



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT L. MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

September 25, 2014

U.S. Army Corps of Engineers
Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. David Bailey
NCDOT Coordinator

SUBJECT: Permit Modification Request for Section 404 Individual Permit and Section 401 Individual Water Quality Certification for the new location facility from SR 2011 to the Haw River at US 220, Greensboro, Guilford County; Division 7; TIP No. R-2413A

Debit \$570.00 from WBS No. 34429.1.1

Reference: US Army Corps of Engineers (USACE) 404 Permit issued January 28, 2014; Action ID: SAW2013-00557
NC Division of Water Resources (NCDWR) 401 Water Quality Certification Permit issued February 3, 2014; NCDWR Project No. 20130517 v.2

Dear Mr. Bailey:

The North Carolina Department of Transportation (NCDOT) awarded the design-build (D-B) team this project on April 8, 2014. They will be constructing projects R-2413A, R-2413B, and I-5110. Sections R-2413A and B were authorized by the USACE and NCDWR as referenced above. By slightly re-aligning the roadway, the D-B Team has modified five sites on Section R-2413A, and the overall changes in impacts are noted below. In light of these efforts, the D-B team has been able to overall reduce impacts. Enclosed is the complete set of Permit Drawings and Roadway plan sheets for R-2413A. Some of the permit drawings were revised and require a permit modification, some of the drawings were revised for slight modifications in pipe sizes and locations, and some were not adjusted at all (see attached R-2413A Permit Drawing Update Summary). All drawings other than the ones listed for permit modification purposes are submitted as courtesy copies.

The following revised permit sheet drawings and accompanying roadway plan sheets are sent as part of the permit modification. Permit drawing sheets numbers: 2-4, 6, 7, 9-13, 72-74, 76, and 78 - 81 of 81 as well as a new permit drawing, 4A of 81.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
NATURAL ENVIRONMENT SECTION
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

TELEPHONE: 919-707-6100

FAX: 919-212-5785

WEBSITE: WWW.NCDOT.ORG

PHYSICAL ADDRESS:
Century Center - Building B
1020 Birch Ridge Dr
Raleigh, NC 27610-4328

The total decreases or increases in stream and wetland impacts are:

- -156 LF in Permanent Stream Impacts (including bank stabilization)
- +29 LF in Temporary Stream Impacts

The site specific decrease or increase in impacts can be found in Table 1.

Table 1 – R-2413A Revised Stream Impacts

Location		Permanent Stream Impacts (ft)	Impacts Requiring USACE Mitigation (ft) ¹	Impacts Requiring NCDWQ Mitigation (ft) ²	Temporary Stream Impacts (ft)	Wetland Impact (ac)	Mechanized Clearing (ac)
Site 1 -Y1- 50+00.00 LT	Original Impacts	719	699	719	22	0.02*	
	New Impacts	651	630	651	11	0.02	
	Difference	-68	-69	-68	-11	0	
Site 2 -L- 117+23.4 0 LT	Original Impacts	490	470	490	47	0	0
	New Impacts	507	484	507	62	<0.01	<0.01
	Difference	+17	+14	+17	+15	+<0.01	+<0.01
Site 3 -Y1C- 12+98.52	Original Impacts	244	212	244	36		
	New Impacts	225	193	225	32		
	Difference	-19	-19	-19	-4		
Site 4 -Y1C- 17+80.74	Original Impacts	553	523	553	42	0.24	0.02
	New Impacts	550	521	550	49	0.23	0.01
	Difference	-3	-2	-3	+7	-0.01	-0.01
Site 22 -Y1C- 25+58.22	Original Impacts	276	256	276	22		
	New Impacts	193	177	193	40		
	Difference	-83	-79	-83	+22		
	Totals	-156	-155	-156	+29	0	0

* Site 1:- A rounding error was noted in the Original Application that listed the impacts as 0.01. That total should have been 0.02, and the revised impacts are now 0.02.

¹ USACE Stream Mitigation ratios for all 5 sites was 2:1.

² Permanent streams impacts plus bank stabilization. NCDWR Stream Mitigation ratio for all 5 sites was 1:1.

Regulatory Approvals

Application is hereby made for a Department of the Army Section 404 Individual Permit Modification as required for the above-described activities for the proposed T.I.P. Project R-2413A.

We are also hereby requesting a Section 401 Individual Water Quality Certification Modification from NCDWR. In compliance with Section 143-215.3D (e) of the NCAC, we will provide \$570.00 to act as payment for processing the Section 401 permit.

Project R-2413 does fall within the Jordan Lake Water Supply Watershed. However, NCDOT is not requesting a Jordan Buffer Authorization because an approved SFONSI was issued for this project in March 1995, which is prior to the adoption of the Jordan Lake Riparian Buffer Rules.

A copy of this permit application and its distribution list will be posted on the NCDOT website at <https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx>. Thank you for your time and assistance with this project. Please contact Deanna Riffey at either driffey@ncdot.gov or (919) 707-6151 if you have any questions or need additional information.

Sincerely,


for

Richard W. Hancock, P.E., Manager
Project Development and Environmental Analysis Unit

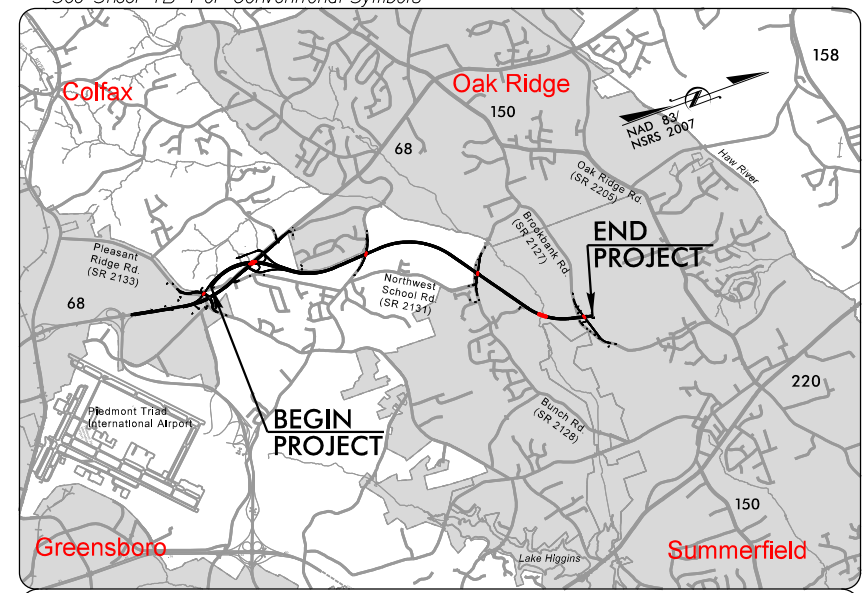
cc: NCDOT Permit Application Standard Distribution List

R-2413A Permit Drawing Update Summary			
(including modification/revision/originals)			
Project: I-73, R-2413A			Date: 9/22/2014
Location: Guilford Co. NC			Des By: THS
Permit Drawings	Plansheets	Site No.	Comments
1 of 81	1	N/A	Cover sheet Added Site 23 (left off original cover), adjusted location circles to be more accurate , includes current prepared by names etc
2-4 of 81	7	1	Permit Modification
4A of 81	Pipe Profile	1	Permit Modification
5 of 81	X Section	1	Original
6-7, 9-10 of 81	8,37	2,3	Permit Modification
8 of 81	Pipe Profile	2C	Original
11-13 of 81	9	4,5	Permit Modification
14 of 81	X Section	4	Original
15 of 81	9	5	Revised Minor system realignment from 0955-0953; Cross pipe 1801 changed from 66" to 60"
16 of 81	Pipe Profile	5	Original
17-19 of 81	12	6	Revised 1113-1115 changed from 2-54" to 48"
20 of 81	Pipe Profile	6	Original
21-23 of 81	13	7	Revised Minor system realignment from 1212-1213, 24" to 18" , 54" to 48"
24 of 81	Pipe Profile	7A	Original
25-27, 29-31 of 81	14	8/9	Revised Minor system realignment from 1412-1414
28 of 81	Pipe Profile	8B	Original
29-30, 32-34 of 81	15, 16	9/10	Revised Minor system realignment from 1507-1508
32-34 of 81	16	10/11	Revised Minor system realignment from 1601-1602
35-36 of 81	Pipe Profile/X Section	10	Original
37-39 of 81	17	12	Revised system and ditches
40 of 81	Pipe Profile	12	Original
41-43 of 81	18	13	Revised Minor system realignment from 1801-1802; Cross pipe 1801 changed from 54" RCP to 60" RCP
44-46 of 81	20	14	Revised Cross pipe 2006 changed from 78" CSP to 72" CSP
47 of 81	Pipe Profile	14	Original
48-50 of 81	21	15,16	Revised undetectable system realignment from 2108-2111, 2113-2115, additional toe protection
51-52 of 81	Pipe Profile/X Section	16	Original
53-55 of 81	22	17,18	Revised Minor system realignment from 2208-2212, 2212-2215 pipe gauge changed
56-58 of 81	Bridge Profile/X Section	18	Original
59-61 of 81	23	19	Revised Minor system realignment from 2310-2311
62 of 81	Pipe Profile	19	Original
63-65 of 81	31	20	Revised Minor system realignment from 3101-3102
66 of 81	X Section	20	Original
66A-66C of 81	33	23	Revised Cross pipe 3305 changed from 30" CSP to 36" CSP
67-69 of 81	34	21	Revised undetectable system realignment from 3409-3410, additional toe protection and ditches
70-71 of 81	Pipe Profile/X Section	21A	Original
72-74 of 81	37	3,4	Permit Modification
75 of 81	X Section	4	Original
76 of 81	37	22	Permit Modification
77 of 81	Sill Detail	22	Original
78 of 81	Permit Impact Summary		Permit Modification
79-80 of 81	Permit Impact Summary		Original
81 of 81	Permit Impact Summary		Permit Modification

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09/08/99

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



VICINITY MAP

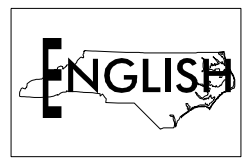
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

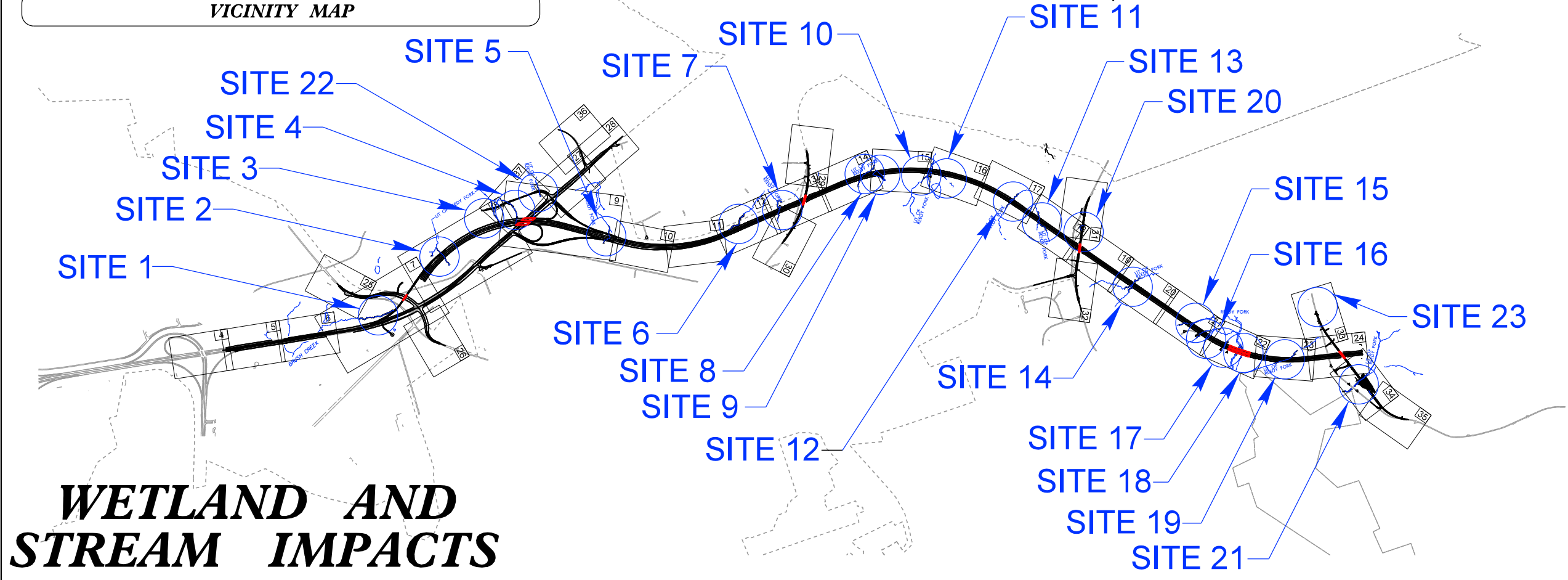
LOCATION: FUTURE I-73 FROM EAST OF SR 2127
(BROOKBANK ROAD) TO HAW RIVER

TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING,
RESURFACING, STRUCTURES, SIGNALS,
SIGNING, LIGHTING, & ITS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
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WSB NO.	F.A. PROJ. NO.	DESCRIPTION	
34429.3.S8	NHF-0073(25)	PE	

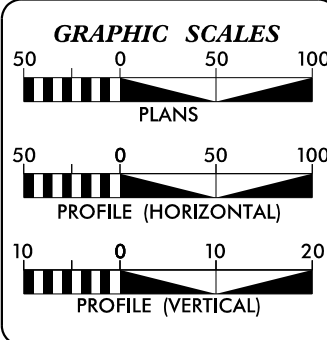


REVISED 9/12/2014
PERMIT DRAWING
SHEET 1 OF 81



**WETLAND AND
STREAM IMPACTS**

THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

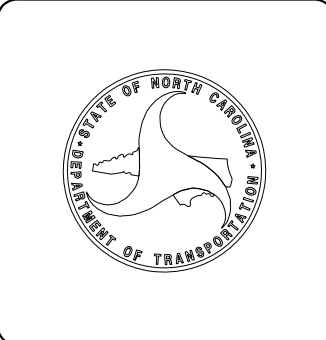


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ADT 2035	= 42,200
DHV	= 11%
D	= 65%
*T	= 15%
V	= 70 mph
(*TTST 10% + DUALS 5%) FUNC. CLASS = INTERSTATE	

PROJECT LENGTH	
LENGTH ROADWAY TIP PROJECT R-2413A.....	4.807 mi
LENGTH STRUCTURES TIP PROJECT R-2413A.....	0.146 mi
TOTAL LENGTH TIP PROJECT R-2413A.....	4.953 mi
NCDOT CONTACT	
K. Zak Hamidi, P.E. PROJECT ENGINEER - DESIGN BUILD GROUP	

PLANS PREPARED BY:	
RK&K RUMMEL, KLEPPER & KAHL, LLP 900 RIDGEFIELD DRIVE, SUITE 350 RALEIGH, NORTH CAROLINA 27609 NC LICENSE NO. P-0112	
FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
2012 STANDARD SPECIFICATIONS	
J.T. Peacock, Jr., P.E. PROJECT ENGINEER	
Brandon J. McInnis, P.E. PROJECT DESIGN ENGINEER	
LETTING DATE: APRIL 2014	

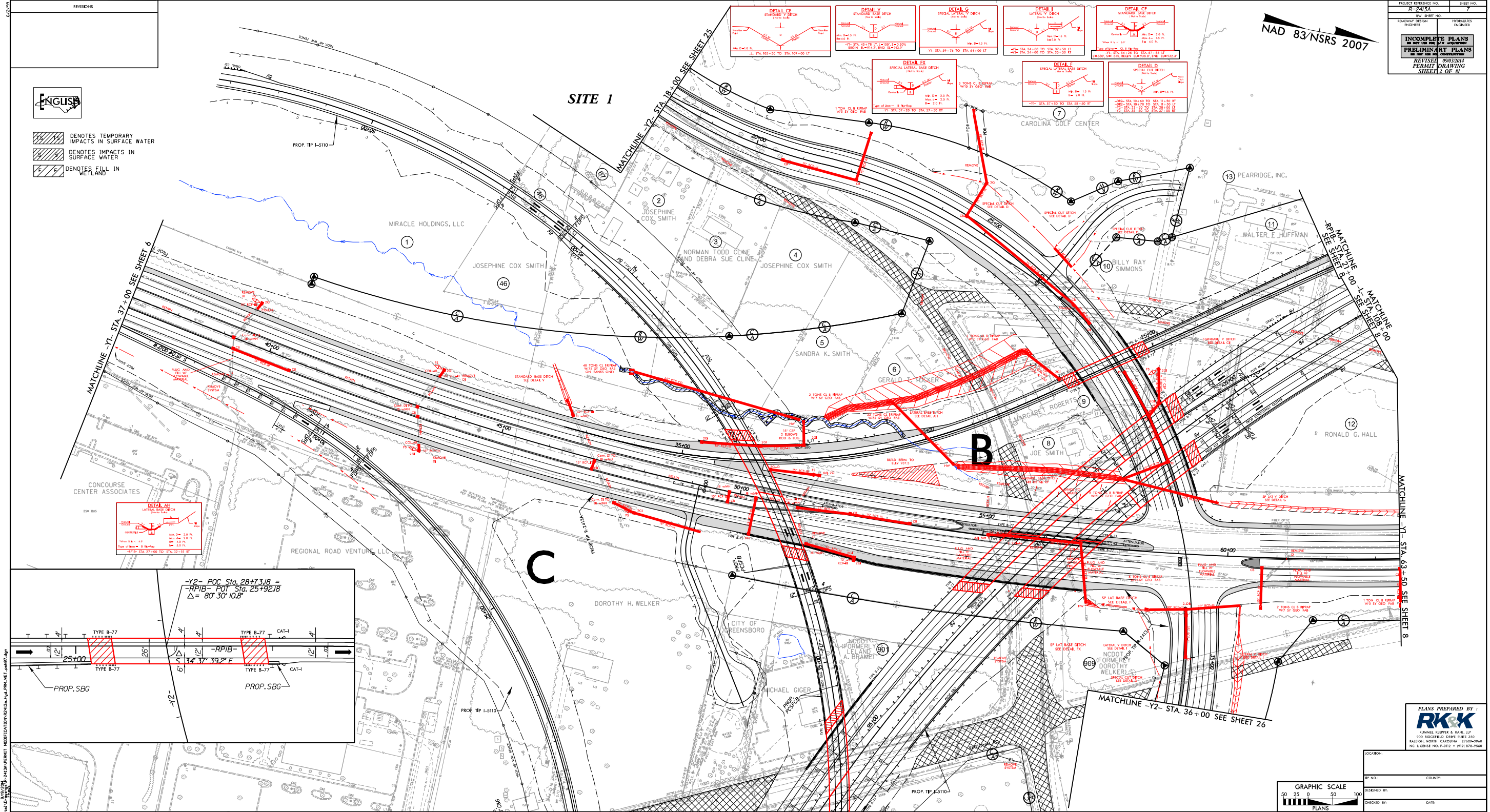
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SIGNATURE: _____ P.E.	
ROADWAY DESIGN ENGINEER	
SIGNATURE: _____ P.E.	



TIP PROJECT: R-2413A

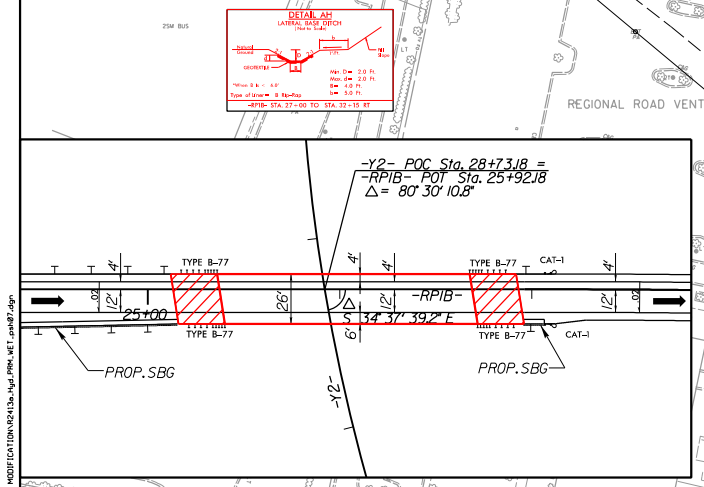
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Fkeys



REVISIONS	

- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND



DETAIL CE
STANDARD V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL V
STANDARD V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL G
SPECIAL LATERAL V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL J
LATERAL V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL CF
STANDARD BASE DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL FX
SPECIAL LATERAL BASE DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL E
SPECIAL LATERAL V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

DETAIL D
SPECIAL LATERAL V DITCH
1.5' TOP CL B REPAIR
W/ 3' GSD FILL

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
7-243A	7
REV. SHEET NO.	
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INCHES	FOOTING
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REVISED 09/03/2014 PERMIT DRAWING SHEET 2 OF 81	

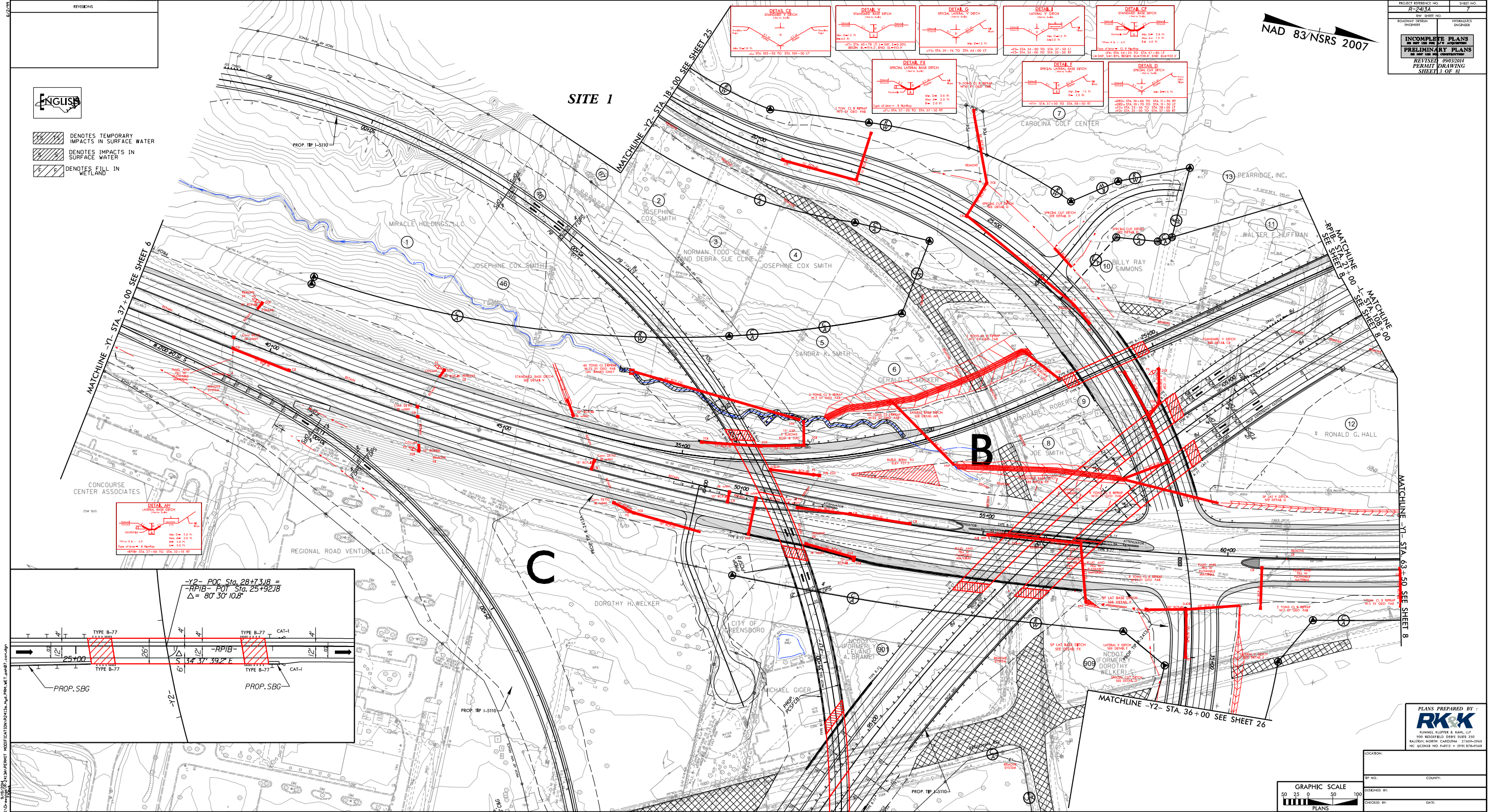
PLANS PREPARED BY:

RK&K

1000 WILSON BLVD. SUITE 310
RALEIGH, NORTH CAROLINA 27609-2949
NC LICENSE NO. 6-0112 • (919) 878-9548

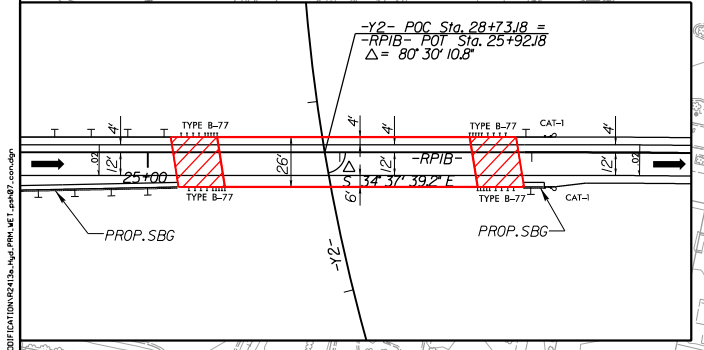
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TP NO.:	
DESIGNED BY:	
CHECKED BY:	DATE:

GRAPHIC SCALE
0 25 50 100
PLANS



REVISIONS	

- ENGLISH**
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 - DENOTES IMPACTS IN SURFACE WATER
 - DENOTES FILL IN WETLAND



DETAIL CE
STANDARD V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 34+00 TO STA 34+50

DETAIL Y2
STANDARD V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 34+50 TO STA 35+00

DETAIL G
SPECIAL LATERAL V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 35+00 TO STA 35+50

DETAIL J
LATERAL V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 35+50 TO STA 36+00

DETAIL CF
STANDARD BASE DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 36+00 TO STA 36+50

DETAIL FX
SPECIAL LATERAL BASE DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 36+50 TO STA 37+00

DETAIL E
SPECIAL LATERAL V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 37+00 TO STA 37+50

DETAIL D
SPECIAL LATERAL V DITCH
MAX. D=1.0 FT.
MIN. D=0.5 FT.
SLOPE: 1:1
STATION: STA 37+50 TO STA 38+00

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
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INCHES	FOOT
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PLANS PREPARED BY:

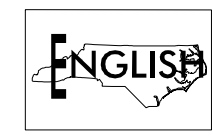
RK&K

ROBERT K. KIRK & ASSOCIATES, LLC
100 REDFIELD DRIVE, SUITE 310
RALEIGH, NORTH CAROLINA 27609-2949
NC LICENSE NO. 6-0112 • (919) 878-9549

LOCATION:	
TP NO.:	COUNTY:
DESIGNED BY:	
CHECKED BY:	DATE:

GRAPHIC SCALE
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PLANS

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8/19/2014
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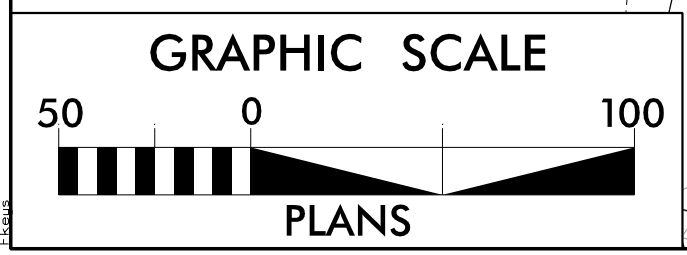
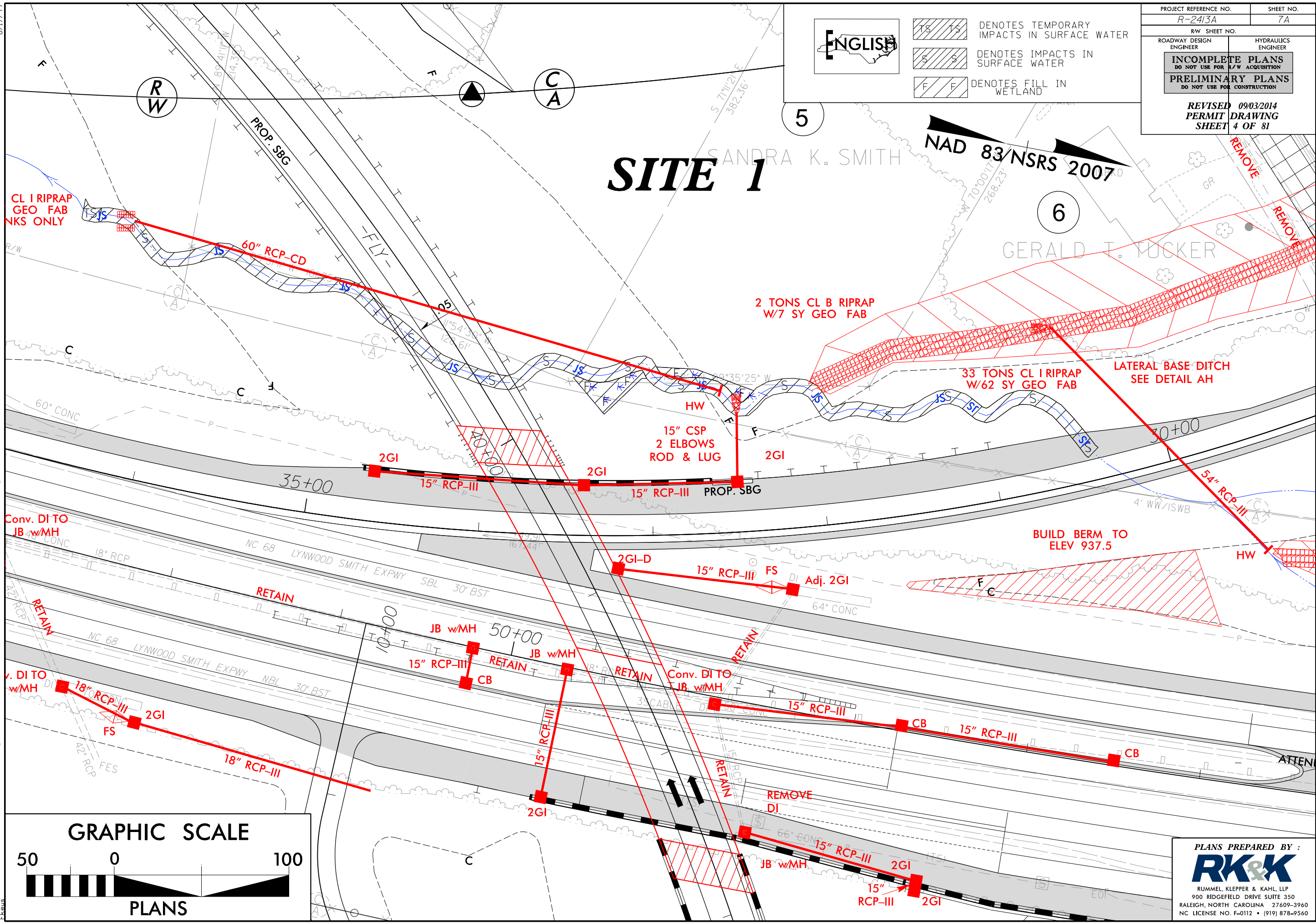
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	7A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
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SITE 1



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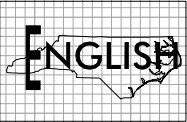
RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

5/14/99

9/7/2014
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SITE 1

-FLY- STA. 40+89

PROJECT REFERENCE NO.		SHEET NO.	
R-2413A			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
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REVISED 09/03/2014		PERMIT DRAWING	
SHEET 4A		OF 81	

970

960

950

940

930

920

910

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SKEW = 140

0.050

0.050

2:1

2:1

INV = 916.00

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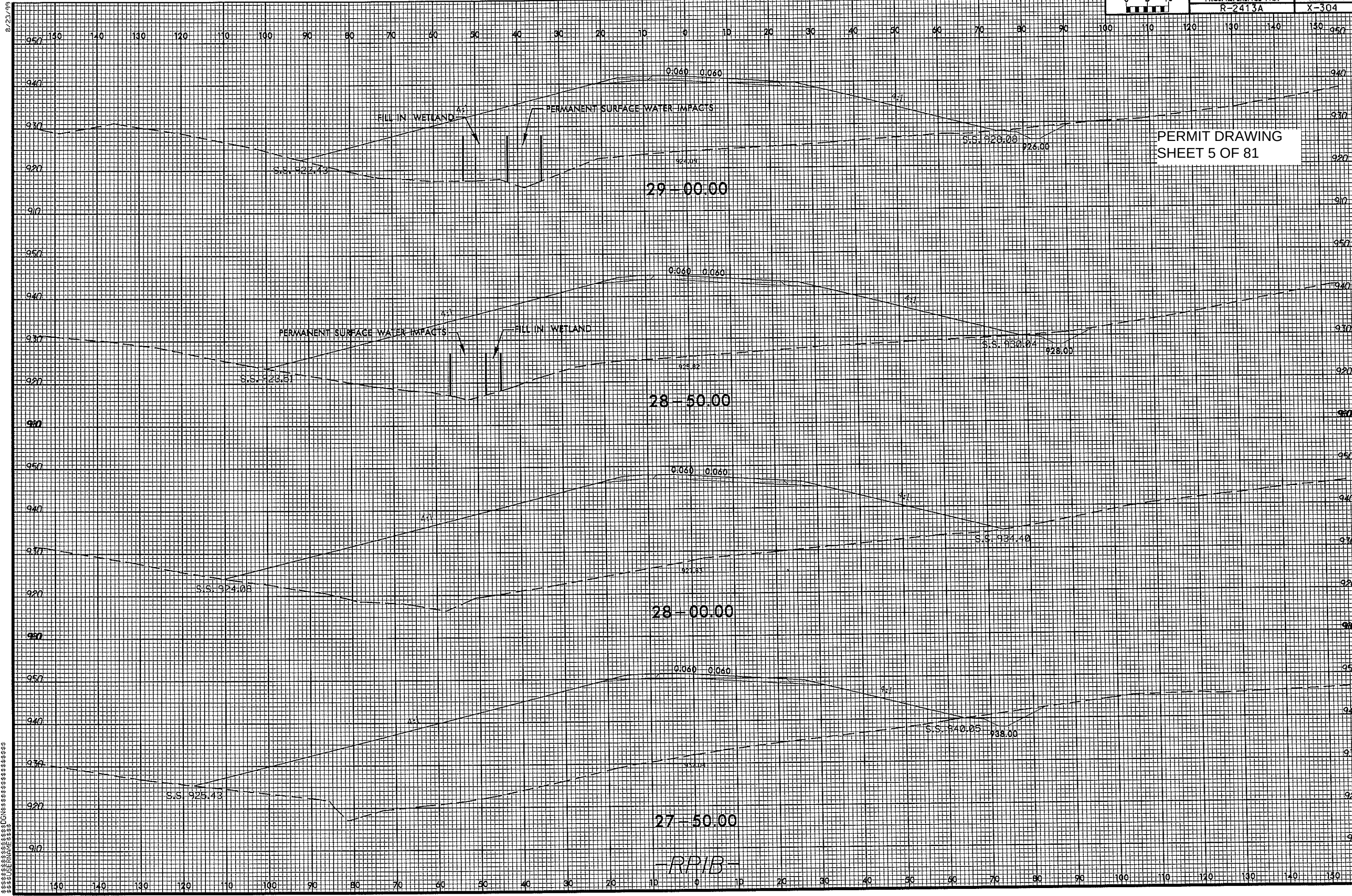
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INV = 909.20

8/23/99

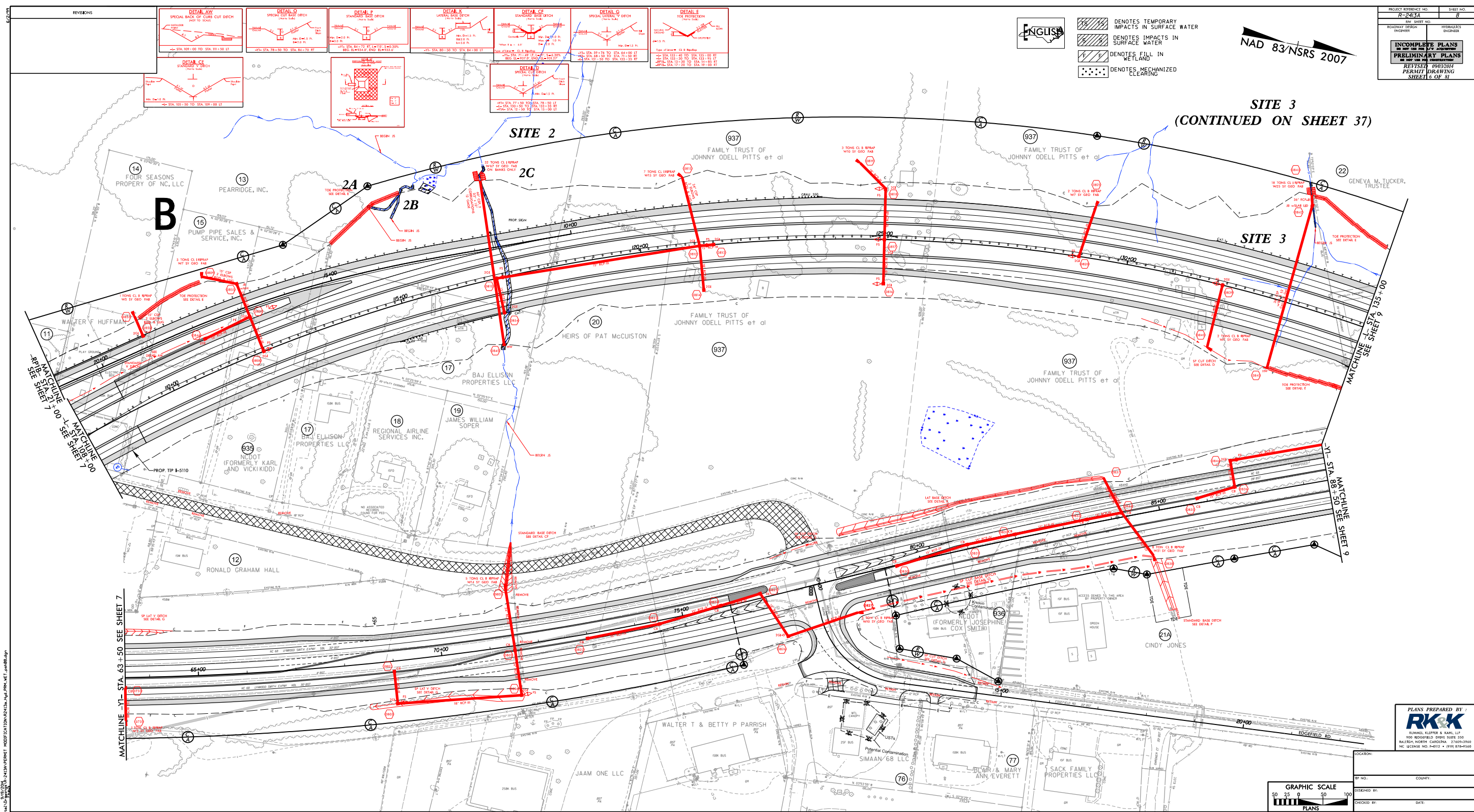


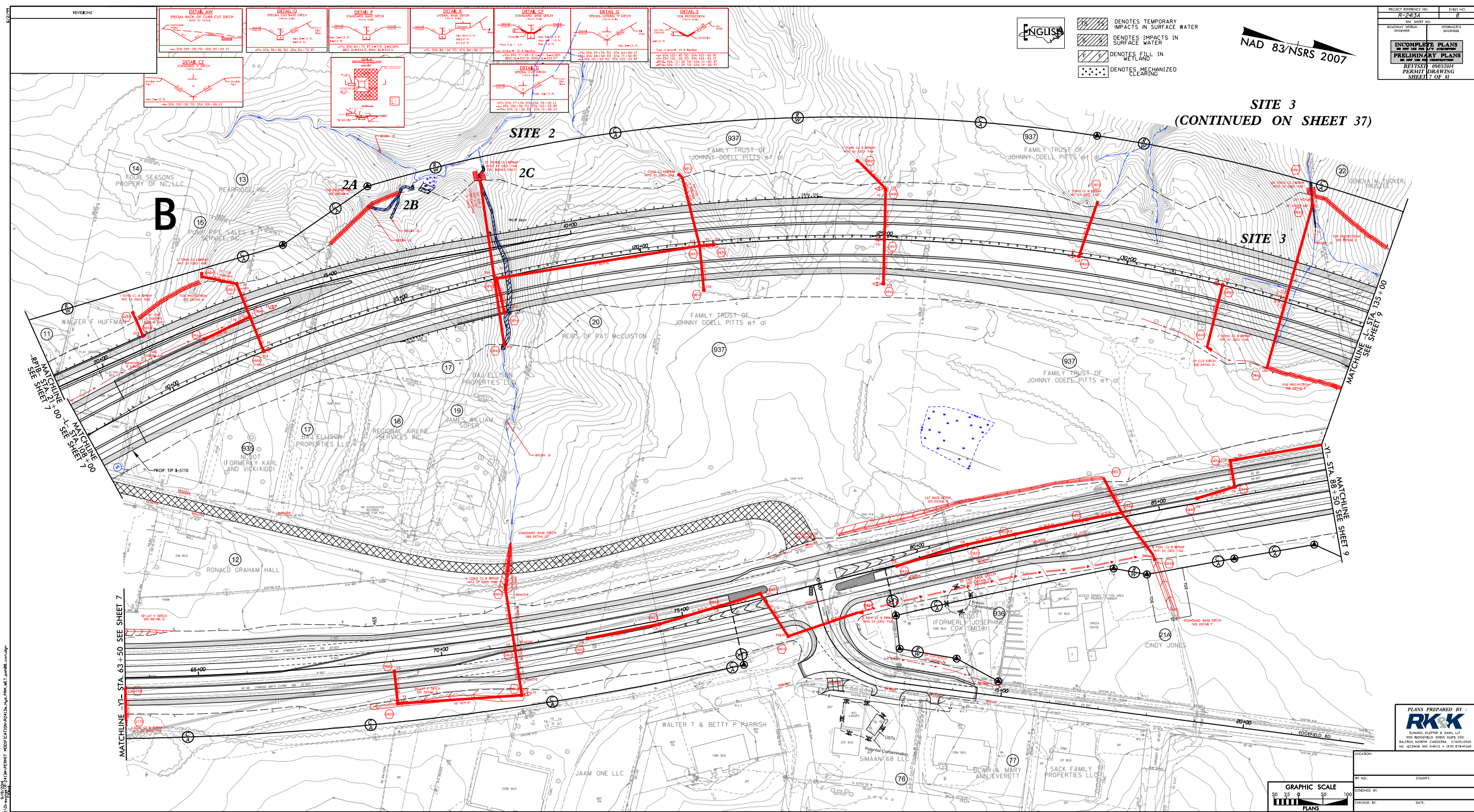
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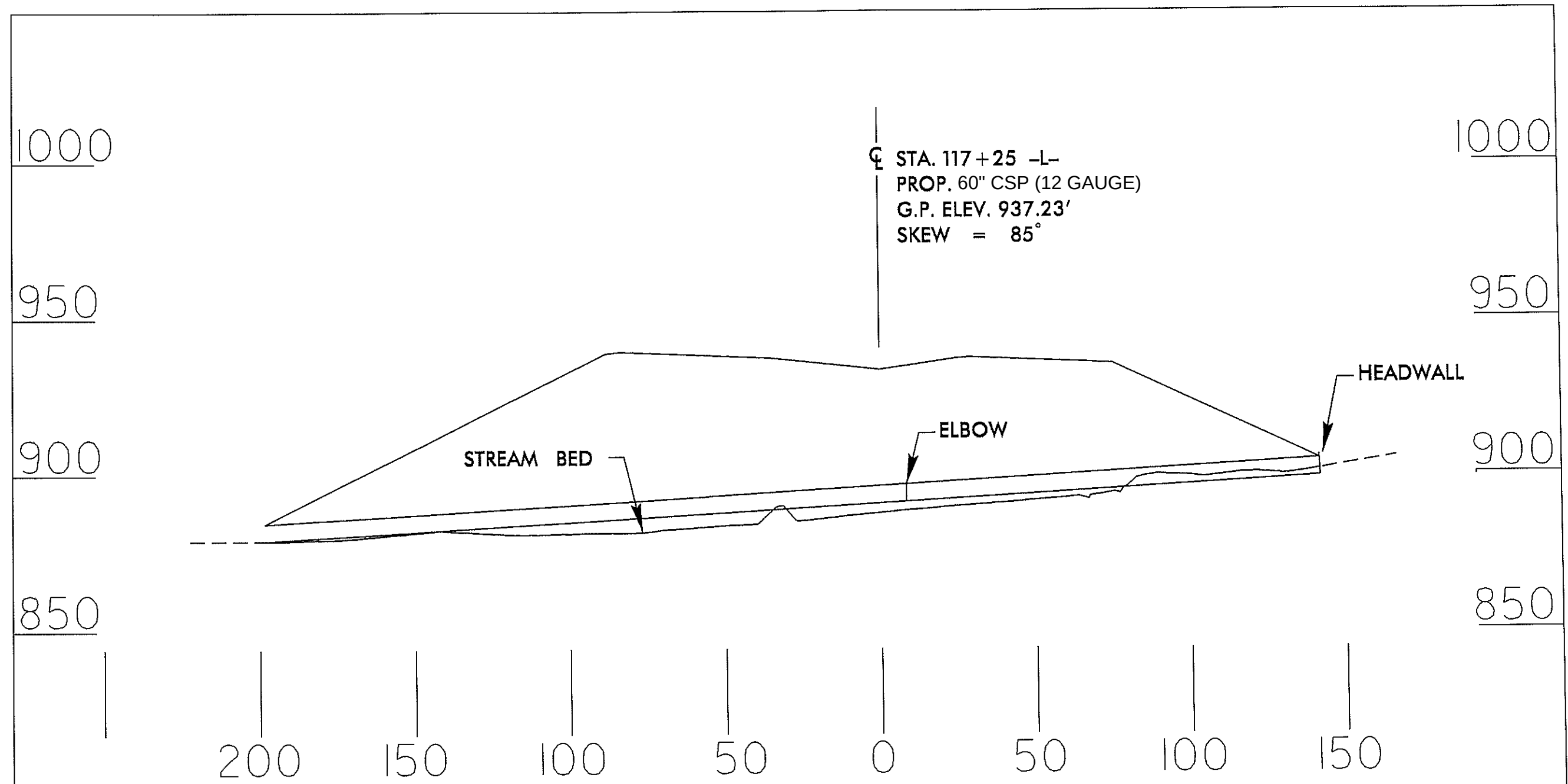


PERMIT DRAWING
SHEET 5 OF 81

-RPIB-







PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 8 OF 81
2 / 13 / 13

8/17/99
8/19/2014
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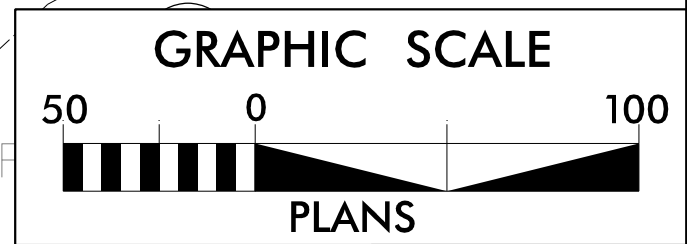
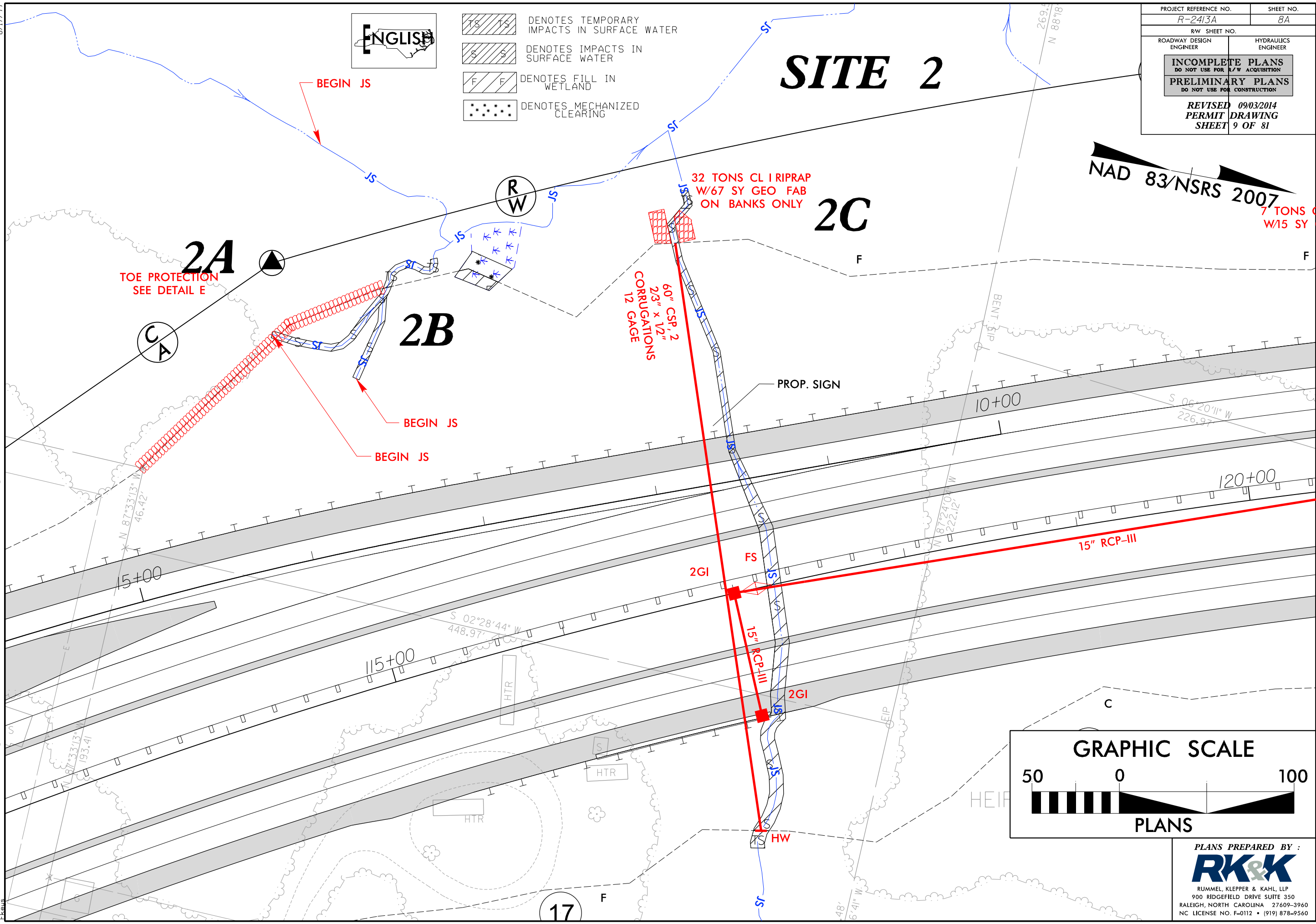


- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- S S DENOTES IMPACTS IN SURFACE WATER
- F F DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

SITE 2

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	8A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
REVISED PERMIT SHEET	09/03/2014 DRAWING 9 OF 81

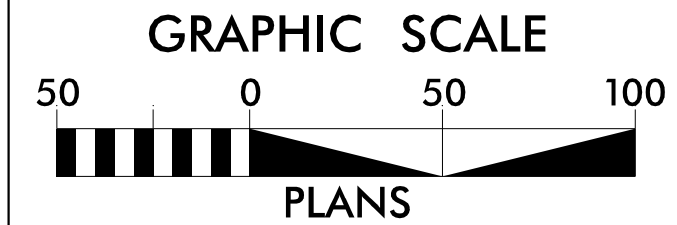
NAD 83/NSRS 2007
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W/67 SY GEO FAB
ON BANKS ONLY



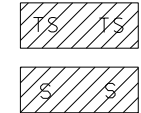
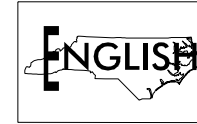
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

SITE 3 (IMPACTS FROM SHEET 8 AND SHEET 37)



PROJECT REFERENCE NO. R-2413A	SHEET NO. 37A
R/W SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
REVISED 09/03/2014 PERMIT DRAWING SHEET 10 OF 81	

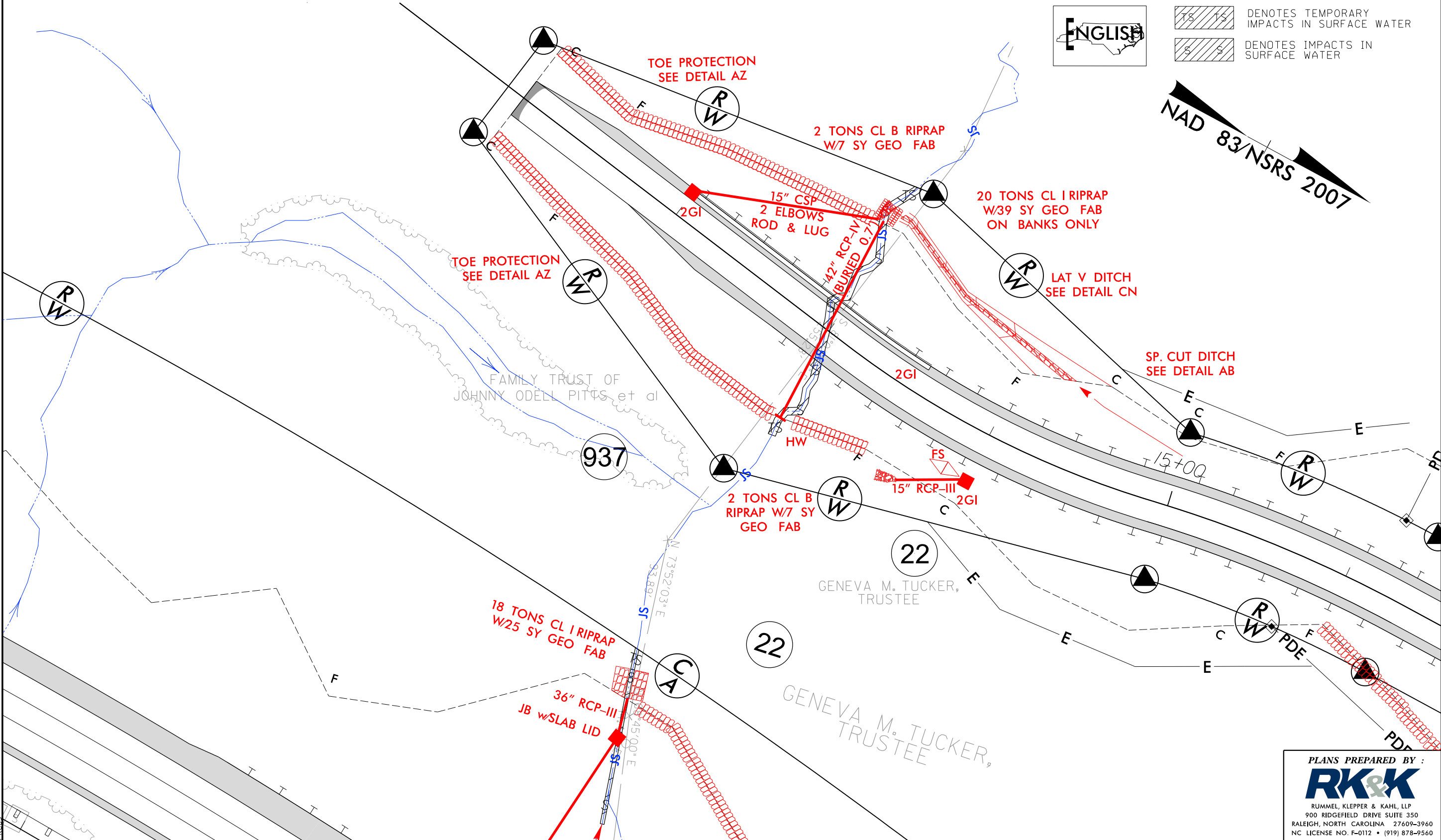


TS TS DENOTES TEMPORARY
IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN
SURFACE WATER

NAD 83/NSRS 2007

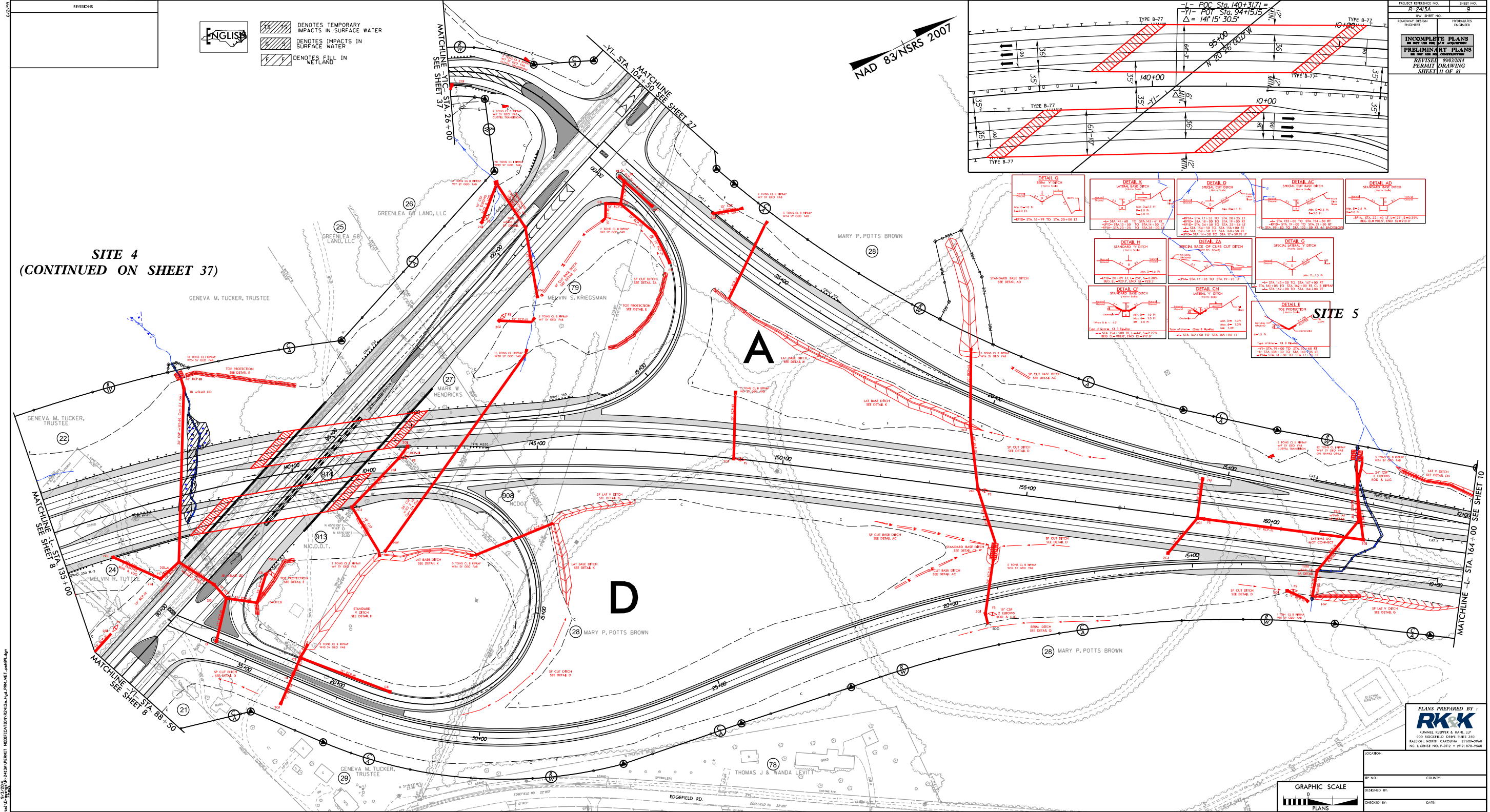
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Rk&K



PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



REVISIONS	

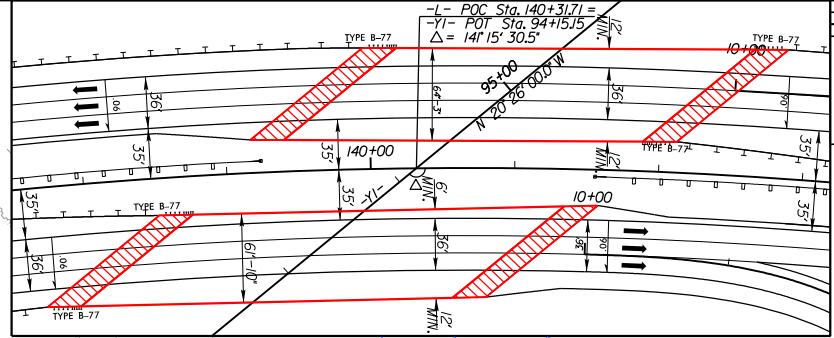
ENGLISH

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

NAD 83/NSRS 2007



DETAIL G
STANDARD V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 16+75 TO STA. 20+00 LT

DETAIL K
LATERAL BASE DITCH
10' WIDE
1' DEEP
APPLIC. STA. 14+00 TO STA. 17+00 RT

DETAIL D
STANDARD V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 17+00 TO STA. 19+00 LT

DETAIL AC
SPECIAL CUT BASE DITCH
10' WIDE
1' DEEP
APPLIC. STA. 13+00 TO STA. 14+00 RT

DETAIL AD
STANDARD V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 22+00 TO STA. 24+00 RT

DETAIL H
STANDARD V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 20+00 TO STA. 22+00 RT

DETAIL ZA
SPECIAL BACK OF CURB CUT DITCH
10' WIDE
1' DEEP
APPLIC. STA. 17+00 TO STA. 19+00 LT

DETAIL G
SPECIAL EXTENSIVE V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 13+00 TO STA. 14+00 RT

DETAIL CN
LATERAL V DITCH
10' WIDE
1' DEEP
APPLIC. STA. 14+00 TO STA. 17+00 RT

DETAIL E
TOE PROTECTION
10' WIDE
1' DEEP
APPLIC. STA. 11+00 TO STA. 13+00 RT

PROJECT REFERENCE NO. **R-243A**

SHEET NO. **9**

ROADWAY DESIGN **INCHES**

HYDRAULICS **FOOTING**

INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

REVISED **06/03/2014**
PERMIT DRAWING
SHEET 11 OF 31

PLANS PREPARED BY:
RK&K
RUMBLE, KUPPER & KAM, LLP
100 REDFIELD DRIVE SUITE 310
RALEIGH, NORTH CAROLINA 27609-2949
NC LICENSE NO. K-0112 • (919) 878-9568

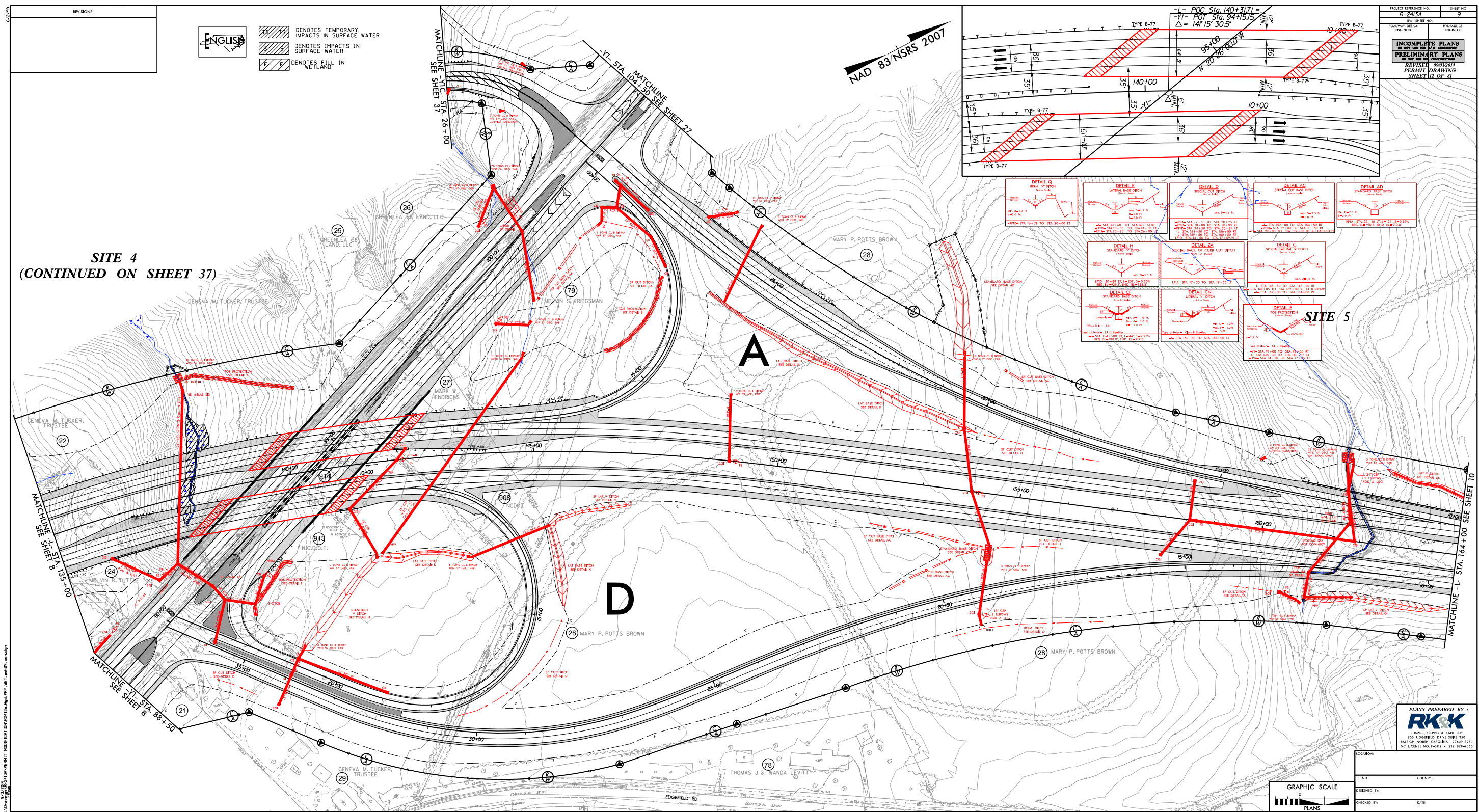
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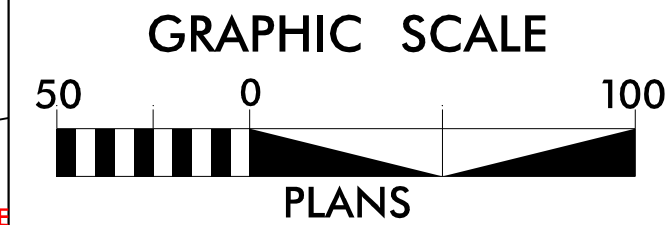
TP NO.: _____ COUNTY: _____

DESIGNED BY: _____

CHECKED BY: _____ DATE: _____

GRAPHIC SCALE
0 10 20
FEET
PLANS





 DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER
 DENOTES FILL IN WETLAND

NAD 83/NSRS 2007

SITE 4
(CONTINUED ON
SHEET 37)

22

GENEVA M. TUCKER
TRUSTEE



18 TONS CL I RIPRAP
W/24 SY GEO FAB

36" RCP-III

JB w/SLAB LID

36" CSP w/83x1/2 Corr. (14 Ga.)

TOE PROTE
SEE DETAIL E

F

(914)

(913)

2 TONS CL B RIPRAP
W/7 SY GEO FAB

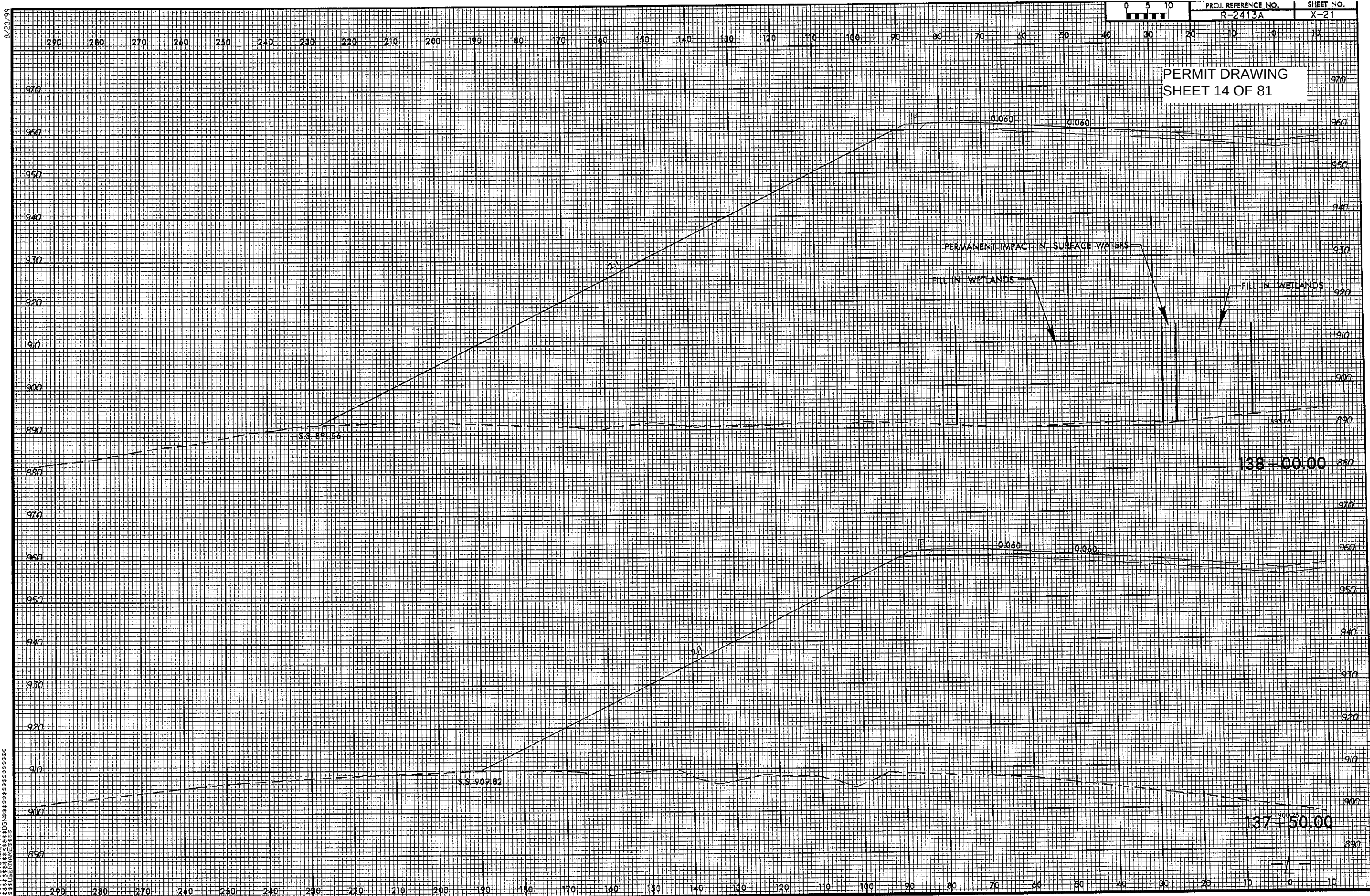
2GI

~~ROD 2 15" CSF
8 ELBC~~

PLANS PREPARED BY :
RK&K
 RUMMEL, KLEPPER & KAHL, LLP
 900 RIDGEFIELD DRIVE SUITE 350
 ALEIGH, NORTH CAROLINA 27609-3960
 NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

9/3/2014
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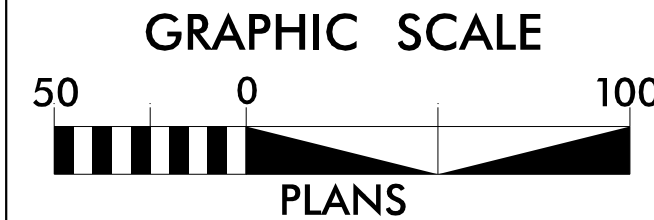


8/17/99

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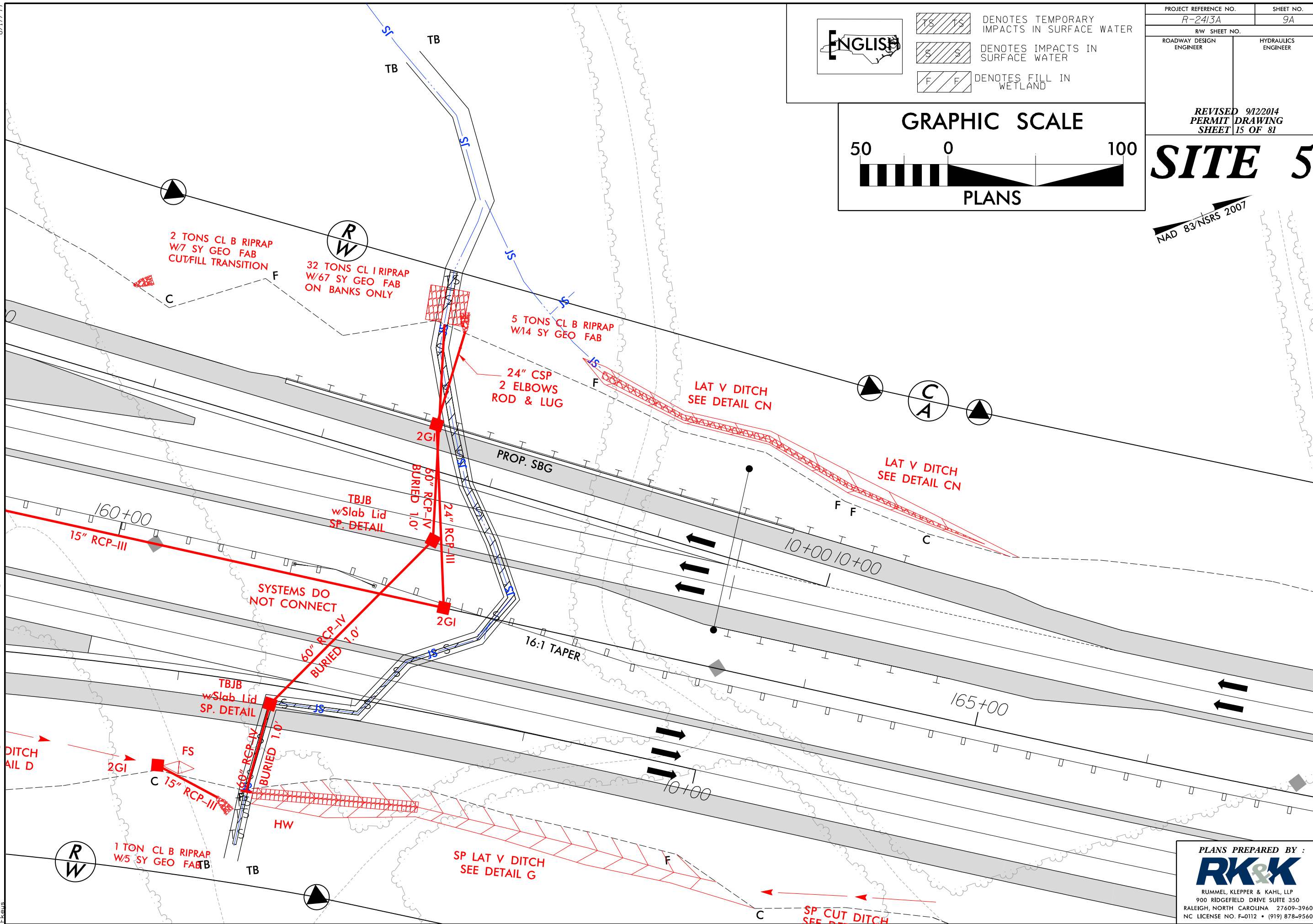
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|--|----|--|
| | TS | DENOTES TEMPORARY IMPACTS IN SURFACE WATER |
| | S | DENOTES IMPACTS IN SURFACE WATER |
| | F | DENOTES FILL IN WETLAND |



PROJECT REFERENCE NO.	SHEET NO.
R-2413A	9A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 15 OF 81	

SITE 5

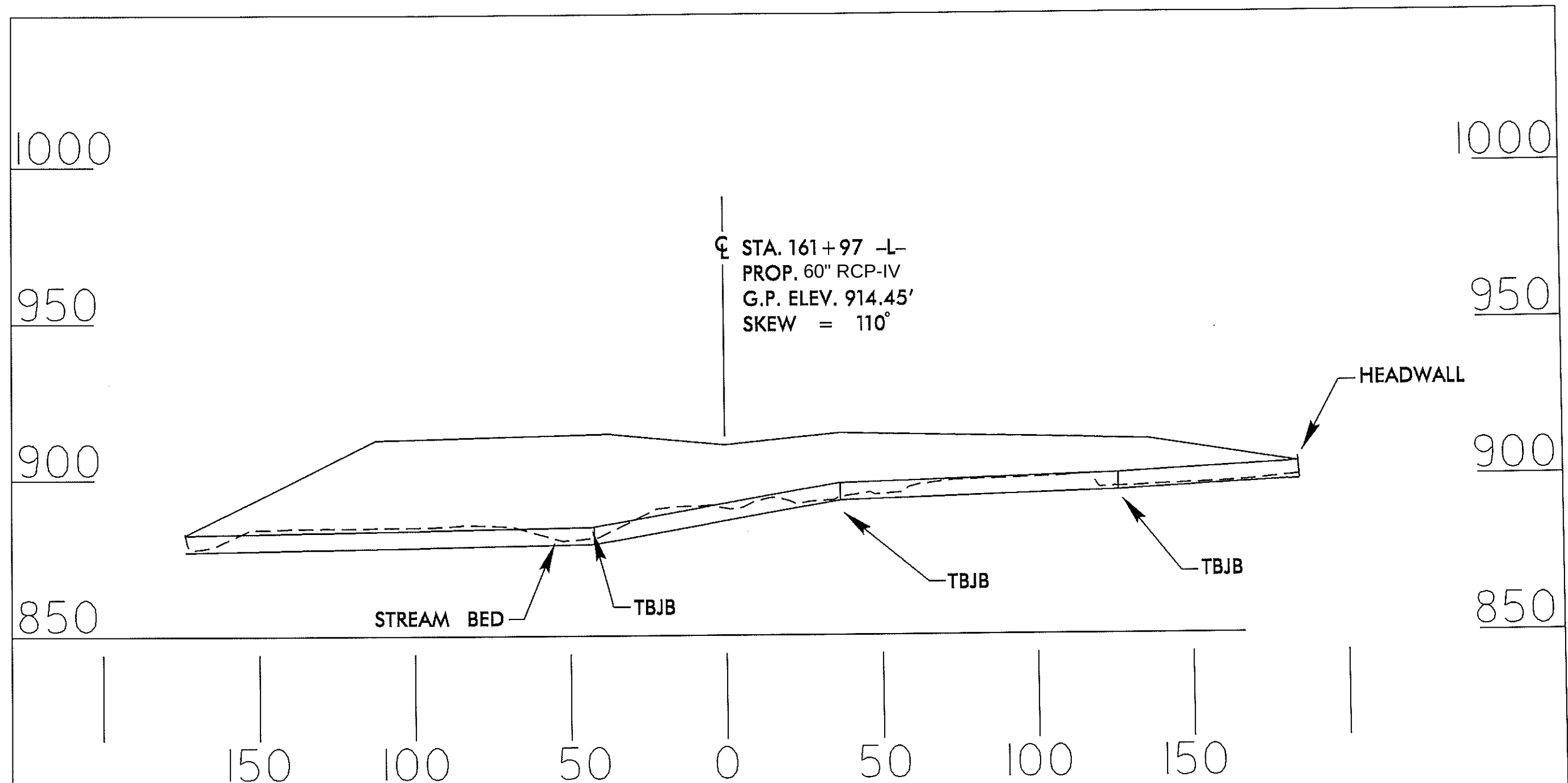
NAD 83/NSRS 2007



PLANS PREPARED BY :

RK&K

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900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



PROFILE

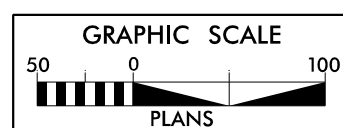
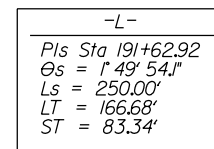
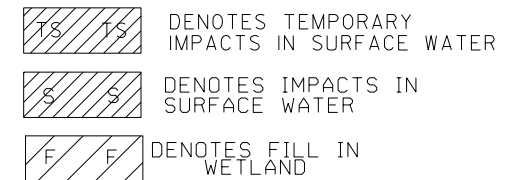
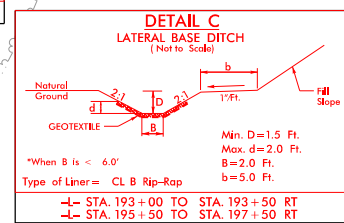
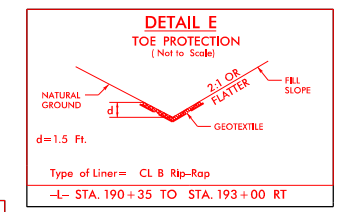
NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

PERMIT DRAWING
SHEET 16 OF 81

2 / 13 / 13

SITE 6

DPS



PLANS PREPARED BY :
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900 RIDGEFIELD DRIVE SUITE 350
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DETAIL AG
LATERAL BASE DITCH
(Not to Scale)

The diagram shows a cross-section of a road with a ditch. The ditch has a bottom width of 'b' and a top width of 'B'. The ditch depth is 'D'. The ditch is located on the right side of the road, with a 'Fill Slope' indicated on the right. The ditch is labeled 'Lateral Base Ditch'. The ditch is shown with a '1 Ft.' width at the top. The ditch is shown with a '2:1' slope on the left side. The ditch is shown with a 'Natural Ground' line on the left. The ditch is shown with a 'Min. D=2.0 Ft.' dimension. The ditch is shown with a 'B=4.0 Ft.' dimension. The ditch is shown with a 'b=5.0 Ft.' dimension.

