



North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

Project/TIP No.: U-2579B

County(ies): Forsyth

Page 1 of 5

General Project Information

Project No.:	U-2579B	Project Type:	Date:	6/27/2013
NCDOT Contact:	Stephen R. Morgan, PE	Contractor / Designer:	W. Henry Wells, Jr., PE	
Address:	NCDOT Hydraulics Unit	Address:	Sungate Design Group	
	1590 Mail Service Center		915 Jones Franklin Road	
	Raleigh, NC 27699		Raleigh, NC 27606	
Phone:	919-707-6739	Phone:	919-859-2243 x202	
Email:	smorgan@ncdot.gov	Email:	hwells@sungatedesign.com	
City/Town:	Winston-Salem	County(ies):	Forsyth	
River Basin(s):	Yadkin-Pee Dee	CAMA County?	No	
Primary Receiving Water:	See Environmental Summary Sheet	NCDWQ Stream Index No.:		
NCDWQ Surface Water Classification for Primary Receiving Water	Primary:			
	Supplemental:			
Other Stream Classification:				
303(d) Impairments:				
Buffer Rules in Effect				

Project Description

Project Length (lin. Miles or feet):	4.06 miles	Surrounding Land Use:	Rural, Farmland, Suburban Neighborhoods
	Proposed Project	Existing Site	
Project Built-Up Area (ac.)	ac.	ac.	
Typical Cross Section Description:	In each direction there will be 3 12-foot lanes plus 1 12-foot future lane plus a 12-foot paved shoulder with a 22-foot grassed median.		
Average Daily Traffic (veh/hr/day):	Design/Future: ADT for 2030 is 79880	Existing: ADT for 2010 is 53560	
General Project Narrative:	Winston-Salem Northern Beltway (Eastern Section)(Future I-74) from US158 to I-40 Bus?US421: Grassed Swales were used throughout the Project to treat the stormwater. These Grassed Swales have side slopes that are 3:1 or flatter, with many side slopes being 6:1, have a velocity during the 2-Year Storm of less than 2 feet per second and have a minimum ditch length equivalent to 100 feet per acre of impervious area. In addition to the Grassed Swales, Preformed Scour Holes and Energy Dissipators are used at several locations.		

References



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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
5	28+00-Y1-	Wetland		Lowery Mill Creek			WS-III		Fill		
5	16+00-Y1RPD-	Stream		Lowery Mill Creek			WS-III		Culvert		
5	21+56-Y1- 25+22-Y1-	Stream		Lowery Mill Creek			WS-III		Culvert		
6	501+51 -L- 503+21-L-	Stream		Lowery Mill Creek			WS-III		Culvert		
6	503+85-L- 509+64-L-	Stream		Lowery Mill Creek			WS-III		Culvert		
7	523+00-L-	Stream		Martin Mill Creek			WS-III		Culvert		
8	527+00-L-	Open Water		Martin Mill Creek			WS-III		Fill		
10	559+75-L-	Stream		Martin Mill Creek			WS-III		Culvert		
10	560+75-L-	Wetland		Martin Mill Creek			WS-III		Fill		
10	560+50-L- 572+75-L-	Stream		Martin Mill Creek			WS-III		Culvert		
15	615+00-L-	Stream		Kerners Mill Creek			WS-III		Culvert		
15	19+76-Y4RPBD- 21+44 -Y4RPBD-	Stream		Kerners Mill Creek			WS-III		Fill		
15	20+00-Y4RPBD- 21+40-Y4RPBD-	Wetland		Kerners Mill Creek			WS-III		Fill		
15	629+95-L- 635+90-L-	Stream		Smith Creek			WS-III		Fill		
15	636+32-L- 641+55-L-	Open Water		Smith Creek			WS-III		Fill		
15	644+00-L- 645+00-L-	Stream		Smith Creek			WS-III		Culvert		
15	643+56-L- 644+61-L-	Open Water		Smith Creek			WS-III		Culvert		

* 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

References



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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
17	663+65-L- 667+00-L-	Stream		Fishers Branch			WS-III		Fill		
17	667+15-L-	Stream		Fishers Branch			WS-III		Culvert		
17	668+50-L-	Wetland		Fishers Branch			WS-III		Fill		
19	687+80-L- 691+59-L-	Open Water		Fishers Branch			WS-III		Fill		
20	22+50-Y1-	Wetland		Lowery Mill Creek			WS-III		Fill		
25	40+50-Y4-	Wetland		Smith Creek			WS-III		Fill		
26	45+65-Y4-	Stream		Smith Creek			WS-III		Culvert		
27	80+50-Y4RPBD- 81+51-Y4RPBD-	Wetland		Smith Creek			WS-III		Fill		
27	37+31-Y4RPA-	Stream		Smith Creek			WS-III		Culvert		
28	29+16-Y4RPC- 31+12-Y4RPC-	Open Water		Smith Creek			WS-III		Fill		
28	107+34-Y4-	Stream		Smith Creek			WS-III		Culvert		
30	138+50-Y4-	Wetland		Kerners Mill Creek			WS-III		Fill		
30	145+62-Y4-	Wetland		Kerners Mill Creek			WS-III		Clearing		

* List all stream and surface water impact locations regardless of jurisdiction or size.

Equalizer Pipes to be noted as a minimization of impacts.

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Description of Minimization of Impacts or Mitigation

References



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Preformed Scour Holes and Energy Dissipators

Sheet No.	Station	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)
5	476+50-L-	Riprap Energy Dissipator Basin	Class I	31.80	Pipe	42	63.0	3.8
5	28+10-Y1-	Riprap Apron / Pad	Class 'B'	0.22	Pipe	15	1.2	2.4
5	42+50-Y1-	PFSH	Class 'B'	1.26	Pipe	15	6.8	3.4
10	556+50-L-	Riprap Energy Dissipator Basin	Class I	34.70	Pipe	42	47.0	3.4
10	558+30-L-	PFSH	Class 'B'	2.59	Pipe	18	12.0	3.8
15	16+50-Y4RPBD-	PFSH	Class 'B'	0.48	Pipe	15	2.5	2.3
15	19+50-Y4RPBD-	PFSH	Class 'B'	0.60	Pipe	15	3.1	2.5
15	24+00-Y4RPBD-	PFSH	Class 'B'	0.36	Pipe	15	1.9	2.0
15	28+06-Y4RPBD-	PFSH	Class 'B'	0.21	Pipe	15	1.1	1.6
18	688+50-L-	PFSH	Class 'B'	0.39	Pipe	15	2.0	2.1
19	687+90-L-	PFSH	Class 'B'	1.35	Pipe	15	6.5	3.4
20	19+23-Y1-	PFSH	Class 'B'	0.95	Pipe	15	5.0	3.0
21	50+99-Y1	Riprap Apron / Pad	Class 'B'	3.10	Pipe	18	10.6	3.7
21	52+65-Y1-	Riprap Apron / Pad	Class 'B'	1.36	Pipe	15	4.5	2.8
25	39+00-Y4-	Riprap Apron / Pad	Class 'B'	0.62	Pipe	15	2.3	2.2
25	43+00-Y4-	PFSH	Class 'B'	0.91	Pipe	15	4.1	2.8
26	46+00-Y4-	PFSH	Class 'B'	0.88	Pipe	15	4.1	2.8
26	50+35-Y4-	Riprap Apron / Pad	Class 'B'	0.54	Pipe	18	2.1	2.1
27	57+57-Y4-	Riprap Apron / Pad	Class 'B'	0.41	Pipe	18	1.6	1.9
27	60+90-Y4-	Riprap Apron / Pad	Class 'B'	0.30	Pipe	18	1.2	1.7

☐ YES

☐ NO

Have minimum design criteria, as presented in the NCDOT Best Management Practices Toolbox (2008), NCDOT Standard Details, or FHWA HEC-14 (July 2006), been met and verified, as applicable? If No, provide further explanation of why design criteria was not met.

Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), NCDOT Standard Details, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.



