Transportation

PAT McCRORY
Governor

NICHOLAS J. TENNYSON
Secretary

September 22, 2016

North Carolina Division of Water Resources
Mooresville Regional Office
610 East Center Avenue, Suite 301
Mooresville, NC 28115

SUBJECT: **Response to August 23, 2016 Review of NCDOT's application for Section 404 and 401 permits for the proposed improvements to NC 3 (Mooresville Road), from Kannapolis Parkway to Dale Earnhardt Boulevard/Loop Road (SR 1691), Cabarrus County, North Carolina. Tip No. U-3440.**

Reference: NCDWR On-Hold letter, dated August 23, 2016
NCDOT 404 & 401 Application dated June 16, 2016

Dear Ms. Hood:

The North Carolina Department of Transportation (NCDOT) received the above referenced letter from the North Carolina Division of Water Resources (NCDWR), noting that the permit application was deficient in certain areas, pertinent to [15A NCAC 02H.056(b)(2)]. These items of deficiency are listed below, with NCDOT responses:

- NCDWR Comment: Existing stream profiles for all relocated and realigned streams are needed.

  - **NCDOT Response**: Ditch profiles have been included in the revised permit drawings for areas where streams will be realigned.

- NCDWR Comment: There is no detail for stream reconstruction at the end of the 10X9 culvert near Site MB.

  - **NCDOT Response:** Detail 6D has been added to the revised permit drawings to address this.

- NCDWR Comment: PSRM is listed as a liner in the bed of a relocated jurisdictional stream at Site S1. This is a permanent impact that was not agreed upon in previous merger meetings.

  - **NCDOT Response**: PSRM has been removed. Based on stream grade, Class B riprap armoring is needed and has been included in Detail 6A.

- NCDWR Comment: Clarify why there is a change in the culvert ~~site~~ [size] at Site MB from the merger notes to the plans submitted.

  - **NCDOT Response**: The approved Culvert Survey Report (CSR) shows a 10' X 9' culvert. During design, the culvert size was based on burying the culvert a foot and including baffles. As such, the hydraulic opening is still 10' X 8'.

- NCDWR Comment: Recommend Class 2 rip rap for Site IBC for bank stabilization and areas of rock/surface water interface.

  - **NCDOT Response**: The existing bank is only three feet above the stream bed. Class I riprap is sufficient for this purpose.

- NCDWR Comment: Detail for turning the jurisdictional stream at S2 into the new location.

  - **NCDOT Response:** The proposed stream line has been corrected to show it connecting to the proposed stream and the existing stream.

- NCDWR Comment: Detail for directing flow into the 42-inch bored pipe at Site S3.

  - **NCDOT Response:** Detail D is the detail used to direct flow into the pipe at the upstream end (Station 86+24 Rt.). This same detail has been added to the downstream end of the pipe (Station 89+05 Lt.) to convey water from the pipe back into the stream.

- NCDWR Comment: Recommend Class 2 rip rap for stabilization at the rock/surface water interface of Site S3.

  - **NCDOT Response:** Class I riprap is adequate for the 2:1 laid back slopes.

- NCDWR Comment: Please provide detail at Site S5 for turning flow from 15' CMP into stream.

  - **NCDOT Response:** A short riprap ditch (armored tail ditch) has been added at the outlet of the 15-inch CMP (see Detail 11F).

- NCDWR Comment: Recommend Class 2 riprap for bank stabilization at S5 due to a very steep grade.

  - **NCDOT Response:** Class I riprap is adequate for this crossing. The armored tail ditch (see comment above) will provide additional stability.

- NCDWR Comment: Recommend Class 2 riprap at Site S6 due to a very steep grade.

  - **NCDOT Response:** Class II riprap will be used on the right side of the culvert.

- NCDWR Comment: Recommend bank stabilization for S7-l discharge outlet to the stream.

  - **NCDOT Response:** Bank stabilization added (see Detail 12H).

- NCDWR Comment: Site S7-2, recommend class 2 riprap for stabilization.

  - **NCDOT Response:** Riprap has been revised to Class II for bank stabilization.

- NCDWR Comment: Site S7-3 depicts fill of a jurisdictional stream but no impacts are requested at this site. Please clarify.

  - **NCDOT Response:** Per Bill Barrett's discussion with Donna Hood, this comment pertains to sites listed/not listed on the Stormwater Management Plan (SMP). The SMP has been revised to include all of the impact sites.

There will be no additional or changes in impacts with the above mentioned changes to the permit drawings. **A set of revised Permit Drawings are enclosed that replace the previously submitted permit drawing package.**

Thank you for your time and assistance with this project. Please contact Bill Barrett at either wabarrett@ncdot.gov or (919) 707-6103 if you have any questions or need additional information.

Sincerely,

for Philip Harris, P.E., C.P.M.
Natural Environment Section Head

Enclosure: revised permit drawing package

cc: Crystal Amschler, USACE

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: U-3440 **County(ies):** Cabarrus

General Project Information

Project No.:	U-3440	**Project Type:**	Roadway Relocation	**Date:**	9/7/2016
NCDOT Contact:	Stephen Morgan, PE	**Contractor / Designer:**	John Shirley, PE / Stantec Consulting Inc.		
Address:	Design Support Group 1020 Birch Ridge Drive Raleigh, NC 27610	**Address:**	801 Jones Franklin Road Suite 300 Raleigh NC 27606		
Phone:	919-707-6739	**Phone:**	919-851-1919		
Email:	smorgan@ncdot.gov	**Email:**	john.shirley@stantec.com		
City/Town:	Kannapolis	**County(ies):**	Cabarrus		
River Basin(s):	Yadkin-Pee Dee	**CAMA County?**	No		
Primary Receiving Water:	Irish Buffalo Creek	**NCDWQ Stream Index No.:**	13-17-9-(2)		
NCDWQ Surface Water Classification for Primary Receiving Water	**Primary:**	Class C			
	Supplemental:	None			
Other Stream Classification:					
303(d) Impairments:	None				
Buffer Rules in Effect	N/A				

Project Description

Project Length (lin. Miles or feet):	2.646 miles	**Surrounding Land Use:**	urban

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	31.25 ac.	20.00 ac.
Typical Cross Section Description:	Typical cross section varies however along the -L- line there is double 11' travel lanes on left and right of the project with 5' bike lanes on both sides of the road.	
Average Daily Traffic (veh/hr/day):	Design/Future: 16800/23900	Existing: 16800/2015

General Project Narrative:

The NCDOT proposed to improve NC 3 (Mooresville Road) from the Kannaplolis Parkway to Dale Earnhardt Boulevard/ Loop Road (SR 1691). The proposed improvements will widen Mooresville Road to a four lane divided facilty. The typical section will consist of two 11 foot travel lanes and a 5 foot bicycle lane in each direction, with a 23.5 foot wide grass median. Sidewalks are proposed on both sides of the proposed facility for the entire length of the project. The project is approximately 2.6 miles in length.

References

North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: U-3440 **County(ies):** Cabarrus

Project Environmental Summary

Surface Water Impacts

Sheet No.	Station (From / To)	Feature Impacted	Water / Wetland / Buffer Type	Receiving Surface Water Name	NRTR Map ID	NCDWQ Stream Index	NCDWQ Surface Water Classification	303(d) Impairments	Type of Impact	Existing SCM	Proposed SCM
6	L37+00 LT L40+15 LT	Stream	Perennial	Miller Branch	S1	N/A	C	None	Fill	N/A	
6	L40+61 RT	Stream	Perennial	Miller Branch	MB	N/A	C	None	Culvert	N/A	
8	L68+25	Stream	Perennial	Irish Buffalo Creek	IBC	13-17-9-(2)	C	None	Fill	N/A	
8	L70+31	Wetland	Wetland	Tributary to Irish Buffalo Creek	WA	N/A	C	None	Fill	N/A	
8	L73+02	Stream	Perennial	Tributary to Irish Buffalo Creek	S2	N/A	C	None	Fill	N/A	
9	86+12	Stream	Perennial	Tributary to Irish Buffalo Creek	S3	N/A	C	None	Culvert	N/A	
10	97+30	Stream	Perennial	Tributary to Irish Buffalo Creek	S4	N/A	C	None	Culvert	N/A	
11	L109+75	Stream	Perennial	Tributary to Irish Buffalo Creek	S5	N/A	C	None	Culvert	N/A	
12	L117+50	Stream	Perennial	Irish Buffalo Creek Tributary 3	S6	N/A	C	None	Fill	N/A	
12	Y15 12+25	Stream	Perennial	Tributary to Irish Buffalo Creek Tributary 3	S7-1	N/A	C	None	Culvert	N/A	
12	L126+30	Stream	Perennial	Tributary to Irish Buffalo Creek Tributary 3	S7-2	N/A	C	None	Stabilization	N/A	
12	L134+38	Stream	Perennial	Tributary to Irish Buffalo Creek Tributary 3	S7-3	N/A	C	None	Fill	N/A	

* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

Description of Minimization of Impacts or Mitigation

See Attachment

References

Description of Minimization of Impacts or Mitigation

Site S1: Includes channel relocation rather than piping. Site MB: Pipe outfall located 80' from stream channel in riprap lined ditch. Box culvert includes baffles with low flow channel and sills to retain native bed material. Site IBC: Pipe outfalls located 200'-300' from channel. Bridge bents located on top of banks to prevent permanent surface water impacts. Site S2: Includes stream channel relocation rather than piping. Site S3: Includes riprap on banks only at pipe inlet and outlet to minimize permanent surface water impacts. Site S4: Includes riprap on banks only at pipe outlet to minimize permanent surface water impacts. Pipe buried 1' below channel bed. Site S5: Includes riprap on banks only at pipe inlet and outlet to minimize permanent surface water impacts. Site S6: Box culvert includes baffles with low flow channel and sills to retain native bed material. Pipe outfall located 140' from channel. Site S7-1: Pipe outfall located 40' from channel. Site S7-2: Includes riprap on banks only at pipe inlet and outlet to minimize permanent surface water impacts. Site S7-3: Includes riprap on banks only at pipe outlet to minimize permanent surface water impacts.

09/08/09

TIP PROJECT: U-3440

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CABARRUS COUNTY

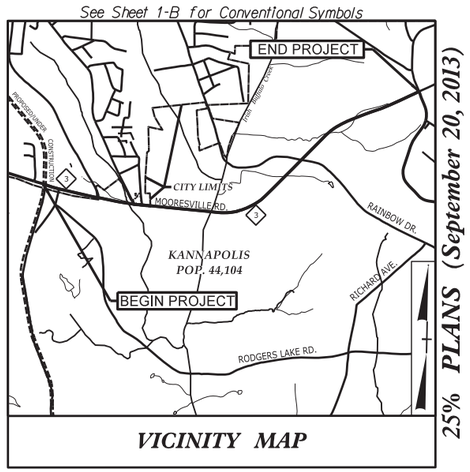
PERMIT DRAWING
SHEET 1 OF 23

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3440	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
39010.1.1	STP-0003(6)	PE

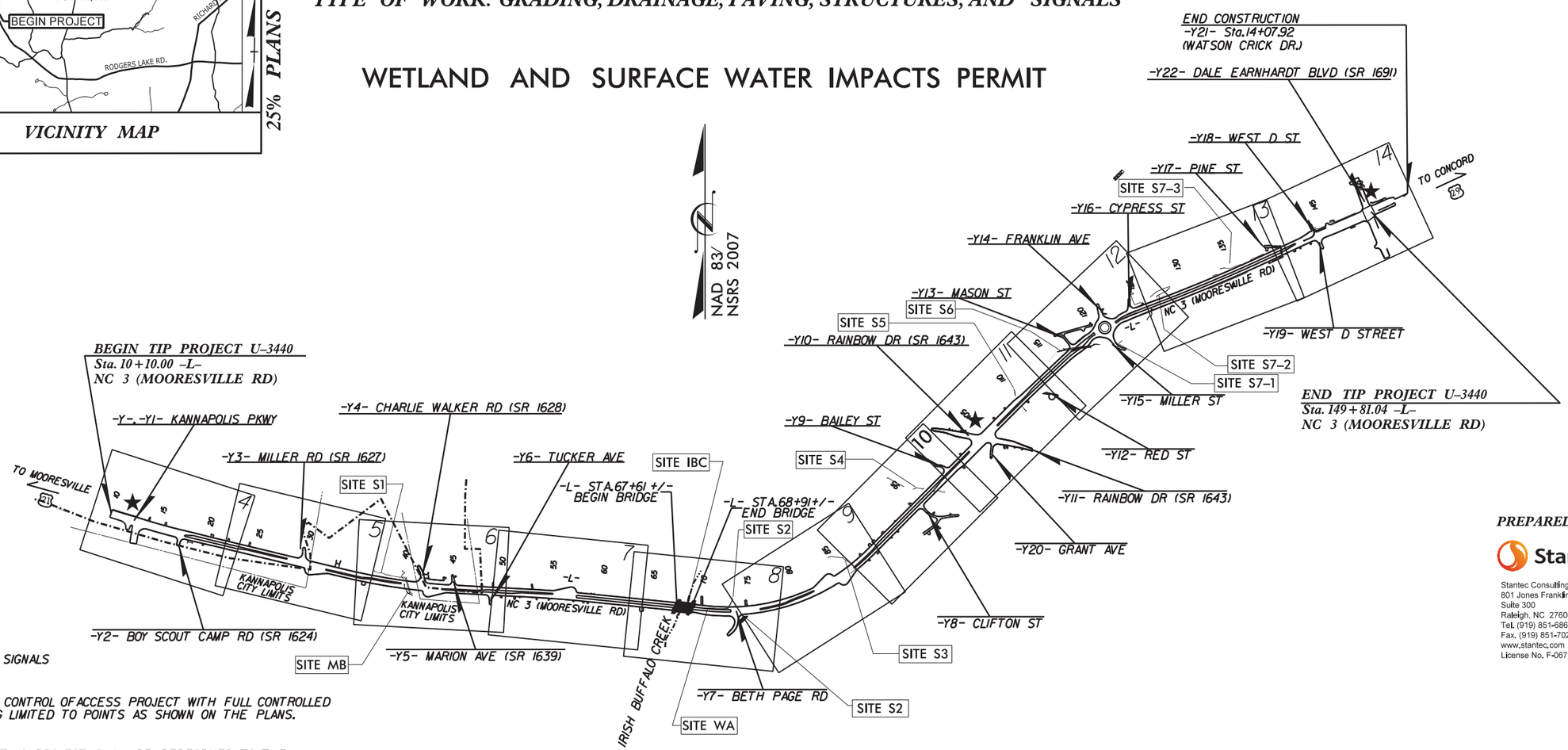
LOCATION: NC 3, PROPOSED WEST SIDE BYPASS TO SR 1691 (LOOP ROAD) IN KANNAPOLIS
TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS

WETLAND AND SURFACE WATER IMPACTS PERMIT



VICINITY MAP

NAD 83/
NSRS 2007



★ REVISED SIGNALS

THIS IS A NO CONTROL OF ACCESS PROJECT WITH FULL CONTROLLED ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

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

PREPARED BY:

Stantec

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Suite 300
Raleigh, NC 27606
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www.stantec.com
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GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2015 = 16,800
ADT 2035 = 23,900
DHV = 12 %
D = 60 %
T = 9 % *
V = 50 MPH
HIST. AREA V= 40 MPH
*(TTST 7% + DUALS 2%)
FUNC CLASS = MINOR ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-3440 = 2.621 MILES
LENGTH STRUCTURE TIP PROJECT U-3440 = 0.025 MILE
TOTAL LENGTH TIP PROJECT U-3440 = 2.646 MILES

Prepared for the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS
RIGHT OF WAY DATE: MAY 29, 2015
LETTING DATE: OCTOBER 18, 2016

MICHAEL LINDGREN, P.E.
PROJECT ENGINEER

MICHAEL LITTLEFIELD, P.E.
PROJECT DESIGN ENGINEER

NCDOT CONTACT: BRENDA MOORE, PE
ROADWAY DESIGN ENGINEERING COORDINATION SECTION ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

