE MINIMUM 12 IN. DIAMETER COIR FIBER (COCONUT FIBER) WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 1 TO 2 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLE ON TOE OF SLOPE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

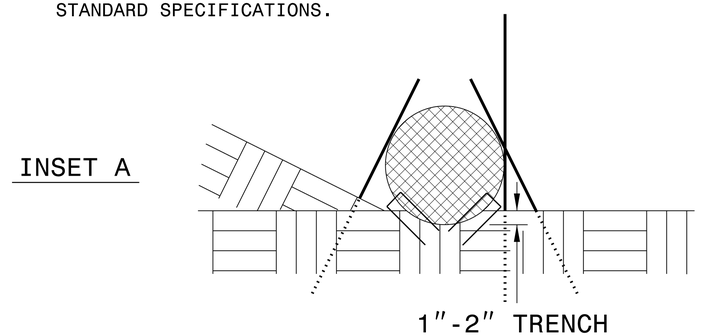
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

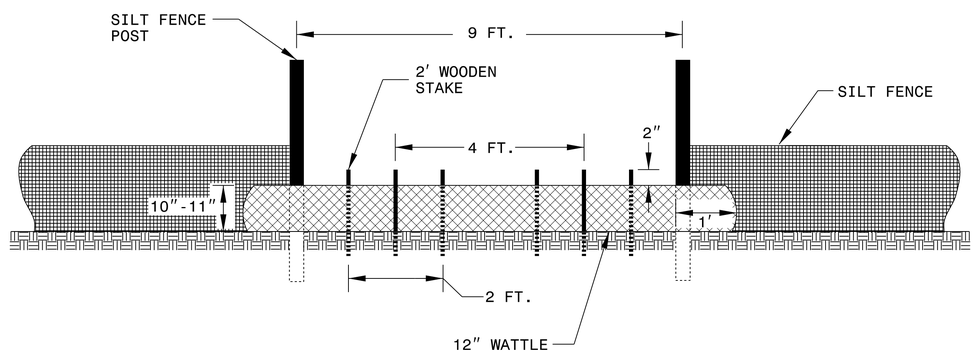
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12″ IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

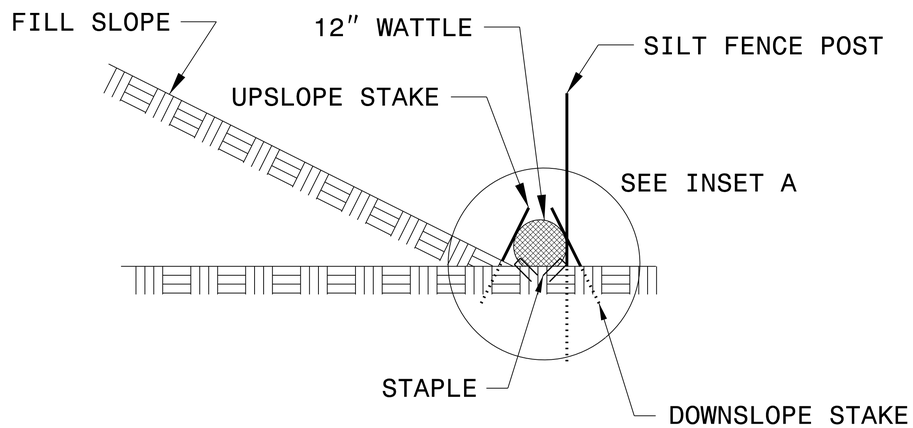
WATTLE INSTALLATION CAN BE ON OUTSIDE OF THE SILT FENCE AS DIRECTED.

INSTALL TEMPORARY SILT FENCE IN ACCORDANCE WITH SECTION 1605 OF THE STANDARD SPECIFICATIONS.





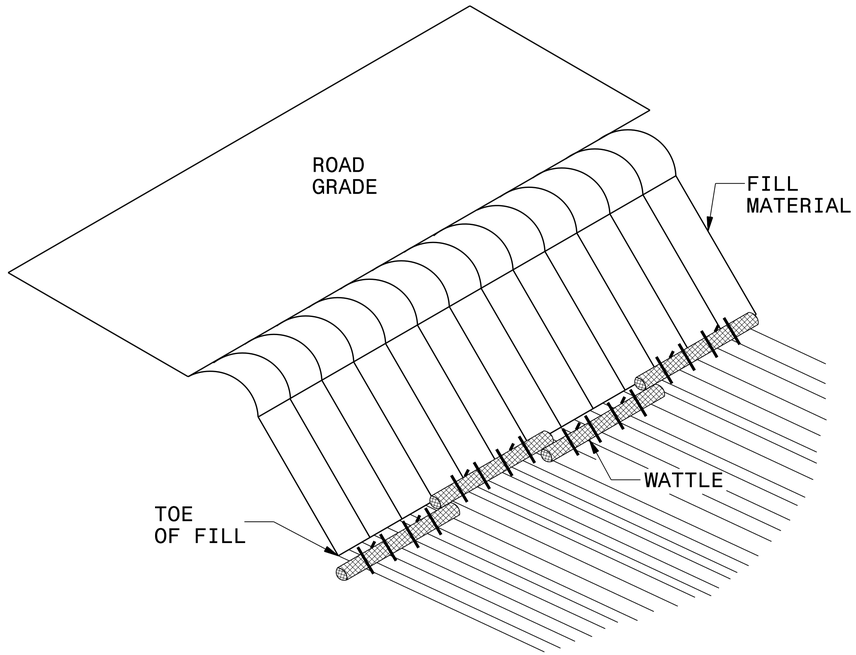
VIEW FROM SLOPE



SIDE VIEW

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-02A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

COIR FIBER WATTLE BARRIER DETAIL



ISOMETRIC VIEW

NOTES:

USE MINIMUM 18 IN. NOMINAL DIAMETER COIR FIBER (COCONUT) WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 2 TO 3 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLES ON TOE OF SLOPE.

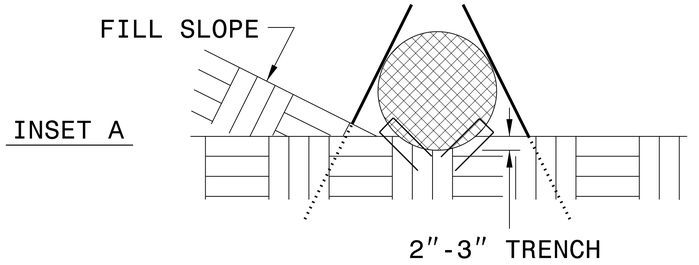
USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

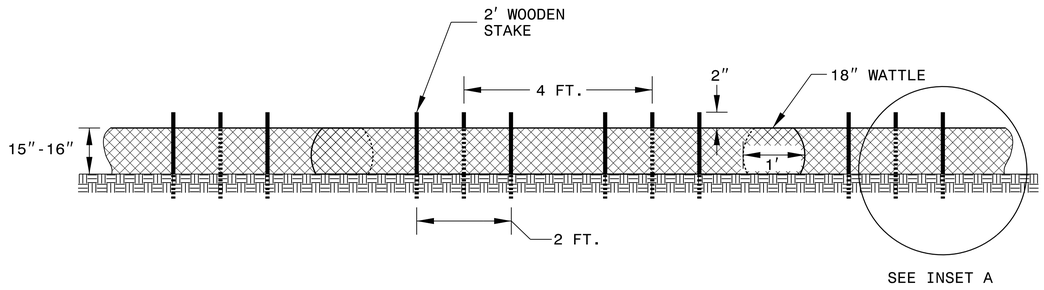
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12″ IN LENGTH.

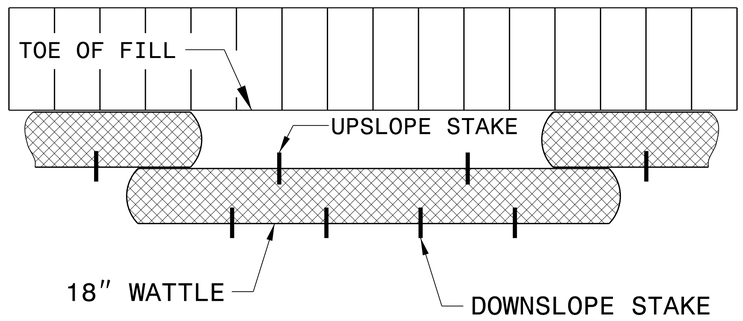
INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

FOR BREAKS ALONG LARGE SLOPES, USE MAXIMUM SPACING OF 25 FT.





FRONT VIEW



TOP VIEW

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-03
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

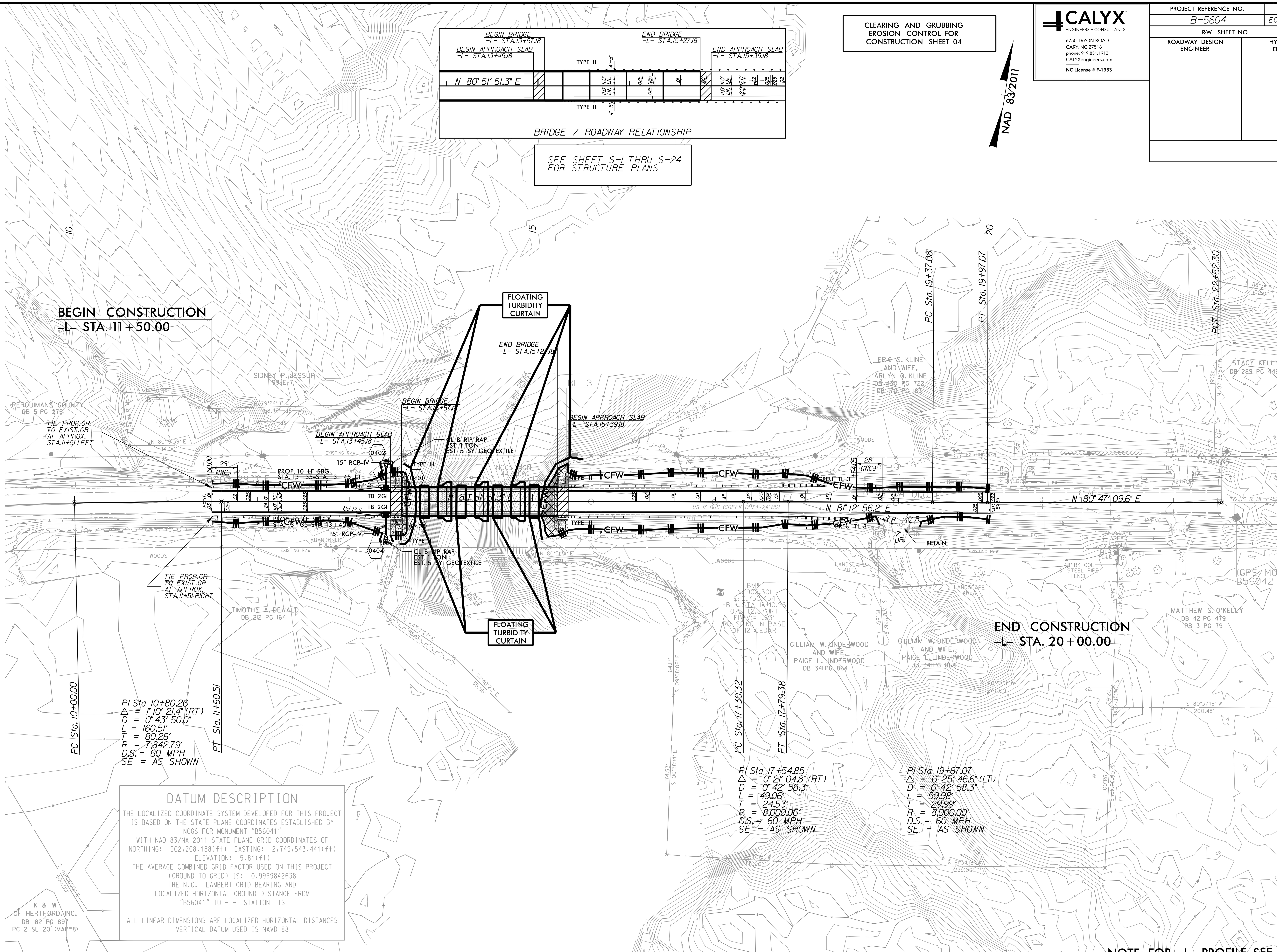
SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES.

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-04/CONST.04
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 04


BEGIN BRIDGE -L- STA.13+57.18
END BRIDGE -L- STA.15+27.18
BEGIN APPROACH SLAB -L- STA.13+45.18
END APPROACH SLAB -L- STA.15+39.18
N 80° 51' 51.3" E
TYPE III
BRIDGE / ROADWAY RELATIONSHIP
SEE SHEET S-1 THRU S-24
FOR STRUCTURE PLANS
NAD 83/2011
BEGIN CONSTRUCTION
-L- STA. 11+50.00
END CONSTRUCTION
-L- STA. 20+00.00
FLOATING TURBIDITY CURTAIN
CL B RIP RAP
EST. 1 TON
EST. 5 SY GEOTEXTILE
PROP. 10 LF SBG
STA. 13+35-STA. 13+45 LT
15" RCP-IV
TB 2GI
CFW
SIDNEY P. JESSUP
PERQUIMANS COUNTY
DB 51 PG 275
TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 LEFT
TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 RIGHT
TIMOTHY A. DEWALD
DB 212 PG 164
ERIC S. KLINE AND WIFE, ARLYN O. KLINE
DB 430 PG 722
DB 170 PG 183
STACY KELLY
DB 289 PG 448
N 81° 12' 56.2" E
N 80° 47' 09.6" E
PC Sta. 19+37.08
PT Sta. 19+97.07
POT Sta. 22+52.30
PC Sta. 10+00.00
PT Sta. 11+60.51
PC Sta. 17+30.32
PT Sta. 17+79.38
GILLIAM W. UNDERWOOD AND WIFE, PAIGE L. UNDERWOOD
DB 341 PG 864
MATTHEW S. O'KELLY
DB 421 PG 479
PB 3 PG 79
K & W OF HERTFORD, INC.
DB 182 PG 897
PC 2 SL 20 (MAP 8)
WOODS
RETAIN
PI Sta 10+80.26
Δ = 1° 10' 21.4" (RT)
D = 0° 43' 50.0"
L = 160.51'
T = 80.26'
R = 7,842.79'
D.S. = 60 MPH
SE = AS SHOWN
PI Sta 17+54.85
Δ = 0° 21' 04.8" (RT)
D = 0° 42' 58.3"
L = 49.06'
T = 24.53'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN
PI Sta 19+67.07
Δ = 0° 25' 46.6" (LT)
D = 0° 42' 58.3"
L = 59.98'
T = 29.99'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "B56041"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 902,268.188(ft) EASTING: 2,749,543.441(ft)
ELEVATION: 5.81(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999842638
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B56041" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

REVISIONS

8/17/99

3/15/2018
R:\Environmental\Design\B-5604_HYD_EC_PSH_04.dgn

NOTE: FOR -L- PROFILE SEE SHEET 5

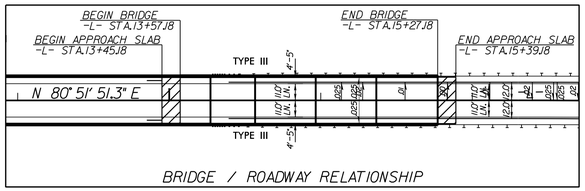
8/17/99

REVISIONS

CALYX
ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC. 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-05/CONST.04
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NAD 83/2011



BRIDGE / ROADWAY RELATIONSHIP

SEE SHEET S-1 THRU S-24 FOR STRUCTURE PLANS

10 15 20

BEGIN CONSTRUCTION
-L- STA. 11+50.00

PC Sta. 10+00.00

PT Sta. 11+60.51

PI Sta 10+80.26
Δ = 1° 10' 21.4" (RT)
D = 0° 43' 50.0"
L = 160.51'
T = 80.26'
R = 7,842.79'
D.S. = 60 MPH
SE = AS SHOWN

PC Sta. 17+30.32

PT Sta. 17+79.38

PI Sta 17+54.85
Δ = 0° 21' 04.8" (RT)
D = 0° 42' 58.3"
L = 49.06'
T = 24.53'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN

PC Sta. 19+37.08

PT Sta. 19+97.07

PI Sta 19+67.07
Δ = 0° 25' 46.6" (LT)
D = 0° 42' 58.3"
L = 59.98'
T = 29.99'
R = 8,000.00'
D.S. = 60 MPH
SE = AS SHOWN

POT Sta. 22+52.30

END CONSTRUCTION
-L- STA. 20+00.00

FLOATING TURBIDITY CURTAIN

FLOATING TURBIDITY CURTAIN

END BRIDGE -L- STA.15+27.18

BEGIN BRIDGE -L- STA.13+57.18

BEGIN APPROACH SLAB -L- STA.13+45.18

BEGIN APPROACH SLAB -L- STA.15+39.18

PROP. 10 LF SBG STA. 13+35-STA. 13+45 LT

PROP. 10 LF SBG STA. 13+35-STA. 13+45 RT

15" RCP-IV

CL B RIP RAP EST. 1 TON EST. 5 SY GEOTEXTILE

N 80° 51' 51.3" E

N 81° 12' 56.2" E

N 80° 47' 09.6" E

TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 LEFT

TIE PROP.GR TO EXIST.GR AT APPROX. STA.11+51 RIGHT

PERQUIMANS COUNTY
DB 51 PG 275

SIDNEY P. JESSUP
99-E-71

TIMOTHY A. DEWALD
DB 212 PG 164

K & W
OF HERTFORD, INC.
DB 182 PG 897
PC 2 SL 20 (MAP#8)

ERIC S. KLINE
AND WIFE,
ARLYN O. KLINE
DB 430 PG 722
DB 170 PG 183

STACY KELLY
DB 289 PG 448

MATTHEW S. O'KELLY
DB 421 PG 479
PB 3 PG 79

GILLIAM W. UNDERWOOD
AND WIFE,
PAIGE L. UNDERWOOD
DB 341 PG 864

GILLIAM W. UNDERWOOD
AND WIFE,
PAIGE L. UNDERWOOD
DB 341 PG 864

BM#1
N. 902,301
E. 2,750,454
-BL- STA 14+10.96
O/S 112.87' RT
ELEV.= 1.63'
RR SPIKE IN BASE OF 12" CEDAR

(GPS MON)
B56042

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "B56041"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 902,268.188(ft) EASTING: 2,749,543.441(ft)
ELEVATION: 5.81(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999842638
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B56041" TO -L- STATION IS

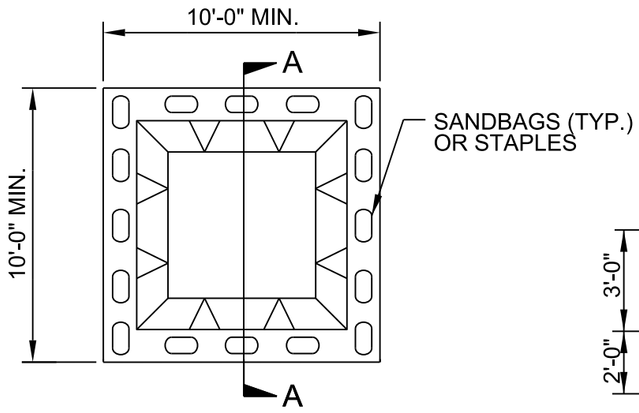
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

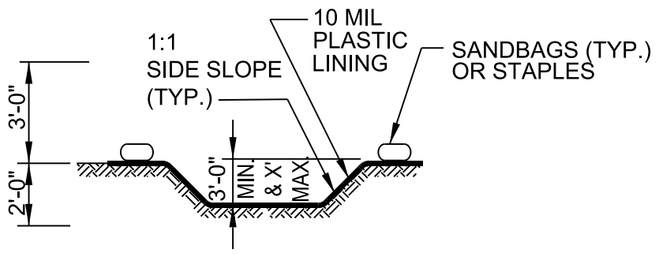
NOTE: FOR -L- PROFILE SEE SHEET 5

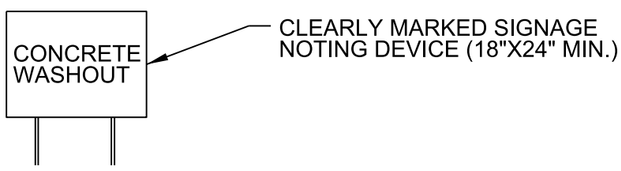
3/15/2018
R:\EC\Environmental\Design\B-5604_HYD_EC_PSH_05.dgn
hopson

WITH LINER, NO GRAVEL APPROACH

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER







PLAN

SECTION A-A

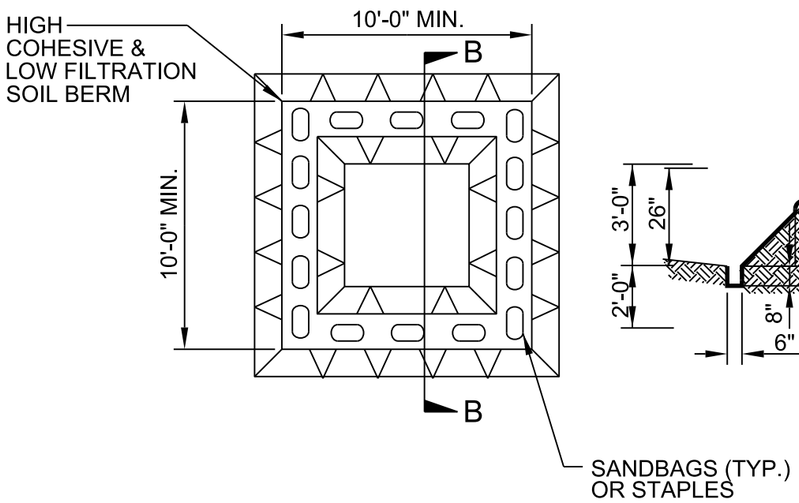
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

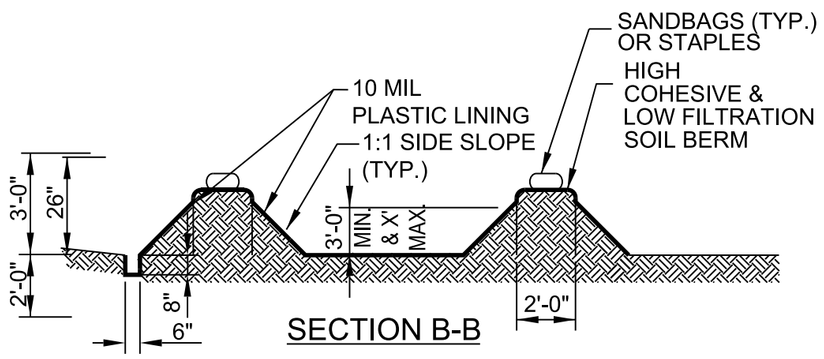
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

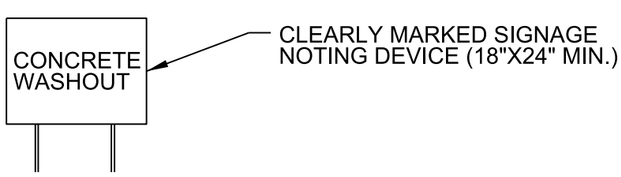
BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE





SECTION B-B



PLAN

NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

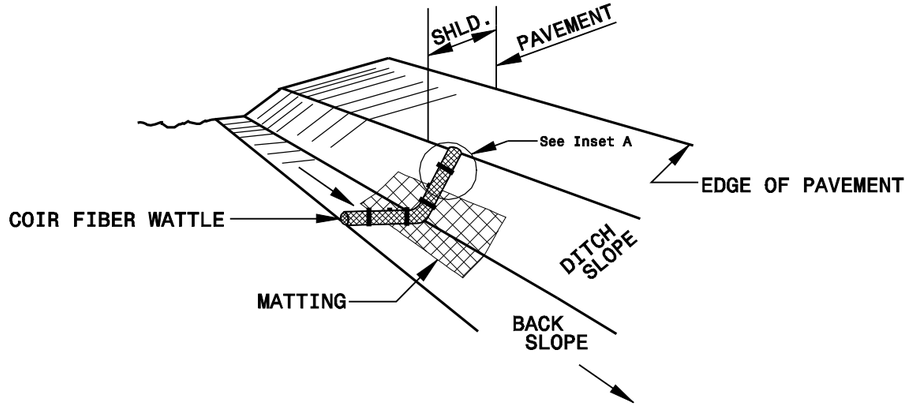
ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

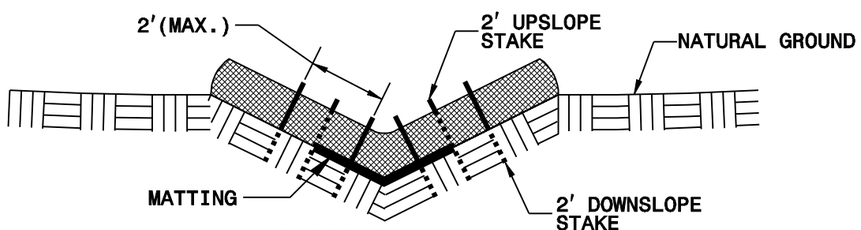
		PRELIMINARY DESIGN NOT FOR CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
B-5604	EC-2G
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

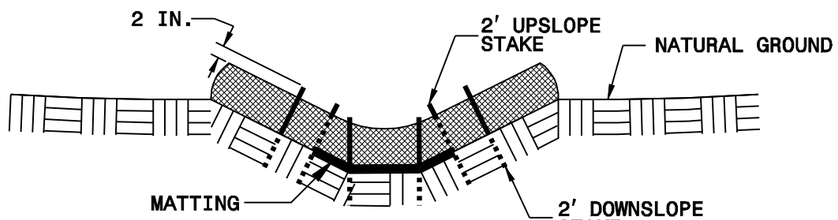
COIR FIBER WATTLE DETAIL



ISOMETRIC VIEW



CROSS SECTION VEE DITCH



CROSS SECTION TRAPEZOIDAL DITCH

NOTES:

USE MINIMUM 12 IN. DIAMETER COIR FIBER (COCONUT FIBER) WATTLE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

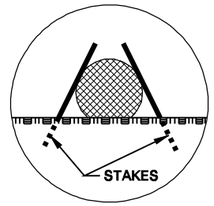
ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.

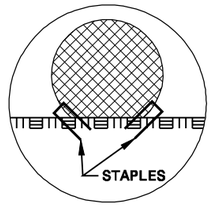
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

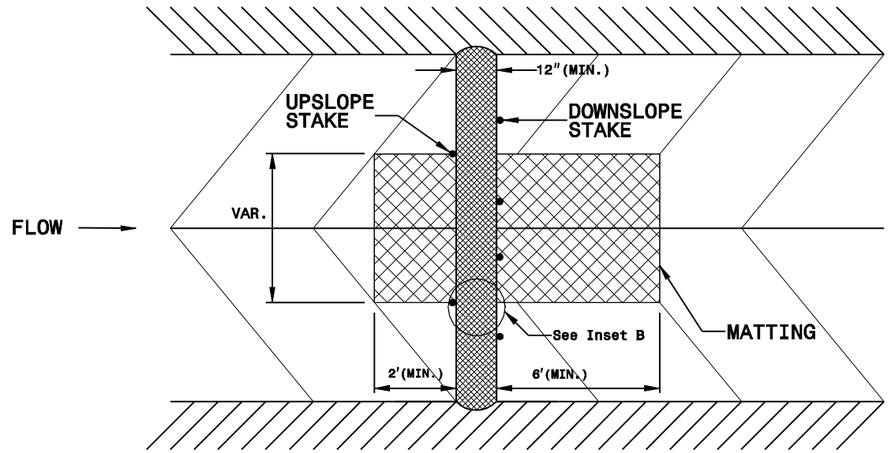
INSTALL MATTING IN ACCORDANCE WITH SECTION 1631 OF THE STANDARD SPECIFICATIONS.



INSET A

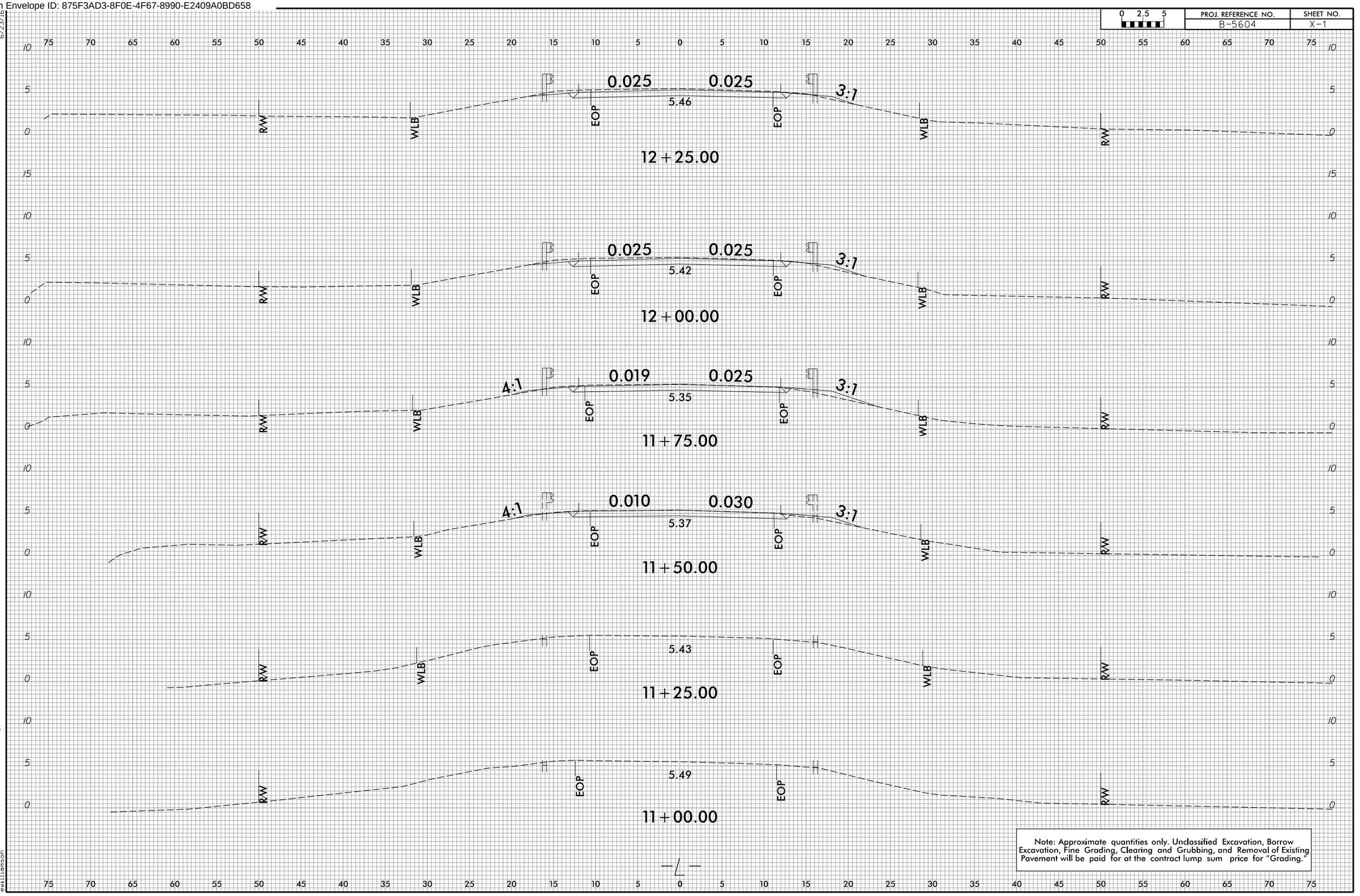


INSET B



TOP VIEW

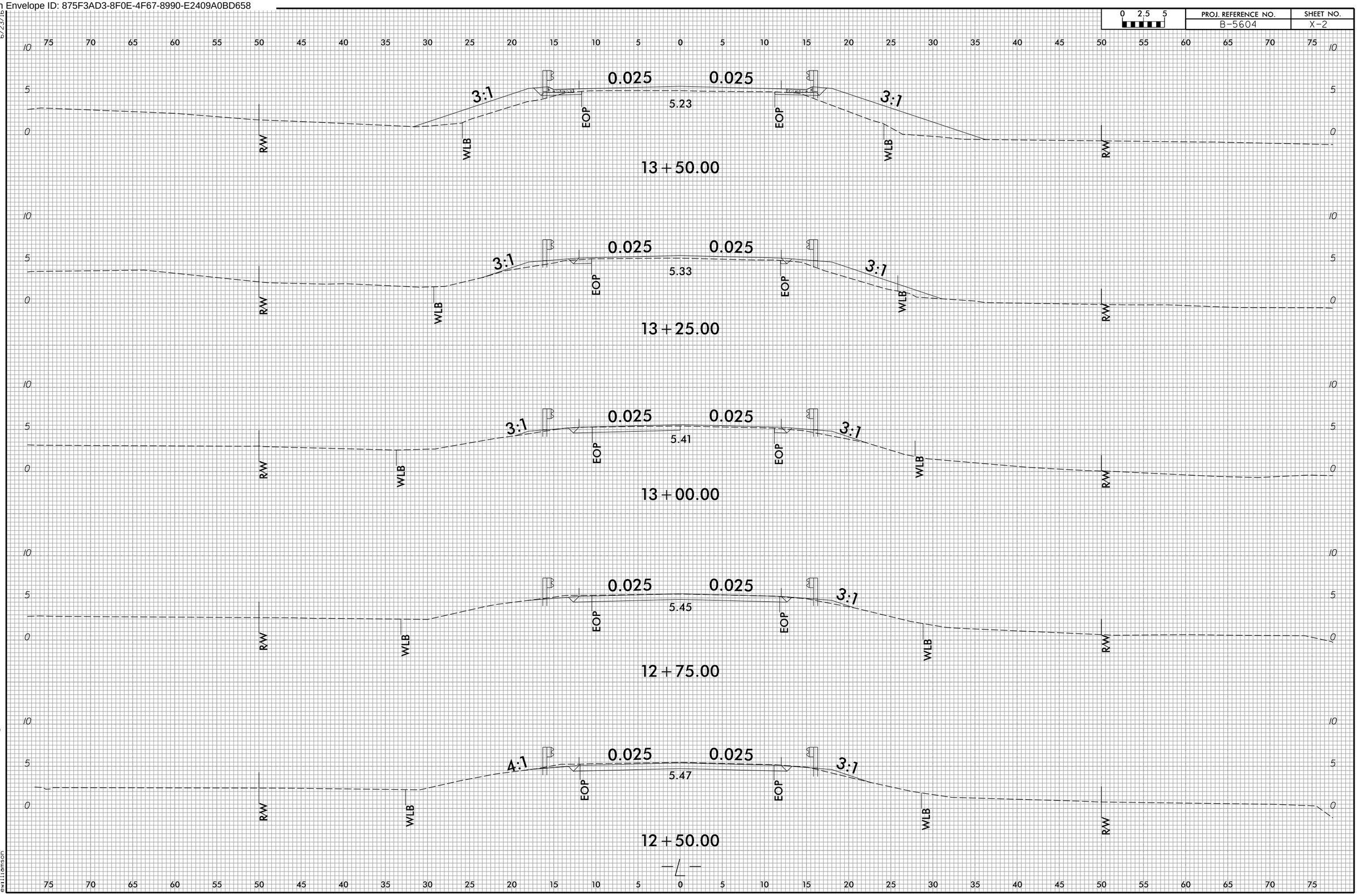
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-1



Note: 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."

