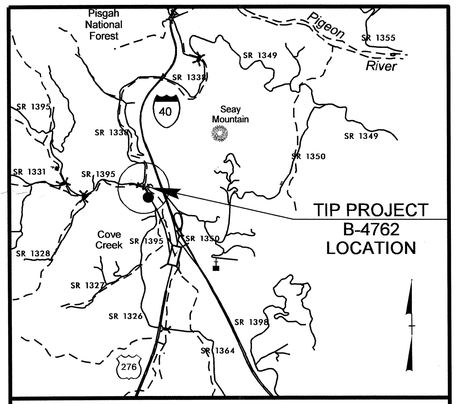
09/09/99

TIP PROJECT: B-4762

CONTRACT: C203364

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HAYWOOD COUNTY

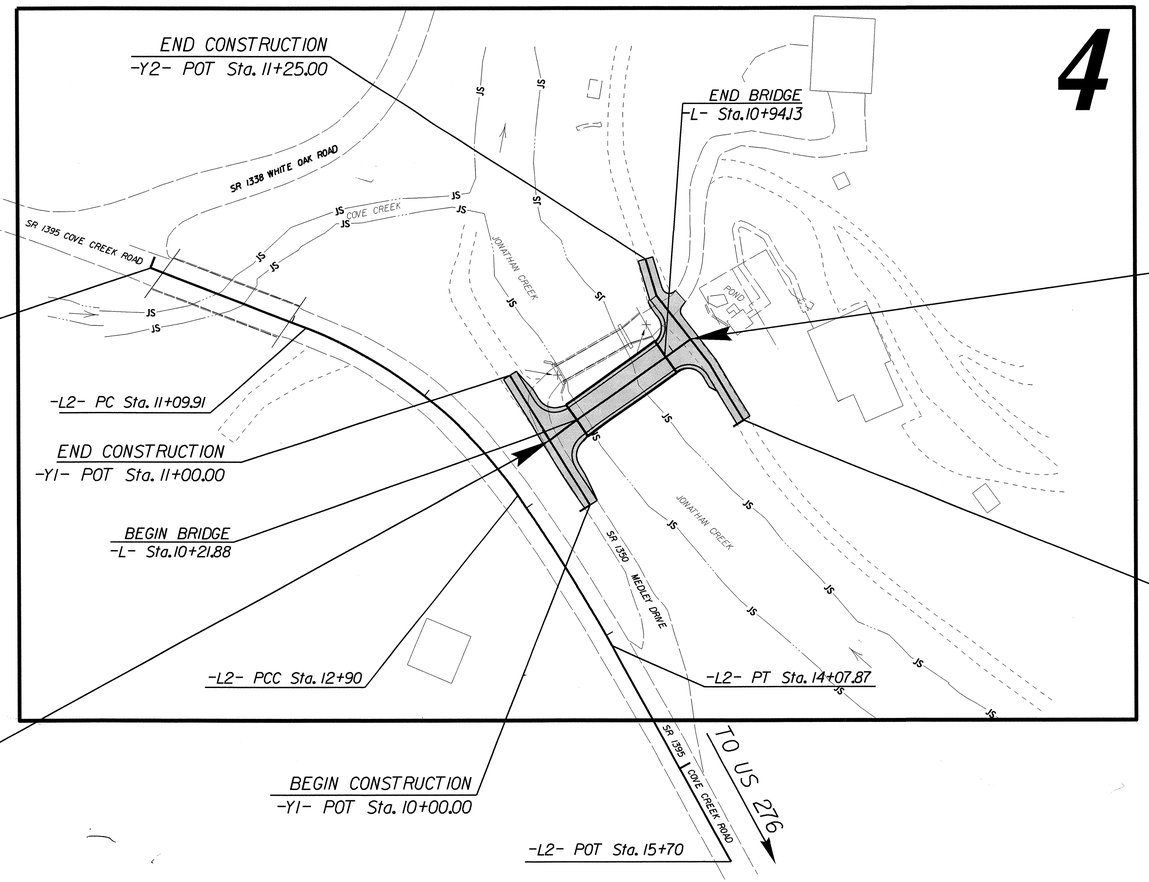
LOCATION: REPLACE BRIDGE 72 OVER JONATHAN CREEK ON SR 1407 (MEDLEY DRIVE).

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4762	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
38534.1.1	BRZ-1407(5)	P.E.
38534.2.1	BRZ-1407(5)	R/W, UTILITIES
38534.3.FD1	BRZ-1407(5)	CONSTRUCTION

NAD 83/95



END TIP PROJECT B-4762
-L- POT Sta. 11+14.10 =
-Y2- POT Sta. 10+63.57

BEGIN CONSTRUCTION
-Y2- POT Sta. 10+00.00

BEGIN TIP PROJECT B-4762
-L- POT Sta. 10+00.00 =
-Y1- POT Sta. 10+50.09

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 2014 = 100
ADT 2034 = 100
DHV = 11 %
D = 85 %
T = 8 % *
V = 15 MPH
* TTST = 1% DUAL 7%
FUNC CLASS = LOCAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT No. B-4762 = 0.008 Miles.
LENGTH STRUCTURE TIP PROJECT No. B-4762 = 0.014 Miles.

TOTAL LENGTH TIP PROJECT No. B-4762 = 0.022 Miles.

THIS PROJECT DESIGNED USING SUB-TIER DESIGN GUIDELINES.

Prepared in the Office of:

DIVISION OF HIGHWAYS

1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 14, 2013

LETTING DATE:
MARCH 18, 2014

KEVIN MOORE, PE
PROJECT ENGINEER

STEVE KENDALL, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

12/20/13
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 34364 ENGINEER TRENTON J. CORMIER

ROADWAY DESIGN ENGINEER

Steve Kendall 12/20/13 P.E.
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. KENDALL

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

04-DEC-2013 08:39
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PROJECT REFERENCE NO.	SHEET NO.
B-4762	1-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. KENDALL

1-17-14

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

2012 ROADWAY ENGLISH STANDARD DRAWINGS

N. C. Department of Transportation – Raleigh, N. C., Dated Jan. 17, 2012 are applicable to this project and by reference hereby are considered part of these plans. The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch –

STD.NO.	TITLE
DIVISION 2 – EARTHWORK	
200.02	Method of Clearing – Method II
225.02	Guide for Grading Subgrade – Secondary and Local
225.04	Method of Obtaining Superelevation – Two Lane Pavement
DIVISION 3 – PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 5 – SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction – High Side of Superelevated Curve – Method I
DIVISION 8 – INCIDENTALS	
815.03	Pipe Underdrain and Blind Drain
840.25	Anchorage for Frames – Brick or Concrete or Precast
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet – for Cast Iron Double Frame and Grates
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
848.04	Street Turnout
862.01	Guardrail Placement
862.02	Guardrail Installation
876.01	Rip Rap in Channels

GENERAL NOTES

2012 SPECIFICATIONS
EFFECTIVE: 01-17-2012
REVISED: 07-30-2012

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 ITEM INVOLVED.

UNDERDRAINS:
UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER

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

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

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.

UTILITIES:
UTILITY OWNERS ON THIS PROJECT ARE:
A.T.&T. –Telephone
BellSouth –Telephone
BellSouth –Fiber Optical Line
Haywood Electrical Membership Corparation

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

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

INDEX OF SHEETS

SHEET No.	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS, GENERAL NOTES AND LIST OF STANDARD DRAWINGS
1-B	CONVENTIONAL SYMBOLS
1-C	SURVEY CONTROL SHEET
2	PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAIL
2-A	STRUCTURE TYPICAL SECTION, TEMPORARY GUARDRAIL, BARRIER LOCATION SKETCH SHOWING BRIDGE /PAVEMENT RELATIONSHIP
2-B	DETAIL OF GUARDRAIL TEMPORARY RETROFIT
2-C	BRIDGE APPROACH FILLS. (SUBREGIONAL TIER)
2-D	DETAIL OF TYPE III SHOP CURVED
2-E	DETAIL OF STANDARD TEMPORARY SHORING
3-A	DRAINAGE SUMMARY SHEET (48"AND UNDER), GUARDRAIL SUMMARY, EARTHWORK SUMMARY, ASPHALT PAVEMENT REMOVAL SUMMARY
4	PLAN SHEETS
5	PROFILE SHEETS
TMP-1 THRU TMP-4	TRANSPORTATION MANAGEMENT PLAN
EC-1 THRU EC-5	EROSION CONTROL PLANS
RF-1	REFORESTATION PLAN
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1	CROSS-SECTION SUMMARY SHEET
X-2 THRU X-12	CROSS-SECTIONS
S-1 THRU S-19	STRUCTURE PLANS

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PROJECT REFERENCE NO.	SHEET NO.
B-4762	1-B

Note: Not to Scale

S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- 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
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

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:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite R/W Marker — RW
- Proposed Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Aerial Utility Easement — AUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

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
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

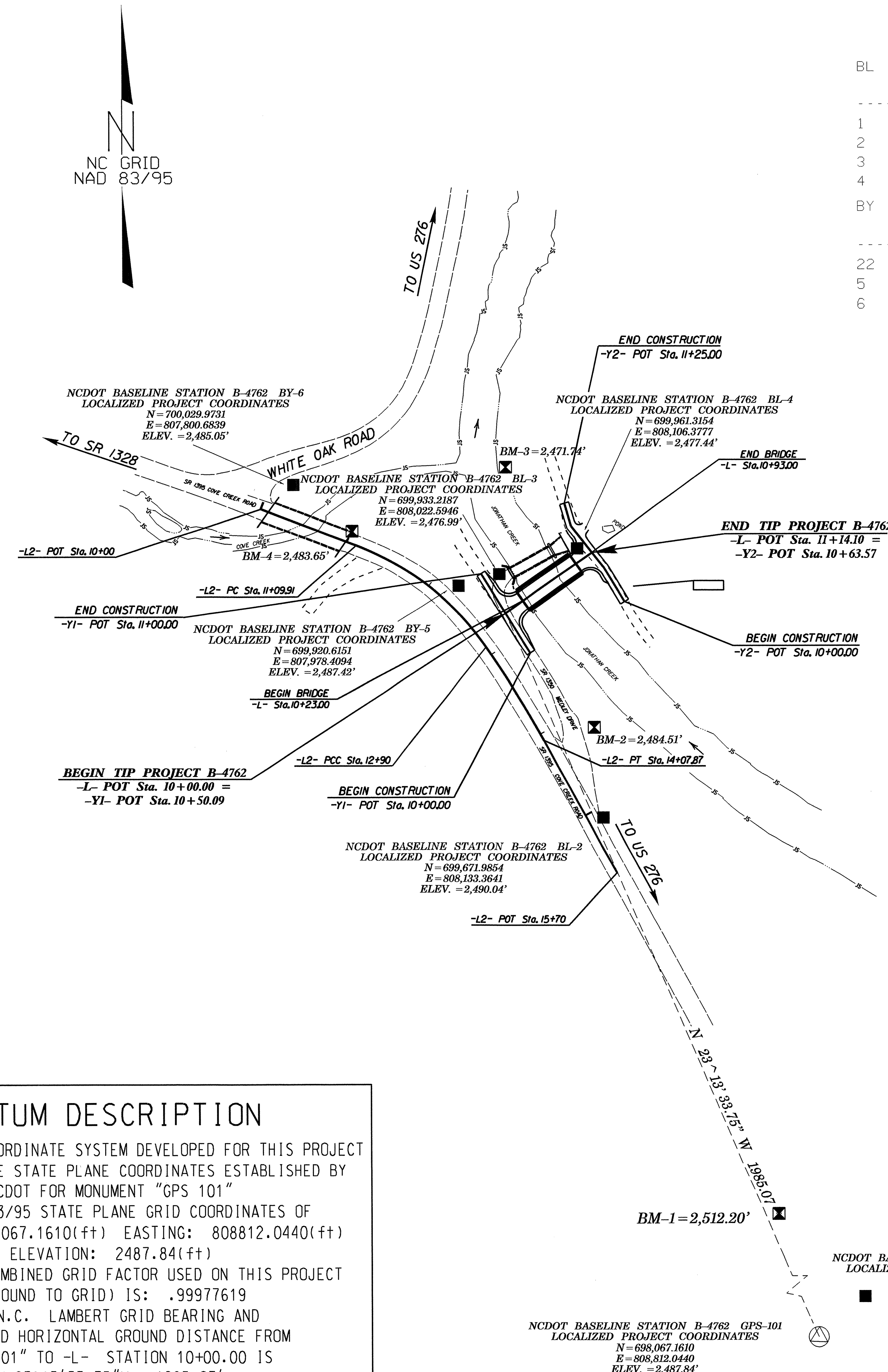
- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole (S.U.E.*)
- Abandoned According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

PROJECT REFERENCE NO.	SHEET NO.
B-4762	1-C
Location and Surveys	

5/28/99

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SURVEY CONTROL SHEET B-4762



BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	BL-1	699156.5602	808413.4747	2504.64	OUTSIDE PROJECT LIMITS	
2	BL-2	699671.9854	808133.3641	2490.04	OUTSIDE PROJECT LIMITS	
3	BL-3	699933.2187	808022.5946	2476.99	10+18.68	38.04 LT
4	BL-4	699961.3154	808106.3777	2477.44	11+03.37	12.81 LT

BY

POINT	DESC.	NORTH	EAST	ELEVATION	L2 STATION	OFFSET
22	BL-2	699671.9854	808133.3641	2490.04	15+11.14	15.64 LT
5	BY1-5	699920.6151	807978.4094	2487.42	12+23.45	21.05 LT
6	BY1-6	700029.9731	807800.6839	2485.05	10+23.48	37.02 LT

-PRELIMINARY- ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	10+12.00	-36.36	699927.9968	808018.1011
L	10+12.00	-55.00	699943.2409	808007.3742
L	10+95.00	-50.00	699986.9166	808078.1303
L	10+95.00	-38.90	699977.8388	808084.5181
L	11+00.00	25.00	699928.4578	808125.3804
L	10+20.00	25.00	699882.4194	808059.9551

-PRELIMINARY- ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L2	12+20.00	-15.50	699918.9742	807971.9658
L2	13+40.00	-45.14	699837.3851	808073.5161

-PRELIMINARY- ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
Y2	11+05.00	10.00	699993.2912	808108.2055
Y2	10+43.68	12.00	699947.5630	808145.0958
Y2	10+00.00	11.83	699910.0402	808167.4569
Y2	10+00.00	-14.00	699896.7310	808145.3197

-PRELIMINARY- ROW MARKER PERMANENT EASEMENT-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	10+33.00	-45.42	699947.4893	808030.0628
L	10+33.00	-55.00	699955.3260	808024.5483
L	10+80.00	-50.00	699978.2844	808065.8631
L	10+80.00	-40.48	699970.4988	808071.3416
L	10+71.00	25.00	699911.7689	808101.6637

-PRELIMINARY- ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	10+12.00	-36.36	699927.9968	808018.1011
L	10+12.00	-55.00	699943.2409	808007.3742
L	10+95.00	-50.00	699986.9166	808078.1303
L	10+95.00	-38.90	699977.8388	808084.5181
L	11+00.00	25.00	699928.4578	808125.3804
L	10+20.00	25.00	699882.4194	808059.9551

-PRELIMINARY- ROW MARKER PERMANENT EASEMENT-E

ALIGN	STATION	OFFSET	NORTH	EAST
Y2	10+00.00	-38.00	699884.3647	808124.7510

PRELIMINARY -L-

TYPE	STATION	NORTH	EAST
POT	10+00.00	699891.3552	808029.2117
POT	11+14.10	699957.0193	808122.5272

PRELIMINARY -L2-

TYPE	STATION	NORTH	EAST
POT	10+00.00	700003.7752	807765.5298
PC	11+09.91	699964.5327	807868.1961
PCC	12+90.00	699855.0337	808007.7663
PT	14+07.87	699754.8745	808069.8095
POT	15+70.00	699612.8870	808148.0779

PRELIMINARY -Y2-

TYPE	STATION	NORTH	EAST
POT	10+00.00	699903.9447	808157.3182
POT	10+43.68	699941.3775	808134.8129
POT	11+00.00	699985.6691	808100.0245
POT	11+25.00	700009.6522	808092.9665

****
BM1 ELEVATION = 2512.20
N 699245 E 808321
BL STATION 6+22.00 39 LEFT
8 INCH SPIKE SET IN BASE OF 13 INCH OAK TREE
****

****
BM2 ELEVATION = 2484.51
N 699769 E 808124
BL STATION 11+80.00 29 RIGHT
8 INCH SPIKE SET IN BASE OF 24 INCH SYAMORE TREE
****

****
BM3 ELEVATION = 2471.74
N 700049 E 808030
BL STATION 14+14.00 107 LEFT
8 INCH SPIKE SET IN BASE OF 16 INCH MAPLE TREE
****

****
BM4 ELEVATION = 2483.65
N 699980 E 807864
BY1 STATION 9+22.00 9 LEFT
CHISELED SQUARE IN NE CORNER OF BRIDGE
****

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "GPS 101"
WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
NORTHING: 698067.1610(ft) EASTING: 808812.0440(ft)
ELEVATION: 2487.84(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .99977619
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "GPS 101" TO -L- STATION 10+00.00 IS
N 23°13'33.75"W 1985.07'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

GEOID MODEL - GEOID 03
NOTE: DRAWING NOT TO SCALE

NOTES:

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

   THE FILES TO BE FOUND ARE AS FOLLOWS:
   TIP B-4762_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.

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PROJECT REFERENCE NO.	SHEET NO.
B-4762	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. KENDAL 1-14-14

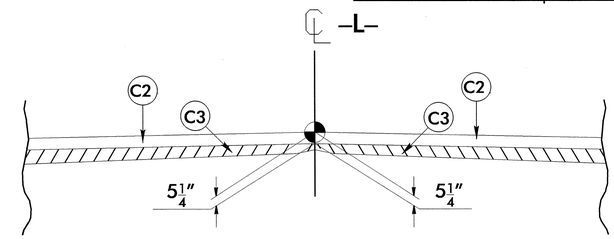
NORTH CAROLINA PROFESSIONAL SEAL 038119 ENGINEER JOHN T. HEYWARD January 10, 2014

PAVEMENT SCHEDULE

FINAL PAVEMENT DESIGN

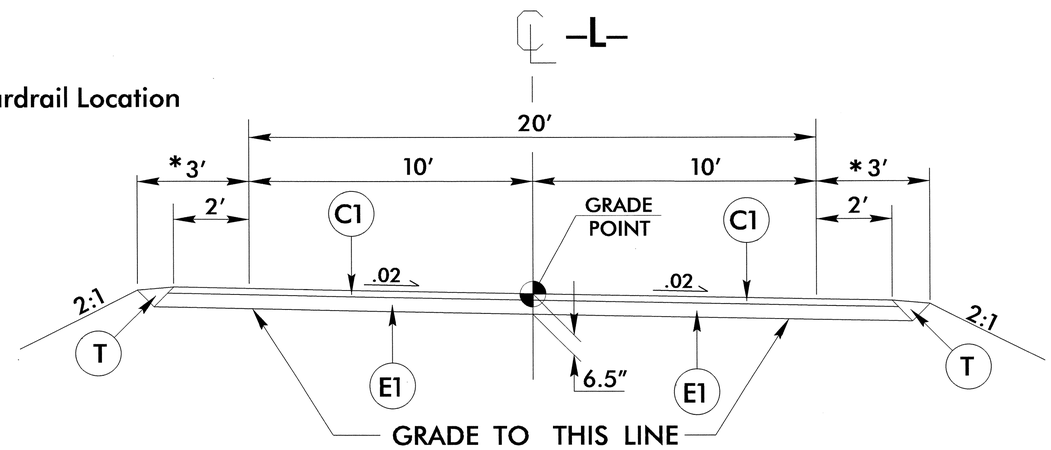
C1	PROP. APPROX. 2 ½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	J1	PROP. 6" AGGREGATE BASE COURSE.
C2	PROP. APPROX. 5¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 144.375 LBS. PER SQ. YD. IN EACH OF FOUR LAYERS.	P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.	T	EARTH MATERIAL.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
		W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL).