20150407
STANTEC
U-3440_Permit Drawings_20150407.pdf

PROJECT REFERENCE NO.	SHEET NO.
U-3440	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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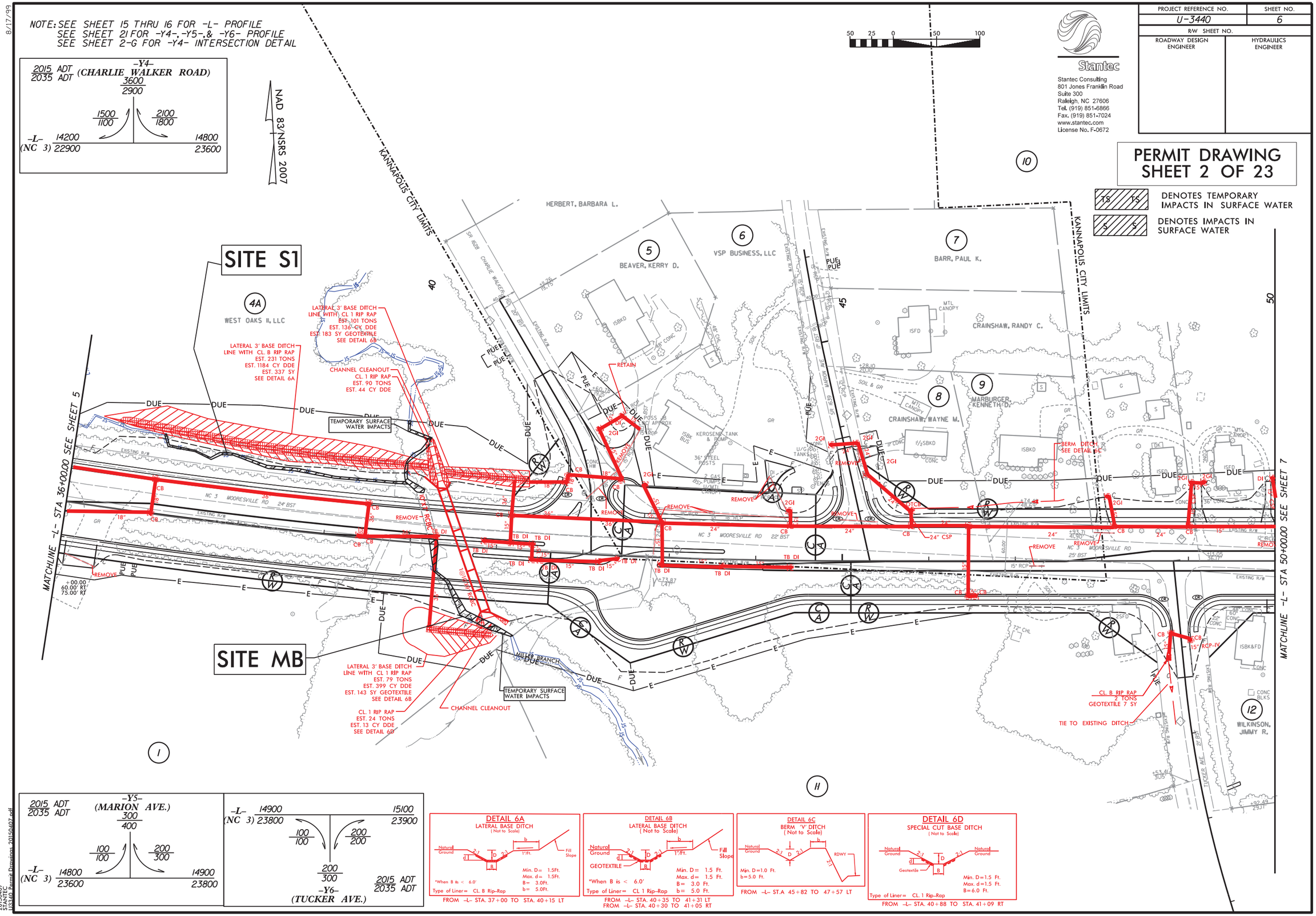
PERMIT DRAWING SHEET 2 OF 23

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

NOTE: SEE SHEET 15 THRU 16 FOR -L- PROFILE
SEE SHEET 21 FOR -Y4-, -Y5-, & -Y6- PROFILE
SEE SHEET 2-G FOR -Y4- INTERSECTION DETAIL



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U3440 Permit Drawings 20150407.pdf

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PERMIT DRAWING SHEET 3 OF 23

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

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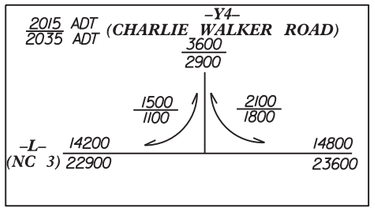
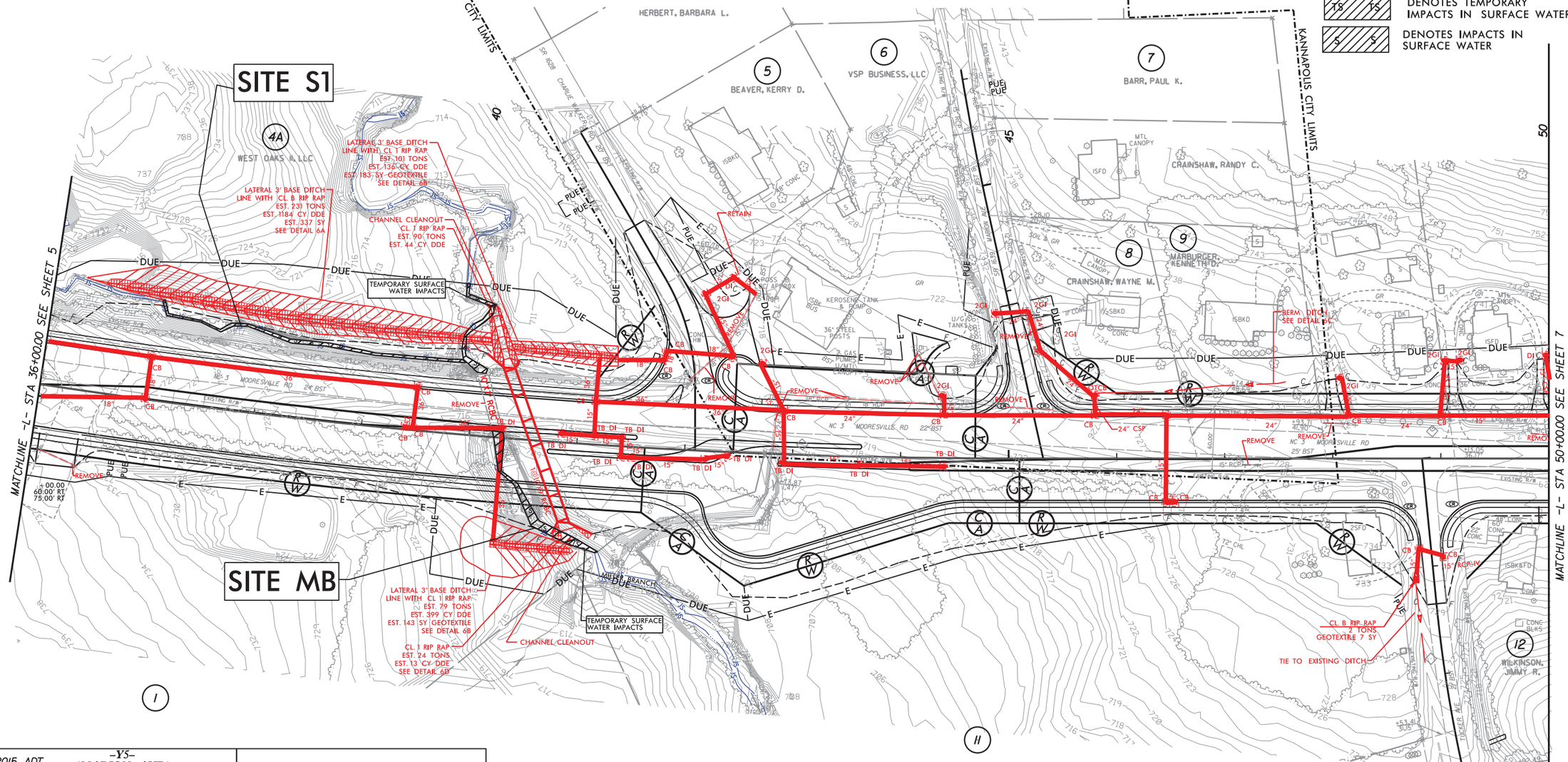
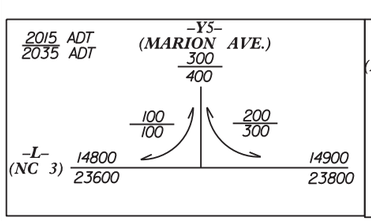
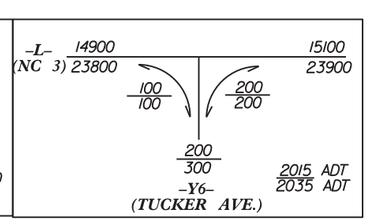
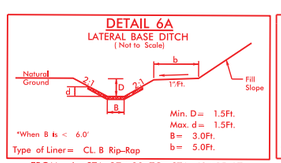
SEE SHEET 21 FOR -Y4-, -Y5-, & -Y6- PROFILE
SEE SHEET 2-G FOR -Y4- INTERSECTION DETAIL











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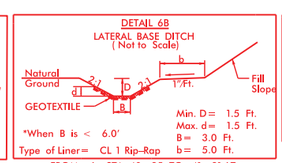

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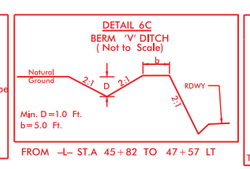

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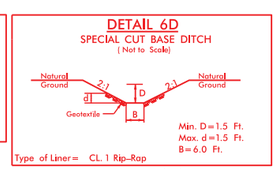

FROM -L- STA. 40+88 TO STA. 41+09 RT

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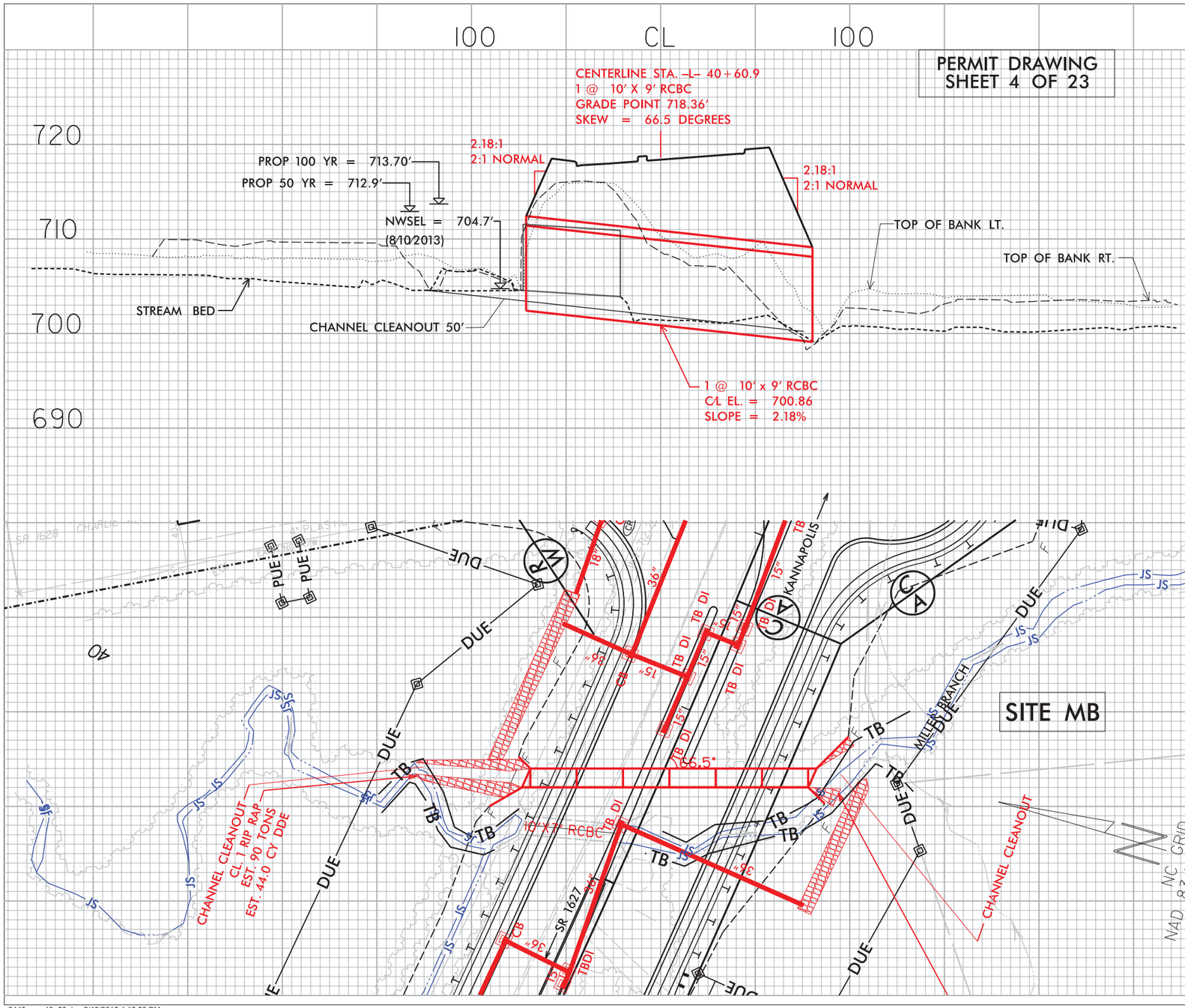
U3440 Permit Drawings 20150407.pdf

PERMIT DRAWING
SHEET 4 OF 23



NCDOT
PERFORMANCE TABLE

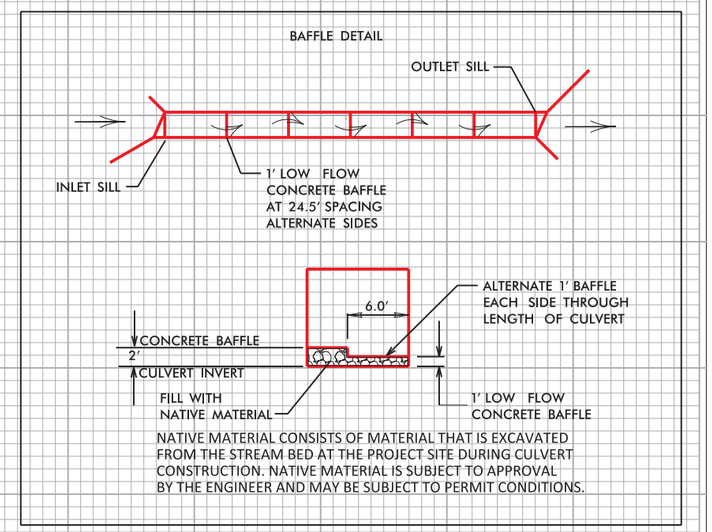
	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	708.4	709.1	709.4	709.52	709.6
EXISTING	711.2	713.3	714.8	715.82	716.5
REVISED	710.1	712.1	712.9	713.70	716.5

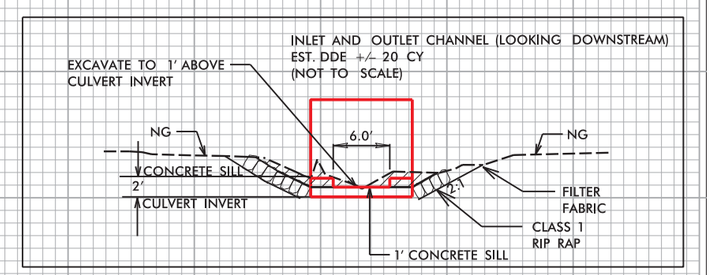
@SECTION REV. 6773; CE 6800
38' (REV) 18' (CE) U/S FROM C/L OF CULVERT

FEMA
PERFORMANCE TABLE

	100yr.
DUPLICATE EFFECTIVE	N/A
CORRECTED EFFECTIVE	712.87
REVISED	711.63

@SECTION REV. 6773; CE 6800
38' (REV) 18' (CE) U/S FROM C/L OF CULVERT





NOTES:

1. THE EDGE OF THE LOW FLOW CHANNEL SHALL BE ARMORED WITH BOULDERS. THE DEPTH OF ARMOR PROTECTION SHOULD EXTEND 1.5' BELOW THE STREAM BED LINED WITH COIR FIBER MATTING.

2. EDGE ARMOR CAN BE NATURAL STREAM BOULDERS OR EXTRACTED FROM CLASS I RIP RAP OR SHOT ROCK MATERIAL AND CAN BE CUBICAL OR RECTANGULAR IN NATURE.