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-2



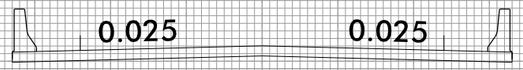
3/15/2018
R:\Projects\XSC\Perquimans 19_RDY_XPLL.dgn
ewilliamson

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-3

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

10 5 0 −5 −10 −15



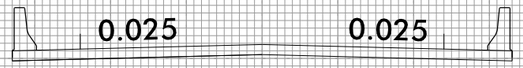
RW

−14.23

14 + 25.00

RW

10 5 0 −5 −10 −15



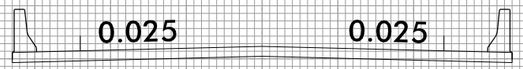
RW

−9.69

14 + 00.00

RW

10 5 0 −5 −10



RW

−2.07

13 + 75.00

RW

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

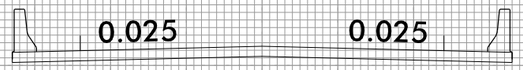
3/15/2018
R:\Roadway\XSC\Perquimans 19_RDY_XPL_L.dgn
eallamson

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-4

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

10 5 0 −5 −10



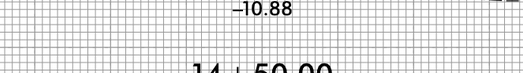
−1.76

R/W

R/W

15+00.00

10 5 0 −5 −10 −15



−5.45

R/W

R/W

14+75.00

10 5 0 −5 −10 −15

−10.88

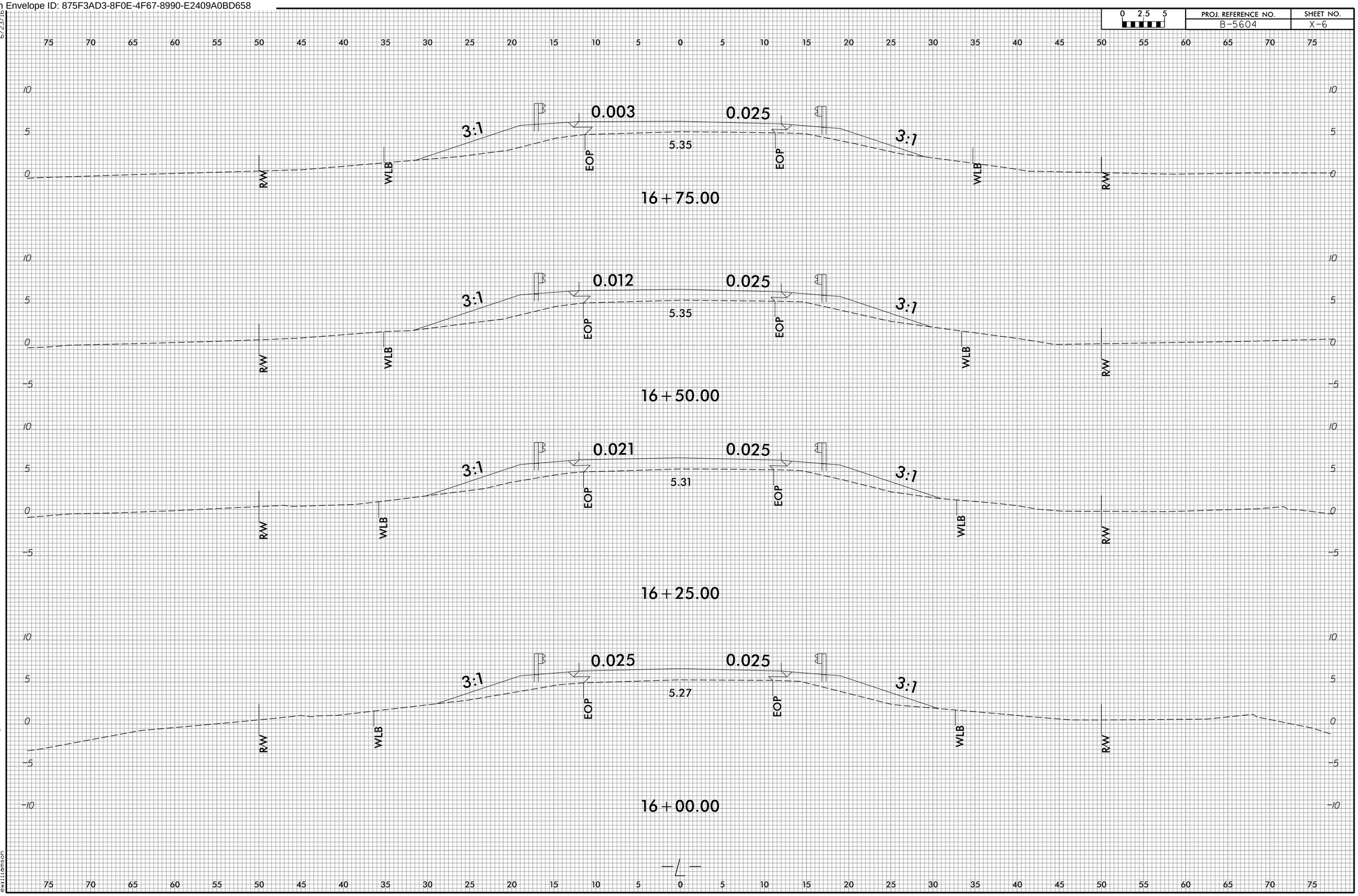
R/W

R/W

14+50.00

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-5

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-6

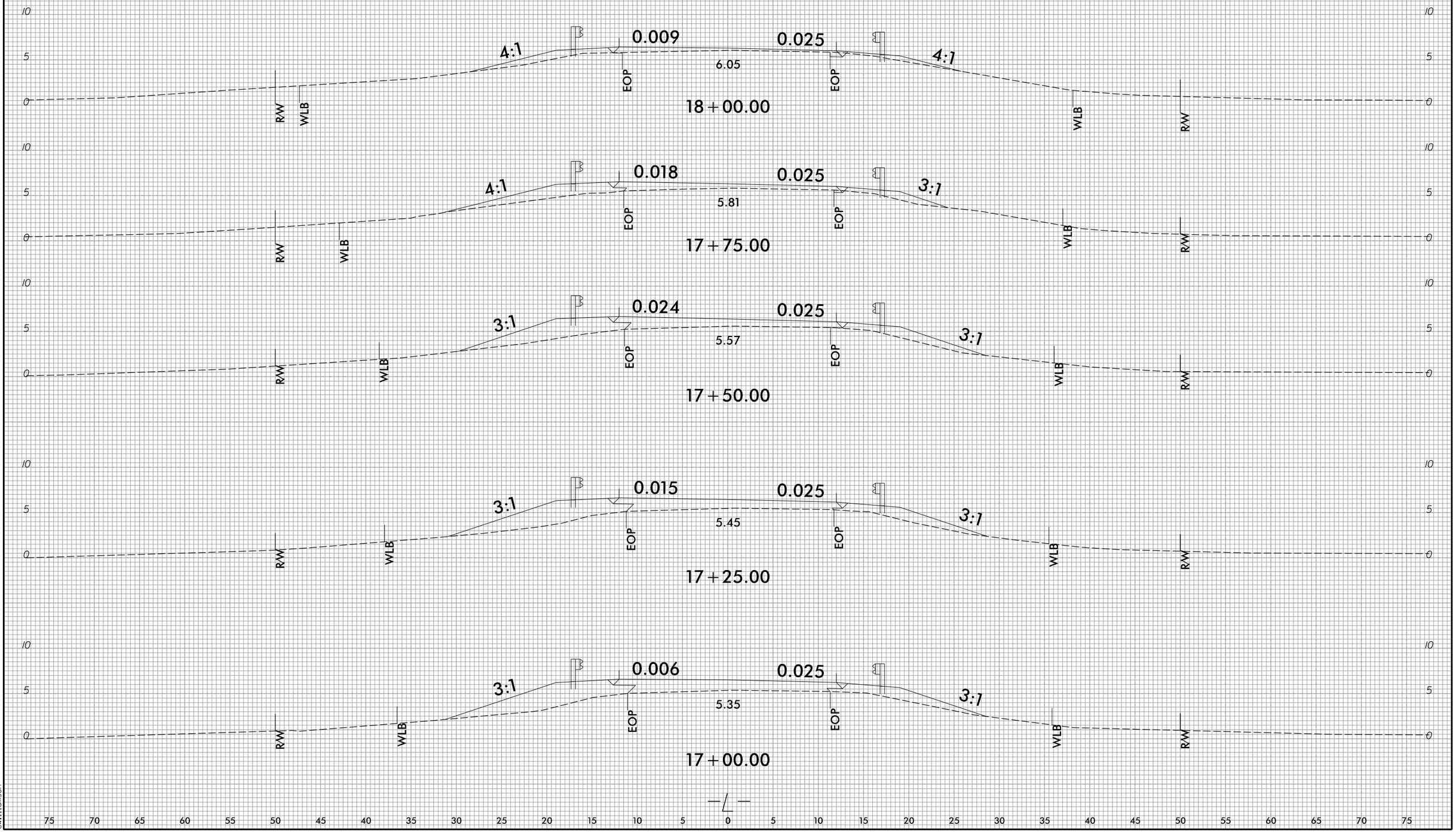


3/15/2018
R:\Roadway\XSC\Perquimans 19_RDY_XPL_L.dgn
ewilliamson

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-7

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



3/15/2018
R:\Roadway\XSC\Perquimans 19_RDY_XPLL.dgn
ewilliamson

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-8

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

10 / 5 / 0

R/W | EOP | 0.025 | 6.65 | 0.025 | EOP | 4:1 | R/W

19 + 50.00

R/W | EOP | 0.025 | 6.57 | 0.025 | EOP | R/W

19 + 25.00

R/W | EOP | 0.025 | 6.49 | 0.025 | EOP | DRIVEWAY | R/W

19 + 00.00

4:1 | R/W | EOP | 0.017 | 6.40 | 0.025 | EOP | R/W

18 + 75.00

4:1 | R/W | EOP | 0.009 | 6.32 | 0.025 | EOP | 4:1 | WLB | R/W

18 + 50.00

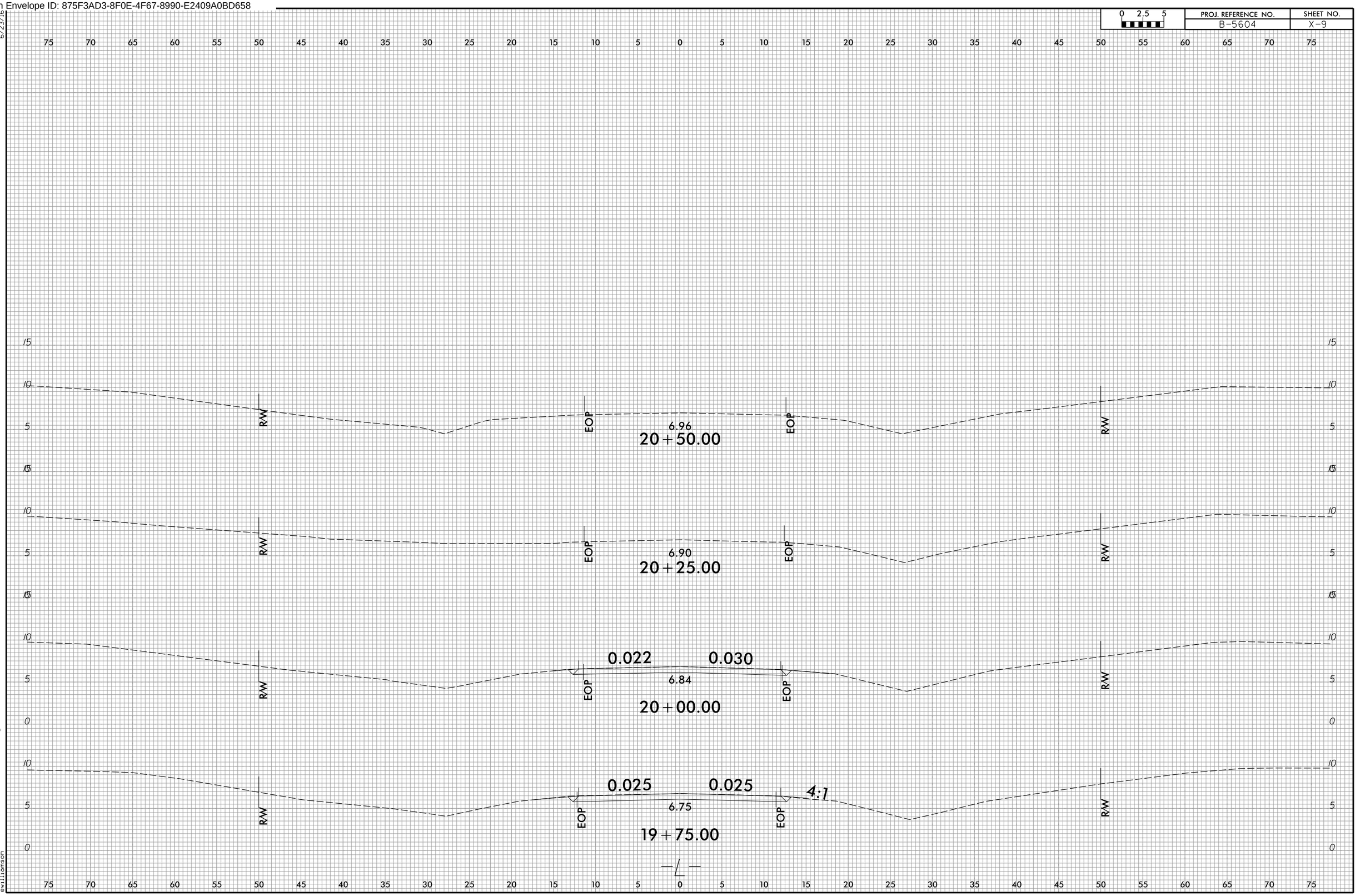
4:1 | WLB | R/W | EOP | 0.000 | 6.19 | 0.025 | EOP | 4:1 | WLB | R/W

18 + 25.00

3/15/2018
R:\Projects\XSC\Perquimans 19_RDY_XPL_L.dgn
ewilliamson

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5604	X-9



3/15/2018
R:\Projects\YSC\Perquimans 19_RDY_XPL_L.dgn
ewilliamson

GRADE DATA -L- (US 17 BUSINESS)

PI = 12+00.00
EL = 5.22'
VC = 95'
(-)0.3000% (+)0.3500%

PI = 16+31.00
EL = 6.73'
VC = 100'
(+)0.3500% (-)0.3001%

HYDRAULIC DATA:

DESIGN DISCHARGE -	1600 CFS
FREQUENCY OF DESIGN FLOOD -	50 YEAR
DESIGN HIGH WATER ELEVATION -	2.5
DRAINAGE AREA -	16.1 SQ. MI.
BASE DISCHARGE (Q 100) -	2000 CFS
BASE HIGH WATER ELEVATION -	3.5

OVERTOPPING DATA:

OVERTOPPING DISCHARGE -	3600 CFS
FREQUENCY OF OVERTOPPING-	>500 YEAR
OVERTOPPING FLOOD ELEVATION -	5.3

LOW POINT OF ROADWAY OVERTOPPING PROFILE OCCURS AT -L- STA. 12+00

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 1 OF 2 REPLACES BRIDGE NO. 19

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN — DocuSigned by: L. Kevin Austin — 3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON US 17 BUSINESS
OVER MILL CREEK
BETWEEN SR 1220 & US 17
30'-10" CLEAR ROADWAY - 90° SKEW

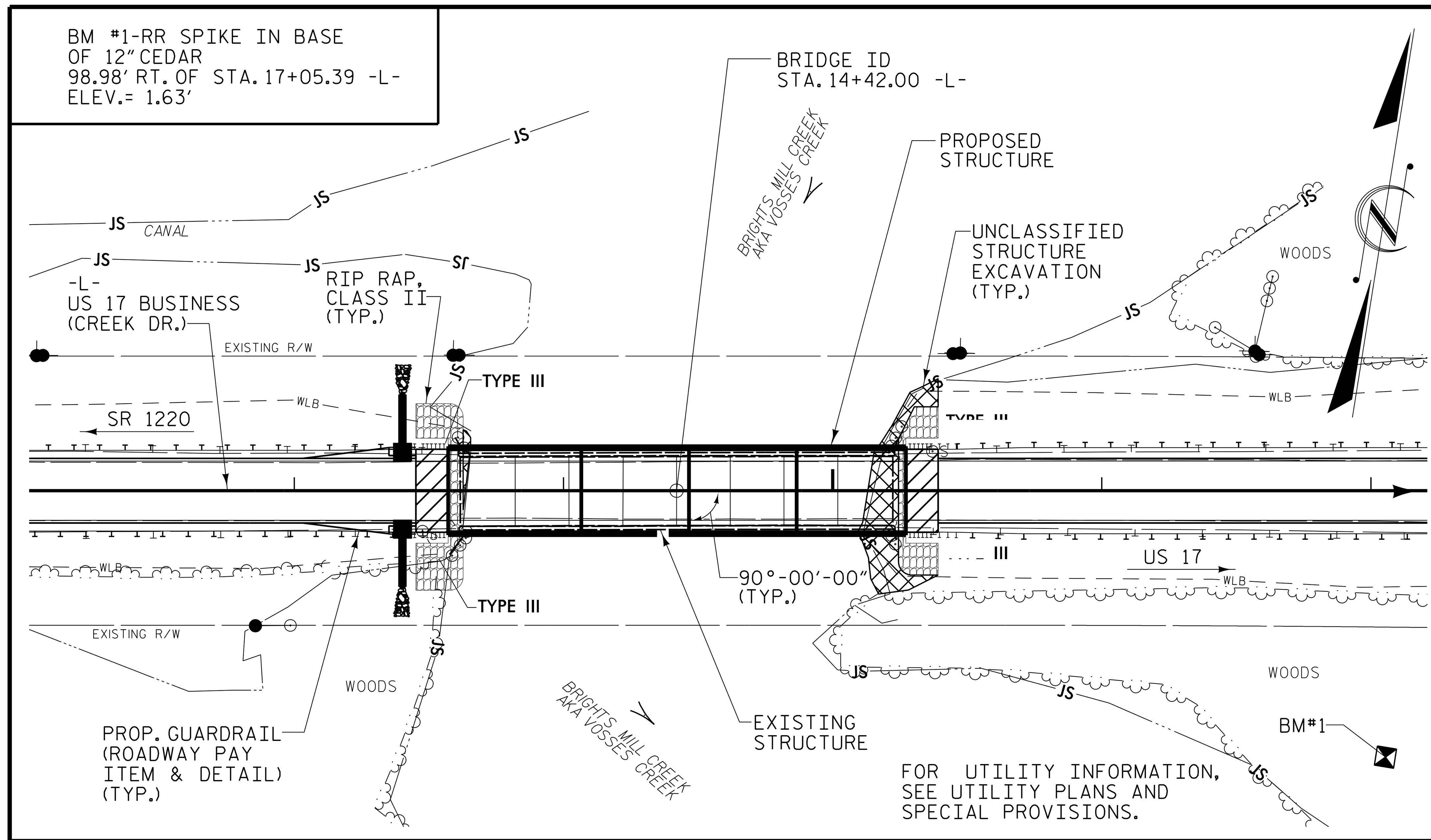
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

SHEET NO. S-1
TOTAL SHEETS 24

DRAWN BY : W. B. ALLEN DATE : 7/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 10/17

8/28/2017 9:38:51 AM R:\Structures\B5604_SMU_GD_70009.dgn



LOCATION SKETCH

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CONCRETE WEARING SURFACE	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 GALVANIZED STEEL PILES	PILE DRIVING EQUIPMENT SETUP FOR PP 20 X 0.50 GALVANIZED STEEL PILES
	LUMP SUM	EACH	LUMP SUM	SQ. FT.	SQ. FT.	CU. YARDS	LUMP SUM	LBS.	EACH	EACH
SUPERSTRUCTURE				5253	5463		LUMP SUM			
END BENT 1			LUMP SUM			13.9		2174	7	
BENT 1						12.5		2193		7
BENT 2						12.5		2193		7
BENT 3						12.5		2193		7
END BENT 2			LUMP SUM			13.9		2174	7	
TOTAL	LUMP SUM	2	LUMP SUM	5253	5463	65.3	LUMP SUM	10927	14	21

TOTAL BILL OF MATERIAL

	HP 12 X 53 GALVANIZED STEEL PILES		PP 20 X 0.50 GALVANIZED STEEL PILES		PILE REDRIVES	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	3'-0" X 1'-9" PRESTRESSED CONCRETE CORED SLABS		ASBESTOS ASSESSMENT
	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	TONS	SQ. YARDS	LUMP SUM	LUMP SUM	NO.	LIN. FT.	LUMP SUM
SUPERSTRUCTURE						341.00			LUMP SUM	LUMP SUM	44	1870.00	LUMP SUM
END BENT 1	7	595			4		102	113					
BENT 1			7	805	4								
BENT 2			7	770	4								
BENT 3			7	700	4								
END BENT 2	7	525			4		82	92					
TOTAL	14	1120	21	2275	20	341.00	184	205	LUMP SUM	LUMP SUM	44	1870.00	LUMP SUM

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR THE DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE MATERIAL SHOWN ON SHEET 1 OF 2 IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A MAX. DISTANCE OF 38 FT. RT. AND 42 FT. LT. OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTING OF FOUR 2 SPAN CONT UNITS, 20' SPANS WITH A 25'-10" CLEAR ROADWAY WIDTH AND REINF. CONCRETE FLOOR ON STEEL I-BEAMS SUPPORTED ON REINF. CONCRETE CAPS & TIMBER PILES SHALL BE REMOVED. THE BRIDGE IS NOT PRESENTLY POSTED FOR LOAD LIMIT.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 14+42.00 -L-.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

IF EXISTING TIMBER PILES CANNOT BE REMOVED, THEY MAY BE CUT-OFF AT THE MUDLINE.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH HEC 18, "EVALUATING SCOUR AT BRIDGES".

GALVANIZED STEEL PILES ARE REQUIRED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATIONS ACTIVITIES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

NO DECK DRAINS REQUIRED.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 67 TONS PER PILE. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 59 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 90 TONS PER PILE. DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 80 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE. PILES AT BENT NO. 2 AND BENT NO. 3 ARE DESIGNED FOR A FACTORED RESISTANCE OF 88 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 135 TONS PER PILE. DRIVE PILES AT BENT NO. 2 AND BENT NO. 3 TO A REQUIRED DRIVING RESISTANCE OF 120 TONS PER PILE. DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG OR SCOUR.

INSTALL PILES AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN -59.5 FT.
INSTALL PILES AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN -61 FT.
INSTALL PILES AT BENT NO. 3 TO A TIP ELEVATION NO HIGHER THAN -41 FT.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND BENT NO. 2 IS -20 FT. THE SCOUR CRITICAL ELEVATION FOR BENT NO. 3 IS -9 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 20 TO 30 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1, END BENT NO. 2, BENT NO. 1, BENT NO. 2 AND BENT NO. 3. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN 19661
DocuSigned by: L. Kevin Austin
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE ON US 17 BUSINESS
OVER MILL CREEK
BETWEEN SR 1220 & US 17
30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-2
1			3					TOTAL SHEETS
2			4					24

DRAWN BY : W. B. ALLEN DATE : 8/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 10/17

12/10/2017 8:40:54 AM R:\Structures\B5604_SMU_GD2_TI009.dgn

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE: LIVELOAD FACTORS	STRENGTH I MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I MOMENT: RATING FACTOR	STRENGTH I MOMENT: SPAN	STRENGTH I MOMENT: GIRDER LOCATION	STRENGTH I MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I SHEAR: RATING FACTOR	STRENGTH I SHEAR: SPAN	STRENGTH I SHEAR: GIRDER LOCATION	STRENGTH I SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVELOAD FACTORS	SERVICE III MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III MOMENT: RATING FACTOR	SERVICE III MOMENT: SPAN	SERVICE III MOMENT: GIRDER LOCATION	SERVICE III MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.56	--	1.75	0.275	1.67	50′	EL	25.00	0.529	**1.56**	50′	EL	5.00	0.80	0.275	2.08	50′	EL	25.00	
		HL-93(Opr)	N/A	--	2.08	--	1.35	0.275	2.17	50′	EL	25.00	0.529	2.08	50′	EL	5.00	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.89	68.04	1.75	0.275	2.07	50′	EL	25.00	0.529	**1.89**	50′	EL	5.00	0.80	0.275	2.58	50′	EL	25.00	
		HS-20(Opr)	36.000	--	2.48	89.28	1.35	0.275	2.69	50′	EL	25.00	0.529	2.48	50′	EL	5.00	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	4.21	56.84	1.4	0.275	5.27	50′	EL	25.00	0.529	5.57	50′	EL	5.00	0.80	0.275	4.21	50′	EL	25.00	
		SNGARBS2	20.000	--	3.32	66.40	1.4	0.275	4.16	50′	EL	25.00	0.529	4.01	50′	EL	5.00	0.80	0.275	3.32	50′	EL	25.00	
		SNAGRIS2	22.000	--	3.23	71.06	1.4	0.275	4.04	50′	EL	25.00	0.529	3.75	50′	EL	5.00	0.80	0.275	3.23	50′	EL	25.00	
		SNCOTTS3	27.250	--	2.1	57.23	1.4	0.275	2.63	50′	EL	25.00	0.529	2.72	50′	EL	5.00	0.80	0.275	2.10	50′	EL	25.00	
		SNAGGRS4	34.925	--	1.82	63.56	1.4	0.275	2.29	50′	EL	25.00	0.529	2.31	50′	EL	5.00	0.80	0.275	1.82	50′	EL	25.00	
		SNS5A	35.550	--	1.78	63.28	1.4	0.275	2.23	50′	EL	25.00	0.529	2.37	50′	EL	5.00	0.80	0.275	1.78	50′	EL	25.00	
		SNS6A	39.950	--	1.66	66.32	1.4	0.275	2.08	50′	EL	25.00	0.529	2.18	50′	EL	5.00	0.80	0.275	1.66	50′	EL	25.00	
		SNS7B	42.000	--	1.58	66.36	1.4	0.275	1.99	50′	EL	25.00	0.529	2.17	50′	EL	5.00	0.80	0.275	1.58	50′	EL	25.00	
	TTST	TNAGRIT3	33.000	--	2.04	67.32	1.4	0.275	2.55	50′	EL	25.00	0.529	2.60	50′	EL	5.00	0.80	0.275	2.04	50′	EL	25.00	
		TNT4A	33.075	--	2.06	68.13	1.4	0.275	2.58	50′	EL	25.00	0.529	2.50	50′	EL	45.00	0.80	0.275	2.06	50′	EL	25.00	
		TNT6A	41.600	--	1.71	71.14	1.4	0.275	2.15	50′	EL	25.00	0.529	2.39	50′	EL	5.00	0.80	0.275	1.71	50′	EL	25.00	
		TNT7A	42.000	--	1.74	73.08	1.4	0.275	2.18	50′	EL	25.00	0.529	2.22	50′	EL	45.00	0.80	0.275	1.74	50′	EL	25.00	
		TNT7B	42.000	--	1.81	76.02	1.4	0.275	2.27	50′	EL	25.00	0.529	2.10	50′	EL	45.00	0.80	0.275	1.81	50′	EL	25.00	
		TNAGRIT4	43.000	--	1.72	73.96	1.4	0.275	2.15	50′	EL	25.00	0.529	2.02	50′	EL	45.00	0.80	0.275	1.72	50′	EL	25.00	
		TNAGT5A	45.000	--	1.61	72.45	1.4	0.275	2.01	50′	EL	25.00	0.529	2.05	50′	EL	5.00	0.80	0.275	1.61	50′	EL	25.00	
		TNAGT5B	45.000	3	1.57	70.65	1.4	0.275	1.97	50′	EL	25.00	0.529	1.91	50′	EL	45.00	0.80	0.275	**1.57**	50′	EL	25.00	

LOAD FACTORS:

	LIMIT STATE	γ_{DC}	γ_{DW}
DESIGN LOAD RATING FACTORS	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

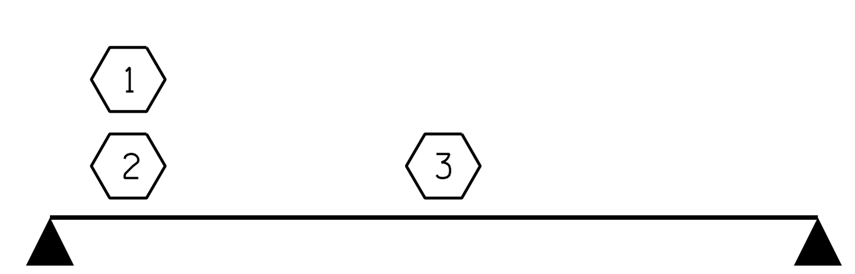
2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

FOR SPAN 'A'

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

L. Kevin Austin 3/19/2018

PLANS PREPARED BY: CALYX ENGINEERS + CONSULTANTS, 6750 TRYON ROAD, CARY, NC 27518, phone: 919.851.1912, CALYXengineers.com, NC License # F-1333

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR 50′ CORED SLAB UNIT 90° SKEW

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			24

ASSEMBLED BY : W. B. ALLEN DATE : 6/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DRAWN BY : CVC 6/10
CHECKED BY : DNS 6/10

STD. NO. 21LRFR1_90S_50L

11/27/2017 8:36:06 AM R:\Structures\B5604_SMU_OD3_71009.dgn

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE: LIVELOAD FACTORS	STRENGTH I MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I MOMENT: RATING FACTOR	STRENGTH I MOMENT: SPAN	STRENGTH I MOMENT: GIRDER LOCATION	STRENGTH I MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I SHEAR: RATING FACTOR	STRENGTH I SHEAR: SPAN	STRENGTH I SHEAR: GIRDER LOCATION	STRENGTH I SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVELOAD FACTORS	SERVICE III MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III MOMENT: RATING FACTOR	SERVICE III MOMENT: SPAN	SERVICE III MOMENT: GIRDER LOCATION	SERVICE III MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.45	--	1.75	0.294	**1.45**	40′	EL	20.00	0.324	2.65	40′	EL	4.00	0.80	0.294	2.04	40′	EL	20.00	
		HL-93(Opr)	N/A	--	1.88	--	1.35	0.294	1.88	40′	EL	20.00	0.324	3.47	40′	EL	4.00	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.82	65.52	1.75	0.294	**1.82**	40′	EL	20.00	0.324	3.12	40′	EL	4.00	0.80	0.294	2.56	40′	EL	20.00	
		HS-20(Opr)	36.000	--	2.36	84.96	1.35	0.294	2.36	40′	EL	20.00	0.324	4.07	40′	EL	4.00	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.78	51.03	1.4	0.294	4.20	40′	EL	20.00	0.324	8.57	40′	EL	36.00	0.80	0.294	3.78	40′	EL	20.00	
	SV	SNGARBS2	20.000	--	3.15	63.00	1.4	0.294	3.48	40′	EL	20.00	0.324	6.34	40′	EL	4.00	0.80	0.294	3.15	40′	EL	16.00	
	SV	SNAGRIS2	22.000	--	3.07	67.54	1.4	0.294	3.40	40′	EL	20.00	0.324	5.99	40′	EL	4.00	0.80	0.294	3.07	40′	EL	24.00	
	SV	SNCOTTS3	27.250	--	1.89	51.50	1.4	0.294	2.10	40′	EL	20.00	0.324	4.24	40′	EL	36.00	0.80	0.294	1.89	40′	EL	20.00	
	SV	SNAGGRS4	34.925	--	1.7	59.37	1.4	0.294	1.89	40′	EL	20.00	0.324	3.69	40′	EL	4.00	0.80	0.294	1.70	40′	EL	20.00	
	SV	SNS5A	35.550	--	1.66	59.01	1.4	0.294	1.84	40′	EL	20.00	0.324	3.85	40′	EL	4.00	0.80	0.294	1.66	40′	EL	20.00	
	SV	SNS6A	39.950	--	1.58	63.12	1.4	0.294	1.75	40′	EL	20.00	0.324	3.58	40′	EL	4.00	0.80	0.294	1.58	40′	EL	20.00	
	SV	SNS7B	42.000	3	1.5	63.00	1.4	0.294	1.67	40′	EL	20.00	0.324	3.64	40′	EL	36.00	0.80	0.294	**1.50**	40′	EL	20.00	
	TTST	TNAGRIT3	33.000	--	1.94	64.02	1.4	0.294	2.15	40′	EL	20.00	0.324	4.24	40′	EL	4.00	0.80	0.294	1.94	40′	EL	20.00	
	TTST	TNT4A	33.075	--	1.96	64.83	1.4	0.294	2.18	40′	EL	20.00	0.324	4.03	40′	EL	4.00	0.80	0.294	1.96	40′	EL	20.00	
	TTST	TNT6A	41.600	--	1.67	69.47	1.4	0.294	1.85	40′	EL	20.00	0.324	3.93	40′	EL	4.00	0.80	0.294	1.67	40′	EL	20.00	
	TTST	TNT7A	42.000	--	1.71	71.82	1.4	0.294	1.90	40′	EL	20.00	0.324	3.63	40′	EL	4.00	0.80	0.294	1.71	40′	EL	20.00	
	TTST	TNT7B	42.000	--	1.75	73.50	1.4	0.294	1.94	40′	EL	20.00	0.324	3.47	40′	EL	36.00	0.80	0.294	1.75	40′	EL	20.00	
	TTST	TNAGRIT4	43.000	--	1.7	73.10	1.4	0.294	1.89	40′	EL	20.00	0.324	3.34	40′	EL	4.00	0.80	0.294	1.70	40′	EL	20.00	
	TTST	TNAGT5A	45.000	--	1.57	70.65	1.4	0.294	1.74	40′	EL	20.00	0.324	3.47	40′	EL	36.00	0.80	0.294	1.57	40′	EL	20.00	
	TTST	TNAGT5B	45.000	--	1.53	68.85	1.4	0.294	1.70	40′	EL	20.00	0.324	3.15	40′	EL	4.00	0.80	0.294	1.53	40′	EL	20.00	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

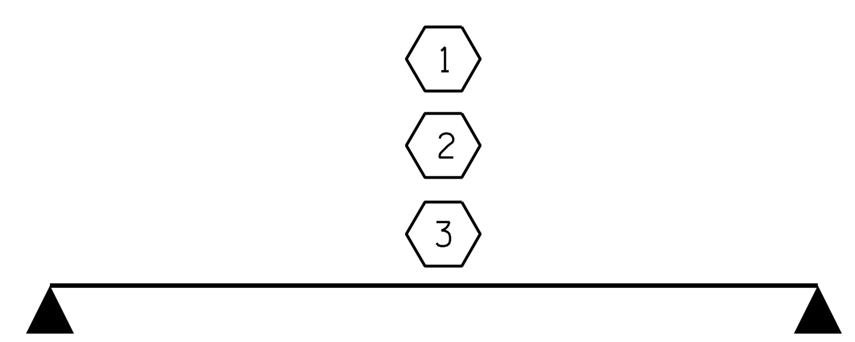
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

FOR SPANS 'B', 'C' & 'D'

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN 3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

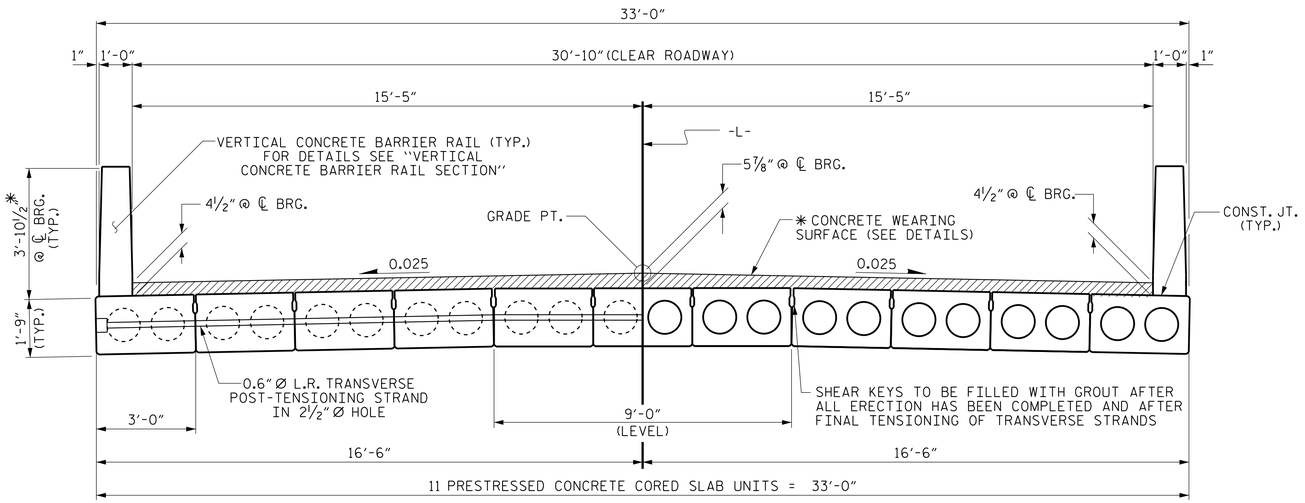
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR 40′ CORED SLAB UNIT 90° SKEW
(NON-INTERSTATE TRAFFIC)

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-4
1			3					TOTAL SHEETS
2			4					24

ASSEMBLED BY : W. B. ALLEN	DATE : 6/17		
CHECKED BY : Z. H. BROWN	DATE : 8/17		
DRAWN BY : CVC 6/10			
CHECKED BY : DNS 6/10			

STD. NO. 21LRFR1_90S_40L

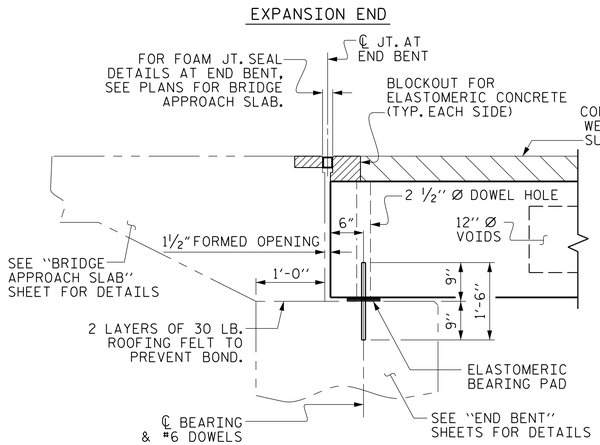


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

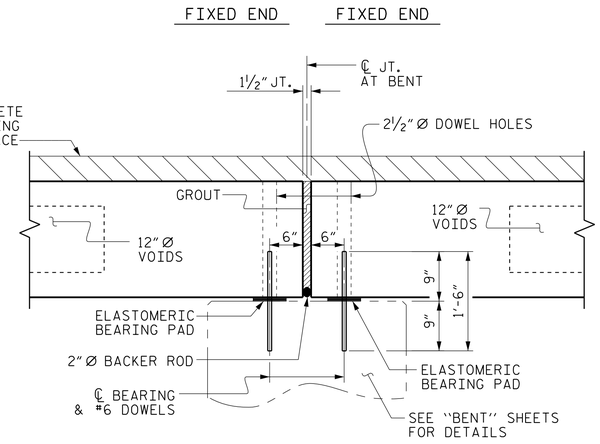
HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

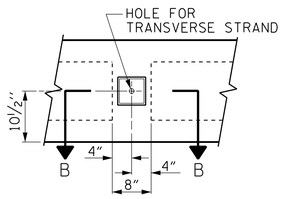
✱-THE MAXIMUM BARRIER RAIL HEIGHT AND CONCRETE THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND CONCRETE THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND CONCRETE THICKNESS SEE THE ''VERTICAL CONCRETE BARRIER RAIL SECTION'' DETAIL.