Min. D=2.0 Ft.
B=4.0 Ft.
b=5.0 Ft.

— STA. 196+80 TO STA. 199+50 LT

DETAIL P
BERM BASE DITCH
 (Not to Scale)

The diagram shows a cross-section of a berm base ditch. The ditch has a bottom width of **B** and a depth of **D**. The ditch is flanked by berms with a width of **b**. The slopes are indicated by a **2:1** ratio. The ditch is located between **Natural Ground** on the left and the **RDWY** (Right of Way) on the right.

Min. D=1.0 Ft.
 B=2.0 Ft.
 b=5.0 Ft.

DETAIL A
LATERAL BASE DITCH
(Not to Scale)

Natural Ground

2.0' 1.0' 1.0'

GEOTEXTILE

D

b

1.0' slope

Min. D = 2.0 Ft.
Max. d = 2.0 Ft.
B = 4.0 Ft.
b = 5.0 Ft.

*When B is < 6.0'

Type of Liner: CL 1 Rio-Rao

DETAIL O
SPECIAL CUT BASE DITCH
 (Not to Scale)

Natural Ground

2:1

D

4:1 or Flatter

Front Ditch Slope

B

Min. D = 1.5 Ft.
 B = 2.0 Ft.

— STA. 197 + 50 TO STA. 199 + 00 RT

DETAIL E

TOE PROTECTION
(Not to Scale)

NATURAL GROUND

d

2:1 OR FLATTER

FILL SLOPE

GEOTEXTILE

d = 1.5 Ft.

Type of Liner = CL B Rip-Rap

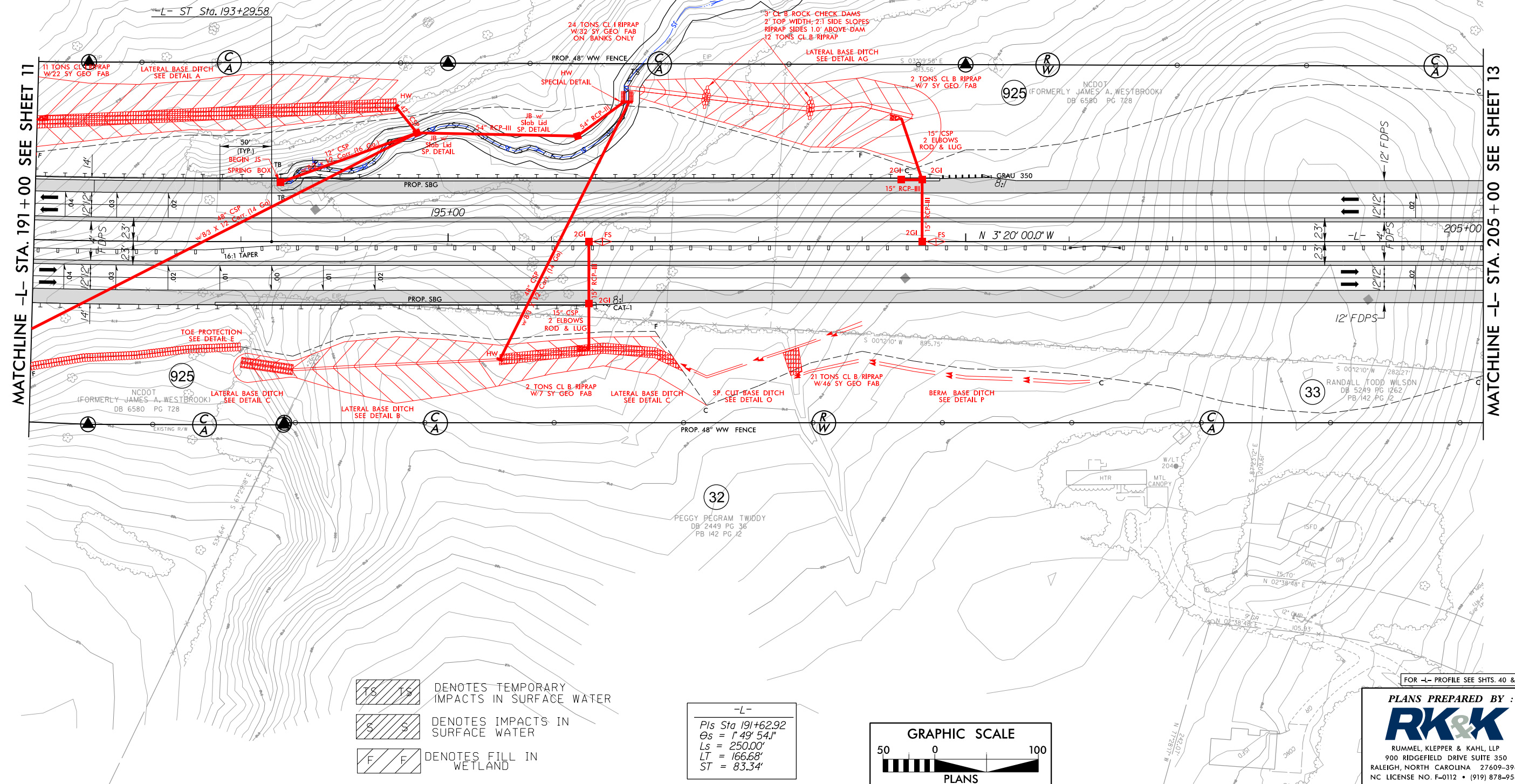
CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOCATION
SBG	-L-	191+00.00	199+75.00	LT
SBG	-L-	192+75.00	196+43.00	RT

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 18 OF 81	

NAD 83/NSRS 2007

ENGLISH

SITE 6



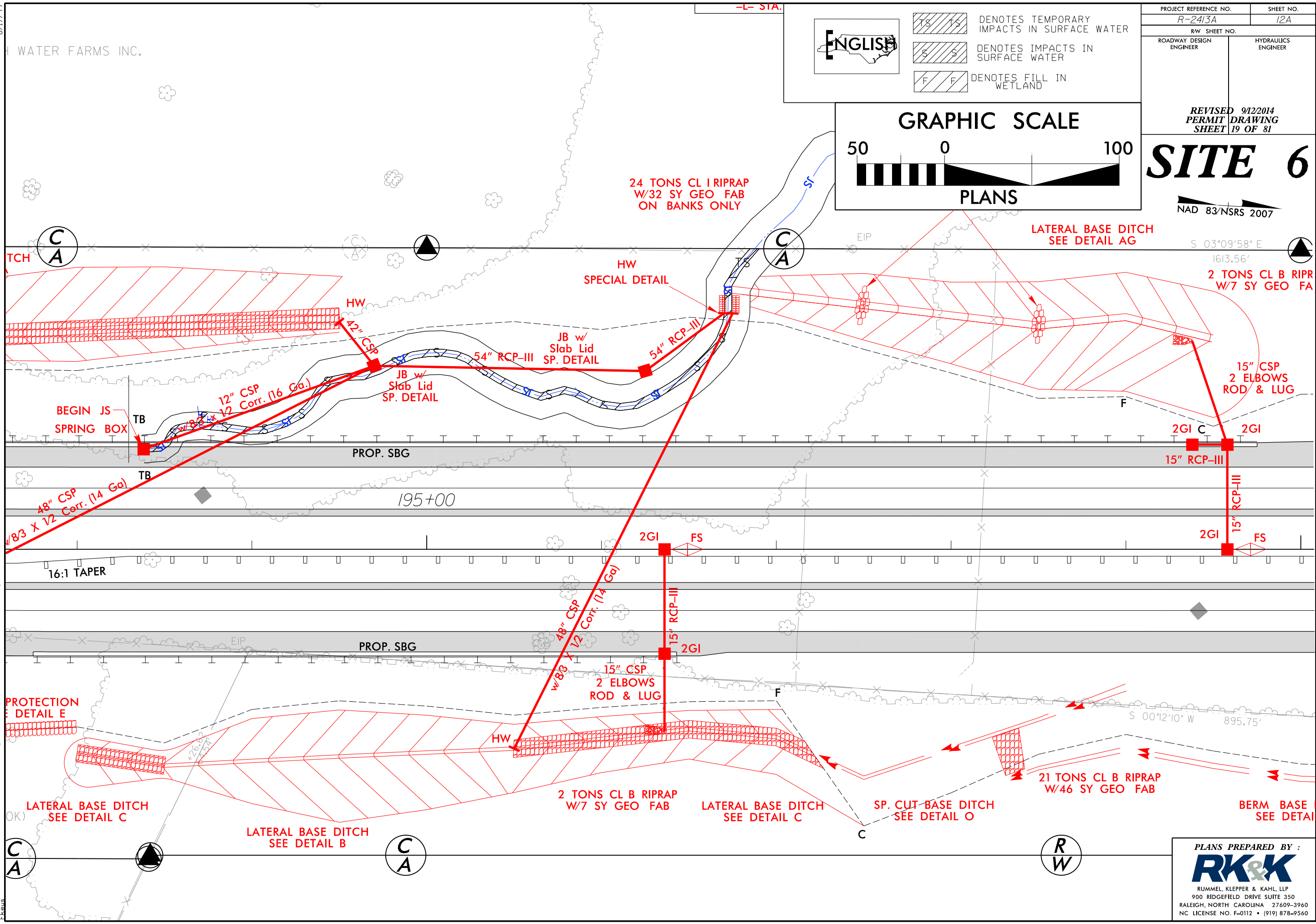
FOR -L- PROFILE SEE SHTS. 40 & 41

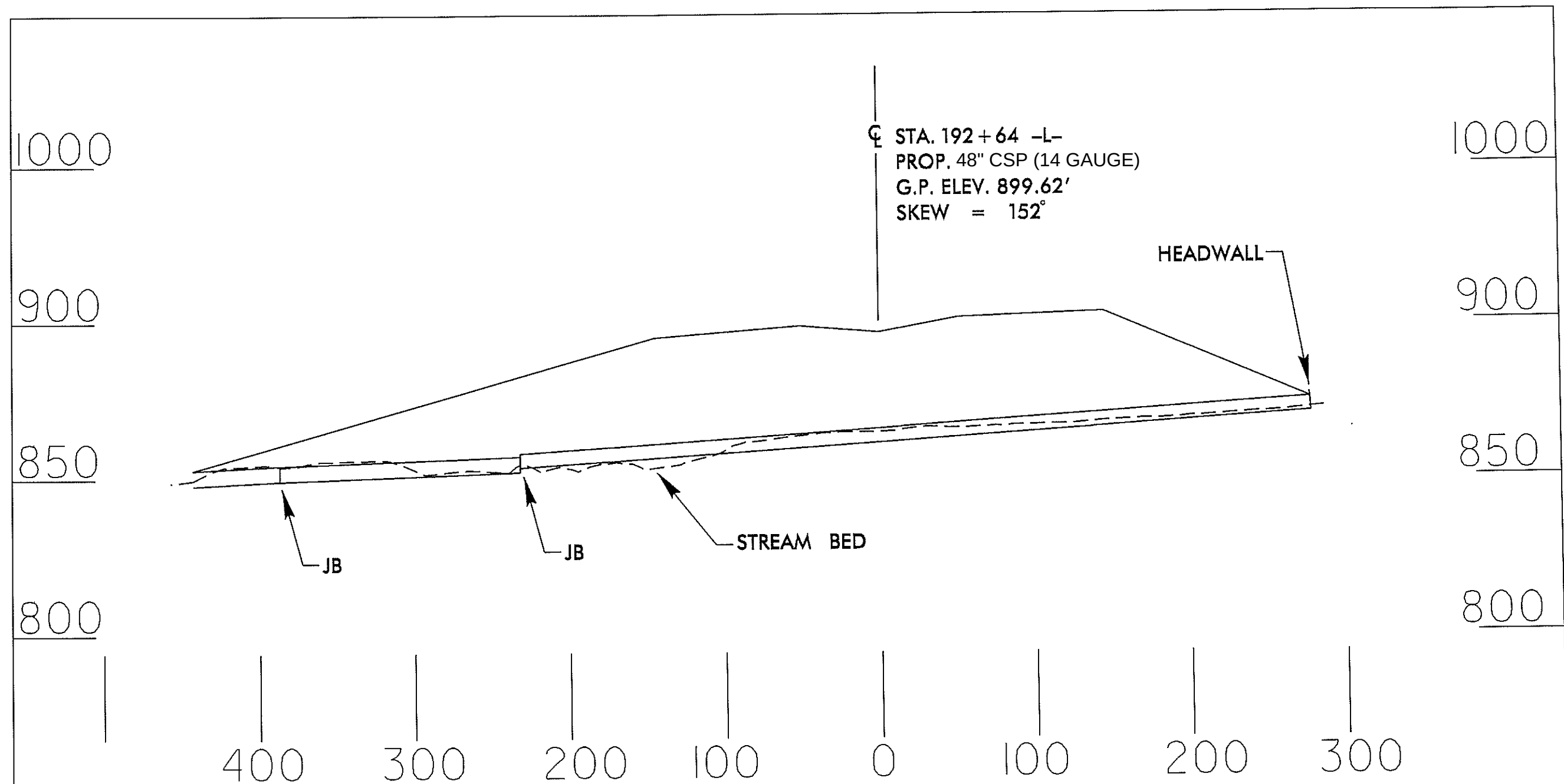
PLANS PREPARED BY :



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900 RIDGEFIELD DRIVE SUITE 350
LEIGH, NORTH CAROLINA 27609-3960
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8/10/2014
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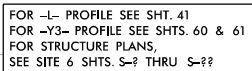




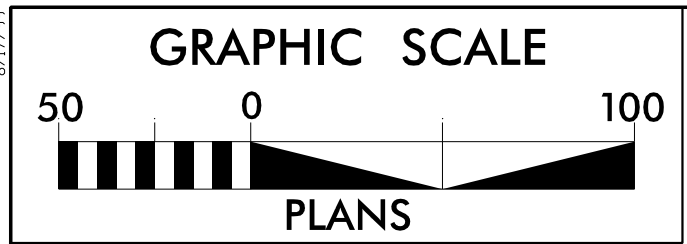
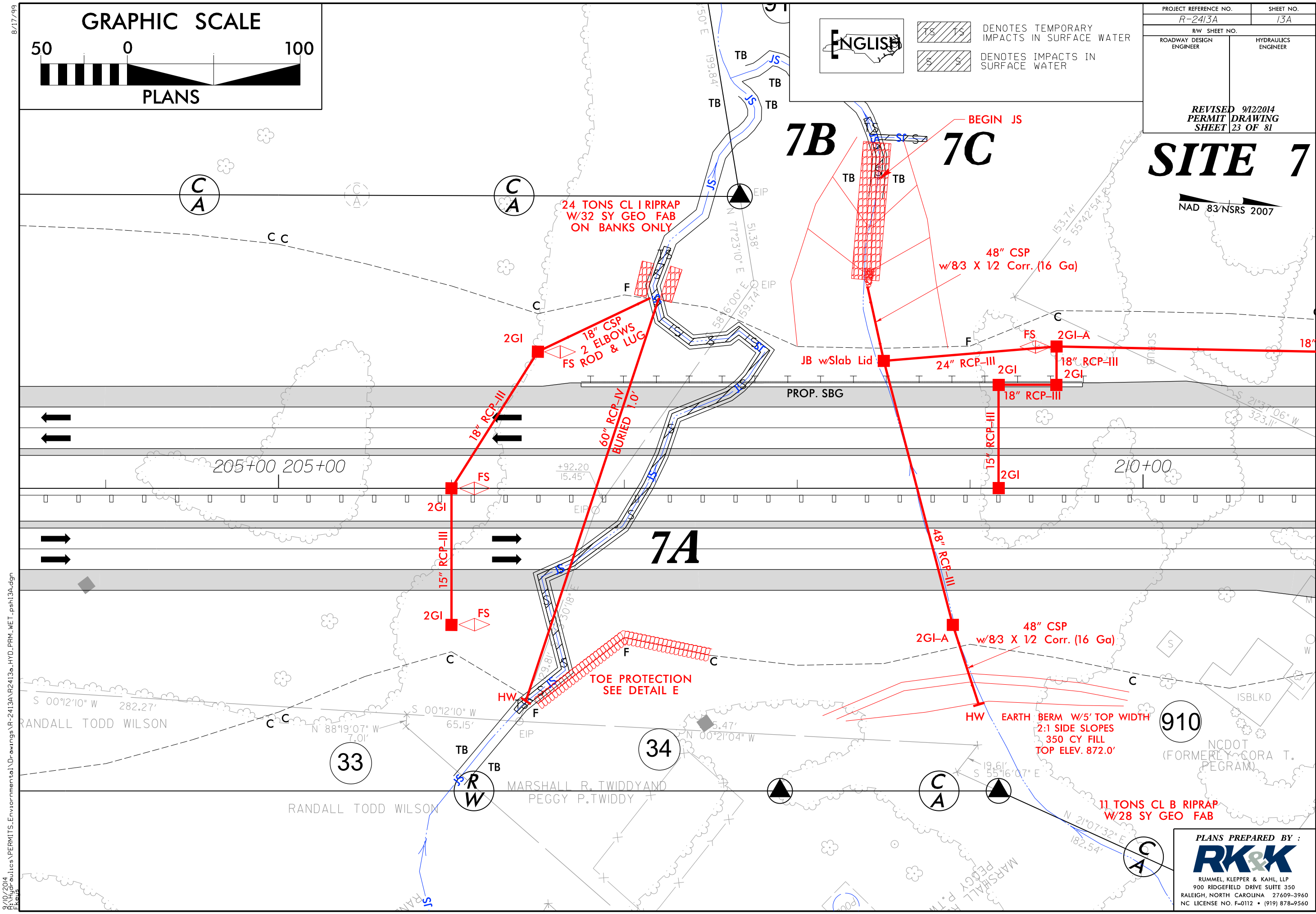
PROFILE

NCDOT
 DIVISION OF HIGHWAYS
 GUILFORD COUNTY
 PROJECT: 34429.1.1 (R-2413A)
 NC 68 CONNECTOR
 FROM FOUR LANES AT
 SR 2011 TO SR 2127
 PERMIT DRAWING
 SHEET 20 OF 81
 2 / 13 / 13





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900 RIDGEFIELD DRIVE SUITE 350
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LICENSE NO. F-0112 • (919) 878-956



ENGLISH

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	13A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 23 OF 81	

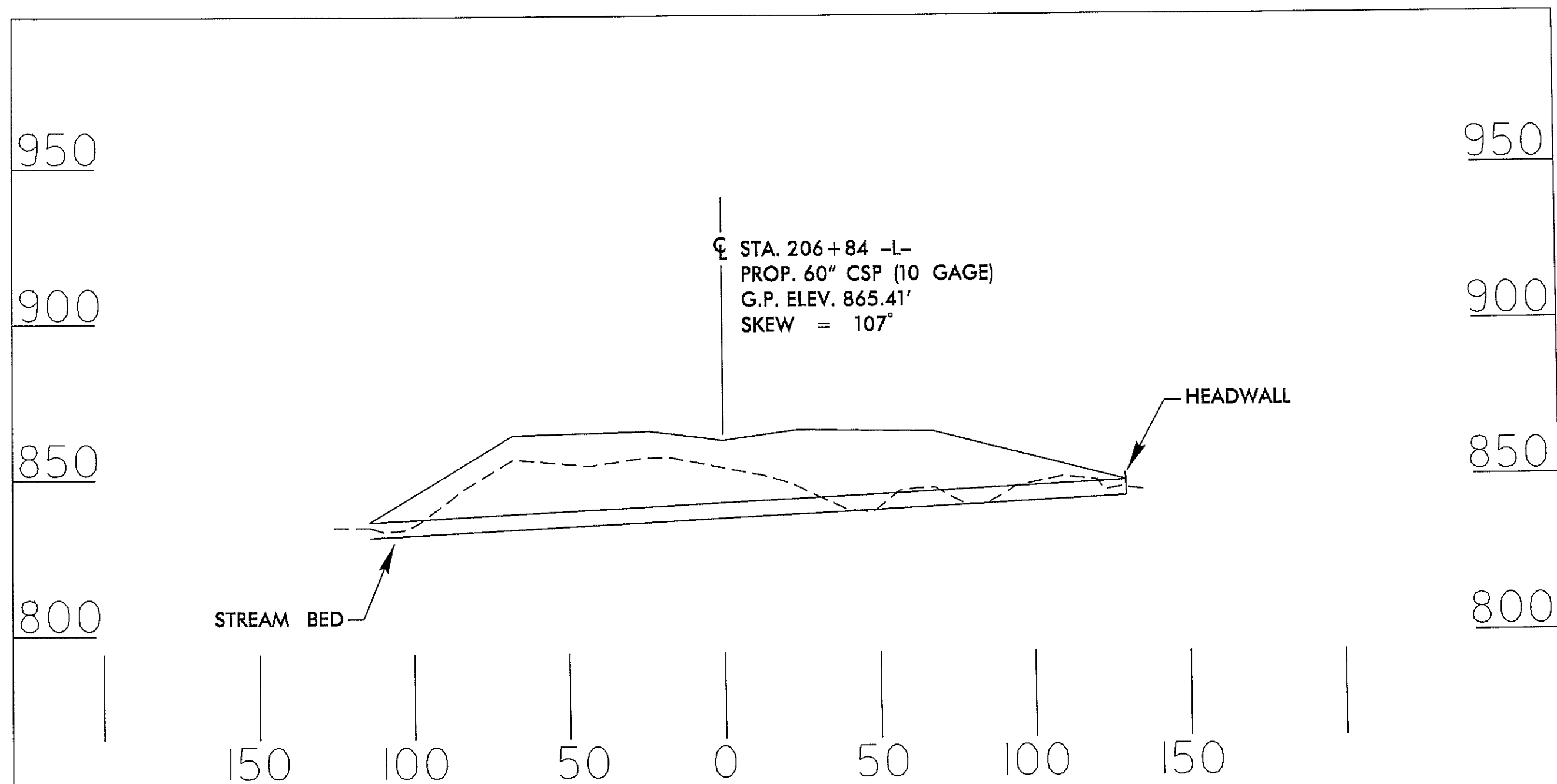
SITE 7

NAD 83/NSRS 2007

PLANS PREPARED BY :

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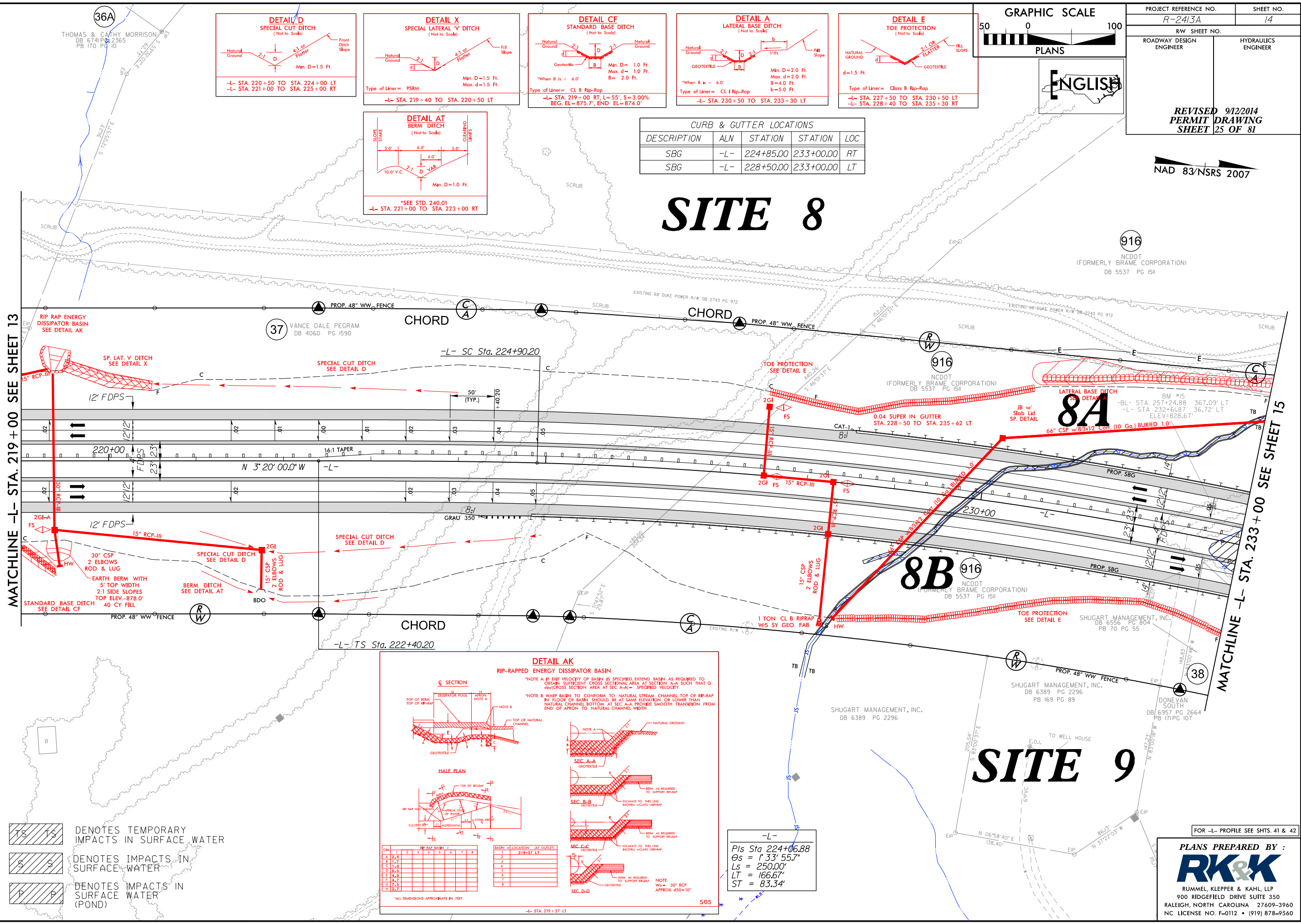
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

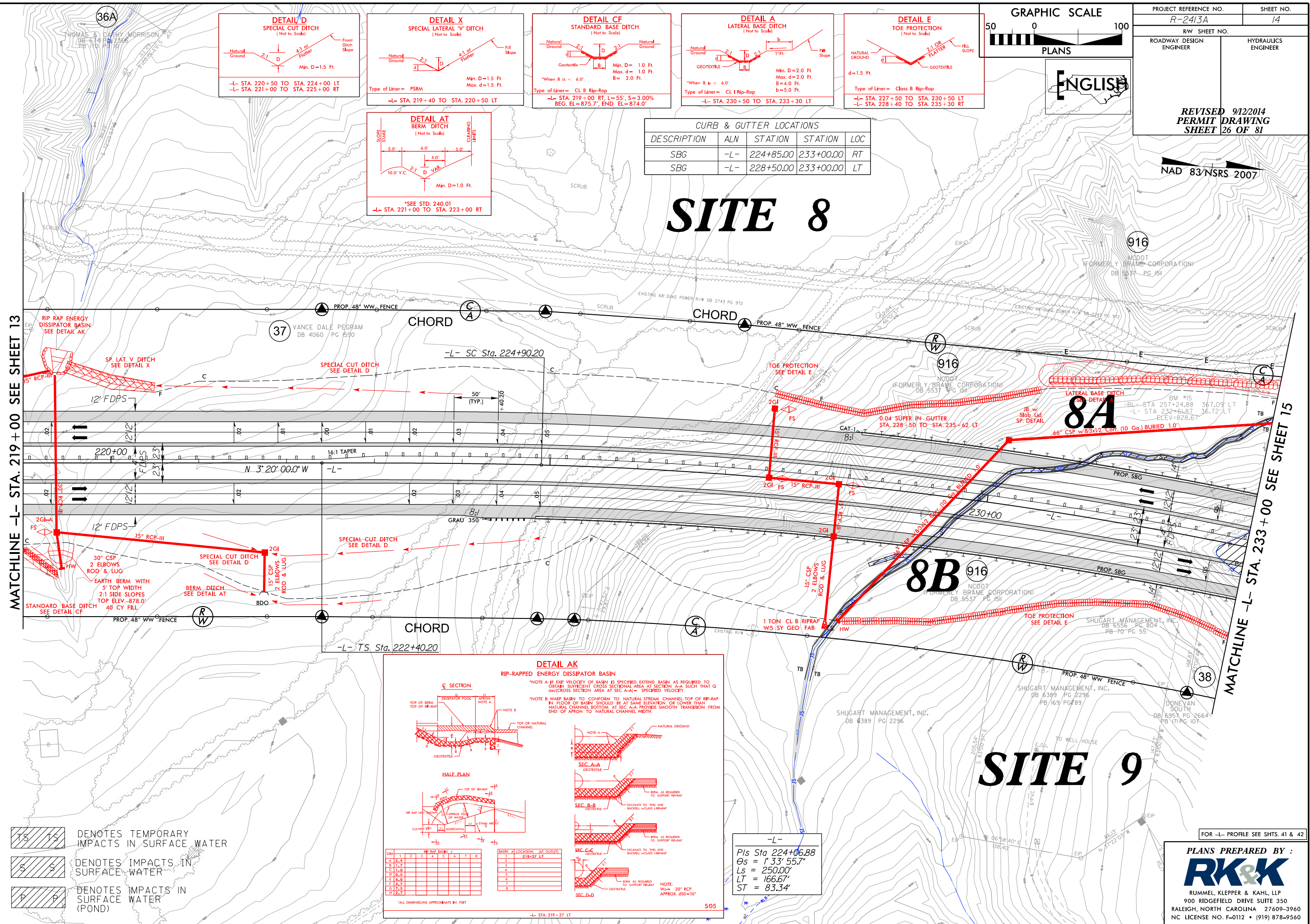


PROFILE

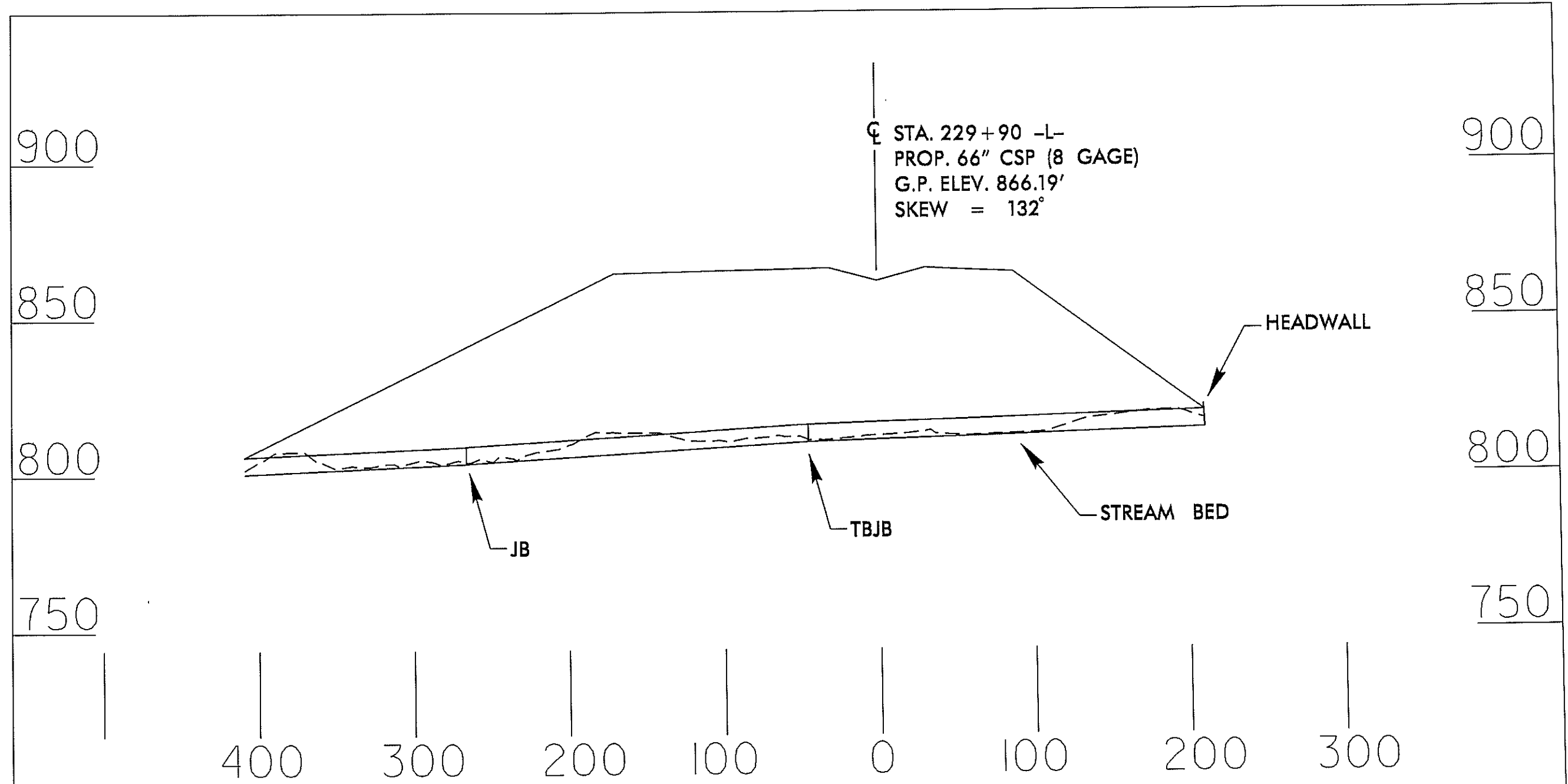
NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 24 OF 81
2 / 13 / 13

8/17/99
8/10/2014
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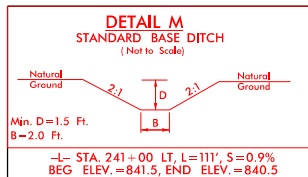
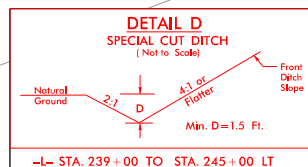
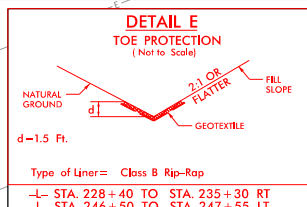
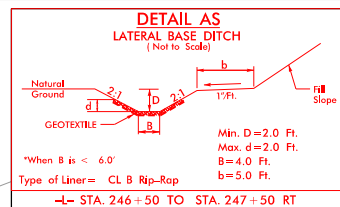


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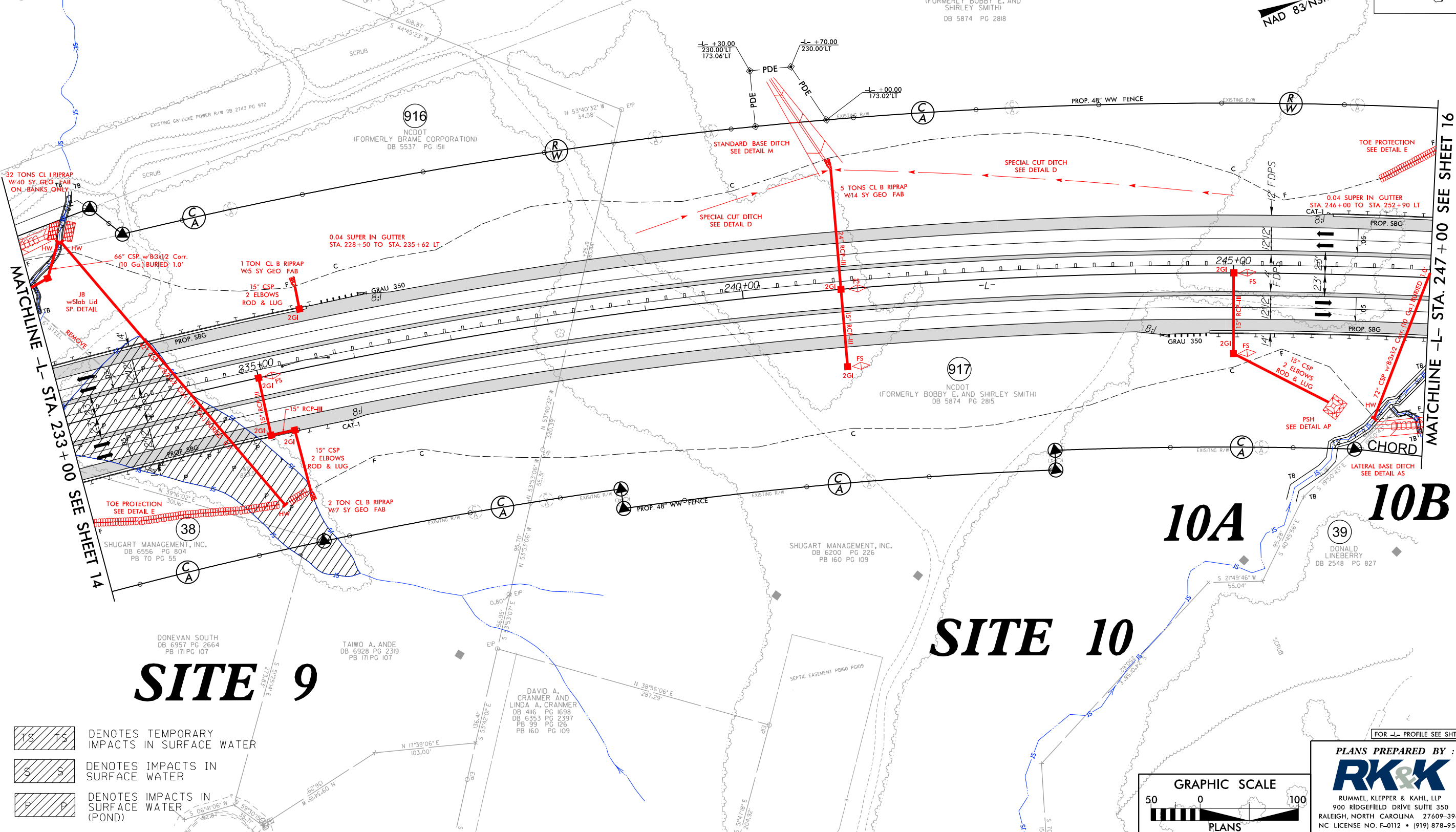
NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 28 OF 81
2 / 13 / 13

NAD 83/NSRS 2007

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	233+00.00	235+62.00	LT
SBG	-L-	233+00.00	235+30.00	RT
SBG	-L-	244+75.00	247+00.00	RT
SBG	-L-	246+00.00	247+00.00	LT



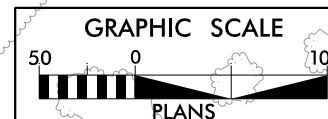
SITE 8



SITE ^{S 51°25'14"E}_{213.83'} **9**

SITE 10


 DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER (POND)

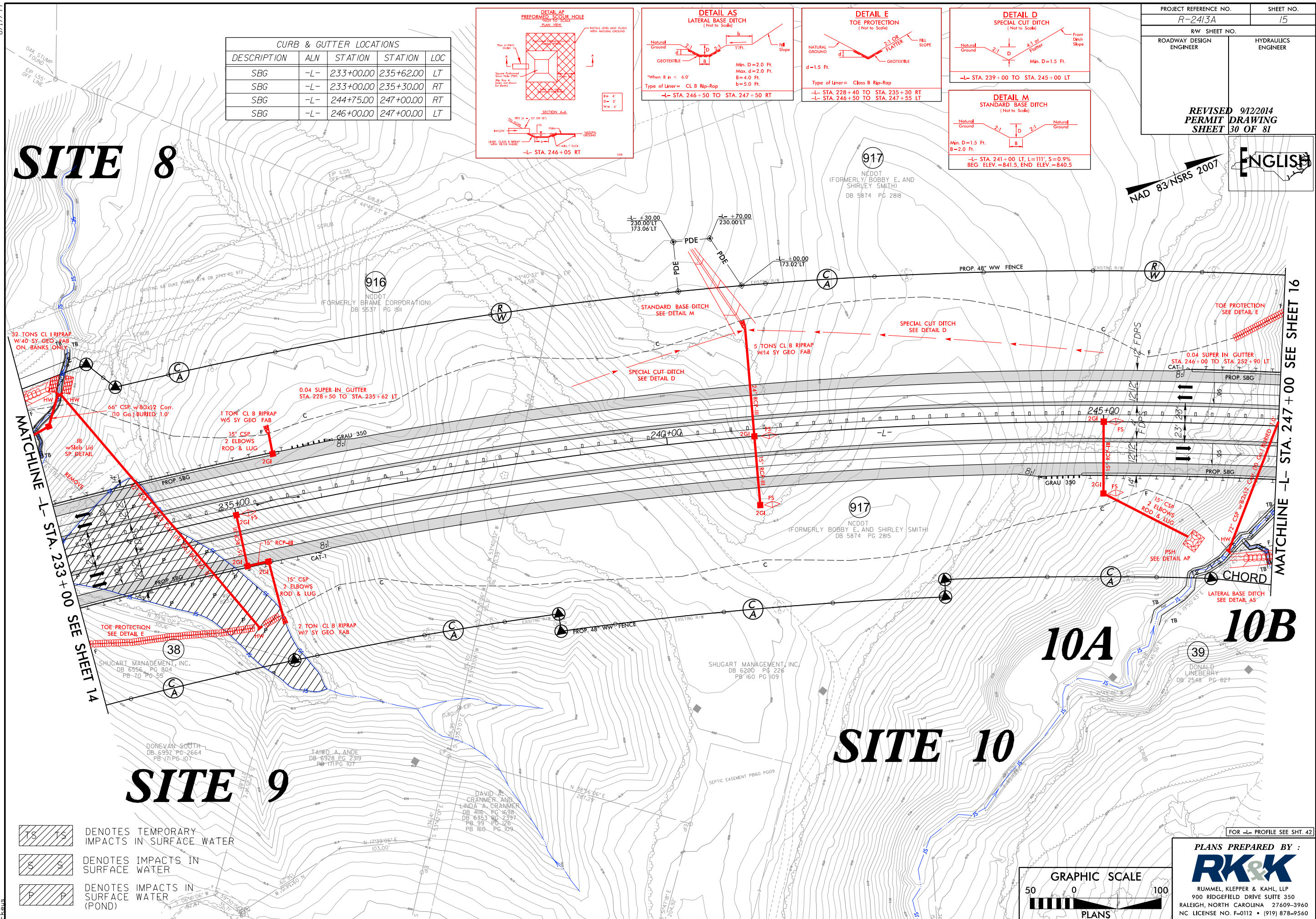


PLANS PREPARED BY :

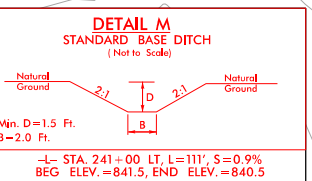
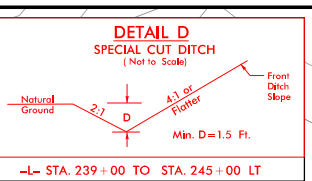
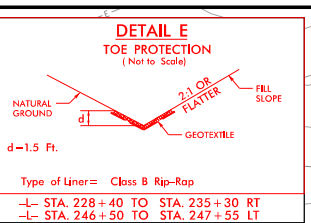
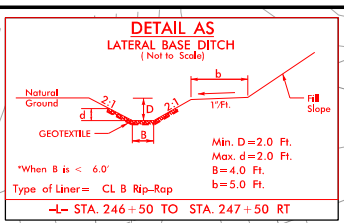
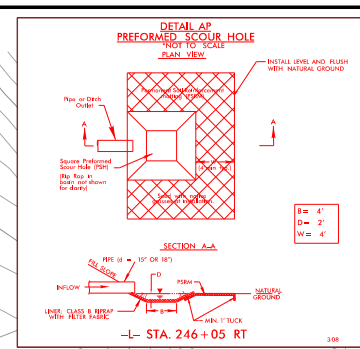
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
LEIGH, NORTH CAROLINA 27609-3960
LICENSE NO. F-0112 • (919) 878-9560

8/17/99

8/10/2014 B:\Hydro\Permits\Environmental\Drawings\NR-2413A\NR2413a_HYD_PRM_WET_psh15_con.dgn



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	233+00.00	235+62.00	LT
SBG	-L-	233+00.00	235+30.00	RT
SBG	-L-	244+75.00	247+00.00	RT
SBG	-L-	246+00.00	247+00.00	LT



PROJECT REFERENCE NO.
R-2413A

SHEET NO.
15

RW SHEET NO.

ROADWAY DESIGN ENGINEER

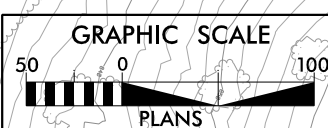
HYDRAULICS ENGINEER

REVISED 9/12/2014
PERMIT DRAWING
SHEET 30 OF 81

NAD 83 NSRS 2007

ENGLISH

- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- S S DENOTES IMPACTS IN SURFACE WATER
- P P DENOTES IMPACTS IN SURFACE WATER (POND)



PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
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RALEIGH, NORTH CAROLINA 27609-3960
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8/17/99

SITE 8

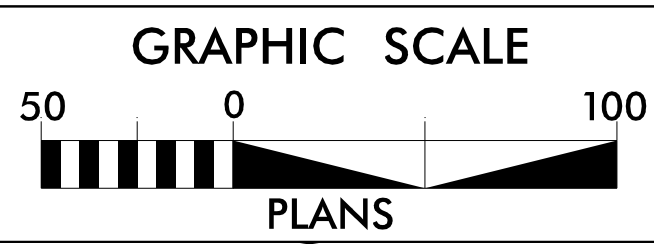
8A

8C

SITE 9

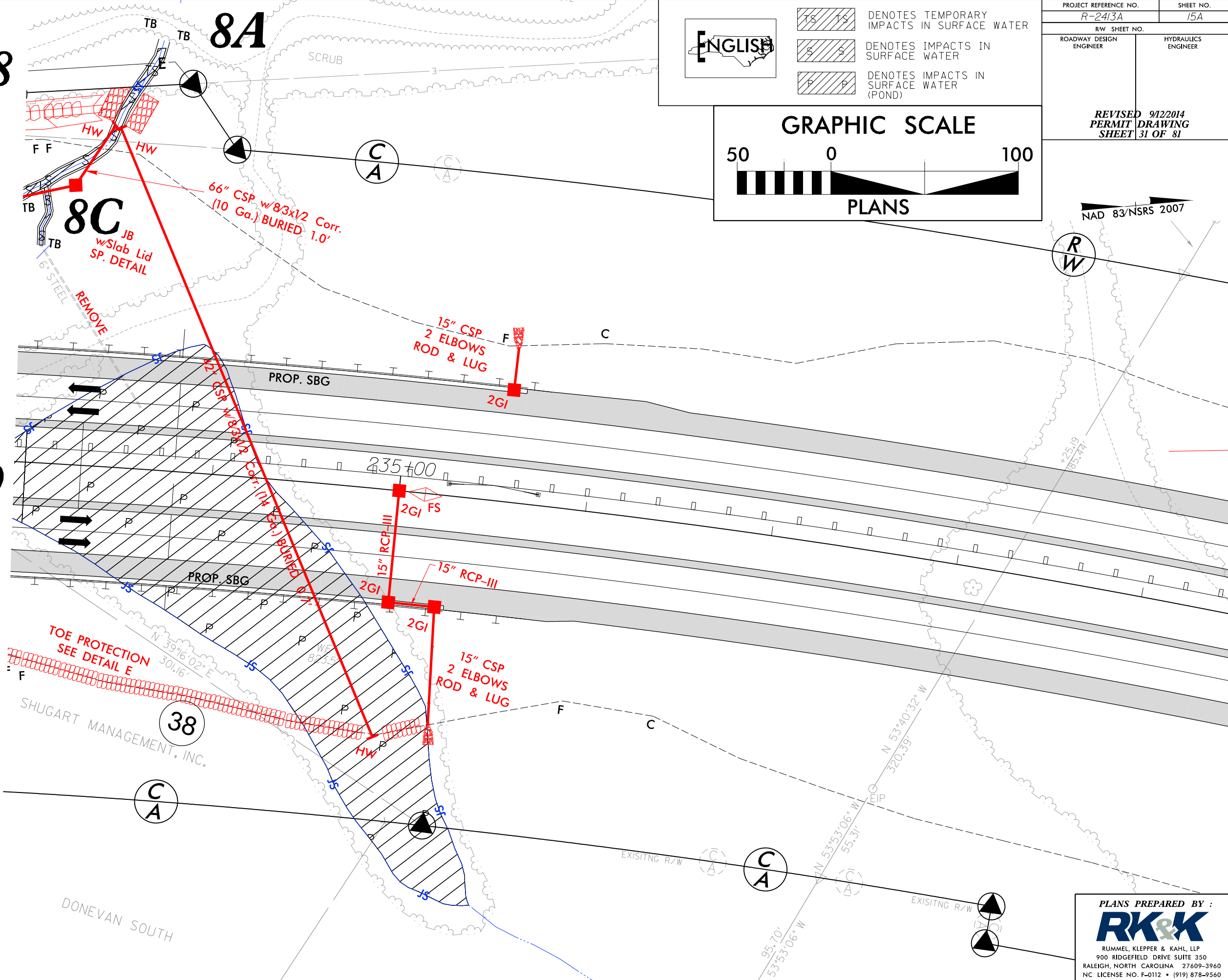


TS	TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S	S	DENOTES IMPACTS IN SURFACE WATER
P	P	DENOTES IMPACTS IN SURFACE WATER (POND)



PROJECT REFERENCE NO. R-2413A	SHEET NO. 15A
RW SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 31 OF 81	

NAD 83/NSRS 2007



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NC LICENSE NO. F-0112 • (919) 878-9560

8/10/2014
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8/10/2014
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GRAPHIC SCALE
50 0 100
PLANS
ENGLISH

DETAIL AS
LATERAL BASE DITCH
(Not to Scale)

DETAIL Q
BERM "V" DITCH
(Not to Scale)

DETAIL E
TOE PROTECTION
(Not to Scale)

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)

DETAIL AQ
PREFORMED SCOUR HOLE
(NOT TO SCALE)
PLAN VIEW

SECTION A-A

CURB & GUTTER LOCATIONS			
DESCRIPTION	ALN	STATION	STATION LOC
SBG	-L-	247+00.00	252+90.00 LT
SBG	-L-	247+00.00	251+90.00 RT

PROJECT REFERENCE NO.
R-2413A

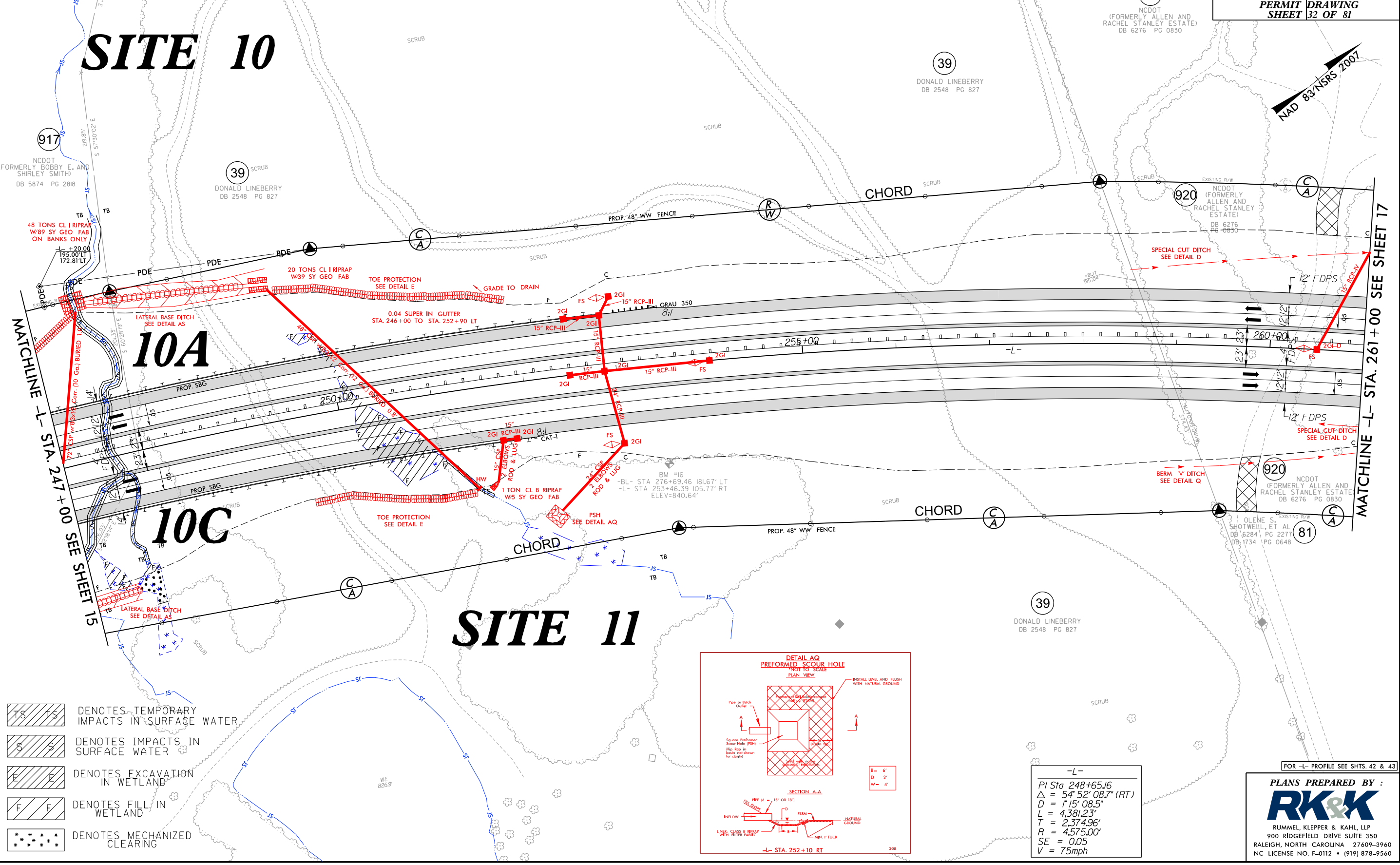
SHEET NO.
16

RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

REVISED 9/12/2014
PERMIT DRAWING
SHEET 32 OF 81



- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- S S DENOTES IMPACTS IN SURFACE WATER
- E E DENOTES EXCAVATION IN WETLAND
- F F DENOTES FILL IN WETLAND
- * * * DENOTES MECHANIZED CLEARING

-L-
PI Sta 248+65.16
Δ = 54° 52' 08.7" (RT)
D = 1' 15" 08.5"
L = 4,381.23'
T = 2,374.96'
R = 4,575.00'
SE = 0.05
V = 75mph

PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99
8/10/2014
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R:\Hydraulics\PERMITS\Environmental\Drawings\2413A\2413a_HYD_PRM_WET_psh16_con.dgn

GRAPHIC SCALE
50 0 100
PLANS
ENGLISH

DETAIL AS
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Geotextile
Min. D=2.0 Ft.
Max. d=2.0 Ft.
B=4.0 Ft.
b=5.0 Ft.
Type of Liner= CL B Rip-Rap
-L- STA. 245+50 TO STA. 247+50 RT
-L- STA. 247+60 TO STA. 249+50 LT

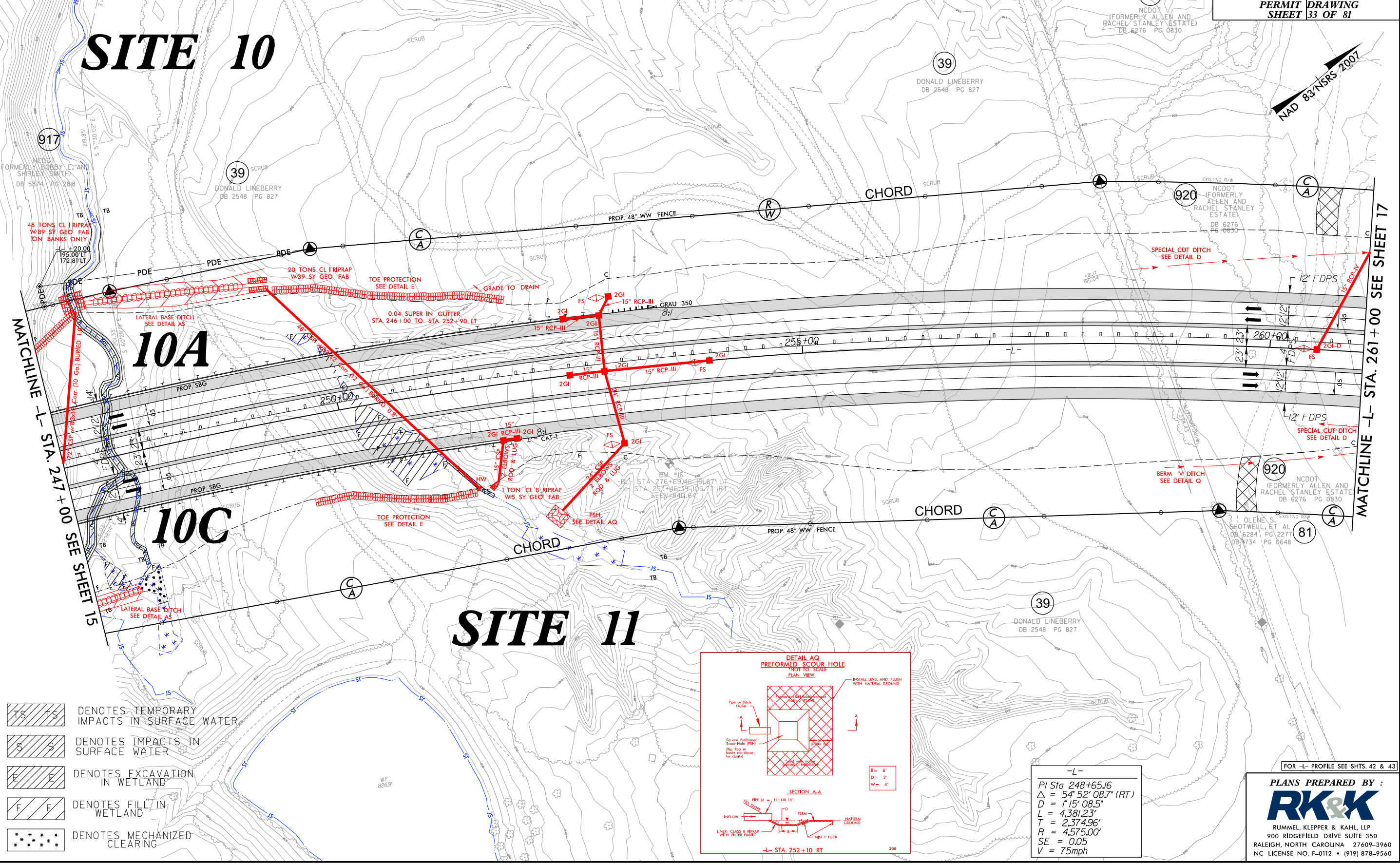
DETAIL Q
BERM "V" DITCH
(Not to Scale)
Natural Ground
Min. D=1.0 Ft.
b=5.0 Ft.
-L- STA. 258+90 TO STA. 264+90 RT

DETAIL E
TOE PROTECTION
(Not to Scale)
Natural Ground
d=1.5 Ft.
Type of Liner= Class B Rip-Rap
-L- STA. 246+50 TO STA. 247+55 LT
-L- STA. 249+50 TO STA. 251+80 LT
-L- STA. 249+60 TO STA. 251+30 RT

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Min. D=1.5 Ft.
-L- STA. 258+50 TO STA. 261+00 LT
-L- STA. 260+50 TO STA. 266+00 RT

CURB & GUTTER LOCATIONS			
DESCRIPTION	ALN	STATION	STATION LOC
SBG	-L-	247+00.00	252+90.00 LT
SBG	-L-	247+00.00	251+90.00 RT

PROJECT REFERENCE NO. R-2413A
SHEET NO. 16
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
REVISED 9/12/2014
PERMIT DRAWING
SHEET 33 OF 81



- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- S S DENOTES IMPACTS IN SURFACE WATER
- E E DENOTES EXCAVATION IN WETLAND
- F F DENOTES FILL IN WETLAND
- * * * * DENOTES MECHANIZED CLEARING

DETAIL AQ
PREFORMED SCOUR HOLE
(NOT TO SCALE)
PLAN VIEW
INSTALL LEVEL AND FLUSH WITH NATURAL GROUND
B= 6'
D= 2'
W= 4'

SECTION A-A
INFLOW
LINER: CLASS B RIPRAP WITH FILTER FABRIC
MIN. 1' TUCK
NATURAL GROUND
-L- STA. 252+10 RT

-L-
PI Sta 248+65.16
 $\Delta = 54^\circ 52' 08.7''$ (RT)
D = 1'15"08.5"
L = 4,381.23'
T = 2,374.96'
R = 4,575.00'
SE = 0.05
V = 75mph

FOR -L- PROFILE SEE SHTS. 42 & 43
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

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DENOTES EXCAVATION IN WETLAND

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

GRAPHIC SCALE

50 0 100

PLANS

PROJECT REFERENCE NO.
R-2413A

SHEET NO.
16A

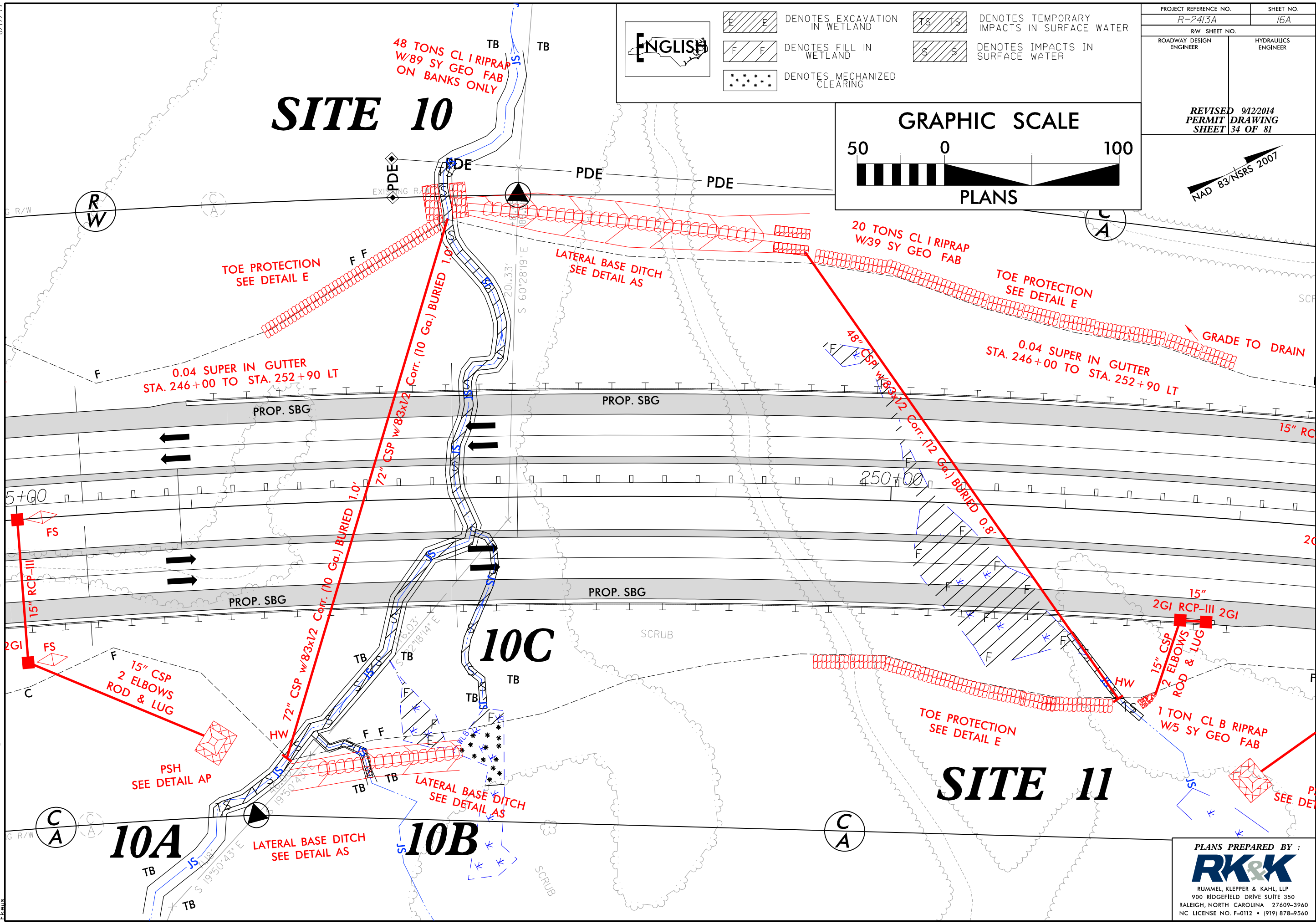
RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

REVISED PERMIT SHEET 9/12/2014 DRAWING 34 OF 81

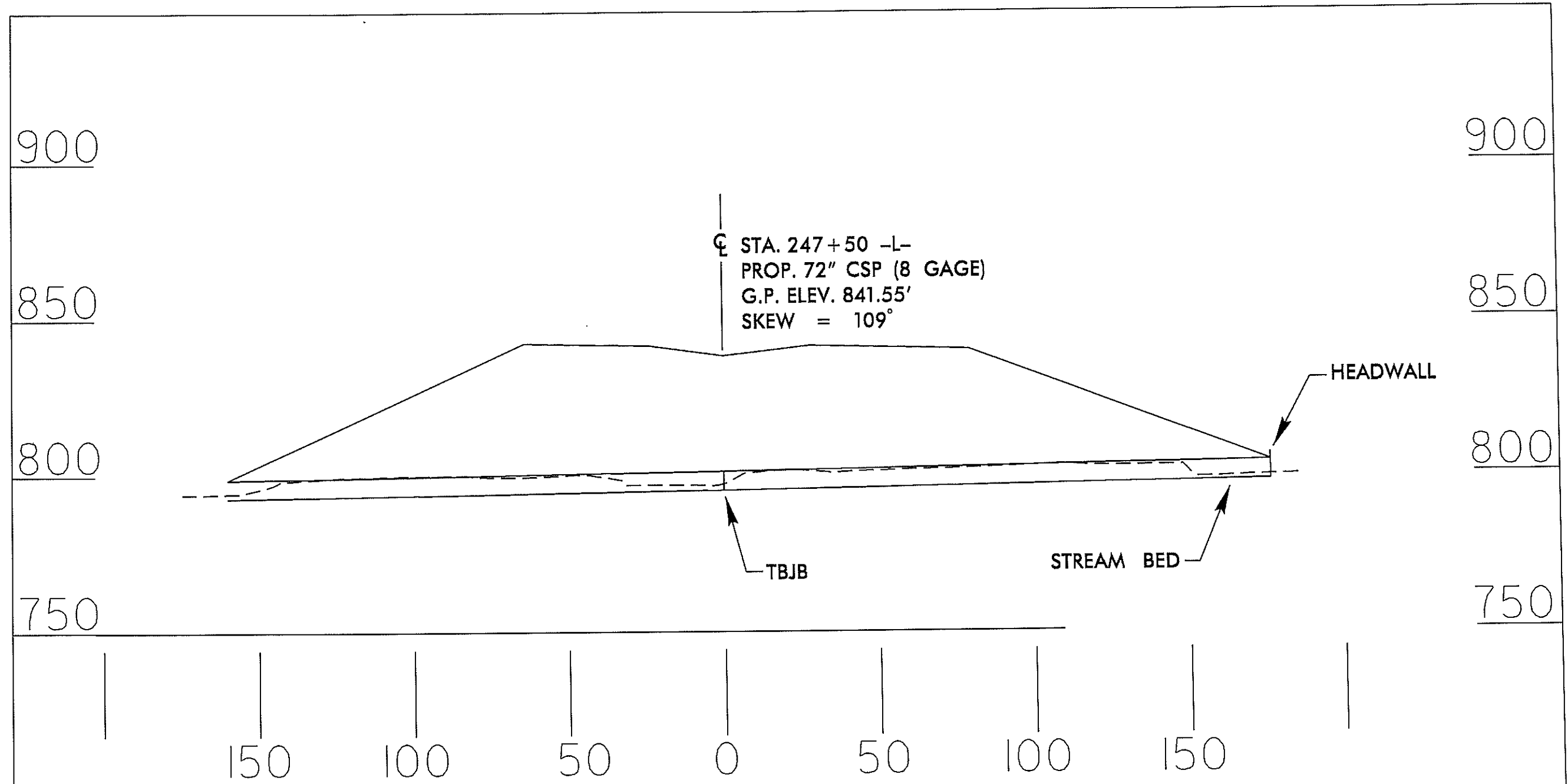
NAD 83/NSRS 2007



PLANS PREPARED BY :

RK&K

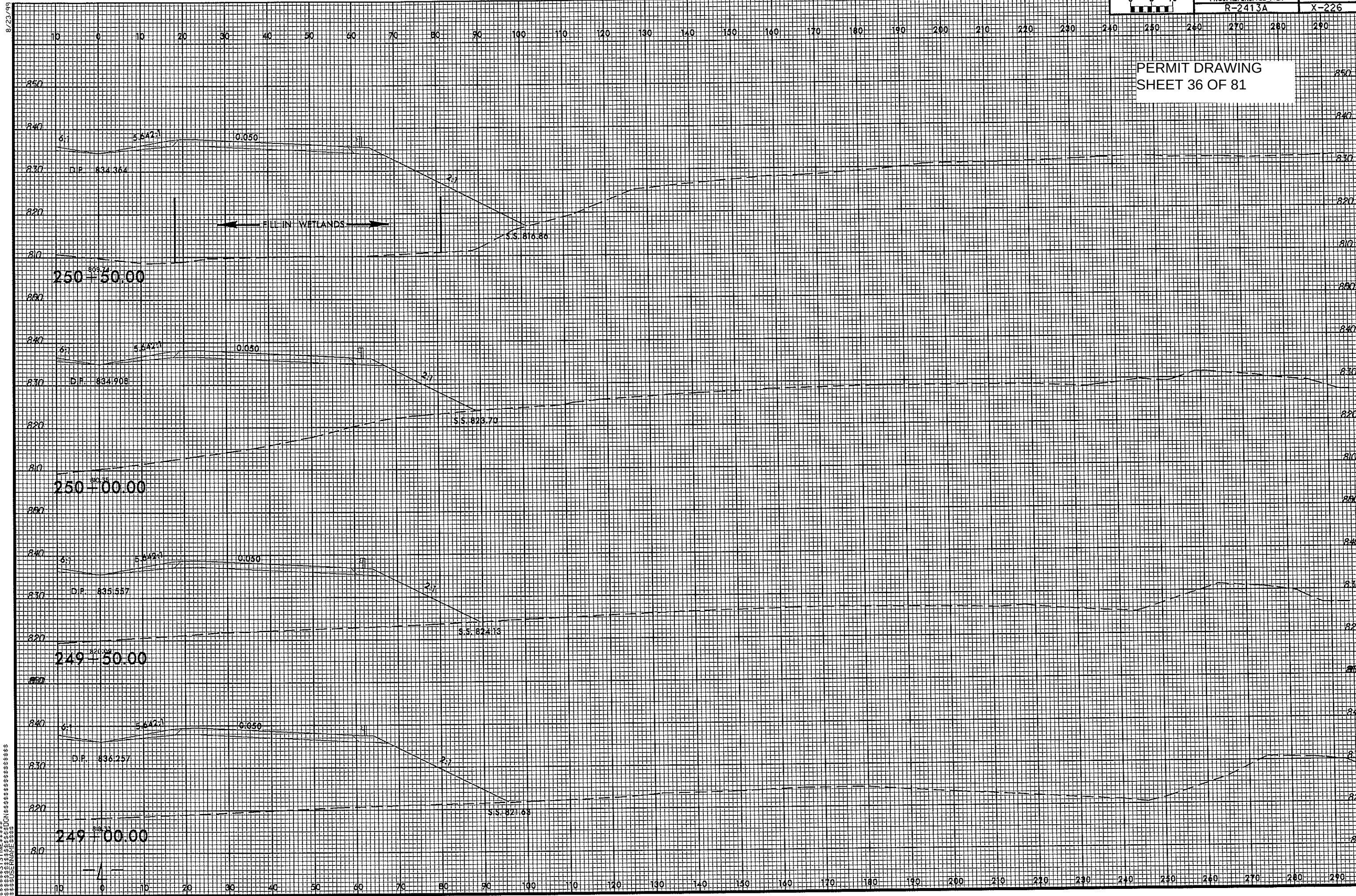
RUMMEL, KLEPPER & KAHL, LLP
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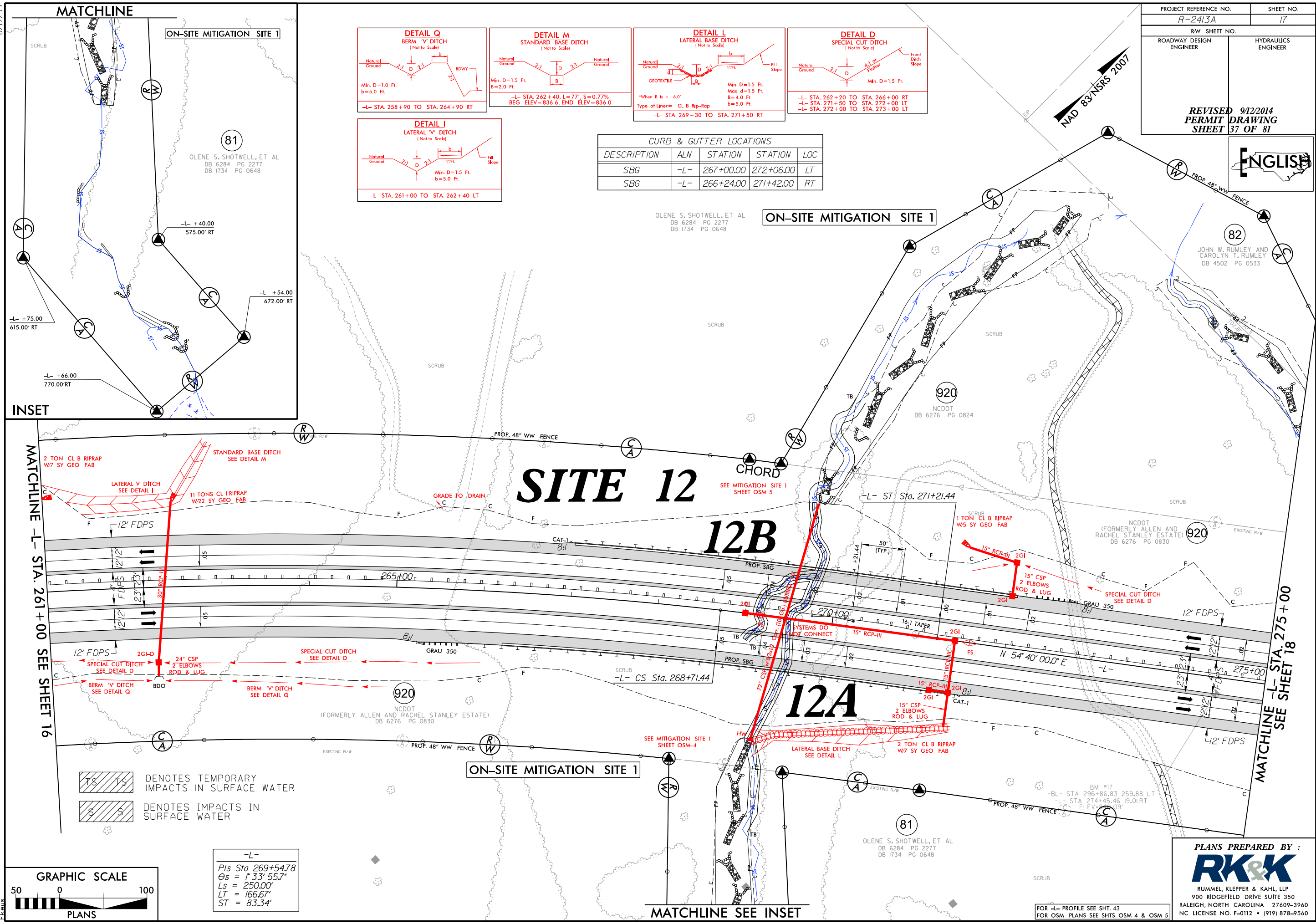
PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 35 OF 81
2 / 13 / 13