3. ACCEPTABLE BOULDERS FOR THE EDGE ARMOR SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS; 3'X2'X1'. UNSUITABLE EDGE ARMOR MATERIAL THAT REMAINS FROM CLASS I RIP RAP OR SHOT ROCK STORES, MAY BE USED IN BACK FILL OF THE OVER BANK AREA OR DISCARDED.

u3440_csr_40+60.dgn 5/13/2016 4:18:29 PM

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REVISIONS

PERMIT DRAWING SHEET 5 OF 23

PROJECT REFERENCE NO.	SHEET NO.
U-3440	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F — DENOTES FILL IN WETLAND

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50 25 0 50 100

NAD 83/NSRS 2007

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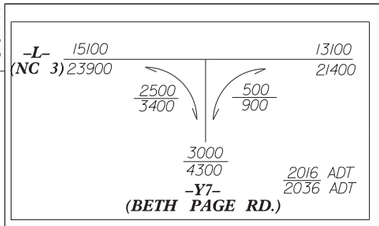
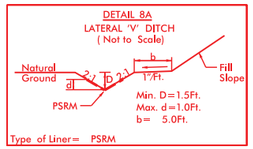
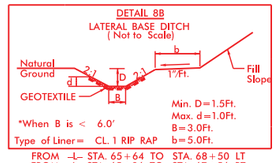




FROM -L- STA. 69+44 TO STA. 73+00 RT



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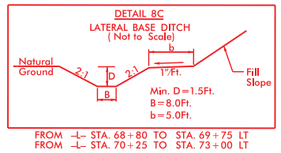

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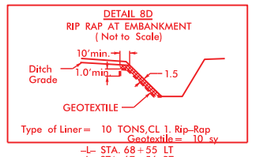

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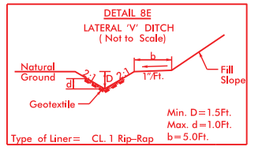
-L- STA. 67+56 RT
-L- STA. 67+95 RT



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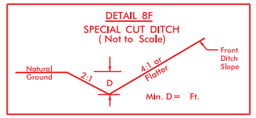

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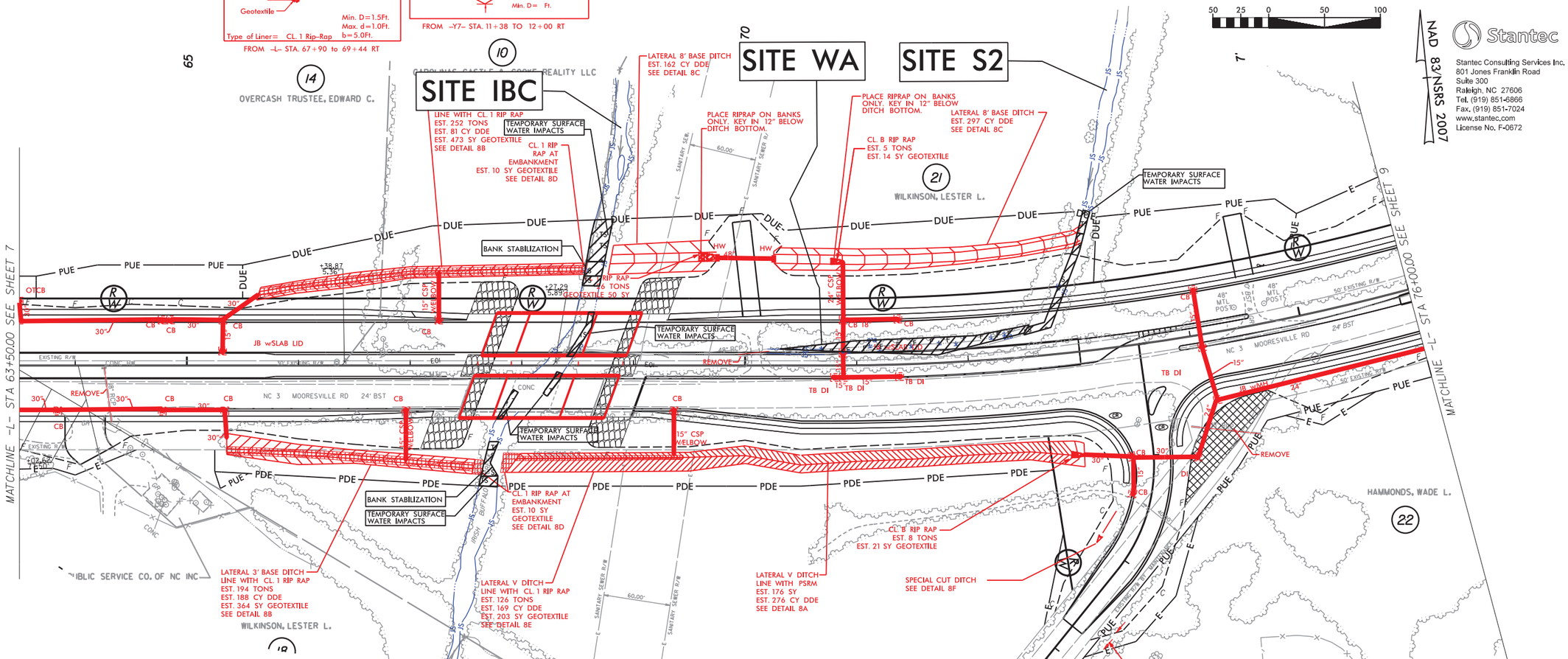

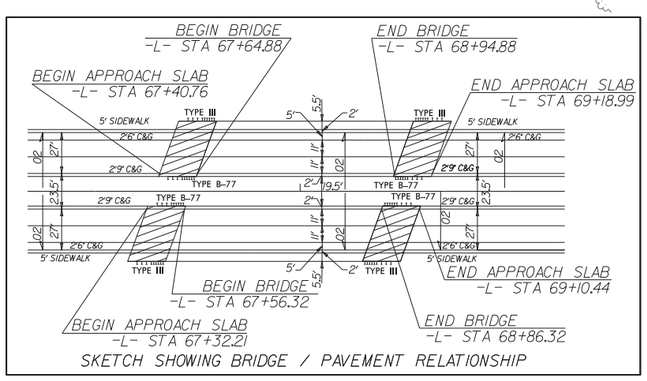

SKETCH SHOWING BRIDGE / PAVEMENT RELATIONSHIP

PERMIT DRAWING
SHEET 6 OF 23

PROJECT REFERENCE NO.	SHEET NO.
U-3440	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F / F — DENOTES FILL IN WETLAND

S / S — DENOTES IMPACTS IN SURFACE WATER

TS / TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50 25 0 50 100

NAD 83/NSRS 2007

Stantec

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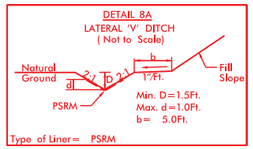
www.stantec.com
License No. F-0672

8/17/99

REVISIONS

-L- 15100 13100
(NC 3) 23900 21400
2500/3400 500/900
3000/4300
-Y7- (BETH PAGE RD.) 2016 ADT / 2036 ADT

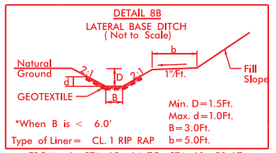
DETAIL 8A
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

FROM -L- STA. 69+44 TO STA. 73+00 RT

DETAIL 8B
LATERAL BASE DITCH
(Not to Scale)

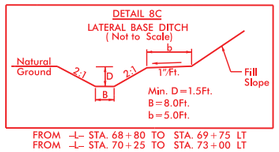


*When B is < 6.0'

Type of Liner= CL. 1 RIP RAP

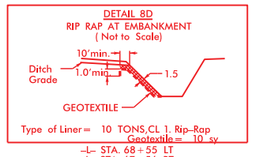
FROM -L- STA. 65+64 TO STA. 68+50 LT
FROM -L- STA. 65+36 TO STA. 67+56 RT

DETAIL 8C
LATERAL BASE DITCH
(Not to Scale)



FROM -L- STA. 68+80 TO STA. 69+75 LT
FROM -L- STA. 70+25 TO STA. 73+00 LT

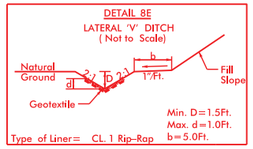
DETAIL 8D
RIP RAP AT EMBANKMENT
(Not to Scale)



Type of Liner= 10 TONS,CL. 1, Rip-Rap
Geotextile= 10 sy

-L- STA. 68+55 LT
-L- STA. 67+56 RT
-L- STA. 67+95 RT

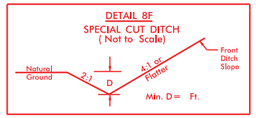
DETAIL 8E
LATERAL 'V' DITCH
(Not to Scale)



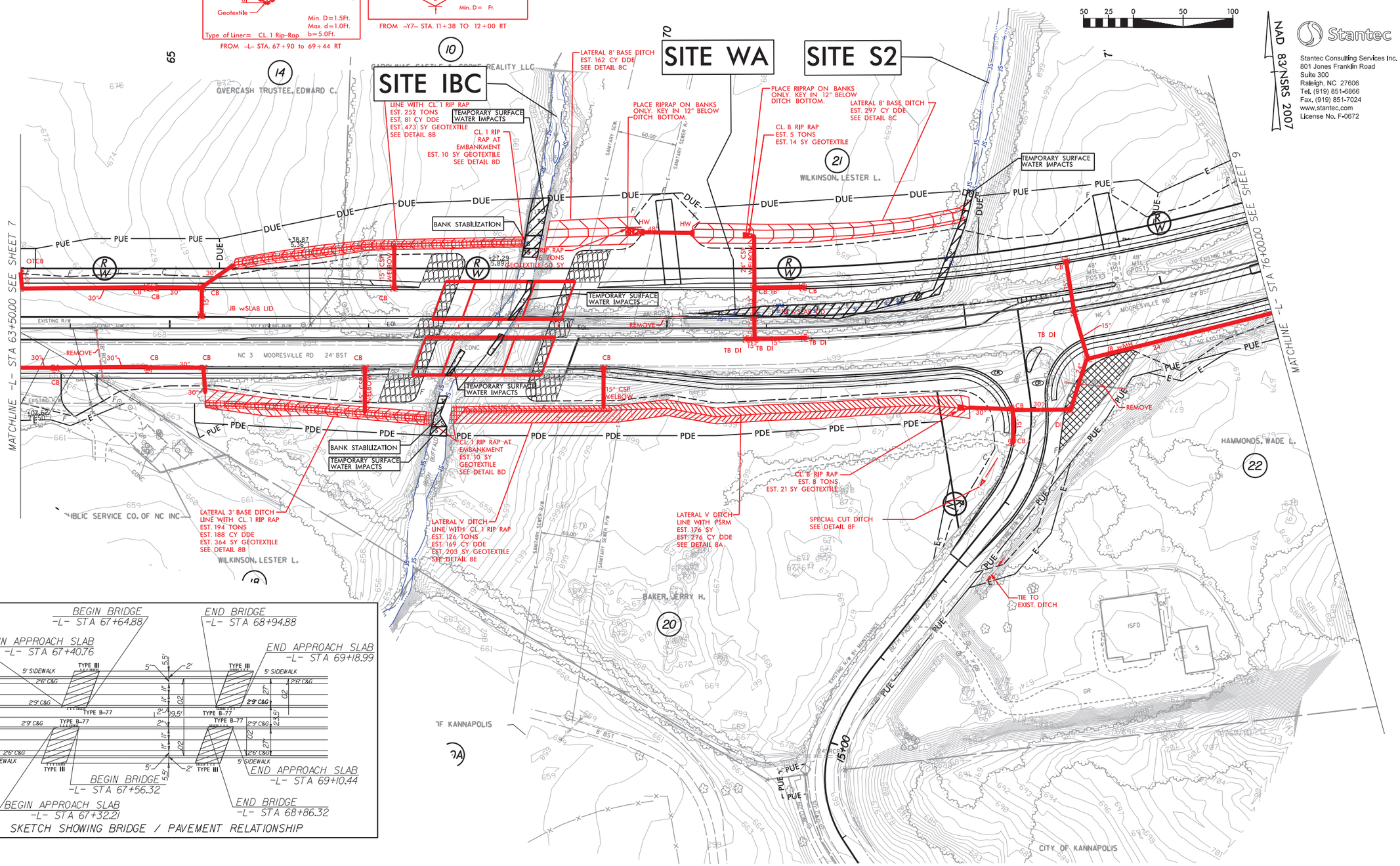
Type of Liner= CL. 1 Rip-Rap

FROM -L- STA. 67+90 to 69+44 RT

DETAIL 8F
SPECIAL CUT DITCH
(Not to Scale)

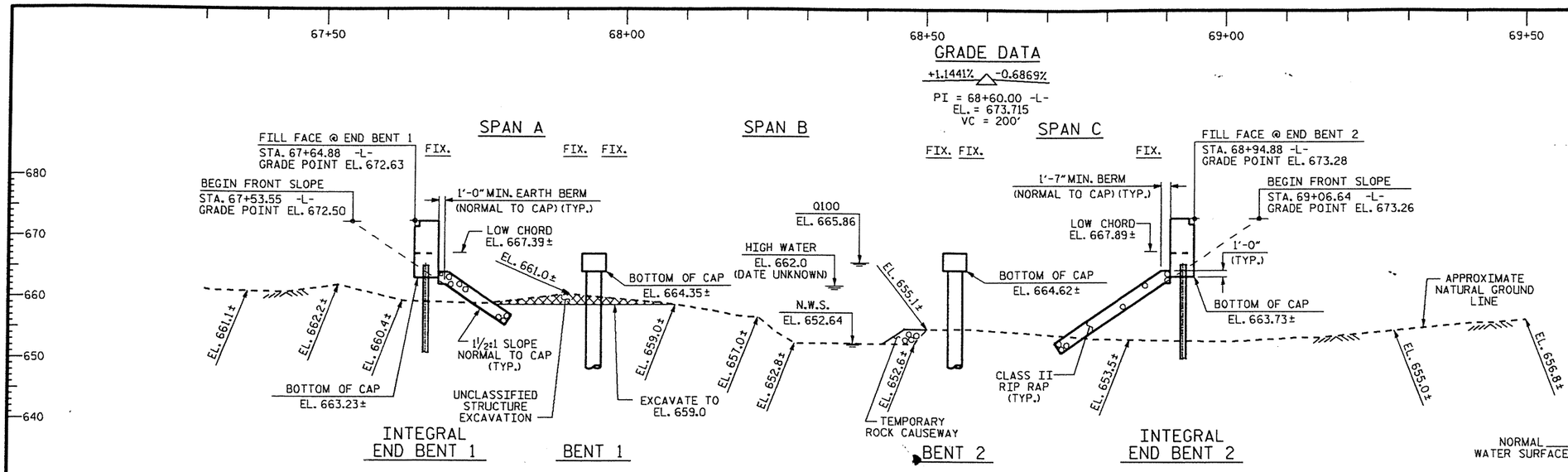


FROM -Y7- STA. 11+38 TO 12+00 RT



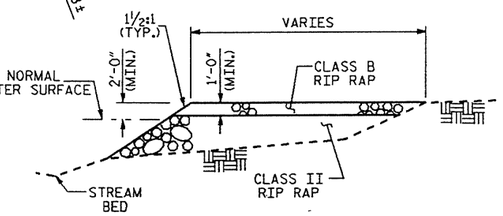
F.A. PROJECT STP-0003(6)

PERMIT DRAWING
SHEET 7 OF 23

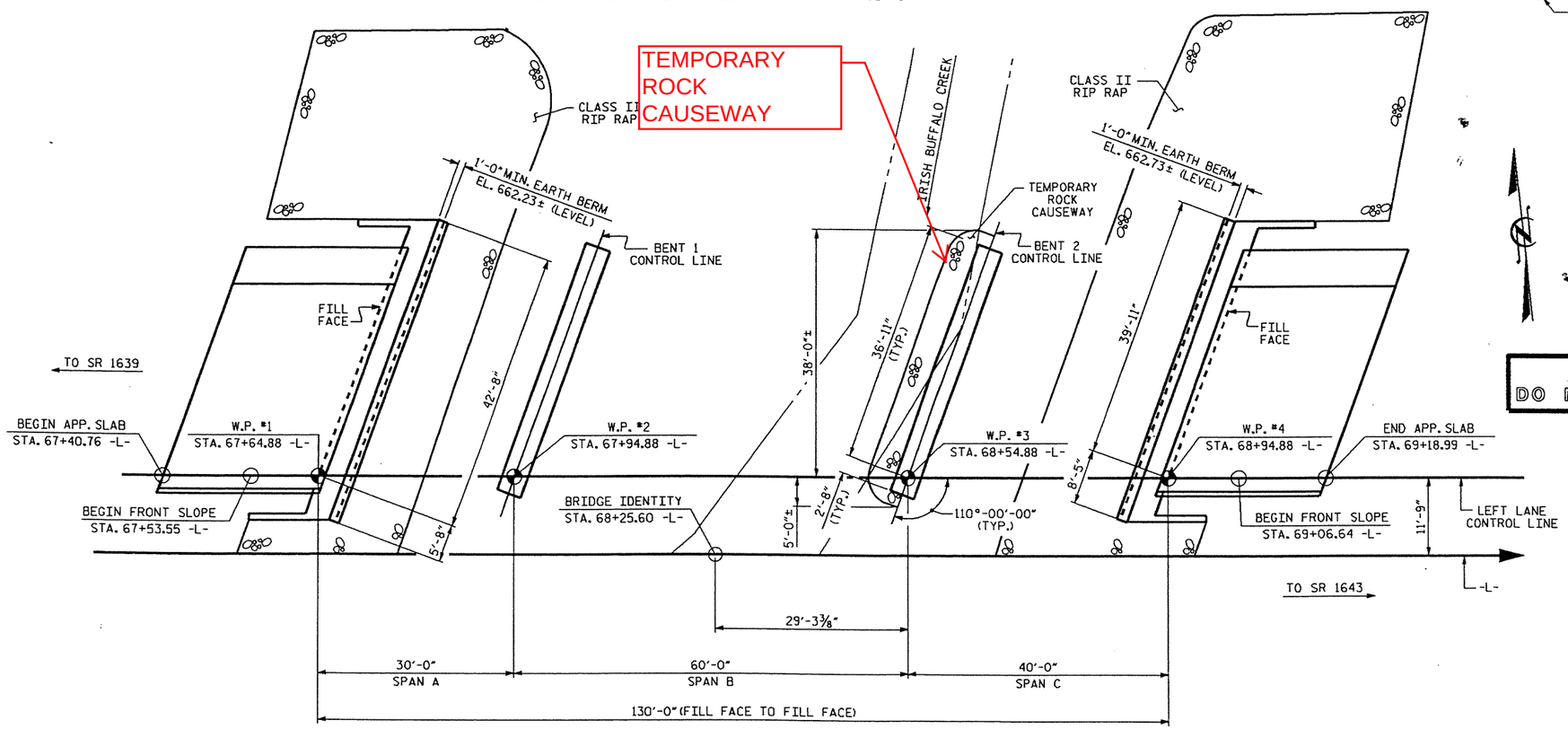


SECTION ALONG LEFT LANE CONTROL LINE

(SECTION TAKEN AT RIGHT ANGLE TO END BENTS & BENTS)