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



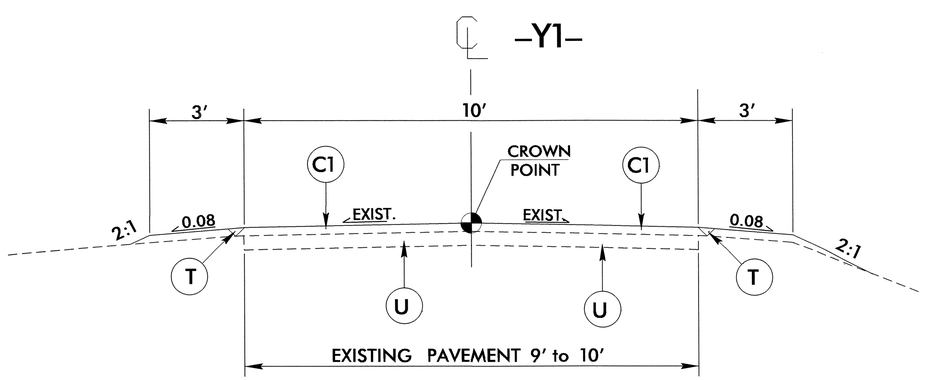
Detail Showing Method of Wedging on Structure

* See Plans For Guardrail Location



TYPICAL SECTION NO. 1

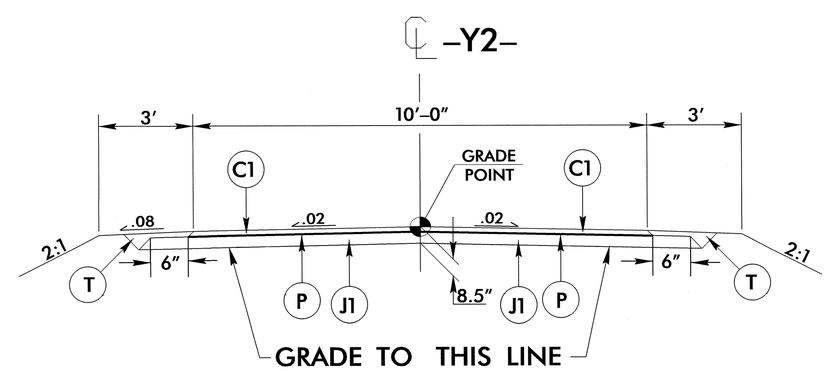
–L– Sta. 10+00.00 to Sta. 10+21.88
–L– Sta. 10+94.13 to Sta. 11+09.10



TYPICAL SECTION NO. 2

–Y1– Sta. 10+00.00 to Sta. 10+42.00

* Use 4" B25.0B –Y1– 10+42.00 TO 11+00.00



TYPICAL SECTION NO. 3

–Y2– Sta. 10+00.00 to Sta. 11+25.00

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09-JAN-2014 16:06
R:\Roadway\Proj\B4762_rdy_typ.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
B-4762	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

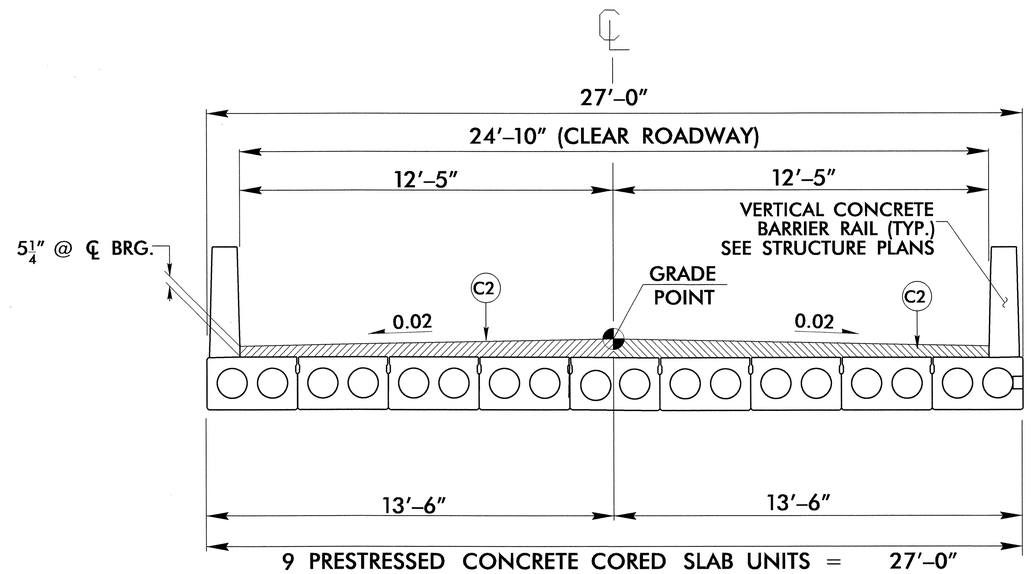
NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. KENDALL 1-16-14

NORTH CAROLINA PROFESSIONAL SEAL 039819 ENGINEER JAMES T. HEYWARD January 17, 2014

C2	5 ¼" SF9.5A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STRUCTURE TYPICAL SECTIONS



TYPICAL SECTION NO. 4

-L- Sta. 10+21.88 to Sta. 10+94.13

DESIGN DATA

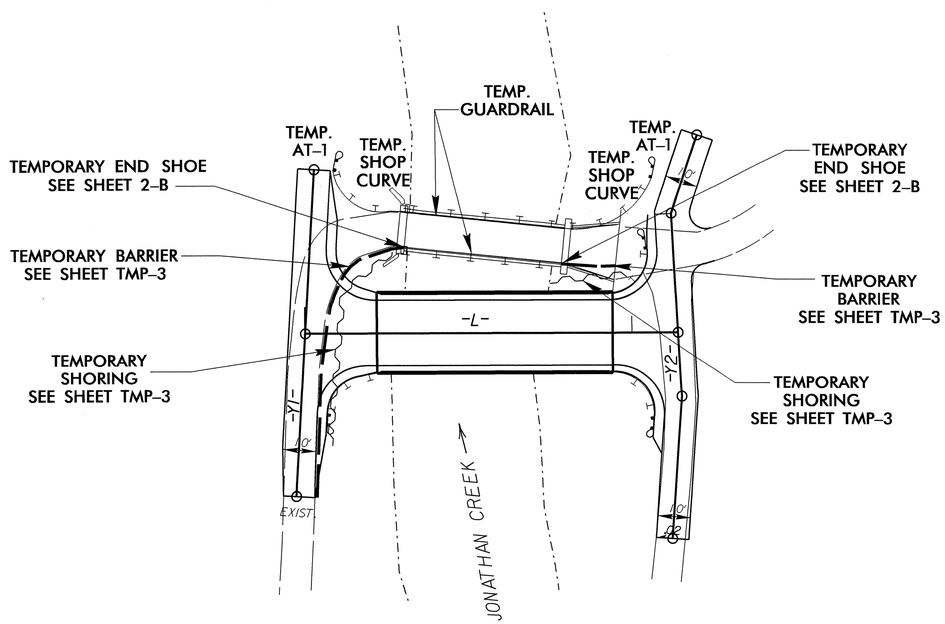
ADT 2014	=	100
ADT 2035	=	100
DHV	=	11%
D	=	85%
T	=	8% *
V	=	15 MPH
* TTST 1%		DUAL 7%
FUNCTIONAL CLASSIFICATION	=	LOCAL

TEMPORARY GUARDRAIL AND TEMPORARY SHORING

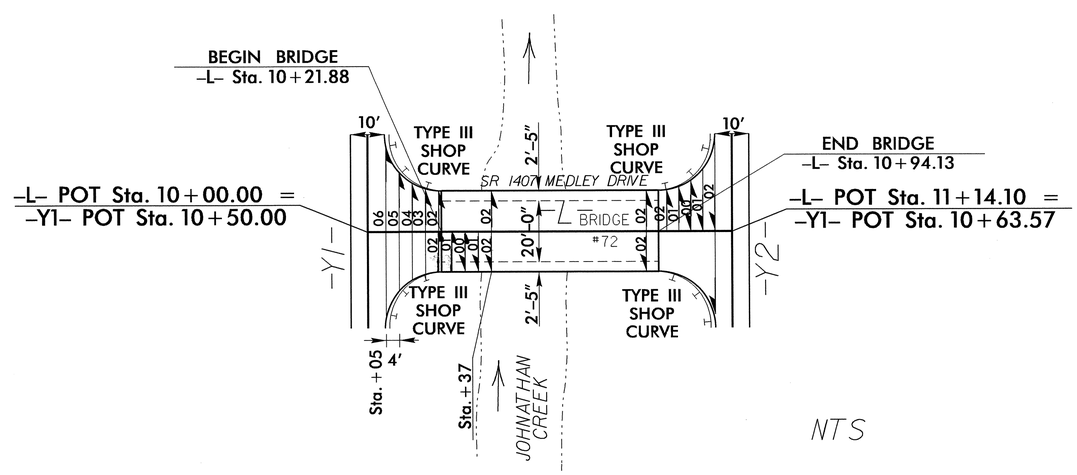
LEGEND

TEMPORARY BARRIER

TEMPORARY SHORING



SKETCH SHOWING BRIDGE/PAVEMENT RELATIONSHIP



NTS

16-JAN-2014 14:08
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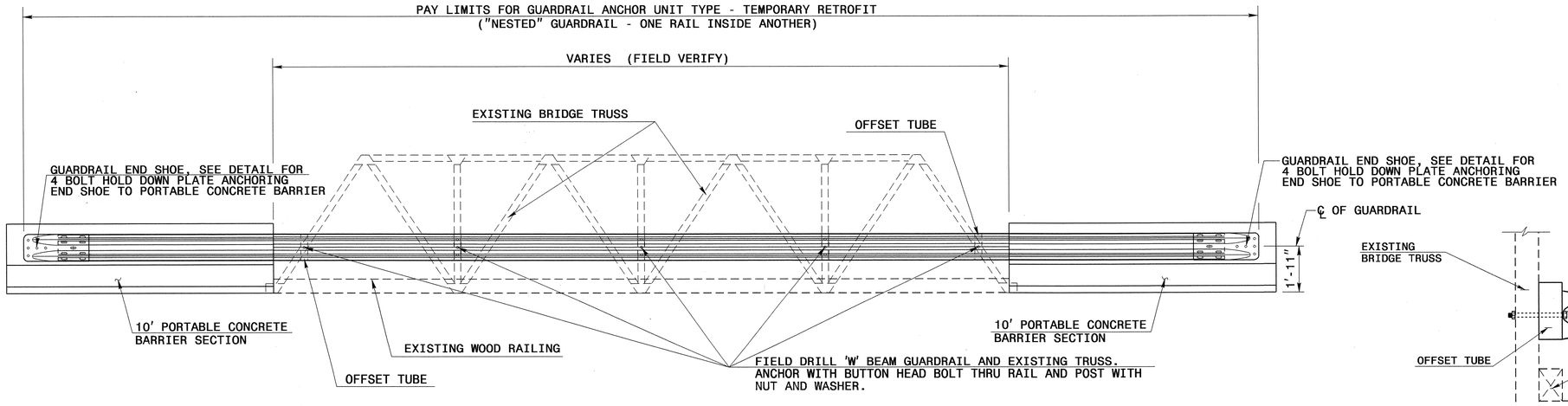
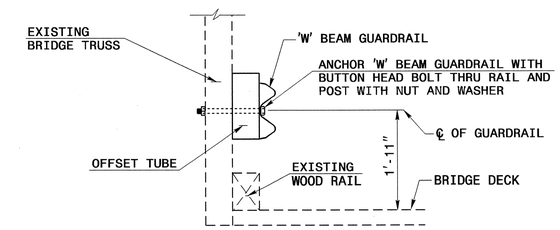
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
B-4762	2-B

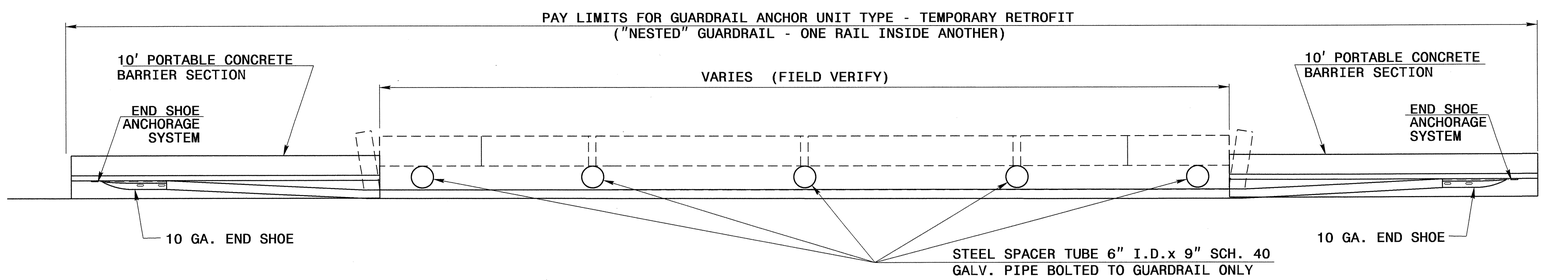


ELEVATION VIEW

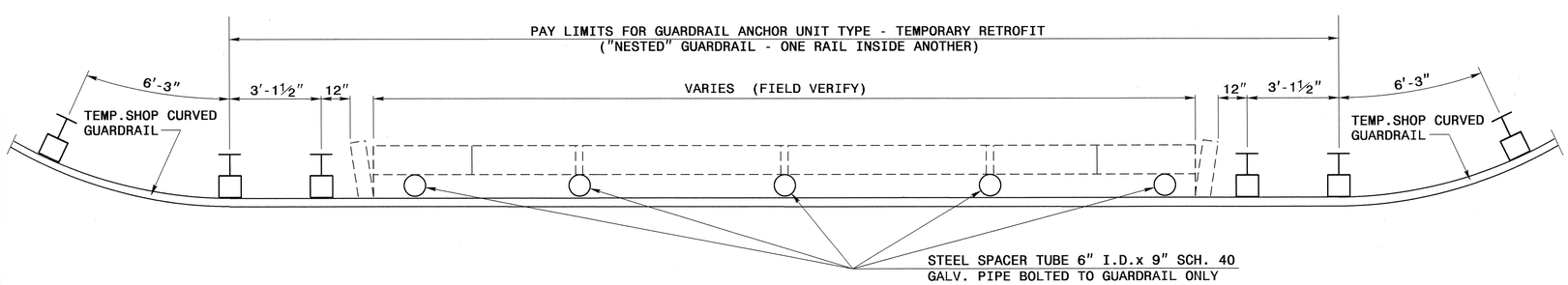


SECTION VIEW

GUARDRAIL ATTACHMENT TO TRUSS



PLAN VIEW



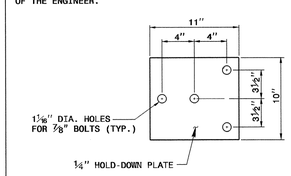
PLAN VIEW

NOTES FOR 4 BOLT HOLD DOWN PLATE

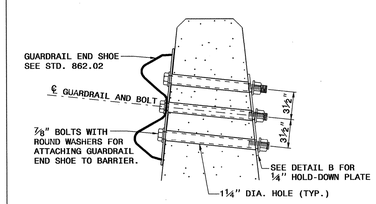
THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD DOWN PLATE AND 4 - ⅞" DIA. BOLTS WITH NUTS AND WASHERS.

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.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL. THE 1¼" DIA. 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.



4 BOLT HOLD DOWN PLATE



PART SECTION OF BARRIER OR RAIL

THRU END SHOE SECTION AND 4 BOLT HOLD DOWN PLATE

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-707-6900 FAX 919-250-4119

DETAIL OF GUARDRAIL TEMPORARY RETROFIT

NORTH CAROLINA PROFESSIONAL SEAL 022964 ENGINEER
2/5/14

ORIGINAL BY:	E.E. WARD	DATE:	04-05
MODIFIED BY:	rnbritt	DATE:	02-03-2014
CHECKED BY:		DATE:	
FILE SPEC.:	details/rnbritt/english/bridge/b4762 str anchor.dgn		

PROJECT REFERENCE NO.	SHEET NO.
B-4762	2C

PLAN VIEW

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

ENGLISH DETAIL DRAWING FOR
BRIDGE APPROACH FILLS
CORED SLAB & BOX BEAM BRIDGES
SUB REGIONAL TIER

SHEET 1 OF 2 — 422D11

SECTION A-A

SECTION B-B

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

ENGLISH DETAIL DRAWING FOR
BRIDGE APPROACH FILLS
CORED SLAB & BOX BEAM BRIDGES
SUB REGIONAL TIER

SHEET 2 OF 2 — 422D11

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

SEE PLATE FOR TITLE

ORIGINAL BY: DATE:
MODIFIED BY: E.E. WARD DATE: 8-21-03
CHECKED BY: DATE: 12/9/13
FILE SPEC.:

5/14/99

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

PROJECT REFERENCE NO.	SHEET NO.
B-4762	2-D

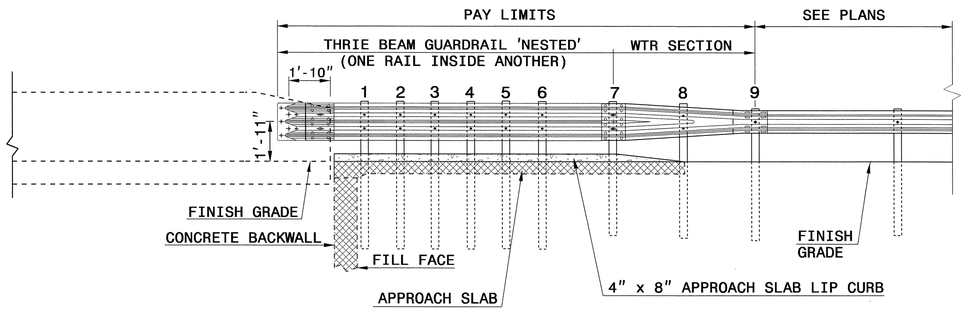
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR

TYPE III - SHOP CURVED
STRUCTURE ANCHOR UNIT

SHEET 1 OF 1

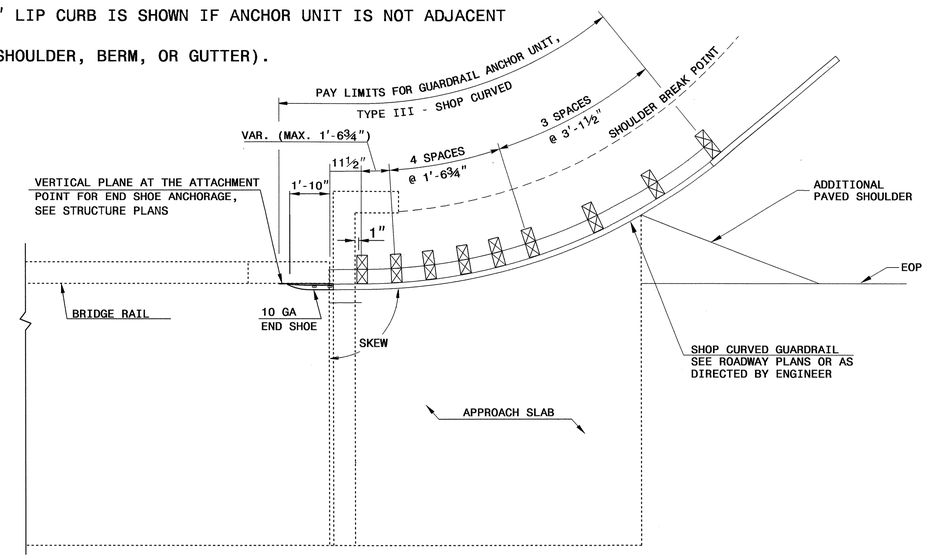
TYPE III SC



ELEVATION

SEE ROADWAY PLANS FOR END TREATMENT

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).
-USE NO STEEL POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-SEE STANDARD 862.03 SHEET 4 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

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

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

ENGLISH DETAIL DRAWING FOR

TYPE III - SHOP CURVED
STRUCTURE ANCHOR UNIT

SHEET 1 OF 1

TYPE III SC

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER
1/10/14

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

SEE PLATE FOR TITLE

ORIGINAL BY: E.E.Ward DATE: 4-4-02
MODIFIED BY: T.S.Spell DATE: 5-29-09
CHECKED BY: DATE: 12/17/13
FILE SPEC.: ward:\usr\details\stand\862stds\typeiiisc.dgn

PROJECT REFERENCE NO.	SHEET
B-4762	2-E

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 7/22/13

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

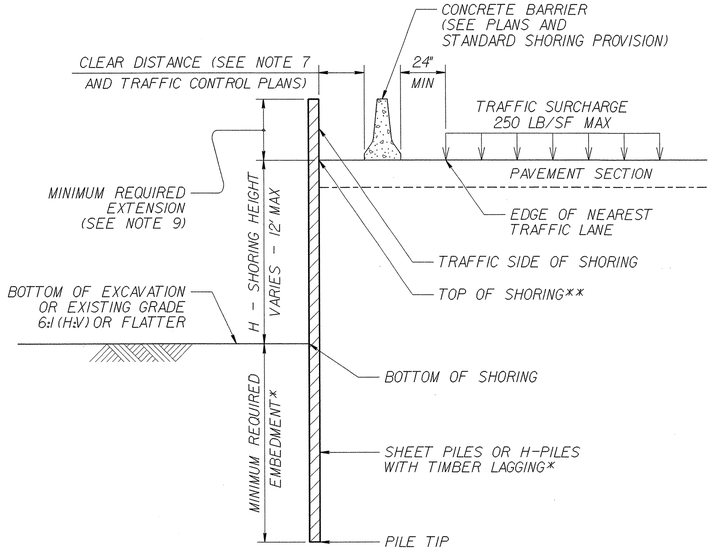
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN^3/FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)			MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN^3/FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)		
				HP 10x42	HP 12x53	HP 14x73			HP 10x42	HP 12x53	HP 14x73
GROUNDWATER ELEVATION BEWTEEN BOTTOM OF SHORING AND PILE TIP	< 6	11.5	4.5	11.5	11.5	11.5	16.0	12.0	13.0	13.0	13.0
	7	13.0	7.0	13.0	13.0	13.0	17.0	14.5	14.5	14.5	14.5
	8	15.0	10.0	--	15.0	15.0	18.0	17.0	--	15.5	15.5
	9	17.0	14.0	--	17.0	17.0	19.0	20.0	--	17.0	17.0
	10	18.5	19.5	--	--	18.5	20.0	23.5	--	--	18.5
	11	20.5	26.0	--	--	--	21.0	28.0	--	--	20.0
	12	22.5	33.0	--	--	--	22.0	33.0	--	--	21.5
GROUNDWATER ELEVATION BELOW PILE TIP	< 6	7.5	3.0	8.0	8.0	8.0	11.0	10.0	9.5	9.5	9.5
	7	8.5	4.5	9.5	9.5	9.5	12.0	12.0	10.5	10.5	10.5
	8	10.0	6.5	10.5	10.5	10.5	12.5	14.0	11.5	11.5	11.5
	9	11.0	9.5	--	12.0	12.0	13.5	16.5	--	12.5	12.5
	10	12.5	13.0	--	--	13.5	14.0	19.5	--	13.5	13.5
	11	13.5	17.0	--	--	14.5	15.0	22.5	--	--	14.5
	12	15.0	21.5	--	--	16.0	16.0	25.5	--	--	15.5

MINIMUM REQUIRED EMBEDMENT AND SECTION MODULUS

***DO NOT USE H-PILES WITH TIMBER LAGGING FOR GROUNDWATER CONDITION, SHORING HEIGHT AND H-PILE SIZE SHOWN IF MINIMUM REQUIRED EMBEDMENT IS "--".**

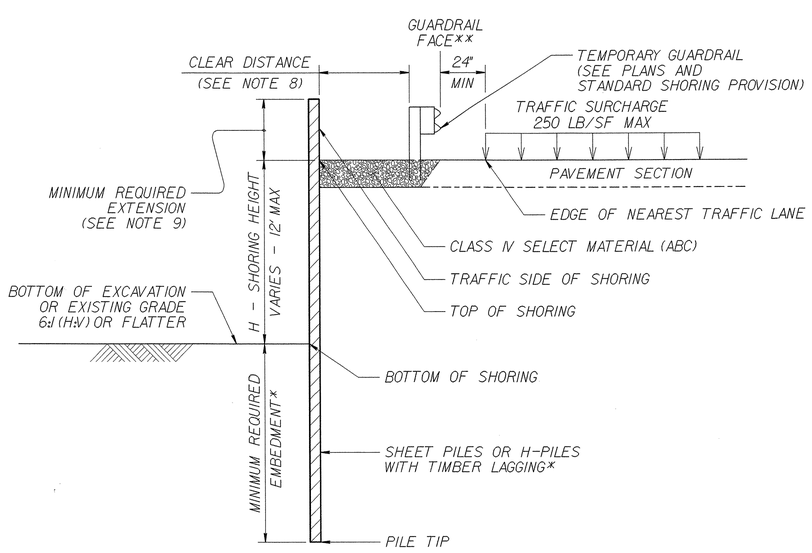
NOTES:

1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
2. FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
3. STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
   UNIT WEIGHT, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF
4. DO NOT USE STANDARD TEMPORARY SHORING IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS WITHIN THE EMBEDMENT DEPTH.
6. USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, USE "GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP" FOR GROUNDWATER CONDITION. DO NOT USE STANDARD TEMPORARY SHORING IF GROUNDWATER IS ABOVE BOTTOM OF SHORING.
7. AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN THE MINIMUM REQUIRED FOR CONCRETE BARRIER, SET BARRIER NEXT TO AND UP AGAINST TRAFFIC SIDE OF PILES AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
8. AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN 4' FOR TEMPORARY GUARDRAIL, ATTACH GUARDRAIL TO TRAFFIC SIDE OF PILES AS SHOWN IN THE PLANS AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
9. MINIMUM REQUIRED EXTENSION IS 6" FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".
10. MINIMUM REQUIRED EMBEDMENT FOR H-PILES WITH TIMBER LAGGING IS BASED ON DRIVEN H-PILES AT MAXIMUM 6' SPACING. AT THE CONTRACTOR'S OPTION, EMBEDMENT DEPTHS MAY BE REDUCED BY 25% FOR DRILLED-IN H-PILES.
11. SUBMIT A "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY SHORING CONSTRUCTION. UP TO 3 SHORING LOCATIONS MAY BE INCLUDED ON EACH FORM. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
12. CONTACT THE ENGINEER IF PILES DO NOT ATTAIN THE MINIMUM REQUIRED EMBEDMENT.



