REVISED May 11, 2020

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.07; Released October 2016)

WBS Element:	34400.1.S5	TIP No.:	R-2233BB	County(ies):	Rutherford	Page	1	of	4

General Project Information

WBS Element:	34400.1.S5	**TIP Number:**	R-2233BB	**Project Type:**	New Location	**Date:**	3/4/2019
NCDOT Contact:	Matthew York, PE Hydraulics Unit			**Contractor / Designer:**	Steven Bondor, PE Dewberry Engineers Inc		
Address:	NCDOT Hydraulics Unit 1020 Birch Ridge Road Raleigh, NC 27610			**Address:**	Dewberry Engineers Inc. 2610 Wycliff Road, Suite 410 Raleigh, NC 27607		
Phone:	919-707-6765			**Phone:**	919-636-6334		
Email:	mjyork@ncdot.gov			**Email:**	sbondor@deqwberry.com		
City/Town:	Rutherfordton			**County(ies):**	Rutherford		
River Basin(s):	Broad			**CAMA County?**	No		
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	5.01 miles	**Surrounding Land Use:**	Residential, light industrial, rural undeveloped

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	139 (proposed pavement) ac.	60.0 ac.
Typical Cross Section Description:	The R-2233BB project is new alignment approximately 5 miles long and includes two interchanges. Typical section is four lane divided highway with 46' grass median, paved shoulders and median ditches.	Two lane shoulder section along existing alignment that will be widened.
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 13,300 / 14,500 Year: 2020/2040	Existing: 7000 Year: 2016

General Project Narrative: (Description of Minimization of Water Quality Impacts)

Roadway runoff flows to grass shouders in fill sections and is collected in median and grass side ditches in cut sections to pipe systems. Pipe systems include riprap pads or energy dissipator basins at outfalls. Two locations include dry detention ponds to reduce post construction runoff to the preconstruction discharge. Ditches include riprap lining where sheat stress exceeds allowable for grass.

Waterbody Information

Surface Water Body (1):	Cleghorn Creek Trib 11	**NCDWR Stream Index No.:**	n/a		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C		
		Supplemental Classification:			
Other Stream Classification:					
Impairments:					
Aquatic T&E Species?	Comments:				
NRTR Stream ID:			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

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WBS Element:	34400.1.S5	**TIP No.:**	R-2233BB	**County(ies):**	Rutherford	**Page**	**2**	**of**	**4**

Additional Waterbody Information

Surface Water Body (2):	Cleghorn Creek Trib 12		**NCDWR Stream Index No.:**	n/a		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:						
Impairments:						
Aquatic T&E Species?		Comments:				
NRTR Stream ID:				**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

Surface Water Body (3):	Cleghorn Creek		**NCDWR Stream Index No.:**	9-26-(0.5)		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:						
Impairments:						
Aquatic T&E Species?		Comments:				
NRTR Stream ID:				**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

Surface Water Body (4):	Hollands Creek		**NCDWR Stream Index No.:**	9-41-13-7-(1)		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Water Supply V (WS-V)			
		Supplemental Classification:				
Other Stream Classification:						
Impairments:						
Aquatic T&E Species?		Comments:				
NRTR Stream ID:				**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

REVISED May 11, 2020

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.07; Released October 2016)

WBS Element: **TIP No.:** R-2233BB **County(ies):** Rutherford

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)	BMP Associated w/ Buffer Rules?
4	L 739+50 LT		Riprap Energy Dissipator Basin	Class 'B'	5.5	Pipe	18	15.0	9.2	N/A
32	Y11 22+00 LT		Riprap Energy Dissipator Basin	Class I	13.1	Pipe	24	28.0	10.2	N/A
31	Y10 16+25 RT		Riprap Energy Dissipator Basin	Class II	13.7	Pipe	36	33.0	9.3	N/A
31	Y10 14+70 LT		Riprap Energy Dissipator Basin	Class I	48.0	Pipe	60	70.0	9.5	N/A
28	Y3 14+55 RT		Riprap Energy Dissipator Basin	Class 'B'	49.0	Pipe	36	49.0	11.8	N/A
22	L 990+58 LT		Riprap Energy Dissipator Basin	Class 'B'	9.0	Pipe	30	15.0	8.5	N/A
20	L 965+10 LT		Riprap Energy Dissipator Basin	Class II	16.0	Pipe	36	27.0	8.8	N/A
18	Y11 13+50 RT		Riprap Energy Dissipator Basin	Class 'B'	6.4	Pipe	30	17.0	8.2	N/A
18	L 947+50 RT		Riprap Energy Dissipator Basin	Class 'B'	2.4	Pipe	15	7.0	7.8	N/A
12	L 867 10 RT		Riprap Energy Dissipator Basin	Class 'B'	53.0	Pipe	54	42.0	6.4	N/A

Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox (2014), NCDOT Standards, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

REVISED May 11, 2020

North Carolina Department of Transportation

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STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

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WBS Element: 34400.1.S5 **TIP No.:** R-2233BB **County(ies):** Rutherford

Other Best Management Practices

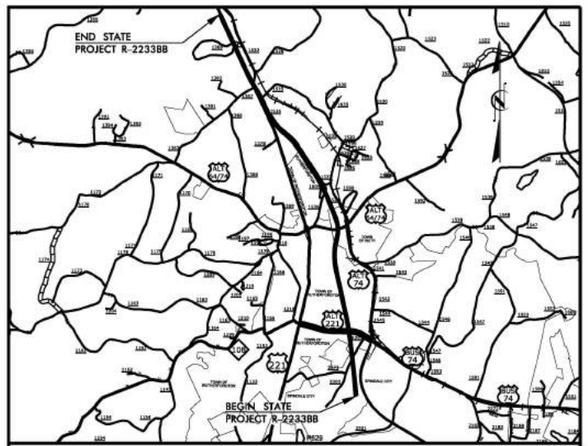
Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	BMP Type	Drainage Area (ac)	New Built-Upon Area (ac)	Volume Treated (ac-ft)	Precipitation Depth Treated over NBUA (in)	BMP Associated w/ Buffer Rules?
6	LP B 17+50 RT	(1)Cleghorn Creek Trib 11	Dry Detention Basin	23.5	5.0	0.53	1.34	No
15	L 907+50 RT	(4)Hollands Creek	Dry Detention Basin	10.4	2.3	0.24	1.32	No

Additional Comments

09/28/99

TIP PROJECT: R-2233BB

See Sheet 1A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RUTHERFORD COUNTY

PERMIT DRAWING
SHEET 1 OF 37

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2233BB	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34400.1.S5		PE
34400.2.S5		R/W & UTIL

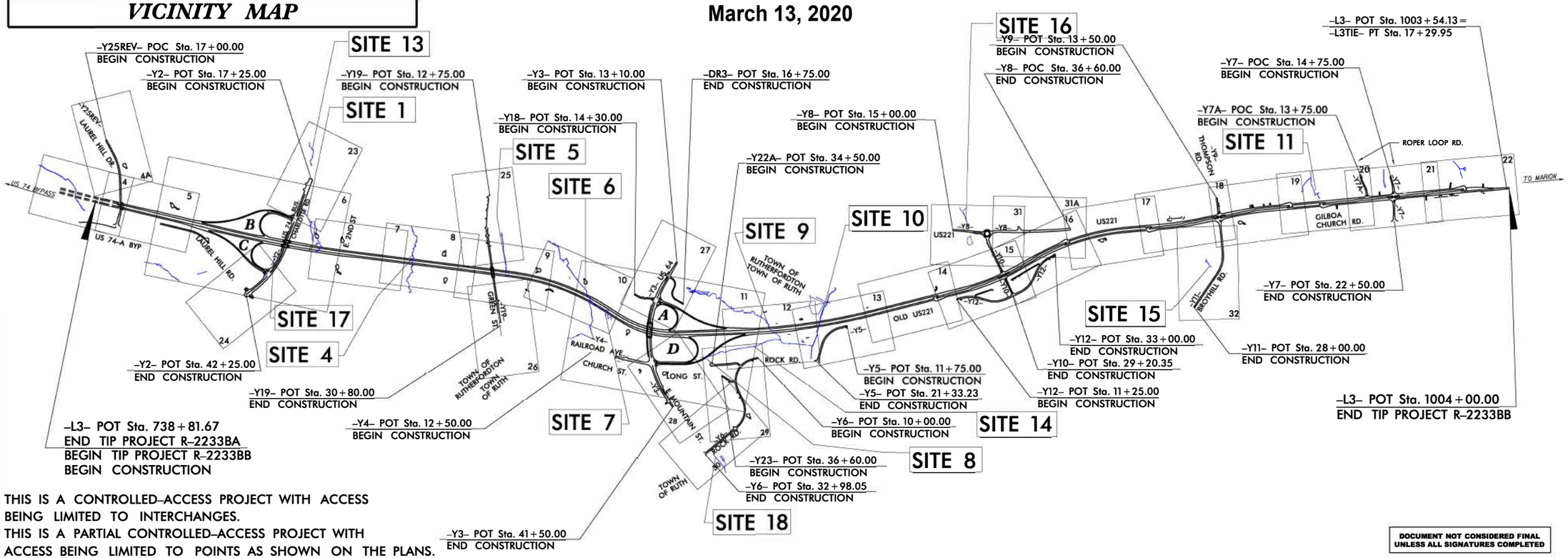
LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD) TO NORTH OF SR 1366 (ROPER LOOP ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURES

NAD 83/NA 2011

WETLAND AND SURFACE WATER IMPACTS PERMIT

March 13, 2020



THIS IS A CONTROLLED–ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.
THIS IS A PARTIAL CONTROLLED–ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWNS OF RUTHERFORDTON, RUTH, AND SPINDALE CITY

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT CONTACT: NATHAN ADIMA, P.E.

CONTRACT:

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2020 = 13300
ADT 2040 = 14500
K = 9 %
D = 60 %
T = 9 % *
V = 70 MPH
* TTST 5% DUAL 4%
FUNC CLASS =
ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2233BB = 4.991 MILES
LENGTH STRUCTURE TIP PROJECT R-2233BB = 0.019 MILES
TOTAL LENGTH TIP PROJECT R-2233BB = 5.010 MILES

STRUCTURE LENGTH BASED ON –L3– NB STATIONING.

PLANS PREPARED FOR NCDOT BY:

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0929

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 28, 2017

LETTING DATE:
JANUARY 21, 2020

DENNIS J. MORY, P.E.
PROJECT ENGINEER

WILLIAM E. TILLITT, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10/26/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919 881-9939
NC CO.A No. F-0929

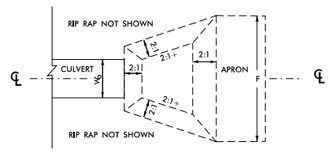
PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	2D-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING SHEET 2 OF 37

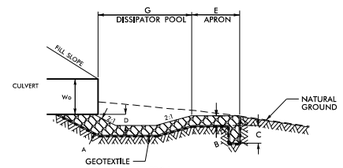
DETAIL 1
RIP-RAP ENERGY DISSIPATOR BASIN

DIM. (ft)	RIP RAP BASIN TYPE A	B	C	D	E	
A	2.0	2.0	2.5	2.5	2.0	
B	1.5	1.5	2.0	2.5	1.5	
C	2.0	2.0	2.0	3.0	2.0	
D	1.5	3.0	2.0	1.5	1.0	
E	7.5	10	10	7.5	5.0	
F	20	25	25	20	15	
G	15	25	20	15	10	
DDE (CY)	370	105	244	50	15	
GEOTEXTILE (SY)	370	70	185	40	20	
CL B RIP RAP (TONS)	125	45	55	45	N/A	
CL I RIP RAP (TONS)	105	N/A	N/A	N/A	15	
CL II RIP RAP (TONS)	25	50	115	N/A	N/A	

ALL DIMENSIONS APPROXIMATE



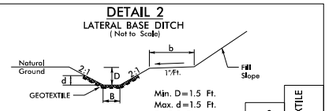
PLAN



℄ SECTION

BASIN #	LOCATION (AT OUTLET)	TYPE	SHEET
1	L3 STA 739+50 LT (CL I)	A	4
2	LPB STA. 17+50 RT (CL B)	B	6
3	L3 STA 778+91 LT (CL II)	A	6
4	L3 STA. 786+61 LT (CL B)	A	7
5	L3 STA. 808+38 LT (CL I)	A	9
6	L3 STA. 824+15 LT (CL B)	A	10
7	RPD STA. 20+15 RT (CL B)	A	11
8	L3 STA. 866+75 RT (CL I)	E	12
9	L3 STA. 867+10 RT (CL I)	A	12
10	L3 STA. 947+50 RT (CL B)	A	18
11	Y11 STA. 13+50 RT (CL B)	A	18
12	L3 STA. 965+10 LT (CL II)	C	20
13	L3 STA. 990+58 LT (CL B)	C	22
14	Y3 STA. 41+55 RT (CL B)	D	28
15	Y10 STA. 14+70 LT (CL II)	B	31
16	Y10 STA. 16+25 RT (CL II)	C	31
17	Y11 STA. 22+00 LT (CL I)	A	32

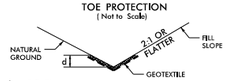
DETAIL 2
LATERAL BASE DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=2.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 745+00 TO STA. 747+80 LT	5	1429	157	430
FROM Y25REV STA. 26+30 TO STA. 28+31 LT	5,33	70	113	305

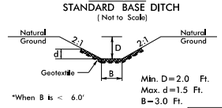
DETAIL 3
TOE PROTECTION
(Not to Scale)



d= 1.5 Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM LPD STA. 16+22 TO 18+08 RT	11	86	250
FROM LPD STA. 18+70 TO 20+41 RT	11	79	230
FROM RPD STA. 16+71 TO 19+00 RT	11	105	300
FROM RPD STA. 19+92 TO 20+50 RT	11	27	80
FROM L STA. 814+50 TO 814+68 RT	9	5	12

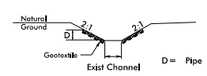
DETAIL 4
STANDARD BASE DITCH
(Not to Scale)



Min. D=2.0 Ft.
Max. d=1.5 Ft.
B=3.0 Ft.
*When B is < 6.0'
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM RPD STA. 19+04 TO 19+86 RT	11	225	59	140
FROM Y5 STA. 11+75 TO 11+77 RT	13	256	1	10

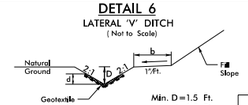
DETAIL 5
RIRPAP PAD AT JURISDICTIONAL STREAM
(Not to Scale)



D= Pipe Dia.
Type of Liner= CL II Rip-Rap

LOCATION	SHEET	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 814+83 LT	9	15	100
FROM RPD STA. 18+09 LT	11	29	100
FROM L3 STA. 995+71 LT	22	15	100
FROM L3 STA. 981+50 LT	21	27	100
FROM L3 STA. 968+80 LT	20	23	100
FROM Y6 STA. 10+25 RT	29	29	100
FROM Y11 STA. 22+33 LT	32	15	100
FROM Y6 STA. 32+05 LT	30	15	100

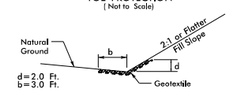
DETAIL 6
LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
b=5.0 Ft.
Type of Liner= CL II Rip-Rap

LOCATION	SHEET	DDE CY	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 798+16 TO 799+00 LT	8	49	103	160
FROM L3 STA. 801+00 TO 802+01 LT	8	51	124	190
FROM L3 STA. 798+42 TO 800+00 RT	8	110	193	300
FROM RPD STA. 18+11 TO 26+22 LT	11	970	993	1500
FROM L3 STA. 831+47 TO 838+00 LT	10, 11	2048	799	1210
FROM Y18 STA. 16+00 TO 17+51 LT	11	104	185	280
FROM Y11 STA. 11+00 TO 13+50 LT	18	529	245	470
FROM L3 STA. 963+56 TO 966+53 RT	19, 20	206	360	550
FROM L3 STA. 961+50 TO 965+05 LT	19, 20	317	435	660
FROM L3 STA. 966+54 TO 968+52 RT	20	121	186	290
FROM L3 STA. 968+55 TO 971+50 RT	20	408	361	550
FROM L3 STA. 989+50 TO 989+87 RT	21	14	45	70
FROM L3 STA. 995+00 TO 996+62 RT	22	113	207	320
FROM Y6 STA. 20+74 TO 21+41 RT	30	24	82	130
FROM Y11 STA. 20+56 TO 24+13 RT	32	160	106	660

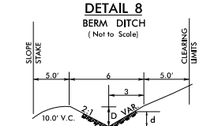
DETAIL 7
TOE PROTECTION
(Not to Scale)



d=2.0 Ft.
b=3.0 Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y12 STA. 16+50 TO 18+00 LT	15	53	130
FROM Y11 STA. 12+42 TO 12+73 RT	18	11	30
FROM Y11 STA. 13+50 TO 14+50 LT	18, 32	36	90
FROM L3 STA. 981+57 TO 982+00 LT	21	15	40
FROM L3 STA. 980+25 TO 980+62 RT	21	13	40
FROM Y10 STA. 12+50 TO 13+50 RT	31	36	90
FROM L3 STA. 888+00 TO 894+50 RT	14	228	685
FROM Y25REV STA. 25+00 TO 25+85 LT	33	65	167

DETAIL 8
BERM DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
Type of Liner= CL B RIPRAP

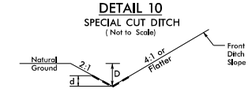
LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y2 STA. 31+00 TO 33+00 LT	6	178	92	260
FROM L3 STA. 782+00 TO 782+50 RT	7	44	23	70
FROM L3 STA. 811+45 TO 812+20 RT	9	67	35	100
FROM L3 STA. 815+87 TO 824+15 RT	9, 10	264	381	1080
FROM L3 STA. 824+15 TO 826+00 RT	10	65	85	240
FROM Y2 STA. 19+08 TO 21+00 LT	23	171	88	250

DETAIL 9
SPECIAL CUT DITCH
(Not to Scale)

Min. D=1.5 Ft.
Max. d=1.5 Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y2 STA. 26+21 TO 27+67 RT	6	67	190
FROM L3 STA. 814+71 TO 816+50 RT	9	82	240
FROM Y19 STA. 22+20 TO 27+00 RT	9, 26	358	1010
FROM LPD STA. 18+08 TO 18+70 RT	11	29	90
FROM L3 STA. 883+96 TO 885+50 LT	13	71	200
FROM L3 STA. 890+50 TO 892+00 LT	14	69	200
FROM Y6 STA. 10+00 TO 10+90 LT	29	41	120
FROM Y6 STA. 11+40 TO 13+56 LT	29	99	280
FROM Y22A STA. 35+60 TO 37+00 RT	11, 29	64	190
FROM Y10 STA. 20+00 TO 22+00 LT	31	92	260
FROM Y10 STA. 31+00 TO 33+02 LT	33	92	260

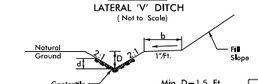
DETAIL 10
SPECIAL CUT DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max d=1.5 Ft.
Type of Liner= PSRM

LOCATION	SHEET	PSRM SY
FROM L3 STA. 807+64 TO 809+50 RT	8, 9	70
FROM Y7 STA. 14+75 TO 17+75 LT	21	330
FROM L3 STA. 776+50 TO 779+50 RT	6	200

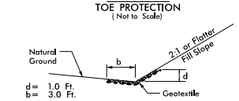
DETAIL 11
LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
b=5.0 Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 765+00 TO 767+15 RT	6	2276	99	170
FROM Y5 STA. 17+50 TO 20+50 LT	13	134	138	230
FROM L3 STA. 885+50 TO 890+50 LT	13, 14	176	230	380
FROM Y22A STA. 37+50 TO 40+00 RT	29	199	115	190
FROM Y10 STA. 13+50 TO 14+25 LT	31	96	35	60
FROM Y25REV STA. 26+00 TO 28+00 RT	5	130	92	259

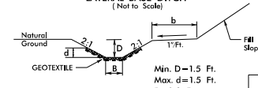
DETAIL 12
TOE PROTECTION
(Not to Scale)



d= 1.0 Ft.
b= 3.0 Ft.
Type of Liner= CL II Rip-Rap

LOCATION	SHEET	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 794+00 TO 796+00 RT	7, 8	225	320
FROM L3 STA. 795+98 TO 797+57 LT	8	179	260
FROM L3 STA. 798+00 TO 798+33 RT	8	37	60
FROM L3 STA. 799+00 TO 801+00 LT	8	225	320
FROM L3 STA. 800+00 TO 801+00 RT	8	112	160
FROM L3 STA. 828+72 TO 830+50 LT	10	200	290
FROM Y18 STA. 15+27 TO 15+76 LT	11	55	80
FROM L3 STA. 963+00 TO 963+54 RT	19	61	90
FROM L3 STA. 980+75 TO 981+50 LT	21	84	120
FROM L3 STA. 989+50 TO 990+50 LT	21	113	160
FROM Y6 STA. 26+25 TO 28+50 LT	30	275	360
FROM Y6 STA. 29+00 TO 30+45 RT	30	177	240

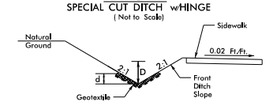
DETAIL 13
LATERAL BASE DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=3.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CL II Rip-Rap

LOCATION	SHEET	DDE CY	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 832+55 TO 838+00 RT	10, 11	1954	332	1190
FROM Y10 STA. 17+80 TO 18+04 LT	31	21	15	60
FROM Y10 STA. 15+50 TO 15+70 RT	31	18	13	50

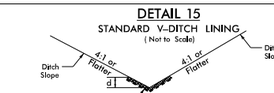
DETAIL 14
SPECIAL CUT DITCH wHINGE
(Not to Scale)



Min. D=1.5Ft.
Max. d=1.0Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y2 STA. 33+50 TO 40+00 LT	6	299	850

DETAIL 15
STANDARD V-DITCH LINING
(Not to Scale)



Max. d= 1.5 Ft.
Type of Liner= CL B Rip-Rap

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM RPD STA. 14+14 TO 16+71 RT	11	118	340
FROM RPD STA. 20+50 TO 23+40 RT	11	133	380
FROM L3 STA. 927+50 LT	17	15	50
FROM L3 STA. 944+50 LT	18	15	50
FROM L3 STA. 871+00 TO 872+00 LT	12	32	70

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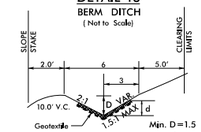
Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919 881-9939
NC CO.A No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	2D-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING SHEET 3 OF 37

DETAIL 16
BERM DITCH
(Not to Scale)

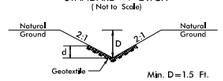


Min. D=1.5 Ft.
Max. d=1.5 Ft.