(Version 1.2; Released July 2012)

Page 5 of 5

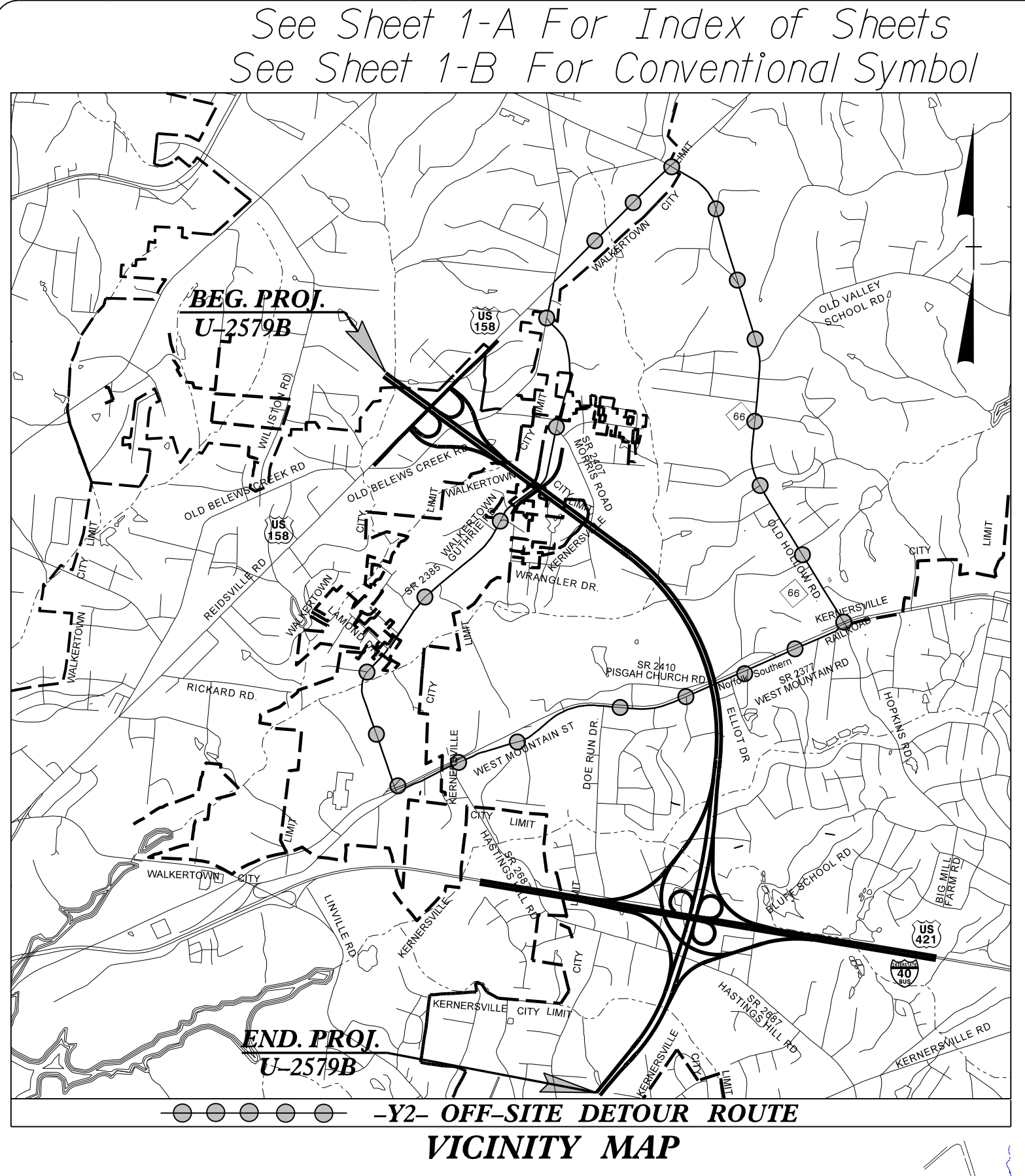
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* Refer to the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), NCDOT Standard Details, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

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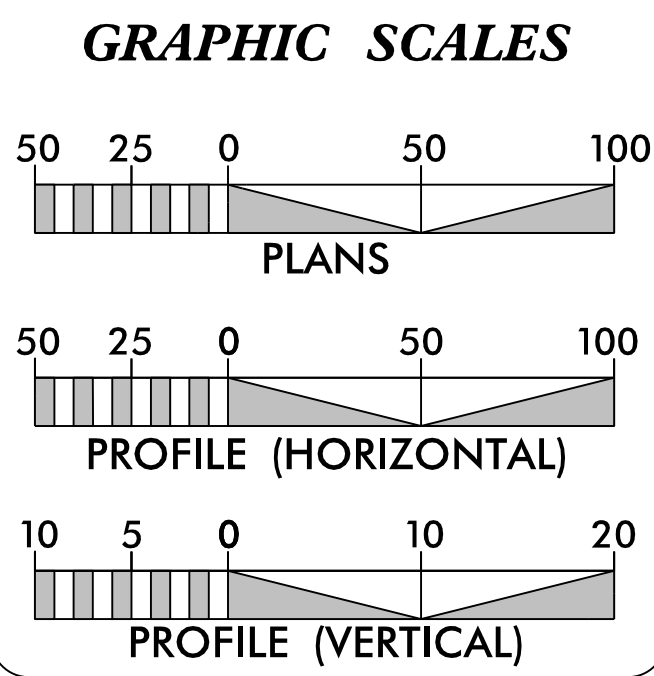
TIP PROJECT: U-2579B



BEG. PROJ. U-2579B
-L- STA 478+00.00

WETLAND AND SURFACE WATER IMPACTS PERMIT

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES
OF WALKERTOWN AND KERNERSVILLE
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III



DESIGN DATA	
ADT 2010	= 53,560
ADT 2030	= 79,880
DHV	= 10 %
D	= 60 %
T	= 18 % *
V	= 70 MPH
* TTST	12 %
DUAL	6 %
FUNC CLASS	= INTERSTATE

PROJECT LENGTH	
LENGTH OF ROADWAY PROJECT U-2579B	= 3.86 Miles.
LENGTH OF STRUCTURE PROJECT U-2579B	= 0.19 Miles.
TOTAL LENGTH OF PROJECT U-2579B	= 4.06 Miles.

Prepared in the Office of: DIVISION OF HIGHWAYS 1000 Birch Ridge Dr., Raleigh NC, 27610	
2006 STANDARD SPECIFICATIONS	
RIGHT OF WAY DATE: JUNE 19, 2012	TONY HOUSER, PE PROJECT ENGINEER
LETTING DATE: OCTOBER 21, 2014	LEE ANN MOORE PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER	
SIGNATURE:	
ROADWAY DESIGN ENGINEER	
SIGNATURE:	

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA	
STATE HIGHWAY DESIGN ENGINEER	