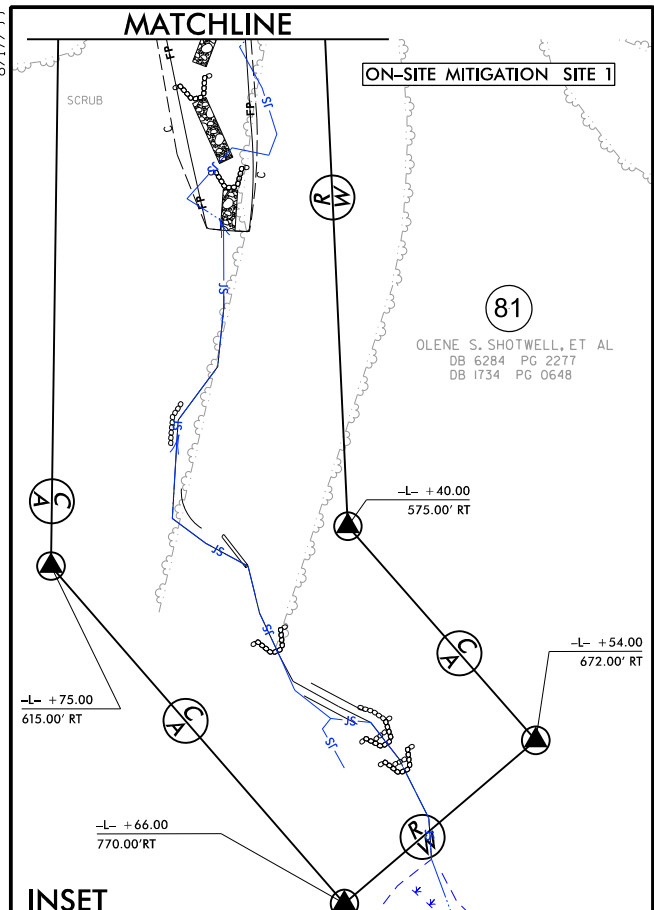
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8/10/2014
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RKL



PROJECT REFERENCE NO. R-2413A		SHEET NO. 17	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		REVISED 9/12/2014 PERMIT DRAWING SHEET 37 OF 81	
		ENGLISH	

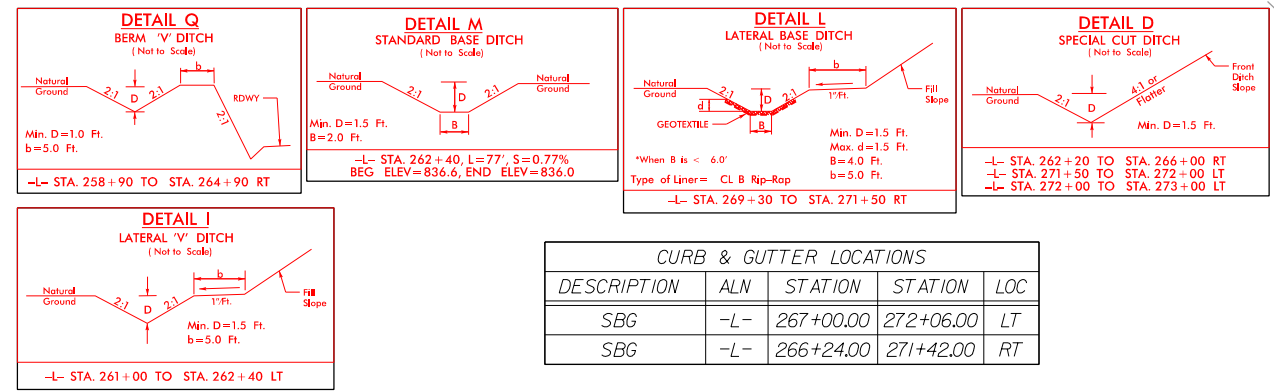
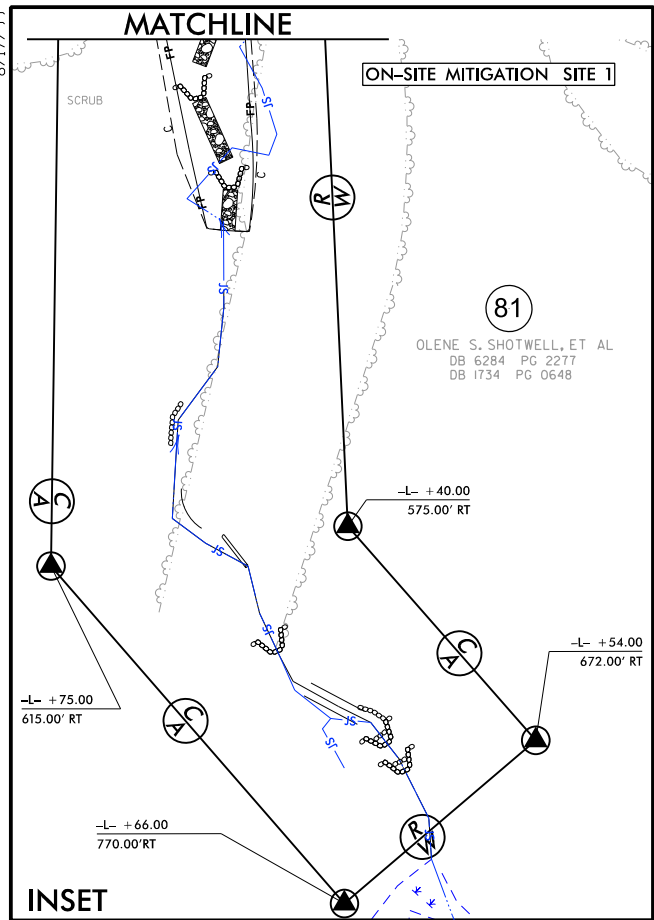
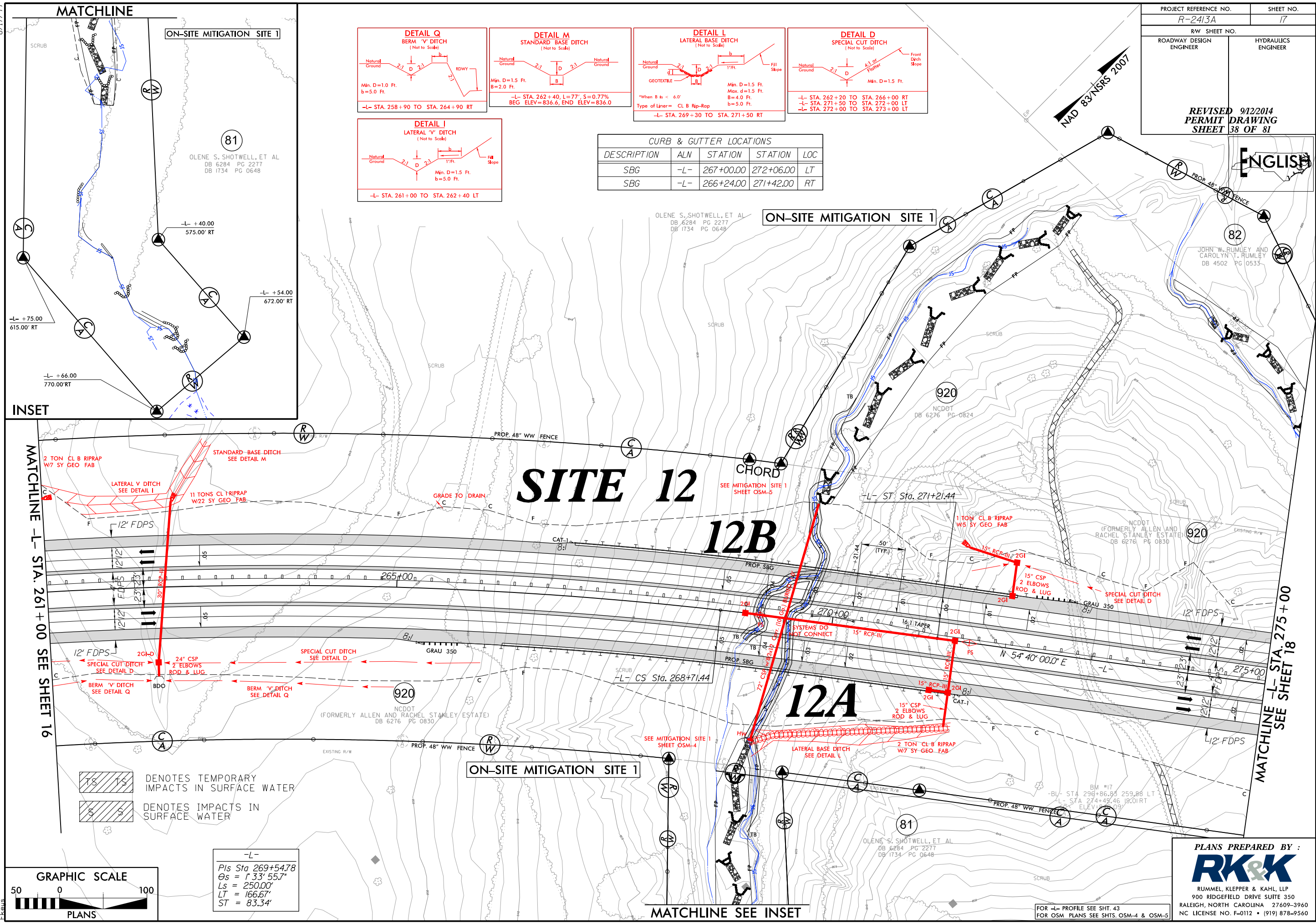


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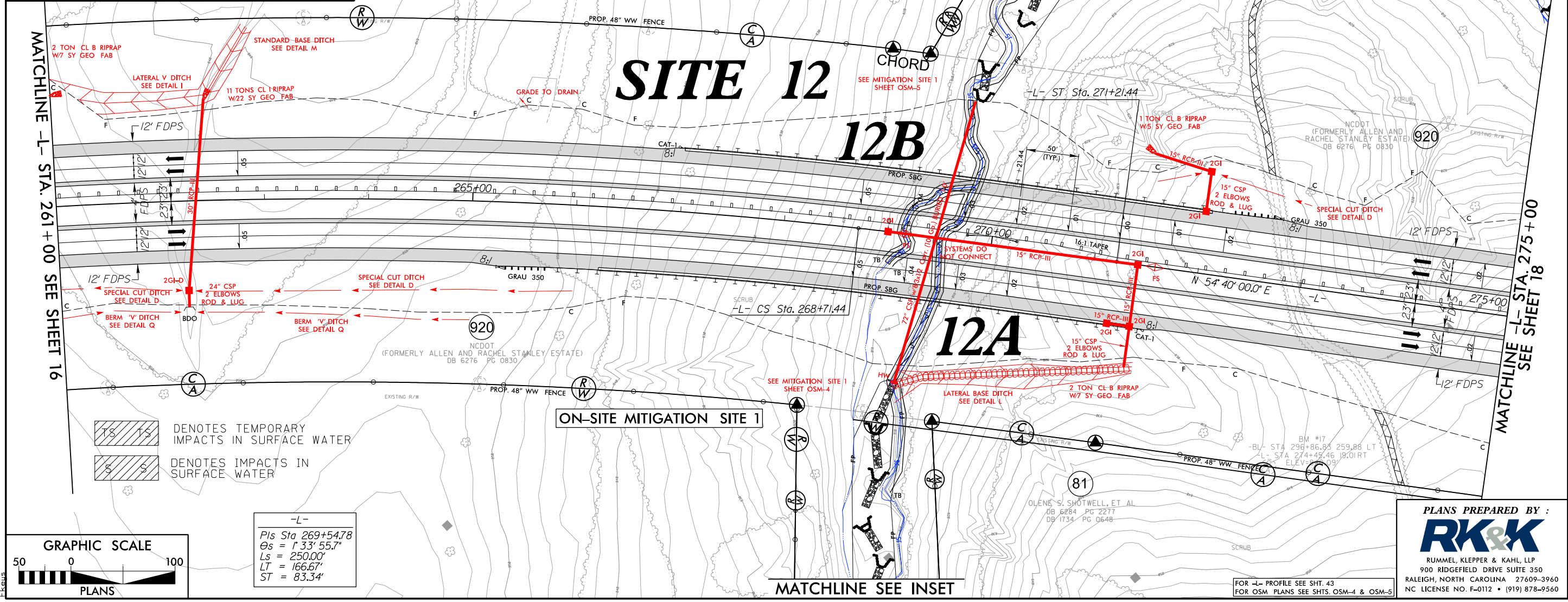
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PROJECT REFERENCE NO. R-2413A		SHEET NO. 17
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		

REVISED 9/12/2014
PERMIT DRAWING
SHEET 38 OF 81



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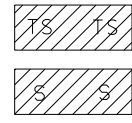
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SITE 12

920
NCDOT

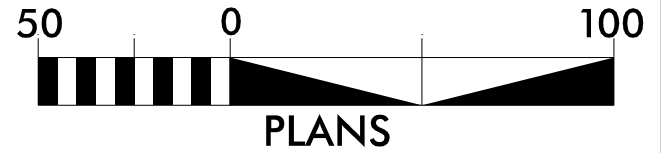


DENOTES TEMPORARY IMPACTS IN SURFACE WATER



DENOTES IMPACTS IN SURFACE WATER

GRAPHIC SCALE



REVISED 9/12/2014
PERMIT DRAWING
SHEET 39 OF 81

NAD 83/NRS 2007

SEE MITIGATION SITE 1
SHEET OSM-5

SCRUB
1 TON CL B RIPRAP
W/5 SY GEO FAB

NCDOT
(FORMERLY ALLEN AND
RACHEL STANLEY ESTATE) 920
EXISTING R/W

12B

2GI

SYSTEMS DO
NOT CONNECT

15" RCP-III

16:1 TAPER

2GI

2GI

15" CSP
2 ELBOWS
ROD & LUG

SPECIAL CUT DITCH
SEE DETAIL D

PROP. SBG

TB

TB

PROP. SBG

2GI

TB

TB

PROP. SBG

72" CSP w/83x12 Corr. (10 Gr.) BURIED 20'

LATERAL BASE DITCH
SEE DETAIL L

2 TON CL B RIPRAP
W/7 SY GEO FAB

12A

MITIGATION SITE 1
SHEET OSM-4

HW

FP

TB

C
A

EXISTING R/W

81

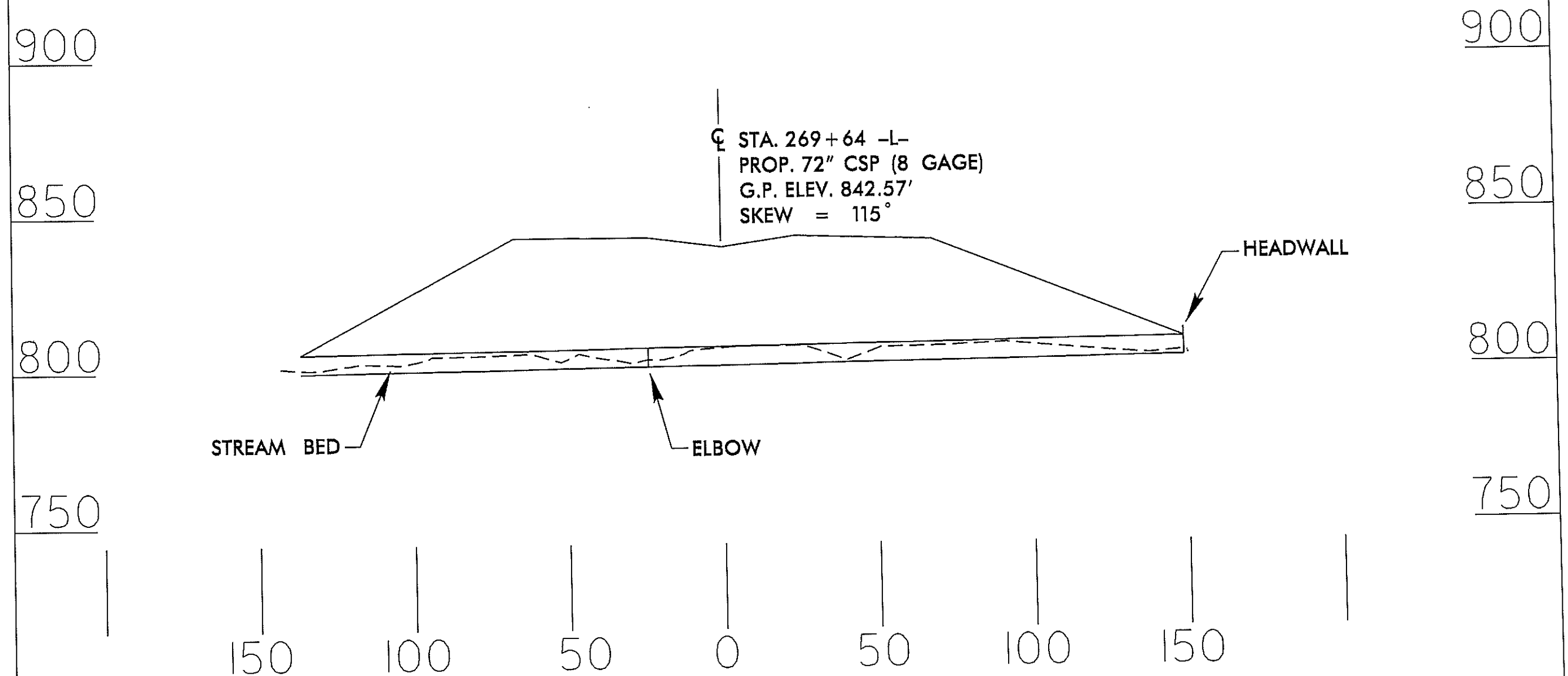
OLENE S. SHOTWELL, ET AL

BM #17
-BL- STA 296+86.83 259.88 LT
-L- STA 274+45.46 19.01 RT
ELEV=878.09'

PLANS PREPARED BY :

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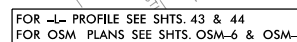


PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

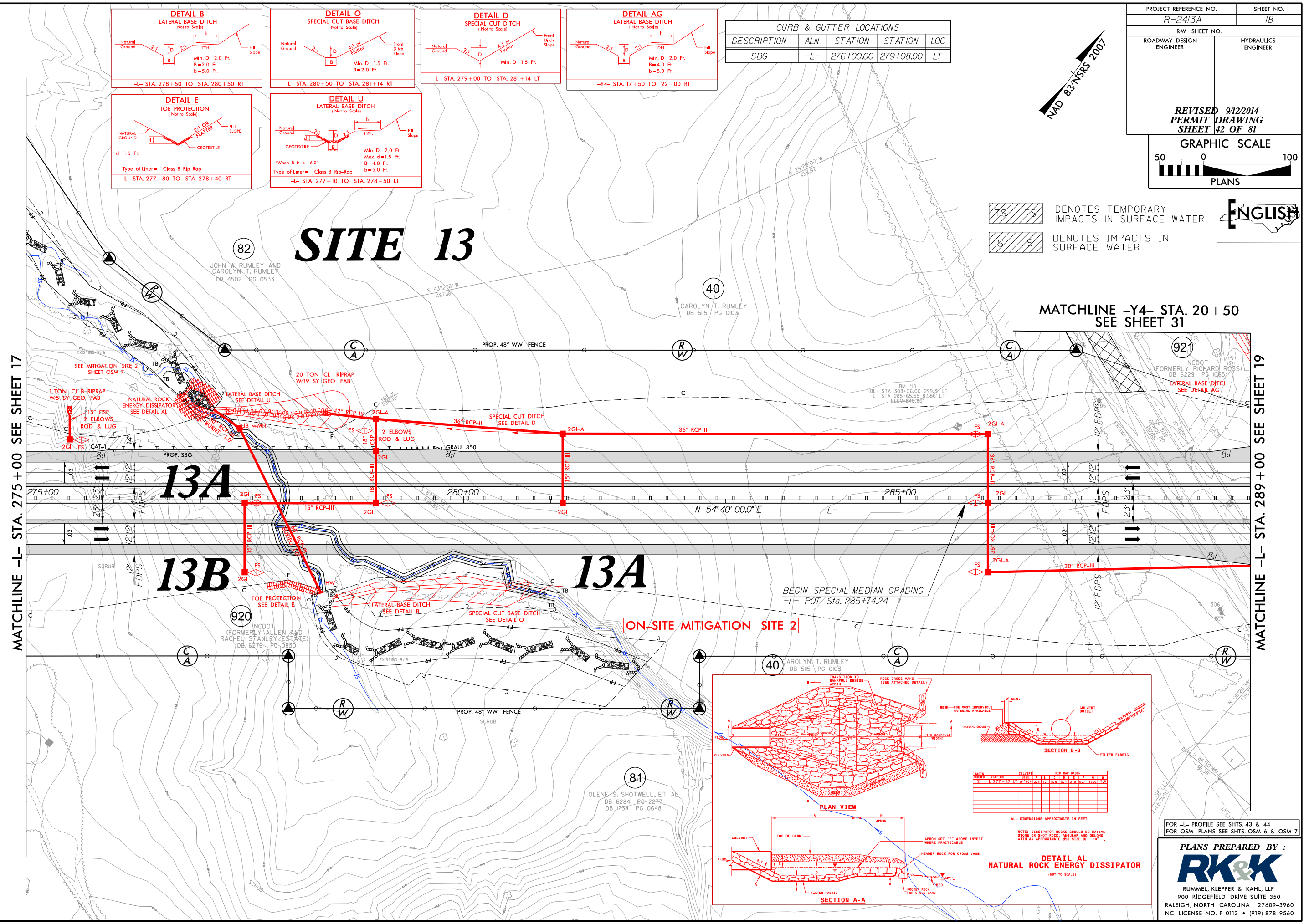
PERMIT DRAWING
SHEET 40 OF 81

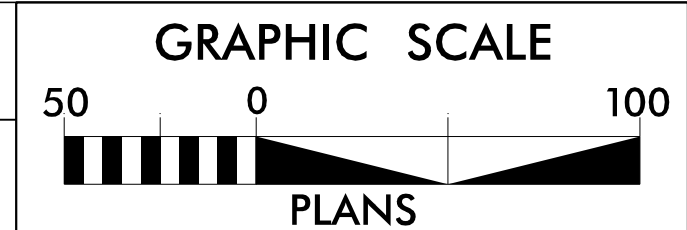
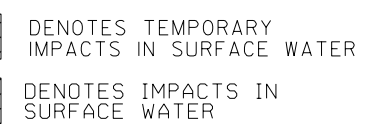
2 / 13 / 13



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8/10/2014
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20 TON CL I RIPRAP
W/39 SY GEO FAB

1 TON CL B RIPRAP
W/5 SY GEO FAB

NATURAL ROCK
ENERGY DISSIPATOR
SEE DETAIL AL

LATERAL BASE DITCH
SEE DETAIL U

15" CSP
2 ELBOWS
ROD & LUG

2GI FS

PROP. SBG

13A

2GI-A

ELBOWS
OD & LUG

2GI

36" RCP-III

SPECIAL CUT DITCH
SEE DETAIL D

2GI-A

2G

13B

TOE PROTECTION
SEE DETAIL E

LATERAL BASE DITCH
SEE DETAIL B

SPECIAL CUT BASE DITCH
SEE DETAIL O

ON-SITE

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8/10/2014
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DETAIL E
TOE PROTECTION
(Not to Scale)

Type of Liner= Class B Rip-Rap

-L- STA. 305+50 TO STA. 307+25 LT
-L- STA. 306+30 TO STA. 312+50 RT

DETAIL M
STANDARD BASE DITCH
(Not to Scale)

Min. D=1.5 Ft.
B=2.0 Ft.

-L- STA. 314+00 LT, L=22', S=5.00%
BEGIN EL=829.3', END EL=828.2'

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)

Min. D=1.5 Ft.

-L- STA. 297+00 TO STA. 303+50 RT
-L- STA. 311+00 TO STA. 315+50 LT

DETAIL Z
STANDARD BASE DITCH
(Not to Scale)

Min. D=2.0 Ft.
Max. d=2.0 Ft.
B=4.0 Ft.

*When B is < 6.0'

Type of Liner= Class I Rip-Rap

-L- STA. 305+88 RT, L=71, S=4.37%
BEGIN EL=802.1', END EL=799.0'

DETAIL V
STANDARD BASE DITCH
(Not to Scale)

Min. D=1.5 Ft.
B=4.0 Ft.

-L- STA. 306+78 RT, L=56, S=0.71%
BEGIN EL=799.4', END EL=799.0'

DETAIL AT
BERM DITCH
(Not to Scale)

Min. D=1.0 Ft.

*SEE STD. 240.01

-L- STA. 315+50 TO STA. 317+00 RT

DETAIL AM
MEDIAN V DITCH
(Not to Scale)

-L- STA. 316+40 TO STA. 317+36 CL

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	303+45.00	310+85.00	RT
SBG	-L-	305+70.00	311+08.00	LT

SITE 14

PROJECT REFERENCE NO.
R-2413A

SHEET NO.
20

RW SHEET NO.

HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER

REVISOR

REVISED 9/12/2014

PERMIT DRAWING

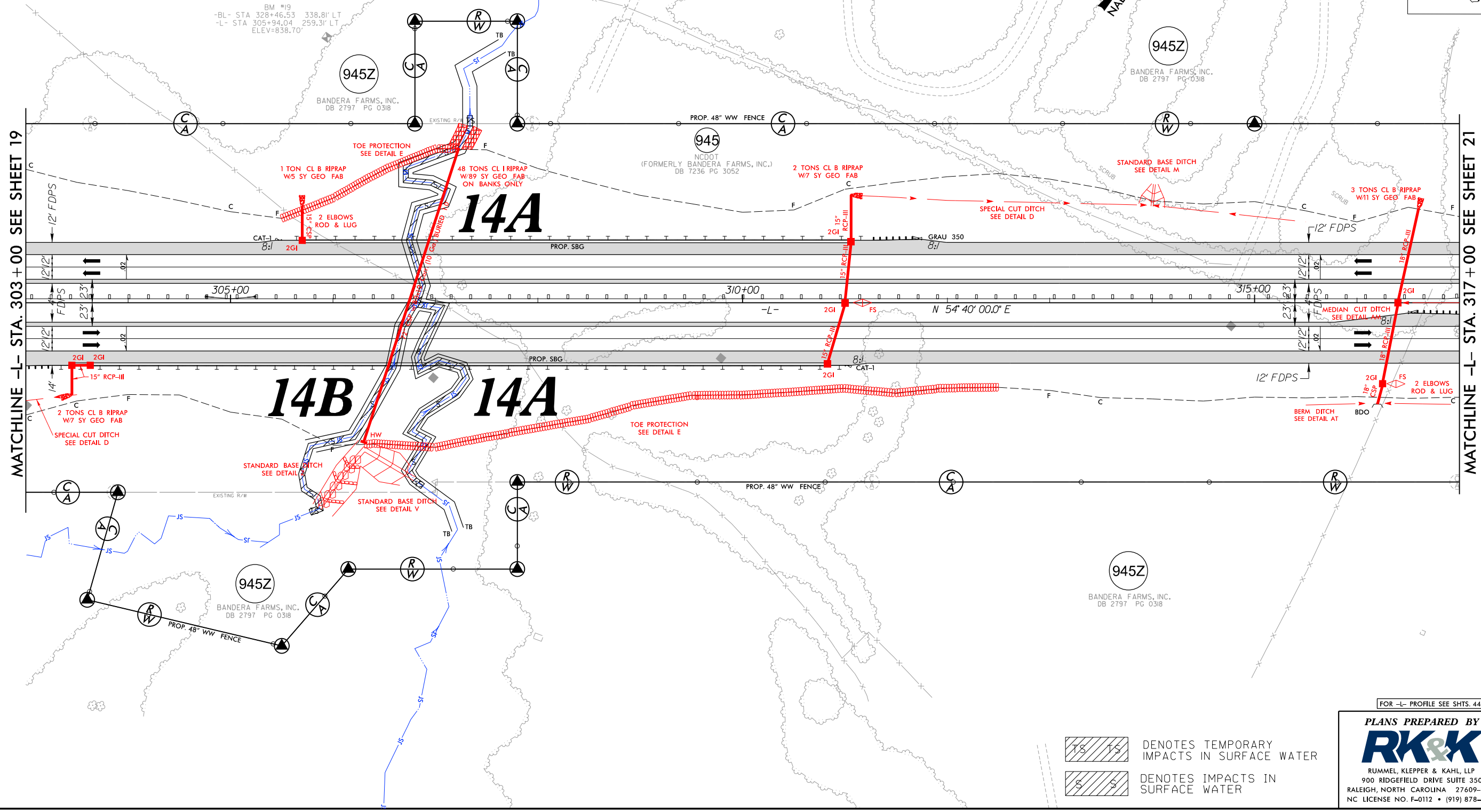
SHEET 44 OF 81

GRAPHIC SCALE

50 0 100

PLANS

ENGLISH



TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

FOR -L- PROFILE SEE SHTS. 44 & 45

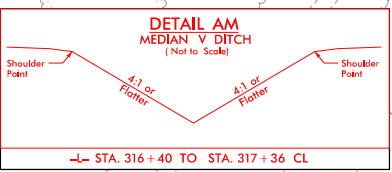
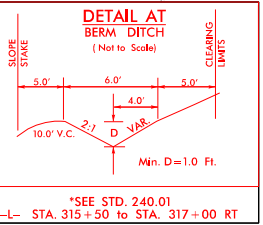
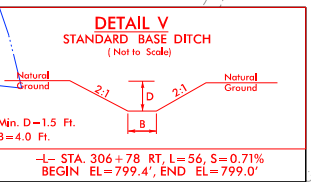
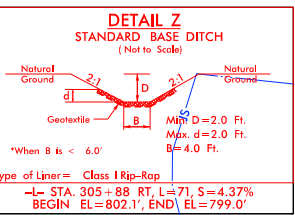
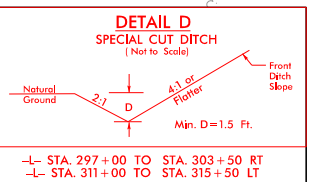
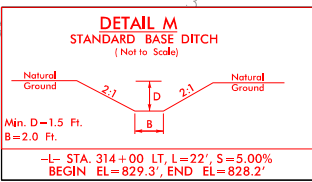
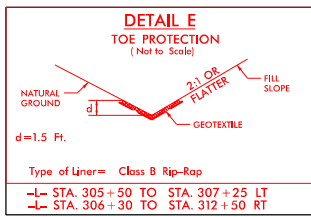
PLANS PREPARED BY :

RK&K

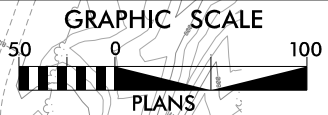
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900 RIDGEFIELD DRIVE SUITE 350
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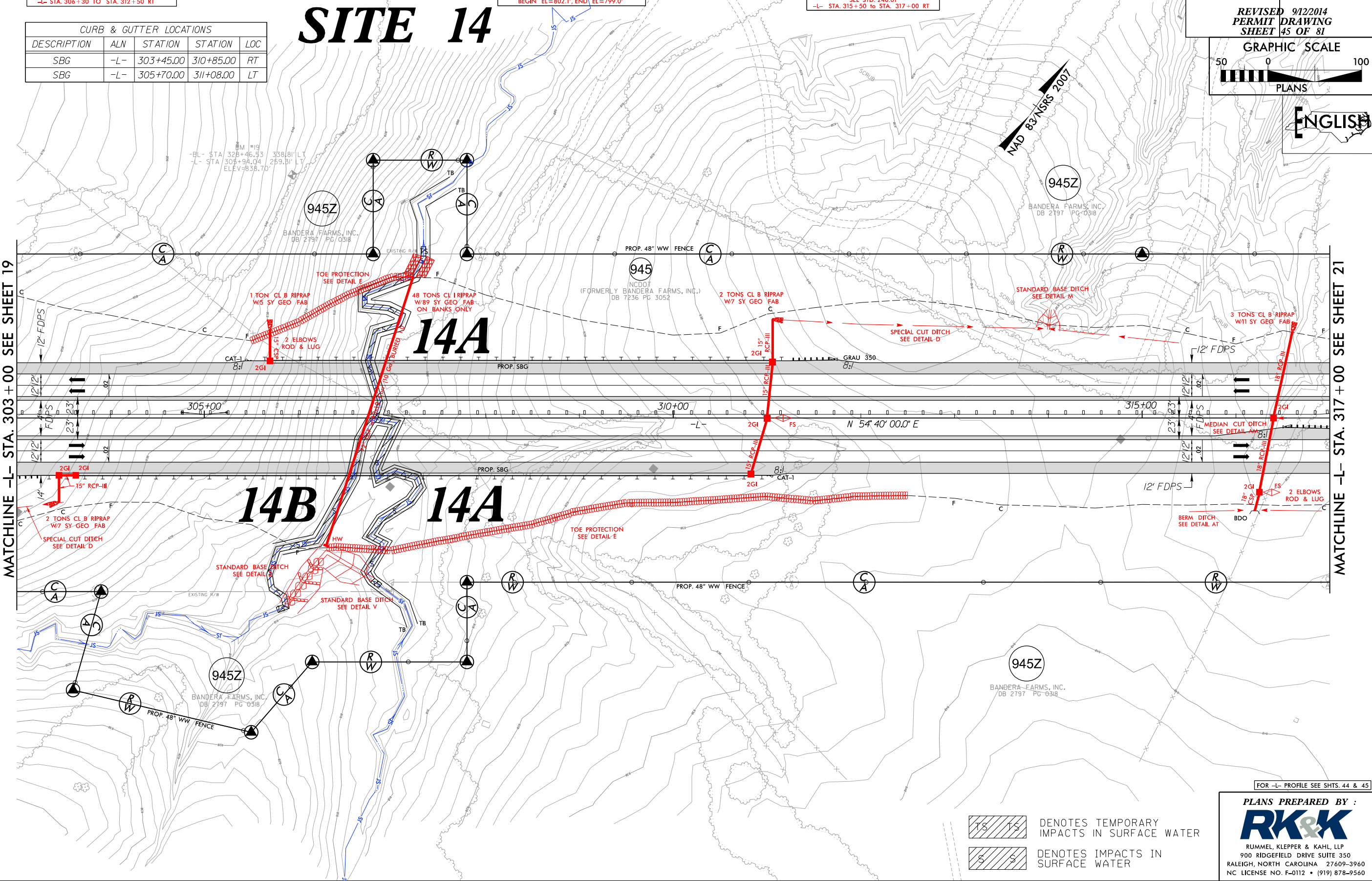
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PROJECT REFERENCE NO. R-2413A		SHEET NO. 20
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
REVISED 9/12/2014 PERMIT DRAWING SHEET 45 OF 81		



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	303+45.00	310+85.00	RT
SBG	-L-	305+70.00	311+08.00	LT



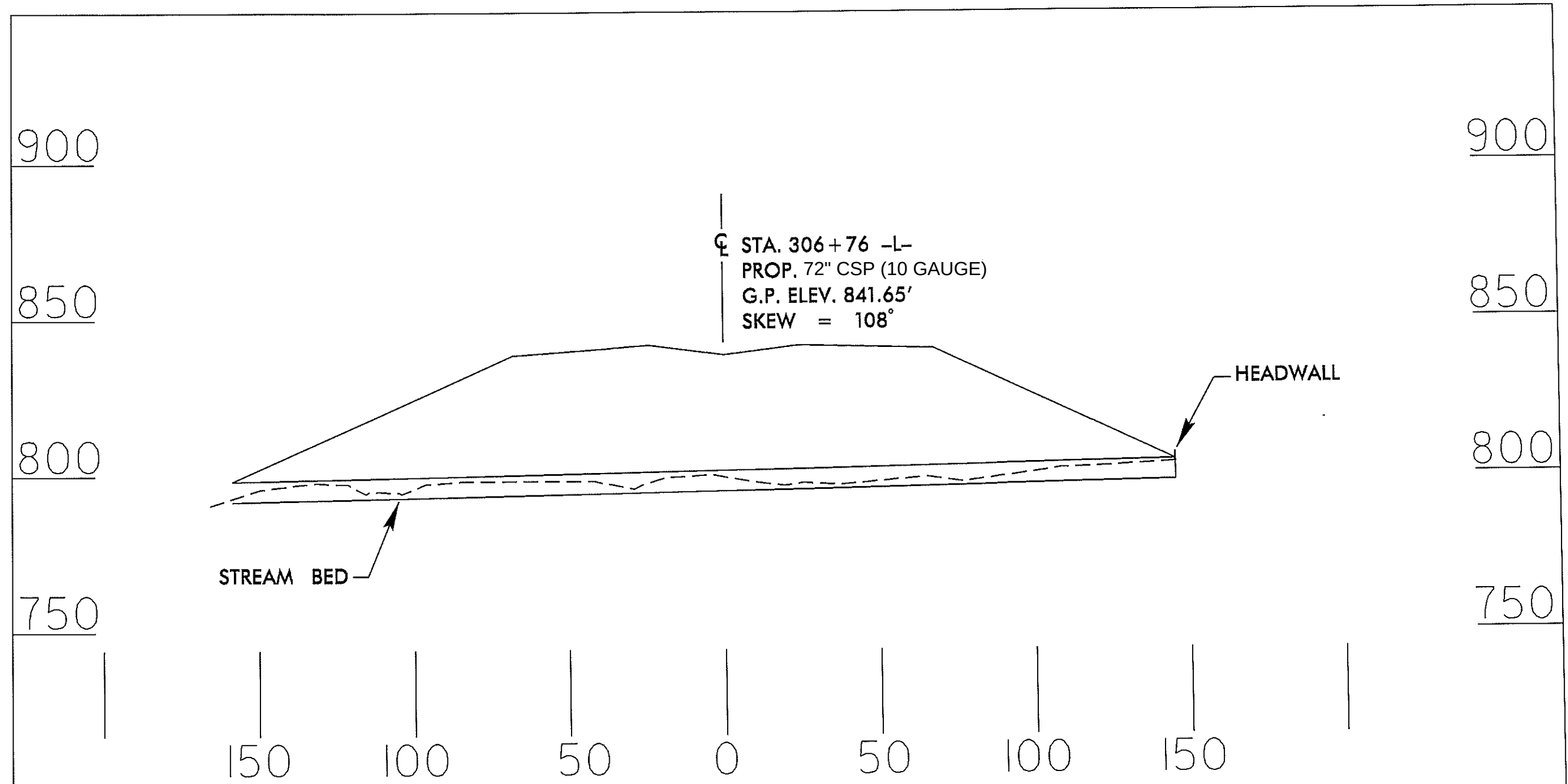
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER

FOR -L- PROFILE SEE SHTS. 44 & 45

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PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 47 OF 81
2 / 13 / 13

SITE 16

16A

16B

15A

-L-

ta 328+62.22
1° 49' 54.1"
250.00'
166.68'
83.34'

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

DETAIL AQ
PREFORMED SCOW HOLE
NOT TO SCALE
PLAN VIEW

INSTALL LEVEL AND FLUSH WITH NATURAL GROUND

Pipe or Ditch Outlet

Square Preformed Scow Hole (PCH)
(Rip Rap In Inside, Not shown for clarity)

Preformed Drainage Component
(Reinforced Urethane)

Preform Footing

Preform of Inlet/Outlet

B = 6'0"
D = 2'0"
W = 4'0"

SECTION A-A

FILL SLOPE

PIPE (4" - 15" OR 18")

D

PSRA

NATURAL GROUNDLINE

MIN. 1" TUCK

INFLOW

UNDER, CLASS B RIPRAP WITH FILTER FABRIC

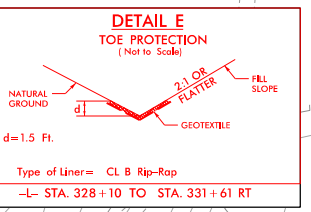
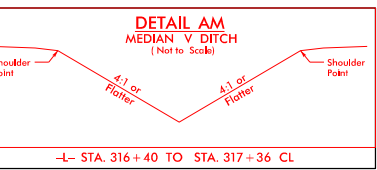
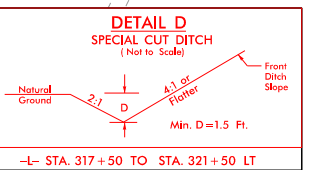
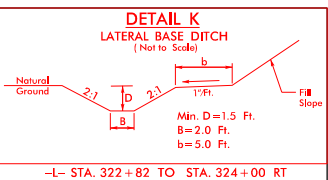
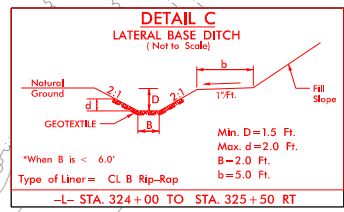
STA. 326 + 00 JT.

308

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FOR -L- PROFILE SEE SHT. 4

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CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	320+65.00	331+00.00	RT
SBG	-L-	323+50.00	331+00.00	LT

PROJECT REFERENCE NO.
R-2413A

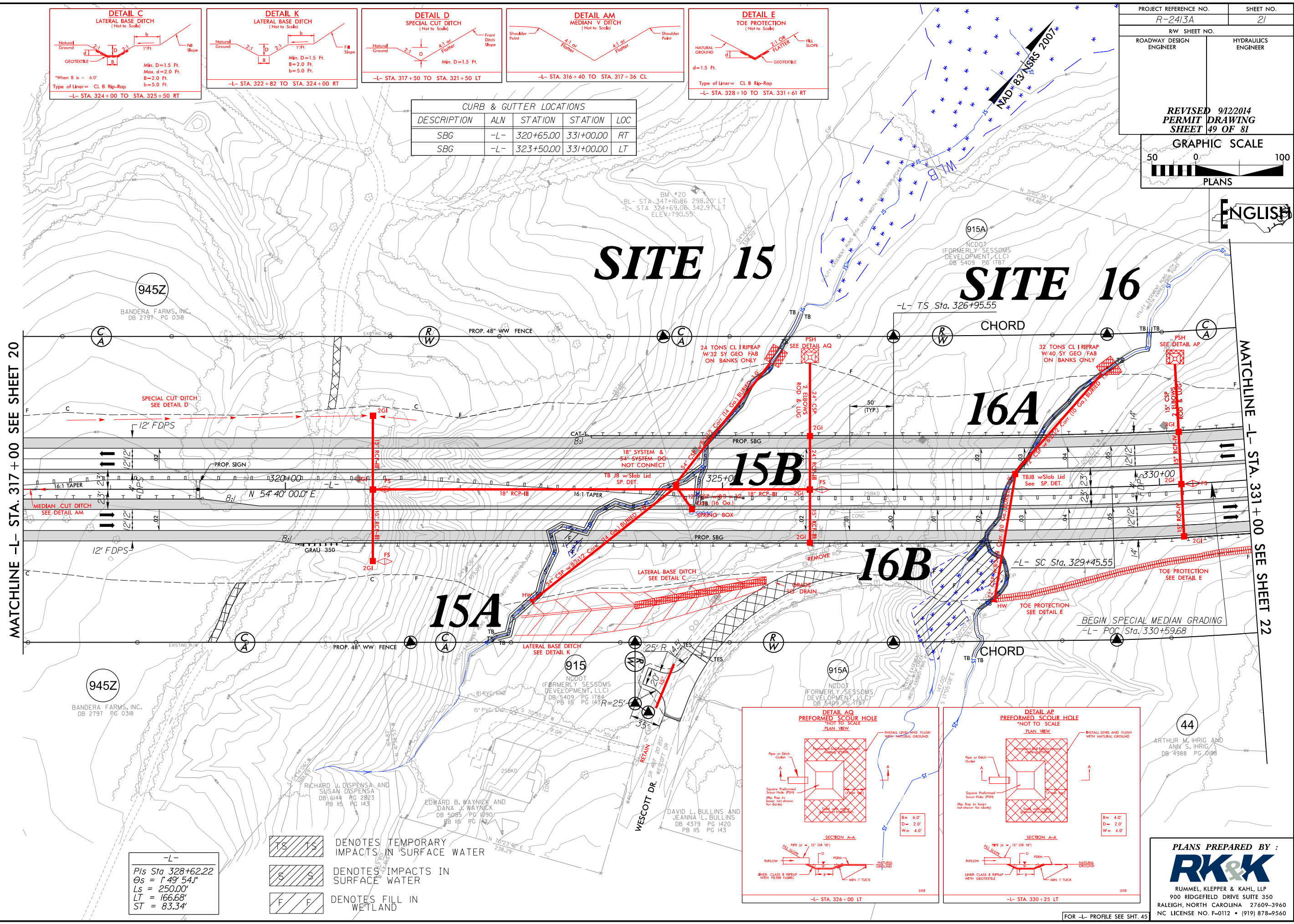
SHEET NO.
21

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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SHEET 49 OF 81

GRAPHIC SCALE
50 0 100
PLANS



FOR -L- PROFILE SEE SHT. 45

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8/10/2014
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E:\Users\pvc\pvc

PROJECT REFERENCE NO.
R-2413A

SHEET NO.
21A

RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

REVISED PERMIT SHEET *9/12/2014*
50 OF 81

DRAWING
50 OF 81

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

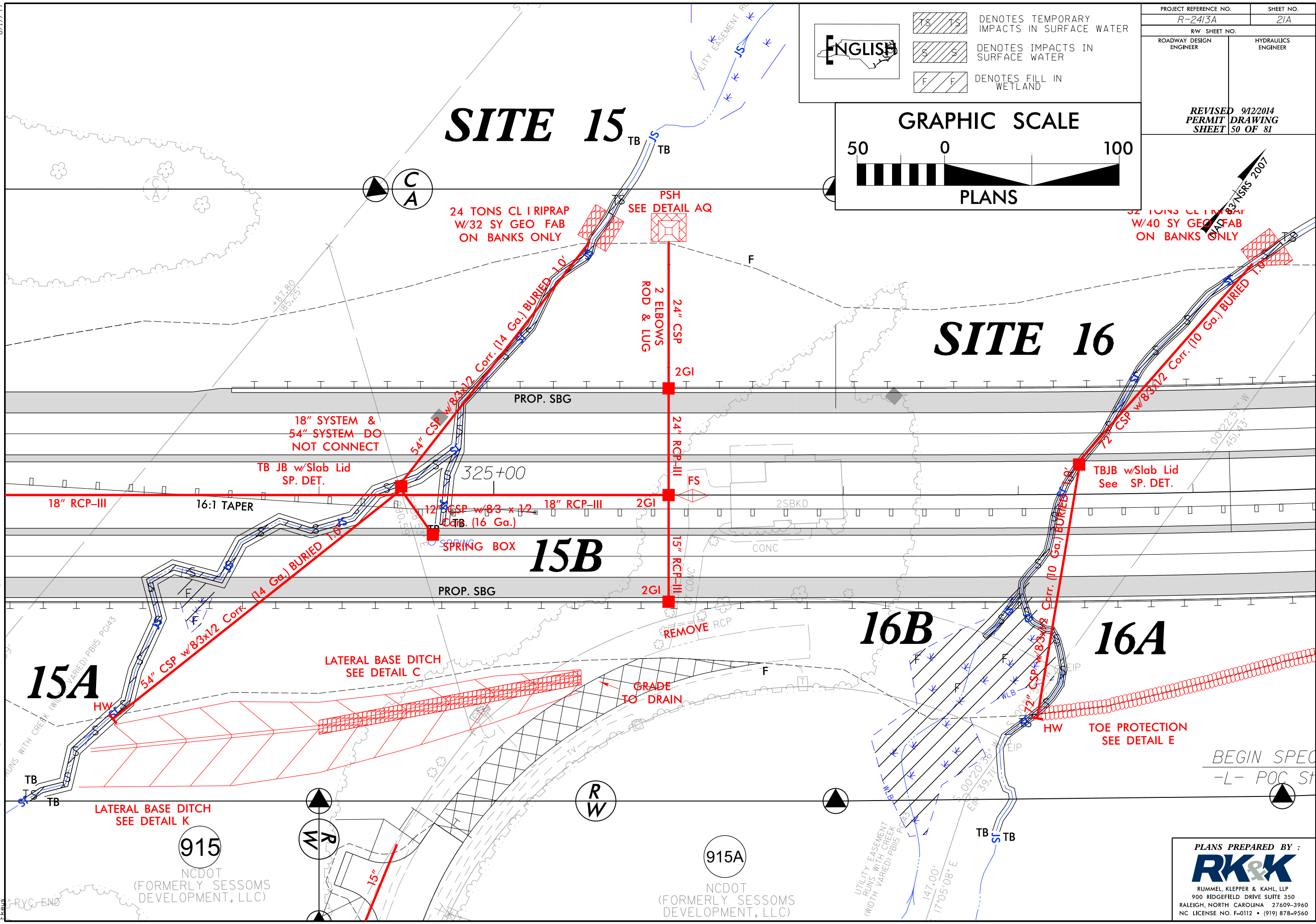
F F DENOTES FILL IN WETLAND

ENGLISH

GRAPHIC SCALE

50 0 100

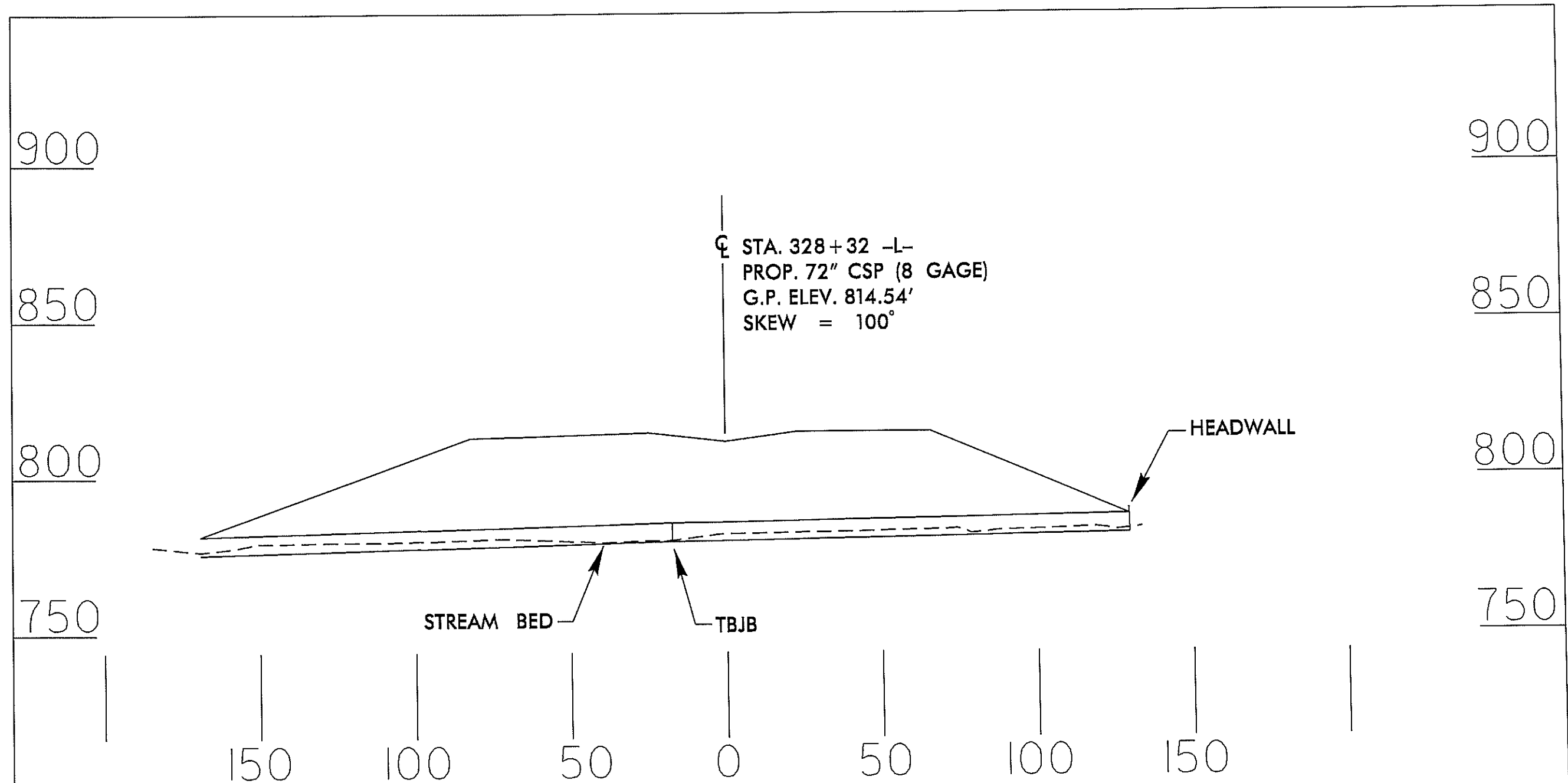
PLANS



PLANS PREPARED BY :

RK&K

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900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 51 OF 81
2 / 13 / 13

8/23/99



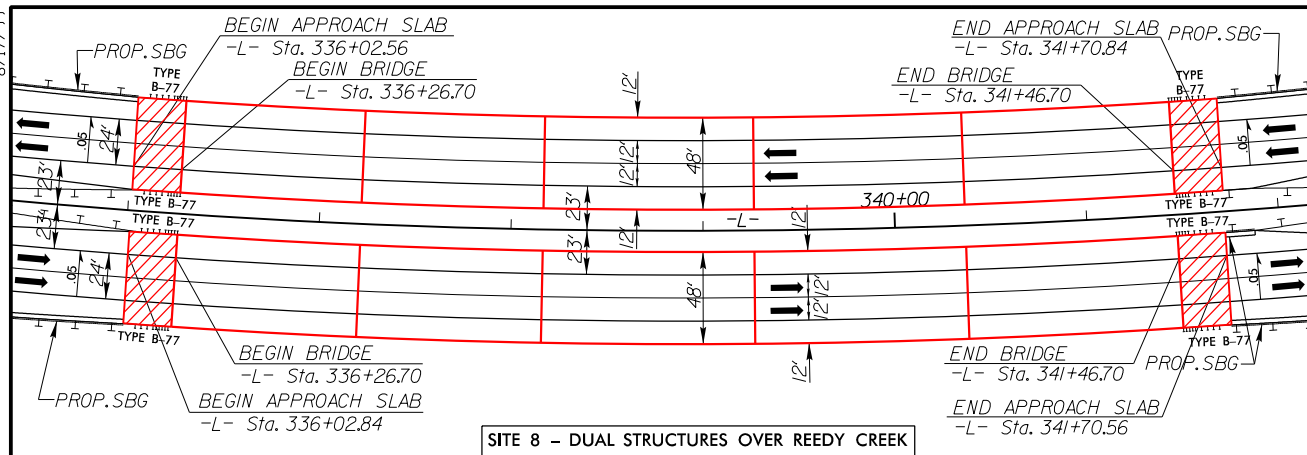
PROJ. REFERENCE NO. R-2413A SHEET NO. X-267

PERMIT DRAWING
SHEET 52 OF 81

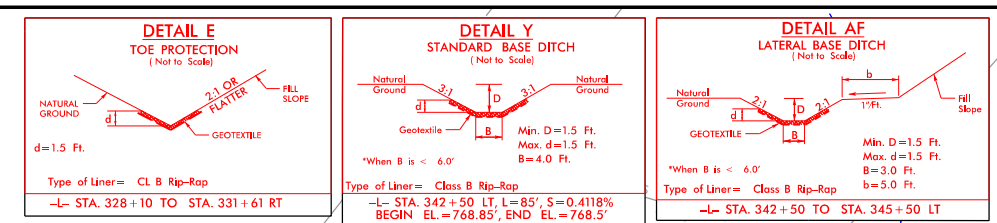


8/23/99

8/17/99
8/10/2014
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REVISIONS



SITE 8 - DUAL STRUCTURES OVER REEDY CREEK



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	331+00.00	336+01.33	LT
SBG	-L-	341+72.07	344+00.00	LT
SBG	-L-	331+00.00	336+02.06	RT
SBG	-L-	341+71.34	344+00.00	RT
SBG	-L-	341+71.62	341+87.00	MED RT

PROJECT REFERENCE NO.
R-2413A

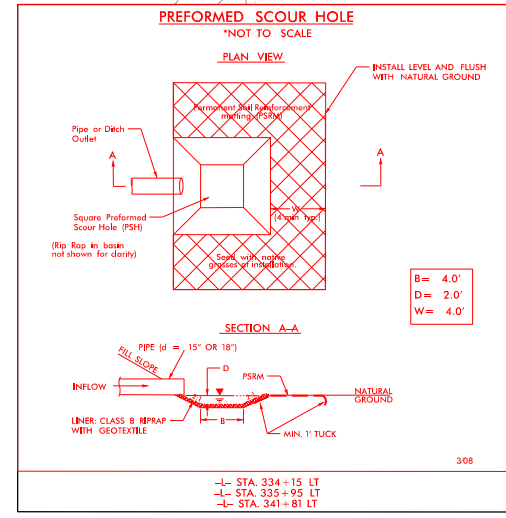
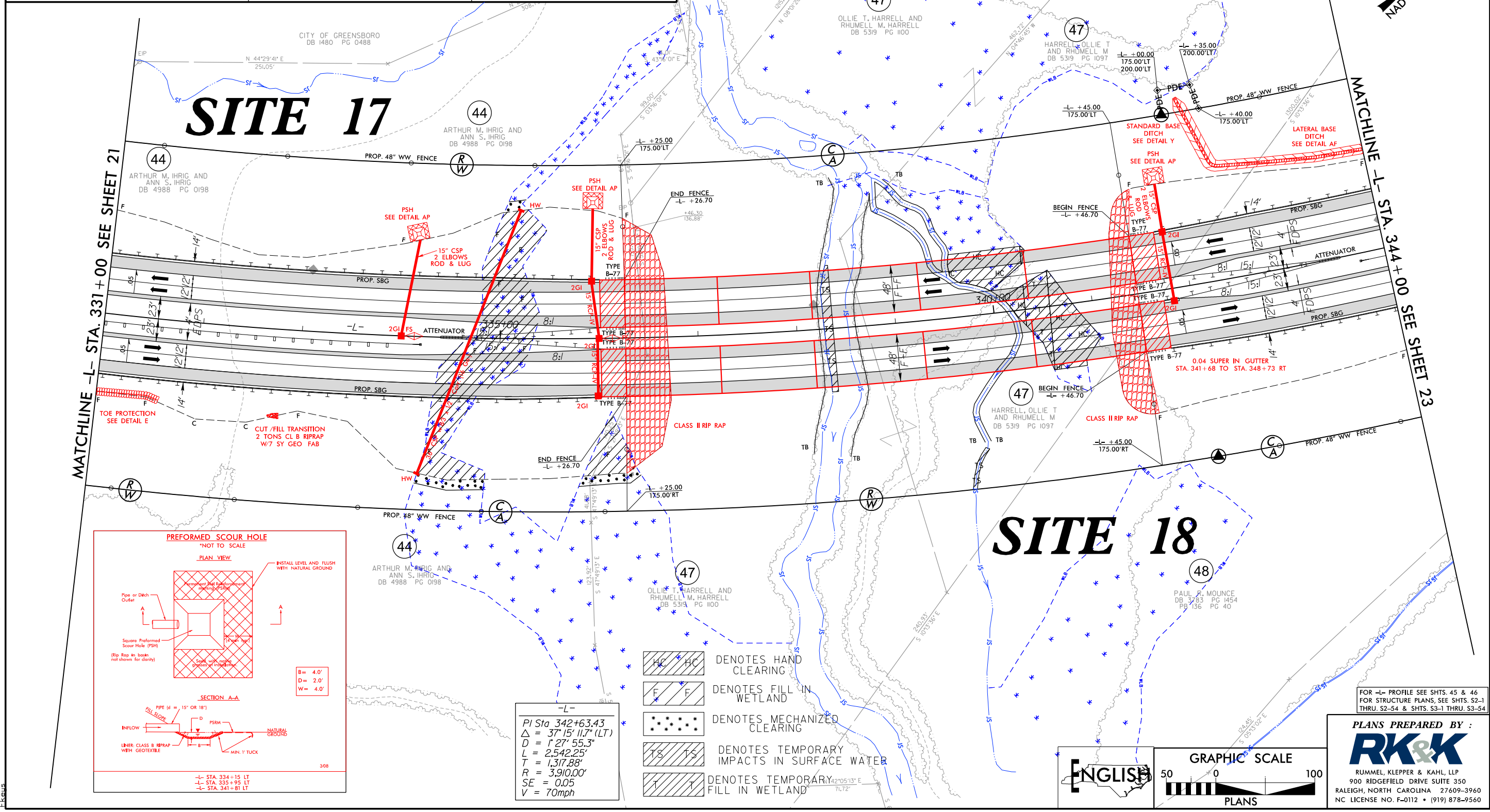
SHEET NO.
22

RW SHEET NO.

ROADWAY DESIGN ENGINEER

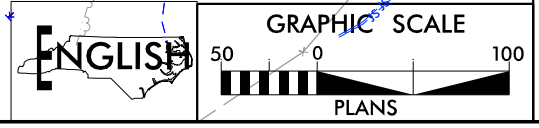
HYDRAULICS ENGINEER

REVISED 9/12/2014
PERMIT DRAWING
SHEET 53 OF 81



-L-
PI Sta 342+63.43
Δ = 37°15'11.7" (LT)
D = 1'27" 55.3"
L = 2,542.25'
T = 1,317.88'
R = 3,910.00'
SE = 0.05
V = 70mph

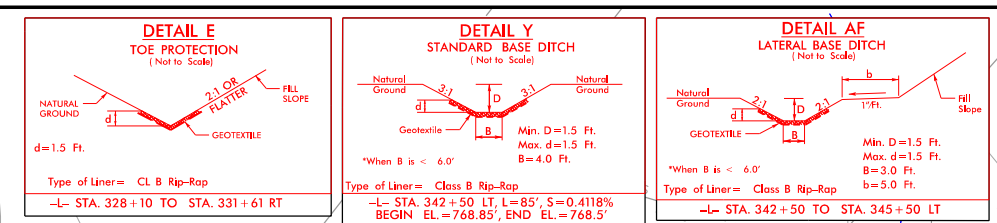
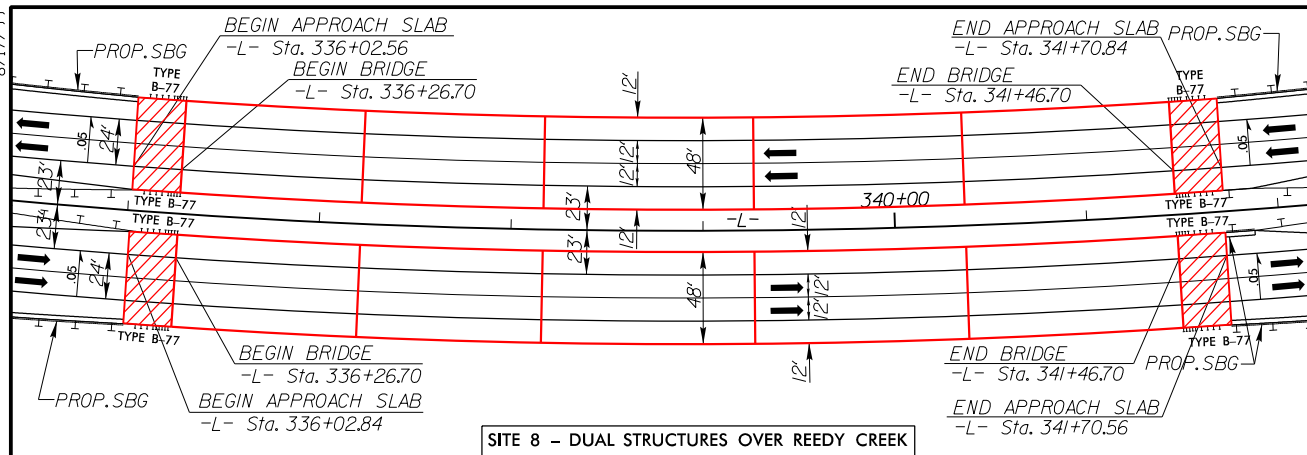
- HC HC DENOTES HAND CLEARING
- F F DENOTES FILL IN WETLAND
- * * * * * DENOTES MECHANIZED CLEARING
- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- 1 1 DENOTES TEMPORARY FILL IN WETLAND



FOR -L- PROFILE SEE SHTS. 45 & 46
FOR STRUCTURE PLANS, SEE SHTS. S2-1
THRU. S2-54 & SHTS. S3-1 THRU. S3-54

PLANS PREPARED BY :
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8/10/2014
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R:\Hydraulics\PERMITS\Environmental\Drawings\2413A\2413a_HYD_PRM_WET_psh22.con.dgn



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	331+00.00	336+01.33	LT
SBG	-L-	341+72.07	344+00.00	LT
SBG	-L-	331+00.00	336+02.06	RT
SBG	-L-	341+71.34	344+00.00	RT
SBG	-L-	341+71.62	341+87.00	MED RT

PROJECT REFERENCE NO.
R-2413A

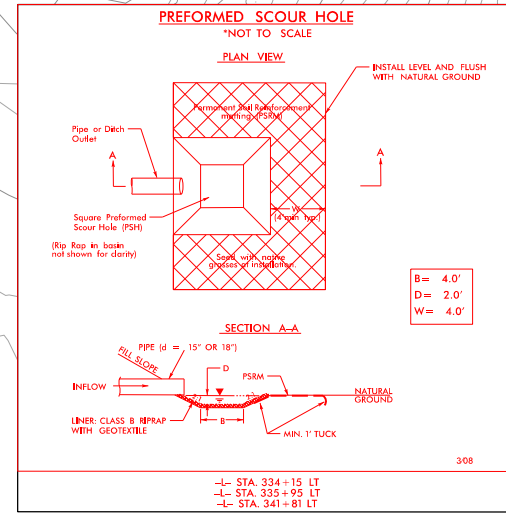
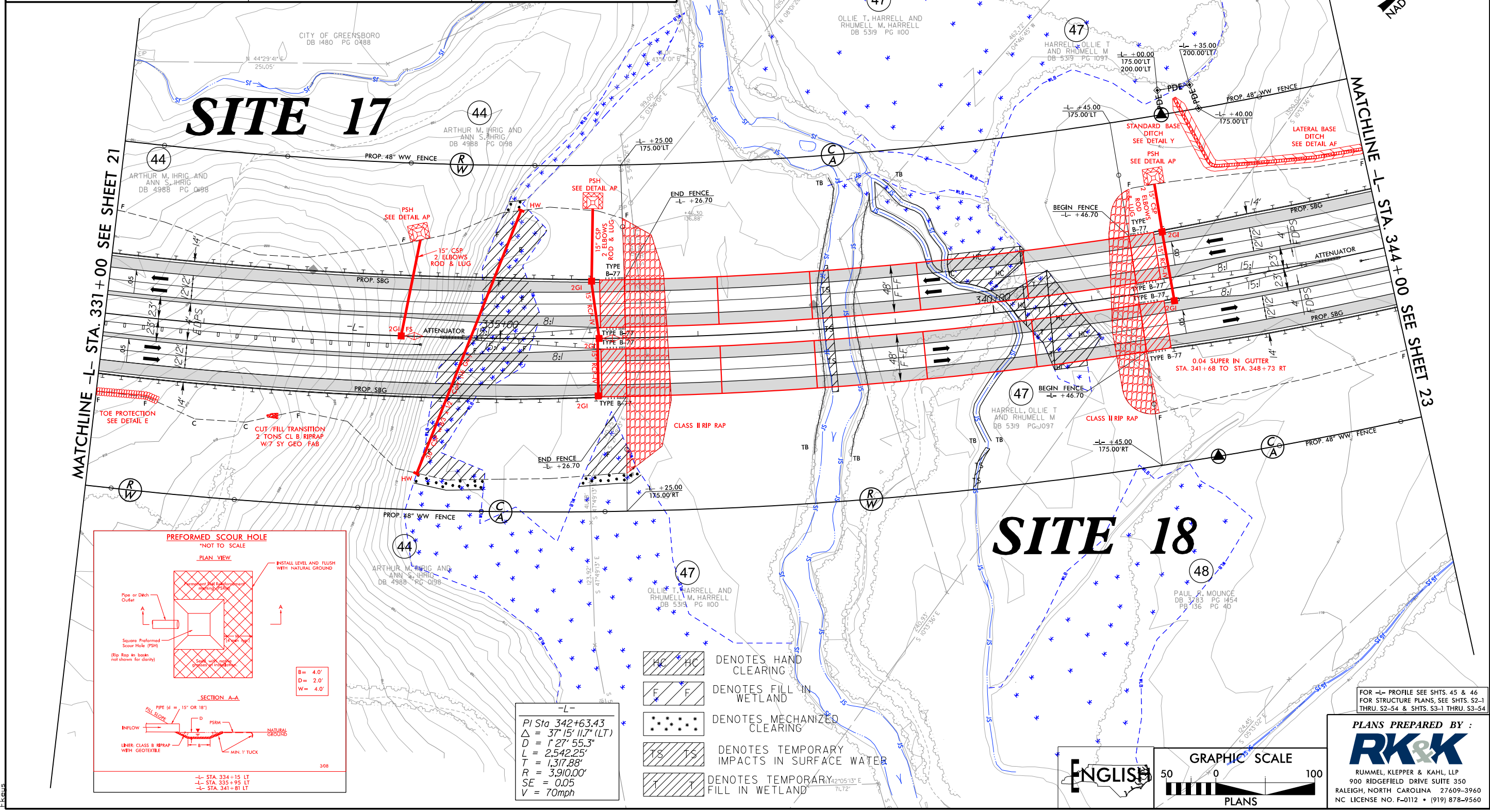
SHEET NO.
22

RW SHEET NO.