Type of Liner= CL B RIPRAP

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 951+32 TO 954+20 RT	18, 19	160	120	320

DETAIL 17
STANDARD 'V' DITCH
(Not to Scale)

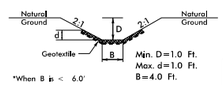


Min. D=1.5 Ft.
Max. d=1.5 Ft.

Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y3 STA. 31+05 TO 31+67 RT	11	24	29	90
FROM Y12 STA. 28+72 TO 29+20 LT	16	20	25	44
FROM Y12 STA. 10+43 TO 11+25 RT	15	40	38	110
FROM Y11 STA. 19+90 TO 20+25 RT	32	33	16	50

DETAIL 18
STANDARD BASE DITCH
(Not to Scale)



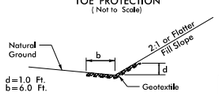
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=4.0 Ft.

*When B is < 6.0'

Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
Y6 STA. 10+31 RT	29	16	30	90

DETAIL 19
TOE PROTECTION
(Not to Scale)

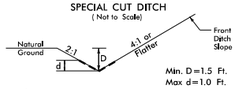


d=1.0 Ft.
b=6.0 Ft.

Type of Liner= CLASS II Rip-Rap

LOCATION	SHEET	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 921+00 TO 922+50 RT	16	148	240
FROM L3 STA. 996+00 TO 998+58 LT	22	292	475
FROM L3 STA. 997+00 TO 998+50 RT	22	195	315

DETAIL 20
SPECIAL CUT DITCH
(Not to Scale)

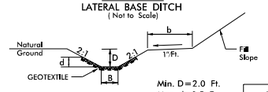


Min. D=1.5 Ft.
Max d=1.0 Ft.

Type of Liner= PSRM

LOCATION	SHEET	PSRM SY
FROM Y12 STA. 20+60 TO 22+50 RT	15	210
FROM Y12 STA. 24+00 TO 26+00 RT	15, 16	225
FROM Y12 STA. 28+50 TO 29+20 RT	16	80
FROM Y12 STA. 29+20 TO 31+00 RT	16	200
FROM Y11 STA. 26+00 TO 27+00 RT	32	110

DETAIL 21
LATERAL BASE DITCH
(Not to Scale)



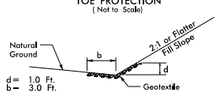
Min. D=2.0 Ft.
Max. d=1.5 Ft.
B=3.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y8 STA. 10+66 TO 12+90 RT	31	176	120	320
FROM L3 STA. 739+50 TO 742+66 LT	4, 5	784	245	655

DETAIL 22
TOE PROTECTION
(Not to Scale)

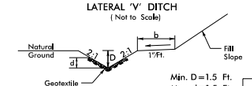


d= 1.0 Ft.
b= 3.0 Ft.

Type of Liner= CL 1 Rip-Rap

LOCATION	SHEET	CL I RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 865+00 TO 866+49 LT	12	112	200
FROM L3 STA. 969+00 TO 971+00 LT	20	151	270

DETAIL 23
LATERAL 'V' DITCH
(Not to Scale)

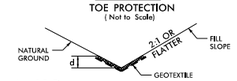


Min. D=1.5 Ft.
Max. d=1.5 Ft.
b=5.0 Ft.

Type of Liner= CL I Rip-Rap

LOCATION	SHEET	DDE CY	CL I RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 828+00 TO 831+80 RT	10	692	175	600
FROM Y11 STA. 12+42 TO 12+73 RT	18	62	14	50
FROM Y10 STA. 19+19 TO 20+00 LT	31	128	37	130
FROM Y11 STA. 15+50 TO 17+09 LT	32	137	73	250
FROM Y11 STA. 17+09 TO 18+00 LT	32	81	42	150
FROM Y11 STA. 18+00 TO 18+64 LT	32	15	29	110
FROM Y11 STA. 18+64 TO 19+45 LT	32	25	37	130
FROM Y11 STA. 19+45 TO 21+51 LT	32	186	95	330
FROM Y11 STA. 21+51 TO 22+03 LT	32	15	24	90

DETAIL 24
TOE PROTECTION
(Not to Scale)

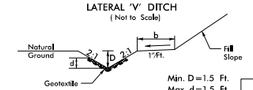


d= 1.5 Ft.

Type of Liner= CL 1 Rip-Rap

LOCATION	SHEET	CL I RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 743+84 TO 745+00 LT	5	133	160
FROM DR3 STA. 12+00 TO 14+50 RT	11, 27	287	340
FROM Y10 STA. 16+50 TO 17+76 LT	31	145	170
FROM Y8 STA. 10+61 TO 11+73 LT	31	129	150
FROM L STA. 744+15 TO 747+50 RT	31	129	150

DETAIL 25
LATERAL 'V' DITCH
(Not to Scale)

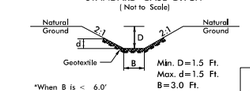


Min. D=1.5 Ft.
Max. d=1.5 Ft.
b=5.0 Ft.

Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y3 STA. 18+85 TO 20+44 RT	11, 27	38	73	210

DETAIL 26
STANDARD BASE DITCH
(Not to Scale)



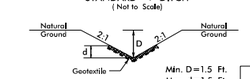
Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=3.0 Ft.

*When B is < 6.0'

Type of Liner= CL B Rip-Rap

LOCATION	SHEET	DDE CY	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 767+26 TO 768+28 LT	6	596	71	190

DETAIL 27
STANDARD 'V' DITCH
(Not to Scale)



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

Type of Liner= CL II Rip-Rap

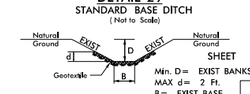
LOCATION	SHEET	DDE CY	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 797+67 TO 798+00 RT	8	18	15	70

DETAIL 28
SPECIAL CUT DITCH
(Not to Scale)

Min. D=1.5 Ft.

LOCATION	SHEET
FROM L3 STA. 779+47 TO 799+60 LT (-CUL16-)	6

DETAIL 29
STANDARD BASE DITCH
(Not to Scale)



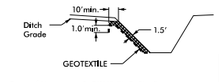
SHEET
Min. D= EXIST BANKS
MAX d= 2 Ft.
B= EXIST BASE

*When B is < 6.0'

Type of RIPRAP = SEE BELOW

LOCATION	SHEET	CL I RIP-RAP TON	GEOTEXTILE FABRIC SY
L3 STA. 867+12 RT (CL I)	12	20	110

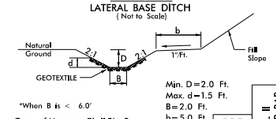
DETAIL 30
RIP RAP AT EMBANKMENT
(Not to Scale)



Type of Liner= 5 TONS,CL B Rip-Rap
Geotextile= 6 sy

LOCATION	SHEET	CL B RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM L3 STA. 797+65 RT	8	35	70
FROM L3 STA. 864+92 LT	12	35	70
FROM L3 STA. 882+80 RT	13	35	70
FROM Y11 STA. 22+27 LT	32	35	70

DETAIL 31
LATERAL BASE DITCH
(Not to Scale)



Min. D=2.0 Ft.
Max. d=1.5 Ft.
B=2.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CL II Rip-Rap

LOCATION	SHEET	DDE CY	CL II RIP-RAP TON	GEOTEXTILE FABRIC SY
FROM Y10 STA. 26+25 TO 28+00 LT	15	55	107	390
FROM L3 STA. 910+00 TO 910+50 RT	15	25	83	115

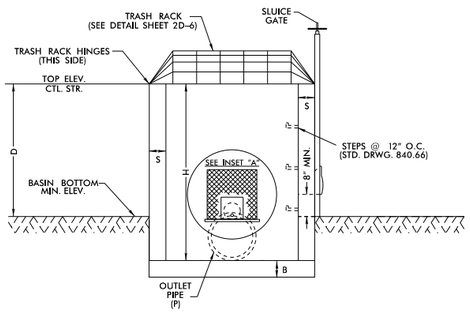
Dewberry
7610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	2D-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

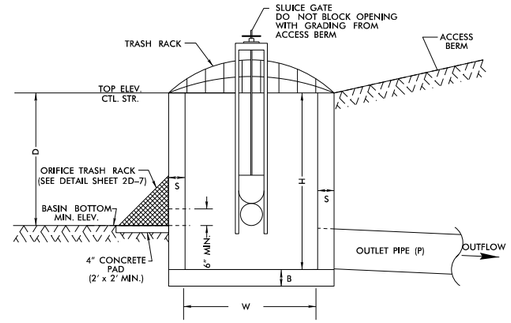
DETAIL K

DRY DETENTION BASIN DRAWDOWN STRUCTURE

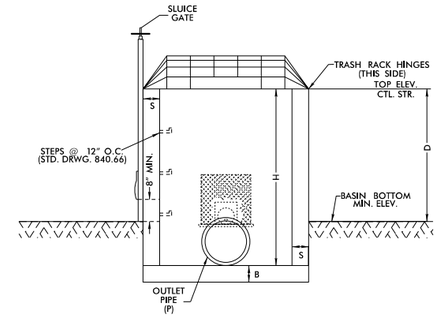
NOT TO SCALE



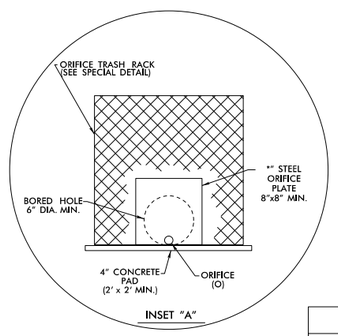
SIDE 1



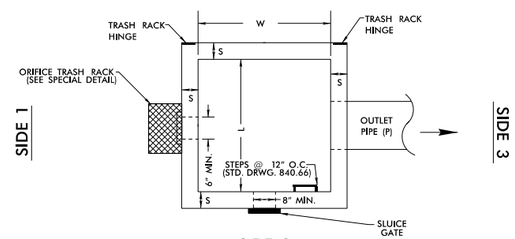
SIDE 2



SIDE 3



INSET "A"



SIDE 2

PLAN VIEW

TRASH RACK NOT SHOWN FOR CLARITY

NOTES:

1. TOP ELEVATION OF CONTROL STRUCTURE (WEIR ELEVATION) SHOULD BE SET AT THE WQv ELEVATION.
2. 2" MINIMUM DIAMETER ORIFICE. IF ORIFICE IS GREATER THAN 6", A STEEL PLATE IS NOT REQUIRED.
3. NO BEDDING MATERIAL TO BE USED. THEREFORE, DO NOT FOLLOW STANDARD DRAWINGS FOR METHOD OF PIPE INSTALLATION FOR OUTLET PIPE THROUGH EMBANKMENT.
4. SLUICE GATE IS FOR MAINTENANCE AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION. A GATE VALVE MAY BE USED IN LIEU OF THE 8" SLUICE GATE.
5. SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR GATE OPERATION AND FOR PROPER SEATING OF GATE OVER PIPE.
6. SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND ORIFICE TRASH RACK WIDTH.
7. ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATE.
8. ADJUST FOOTER DIMENSIONS AS NEEDED FOR ANTI-FLOTATION.

MINIMUM DIMENSIONS FOR DRY DETENTION BASIN DRAWDOWN STRUCTURE

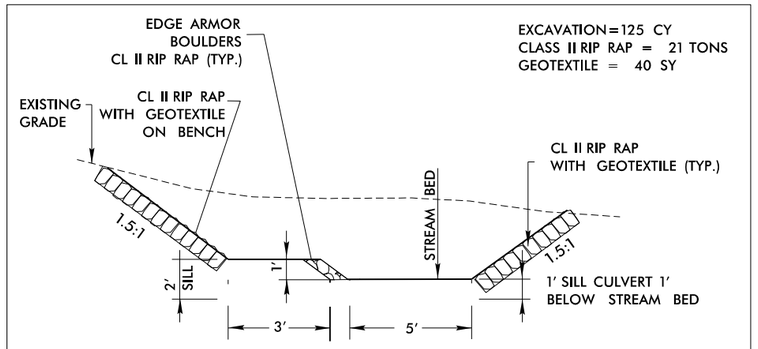
STATION	STRUCTURE NUMBER	S (INCHES) 6" MIN.	B (INCHES) 6" MIN.	BASIN BOTTOM MINIMUM ELEV.	TOP ELEVATION CONTROL STRUCTURE	MAX. STORAGE DEPTH(D) FEET	INV. ELEV. CTL. STR.	CTL. STR. DIMENSIONS (W x L x H)	ORIFICE DIAMETER (O) INCHES	ORIFICE INV. ELEV.	OUTLET PIPE DIAMETER(P) INCHES
LPB 17+50 RT	655	8	12	957.50	960.50	3.0	956.00	4 X 4 X 4.5	2	957.50	30
L 907+00 RT	1514	8	12	1036.50	1039.00	2.5	1034.00	4 X 4 X 5	2	1036.50	30

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0029

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	2D-5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

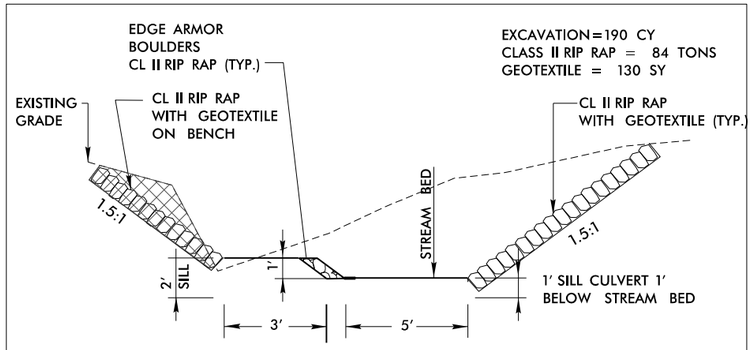
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 5 OF 37



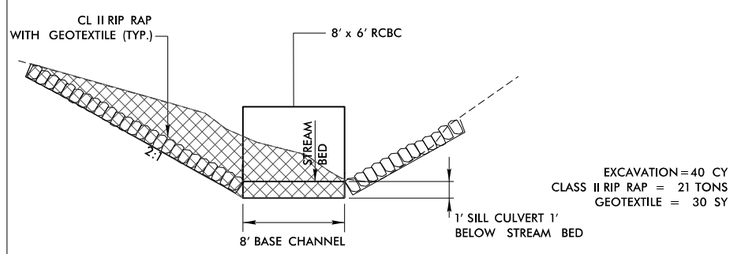
DETAIL G1 – FLOODPLAIN BENCH INLET CHANNEL DETAIL
STA 797+66 (LOOKING DOWNSTREAM)

DETAIL G1
CULVERT 797+66



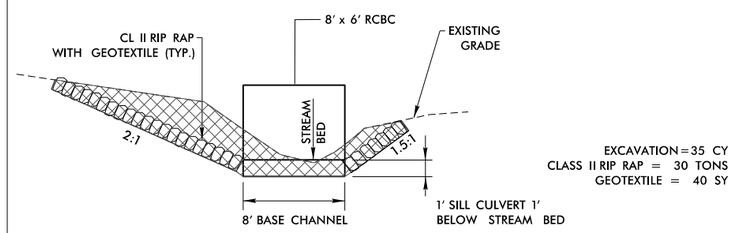
DETAIL G2 – FLOODPLAIN BENCH OUTLET CHANNEL DETAIL
STA 797+66 (LOOKING DOWNSTREAM)

DETAIL G2
CULVERT 797+66



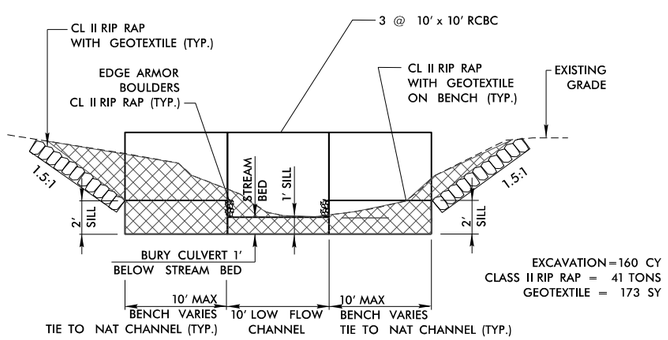
INLET CHANNEL DETAIL
STA 830+03 (LOOKING DOWNSTREAM)

DETAIL H1
CULVERT 830+02



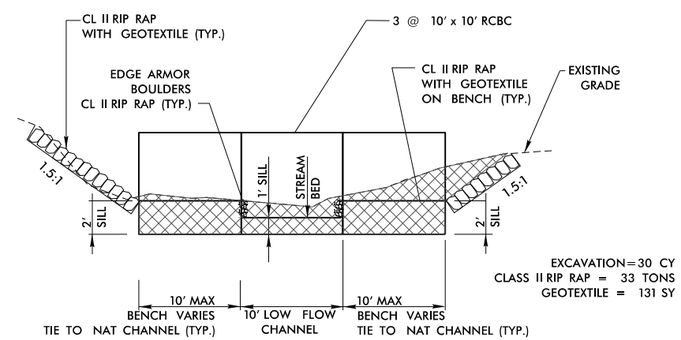
OUTLET CHANNEL DETAIL
STA 830+03 (LOOKING DOWNSTREAM)

DETAIL H2
CULVERT 830+02



FLOODPLAIN BENCH INLET CHANNEL DETAIL
STA 874+45 (LOOKING DOWNSTREAM)

DETAIL J1
CULVERT 874+45



FLOODPLAIN BENCH OUTLET CHANNEL DETAIL
STA 874+45 (LOOKING DOWNSTREAM)

DETAIL J2
CULVERT 874+45

5/14/99
10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

REVISIONS

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 1 SN

SITE 17 SO

SITE 17

MATCH TO SHEET 23 -Y2- STA. 23+00.00

MATCH TO SHEET 5 -L3- STA. 756+00.00

MATCH TO SHEET 7 -L3- STA. 782+00.00

MATCH TO SHEET 24 -Y25- STA. 32+00.00

MATCH TO SHEET 24 -Y2- STA. 37+50.00

NAD 83

Dewberry

PERMIT DRAWING SHEET 6 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRAFFIC DATA

B 87/114 A 12/15
10/15
65/80 US 221 BYPASS 128/145
CHARLOTTE RD. US 74 BUSINESS
C 71/57 D 94/112
192/255 206/260
*TPD IN KDN

PROPOSED SIGNAL

GRAPHIC SCALE
50 25 0 50 100
PLANS

SEE SHEETS 33 & 36 FOR -L3- PROFILE
SEE SHEETS 34 & 35 FOR -Y25- PROFILE
SEE SHEETS 18&19 FOR -RPB- PROFILE
SEE SHEETS 19&20 FOR -RPC- PROFILE
SEE SHEET 20 FOR -RPA- PROFILE
SEE SHEET 20 FOR -LPB- PROFILE
SEE SHEET 20 FOR -LPC- PROFILE
SEE SHEET 36-A FOR INTERSECTION DETAILS
SEE SHEET 36-B FOR INTERCHANGE DETAILS
SEE SHEETS 20-1 THRU 20-7 FOR DRAINAGE DETAILS

LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD) TO NORTH OF SR 1366 (ROPER LOOP ROAD)

TIP NO.:	COUNTY:
R-2233BB	RUTHERFORD
DESIGNED BY: RES	DATE: 6/1/2018
CHECKED BY: DJM	DATE: 6/1/2018

REVISIONS

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 1 SN

SITE 1 SN

SITE 17

SITE 17 SO

B

C

MATCH TO SHEET 23 -Y2- STA. 23+00.00

MATCH TO SHEET 5 -L3- STA. 756+00.00

MATCH TO SHEET 7 -L3- STA. 782+00.00

MATCH TO SHEET 24 -Y25- STA. 32+00.00

MATCH TO SHEET 24 -Y2- STA. 37+50.00

Dewberry

PERMIT DRAWING SHEET 7 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRAFFIC DATA

CHARLOTTE RD. US 74 BUSINESS

US 221 BYPASS

	A	B	C	D
	12/15	87/114	94/112	126/145
	128/145	10/15	74/97	196/200
		65/88	192/255	

*TPD IN 100s

SEE SHEETS 35 & 36 FOR <L3> PROFILE
SEE SHEETS 44 & 45 FOR <Y2> PROFILE
SEE SHEETS 58 & 59 FOR <PL> PROFILE
SEE SHEETS 59 & 60 FOR <PR> PROFILE
SEE SHEET 58 FOR <RPB> PROFILE
SEE SHEET 59 FOR <RPC> PROFILE
SEE SHEET 38-A FOR INTERSECTION DETAILS
SEE SHEET 38-B FOR <L3> DETAILS
SEE SHEETS 20-1 THRU 20-7 FOR DRAINAGE DETAILS