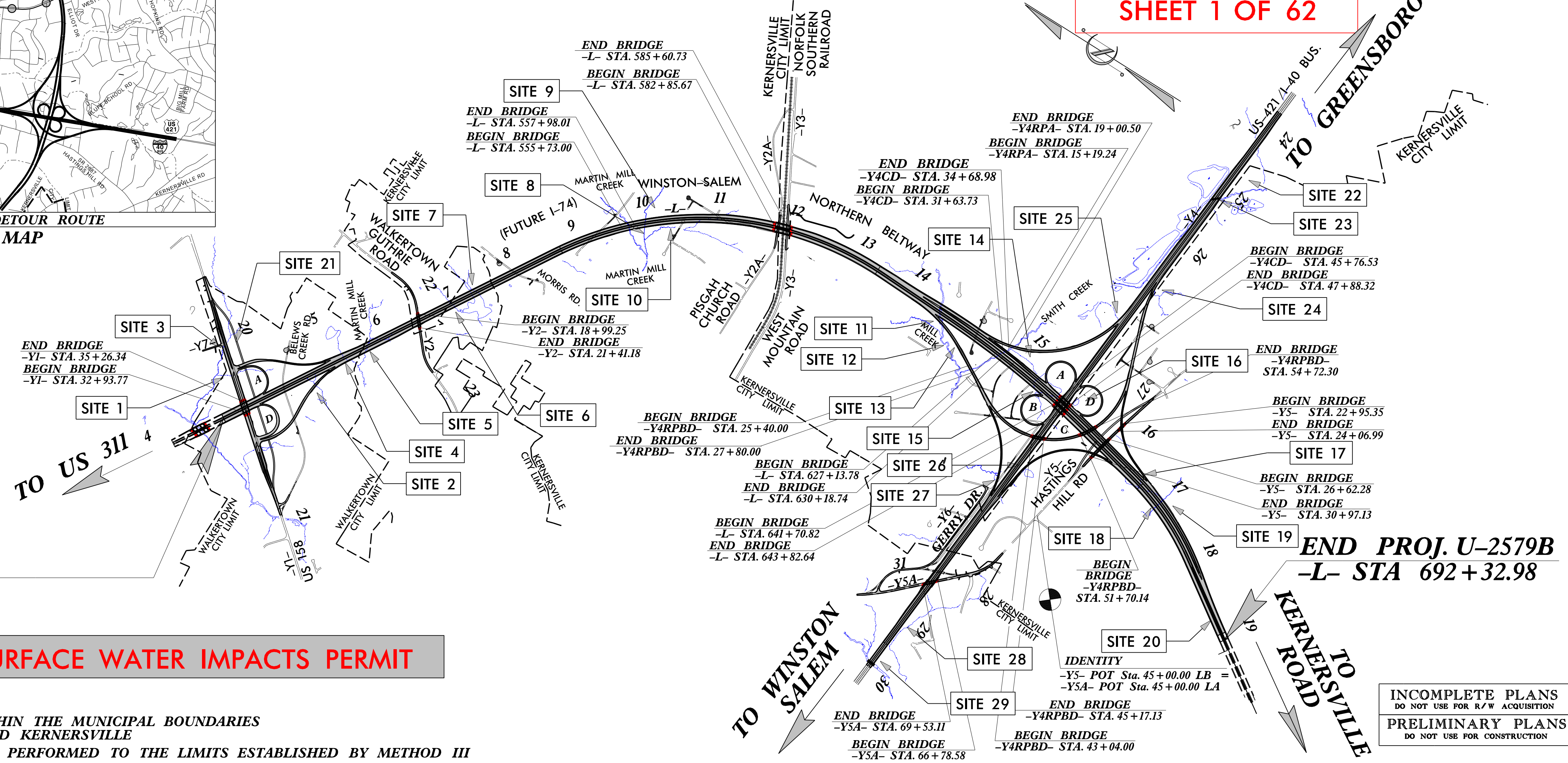
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
FORSYTH COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2579B	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34839.1.1	N/A	PE	
34839.2.10	FSTR HPPNHF-0918(46)	R\W	
34839.2.5		R\W UTIL	

LOCATION: WINSTON SALEM NORTHERN BELTWAY (EASTERN SECTION)
(FUTURE I-74) FROM US 158 TO I-40 BUS/US 421

TYPE OF WORK: WIDENING, GRADING, PAVING, DRAINAGE, SIGNING, SIGNALS,
CULVERTS AND STRUCTURES.

PERMIT DRAWING
SHEET 1 OF 62



END PROJ. U-2579B
-L- STA 692+32.98

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

~~DENOTES MECHANIZED
CLEARING~~

DENOTES FILL IN WETLAND

PERMIT DRAWING
SHEET 2 OF 62

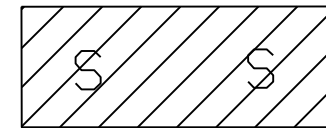
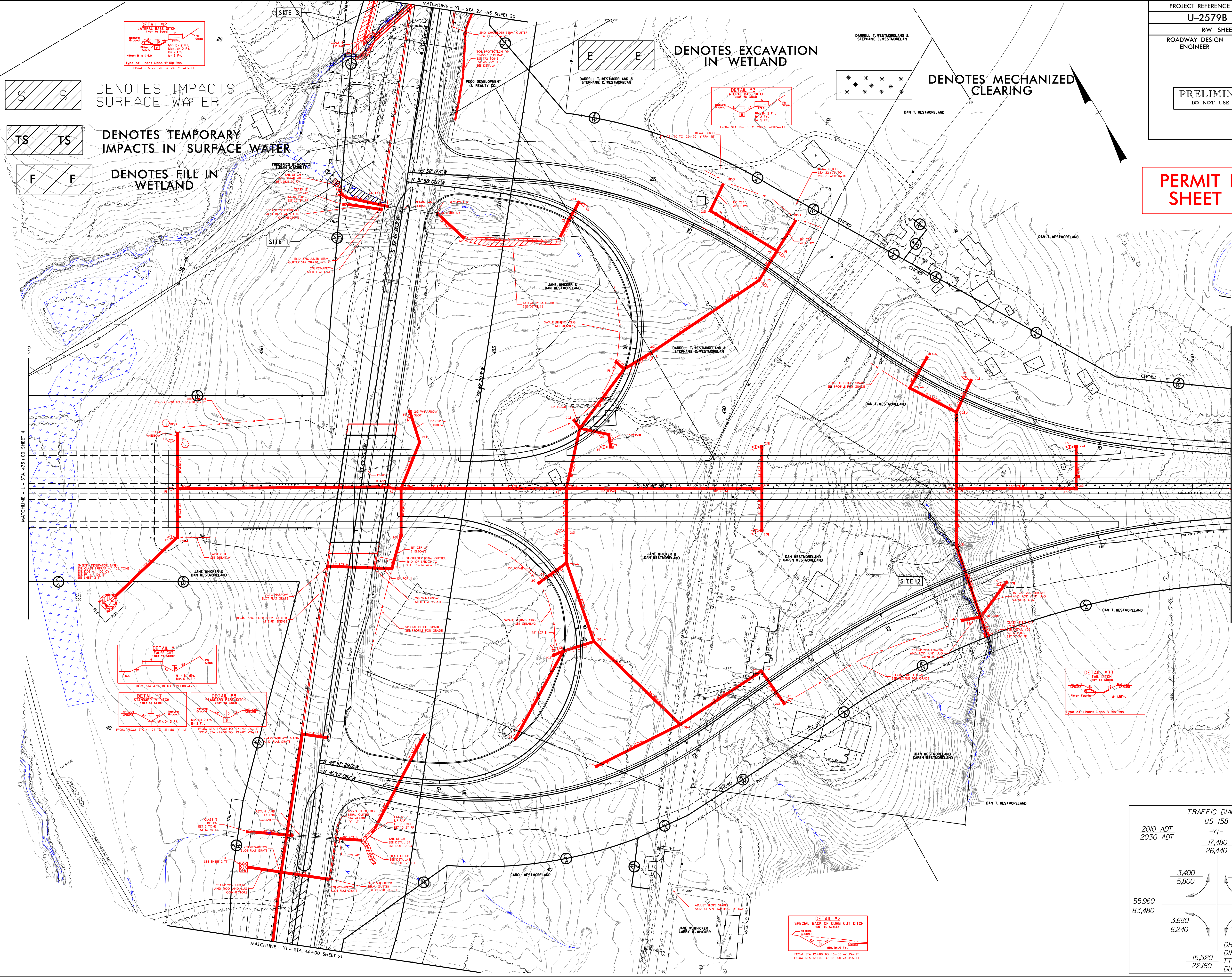
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DIR = 60%
TST = 5%
QUAL = 3%