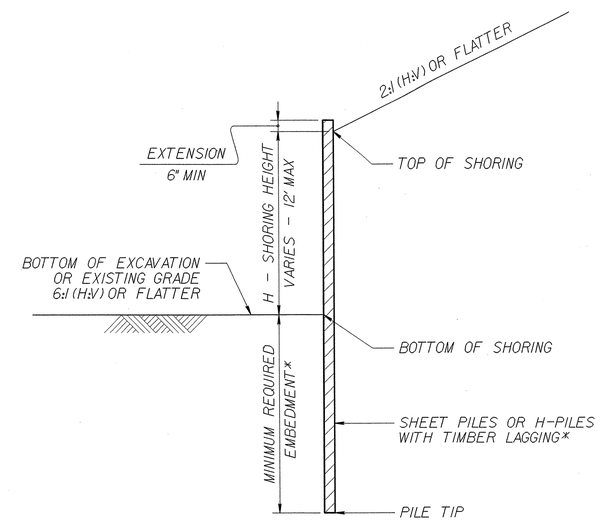
CONCRETE BARRIER

****TOP OF SHORING = EDGE OF PAVEMENT**



TEMPORARY GUARDRAIL

****GUARDRAIL FACE = EDGE OF PAVEMENT**



STANDARD TEMPORARY SHORING

(SLOPE CASE)

***SEE TABLE ABOVE.**

STANDARD TEMPORARY SHORING

(SURCHARGE CASE)

***SEE TABLE ABOVE.**

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 11-19-13

4/04/06

COMPUTED BY: T. BURNS	DATE: DEC. 7, 2013
CHECKED BY: S. KENDALL	DATE: DEC. 9, 2013

PROJECT REFERENCE NO.	SHEET NO.
B-4762	3-A

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

LIST OF PIPES, ENDWALLS, ETC.

STATION / SIZE / THICKNESS OR GAUGE	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC) 15"	18"	24"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	C.S. PIPE 15" .064	18" .064	24" .064	36" .079	84" 0.168	R.C. PIPE (CLASS III) 15"	18"	24"	30"	36"	R.C. PIPE (CLASS IV) 15"	18"	24"	30"	36"	REINFORCED ENDWALLS WITH R.C. - C.Y.	WITH C.S. - C.Y.	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	* TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. *FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	G.D.I. (N.S.) FRAME WITH GRATE STD.840.29	D.I. STD. 840.35 OR STD. (TBDI)	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
-L- 11+00.00	RT.	401		2477.7	2473.5																																1							1	1					
	RT.	401	402		2475.1	2472.4		12'																																										
-Y- 10+98.04	LT.	403	404		2474.4	2474.0		24'									X																																20'	REMOVE EXIST. 12" CMP
-L- 10+96.00	LT.	405		2478.1	2473.6																																1							1	1					
		401	405	2473.5	2473.6			28'									X																																	
GRAND TOTAL								64'																													2							2	2				20'	GRAND TOTAL

ABBREVIATIONS

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

REMOVAL OF EXISTING ASPHALT PAVEMENT

SURVEY LINE	STATION	STATION	SY
-L-	10+10.00	10+28.00	26
-L-	10+80.00	11+05.00	38
		TOTAL	64
		SAY	70

SUMMARY OF SUBSURFACE DRAINAGE

LINE	STATION	STATION	LOCATION LT/RT/CL	DRAIN TYPE* UD/BD/SD	LF
	CONTINGENCY			UD	100
				TOTAL LF:	100

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

SUMMARY OF AGGREGATE SUBGRADE /STABILIZATION

LINE	STATION	STATION	AGGREGATE TYPE* ASU/AST	AGGREGATE THICKNESS INCHES	SHALLOW UNDERCUT CY	CLASS IV SUBGRADE STABILIZATION TONS	GEOTEXTILE FOR SOIL STABILIZATION SY	STABILIZER AGGREGATE TONS	CLASS IV AGGREGATE STABILIZATION TONS
	CONTINGENCY		ASU		33	63	125		
		TOTAL CY /TONS /SY:			33	63	125	0	0

*ASU = Aggregate Subgrade
*AST = Aggregate Stabilization

EARTHWORK SUMMARY
In Cubic Yards

SURVEY LINE	STATION	STATION	UNCL. EXCAV.	EMBANK + %	BORROW	WASTE
-L-	10+05.52	10+21.88	1	69	68	0
-Y1-	10+00.00	11+00.00	4	3	0	1
		SUB-TOTAL	5	72	68	1
-L-	10+94.13	11+07.96	0	40	40	0
-Y2-	10+00.00	11+25.00	108	31	0	77
		SUB-TOTAL	108	71	40	77
		TOTAL	113	143	108	78
LOSS DUE TO CLEARING & GRUBBING			-10		10	
WASTE IN LIEU OF BORROW					-78	-78
		PROJECT TOTAL	103	143	41	0
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT					2	
		PROJECT GRAND TOTAL	103	143	43	0
		SAY	110		50	

SHALLOW UNDERCUT = 33 Cu. Yds.
CLASS IV SUBGRADE STABILIZATION = 63 Tons
ADDITIONAL UNDERCUT = 50 Cu. Yds.

Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

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

GUARDRAIL SUMMARY

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

"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.

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	SHOP CURVED	DOUBLE FACED	WARRANT POINT APPROACH END	TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	TRAILING END	W APPROACH END	TRAILING END	ANCHORS TYPE III SHOP CURVED	AT-1	TEMP. RETROFIT	TEMP. AT-1	ANCHOR DEDUCTIONS	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
-Y1-	10+82.70	-L- 10+21.88	LT.		25'			10+23.00	3'	6'					1	1										
-L-	10+94.13	-Y2- 10+95.85	LT.		25'		10+93.00		3'	6'					1	1			4 - TYPE AT-1 @ 6.25' =25'							
																			TOTAL=-25'							
-Y1-	10+19.40	-L- 10+21.88	RT.		25'		10+23.00		3'	6'					1	1										
-L-	10+94.13	-Y2- 10+30.40	RT.		25'			10+93.00	3'	6'					1	1										
			SUB-TOTAL		100'																					
			MINUS ANCHORS		-25'										4	4			TOTAL							ADDITIONAL GUARDRAIL POSTS = 5
			GRAND TOTAL		75'																					
			SAY		87.5'																					
TEMPORARY GAURDRAIL			EXISTING LT.		25'												1	1								ATTACH TO TEMPORARY BARRIER SEE DETAIL SHEET 2-B & TMP-3
			EXISTING RT.		25'												1	1								
					50'												2	2	TOTAL							

03-FEB-2014 11:30
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PROJECT REFERENCE NO.	SHEET NO.
B-4762	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. KENDALL 8/17/2012 1-16-14

NORTH CAROLINA PROFESSIONAL SEAL 34364 ENGINEER TRENTON J. CORMIER 1/17/14

SEE SHEET No.5 FOR PROFILE

SEE SHEET No.5 DRAINAGE DETAILS

SEE SHEET No.2A FOR BRIDGE TO PAVEMENT RELATIONSHIP AND BRIDGE STATIONING

NOTE: TEMPORARY SHORING SEE TMP PLANS

SEE SHEET No. S-1 to S-19 FOR STRUCTURE PLANS

SEE SHEET No. 2-A FOR SUPER TRANSITION ON BRIDGE

NOTE: REMOVAL OF EXISTING ASPHALT PAVEMENT.
-L- Sta.10+10 to 10+28
-L- Sta.10+80 to 11+05
SEE SHEET No.3-A

FLOODPLAIN EXCAVATION
EST. 150 TONS CLASS II RIP-RAP
(2 FT. THICK)
EST. 165 SY GEOTEXTILE
SEE DETAIL 'A' SHEET 5
SEE BRIDGE STRUCTURE PLANS

NOTE: REMOVE END BENTS 1 & 2 AND RETURN ROADWAY FILL TO NATURAL GROUND
SEE STRUCTURE PLANS

NAD 83/95

NOTE: EXIST. BRIDGE DESCRIPTION
STEEL TRUSS BRIDGE W/ WD BRIDGE ADDITION
CONC AND WD END BENTS
CONC WW
WD DECK W/ BST COVER
STEEL AND WD RAILS
3 STEEL BEAMS

END CONSTRUCTION
-Y2- POT Sta. 11+25

-Y2- POT Sta. 11+00

END PROJECT
-L- POT Sta.11+14.10 =
-Y2- POT Sta.10+63.57
END BRIDGE
-L- STA. 10+94.13
SPECIAL CUT V DITCH
SEE DETAIL 'C'
SHEET 5

-Y2- POT Sta. 10+43.68

BEGIN CONSTRUCTION
-Y2- POT Sta. 10+00

-L2- POT Sta. 10+00

-L2- PC Sta. 11+09.91

END CONSTRUCTION
-Y1- POT Sta. 11+00

BEGIN BRIDGE
-L- STA. 10+21.88

BEGIN PROJECT
-L- POT Sta.10+00.00 =
-Y1- POT Sta.10+50.09

-L2- PCC Sta. 12+90

BEGIN CONSTRUCTION
-Y1- POT Sta. 10+00

-L2- PT Sta. 14+07.87

-L2- POT Sta. 15+70

BANK STABILIZATION
EST. 40 TONS CLASS II RIP-RAP
EST. 45 SY GEOTEXTILE
SEE DETAIL 'B' SHEET 5
SEE BRIDGE STRUCTURE PLANS

NOTE: USE TYPE III SHOP CURVE ANCHORS AT BEGIN AND END OF BRIDGE.

8' x 4' DRAINAGE OPENING (TOTAL 7)

PROPERTY OWNERS	
01	DANIEL BOONE MESSER D.B. 375 PG. 222 D.B. 136 PG. 511 D.B. 387 PG. 159
02	MARVIN J. SUTTON D.B. 376 PG. 796 PC. B SLOT 387E
03	HARRY A. BRUNSON D.B. 733 PG. 488 PC. B SLOT 387E

-L2- (EXIST)

PI Sta 12+02.76	PI Sta 13+48.99
Δ = 34° 23' 40.3" (RT)	Δ = 5° 49' 18.9" (RT)
D = 19° 05' 54.9"	D = 4° 56' 21.4"
L = 180.09'	L = 117.87'
T = 92.85'	T = 58.99'
R = 300.00'	R = 1,160.00'

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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

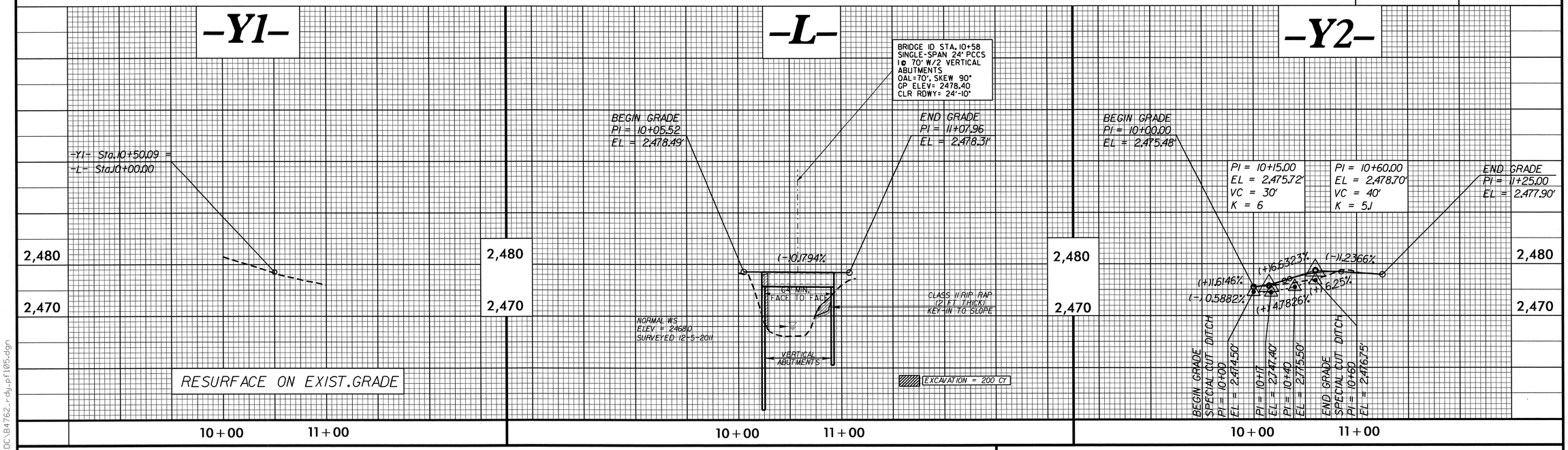
PROFILES

SEE SHEET No. 4 FOR DESIGN

PROJECT REFERENCE NO.	SHEET NO.
B-4762	5
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 33296 ENGINEER STEVEN D. TENDALL
1-21-14

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 34364 ENGINEER TRENTON J. CROMWELL
1/21/14

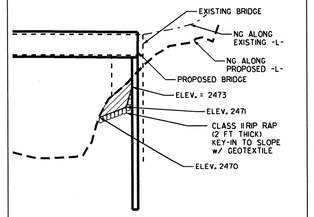


BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 4,340	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 2,477.5	FT
BASE DISCHARGE	= 5,770	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2,478.9	FT
OVERTOPPING DISCHARGE	= 7800	CFS
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING ELEVATION	= 2,480.3	FT
DATE OF SURVEY	= 12-5-11	
W.S. ELEVATION AT DATE OF SURVEY	= 2,468.0	FT

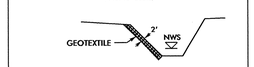
DRAINAGE DETAILS

DETAIL A
FLOODPLAIN EXCAVATION
PROFILE VIEW (LOOKING DOWNSTREAM)



NOTE: SEE CROSS SECTIONS ALONG -Y2- AND PLAN VIEW FOR ADDITIONAL DETAILS.

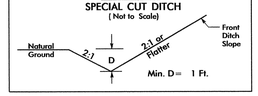
DETAIL B
BANK STABILIZATION
(Not to Scale)



Type of Liner= CLASS II RIP-RAP

-L- Sta. 10+14 to Sta. 10+27 LT.

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



-Y2- Sta. 10+00 to Sta. 10+17 RT.
-Y2- Sta. 10+17 to Sta. 10+60 RT.

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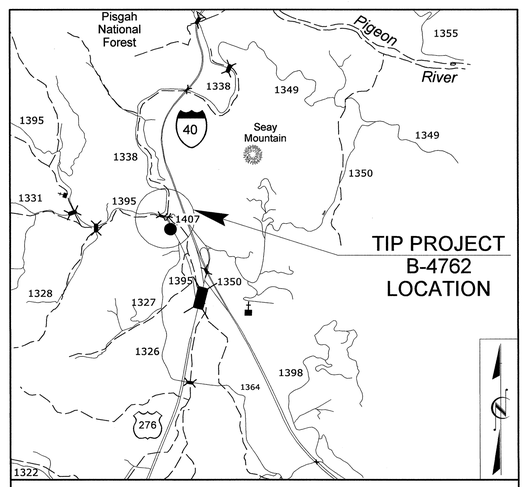
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSPORTATION MANAGEMENT PLAN

HAYWOOD COUNTY



VICINITY MAP

REPLACEMENT OF BRIDGE No. 72 ON SR 1407 (MEDLEY RD.) OVER JONATHAN CREEK.

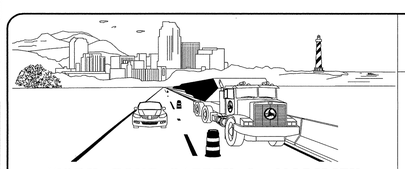
INDEX OF SHEETS

SHEET NO.	TITLE
TMP-1	TITLE SHEET, AND INDEX OF SHEETS
TMP-1A	LIST OF APPLICABLE ROADWAY STANDARD DRAWINGS, LEGEND, AND TEMPORARY PAVEMENT MARKING
TMP-1B	MANAGEMENT STRATEGIES AND GENERAL/LOCAL NOTES
TMP-2	PORTABLE CONCRETE BARRIER AT TEMPORARY SHORING LOCATIONS
TMP-2A	TEMPORARY SHORING DATA
TMP-3	PHASE I DETAIL AND PHASING
TMP-3A	PHASE I SHORING DETAIL
TMP-3B	PHASE I TYPICAL SECTIONS
TMP-4	PHASE II DETAIL AND PHASING

SHEET NO.
TMP-1

B-4762

TIP PROJECT:



WORK ZONE SAFETY & MOBILITY
"from the MOUNTAINS to the COAST"

N.C.D.O.T. WORK ZONE TRAFFIC CONTROL
1561 MAIL SERVICE CENTER (MSC) RALEIGH, NC 27699-1561
750 N. GREENFIELD PARKWAY, GARNER, NC 27529 (DELIVERY)
PHONE: (919) 773-2800 FAX: (919) 771-2745

J. S. BOURNE, P.E. — STATE TRAFFIC MANAGEMENT ENGINEER
G. L. GETTIER, P.E. — TRAFFIC CONTROL PROJECT ENGINEER
J. W. GILSTRAP — TRAFFIC CONTROL PROJECT DESIGN ENGINEER
S. HASSAN — TRAFFIC CONTROL DESIGN ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WORK ZONE TRAFFIC CONTROL

APPROVED:
DATE:
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 8973 ENGINEER G. L. GETTIER
6 Dec 13

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PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-1A

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.01	WORK ZONE ADVANCE WARNING SIGNS
1101.02	TEMPORARY LANE CLOSURES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1130.01	DRUMS
1135.01	CONES
1145.01	BARRICADES
1150.01	FLAGGING DEVICES
1160.01	TEMPORARY CRASH CUSHION
1165.01	WORK VEHICLE LIGHTING SYSTEMS AND TMA DELINEATION
1170.01	PORTABLE CONCRETE BARRIER
1180.01	SKINNY - DRUM

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- DIRECTION OF PEDESTRIAN TRAFFIC FLOW
- EXIST. PVMT.
- NORTH ARROW
- PROPOSED PVMT.
- TEMP. SHORING (LOCATION PURPOSES ONLY)
- WORK AREA
- REMOVAL
- AGGREGATE BASE COURSE (ABC)

SIGNALS

- EXISTING
- PROPOSED
- TEMPORARY

PAVEMENT MARKINGS

- EXISTING LINES
- TEMPORARY LINES

TRAFFIC CONTROL DEVICES

- BARRICADE (TYPE III)
- CONE
- DRUM
- SKINNY DRUM
- TUBULAR MARKER
- TEMPORARY CRASH CUSHION
- FLASHING ARROW BOARD
- FLAGGER
- LAW ENFORCEMENT
- TRUCK MOUNTED ATTENUATOR (TMA)
- CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

- PORTABLE SIGN
- STATIONARY SIGN
- STATIONARY OR PORTABLE SIGN

PAVEMENT MARKERS

- CRYSTAL/CRYSTAL
- CRYSTAL/RED
- YELLOW/YELLOW

PAVEMENT MARKING SYMBOLS

- PAVEMENT MARKING SYMBOLS

TEMPORARY PAVEMENT MARKING

NOT APPLICABLE

APPROVED: _____ DATE: _____

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 8973 ENGINEER G. L. GETTIER 3/22/13

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

ROADWAY STANDARD DRAWINGS & LEGEND

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PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-1B

MANAGEMENT STRATEGIES

CONSTRUCTION

CONSTRUCT PROPOSED STRUCTURE ON NEW ALIGNMENT WITH NEW APPROACHES AND CONSTRUCT NEW DRIVEWAYS. REMOVE EXISTING STRUCTURE AND APPRAOCHES.