PROPOSED SIGNAL

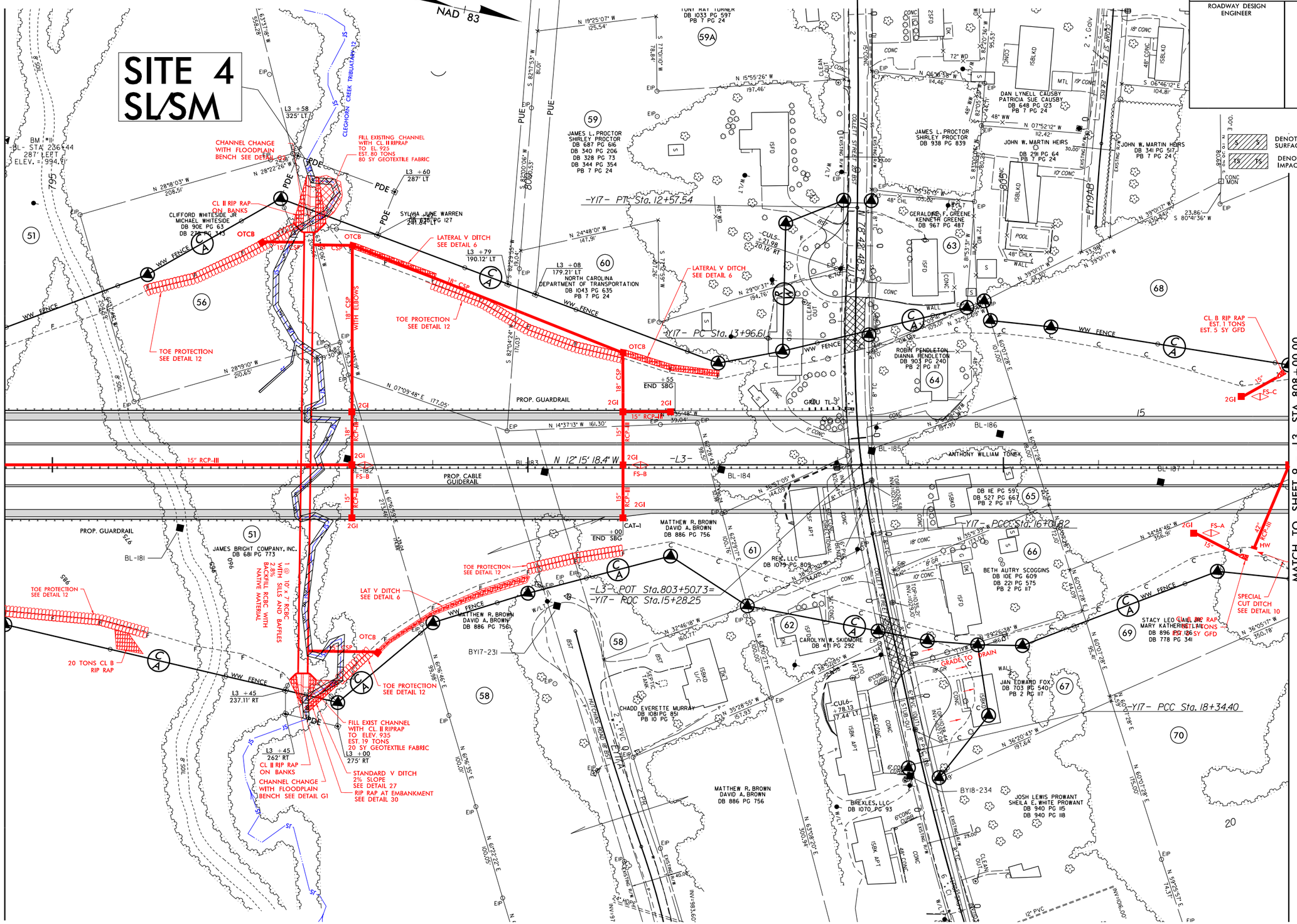
GRAPHIC SCALE
50 25 0 50 100
PLANS

LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD) TO NORTH OF SR 1366 (ROPER LOOP ROAD)

TIP NO.	COUNTY:
R-2233BB	RUTHERFORD
DESIGNED BY: RES	6/1/2018
CHECKED BY: DJM	DATE: 6/1/2018

PERMIT DRAWING
SHEET 8 OF 37

PROJECT REFERENCE NO.	SHEET NO.
	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



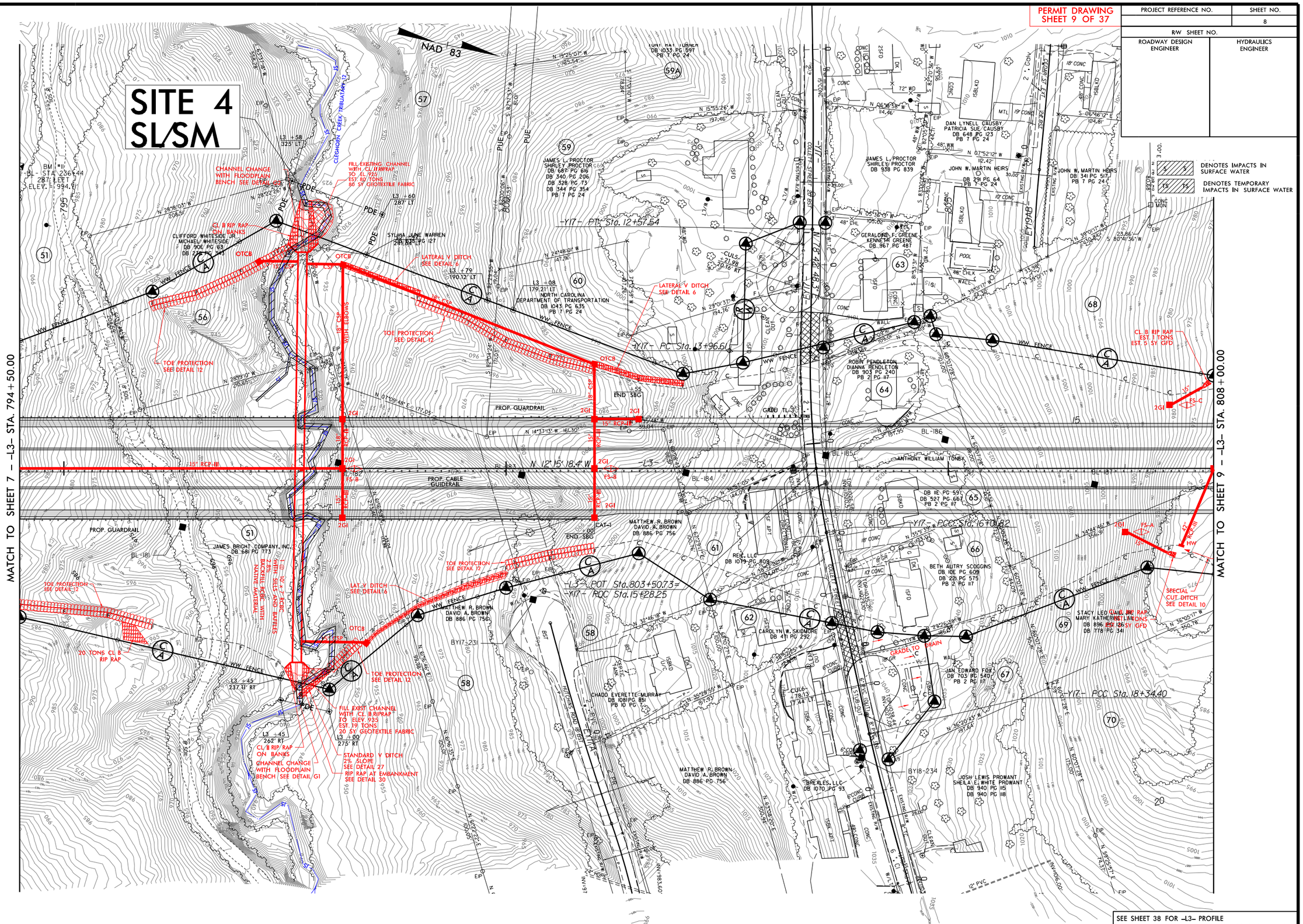
5/14/99

10252017
DSWEBKRY
R2223198_Permit Drawings_20171025.pdf

5/14/99

PERMIT DRAWING
SHEET 9 OF 37

PROJECT REFERENCE NO.	SHEET NO.
	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

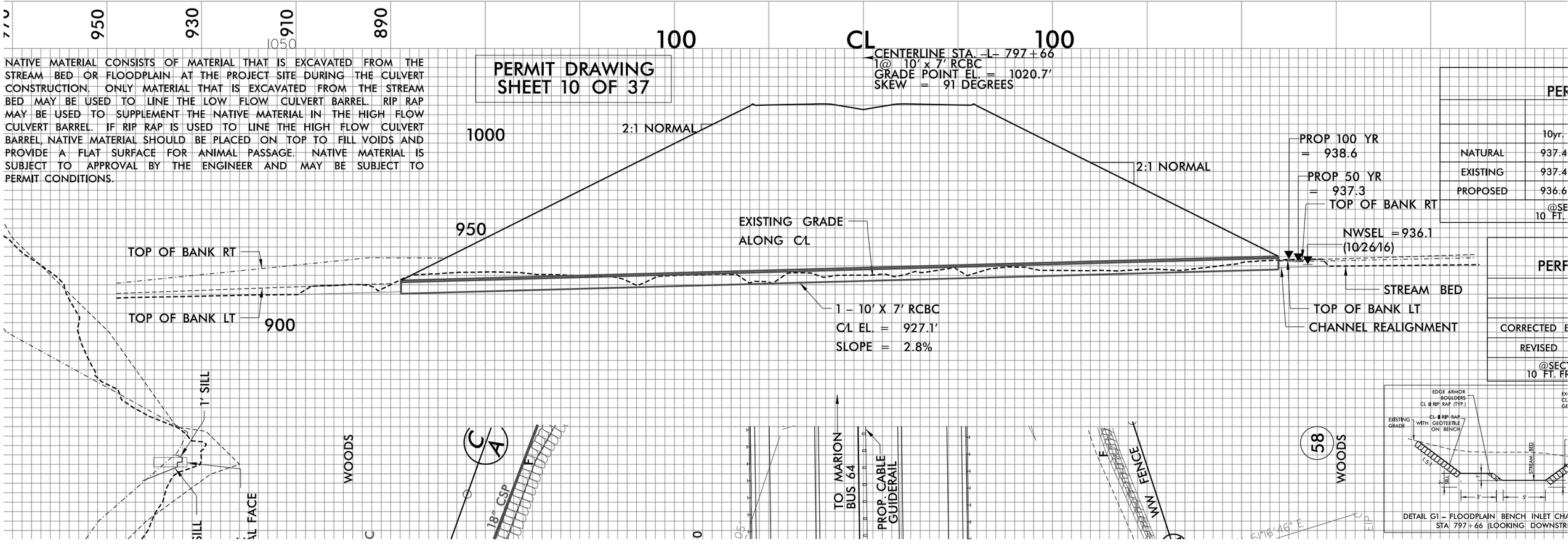


SEE SHEET 38 FOR –L3– PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

10/25/2017
DEWBERRY
R2123-38_Permit Drawings_20171025.pdf

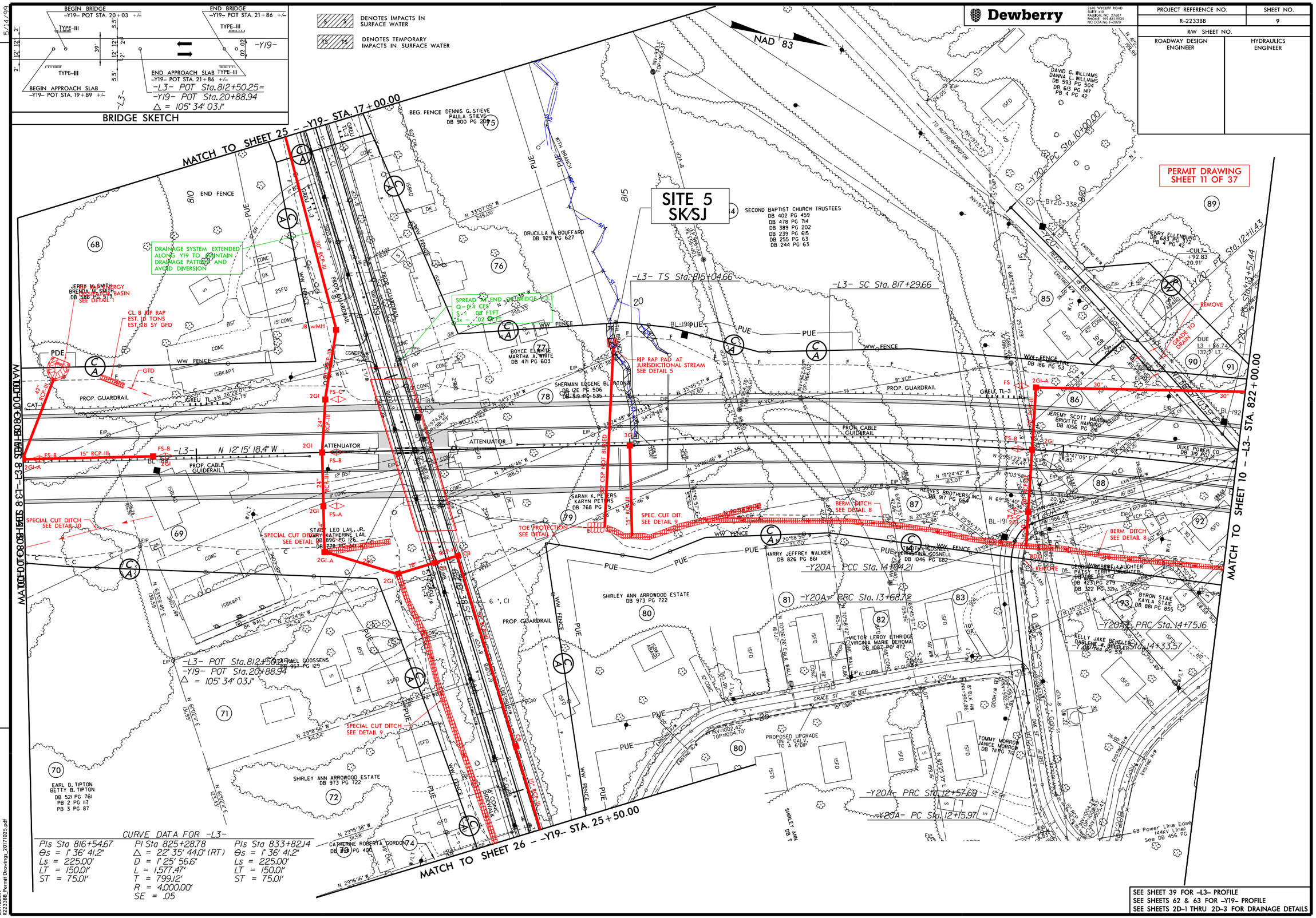
NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING THE CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW CULVERT BARREL. IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

PERMIT DRAWING
SHEET 10 OF 37



PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

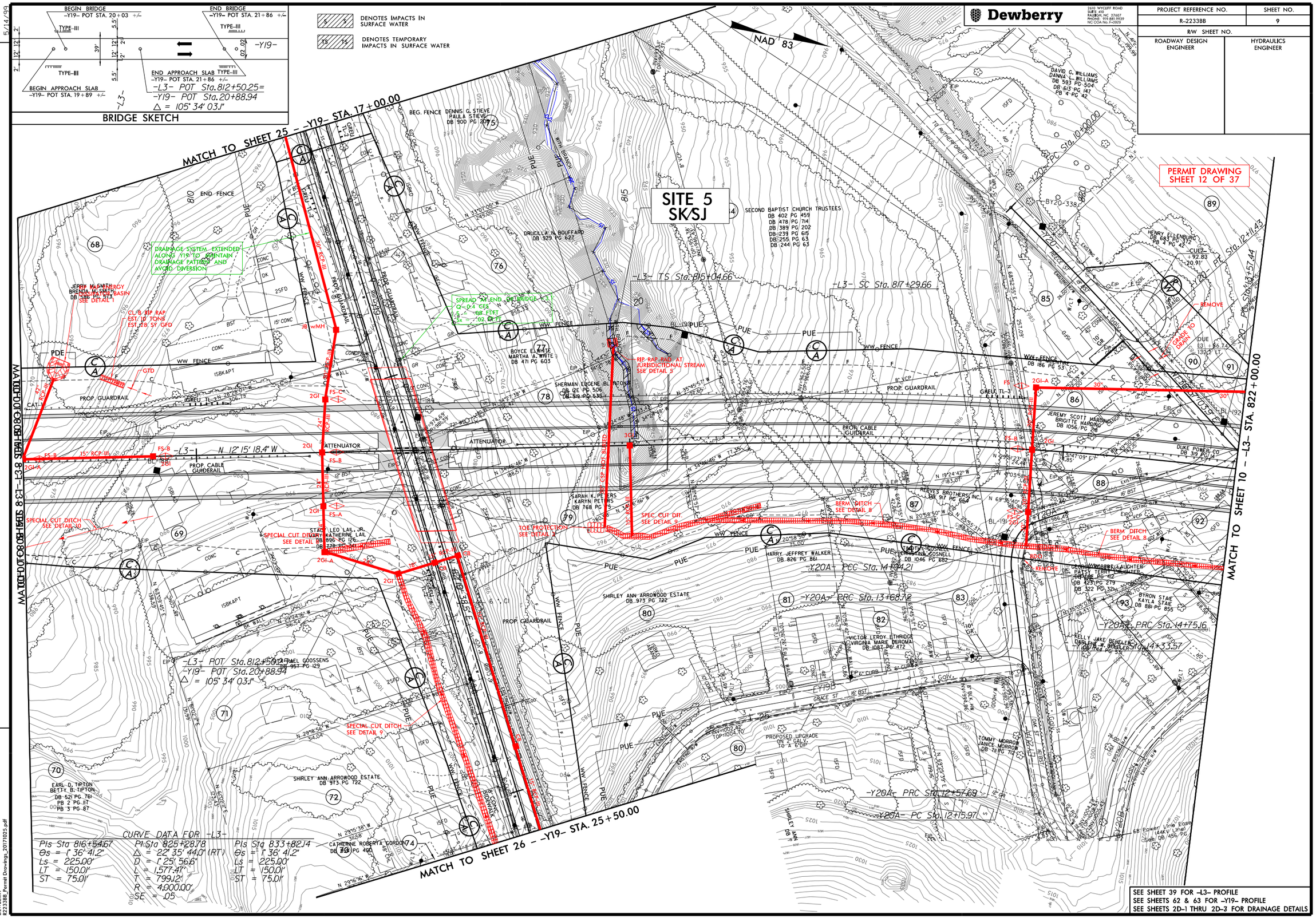
Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929



REVISIONS
ROW REV. - December 21, 2017 - Parcel 93 - Revised tie at Y20A +60 to Y20A +68.88EX. RW (WET)
ROW REV. - December 21, 2017 - Parcel 85 - Property owner name changed to Earl McEntire (WET)

SEE SHEET 39 FOR -L3- PROFILE
SEE SHEETS 62 & 63 FOR -Y19- PROFILE
SEE SHEETS 2D-1 THRU 2D-3 FOR DRAINAGE DETAILS

10252017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

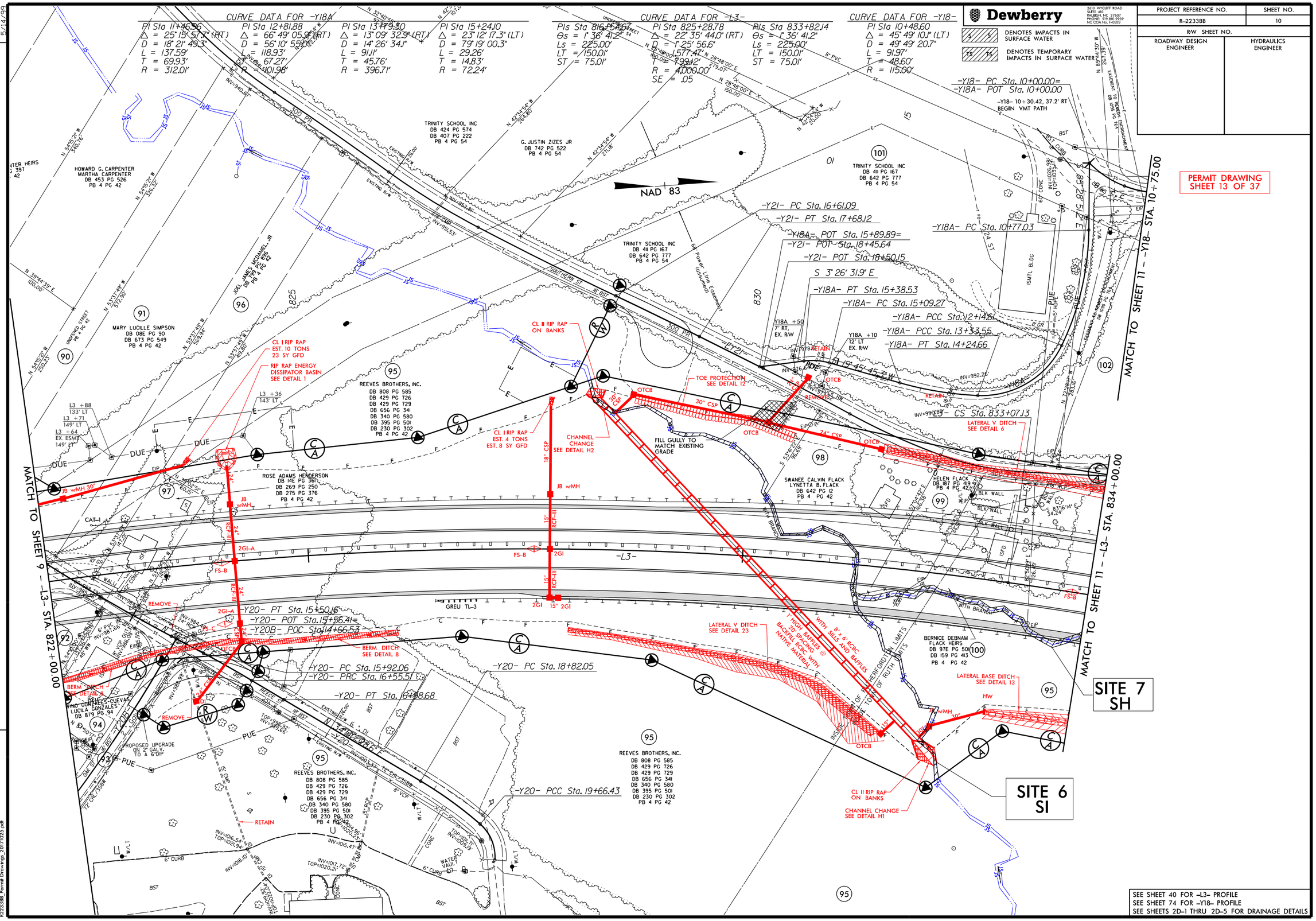


REVISIONS

ROW REV. - December 21, 2017 - Parcel 93 - Revised tie at Y20A +60 to Y20A +68.88EX. R/W (WET)
ROW REV. - December 21, 2017 - Parcel 85 - Property owner name changed to Earl McEntire (WET)