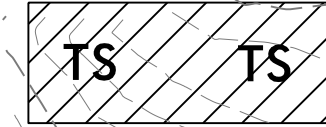
8/17/99

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REVISIONS



DENOTES IMPACTS IN
SURFACE WATER



DENOTES TEMPORARY
IMPACTS IN SURFACE WATER



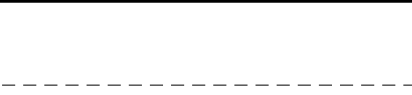
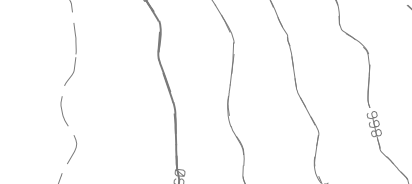
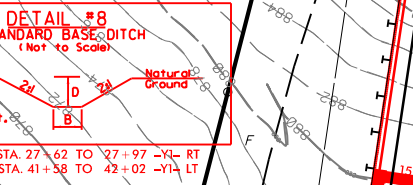
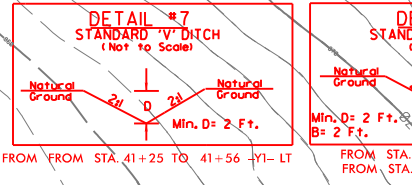
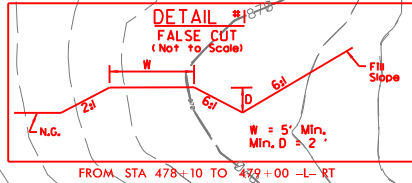
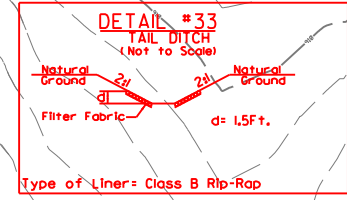
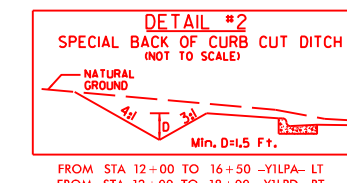
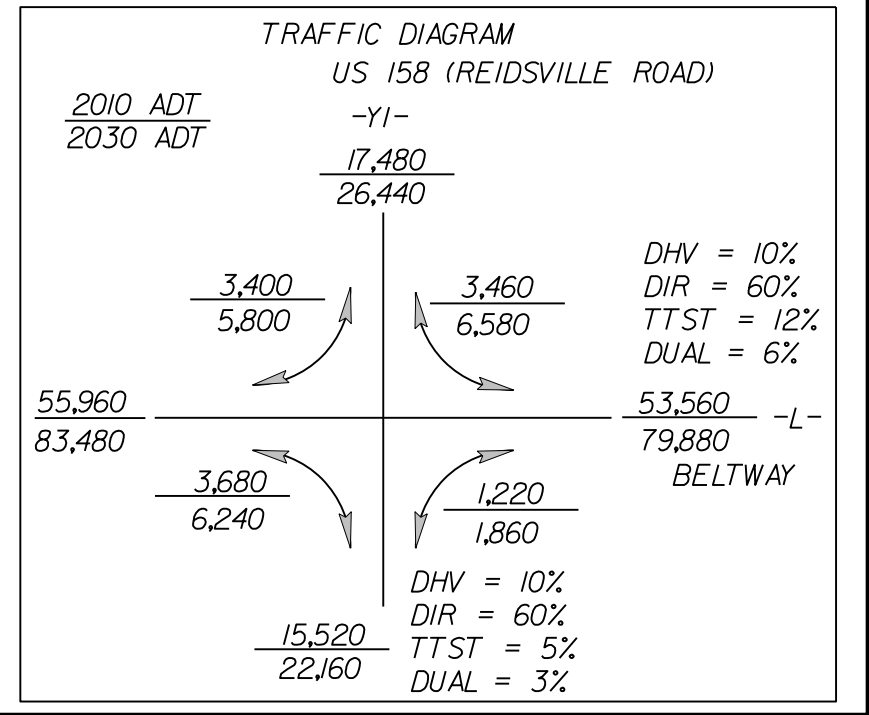
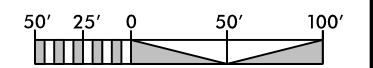
DENOTES FILL IN
WETLAND

DENOTES EXCAVATION
IN WETLAND

DENOTES MECHANIZED
CLEARING

PERMIT DRAWING
SHEET 3 OF 62

PROJECT REFERENCE NO.		SHEET NO.	
U-2579B		5	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			



PERMIT DRAWING
SHEET 5 OF 62

IMPACTS IN SURFACE WATER

SITE 2

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;TMORELAND
;STMORELAND

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DAN T. WESTIN

DENOTES IMPACTS IN
SURFACE WATER

DENOTES TEMPORARY
IMPACTS IN SURFACE WATER

TEMP IMPACTS IN SURFACE WATER

CLASS 'B' RIP RAP
(BANKS ONLY)
- SEE DETAIL #33
EST 5 TONS
EST 16 SY FF

**15" CSP W/2 ELBOWS
AND ROD AND LUG
CONNECTORS**

SPECIAL DITCH GRADE
SEE PROFILE FOR GRADE

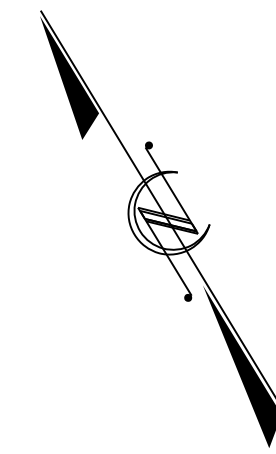
PLANS

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REVISIONS

DENOTES IMPACTS IN
SURFACE WATER

DENOTES TEMPORARY
IMPACTS IN SURFACE WATER



IMPACTS IN SURFACE WATER

TEMP IMPACTS IN SURFACE WATER

CLASS 'I'
RIP RAP

~~END SHOULDER BERM GUTTER~~
~~STA 24+00 -Y1- LT~~

TOE PROTECTION W/
CLASS "B" RIPRAP
— EST 172 TONS
EST 463 SY FF
SEE DETAIL#

PEGG DEVELOPMENT
& REALTY CO. /

DARRELL
STEPHA

FREDERICO B. MORETZ
SUSAN K. MORETZ

TAIL DITCH
SEE DETAIL #8
EST DDE 20 CV

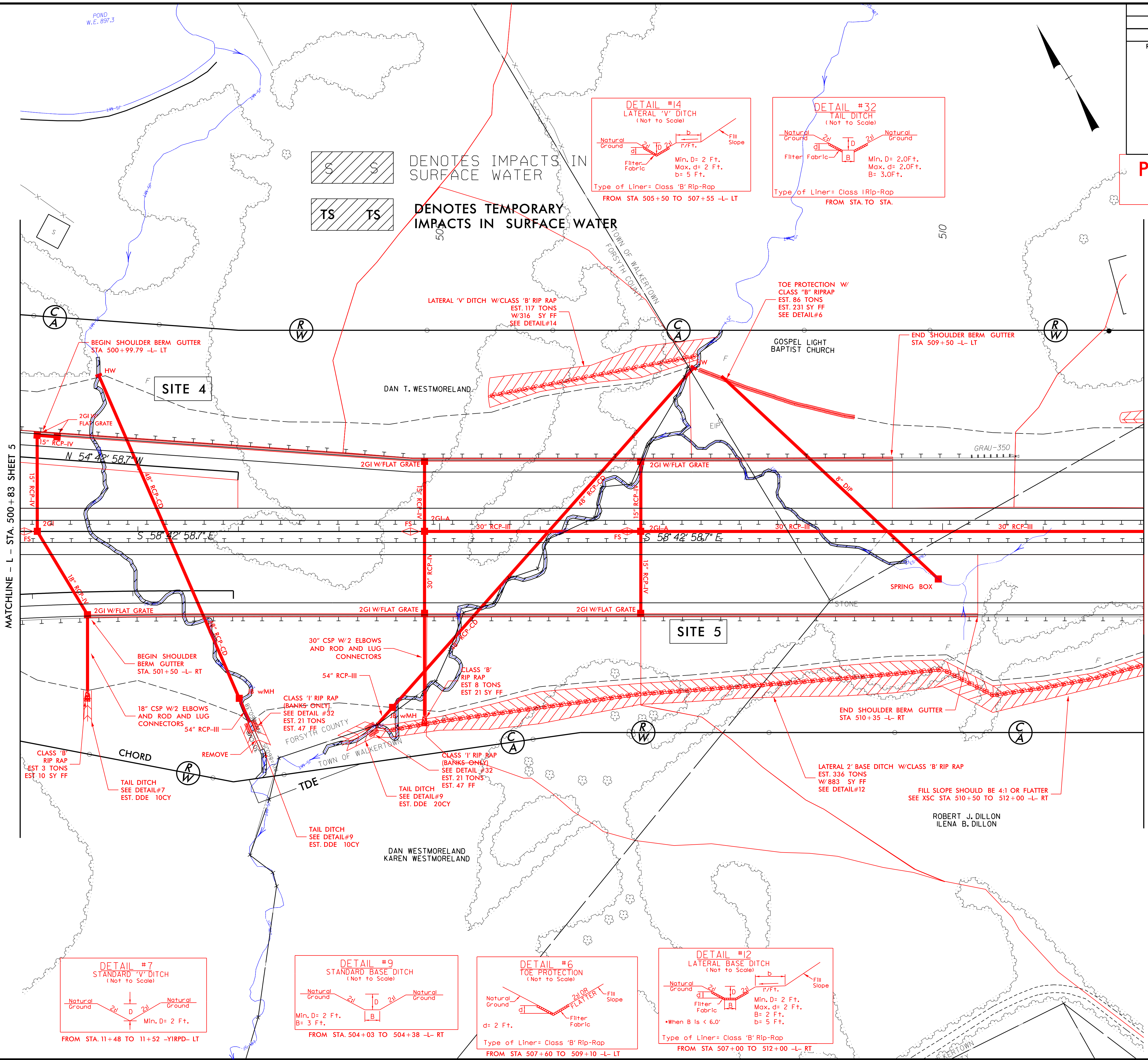
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N 51° 52' 00" ...