TMP DESIGN PARAMETERS

FLAGGING SHALL BE UTILIZED TO CONSTRUCT NEW ROADWAYS, DRIVEWAYS, AND TIE-INS.

TRAFFIC SHALL BE MAINTAINED TO ALL EXISTING DRIVEWAYS LOCATED WITHIN THE PROJECT LIMITS.

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT EXCEPT WHEN OTHERWISE NOTED IN THE PLAN OR DIRECTED BY THE ENGINEER.

LANE AND SHOULDER CLOSURE REQUIREMENTS

A) REMOVE LANE CLOSURE DEVICES FROM THE LANE WHEN WORK IS NOT BEING PERFORMED BEHIND THE LANE CLOSURE OR WHEN A LANE CLOSURE IS NO LONGER NEEDED OR AS DIRECTED BY THE ENGINEER.

B) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO AN UNDIVIDED FACILITY AND WITHIN 5 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO A DIVIDED FACILITY AND WITHIN 10 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

C) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN A LANE OF TRAVEL OF AN UNDIVIDED OR DIVIDED FACILITY, CLOSE THE LANE ACCORDING TO THE TRAFFIC CONTROL PLANS, ROADWAY STANDARD DRAWINGS, OR AS DIRECTED BY THE ENGINEER. CONDUCT THE WORK SO THAT ALL PERSONNEL AND/OR EQUIPMENT REMAIN WITHIN THE CLOSED TRAVEL LANE.

D) DO NOT WORK SIMULTANEOUSLY WITHIN 15 FT ON BOTH SIDES OF AN OPEN TRAVELWAY, RAMP, OR LOOP WITHIN THE SAME LOCATION UNLESS PROTECTED WITH GUARDRAIL OR BARRIER.

E) PROVIDE TRAFFIC CONTROL FOR APPROPRIATE LANE CLOSURES FOR SURVEYING DONE BY THE DEPARTMENT.

PAVEMENT EDGE DROP OFF REQUIREMENTS

F) BACKFILL AT A 6:1 SLOPE UP TO THE EDGE AND ELEVATION OF EXISTING PAVEMENT IN AREAS ADJACENT TO AN OPENED TRAVEL LANE THAT HAS AN EDGE OF PAVEMENT DROP-OFF AS FOLLOWS:

BACKFILL DROP-OFFS THAT EXCEED 2 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS OF 45 MPH OR GREATER.

BACKFILL DROP-OFFS THAT EXCEED 3 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS LESS THAN 45 MPH.

BACKFILL WITH SUITABLE COMPACTED MATERIAL, AS APPROVED BY THE ENGINEER, AT NO EXPENSE TO THE DEPARTMENT.

TRAFFIC PATTERN ALTERATIONS

G) NOTIFY THE ENGINEER TWENTY ONE (21) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

H) INSTALL ADVANCE WORK ZONE WARNING SIGNS WHEN WORK IS WITHIN 40 FT FROM THE EDGE OF TRAVEL LANE AND NO MORE THAN THREE (3) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

I) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

TRAFFIC BARRIER

J) INSTALL TEMPORARY BARRIER ACCORDING TO THE TRAFFIC CONTROL PLANS A MAXIMUM OF TWO (2) WEEKS PRIOR TO BEGINNING WORK IN ANY LOCATION. ONCE TEMPORARY BARRIER IS INSTALLED AT ANY LOCATION PROCEED IN A CONTINUOUS MANNER TO COMPLETE THE PROPOSED WORK IN THAT LOCATION UNLESS OTHERWISE STATED IN THE TRAFFIC CONTROL PLANS OR AS DIRECTED BY THE ENGINEER.

DO NOT PLACE BARRIER DIRECTLY ON ANY SURFACE OTHER THAN ASPHALT OR CONCRETE.

ONCE TEMPORARY BARRIER IS INSTALLED AT ANY LOCATION AND NO WORK IS PERFORMED BEHIND THE TEMPORARY BARRIER FOR A PERIOD LONGER THAN TWO (2) MONTHS, REMOVE/RESET TEMPORARY BARRIER AT NO COST TO THE DEPARTMENT UNLESS OTHERWISE STATED IN THE TRAFFIC CONTROL PLANS, TEMPORARY BARRIER IS PROTECTING A HAZARD, OR AS DIRECTED BY THE ENGINEER.

INSTALL TEMPORARY BARRIER WITH THE TRAFFIC FLOW BEGINNING WITH THE UPSTREAM SIDE OF TRAFFIC. REMOVE TEMPORARY BARRIER AGAINST THE TRAFFIC FLOW BEGINNING WITH THE DOWNSTREAM SIDE OF TRAFFIC.

INSTALL AND SPACE DRUMS NO GREATER THAN TWICE THE POSTED SPEED LIMIT (MPH) TO CLOSE OR KEEP THE SECTION OF THE ROADWAY CLOSED UNTIL THE TEMPORARY BARRIER CAN BE PLACED OR AFTER THE TEMPORARY BARRIER IS REMOVED.

K) PROTECT THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER AT ALL TIMES DURING THE INSTALLATION AND REMOVAL OF THE BARRIER BY EITHER A TRUCK MOUNTED IMPACT ATTENUATOR (MAXIMUM 72 HOURS) OR A TEMPORARY CRASH CUSHION.

PROTECT THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER FROM ONCOMING TRAFFIC AT ALL TIMES BY A TEMPORARY CRASH CUSHION UNLESS THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER IS OFFSET FROM ONCOMING TRAFFIC AS FOLLOWS OR AS SHOWN IN THE PLANS:

POSTED SPEED LIMIT	MINIMUM OFFSET
40 OR LESS	15 FT
45 - 50	20 FT
55	25 FT
60 MPH or HIGHER	30 FT

TRAFFIC CONTROL DEVICES

L) WHEN LANE CLOSURES ARE NOT IN EFFECT SPACE CHANNELIZING DEVICES IN WORK AREAS NO GREATER IN FEET THAN TWICE THE POSTED SPEED LIMIT (MPH) EXCEPT, 10 FT ON-CENTER IN RADII, AND 3 FT OFF THE EDGE OF AN OPEN TRAVELWAY. REFER TO STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES SECTIONS 1130 (DRUMS), 1135 (CONES) AND 1180 (SKINNY DRUMS) FOR ADDITIONAL REQUIREMENTS.

M) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11-2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY.

APPROVED:_____ DATE:_____

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 8973 ENGINEER G. L. GETTIER

DIVISION OF HIGHWAYS · STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · WORK ZONE TRAFFIC CONTROL

MANAGEMENT STRATEGIES AND GENERAL/LOCAL NOTES

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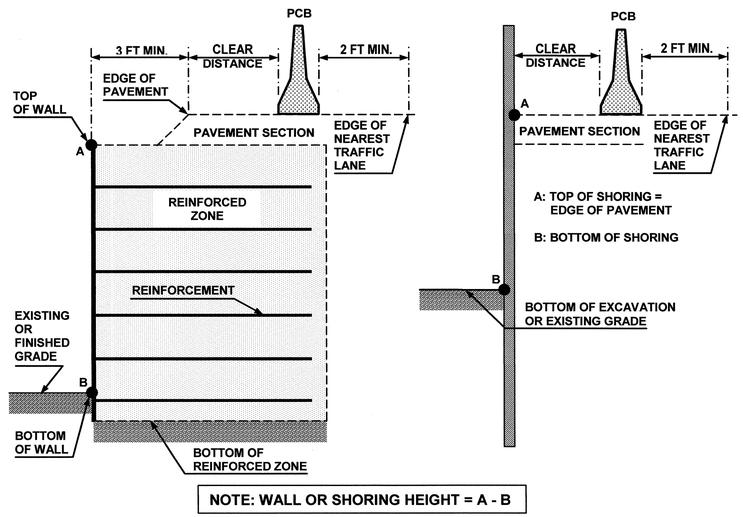

FIGURE A

NOTES

1- REFER TO THE TRAFFIC CONTROL PLANS FOR TEMPORARY SHORING LOCATIONS AND NOTES.

2- REFER TO THE "TEMPORARY SHORING" PROJECT SPECIAL PROVISION FOR INFORMATION ABOUT TEMPORARY SHORING AND PORTABLE CONCRETE BARRIER (PCB).

3- PCB IS REQUIRED IF TEMPORARY SHORING IS LOCATED WITHIN THE CLEAR ZONE IN ACCORDANCE WITH THE AASHTO ROADSIDE DESIGN GUIDE. DO NOT PLACE BARRIER DIRECTLY ON ANY SURFACE OTHER THAN ASPHALT OR CONCRETE. (CONTACT NCDOT PAVEMENT MANAGEMENT UNIT FOR APPLICABLE PAVEMENT DESIGN).

4- BASED ON THE CLEAR DISTANCE, OFFSET, DESIGN SPEED AND PAVEMENT TYPE, CHOOSE AN UNANCHORED OR ANCHORED PCB FROM THE TABLE SHOWN IN FIGURE B. CLEAR DISTANCE IS DEFINED AS SHOWN IN FIGURE A AND OFFSET IS DEFINED AS SHOWN IN FIGURE B.

5- AT THE CONTRACTOR'S OPTION OR IF THE MINIMUM REQUIRED CLEAR DISTANCE IS NOT AVAILABLE, SET PCB NEXT TO AND UP AGAINST THE TRAFFIC SIDE OF THE TEMPORARY SHORING EXCEPT FOR BARRIER ABOVE TEMPORARY WALLS. PCB WITH THE MINIMUM REQUIRED CLEAR DISTANCE IS REQUIRED ABOVE TEMPORARY WALLS.

6- USE NCDOT PORTABLE CONCRETE BARRIER (PCB) IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1170.01 AND SECTION 1170 OF THE STANDARD SPECIFICATIONS.

7- PCB REQUIREMENTS FOR TEMPORARY WALLS APPLY TO TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS AND TEMPORARY SOIL NAIL WALLS.

8- SET PCB WITH A MINIMUM HORIZONTAL DISTANCE OF 2 FT BETWEEN THE FRONT FACE OF THE BARRIER AND THE EDGE OF THE NEAREST TRAFFIC LANE AS SHOWN IN FIGURE A UNLESS OTHERWISE SHOWN IN THE PLANS AND OR AS APPROVED BY THE ENGINEER.

9- FOR PCB ABOVE AND BEHIND TEMPORARY WALLS, PROVIDE A MINIMUM DISTANCE OF 3 FT BETWEEN THE EDGE OF PAVEMENT AND THE WALL FACE AS SHOWN IN FIGURE A. IF THESE MINIMUM REQUIRED DISTANCES ARE NOT AVAILABLE, CONTACT THE ENGINEER.

10- TABLE SHOWN IN FIGURE B IS BASED ON NCDOT RESEARCH PROJECT NO. 2005-010 WITH VEHICLE TYPE USED FOR NCHRP 350 CRASH TESTS. BARRIER DEFLECTIONS AND RESULTING MINIMUM REQUIRED CLEAR DISTANCES MIGHT VARY SIGNIFICANTLY FOR LARGER HEAVIER VEHICLES, RUNS OF BARRIER LESS THAN 200 FT IN LENGTH AND WET OR DRY PAVEMENT.

MINIMUM REQUIRED CLEAR DISTANCE, inches

Barrier Type	Pavement Type	Offset * ft	Design Speed, mph <30	31-40	41-50	51-60	61-70	71-80
Unanchored PCB	Asphalt	<8	24	26	29	32	36	40
		8-14	26	28	31	35	38	42
		14-20	27	29	34	36	39	43
		20-26	28	31	35	38	40	44
		26-32	29	32	36	39	42	45
		32-38	30	34	38	41	43	46
		38-44	31	34	41	43	45	48
		44-50	31	35	41	43	46	49
		50-56	32	36	42	44	47	50
		>56	32	36	42	45	47	51
	Concrete	<8	17	18	21	22	25	26
		8-14	19	20	23	25	26	29
		14-20	22	22	24	26	28	31
		20-26	23	24	26	27	30	34
		26-32	24	25	27	28	32	35
		32-38	24	26	27	30	33	36
		38-44	25	26	28	30	34	37
		44-50	26	26	28	32	35	37
		50-56	26	26	28	32	35	38
		>56	26	27	29	32	36	38
Anchored PCB	Asphalt	All Offsets	24 for All Design Speeds					
Anchored PCB	Concrete (including bridge approach slabs)	All Offsets	12 for All Design Speeds					

* See Figure Below

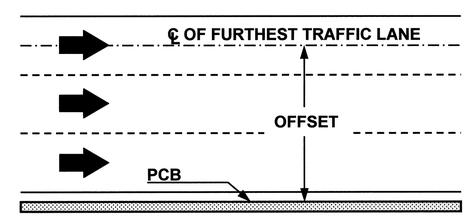

FIGURE B

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WORK ZONE TRAFFIC CONTROL

PORTABLE CONCRETE BARRIER
AT
TEMPORARY SHORING LOCATIONS

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Userrtshassan

PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-2A

SHORING LOCATION NO. 1

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION 10+23± -Y1-, ALONG EXISTING EDGE OF PAVEMENT FOR MEDLEY DRIVE TO THE EXISTING BRIDGE. FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEIGHT (γ) = 120 LB/CF
FRICTION ANGLE (ϕ) = 30 DEGREES
COHESION (c) = 0 LB/SF
GROUNDWATER ELEVATION = 2468 FT

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION 10+23± -Y1-, ALONG EXISTING EDGE OF PAVEMENT FOR MEDLEY DRIVE TO THE EXISTING BRIDGE. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION.

DRIVEN PILING FOR TEMPORARY SHORING FROM STATION 10+23± -Y1-, ALONG EXISTING EDGE OF PAVEMENT FOR MEDLEY DRIVE TO THE EXISTING BRIDGE MAY NOT PENETRATE BELOW ELEVATION 2467 FT DUE TO OBSTRUCTIONS, VERY DENSE OR HARD SOIL, BOULDERS OR WEATHERED OR HARD ROCK.

AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING FOR TEMPORARY SHORING FROM STATION 10+23± -Y1-, ALONG EXISTING EDGE OF PAVEMENT FOR MEDLEY DRIVE TO THE EXISTING BRIDGE. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

IT MAY BE PREFERRED TO USE A TEMPORARY SOIL NAIL WALL FOR TEMPORARY SHORING FROM STATION 10+23± -Y1-, ALONG EXISTING EDGE OF PAVEMENT FOR MEDLEY DRIVE TO THE EXISTING BRIDGE. FOR TEMPORARY SOIL NAIL WALLS, SEE TEMPORARY SOIL NAIL WALLS PROVISION.

SHORING LOCATION NO. 2

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION 10+84± -L-, 19 FT LT TO STATION 10+98± -L-, 21.5 FT LT, TO STATION 11+03± -L-, 24.5 FT LT. FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUND WATER ELEVATION:

UNIT WEIGHT (γ) = 120 LB/CF
FRICTION ANGLE (ϕ) = 30 DEGREES
COHESION (c) = 0 LB/SF
GROUNDWATER ELEVATION = 2468 FT

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION 10+84± -L-, 19 FT LT TO STATION 10+98± -L-, 21.5 FT LT, TO STATION 11+03± -L-, 24.5 FT LT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DISEGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION.

DRIVEN PILING FOR TEMPORARY SHORING FROM STATION 10+84± -L-, 19 FT LT TO STATION 10+98± -L-, 21.5 FT LT, TO STATION 11+03± -L-, 24.5 FT LT, MAY NOT PENETRATE BELOW ELVATION 2468 FT DUE TO OBSTRUCTIONS, VERY DENSE OR HARD SOIL, BOULDERS OR WEATHERED OR HARD ROCK.

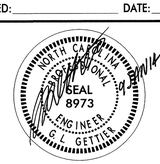
AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING FOR TEMPORARY SHORING FROM STATION 10+84± -L-, 19 FT LT TO STATION 10+98± -L-, 21.5 FT LT, TO STATION 11+03± -L-, 24.5 FT LT. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

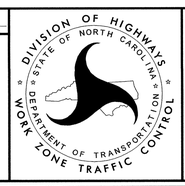
IT MAY BE PREFERRED TO USE A TEMPORARY SOIL NAIL WALL FOR TEMPORARY SHORING FROM STATION 10+84± -L-, 19 FT LT TO STATION 10+98± -L-, 21.5 FT LT, TO STATION 11+03± -L-, 24.5 FT LT. FOR TEMPORARY SOIL NAIL WALLS, SEE TEMPORARY SOIL NAIL WALLS PROVISION.

THE TEMPORARY SHORING NOTES SHOWN ON THIS SHEET WERE PROVIDED THROUGH A SEALED DOCUMENT FROM THE GEOTECHNICAL ENGINEERING UNIT. THE DOCUMENT WAS SUBMITTED TO THE WZTC SECTION ON DECEMBER 31, 2013 AND SEALED BY A PROFESSIONAL ENGINEER, SHANE C. CLARK, LICENSE #029869.

APPROVED: _____ DATE: _____

SEAL





TEMPORARY SHORING NOTES

1/9/2014
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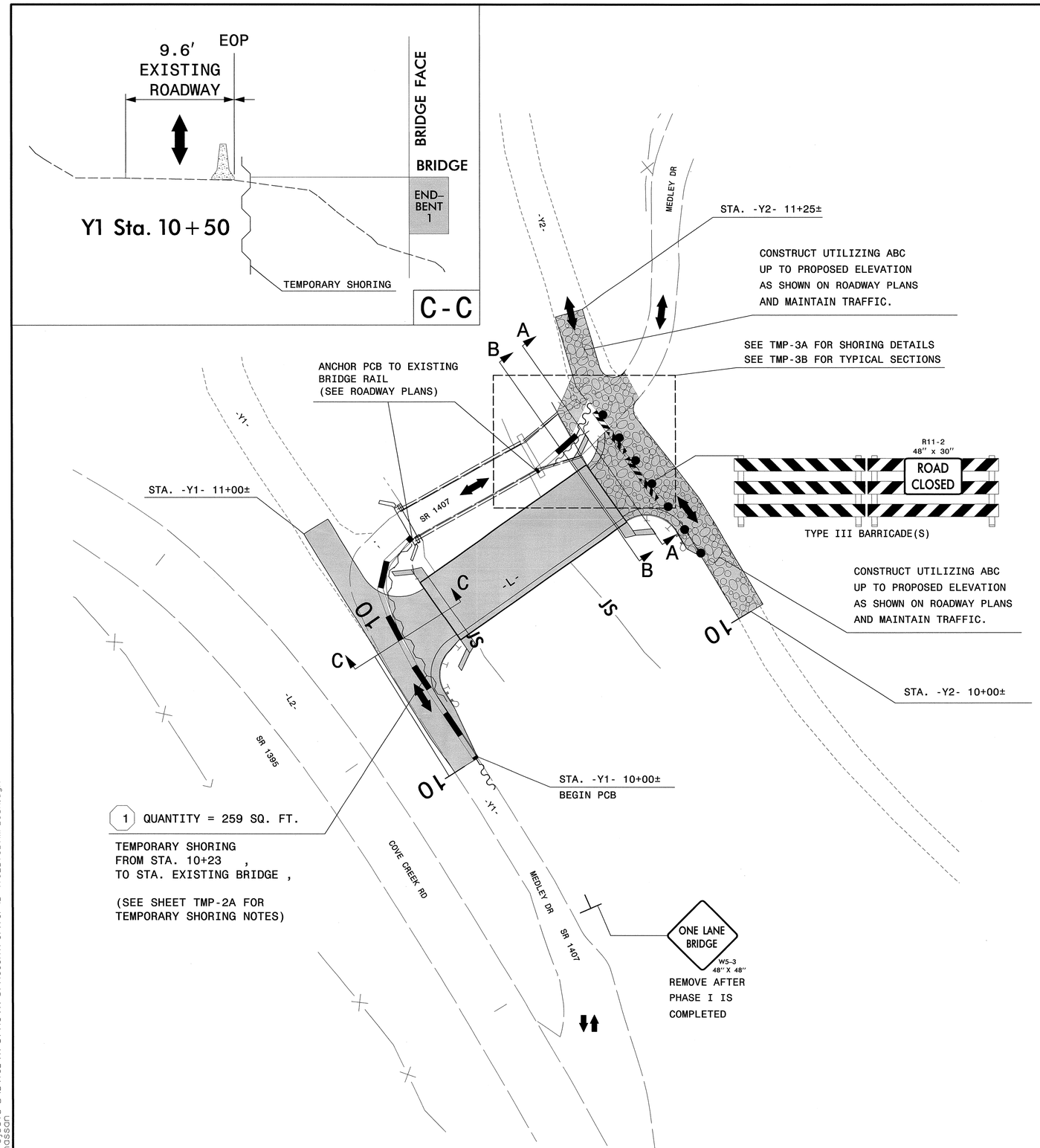
PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-3



PHASE I

STEP 1: USING ROADWAY STANDARD DRAWING (RSD) 1101.01, SHEET 3 OF 3, INSTALL ADVANCE WORK ZONE WARNING SIGNS AND W5-3 SIGN ON SR 1350/1407 (MEDLEY DR).