ROADWAY DESIGN ENGINEER

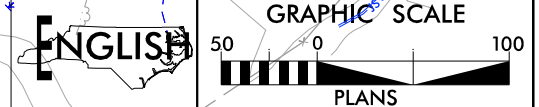
HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 54 OF 81



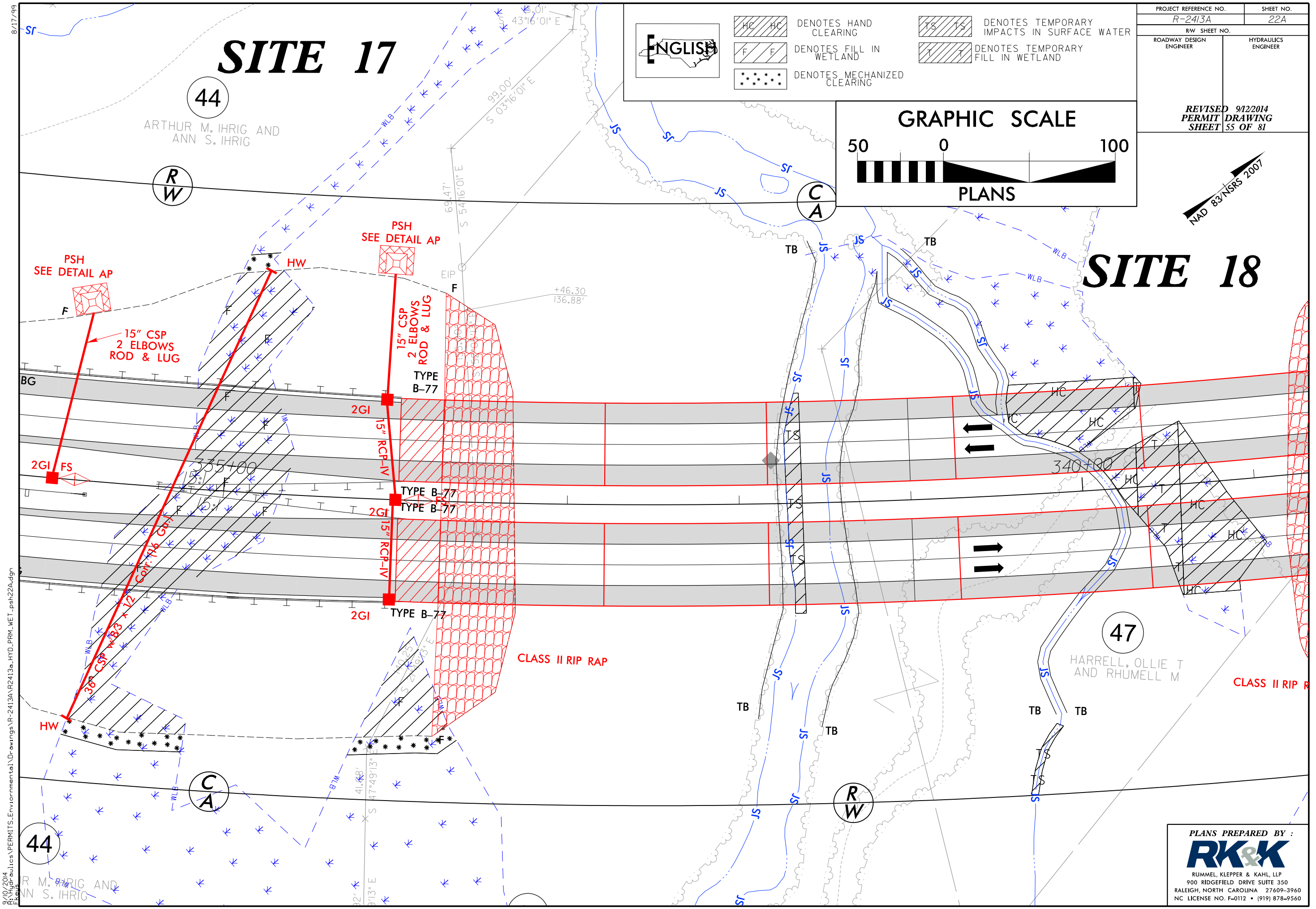
-L-
PI Sta 342+63.43
 $\Delta = 37^{\circ}15'11.7''$ (LT)
D = 1'27" 55.3"
L = 2,542.25'
T = 1,317.88'
R = 3,910.00'
SE = 0.05
V = 70mph

- HC HC DENOTES HAND CLEARING
- F F DENOTES FILL IN WETLAND
- *** DENOTES MECHANIZED CLEARING
- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- 1 1 DENOTES TEMPORARY FILL IN WETLAND



FOR -L- PROFILE SEE SHTS. 45 & 46
FOR STRUCTURE PLANS, SEE SHTS. S2-1
THRU. S2-54 & SHTS. S3-1 THRU. S3-54

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HC HC DENOTES HAND CLEARING

F F DENOTES FILL IN WETLAND

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

T T DENOTES TEMPORARY FILL IN WETLAND

DENOTES MECHANIZED CLEARING

GRAPHIC SCALE

50 0 100

PLANS

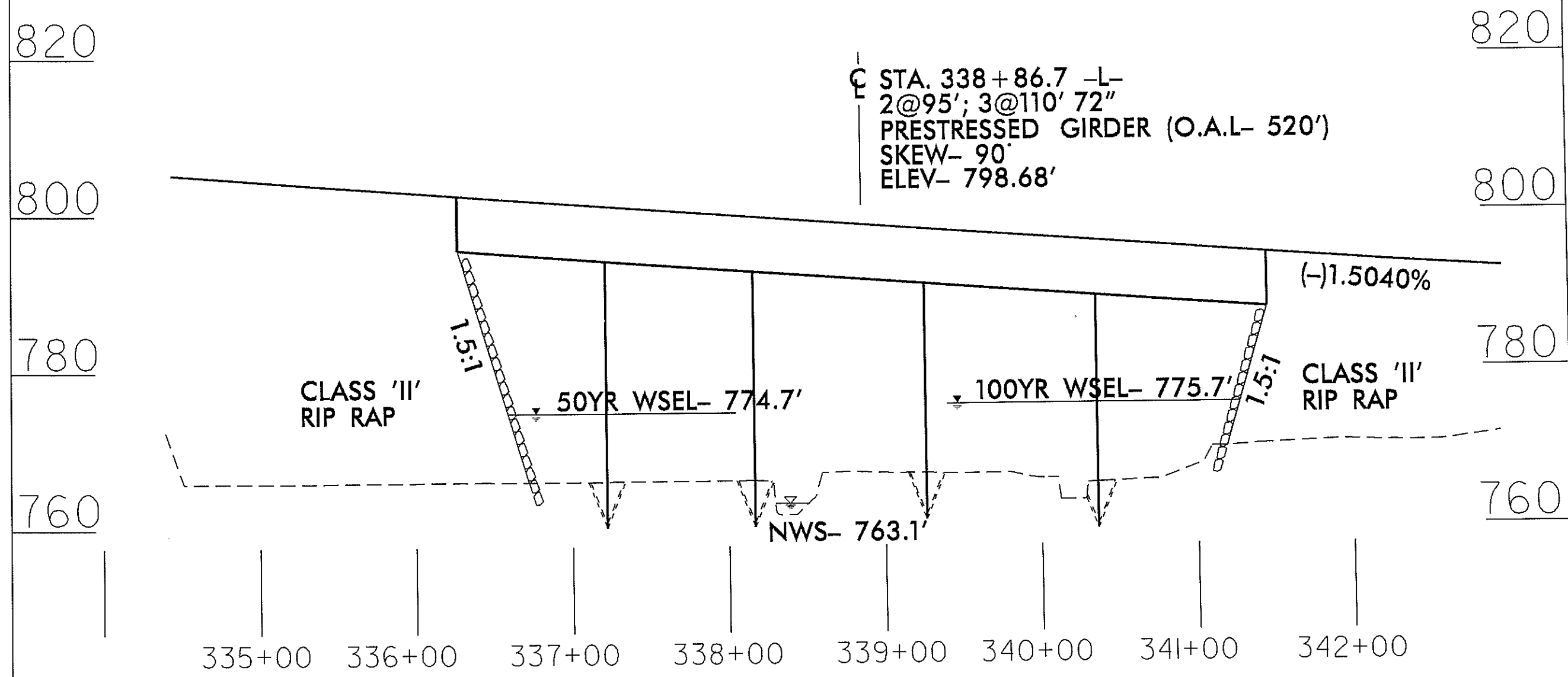
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R-2413A	22A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
REVISED PERMIT SHEET	9/12/2014 DRAWING 55 OF 81

NAD 83/USRS 2007

8/17/99

8/10/2014

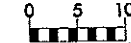
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PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 56 OF 81
2 / 13 / 13

8/23/99



PROJ. REFERENCE NO. R-2413A SHEET NO. X-270

PERMIT DRAWING
SHEET 57 OF 81



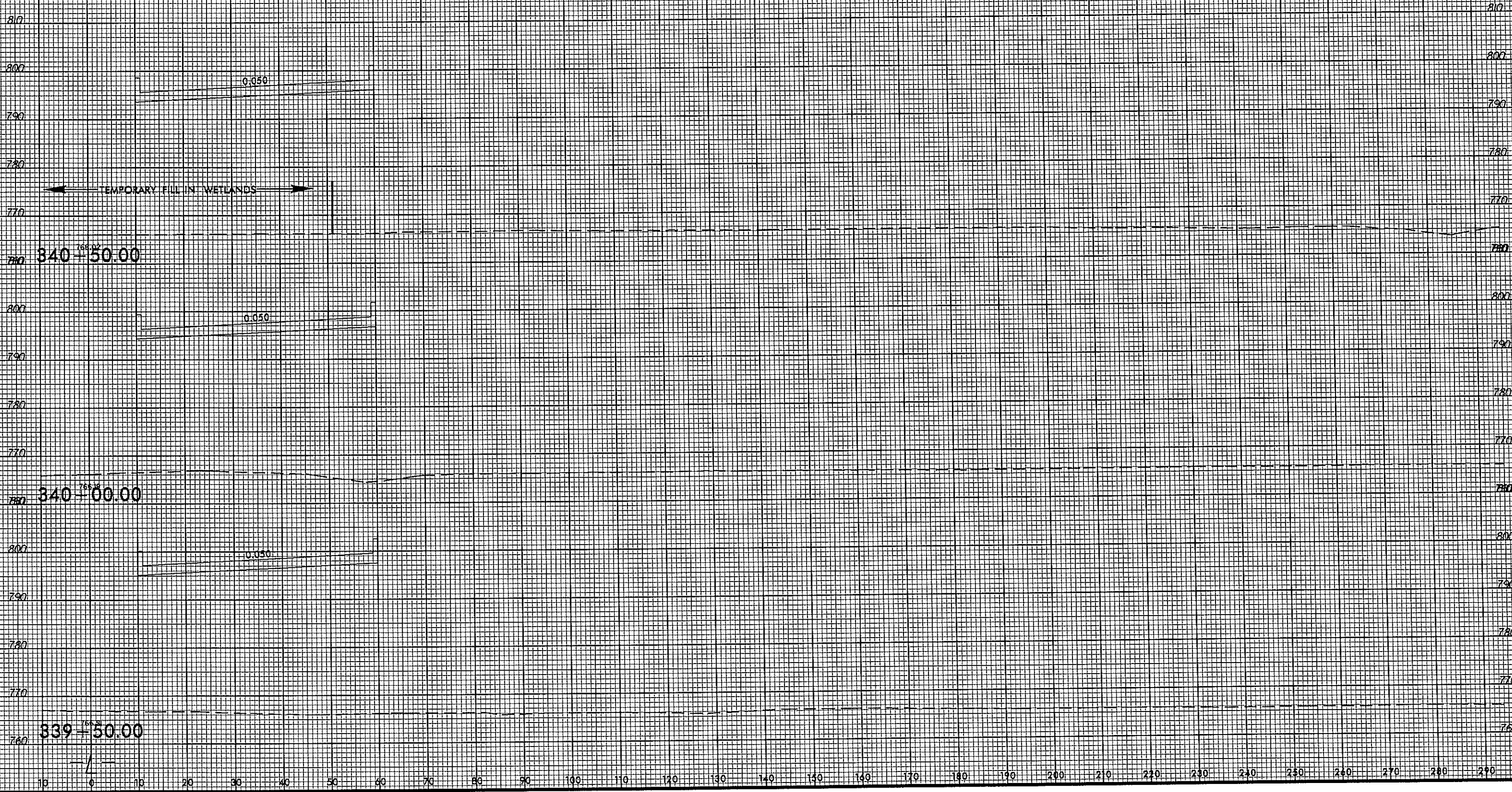
8/23/99



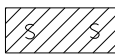
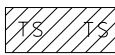
PROJ. REFERENCE NO.
R-2413A

SHEET NO.
X-274

PERMIT DRAWING
SHEET 58 OF 81

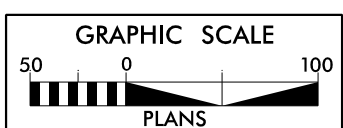
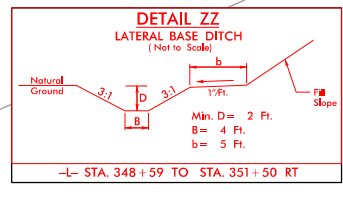
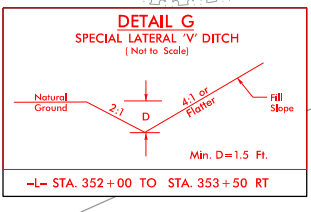
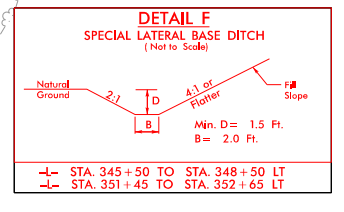
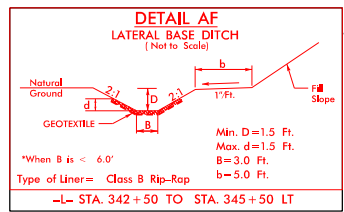
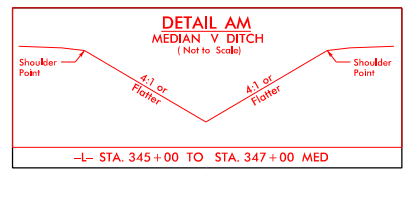
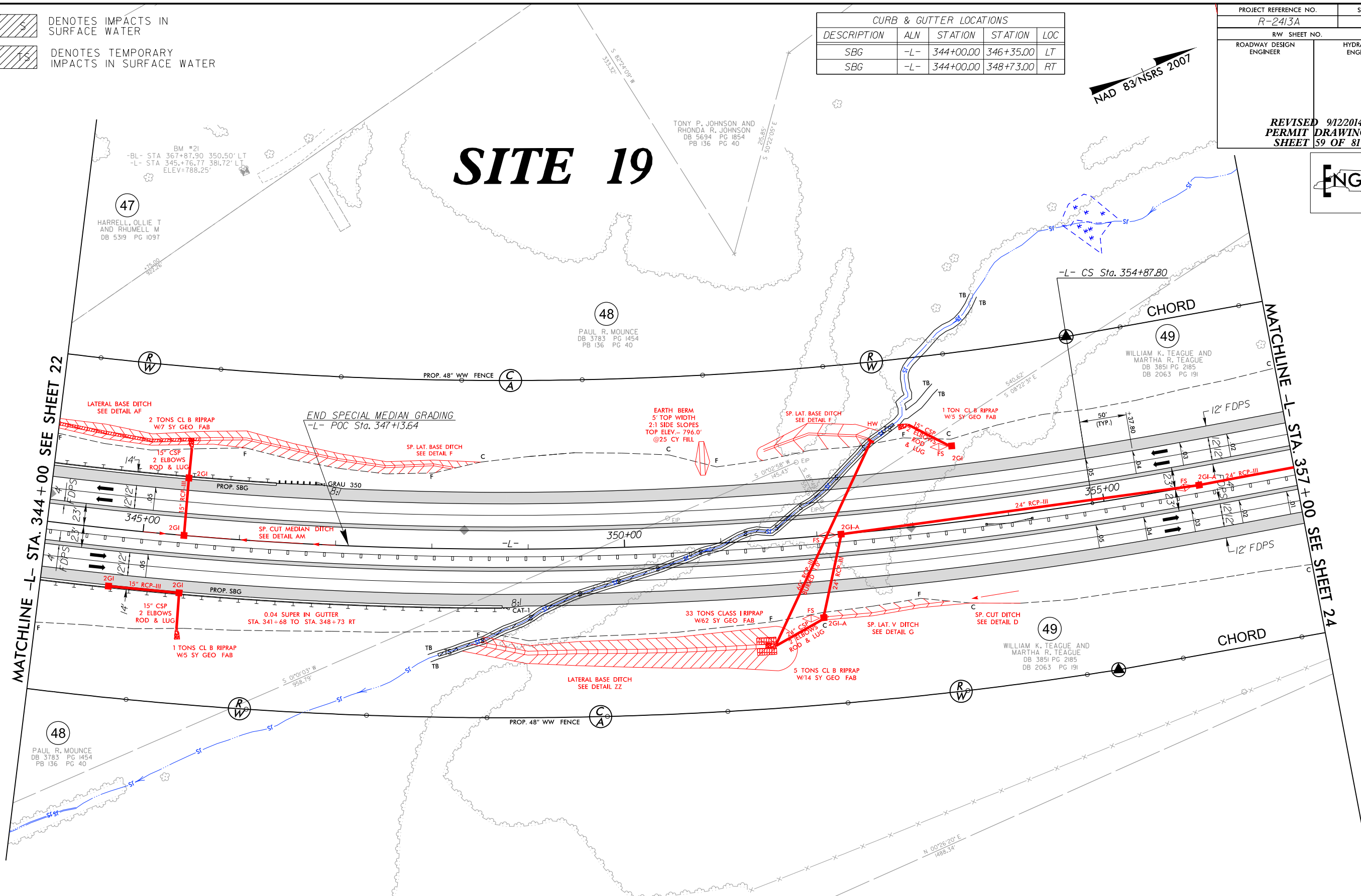


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8/10/2014
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 DENOTES IMPACTS IN SURFACE WATER
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	344+00.00	346+35.00	LT
SBG	-L-	344+00.00	348+73.00	RT

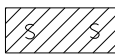
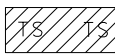
PROJECT REFERENCE NO. <i>R-2413A</i>		SHEET NO. <i>23</i>
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 59 OF 81		



-L-
Pls Sta 355+71.14
Os = 1' 49' 54.1"
Ls = 250.00'
LT = 166.68'
ST = 83.34'

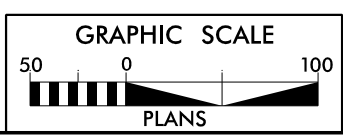
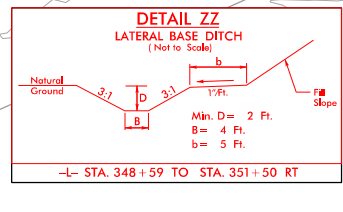
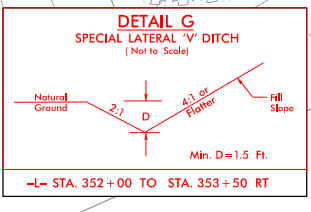
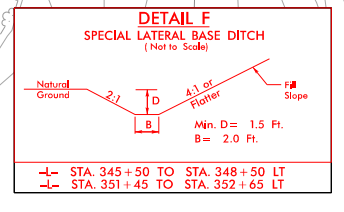
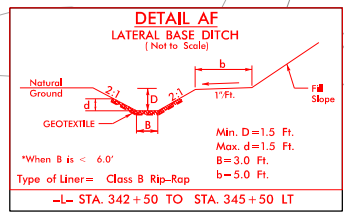
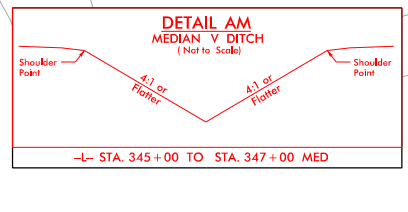
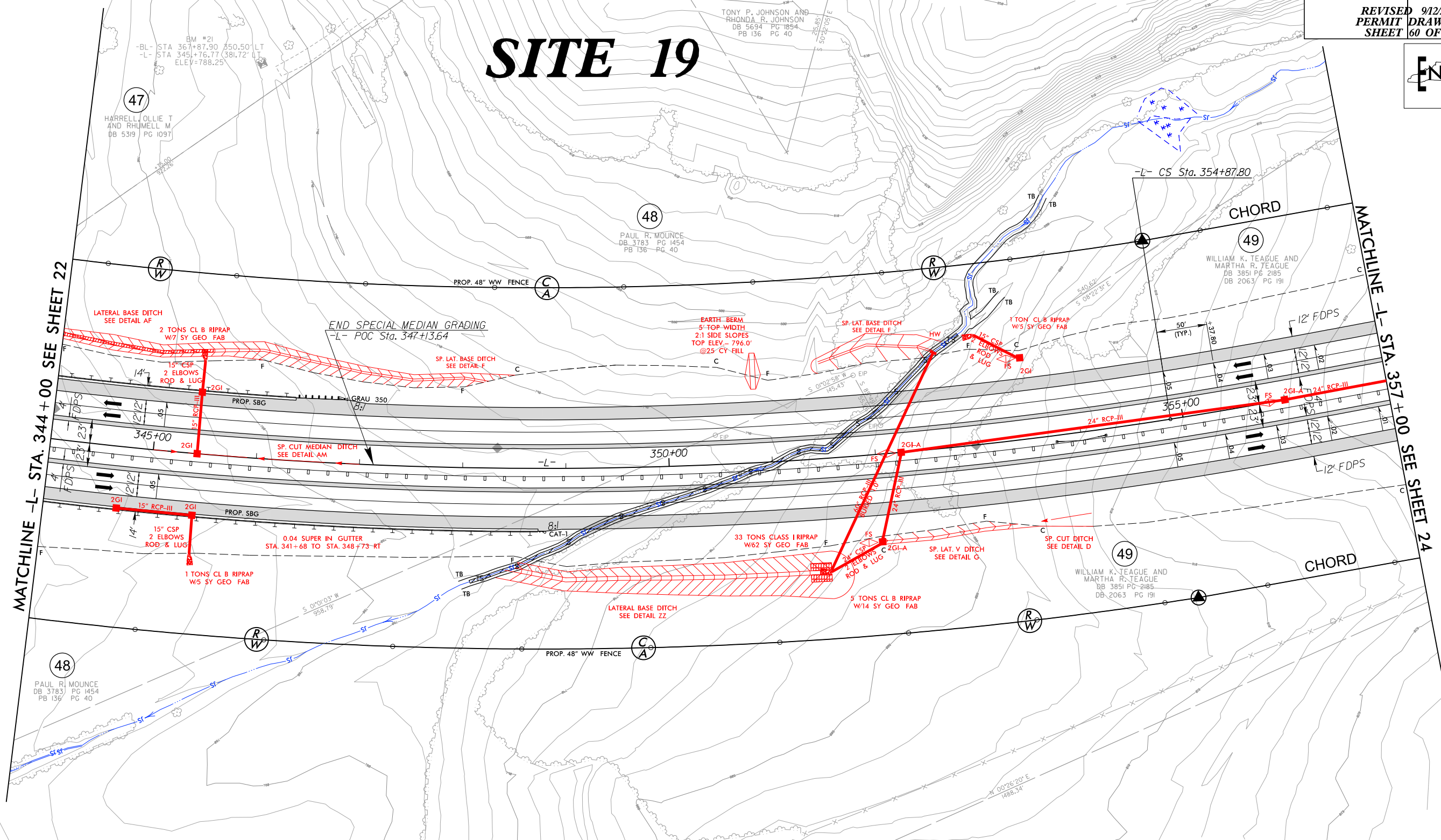
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

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8/10/2014
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 DENOTES IMPACTS IN SURFACE WATER
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	344+00.00	346+35.00	LT
SBG	-L-	344+00.00	348+73.00	RT

PROJECT REFERENCE NO. <i>R-2413A</i>		SHEET NO. <i>23</i>
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
REVISED 9/12/2014 PERMIT DRAWING SHEET 60 OF 81		

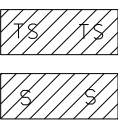


-L-
Pls Sta 355+71.14
Os = 1' 49' 54.1"
Ls = 250.00'
LT = 166.68'
ST = 83.34'

PLANS PREPARED BY :
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NC LICENSE NO. F-0112 • (919) 878-9560

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8/10/2014 R:\Hydro\Hydro\PERMITS\Environmental\Drawings\NR-2413A\NR2413a_HYD_PRM_WET_psh23A.dgn

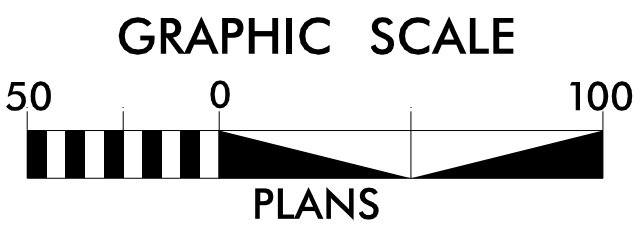


DENOTES TEMPORARY
IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN
SURFACE WATER

PROJECT REFERENCE NO.		SHEET NO.
R-2413A		23A
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
REVISED 9/12/2014 PERMIT DRAWING SHEET 61 OF 81		

NAD 83/NSRS 2007



48

PAUL R. MOUNCE

C
A

R
W

SITE 19

GRADING

LAT. BASE DITCH
SEE DETAIL F

EARTH BERM
5' TOP WIDTH
2:1 SIDE SLOPES
TOP ELEV.- 796.0'
@25 CY FILL

SP. LAT. BASE DITCH
SEE DETAIL F

1 TON CL B RIPRAP
W/5 SY GEO FAB

15" CSP
2 ELBOWS
ROD & LUG

2GI

350+00

355+00

24" RCP-III

33 TONS CLASS I RIPRAP
W/62 SY GEO FAB

24" CSP
2 ELBOWS
ROD & LUG

5 TONS CL B RIPRAP
W/14 SY GEO FAB

SP. LAT. V DITCH
SEE DETAIL G

SP. CUT DITCH
SEE DETAIL D

49

WILLIAM K. TEAGUE AND
MARTHA R. TEAGUE

LATERAL BASE DITCH
SEE DETAIL ZZ

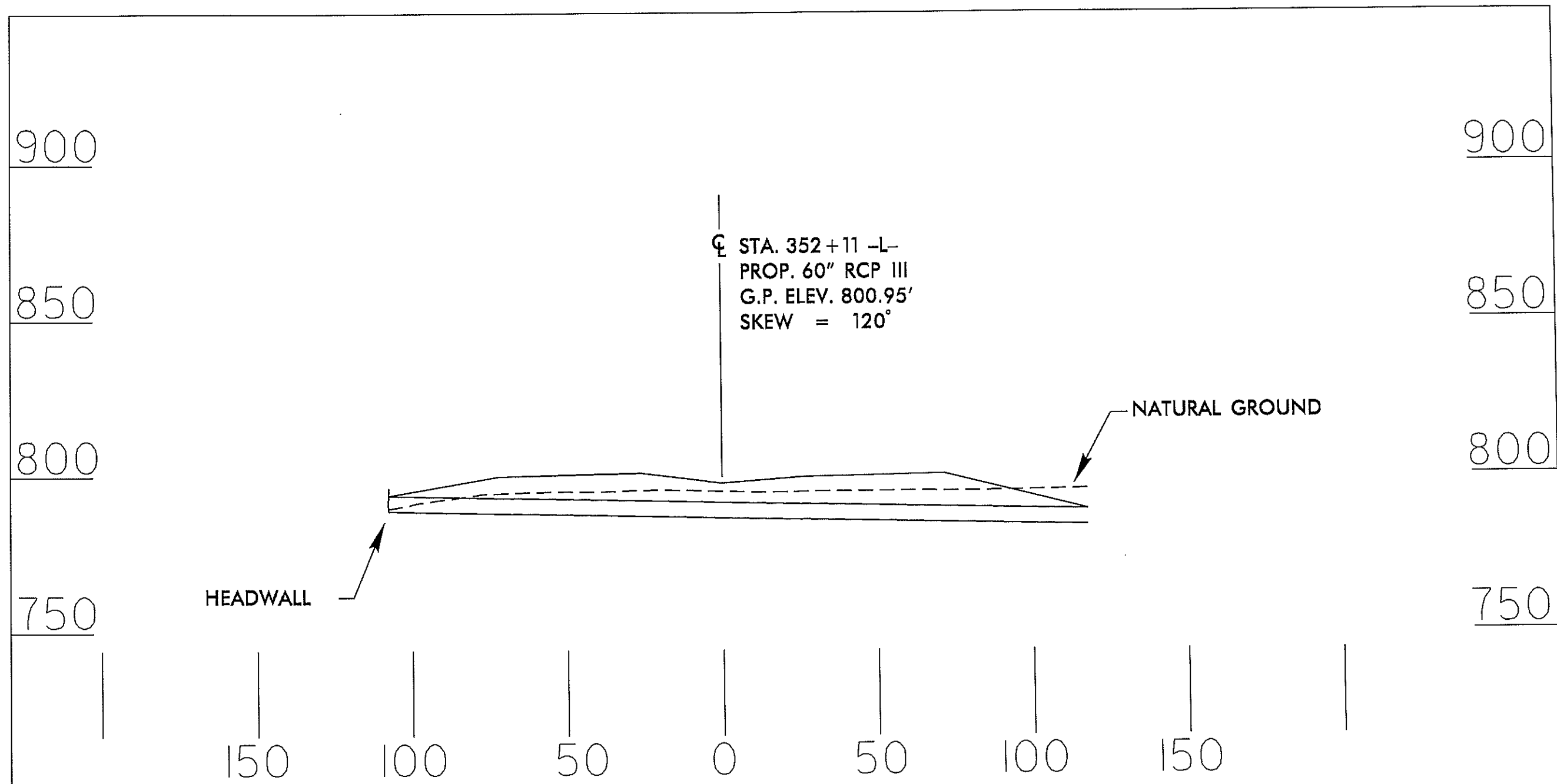
C
A

R
W

PLANS PREPARED BY :

RK&K

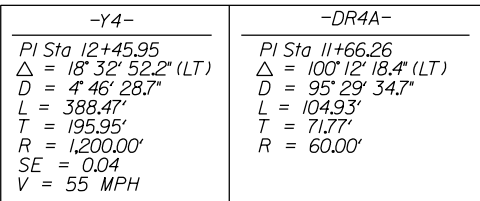
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900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 62 OF 81
2 / 13 / 13

MATCHLINE -Y4- STA. 20+50 SEE SHEET 19



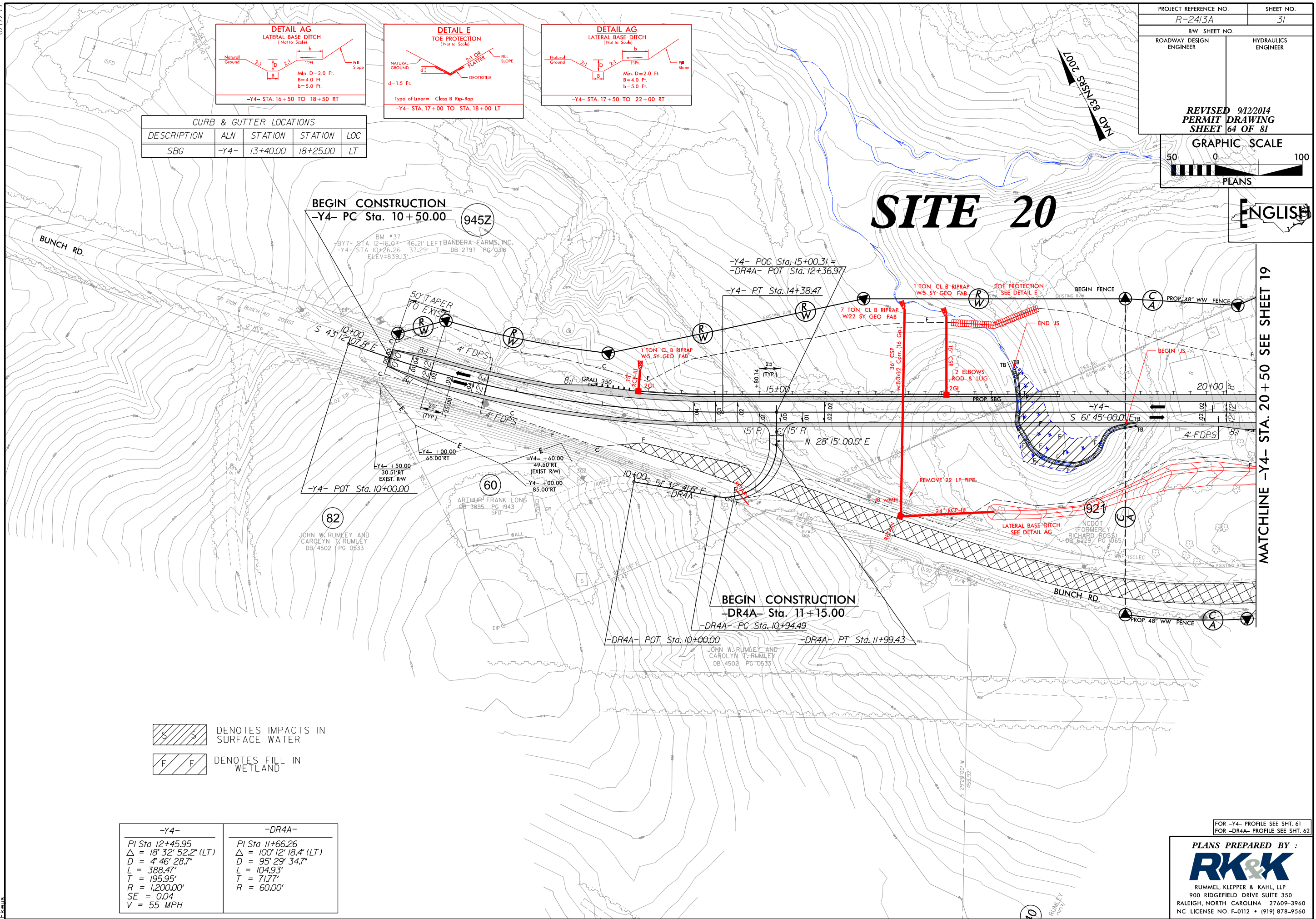
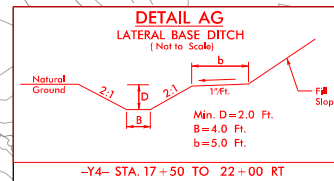
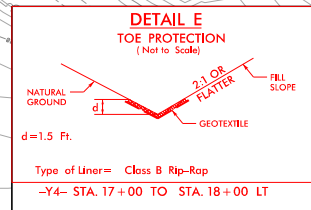
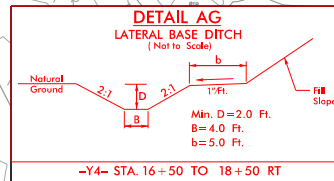
PLANS PREPARED BY :

RK&K
RUMMEL, KLEPPER & KAHL, LLP
700 RIDGEFIELD DRIVE SUITE 350
HIGH, NORTH CAROLINA 27609-3960
LICENSE NO. F-0112 • (919) 878-9560

MATCHLINE -Y4- STA. 20+50 SEE SHEET 19

SITE 20

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y4-	13+40.00	18+25.00	LT



 DENOTES IMPACTS IN SURFACE WATER

 DENOTES FILL IN WETLAND

-Y4-	-DR4A-
<i>PI Sta 12+45.95</i>	<i>PI Sta 11+66.26</i>
$\Delta = 18^{\circ} 32' 52.2''$ (LT)	$\Delta = 100^{\circ} 12' 18.4''$ (LT)
$D = 4' 46' 28.7''$	$D = 95' 29' 34.7''$
$L = 388.47'$	$L = 104.93'$
$T = 195.95'$	$T = 71.77'$
$R = 1,200.00'$	$R = 60.00'$
$SE = 0.04$	
$V = 55$ MPH	

FOR -Y4- PROFILE SEE SHT. 61
FOR -DR4A- PROFILE SEE SHT. 62

PLANS PREPARED BY :

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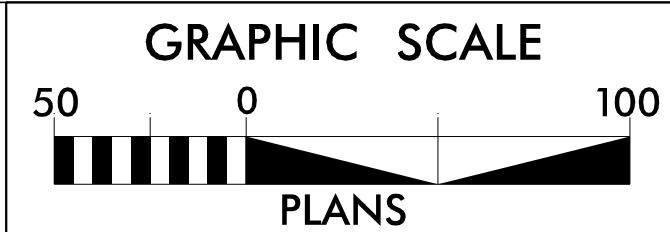
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8/10/2014
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E:\Users\jleu

SITE 20

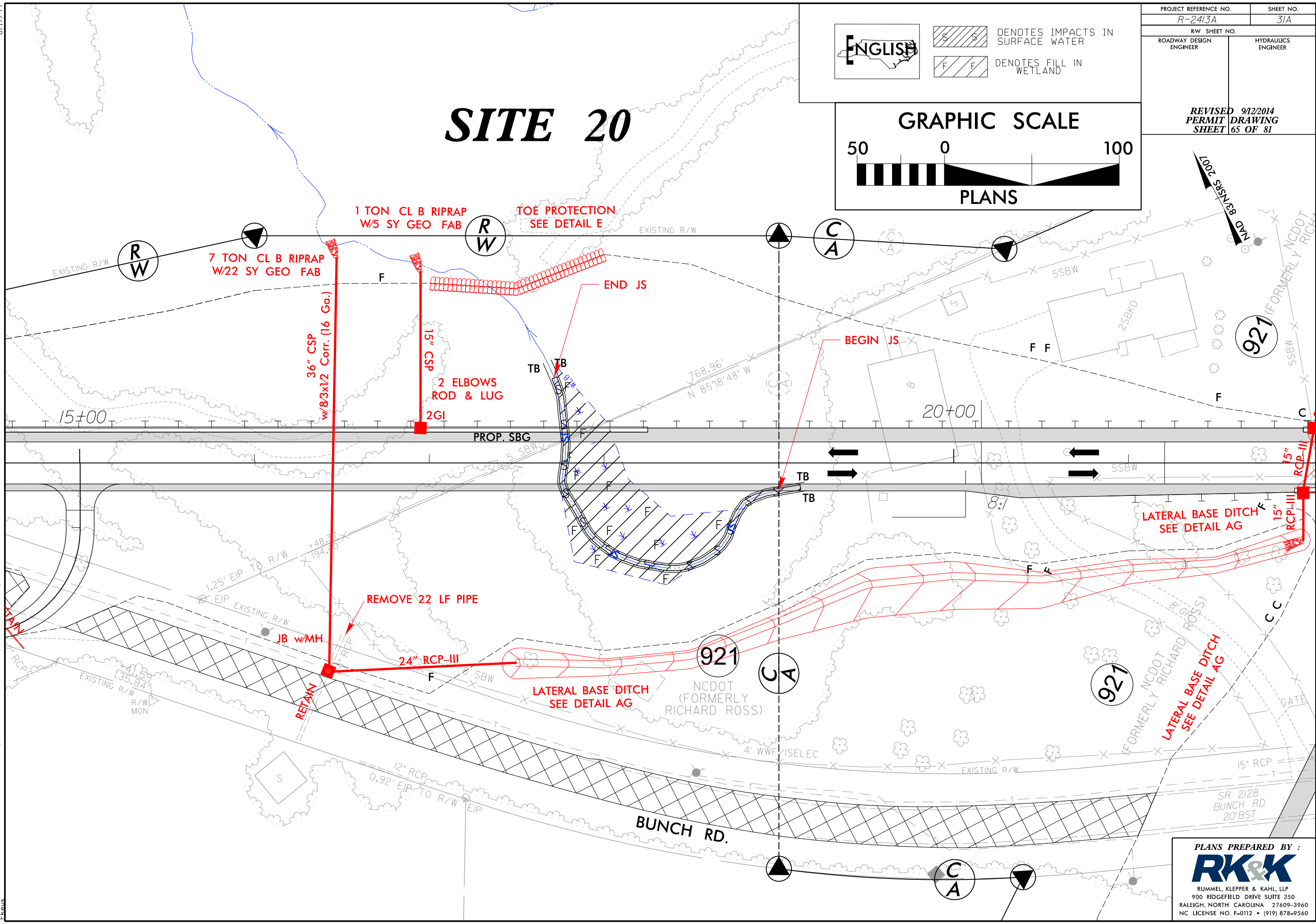


DENOTES IMPACTS IN
SURFACE WATER

DENOTES FILL IN
WETLAND



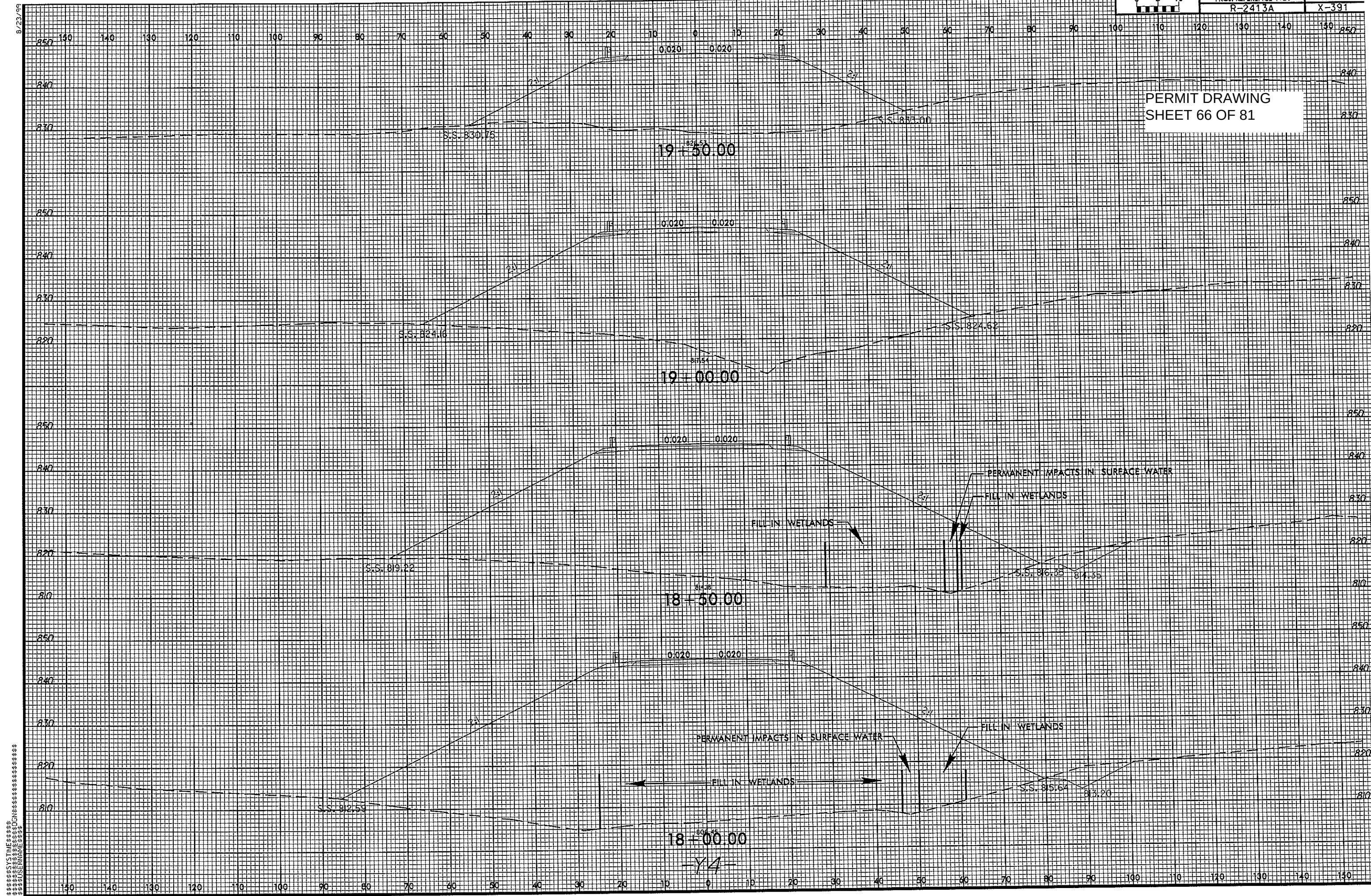
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RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		REVISED 9/12/2014 PERMIT DRAWING SHEET 65 OF 81	



PLANS PREPARED BY :

RK&K

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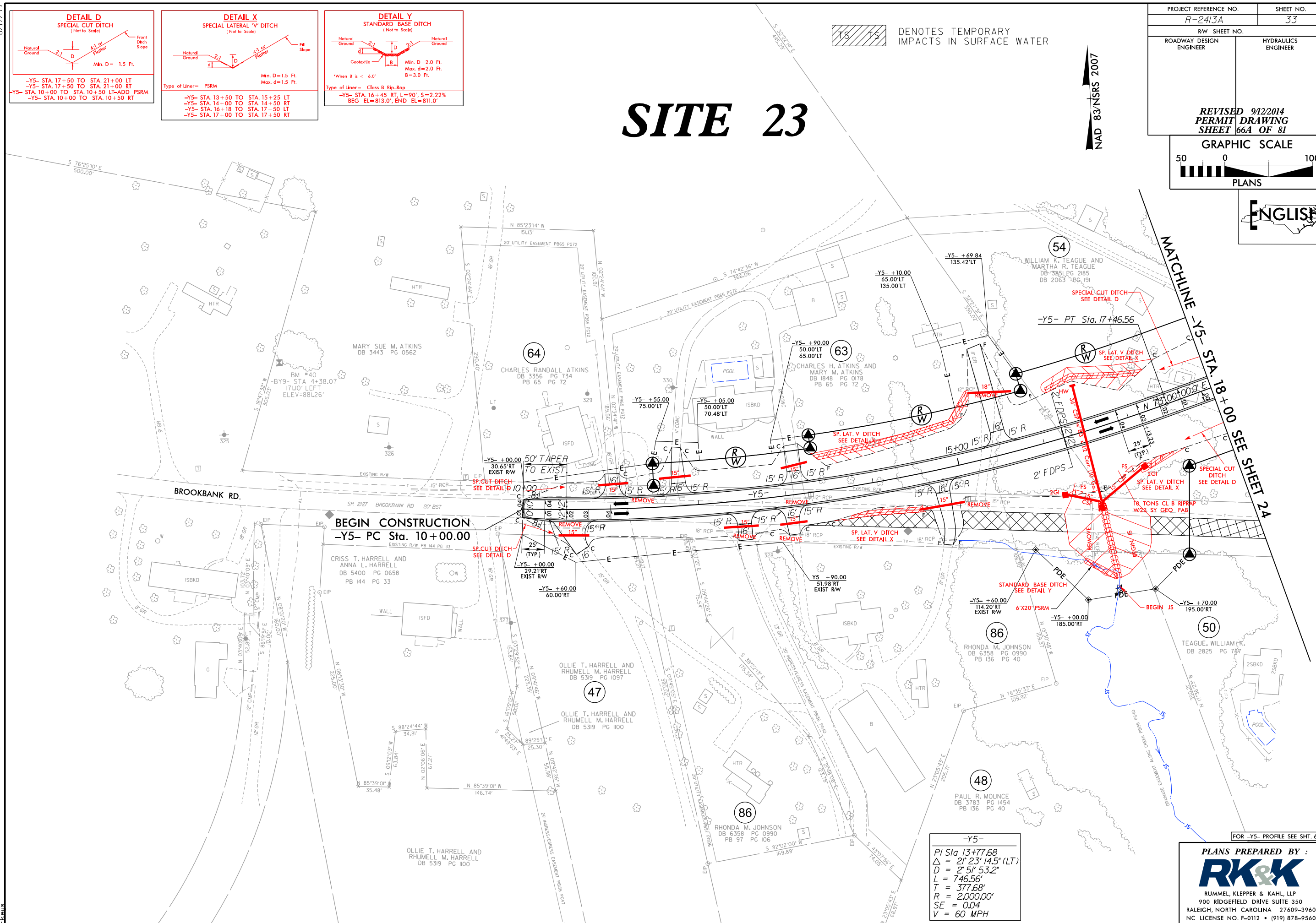
FOR -Y5- PROFILE SEE SHT. 6

PLANS PREPARED BY :

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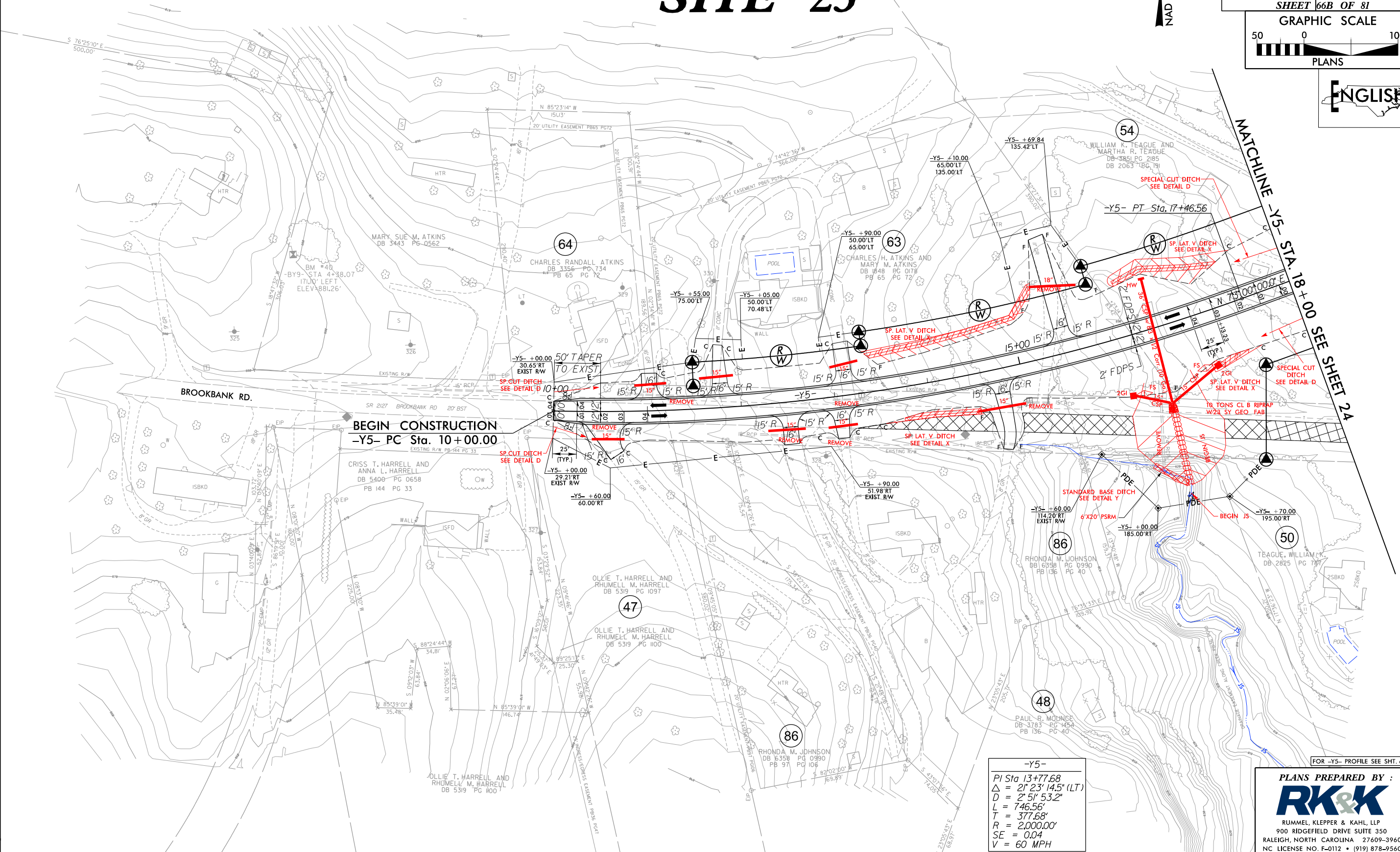
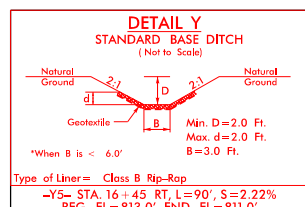
SITE 23



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900 RIDGEFIELD DRIVE SUITE 350
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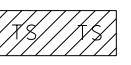
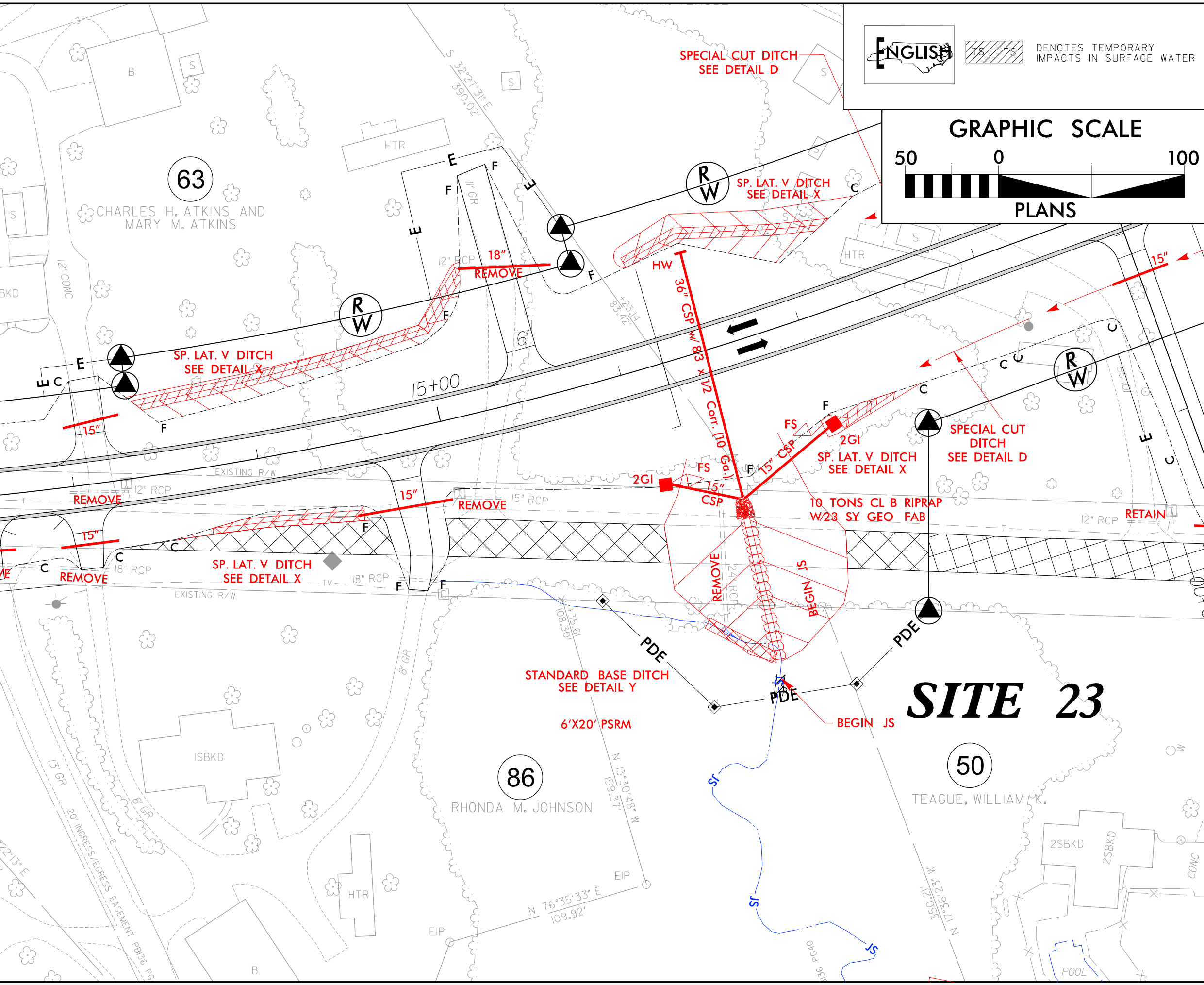
TS TS

SITE 23

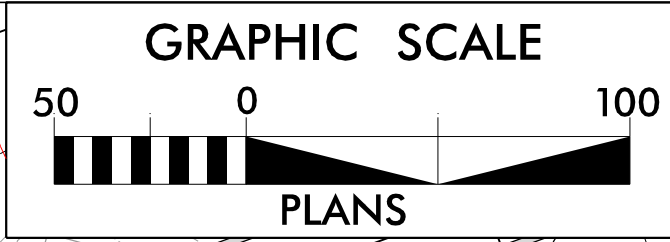


3/10/2014
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8/17/99
8/10/2014
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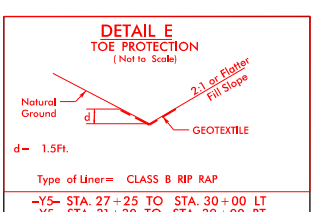
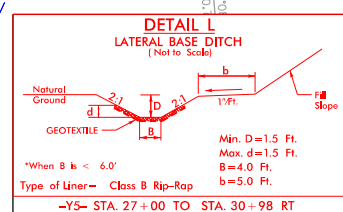
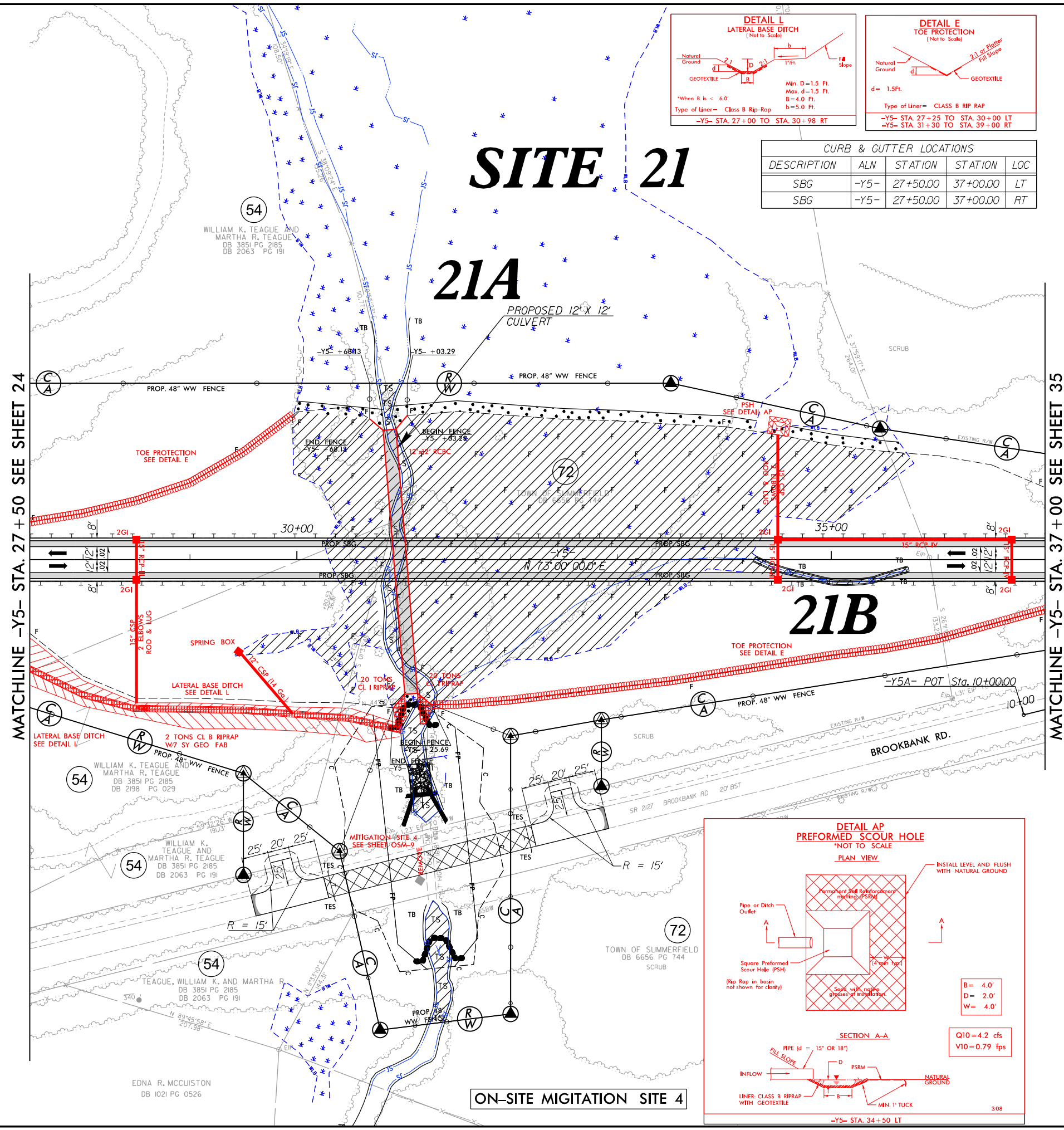
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER



PROJECT REFERENCE NO. <i>R-2413A</i>		SHEET NO. <i>33A</i>
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
<i>REVISED 9/12/2014</i> <i>PERMIT DRAWING</i> <i>SHEET 66C OF 81</i>		

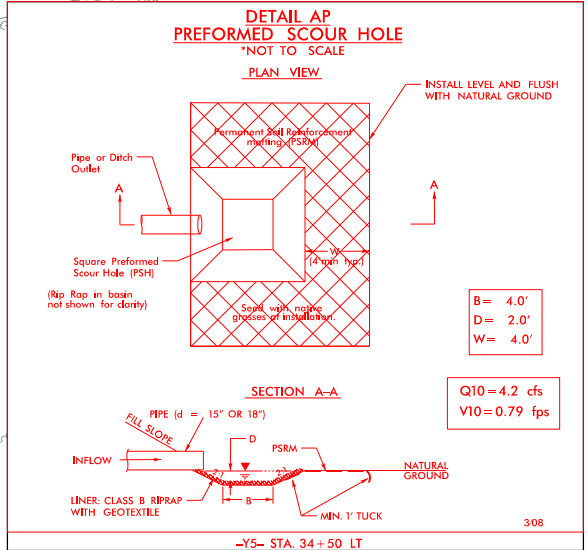
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

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8/10/2014
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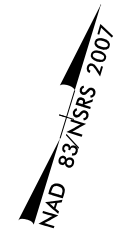


CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y5-	27+50.00	37+00.00	LT
SBG	-Y5-	27+50.00	37+00.00	RT

- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER



PROJECT REFERENCE NO. R-2413A		SHEET NO. 34	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		REVISED 9/12/2014 PERMIT DRAWING SHEET 67 OF 81	



ENGLISH

GRAPHIC SCALE

FOR -Y5- PROFILES SEE SHT. 63
FOR OSM PLANS SEE SHTS. OSM-4 & OSM-6
FOR STRUCTURE PLANS SEE -Y5- CULVERT SHTS. C-1 & C-5

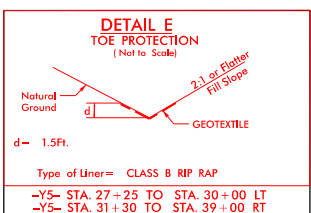
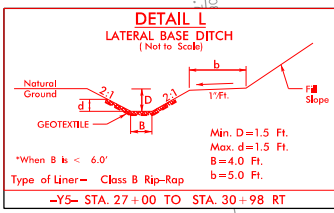
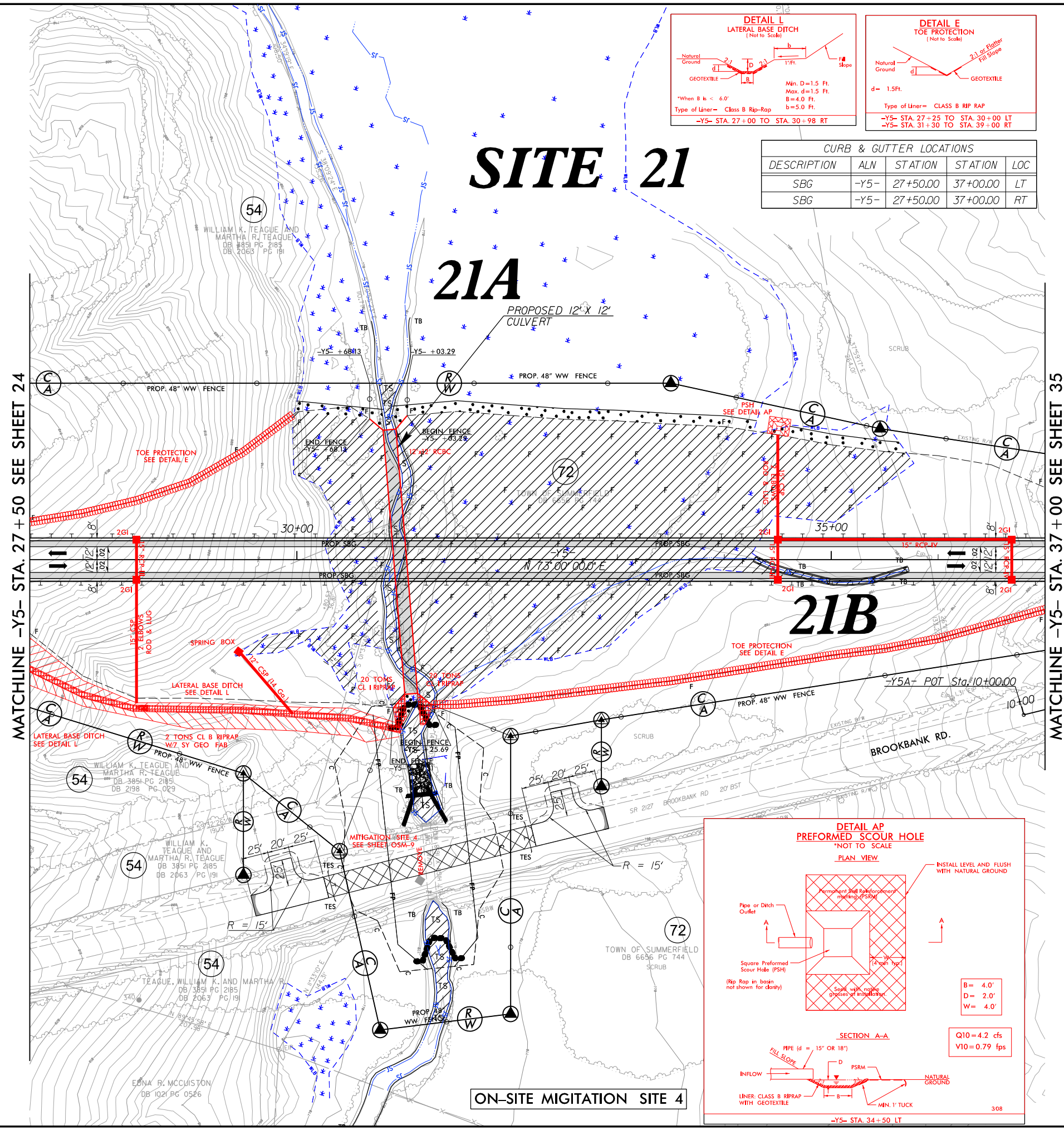
PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

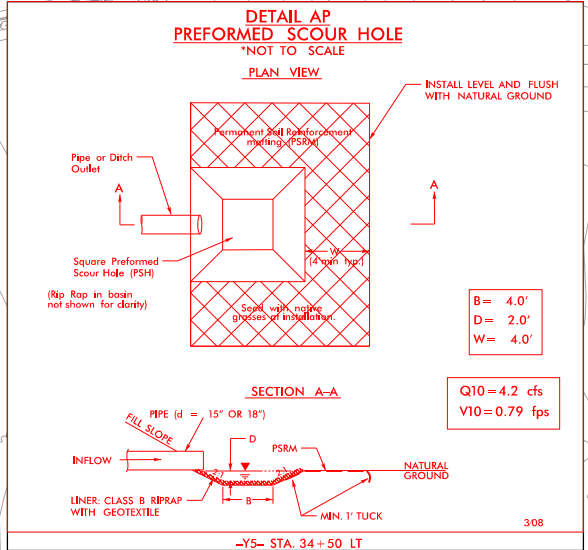
8/17/99

8/10/2014
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CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y5-	27+50.00	37+00.00	LT
SBG	-Y5-	27+50.00	37+00.00	RT

- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER



PROJECT REFERENCE NO. <i>R-2413A</i>		SHEET NO. <i>34</i>
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	

REVISED 9/12/2014
PERMIT DRAWING
SHEET 68 OF 81

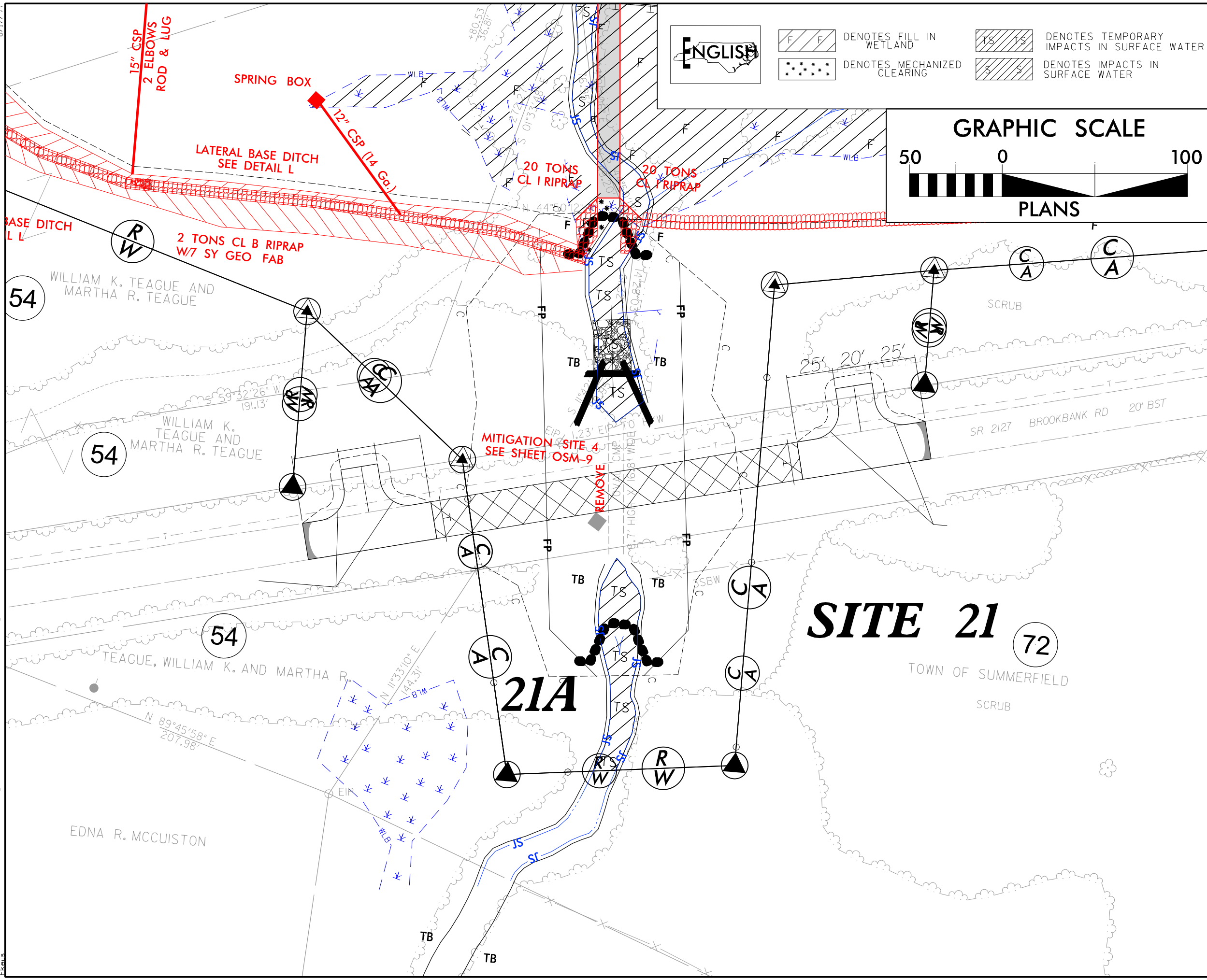
ENGLISH

GRAPHIC SCALE
50 0 100
FOR -Y5- PROJECT SHEET 63
FOR OSM PLANS SEE SHTS. OSM-4 & OSM-6
FOR STRUCTURE PLANS SEE -Y5- CULVERT SHTS. C-1 & C-5

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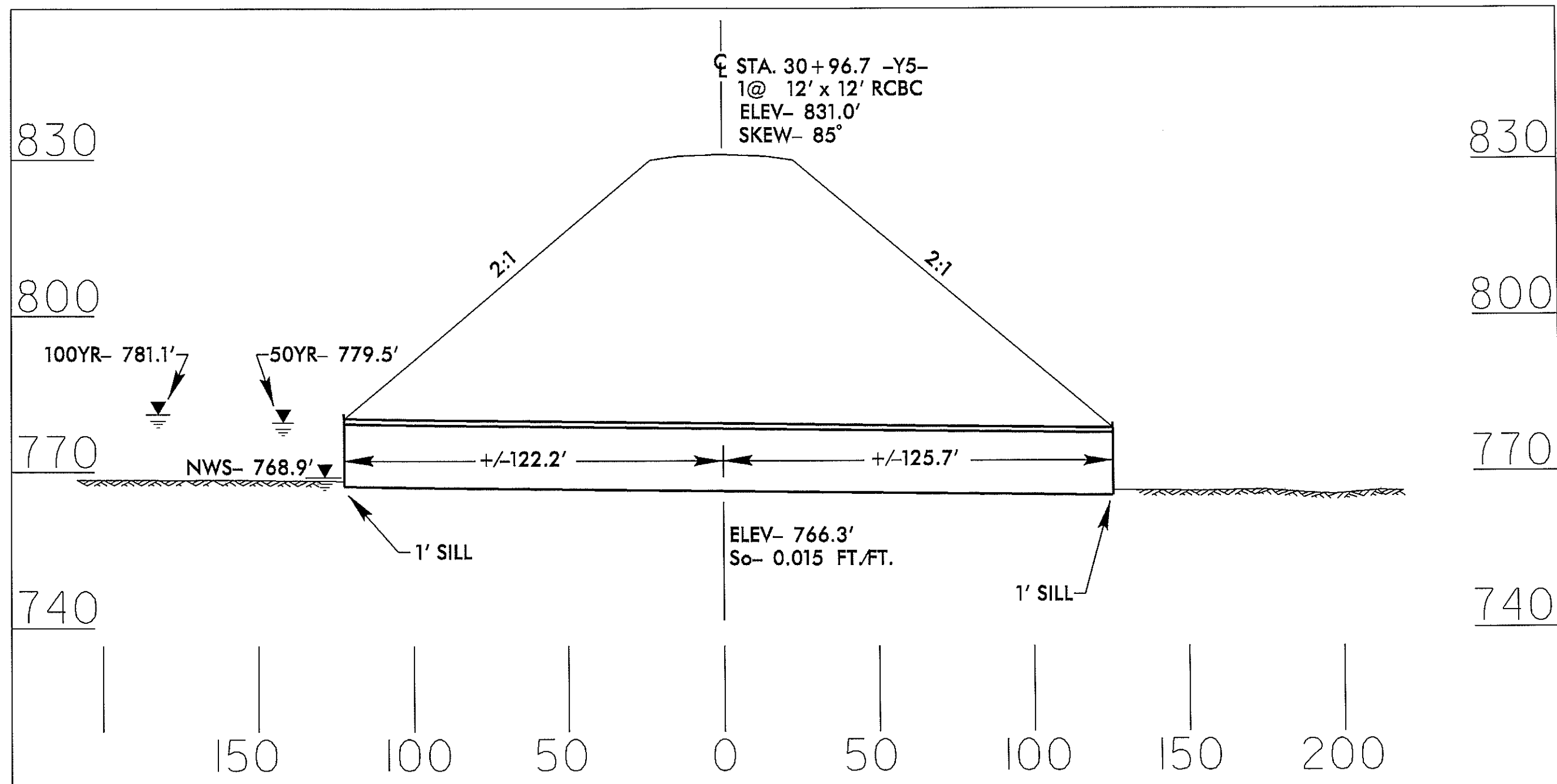
ON-SITE MIGITATION SITE 4

8/17/99
8/10/2014
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PROJECT REFERENCE NO. R-2413A		SHEET NO. 34A	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		REVISED 9/12/2014 PERMIT DRAWING SHEET 69 OF 81	

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PROFILE

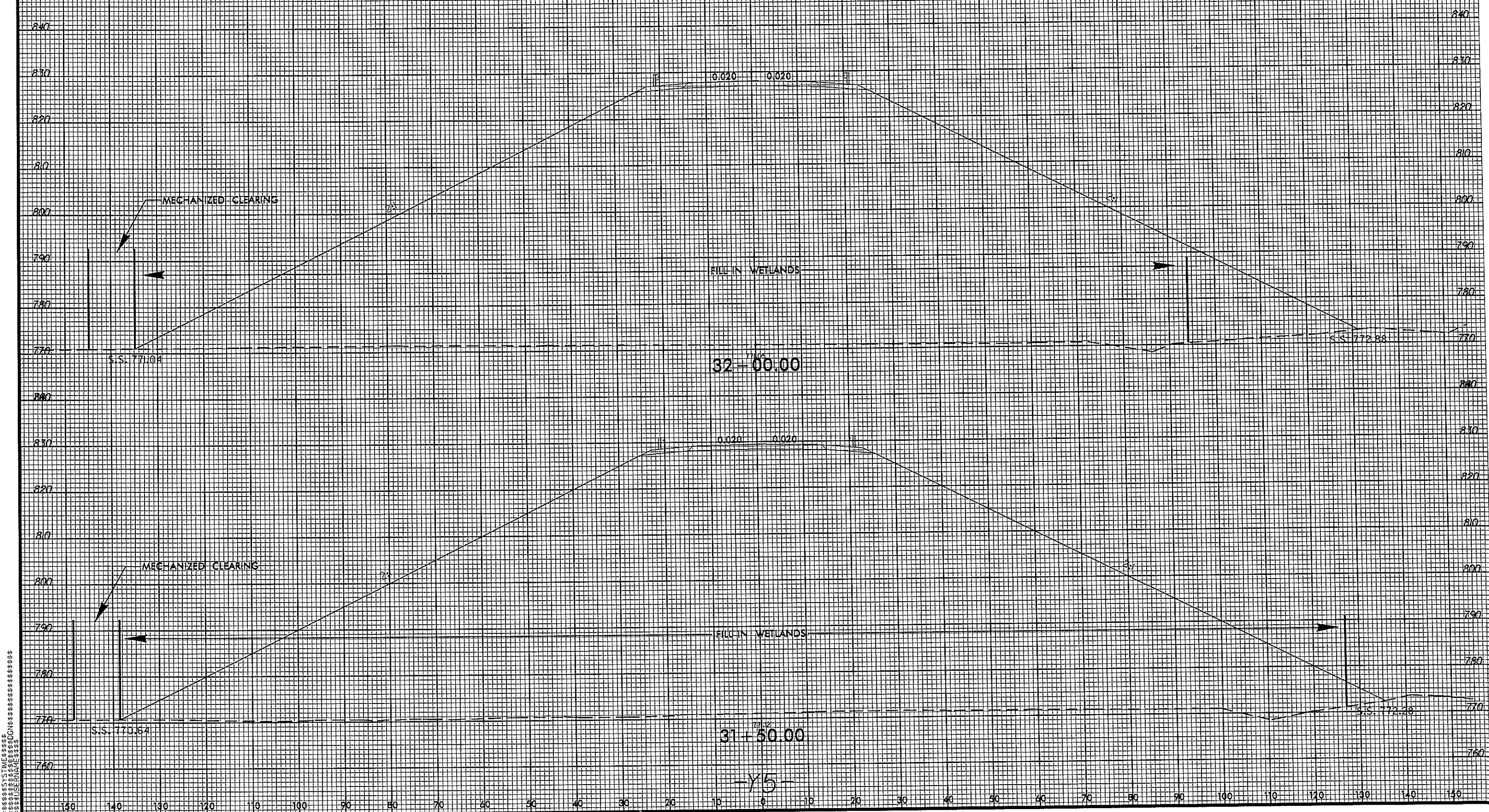
NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127
PERMIT DRAWING
SHEET 70 OF 81
2 / 13 / 13

B/23/99



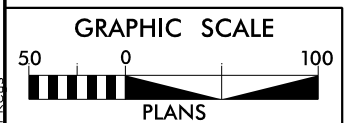
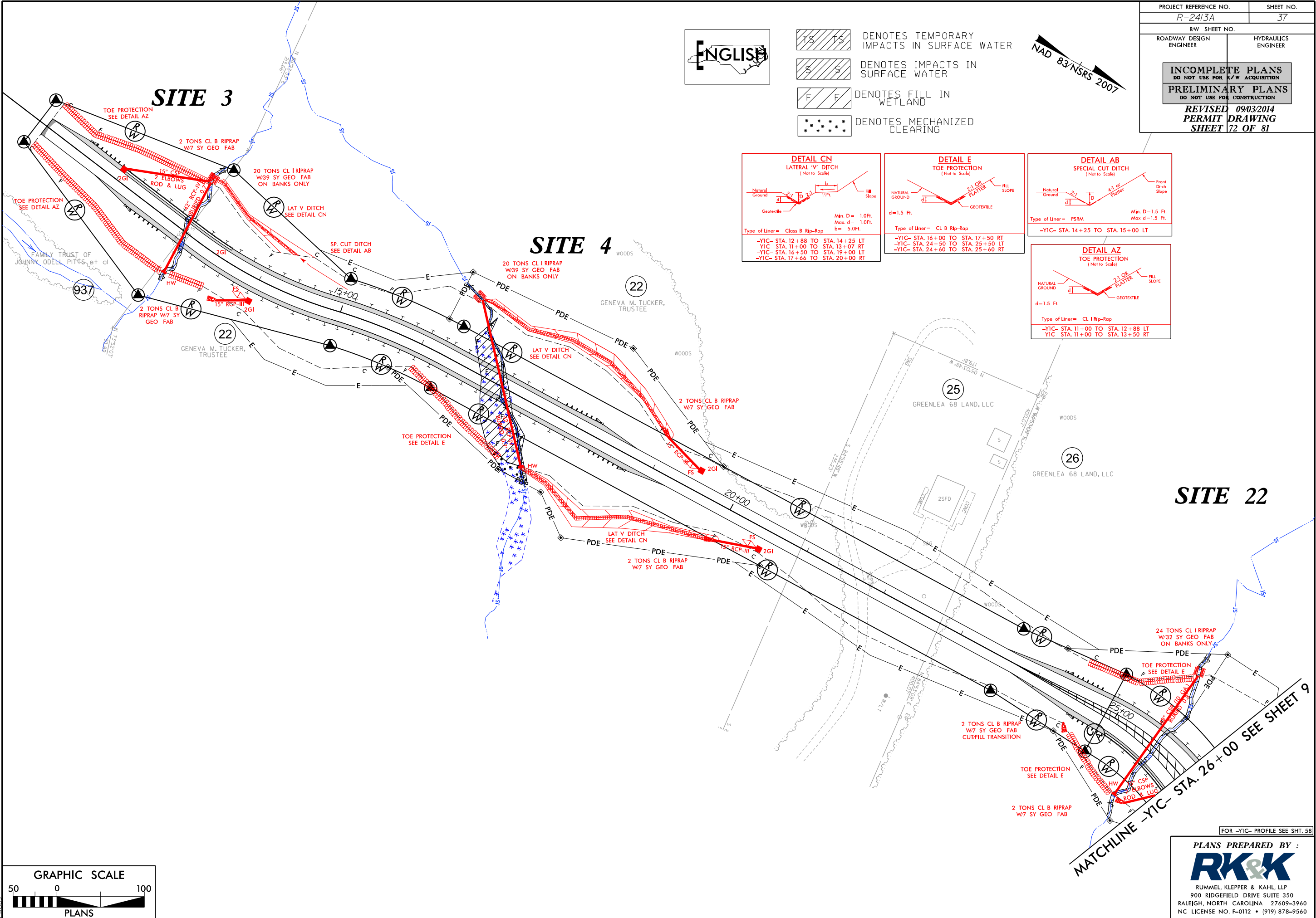
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PERMIT DRAWING
SHEET 71 OF 81



8/17/99

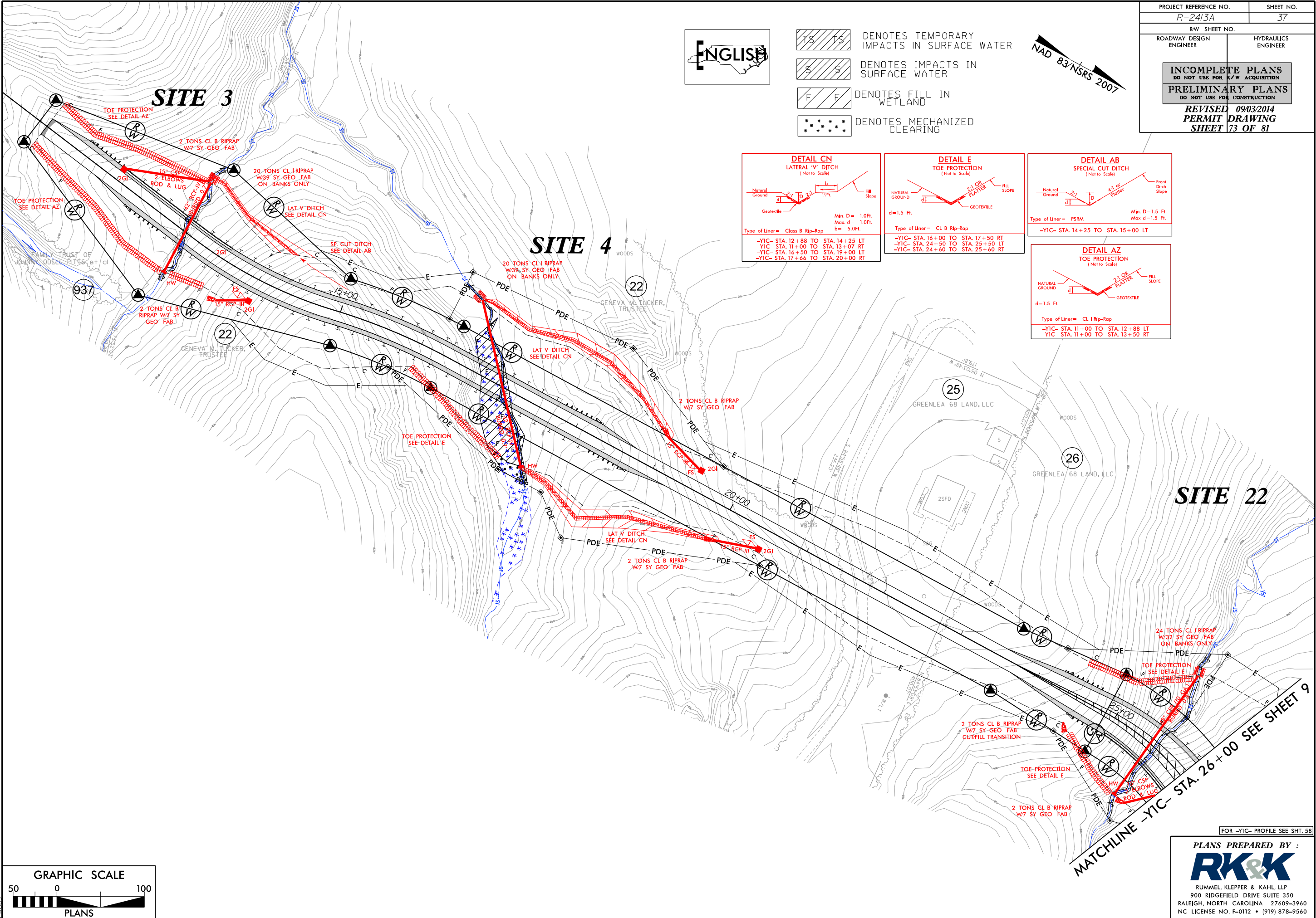
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8/17/99