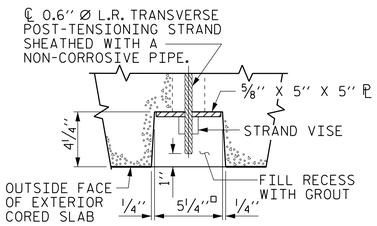
SECTION AT END BENT



SECTION AT BENT

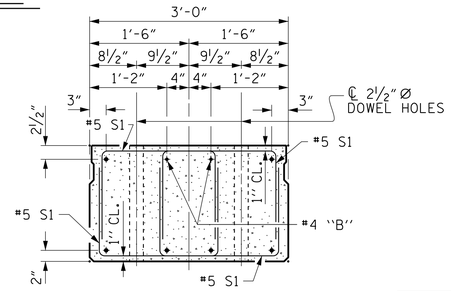


ELEVATION VIEW



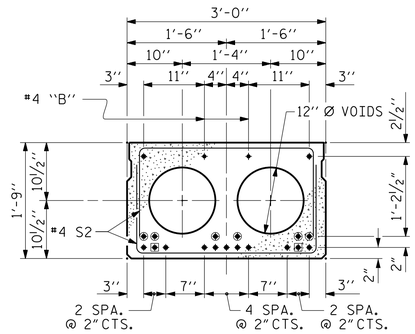
SECTION B-B

GROUTED RECESS AT END OF POST-TENSIONED STRAND OF CORED SLABS

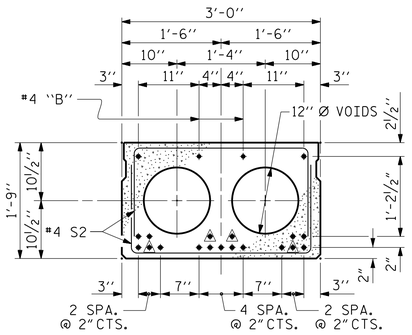


END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.

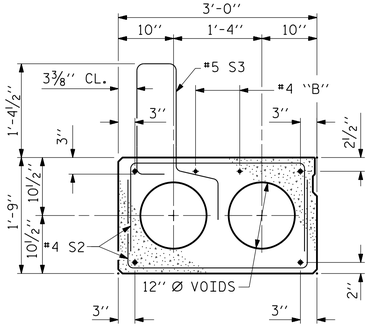


INTERIOR SLAB SECTION
(40′ UNIT)
(13 STRANDS REQUIRED)



INTERIOR SLAB SECTION
(50′ UNIT)
(19 STRANDS REQUIRED)

0.6″Ø LOW RELAXATION STRAND LAYOUT



EXT. SLAB SECTION
(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

△ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6′-0″FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

▣ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2′-0″FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

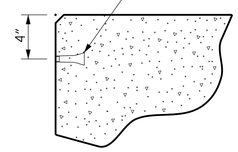
◉ OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED ⅜″, SIZE TO BE DETERMINED BY CONTRACTOR.



THREADED INSERT DETAIL

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 1 OF 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

Docusigned by: L. Kevin Austin 3/19/2018

PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

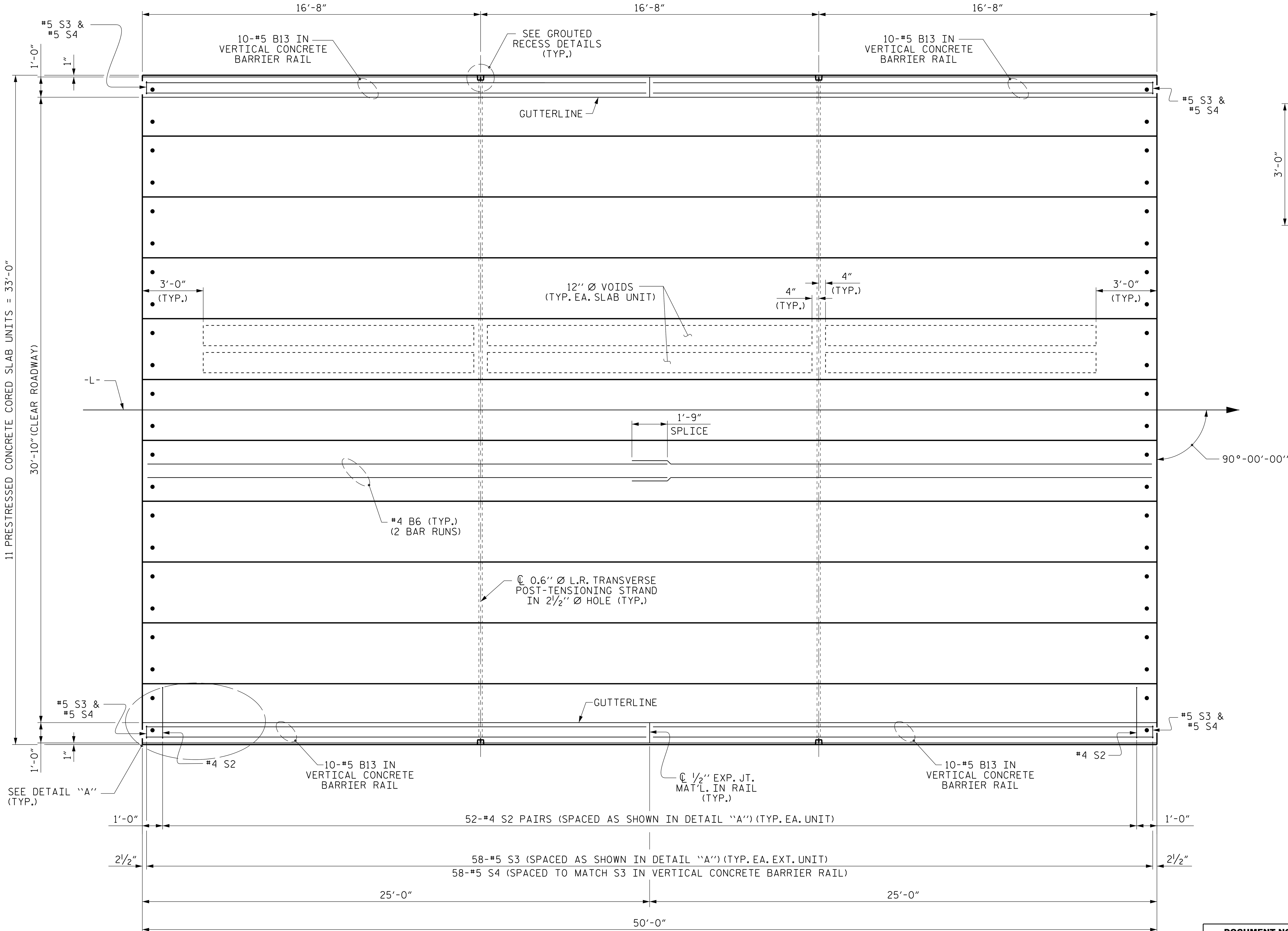
STANDARD
3′-0″ X 1′-9″
PRESTRESSED CONCRETE
CORED SLAB UNIT
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			24

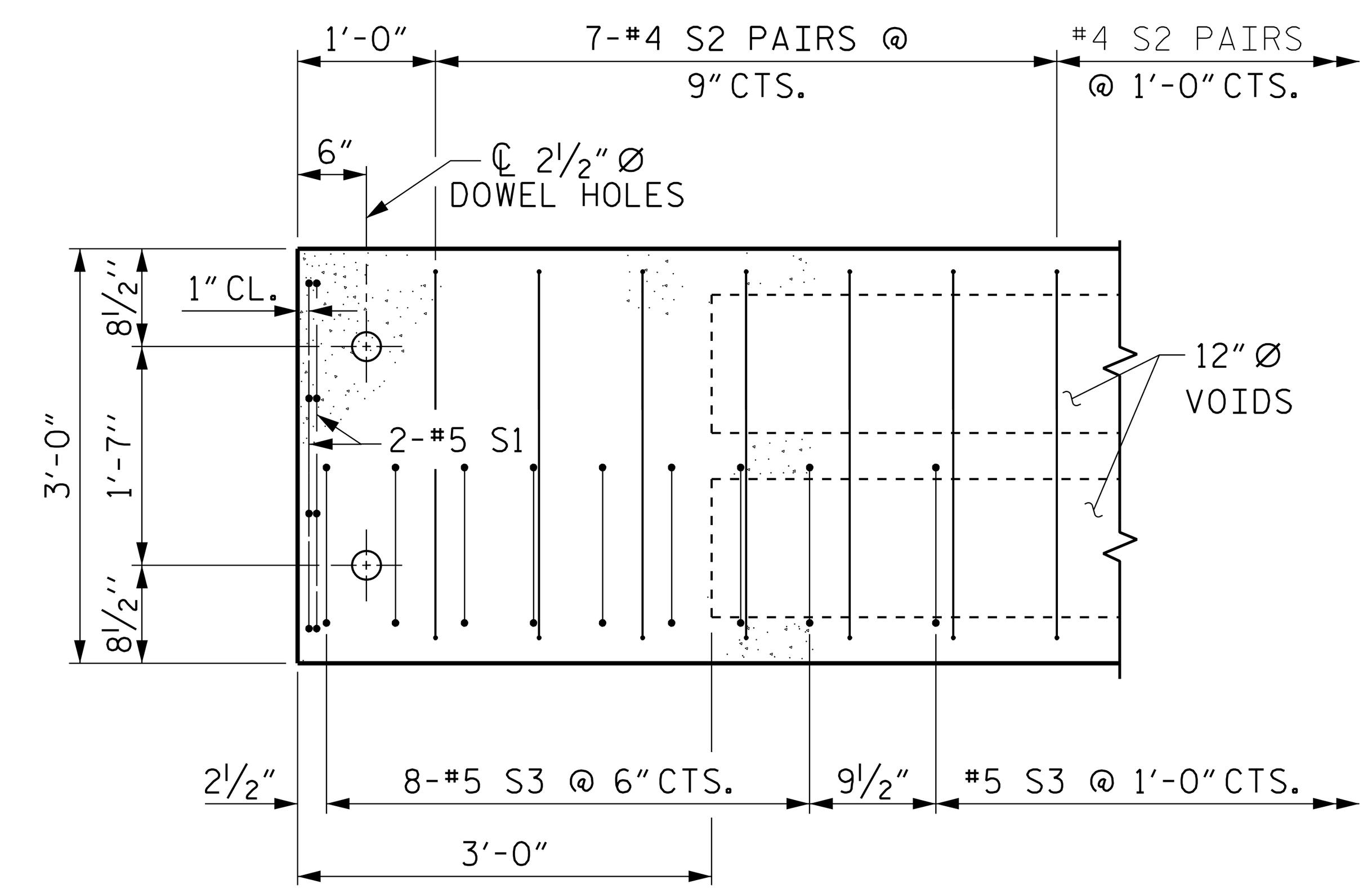
ASSEMBLED BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DRAWN BY : DGE	5/09	REV. 9/14	MAA/TMG
CHECKED BY : BCH	6/09		

11/27/2017 8:36:08 AM R:\Structures\B5604_SMU_CSL_71009.dgn

STD. NO. 21″PCS2_33_90S



PLAN OF UNIT



DETAIL "A"

(TYPICAL EACH END OF UNIT)
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 50' UNIT 30'-10'' CLEAR ROADWAY 90° SKEW

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

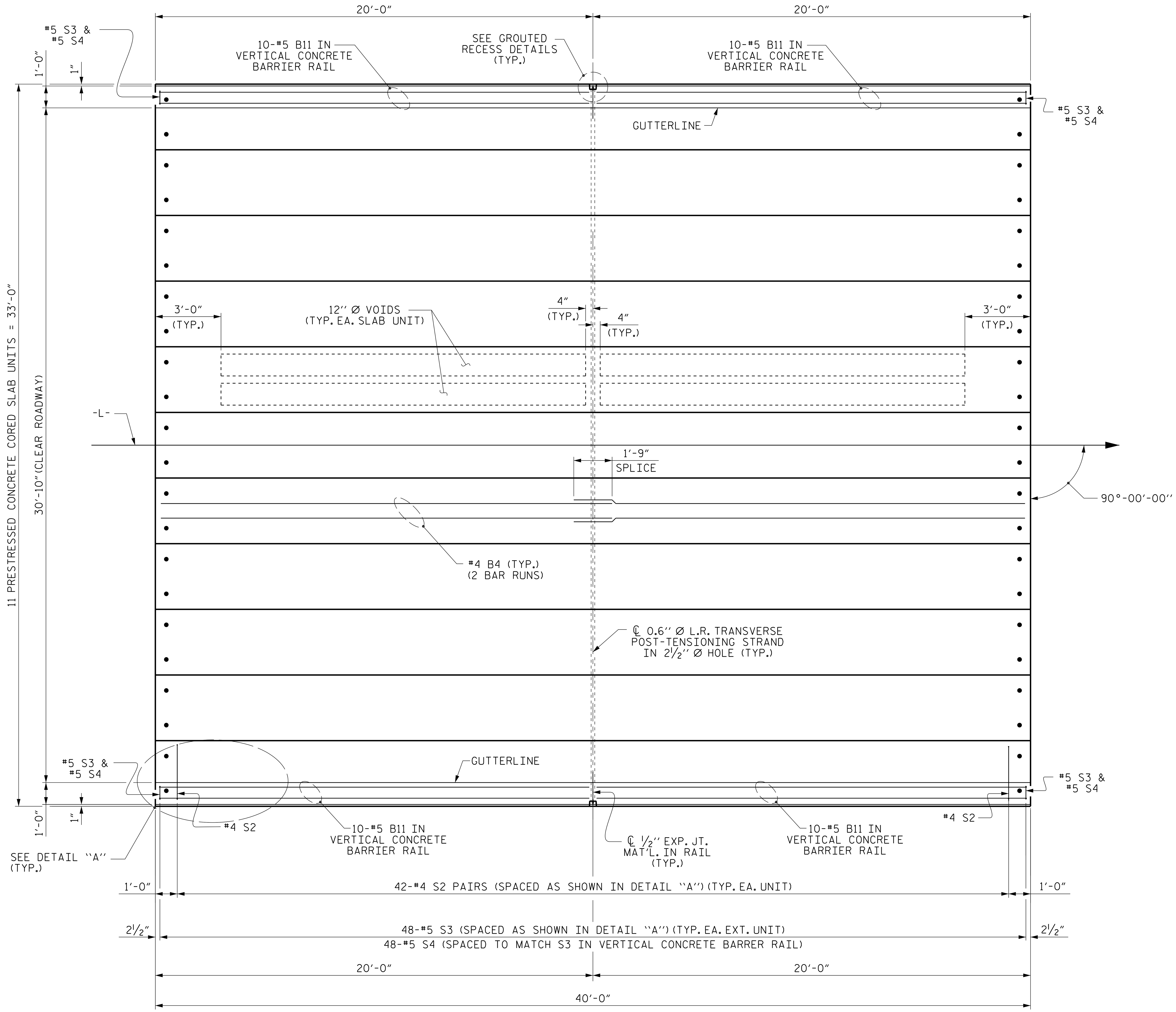
PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

ASSEMBLED BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DRAWN BY : DGE 3/09	REV. 12/5/11	MAA/AAC	
CHECKED BY : BCH 3/09	REV. 8/14	MAA/TMG	

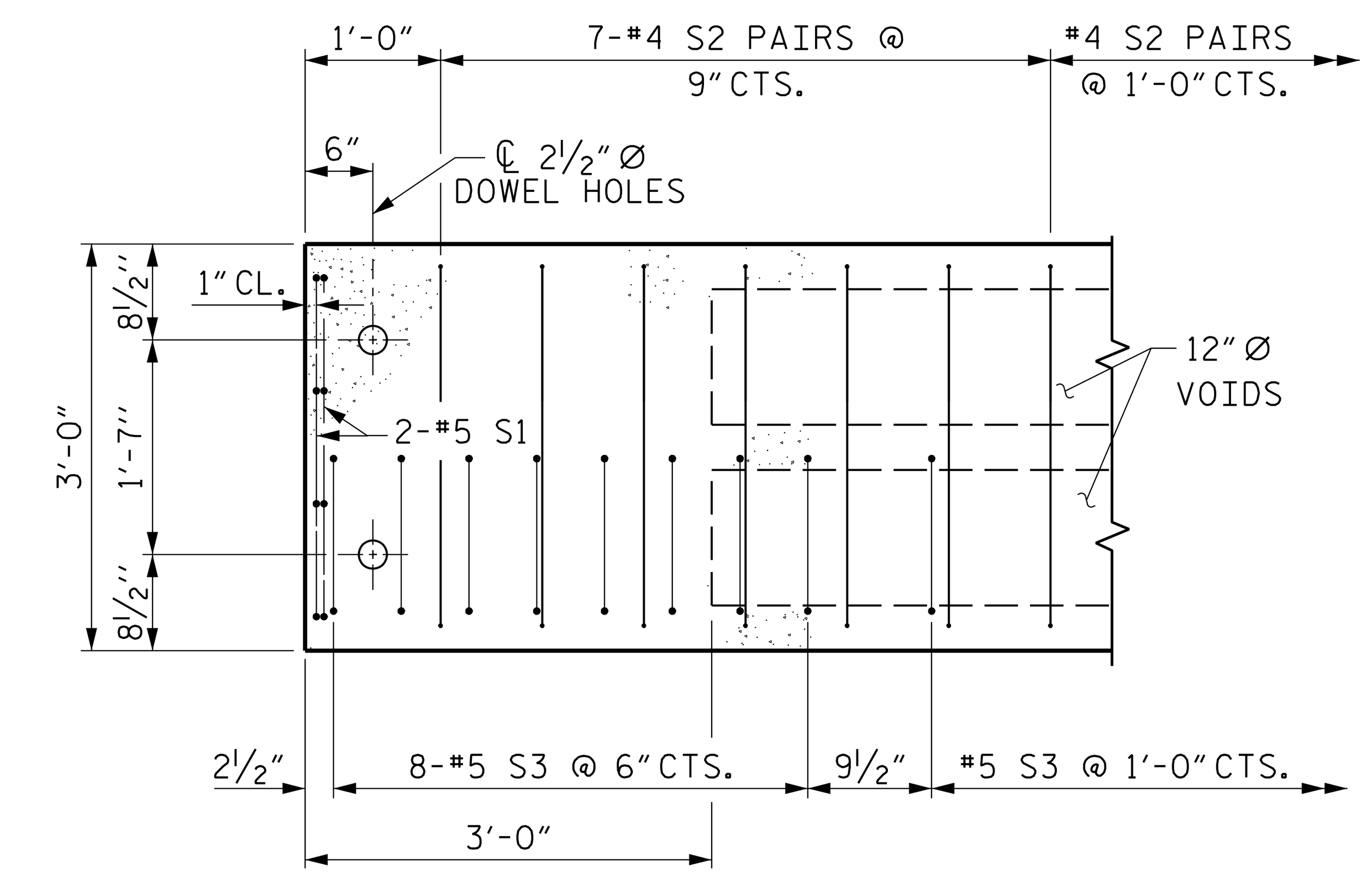
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			24

STD. NO. 21" PCS_33_90S_50L

8:36:09 AM R:\Structures\B5604_SMU_CS2_TI009.dgn 11/27/2017



PLAN OF UNIT



DETAIL "A"

(TYPICAL EACH END OF UNIT)
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 40' UNIT
30'-10" CLEAR ROADWAY
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL L. KEVIN AUSTIN
3/19/2018

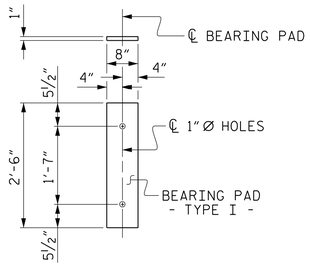
PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

ASSEMBLED BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17

DRAWN BY : DGE	3/09	REV. 12/5/11	MAA/AAC
CHECKED BY : BCH	3/09	REV. 8/14	MAA/TMG

11/27/2017 8:36:10 AM R:\Structures\B5604_SMU_CS3_71009.dgn

STD. NO. 21"PCS_33_90S_40L



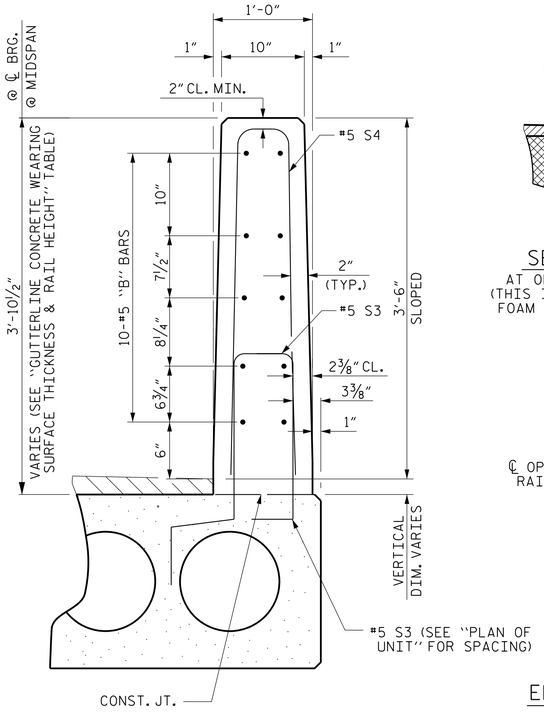
EXPANSION & FIXED END
(TYPE I - 22 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0"x 1'-9"
50' CORED SLAB UNIT	0.6"Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	5/16" ↓
FINAL CAMBER	3/16" ↑

** INCLUDES FUTURE WEARING SURFACE

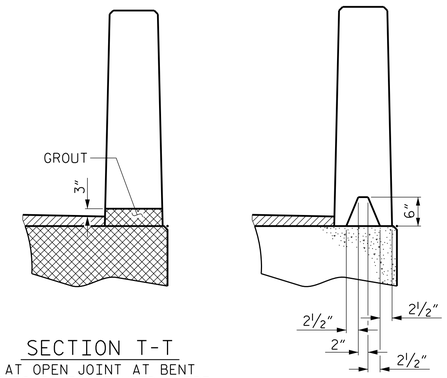


VERTICAL CONCRETE BARRIER RAIL SECTION

GRADE 270 STRANDS	
	0.6"Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

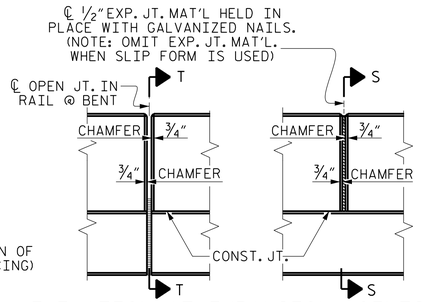
CONCRETE RELEASE STRENGTH	
UNIT	PSI
50' UNITS	4900

CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
50' UNIT			
EXTERIOR C.S.	2	50'-0"	100'-0"
INTERIOR C.S.	9	50'-0"	450'-0"
TOTAL	11		550'-0"



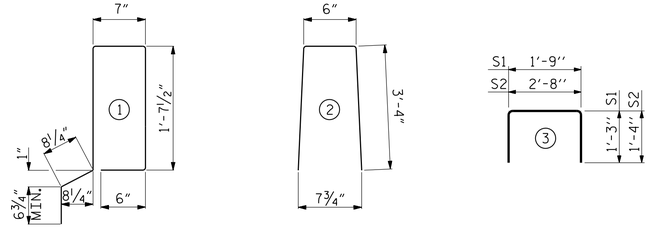
SECTION T-T
AT OPEN JOINT AT BENT
(THIS IS TO BE USED WHERE FOAM JOINT IS NOT USED)

SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BAR TYPES



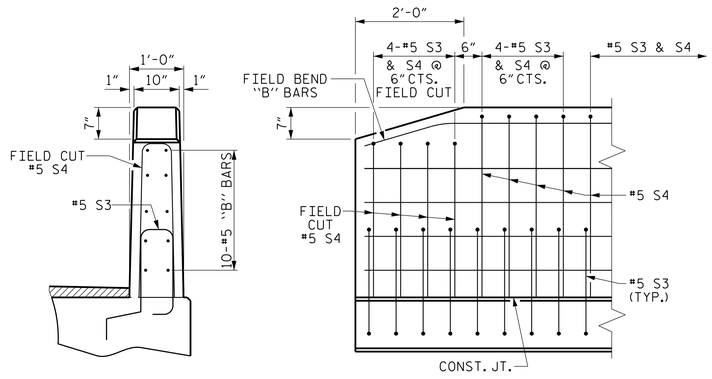
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL

BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
	50' UNIT					
✱B13	40	40	#5	STR	24'-7"	1026
✱ S4	116	116	#5	2	7'-2"	867
✱EPOXY COATED REINFORCING STEEL				LBS.		1893
CLASS AA CONCRETE				CU.YDS.		12.8
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.		100.25

BILL OF MATERIAL FOR ONE 50' CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B6	4	#4	STR	25'-9"	69	25'-9"	69
S1	8	#5	3	4'-3"	35	4'-3"	35
S2	104	#4	3	5'-4"	371	5'-4"	371
✱ S3	58	#5	1	5'-7"	338		
REINFORCING STEEL		LBS.			475		475
✱EPOXY COATED REINFORCING STEEL		LBS.			338		
6500 P.S.I. CONCRETE		CU. YDS.			7.1		7.1
0.6"Ø L.R. STRANDS		No.			19		19



END VIEW

SIDE VIEW

END OF RAIL DETAILS

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½"Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT. THE 2½"Ø DOWEL HOLES AT EXPANSION ENDS OF SLAB SECTIONS SHALL BE FILLED WITH JOINT SEALER MATERIAL TO 1½" ABOVE THE TOP OF DOWELS AND THEN FILLED WITH GROUT.

THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF TYPE SL LOW MODULUS SILICONE SEALANT. THE 2"Ø BACKER ROD SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TOP OF THE CORED SLAB UNITS SHALL RECEIVE A RAKED FINISH IN ACCORDANCE WITH SECTION 1078-15 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

ALL REINFORCING STEEL IN THE VERTICAL CONCRETE BARRIER RAIL SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

GROUT THE SHEAR KEYS BETWEEN THE LEVEL AND SLOPED CORED SLAB UNITS (I.E. SHEAR KEYS AT BREAK POINTS IN THE CAP) PRIOR TO TENSIONING THE TRANSVERSE STRANDS. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

GUTTERLINE CONCRETE WEARING SURFACE THICKNESS & RAIL HEIGHT		
	CONCRETE WEARING SURFACE THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
50' UNITS	4 5/16"	3'-10 5/16"

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 4 OF 5

ASSEMBLED BY : W. B. ALLEN	DATE : 6/17
CHECKED BY : Z H. BROWN	DATE : 8/17
DRAWN BY : DGE 5/09	REV. 11/14 MAA/TMG
CHECKED BY : BCH 6/09	

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

Docusigned by: L. Kevin Austin
NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN
3/19/2018

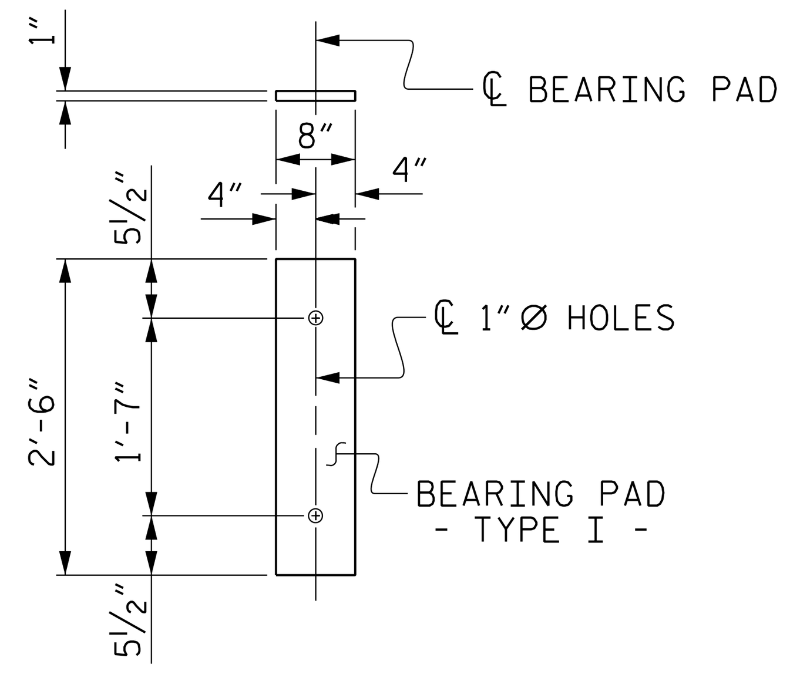
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT
90° SKEW
SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			24

STD. NO. 21"PCS3_33_90S

11/27/2017 8:36:8 AM R:\Structures\B5604_SMU_CS4_7009.dgn



EXPANSION & FIXED END
(TYPE I - 66 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

GRADE 270 STRANDS	
	0.6" Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

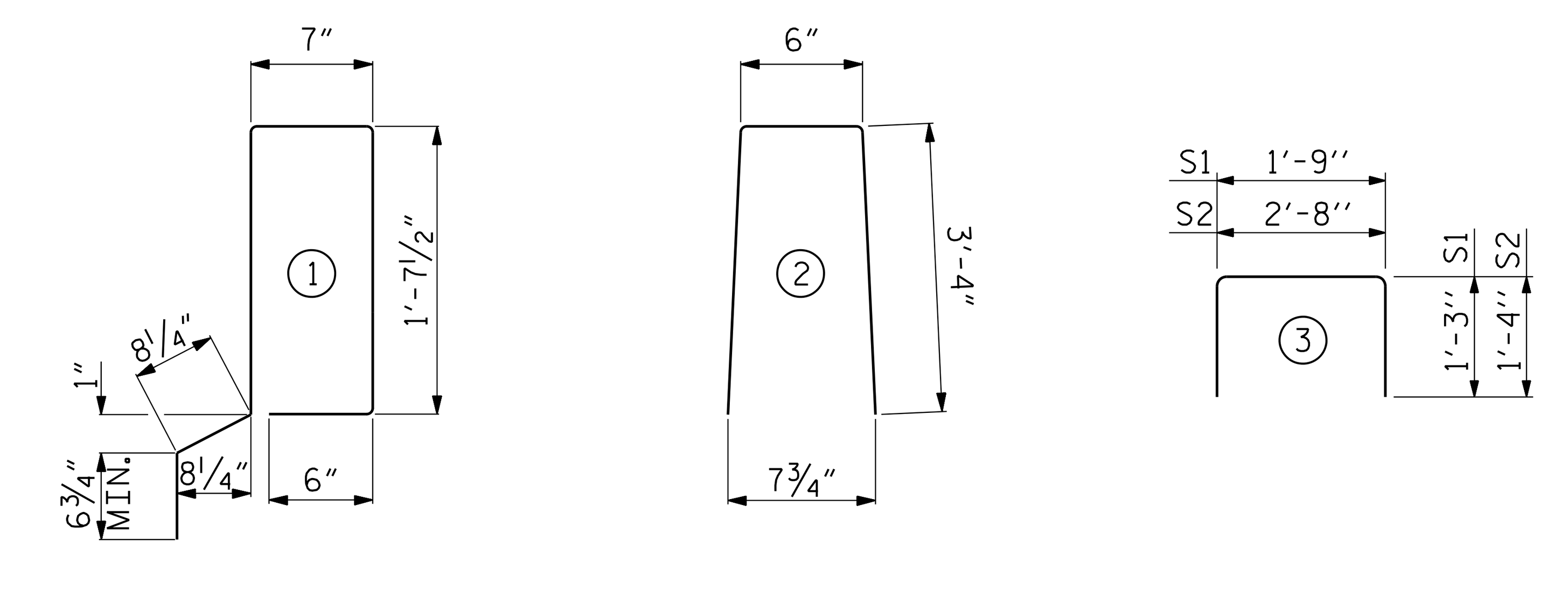
CONCRETE RELEASE STRENGTH	
UNIT	PSI
40' UNITS	4000

CORED SLABS REQUIRED	NUMBER	LENGTH	TOTAL LENGTH
40' UNIT			
EXTERIOR C.S.	6	40'-0"	240'-0"
INTERIOR C.S.	27	40'-0"	1080'-0"
TOTAL	33		1320'-0"

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 1'-9"
40' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	¾" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD **	⅛" ↓
FINAL CAMBER	⅝" ↑

** INCLUDES FUTURE WEARING SURFACE

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL						
BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
	40' UNIT					
* B11	40	120	#5	STR	19'-7"	2451
* S4	96	288	#5	2	7'-2"	2154
* EPOXY COATED REINFORCING STEEL				LBS.		4605
CLASS AA CONCRETE				CU.YDS.		30.6
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN.FT.		240.75

BILL OF MATERIAL FOR ONE 40' CORED SLAB UNIT							
				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B4	4	#4	STR	20'-9"	55	20'-9"	55
S1	8	#5	3	4'-3"	35	4'-3"	35
S2	84	#4	3	5'-4"	299	5'-4"	299
* S3	48	#5	1	5'-7"	280		
REINFORCING STEEL		LBS.			389		389
* EPOXY COATED REINFORCING STEEL		LBS.			280		
5000 P.S.I. CONCRETE		CU. YDS.			5.8		5.8
0.6" Ø L.R. STRANDS		No.			13		13

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½" Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT. THE 2½" Ø DOWEL HOLES AT EXPANSION ENDS OF SLAB SECTIONS SHALL BE FILLED WITH JOINT SEALER MATERIAL TO 1½" ABOVE THE TOP OF DOWELS AND THEN FILLED WITH GROUT.

THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF TYPE SL LOW MODULUS SILICONE SEALANT. THE 2" Ø BACKER ROD SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TOP OF THE CORED SLAB UNITS SHALL RECEIVE A RAKED FINISH IN ACCORDANCE WITH SECTION 1078-15 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

ALL REINFORCING STEEL IN THE VERTICAL CONCRETE BARRIER RAIL SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

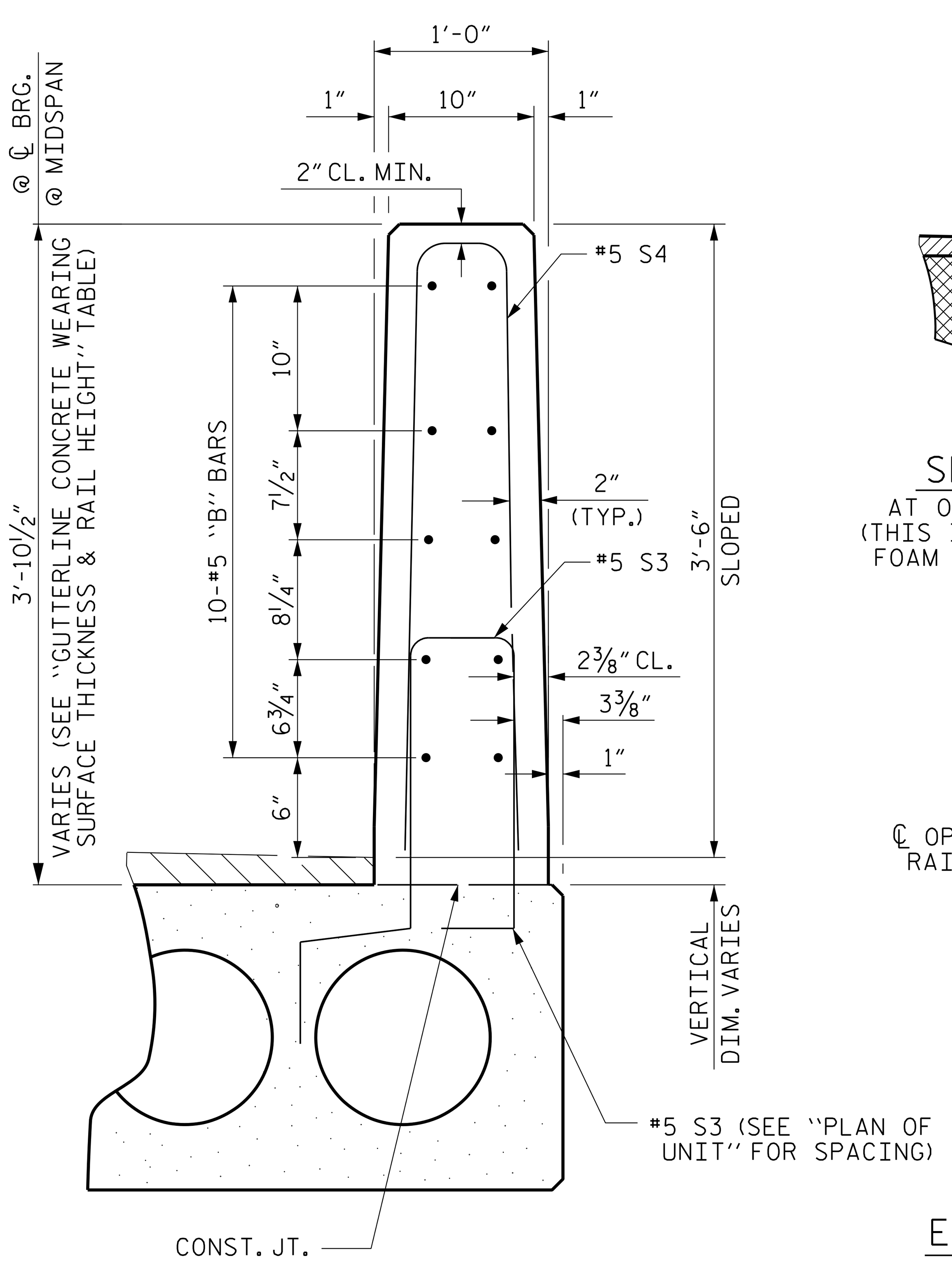
GROUT THE SHEAR KEYS BETWEEN THE LEVEL AND SLOPED CORED SLAB UNITS (I.E. SHEAR KEYS AT BREAK POINTS IN THE CAP) PRIOR TO TENSIONING THE TRANSVERSE STRANDS. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

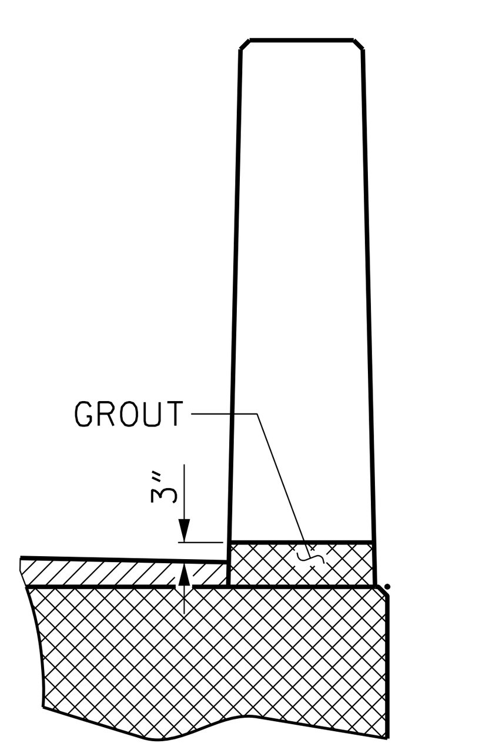
THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

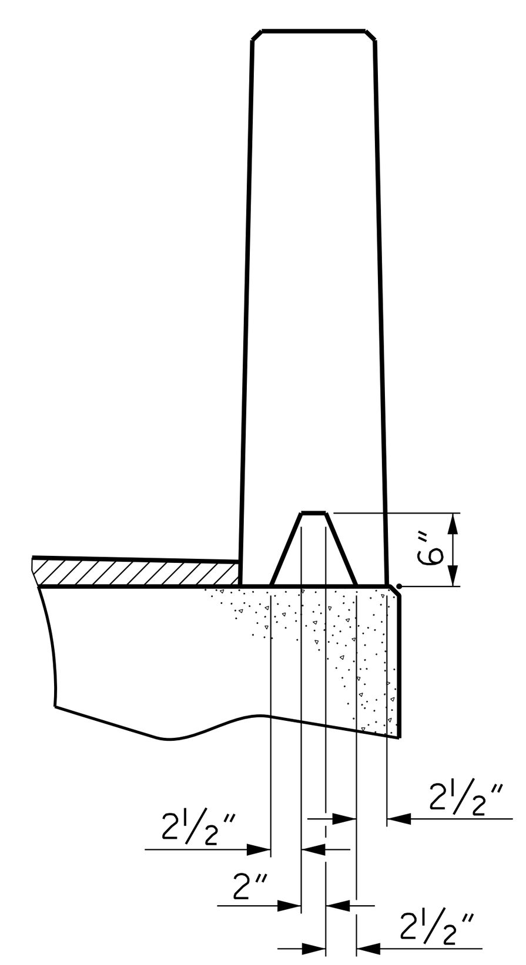
THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.



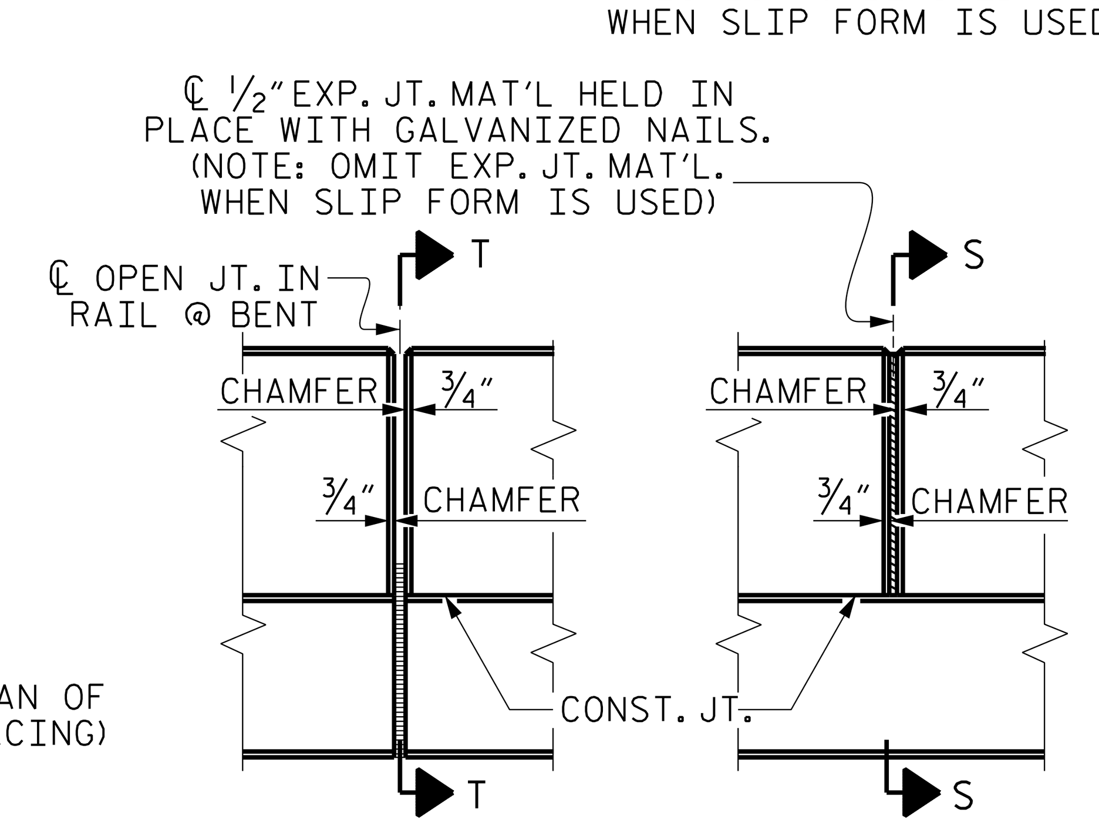
VERTICAL CONCRETE BARRIER RAIL SECTION



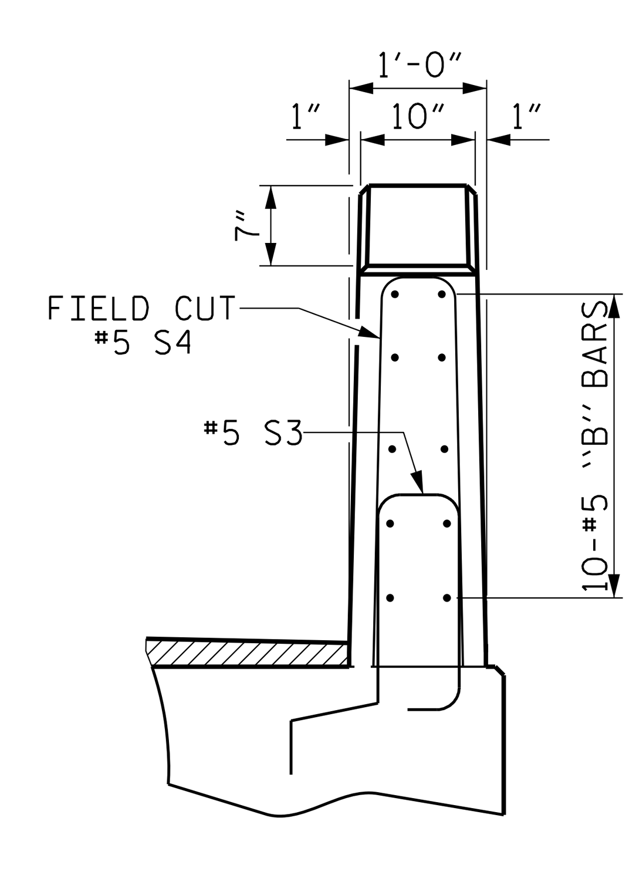
SECTION T-T
AT OPEN JOINT AT BENT
(THIS IS TO BE USED WHERE FOAM JOINT IS NOT USED)



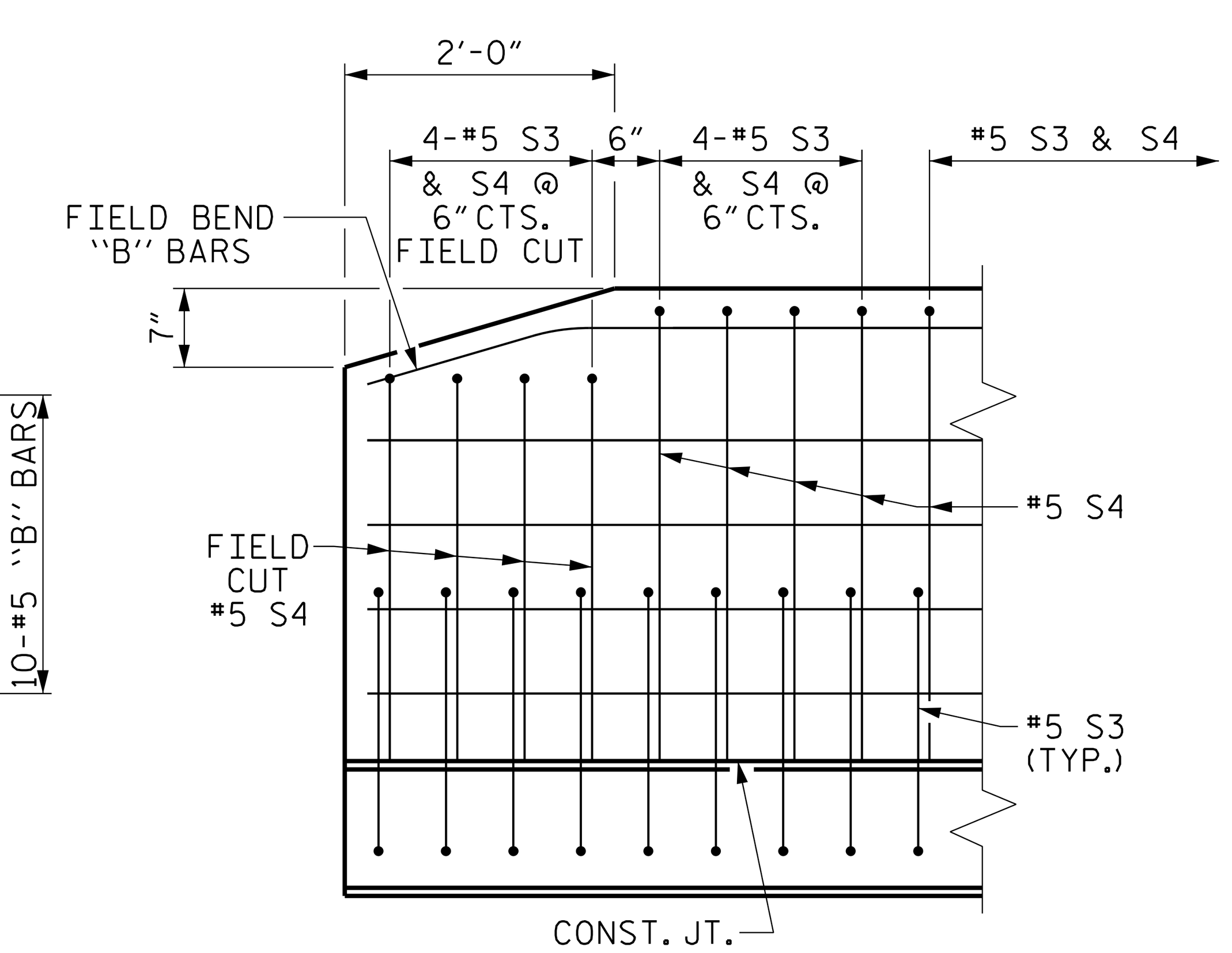
SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS



END VIEW



SIDE VIEW

END OF RAIL DETAILS

GUTTERLINE CONCRETE WEARING SURFACE THICKNESS & RAIL HEIGHT		
	CONCRETE WEARING SURFACE THICKNESS	RAIL HEIGHT
	@ MID-SPAN	@ MID-SPAN
40' UNITS	3⅞"	3'-9⅞"

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 5 OF 5

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN 19661
L. Kevin Austin
3/19/2018

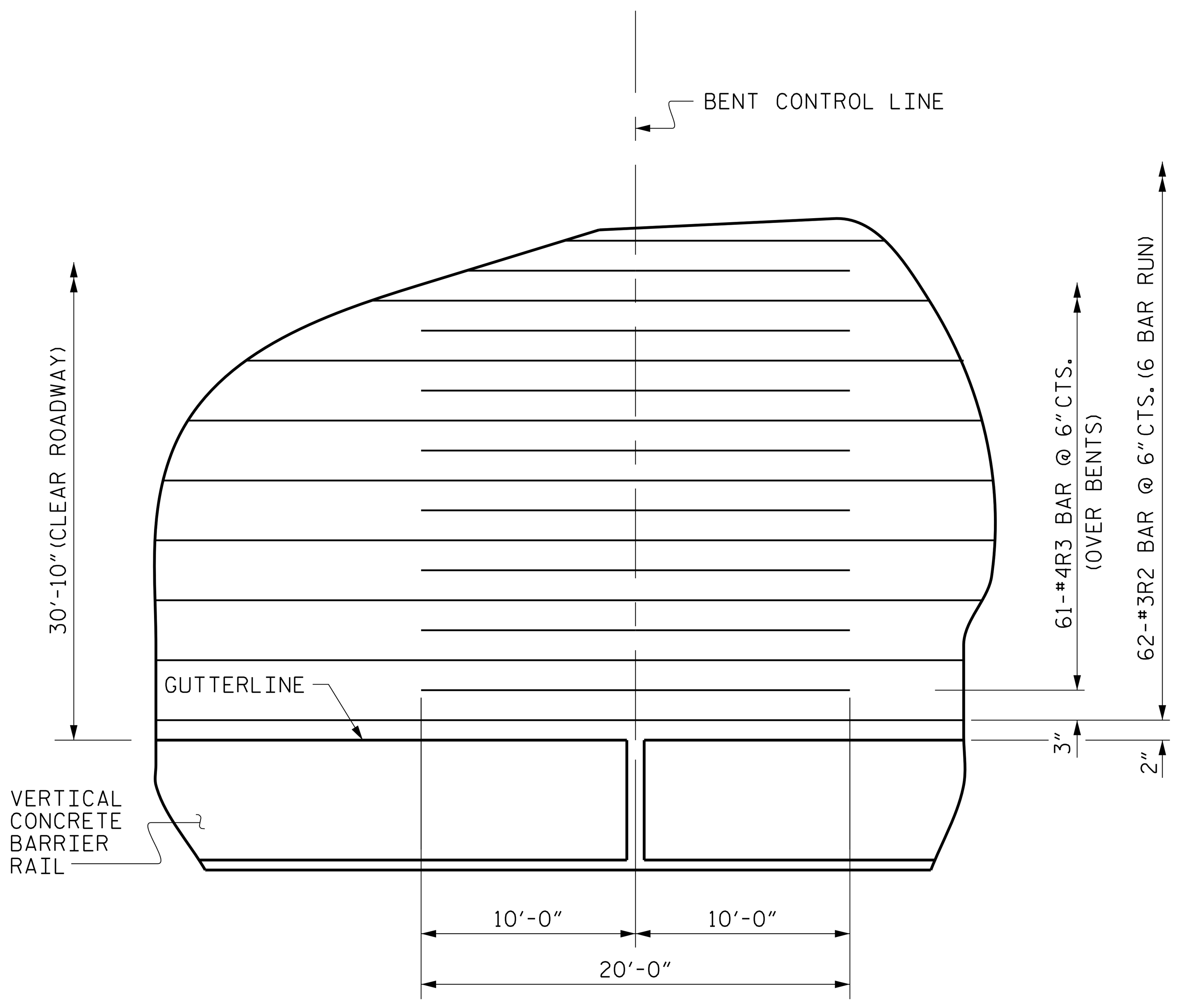
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE CORED SLAB UNIT
90° SKEW
SPANS B, C & D

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			24

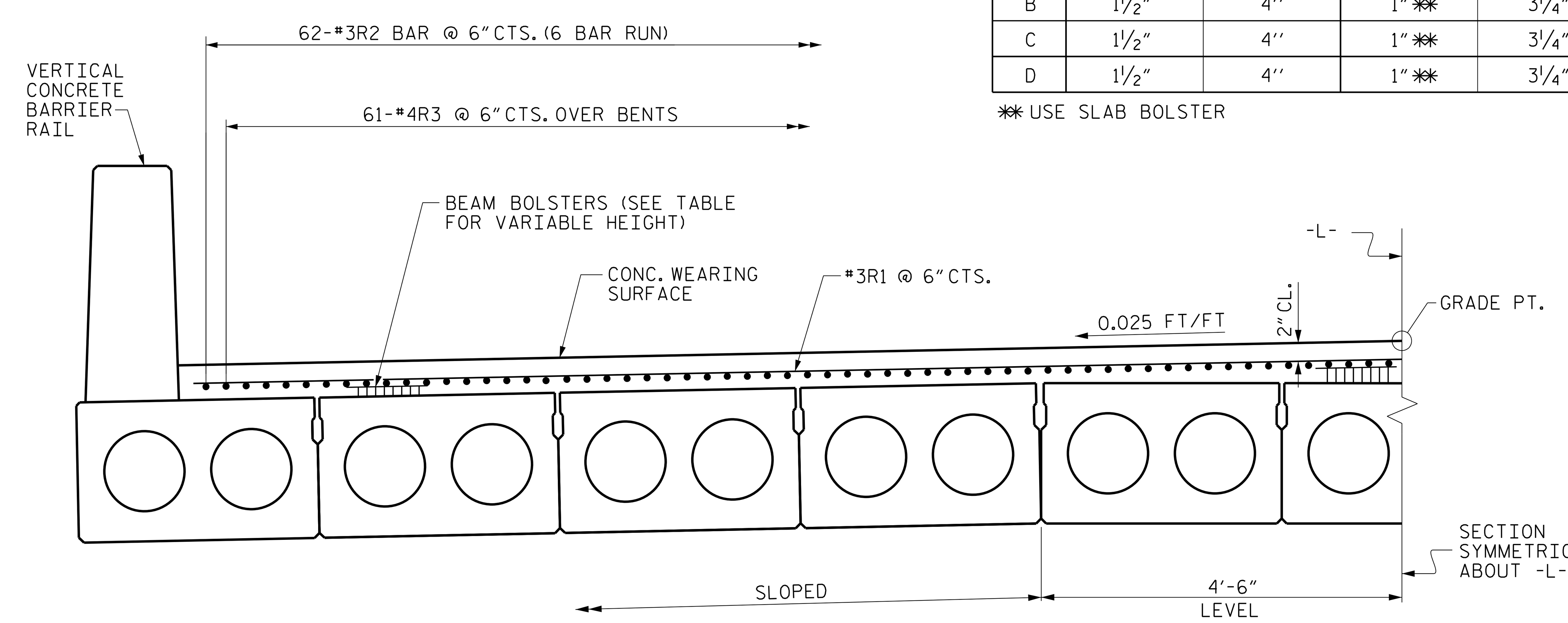
ASSEMBLED BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DRAWN BY : DGE 5/09	REV. 11/14		MAA/TMG
CHECKED BY : BCH 6/09			

STD. NO. 21"PCS3_33_90S



PLAN @ BENTS

R1 BARS NOT SHOWN FOR CLARITY.



REINFORCING STEEL AND BEAM BOLSTER HEIGHTS

NOTE: BEAM AND SLAB BOLSTER HEIGHTS BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATION AND VARY BETWEEN ℄ BEARING AND MID-SPAN FOR ALL SPANS.

BEAM BOLSTER HEIGHT

SPAN	AT ℄ BEARINGS		AT MID-SPAN	
	GUTTERS	GRADE PT.	GUTTERS	GRADE PT.
A	1½"	4"	1½"	3¾"
B	1½"	4"	1" **	3¼"
C	1½"	4"	1" **	3¼"
D	1½"	4"	1" **	3¼"

** USE SLAB BOLSTER

BILL OF MATERIAL

CONCRETE WEARING SURFACE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*R1	678	#3	STR	16'-1"	4100
*R2	372	#3	STR	29'-3"	4091
*R3	122	#4	STR	20'-0"	1630

* EPOXY COATED REINF. STEEL = 9821 LBS

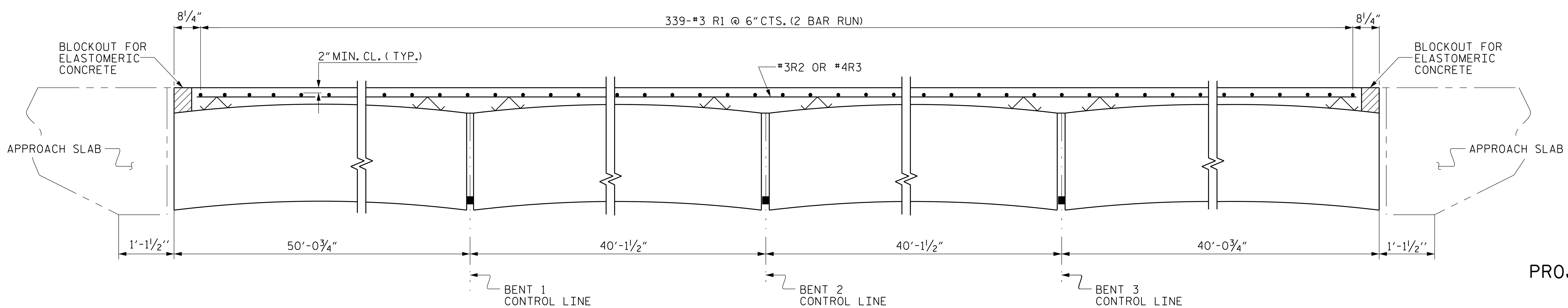
CONCRETE WEARING SURFACE = 5253 SQ. FT.

SPLICE LENGTH CHART

BAR SIZE	EPOXY COATED
#3	1'-3"

GROOVING BRIDGE FLOOR QUANTITY

	AREA (SQ. FT.)
BRIDGE DECK	4707
APPROACH SLABS	756
TOTAL	5463



ELEVATION OF THE CONCRETE WEARING SURFACE

NOTES:

PLACEMENT OF THE CONCRETE WEARING SURFACE SHALL OCCUR AFTER CASTING THE VERTICAL CONCRETE BARRIER RAILS. THE COST OF THE REINFORCING STEEL CAST WITH THE CONCRETE WEARING SURFACE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CONCRETE WEARING SURFACE. FOR CONCRETE WEARING SURFACE, SEE SPECIAL PROVISIONS.

ALL REINFORCING FOR THE CONCRETE WEARING SURFACE SHALL BE EPOXY COATED.

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19661 L. KEVIN AUSTIN

DocuSigned by: L. Kevin Austin

3/19/2018

PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE WEARING SURFACE DETAILS

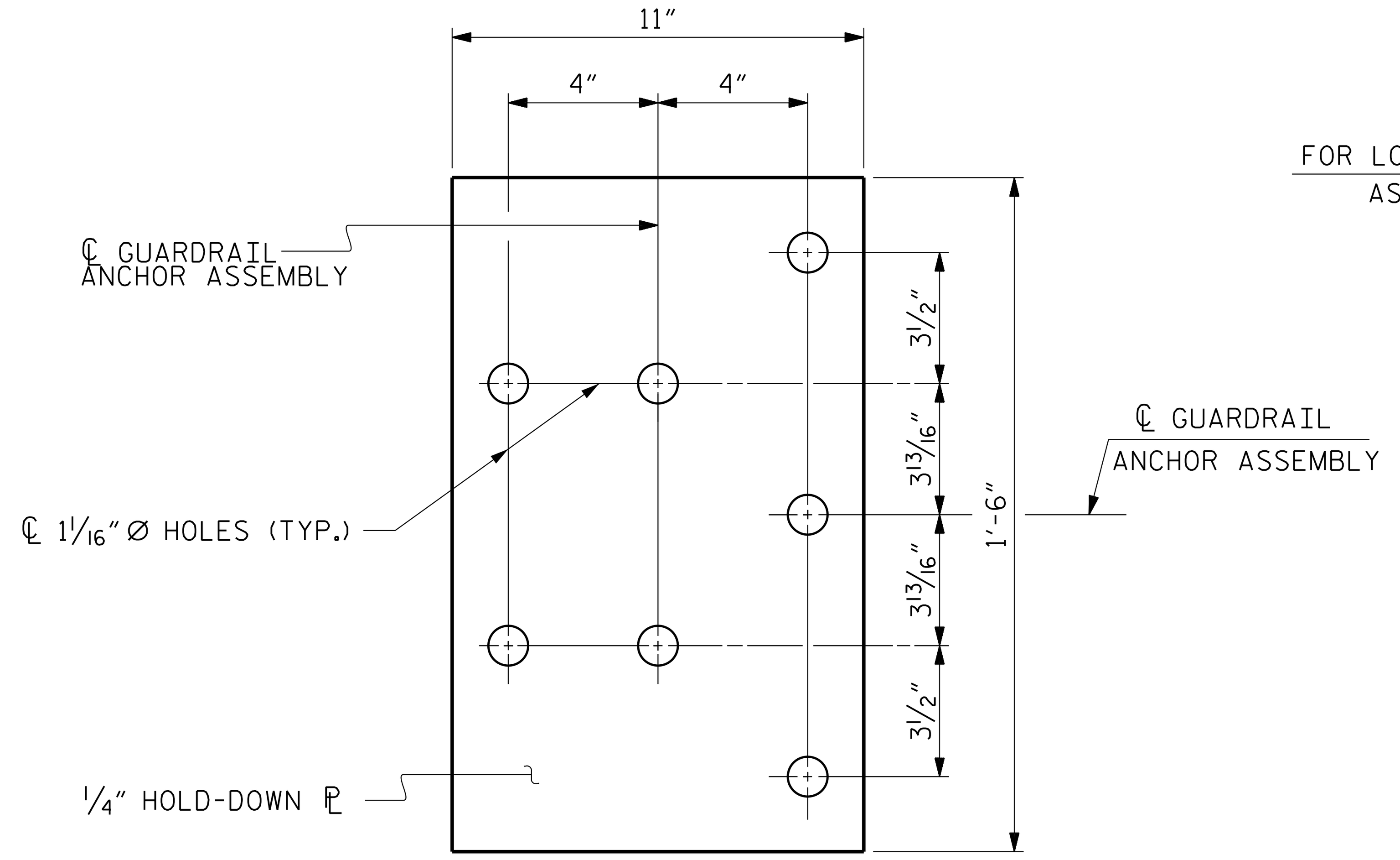
30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			24

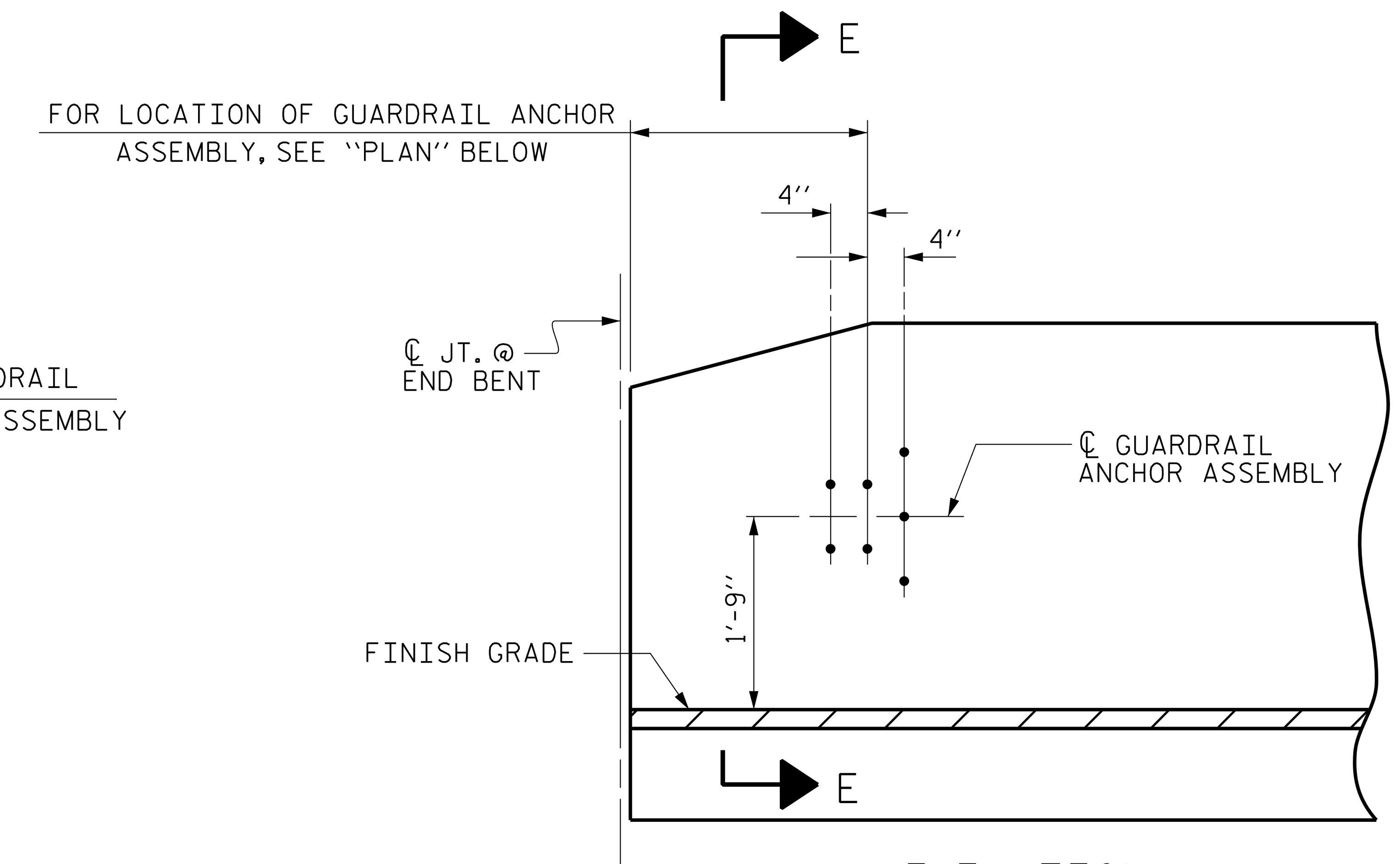
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	10/17

11/27/2017 8:36:03 AM R:\Structures\B5604_SMU_CWS_7100.dgn



PLAN



ELEVATION

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

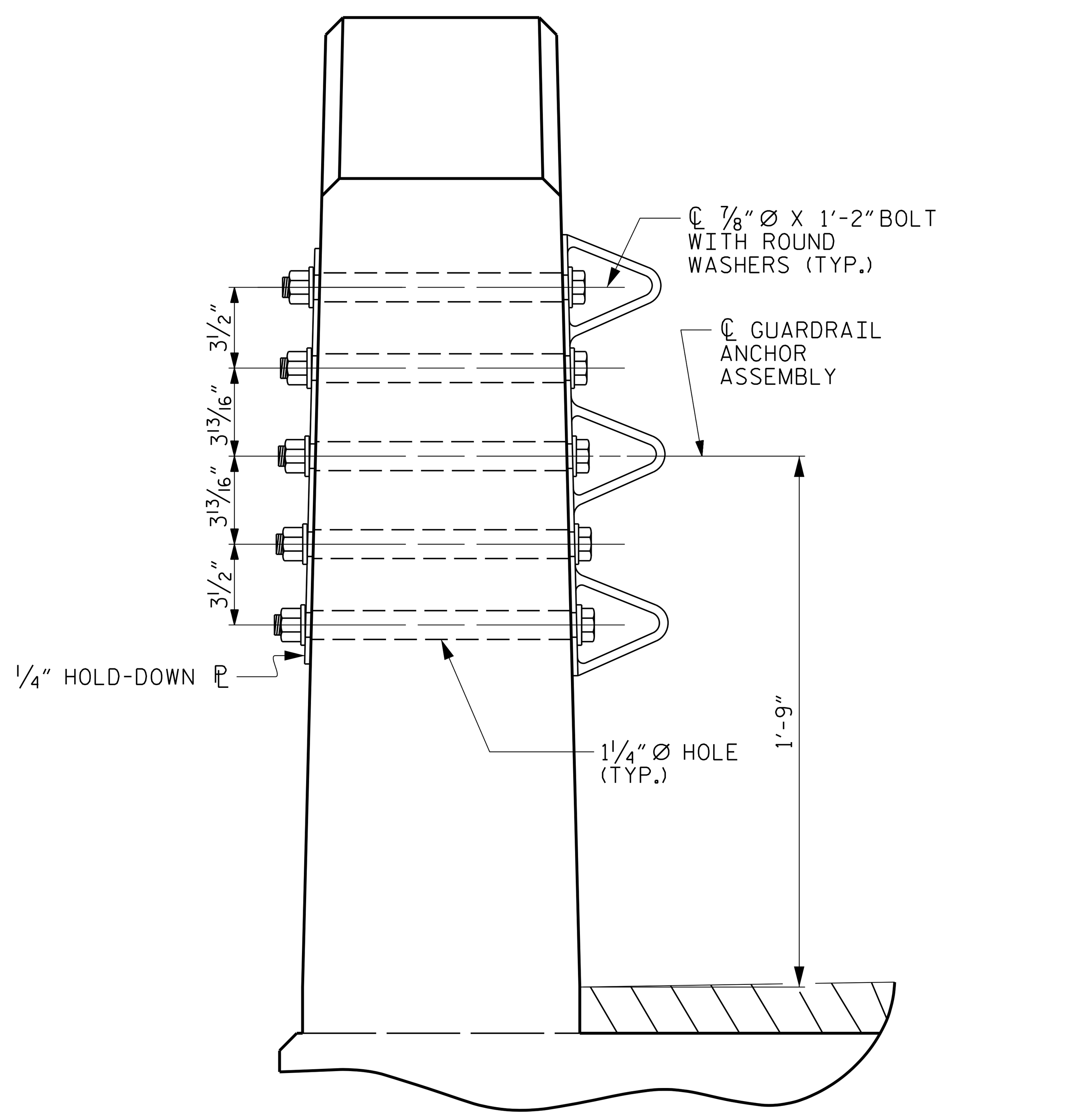
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

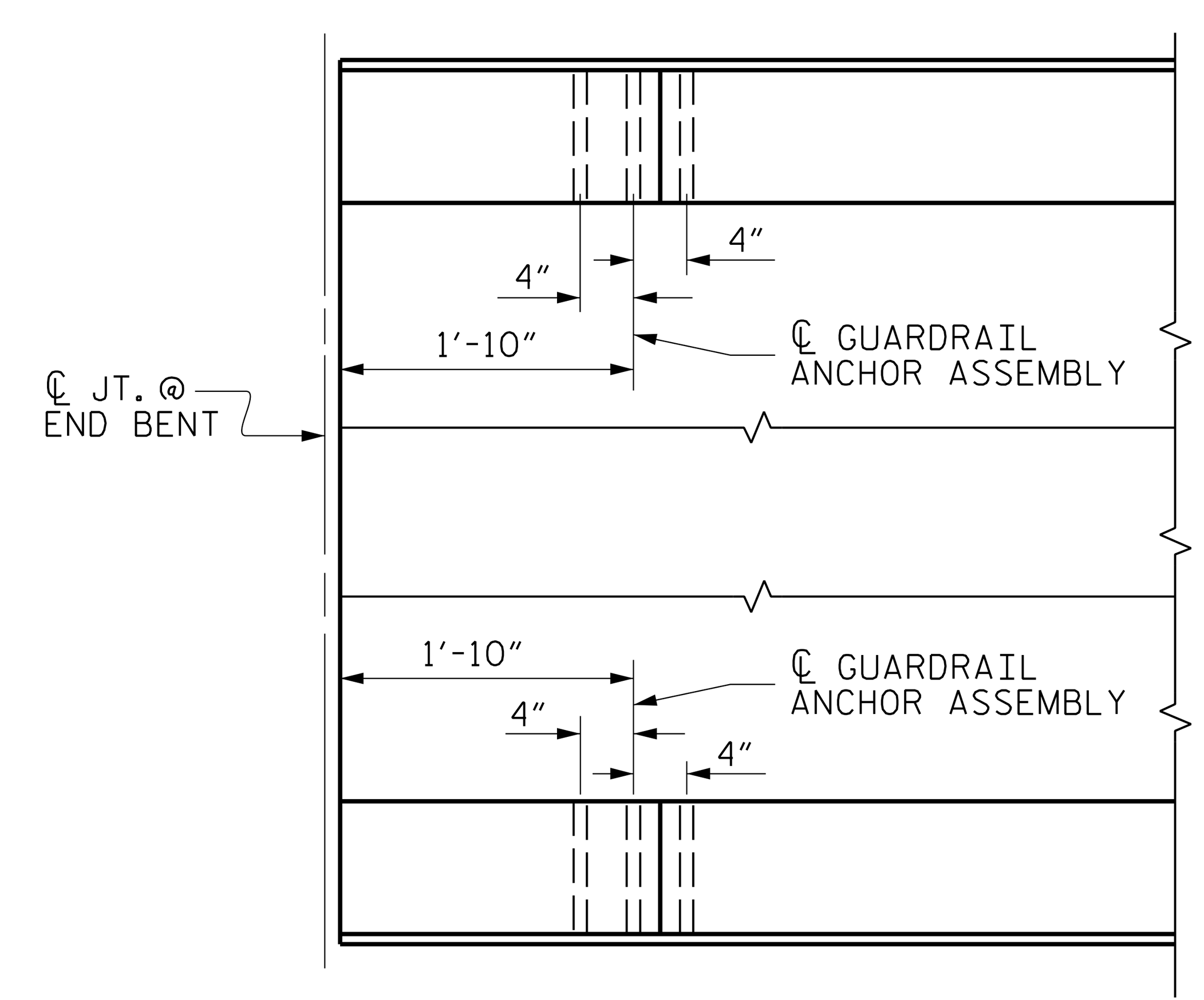
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