5/14/99

10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf



REVISIONS

5/14/99

10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PERMIT DRAWING
SHEET 14 OF 37

CURVE DATA FOR -Y18A-

PI Sta 11+46.96
Δ = 25° 15' 57.7" (RT)
D = 18° 21' 49.3"
L = 137.59'
T = 69.93'
R = 312.01'

PI Sta 12+81.88
Δ = 66° 49' 05.9" (RT)
D = 56° 10' 55.0"
L = 118.93'
T = 67.27'
R = 101.98'

PI Sta 13+79.50
Δ = 13° 09' 32.9" (RT)
D = 14° 26' 34.1"
L = 91.11'
T = 45.76'
R = 396.71'

PI Sta 15+24.10
Δ = 23° 12' 17.3" (LT)
D = 79° 19' 00.3"
L = 29.26'
T = 14.83'
R = 72.24'

CURVE DATA FOR -L3-

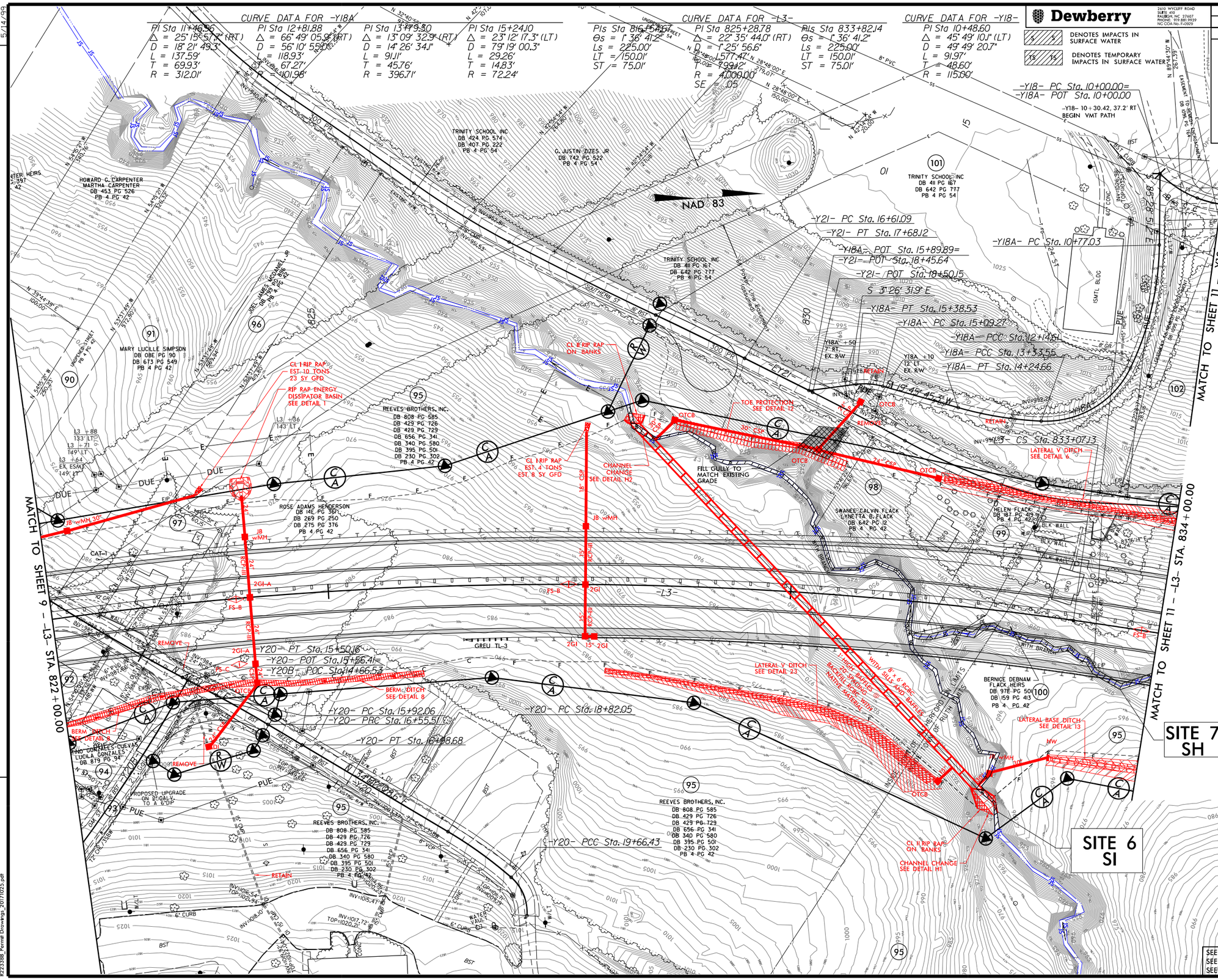
PIs Sta 816+54.04
Θs = 1° 36' 41.2"
Ls = 225.00'
LT = 150.01'
ST = 75.01'

PI Sta 825+28.78
Δ = 22° 35' 44.0" (RT)
D = 1° 25' 56.6"
L = 1,577.47'
T = 793.42'
R = 4,000.00'
SE = .05

PIs Sta 833+82.14
Θs = 1° 36' 41.2"
Ls = 225.00'
LT = 150.01'
ST = 75.01'

CURVE DATA FOR -Y18-

PI Sta 10+48.60
Δ = 45° 49' 10.1" (LT)
D = 49° 49' 20.7"
L = 91.97'
T = 48.60'
R = 115.00'

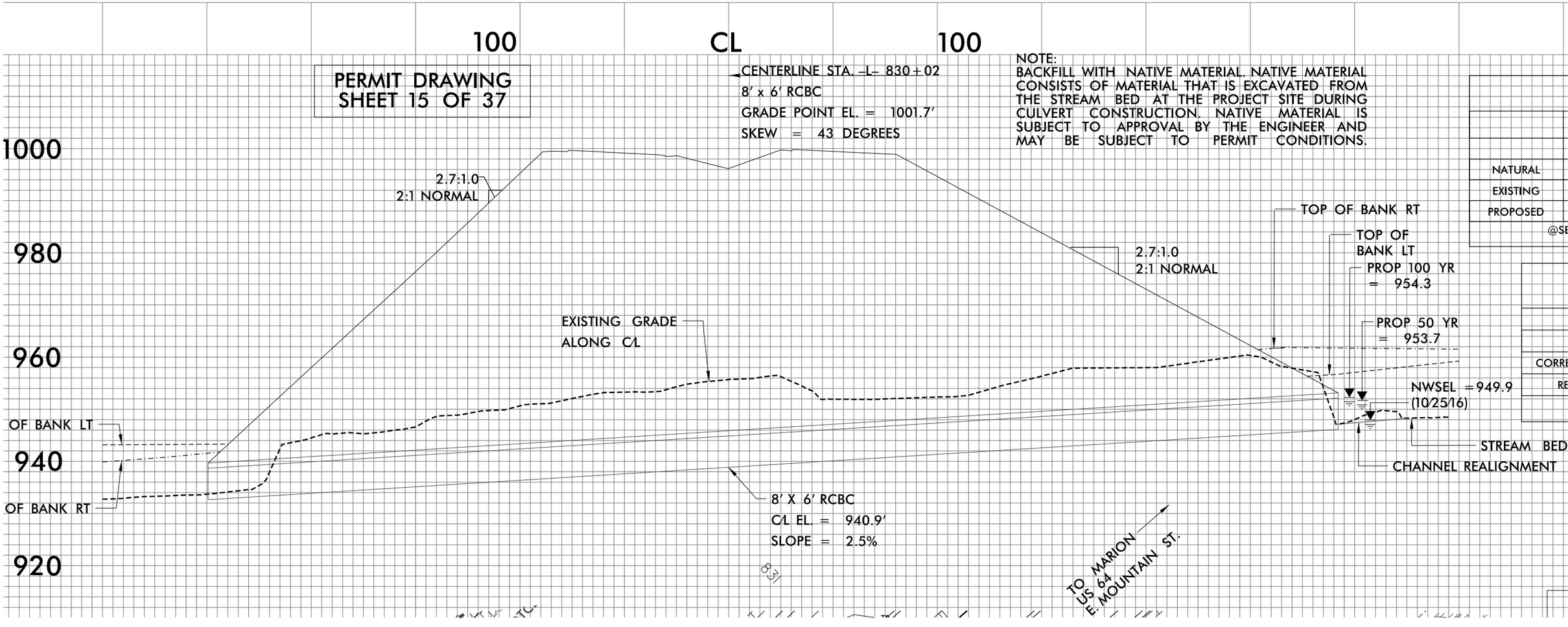


SEE SHEET 40 FOR -L3- PROFILE
SEE SHEET 74 FOR -Y18- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

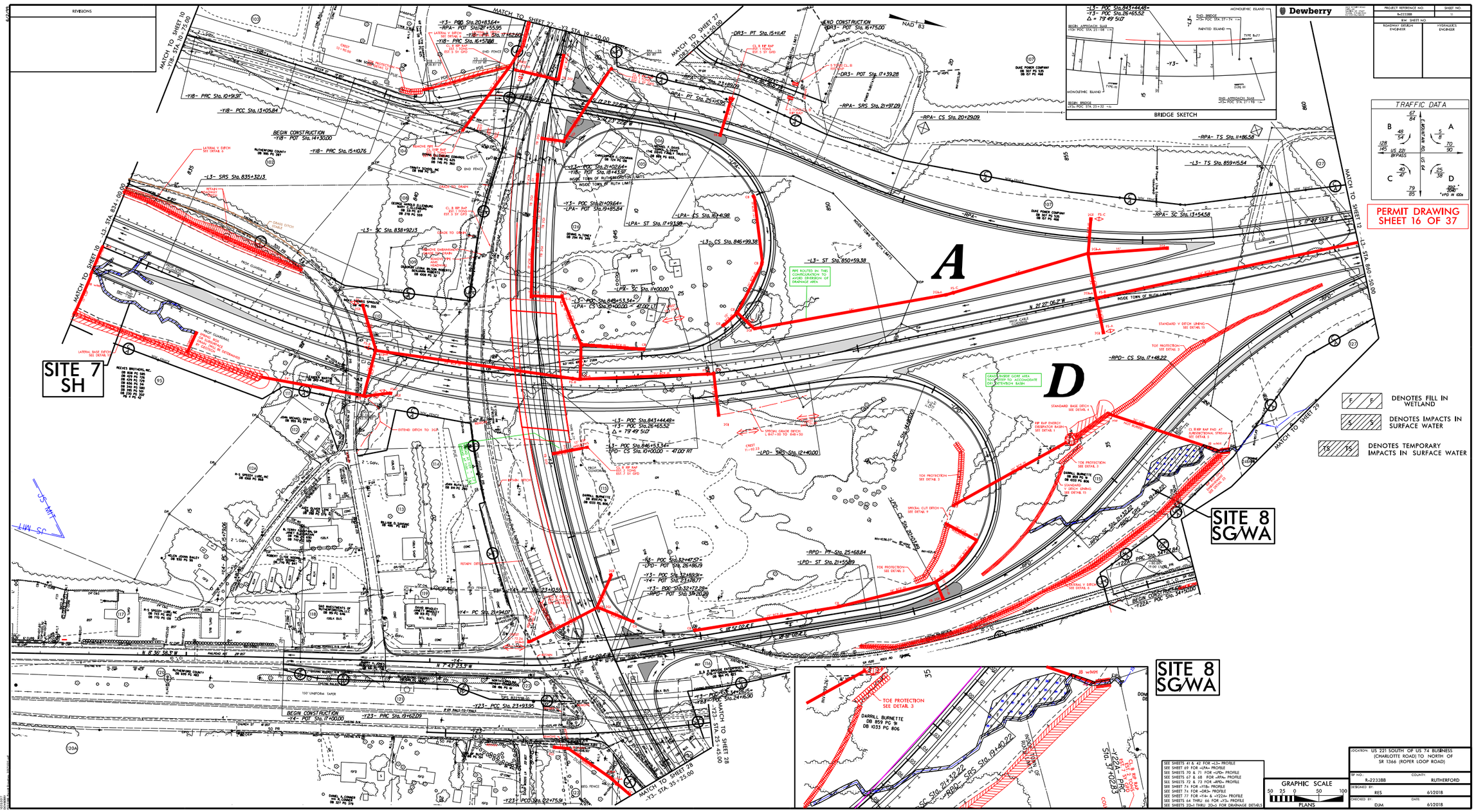
10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf


100
CL
100
PERMIT DRAWING
SHEET 15 OF 37
CENTERLINE STA. –L– 830+02
8' x 6' RCBC
GRADE POINT EL. = 1001.7'
SKEW = 43 DEGREES
NOTE:
BACKFILL WITH NATIVE MATERIAL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
1000
980
960
940
920
2.7:1.0
2:1 NORMAL
EXISTING GRADE
ALONG C/L
TOP OF BANK RT
TOP OF
BANK LT
PROP 100 YR
= 954.3
2.7:1.0
2:1 NORMAL
PROP 50 YR
= 953.7
NWSEL = 949.9
(10/25/16)
STREAM BED
CHANNEL REALIGNMENT
OF BANK LT
OF BANK RT
8' X 6' RCBC
C/L EL. = 940.9'
SLOPE = 2.5%
TO MARION
US 64
E. MOUNTAIN ST.
NATURAL
EXISTING
PROPOSED

REVISIONS

Dewberry

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



SEE SHEETS 41 & 42 FOR -L3- PROFILE
SEE SHEET 69 FOR -L2A- PROFILE
SEE SHEETS 70 & 71 FOR -LPD- PROFILE
SEE SHEETS 67 & 68 FOR -LPA- PROFILE
SEE SHEETS 72 & 73 FOR -RPD- PROFILE
SEE SHEET 74 FOR -Y18- PROFILE
SEE SHEET 76 FOR -DR3- PROFILE
SEE SHEET 77 FOR -Y4- & -Y22A- PROFILE
SEE SHEETS 64 THRU 66 FOR -Y3- PROFILE
SEE SHEETS 20-1 THRU 20-5 FOR DRAINAGE DETAILS

LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD) TO NORTH OF SR 1366 (ROPER LOOP ROAD)

TIP NO.	COUNTY:
R-2233BB	RUTHERFORD
DESIGNED BY: RES	6/1/2018
CHECKED BY: DJM	DATE: 6/1/2018

REVISIONS

Dewberry

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	17

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

BRIDGE SKETCH

TRAFFIC DATA

PERMIT DRAWING
SHEET 17 OF 37

SITE 7
SH

SITE 8
SGWA

SITE 8
SGWA

A

D

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEETS 41 & 42 FOR -L3- PROFILE
SEE SHEET 69 FOR -LPA- PROFILE
SEE SHEETS 70 & 71 FOR -LPD- PROFILE
SEE SHEETS 67 & 68 FOR -RPA- PROFILE
SEE SHEETS 72 & 73 FOR -RPD- PROFILE
SEE SHEET 74 FOR -Y13- PROFILE
SEE SHEET 76 FOR -DR3- PROFILE
SEE SHEET 77 FOR -Y4- & -Y22A- PROFILE
SEE SHEETS 64 THRU 66 FOR -Y3- PROFILE
SEE SHEETS 20-1 THRU 20-5 FOR DRAINAGE DETAILS

GRAPHIC SCALE
50 25 0 50 100
PLANS

LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD) TO NORTH OF SR 1366 (ROPER LOOP ROAD)

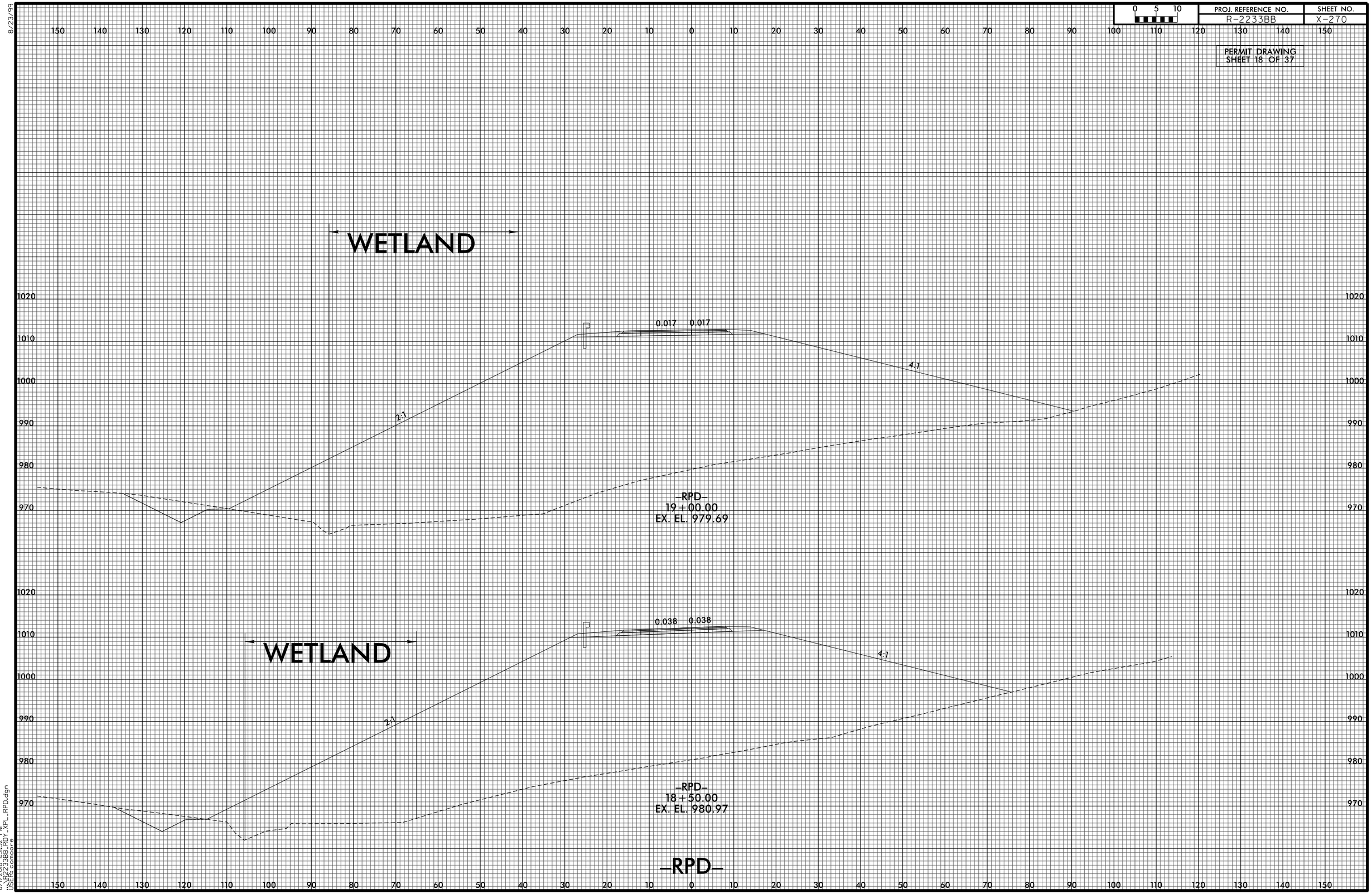
TIP NO:	COUNTY:
R-2233BB	RUTHERFORD

DESIGNED BY:	
RES	6/1/2018

CHECKED BY:	DATE:
DJM	6/1/2018

PROJ. REFERENCE NO.	SHEET NO.
R-2233BB	X-270

PERMIT DRAWING
SHEET 18 OF 37



8/23/99

6/1/2018 1:51:52 PM
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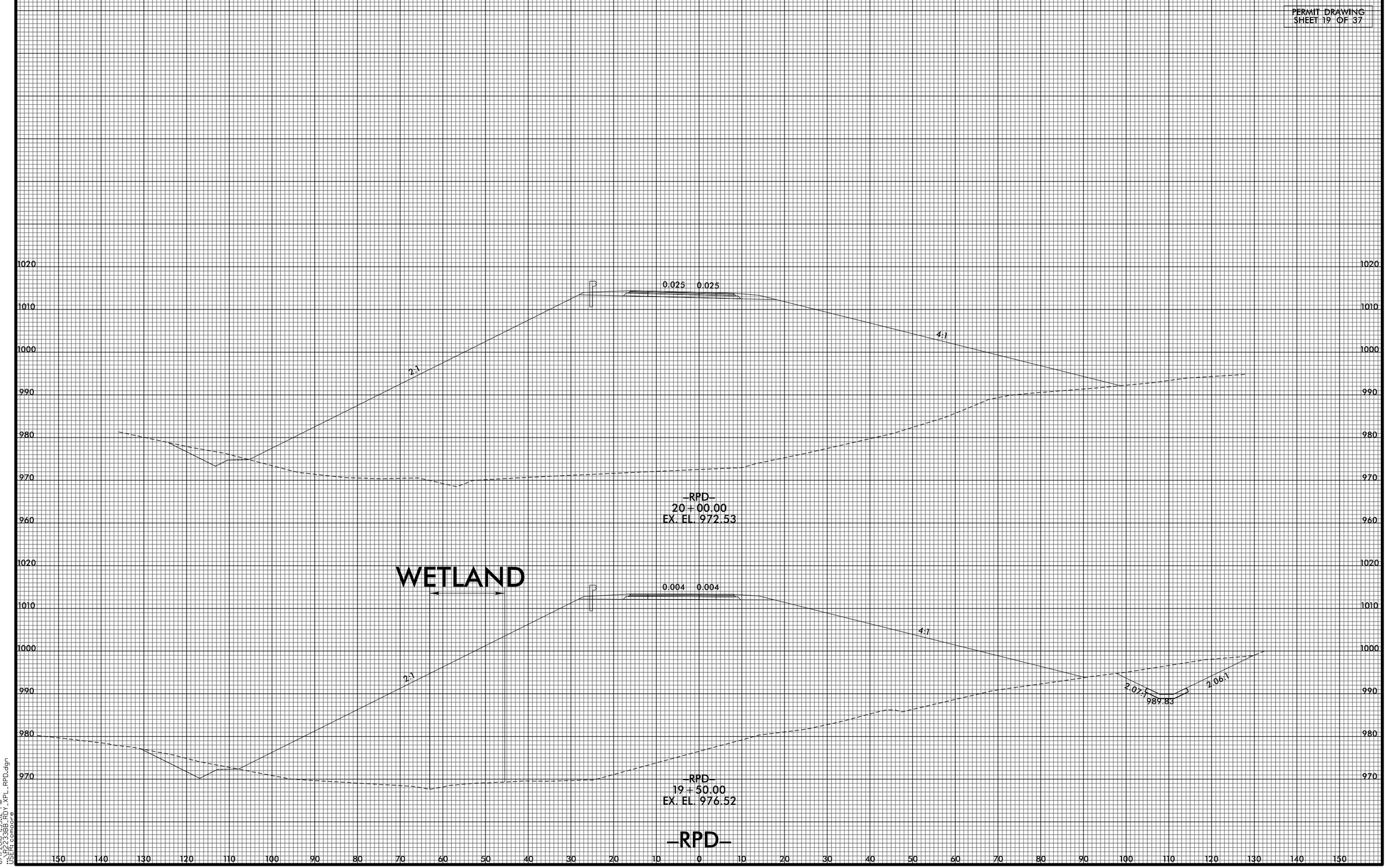
USER: comoore