9/3/2014
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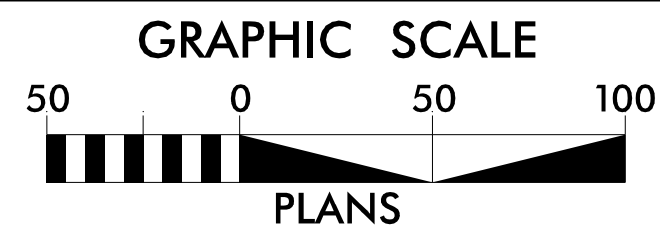
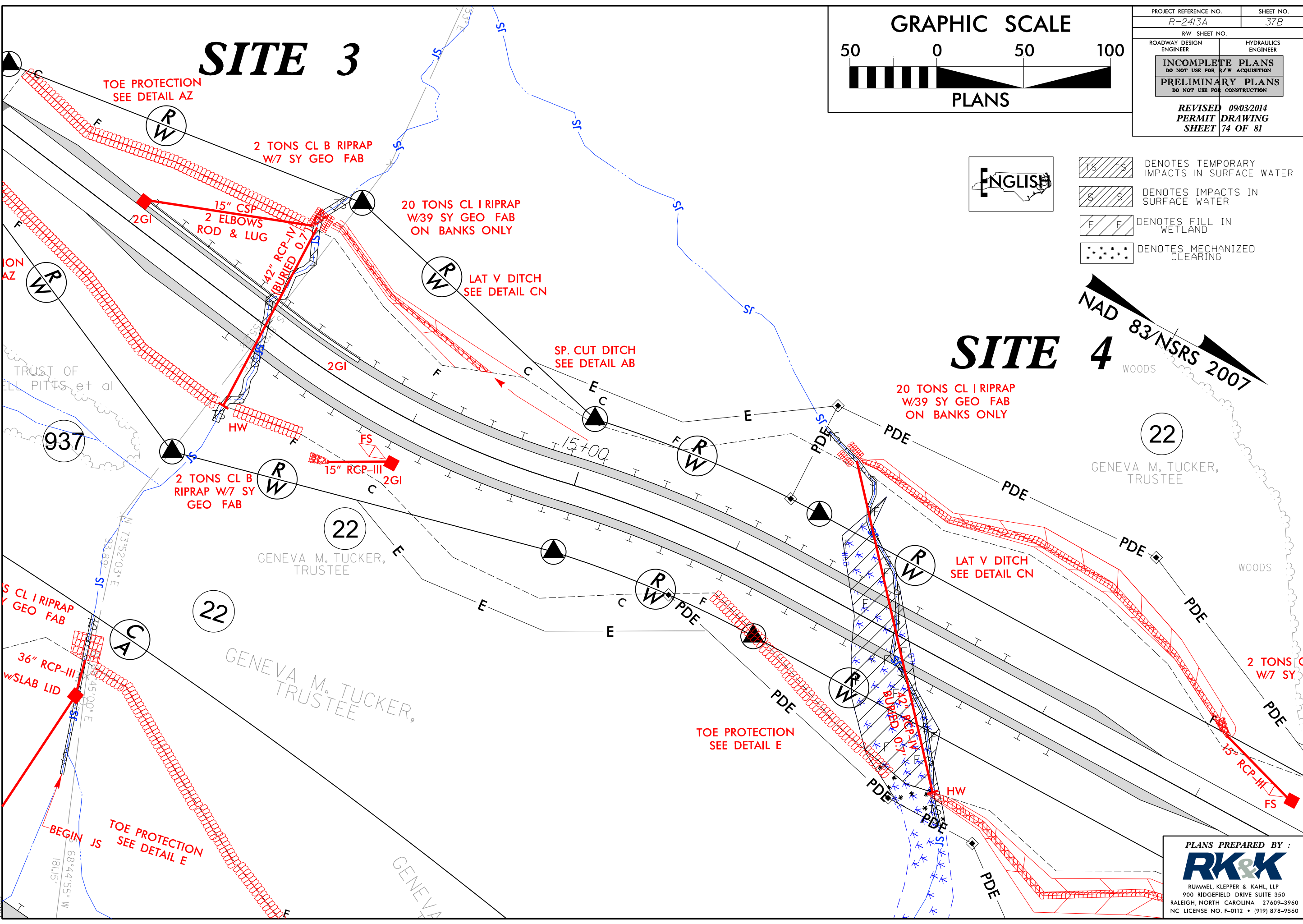
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RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION <i>REVISED 09/03/2014</i> <i>PERMIT DRAWING</i> <i>SHEET 73 OF 81</i>			

FOR -YIC- PROFILE SEE SHT. 58

8/17/99

9/3/2014
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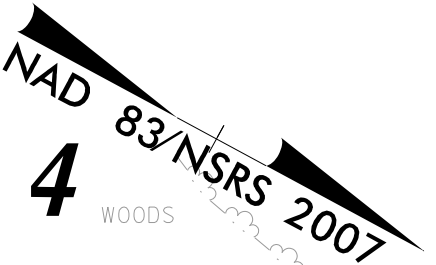
SITE 3



PROJECT REFERENCE NO. R-2413A	SHEET NO. 37B
R/W SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
REVISED 09/03/2014 PERMIT DRAWING SHEET 74 OF 81	



- TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- S S DENOTES IMPACTS IN SURFACE WATER
- F F DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING



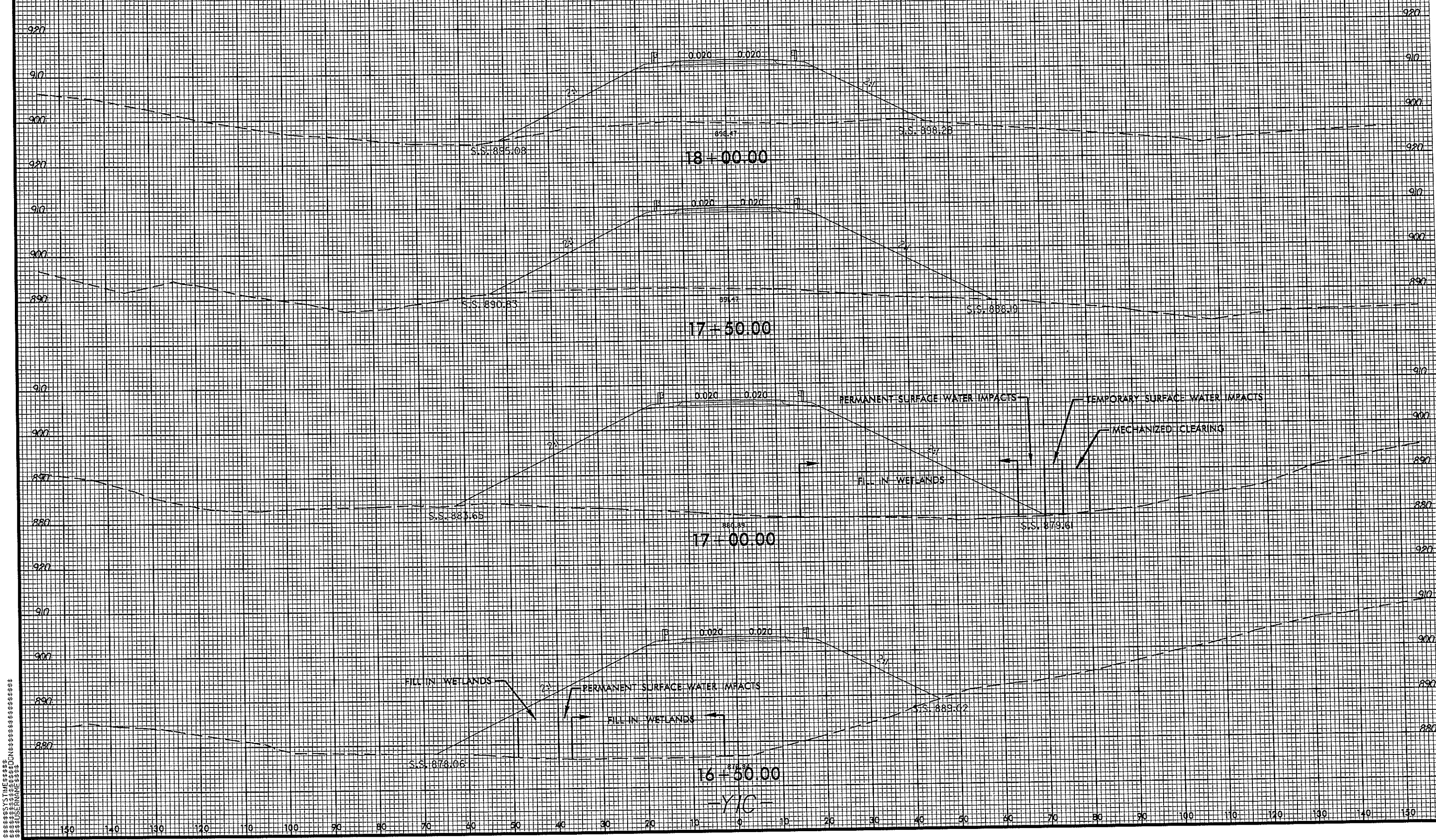
SITE 4

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8/23/99

R-2413A X-433

PERMIT DRAWING
SHEET 75 OF 81



SITE 22

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

NAD 83/NSRS 2007

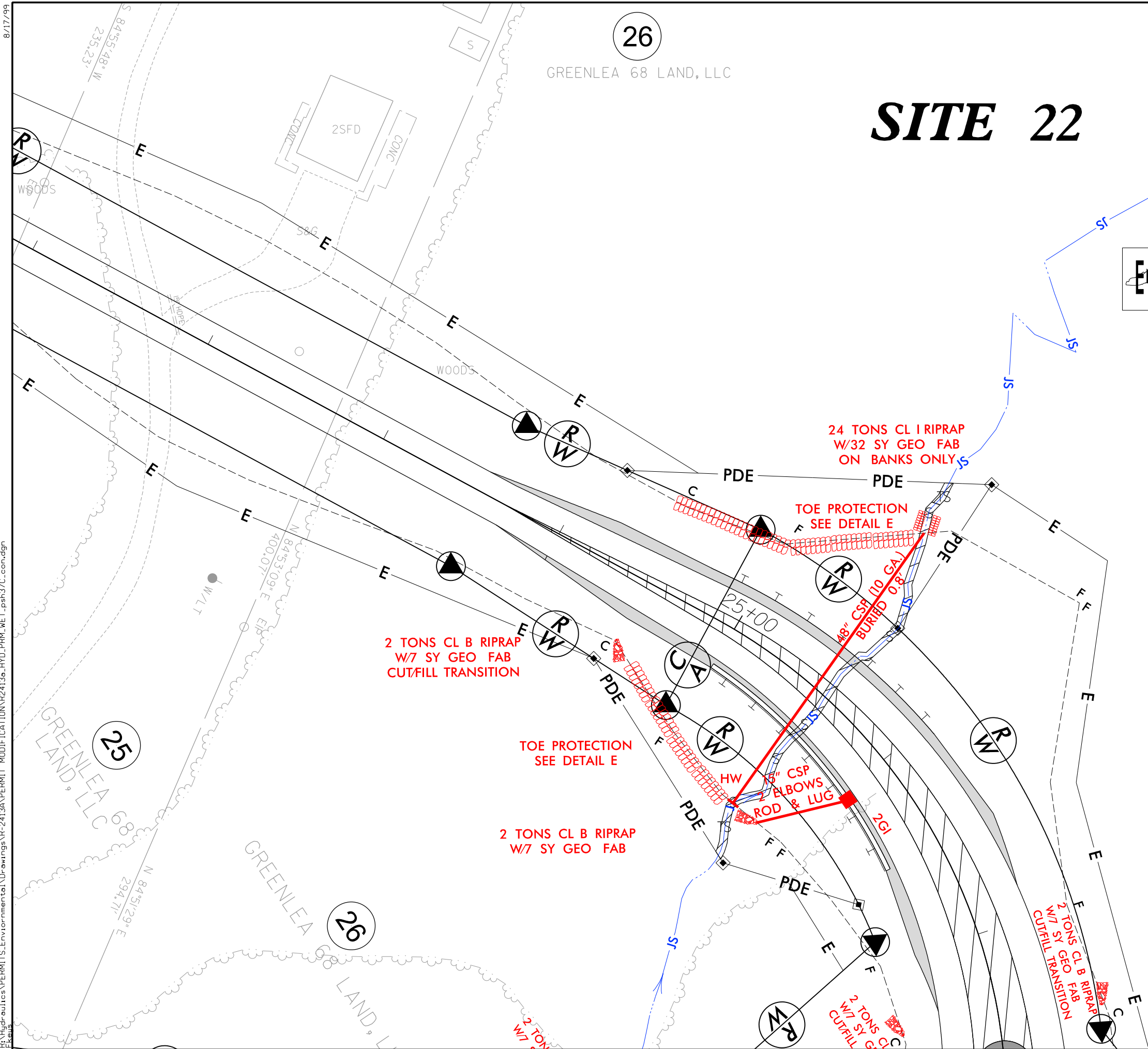


GRAPHIC SCALE

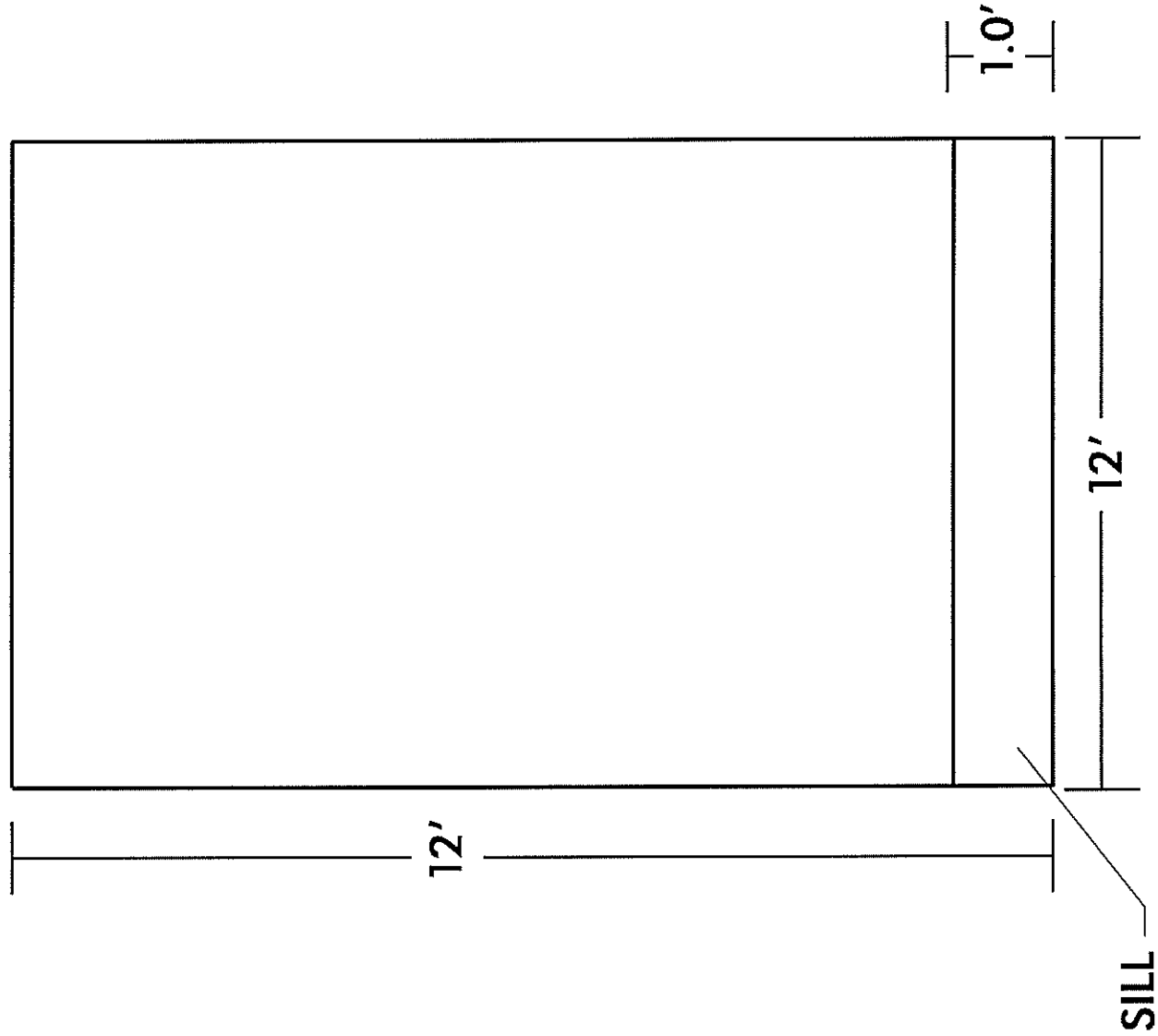
50 0 100

PLANS

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ALEIGH, NORTH CAROLINA 27609-3960
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SILL DETAIL



(PLACE SILL AT INLET AND OUTLET)

WETLAND PERMIT IMPACT SUMMARY												
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			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)
7	206+50 to 208+50 -L-	60" CSP & 54" CSP										
7a.								0.03	<0.01	379	21	
7b.								<0.01	<0.01	26	10	
7c.								<0.01		31		
		Bank Stabilization								45		
8	228+00 to 233+50 -L-	66" CSP										
8a.								0.06	<0.01	654	50	
8b.								<0.01		50		
8c.								<0.01		34		
		Bank Stabilization								21		
9	232+50 to 235+50 -L-	42" CSP						0.60 (pond)				
10	247+50 -L-	72" CSP										
10a.			0.01		<0.01			0.05	<0.01	426	41	
10b.								<0.01		49		
10c.			<0.01			0.01		0.01		116		
		Bank Stabilization								20		
11	249+50 to 251+50 -L-	48" CSP	0.12					<0.01	<0.01	47	17	
TOTALS:								0.15				

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

PERMIT DRAWING
SHEET 79 OF 81

4/17/2013

WETLAND PERMIT IMPACT SUMMARY												
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			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)
12	269+50 -L-	72" CSP										
12a.								0.03		299		1163*
12b.								0.01		131		
13	277+00 to 281+00 -L-	54" RCP										
13a.								0.04	<0.01	525	10	977*
13b.								0.01		106		
14	307+00 -L-	78" CSP										
14a.								0.07		551	20	
14b.								0.02		258	10	
		Bank Stabilization								25		
15	322+50 to 326+00 -L-	54" CSP										
15a.			0.01					0.04	<0.01	513	41	
		Bank Stabilization								20		
15b.								<0.01		46		
16	327+50 to 329+50 -L-	72" CSP										
16a.			0.15					0.02	<0.01	342	29	
		Bank Stabilization								20		
16b.								<0.01		33		
SUBTOTALS:			0.16					0.21	0.03	2,869	110	2,140

* See Plan for On-Site Mitigation

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

PERMIT DRAWING
SHEET 80 OF 81

7/1/2013

WETLAND PERMIT IMPACT SUMMARY												
			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	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)
17	-L- 334+00-336+50	36" CSP	0.35			0.03						
18	-L- 338+00-340+50	Bridge		0.04			0.13		0.03		172	
19	-L- 348+00-353+00	60" RCP						0.03	<0.01	507	34	
20	-Y4- 17+50-19+00	36" CSP	0.11					0.02		240		
21	-Y5- 29+00-36+00	1@12'x12' RCBC										
21A			2.11			0.13		0.06	0.09	288	262	250*
21B		Road Fill						0.01		149		
22	Y1C- 25+50	48" CSP						0.02	<0.01	177	40	
		Bank Stabilization								16		
23	-Y5- 16+50	30" CSP/PDE							<0.01		12	
SUBTOTALS:			2.57	0.04		0.16	0.13	0.14	0.15	1377	520	250
TOTALS:			3.11 **	0.04	<0.01	0.19	0.13	1.42	0.30	8937	977 ***	2390

* SEE PLAN FOR ON-SITE MITIGATION

** DUE TO SITE 1 WETLAND IMPACTS ERROR, PERMANENT FILL IN WETLAND IN ORIGINAL PERMIT WAS SUMMED WRONG. IT WAS LISTED AS 3.13ac; IT SHOULD HAVE BEEN 3.14ac

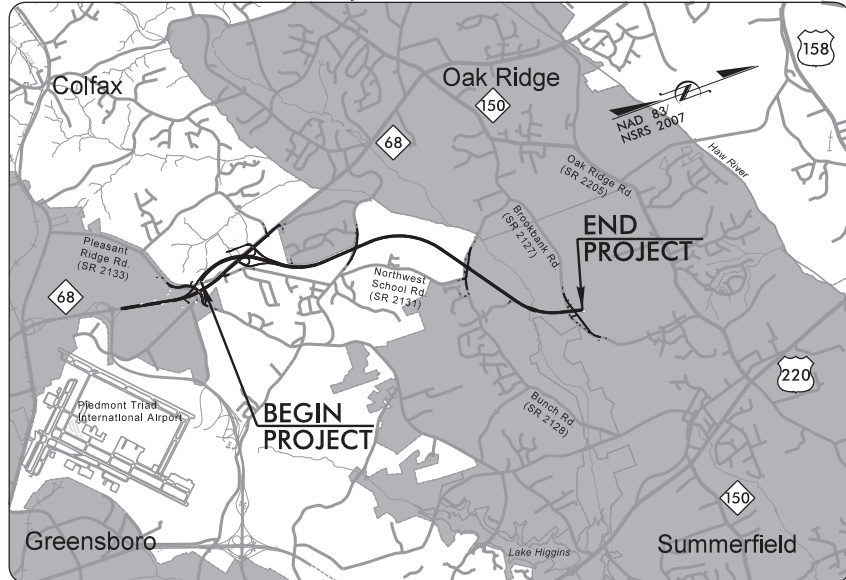
*** TEMP CHANNEL IMPACT IN ORIGINAL PERMIT WAS SUMMED WRONG. IT WAS LISTED AS 942 FT; IT SHOULD HAVE BEEN 952 FT.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

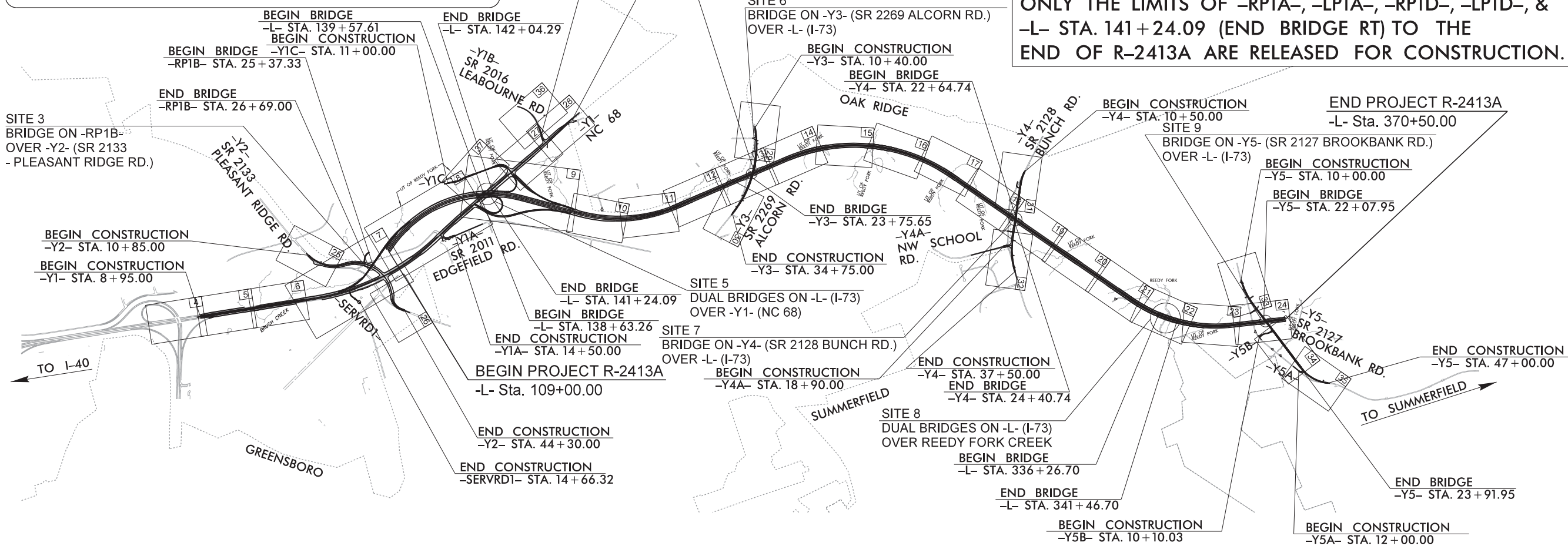
UNION COUNTY
WBS - 34533.5.TA1 (R-3329/2559)
PERMIT DRAWING
SHEET 81 OF 81

REVISED
9/3/2014

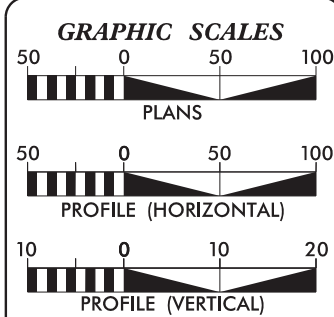
See Sheet 1A for Index of Sheets
See Sheet 1B For Conventional Symbols



VICINITY MAP



THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.



DESIGN DATA

ADT 2014 = 24,500
ADT 2035 = 42,200
DHV = 11%
D = 65%
*T = 15%
V = 70 mph

(*TTST 10% + DUALS 5%)
FUNC. CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2431A..... 4.807 mi
LENGTH STRUCTURES TIP PROJECT R-2431A..... 0.146 mi
TOTAL LENGTH TIP PROJECT R-2431A..... 4.953 mi

NCDOT CONTACT

K. Zak Hamidi, P.E.
PROJECT ENGINEER - DESIGN BUILD GROUP

PLANS PREPARED BY:

RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE, SUITE 350
RALEIGH, NORTH CAROLINA 27609
NC LICENSE NO. P-0112

FOR NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS



J.T. Peacock, Jr., P.E.
PROJECT ENGINEER

Brandon J. McInnis, P.E.
PROJECT DESIGN ENGINEER

LETTING DATE:
APRIL 2014

HYDRAULICS
ENGINEER

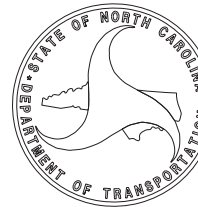


SIGNATURE:

ROADWAY
DESIGN
ENGINEER



SIGNATURE:



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

FYI

LOCATION: FUTURE I-73 FROM EAST OF SR 2127
(BROOKBANK ROAD) TO HAW RIVER

TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING,
RESURFACING, STRUCTURES, SIGNALS,
SIGNING, LIGHTING, & ITS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413A	1	
WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
34429.3.S8	NHF-0073(25)	PE	

RFC

RELEASED FOR CONSTRUCTION

RFC PLANS
SUBMITTAL NO.: S-055
DATE: 9-10-14

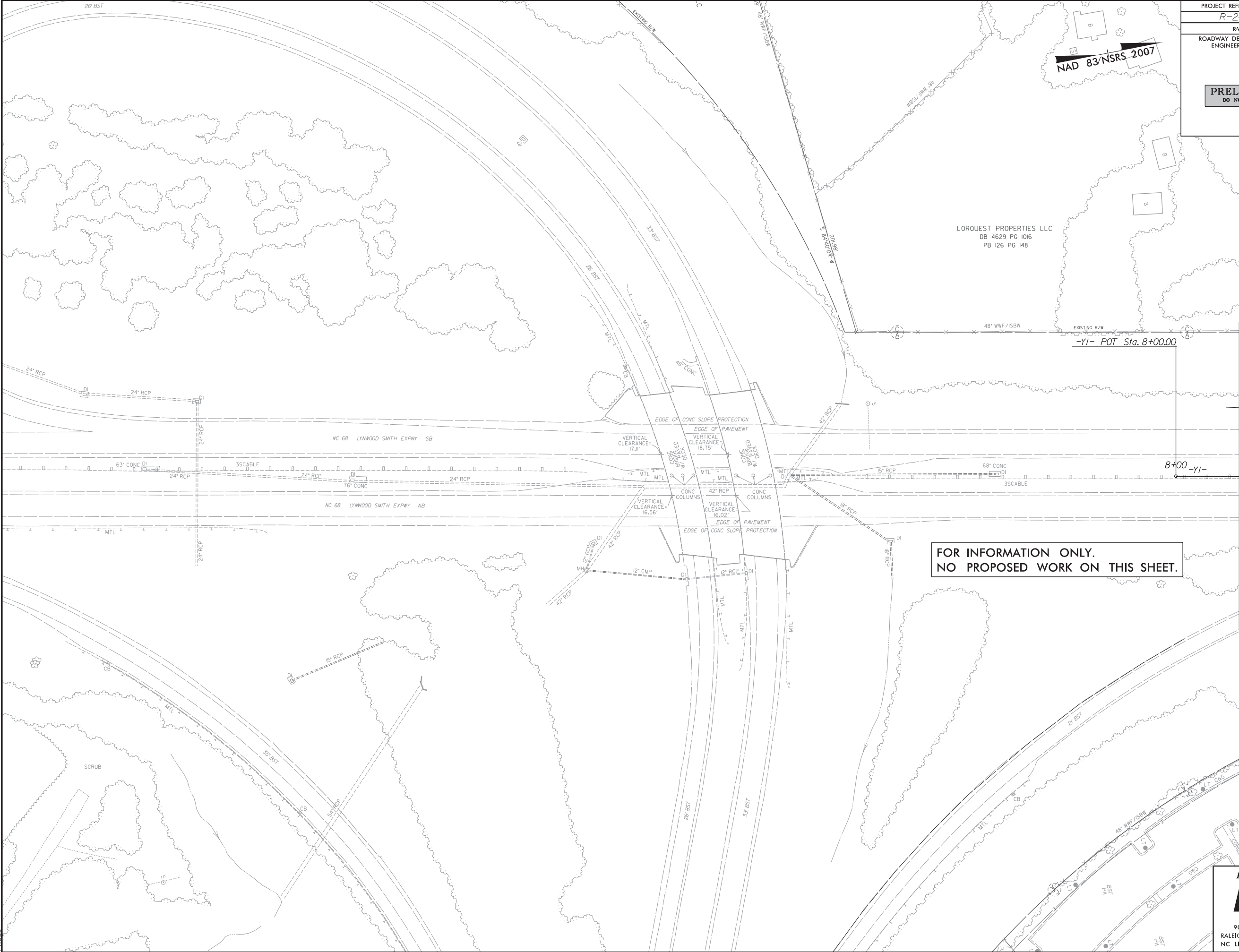
ONLY THE LIMITS OF -RP1A-, -LP1A-, -RP1D-, -LP1D-, &
-L- STA. 141+24.09 (END BRIDGE RT) TO THE
END OF R-2413A ARE RELEASED FOR CONSTRUCTION.

TIP PROJECT: R-2413A

CONTRACT: C203433

8/17/99

8/12/2014
B:\Roadway\Proj\R2413a_Rdy.pst\04.dgn
E:\



PROJECT REFERENCE NO.		SHEET NO.	
R-2413A		4	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

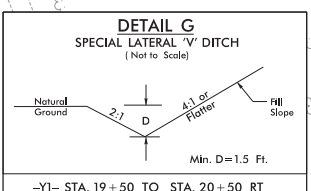
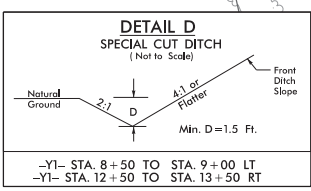
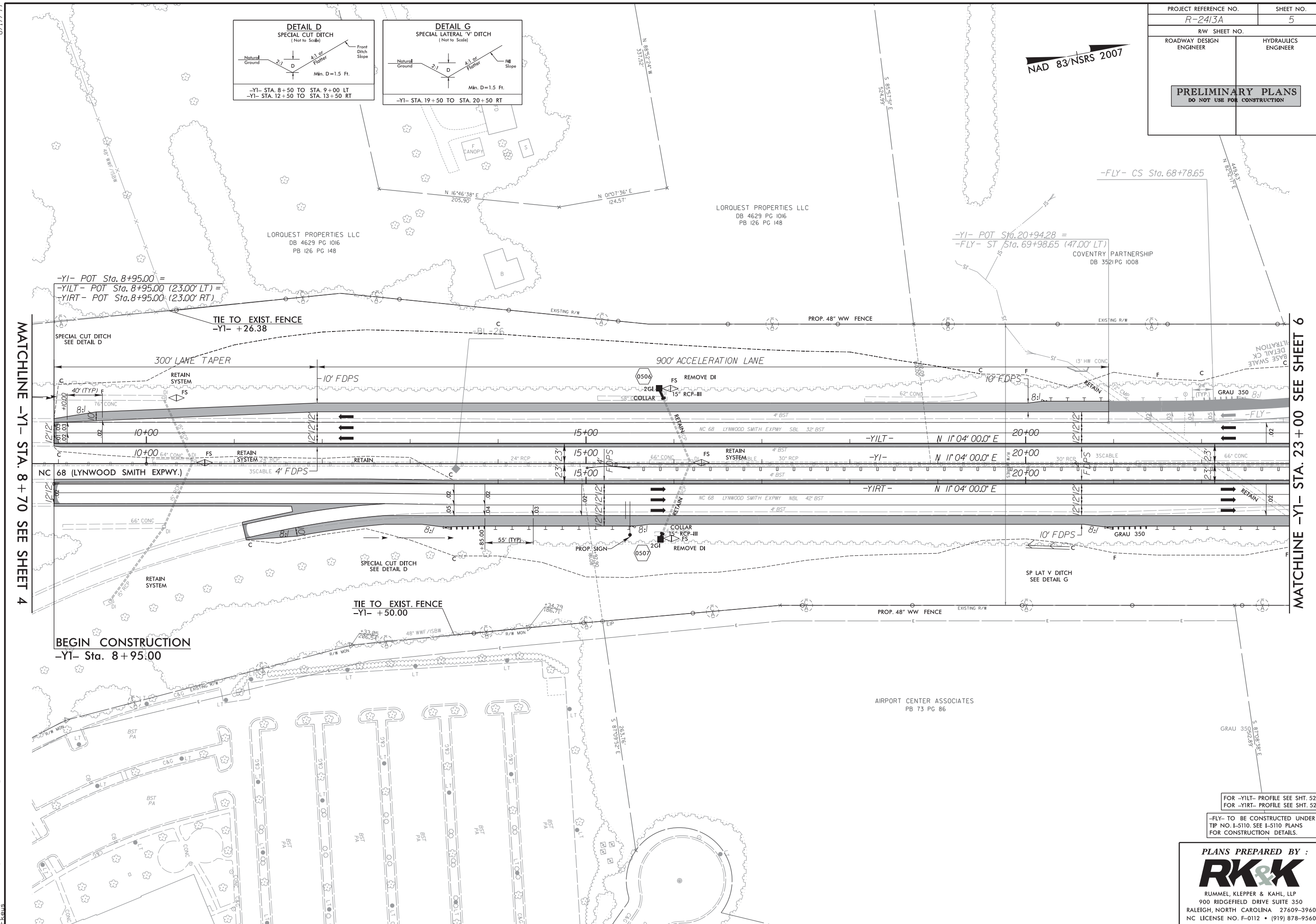
FOR INFORMATION ONLY.
NO PROPOSED WORK ON THIS SHEET.

MATCHLINE -Y1- STA. 8 + 70 SEE SHEET 4

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
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8/17/99

8/12/2014
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PROJECT REFERENCE NO.		SHEET NO.
R-2413A		5
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

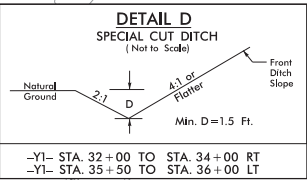
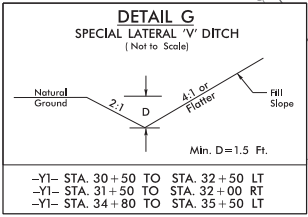
NAD 83/NSRS 2007

FOR -YILT- PROFILE SEE SHT. 52
FOR -YIRT- PROFILE SEE SHT. 52

-FLY- TO BE CONSTRUCTED UNDER
TIP NO. I-5110. SEE I-5110 PLANS
FOR CONSTRUCTION DETAILS.

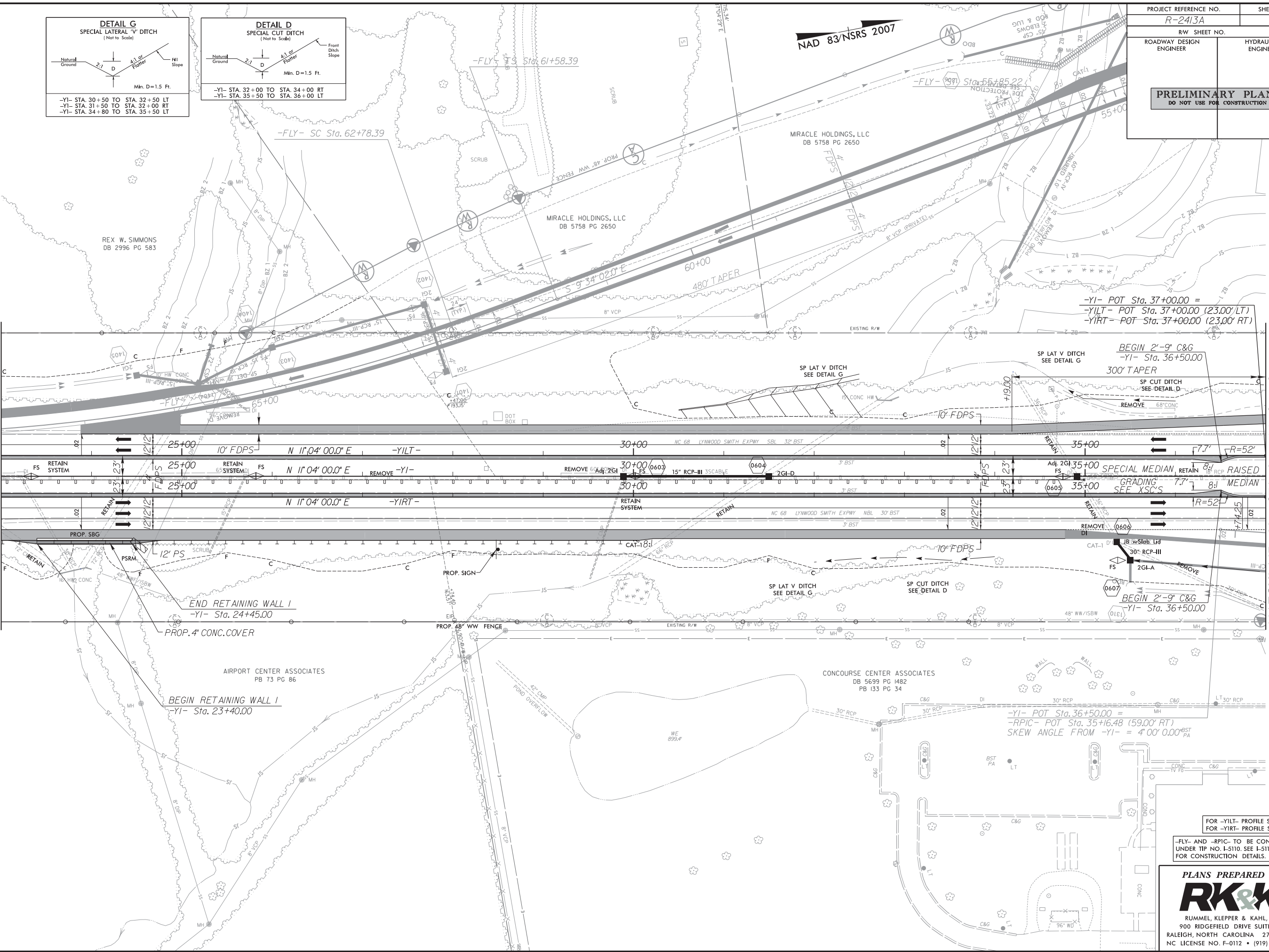
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99
8/12/2014
B:\Roadway\Proj\R2413a_Rdy.pst\06.dgn



PROJECT REFERENCE NO. R-2413A		SHEET NO. 6	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

MATCHLINE -Y1- STA. 23+00 SEE SHEET 5

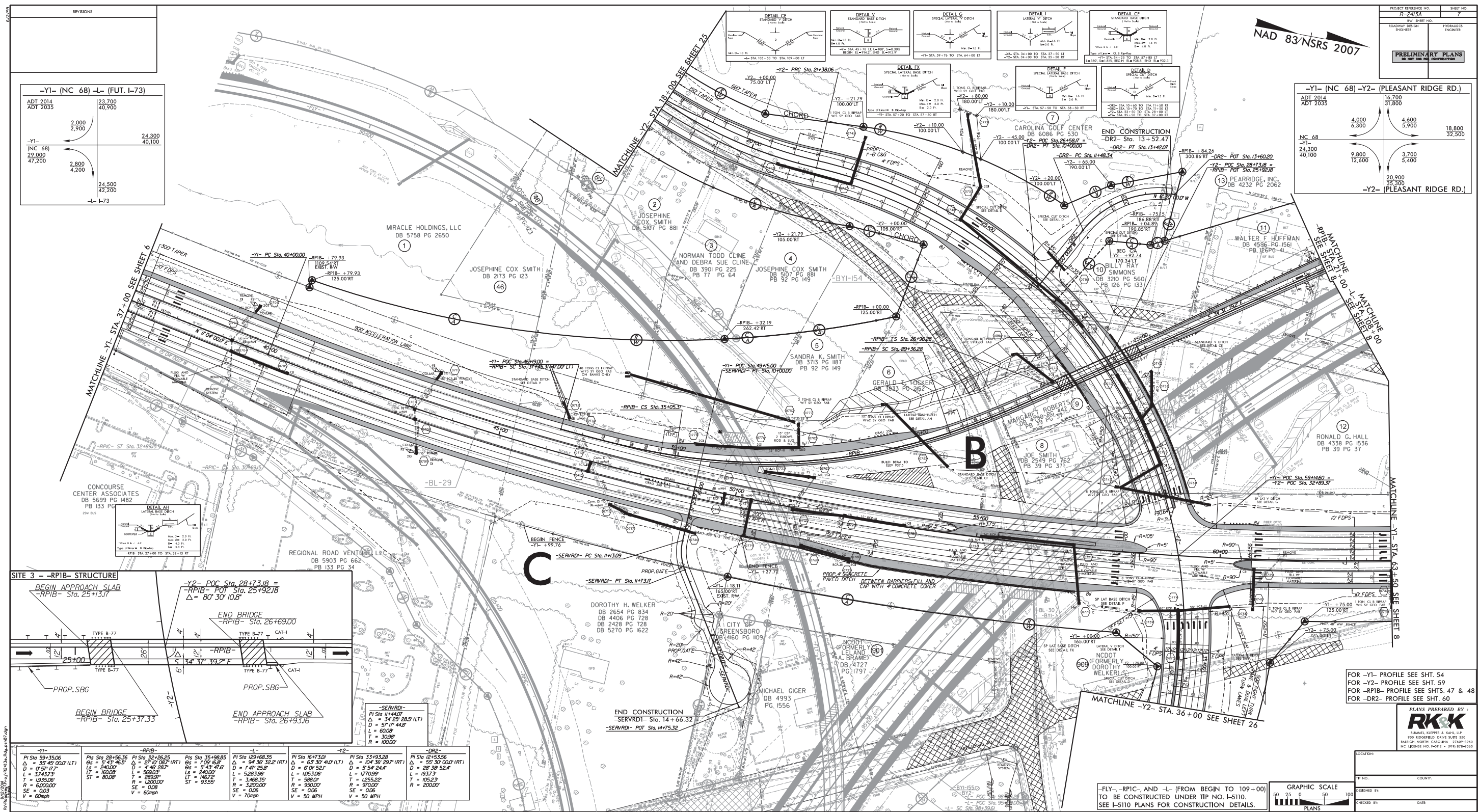


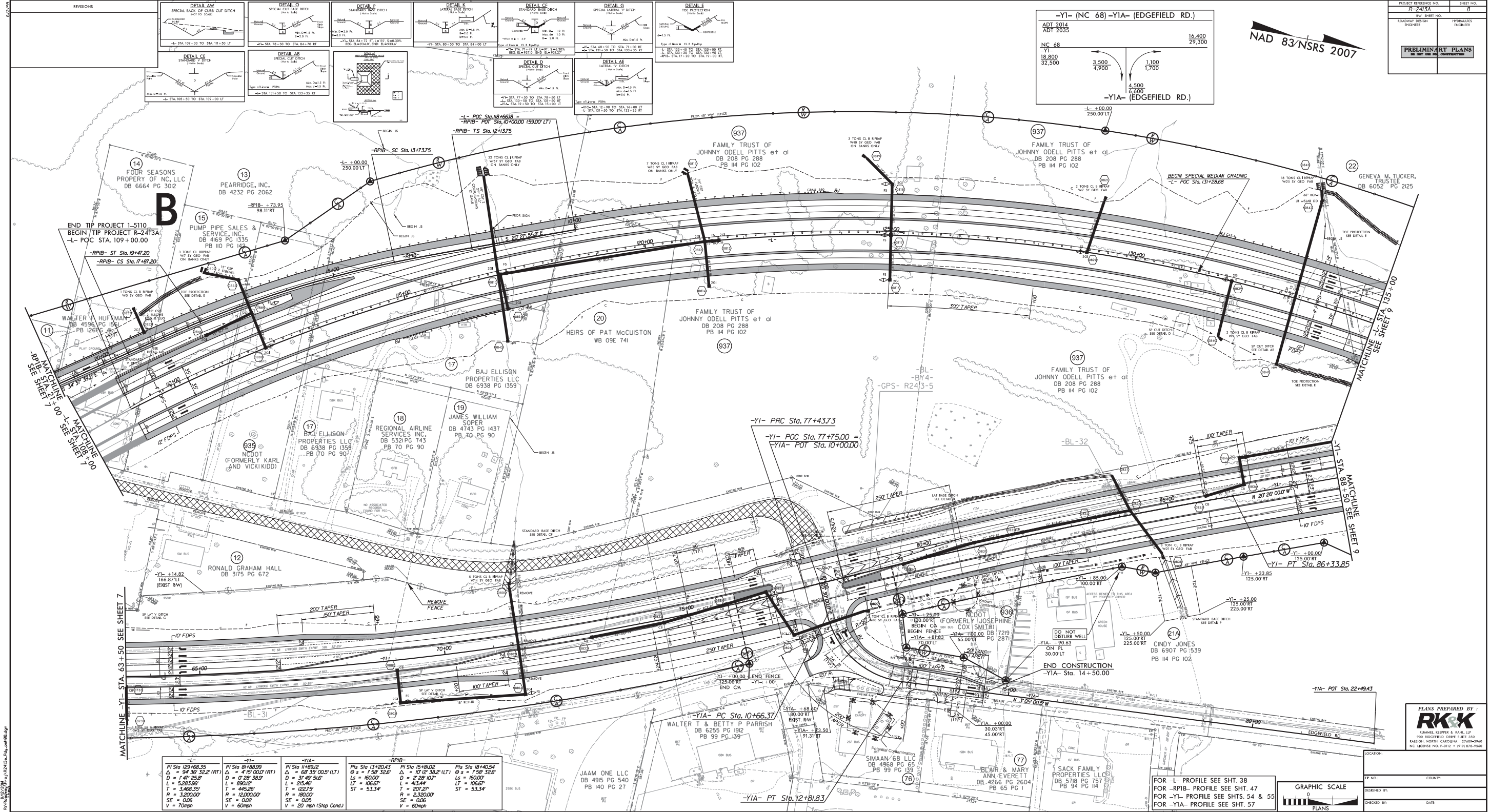
MATCHLINE -Y1- STA. 37+00 SEE SHEET 7

FOR -Y1LT- PROFILE SEE SHT. 53
FOR -Y1RT- PROFILE SEE SHT. 53

-FLY- AND -RPIC- TO BE CONSTRUCTED
UNDER TIP NO. I-5110. SEE I-5110 PLANS
FOR CONSTRUCTION DETAILS.

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

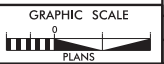




8/10/2024 10:00 AM C:\Users\j\OneDrive\Documents\2413a_Road\2413a.dgn

-Y1-		-Y1A-		-Y1B-	
Pi Sta 12+00.00	Pi Sta 12+00.00	Pi Sta 12+00.00	Pi Sta 12+00.00	Pi Sta 12+00.00	Pi Sta 12+00.00
Δ = 14° 25' 32.2" (RT)	Δ = 14° 25' 32.2" (RT)	Δ = 14° 25' 32.2" (RT)	Δ = 14° 25' 32.2" (RT)	Δ = 14° 25' 32.2" (RT)	Δ = 14° 25' 32.2" (RT)
L = 528.158'	L = 528.158'	L = 528.158'	L = 528.158'	L = 528.158'	L = 528.158'
T = 346.315'	T = 346.315'	T = 346.315'	T = 346.315'	T = 346.315'	T = 346.315'
R = 3,200.00'	R = 3,200.00'	R = 3,200.00'	R = 3,200.00'	R = 3,200.00'	R = 3,200.00'
SE = 0.06	SE = 0.06	SE = 0.06	SE = 0.06	SE = 0.06	SE = 0.06
V = 70mph	V = 70mph	V = 70mph	V = 70mph	V = 70mph	V = 70mph

FOR -L- PROFILE SEE SHT. 38
FOR -RPB- PROFILE SEE SHT. 47
FOR -Y1- PROFILE SEE SHTS. 54 & 55
FOR -Y1A- PROFILE SEE SHT. 57



DESIGNED BY: _____
CHECKED BY: _____
DATE: _____

PLANS PREPARED BY:
RK&K
RUMBLE, KALP & KALP, LLP
1000 ROSEFIELD DRIVE SUITE 350
FARMER, NORTH CAROLINA 27804-9949
NC LICENSE NO. 6-0112 • (919) 878-9568

REVISIONS

DETAIL A

DETAIL B

DETAIL C

DETAIL D

DETAIL E

DETAIL F

DETAIL G

DETAIL H

DETAIL I

DETAIL J

PROJECT REFERENCE NO. **R-2413A**

SHEET NO. **8**

REV. SHEET NO. _____

ROADWAY DESIGN ENGINEER _____

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1- (NC 68) -Y1A- (EDGEFIELD RD.)

ADT 2014
ADT 2035

NC 68
18,800
32,500

16,400
29,300

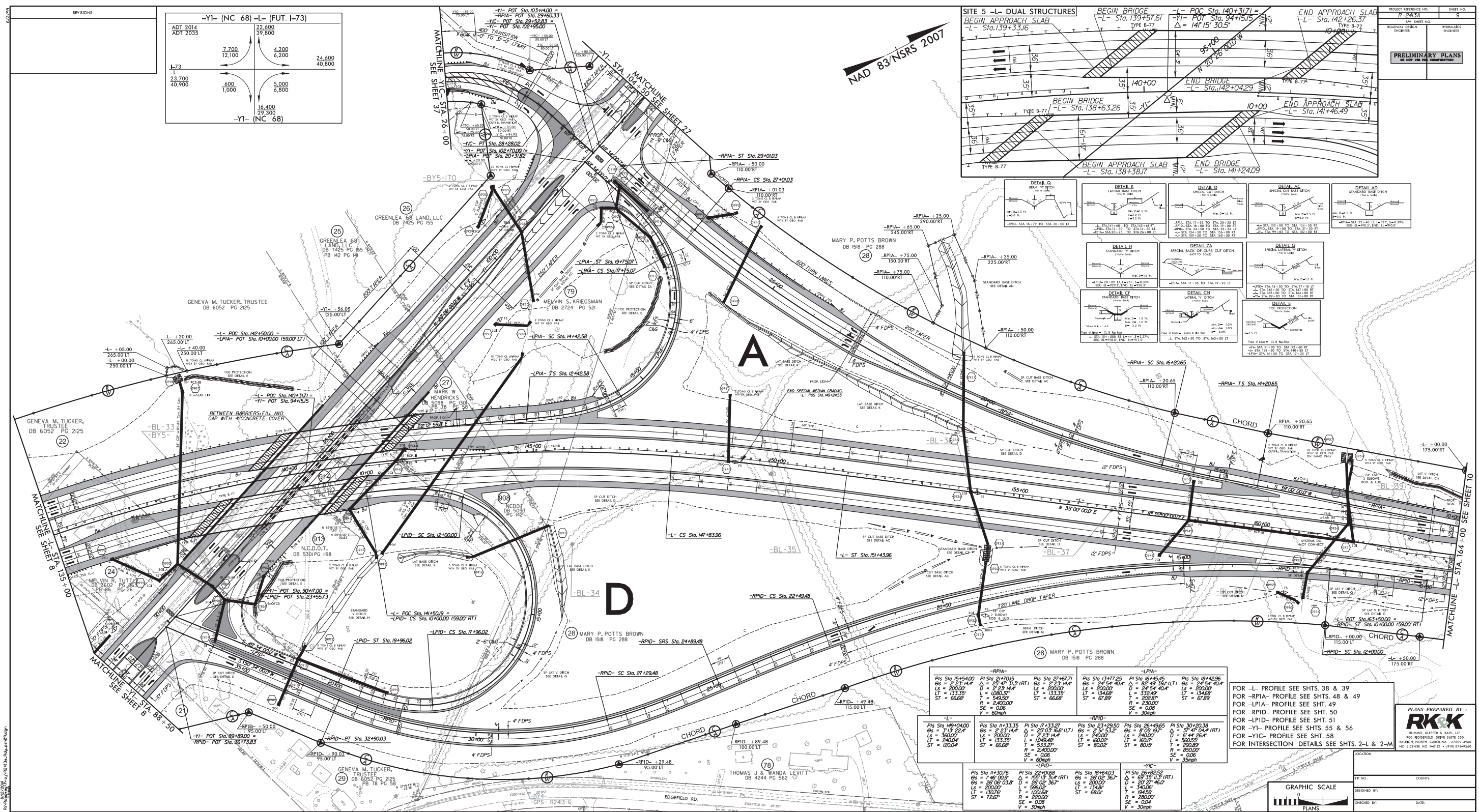
3,500
4,900

1,100
1,700

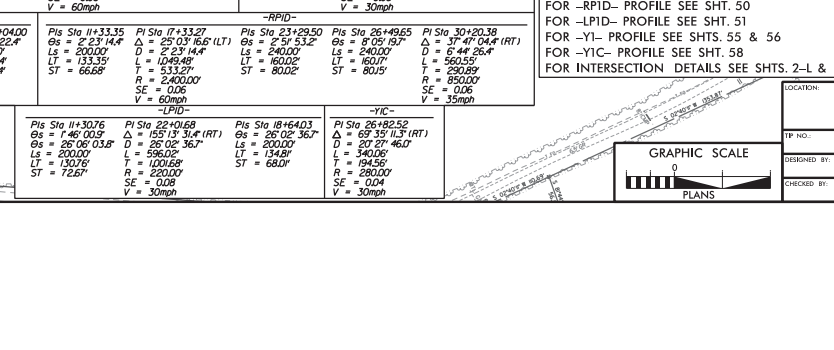
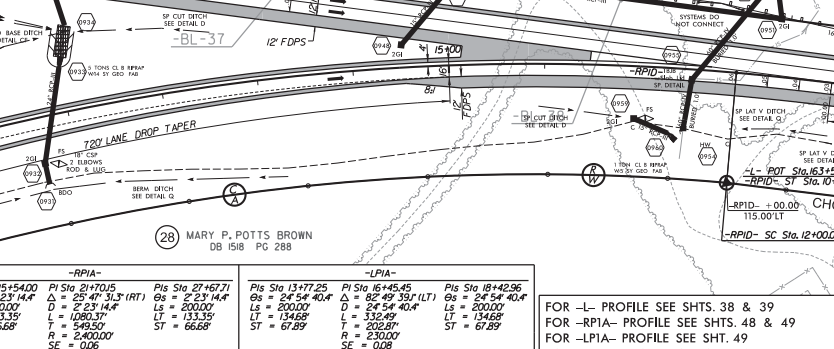
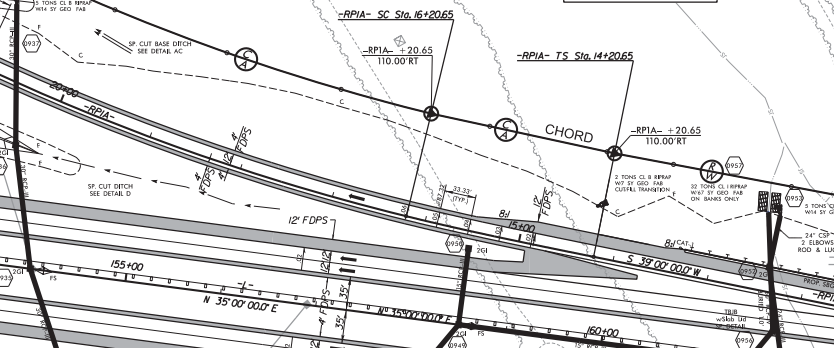
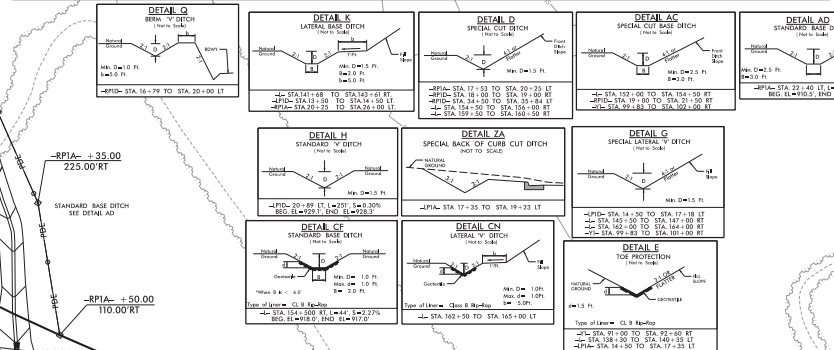
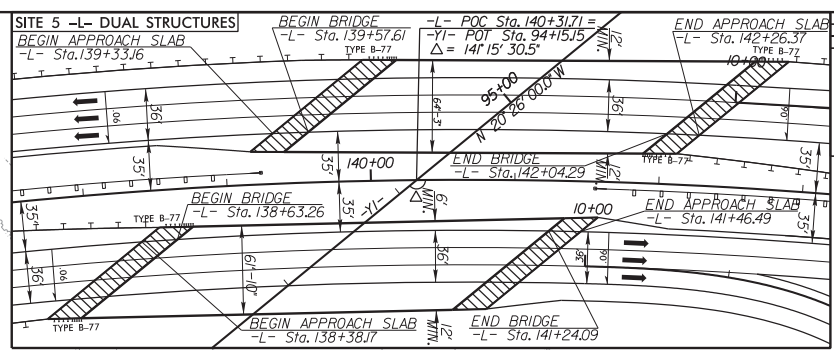
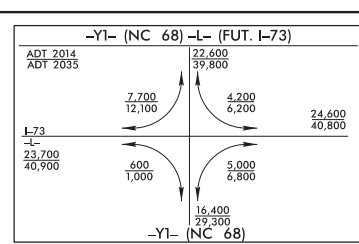
4,500
6,500

-Y1A- (EDGEFIELD RD.)

NAD 83/NSRS 2007



REVISIONS	
NO.	DESCRIPTION
1	ADT 2014
2	ADT 2035



PROJECT REFERENCE NO.
R-243A

SHEET NO.
9

REV. SHEET NO.
INCHES

FEET

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

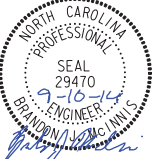
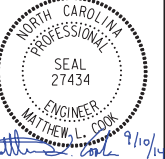
PLANS PREPARED BY:
RK&K
RURAL KAPLAN & KAPLAN, LLC
1000 ROBERTSON DRIVE, SUITE 350
RALEIGH, NORTH CAROLINA 27609-1949
NC LICENSE NO. 6-0112 • (919) 878-9568

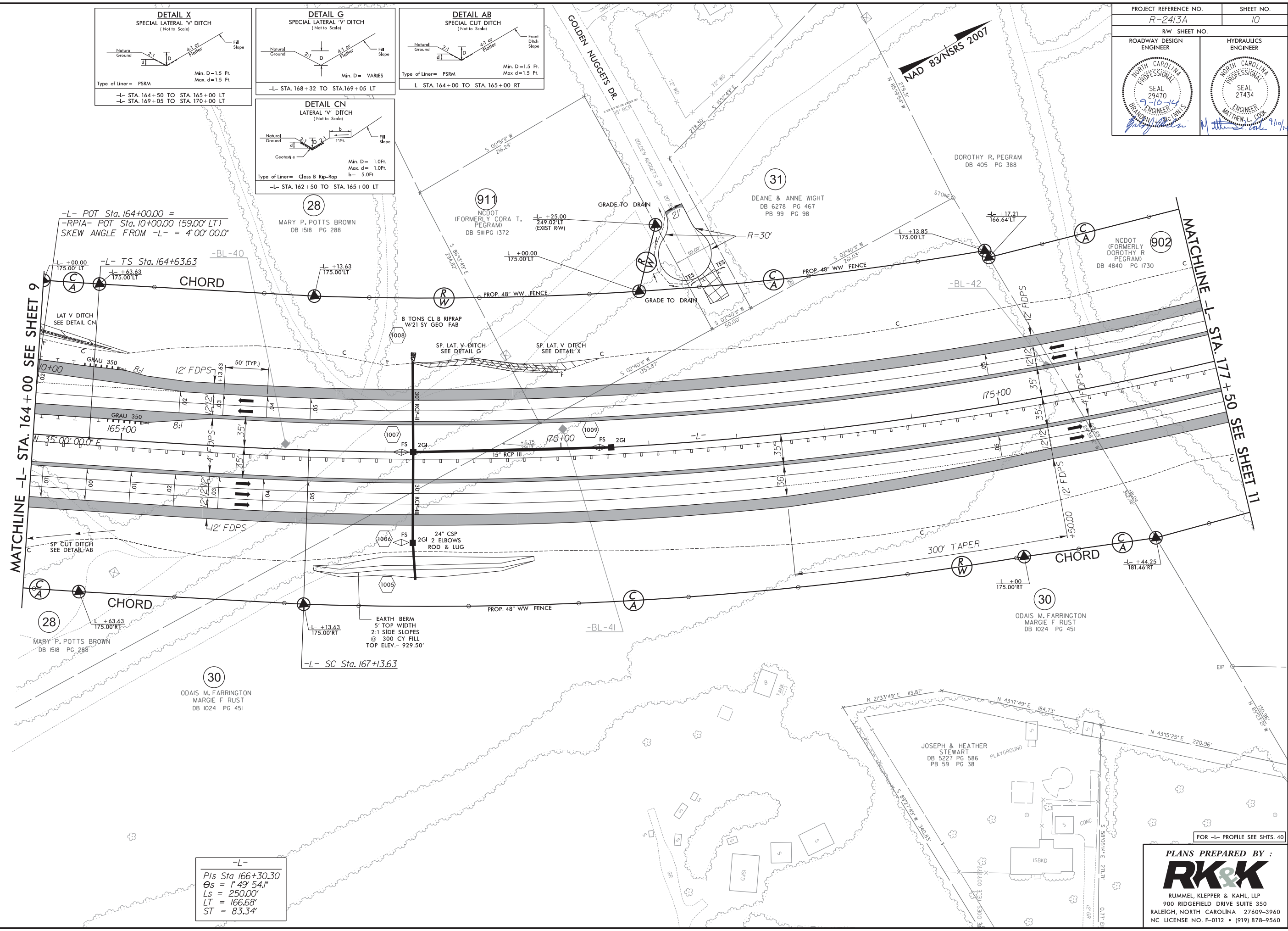
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DESIGNED BY:
CHECKED BY:

COUNTY:
DATE:

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8/17/99

PROJECT REFERENCE NO. R-2413A		SHEET NO. 10	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
			



8/10/2014
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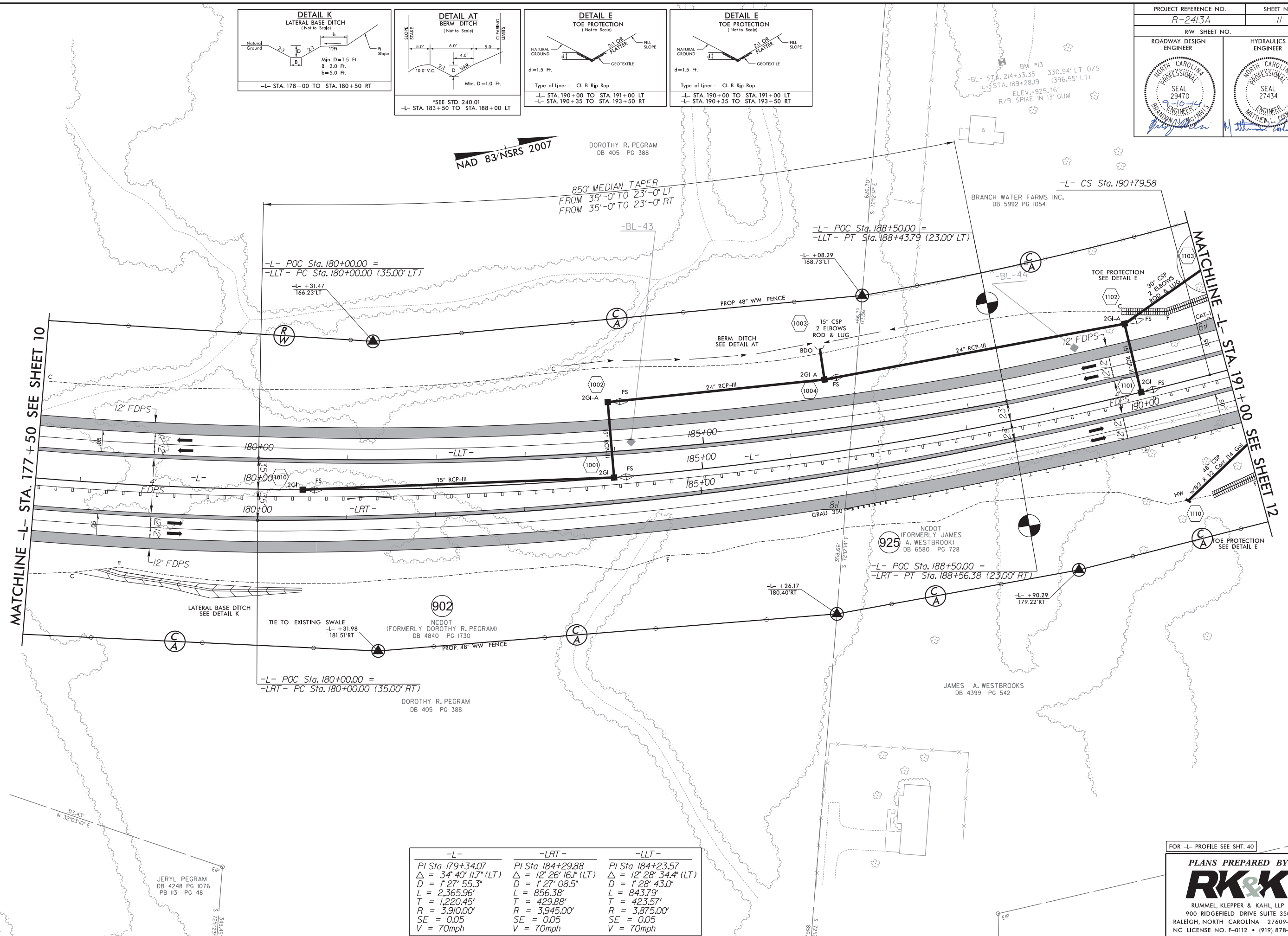
-L-
Pis Sta 166+30.30
Θs = 1° 49' 54.1\"/>
Ls = 250.00'
LT = 166.68'
ST = 83.34'

FOR -L- PROFILE SEE SHTS. 40

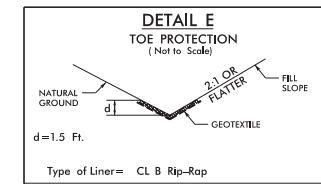
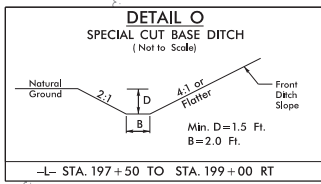
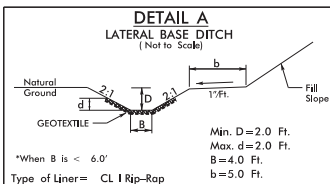
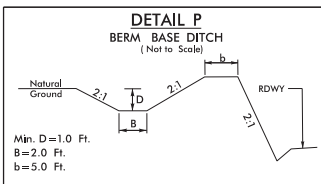
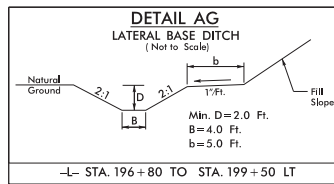
PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



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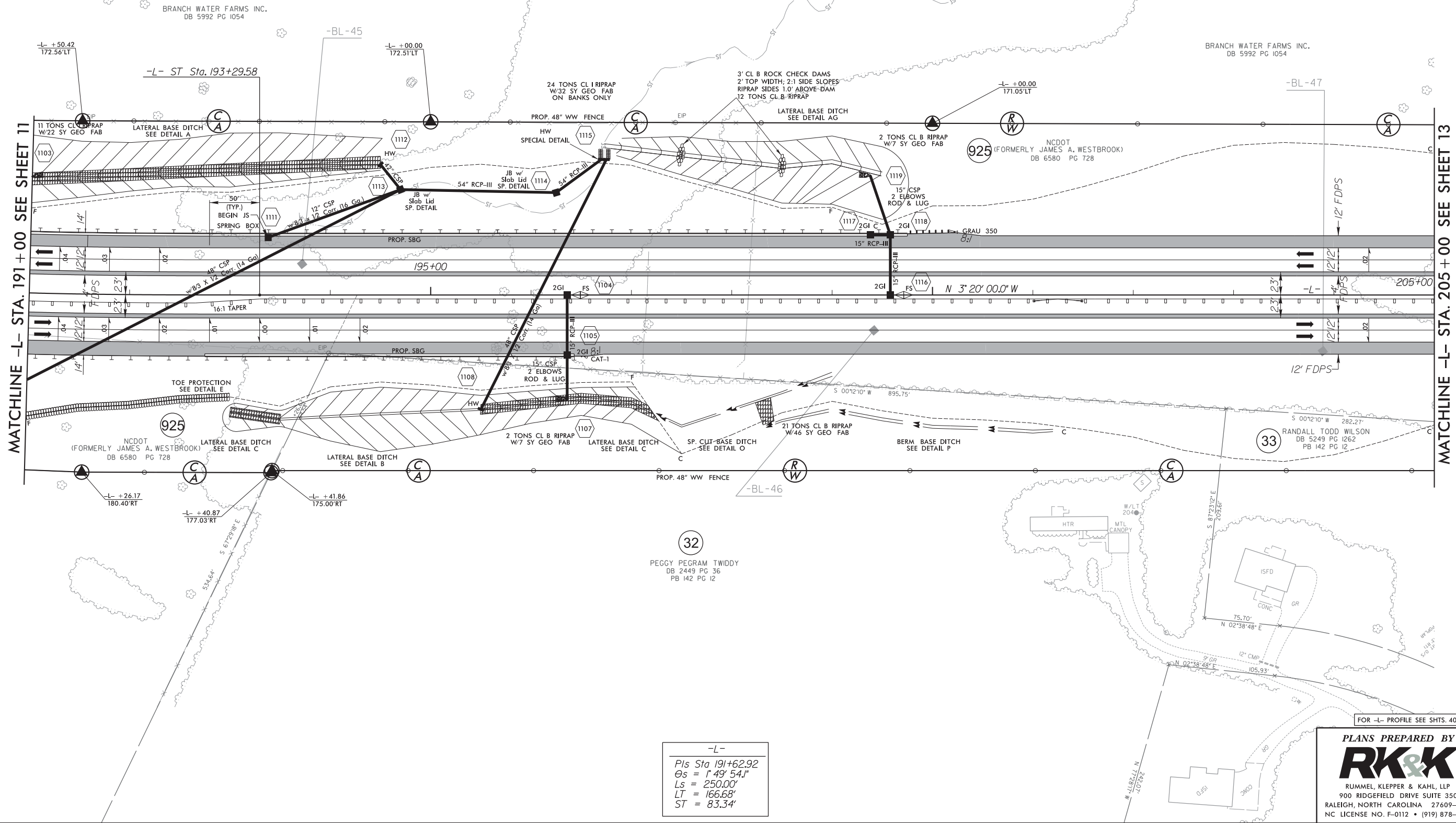
CURB & GUTTER LOCATIONS			
DESCRIPTION	ALN	STATION	LOC
SBG	-L-	191+00.00	199+75.00 LT
SBG	-L-	192+75.00	196+43.00 RT

PROJECT REFERENCE NO. **R-2413A** SHEET NO. **12**

RW SHEET NO.

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29470
BRANDON J. MCINNES

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 27434
MATTHEW L. COOK



8/10/2014
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-L-
Pls Sta 191+62.92
Os = 1' 49' 54.1\"/>
Ls = 250.00'
LT = 166.68'
ST = 83.34'

FOR -L- PROFILE SEE SHTS. 40 & 41

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

PROJECT REFERENCE NO.
R-2413A

SHEET NO.
13

RW SHEET NO.