SECTION E-E

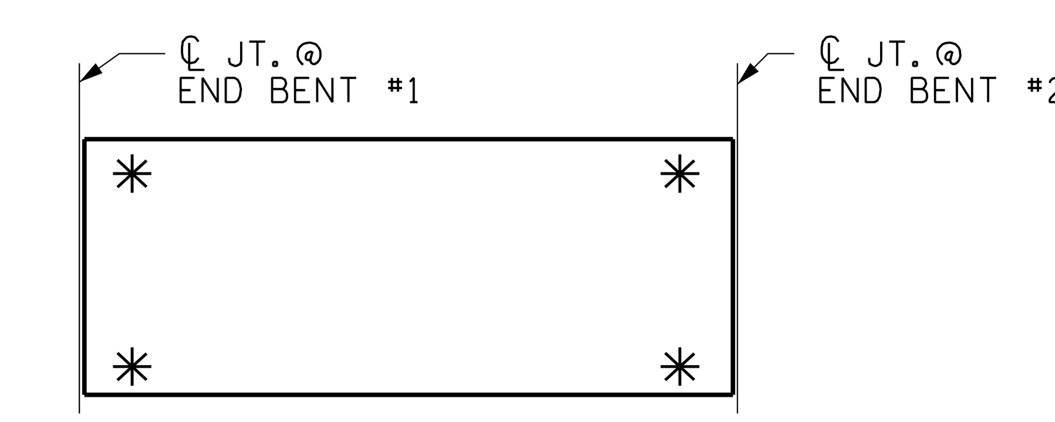
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

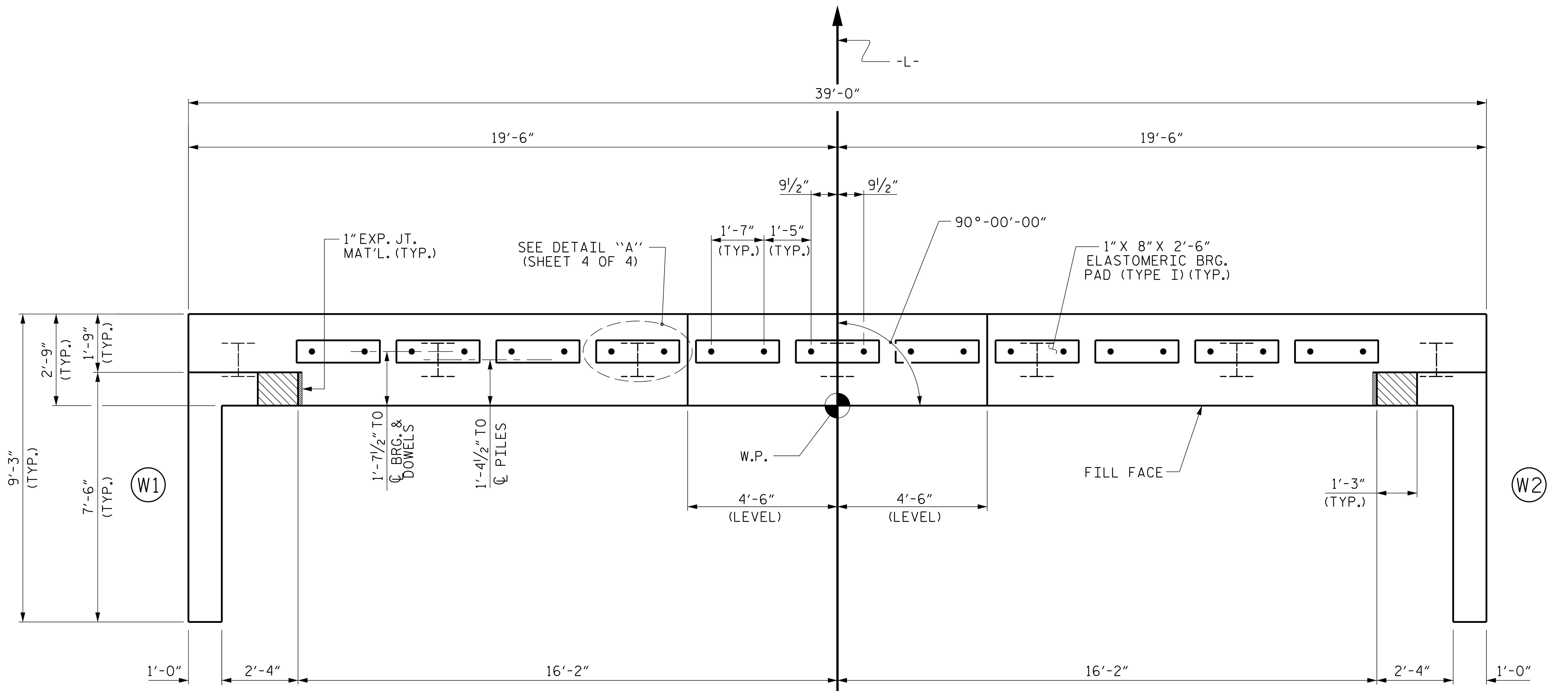
STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR VERTICAL CONCRETE BARRIER RAIL

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-11
1				3				TOTAL SHEETS
2				4				24

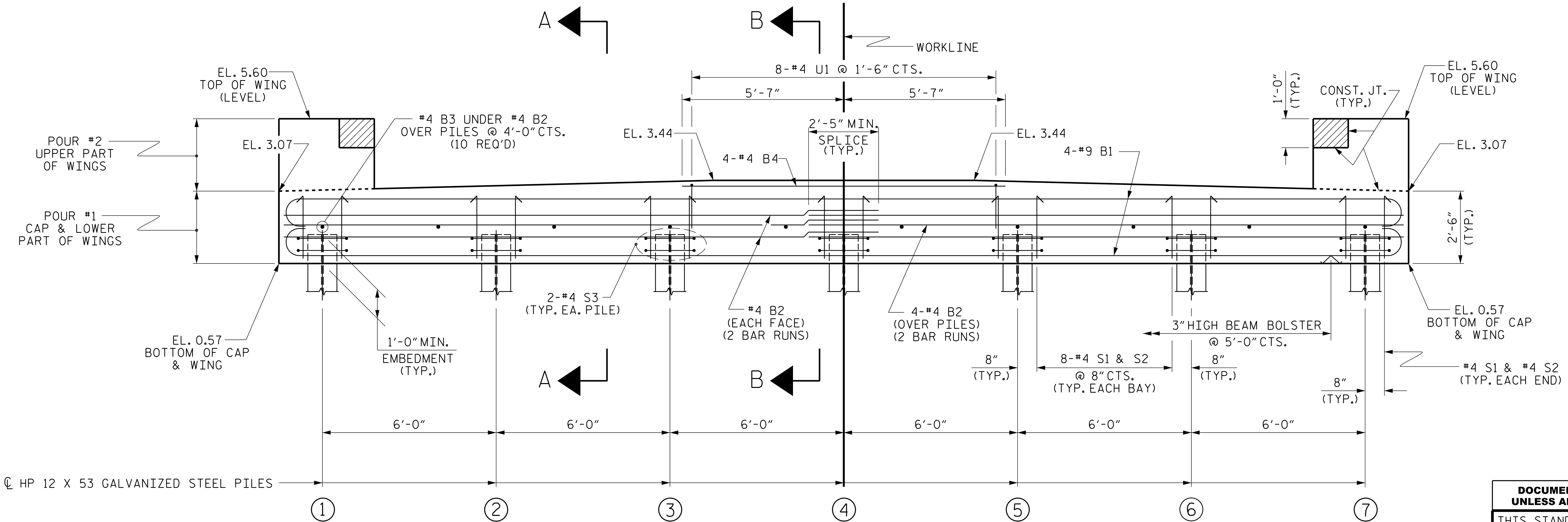
STD. NO. GRA3

ASSEMBLED BY : W. B. ALLEN	DATE : 6/17	
CHECKED BY : Z. H. BROWN	DATE : 8/17	
DRAWN BY : MAA 5/10	REV. 6/13	MAA/GM
CHECKED BY : GM 5/10	REV. 1/15	MAA/TMG
	REV. 12/17	MAA/THC

3/15/2018 9:57:08 AM R:\Structures\B5604_SMU_GR_71009.dgn



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

GALVANIZE THE FULL LENGTH OF EACH END BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-12
TOTAL SHEETS 24

ASSEMBLED BY : W. B. ALLEN	DATE : 6/17		
CHECKED BY : Z. H. BROWN	DATE : 8/17		
DRAWN BY : DGE 01/10		REV. 4/15	MAA/TMG
CHECKED BY : MKT 01/10			

11/27/2017 8:36:07 AM R:\Structures\B5604_SMU_EL_7009.dgn

STD. NO. EB_33_90S

NOTES

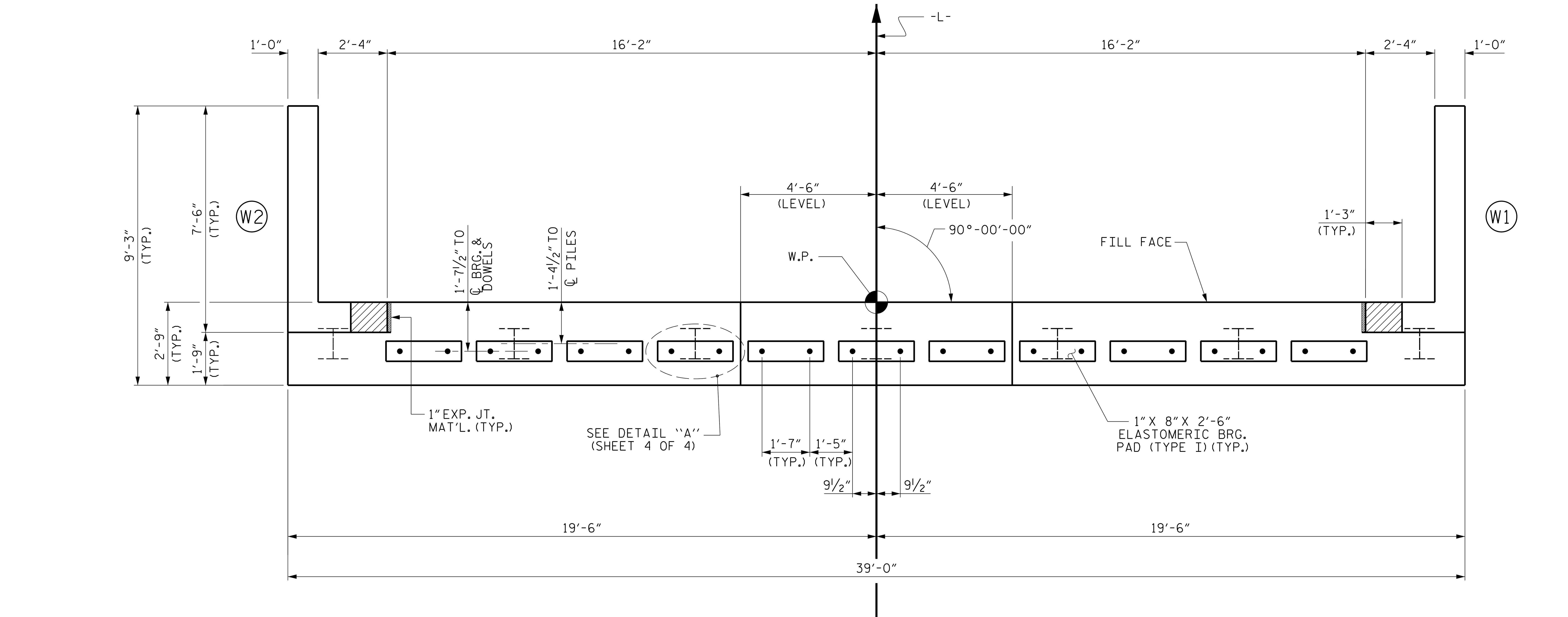
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

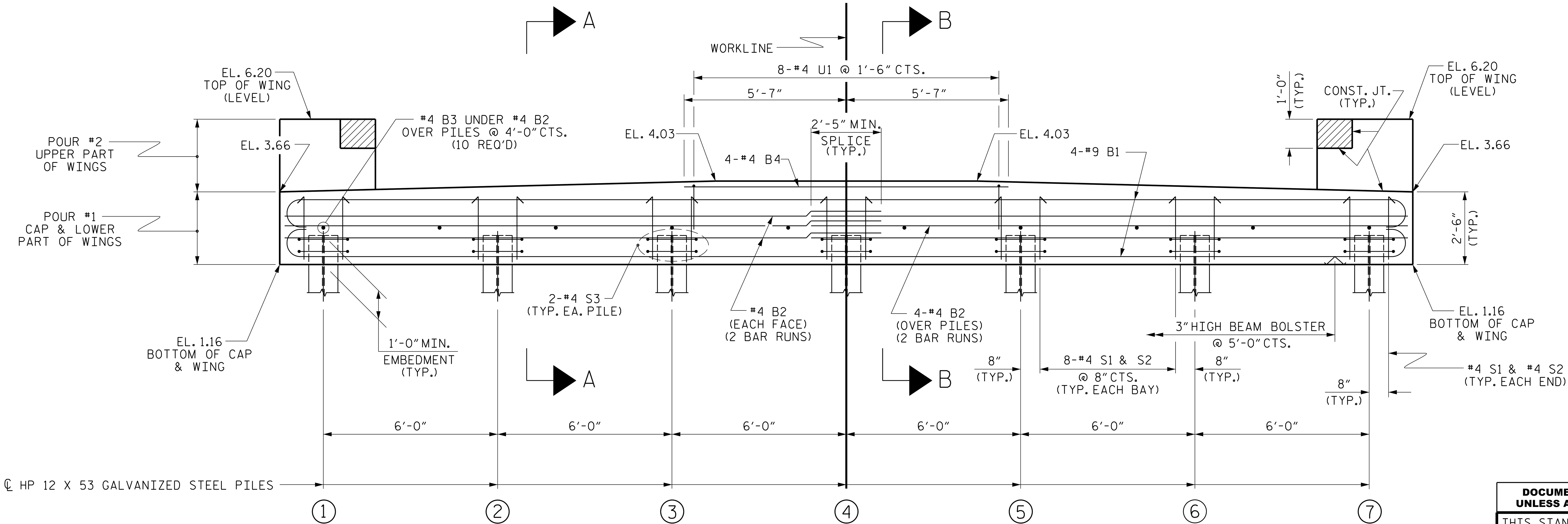
GALVANIZE THE FULL LENGTH OF EACH END BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN
Docusigned by: L. Kevin Austin
3/19/2018

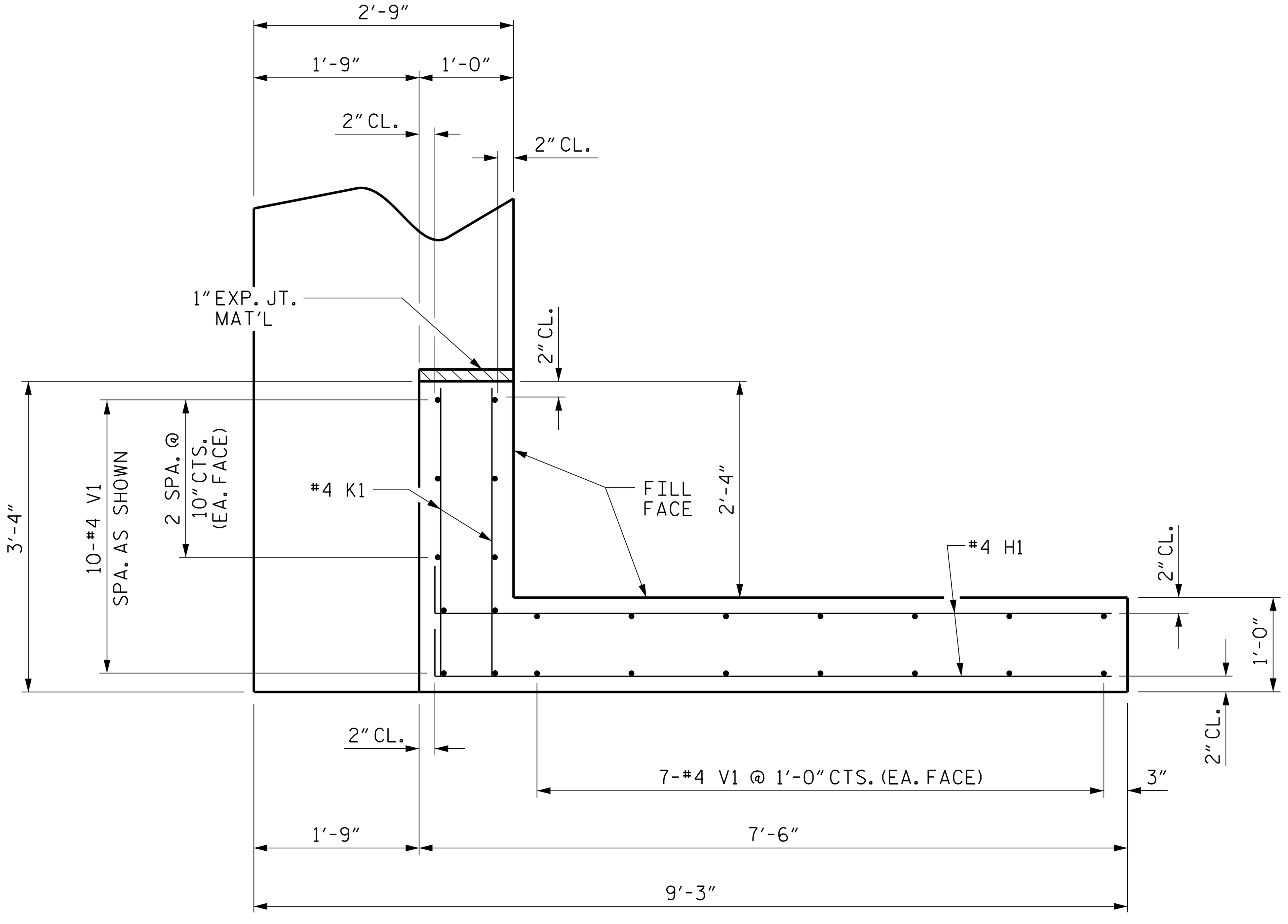
PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-13
1			3				TOTAL SHEETS
2			4				24

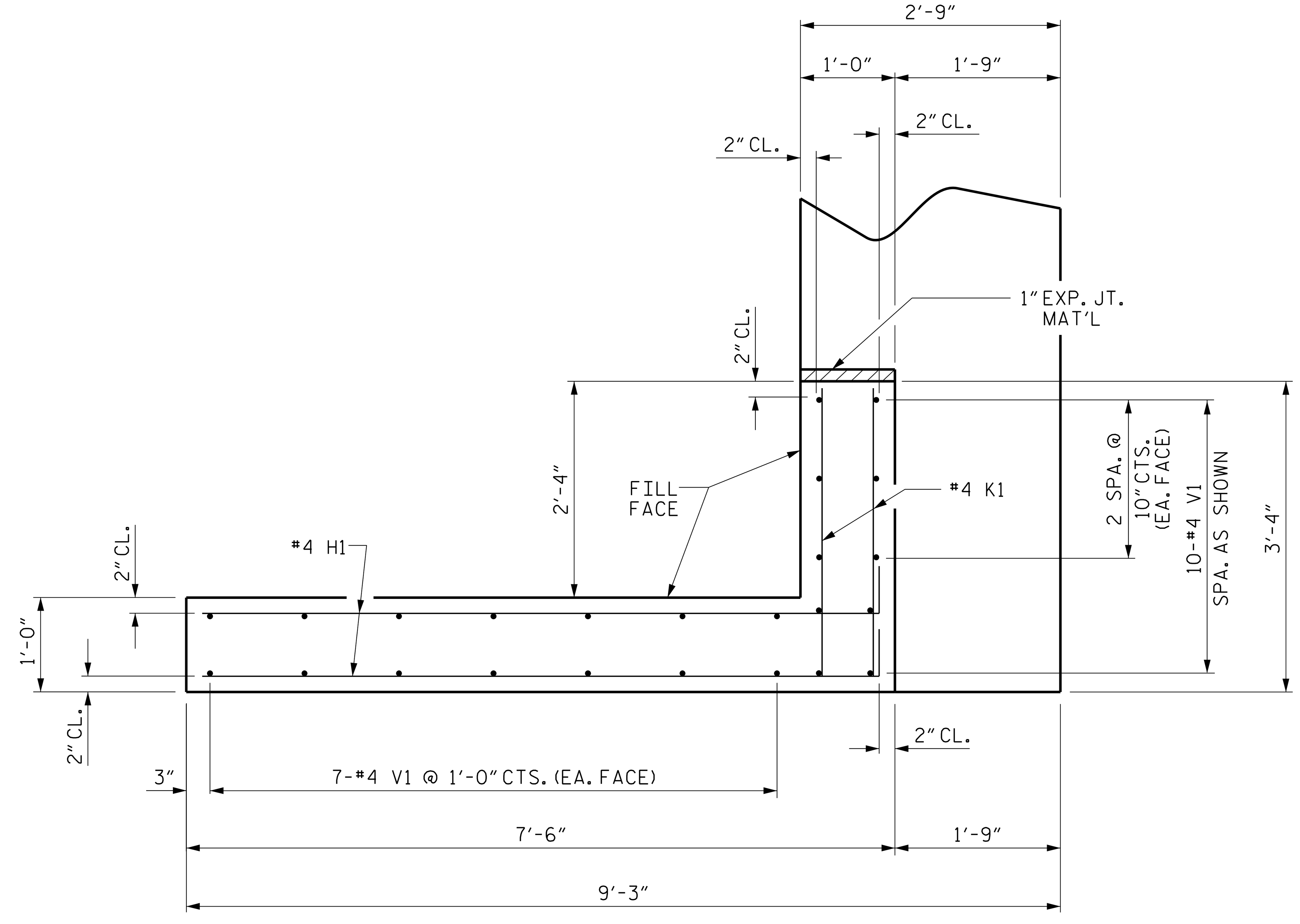
ASSEMBLED BY : W. B. ALLEN DATE : 6/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DRAWN BY : DGE 01/10
CHECKED BY : MKT 01/10
REV. 4/15 MAA/TMG

STD. NO. EB_33_90S

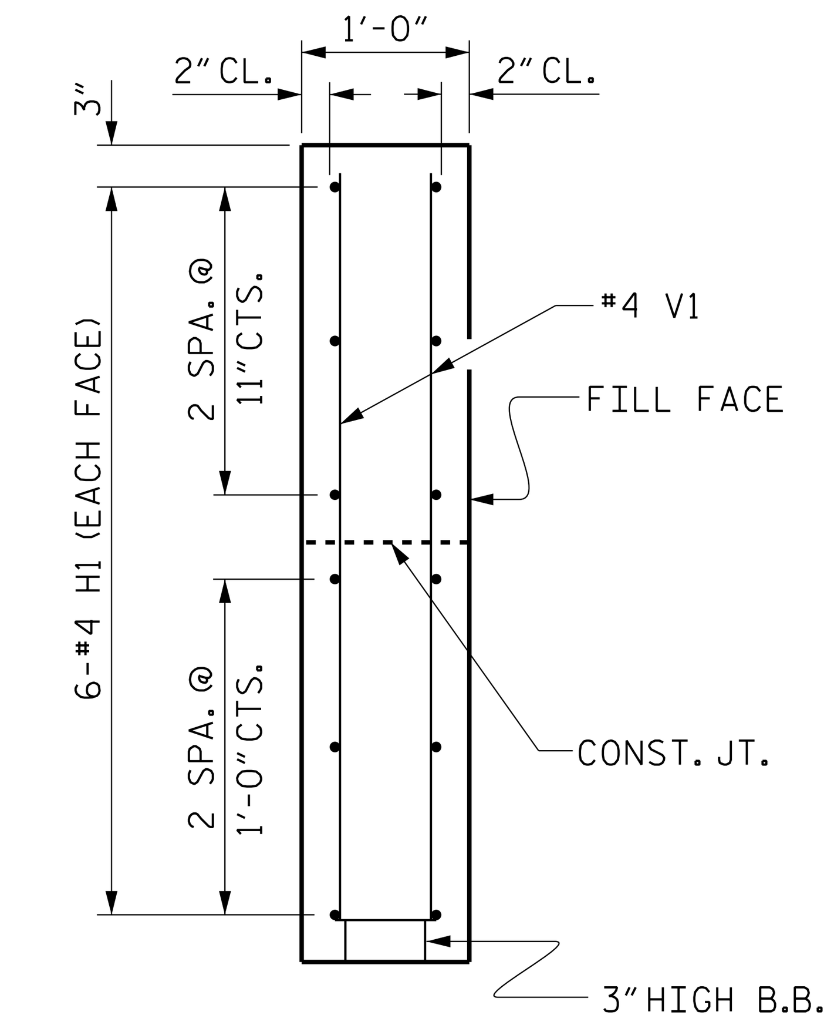
11/27/2017 8:36:18 AM R:\Structures\B5604_SMU_E2_71009.dgn



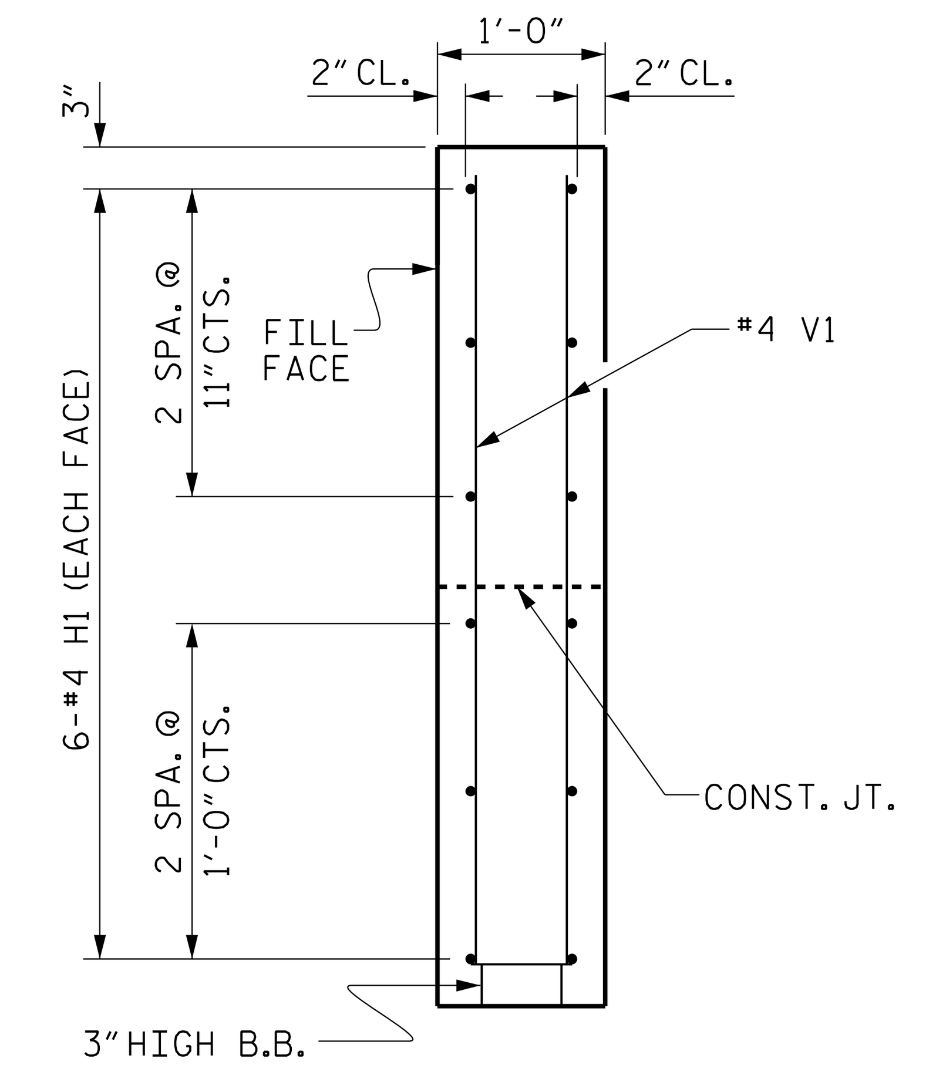
PLAN OF WING (W1)



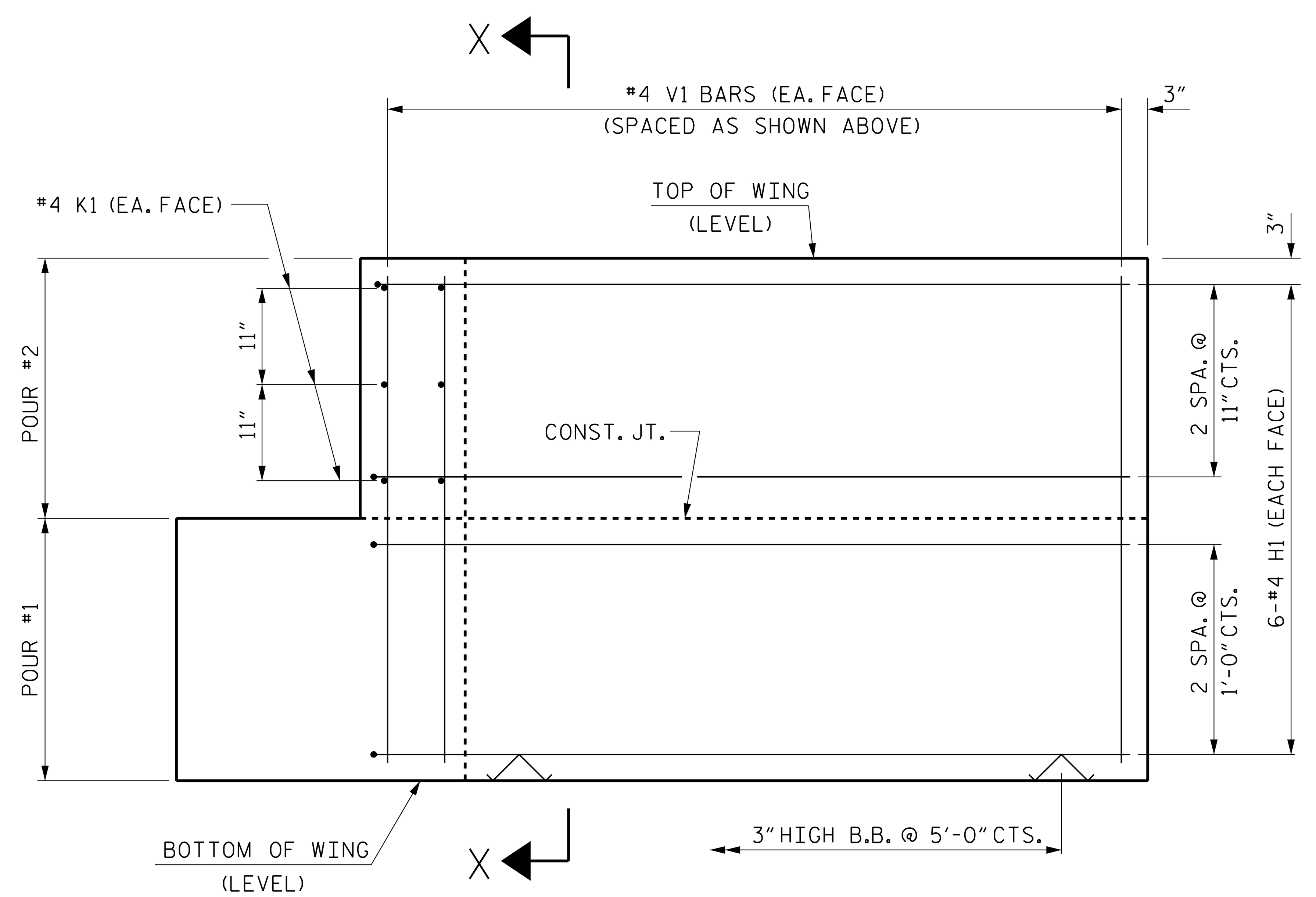
PLAN OF WING (W2)



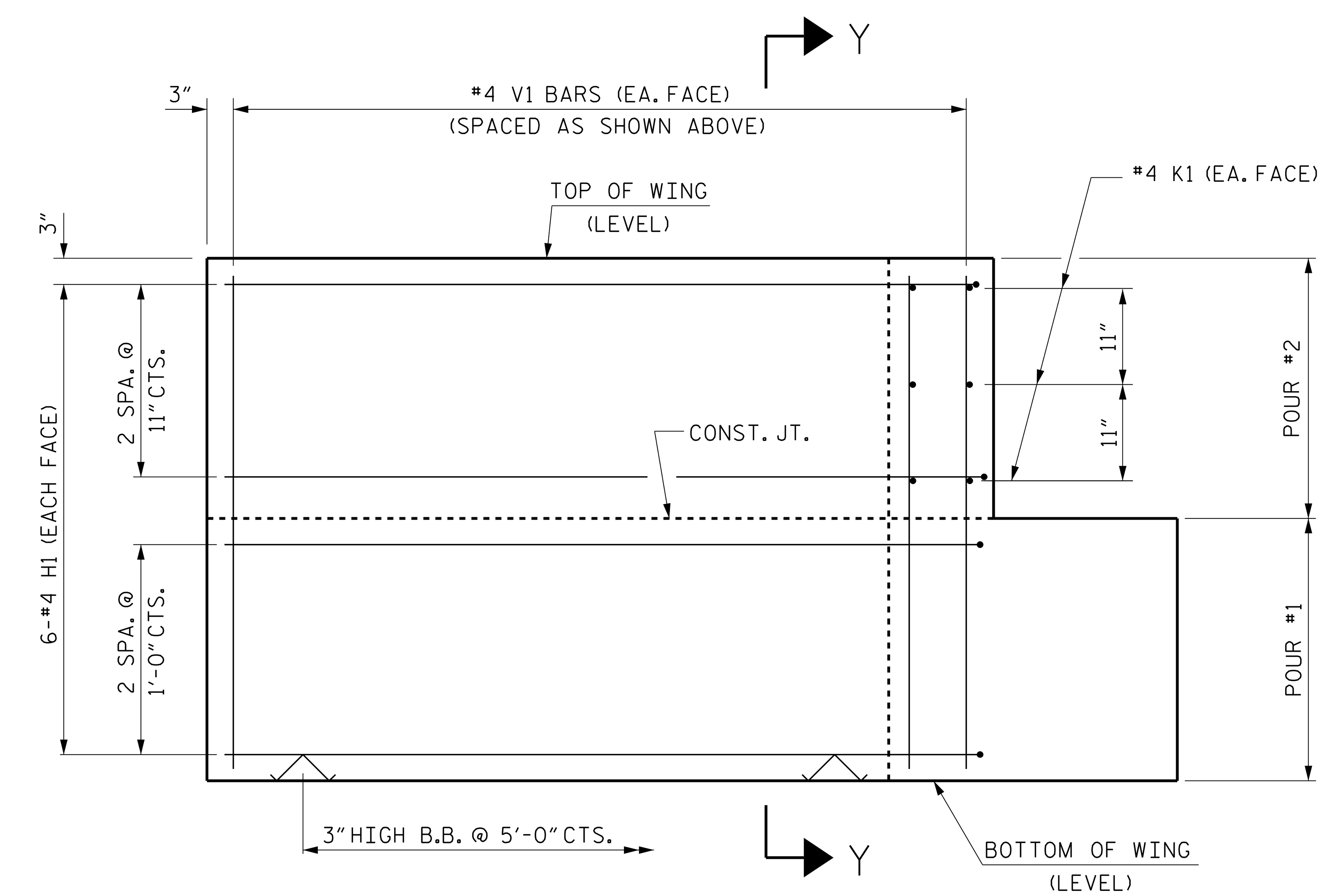
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			24