DETAIL OF TEMPORARY ROCK CAUSEWAY



PLAN

(PILES & COLUMNS NOT SHOWN FOR CLARITY)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROJECT NO. U-3440
CABARRUS COUNTY
STATION: 68+25.60 -L-

SHEET 1 OF 2 BRIDGE No. 402

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRELIMINARY
GENERAL DRAWING
FOR BRIDGE OVER IRISH BUFFALO CREEK ON NC 3 BETWEEN SR 1639 AND SR 1643 (LEFT LANE)

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

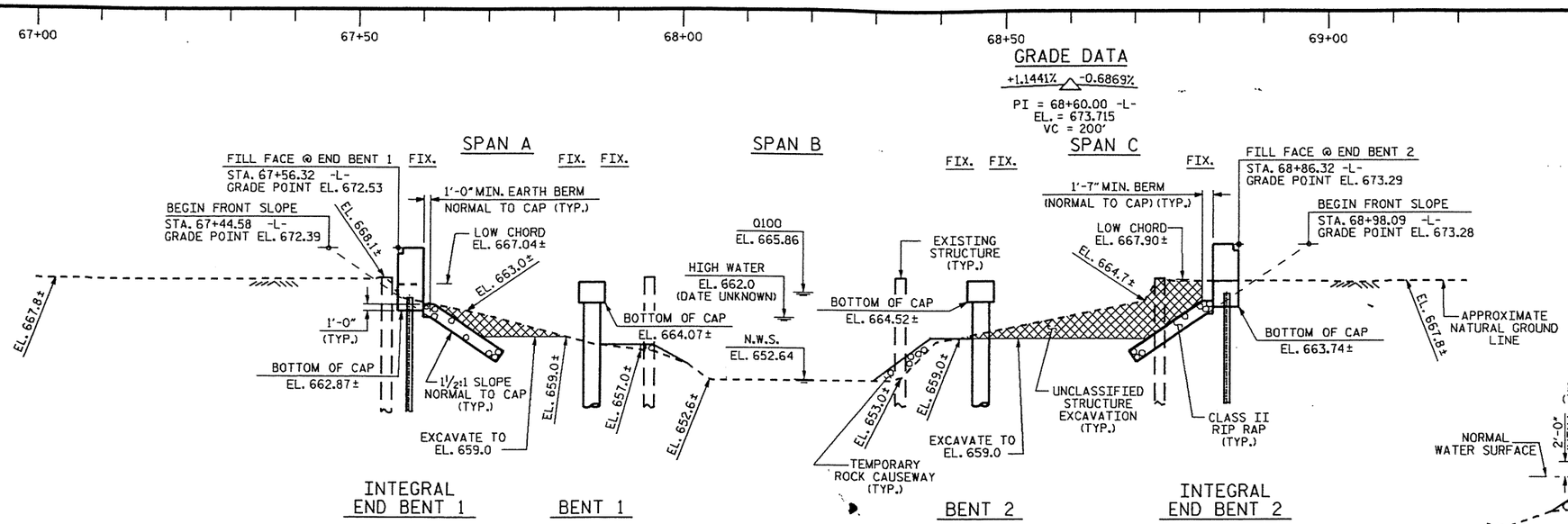
STR. #1

DRAWN BY : T. H. CARROLL DATE : 6/3/14
CHECKED BY : R. P. PATEL DATE : 6/9/14
DESIGN ENGINEER OF RECORD: T. H. CARROLL DATE : 6/19/14

29-OCT-2015 12:24
R:\Structures\Plans\Str02\U3440_SD_PGD_02.dgn

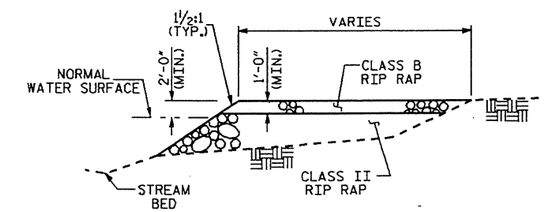
F.A. PROJECT STP-0003(6)

PERMIT DRAWING
SHEET 8 OF 23

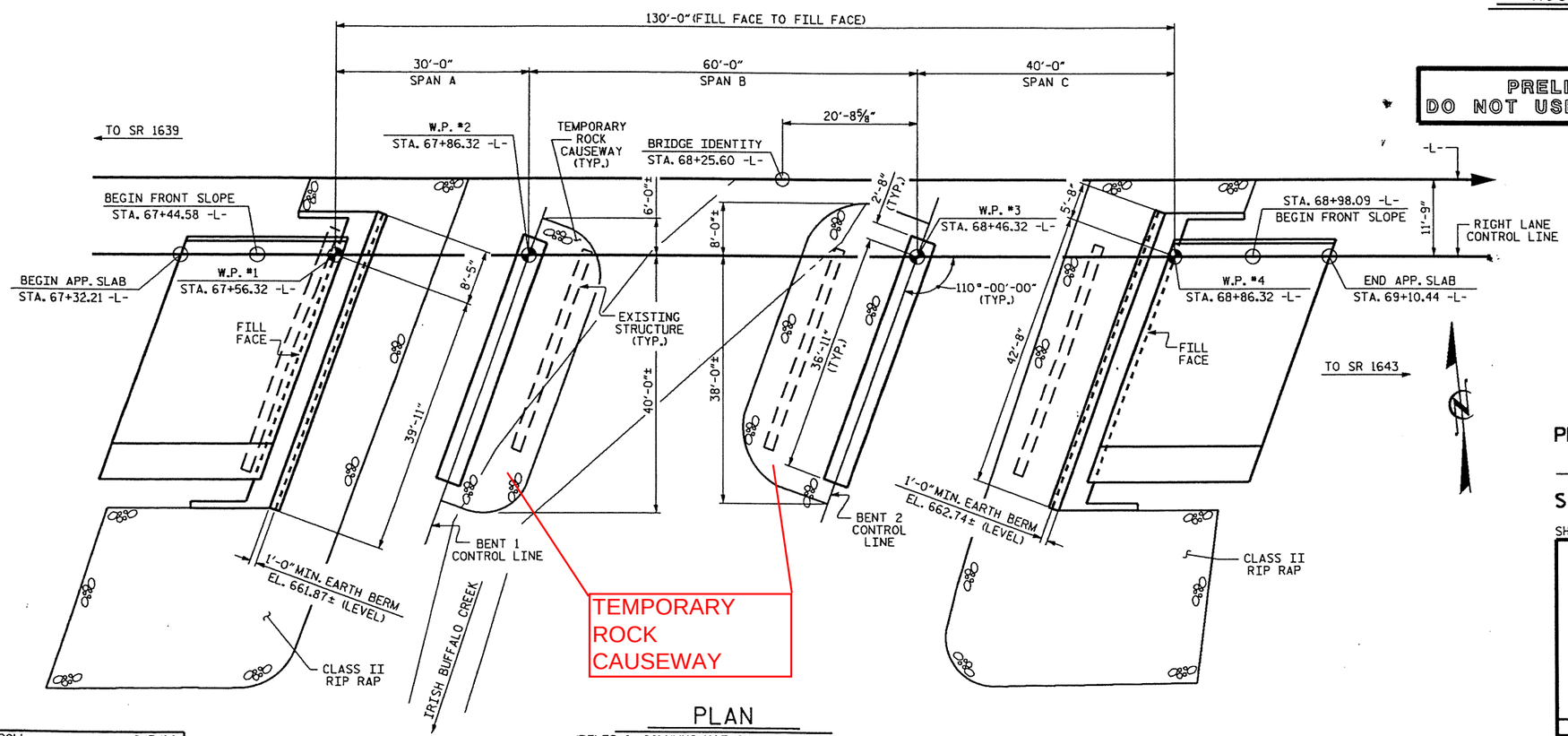


SECTION ALONG RIGHT LANE CONTROL LINE

(SECTION TAKEN AT RIGHT ANGLE TO END BENTS & BENTS)



DETAIL OF TEMPORARY ROCK CAUSEWAY



PLAN

(PILES & COLUMNS NOT SHOWN FOR CLARITY)

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-3440
CABARRUS COUNTY
STATION: 68+25.60 -L-

SHEET 1 OF 2 REPLACES BRIDGE No. 36

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRELIMINARY
GENERAL DRAWING
FOR BRIDGE OVER IRISH BUFFALO CREEK ON NC 3 BETWEEN SR 1639 AND SR 1643 (RIGHT LANE)

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

STR. #2

DRAWN BY :	T. H. CARROLL	DATE : 6/3/14
CHECKED BY :	R. P. PATEL	DATE : 6/9/14
DESIGN ENGINEER OF RECORD:	T. H. CARROLL	DATE : 6/19/14

29-OCT-2015 12:22
R:\Structures\Plans\Str02\U3440_SD_PG0_02.dgn
drsmith

5/28/99

PERMIT DRAWING
SHEET 9 OF 23

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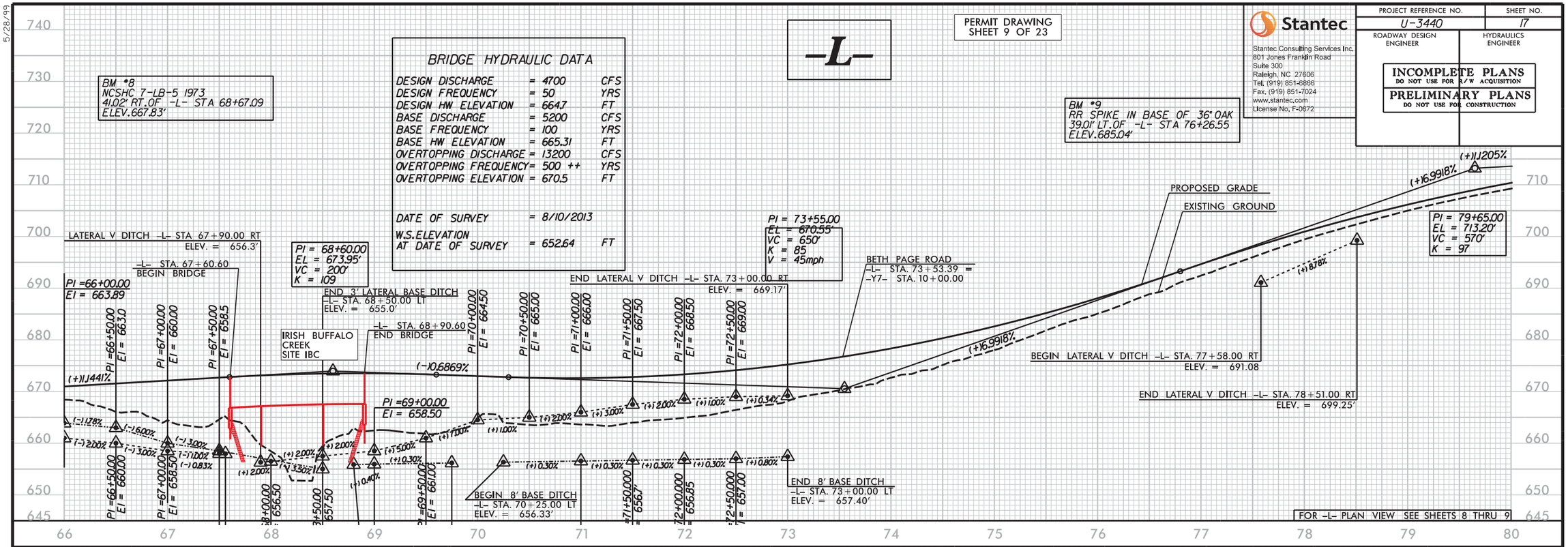
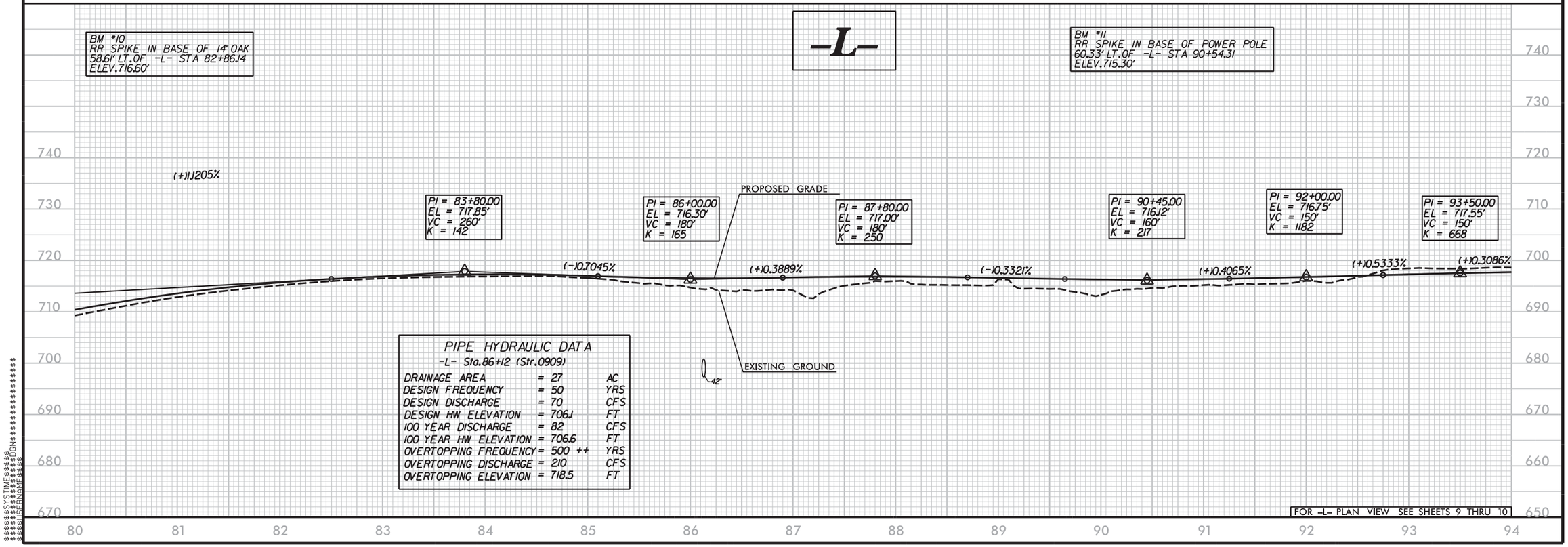
PROJECT REFERENCE NO.	SHEET NO.
U-3440	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 4700	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 664.7	FT
BASE DISCHARGE	= 5200	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 665.31	FT
OVERTOPPING DISCHARGE	= 13200	CFS
OVERTOPPING FREQUENCY	= 500 ++	YRS
OVERTOPPING ELEVATION	= 670.5	FT
DATE OF SURVEY	= 8/10/2013	
W.S. ELEVATION AT DATE OF SURVEY	= 652.64	FT