ROADWAY DESIGN ENGINEER

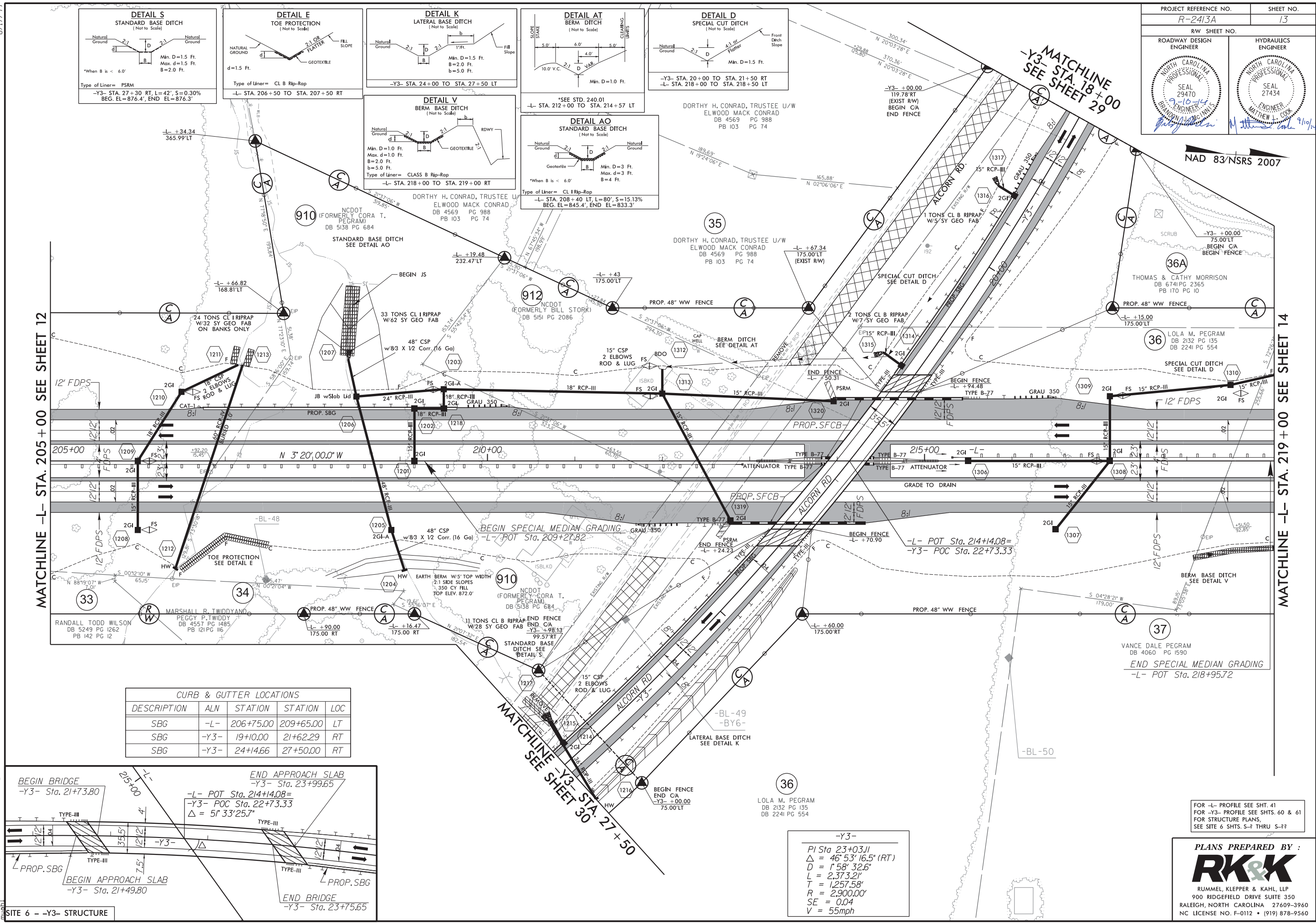
HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 27434

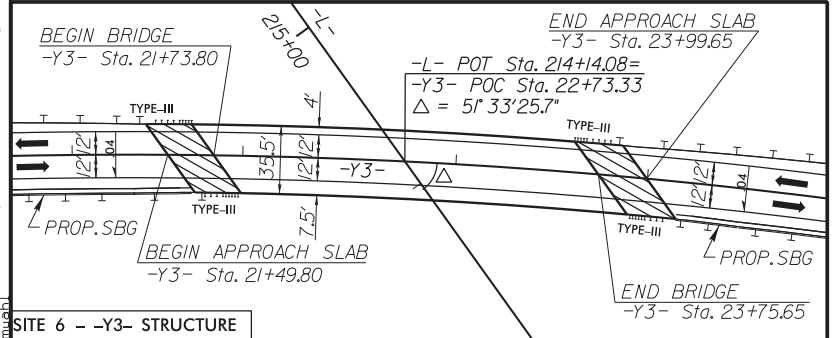
ENGINEER

MATTHEW L. COOK

9/10/14



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	206+75.00	209+65.00	LT
SBG	-Y3-	19+10.00	21+62.29	RT
SBG	-Y3-	24+14.66	27+50.00	RT



-Y3-
PI Sta 23+03.11
 $\Delta = 46' 53'' 16.5''$ (RT)
D = 1' 58'' 32.6"
L = 2,373.21'
T = 1,257.58'
R = 2,900.00'
SE = 0.04
V = 55mph

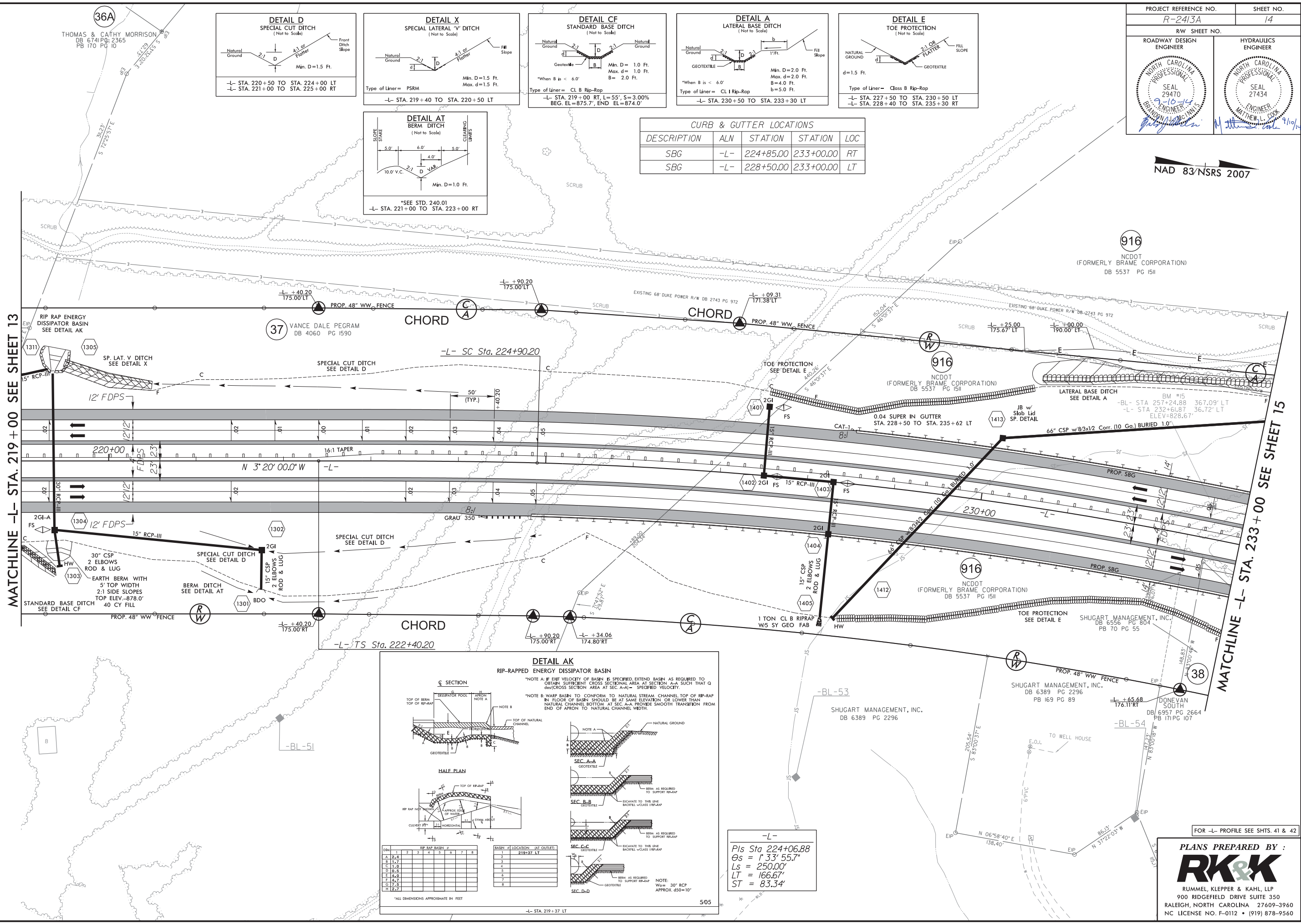
FOR -L- PROFILE SEE SHT. 41
FOR -Y3- PROFILE SEE SHTS. 60 & 61
FOR STRUCTURE PLANS,
SEE SITE 6 SHTS. S-1 THRU S-3

PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99
8/10/2014
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PROJECT REFERENCE NO.
R-2413A

SHEET NO.
14

RW SHEET NO.

HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER

SEAL 29470
BRANDON J. MCINIS
9-10-14

SEAL 27434
MATTHEW L. COOK
9-10-14

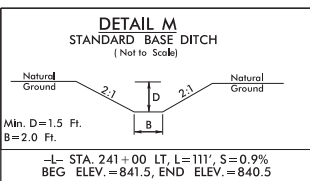
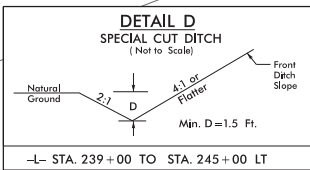
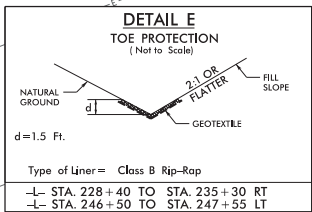
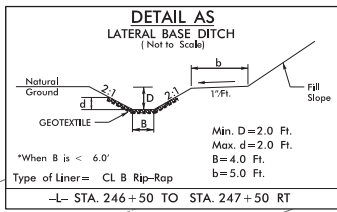
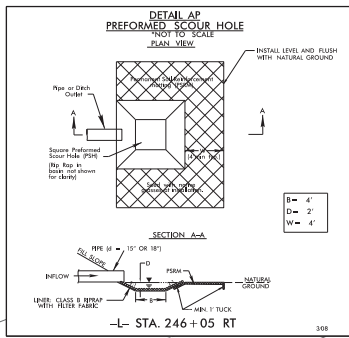
NAD 83/NSRS 2007

FOR -L- PROFILE SEE SHTS. 41 & 42

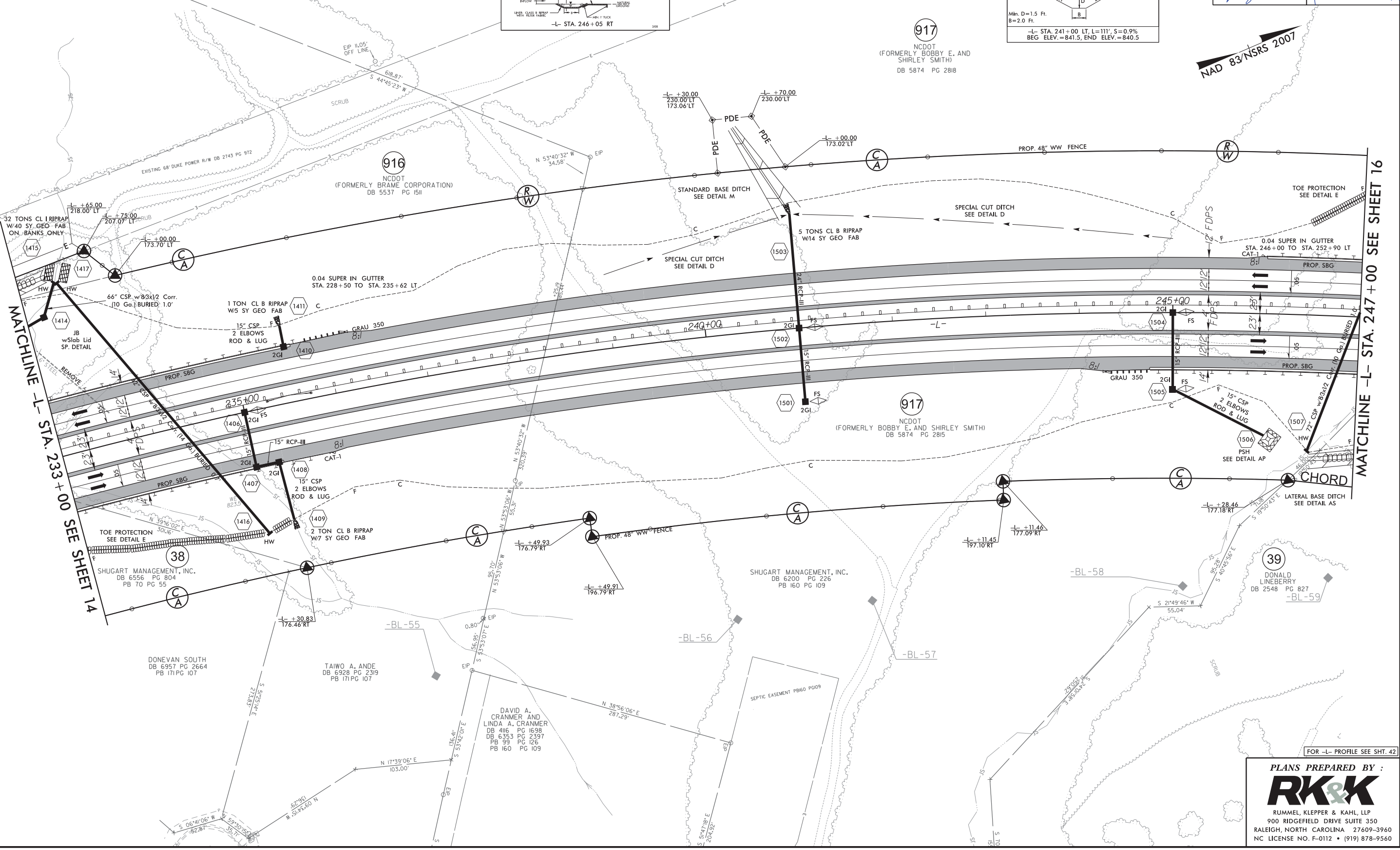
PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99
8/10/2014
R:\Roadway\Project\2413a_Rdy.psh15.dgn

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	233+00.00	235+62.00	LT
SBG	-L-	233+00.00	235+30.00	RT
SBG	-L-	244+75.00	247+00.00	RT
SBG	-L-	246+00.00	247+00.00	LT



PROJECT REFERENCE NO. R-2413A		SHEET NO. 15
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	NORTH CAROLINA PROFESSIONAL SEAL 29470 BRANDON M. MCINNES 9/10/14	
		NORTH CAROLINA PROFESSIONAL SEAL 27434 MATTHEW L. COOK 9/10/14



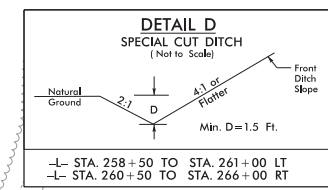
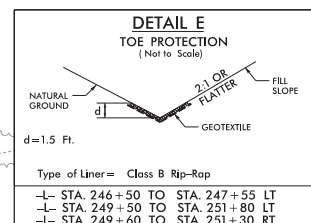
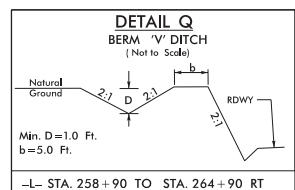
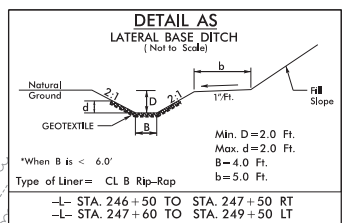
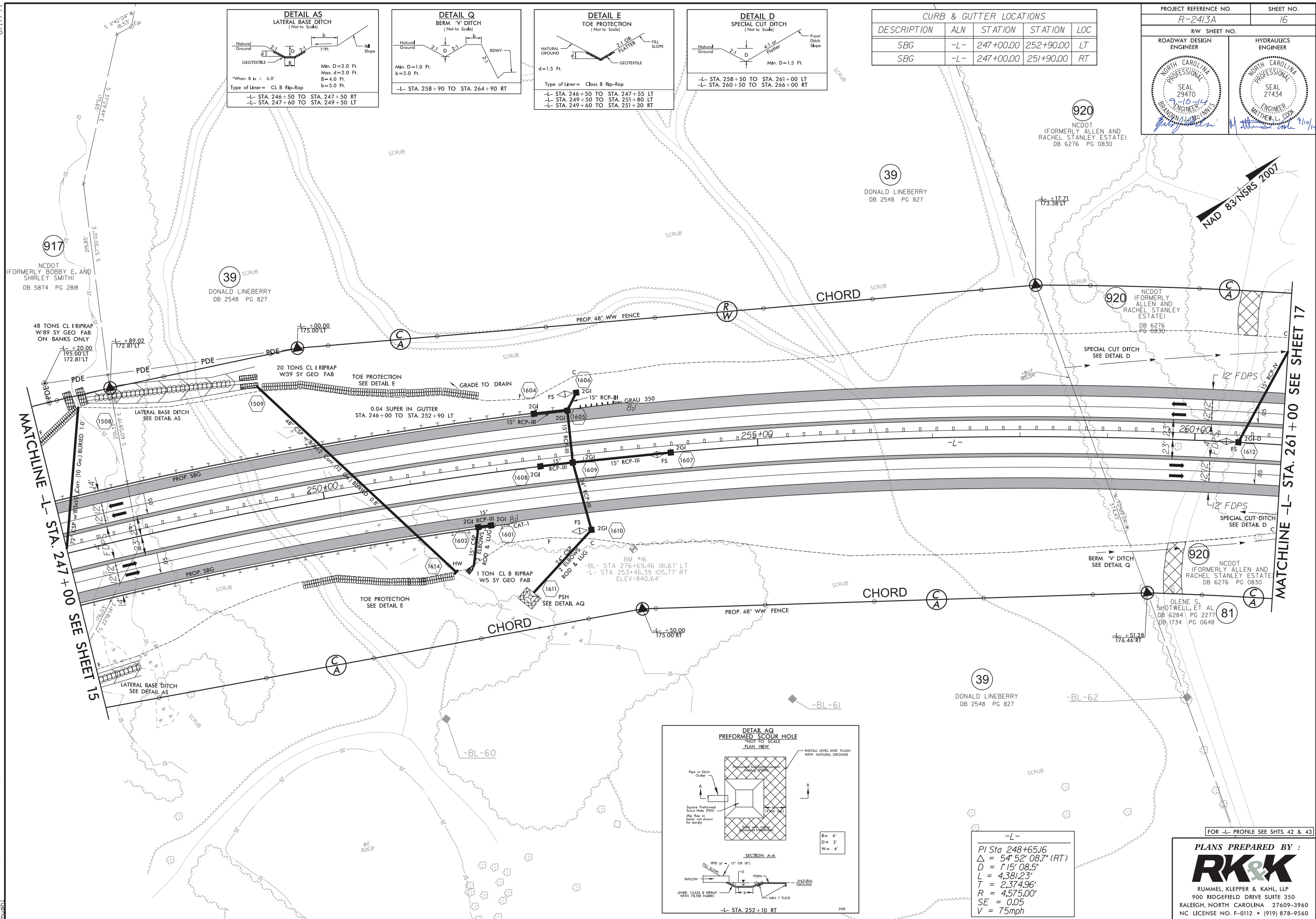
PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

8/10/2014
R:\Roadway\Proj\R2413a_Rdy.psh\6.dgn



CURB & GUTTER LOCATIONS			
DESCRIPTION	ALN	STATION	LOC
SBG	-L-	247+00.00	252+90.00 LT
SBG	-L-	247+00.00	251+90.00 RT

PROJECT REFERENCE NO.
R-2413A

SHEET NO.
16

RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

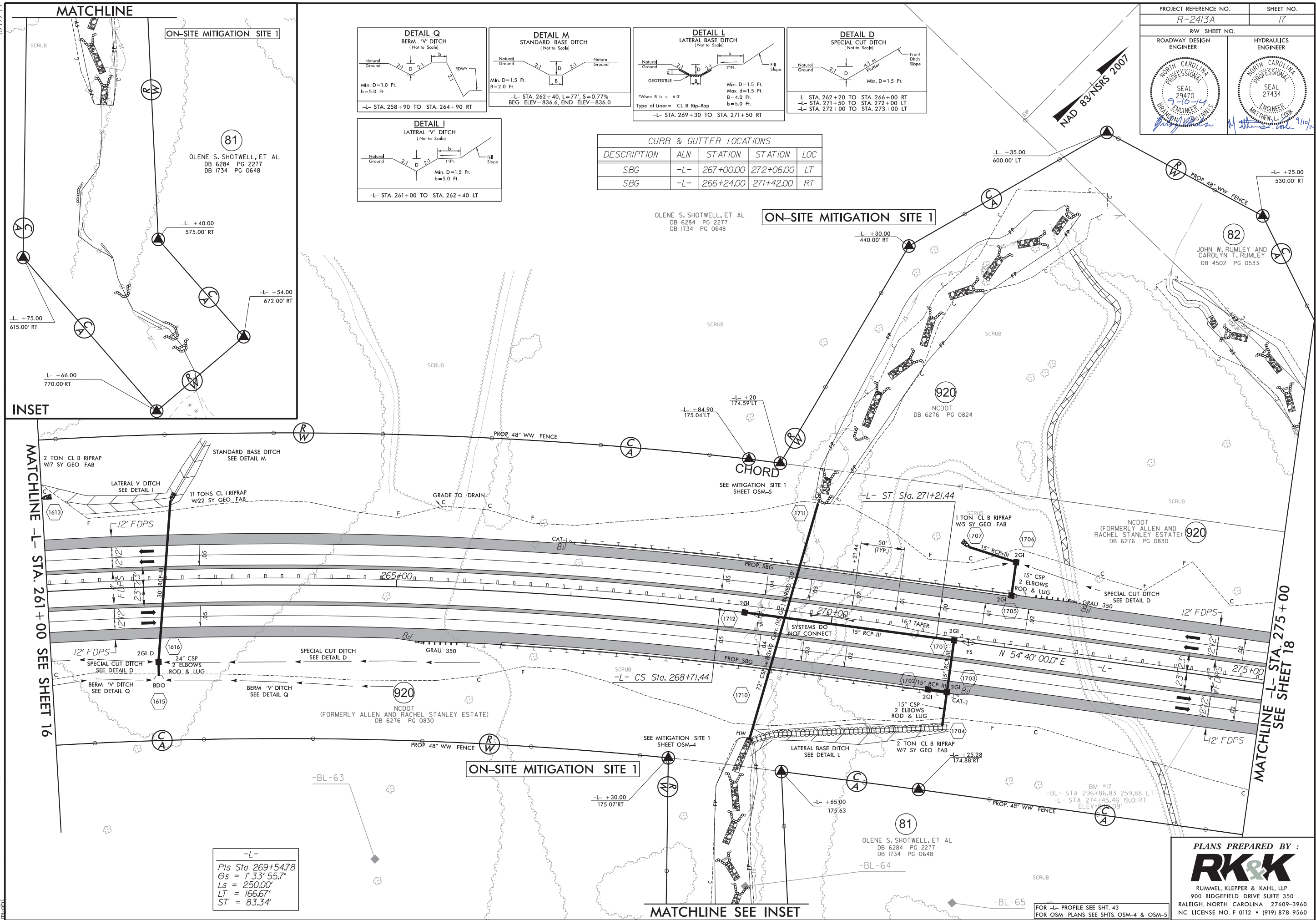
SEAL 29470
9-10-14
BRANDON MCMILLIN
ENGINEER

SEAL 27434
MATTHEW L. COOK
ENGINEER

9/10/14

-L-
PI Sta 248+65J6
 $\Delta = 54' 52" 08.7" (RT)$
D = 1' 15" 08.5"
L = 4,381.23'
T = 2,374.96'
R = 4,575.00'
SE = 0.05
V = 75mph

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560



DETAIL B
LATERAL BASE DITCH
(Not to Scale)

Natural Ground 2:1 D 1' Ft. b Min. D=2.0 Ft. B=2.0 Ft. b=5.0 Ft. Fill Slope

—L— STA. 278+50 TO STA. 280+50 RT

DETAIL O
SPECIAL CUT BASE DITCH
(Not to Scale)

Natural Ground 2:1 D 4:1 or Flatter 1' Ft. b Min. D=1.5 Ft. B=2.0 Ft. Front Ditch Slope

—L— STA. 280+50 TO STA. 281+14 RT

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)

Natural Ground 2:1 D 4:1 or Flatter 1' Ft. b Min. D=1.5 Ft. Front Ditch Slope

—L— STA. 279+00 TO STA. 281+14 LT

DETAIL AG
LATERAL BASE DITCH
(Not to Scale)

Natural Ground 2:1 D 2:1 1' Ft. b Min. D=2.0 Ft. B=4.0 Ft. b=5.0 Ft. Fill Slope

—Y4— STA. 17+50 TO 22+00 RT

DETAIL E
TOE PROTECTION
(Not to Scale)

NATURAL GROUND d 2:1 OR FLATTER 1' Ft. b GEOTEXTILE FILL SLOPE

d=1.5 Ft.

Type of Liner= Class B Rip-Rap

—L— STA. 277+80 TO STA. 278+40 RT

DETAIL U
LATERAL BASE DITCH
(Not to Scale)

Natural Ground 2:1 D 2:1 1' Ft. b GEOTEXTILE FILL SLOPE

Min. D=2.0 Ft. Max. d=1.5 Ft. B=4.0 Ft. b=5.0 Ft.

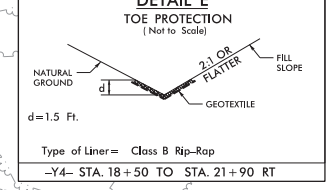
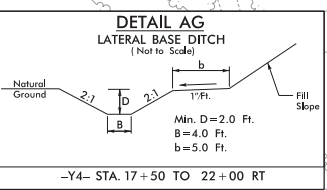
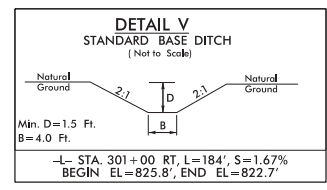
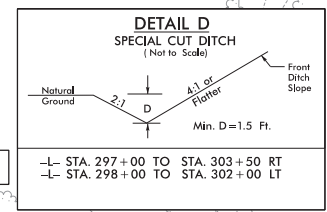
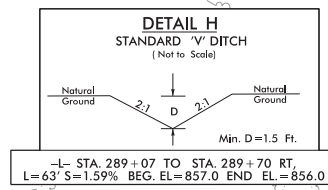
*When B is < 6.0'

Type of Liner= Class B Rip-Rap

—L— STA. 277+10 TO STA. 278+50 LT



RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3
C LICENSE NO. F-0112 • (919) 878-9

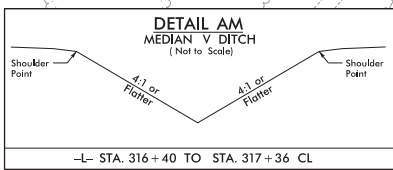
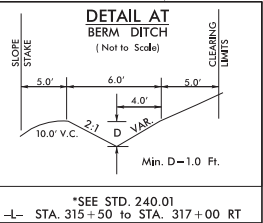
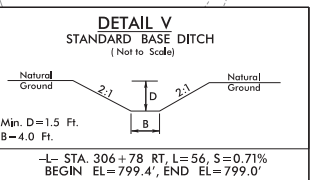
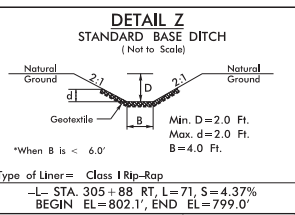
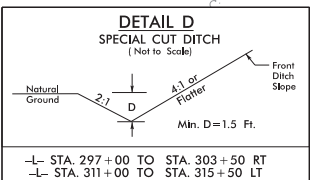
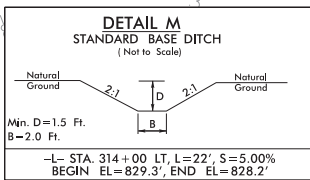
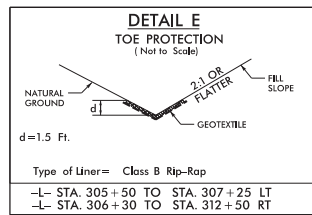


CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	289+65.2	290+21.37	RT
SBG	-L-	290+82.77	291+39.00	LT
SBG	-Y4-	22+00.00	22+49.40	LT
SBG	-Y4-	21+95.00	22+34.08	RT

FOR -L- PROFILE SEE SHT. 44
FOR -Y4- PROFILE SEE SHTS. 61 & 62
FOR -DR4B- PROFILE SEE SHT. 62
FOR STRUCTURE PLANS,
SEE SITE 7 SHTS. S-?? THRU S-??

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

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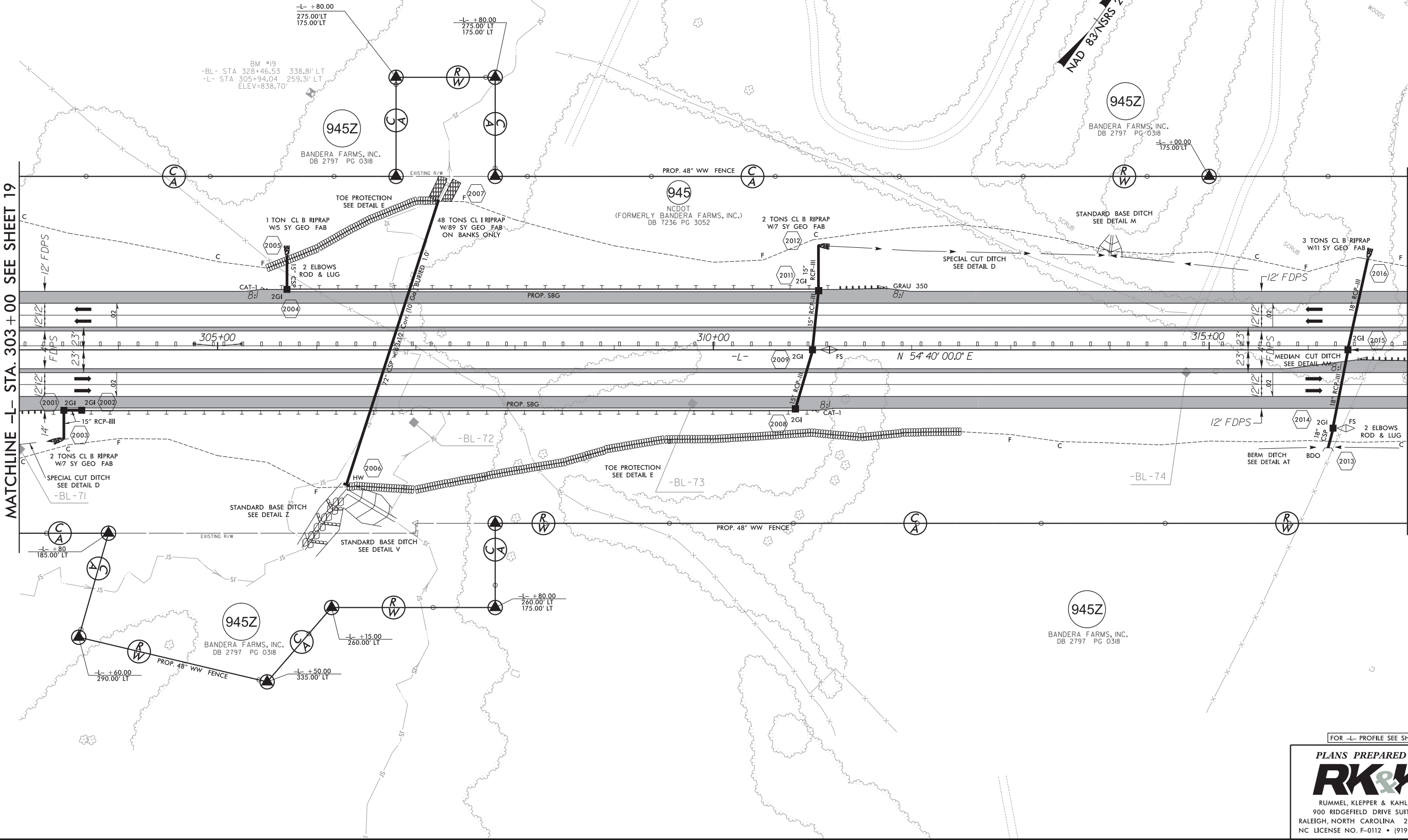


PROJECT REFERENCE NO. R-2413A		SHEET NO. 20
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
 BRANDON J. MCINNIS SEAL 29470 NORTH CAROLINA PROFESSIONAL ENGINEER	 MATTHEW L. COOK SEAL 27434 NORTH CAROLINA PROFESSIONAL ENGINEER	

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	303+45.00	310+85.00	RT
SBG	-L-	305+70.00	311+08.00	LT

MATCHLINE -L- STA. 303+00 SEE SHEET 19

MATCHLINE -L- STA. 317+00 SEE SHEET 21



FOR -L- PROFILE SEE SHTS. 44 & 45

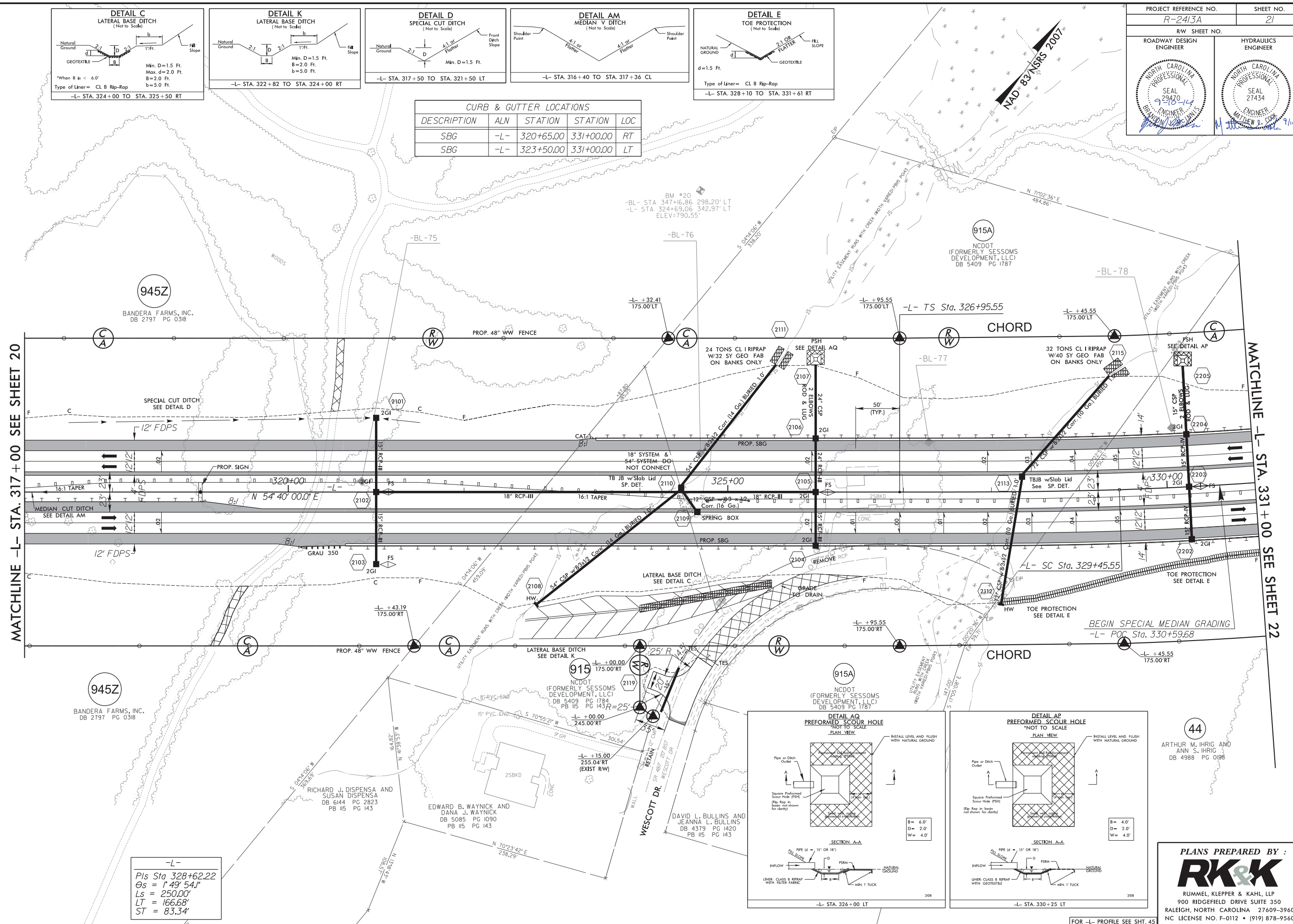
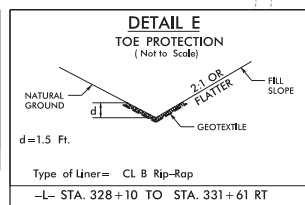
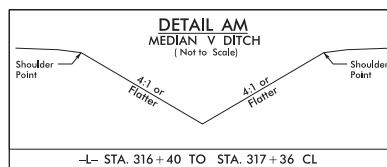
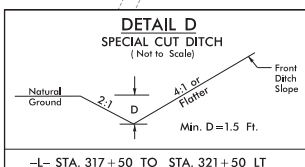
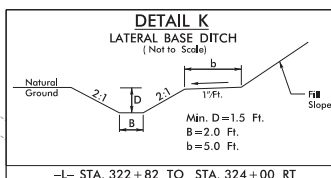
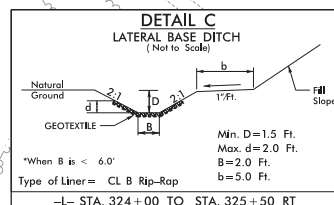
PLANS PREPARED BY :

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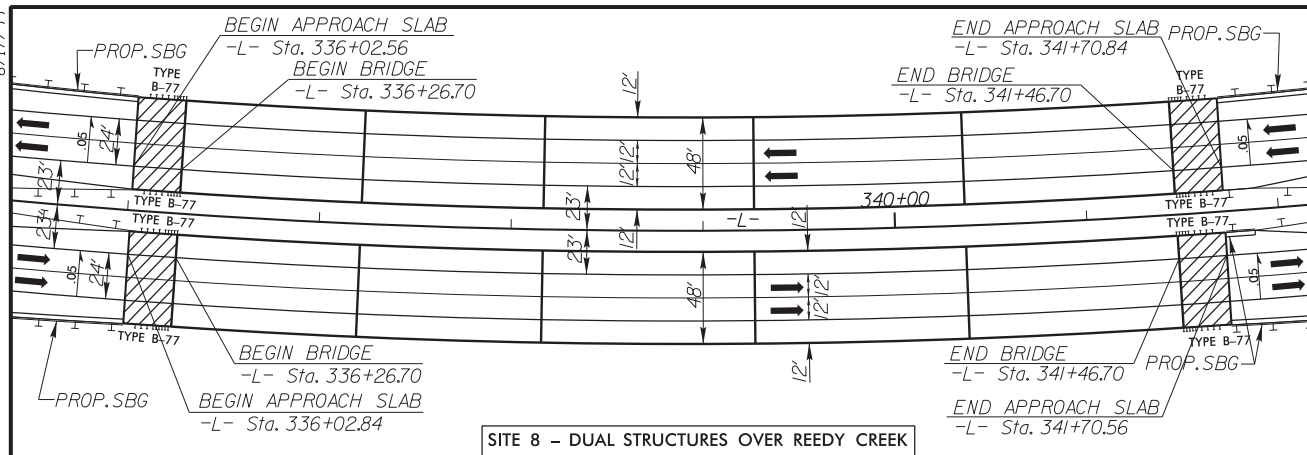
CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	320+65.00	331+00.00	RT
SBG	-L-	323+50.00	331+00.00	LT



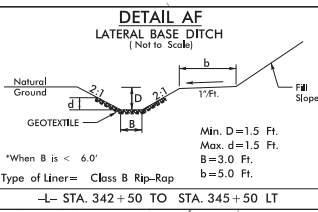
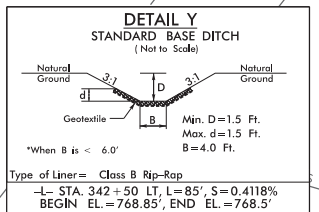
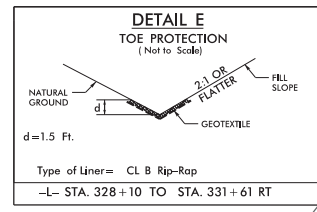
PLANS PREPARED BY :
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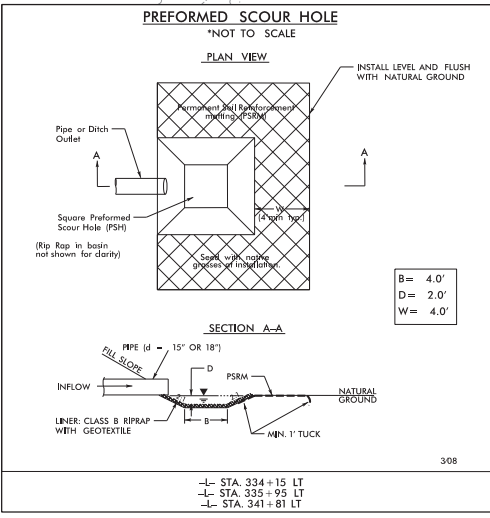
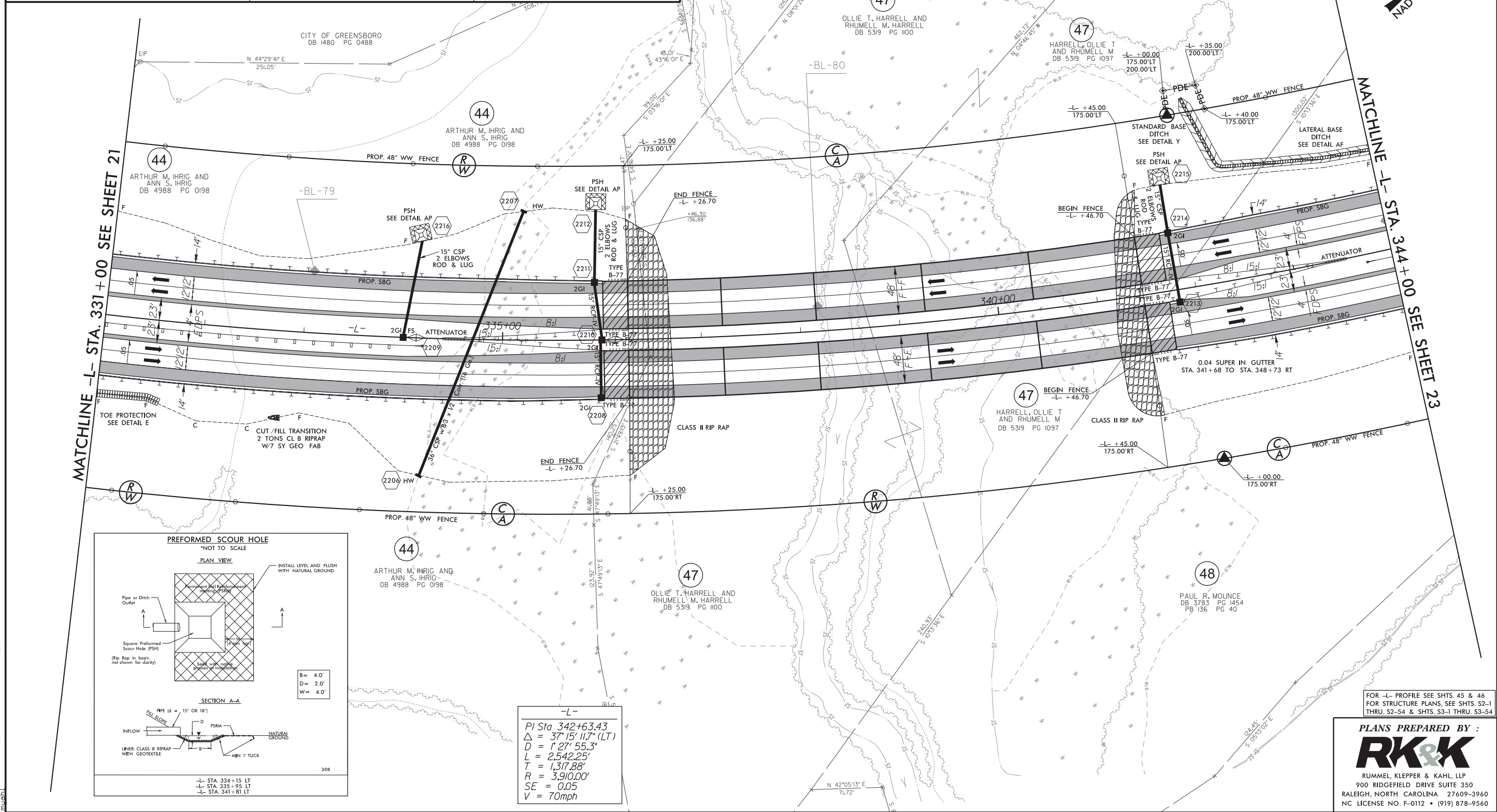
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SITE 8 - DUAL STRUCTURES OVER REEDY CREEK



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	331+00.00	336+01.33	LT
SBG	-L-	341+72.07	344+00.00	LT
SBG	-L-	331+00.00	336+02.06	RT
SBG	-L-	341+71.34	344+00.00	RT
SBG	-L-	341+71.62	341+87.00	MED RT



-L-
PI Sta 342+63.43
 $\Delta = 37^{\circ}15'11.7\"$ (LT)
 $D = 1^{\circ}27'55.3\"$
 $L = 2,542.25'$
 $T = 1,317.88'$
 $R = 3,910.00'$
 $SE = 0.05$
 $V = 70\text{mph}$

PROJECT REFERENCE NO. R-2413A	SHEET NO. 22
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER

FOR -L- PROFILE SEE SHTS. 45 & 46
FOR STRUCTURE PLANS, SEE SHTS. S2-1
THRU. S2-54 & SHTS. S3-1 THRU. S3-54

PLANS PREPARED BY :

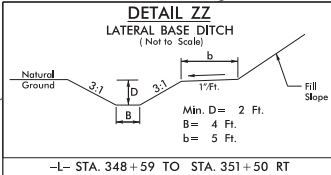
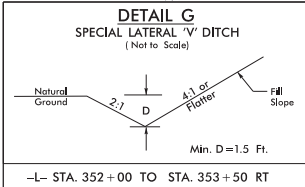
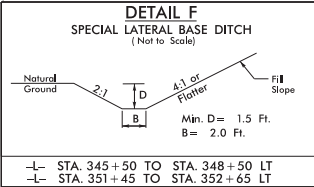
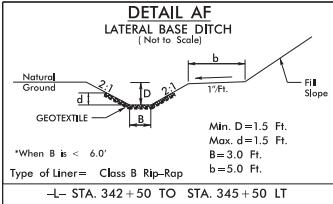
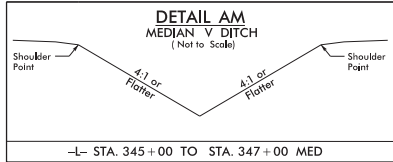
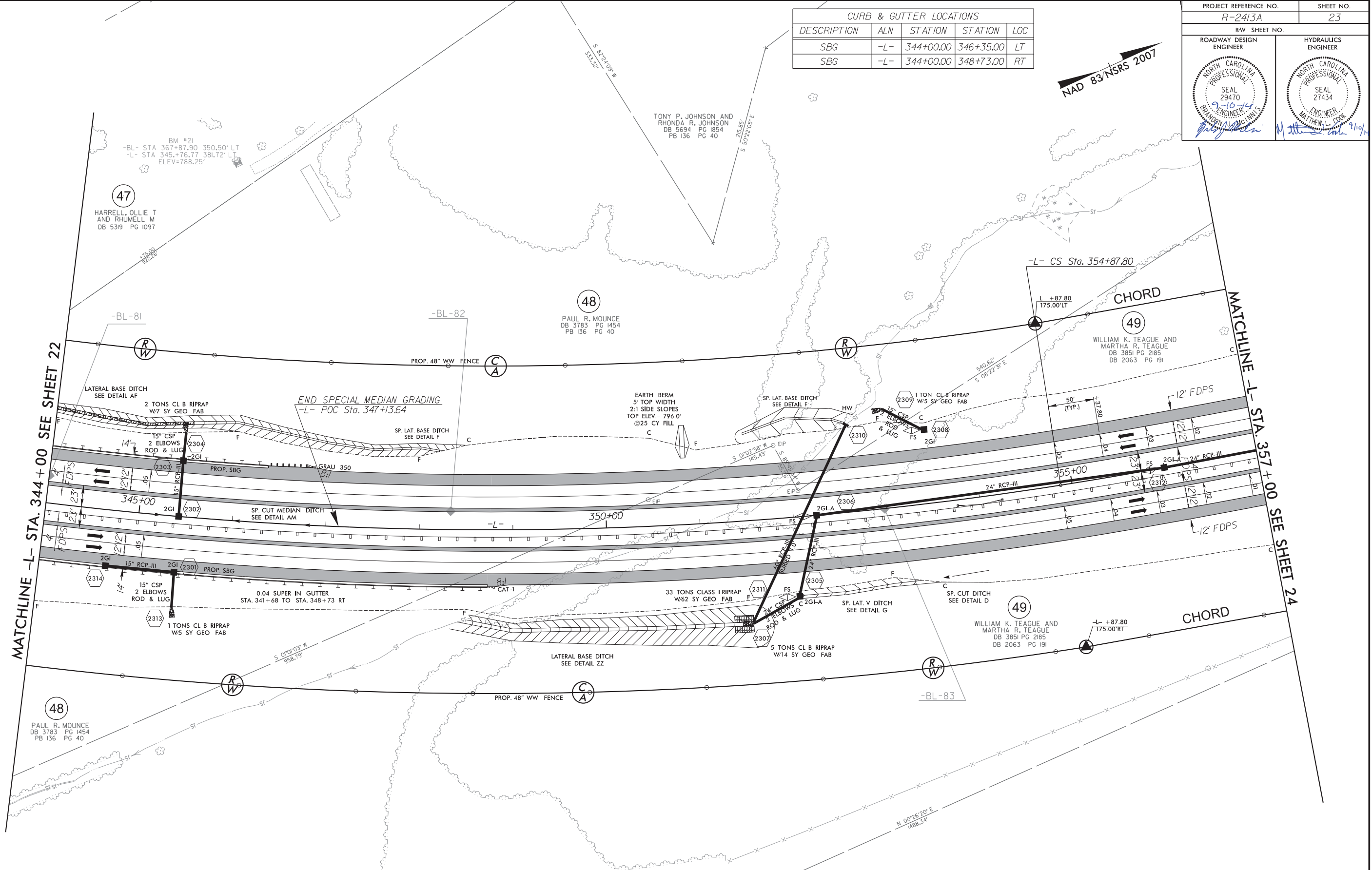
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8/10/2014

CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-L-	344+00.00	346+35.00	LT
SBG	-L-	344+00.00	348+73.00	RT

PROJECT REFERENCE NO.		SHEET NO.
R-2413A		23
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
		

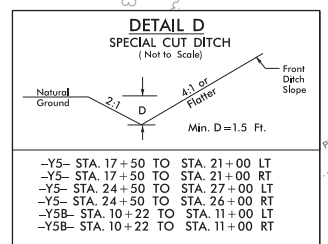


-L-
Pls Sta 355+71.14
Os = 1' 49' 54.1"
Ls = 250.00'
LT = 166.68'
ST = 83.34'

FOR -L- PROFILE SEE SHT. 46

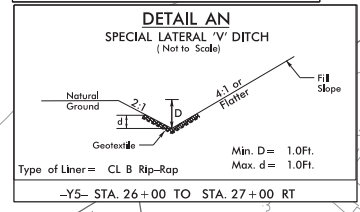
PLANS PREPARED BY :
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8/10/2014



NOTE: DECK DRAINS NEEDED
6" SCUPPERS ON 6' CENTERS

-Y5- STA. 22+31.11	LT
-Y5- STA. 22+31.11	RT
-Y5- STA. 23+03.37	LT
-Y5- STA. 23+03.37	RT
-Y5- STA. 23+15.15	LT
-Y5- STA. 23+15.15	RT
-Y5- STA. 23+27.00	LT
-Y5- STA. 23+27.00	RT
-Y5- STA. 23+38.80	LT
-Y5- STA. 23+38.80	RT
-Y5- STA. 23+50.63	LT
-Y5- STA. 23+50.63	RT
-Y5- STA. 23+62.47	LT
-Y5- STA. 23+62.47	RT

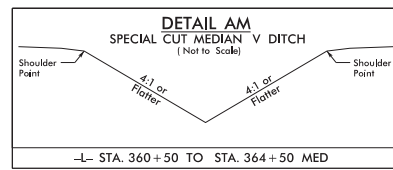
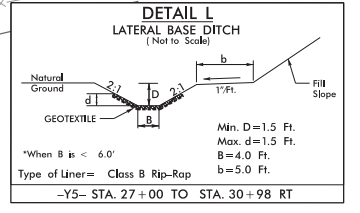


-L- ST Sta. 357+37.80

MATCHLINE -L- STA. 357+00 SEE SHEET 23

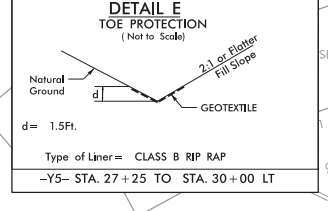
BEGIN CONSTRUCTION
-DR5A- POT Sta. 10+00.00

BEGIN SPECIAL MEDIAN GRADING
-L- POT Sta. 360+50.27



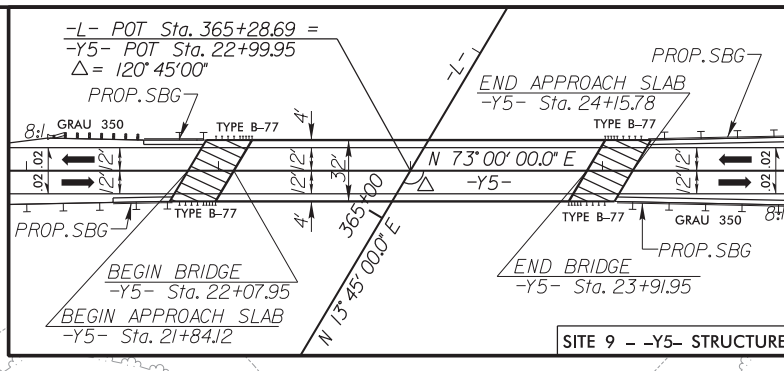
-Y5B-

PI Sta. 11+65.26	PI Sta. 13+03.21
$\Delta = 31' 20'' 39.5''$ (RT)	$\Delta = 31' 50'' 39.5''$ (LT)
D = 22' 55' 05.9"	D = 22' 55' 05.9"
L = 136.77'	L = 138.95'
T = 70.14'	T = 71.32'
R = 250.00'	R = 250.00'
SE = RC	SE = RC
V < 15mph (Stop Cond.)	V < 15mph (Stop Cond.)



MATCHLINE -Y5- STA. 18+00 SEE SHEET 33

-Y5- POT Sta. 18+80.00 =
-DR5A- POT Sta. 12+15.00



PROJECT REFERENCE NO. R-2413A		SHEET NO. 24
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		SEAL 29470 BRANDON J. MCINNES 9-10-14
		SEAL 27434 MATTHEW L. COOK 9-10-14

NORTH CAROLINA PROFESSIONAL ENGINEER

NAD 83/NSRS 2007

END PROJECT R-2413A
BEGIN PROJECT R-2413B
-L- Sta. 370+50.00

END SPECIAL MEDIAN GRADING
-L- POT Sta. 370+07.01

CURB & GUTTER LOCATIONS

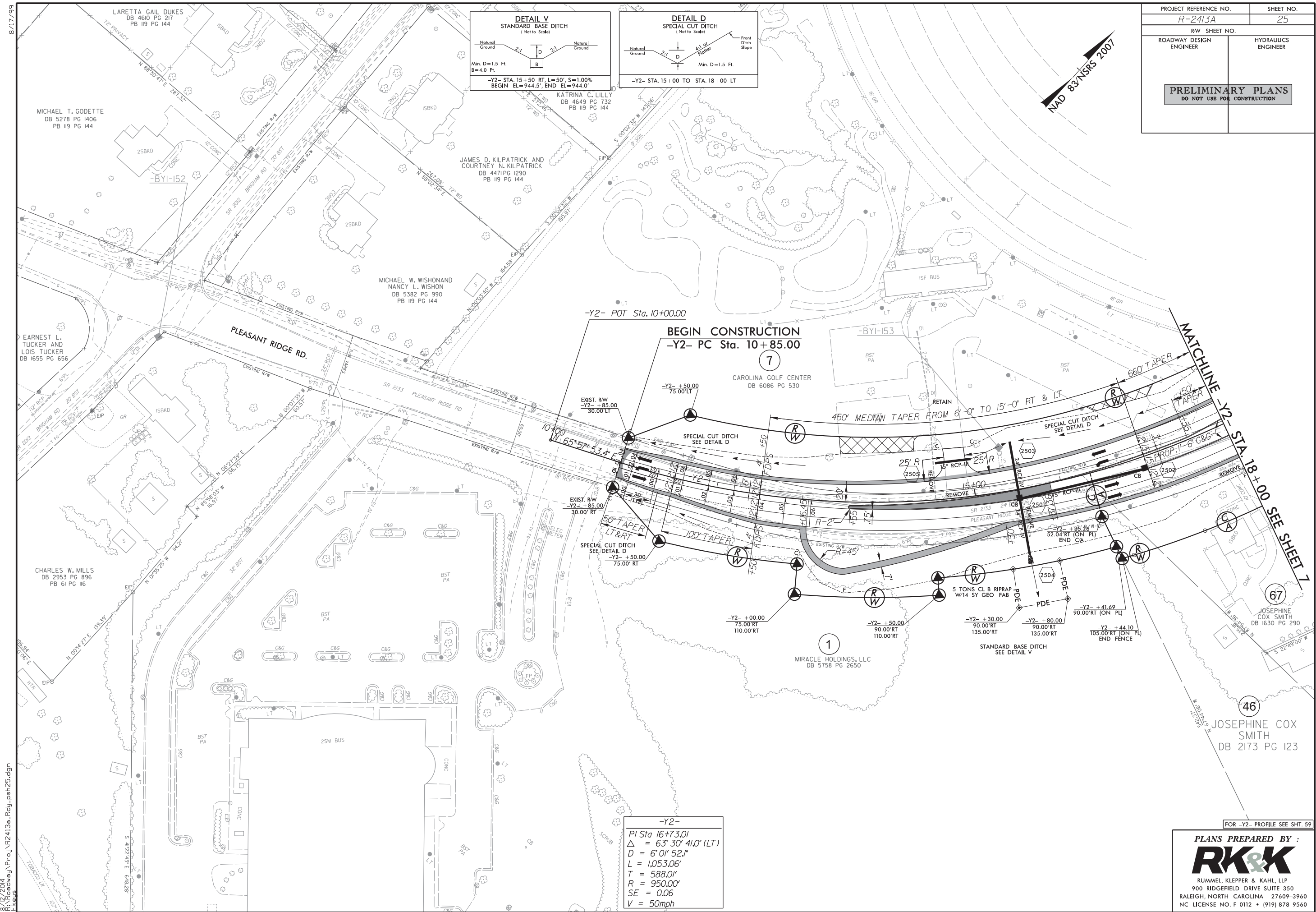
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y5-	21+60.00	21+92.25	LT
SBG	-Y5-	24+23.89	27+50.00	LT
SBG	-Y5-	21+45.00	21+75.99	RT
SBG	-Y5-	24+07.63	25+07.55	RT
SBG	-Y5-	27+17.50	27+50.00	RT

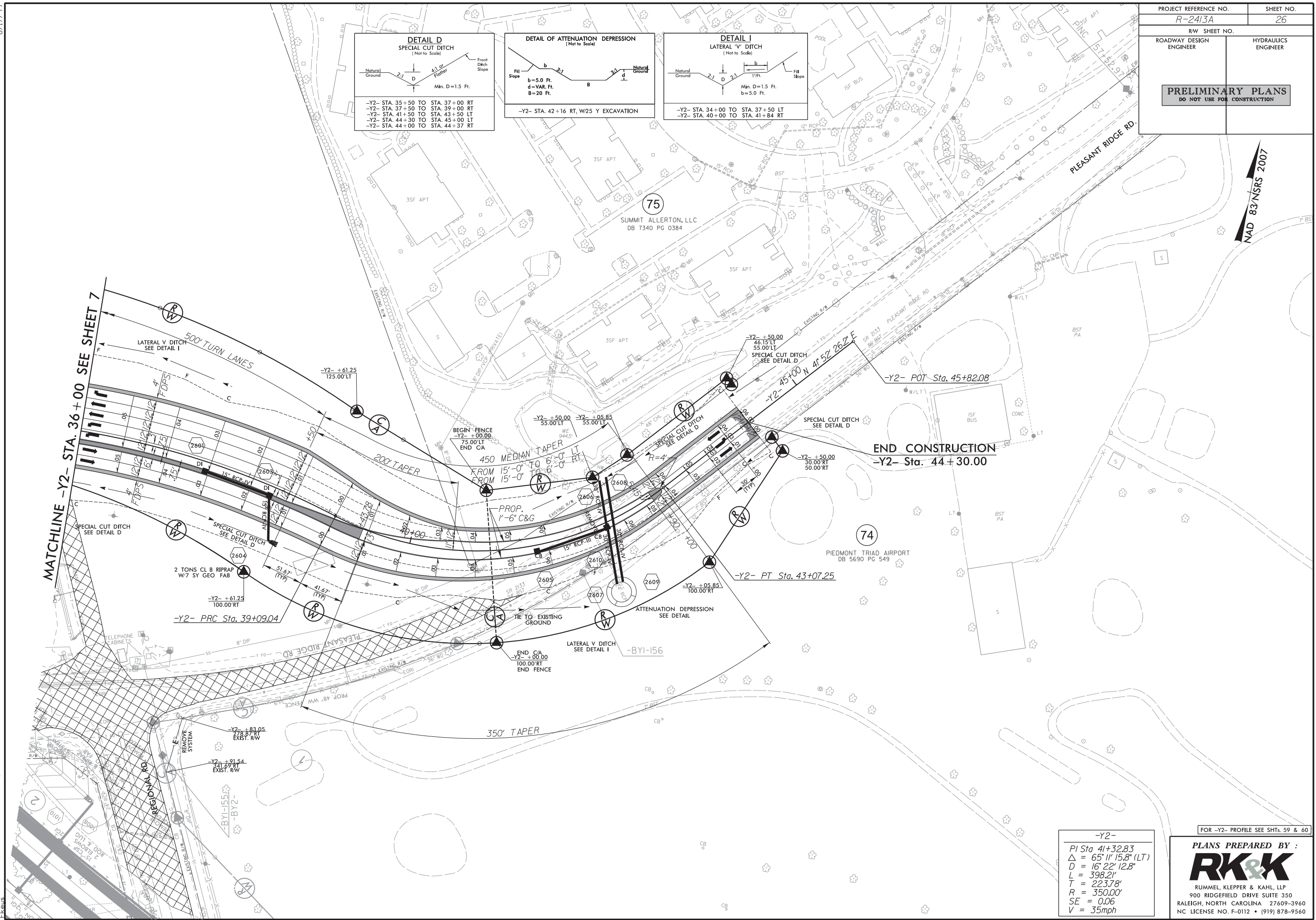
FOR -L- PROFILE SEE SHTS. 46 & 47
FOR -Y5- PROFILE SEE SHT. 63
FOR -DR5A- PROFILE SEE SHT. 64
FOR -Y5B- PROFILE SEE SHT. 64
FOR STRUCTURE PLANS, SEE SITE 9
SHTS. S-2 THRU. S-22

PLANS PREPARED BY :

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-Y2-

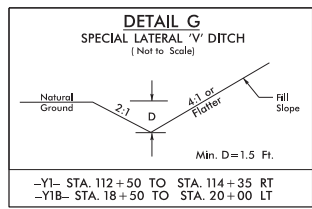
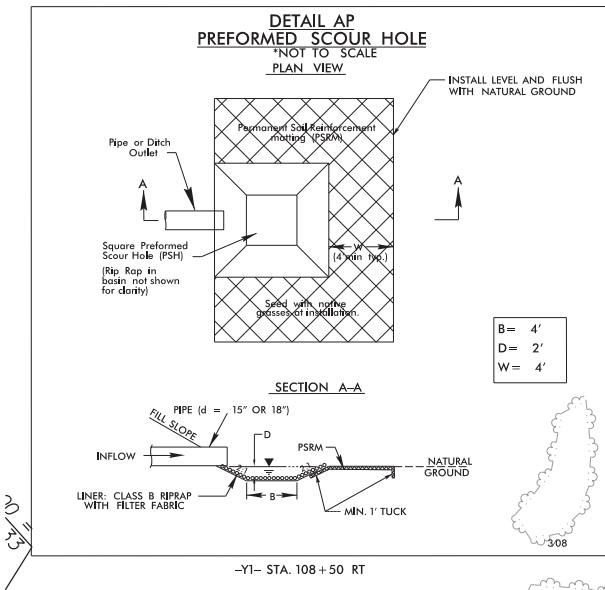
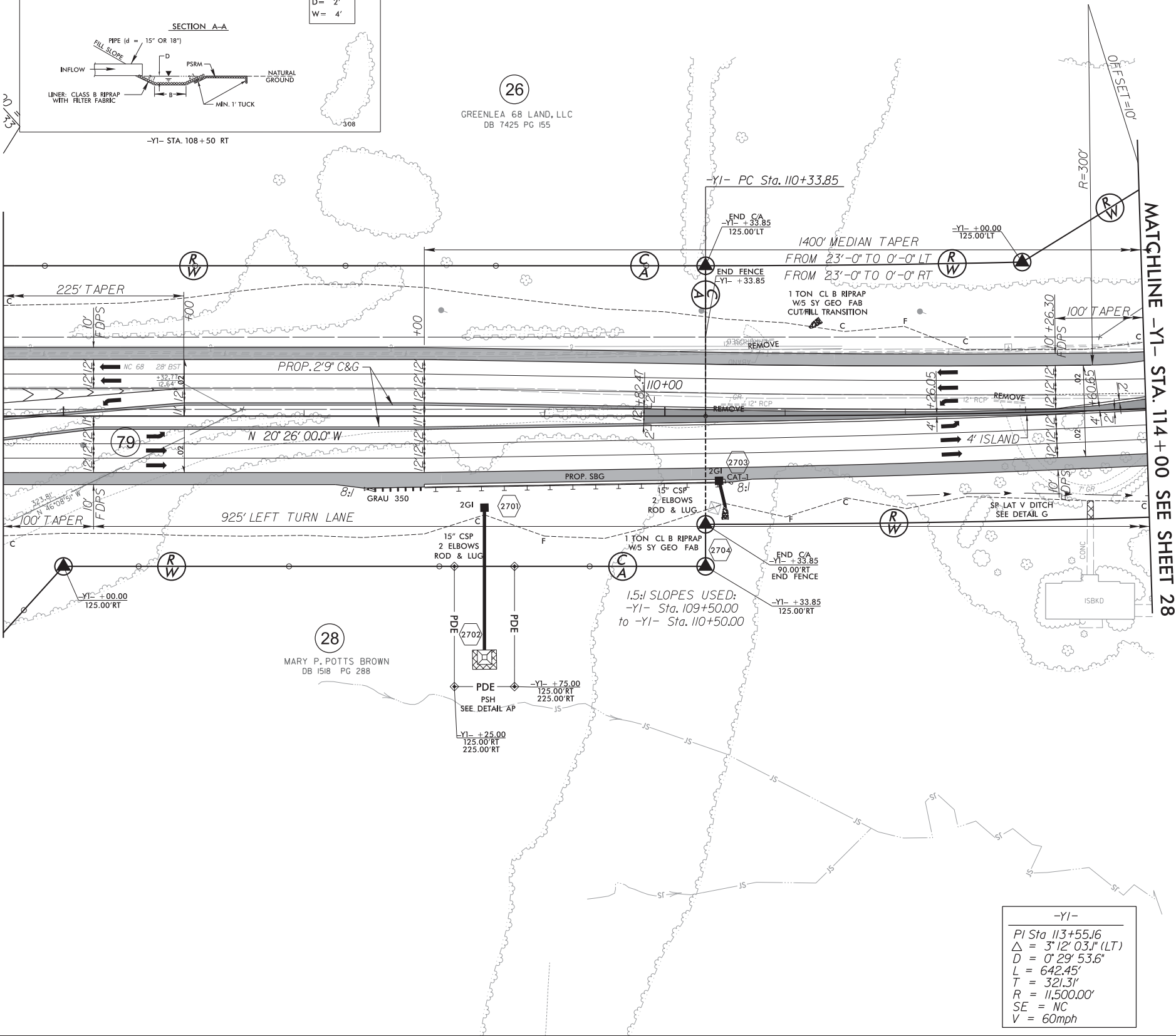
Pl Sta 41+32.83
 $\Delta = 65^{\circ}11'15.8''$ (LT)
 $D = 16^{\circ}22'12.8''$
 $L = 398.21'$
 $T = 223.78'$
 $R = 350.00'$
 $SE = 0.06$
 $V = 35\text{mph}$

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MATCHLINE -Y1- STA. 104+50 SEE SHEET 9

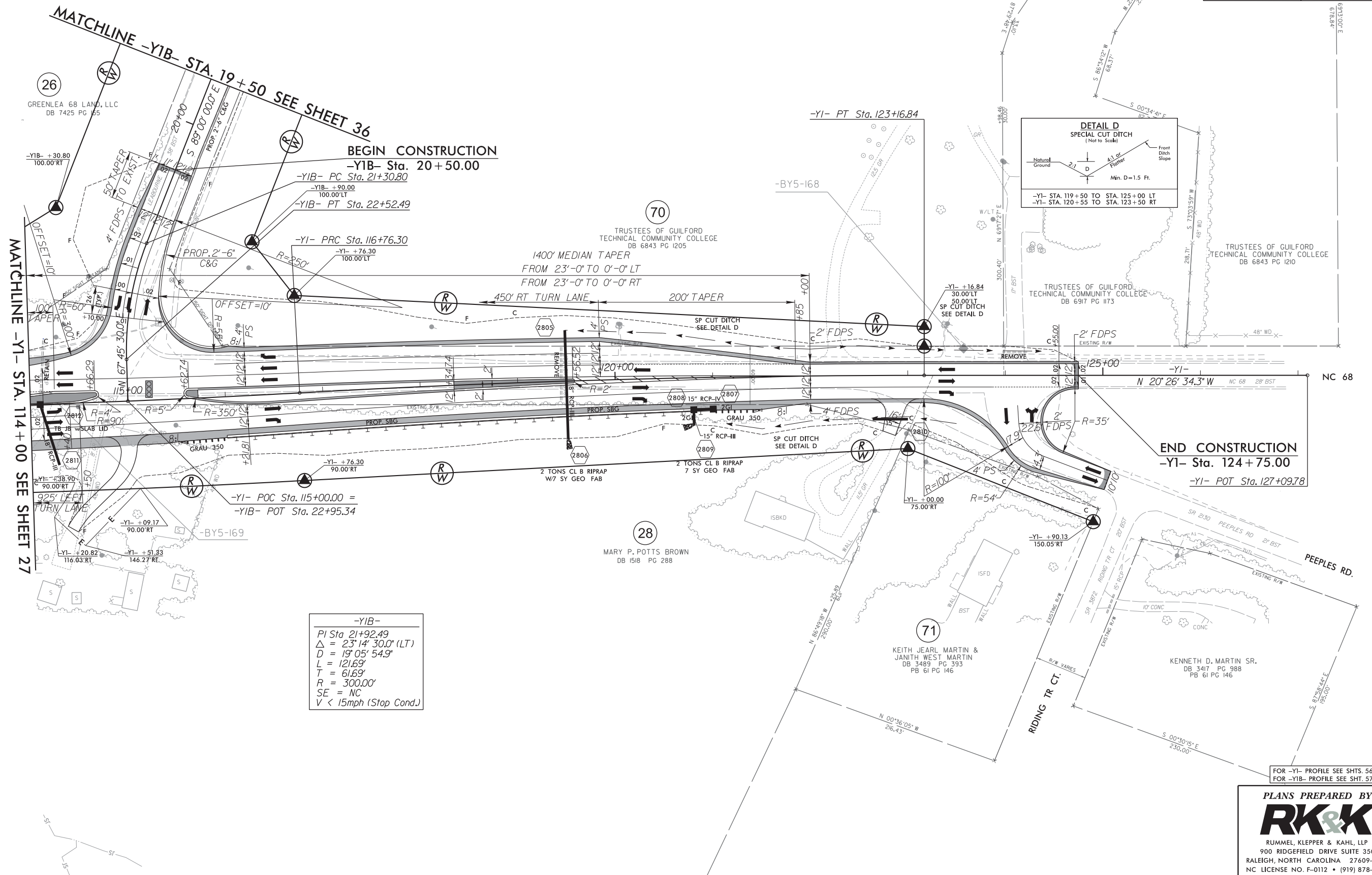
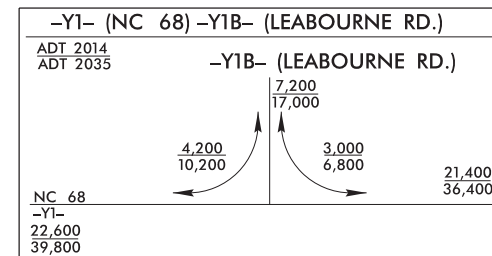


-Y1-
PI Sta 113+55.16
 $\Delta = 3' 12' 03.1''$ (LT)
 $D = 0' 29' 53.6''$
 $L = 642.45'$
 $T = 321.31'$
 $R = 11,500.00'$
 $SE = NC$
 $V = 60\text{mph}$

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	27
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

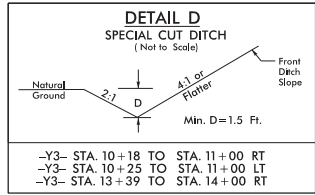
FOR -Y1- PROFILE SEE SHT. 56

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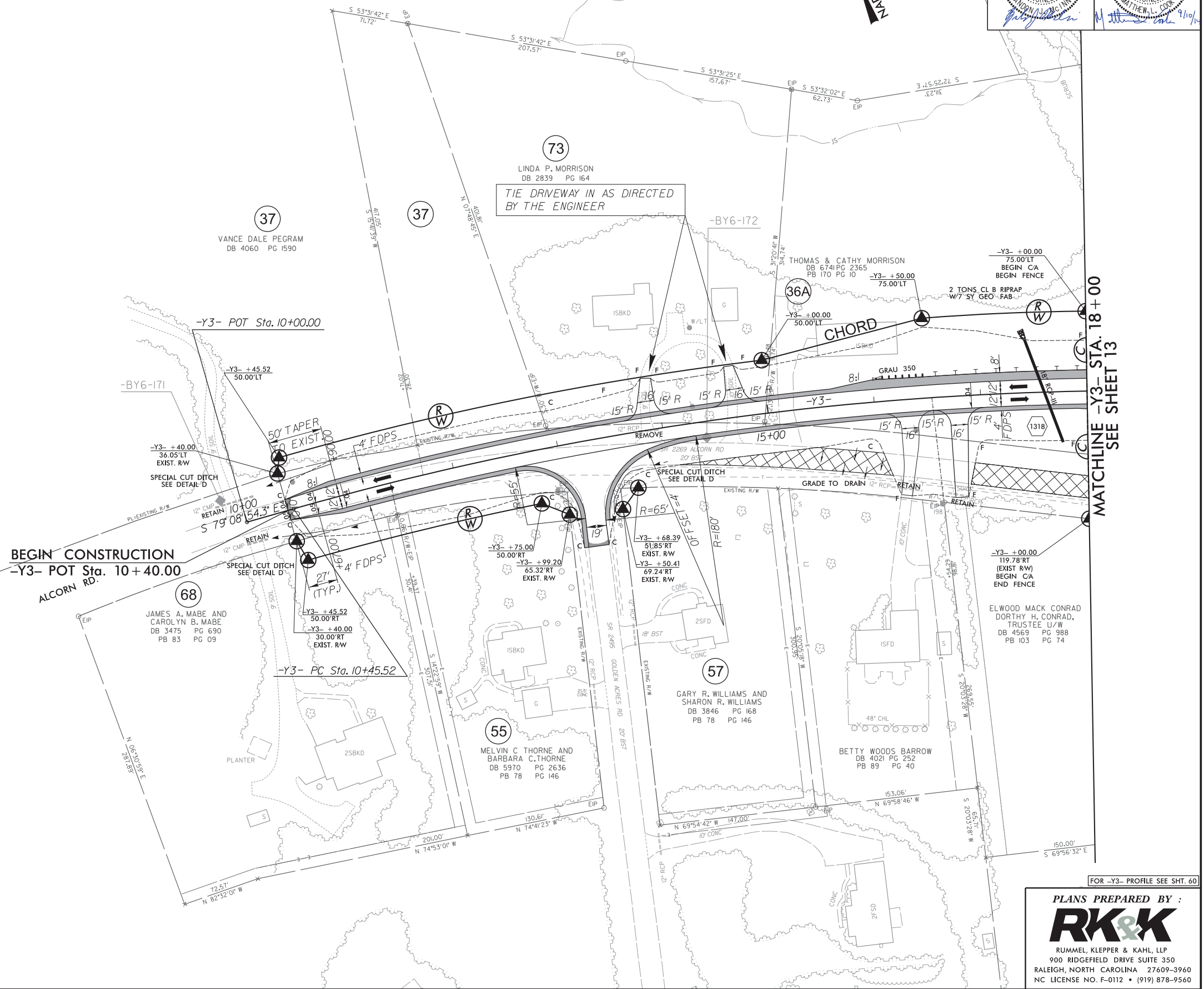


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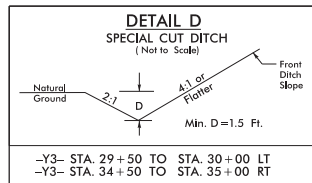
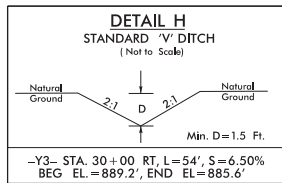
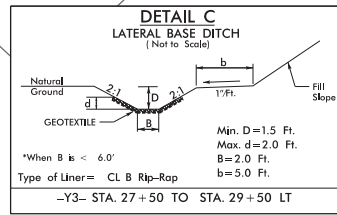
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8/10/2014
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PROJECT REFERENCE NO.		SHEET NO.
R-2413A		29
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		
		



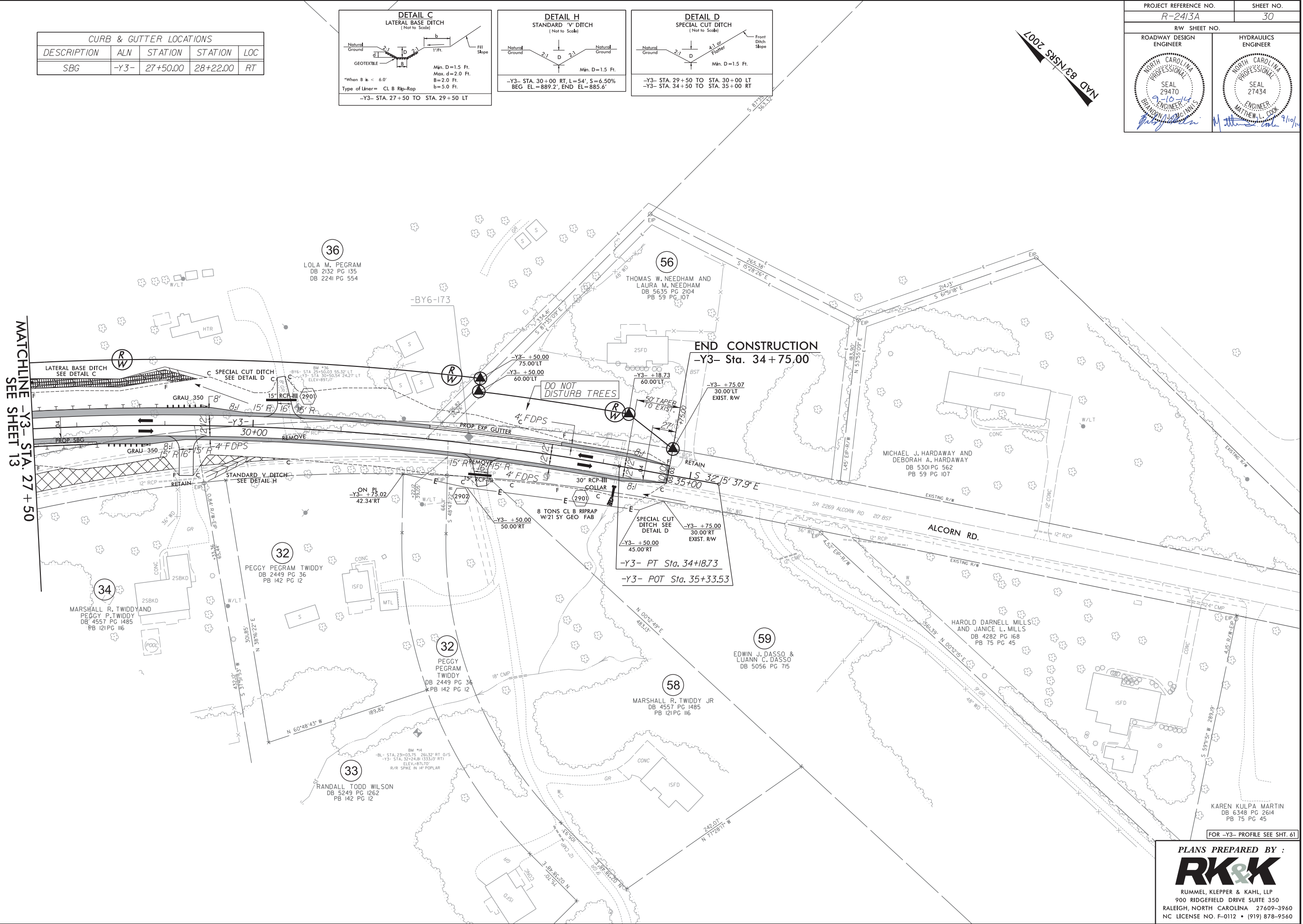
CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y3-	27+50.00	28+22.00	RT



NAD 83 NGS 2007

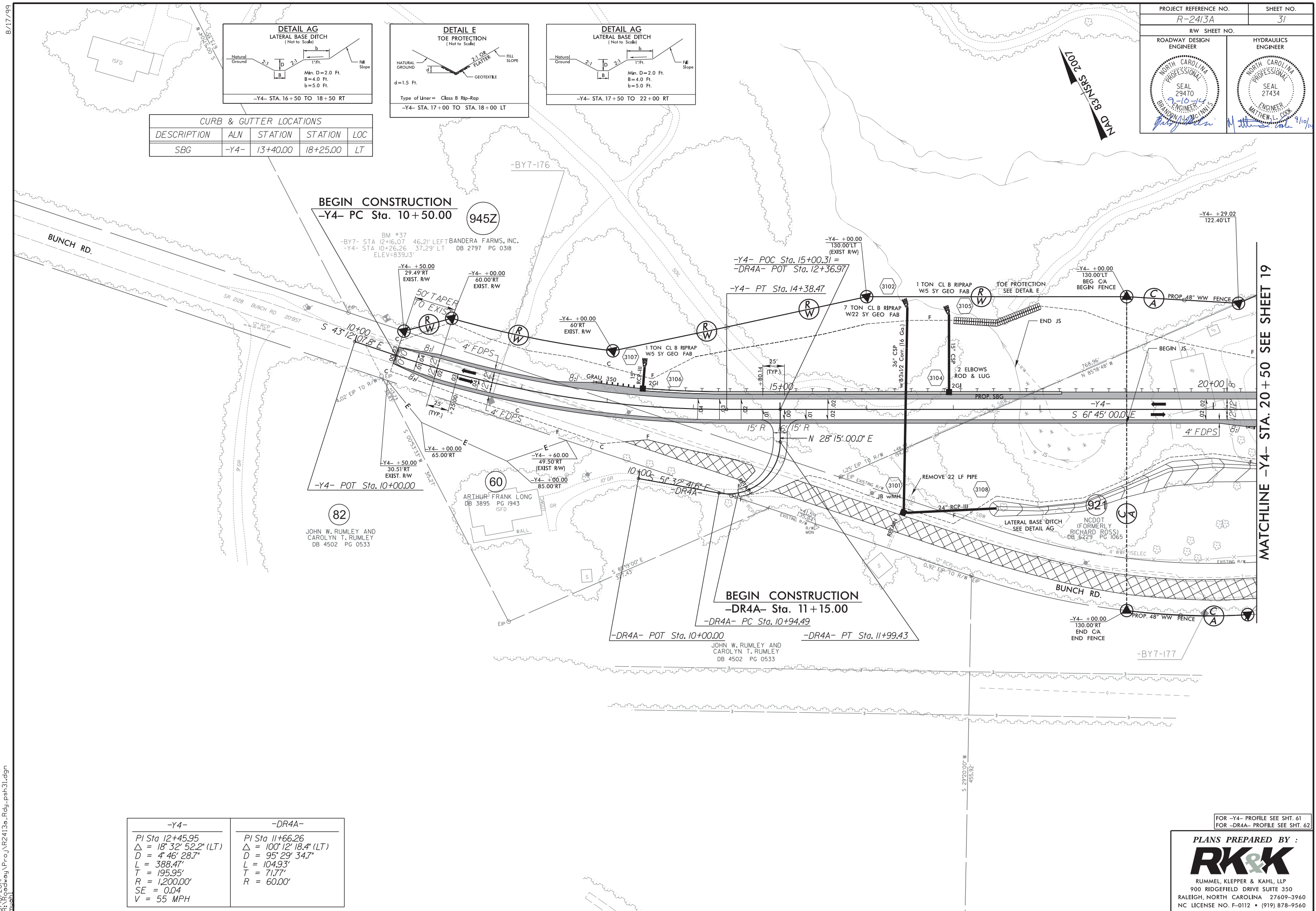
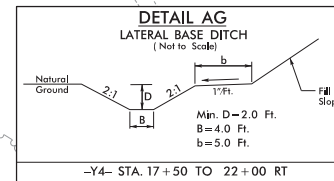
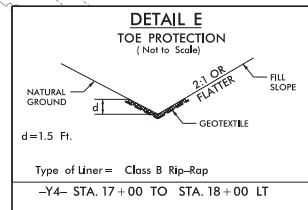
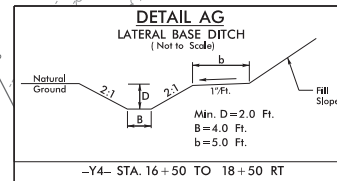
PROJECT REFERENCE NO.		SHEET NO.
R-2413A		30
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		
		

MATCHLINE -Y3- STA. 27+50
SEE SHEET 13



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CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y4-	13+40.00	18+25.00	LT



-Y4-	-DR4A-
<i>PI Sta 12+45.95</i>	<i>PI Sta 11+66.26</i>
$\Delta = 18^{\circ} 32' 52.2''$ (LT)	$\Delta = 100^{\circ} 12' 18.4''$ (LT)
$D = 4' 46'' 28.7''$	$D = 95' 29'' 34.7''$
$L = 388.47'$	$L = 104.93'$
$T = 195.95'$	$T = 71.77'$
$R = 1,200.00'$	$R = 60.00'$
$SE = 0.04$	
$V = 55$ MPH	

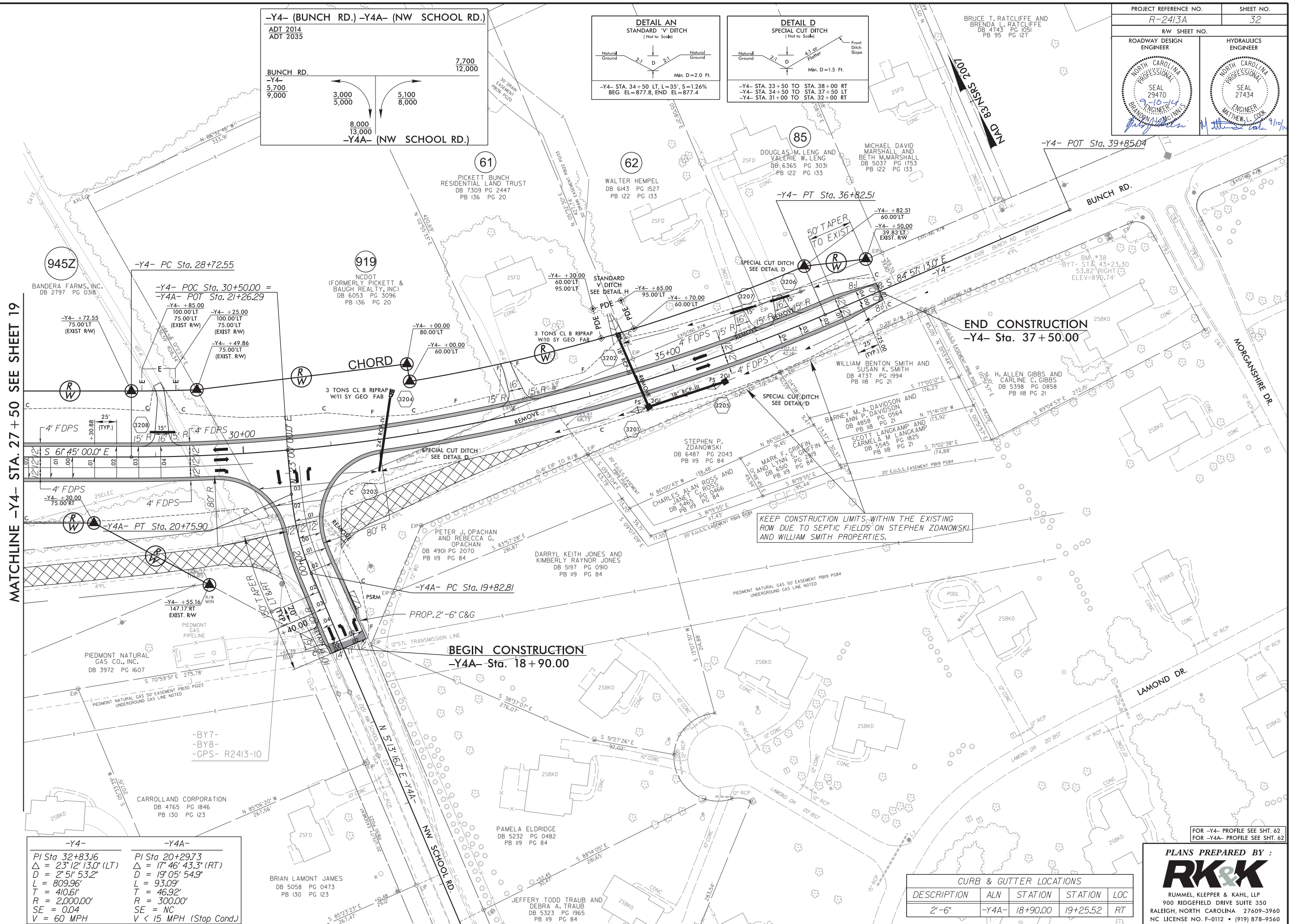
FOR -Y4- PROFILE SEE SHT. 61
FOR -DR4A- PROFILE SEE SHT. 62

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CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
2'-6"	-Y4A-	18+90.00	19+25.52	RT

FOR -Y4- PROFILE SEE SHT. 62
FOR -Y4A- PROFILE SEE SHT. 62



MATCHLINE -Y4- STA. 27+50 SEE SHEET 19

-Y4-	-Y4A-
PI Sta 32+83J6	PI Sta 20+2973
$\Delta = 23^{\circ}12' 13.0''$ (LT)	$\Delta = 17^{\circ}46' 43.3''$ (RT)
D = 2' 51" 53.2"	D = 19' 05" 54.9"
L = 809.96'	L = 93.09'
T = 410.61'	T = 46.92'
R = 2,000.00'	R = 300.00'
SE = 0.04	SE = NC
V = 60 MPH	V < 15 MPH (Stop Cond.)