PROJ. REFERENCE NO.	SHEET NO.
R-2233BB	X-271

0 5 10

PERMIT DRAWING
SHEET 19 OF 37



8/23/99

6/1/2018 1:53:12 PM
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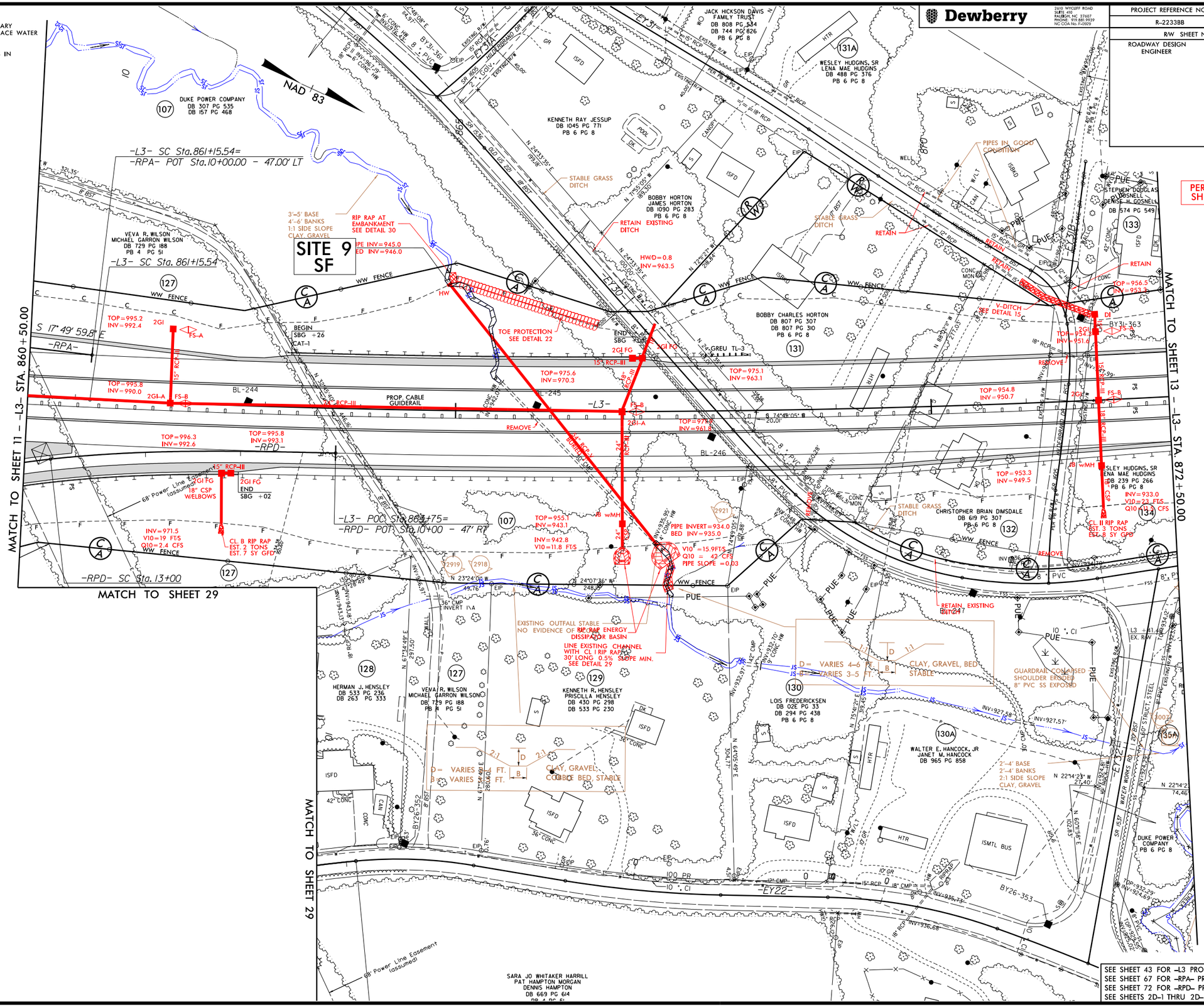
USER: rcamoore

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 20 OF 37

▨ TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
▨ S	DENOTES IMPACTS IN SURFACE WATER



SEE SHEET 43 FOR -L3 PROFILE
SEE SHEET 67 FOR -RPA- PROFILE
SEE SHEET 72 FOR -RPD- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

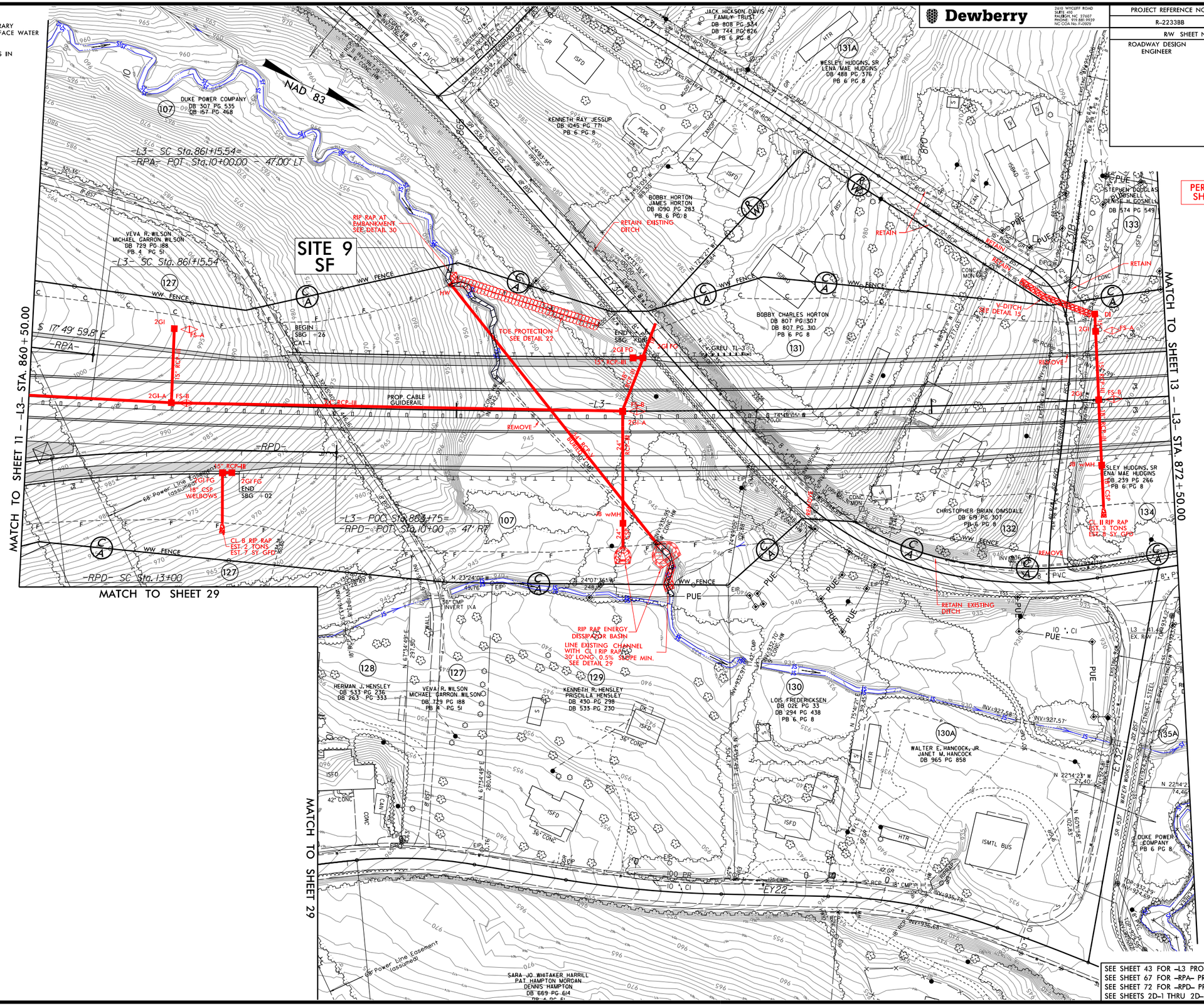
10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

5/14/99

REVISIONS

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S DENOTES IMPACTS IN SURFACE WATER



Dewberry

2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

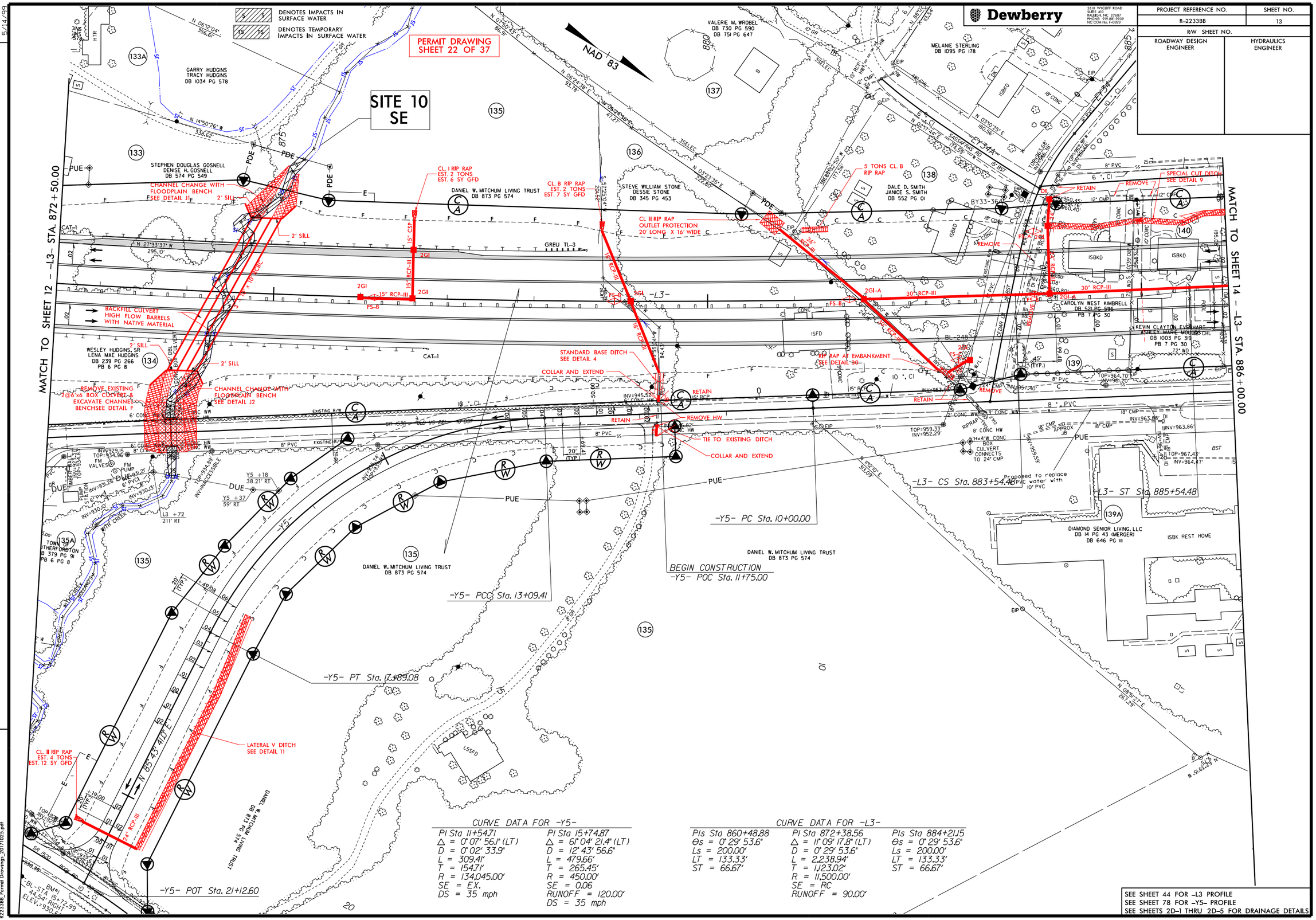
PERMIT DRAWING
SHEET 21 OF 37

SEE SHEET 43 FOR -L3 PROFILE
SEE SHEET 67 FOR -RPA- PROFILE
SEE SHEET 72 FOR -RPD- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929



CURVE DATA FOR -Y5-

PI Sta 11+54.71	PI Sta 15+74.87
Δ = 0° 07' 56.1" (LT)	Δ = 61° 04' 21.4" (LT)
D = 0° 02' 33.9"	D = 12° 43' 56.6"
L = 309.41'	L = 479.66'
T = 154.71'	T = 265.45'
R = 134,045.00'	R = 450.00'
SE = EX.	SE = 0.06
DS = 35 mph	RUNOFF = 120.00'
	DS = 35 mph

CURVE DATA FOR -L3-

PIs Sta 860+48.88	PI Sta 872+38.56	PIs Sta 884+21.15
Θs = 0° 29' 53.6"	Δ = 11° 09' 17.8" (LT)	Θs = 0° 29' 53.6"
Ls = 200.00'	D = 0° 29' 53.6"	Ls = 200.00'
LT = 133.33'	L = 2,238.94'	LT = 133.33'
ST = 66.67'	T = 1,123.02'	ST = 66.67'
	R = 11,500.00'	
	SE = RC	
	RUNOFF = 90.00'	

SEE SHEET 44 FOR -L3 PROFILE
SEE SHEET 78 FOR -Y5- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

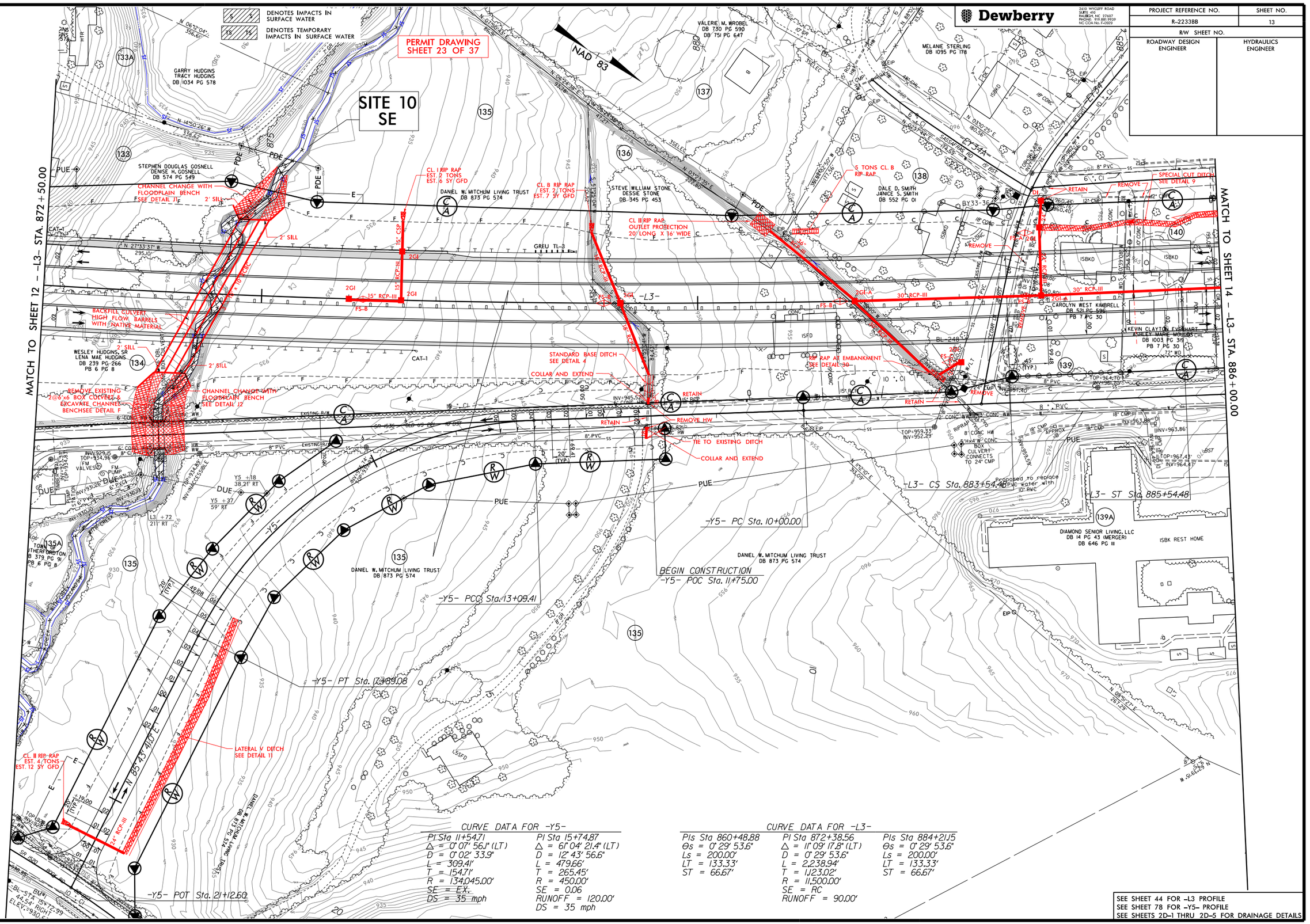
REVISIONS

5/14/99

10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929



CURVE DATA FOR -Y5-

PI Sta 11+54.71	PI Sta 15+74.87
Δ = 0° 07' 56.1" (LT)	Δ = 61° 04' 21.4" (LT)
D = 0° 02' 33.9"	D = 12° 43' 56.6"
L = 309.41'	L = 479.66'
T = 154.71'	T = 265.45'
R = 134,045.00'	R = 450.00'
SE = EX.	SE = 0.06
DS = 35 mph	RUNOFF = 120.00'
	DS = 35 mph

CURVE DATA FOR -L3-

PIs Sta 860+48.88	PI Sta 872+38.56	PIs Sta 884+21.15
Θs = 0° 29' 53.6"	Δ = 11° 09' 17.8" (LT)	Θs = 0° 29' 53.6"
Ls = 200.00'	D = 0° 29' 53.6"	Ls = 200.00'
LT = 133.33'	L = 2,238.94'	LT = 133.33'
ST = 66.67'	T = 1,123.02'	ST = 66.67'
	R = 11,500.00'	
	SE = RC	
	RUNOFF = 90.00'	

SEE SHEET 44 FOR -L3 PROFILE
SEE SHEET 78 FOR -Y5- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

10/25/2017
DEWBERRY
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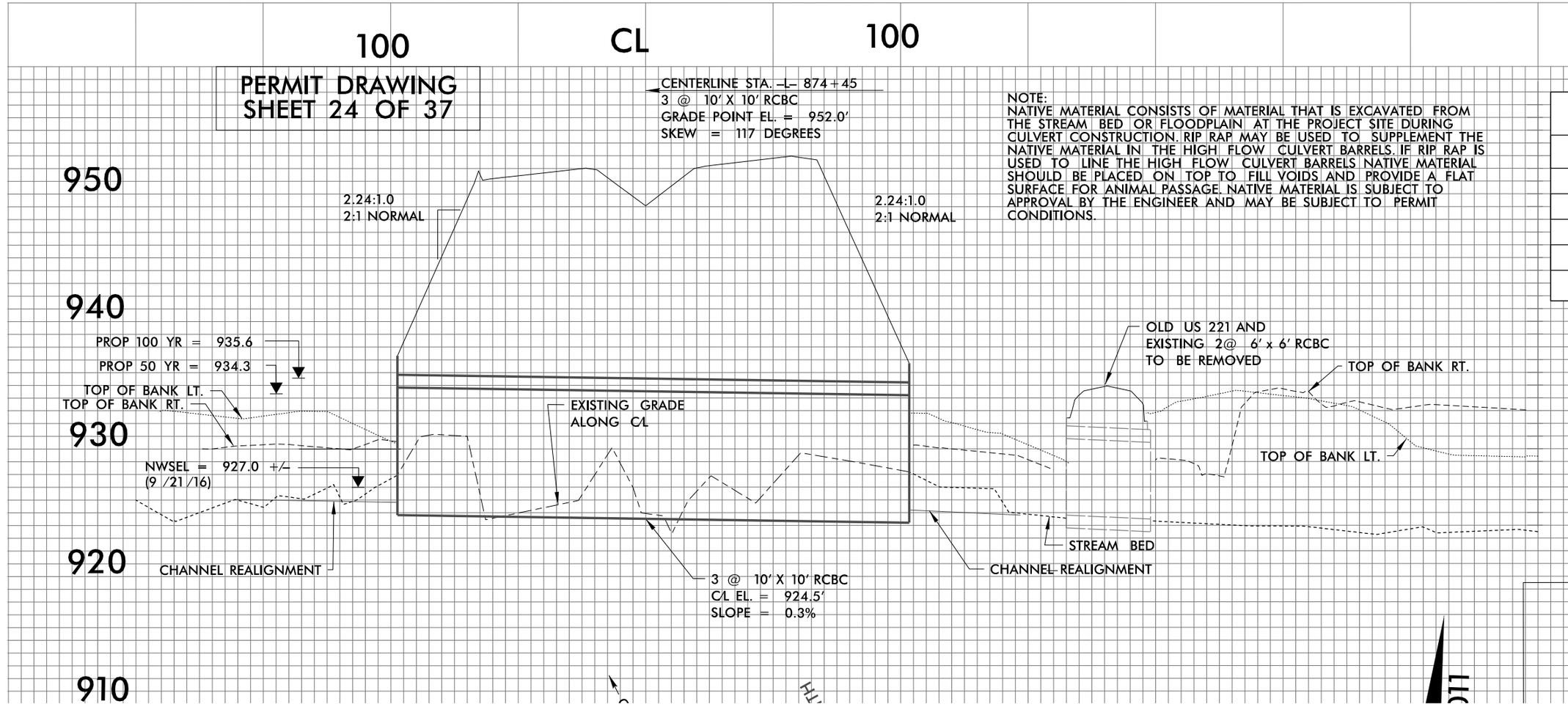