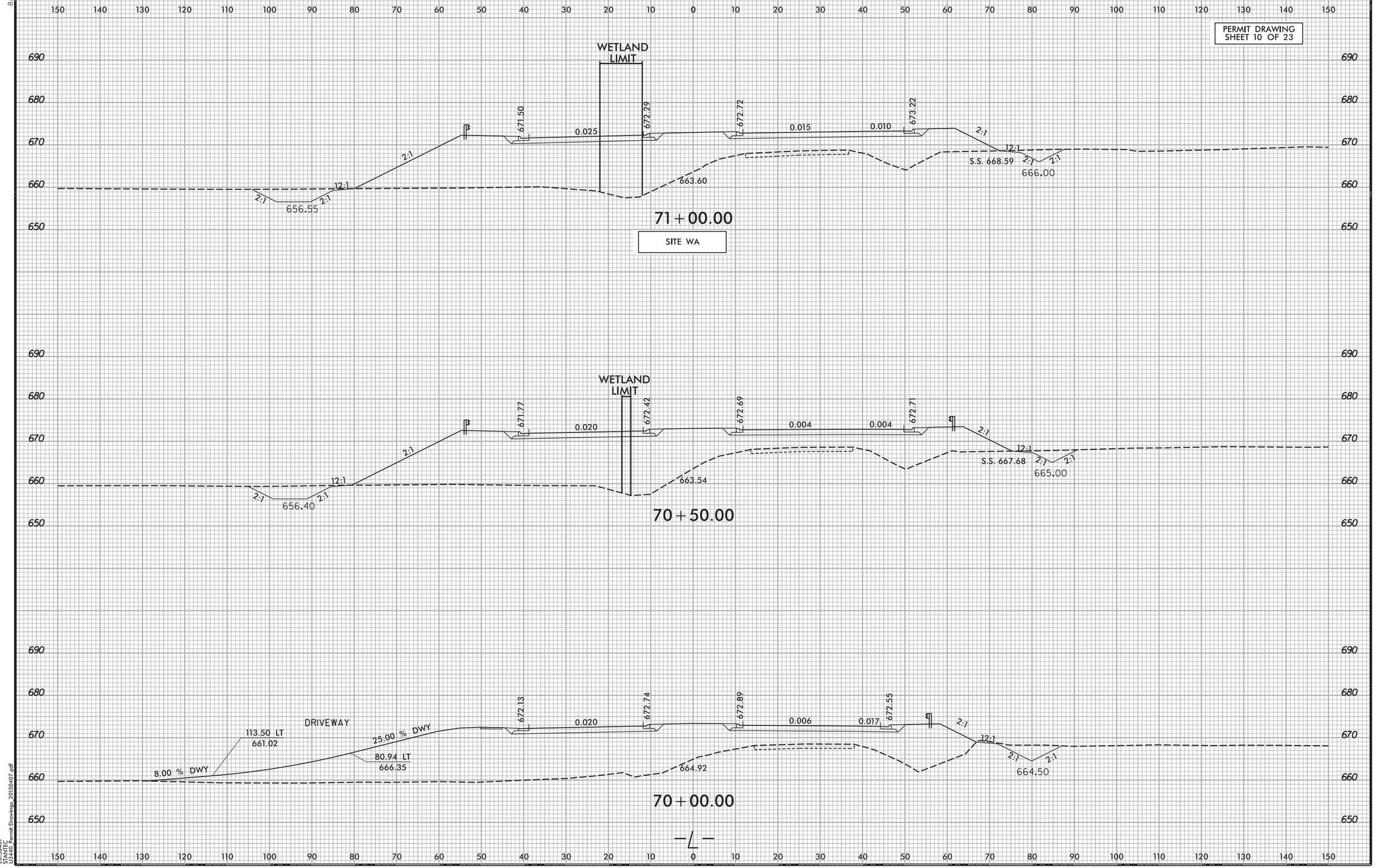


PIPE HYDRAULIC DATA
-L- Sta. 86+12 (Str. 0909)

DRAINAGE AREA	= 27	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 70	CFS
DESIGN HW ELEVATION	= 706.1	FT
100 YEAR DISCHARGE	= 82	CFS
100 YEAR HW ELEVATION	= 706.6	FT
OVERTOPPING FREQUENCY	= 500 ++	YRS
OVERTOPPING DISCHARGE	= 210	CFS
OVERTOPPING ELEVATION	= 718.5	FT

SYSTIME$$$$ SCN$$$$ LEVEL$$$$ USERNAME$$$$

U-3440_rdy_pfl.dgn 12/21/2015 1:08:55 PM



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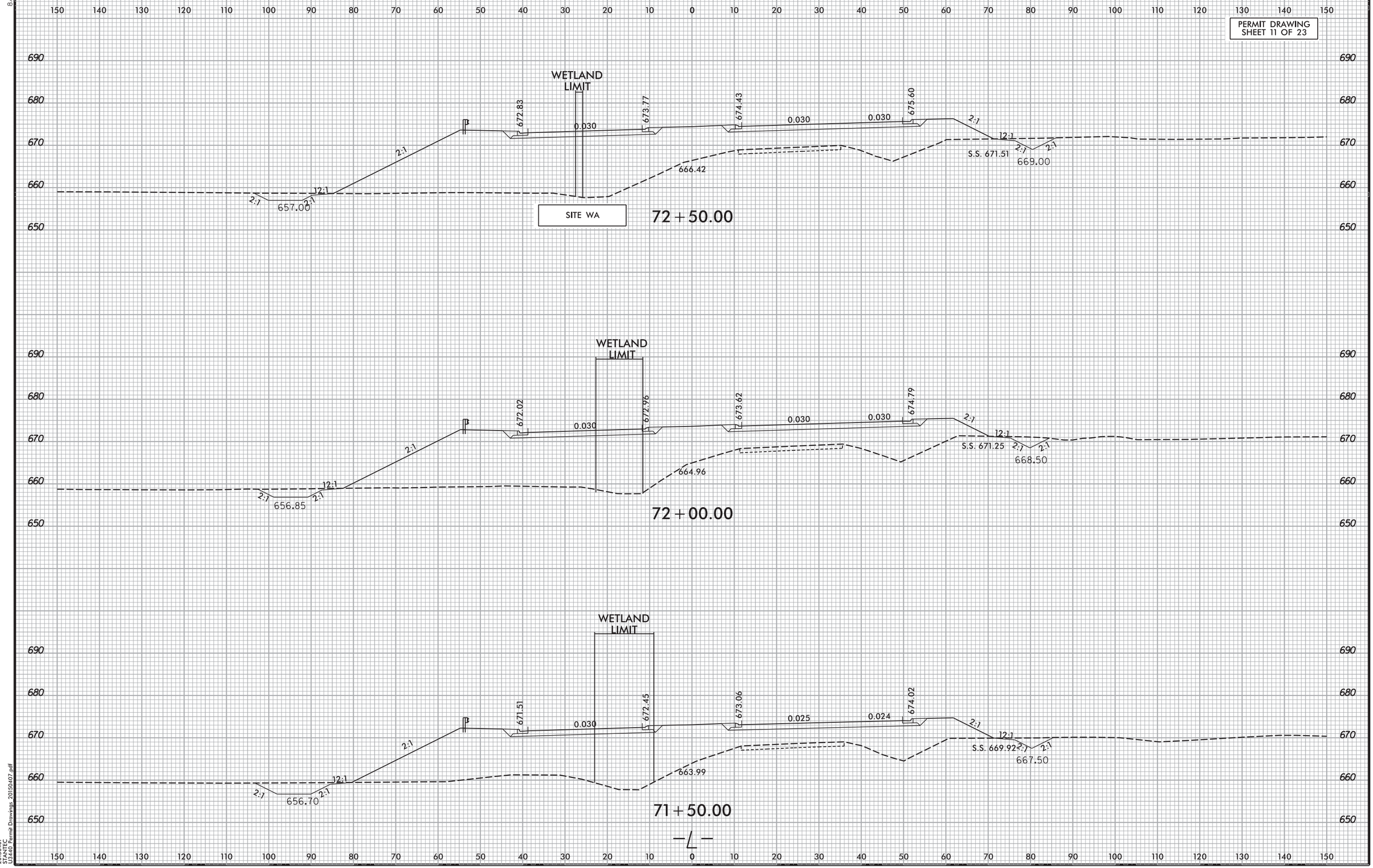

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U3440 Permit Drawings_20150407.pdf

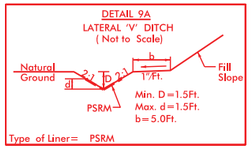
U-3440_rdy_xpl_L.dgn 12/21/2015 1:11:20 PM

PERMIT DRAWING
SHEET 12 OF 23

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S — DENOTES IMPACTS IN SURFACE WATER

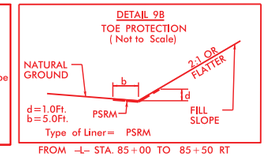
DETAIL 9A
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

FROM -L- STA. 77+58 TO 78+51 RT

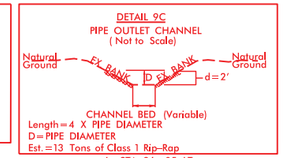
DETAIL 9B
TOE PROTECTION
(Not to Scale)



Type of Liner= PSRM

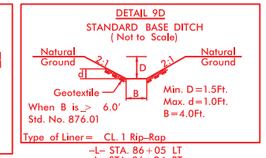
FROM -L- STA. 85+00 TO 85+50 RT

DETAIL 9C
PIPE OUTLET CHANNEL
(Not to Scale)



-L- STA. 86+05 LT

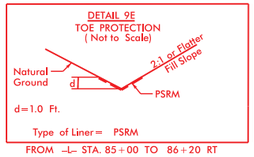
DETAIL 9D
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CL. 1 Rip-Rap

-L- STA. 86+05 LT
-L- STA. 86+24 RT

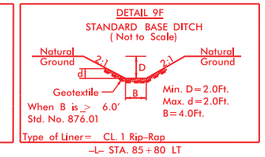
DETAIL 9E
TOE PROTECTION
(Not to Scale)



Type of Liner= PSRM

FROM -L- STA. 85+00 TO 86+20 RT

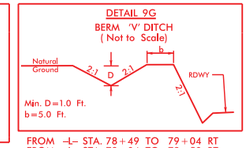
DETAIL 9F
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CL. 1 Rip-Rap

-L- STA. 85+80 LT

DETAIL 9G
BERM 'V' DITCH
(Not to Scale)



FROM -L- STA. 78+49 TO 79+04 RT
FROM -L- STA. 79+04 TO 79+50 RT
FROM -L- STA. 79+50 TO 82+00 RT
FROM -L- STA. 82+00 TO 84+00 RT

-L-
PI Sta 80+28.76
Δ = 50° 54' 39.2" (LT)
D = 2° 51' 53.2"
L = 1,777.13'
T = 952.04'
R = 2,000.00'
RO = 144'
e = .03

50 25 0 50 100

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

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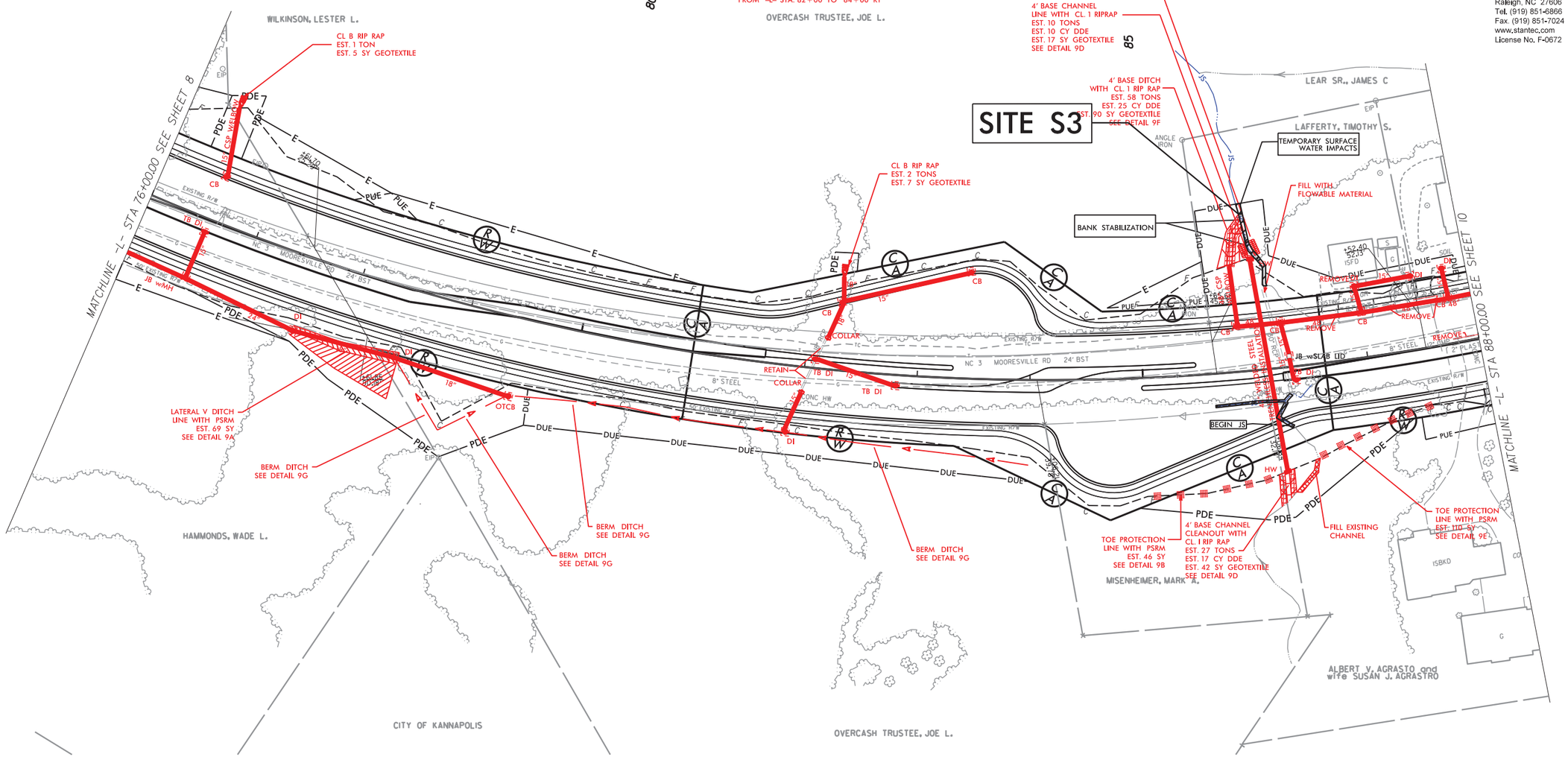

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PERMIT DRAWING
SHEET 13 OF 23

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S — DENOTES IMPACTS IN SURFACE WATER

DETAIL 9A
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground; 2:1; D; 2:1; d; b; 1'/Ft.; Fill Slope; PSRM; Min. D=1.5Ft. Max. d=1.5Ft. b=5.0Ft.
Type of Liner= PSRM
FROM -L- STA. 77+58 TO 78+51 RT

DETAIL 9B
TOE PROTECTION
(Not to Scale)
NATURAL GROUND; b; 2:1 OR FLATTER; d=1.0Ft. b=5.0Ft.; PSRM; FILL SLOPE
Type of Liner= PSRM
FROM -L- STA. 85+00 TO 85+50 RT

DETAIL 9C
PIPE OUTLET CHANNEL
(Not to Scale)
Natural Ground; FV BANK; D; FV BANK; Natural Ground; d=2'; CHANNEL BED (Variable)
Length=4 X PIPE DIAMETER
D=PIPE DIAMETER
Est.=13 Tons of Class 1 Rip-Rap
-L- STA. 86+05 LT

DETAIL 9D
STANDARD BASE DITCH
(Not to Scale)
Natural Ground; 2:1; D; 2:1; Natural Ground; d; B; Geotextile; Min. D=1.5Ft. Max. d=1.0Ft. B=4.0Ft.
When B is > 6.0' Std. No. 876.01
Type of Liner= CL. 1 Rip-Rap
-L- STA. 86+05 LT
-L- STA. 86+24 RT

DETAIL 9E
TOE PROTECTION
(Not to Scale)
Natural Ground; 2:1 or Flatter Fill Slope; d; PSRM
d=1.0 Ft.
Type of Liner= PSRM
FROM -L- STA. 85+00 TO 86+20 RT

DETAIL 9F
STANDARD BASE DITCH
(Not to Scale)
Natural Ground; 2:1; D; 2:1; Natural Ground; d; B; Geotextile; Min. D=2.0Ft. Max. d=2.0Ft. B=4.0Ft.
When B is > 6.0' Std. No. 876.01
Type of Liner= CL. 1 Rip-Rap
-L- STA. 85+80 LT