REVISIONS
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REVISIONS



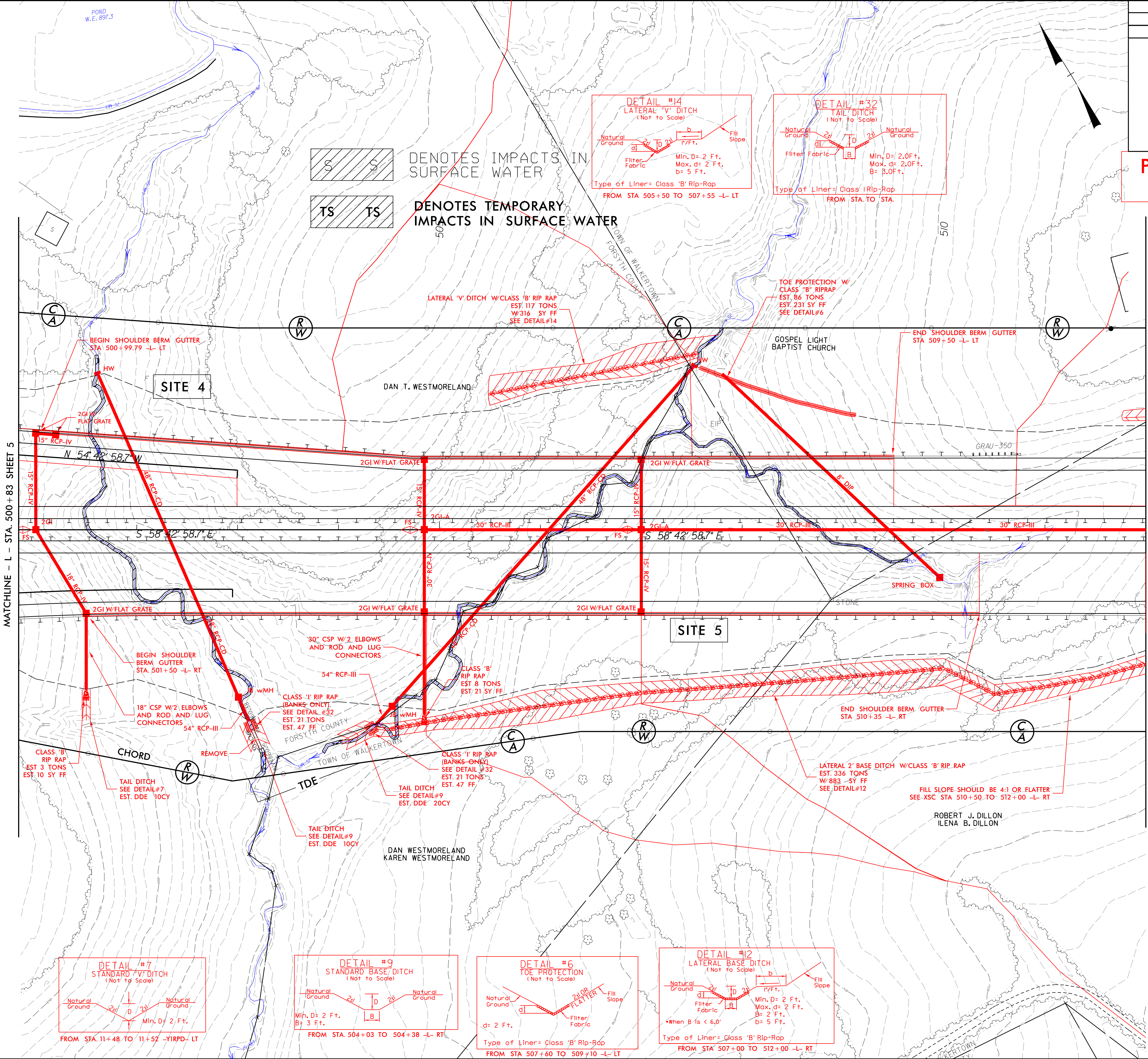
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ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

PERMIT DRAWING
SHEET 7 OF 62

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REVISIONS



PROJECT REFERENCE NO.		SHEET NO.	
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ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

PERMIT DRAWING
SHEET 8 OF 62

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MATCHLINE - L - STA. 512 + 00 SHEET 7