100
CL
100
PERMIT DRAWING
SHEET 24 OF 37
CENTERLINE STA. –L– 874+45
3 @ 10' X 10' RCBC
GRADE POINT EL. = 952.0'
SKEW = 117 DEGREES
NOTE:
NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW CULVERT BARRELS. IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARRELS NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
950
940
930
920
910
2.24:1.0
2:1 NORMAL
2.24:1.0
2:1 NORMAL
PROP 100 YR = 935.6
PROP 50 YR = 934.3
TOP OF BANK LT.
TOP OF BANK RT.
NWSEL = 927.0 +/–
(9 /21 /16)
EXISTING GRADE
ALONG C/L
OLD US 221 AND
EXISTING 2@ 6' x 6' RCBC
TO BE REMOVED
TOP OF BANK RT.
TOP OF BANK LT.
STREAM BED
CHANNEL REALIGNMENT
CHANNEL REALIGNMENT
3 @ 10' X 10' RCBC
C/L EL. = 924.5'
SLOPE = 0.3%

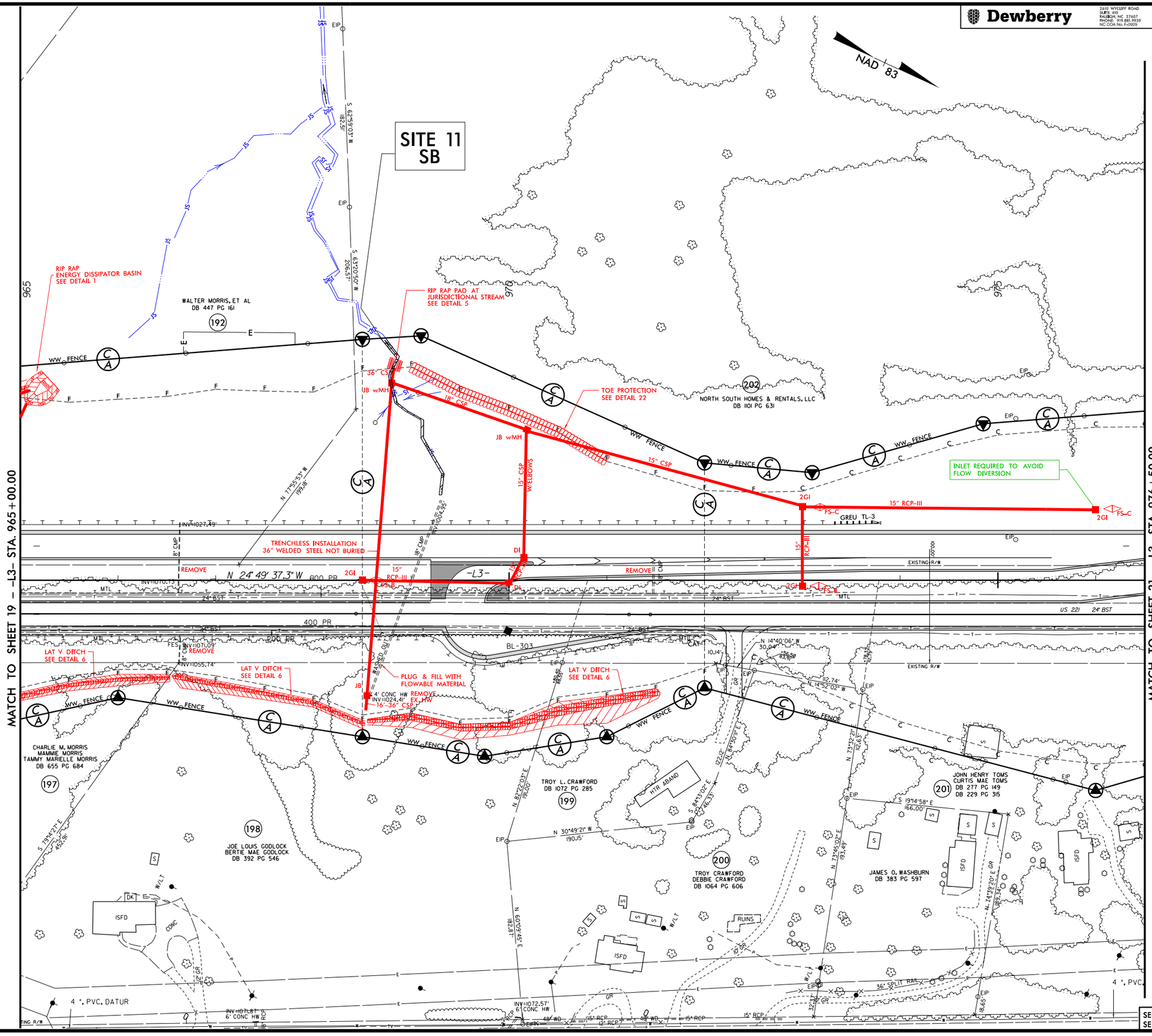
Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 25 OF 37

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



SEE SHEET 51 FOR –L3– PROFILE
SEE SHEETS 2D-1 THRU 2D-3 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

10/25/2017
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REVISIONS

Dewberry

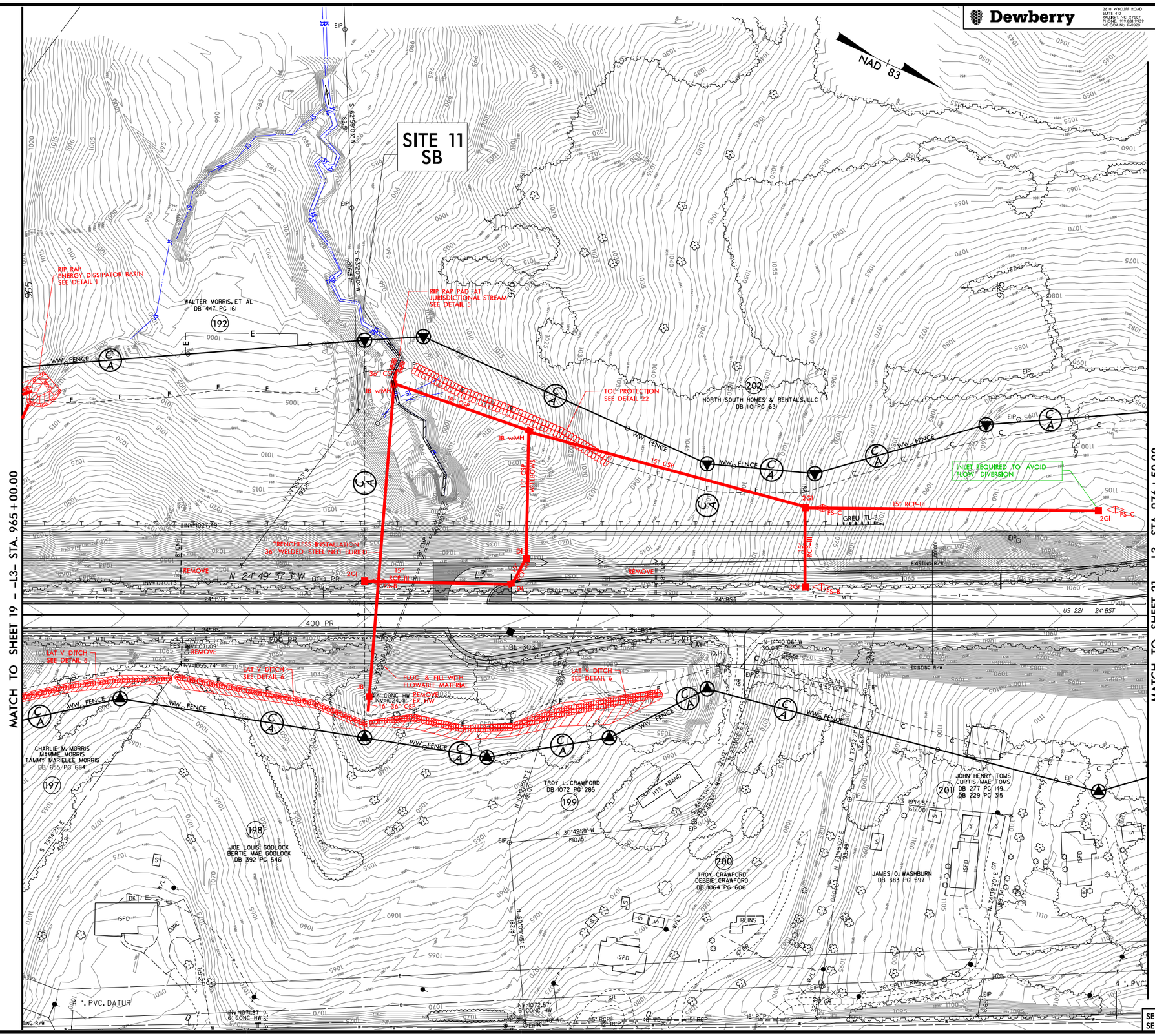
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 26 OF 37

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER



SEE SHEET 51 FOR –L3– PROFILE
SEE SHEETS 2D-1 THRU 2D-3 FOR DRAINAGE DETAILS

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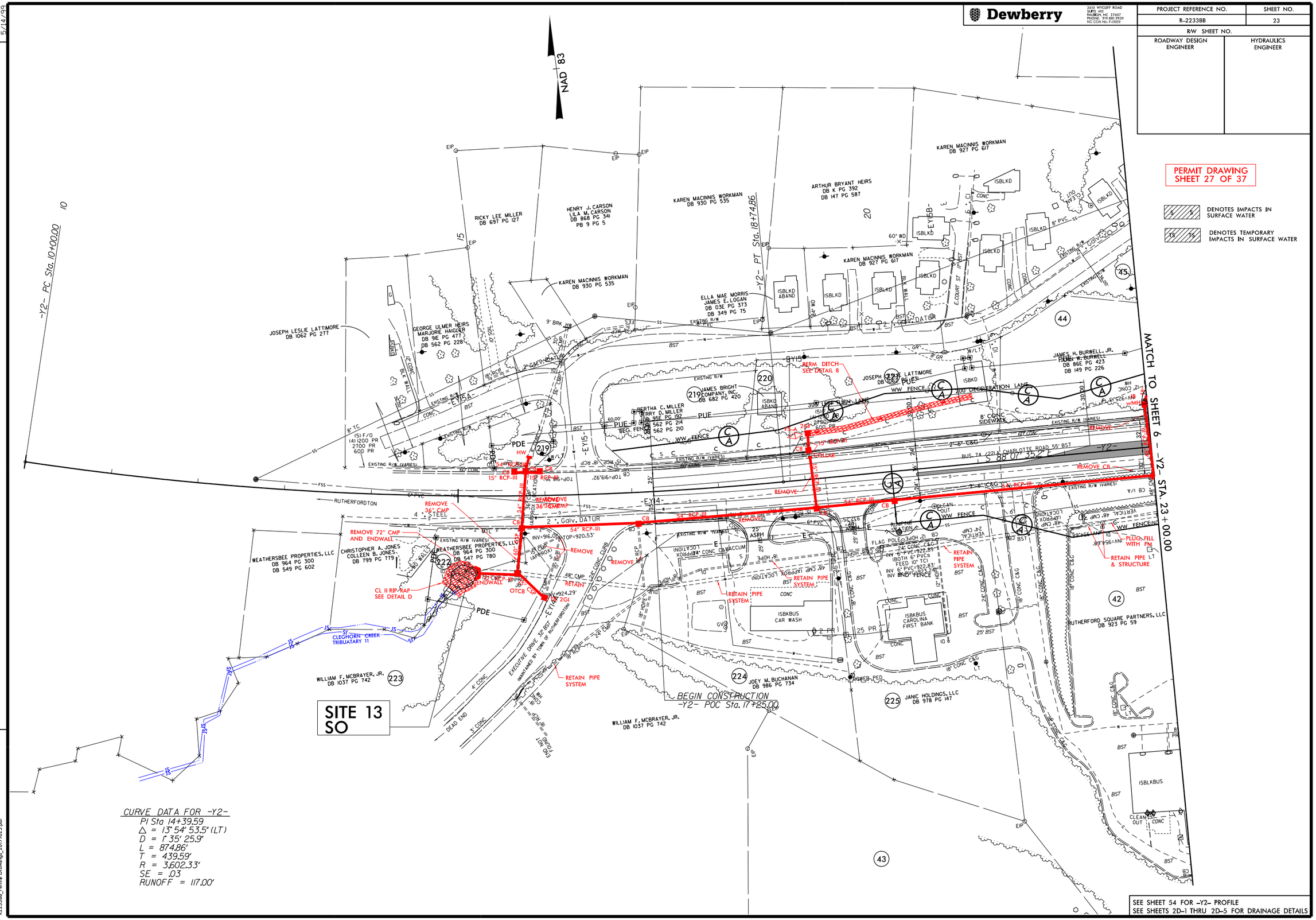
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 27 OF 37

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y2-
PI Sta 14+39.59
Δ = 13° 54' 53.5" (LT)
D = 1° 35' 25.9"
L = 874.86'
T = 439.59'
R = 3,602.33'
SE = .03
RUNOFF = 117.00'

REVISIONS

5/14/99

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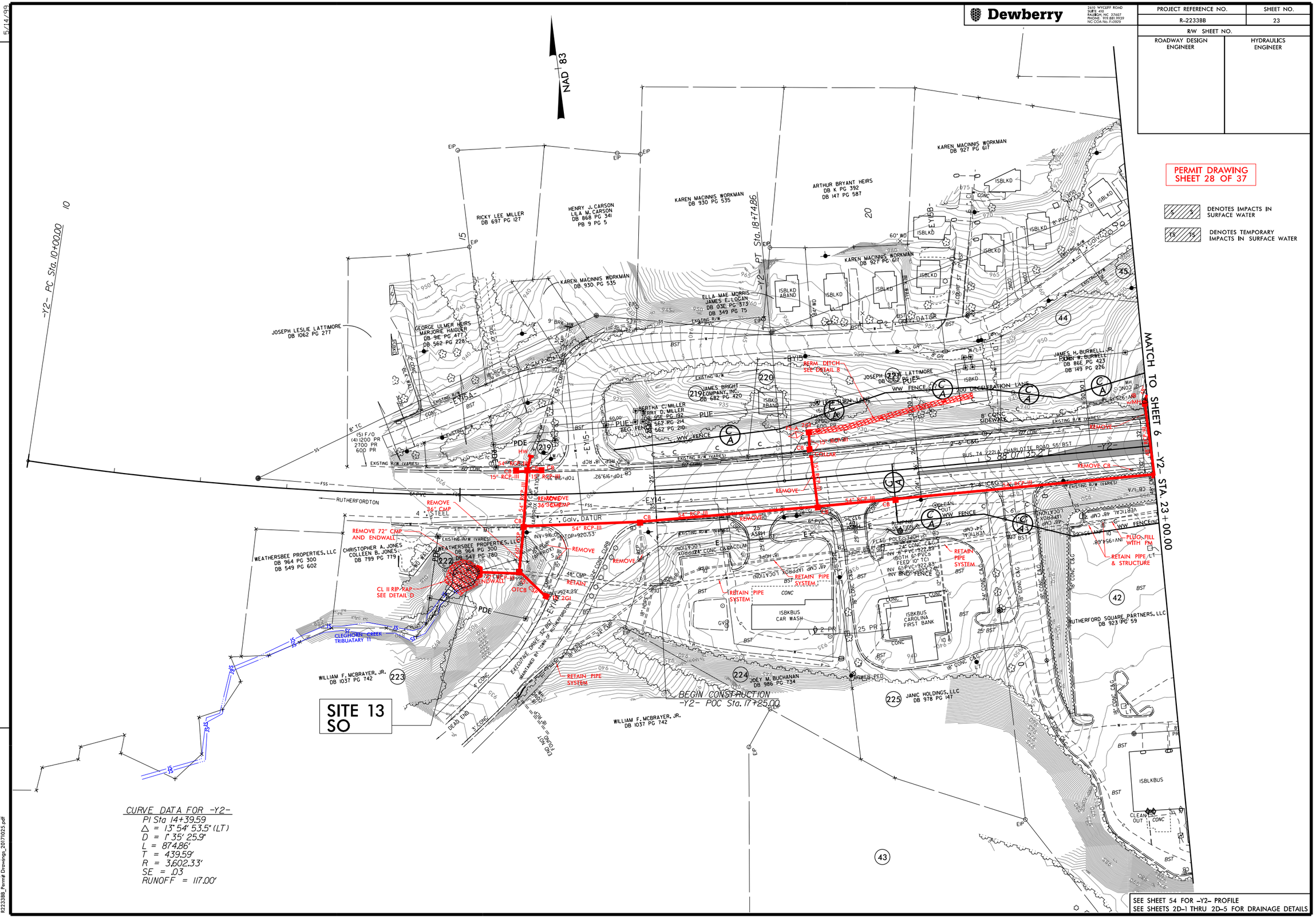
Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 28 OF 37

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y2-
PI Sta 14+39.59
△ = 13° 54' 53.5" (LT)
D = 1° 35' 25.9"
L = 874.86'
T = 439.59'
R = 3,602.33'
SE = .03
RUNOFF = 117.00'

SEE SHEET 54 FOR -Y2- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

10/25/2017
DEWBERRY
R2233BB_Permit Drawings_20171025.pdf

5/14/99

REVISIONS

ROW REV. - October 22, 2018 - Parcel 153 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 158 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 265 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 266 - Revised R/W take for roundabout (WET)

Dewberry

2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 29 OF 37

DENOTES IMPACTS IN SURFACE WATER

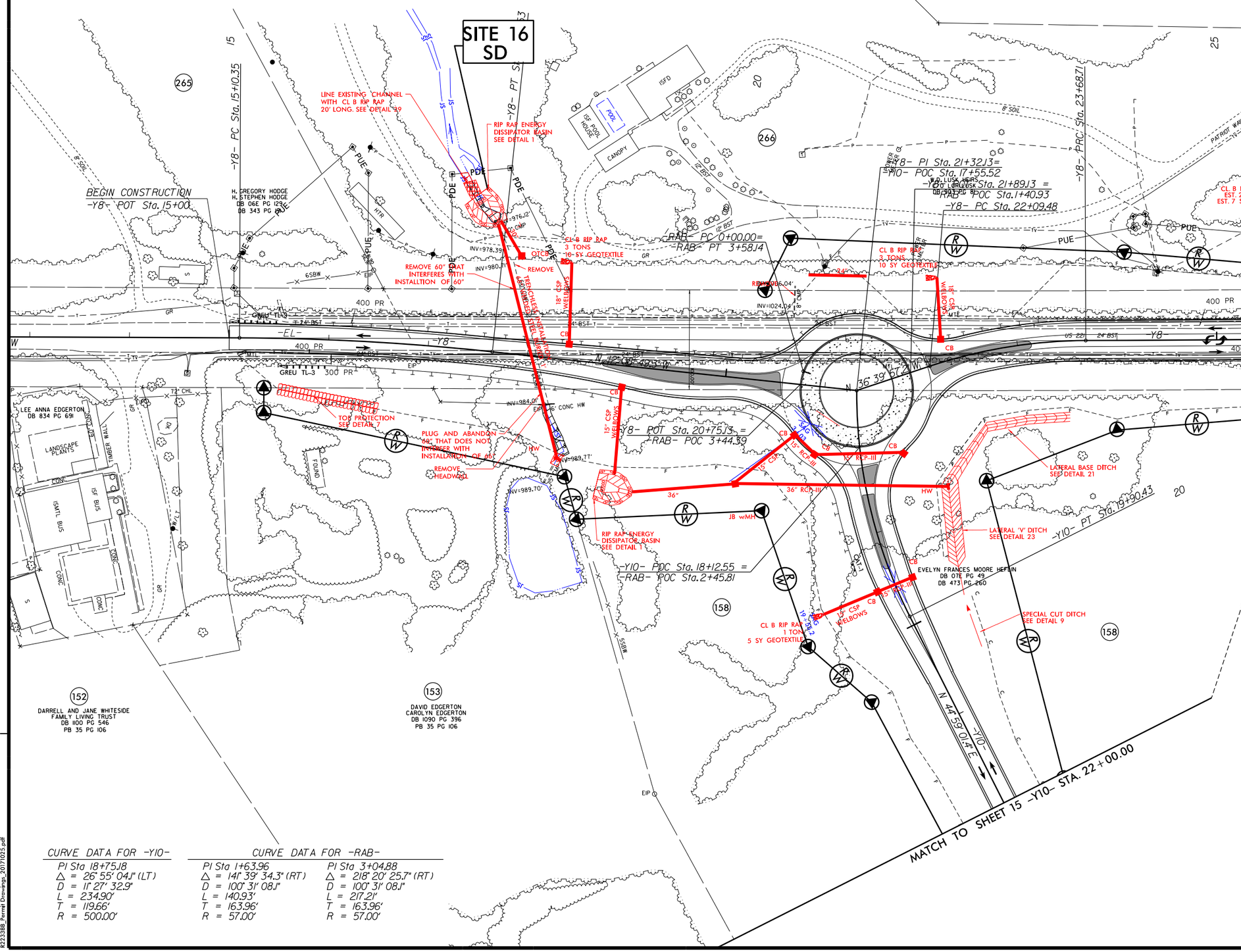
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83