DETAIL 9G
BERM 'V' DITCH
(Not to Scale)
Natural Ground; 2:1; D; 2:1; b; RDWY; 2:1; Min. D=1.0 Ft. b=5.0 Ft.
FROM -L- STA. 78+49 TO 79+04 RT
FROM -L- STA. 79+04 TO 79+50 RT
FROM -L- STA. 79+50 TO 82+00 RT
FROM -L- STA. 82+00 TO 84+00 RT

-L-
PI Sta 80+28.76
Δ = 50° 54' 39.2" (LT)
D = 2° 51' 53.2"
L = 1,777.13'
T = 952.04'
R = 2,000.00'
RO = 144'
e = .03

50 25 0 50 100

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

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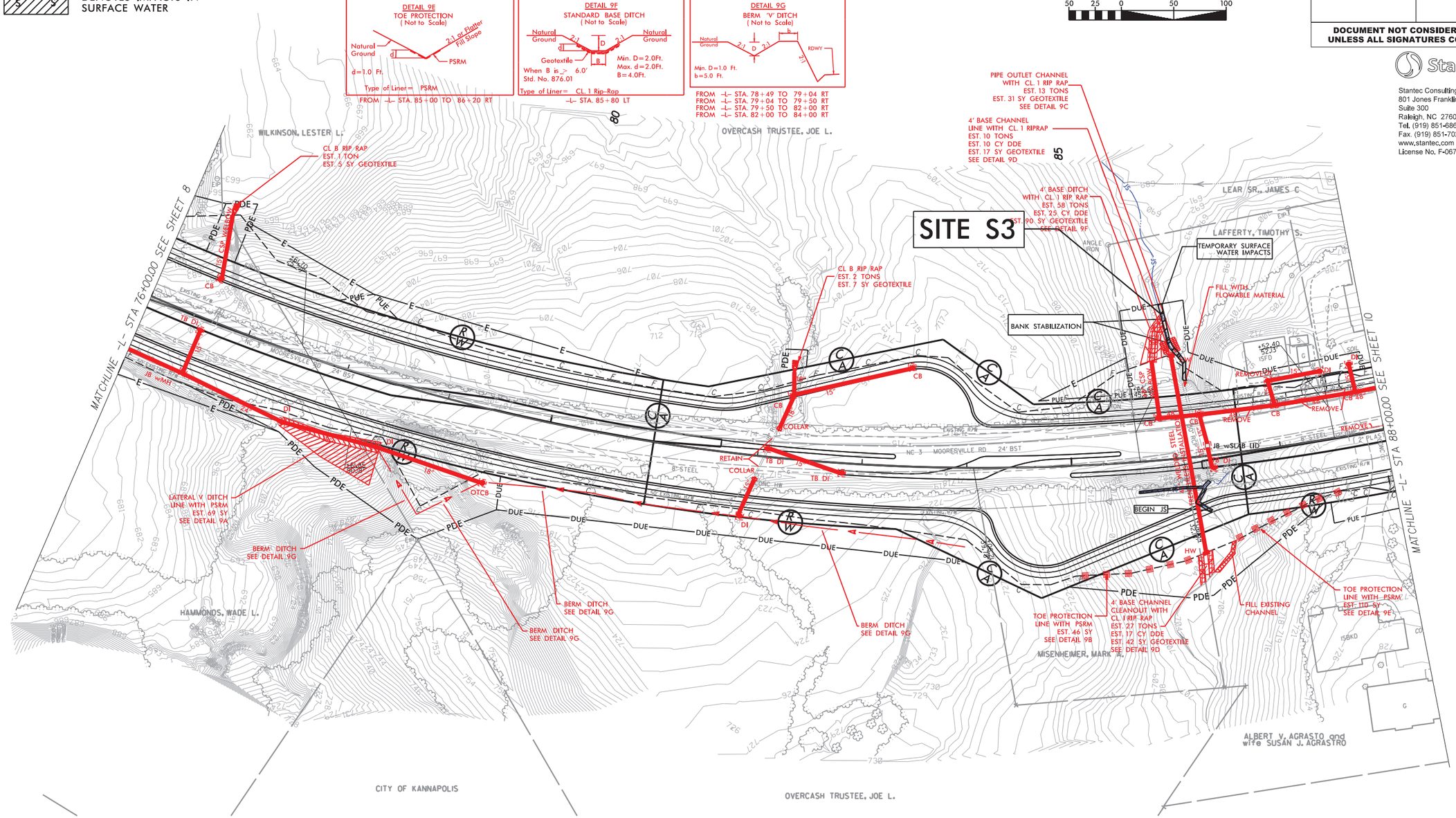

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 14 OF 23

SITE S4

NAD 83/NSRS 2007

50 25 0 50 100

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

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License No. F-0672

DETAIL 10A
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, Natural Ground; d, B; Geotextile
When B is > 6.0' Std. No. 876.01
Min. D=1.5Ft. Max. d=1.0Ft. B=5.0Ft.
Type of Liner= C. II Rip-Rap
-L- STA. 96+65 LT

DETAIL 10B
TOE PROTECTION
(Not to Scale)
NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE
d=1.0Ft.
Type of Liner= CL. B Rip-Rap
FROM -L- STA. 96+50 TO 99+00 LT
FROM -L- STA. 97+00 TO 97+86 RT

DETAIL 10C
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, Natural Ground; d, B; Geotextile
Min. D=1.5Ft. Max. d=1.0Ft. B=3.0Ft.
*When B is < 6.0'
Type of Liner= CL. 1 Rip-Rap
-L- STA. 96+15 LT

DETAIL 10D
RIP RAP AT EMBANKMENT
(Not to Scale)
10' min., 1.0' min., Ditch Grade, 1.5', GEOTEXTILE
Type of Liner= 12 TONS,CL B Rip-Rap
Geotextile= 16sy
STA. 98+05 RT

DETAIL 10E
BERM 'V' DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, b, RDWY, 2:1
Min. D=1.0 Ft.
b=5.0 Ft.
FROM -L- STA. 92+35 TO 94+10 RT
FROM -L- STA. 94+10 TO 95+15 RT
FROM -L- STA. 96+00 TO 97+00 RT

DETAIL 10F
CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope, d, Geotextile
Min. D=1.0 Ft. Max. d=1.0 Ft.
Type of Liner= CL B Rip-Rap
FROM Y8 STA. 10+50 TO STA. 13+00 LT
FROM Y8 STA. 10+50 TO STA. 12+00 RT
FROM Y8A STA. 10+80 TO STA. 12+00 RT
FROM Y8A STA. 11+50 TO STA. 12+00 LT

NOTE: DRIVEWAY RADII ARE 5FT UNLESS OTHERWISE NOTED

3' BASE DITCH CHANNEL CLEANOUT WITH CL. II RIP RAP EST. 41 TONS EST. 12 CY DDE EST. 65 SY GEOTEXTILE SEE DETAIL 10A

3' BASE DITCH LINE WITH CL. 1 RIPRAP EST. 25 TONS EST. 9 CY DDE EST. 50 SY GEOTEXTILE SEE DETAIL 10C

CL. II RIP RAP TOE PROTECTION LINE CL. B RIP RAP EST. 87 TONS EST. 262 SY GEOTEXTILE SEE DETAIL 10B

TEMPORARY SURFACE WATER IMPACTS

BANK STABILIZATION

FILL AND PLUG

BERM DITCH SEE DETAIL 10E

CL. B RIPRAP BANK PROTECTION SEE DETAIL 10D

BURY PIPE 1' BELOW

TOE PROTECTION LINE CL. B RIP RAP EST. 30 TONS EST. 90 SY GEOTEXTILE SEE DETAIL 10B

LINE DITCH WITH CL B RIP RAP EST. 87 TONS EST. 296 SY GEOTEXTILE, SEE DETAIL 10F

LINE DITCH WITH CL B RIP RAP EST. 70 TONS EST. 237 SY GEOTEXTILE, SEE DETAIL 10F

LINE DITCH WITH CL B RIP RAP EST. 42 TONS EST. 143 SY GEOTEXTILE RIPRAP SEE DETAIL 10F

PLUG

PLUG AND ABANDON WITHIN ROW

REMOVE

JB w/SLAB LID

JB w/MH

NC 3 MOORESVILLE RD 24' BST

LEAR SR., JAMES C

LAFFERTY, TIMOTHY S.

OVERCASH TRUSTEE, JOE L.

LOVE, WILLIAM E.

THREATT, DAVID L.

VANPELT, CLARENCE R.

BROCK TRUSTEE, DOROTHY P.

SPRAGUE, RONDA W.

BREWER, WAYNE C.

MCGINNIS, JIMMIE D.

BCA PROPERTY MGMT, LLC

MISENHEIMER, MARK A.

BROWN, LIRCEY L.

BROWN, PHILIP L.

PRICE JR, JAMES H

MUNDAY, T. M.

ROBIE, DANIEL C.

FERGUSON, SHARON C.

THOMAS E. BARNHARDT

BARRY S. HALE

JONATHAN H. MILLS

ANDREW SCIARRINO
JOYCE I. SCIARRINO

ALBERT v. AGRASTO and wife SUSAN J. AGRASTRO

-L- (NC 3)	13100 / 21400	13300 / 21600	2016 ADT / 2036 ADT
-Y8- (CLIFTON ST.)	50/50	200/200	200/200
-Y9- (BAILEY ST.)	100/100		2016 ADT / 2036 ADT
-L- (NC 3)	13300 / 21600	13400 / 21700	50/50 · 100/100

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 15 OF 23

NAD 83/NSRS 2007

50 25 0 50 100

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

SITE S4

NOTE: DRIVEWAY RADII ARE 5FT UNLESS OTHERWISE NOTED

DETAIL 10A
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, Natural Ground; d, B; Geotextile
When B is > 6.0' Std. No. 876.01
Min. D=1.5Ft. Max. d=1.0Ft. B=5.0Ft.
Type of Liner= C. II Rip-Rap
-L- STA. 96+65 LT

DETAIL 10B
TOE PROTECTION
(Not to Scale)
NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE
d=1.0Ft.
Type of Liner= CL. B Rip-Rap
FROM -L- STA. 96+50 TO 99+00 LT
FROM -L- STA. 97+00 TO 97+86 RT

DETAIL 10C
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, Natural Ground; d, B; Geotextile
Min. D=1.5Ft. Max. d=1.0Ft. B=3.0Ft.
*When B is < 6.0'
Type of Liner= CL. 1 Rip-Rap
-L- STA. 96+15 LT

DETAIL 10D
RIP RAP AT EMBANKMENT
(Not to Scale)
10' min., 1.0' min., 1.5', Ditch Grade, GEOTEXTILE
Type of Liner= 12 TONS,CL B Rip-Rap Geotextile= 16sy
STA. 98+05 RT

DETAIL 10E
BERM 'V' DITCH
(Not to Scale)
Natural Ground, 2:1, D, 2:1, b, RDWY, 2:1
Min. D=1.0 Ft. b=5.0 Ft.
FROM -L- STA. 92+35 TO 94+10 RT
FROM -L- STA. 94+10 TO 95+15 RT
FROM -L- STA. 96+00 TO 97+00 RT

DETAIL 10F
CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope, Geotextile
Min. D=1.0 Ft. Max. d=1.0 Ft.
Type of Liner= CL B Rip-Rap
FROM Y8 STA. 10+50 TO STA. 13+00 LT
FROM Y8 STA. 10+50 TO STA. 12+00 RT
FROM Y8A STA. 10+80 TO STA. 12+00 RT
FROM Y8A STA. 11+50 TO STA. 12+00 LT

3' BASE DITCH CHANNEL CLEANOUT WITH CL. II RIP RAP EST. 41 TONS EST. 7 CY DDE EST. 65 SY GEOTEXTILE SEE DETAIL 10A

3' BASE DITCH LINE WITH CL. 1 RIPRAP EST. 25 TONS EST. 9 CY DDE EST. 50 SY GEOTEXTILE SEE DETAIL 10C

CL. II RIP RAP TOE PROTECTION LINE CL. B RIP RAP EST. 87 TONS EST. 262 SY GEOTEXTILE SEE DETAIL 10B

TEMPORARY SURFACE WATER IMPACTS

BANK STABILIZATION

FILL AND PLUG

PLUG

PLUG AND ABANDON WITHIN ROW

REMOVE

JB w/SLAB LID

JB w/MH

BERM DITCH SEE DETAIL 10E

LINE DITCH WITH CL B RIP RAP EST. 87 TONS EST. 296 SY GEOTEXTILE, SEE DETAIL 10F

LINE DITCH WITH CL B RIP RAP EST. 70 TONS EST. 237 SY GEOTEXTILE, SEE DETAIL 10F

CL. B RIPRAP BANK PROTECTION SEE DETAIL 10D

BURY PIPE 1' BELOW

TOE PROTECTION LINE CL B RIP RAP EST. 30 TONS EST. 90 SY GEOTEXTILE SEE DETAIL 10B

LINE DITCH WITH CL B RIP RAP EST. 42 TONS EST. 143 SY GEOTEXTILE RIPRAP SEE DETAIL 10F

OVERCASH TRUSTEE, JOE L.
LEAR SR., JAMES C
LAFFERTY, TIMOTHY S.
THREATT, DAVID L.
LOVE, WILLIAM E.
VANPELT, CLARENCE R.
UNKNOWN
BROCK TRUSTEE, DOROTHY P.
SPRAGUE, ROLINDA W.
BREWER, WAYNE C.
MISENHEIMER, MARK A.
BROWN, LIRCEY
BROWN, PHILIP L.
PRICE JR, JAMES H
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THOMAS E. BARNHARDT
BARRY S. HALE
JONATHAN H. MILLS
ANDREW SCIARRINO JOYCE J. SCIARRINO
NC 3 MOORESVILLE RD 24' BST

-L- (NC 3)		-Y9- (BAILEY ST.)
13100 / 21400		13300 / 21600
50 / 50		200 / 200
200 / 200		100 / 100
2016 ADT / 2036 ADT		100 / 100
		50 / 50
		100 / 100
		13300 / 21600
		13400 / 21700
	-Y8- (CLIFTON ST.)	-L- (NC 3)
	2016 ADT / 2036 ADT	

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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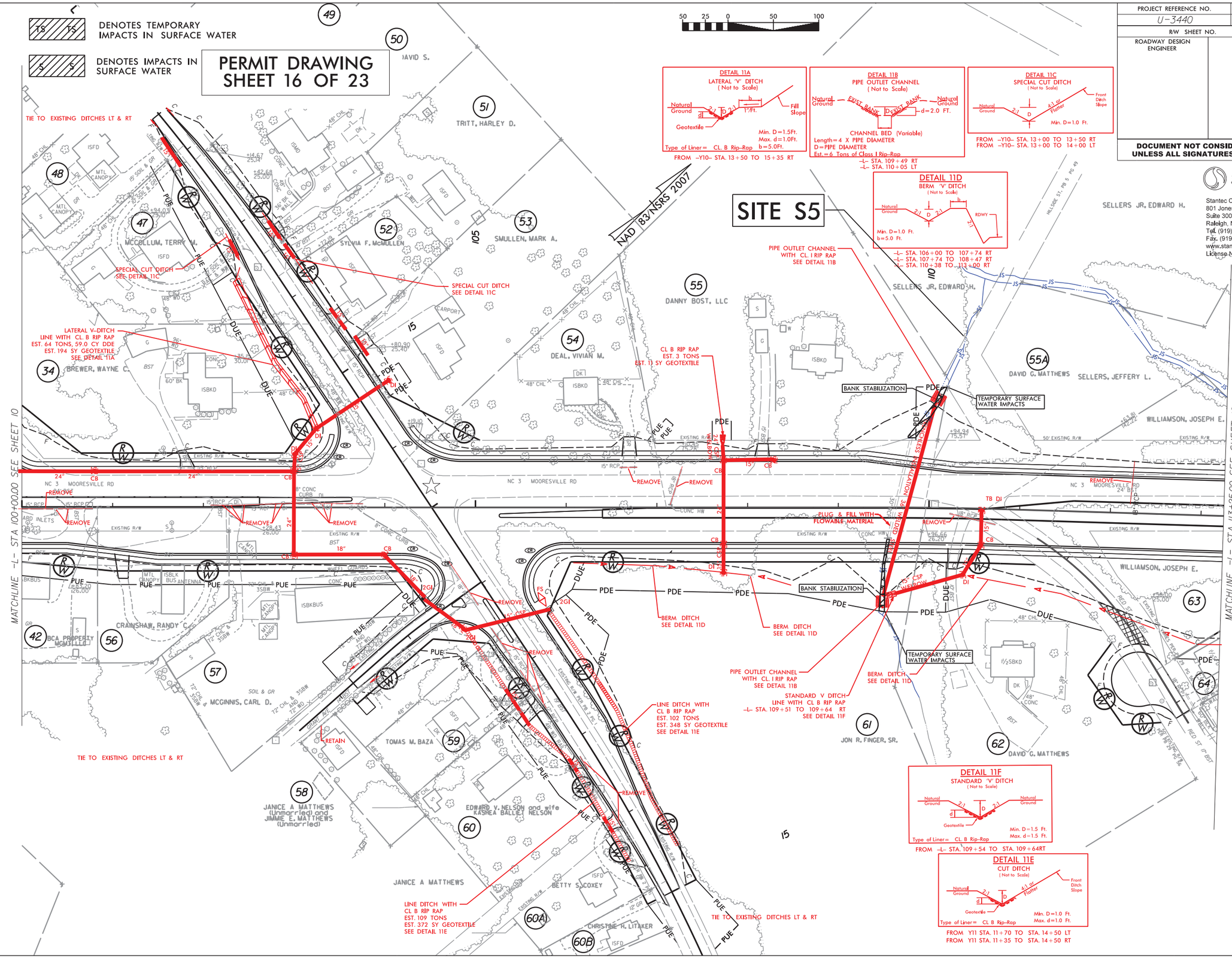
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