STEP 2: USING RSD 1101.02, SHEET 1 OF 15, AS REQUIRED:

- PLACE PORTABLE CONCRETE BARRIER (PCB) ALONG THE EXISTING EDGE OF PAVEMENT FROM -Y1- STA. 10+00±, RT., TO EXISTING STRUCTURE; AND FROM EXISTING STRUCTURE TO -L- STA. 10+96±. PLACE TEMPORARY ABC FROM EXISTING BRIDGE APPROACH TO -Y2- IN ORDER TO MAINTAIN MINIMUM 9′ TRAVEL LANE.

- AWAY FROM TRAFFIC, PLACE TEMPORARY SHORING AND BEGIN CONSTRUCTION OF PROPOSED STRUCTURE NO. 72, APPROACHES, AND TIE-INS WITH -Y1- AND -Y2- (SEE ROADWAY AND STRUCTURE PLANS).

STEP 3: - USING ROADWAY PLANS AND RSD 1101.02, SHEET 1 OF 15; CONSTRUCT THE FOLLOWING UP TO BUT NOT INCLUDING FINAL LAYER OF SURFACE COURSE:

  - -Y1- STA. 10+00± TO -Y1- 11+00± AS MUCH AS POSSIBLE WITH SHOULDER AND GUARDRAIL UTILIZING ASPHALT.
  - -Y2- STA. 10+00± TO -Y2- STA. 11+25± UTILIZING ABC. TIE INTO EXISTING GRAVEL DRIVEWAY AND EXISTING MEDLEY DR.

- COMPLETE CONSTRUCTION OF PROPOSED STRUCTURE NO. 72 AND APPROACHES.

APPROVED: _____ DATE: _____

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 8973 C. L. GETTIER

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

PHASE I DETAIL AND PHASING

1/9/2014
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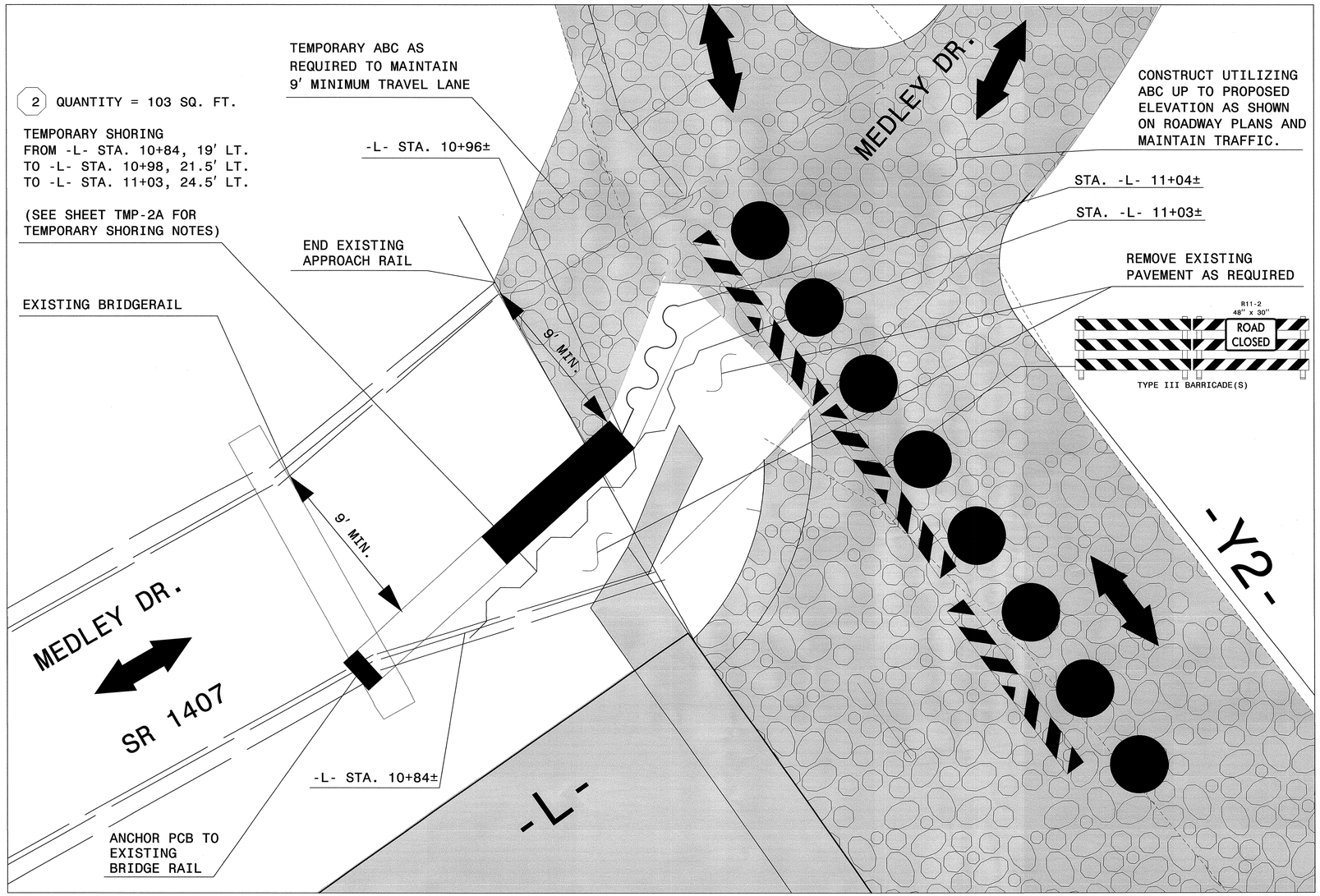
PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-3A



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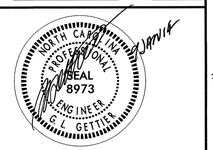

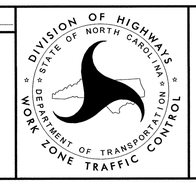

PHASE I
SHORING DETAIL

1/9/2014
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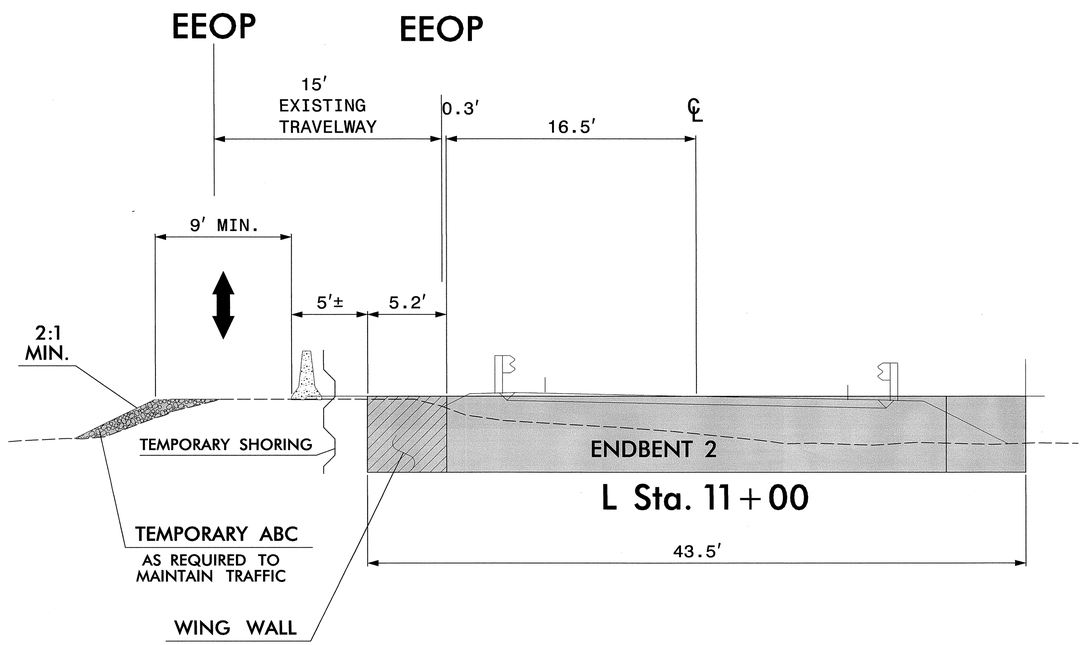
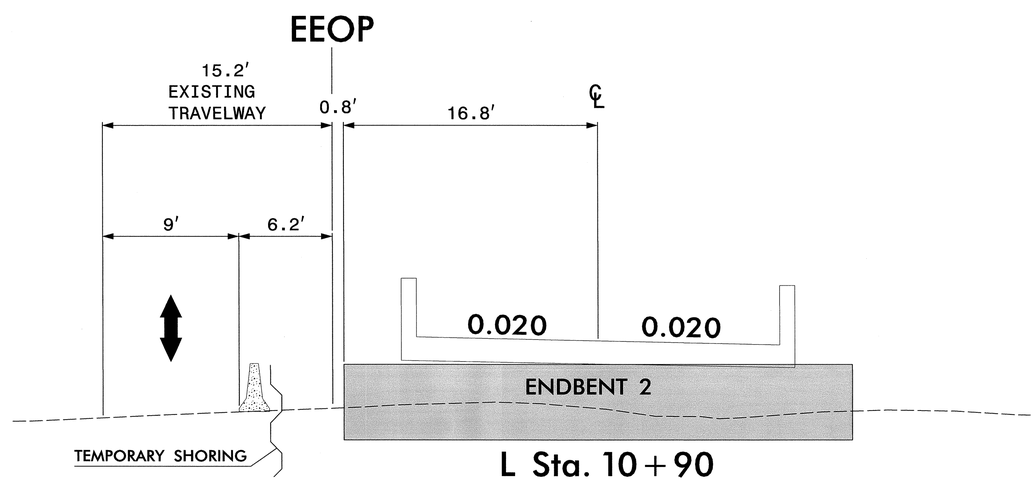
PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-3B

A-A



B-B



APPROVED: _____ DATE: _____

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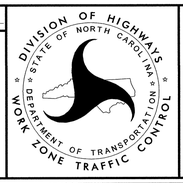

PHASE I
TYPICAL
SECTIONS

12/3/2013
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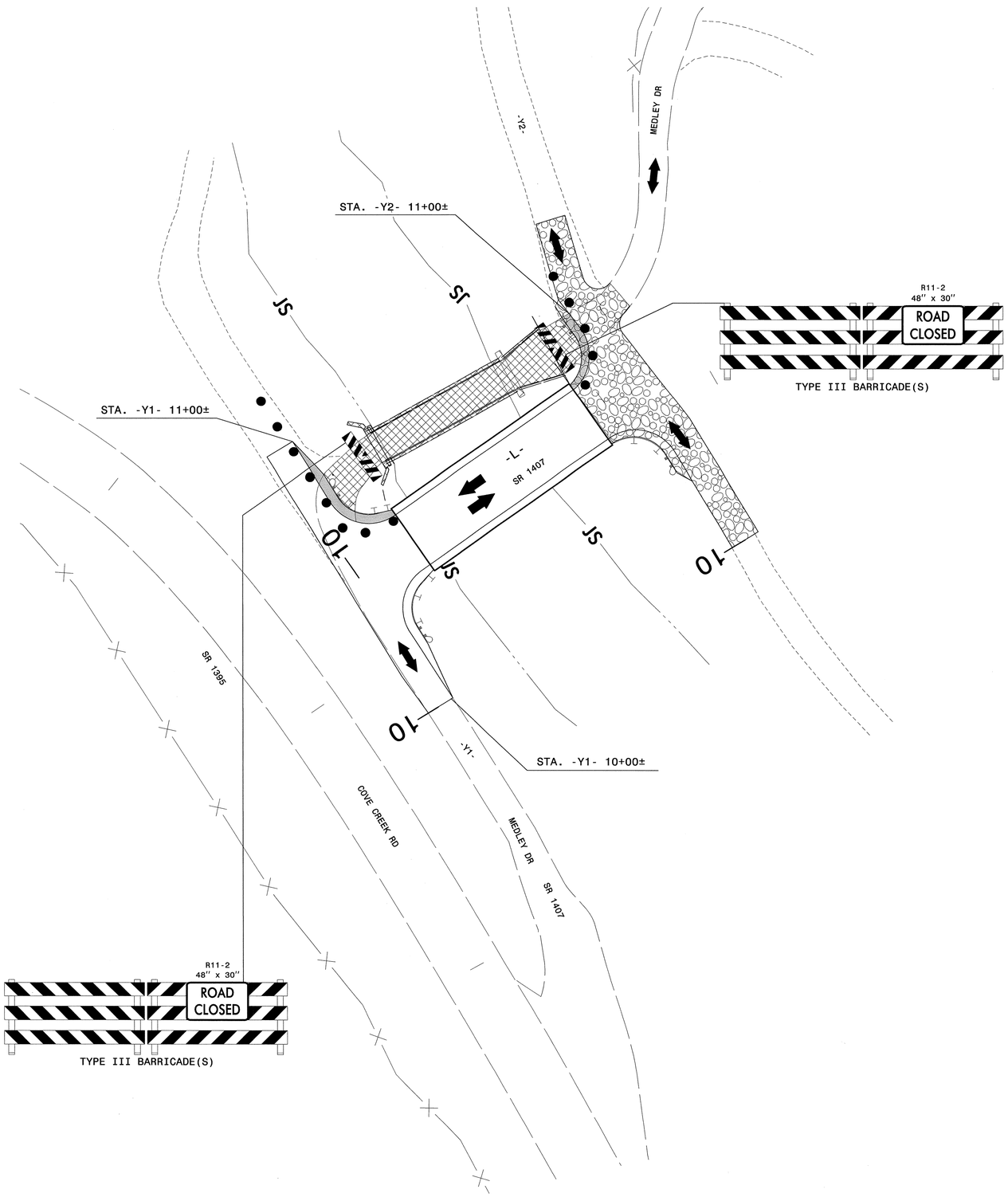
PROJ. REFERENCE NO.	SHEET NO.
B-4762	TMP-4



PHASE II

STEP 1: OPEN -L- TO TRAFFIC AND CLOSE EXISTING STRUCTURE NO. 72 TO TRAFFIC.

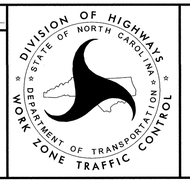
STEP 2:
- USING ROADWAY PLANS AND RSD 1101.02, SHEET 1 OF 15; CONSTRUCT THE FOLLOWING UP TO BUT NOT INCLUDING FINAL LAYER OF SURFACE COURSE:
  - FULL-DEPTH SHOULDER AND GUARDRAIL FROM PROPOSED STRUCTURE TO -Y1- STA. 11+00.
  - FULL-DEPTH SHOULDER AND GUARDRAIL FROM PROPOSED STRUCTURE TO -Y2- STA. 11+00.
- AWAY FROM TRAFFIC REMOVE EXISTING STRUCTURE NO. 72 AND APPROACHES.

STEP 3: USING RSD 1101.02, SHEET 1 OF 15, PLACE FINAL LAYER OF SURFACE COURSE ON -L-, -Y1-, AND -Y2- (SEE ROADWAY PLANS).

STEP 4: REMOVE ALL WORK ZONE SIGNS AND TEMPORARY TRAFFIC CONTROL DEVICES AND OPEN TO FINAL TRAFFIC PATTERN.

APPROVED:_____ DATE:_____

SEAL



PHASE II DETAIL AND PHASING

12/3/2013
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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4762	EC-1	

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

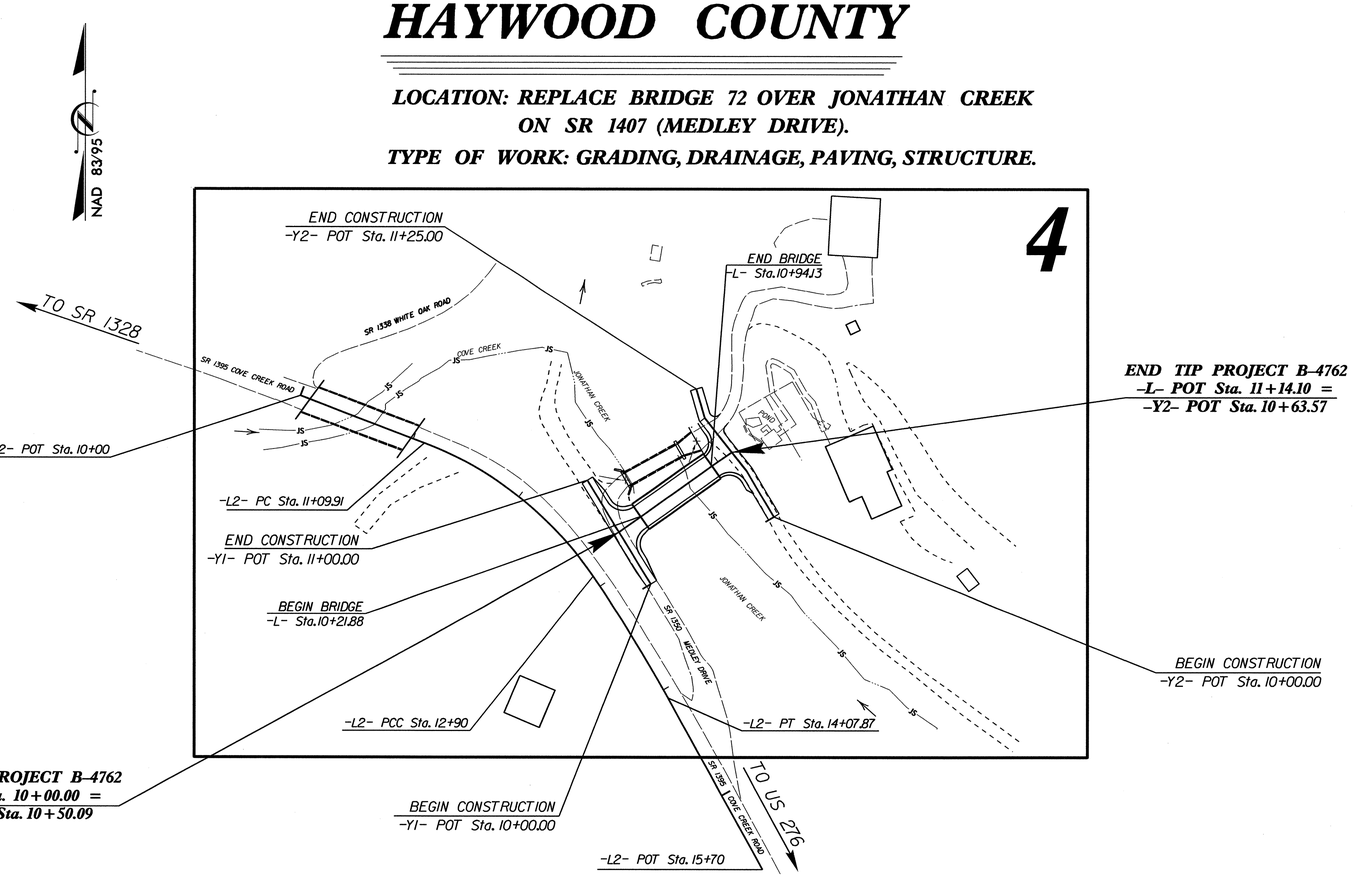
PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

HAYWOOD COUNTY

LOCATION: REPLACE BRIDGE 72 OVER JONATHAN CREEK ON SR 1407 (MEDLEY DRIVE).

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

TIP PROJECT: B-4762



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	EW / 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	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	
	Tiered Skimmer Basin	
	Infiltration Basin	

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

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

GRAPHIC SCALE

0
PLANS

0
PROFILE (HORIZONTAL)

0
PROFILE (VERTICAL)

ROADSIDE ENVIRONMENTAL UNIT
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE AUGUST 3, 2011 ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DIVISION OF WATER QUALITY.

Prepared In the Office of:

ROADSIDE ENVIRONMENTAL UNIT

1 South Wilmington St.
Raleigh, NC 27611

2012 STANDARD SPECIFICATIONS

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 2012 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		

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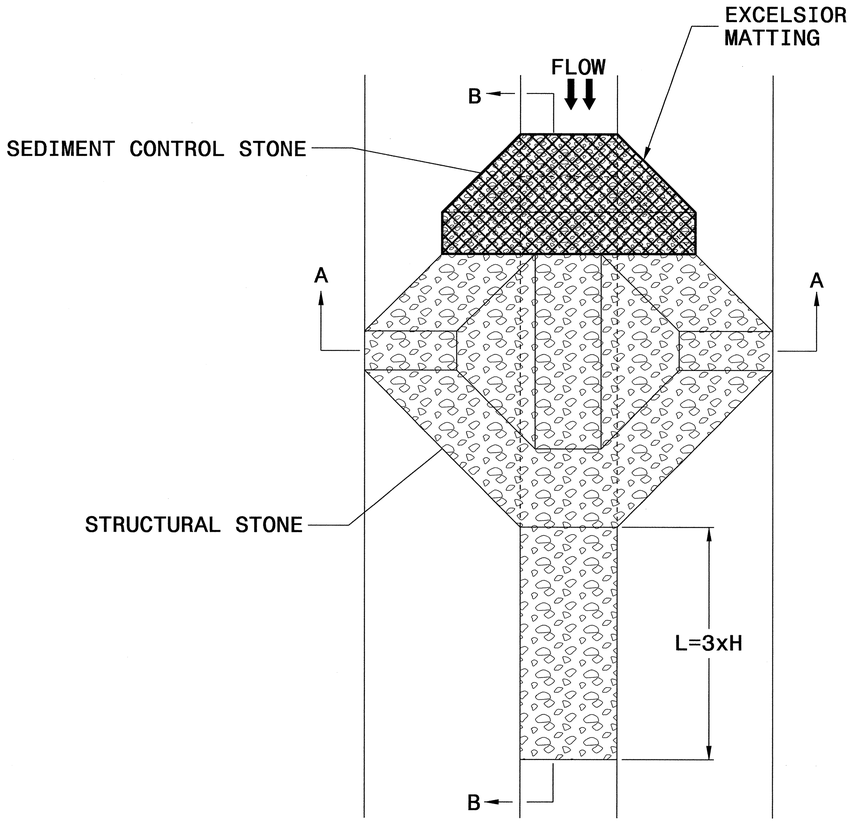
PROJECT REFERENCE NO.	SHEET NO.
B-4762	EC-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



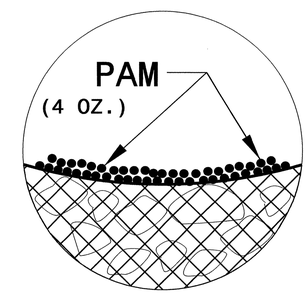
PLAN

NOTES

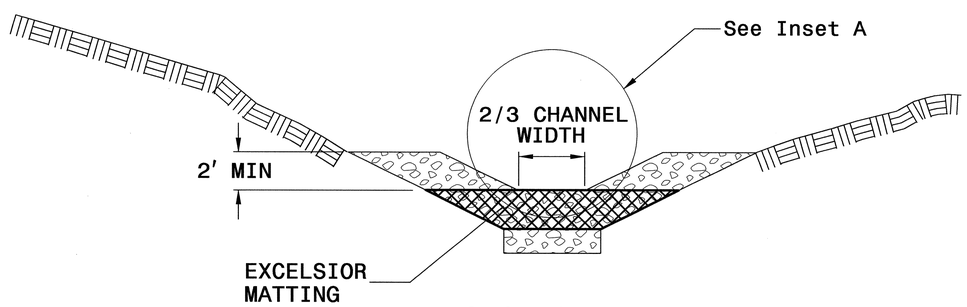
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.