SITE 16
SD

CURVE DATA FOR -Y8-

PI Sta 16+37.55	PI Sta 22+89.77	PI Sta 24+86.43	PI Sta 28+64.40
Δ = 5° 49' 31.0" (RT)	Δ = 18° 14' 44.9" (RT)	Δ = 0° 26' 26.8" (LT)	Δ = 3° 01' 15.1" (LT)
D = 2° 17' 30.6"	D = 11° 27' 33.0"	D = 0° 11' 14.0"	D = 0° 34' 49.8"
L = 254.18'	L = 159.22'	L = 235.44'	L = 520.39'
T = 127.20'	T = 80.29'	T = 117.72'	T = 260.25'
R = 2,500.00'	R = 500.00'	R = 30,605.00'	R = 9,870.00'



CURVE DATA FOR -Y10-

PI Sta 18+75.18
Δ = 26° 55' 04.1" (LT)
D = 11° 27' 32.9"
L = 234.90'
T = 119.66'
R = 500.00'

CURVE DATA FOR -RAB-

PI Sta 1+63.96	PI Sta 3+04.88
Δ = 141° 39' 34.3" (RT)	Δ = 218° 20' 25.7" (RT)
D = 100° 31' 08.1"	D = 100° 31' 08.1"
L = 140.93'	L = 217.21'
T = 163.96'	T = 163.96'
R = 57.00'	R = 57.00'

SEE SHEET 78 FOR -Y8- PROFILE
SEE SHEET 79 FOR -Y10- PROFILE
SEE SHEET 79 FOR -RAB- PROFILE
SEE SHEETS 2D-1 THRU 2D-7 FOR DRAINAGE DETAILS

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PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PERMIT DRAWING
SHEET 30 OF 37

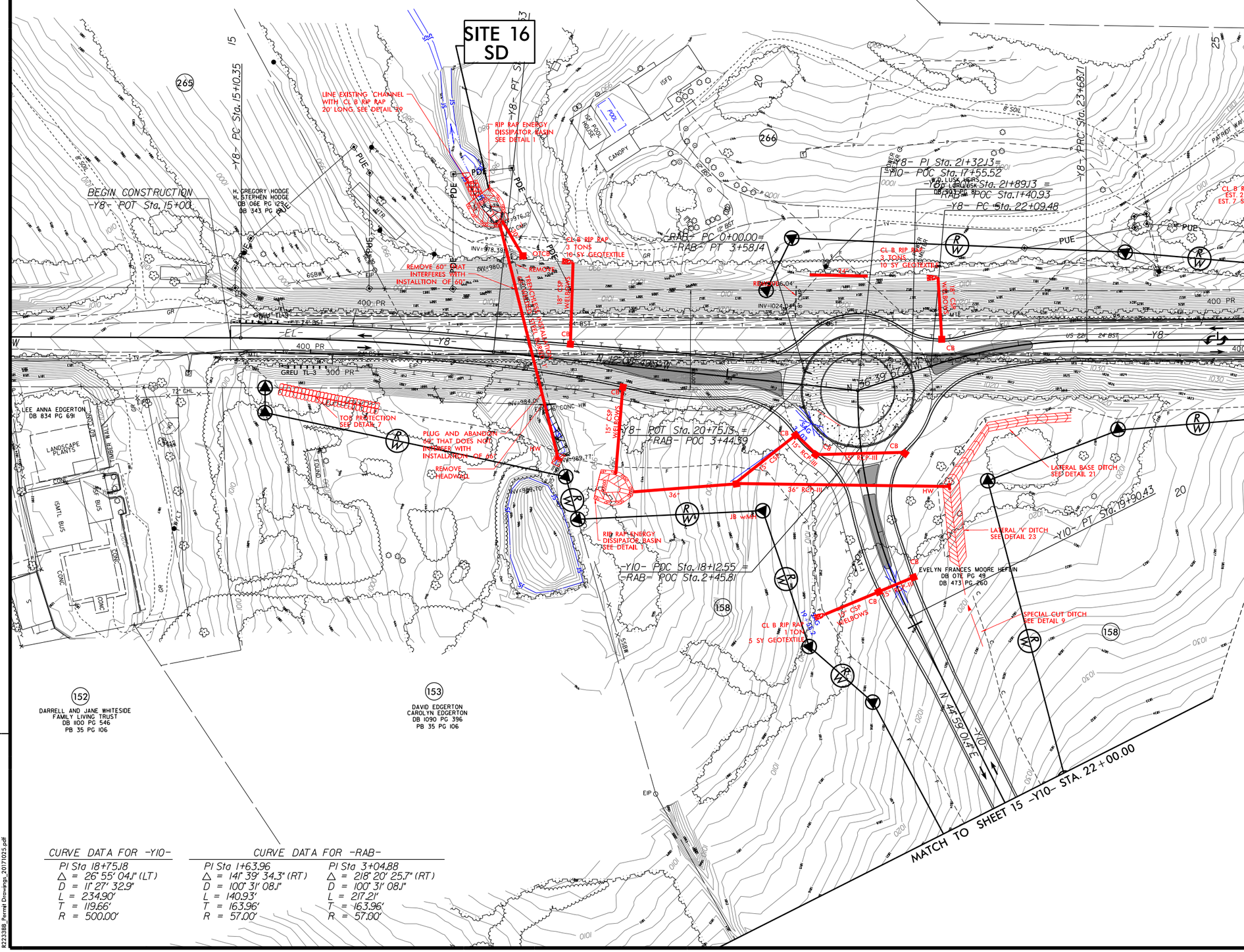
DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83

CURVE DATA FOR -Y8-

PI Sta 16+37.55	PI Sta 22+89.77	PI Sta 24+86.43	PI Sta 28+64.40
Δ = 5° 49' 31.0" (RT)	Δ = 18° 14' 44.9" (RT)	Δ = 0° 26' 26.8" (LT)	Δ = 3° 01' 15.1" (LT)
D = 2° 17' 30.6"	D = 11° 27' 33.0"	D = 0° 11' 14.0"	D = 0° 34' 49.8"
L = 254.18'	L = 159.22'	L = 235.44'	L = 520.39'
T = 127.20'	T = 80.29'	T = 117.72'	T = 260.25'
R = 2,500.00'	R = 500.00'	R = 30,605.00'	R = 9,870.00'



CURVE DATA FOR -Y10-

PI Sta 18+75.18
Δ = 26° 55' 04.1" (LT)
D = 11° 27' 32.9"
L = 234.90'
T = 119.66'
R = 500.00'

CURVE DATA FOR -RAB-

PI Sta 1+63.96	PI Sta 3+04.88
Δ = 141° 39' 34.3" (RT)	Δ = 218° 20' 25.7" (RT)
D = 100° 31' 08.1"	D = 100° 31' 08.1"
L = 140.93'	L = 217.21'
T = 163.96'	T = 163.96'
R = 57.00'	R = 57.00'

SEE SHEET 78 FOR -Y8- PROFILE
SEE SHEET 79 FOR -Y10- PROFILE
SEE SHEET 79 FOR -RAB- PROFILE
SEE SHEETS 2D-1 THRU 2D-7 FOR DRAINAGE DETAILS

REVISIONS

ROW REV. - October 22, 2018 - Parcel 153 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 158 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 265 - Revised R/W take for roundabout (WET)
ROW REV. - October 22, 2018 - Parcel 266 - Revised R/W take for roundabout (WET)

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Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 31 OF 37

S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

JAMES E. STILL, JR
SHARON D. STILL
DB 849 PG 681
DB 280 PG 429
DB 230 PG 499

CURVE DATA FOR -Y11-
PI Sta 18+63.57
△ = 39° 47' 36.2" (RT)
D = 9° 32' 57.5"
L = 416.72'
T = 217.16'
R = 600.00'
SE = .06
RUNOFF = 126.00'
DS = 40 mph

TOE PROTECTION RECOMMENDED DUE TO STEEP SLOPE AND OBSERVATION OF EROSION AT BOTTOM OF EXISTING EMBANKMENTS

SLOPE TOO STEEP FOR LAT DITCH

-Y11- PC Sta. 16+46.41

-Y11- PT Sta. 20+63.13

MATCH TO SHEET 18 -Y11- STA. 13+65.00

N 65° 17' 29.0" E

TOE PROTECTION SEE DETAIL 7

LAT V DITCH SEE DETAIL 23

RIP RAP ENERGY DISSIPATOR BASIN SEE DETAIL 1

RIP RAP AT EMBANKMENT SEE DETAIL 30

RIP RAP PAD AT JURISDICTIONAL STREAM RT BANK ONLY SEE DETAIL 5

STANDARD V DITCH 6% MIN SLOPE SEE DETAIL 17

LAT V DITCH SEE DETAIL 6

SITE 15 SC

RETAIN

SPECIAL CUT DITCH SEE DETAIL 20

END CONSTRUCTION -Y11- POT Sta. 28+00

HHG REAL PROPERTY, LLC
DB 1085 PG 536
DB 401 PG 553

GPS R2597-2

BY41-329

BY40-328

SEE SHEETS 81 & 82 FOR -Y11- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

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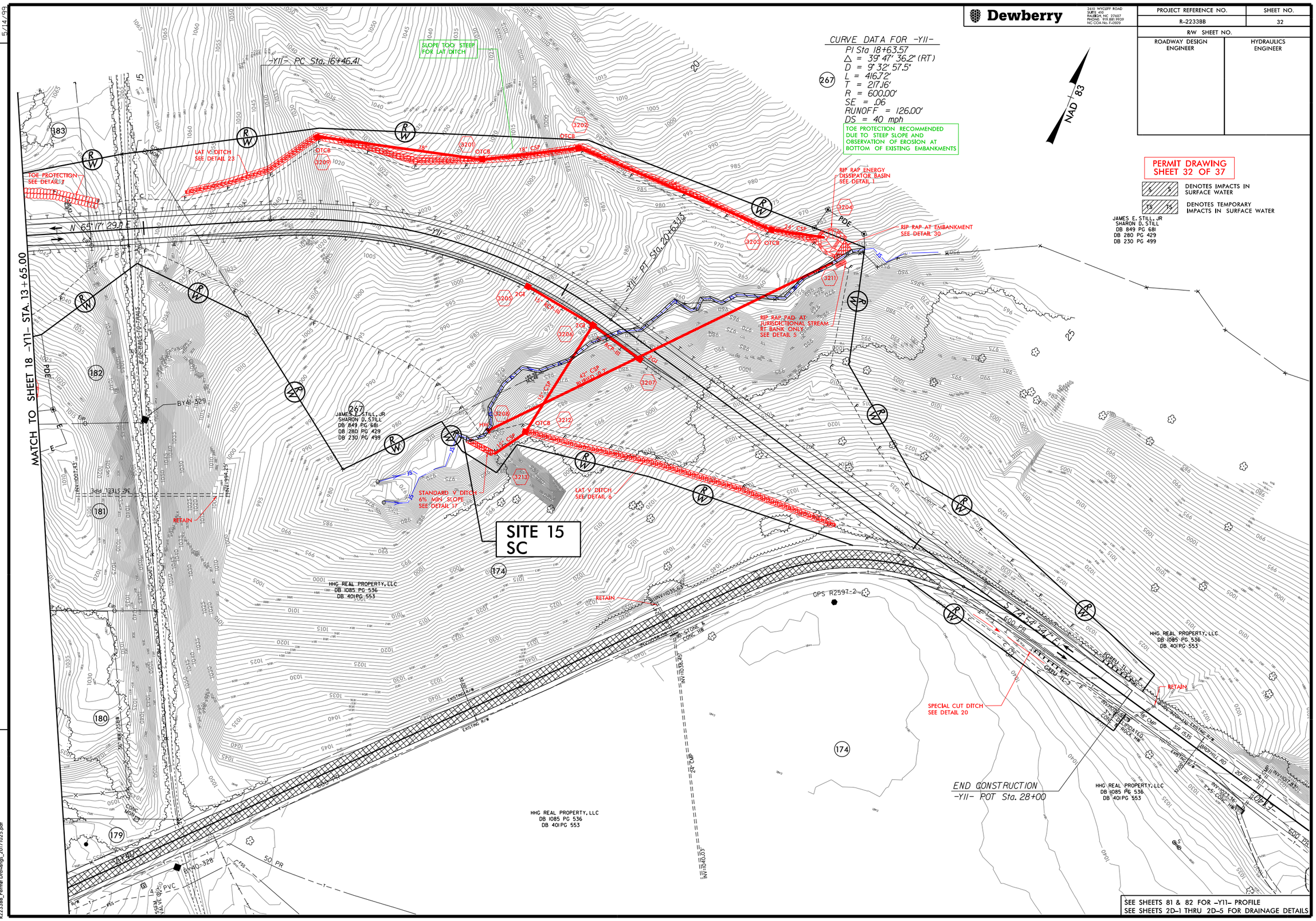
Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5/14/99

REVISIONS



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DEWBERRY
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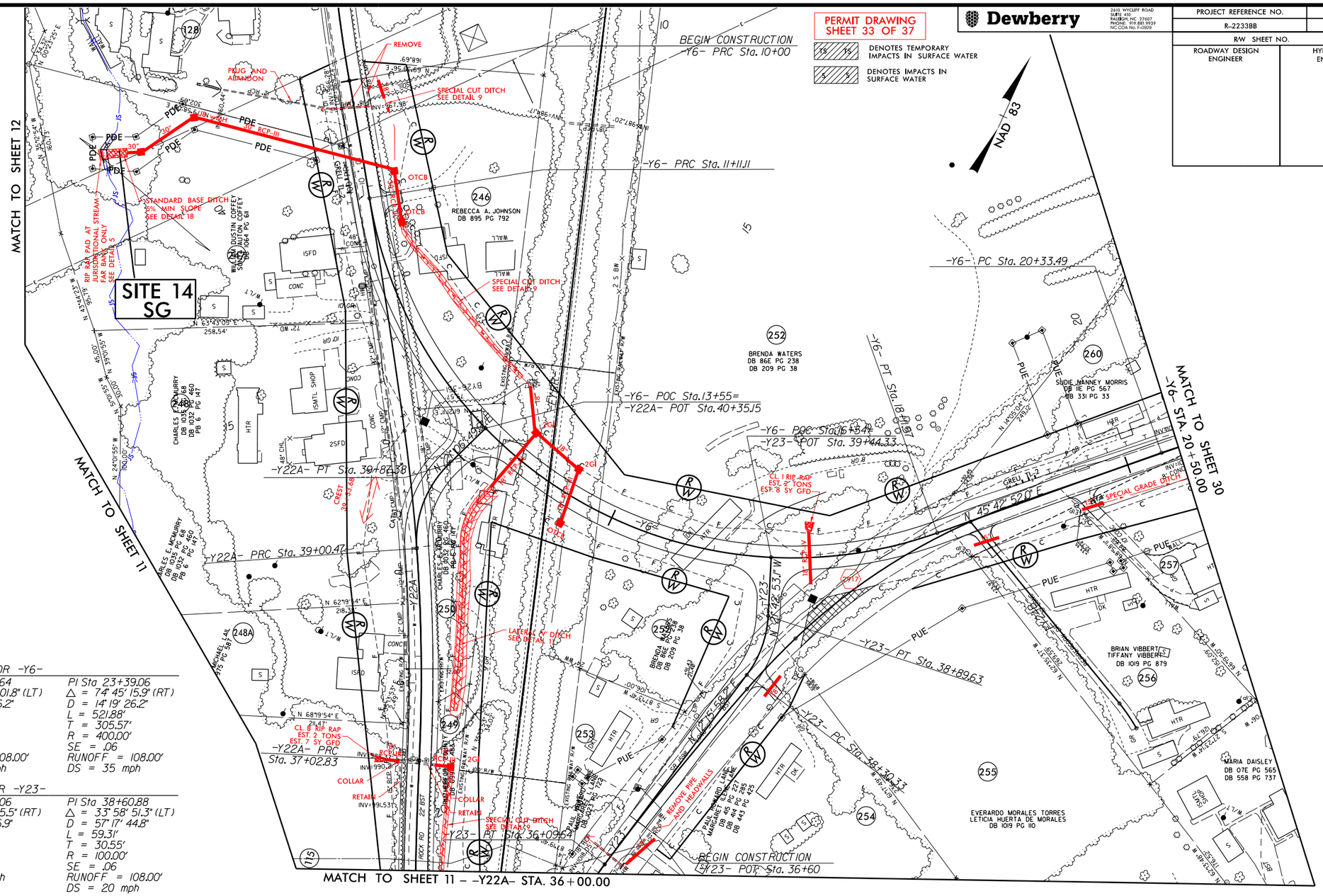
PERMIT DRAWING
SHEET 33 OF 37

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y6-

PI Sta 10+55.56	PI Sta 15+90.64	PI Sta 23+39.06
Δ = 0° 45' 51.3" (RT)	Δ = 100° 20' 01.8" (LT)	Δ = 74° 45' 15.9" (RT)
D = 0° 41' 16.2"	D = 14° 19' 26.2"	D = 14° 19' 26.2"
L = 111.11'	L = 700.46'	L = 521.88'
T = 55.56'	T = 479.53'	T = 305.57'
R = 8,330.00'	R = 400.00'	R = 400.00'
SE = EX.	SE = .06	SE = .06
DS = 35 mph	RUNOFF = 108.00'	RUNOFF = 108.00'
	DS = 35 mph	DS = 35 mph

CURVE DATA FOR -Y23-

PI Sta 32+45.69	PI Sta 35+18.06	PI Sta 38+60.88
Δ = 4° 29' 38.6" (RT)	Δ = 30° 01' 05.5" (RT)	Δ = 33° 58' 51.3" (LT)
D = 1° 16' 23.7"	D = 16° 00' 15.9"	D = 57° 17' 44.8"
L = 352.96'	L = 187.56'	L = 59.31'
T = 176.57'	T = 95.99'	T = 30.55'
R = 4,500.00'	R = 358.00'	R = 100.00'
SE = EX.	SE = EX.	SE = .06
DS = 35 mph	DS = 20 mph	RUNOFF = 108.00'
		DS = 20 mph

CURVE DATA FOR -Y22A-

PI Sta 32+70.82	PI Sta 35+65.41	PI Sta 38+01.76	PI Sta 39+46.88
Δ = 0° 56' 34.2" (LT)	Δ = 4° 35' 36.2" (RT)	Δ = 6° 44' 25.9" (LT)	Δ = 49° 47' 48.1" (RT)
D = 0° 18' 00.8"	D = 1° 40' 13.6"	D = 3° 24' 37.7"	D = 57° 17' 44.8"
L = 314.05'	L = 274.98'	L = 197.64'	L = 86.91'
T = 157.03'	T = 137.56'	T = 98.94'	T = 46.41'
R = 19,085.00'	R = 3,430.00'	R = 1,680.00'	R = 100.00'
SE = EX.	SE = EX.	SE = EX.	SE = .04
DS = 35 mph	DS = 35 mph	DS = 35 mph	RUNOFF = 72.00'
			DS = 15 mph

CURVE DATA FOR -Y23A-

PI Sta 44+55.25	PI Sta 45+75.10	PI Sta 46+84.50	PI Sta 48+15.42
Δ = 1° 32' 38.7" (RT)	Δ = 6° 33' 34.4" (RT)	Δ = 19° 55' 51.0" (RT)	Δ = 35° 04' 00.6" (RT)
D = 1° 09' 35.4"	D = 6° 09' 39.0"	D = 17° 54' 17.8"	D = 23° 52' 23.7"
L = 133.13'	L = 106.47'	L = 111.31'	L = 146.89'
T = 66.57'	T = 53.29'	T = 56.23'	T = 75.83'
R = 4,940.00'	R = 930.00'	R = 320.00'	R = 240.00'
SE = EX.	SE = EX.	SE = EX.	SE = EX.