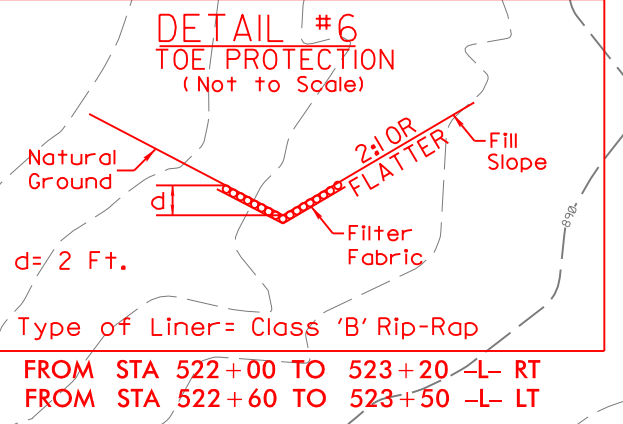
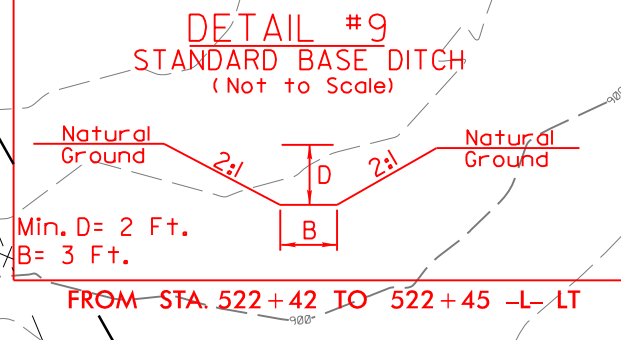
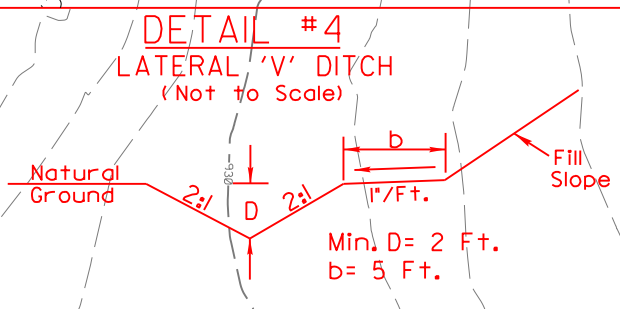
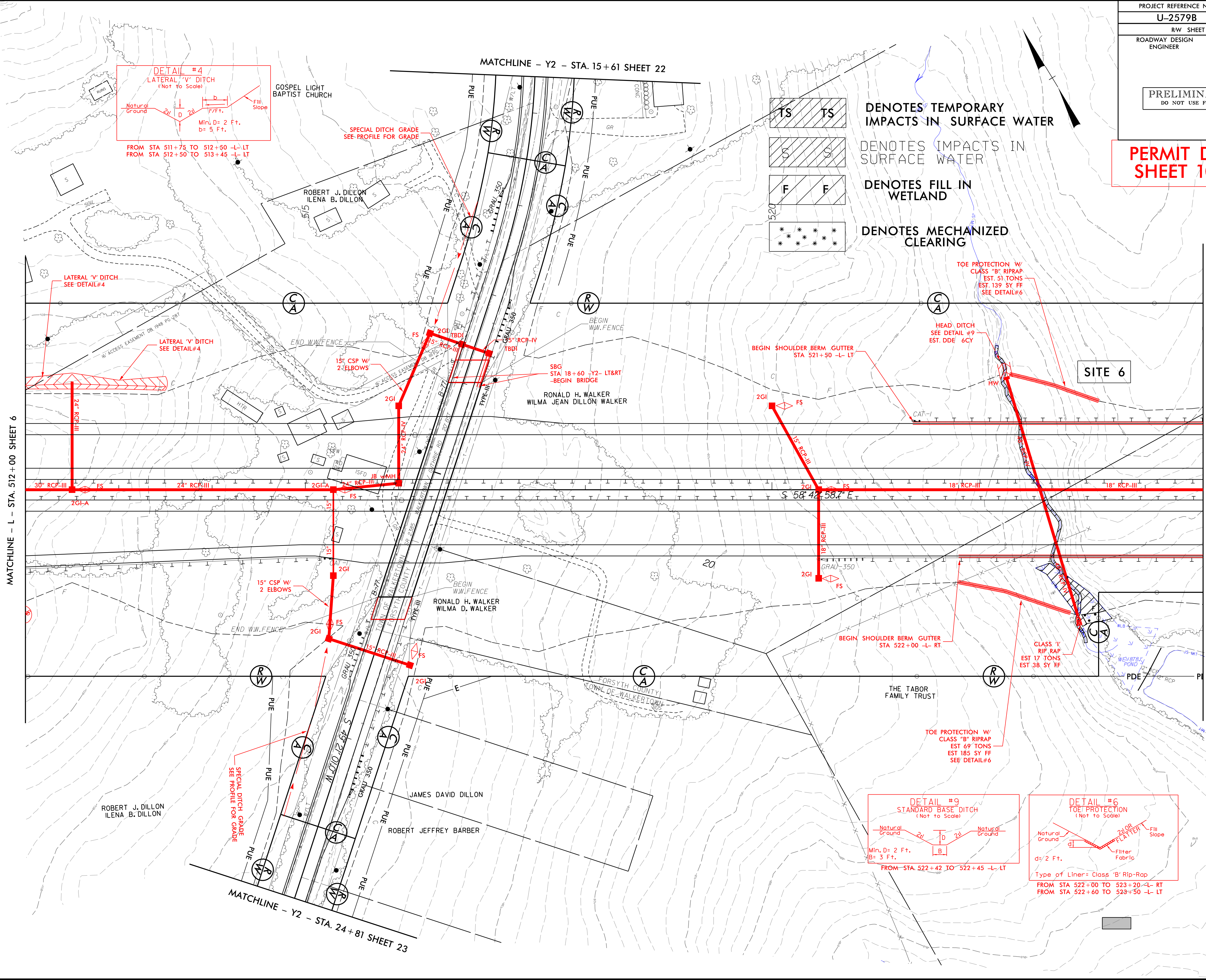


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U-2579B	7
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PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PERMIT DRAWING
SHEET 10 OF 62

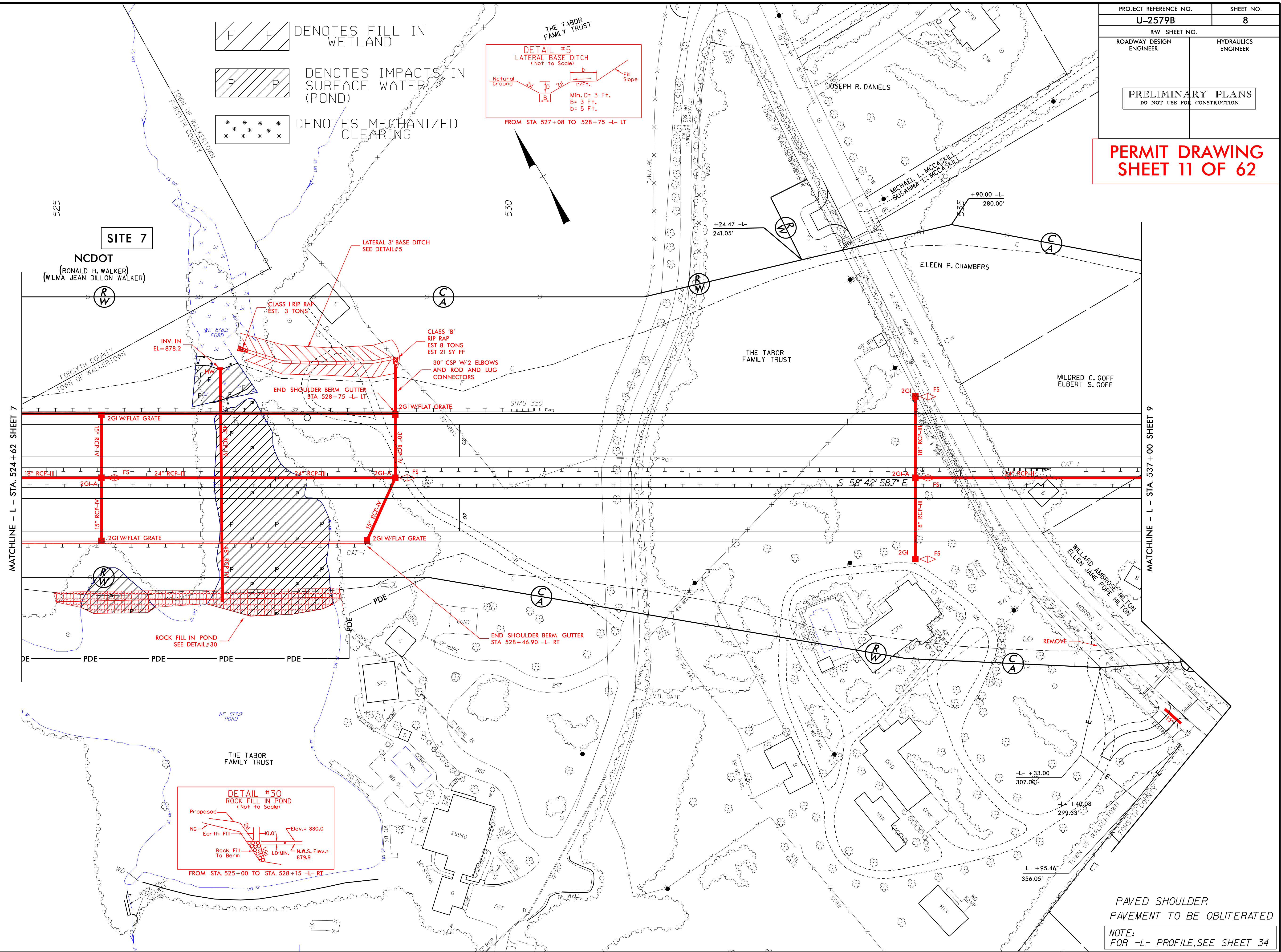
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- S S DENOTES IMPACTS IN SURFACE WATER
- F F DENOTES FILL IN WETLAND
- * * * * * DENOTES MECHANIZED CLEARING