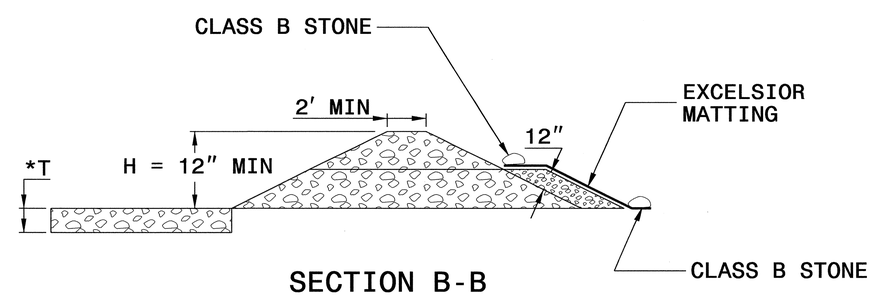
INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION A-A



SECTION B-B

*T = 12" MIN., 18" MAX.

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
B-4762	EC-3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION SUMMARY SHEET

PERMANENT SOIL REINFORCEMENT MAT

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4	-Y2-	10+10	10+80	RT	45
				SUBTOTAL	45
	ADDITIONAL PSRM TO BE INSTALLED				0
				TOTAL	45
				SAY	50

PERMANENT SOIL REINFORCEMENT MAT

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)

PROJECT REFERENCE NO.	SHEET NO.
B-4762	EC-3A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

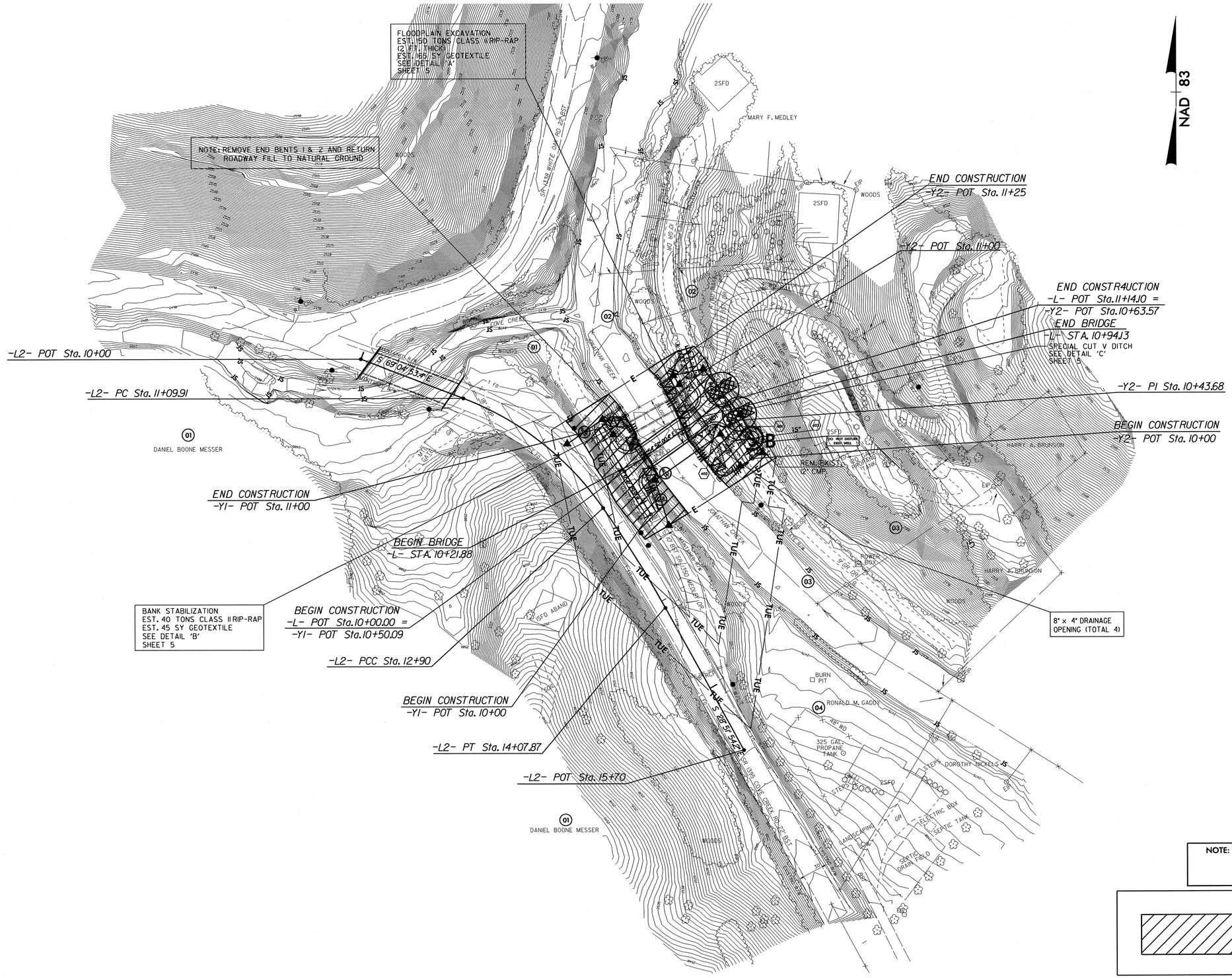
SOIL STABILIZATION TIMEFRAMES

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.

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-4762	EC-4/CONST.4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NOTE:
UTILIZE SPECIAL STILLING BASIN(S)
AS STILLING BASIN WHERE APPLICABLE.



CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE – B
AND TEMPORARY ROCK SILT CHECKS TYPE – A AT
DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

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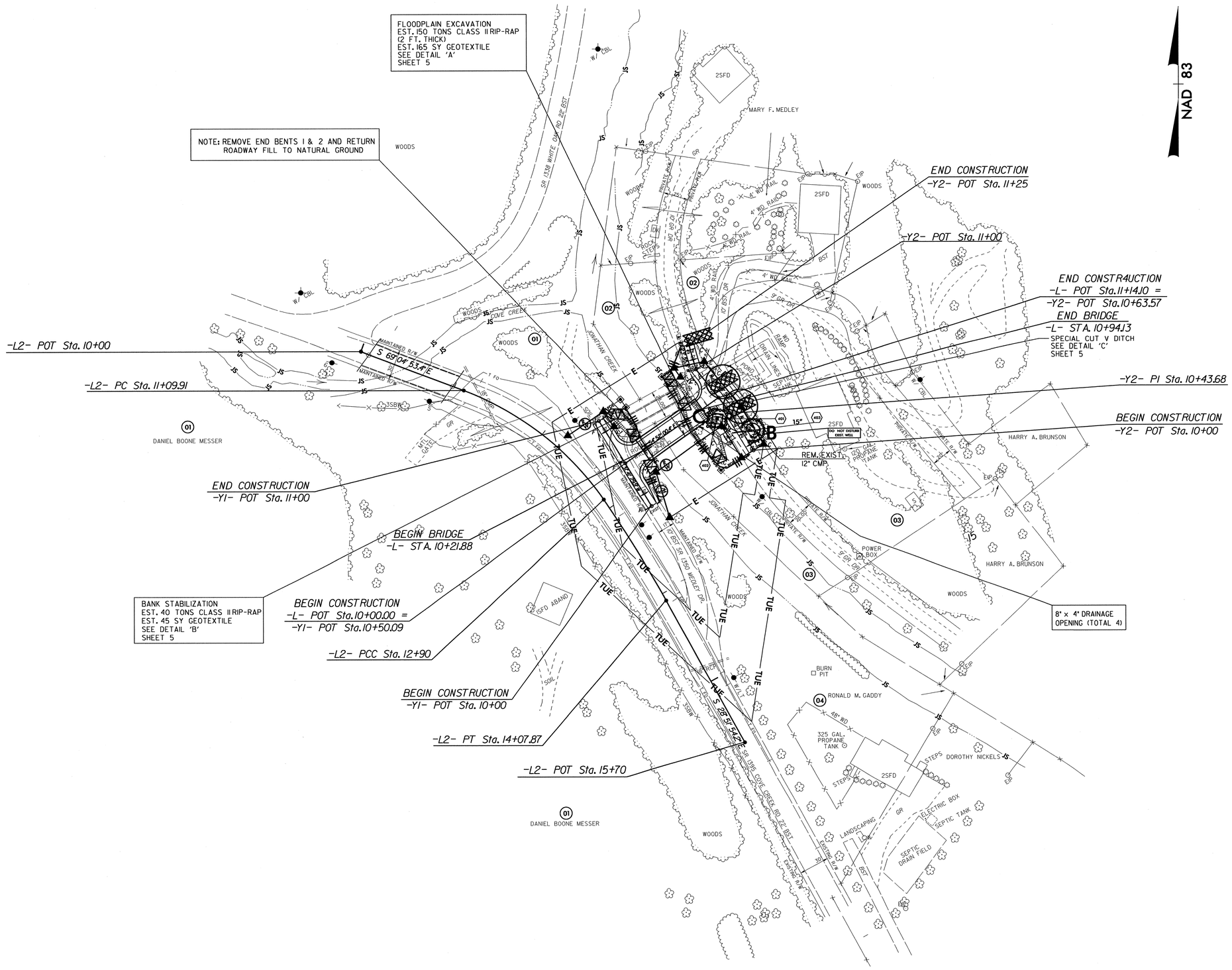
PROJECT REFERENCE NO.	SHEET NO.
B-4762	EC-5/CONST.4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NOTE:
UTILIZE SPECIAL STILLING BASIN(S) AS STILLING BASIN WHERE APPLICABLE.



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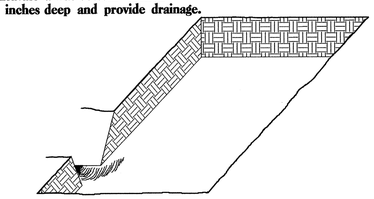
PROJECT REFERENCE NO.	SHEET NO.
B-4762	RF-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANTING DETAILS

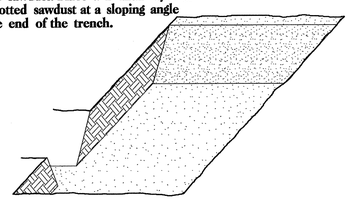
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

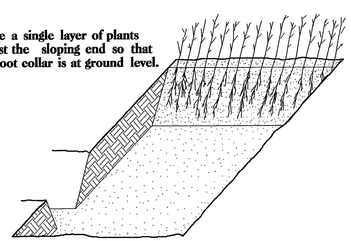
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



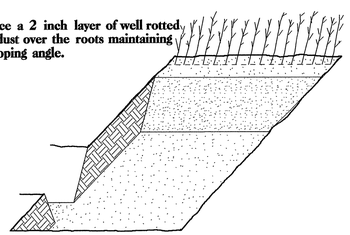
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

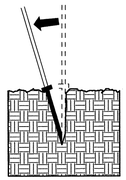


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

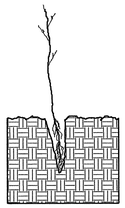


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

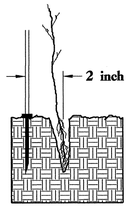
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



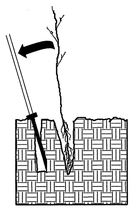
1. Insert planting bar as shown and pull handle toward planter.



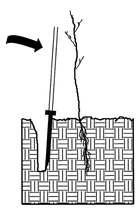
2. Remove planting bar and place seedling at correct depth.



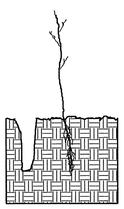
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

40%	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	12 in - 18 in BR
30%	LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
30%	FRAXINUS PENNSYLVANICA	GREEN ASH	12 in - 18 in BR

REFORESTATION DETAIL SHEET

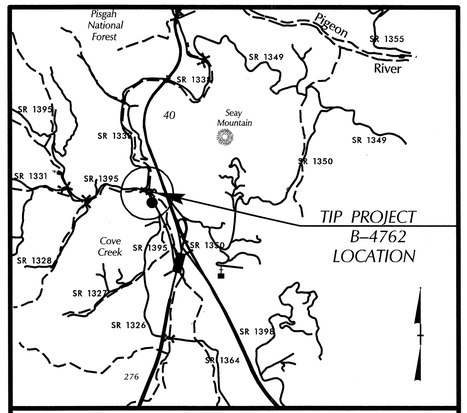
N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

T.I.P. NO.	SHEET NO.
B-4762	UO-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES BY OTHERS PLANS
HAYWOOD COUNTY

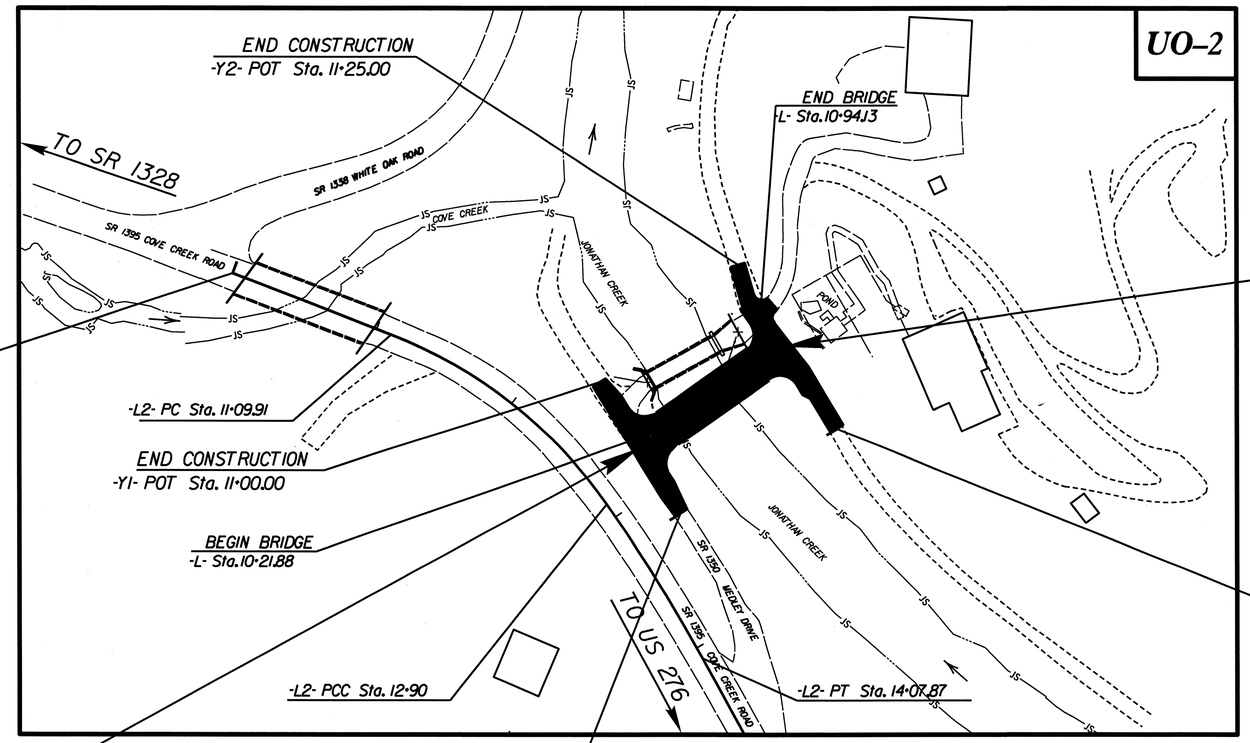
TIP PROJECT: B-4762



VICINITY MAP

LOCATION: REPLACE BRIDGE 72 OVER JONATHAN CREEK ON SR 1407 (MEDLEY DRIVE).

TYPE OF WORK: AERIAL POWER AND TELEPHONE



GRAPHIC SCALES

50 25 0 50 100 — PLANS

50 25 0 50 100 — PROFILE (HORIZONTAL)

10 5 0 10 20 — PROFILE (VERTICAL)

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
UO-1	TITLE SHEET
UO-2	UTILITIES BY OTHERS PLAN SHEET

UTILITY OWNERS ON PROJECT

(1) AT&T OF NC - TELEPHONE
(2) HAYWOOD EMC - POWER DISTRIBUTION

Cardno

CARDNO (NC), INC.
7606 WHITEHALL EXECUTIVE CTR DR
SUITE 800
CHARLOTTE NC 28273
PHONE (704) 927-9700
FAX (704) 529-3272

Thomas J. Yocom, P.L.S. SENIOR PROJECT MANAGER

PREPARED IN THE OFFICE OF:
DIVISION OF HIGHWAYS
UTILITIES UNIT
UTILITIES ENGINEERING
1555 MAIL SERVICES CENTER
RALEIGH NC 27699-1555
PHONE (919) 707-6690
FAX (919) 250-4151

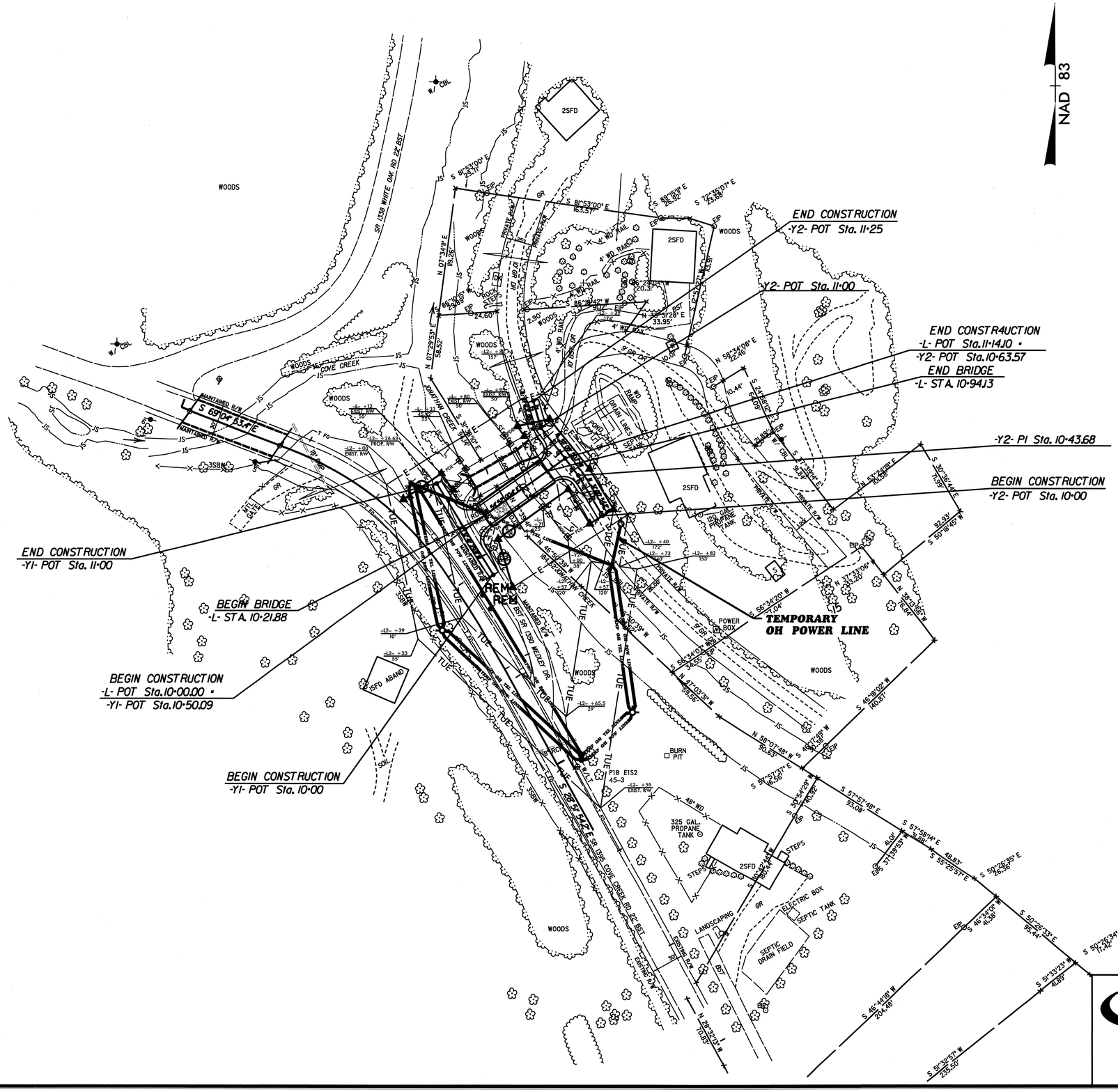
Roger Worthington, P.E. UTILITIES SECTION ENGINEER
Carl Barclay, P.E. UTILITIES SQUAD LEADER PROJECT ENGINEER
Bo Hemphill, P.E. UTILITIES PROJECT DESIGNER