SEE SHEETS 75 & 76 FOR -Y6- PROFILE
SEE SHEET 77 FOR -Y22A- PROFILE
SEE SHEET 77 FOR -Y23- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

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REVISIONS

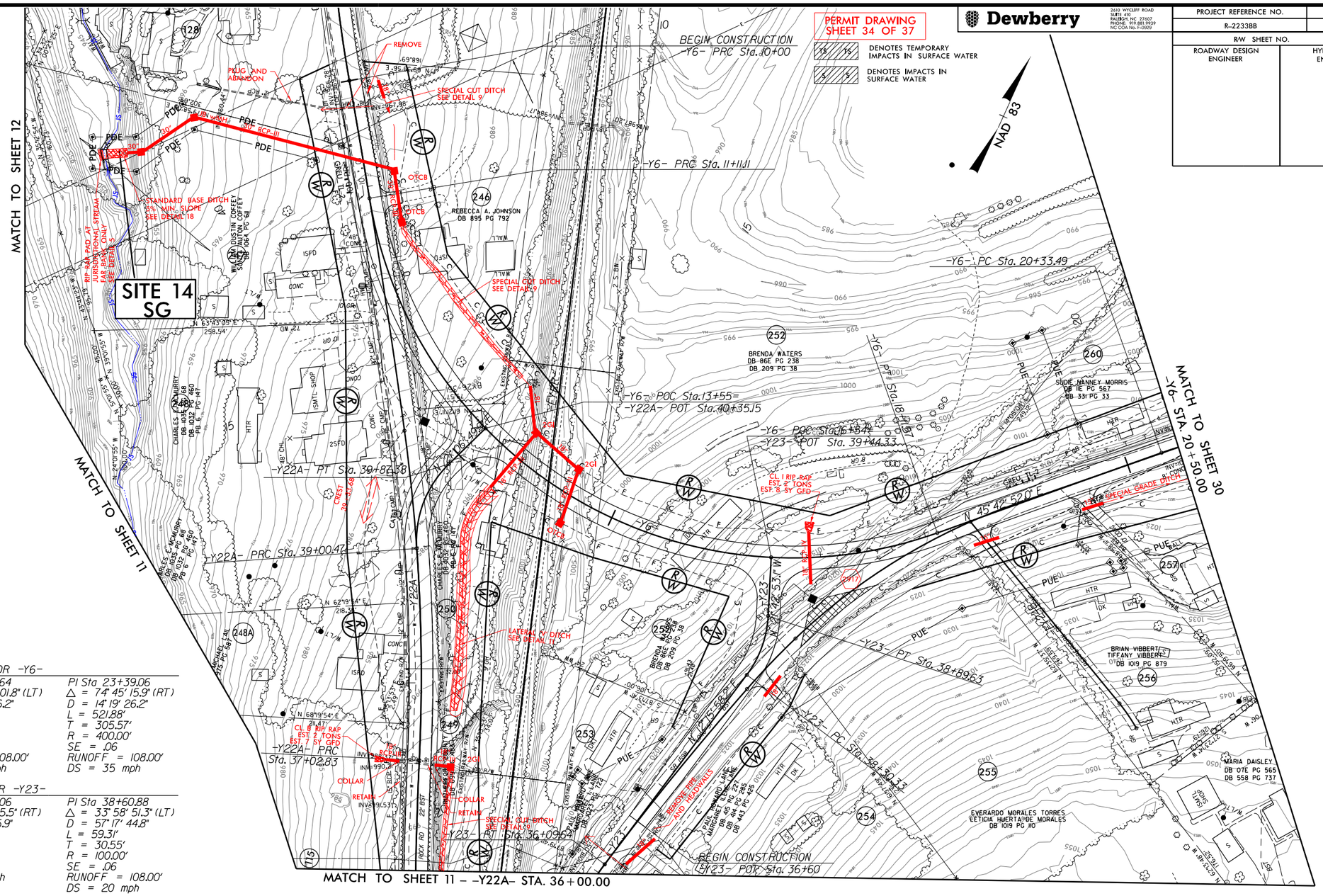
PERMIT DRAWING
SHEET 34 OF 37

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TS / TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S / S DENOTES IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y6-

PI Sta 10+55.56	PI Sta 15+90.64	PI Sta 23+39.06
Δ = 0° 45' 51.3" (RT)	Δ = 100° 20' 01.8" (LT)	Δ = 74° 45' 15.9" (RT)
D = 0° 41' 16.2"	D = 14° 19' 26.2"	D = 14° 19' 26.2"
L = 111.11'	L = 700.46'	L = 521.88'
T = 55.56'	T = 479.53'	T = 305.57'
R = 8,330.00'	R = 400.00'	R = 400.00'
SE = EX.	SE = .06	SE = .06
DS = 35 mph	RUNOFF = 108.00'	RUNOFF = 108.00'
	DS = 35 mph	DS = 35 mph

CURVE DATA FOR -Y23-

PI Sta 32+45.69	PI Sta 35+18.06	PI Sta 38+60.88
Δ = 4° 29' 38.6" (RT)	Δ = 30° 01' 05.5" (RT)	Δ = 33° 58' 51.3" (LT)
D = 1° 16' 23.7"	D = 16° 00' 15.9"	D = 57° 17' 44.8"
L = 352.96'	L = 187.56'	L = 59.31'
T = 176.57'	T = 95.99'	T = 30.55'
R = 4,500.00'	R = 358.00'	R = 100.00'
SE = EX.	SE = EX.	SE = .06
DS = 35 mph	DS = 20 mph	RUNOFF = 108.00'
		DS = 20 mph

CURVE DATA FOR -Y22A-

PI Sta 32+70.82	PI Sta 35+65.41	PI Sta 38+01.76	PI Sta 39+46.88
Δ = 0° 56' 34.2" (LT)	Δ = 4° 35' 36.2" (RT)	Δ = 6° 44' 25.9" (LT)	Δ = 49° 47' 48.1" (RT)
D = 0° 18' 00.8"	D = 1° 40' 13.6"	D = 3° 24' 37.7"	D = 57° 17' 44.8"
L = 314.05'	L = 274.98'	L = 197.64'	L = 86.91'
T = 157.03'	T = 137.56'	T = 98.94'	T = 46.41'
R = 19,085.00'	R = 3,430.00'	R = 1,680.00'	R = 100.00'
SE = EX.	SE = EX.	SE = EX.	SE = .04
DS = 35 mph	DS = 35 mph	DS = 35 mph	RUNOFF = 72.00'
			DS = 15 mph

CURVE DATA FOR -Y23A-

PI Sta 44+55.25	PI Sta 45+75.10	PI Sta 46+84.50	PI Sta 48+15.42
Δ = 1° 32' 38.7" (RT)	Δ = 6° 33' 34.4" (RT)	Δ = 19° 55' 51.0" (RT)	Δ = 35° 04' 00.6" (RT)
D = 1° 09' 35.4"	D = 6° 09' 39.0"	D = 17° 54' 17.8"	D = 23° 52' 23.7"
L = 133.13'	L = 106.47'	L = 111.31'	L = 146.89'
T = 66.57'	T = 53.29'	T = 56.23'	T = 75.83'
R = 4,940.00'	R = 930.00'	R = 320.00'	R = 240.00'
SE = EX.	SE = EX.	SE = EX.	SE = EX.

SEE SHEETS 75 & 76 FOR -Y6- PROFILE
SEE SHEET 77 FOR -Y22A- PROFILE
SEE SHEET 77 FOR -Y23- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

10/22/2017
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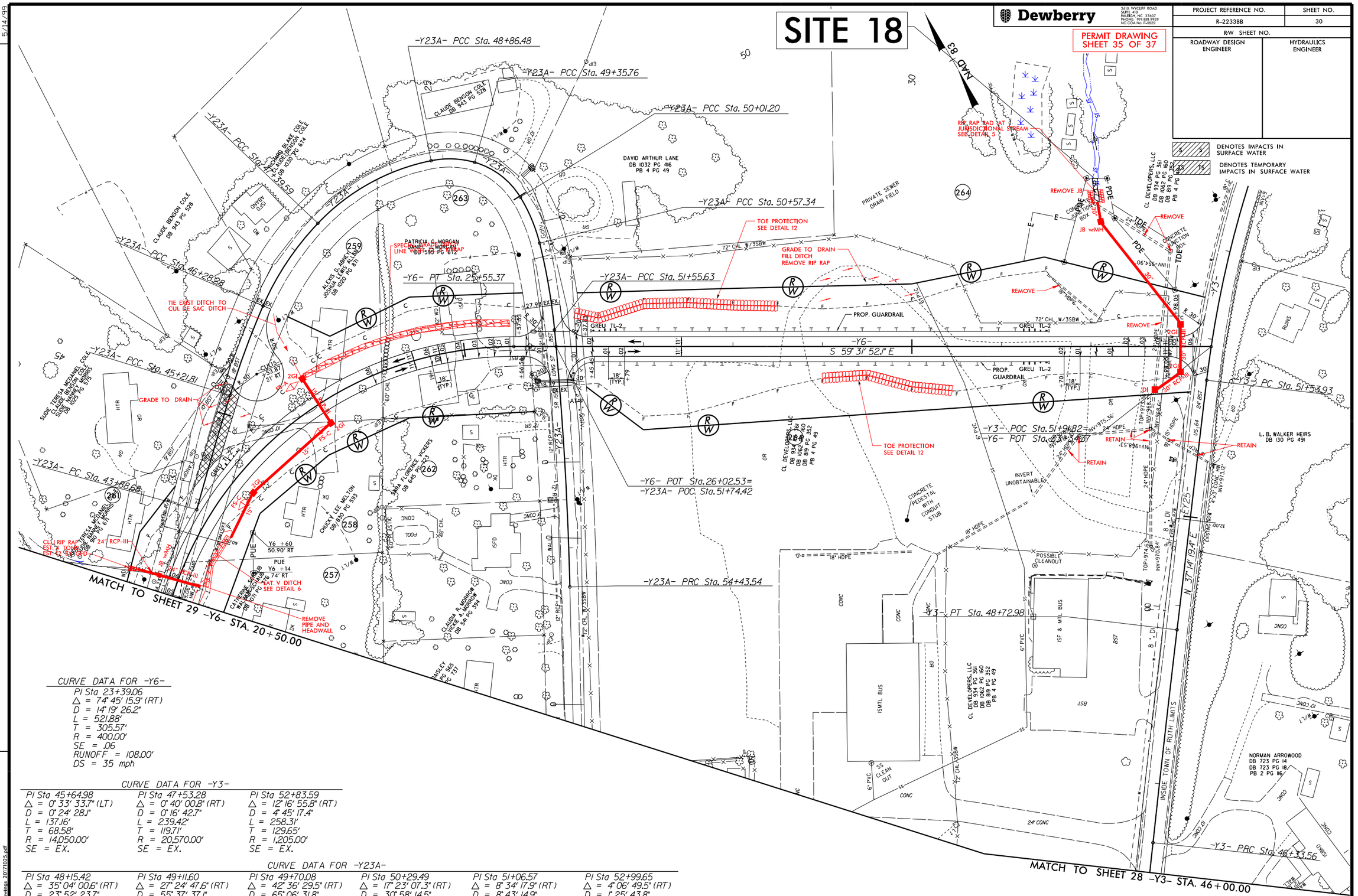
SITE 18

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 35 OF 37

S DENOTES IMPACTS IN SURFACE WATER
TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y6-

PI Sta 23+39.06
△ = 74° 45' 15.9" (RT)
D = 14° 19' 26.2"
L = 521.88'
T = 305.57'
R = 400.00'
SE = .06
RUNOFF = 108.00'
DS = 35 mph

CURVE DATA FOR -Y3-

PI Sta 45+64.98	PI Sta 47+53.28	PI Sta 52+83.59
△ = 0° 33' 33.7" (LT)	△ = 0° 40' 00.8" (RT)	△ = 12° 16' 55.8" (RT)
D = 0° 24' 28.1"	D = 0° 16' 42.7"	D = 4° 45' 17.4"
L = 137.16'	L = 239.42'	L = 258.31'
T = 68.58'	T = 119.71'	T = 129.65'
R = 14,050.00'	R = 20,570.00'	R = 1,205.00'
SE = EX.	SE = EX.	SE = EX.

CURVE DATA FOR -Y23A-

PI Sta 48+15.42	PI Sta 49+11.60	PI Sta 49+70.08	PI Sta 50+29.49	PI Sta 51+06.57	PI Sta 52+99.65
△ = 35° 04' 00.6" (RT)	△ = 27° 24' 47.6" (RT)	△ = 42° 36' 29.5" (RT)	△ = 17° 23' 07.3" (RT)	△ = 8° 34' 17.9" (RT)	△ = 4° 06' 49.5" (RT)
D = 23° 52' 23.7"	D = 55° 37' 37.1"	D = 65° 06' 31.8"	D = 30° 58' 14.5"	D = 8° 43' 14.9"	D = 1° 25' 43.8"
L = 146.89'	L = 49.28'	L = 65.44'	L = 56.13'	L = 98.29'	L = 287.91'
T = 75.83'	T = 25.12'	T = 34.32'	T = 28.28'	T = 49.24'	T = 144.02'
R = 240.00'	R = 103.00'	R = 88.00'	R = 185.00'	R = 657.00'	R = 4,010.00'
SE = EX.	SE = EX.	SE = EX.	SE = EX.	SE = EX.	SE = EX.

SEE SHEETS 75 & 76 FOR -Y6- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS
5/14/99

1/18/2017
DEWBERRY
R2233BB Permit Drawings 20171025.pdf

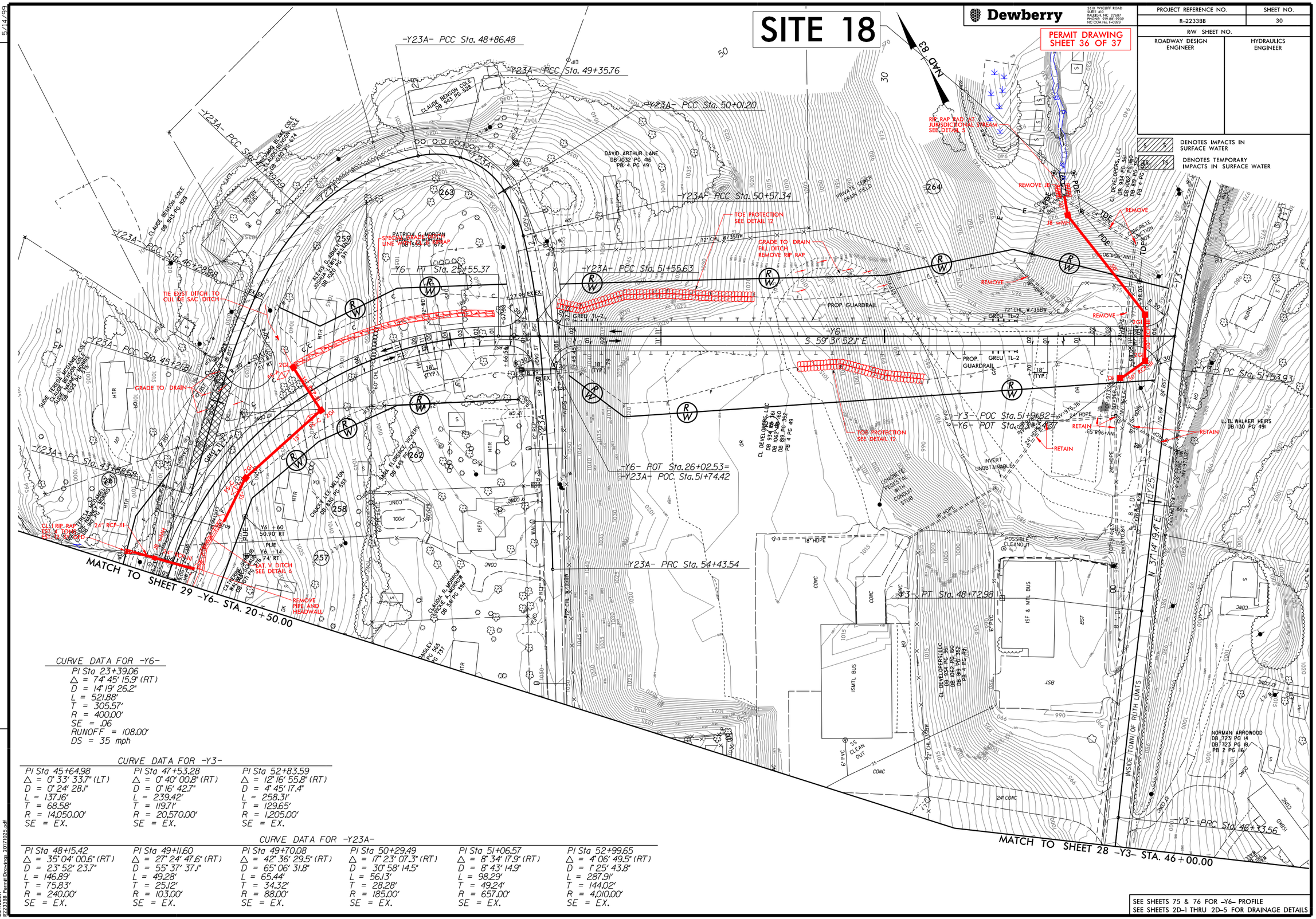
SITE 18

Dewberry
2610 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9929
NC COA No. F-0929

PERMIT DRAWING
SHEET 36 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-2233BB	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

S DENOTES IMPACTS IN SURFACE WATER
TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER



CURVE DATA FOR -Y6-

PI Sta 23+39.06
△ = 74° 45' 15.9" (RT)
D = 14° 19' 26.2"
L = 521.88'
T = 305.57'
R = 400.00'
SE = .06
RUNOFF = 108.00'
DS = 35 mph

CURVE DATA FOR -Y3-

PI Sta 45+64.98	PI Sta 47+53.28	PI Sta 52+83.59
△ = 0° 33' 33.7" (LT)	△ = 0° 40' 00.8" (RT)	△ = 12° 16' 55.8" (RT)
D = 0° 24' 28.1"	D = 0° 16' 42.7"	D = 4° 45' 17.4"
L = 137.16'	L = 239.42'	L = 258.31'
T = 68.58'	T = 119.71'	T = 129.65'
R = 14,050.00'	R = 20,570.00'	R = 1,205.00'
SE = EX.	SE = EX.	SE = EX.

CURVE DATA FOR -Y23A-

PI Sta 48+15.42	PI Sta 49+11.60	PI Sta 49+70.08	PI Sta 50+29.49	PI Sta 51+06.57	PI Sta 52+99.65
△ = 35° 04' 00.6" (RT)	△ = 27° 24' 47.6" (RT)	△ = 42° 36' 29.5" (RT)	△ = 17° 23' 07.3" (RT)	△ = 8° 34' 17.9" (RT)	△ = 4° 06' 49.5" (RT)
D = 23° 52' 23.7"	D = 55° 37' 37.1"	D = 65° 06' 31.8"	D = 30° 58' 14.5"	D = 8° 43' 14.9"	D = 1° 25' 43.8"
L = 146.89'	L = 49.28'	L = 65.44'	L = 56.13'	L = 98.29'	L = 287.91'
T = 75.83'	T = 25.12'	T = 34.32'	T = 28.28'	T = 49.24'	T = 144.02'
R = 240.00'	R = 103.00'	R = 88.00'	R = 185.00'	R = 657.00'	R = 4,010.00'
SE = EX.	SE = EX.	SE = EX.	SE = EX.	SE = EX.	SE = EX.

SEE SHEETS 75 & 76 FOR -Y6- PROFILE
SEE SHEETS 2D-1 THRU 2D-5 FOR DRAINAGE DETAILS

REVISIONS

5/14/99

11/8/2017
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WETLAND AND SURACE WATER IMPACTS SUMMARY

				WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	JD ID	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	SN	L3 778+97 TO 779+40 LT	ROADWAY FILL						< 0.01	< 0.01	43	34	
1	SN	Y2 22+05 LT	48" Pipe						< 0.01	< 0.01	24	14	
4	SL	L3 797+64 TO 798+03 LT	CHANNEL REALIGNMENT						0.01	< 0.01	96	18	
4	SL/SM	L3 797+66	10' X 7' RCBC						0.09		766		
4	SL	L 797+63 TO 798+0 RT	CHANNEL REALIGNMENT						< 0.01		43		
4	SL	L3 797+63 TO 797+70 RT	V DITCH						< 0.01	< 0.01	10	7	
5	SK	L3 814+76 LT TO 814+87 LT	BANK STABILIZATION						< 0.01	< 0.01	10	17	
5	SK	L3 814+76 LT TO 815+43 RT	ROADWAY FILL/30" CSP						0.02		112		
5	SJ	L3 815+11 TO 815+46LT	ROADWAY FILL						< 0.01	< 0.01	28	21	
6	SI	L3 828+19 TO 828+28 LT	BANK STABILIZATION						< 0.01	< 0.01	11	9	
6	SI	L3 830+00	8' X 6' RCBC						0.06		670		
6	SI	L3 832+25 TO 832+56 RT	CL. II RIPRAP ON BANKS						< 0.01	< 0.01	34	18	
7	SH	L3 831+35 TO 836+42 RT	ROADWAY FILL						0.11		832		
8	SG	RPD 22+04 RT TO 18+22 LT	ROADWAY FILL						0.05		445		
8	WA	RPD 17+38 TO 22+04 LT	ROADWAY FILL	0.11									
8	SG	RPD 18+26 TO 18+08 LT	36" PIPE						< 0.01		32		
8	SG	RPD 18+08 TO 17+76 LT	CL. II RIPRAP ON BANKS						< 0.01	< 0.01	25	20	
9	SF	L3 864+92 LT	BANK STABILIZATION						< 0.01	< 0.01	14	8	
9	SF	L3 866+00	54" RCP-V						0.01		140		
9	SF	L3 867+00 TO 867+28 RT	RIIP RAP ENERGY DISSIPATOR BASIN/CL. I RIP RAP IN CHANNEL						< 0.01	< 0.01	55	7	
10	SE	L3 875+24 LT	FLOODPLAIN BENCH						0.01	< 0.01	72	19	
10	SE	L3 874+42	3 - 10' X 10' RCBC						0.05		217		
10	SE	L3 874+16 RT	FLOODPLAIN BENCH						0.01		45		
10	SE	L3 873+90 RT	REMOVAL OF EXISTING CULVERT							0.01		51	
11	SB	L3 968+69 TO 968+88 LT	BANK STABILIZATION						< 0.01	< 0.01	10	27	
11	SB	L3 968+64	36" STEEL PIPE						< 0.01		151		
13	SO	Y2 15+24 RT	CL. II RIPRAP						0.02	< 0.01	35	19	
14	SG	Y6 10+23 RT	BANK STABILIZATION						< 0.01	< 0.01	10	24	
15	SC	Y11 22+50 LT	BANK STABILIZATION						< 0.01	< 0.01	22	14	
15	SC	Y11 22+80	42" CSP						0.05		506		
15	SC	Y11 19+88 RT	LATERAL V DITCH						< 0.01	< 0.01	14	19	
16	SD	Y8 17+18 LT	RIP RAP ENEGY DISSIPATOR/CL. B RIPRAP LINING CHANNEL						< 0.01	< 0.01	52	10	
16	SD	Y8 18+04	60" PIPE						< 0.01		38		
16	SD	Y10 15+63 RT	LATERAL V DITCH						< 0.01	< 0.01	18	12	
17	SO	Y2 33+41 TO 34+50 RT	ROADWAY FILL						0.01		143		
18	N/A	Y6 32+02 TO 32+09 LT	BANK STABILIZATION						< 0.01	< 0.01	13	12	
TOTALS*:				0.11					0.58	0.05	4734	381	0

*Rounded totals are sum of actual impacts

NOTES:
Site 4 SL/SM is comprised of both the main jurisdictional stream and a trib to the left of the main stem.
Site 7 begin on sheet 16 of 37. The stream is completely covered by roadway. The drainage that would have gone to the stream is being picked up in the proposed lateral V ditc
to the right of L3.
Site 17 is a small area between piped streams that has been covered up by the roadway.
Site 2,3, and 12 have been removed due to those sites not being jurisdictional.
Site 18 was not in the original JD file, therefore it never received a JD ID. During the 4C meeting, it was agreed upon to keep the impact site.

Revised 2016 09 09

NC DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
3/4/2019
RUTHERFORD
R-2233BB
ENTER WBS # HERE