STD. NO. EB_33_90S

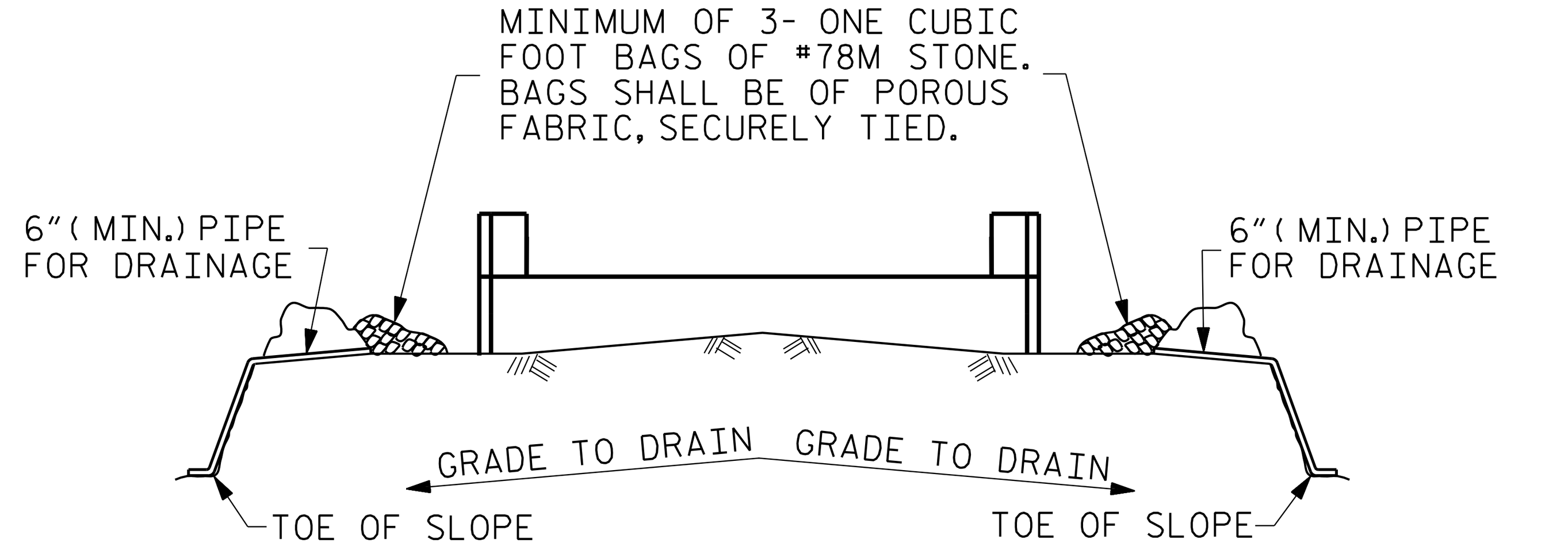
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

ASSEMBLED BY :	W. B. ALLEN	DATE :	6/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DRAWN BY : DGE 02/10	CHECKED BY : MKT 02/10	REV. 4/15	MAA/TMG

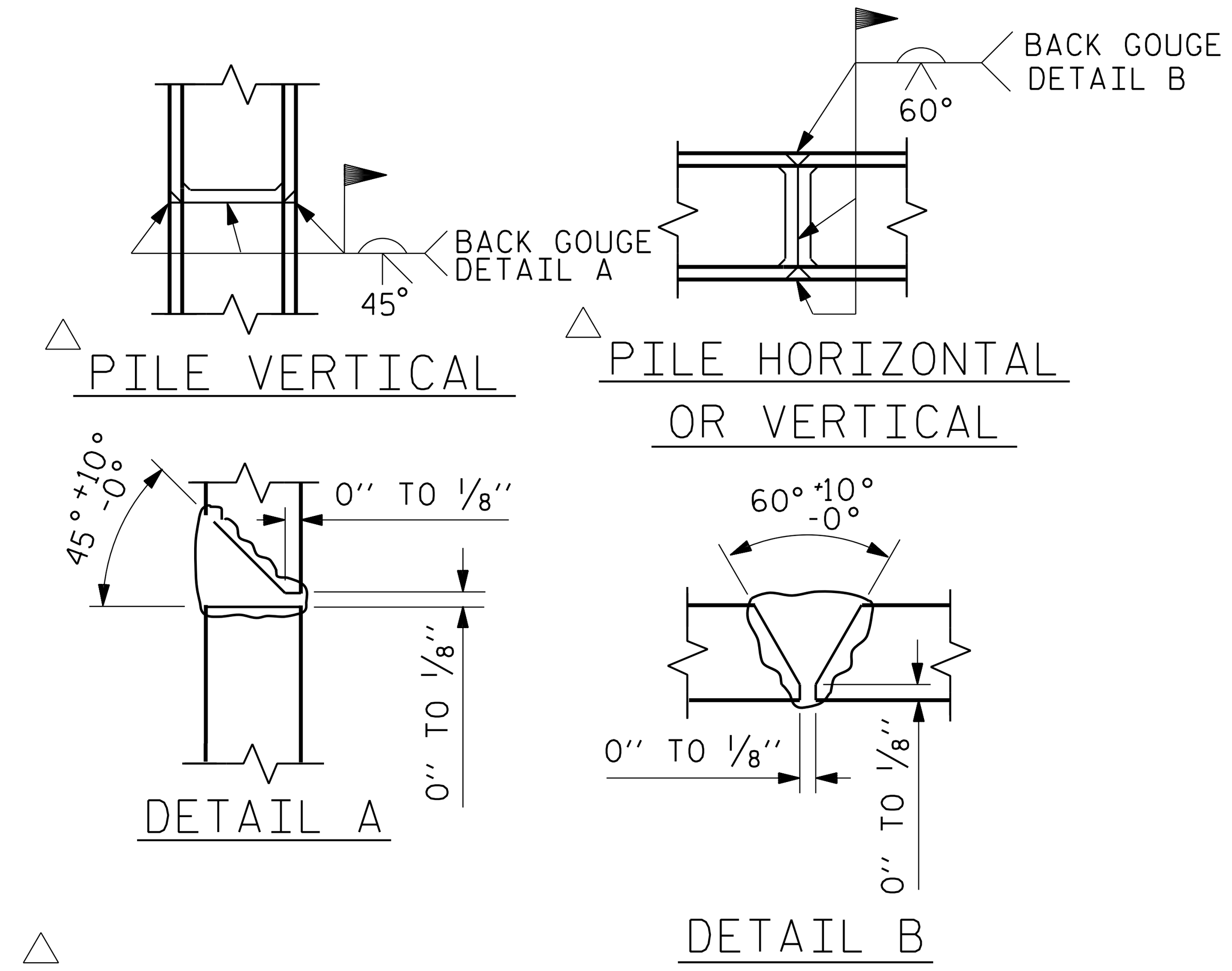


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

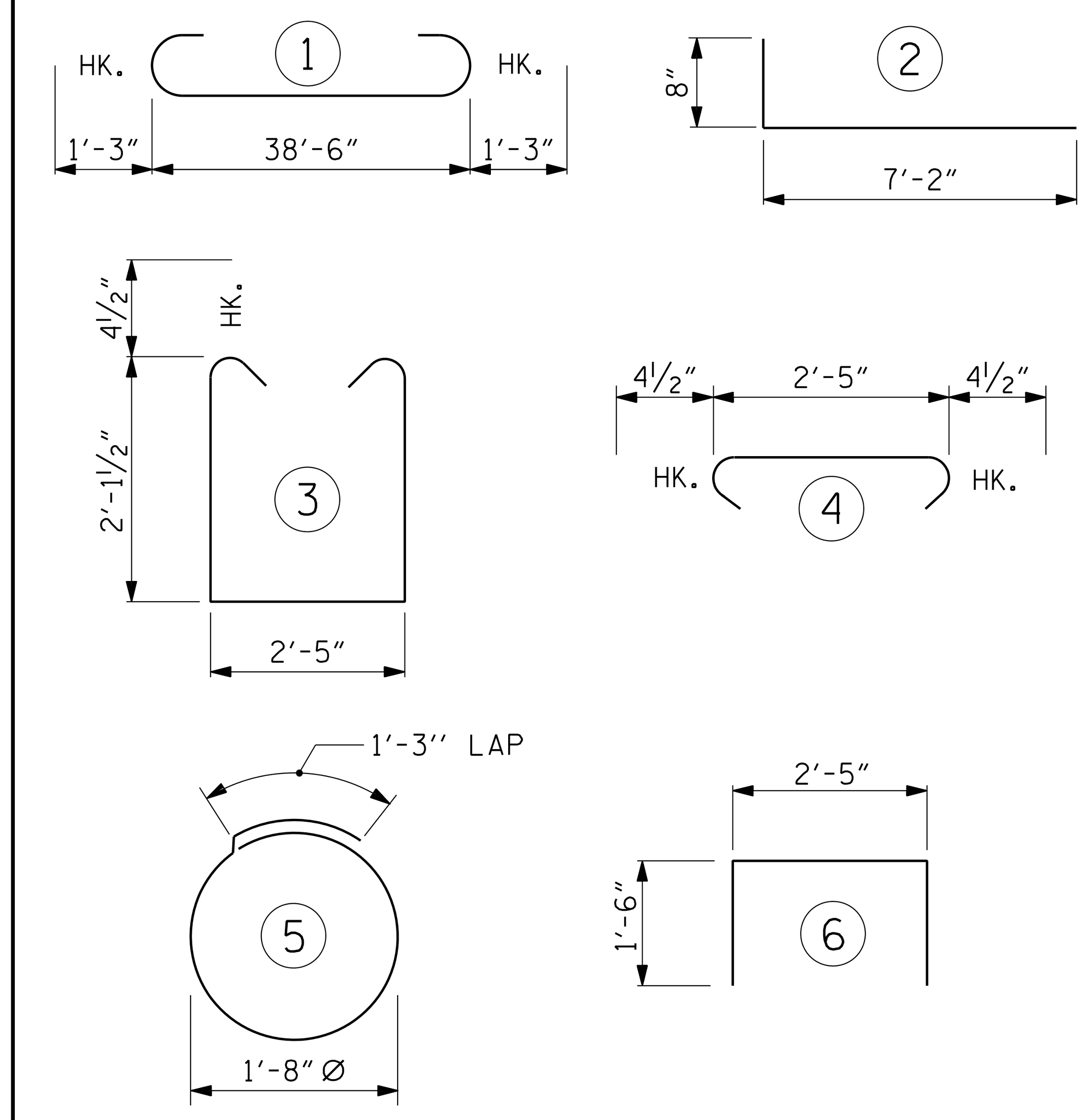
TEMPORARY DRAINAGE AT END BENT



POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 GALVANIZED STEEL PILES NO: 7 LIN. FT.= 595	HP 12 X 53 GALVANIZED STEEL PILES NO: 7 LIN. FT.= 525
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 GALVANIZED STEEL PILES NO: 7	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 GALVANIZED STEEL PILES NO: 7
PILE REDRIVES NO: 4	PILE REDRIVES NO: 4

BILL OF MATERIAL
FOR ONE END BENT

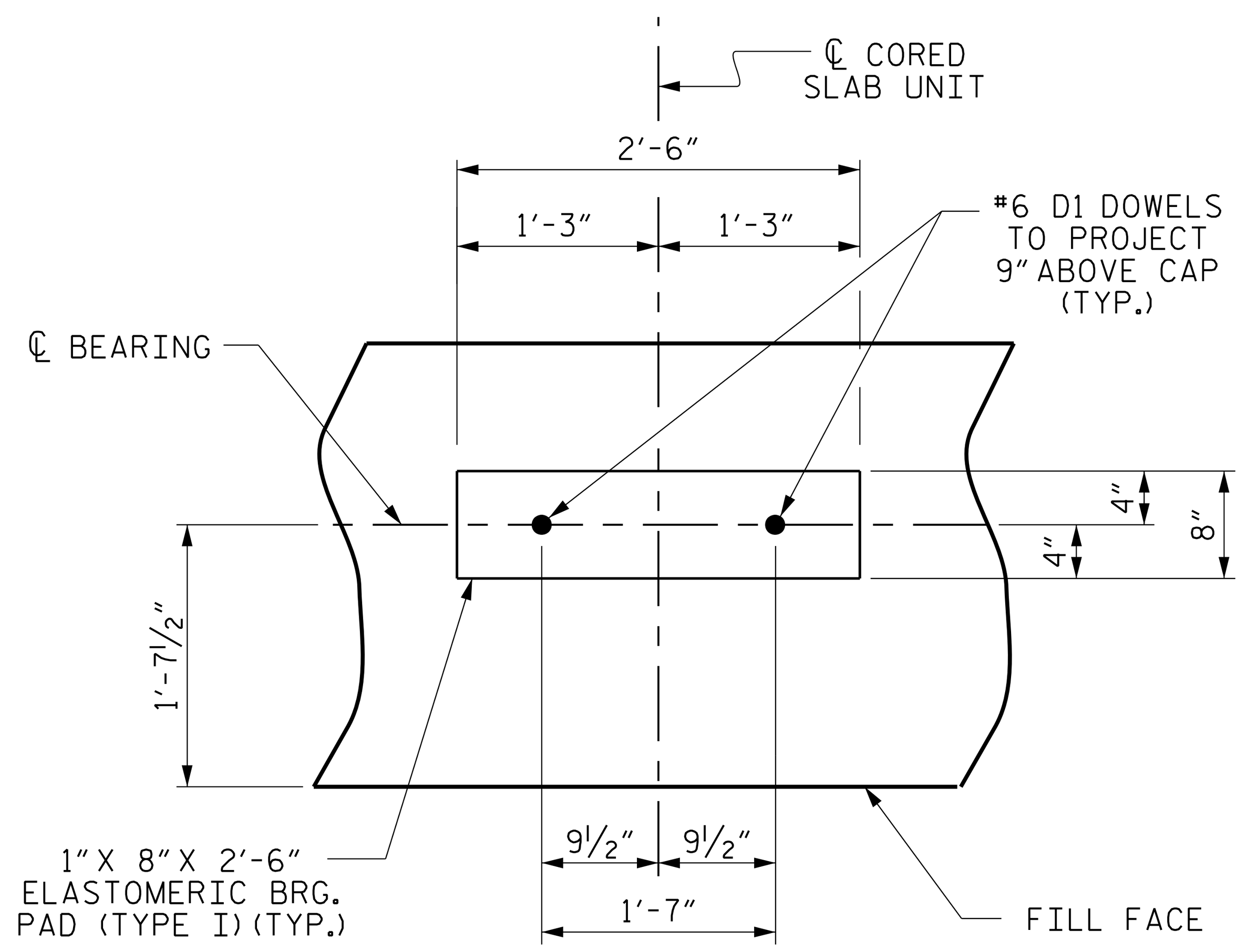
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	41'-0"	1115
B2	16	#4	STR	20'-7"	220
B3	10	#4	STR	2'-5"	16
B4	4	#4	STR	11'-2"	30
D1	22	#6	STR	1'-6"	50
H1	24	#4	2	7'-10"	126
K1	12	#4	STR	2'-11"	23
S1	50	#4	3	7'-5"	248
S2	50	#4	4	3'-2"	106
S3	14	#4	5	6'-6"	61
U1	8	#4	6	5'-5"	29
V1	48	#4	STR	4'-8"	150

REINFORCING STEEL (FOR ONE END BENT) 2174 LBS.

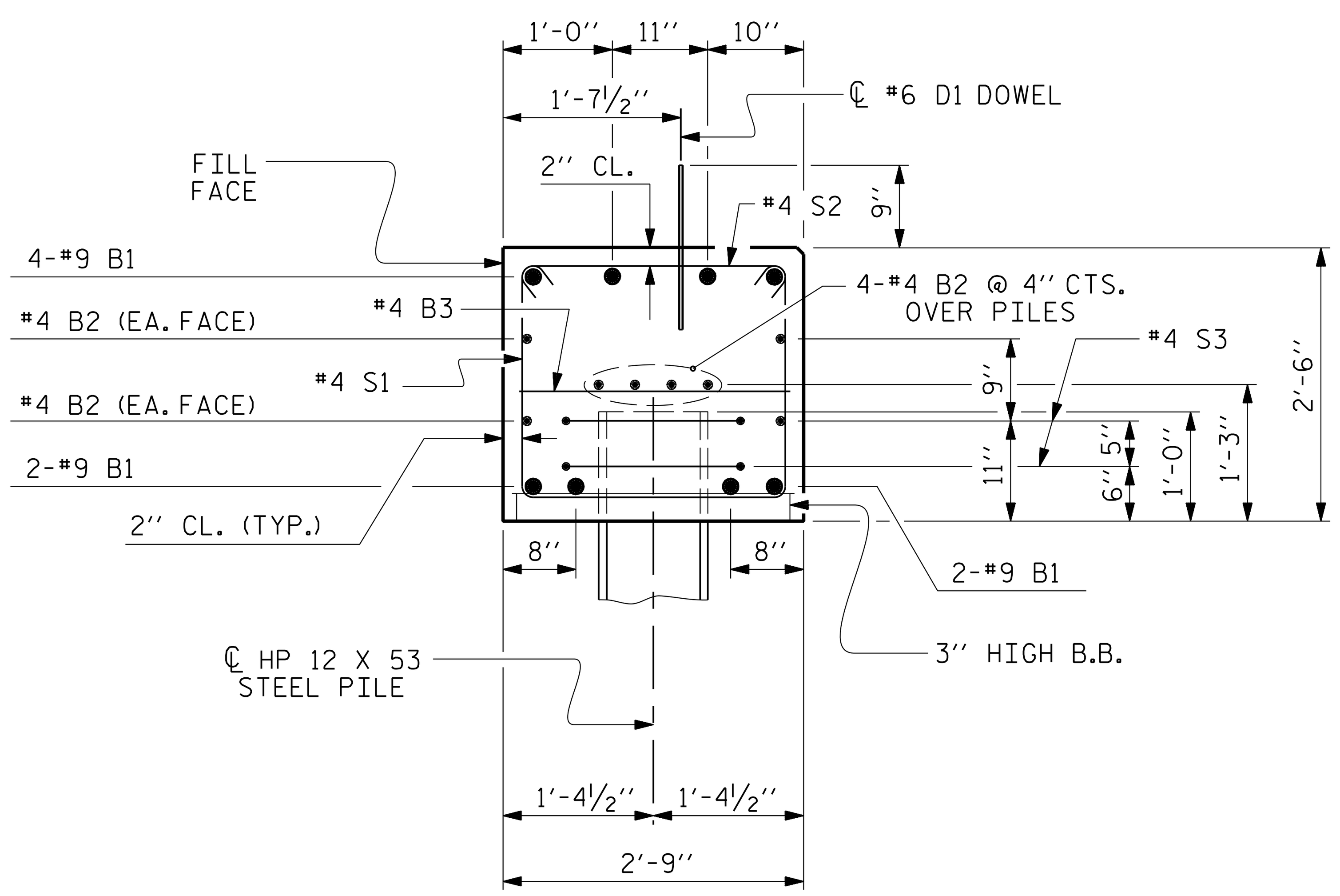
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1	CAP & LOWER PART OF WINGS	12.1 C.Y.
POUR #2	UPPER PART OF WINGS	1.8 C.Y.

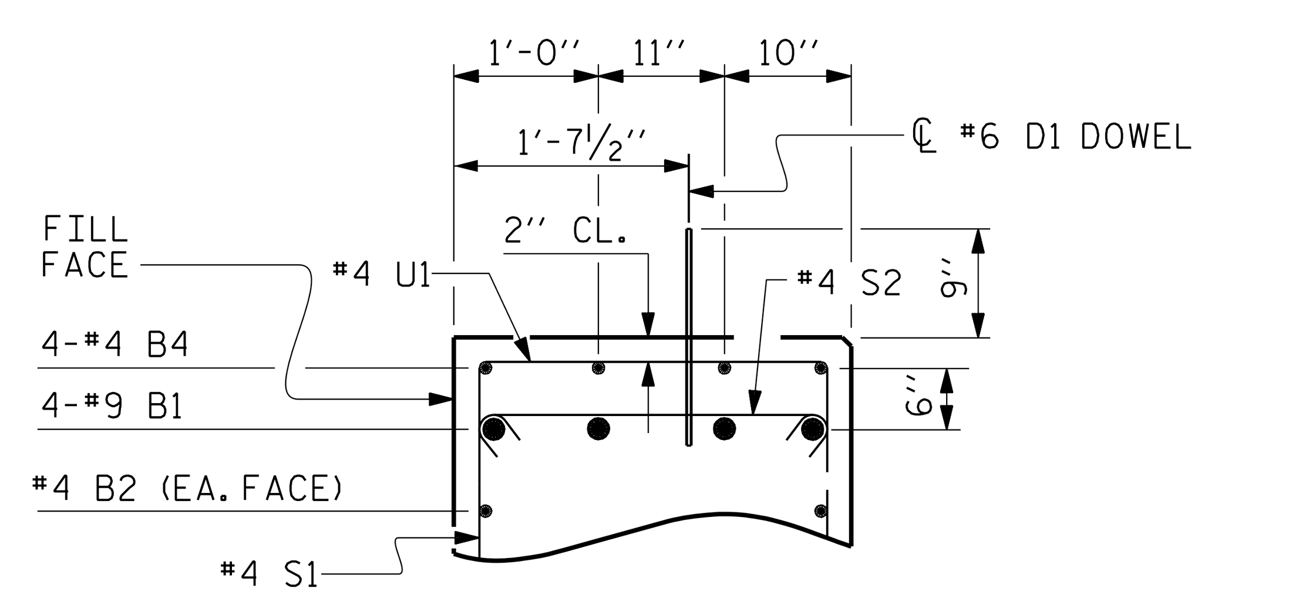
TOTAL CLASS A CONCRETE 13.9 C.Y.



DETAIL "A"
(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



SECTION A-A



PARTIAL SECTION B-B

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

DocuSigned by: L. Kevin Austin
NORTH CAROLINA PROFESSIONAL SEAL ENGINEER L. KEVIN AUSTIN
3/19/2018

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

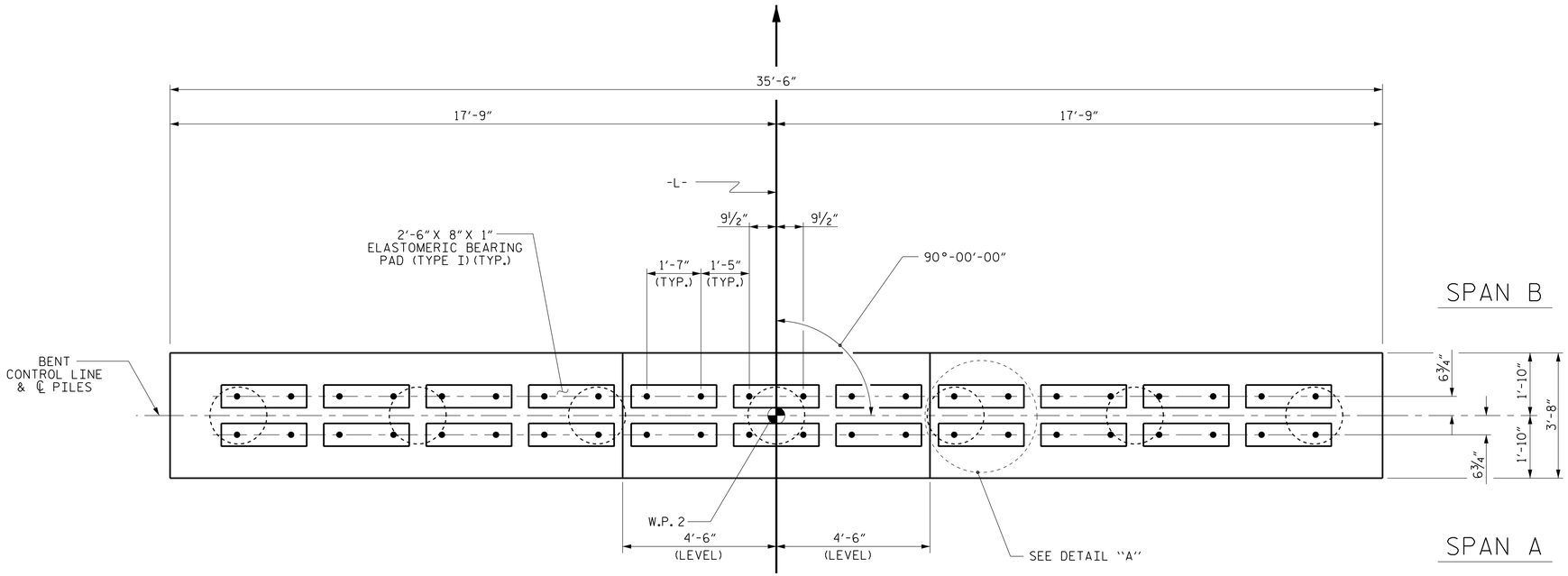
END BENT No. 1 & 2 DETAILS

REVISIONS						SHEET NO. S-15
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS 24
1			3			
2			4			

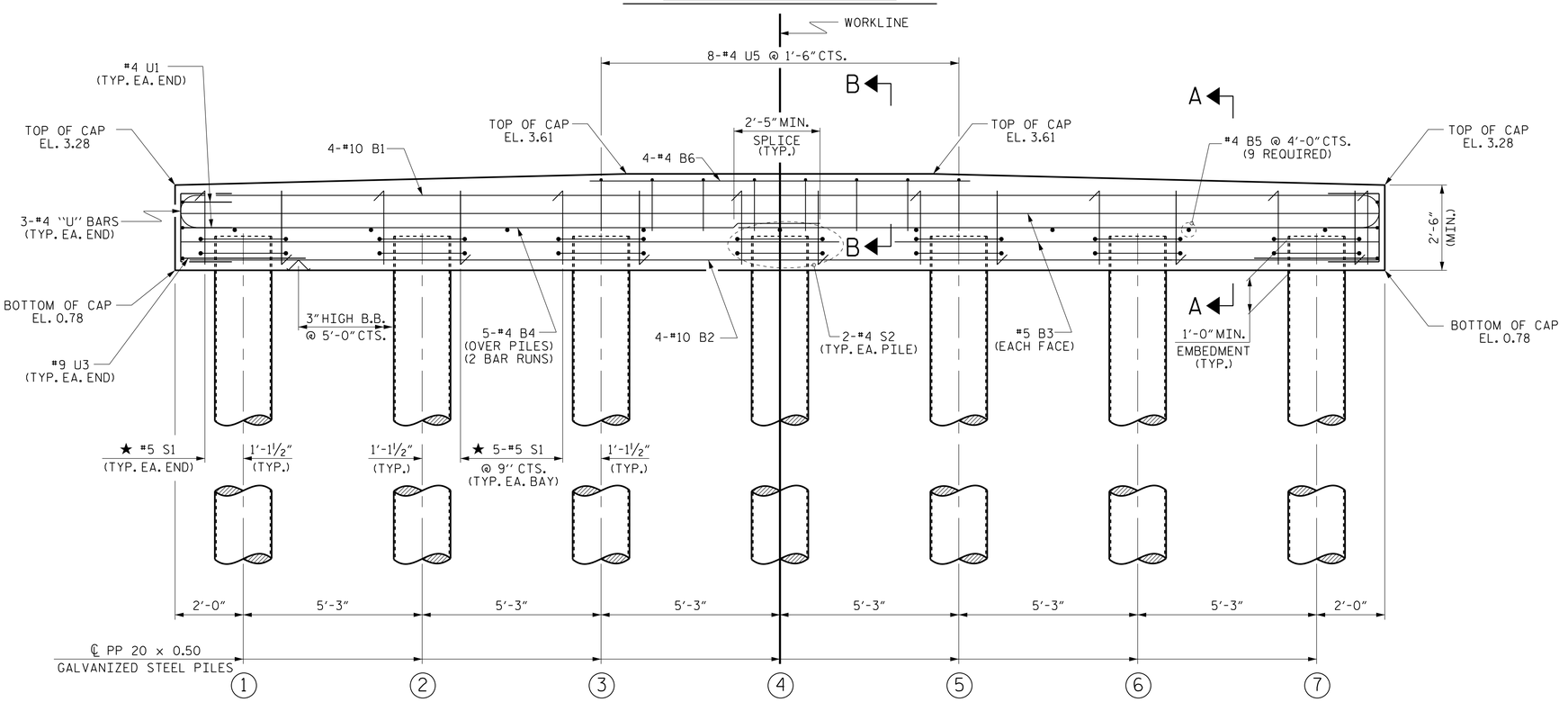
ASSEMBLED BY : W. B. ALLEN	DATE : 6/17		
CHECKED BY : Z. H. BROWN	DATE : 8/17		
DRAWN BY : DGE 12/09	REV. 4/17	MAA/THC	
CHECKED BY : MKT 01/10			

11/27/2017 8:36:21 AM R:\Structures\B5604_SMU_E4_TI009.dgn

STD. NO. EB_33_90S



PLAN



ELEVATION

FOR SECTION A-A & SECTION B-B, SEE SHEET 4 OF 5

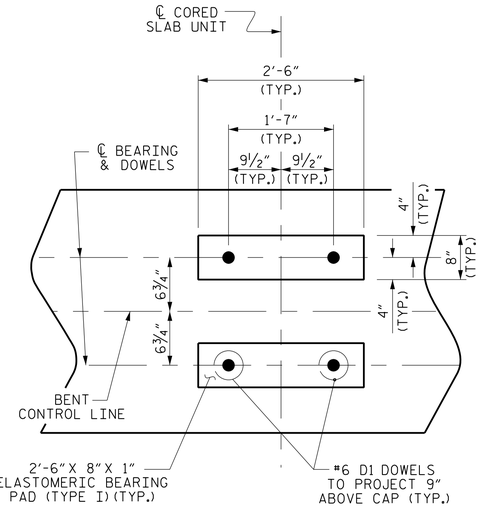
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

★ INVERT ALTERNATE STIRRUPS.

FOR ADDITIONAL REINFORCING STEEL IN PP 20 x 0.50 GALVANIZED STEEL PILES, SEE SHEET 5 OF 5.

GALVANIZE THE FULL LENGTH EACH INTERIOR BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			24

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036611 KEVIN AUSTIN
Docusigned by: L. Kevin Austin 73B7B3720EA4BB...
3/19/2018

PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DRAWN BY : W. B. ALLEN DATE : 8/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 10/17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

11/27/2017 8:36:25 AM R:\Structures\B5604_SMU_BL1100ft.dgn

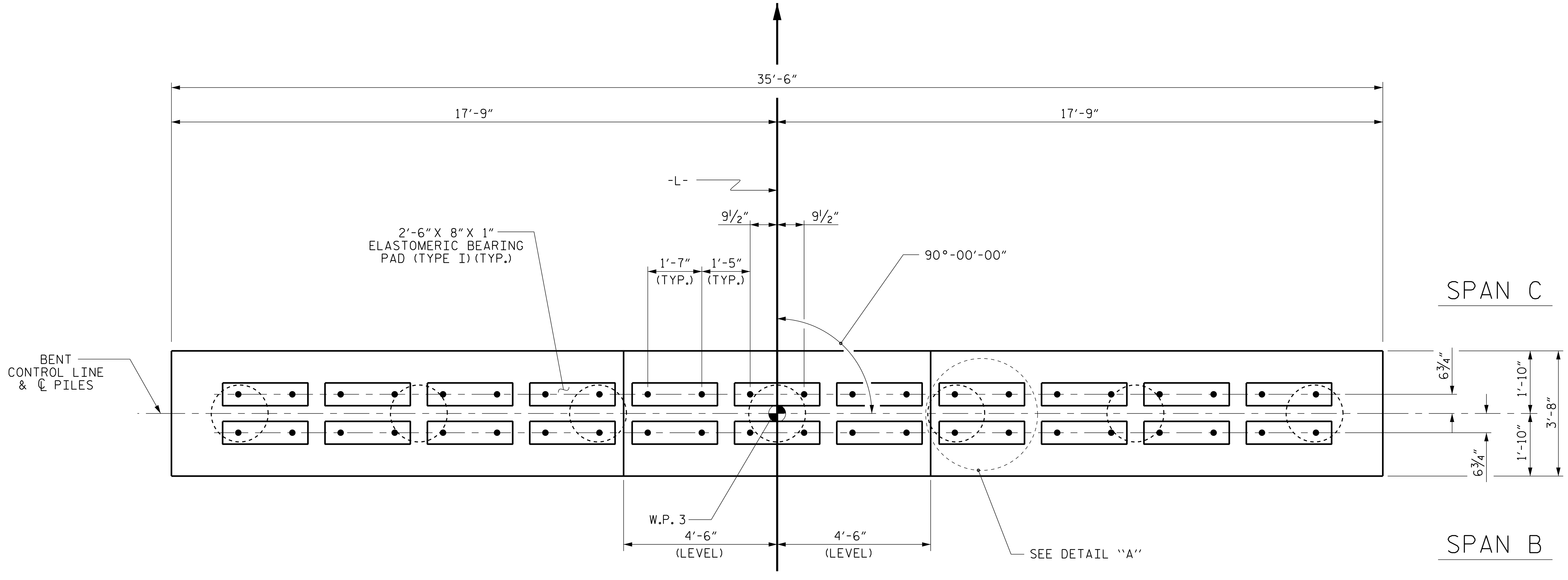
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

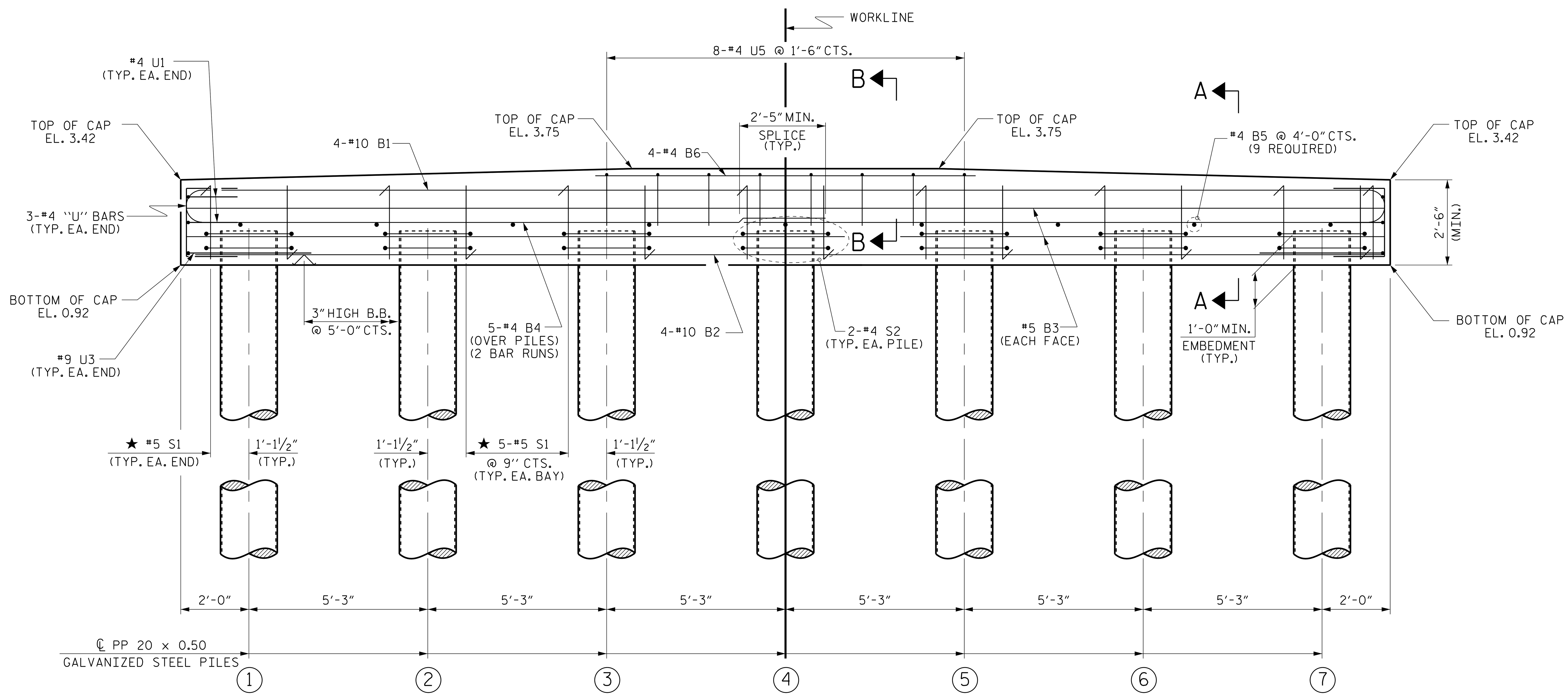
★ INVERT ALTERNATE STIRRUPS.

FOR ADDITIONAL REINFORCING STEEL IN PP 20 x 0.50 GALVANIZED STEEL PILES, SEE SHEET 5 OF 5.