-Y4- (BUNCH RD.) -Y4A- (NW SCHOOL RD.)
 ADT 2014
 ADT 2035

BUNCH RD.
 -Y4-
 5,700
 9,000

3,000
 5,000

8,000
 13,000

-Y4A- (NW SCHOOL RD.)

7,700
 12,000

5,100
 8,000

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

Min. D = 2.0 Ft.

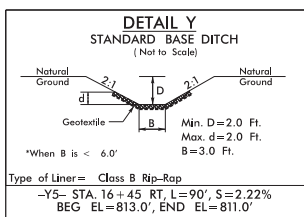
—Y4— STA. 34 + 50 LT, L = 35', S = 1.26%
BEG EL = 877.8, END EL = 877.4

DETAIL D
SPECIAL CUT DITCH
 (Not to Scale)

2:1
 D
 4:1 or flatter
 Min. D = 1.5 Ft.
 Natural Ground
 Front Ditch Slope

-Y4-	STA. 33 + 50	TO	STA. 38 + 00	RT
-Y4-	STA. 34 + 50	TO	STA. 37 + 50	LT

BRUCE T. RATCLIFFE AND
BRENDA L. RATCLIFFE
DB 4743 PG 1051
PB 95 PG 127



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PROJECT REFERENCE NO.
R-2413A

SHEET NO.
34

RW SHEET NO.

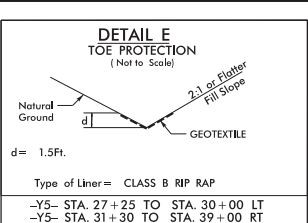
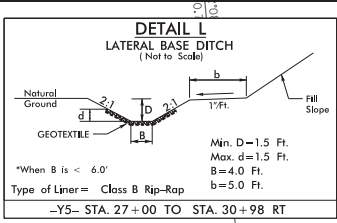
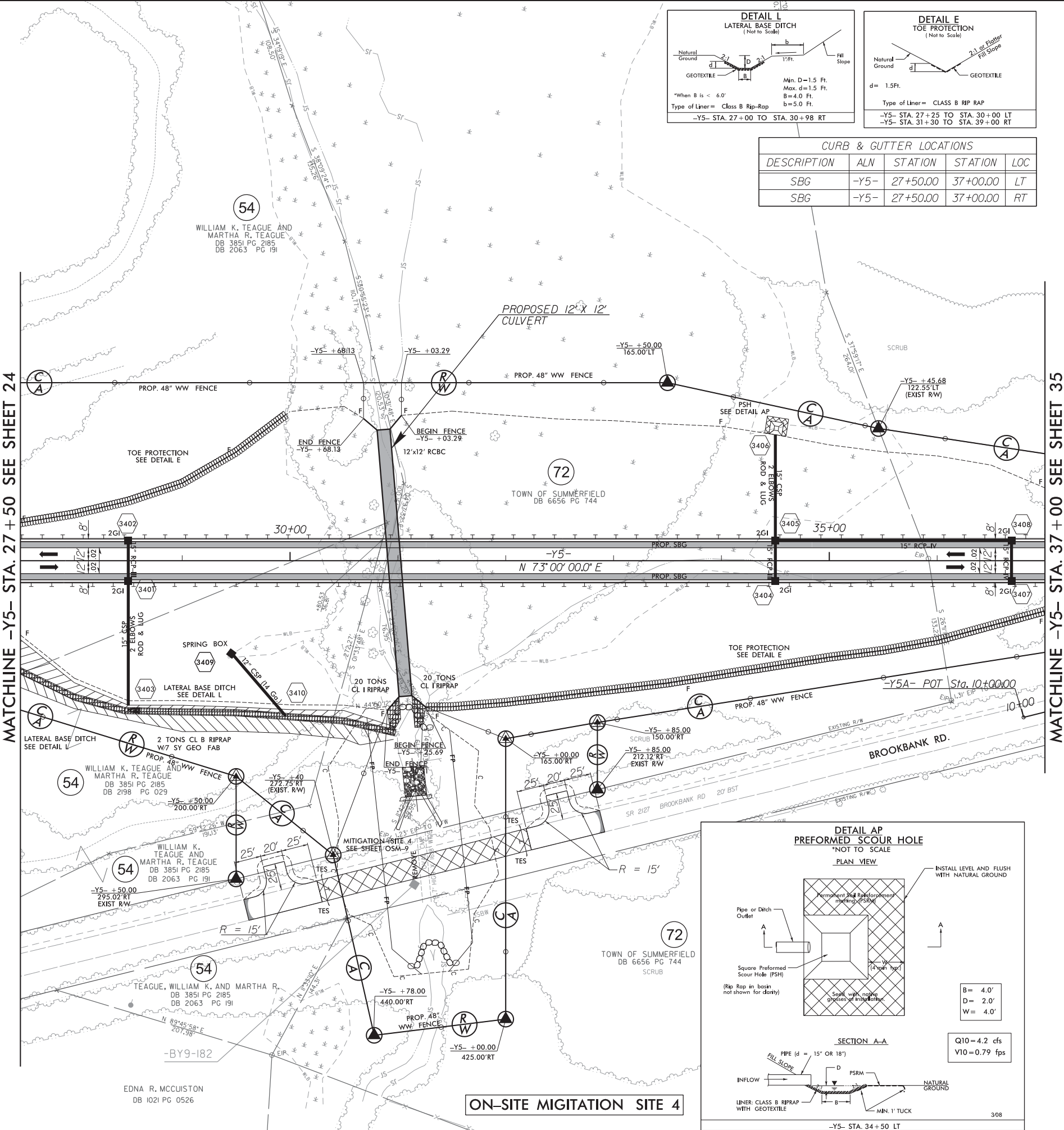
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

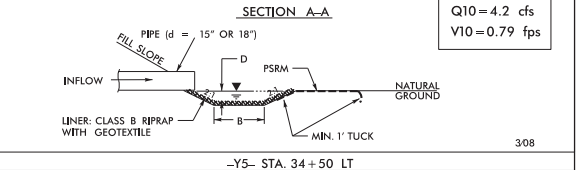
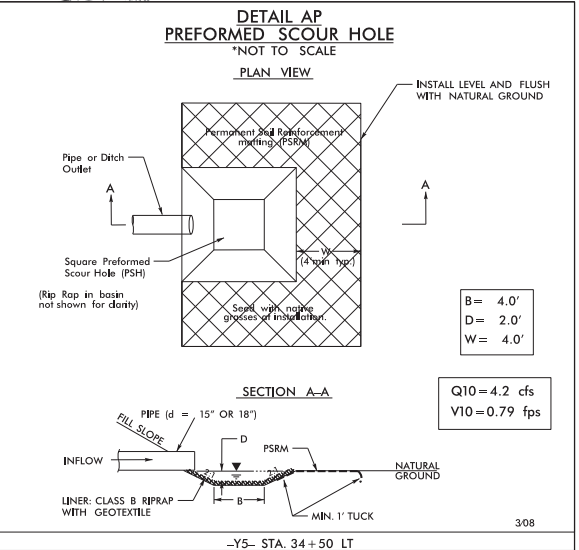
SEAL
29470
9-10-14
BRANDON J. MCINNES
ENGINEER

SEAL
27434
MATTHEW L. COOK
ENGINEER

NAD 83 NRS 2007



CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y5-	27+50.00	37+00.00	LT
SBG	-Y5-	27+50.00	37+00.00	RT



FOR -Y5- PROFILE SEE SHT. 63
FOR OSM PLANS SEE SHTS. OSM-4 & OSM-6
FOR STRUCTURE PLANS SEE -Y5- CULVERT
SHTS. C-1 & C-5

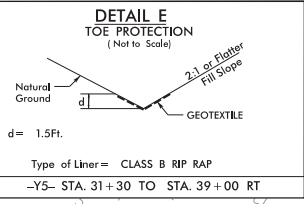
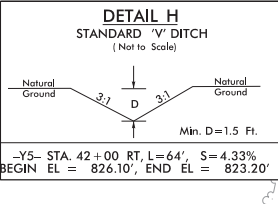
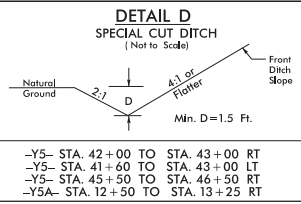
PLANS PREPARED BY :

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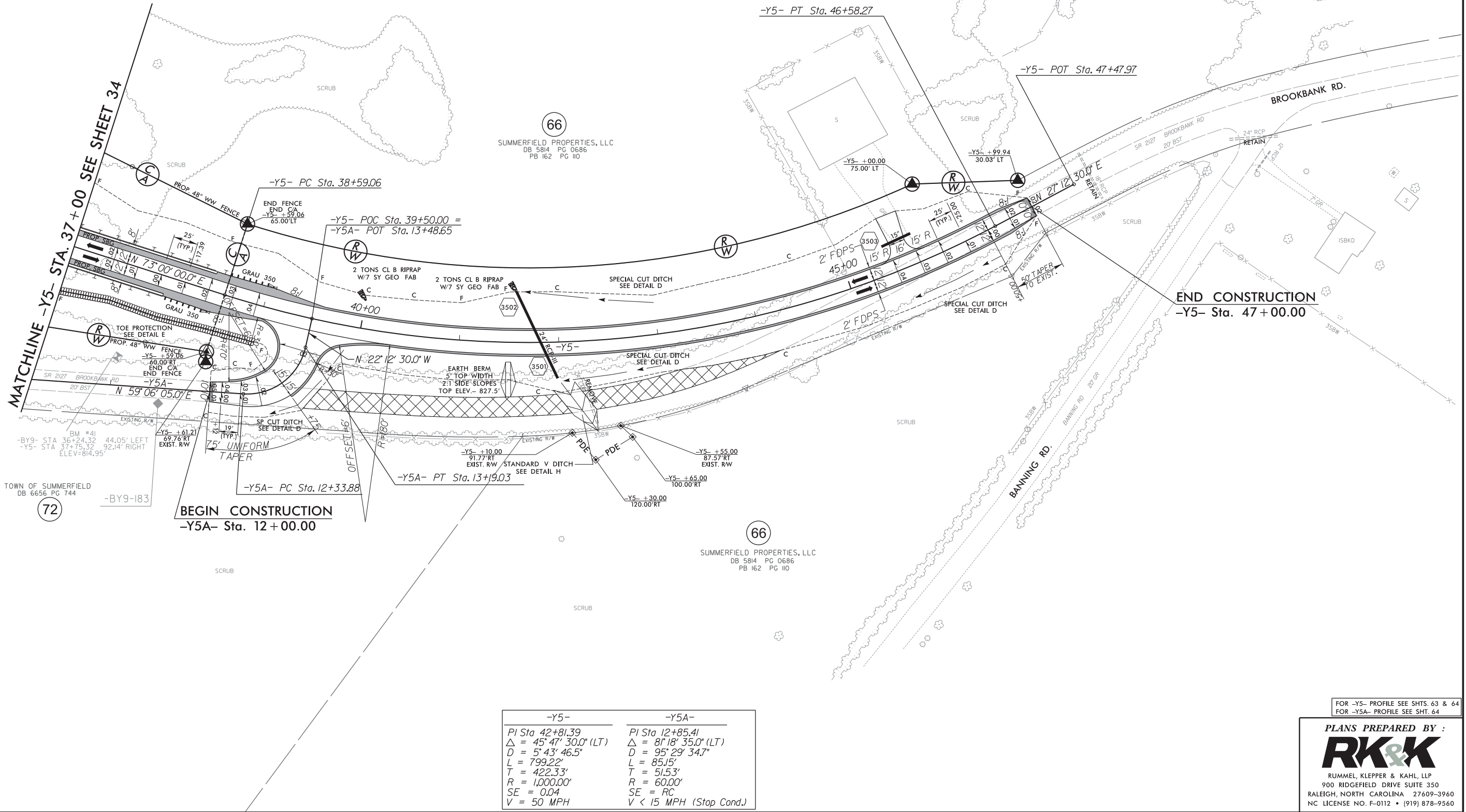
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CURB & GUTTER LOCATIONS				
DESCRIPTION	ALN	STATION	STATION	LOC
SBG	-Y5-	37+00.00	38+45.00	LT
SBG	-Y5-	37+00.00	38+00.00	RT



PROJECT REFERENCE NO. R-2413A		SHEET NO. 35
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	



-Y5-	-Y5A-
PI Sta. 42+81.39	PI Sta. 12+85.41
$\Delta = 45^{\circ} 47' 30.0''$ (LT)	$\Delta = 81^{\circ} 18' 35.0''$ (LT)
$D = 5^{\circ} 43' 46.5''$	$D = 95^{\circ} 29' 34.7''$
$L = 799.22'$	$L = 85.15'$
$T = 422.33'$	$T = 51.53'$
$R = 1,000.00'$	$R = 60.00'$
$SE = 0.04$	$SE = RC$
$V = 50$ MPH	$V < 15$ MPH (Stop Cond.)

FOR -Y5- PROFILE SEE SHTS. 63 & 64
FOR -Y5A- PROFILE SEE SHT. 64

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

FOR -Y1B- PROFILE SEE SHT. 57

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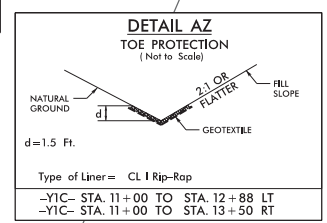
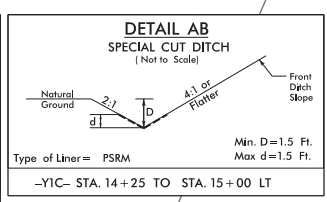
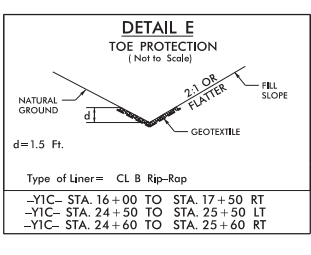
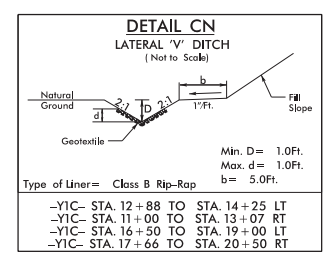
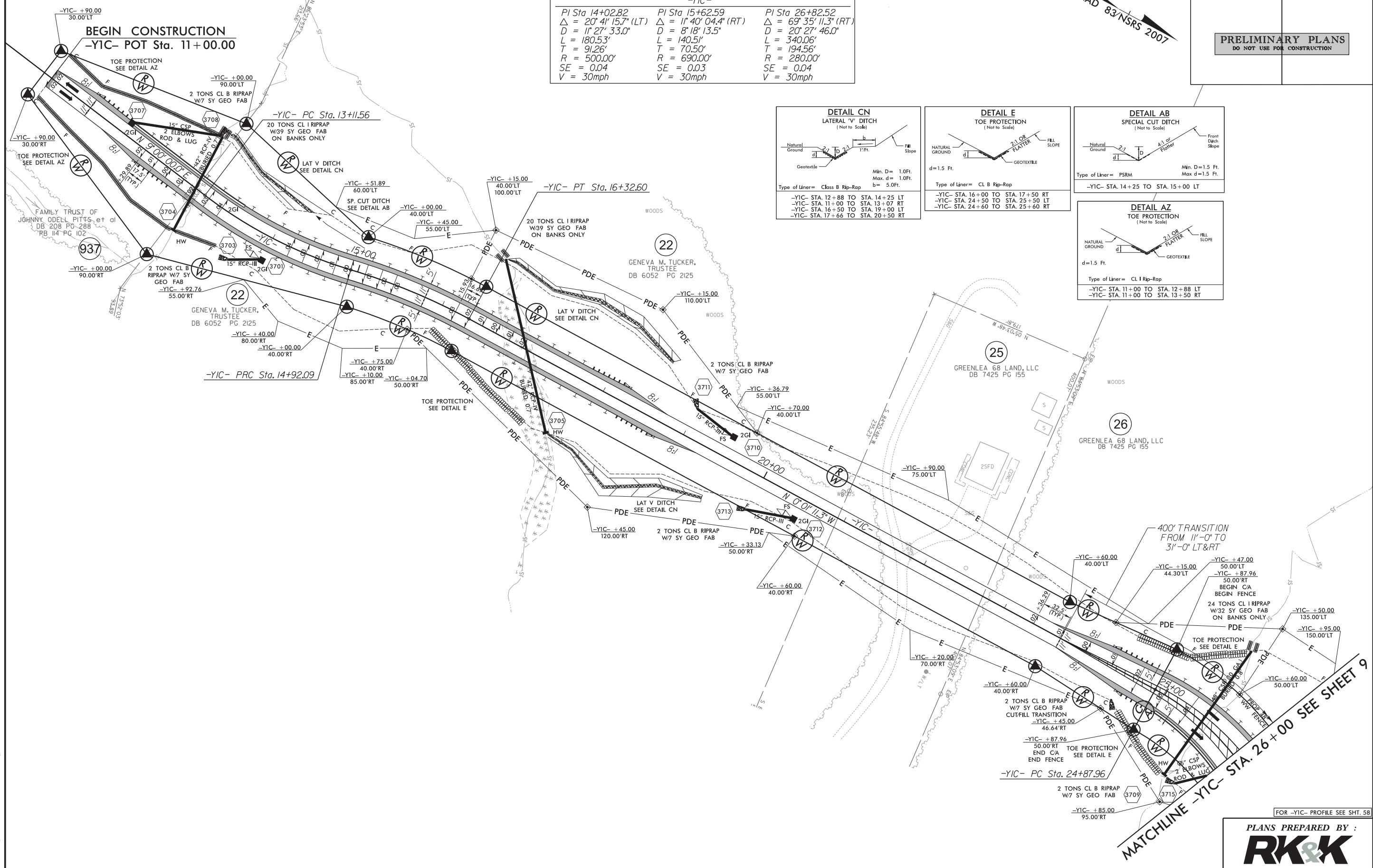
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PROJECT REFERENCE NO. R-2413A		SHEET NO. 37
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



-YIC-		
PI Sta. 14+02.82	PI Sta. 15+62.59	PI Sta. 26+82.52
$\Delta = 20^\circ 41' 15.7" (LT)$	$\Delta = 1^\circ 40' 04.4" (RT)$	$\Delta = 69^\circ 35' 11.3" (RT)$
$D = 1^\circ 27' 33.0"$	$D = 8^\circ 18' 13.5"$	$D = 20^\circ 27' 46.0"$
$L = 180.53'$	$L = 140.51'$	$L = 340.06'$
$T = 91.26'$	$T = 70.50'$	$T = 194.56'$
$R = 500.00'$	$R = 690.00'$	$R = 280.00'$
$SE = 0.04$	$SE = 0.03$	$SE = 0.04$
$V = 30mph$	$V = 30mph$	$V = 30mph$



FOR -YIC- PROFILE SEE SHT. 58

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END GRADE I-5110
BEGIN GRADE R-2413A
-L- STA.109+00.00
EL = 963.02'

-L-

PROJECT REFERENCE NO.		SHEET NO.
R-2413A		38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

PI = 120+00.00
EL = 926.95'
VC = 1,000'
K = 189
DS = 72mph

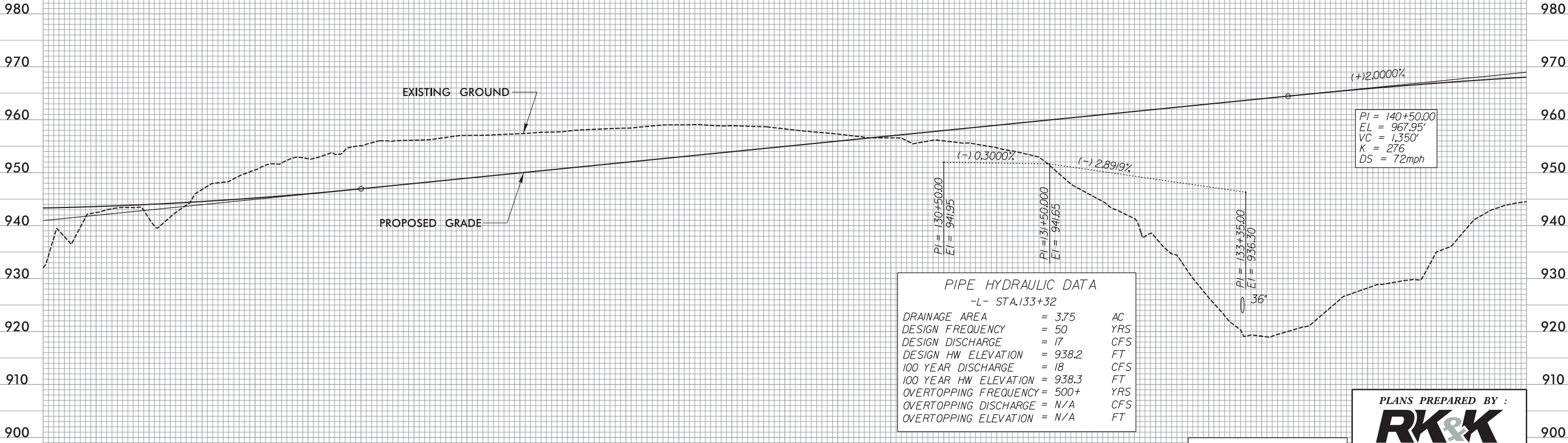
PROPOSED GRADE

EXISTING GROUND

PIPE HYDRAULIC DATA		
-L- STA.117+00		
DRAINAGE AREA	= 24.21	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 107	CFS
DESIGN HW ELEVATION	= 904.8	FT
100 YEAR DISCHARGE	= 117	CFS
100 YEAR HW ELEVATION	= 905.11	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT

60"

108 + 00 109 + 00 110 + 00 111 + 00 112 + 00 113 + 00 114 + 00 115 + 00 116 + 00 117 + 00 118 + 00 119 + 00 120 + 00 121 + 00 122 + 00



EXISTING GROUND

PROPOSED GRADE

PI = 140+50.00
EL = 967.95'
VC = 1,350'
K = 276
DS = 72mph

PI = 130+50.00
EL = 941.95

PI = 131+50.00
EL = 941.65

PI = 133+35.00
EL = 936.30

PI = 130+50.00
EL = 941.95

PI = 131+50.00
EL = 941.65

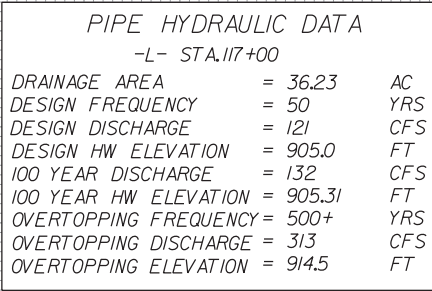
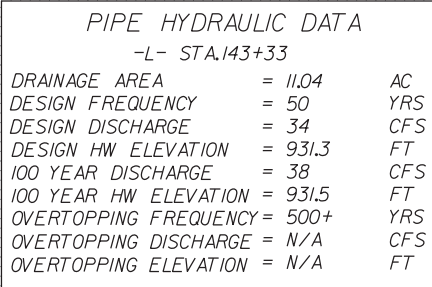
PI = 133+35.00
EL = 936.30

RIGHT DITCH

FOR -L- PLAN SEE SHTS. 8 - 9

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Elevs

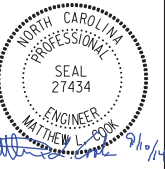
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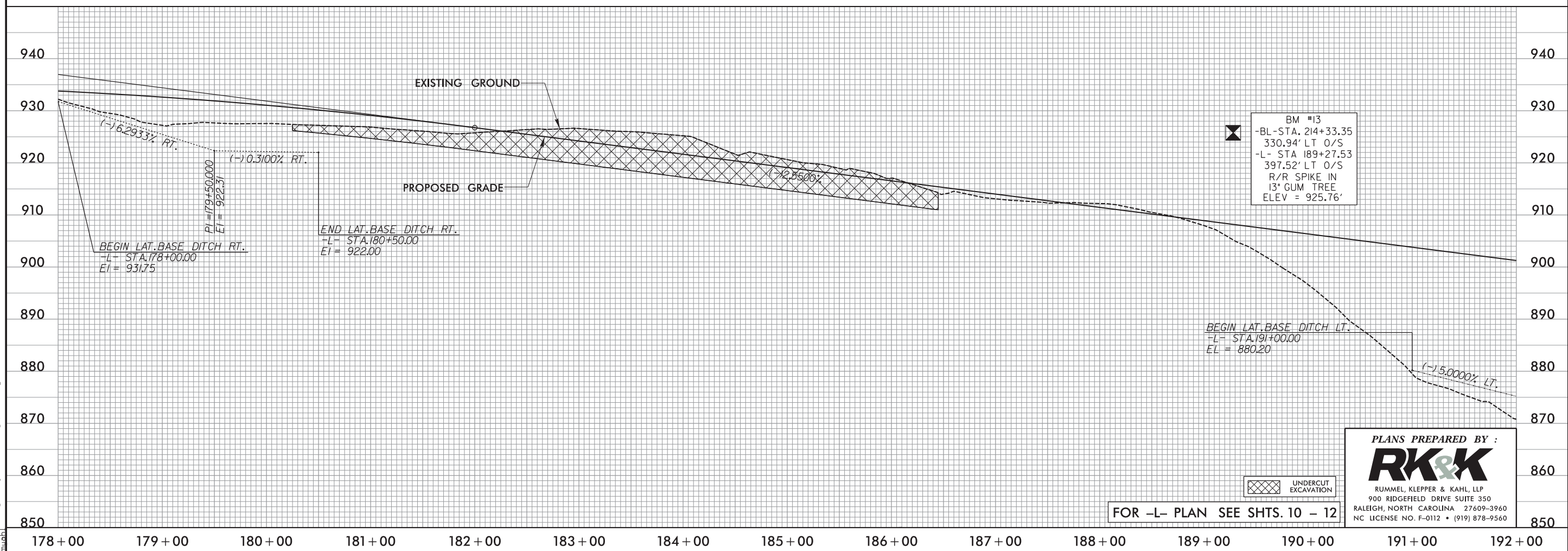
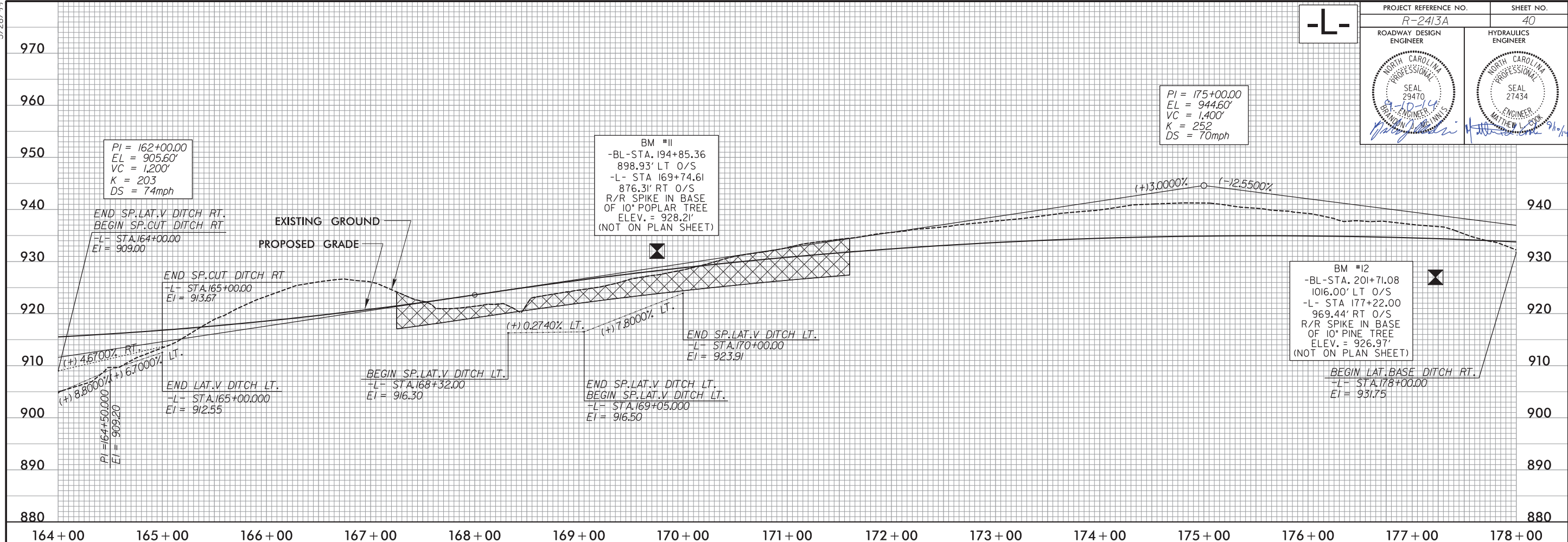
FOR -L- PLAN SEE SHT. 9

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-L-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 40
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
		



UNDERCUT
EXCAVATION

FOR -L- PLAN SEE SHTS. 10 - 12

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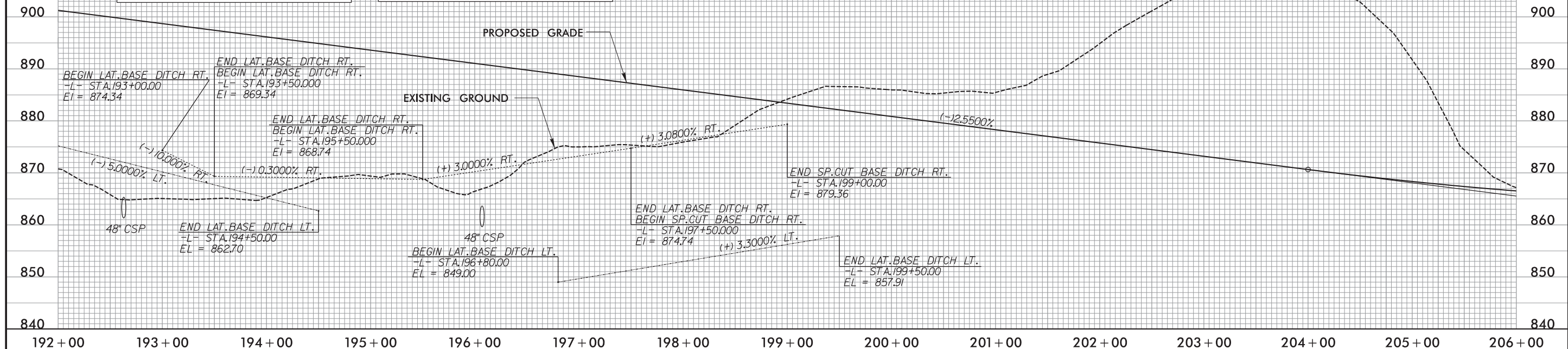
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-L-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 41
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	

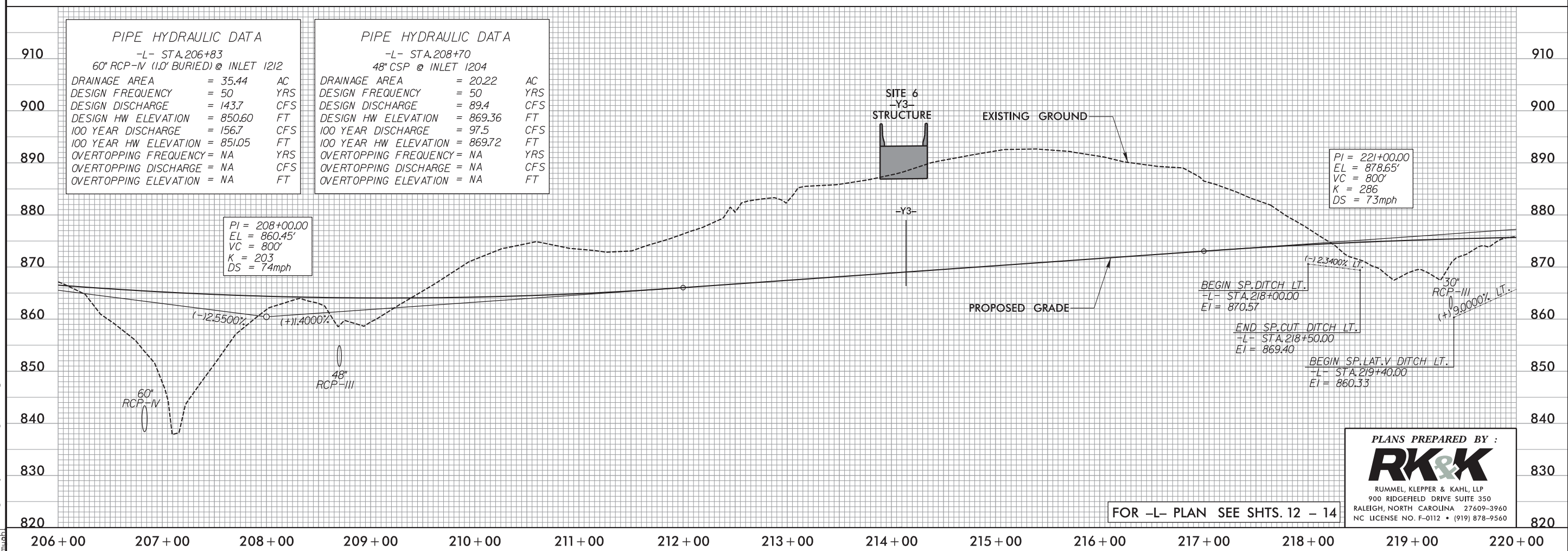
PIPE HYDRAULIC DATA			
-L- STA.192+63 48" CSP @ INLET 1110			
DRAINAGE AREA	= 30.85	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 107.0	CFS	
DESIGN HW ELEVATION	= 876.64	FT	
100 YEAR DISCHARGE	= 116.8	CFS	
100 YEAR HW ELEVATION	= 877.05	FT	
OVERTOPPING FREQUENCY	= NA	YRS	
OVERTOPPING DISCHARGE	= NA	CFS	
OVERTOPPING ELEVATION	= NA	FT	

PIPE HYDRAULIC DATA			
-L- STA.196+07 48" CSP @ INLET 1108			
DRAINAGE AREA	= 23.05	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 98.7	CFS	
DESIGN HW ELEVATION	= 873.78	FT	
100 YEAR DISCHARGE	= 107.7	CFS	
100 YEAR HW ELEVATION	= 874.82	FT	
OVERTOPPING FREQUENCY	= NA	YRS	
OVERTOPPING DISCHARGE	= NA	CFS	
OVERTOPPING ELEVATION	= NA	FT	



PIPE HYDRAULIC DATA			
-L- STA.206+83 60" RCP-IV (1.0' BURIED) @ INLET 1212			
DRAINAGE AREA	= 35.44	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 143.7	CFS	
DESIGN HW ELEVATION	= 850.60	FT	
100 YEAR DISCHARGE	= 156.7	CFS	
100 YEAR HW ELEVATION	= 851.05	FT	
OVERTOPPING FREQUENCY	= NA	YRS	
OVERTOPPING DISCHARGE	= NA	CFS	
OVERTOPPING ELEVATION	= NA	FT	

PIPE HYDRAULIC DATA			
-L- STA.208+70 48" CSP @ INLET 1204			
DRAINAGE AREA	= 20.22	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 89.4	CFS	
DESIGN HW ELEVATION	= 869.36	FT	
100 YEAR DISCHARGE	= 97.5	CFS	
100 YEAR HW ELEVATION	= 869.72	FT	
OVERTOPPING FREQUENCY	= NA	YRS	
OVERTOPPING DISCHARGE	= NA	CFS	
OVERTOPPING ELEVATION	= NA	FT	



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FOR -L- PLAN SEE SHTS. 12 - 14

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PI = 221+00.00
EL = 878.65'
VC = 800'
K = 286
DS = 73mph

EXISTING GROUND

PIPE HYDRAULIC DATA

-L- STA.229+62

66" CSP (1.0' BURIED) @ INLET 1412

DRAINAGE AREA	= 47.58	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 153.7	CFS
DESIGN HW ELEVATION	= 821.51	FT
100 YEAR DISCHARGE	= 182.1	CFS
100 YEAR HW ELEVATION	= 822.61	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 467.7	CFS
OVERTOPPING ELEVATION	= 850.38	FT

-L-

PROJECT REFERENCE NO.

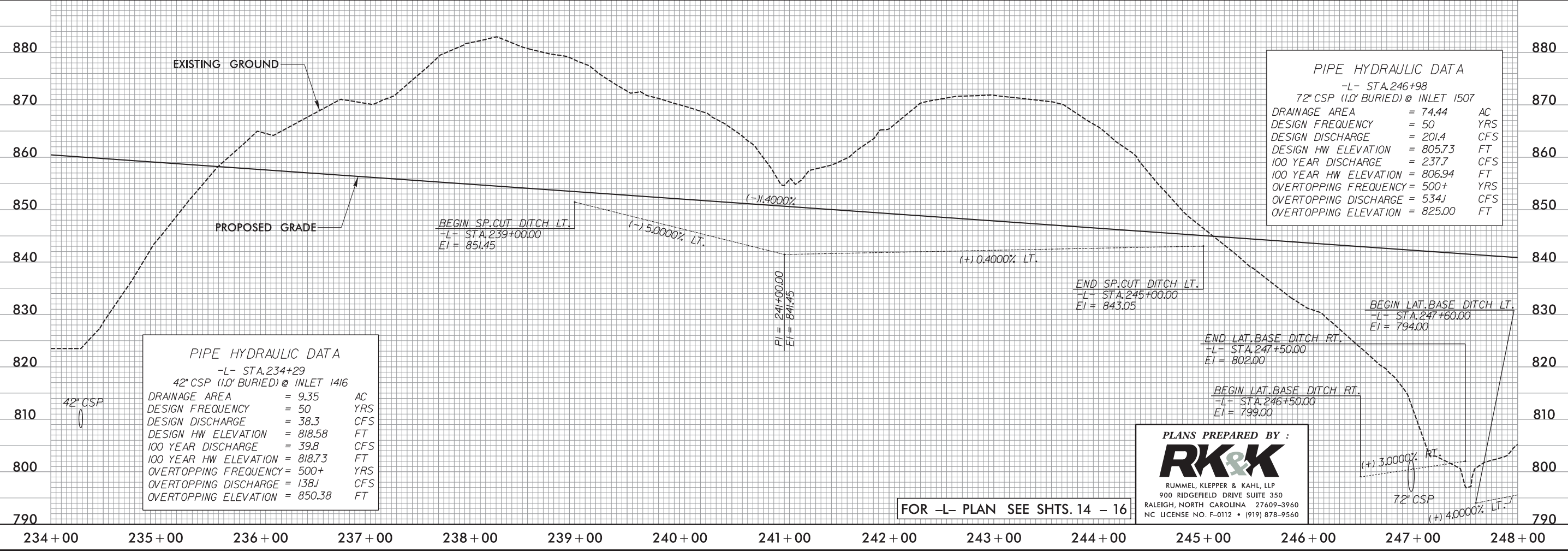
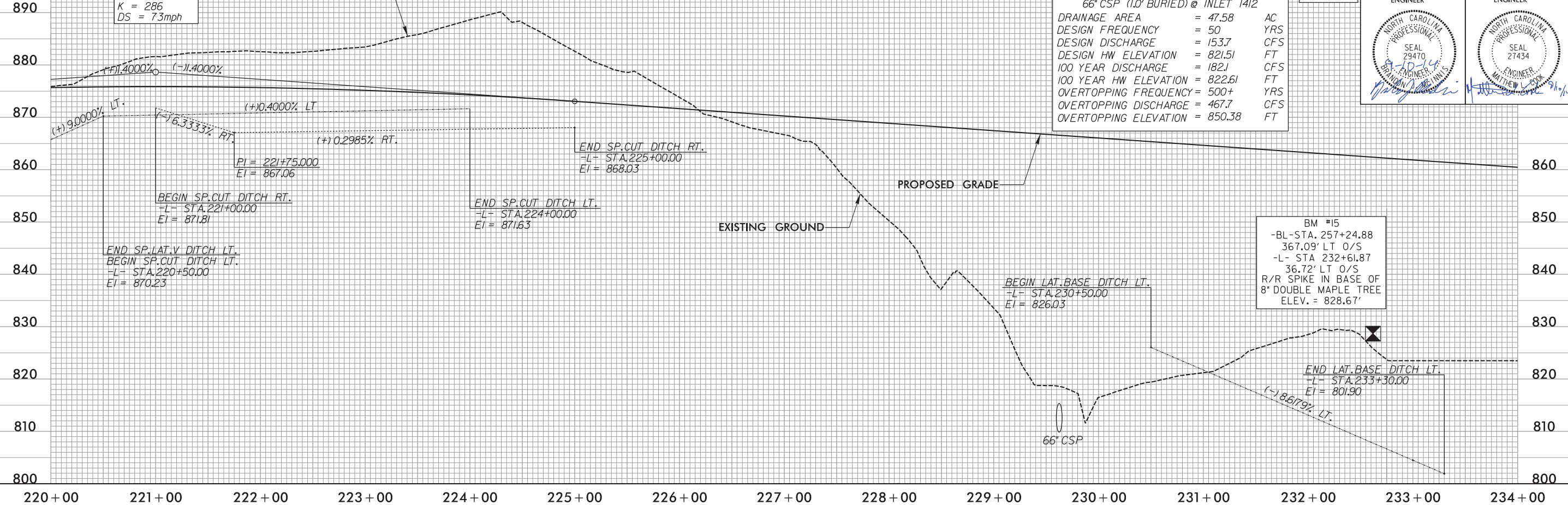
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SHEET NO.

42

ROADWAY DESIGN
ENGINEER

HYDRAULICS
ENGINEER



PIPE HYDRAULIC DATA
-L- STA.234+29
42" CSP (1.0' BURIED) @ INLET 1416

DRAINAGE AREA	= 9.35	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 38.3	CFS
DESIGN HW ELEVATION	= 818.58	FT
100 YEAR DISCHARGE	= 39.8	CFS
100 YEAR HW ELEVATION	= 818.73	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 138.1	CFS
OVERTOPPING ELEVATION	= 850.38	FT

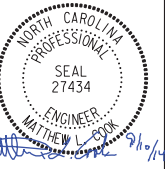
PIPE HYDRAULIC DATA
-L- STA.246+98
72" CSP (1.0' BURIED) @ INLET 1507

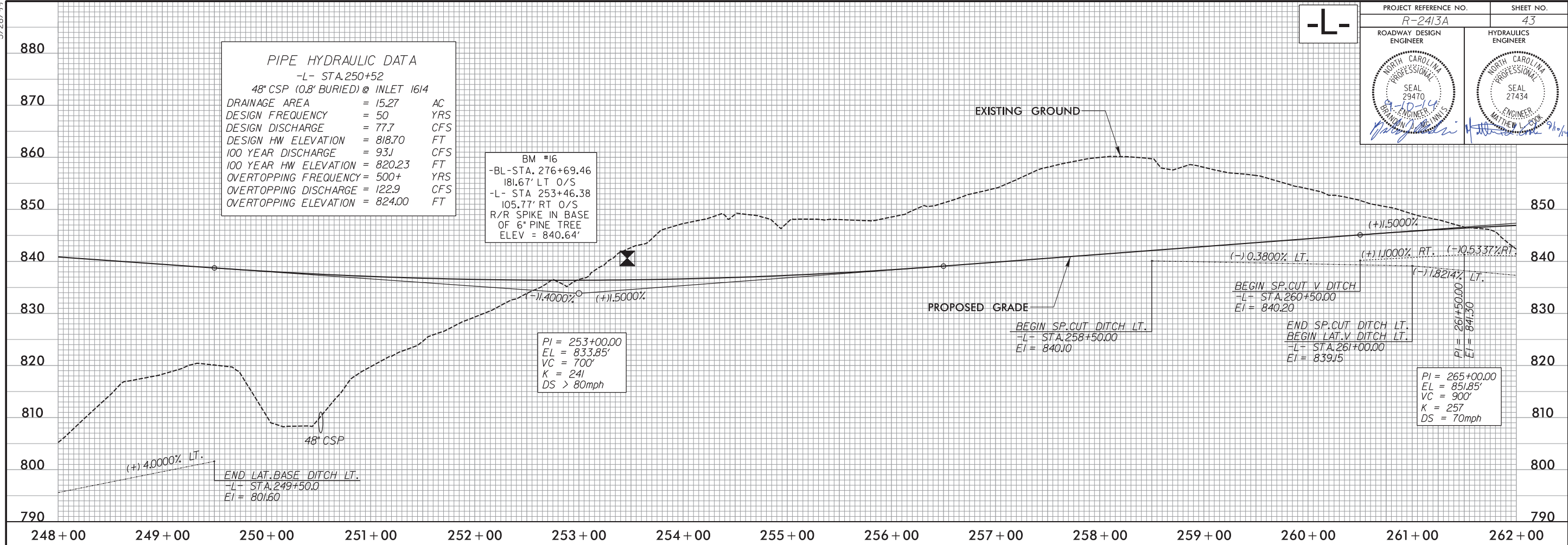
DRAINAGE AREA	= 74.44	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 201.4	CFS
DESIGN HW ELEVATION	= 805.73	FT
100 YEAR DISCHARGE	= 237.7	CFS
100 YEAR HW ELEVATION	= 806.94	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 534.1	CFS
OVERTOPPING ELEVATION	= 825.00	FT

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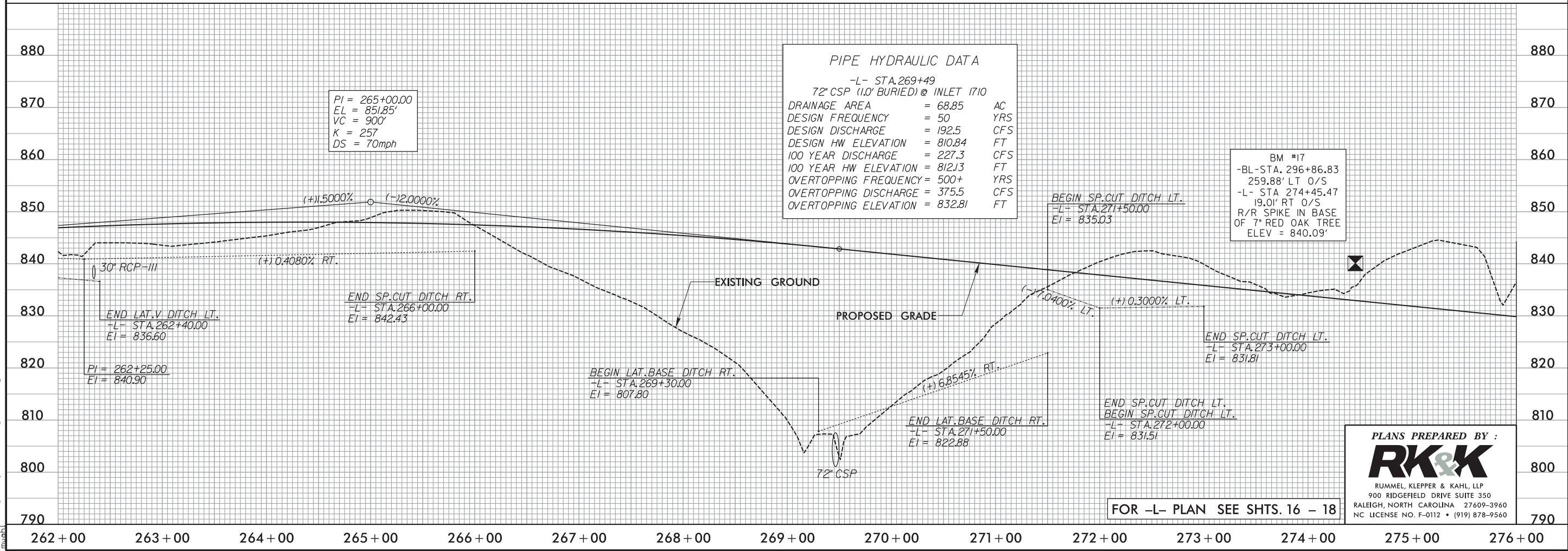
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PROJECT REFERENCE NO. R-2413A		SHEET NO. 43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
		



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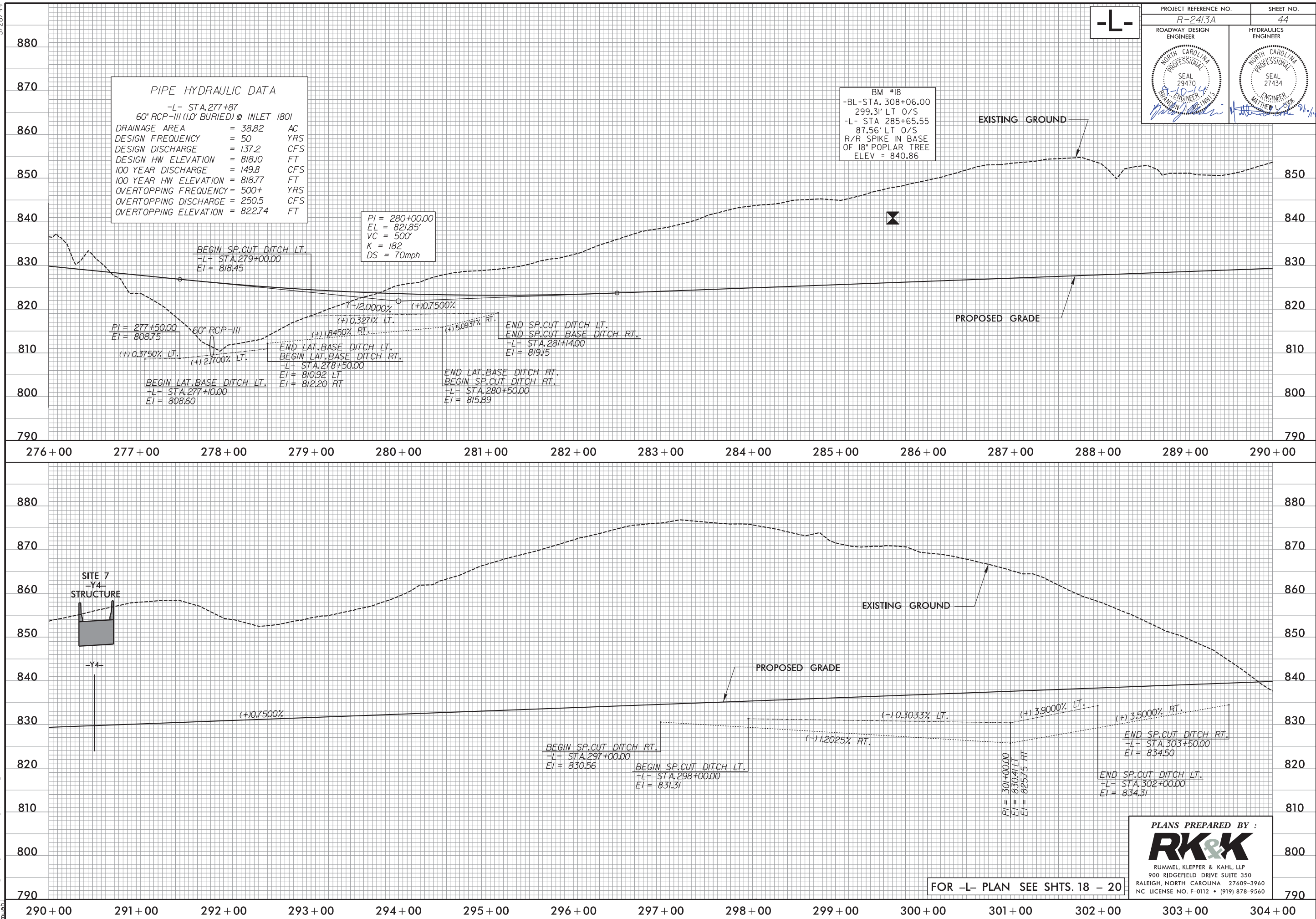
FOR -L- PLAN SEE SHTS. 16 - 18

PLANS PREPARED BY :



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PROJECT REFERENCE NO.
R-2413A

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

SEAL 27434

ENGINEER

SEAL 29470

ENGINEER

SEAL 27434

ENGINEER

FOR -L- PLAN SEE SHTS. 18 - 20

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-L-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 45
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	

PIPE HYDRAULIC DATA
-L- STA. 306+75
66" CSP (6.0" BURIED) @ INLET 2006
DRAINAGE AREA = 83.89 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 222 CFS
DESIGN HW ELEVATION = 806.10 FT
100 YEAR DISCHARGE = 258 CFS
100 YEAR HW ELEVATION = 807.47 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 564.6 CFS
OVERTOPPING ELEVATION = 840.50 FT

PI = 309+00.00
EL = 843.60'
VC = 700'
K = 311
DS = 75mph

BM #19
-BL- STA. 328+46.5300
338.81' LT O/S
-L- STA 305+94.04
259.31' LT O/S
R/R SPIKE IN BASE OF 10"
DOUBLE SWEET GUM TREE
ELEV = 838.70'

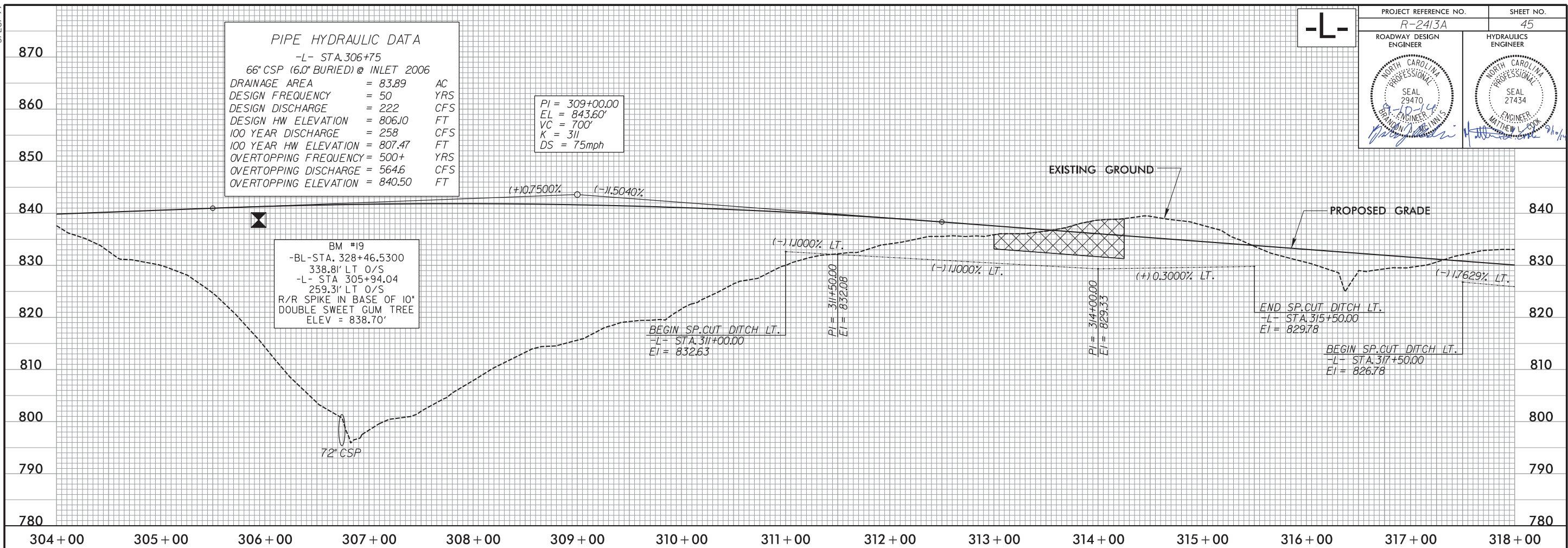
BEGIN SP. CUT DITCH LT.
-L- STA. 311+00.00
EI = 832.63

PI = 311+50.00
EI = 832.08

PI = 314+00.00
EI = 829.33

END SP. CUT DITCH LT.
-L- STA. 315+50.00
EI = 829.78

BEGIN SP. CUT DITCH LT.
-L- STA. 317+50.00
EI = 826.78



PIPE HYDRAULIC DATA
-L- STA. 328+32
72" CSP (6.0" BURIED) @ INLET 2112
DRAINAGE AREA = 65.79 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 178.0 CFS
DESIGN HW ELEVATION = 789.84 FT
100 YEAR DISCHARGE = 207.0 CFS
100 YEAR HW ELEVATION = 790.56 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 499.7 CFS
OVERTOPPING ELEVATION = 814.74 FT

BM #20
-BL- STA. 347+16.86
298.20' LT O/S
-L- STA 324+69.06
342.96' LT O/S
R/R SPIKE IN BASE OF
13" WHITE OAK TREE
ELEV = 790.55'

END LAT. BASE DITCH RT.
-L- STA. 325+50.00
EI = 800.00

END SP. CUT DITCH LT.
-L- STA. 321+50.00
EI = 820.76

PI = 321+00.00
EI = 820.61

PIPE HYDRAULIC DATA
-L- STA. 324+44
54" CSP (6.0" BURIED) @ INLET 2108
DRAINAGE AREA = 29.32 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 83.6 CFS
DESIGN HW ELEVATION = 788.30 FT
100 YEAR DISCHARGE = 91.7 CFS
100 YEAR HW ELEVATION = 788.70 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 230.2 CFS
OVERTOPPING ELEVATION = 819.23 FT

BEGIN LAT. BASE DITCH RT.
-L- STA. 322+82.00
EI = 783.90

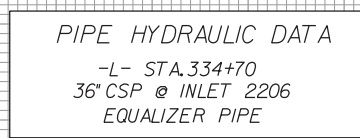
END LAT. BASE DITCH RT.
BEGIN LAT. BASE DITCH RT.
-L- STA. 324+00.00
EI = 788.03

UNDERCUT
EXCAVATION

FOR -L- PLAN SEE SHTS. 20 - 22

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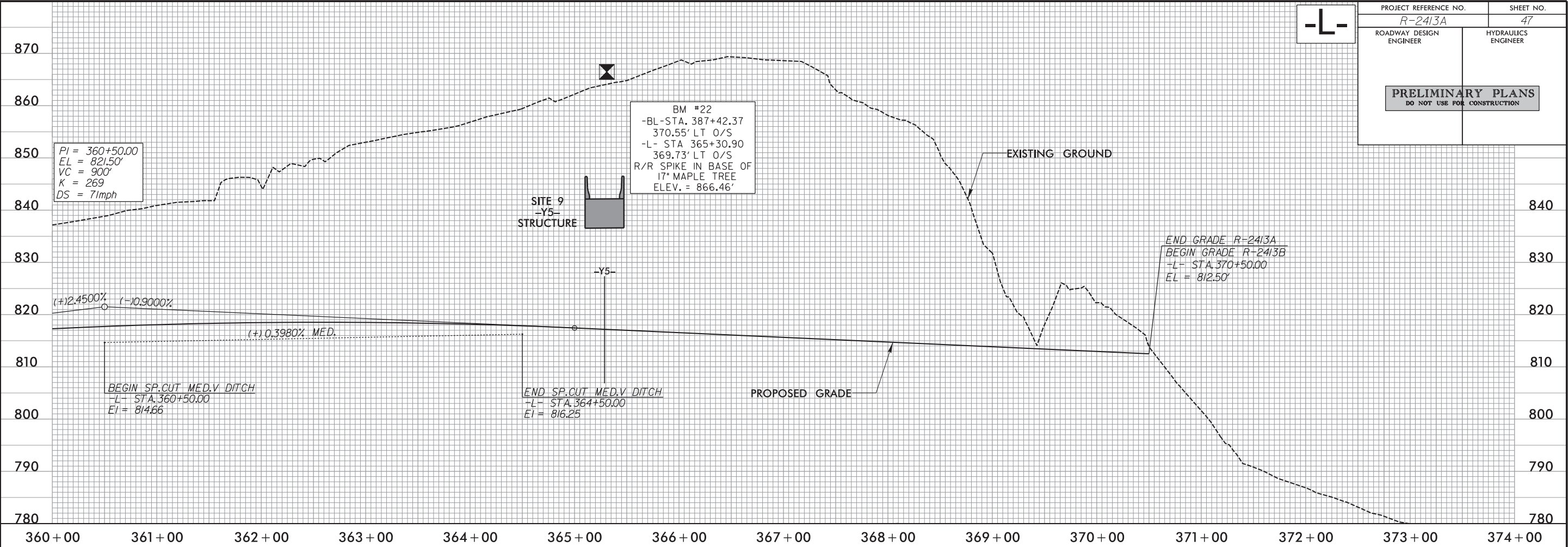
FOR -L- PLAN SEE SHTS. 22 - 24

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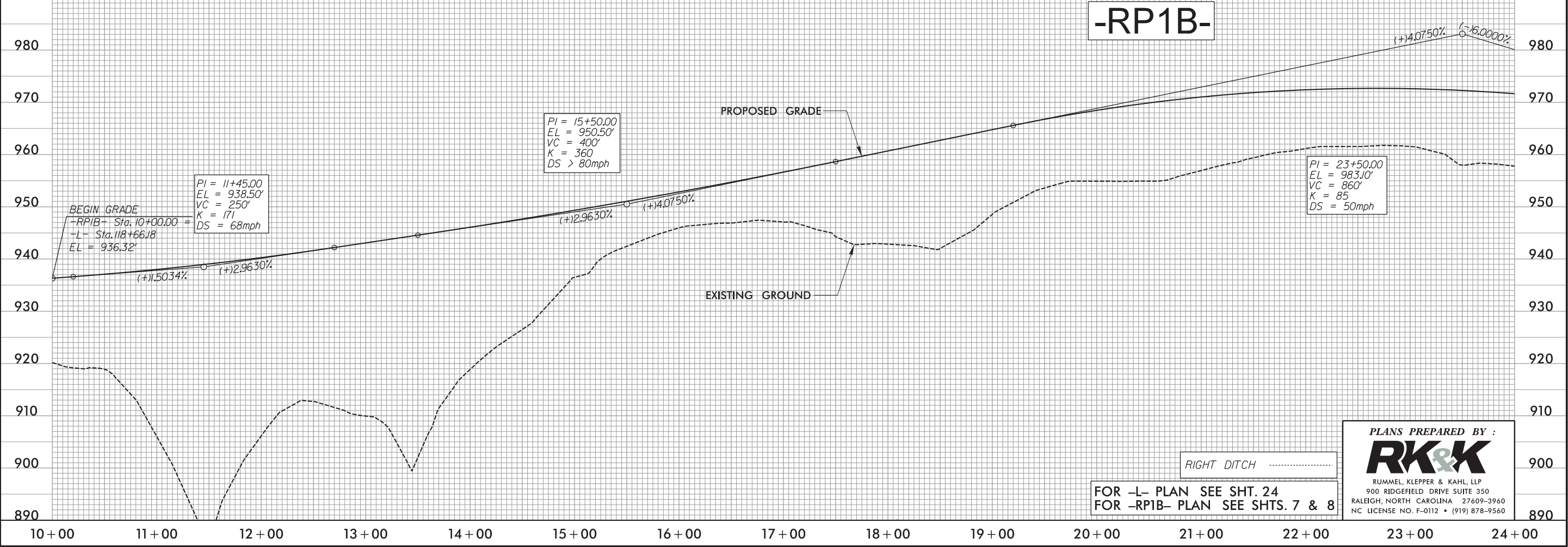
-L-

PROJECT REFERENCE NO. R-2413A	SHEET NO. 47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



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-RP1B-



FOR -L- PLAN SEE SHT. 24
FOR -RP1B- PLAN SEE SHTS. 7 & 8

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BEGIN BRIDGE
-RP1B- Sta. 25+37.33

PI = 23+50.00
EL = 983.10'
VC = 860'
K = 85
DS = 50mph

END BRIDGE
-RP1B- Sta. 26+69.00

SITE 3 - -RP1B- STRUCTURE

-Y2-

PROPOSED GRADE

PI = 32+10.00
EL = 931.50'
VC = 435'
K = 96
DS = 50mph

END GRADE
-RP1B- Sta. 37+45.31 =
-Y1- Sta. 46+19.00
EL = 922.53'

PI = 35+80.00
EL = 926.00'
VC = 100'
K = 163
DS = 62mph

BEGIN LAT. BASE DITCH RT.
-RP1B- STA. 27+00.00
EI = 935.60

EXISTING GROUND

END LAT. BASE DITCH RT.
-RP1B- STA. 32+15.00
EI = 916.02

SITE 2A
-FLY-
STRUCTURE

-FLY-

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

-RP1A-

BEGIN GRADE
-RP1A- Sta. 10+00.00 =
+L- Sta. 164+00.00
EL = 915.05'

PI = 12+50.00
EL = 912.45'
VC = 400'
K = 182
DS = 70mph

EXISTING GROUND

PROPOSED GRADE

PI = 17+50.00
EL = 918.25'
VC = 250'
K = 113
DS = 54mph

BEG. SP. CUT DITCH LT.
STA. 17+53.00
EI = 916.85

END SP. CUT DITCH LT.
BEG. LAT. BASE DITCH LT.
STA. 20+25.00
EI = 915.70

PI = 23+70.00
EL = 939.11'
VC = 640'
K = 84
DS = 50mph

PIPE HYDRAULIC DATA			
-L- STA. 117+00			
DRAINAGE AREA	= 36.23	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 121	CFS	
DESIGN HW ELEVATION	= 905.0	FT	
100 YEAR DISCHARGE	= 132	CFS	
100 YEAR HW ELEVATION	= 905.31	FT	
OVERTOPPING FREQUENCY	= 500+	YRS	
OVERTOPPING DISCHARGE	= 313	CFS	
OVERTOPPING ELEVATION	= 914.5	FT	

LEFT DITCH

RIGHT DITCH

FOR -RP1B- PLAN SEE SHT. 7
FOR -RP1A- PLAN SEE SHT. 9

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8/12/2014
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perry

5/28/99

-RP1A-

PROJECT REFERENCE NO.
R-2413A

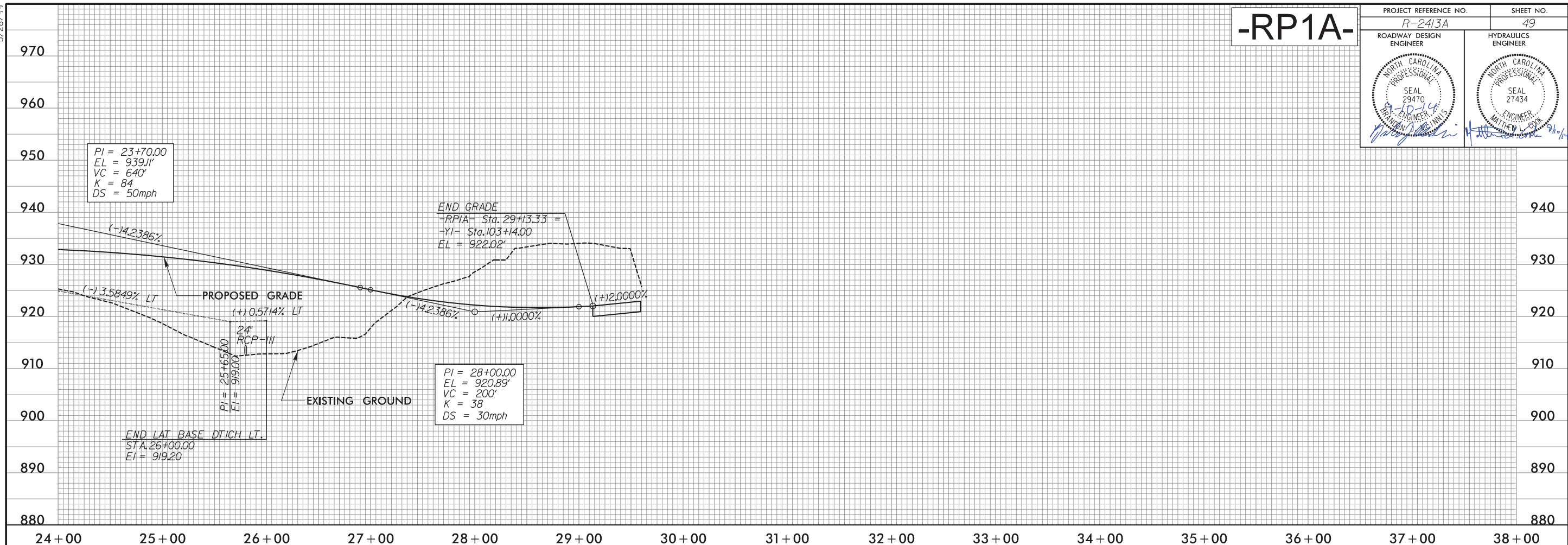
ROADWAY DESIGN ENGINEER

SHEET NO.
49

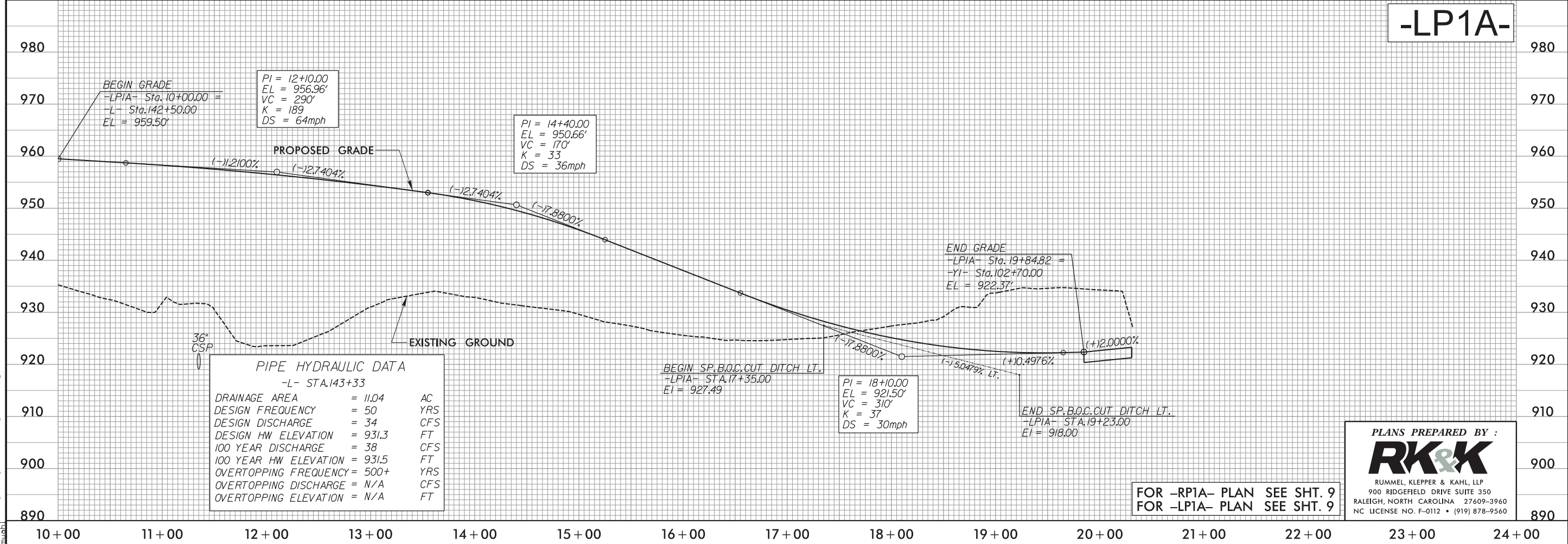
HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 29470
BRANKEN ENGINEERING, INC.