PERMIT DRAWING SHEET 16 OF 23



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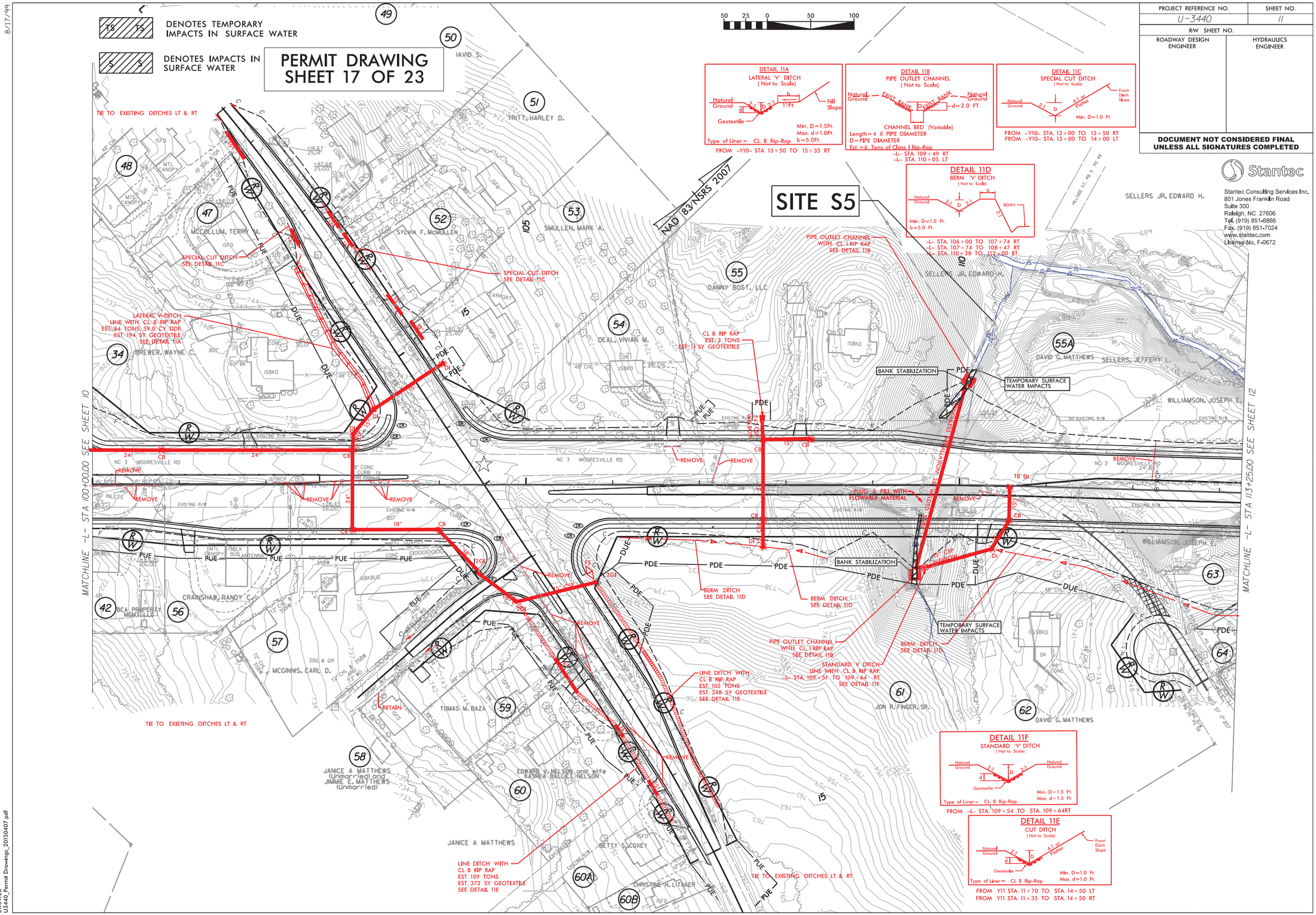

PROJECT REFERENCE NO.	SHEET NO.
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	12
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 18 OF 23

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S — DENOTES IMPACTS IN SURFACE WATER

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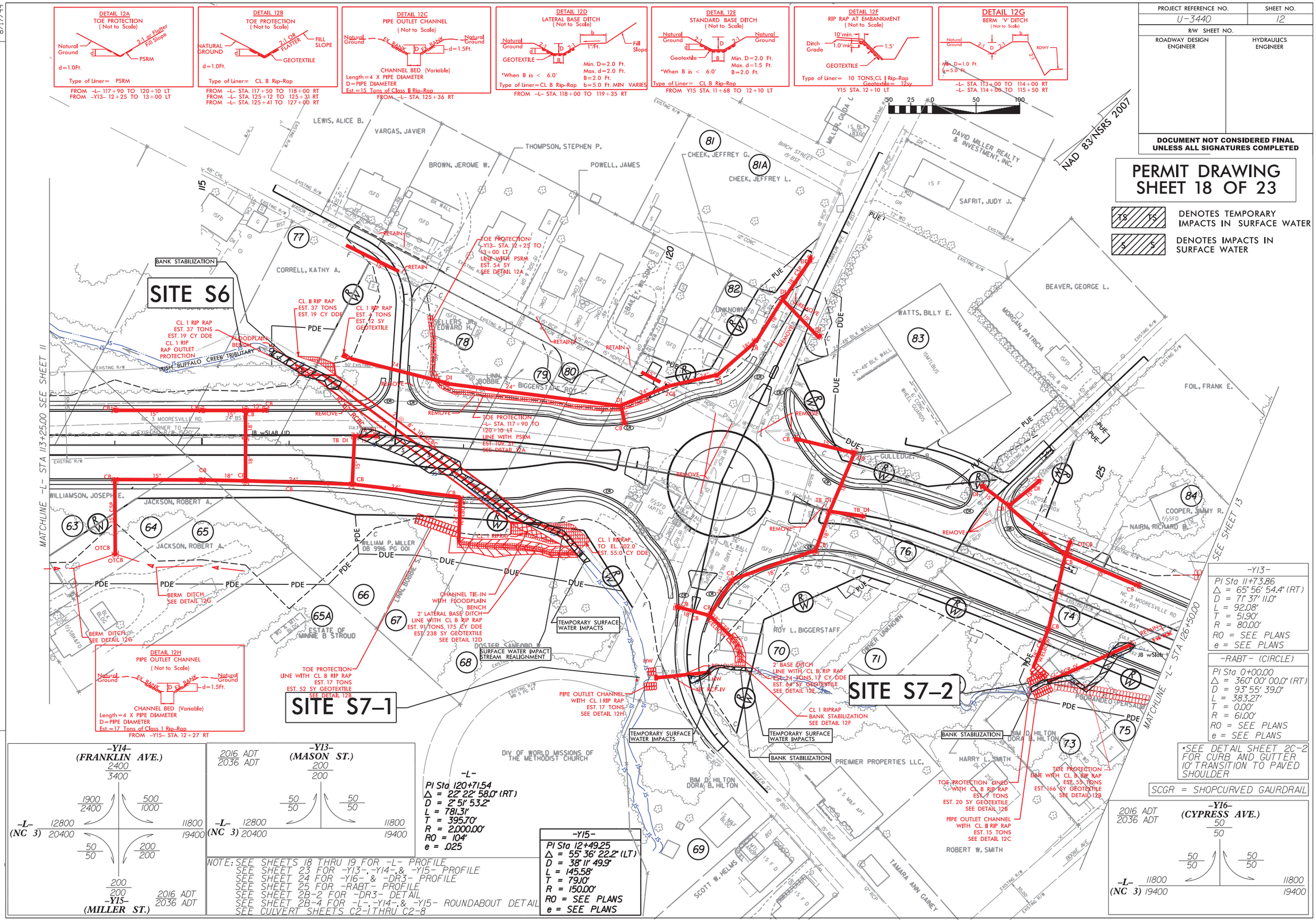

NOTE: SEE SHEETS 18 THRU 19 FOR -L- PROFILE
SEE SHEET 23 FOR -Y13-,-Y14-,& -Y15- PROFILE
SEE SHEET 24 FOR -Y16- & -DR3- PROFILE
SEE SHEET 25 FOR -RABT- PROFILE
SEE SHEET 2B-2 FOR -DR3- DETAIL
SEE SHEET 2B-4 FOR -L-,-Y14-,& -Y15- ROUNDABOUT DETAIL
SEE CULVERT SHEETS C2-1 THRU C2-8

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 19 OF 23

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S — DENOTES IMPACTS IN SURFACE WATER

NAD 83/NSRS 2007

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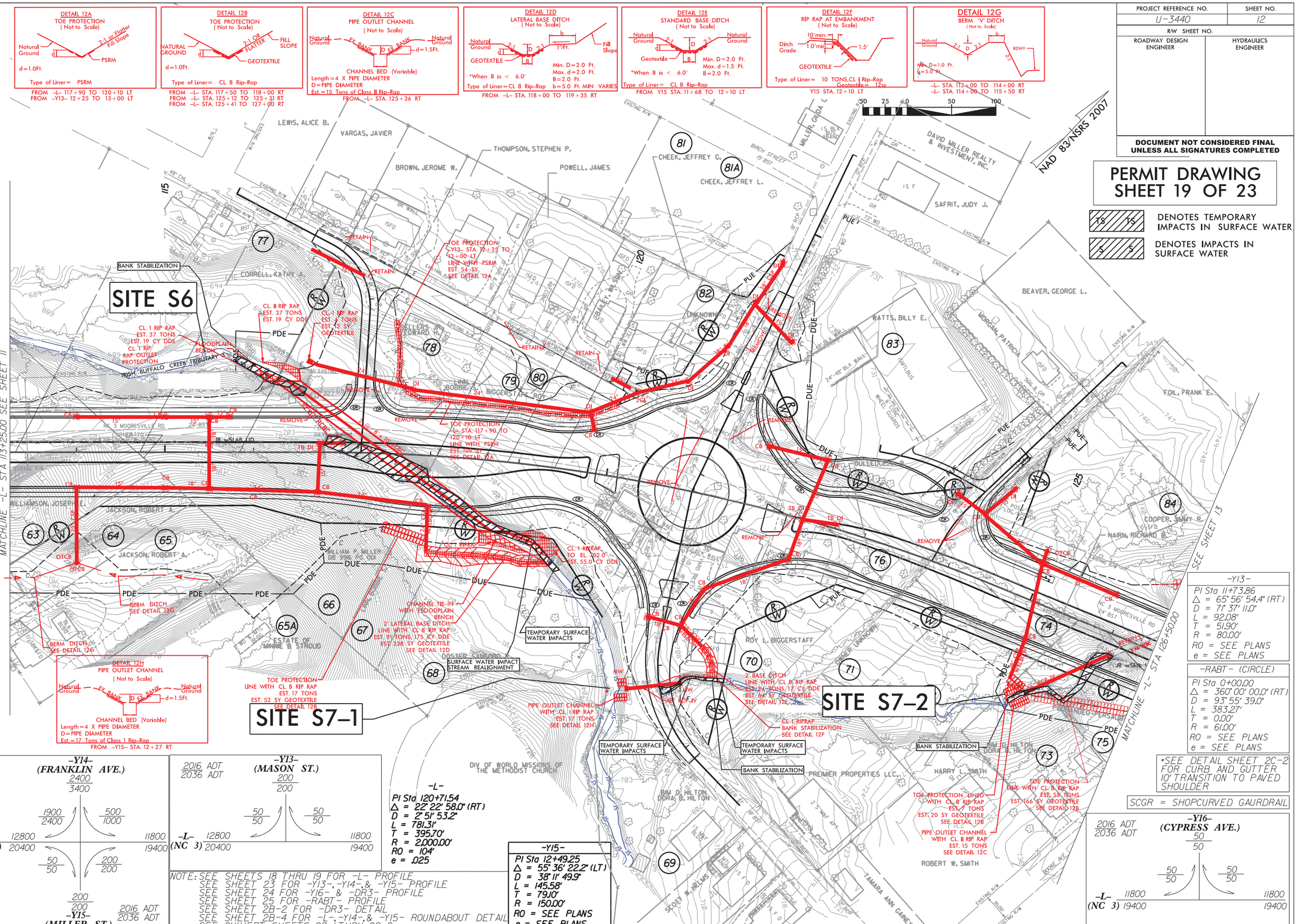

NOTE: SEE SHEETS 18 THRU 19 FOR -L- PROFILE
SEE SHEET 23 FOR -Y13-, -Y14-, & -Y15- PROFILE
SEE SHEET 24 FOR -Y16- & -DR3- PROFILE
SEE SHEET 25 FOR -RABT- PROFILE
SEE SHEET 2B-2 FOR -DR3- DETAIL
SEE SHEET 2B-4 FOR -L-, -Y14-, & -Y15- ROUNDABOUT DETAIL
SEE CULVERT SHEETS C2-1 THRU C2-8

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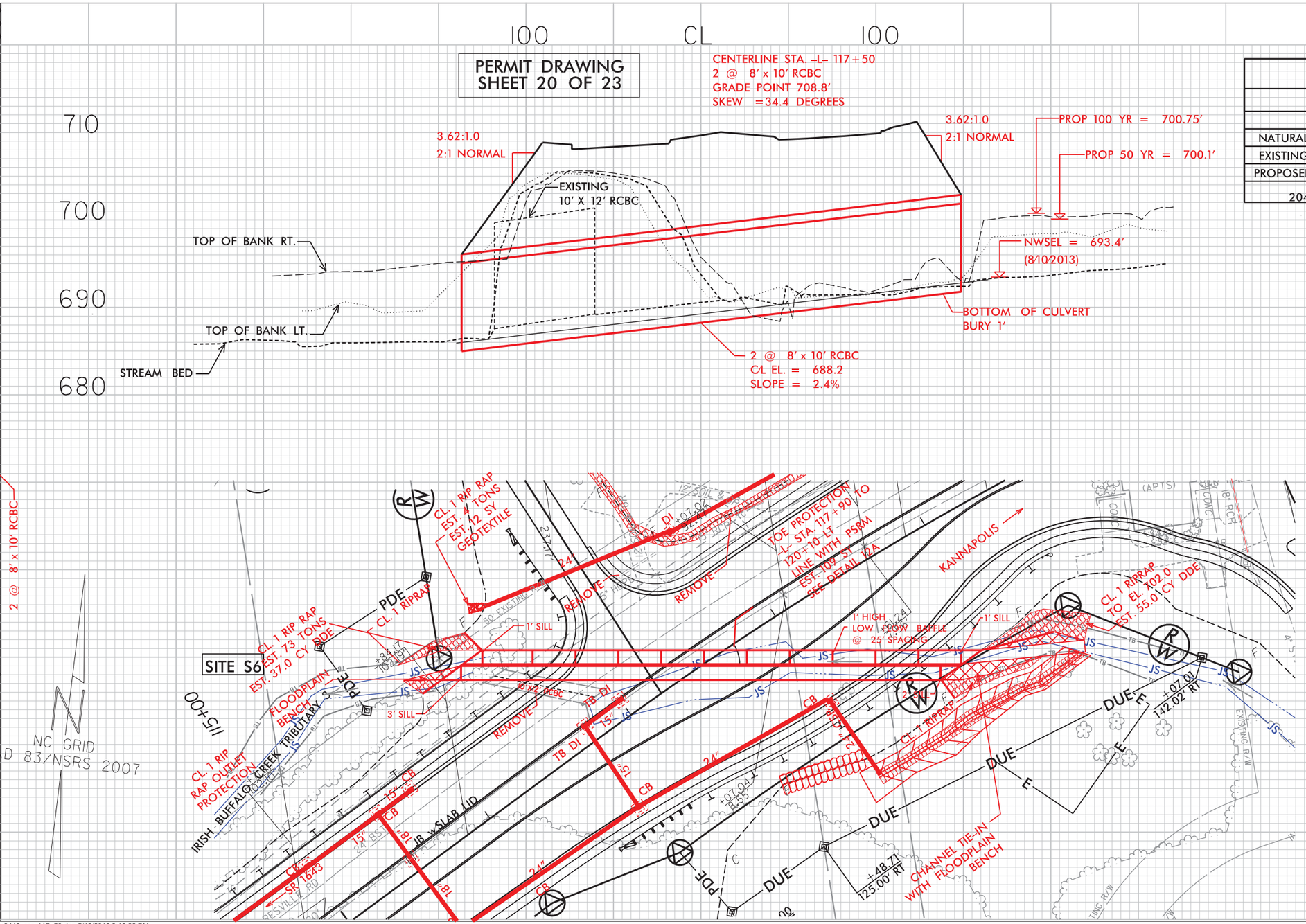
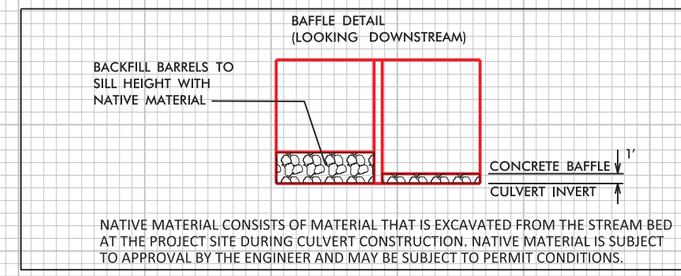
PERMIT DRAWING
SHEET 20 OF 23