GALVANIZE THE FULL LENGTH EACH INTERIOR BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

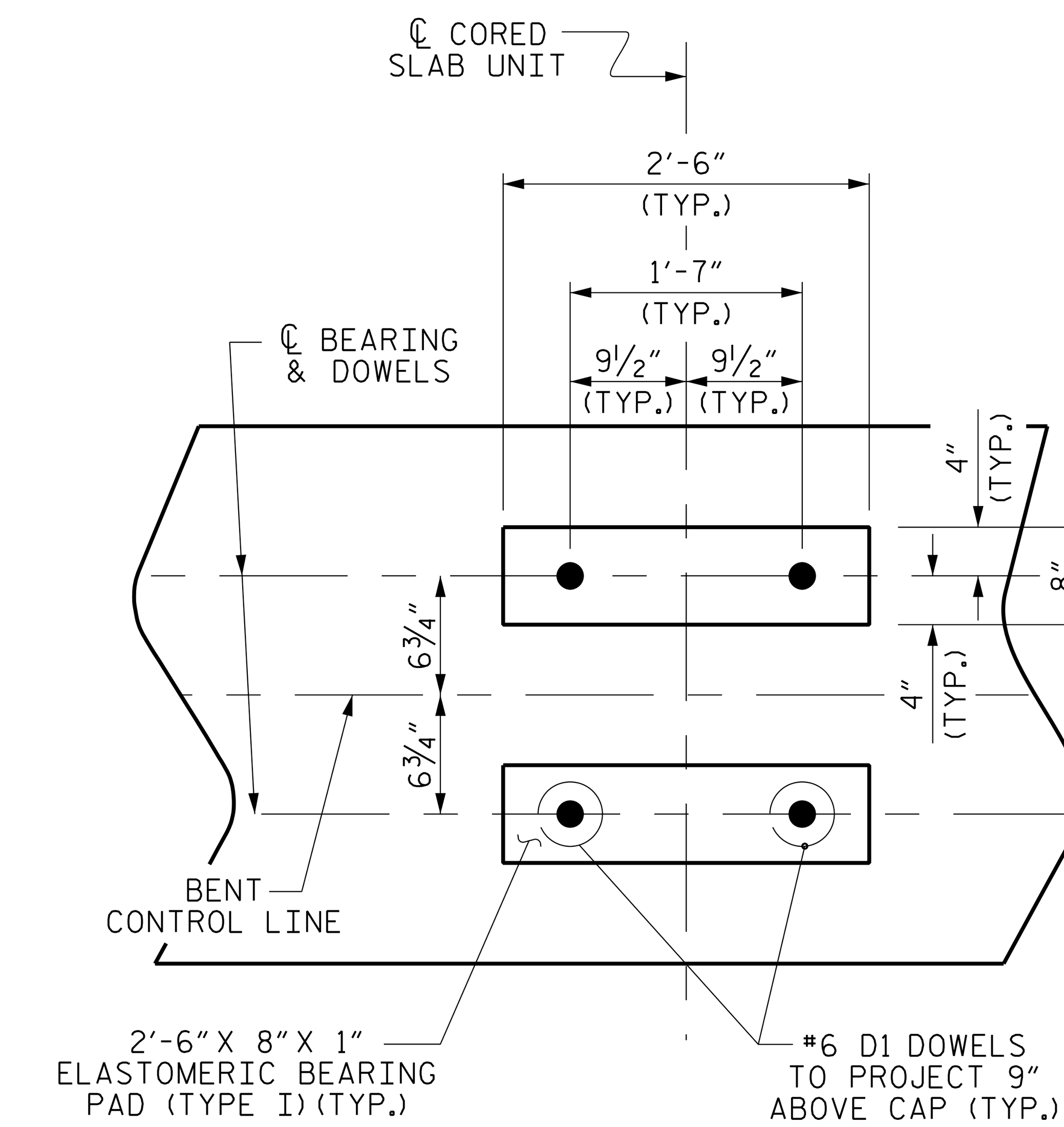


PLAN



ELEVATION

FOR SECTION A-A & SECTION B-B, SEE SHEET 4 OF 5



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 2

30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			24

DocuSigned by: L. Kevin Austin
NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN 19566
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	W. B. ALLEN	DATE :	8/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	10/17

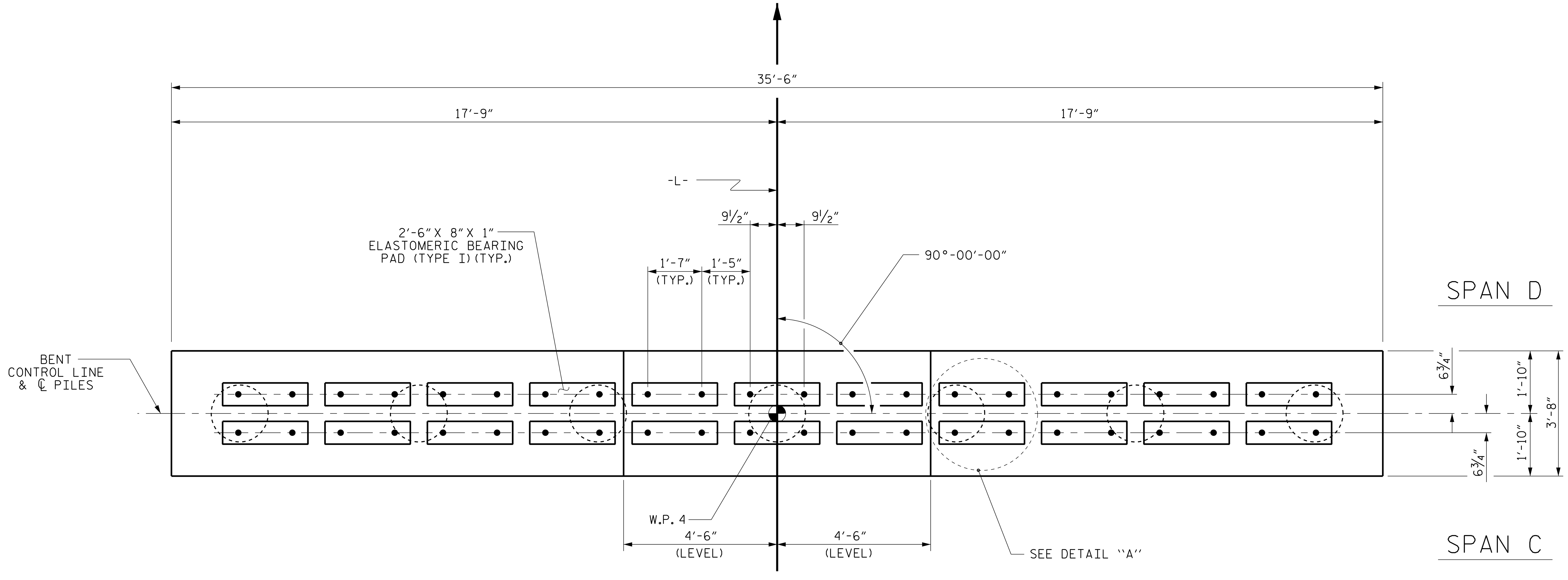
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

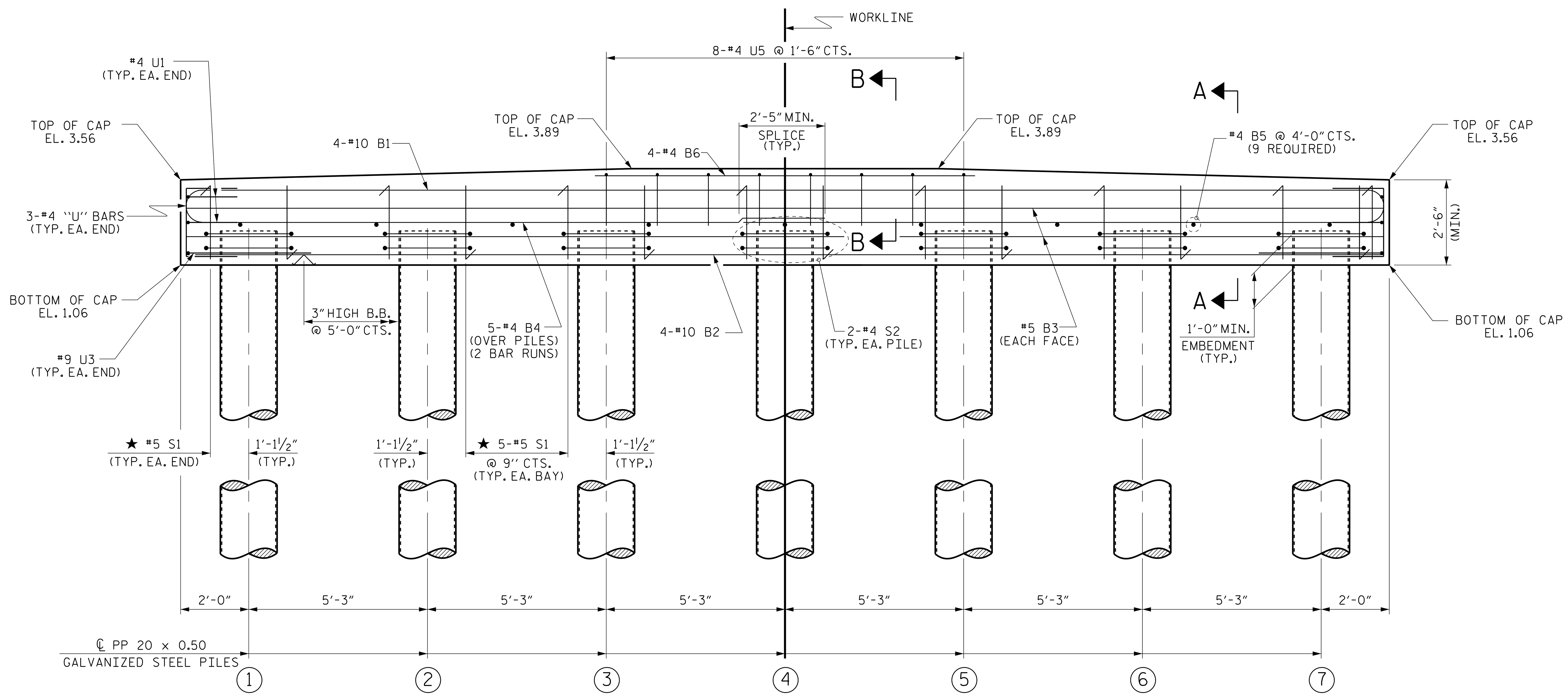
★ INVERT ALTERNATE STIRRUPS.

FOR ADDITIONAL REINFORCING STEEL IN PP 20 x 0.50 GALVANIZED STEEL PILES, SEE SHEET 5 OF 5.

GALVANIZE THE FULL LENGTH EACH INTERIOR BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

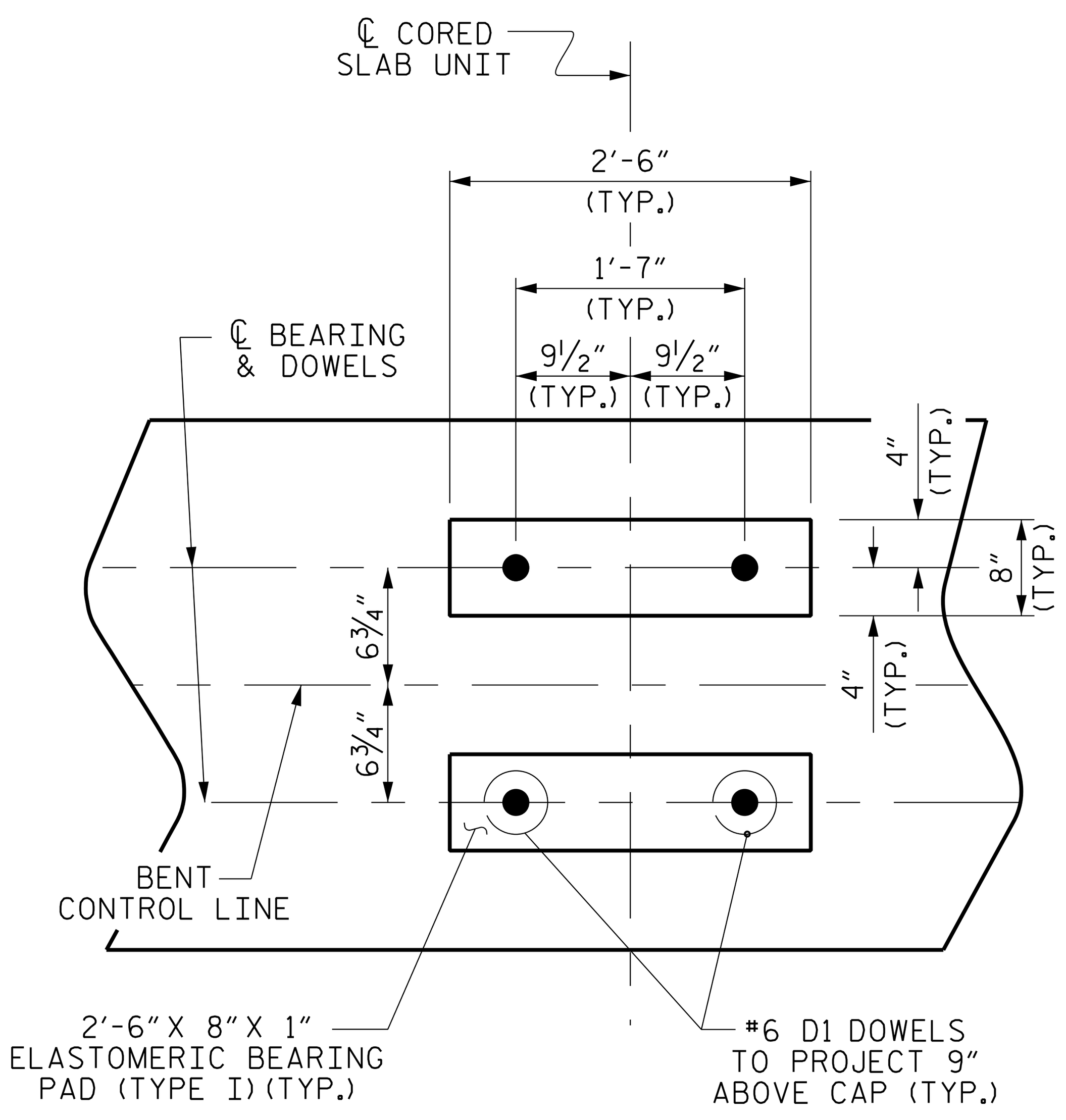


PLAN



ELEVATION

FOR SECTION A-A & SECTION B-B, SEE SHEET 4 OF 5



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 3

30'-10" CLEAR ROADWAY - 90° SKEW

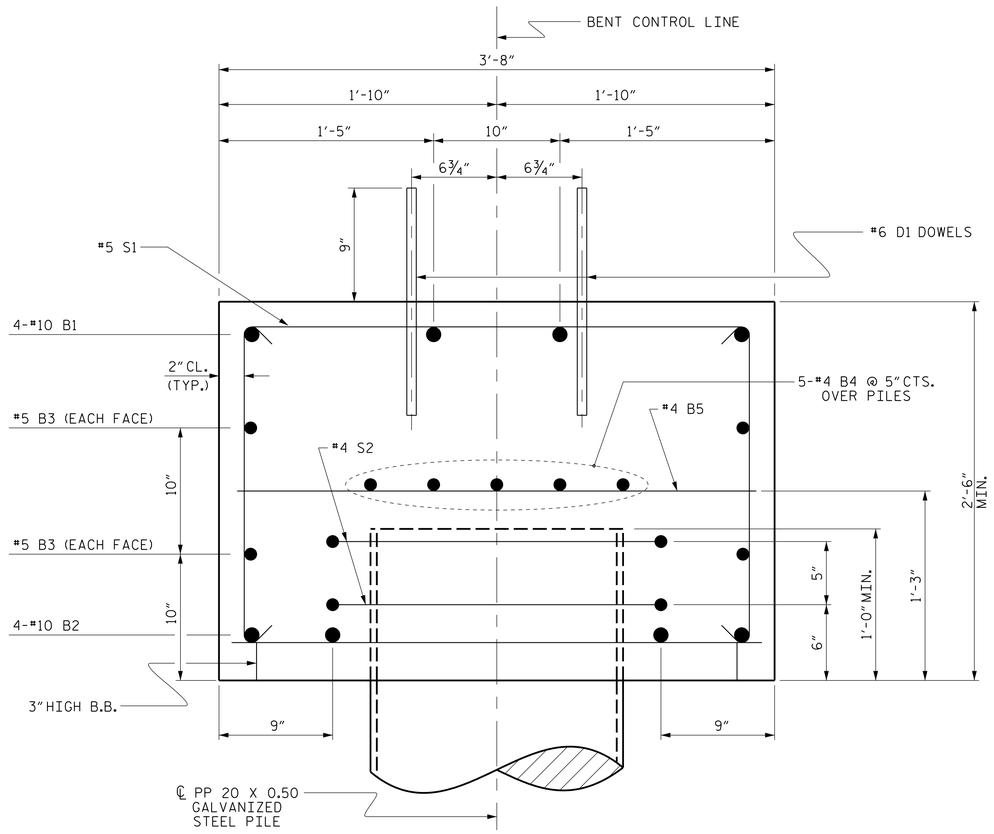
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			24

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19661 L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

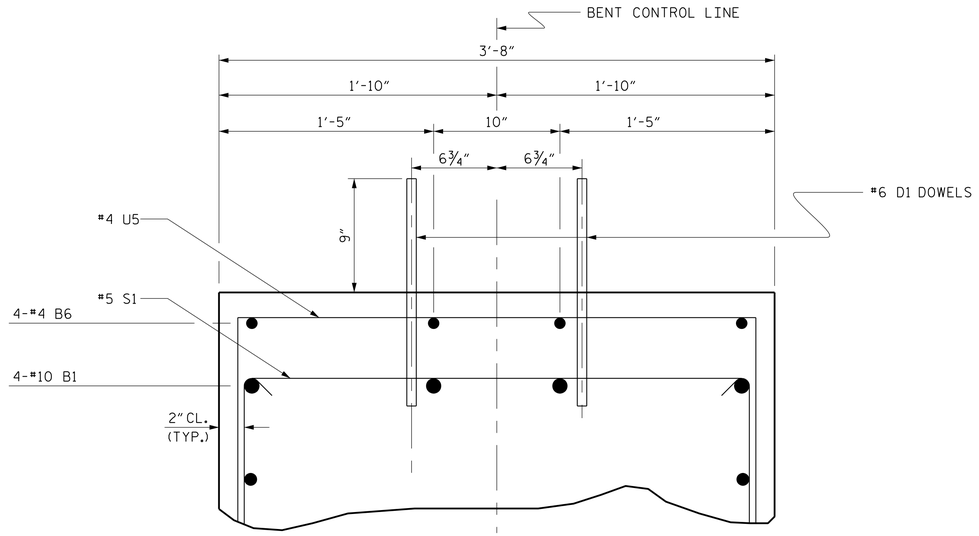
PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	W. B. ALLEN	DATE :	8/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	10/17

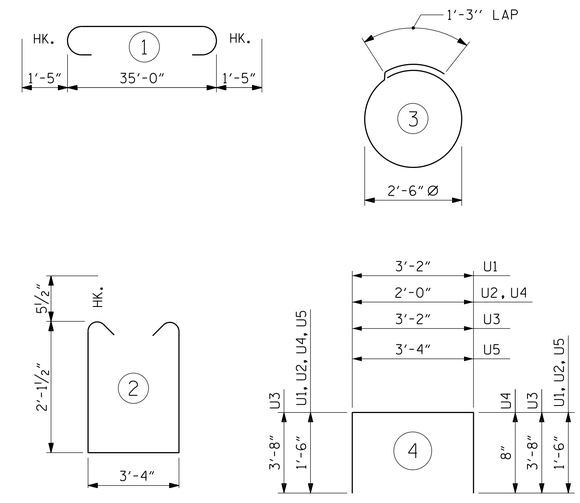


SECTION A-A

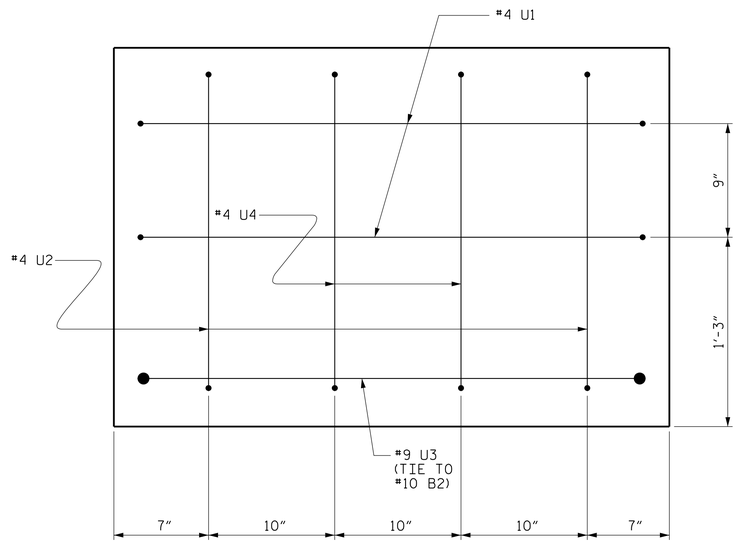


PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	1	37'-10"	651
B2	4	#10	STR	35'-2"	605
B3	4	#5	STR	35'-2"	147
B4	10	#4	STR	18'-10"	126
B5	9	#4	STR	3'-4"	20
B6	4	#4	STR	11'-2"	30
D1	44	#6	STR	1'-6"	99
S1	32	#5	2	8'-6"	284
S2	14	#4	3	9'-2"	86
U1	4	#4	4	6'-2"	16
U2	4	#4	4	5'-0"	13
U3	2	#9	4	10'-6"	71
U4	4	#4	4	4'-2"	11
U5	8	#4	4	6'-4"	34

REINFORCING STEEL (FOR ONE BENT) 2193 LBS

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

TOTAL CLASS A CONCRETE ▲ 12.5 C.Y.

PP 20 x 0.50 GALVANIZED STEEL PILES (FOR BENT NO. 1)
No. 7 LIN. FT. 805

PP 20 x 0.50 GALVANIZED STEEL PILES (FOR BENT NO. 2)
No. 7 LIN. FT. 770

PP 20 x 0.50 GALVANIZED STEEL PILES (FOR BENT NO. 3)
No. 7 LIN. FT. 700

PILE DRIVING EQUIPMENT SETUP FOR PP 20 x 0.50 GALVANIZED STEEL PILES (FOR ONE BENT) NO. 7

PILE REDRIVES NO. 4

▲ CONCRETE DISPLACED BY THE PP 20 x 0.50 GALVANIZED STEEL PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1, 2 & 3

30'-10" CLEAR ROADWAY - 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			24

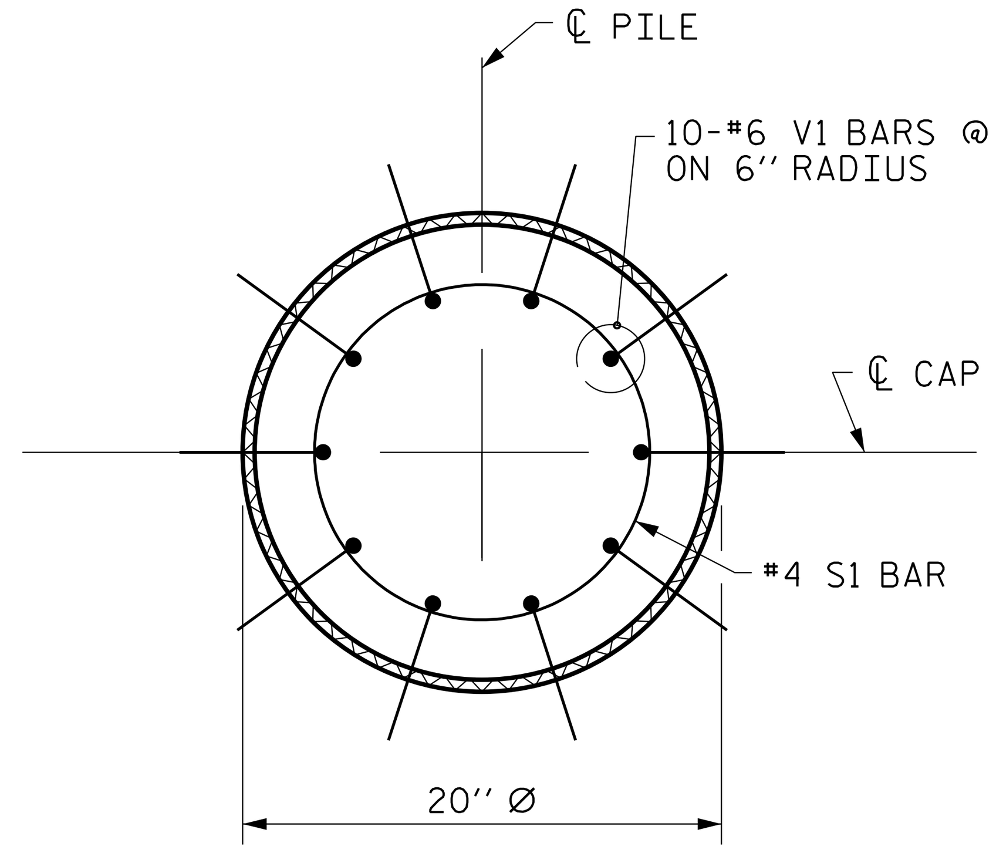
DRAWN BY : W. B. ALLEN DATE : 8/17
CHECKED BY : Z. H. BROWN DATE : 8/17
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 10/17

NORTH CAROLINA PROFESSIONAL SEAL 037202 ENGINEER KEVIN AUSTIN
Docusigned by: L. Kevin Austin
3/19/2018

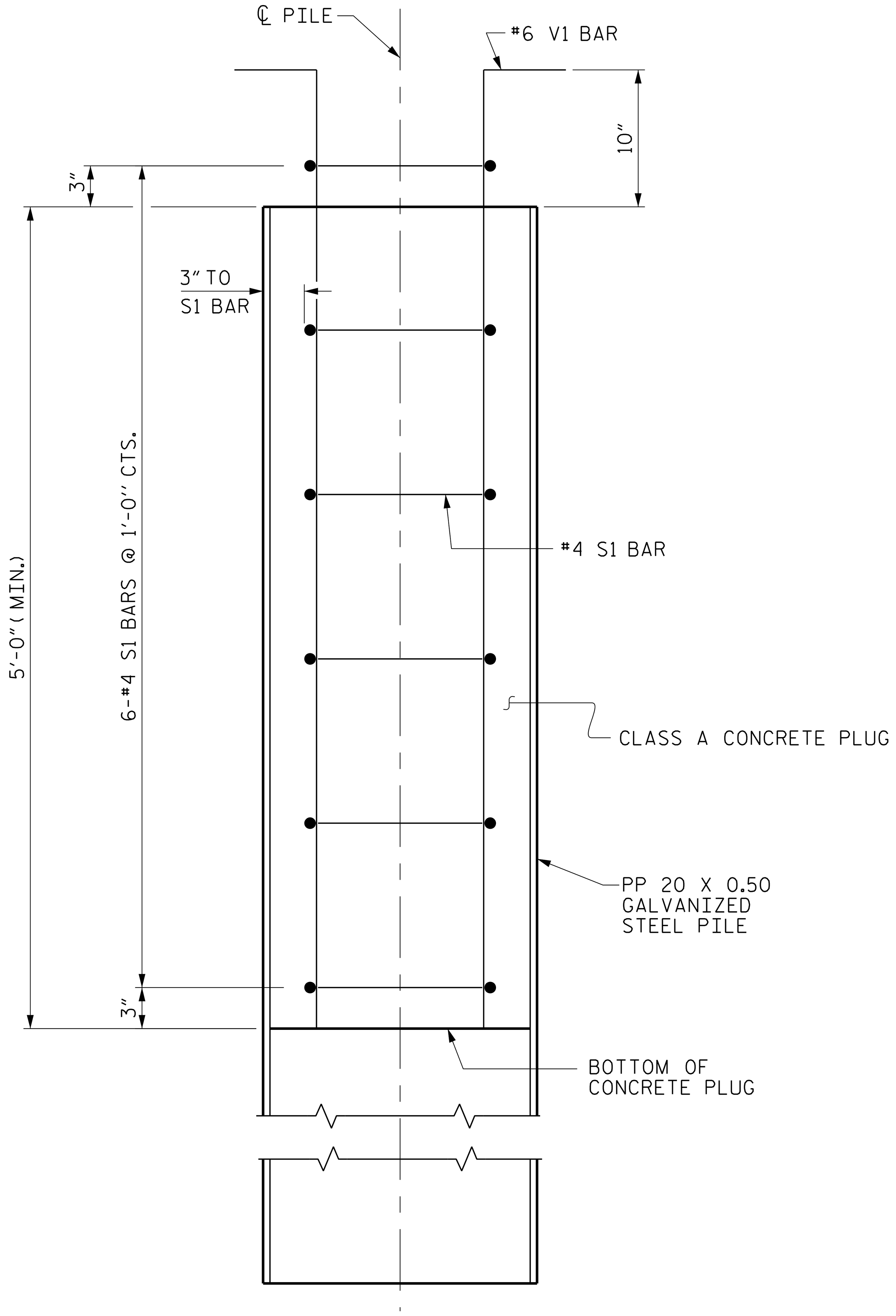
PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



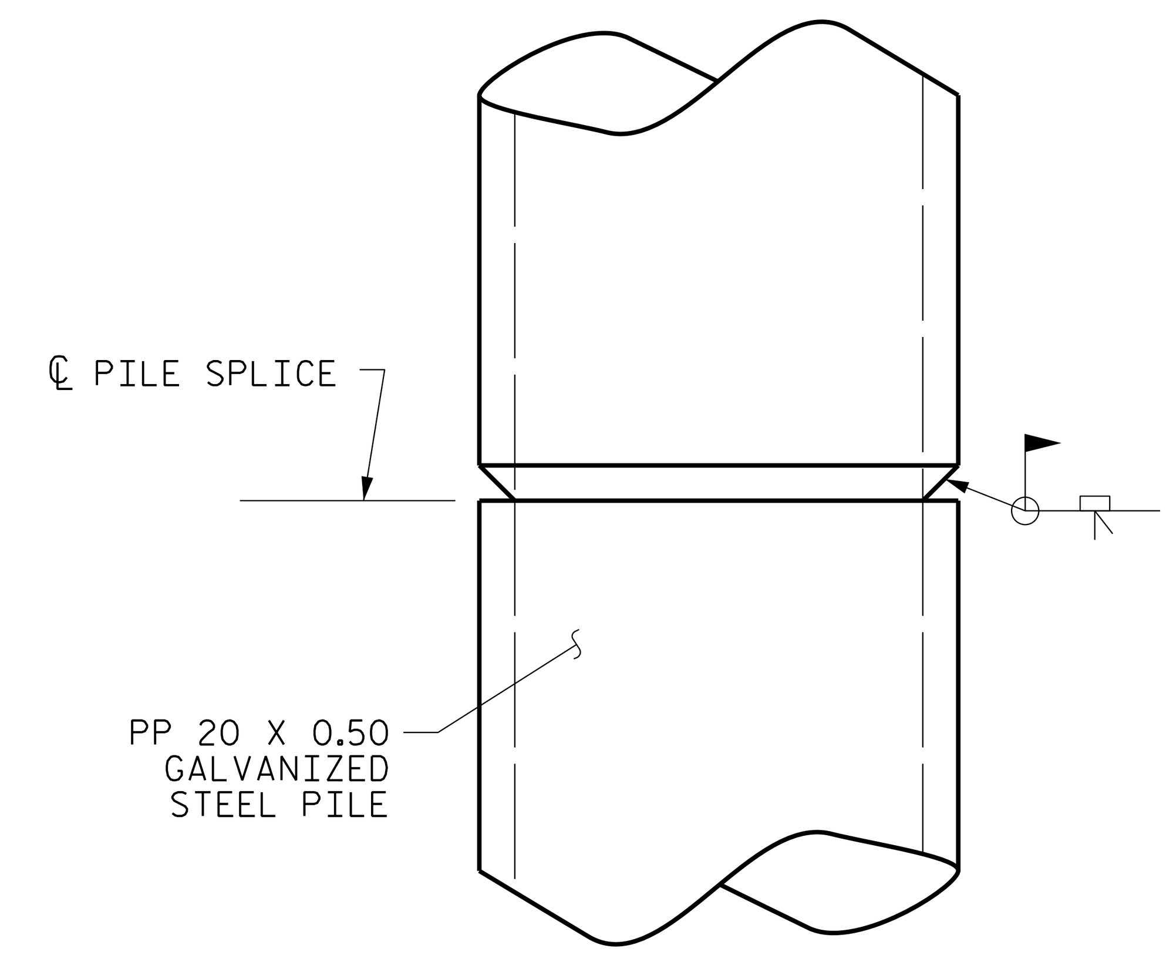
PLAN



ELEVATION

PP 20 X 0.50 GALVANIZED STEEL PILE

(OPEN END)



PIPE PILE SPLICE DETAIL

NOTES

PIPE PILES SHALL BE IN ACCORDANCE WITH SECTION 1084 OF THE STANDARD SPECIFICATIONS.

GALVANIZE STEEL PIPE PILES IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS UNLESS METALLIZING IS REQUIRED.

REMOVE AND REPLACE OR REPAIR TO THE SATISFACTION OF THE ENGINEER PILES THAT ARE DAMAGED, DEFORMED OR COLLAPSED DURING INSTALLATION OR DRIVING.

PILE SPLICES SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.

FOR OPEN END PIPE PILES, REMOVE ENOUGH SOIL AND WATER FROM INSIDE THE PILES TO CONSTRUCT THE CONCRETE PLUG WITHOUT FOULING THE CONCRETE.

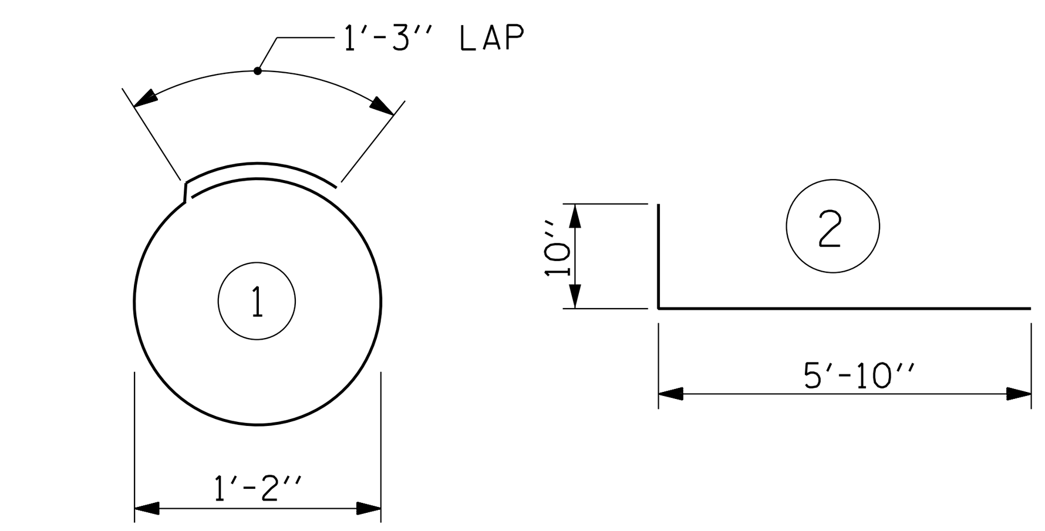
FORM THE CONCRETE PLUG SUCH THAT THE REINFORCING STEEL OR CONCRETE DOES NOT MOVE AND THE CLEARANCE FROM THE REINFORCING STEEL TO THE INSIDE OF THE PILE IS MAINTAINED AFTER CONCRETE PLACEMENT. DO NOT PLACE CONCRETE IN THE BENT CAP UNTIL THE CONCRETE PLUG HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

THE REINFORCING STEEL, CLASS A CONCRETE, AND GALVANIZING ARE CONSIDERED INCIDENTAL TO THE CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR PP 20 X 0.50 GALVANIZED STEEL PILES.