REVISIONS

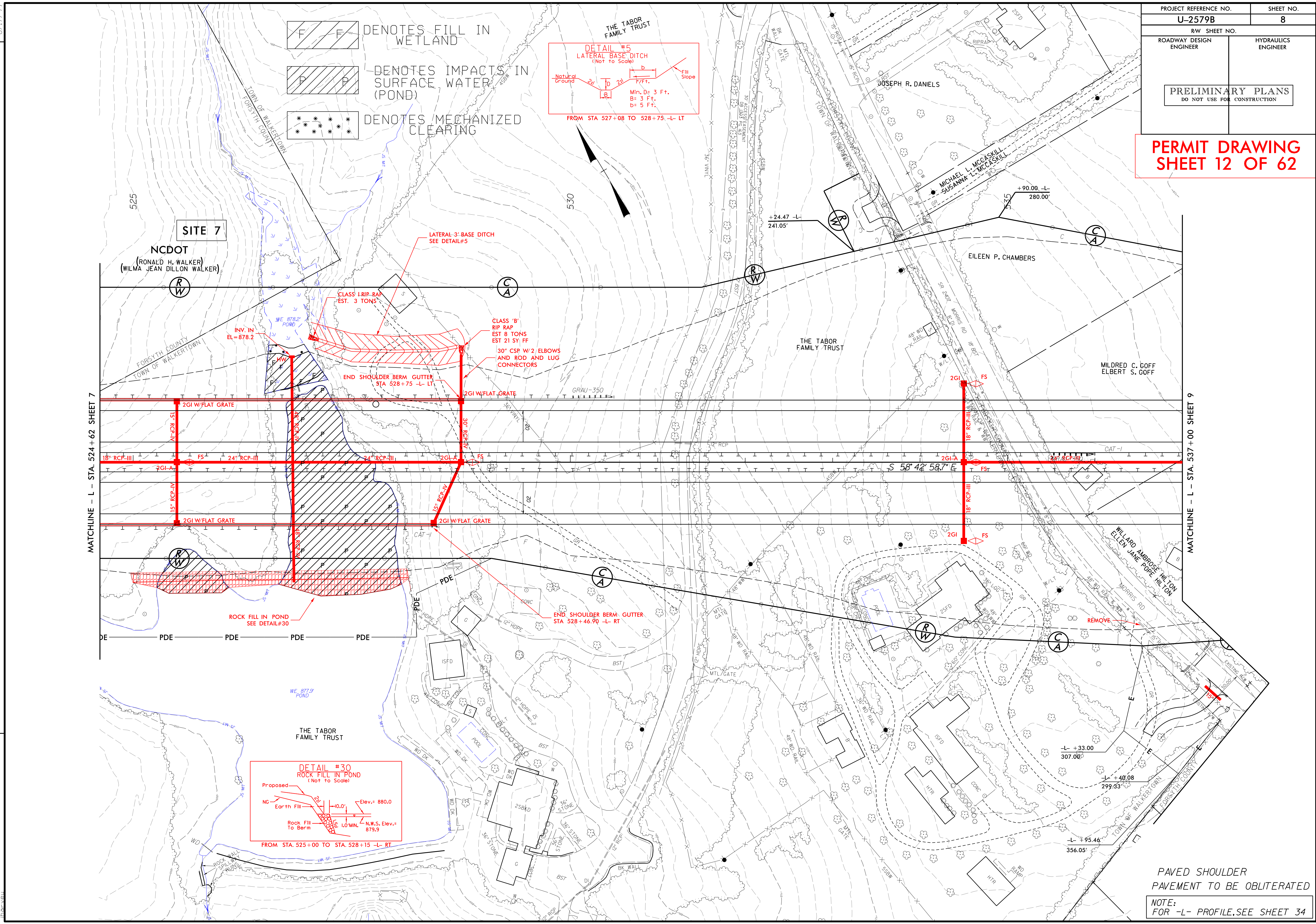
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PERMIT DRAWING
SHEET 11 OF 62



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REVISIONS

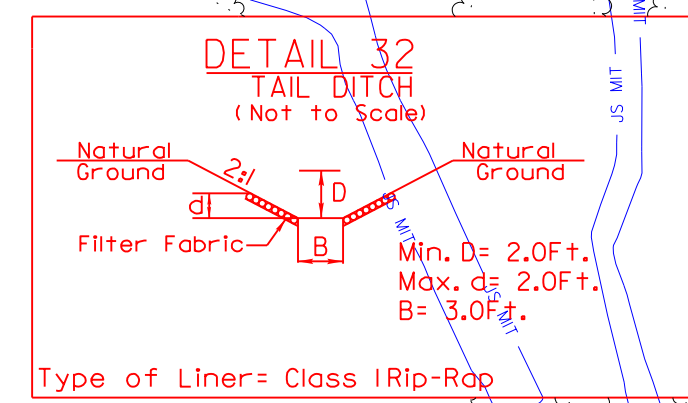
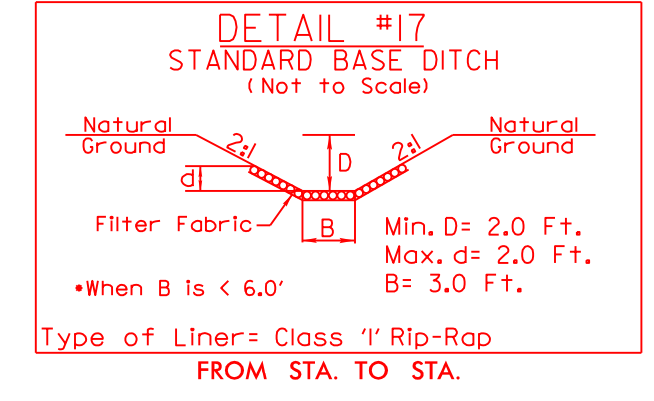
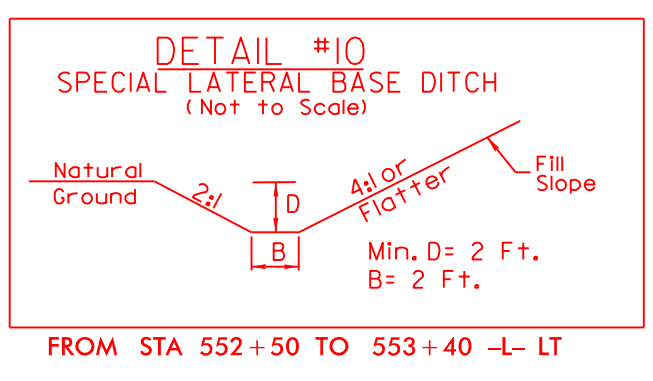
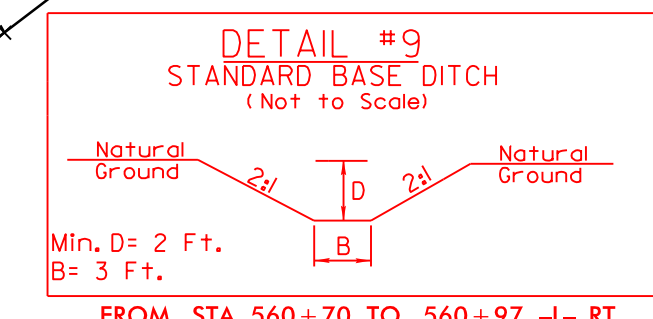
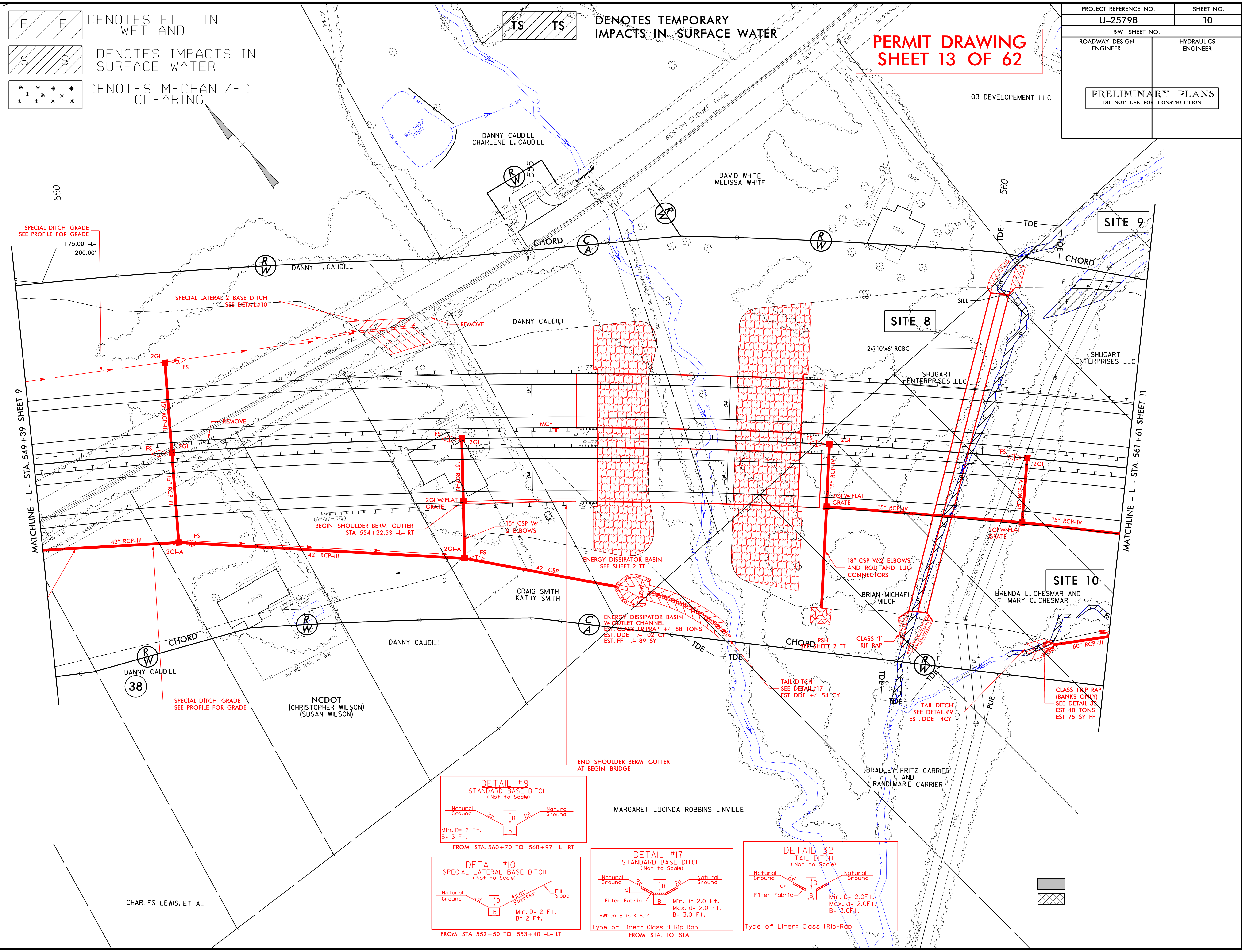