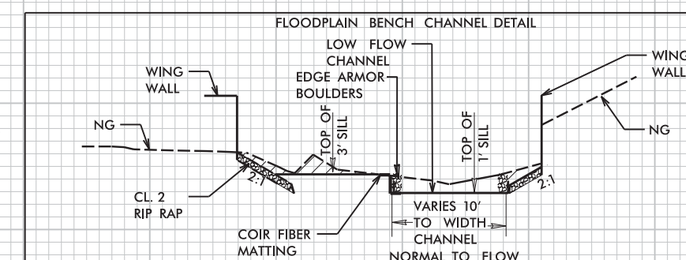


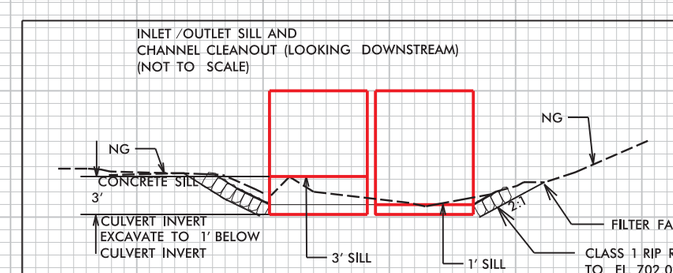
NCDOT PERFORMANCE TABLE					
	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	697.8	698.9	699.6	699.87	700.4
EXISTING	697.8	699.2	699.6	700.28	702.2
PROPOSED	697.6	699.4	700.1	700.75	702.2
@SECTION 3757;CE 3770 204 FT. US FROM C/L OF REVISED CULVERT					

FEMA PERFORMANCE TAB	
	100y
DUPLICATE EFFECTIVE	NA
CORRECTED EFFECTIVE	700.0
REVISED	700.4
@SECTION 3757; CE 377 204 FT.US FROM C/L OF REV. C	



NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.





NOTES:

1. THE EDGE OF THE LOW FLOW CHANNEL SHALL BE ARMORED WITH BOULDERS. THE DEPTH OF ARMOR PROTECTION SHOULD EXTEND 1.5' BELOW THE STREAM BED LINED WITH COIR FIBER MATTING.

2. EDGE ARMOR CAN BE NATURAL STREAM BOULDERS OR EXTRACTED FROM CLASS I RIP RAP OR SHOT ROCK MATERIAL AND CAN BE CUBICAL OR RECTANGULAR IN NATURE.

3. ACCEPTABLE BOULDERS FOR THE EDGE ARMOR SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS; 3'X2'X1'. UNSUITABLE EDGE ARMOR MATERIAL THAT REMAINS FROM CLASS I RIP RAP OR SHOT ROCK STORES, MAY BE USED IN BACK FILL OF THE OVER BANK AREA OR DISCARDED.

u3440_csr_117+50.dgn 5/13/2016 3:19:32 PM

PROJECT REFERENCE NO.	SHEET NO.
U-3440	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 21 OF 23

TS / TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S / S — DENOTES IMPACTS IN SURFACE WATER

-L-
PI Sta 133+14.77
Δ = 3° 55' 58.4" (LT)
D = 0° 21' 29.2"
L = 1,098.27'
T = 549.35'
R = 16,000.00'
e = NC (.02)

NAD 83/NSRS 2007

50 25 0 50 100

MATCHLINE -L- STA 126+50.00 SEE SHEET 12

MATCHLINE -L- STA 140+00.00 SEE SHEET 14

SITE S7-2

SITE S7-3

TOE PROTECTION LINE WITH CL. B RIP RAP SEE DETAIL 13A

CHANNEL WITH CL. B RIP RAP EST. 10 TONS EST. 42 SY GEOTEXTILE SEE DETAIL 13E

TEMPORARY SURFACE WATER IMPACTS

BANK STABILIZATION

LATERAL 3' BASE DITCH LINE WITH PRSM EST. 54 SY SEE DETAIL 13B

PIPE OUTLET CHANNEL WITH CL. B RIP RAP EST. 10 TONS EST. 42 SY GEOTEXTILE SEE DETAIL 13E

TOE PROTECTION LINE WITH PSRM EST. 158 SY SEE DETAIL 13C

PAVED DITCH AT RETAINING WALL SEE DETAIL 13D

FILL WITH FLOWABLE MATERIAL

WRAP CURB AROUND DI

TOE PROTECTION LINE WITH CL. B RIP RAP EST. 55 TONS EST. 167 SY GEOTEXTILE SEE DETAIL 13A

ABERNATHY, JAMES E.
FREEMAN, JOHNSIE S.
ABERNATHY, OPAL S.
COOPER, JIMMY R.
MOORE, NORMAN R.
UNKNOWN OWNER
IPS ESTATES, J.W.
RUBINSTEIN, BRIAN
BARBER, FRANK
DALRYMPLE, JOHN W.
DAVIS SR, KENNETH L.
MURPH, MERLE D.
MCGINNIS, JIMMIE D
WATTS, BILLY E.
HARVEY, ELZENA
ISENHOUR, DENNIS C.
HILTON, BIM D.
MOORE, ALVIN W.
REYNOLDS, CAROLYN P.
LABARGE, SHERRY L.
EURY, IRA D.
JENNIE M. LINGERFELT
JACOBS, GRACE D.
LINGERFELT, JENNIE M.
BUTLER BUILDERS OF NORTH CAROLINA INC

NC 3 MOORESVILLE RD 24' BST

DETAIL 13A
TOE PROTECTION
(Not to Scale)
NATURAL GROUND — 2:1 OR FLATTER — FILL SLOPE — GEOTEXTILE — d=1.0Ft.
Type of Liner= CL. B Rip-Rap
FROM -L- STA 125+41 TO 127+00 RT
FROM -L- STA 126+40 TO 128+00 LT

DETAIL 13B
LATERAL BASE DITCH
(Not to Scale)
Natural Ground — 2:1 — D — 2:1 — 1'/Ft. — Fill Slope — B
Min. D=1.5Ft.
Max. d=1.0Ft.
B=3.0Ft.
b=5.0Ft.
Type of Liner= PSRM
FROM -L- STA. 134+30 TO 134+80 LT

DETAIL 13C
TOE PROTECTION
(Not to Scale)
Natural Ground — 2:1 or Flatter Fill Slope — PSRM — d=1.0Ft.
Type of Liner= PSRM
FROM -L- STA. 135+48 TO 137+20 LT

DETAIL 13D
CONCRETE LINED DITCH BEHIND RETAINING WALL
FENCE — RETAINING WALL — 12" — 2:1 — 2' — 4" THICK CONCRETE DITCH
FROM -L- STA. 131+92 RT TO 136+25 RT

DETAIL 13E
PIPE OUTLET CHANNEL
(Not to Scale)
Natural Ground — EX. BANK — D — EX. BANK — Natural Ground — d= ?
CHANNEL BED (Variable)
Length=4 X PIPE DIAMETER.
D=PIPE DIAMETER
Est.=10 Tons of Class B Rip-Rap
-L- STA. 128+20 LT
-L- STA. 134+38 LT

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-3440	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 22 OF 23

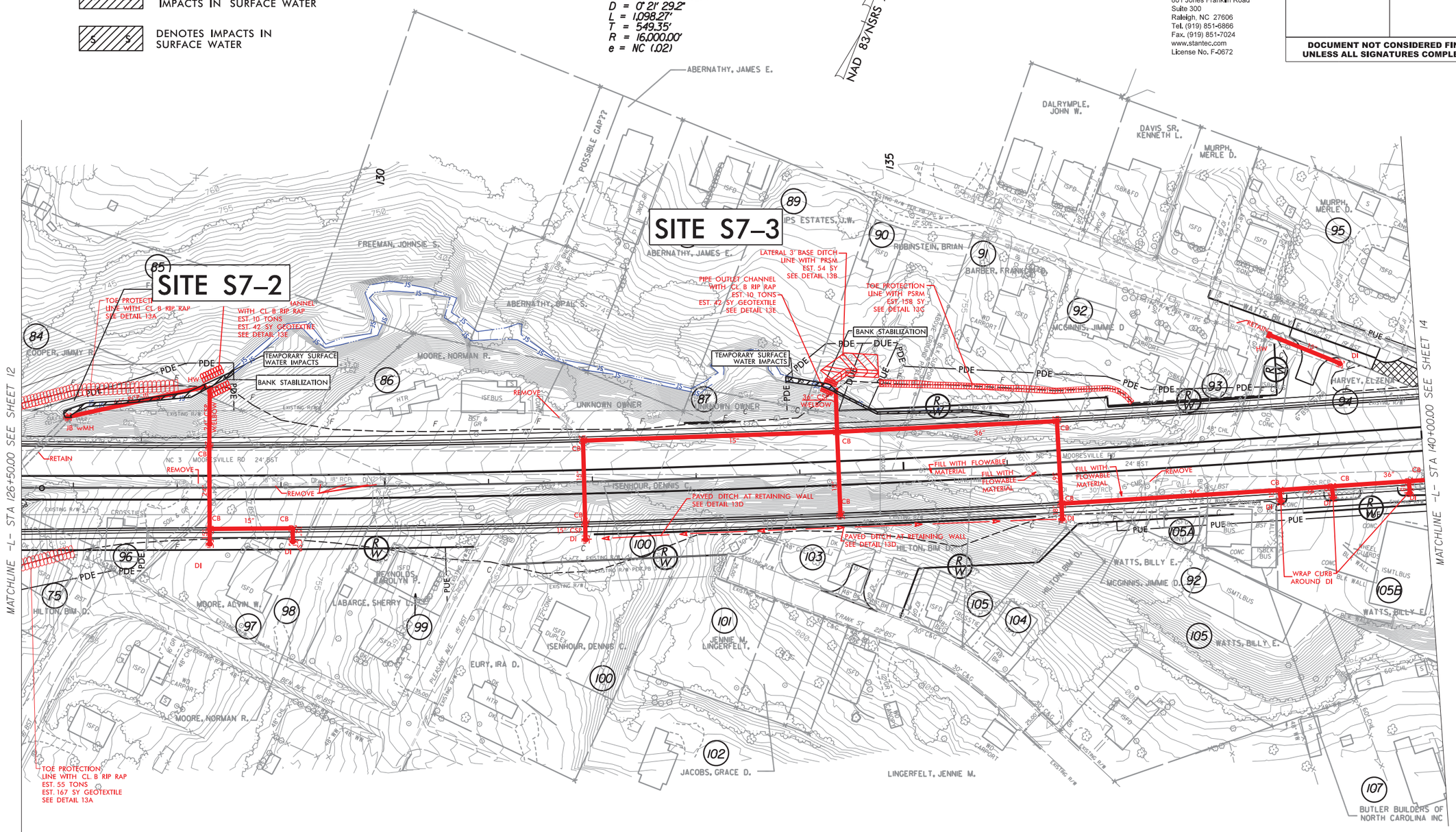
TS / TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S / S — DENOTES IMPACTS IN SURFACE WATER

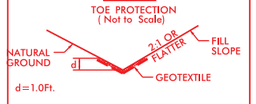
-L-
PI Sta 133+14.77
Δ = 3° 55' 58.4" (LT)
D = 0° 21' 29.2"
L = 1,098.27'
T = 549.35'
R = 16,000.00'
e = NC (.02)

NAD 83/NSRS 2007

50 25 0 50 100



DETAIL 13A
TOE PROTECTION
(Not to Scale)

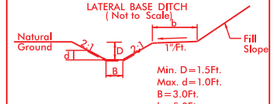


d=1.0Ft.

Type of Liner= CL. B Rip-Rap

FROM -L- STA 125+41 TO 127+00 RT
FROM -L- STA 126+40 TO 128+00 LT

DETAIL 13B
LATERAL BASE DITCH
(Not to Scale)

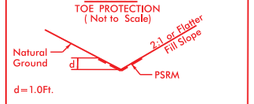


Min. D=1.5Ft.
Max. d=1.0Ft.
B=3.0Ft.
b=5.0Ft.

Type of Liner= PSRM

FROM -L- STA. 134+30 TO 134+80 LT

DETAIL 13C
TOE PROTECTION
(Not to Scale)

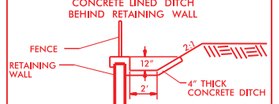


d=1.0Ft.

Type of Liner= PSRM

FROM -L- STA. 135+48 TO 137+20 LT

DETAIL 13D
CONCRETE LINED DITCH BEHIND RETAINING WALL



FROM -L- STA. 131+92 RT TO 136+25 RT

DETAIL 13E
PIPE OUTLET CHANNEL
(Not to Scale)

CHANNEL BED (Variable)
Length=4 X PIPE DIAMETER.
D=PIPE DIAMETER
Est.=10 Tons of Class B Rip-Rap

-L- STA. 128+20 LT
-L- STA. 134+38 LT

REVISIONS

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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)	Temp 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)
S1	L 37+00 TO 40+15 LT	ROAD FILL							0.02		300		
MB	L 40+61	10' X 9' RCBC							0.03	< 0.01	214	51	
IBC	L 68+25	BRIDGE								0.01		96	
IBC	L 68+55 LT	BANK STABILIZATION							< 0.01	0.02	13	47	
IBC	L 67+61 RT	BANK STABILIZATION							< 0.01	< 0.01	24	16	
WA	L 70+30 TO 72+56 LT	ROAD FILL	0.05										
S2	L72+70 TO 73+16 LT	ROAD FILL							0.02	< 0.01	109	22	
S3	L 86+12	42" WELDED STEEL							< 0.01		126	0	
S3	L 86+12 LT	BANK STABILIZATION							< 0.01	< 0.01	54	9	
S4	L 97+30	66" WELDED STEEL							0.01		181		
S4	L 96+43 LT	BANK STABILIZATION							< 0.01	< 0.01	47	18	
S4	L 97+92 RT	BANK STABILIZATION							< 0.01	< 0.01	12	9	
S5	L 109+75	36" WELDED STEEL							0.01		105		
S5	L 110+07 LT	BANK STABILIZATION							< 0.01	< 0.01	12	12	
S5	L 109+46 RT	BANK STABILIZATION							< 0.01	< 0.01	12	6	
S6	L 117+50	2-8' X 10' RCBC							0.08		246		
S6	L115+79 LT	BANK STABILIZATION							< 0.01	< 0.01	15	17	
S6	L119+23 RT	STREAM REALIGNMENT							0.01	< 0.01	72	10	
S7-1	Y15 12+25	48" RCP							< 0.01	< 0.01	24	31	
S7-1	Y15 12+25	BANK STABILIZATION							< 0.01	< 0.01	12	8	
S7-2	L 126+30	66" RCP							0.03		265		
S7-2	L 125+15 RT	BANK STABILIZATION							< 0.01		20		
S7-2	L 128+55 LT	BANK STABILIZATION							< 0.01	< 0.01	22	10	
S7-3	L 134+38	ROAD FILL							< 0.01		170		
S7-3	L 134+38	BANK STABILIZATION							< 0.01	< 0.01	12	36	
TOTALS*:			0.05						0.25	0.06	2067	399	

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
U-3440 05/13/2016
CABARRUS COUNTY
WBS - 39010.1.1 (U-3440)

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