09/08/99
$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
B-4762	U0-2

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS



Cardno

CARDNO (NC), INC.
7606 WHITEHALL EXECUTIVE CTR DR
SUITE 800
CHARLOTTE NC 28273
PHONE (704) 927-9700
FAX (704) 529-3272

5/14/99
$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$GRAPHIC$$$$

PROJ. REFERENCE NO.	SHEET NO.
B-4762	X-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

NOTE: EMBANKMENT COLUMN DOES NOT INCLUDE BACKFILL FOR UNDERCUT

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+05.52	0	0
10+10.00	1	1
10+20.00	0	43
10+21.88	0	16

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+94.13	0	0
11+00.00	0	15
11+07.96	0	20

Station Y1	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+00.00	0	0
10+25.00	1	2
10+50.00	2	1
10+75.00	1	0
11+00.00	0	0

Station Y2	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+00.00	0	0
10+10.00	5	0
10+20.00	3	1
10+30.00	1	2
10+40.00	1	5
10+50.00	1	8
10+60.00	1	6
10+70.00	2	2
10+80.00	5	1
10+90.00	7	0
11+00.00	5	0
11+10.00	2	1
11+20.00	2	0
11+25.00	1	1

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

Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

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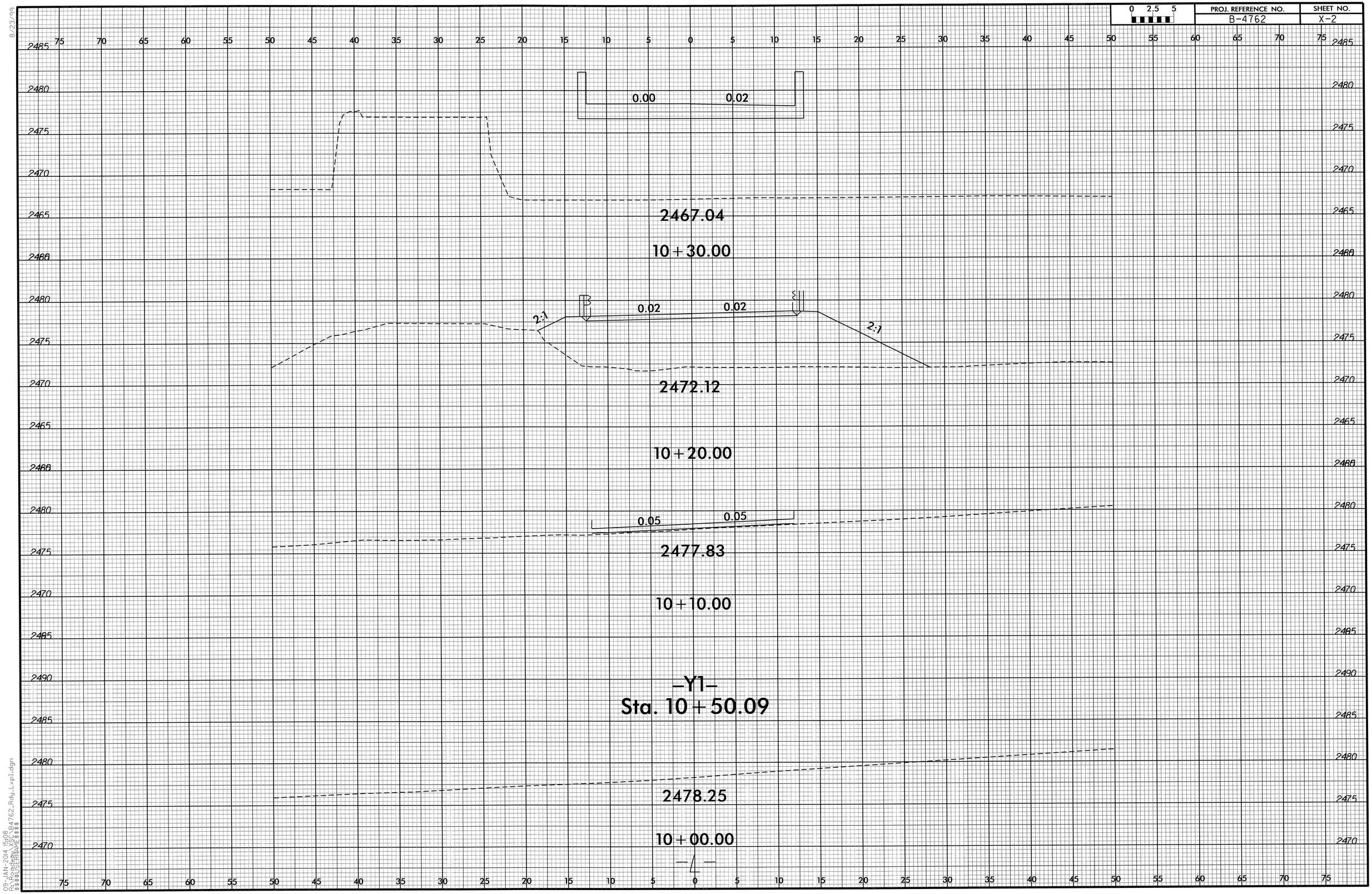

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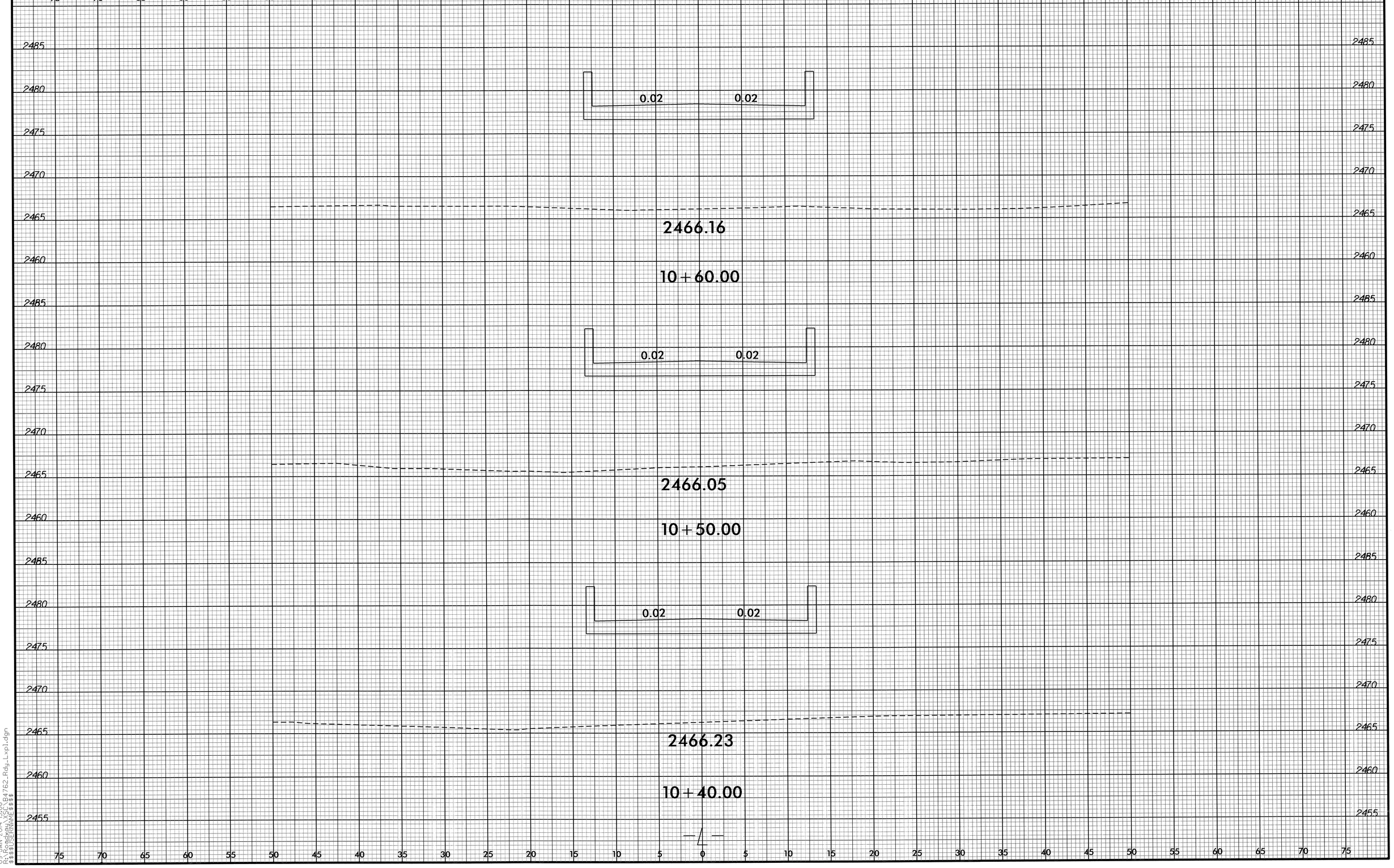

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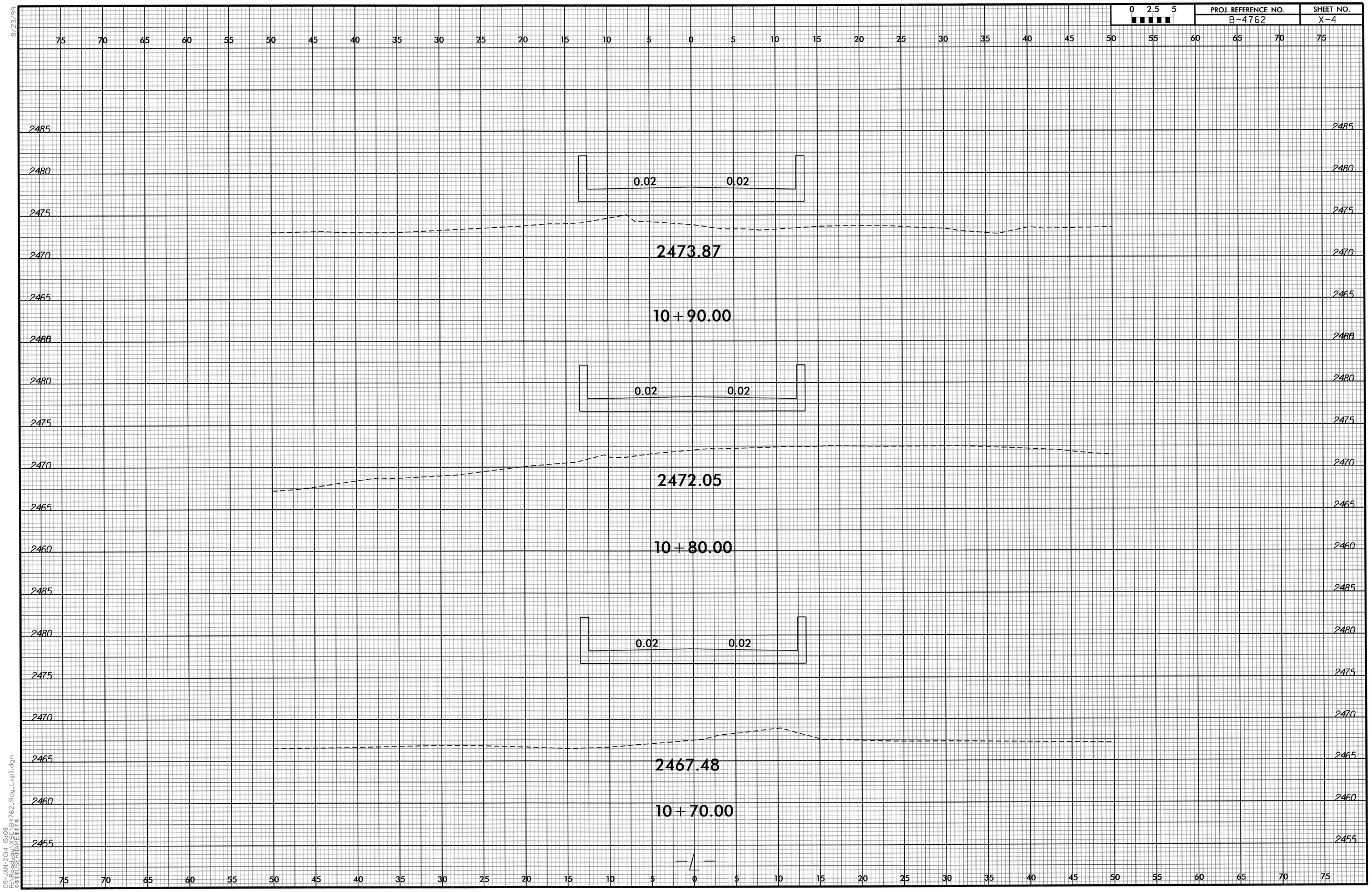

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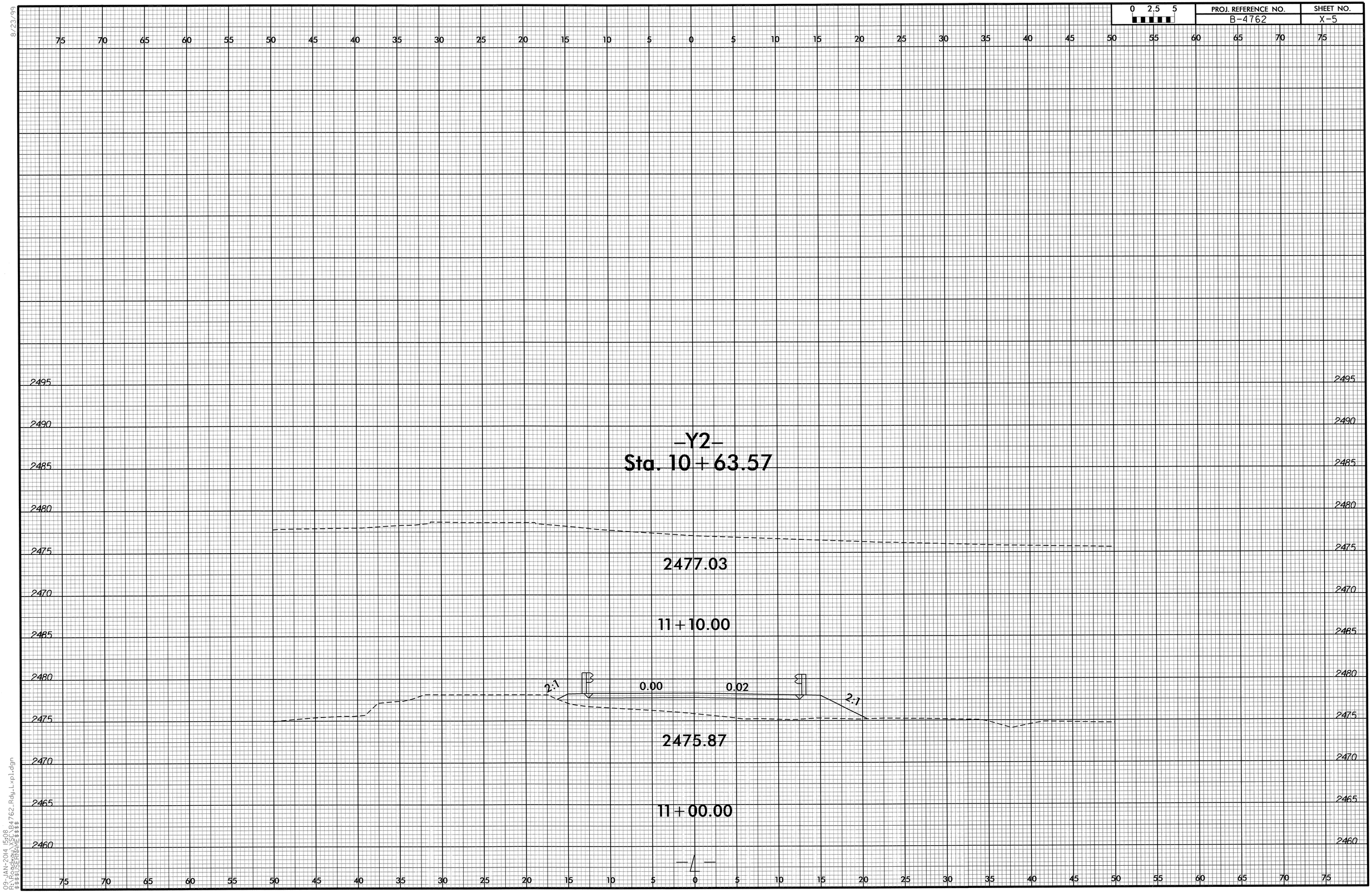

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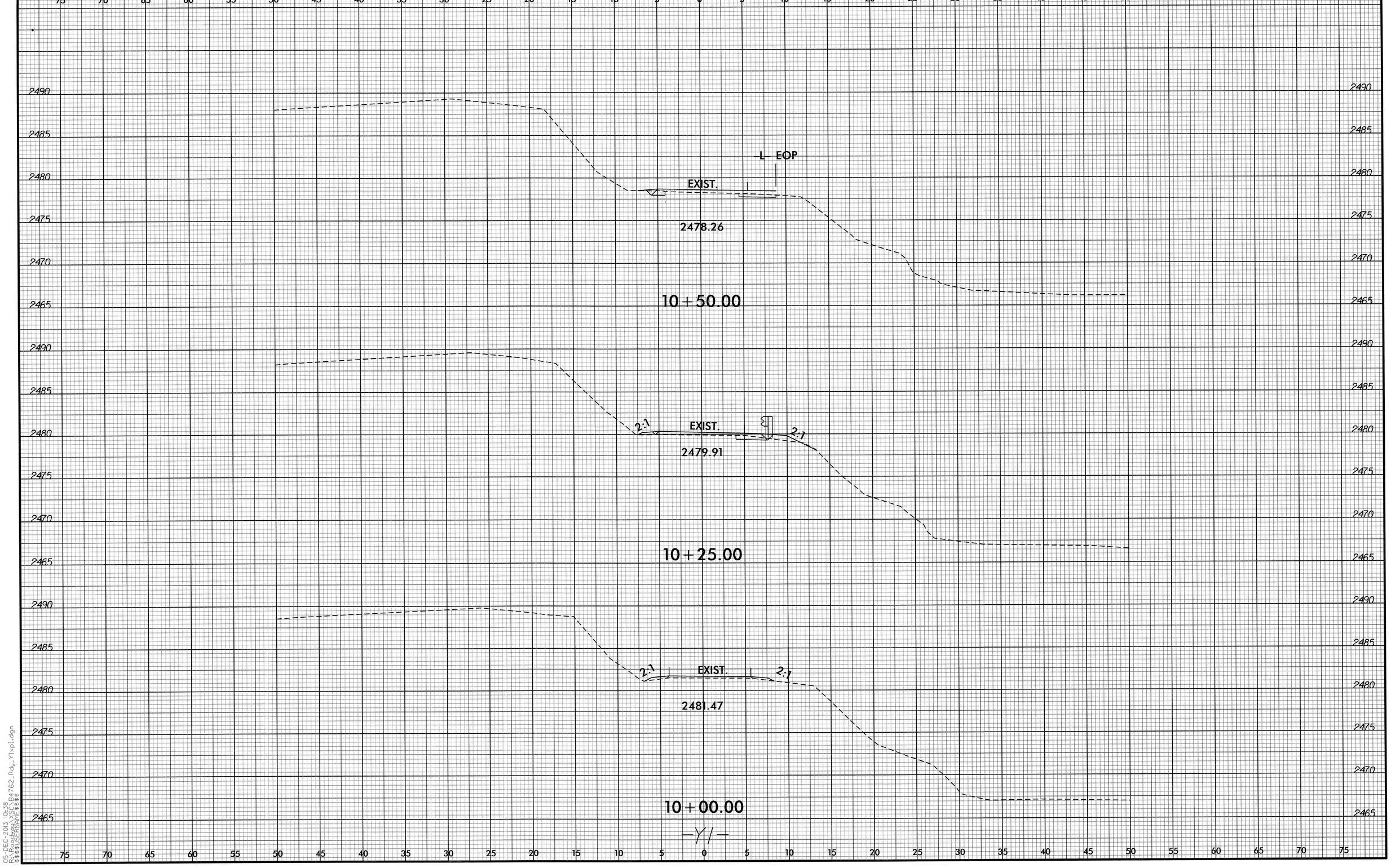