PROJECT REFERENCE NO.		SHEET NO.	
U-2579B		8	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
PERMIT DRAWING SHEET 12 OF 62			

PAVED SHOULDER
PAVEMENT TO BE OBLITERATED
NOTE:
FOR -L- PROFILE, SEE SHEET 34

8/17/99
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Plans 20130214\U2579B Hydraulics\PERMITS\Drawings\U2579b_hyd.prm_wet.psh10.dgn
Forsyth PDW
7/2/2013
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REVISIONS



PERMIT DRAWING
SHEET 13 OF 62

PROJECT REFERENCE NO.		SHEET NO.	
U-2579B		10	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

F F DENOTES FILL IN WETLAND

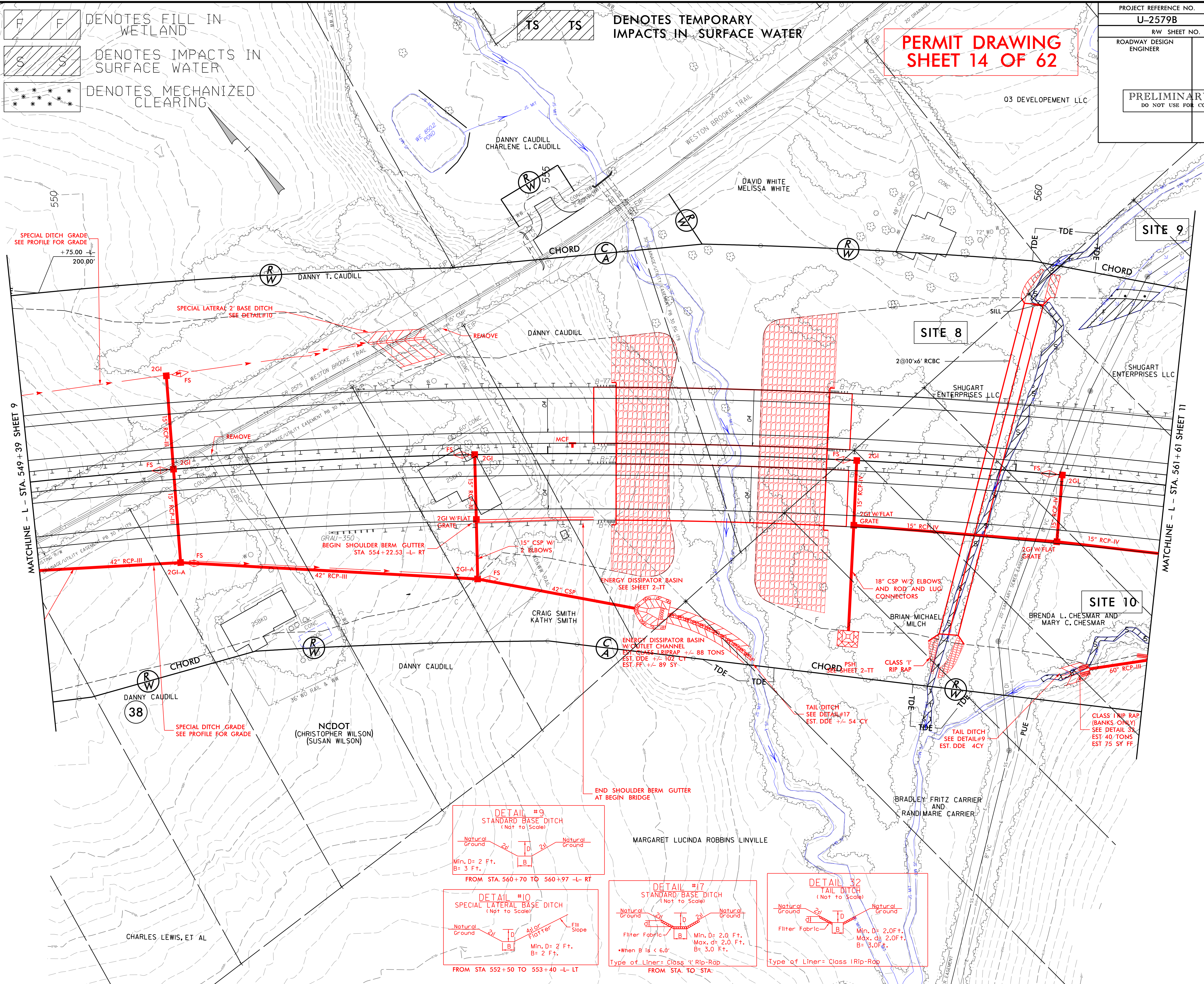
S S DENOTES IMPACTS IN SURFACE WATER

***** DENOTES MECHANIZED CLEARING

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PERMIT DRAWING SHEET 14 OF 62

03 DEVELOPMENT



REVISIONS

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