NORTH CAROLINA PROFESSIONAL SEAL 27434
ENGINEER MATTHEW L. BOOK



-LP1A-



PIPE HYDRAULIC DATA			
-L- STA. 143+33			
DRAINAGE AREA	= 11.04	AC	
DESIGN FREQUENCY	= 50	YRS	
DESIGN DISCHARGE	= 34	CFS	
DESIGN HW ELEVATION	= 931.3	FT	
100 YEAR DISCHARGE	= 38	CFS	
100 YEAR HW ELEVATION	= 931.5	FT	
OVERTOPPING FREQUENCY	= 500+	YRS	
OVERTOPPING DISCHARGE	= N/A	CFS	
OVERTOPPING ELEVATION	= N/A	FT	

FOR -RP1A- PLAN SEE SHT. 9
FOR -LP1A- PLAN SEE SHT. 9

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-RP1D-

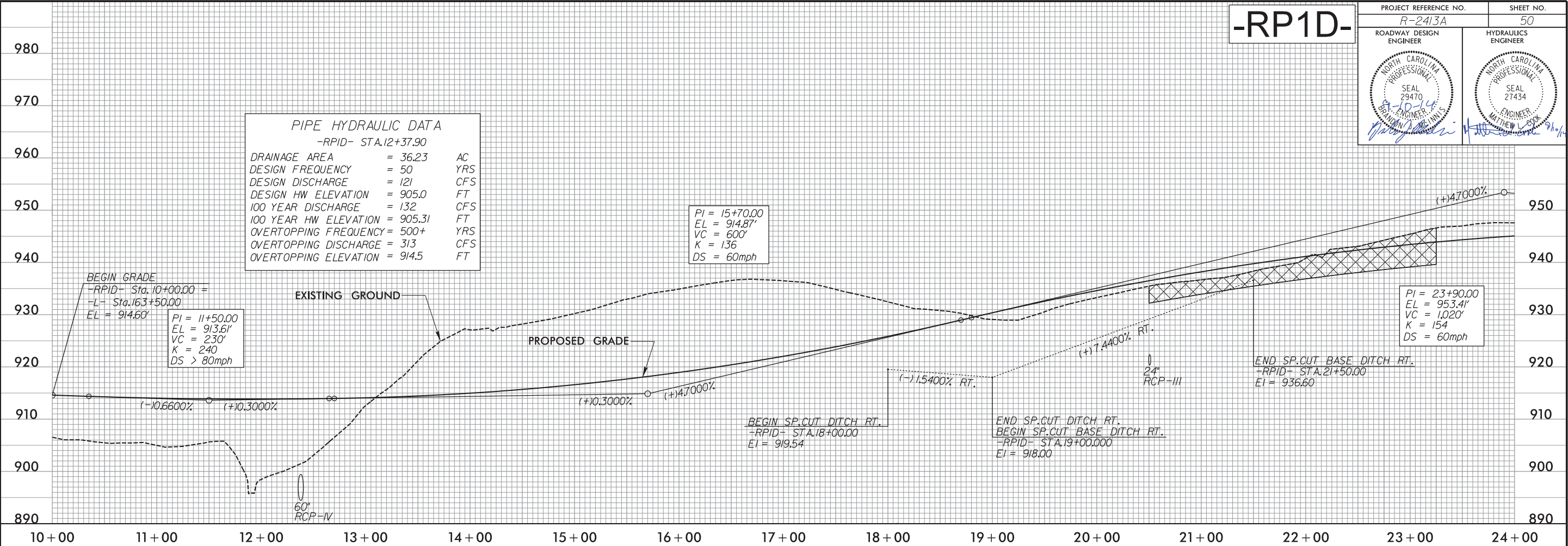
PROJECT REFERENCE NO. R-2413A		50
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER

PIPE HYDRAULIC DATA		
-RPID- STA.12+37.90		
DRAINAGE AREA	= 36.23	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 121	CFS
DESIGN HW ELEVATION	= 905.0	FT
100 YEAR DISCHARGE	= 132	CFS
100 YEAR HW ELEVATION	= 905.31	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 313	CFS
OVERTOPPING ELEVATION	= 914.5	FT

PI = 15+70.00
EL = 914.87'
VC = 600'
K = 136
DS = 60mph

PI = 11+50.00
EL = 913.61'
VC = 230'
K = 240
DS > 80mph

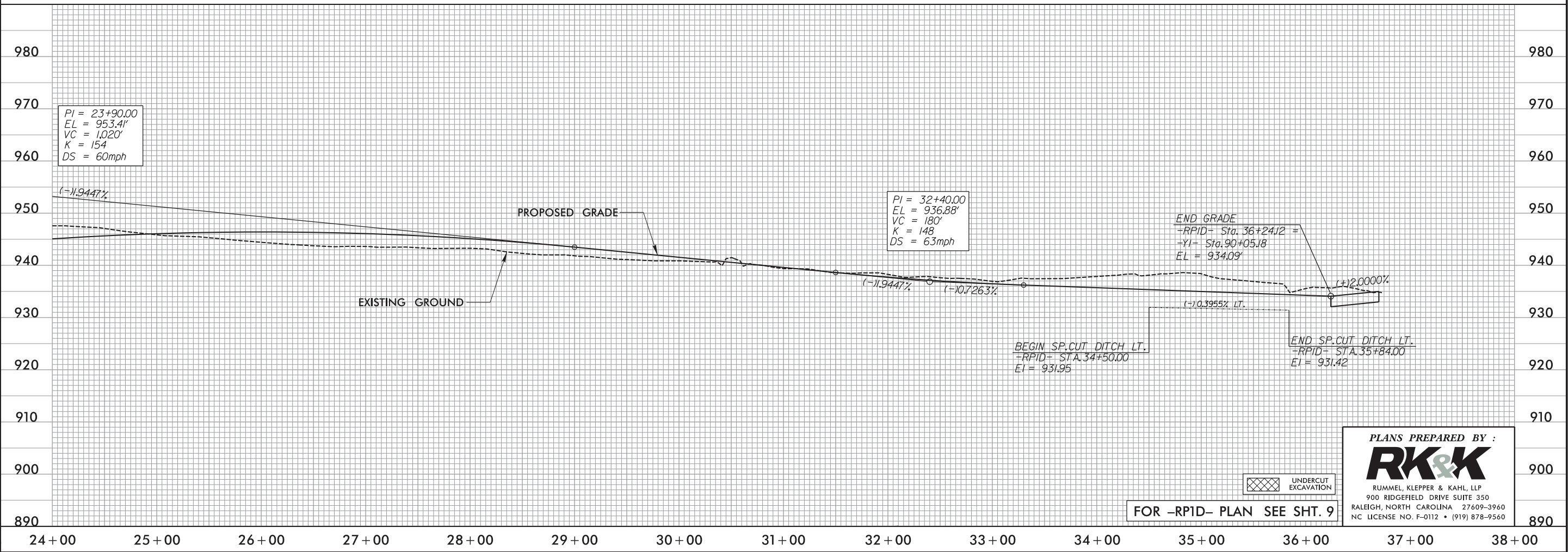
PI = 23+90.00
EL = 953.41'
VC = 1,020'
K = 154
DS = 60mph



PI = 23+90.00
EL = 953.41'
VC = 1,020'
K = 154
DS = 60mph

PI = 32+40.00
EL = 936.88'
VC = 180'
K = 148
DS = 63mph

END GRADE
-RPID- Sta. 36+24.12 =
-YI- Sta. 90+05.18
EL = 934.09'



UNDERCUT
EXCAVATION

FOR -RPID- PLAN SEE SHT. 9

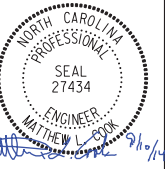
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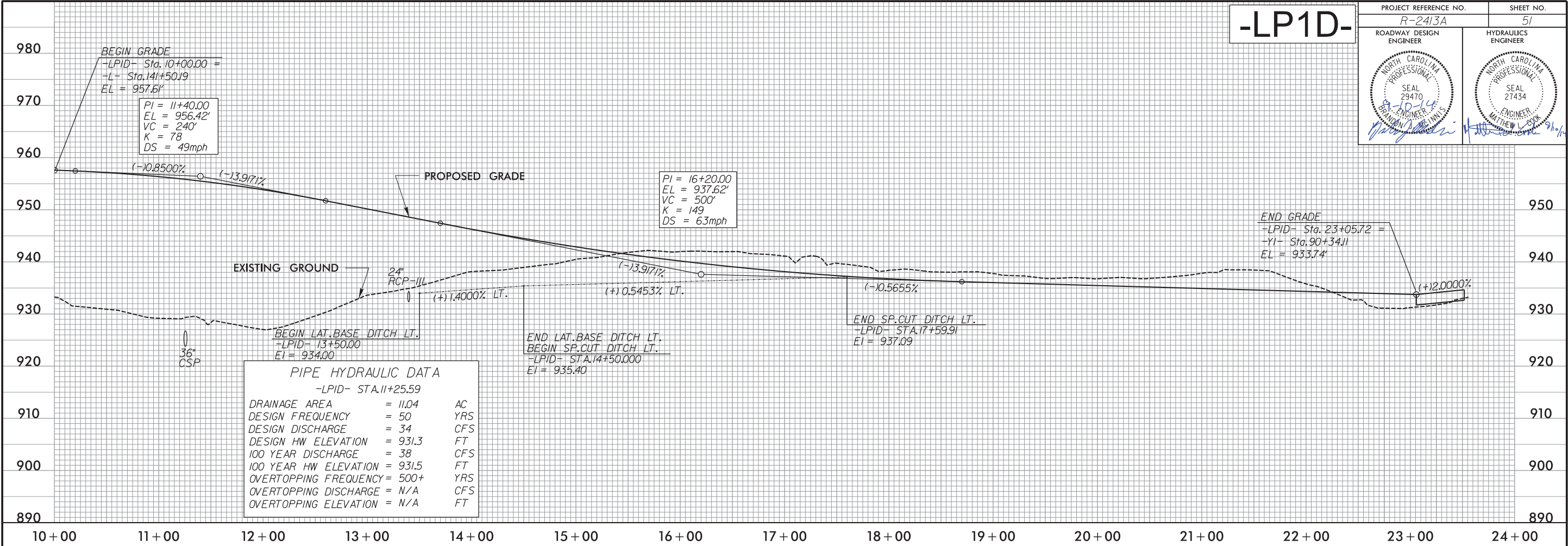
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-LP1D-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 51
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
		



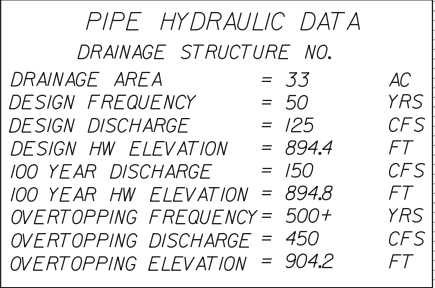
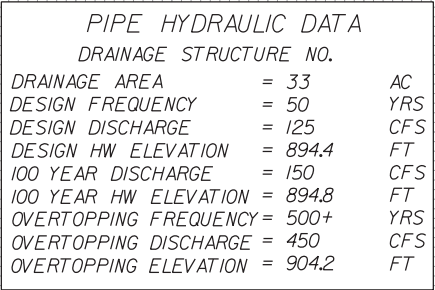
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FOR -LPID- PLAN SEE SHT. 9

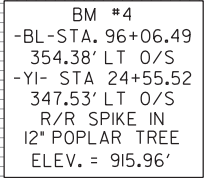


RIGHT DITCH

FOR -Y1LT- PLAN SEE SHT. 5

FOR -Y1RT- PLAN SEE SHT. 5

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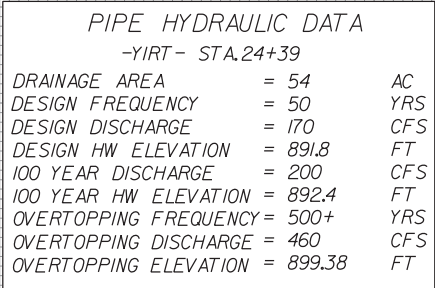


PIPE HYDRAULIC DATA		
-YILT- STA.24+67		
DRAINAGE AREA	= 54	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 170	CFS
DESIGN HW ELEVATION	= 891.8	FT
100 YEAR DISCHARGE	= 200	CFS
100 YEAR HW ELEVATION	= 892.4	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 460	CFS
OVERTOPPING ELEVATION	= 899.38	FT

PIPE HYDRAULIC DATA		
-YILT- STA. 31+80		
DRAINAGE AREA	= 71	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 200	CFS
DESIGN HW ELEVATION	= 892.1	FT
100 YEAR DISCHARGE	= 230	CFS
100 YEAR HW ELEVATION	= 893.1	FT
OVERTOPPING FREQUENCY	= 500+/-	YRS
OVERTOPPING DISCHARGE	= 350	CFS
OVERTOPPING ELEVATION	= 897.75	FT

$$\begin{aligned} PI &= 32+20.00 \\ EL &= 893.99' \\ VC &= 770' \\ K &= 218 \\ DS &= 77\text{mph} \end{aligned}$$

END GRADE
-YI- Sta. 37+00.00=
-YILT- Sta. 37+00.00
EL = 904.04'



PIPE HYDRAULIC DATA		
-YIRT- STA.31+09		
DRAINAGE AREA	= 71	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 200	CFS
DESIGN HW ELEVATION	= 892.1	FT
100 YEAR DISCHARGE	= 230	CFS
100 YEAR HW ELEVATION	= 893.1	FT
OVERTOPPING FREQUENCY	= 500+/-	YRS
OVERTOPPING DISCHARGE	= 350	CFS
OVERTOPPING ELEVATION	= 897.75	FT

$$\begin{aligned} PI &= 32+20.00 \\ EL &= 893.99' \\ VC &= 770' \\ K &= 219 \\ DS &= 78\text{mph} \end{aligned}$$

END SP. CUT DITCH RT.
-YI- STA. 37+50.00
EI = 900.31

END GRADE
-YI- Sta. 37-
-YIRT- Sta.
EL = 904.04

BEGIN SP.LAT.V DITCH RT.
-YI- STA. 31+50.00
EI = 889.34

END SP.CUT DITCH RT.
-YI- STA. 34+00.00
EI = 894.90

END SP.LAT.V DITCH RT.
BEGIN SP.CUT DITCH RT.
-YI- STA.32+00.00
EI = 890.10

DITCH

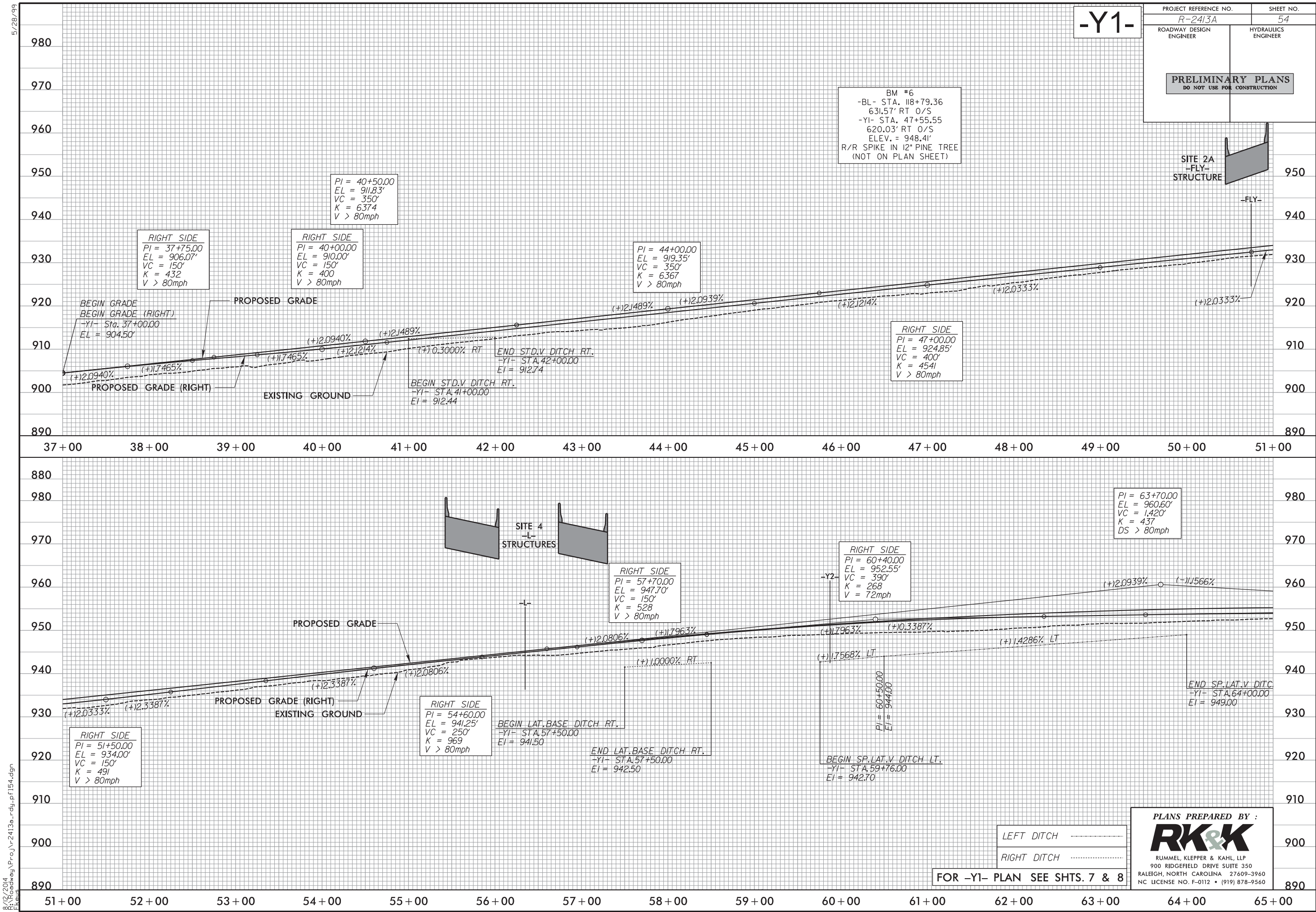
RIGHT DITCH

FOR -Y1LT- PLAN SEE SHT. 6
FOR -Y1RT- PLAN SEE SHT. 6

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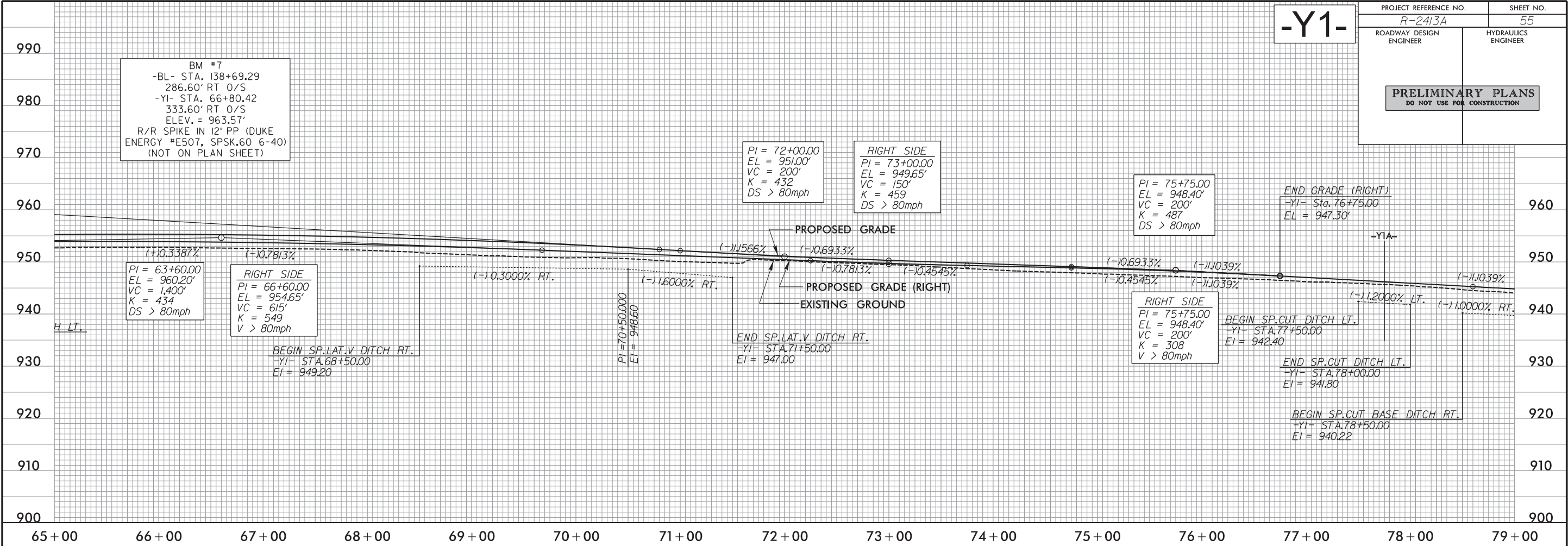
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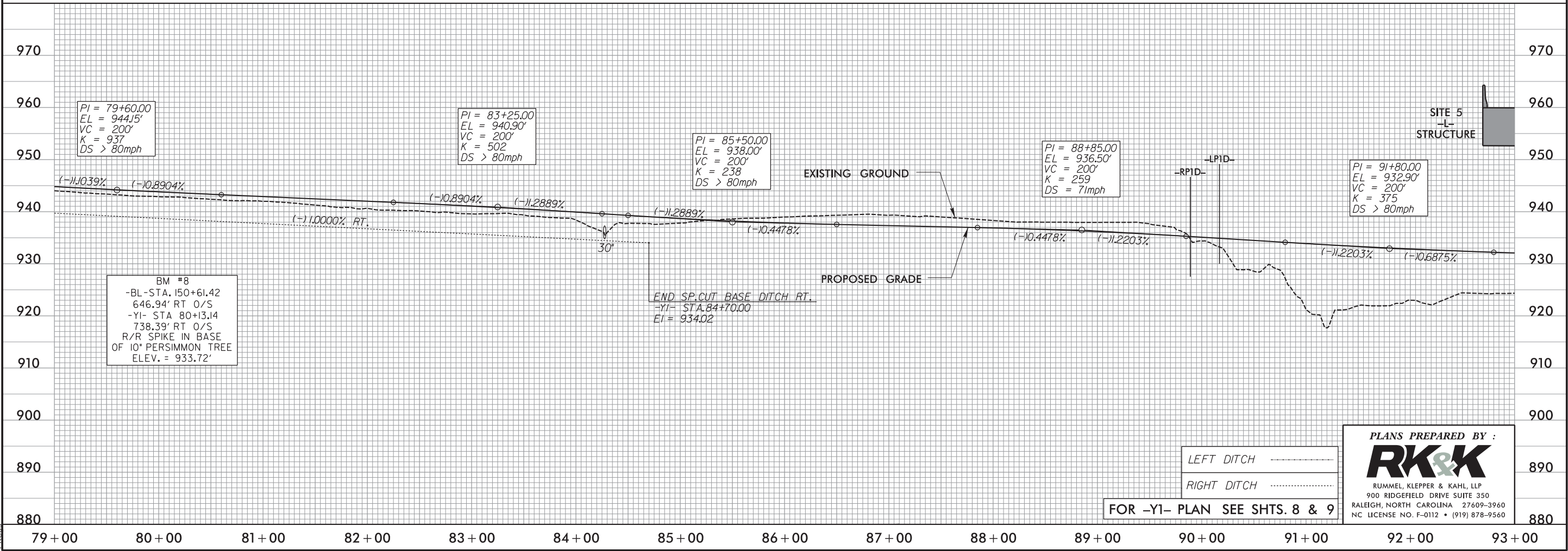
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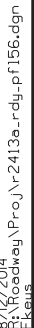
-Y1-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 55
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
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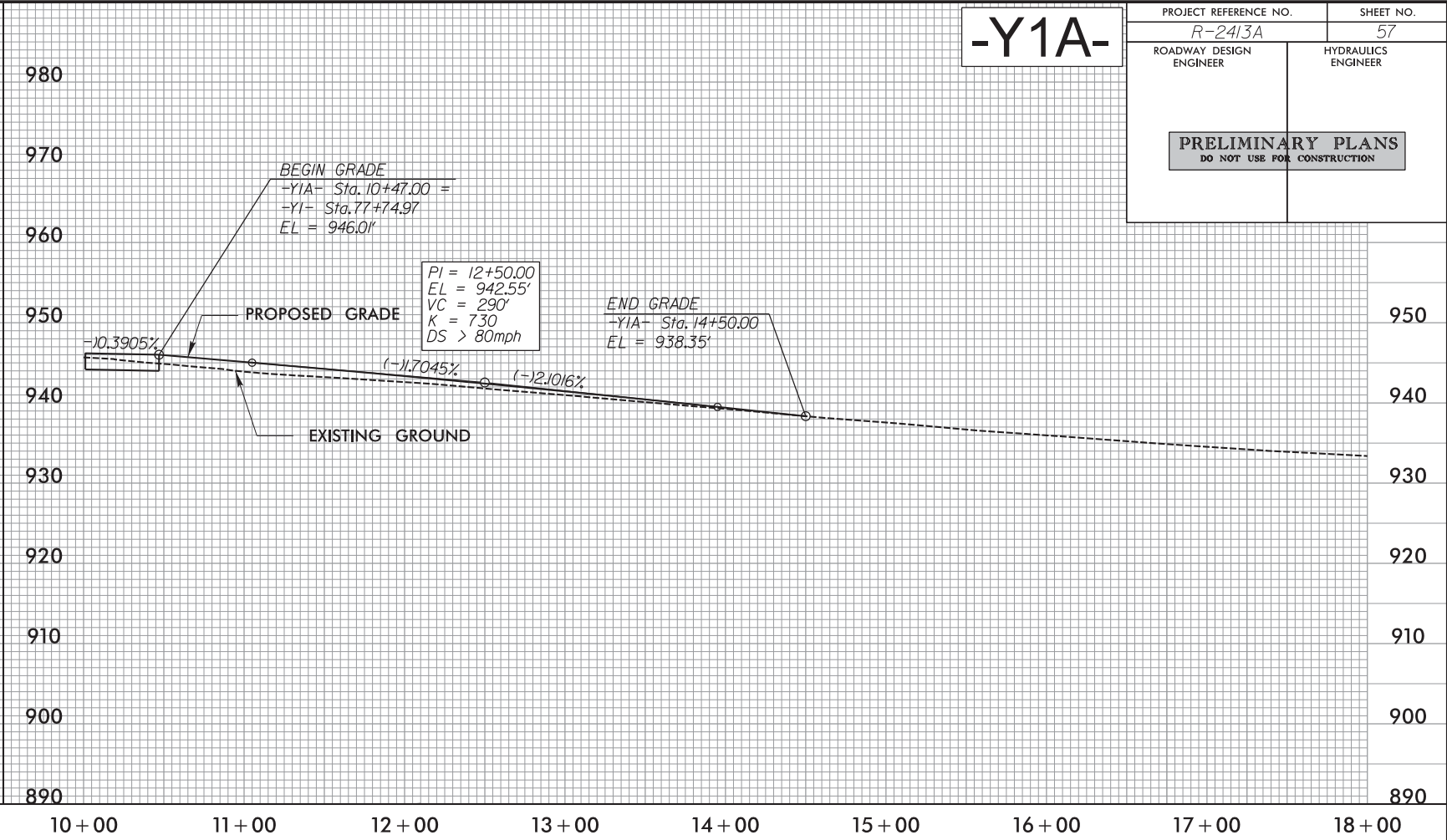
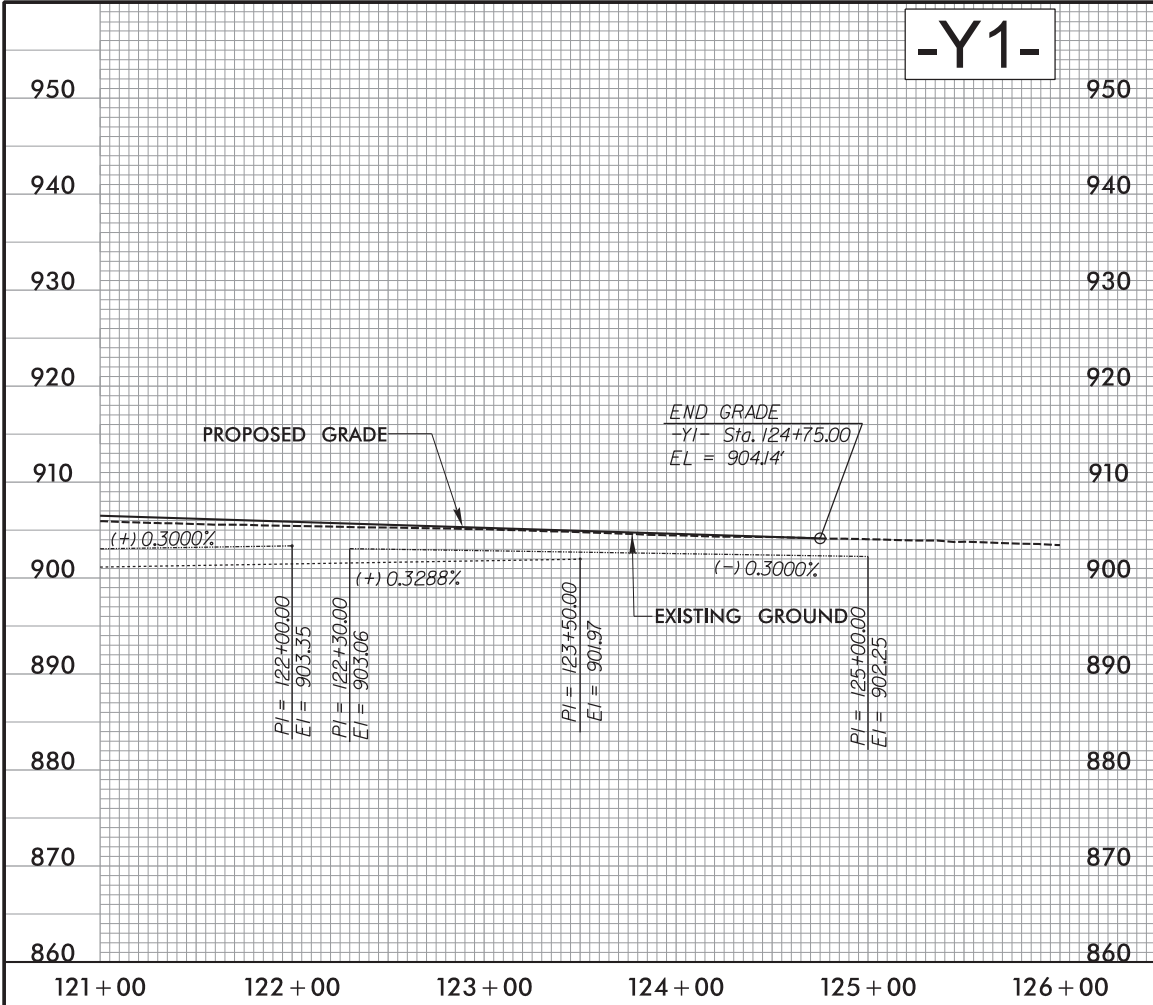
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Elevs



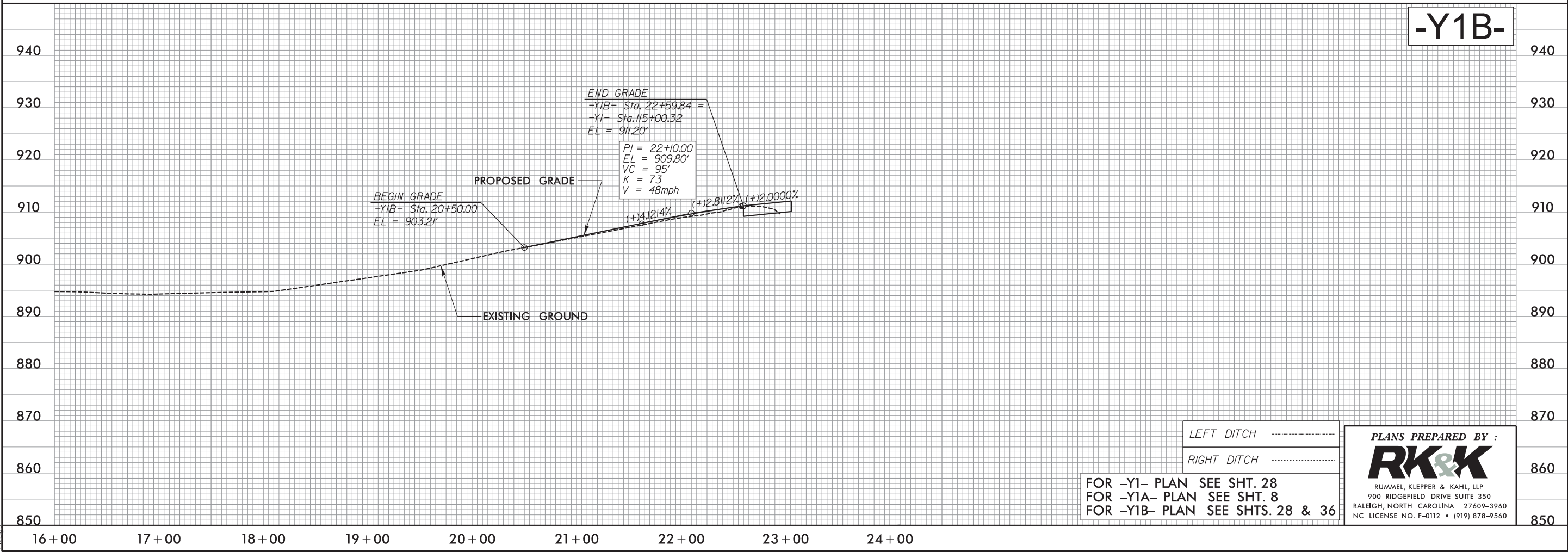


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PROJECT REFERENCE NO. R-2413A	SHEET NO. 57
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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LEFT DITCH
RIGHT DITCH

FOR -Y1- PLAN SEE SHT. 28
FOR -Y1A- PLAN SEE SHT. 8
FOR -Y1B- PLAN SEE SHTS. 28 & 36

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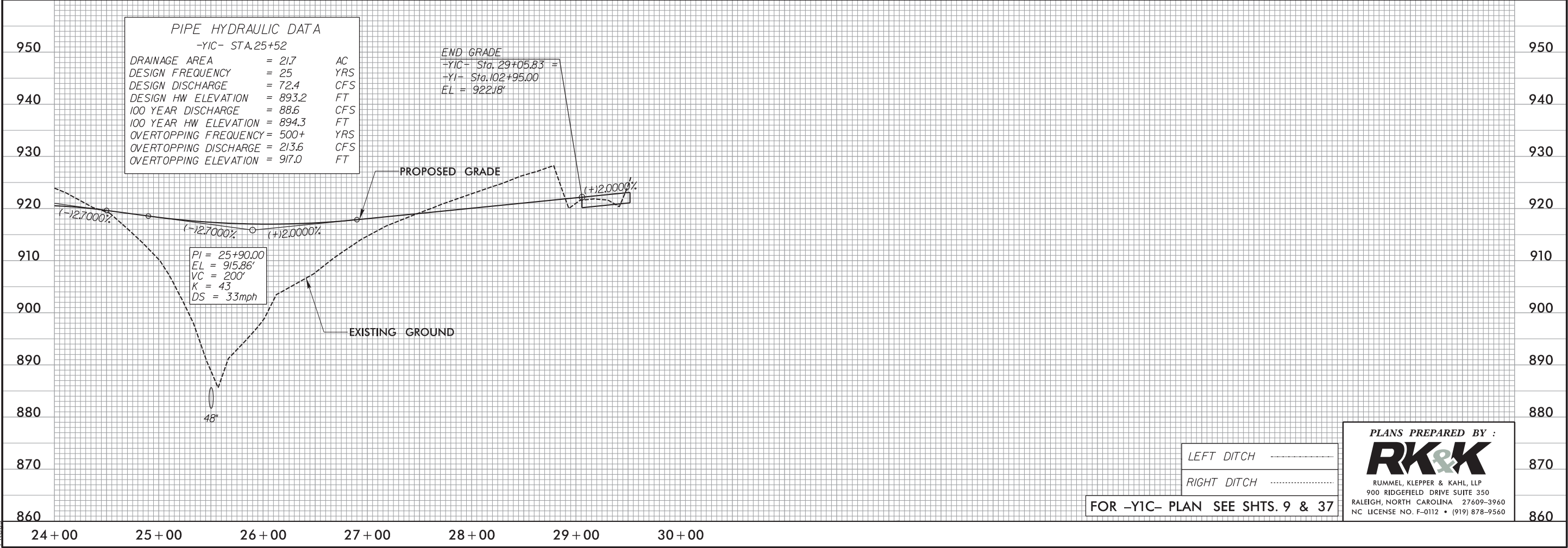
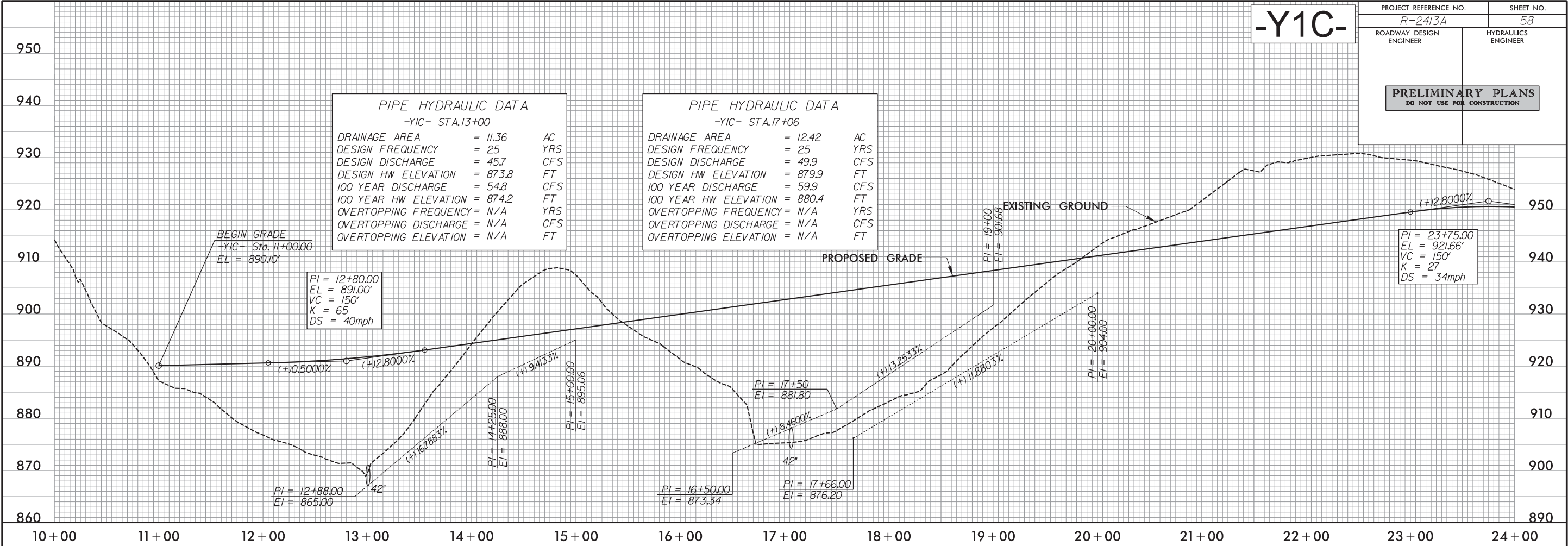
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-Y1C-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 58
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
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LEFT DITCH
RIGHT DITCH

FOR -Y1C- PLAN SEE SHTS. 9 & 37

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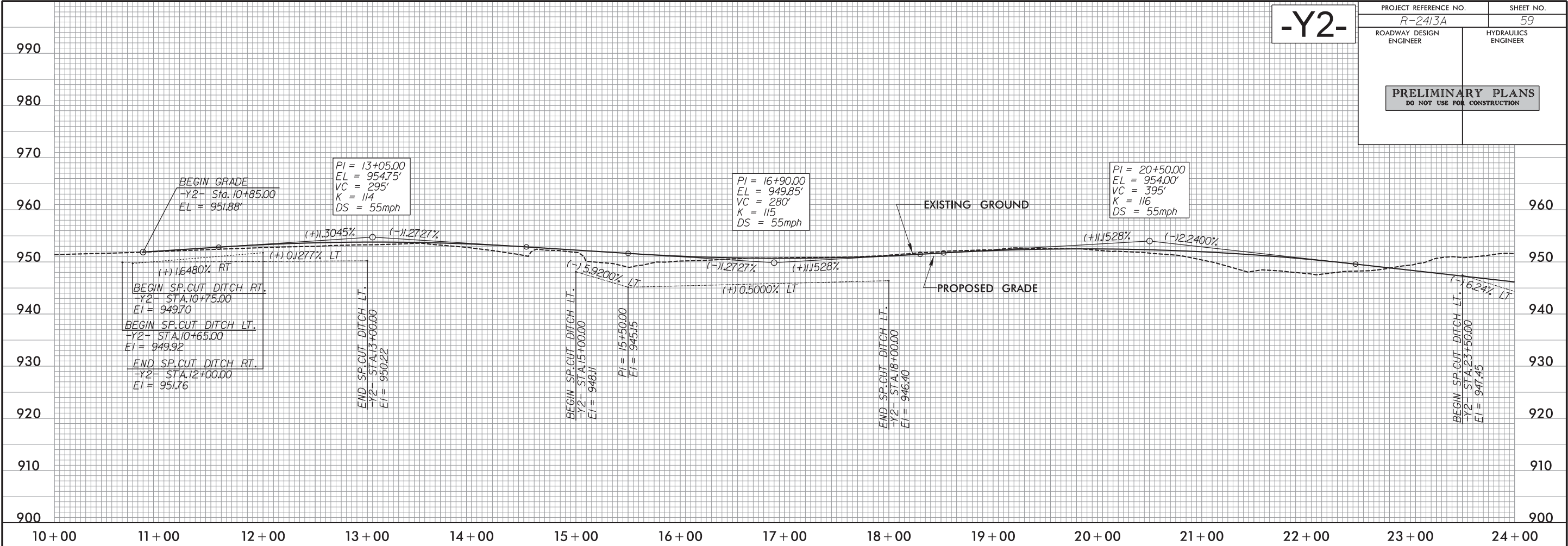
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Elevs

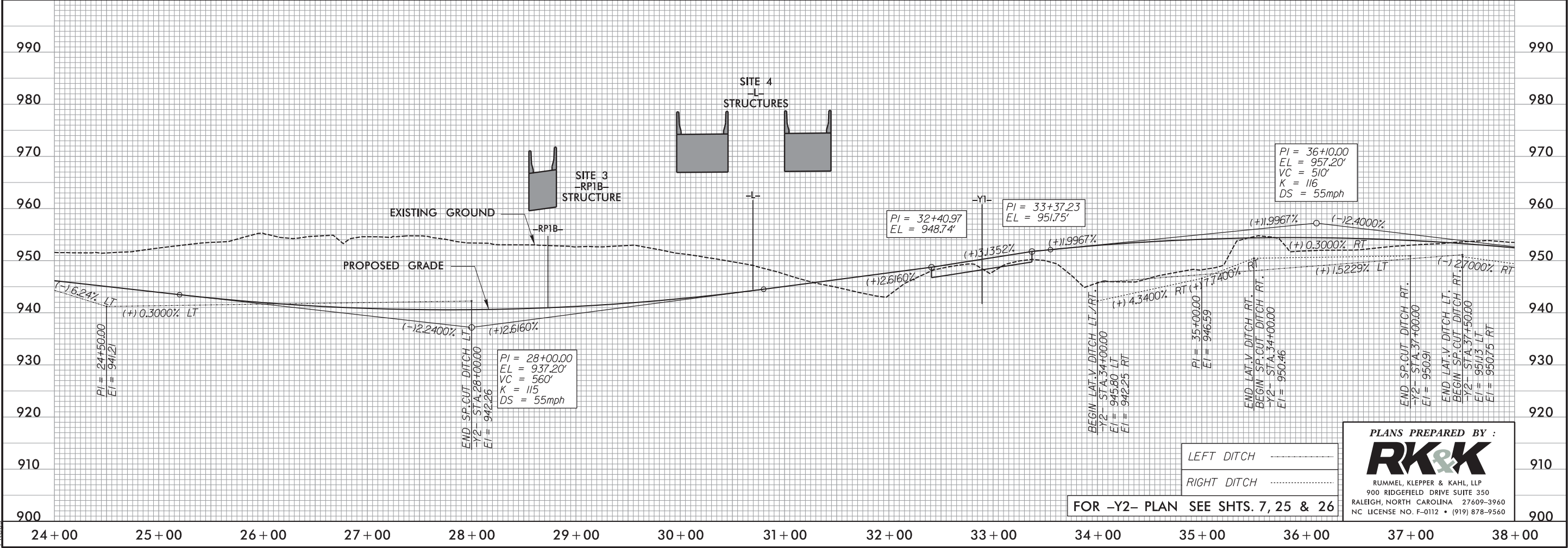
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-Y2-

PROJECT REFERENCE NO.		SHEET NO.
R-2413A		59
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



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Elevs



FOR -Y2- PLAN SEE SHTS. 7, 25 & 26

LEFT DITCH
RIGHT DITCH

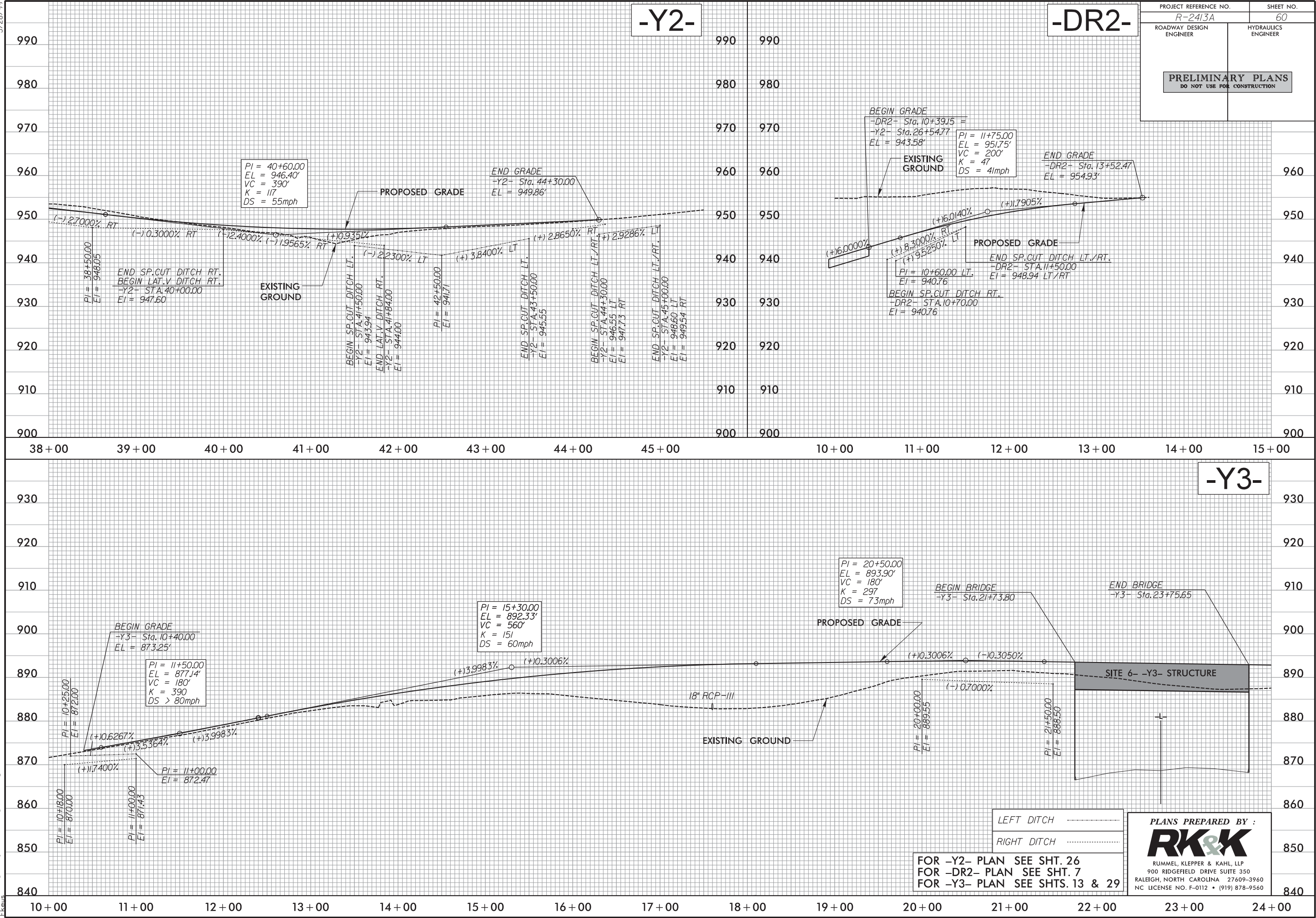
PLANS PREPARED BY :

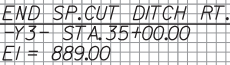
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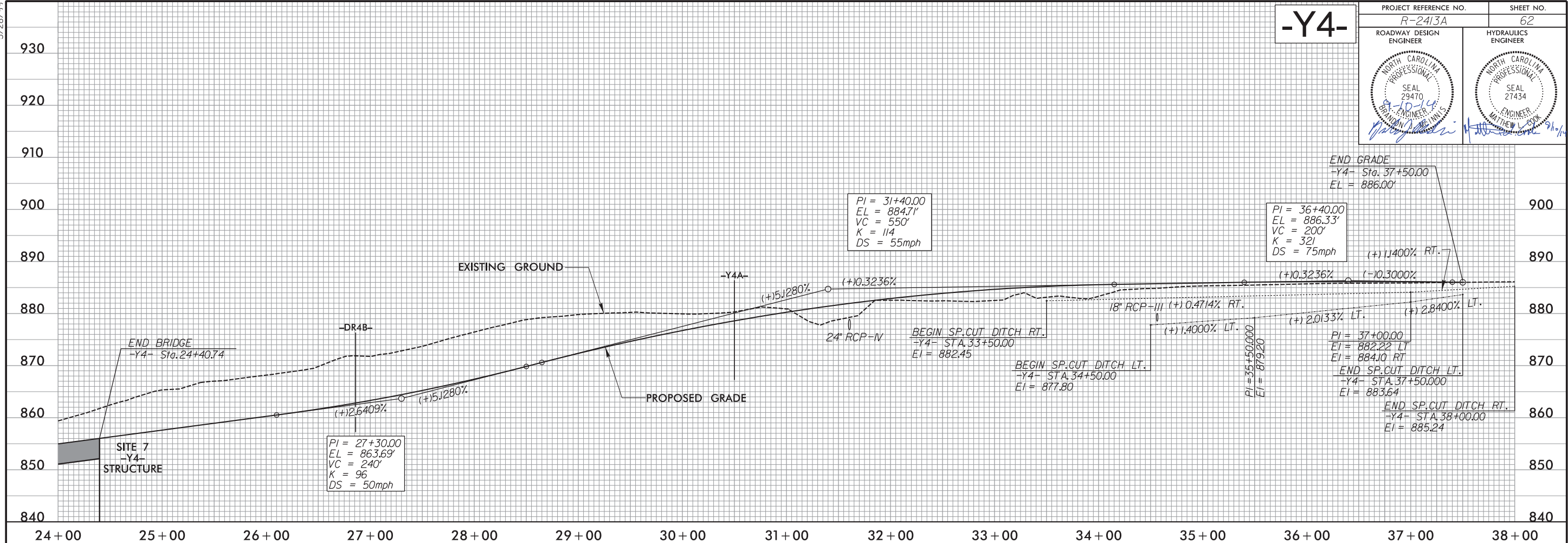




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-Y4-

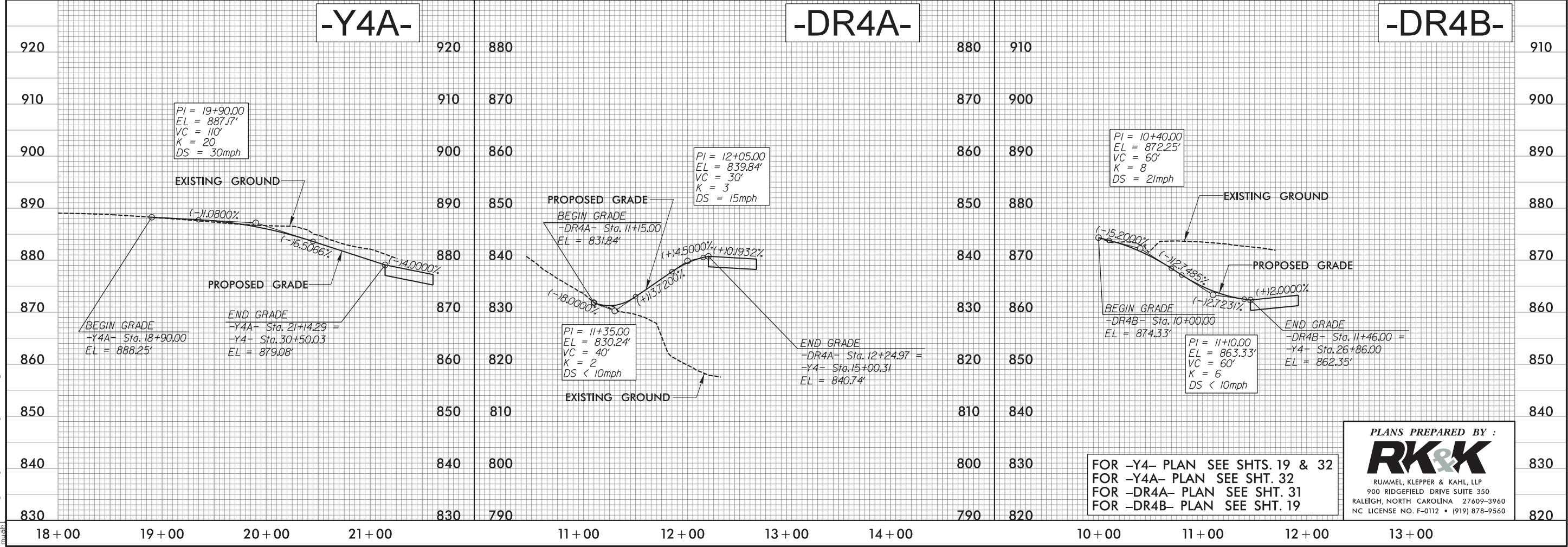
PROJECT REFERENCE NO. R-2413A		SHEET NO. 62
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	



-Y4A-

-DR4A-

-DR4B-



FOR -Y4- PLAN SEE SHTS. 19 & 32
FOR -Y4A- PLAN SEE SHT. 32
FOR -DR4A- PLAN SEE SHT. 31
FOR -DR4B- PLAN SEE SHT. 19

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-Y5-

PROJECT REFERENCE NO.
R-2413A

ROADWAY DESIGN
ENGINEER

SEAL
29470
NORTH CAROLINA
PROFESSIONAL
ENGINEER
MATTHEW L. BOOK

SHEET NO.
63

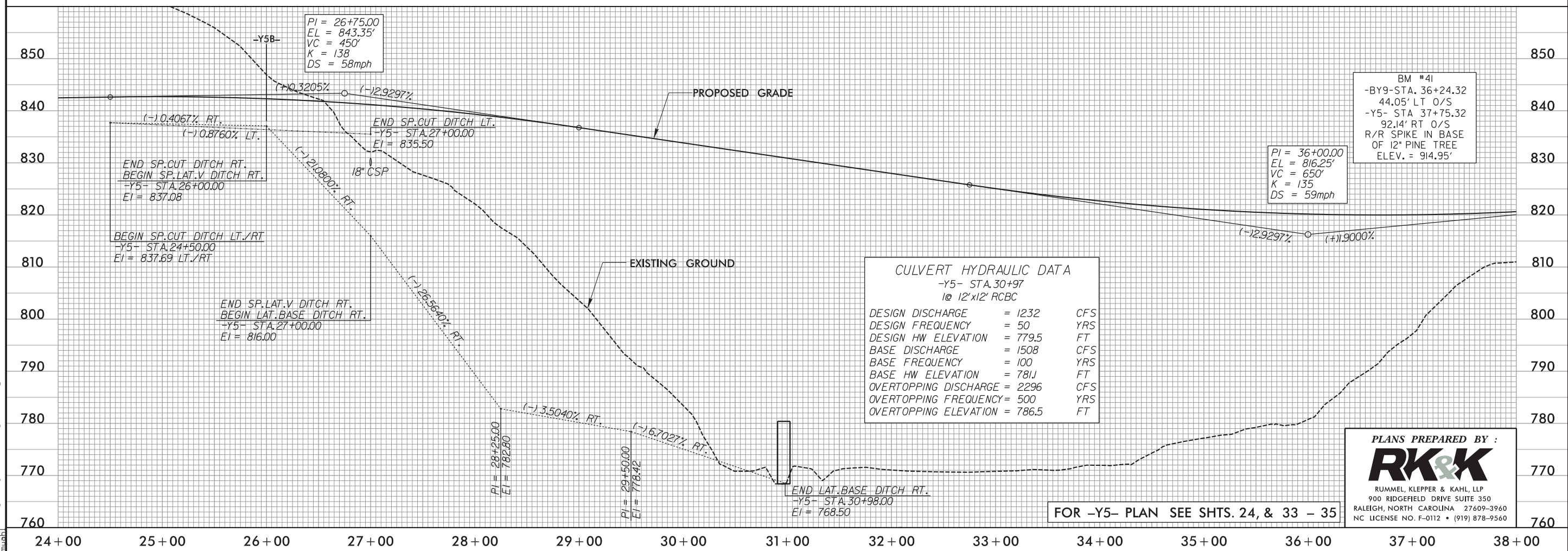
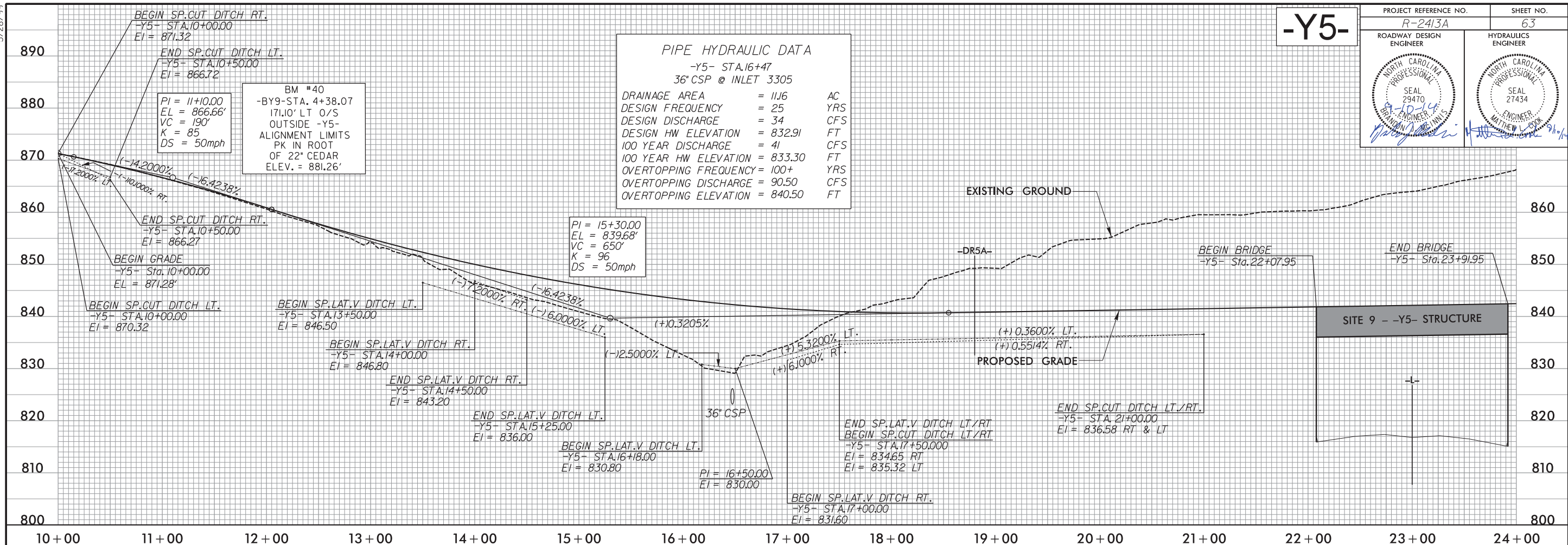
HYDRAULICS
ENGINEER

SEAL
27434
NORTH CAROLINA
PROFESSIONAL
ENGINEER
MATTHEW L. BOOK

PIPE HYDRAULIC DATA

-Y5- STA.16+47
36" CSP @ INLET 3305

DRAINAGE AREA	= 11.6	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 34	CFS
DESIGN HW ELEVATION	= 832.91	FT
100 YEAR DISCHARGE	= 41	CFS
100 YEAR HW ELEVATION	= 833.30	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 90.50	CFS
OVERTOPPING ELEVATION	= 840.50	FT



BM #41
-BY9- STA. 36+24.32
44.05' LT O/S
-Y5- STA 37+75.32
92.14' RT O/S
R/R SPIKE IN BASE
OF 12" PINE TREE
ELEV. = 914.95'

PI = 36+00.00
EL = 816.25'
VC = 650'
K = 135
DS = 59mph

CULVERT HYDRAULIC DATA

-Y5- STA.30+97
1@ 12"x12' RCBC

DESIGN DISCHARGE	= 1232	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 779.5	FT
BASE DISCHARGE	= 1508	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 781.1	FT
OVERTOPPING DISCHARGE	= 2296	CFS
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING ELEVATION	= 786.5	FT

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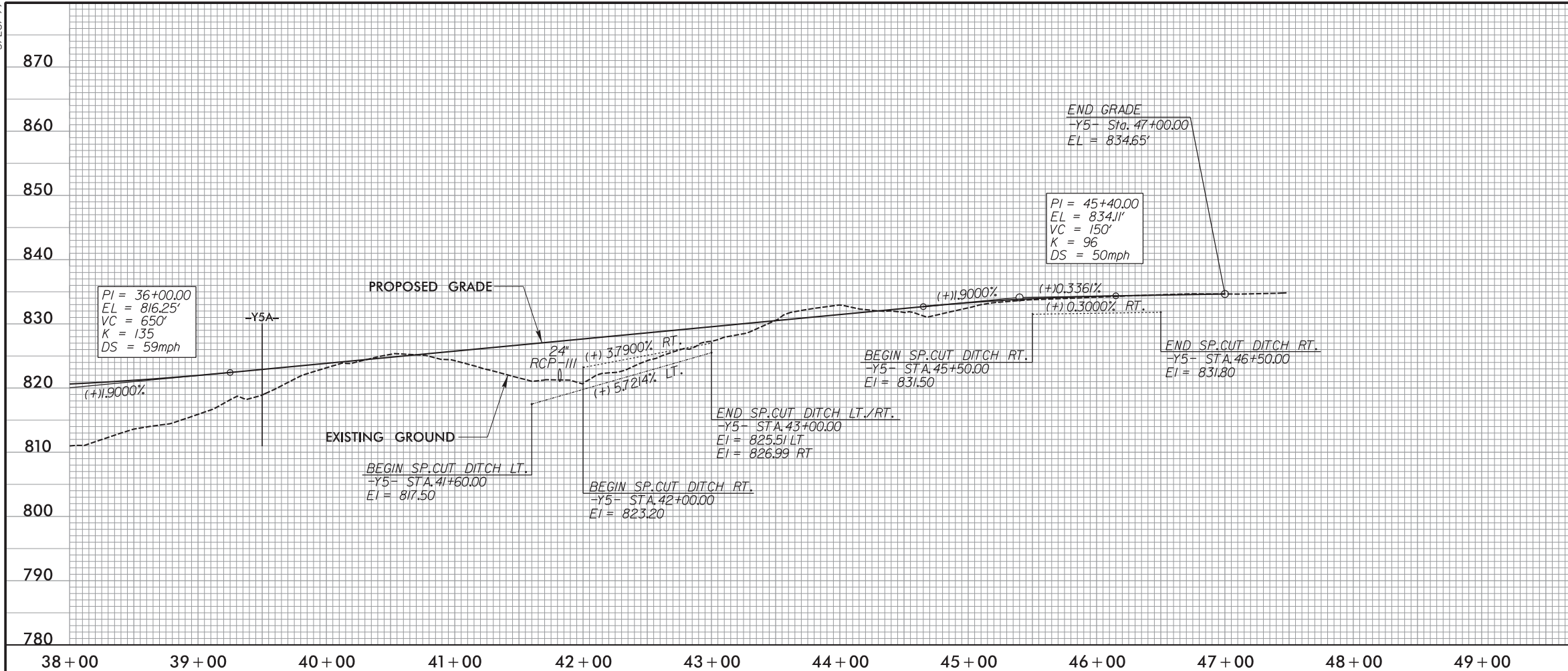
FOR -Y5- PLAN SEE SHTS. 24, & 33 - 35

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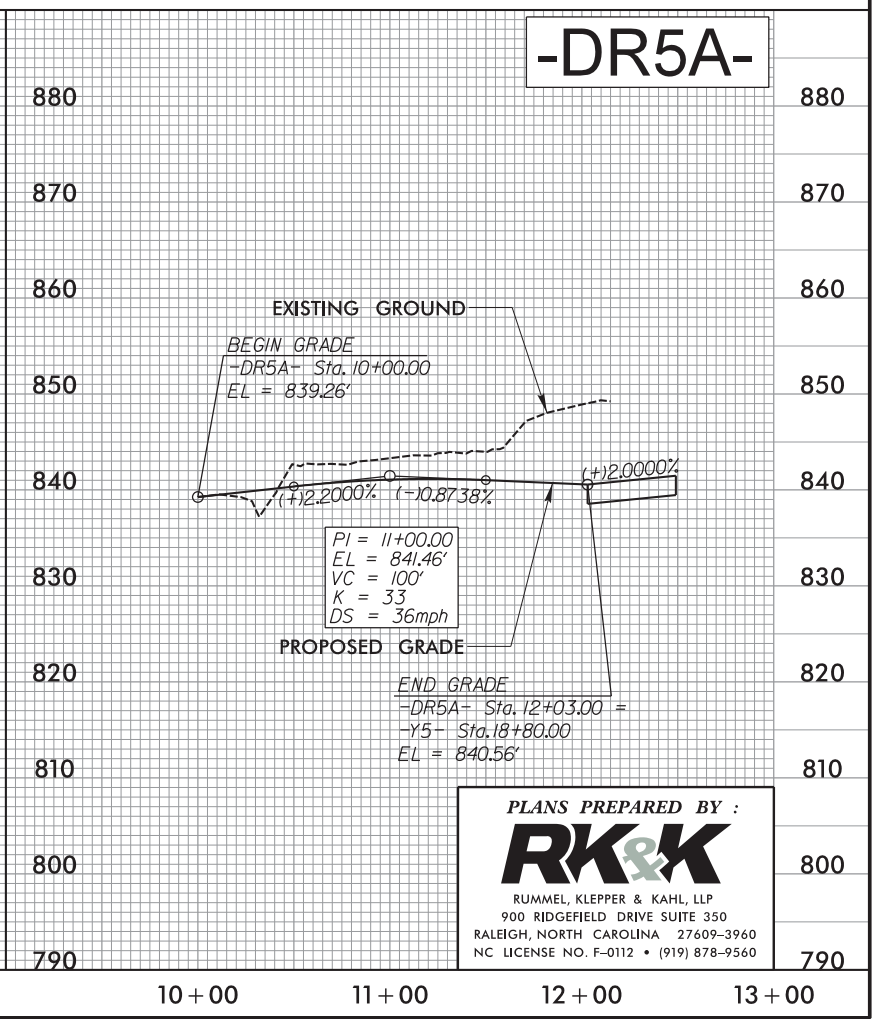
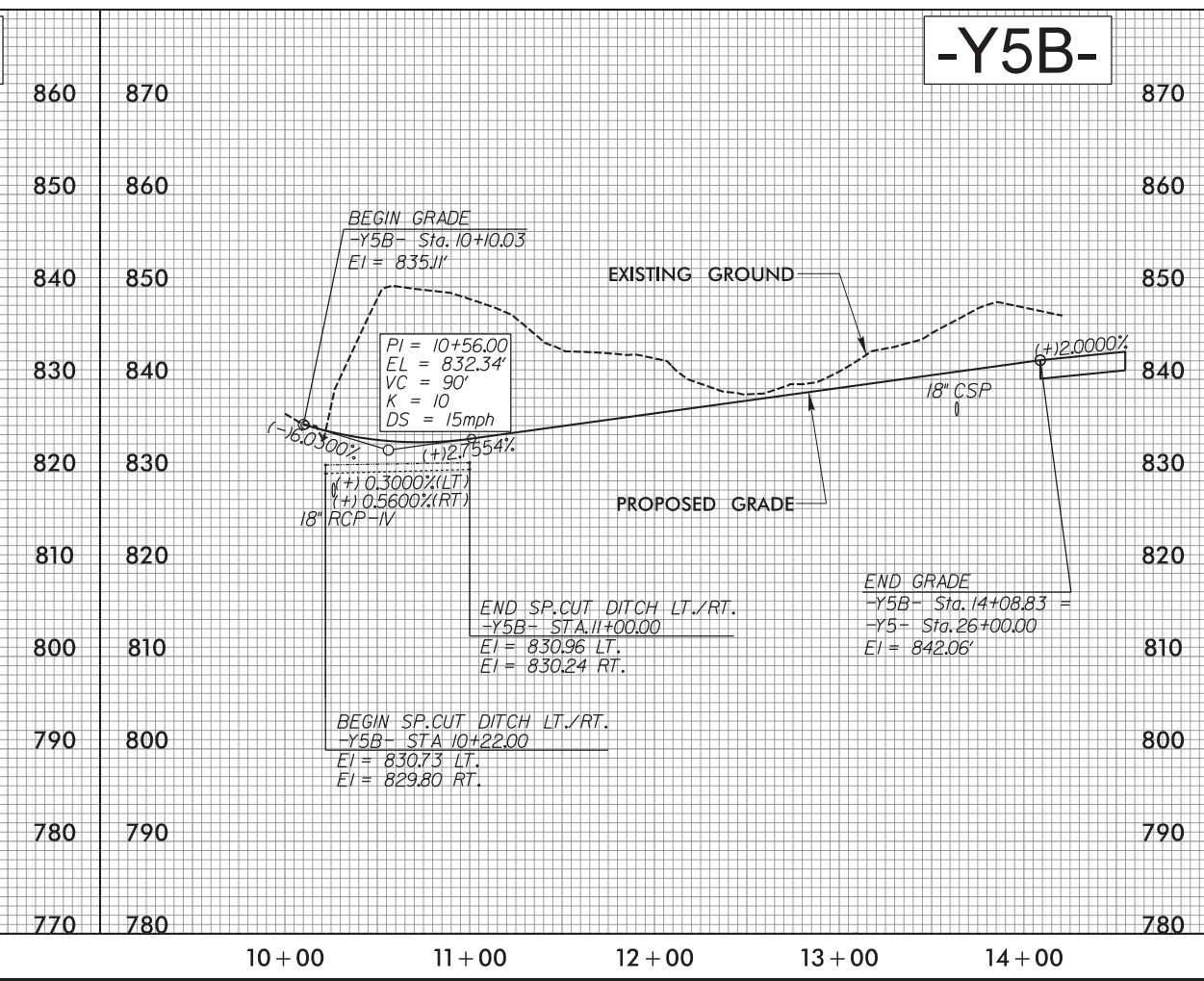
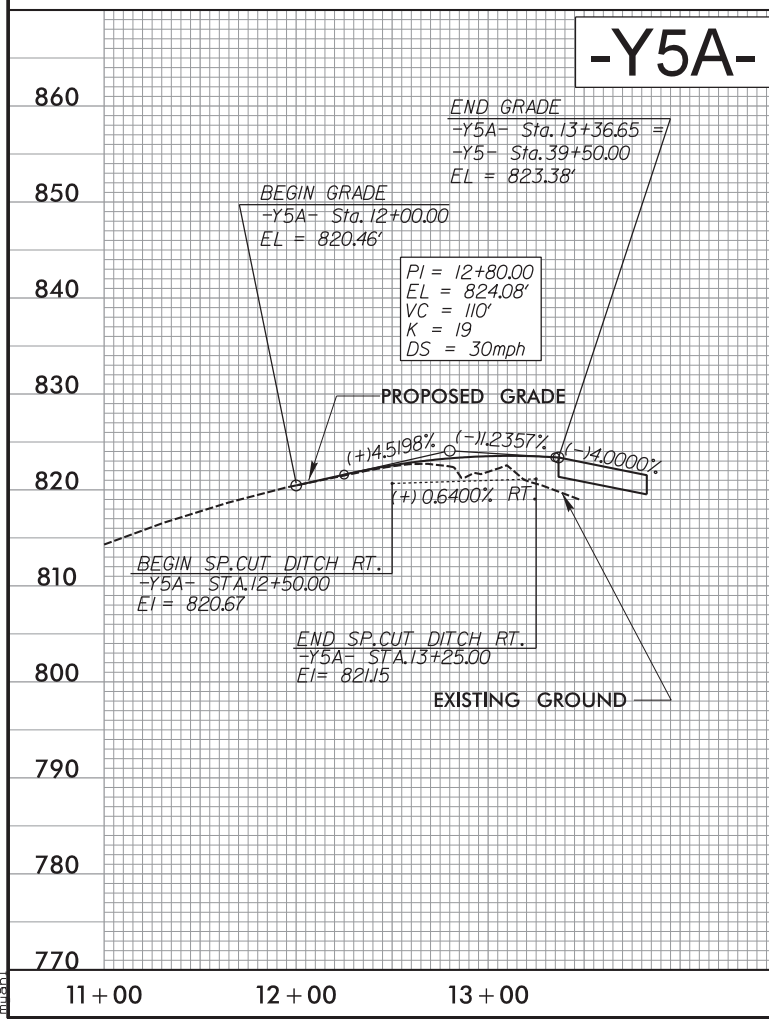
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-Y5-

PROJECT REFERENCE NO. R-2413A		SHEET NO. 64
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	



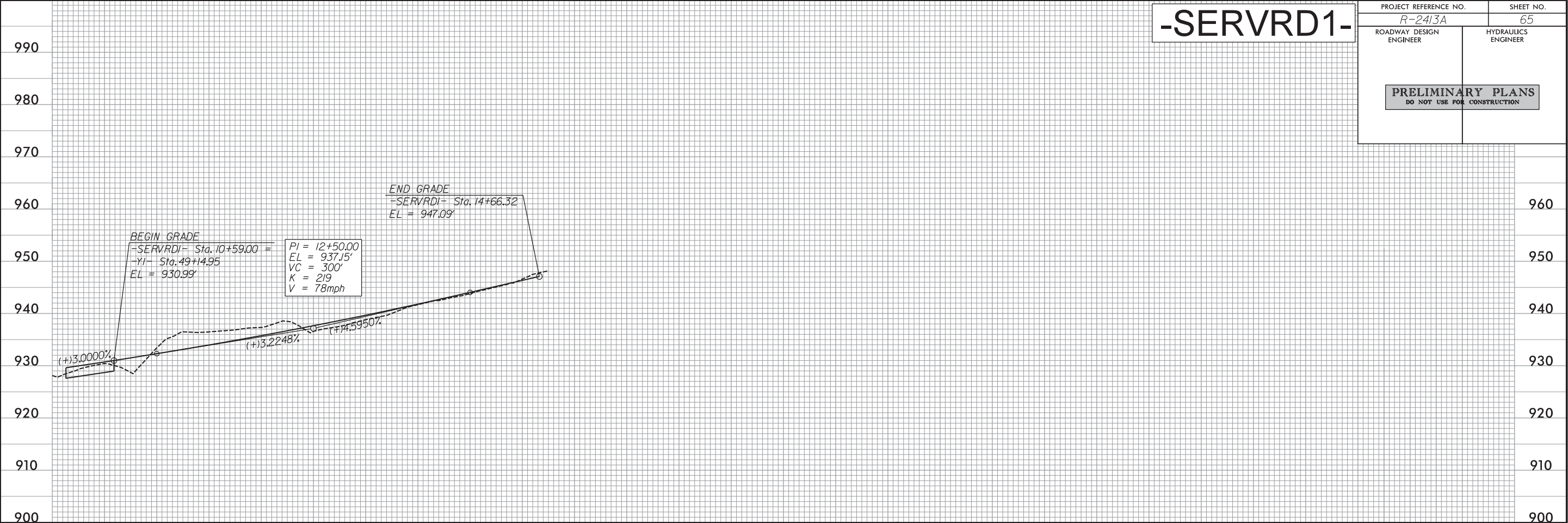
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-SERVRD1-

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	65
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



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FOR -SERVRD1- PLAN SEE SHT. 7

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