BILL OF MATERIAL FOR ONE PP 20 X 0.50 GALVANIZED STEEL PILE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	6	#4	1	4'-5''	18
V1	10	#6	2	6'-8''	100
REINFORCING STEEL =				118	lbs
CLASS A CONCRETE					
5'-0'' MINIMUM PLUG					0.4 CY

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

20'' STEEL PIPE PILE

30'-10'' CLEAR ROADWAY - 90° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19656 L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

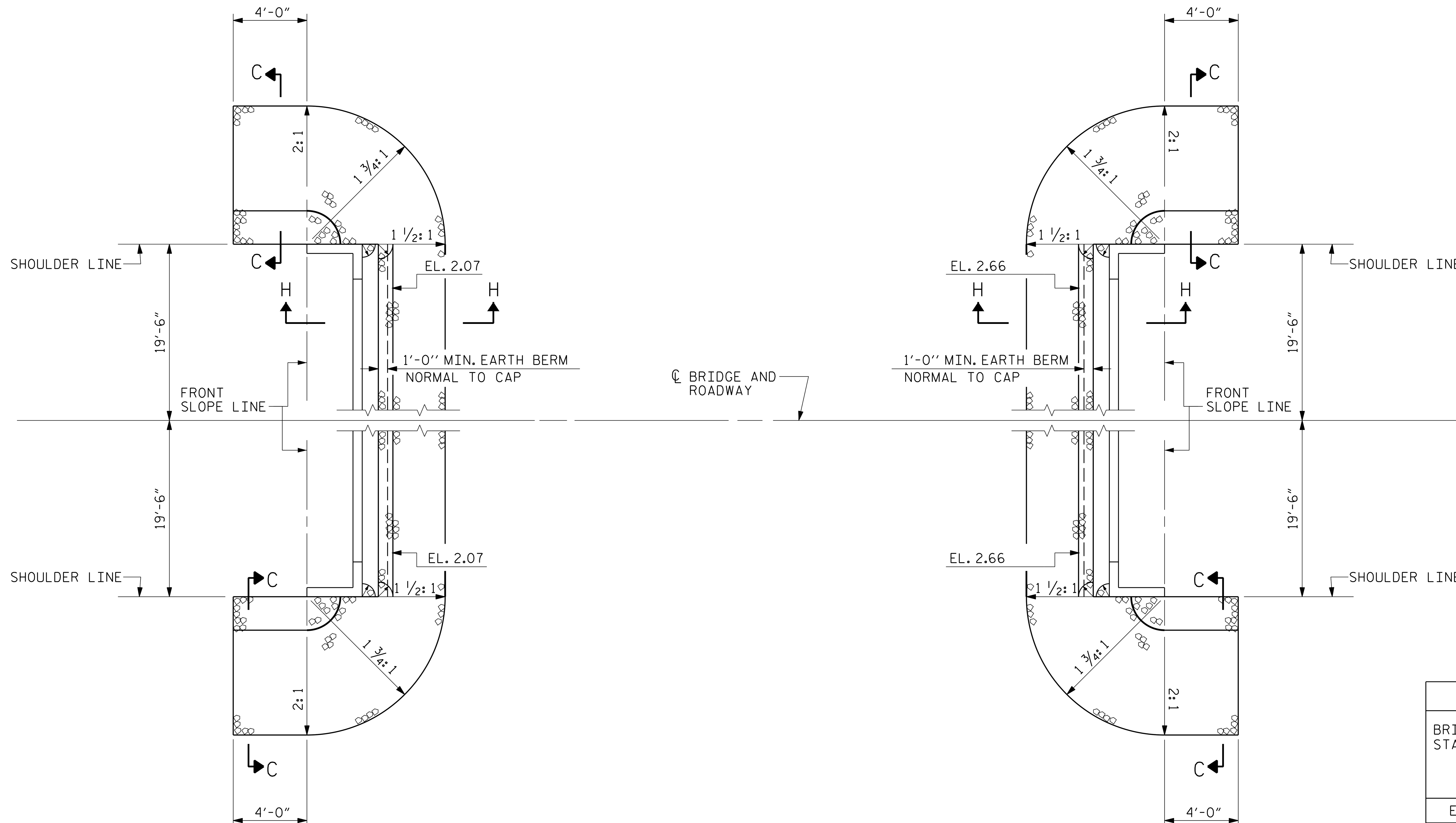
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			24

DRAWN BY :	W. B. ALLEN	DATE :	8/17
CHECKED BY :	Z. H. BROWN	DATE :	8/17
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	10/17

11/27/2017 8:36:29 AM R:\Structures\B5604_SMU_B5_7009.dgn

NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

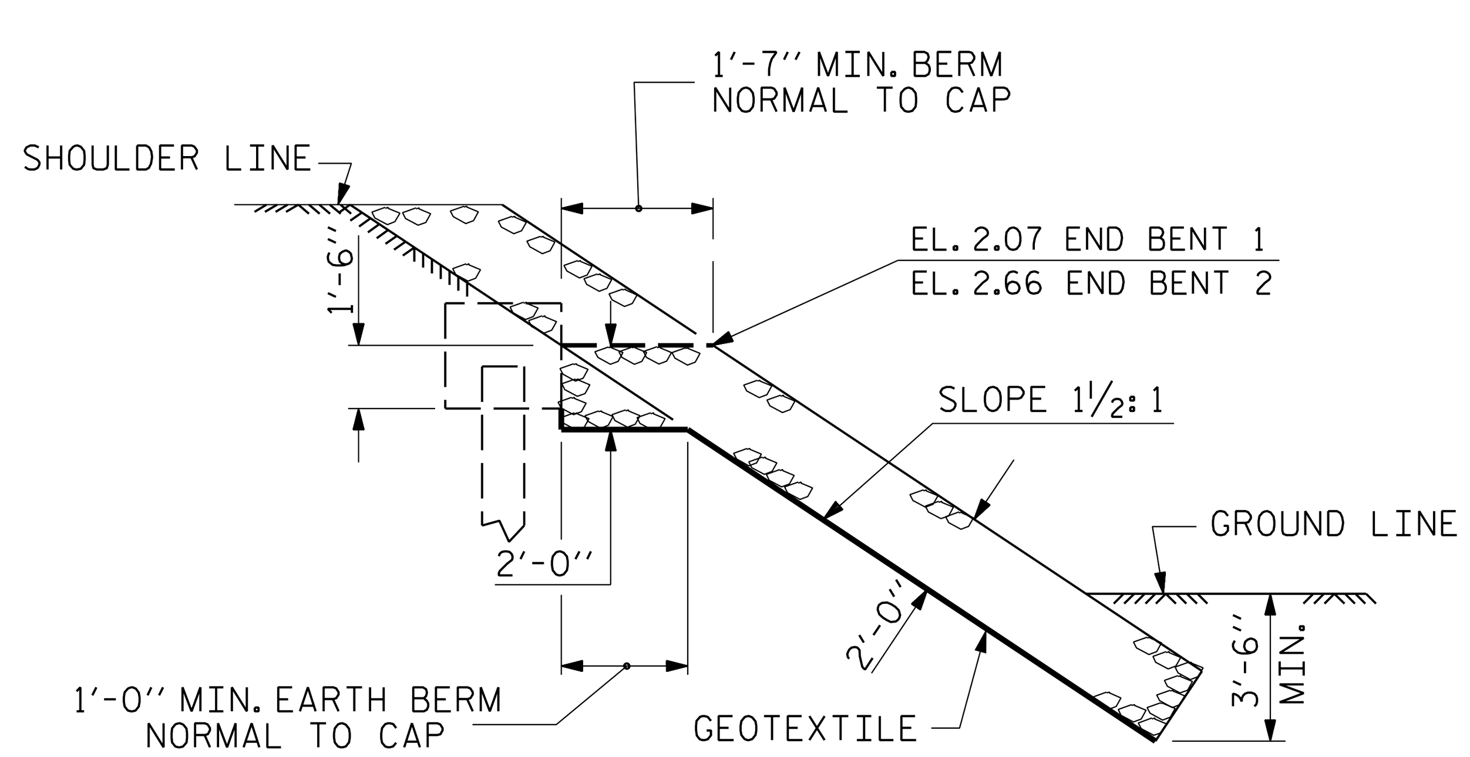


END BENT 1

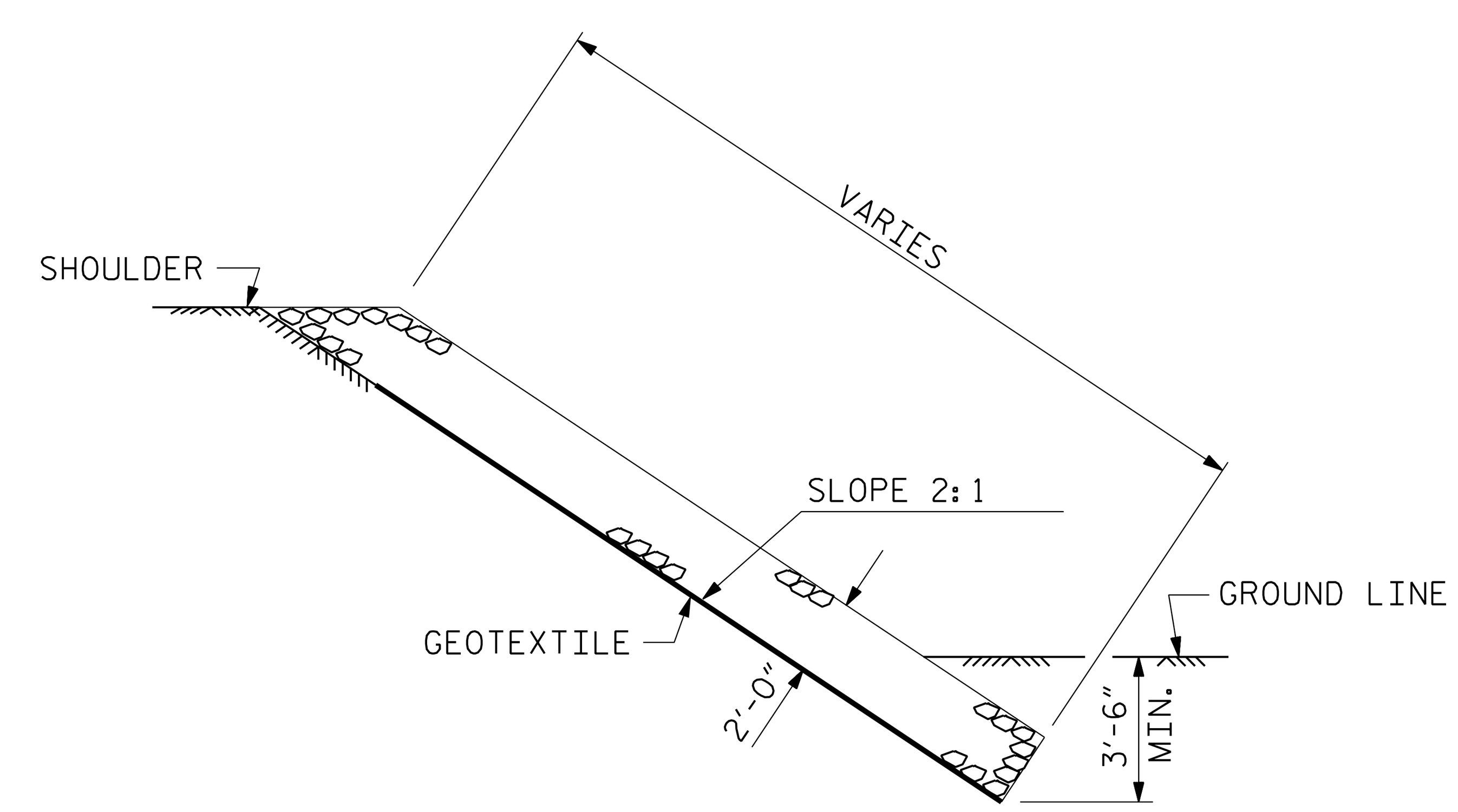
END BENT 2

SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

ESTIMATED QUANTITIES		
BRIDGE @ STA. 14+42.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	102	113
END BENT 2	82	92



SECTION H-H



SECTION C-C

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER L. KEVIN AUSTIN

DocuSigned by: L. Kevin Austin

3/19/2018

PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

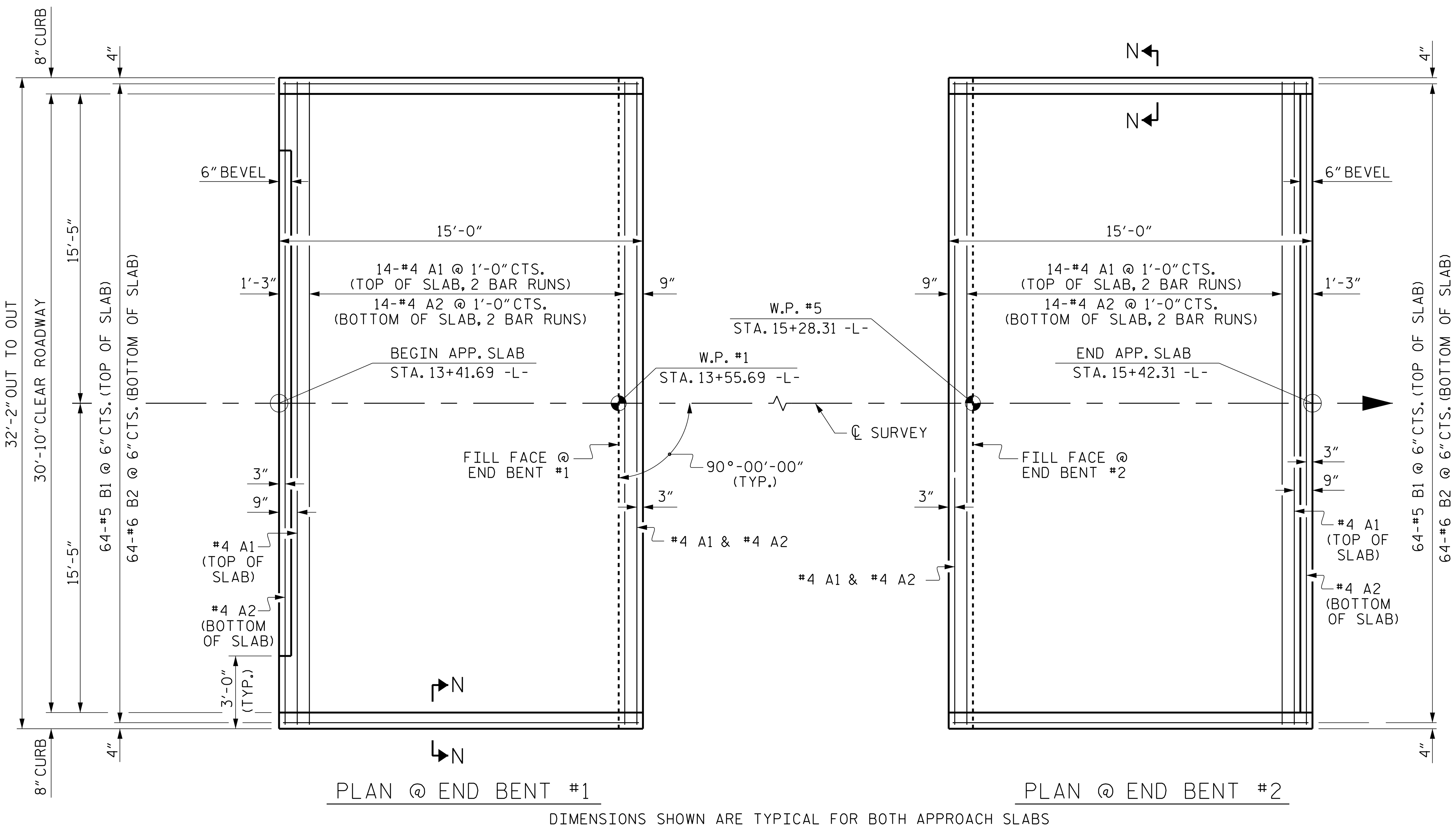
RIP RAP DETAILS

ASSEMBLED BY : W. B. ALLEN	DATE : 8/17
CHECKED BY : Z. H. BROWN	DATE : 8/17
DRAWN BY : REK 1/84	REV. 5/1/06R TLA/GM
CHECKED BY : RDU 1/84	REV. 10/1/11 MAA/GM
	REV. 12/21/11 MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			24

STD. NO. RR1

11/27/2017 8:36:23 AM R:\Structures\B5604_SMU_RR_7009.dgn



NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

WITH FOAM JOINT SEAL

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 1".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

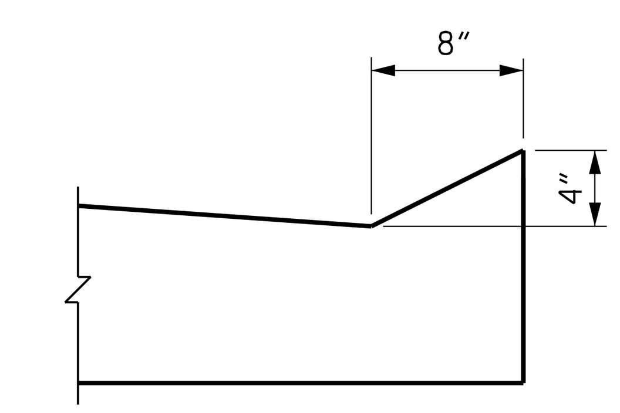
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	16'-11"	362
A2	32	#4	STR	16'-10"	360
* B1	64	#5	STR	13'-9"	918
B2	64	#6	STR	14'-8"	1410
REINFORCING STEEL				LBS.	1770
* EPOXY COATED REINFORCING STEEL				LBS.	1280
CLASS AA CONCRETE				C.Y.	23.3

APPROACH SLAB AT EB #2

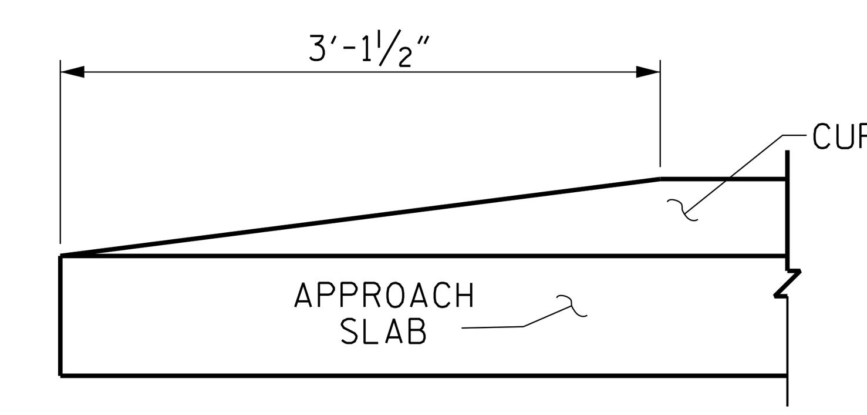
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	16'-11"	362
A2	32	#4	STR	16'-10"	360
* B1	64	#5	STR	13'-9"	918
B2	64	#6	STR	14'-8"	1410
REINFORCING STEEL				LBS.	1770
* EPOXY COATED REINFORCING STEEL				LBS.	1280
CLASS AA CONCRETE				C.Y.	23.3

SPLICE LENGTHS

BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

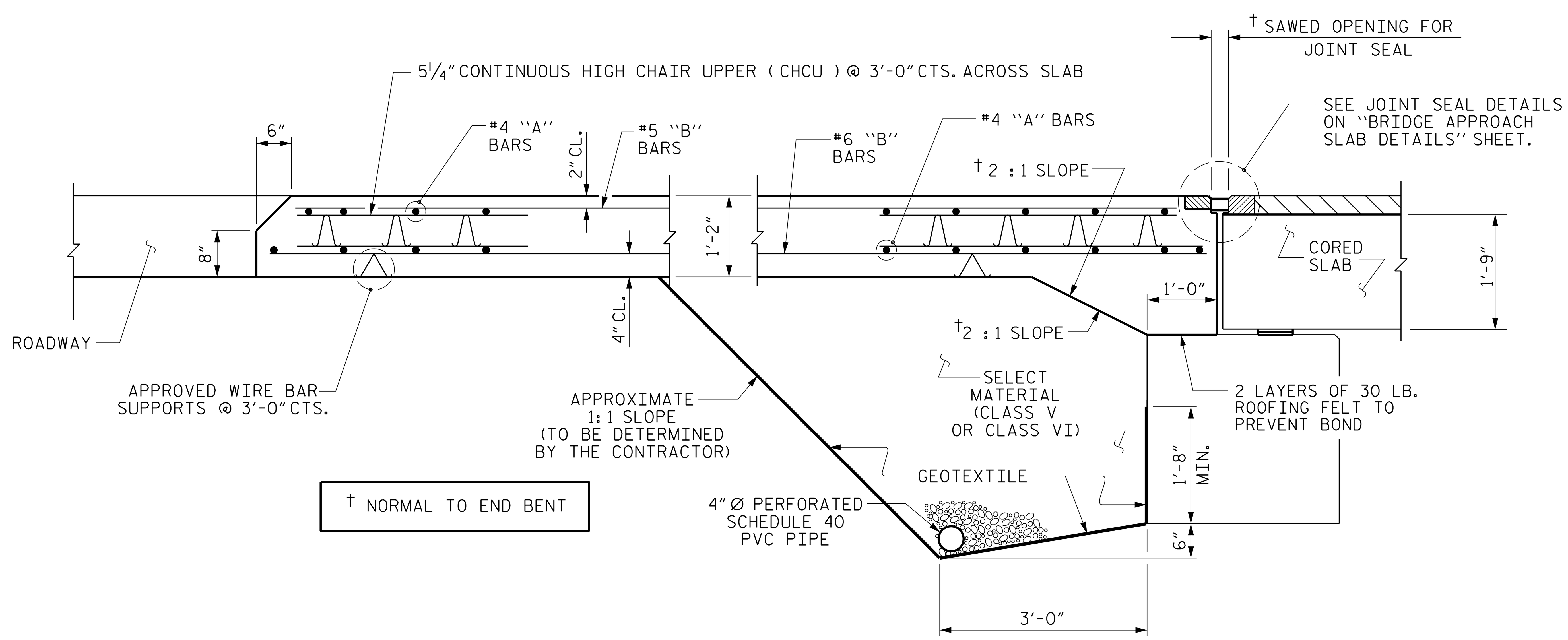


SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



SECTION THRU SLAB

(TYPE II - MODIFIED APPROACH FILL)

ASSEMBLED BY : W. B. ALLEN	DATE : 8/17		
CHECKED BY : Z. H. BROWN	DATE : 8/17		
DRAWN BY : FCJ 6/87	REV. 12/21/11	MAA/GM	
CHECKED BY : EGA 6/87	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

PLANS PREPARED BY:

CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
3/19/2018

PROJECT NO. B-5604
PERQUIMANS COUNTY
STATION: 14+42.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

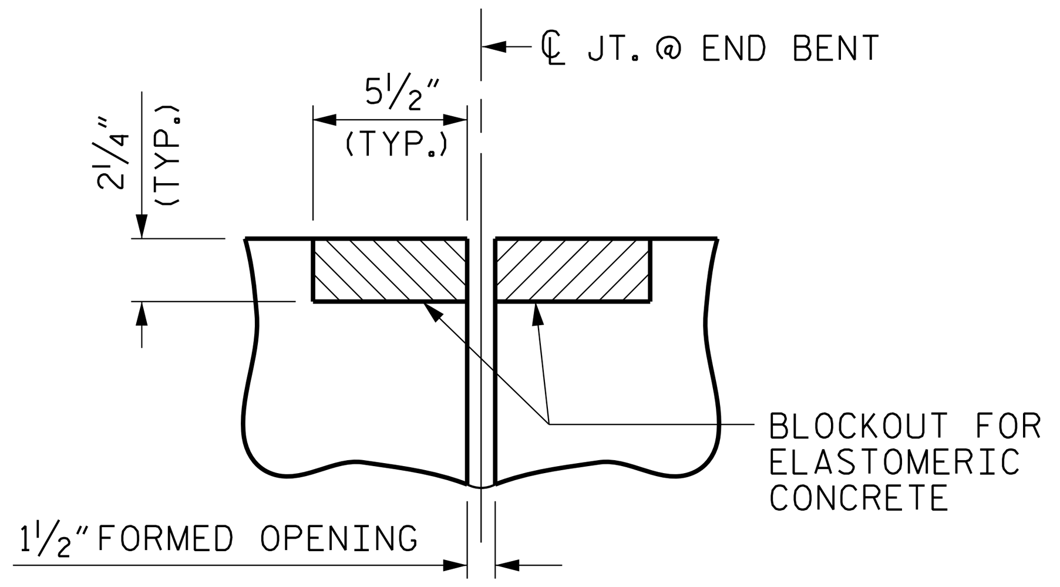
STANDARD
BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE CORED SLAB

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

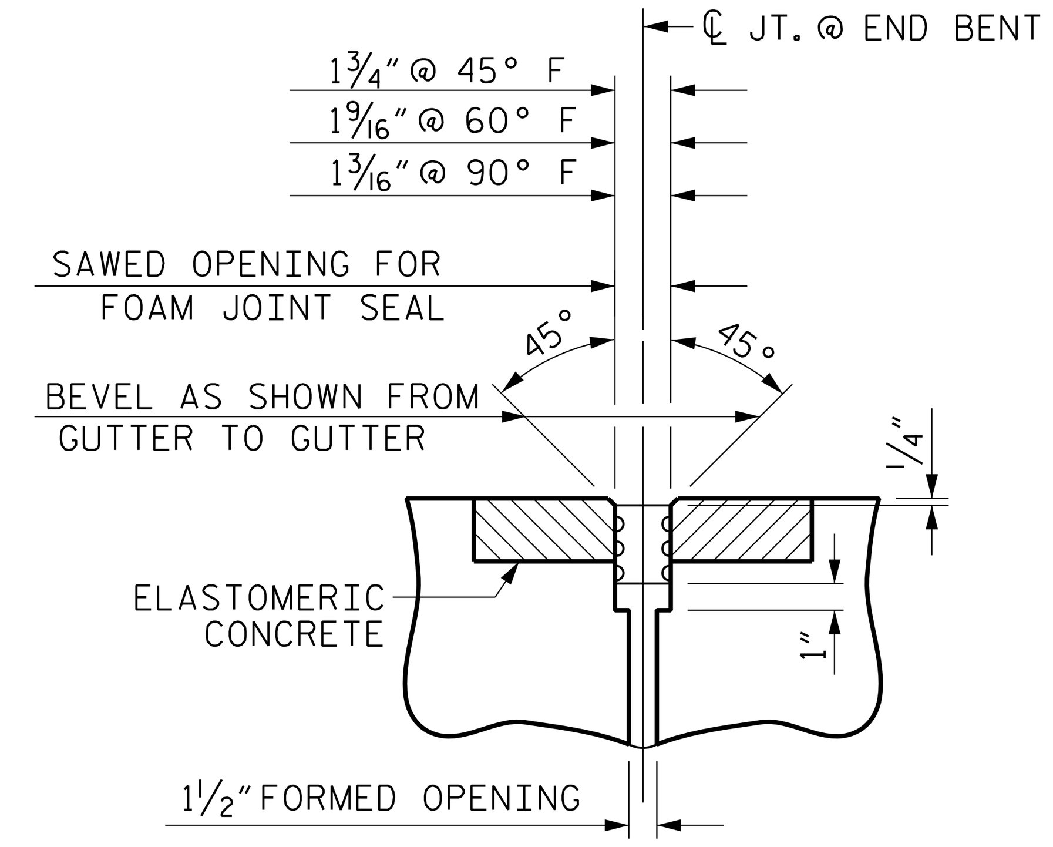
SHEET NO. S-22
TOTAL SHEETS 24

STD. NO. BAS3



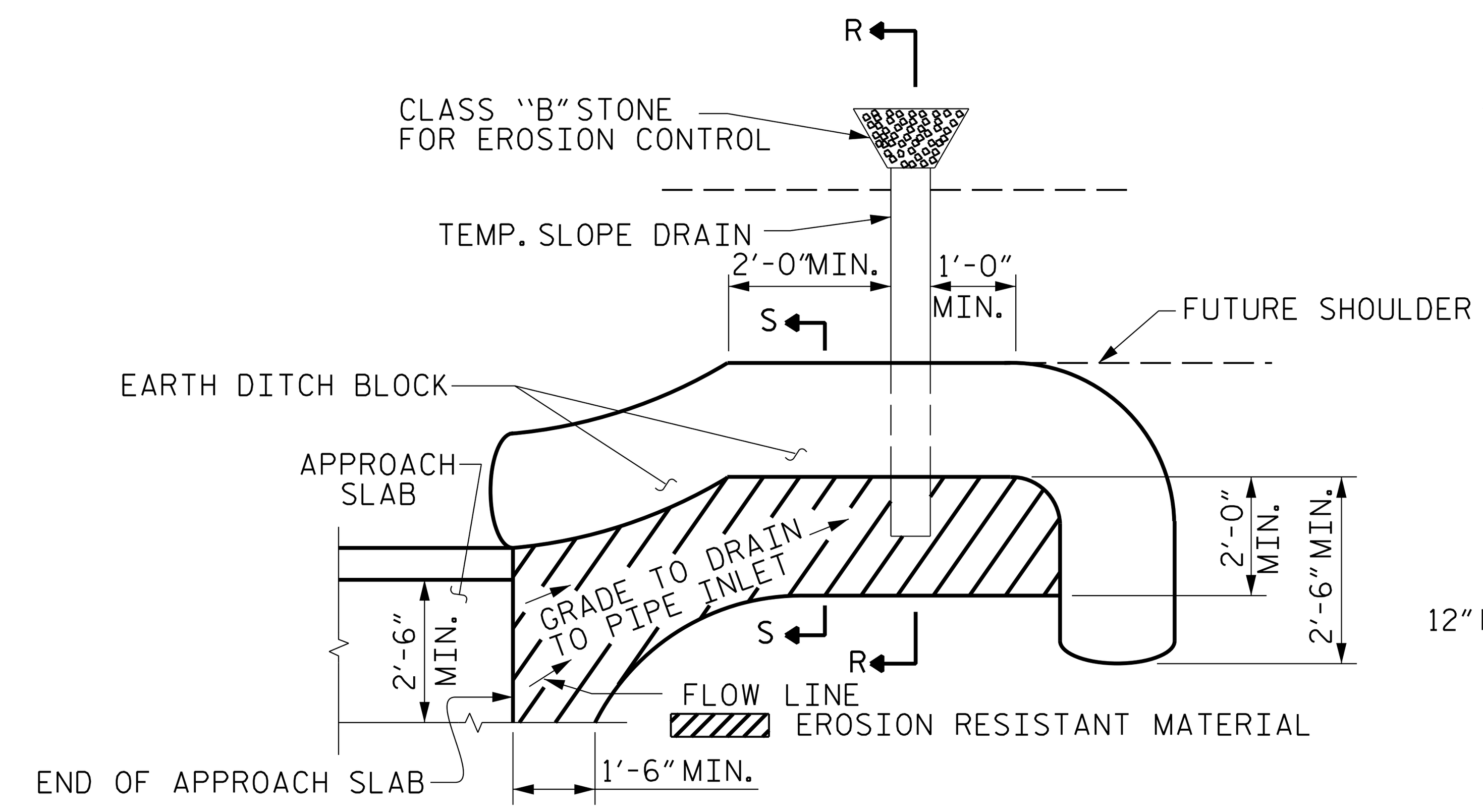
SECTION C-C

FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC CONCRETE DIMENSIONS)



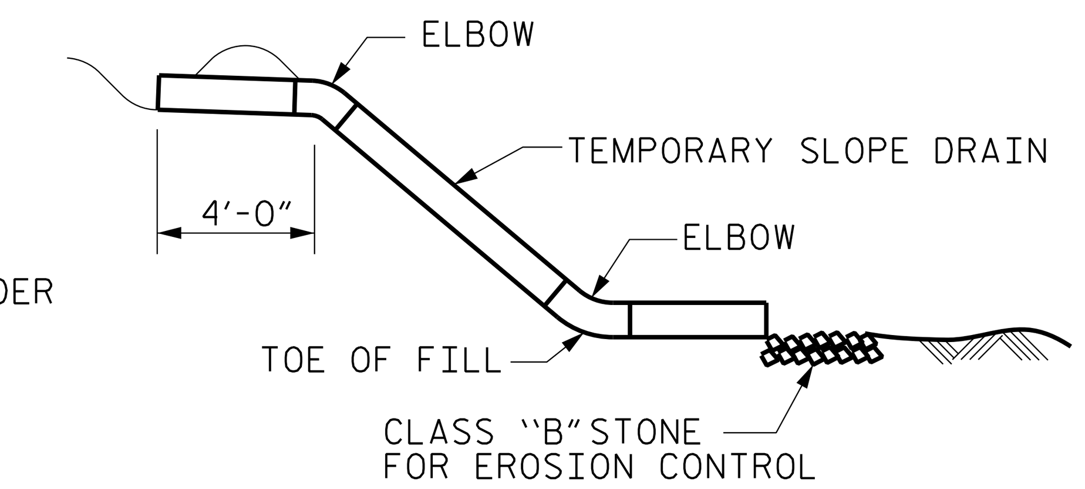
SECTION C-C

FOAM JOINT SEAL
(EXPANSION)

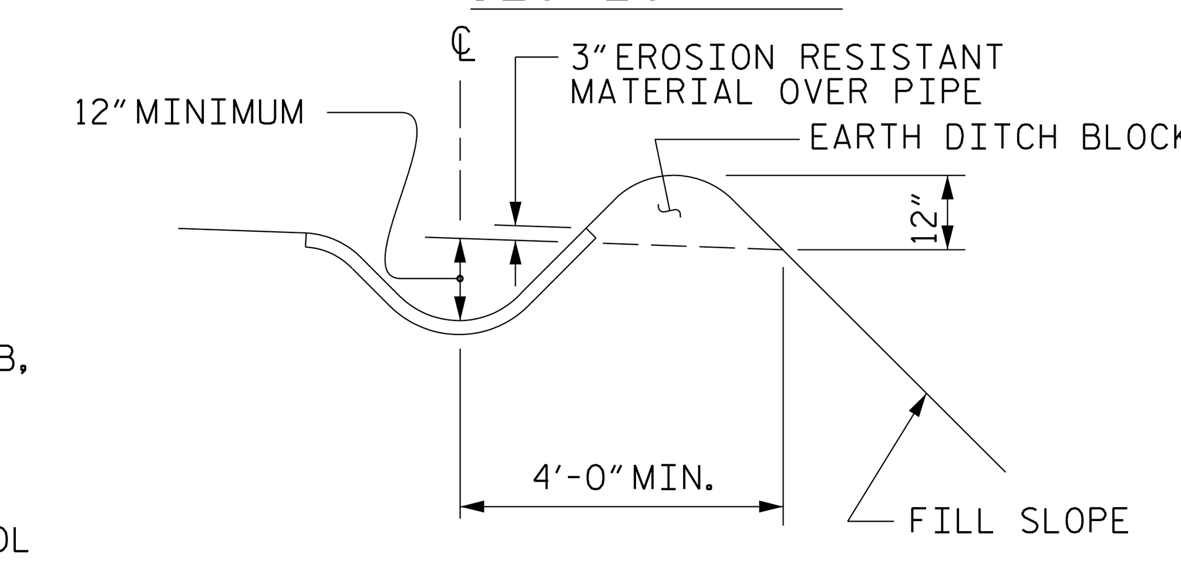


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

PLAN VIEW



SECTION R-R



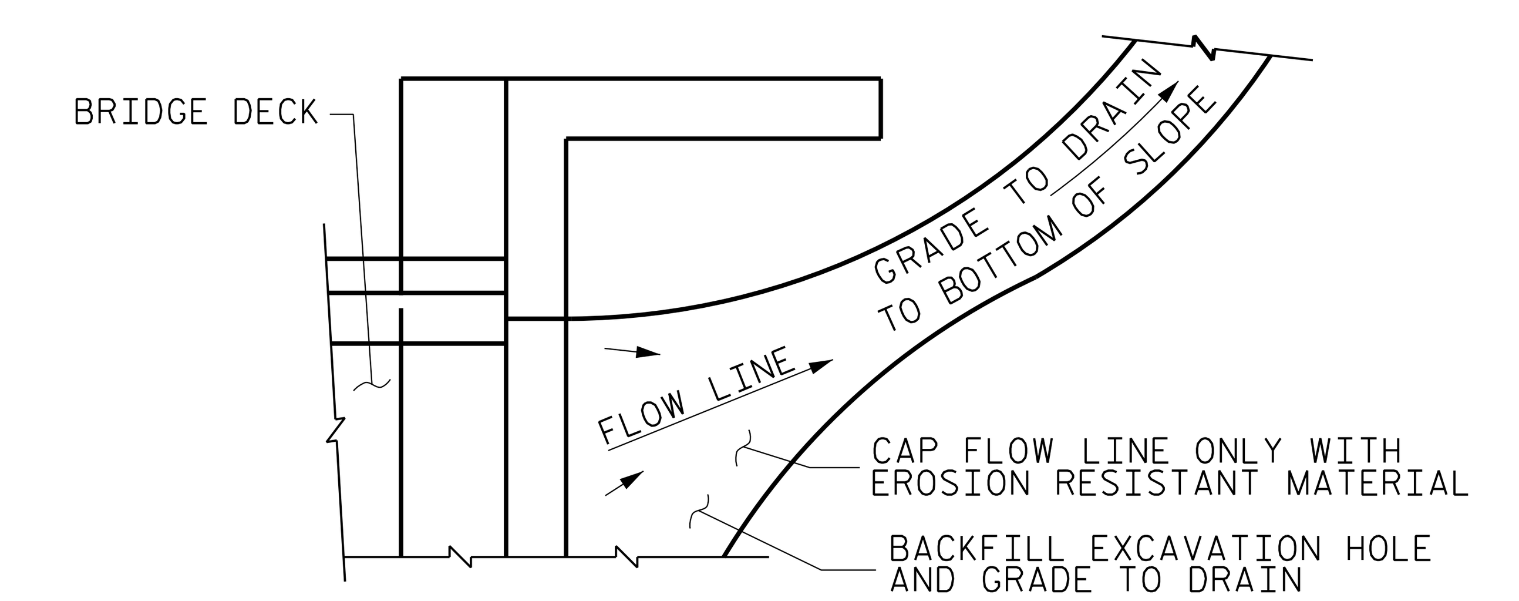
SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	2.6
2	2.6
TOTAL	5.2

* BASED ON THE MINIMUM BLOCKOUT SHOWN.



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

PROJECT NO. B-5604

PERQUIMANS COUNTY

STATION: 14+42.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039661 L. KEVIN AUSTIN
DocuSigned by: L. Kevin Austin
72F1B3720EA9466...
3/19/2018

PLANS PREPARED BY:
CALYX ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-23
1			3					TOTAL SHEETS
2			4					24

STD. NO. BAS4

ASSEMBLED BY : W. B. ALLEN	DATE : 8/17
CHECKED BY : Z. H. BROWN	DATE : 8/17

DRAWN BY : FCJ 11/88	REV. 10/1/11	MAA/GM
CHECKED BY : ARB 11/88	REV. 7/12	MAA/GM
	REV. 6/13	MAA/GM

11/27/2017 8:36:35 AM R:\Structures\B5604_SMU_AS2_7600.dgn

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF	
STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION	
GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

11/27/2017 8:36:36 AM R:\Structures\BS604_SMU_SN_7009.dgn

REV. 6-16-95 EEM (J) RGW REV. 5-7-03 RWW (J) JTE REV. 10-1-11 MAA (J) GM
REV. 8-16-99 RWW (J) LES REV. 5-1-06 TLA (J) GM

ENGLISH

JANUARY, 1990

SHEET NO. S-24

TOTAL SHEETS 24

STD. NO. SN