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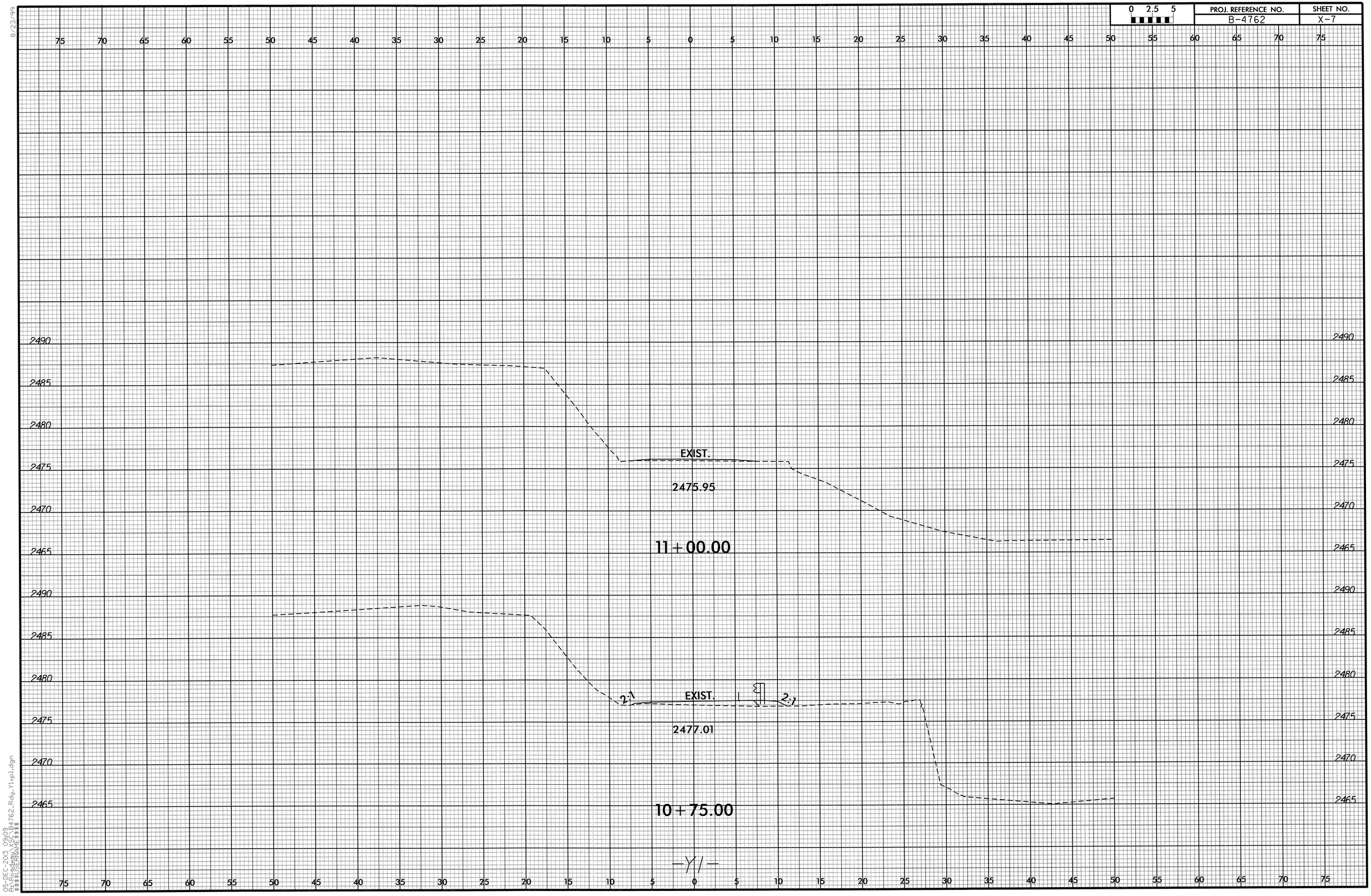

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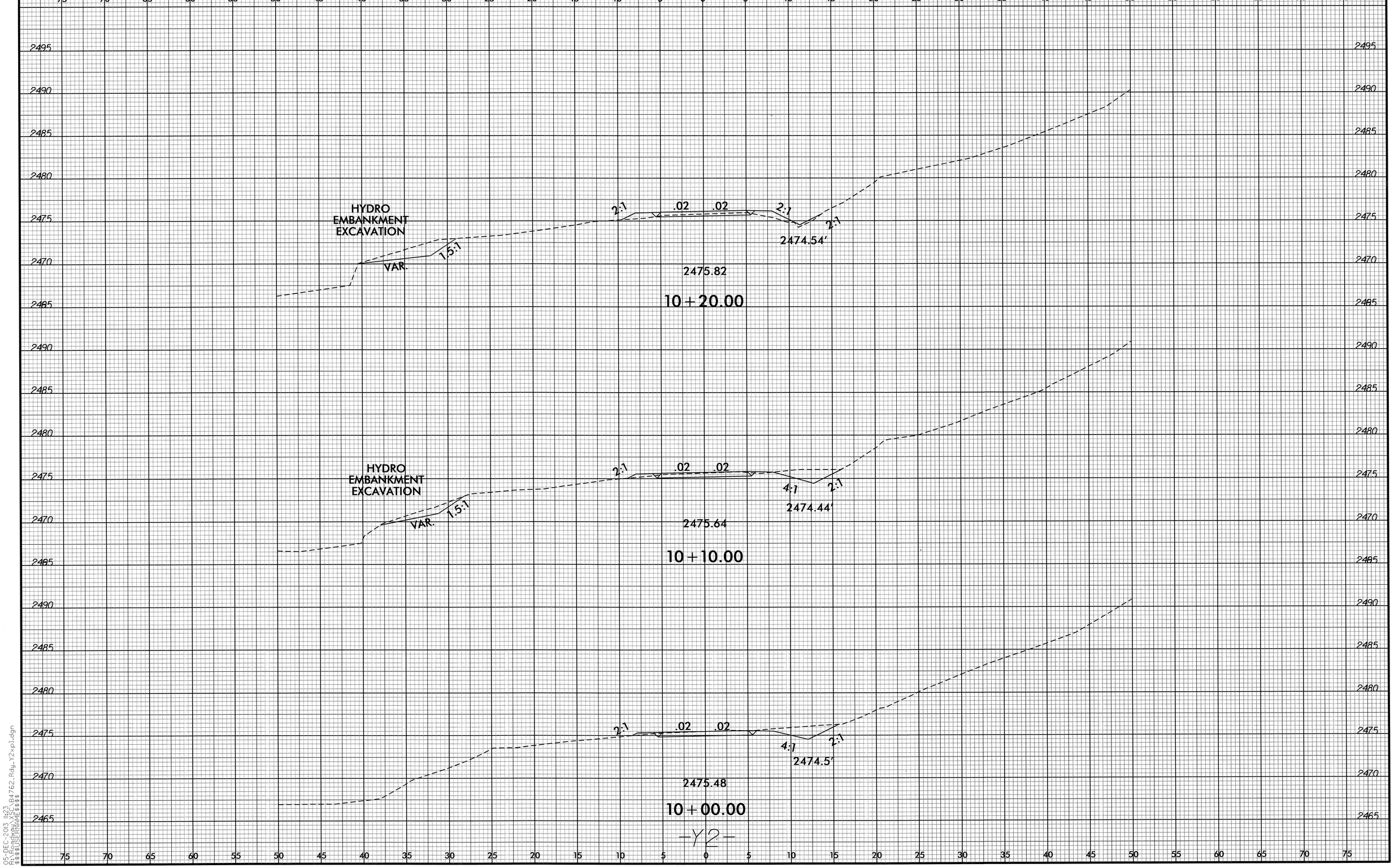

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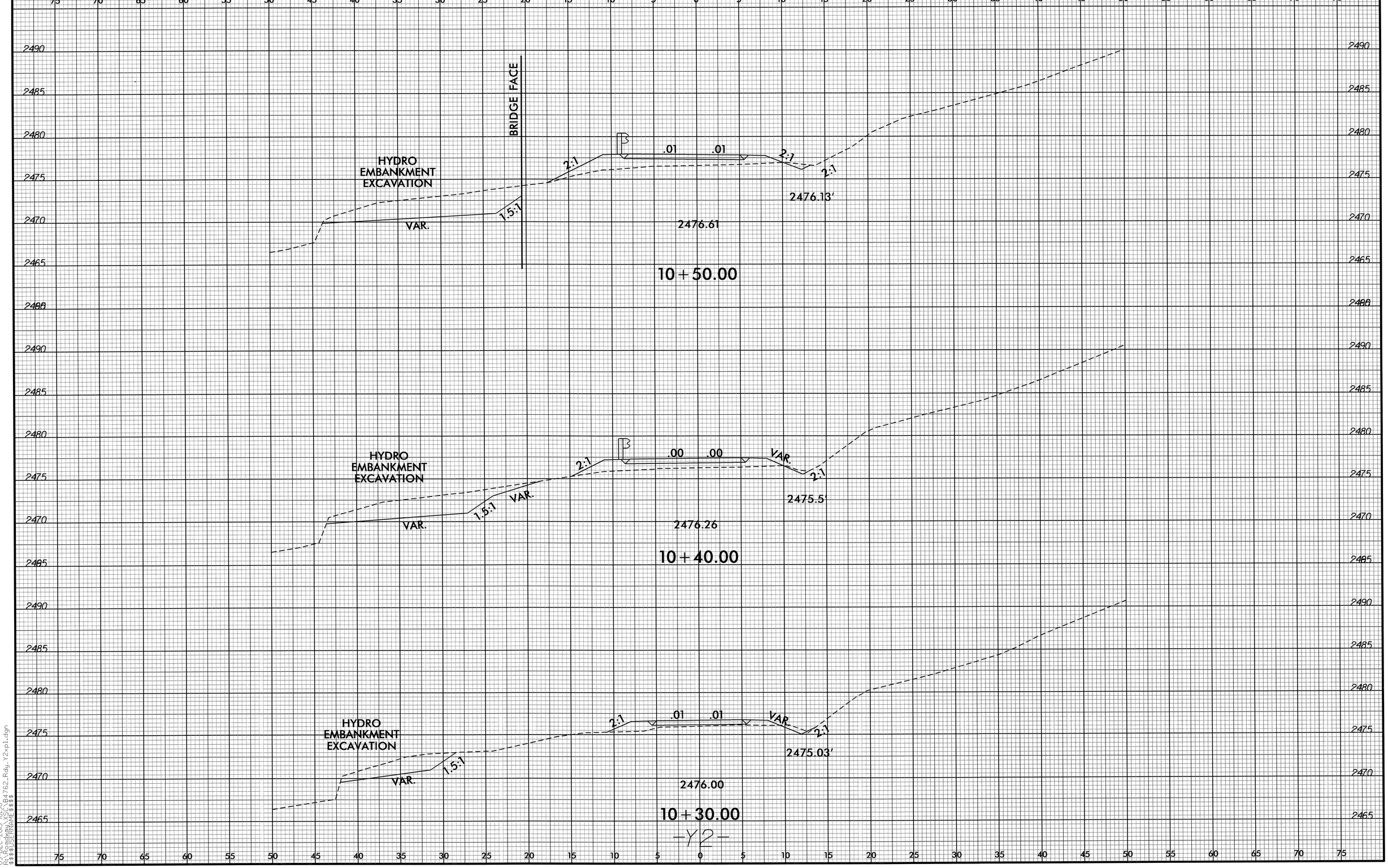

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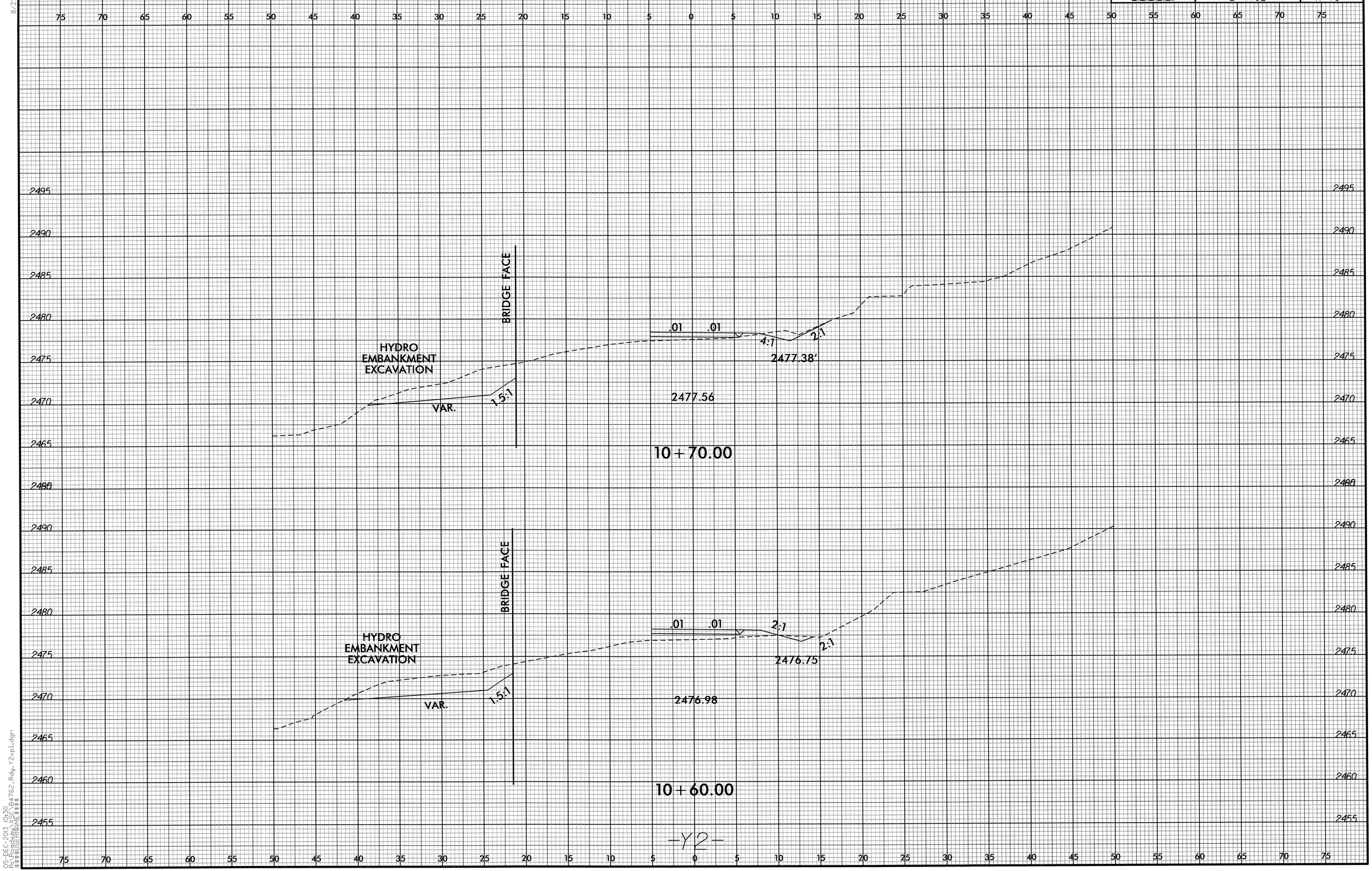

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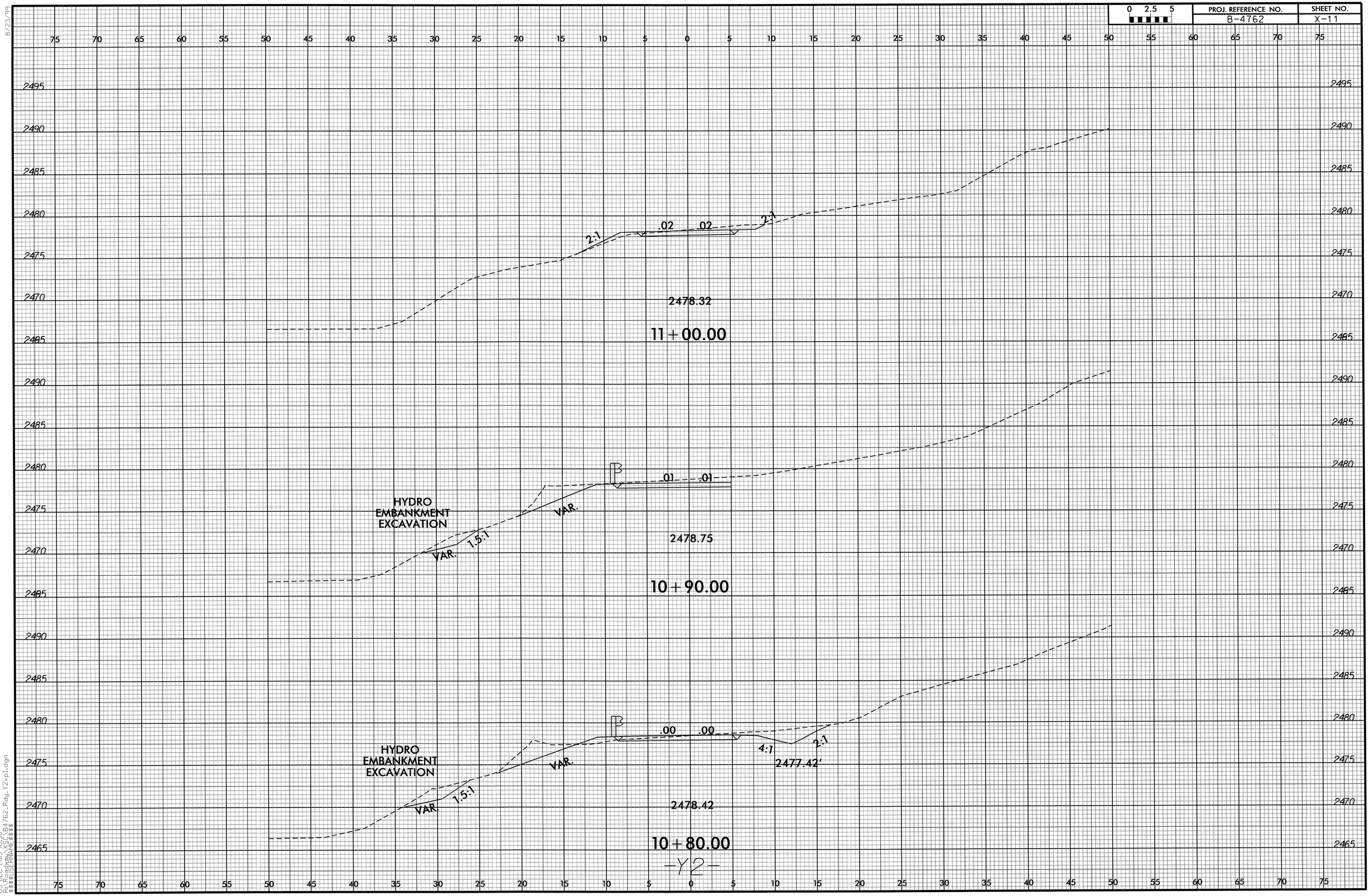

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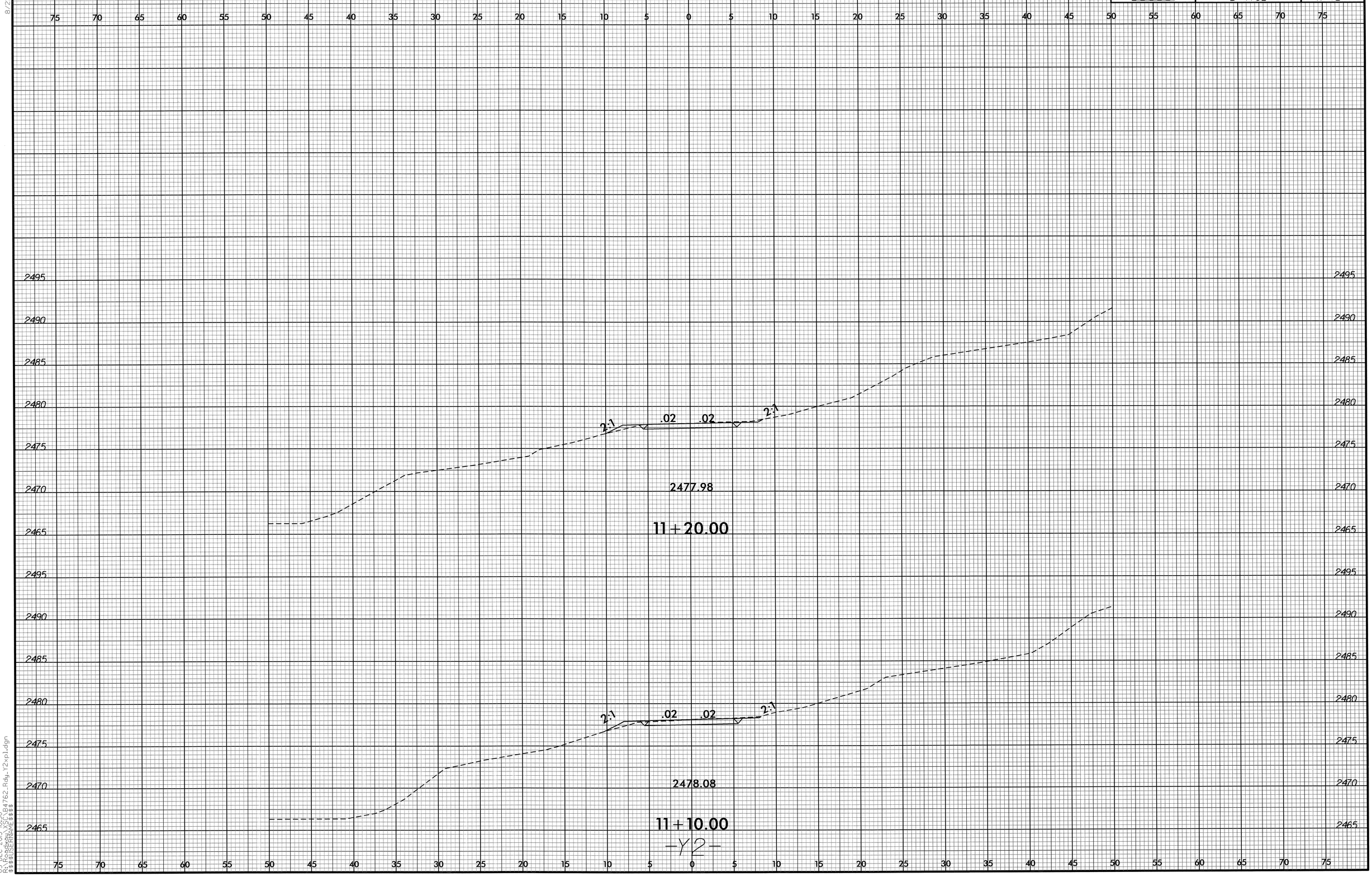

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