



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

June 14, 2019

N.C. Department of Environmental Quality
Division of Water Resources
1617 Mail Service Center
Raleigh, NC 27699

ATTN: Ms. Amy Chapman
Transportation Permitting Branch Supervisor

Dear Madam:

Subject: **Response to NCDWR On Hold Letter dated May 9, 2019** for the extension and relocation of NC 84 from NC 16 to SR 1008 (Waxhaw-Indian Trail Road) in Union County. Federal Aid Project No. STP-1316(10), WBS 39019.1.1, Division 10, TIP No. U-3467.

Reference: 404/401 Individual Permit Application dated February 21, 2019
NCDWR On Hold Letter dated May 9, 2019

On May 9, 2019, NCDWR sent a letter placing the permit application for the above-referenced project on hold, requesting an additional review of the stormwater detention and treatment measures and requesting increases in size where possible to address public concerns on the project, especially swales, ditches, and measures for the existing roadway.

NCDOT investigated several areas where there was potential room to accommodate additional grass swales, and these areas are described below and shown in the attached drainage plans. After coordination and discussion with additional NCDOT staff, it was determined that these locations were not feasible due to project constraints and/or would not offer any appreciable measure of improved stormwater treatment. In addition, the right of way and extensive utility impacts additional treatment would require make these options impractical for this project. The current design meets the design requirements for the watershed/river basin.

Additional areas that were investigated are identified below and shown in the attached drawings:

- Plan sheet 4: This swale would have to extend a significant distance downhill to get the appropriate depth and would extend well beyond the proposed ROW.
- Plan sheet 14, north and south side: This area has steep slopes leading down to Culvert Branch. The proposed ditch from -L- Sta. 159+85 to Sta. 161+46 Rt. has a 3.6% slope and a high velocity. Installing a swale on either side of the road in this location would require an extensive cut to flatten out the ditch to meet swale criteria. Additionally, the swales would extend past ROW.
- Plan sheet 15, north and south side: This area has sidewalk curb and gutter. The roadway drainage will be picked up by the proposed storm drain system. A grass swale would not provide any treatment of the roadway drainage in this area.
- Plan sheet 16, north and south side: This area has sidewalk and curb and gutter. The NC 84 roadway drainage will be picked up by the proposed storm drain system. The majority of the roadway drainage from SR 1574 would not be picked up by the proposed swale. These swales would also potentially extend past the proposed construction easement.
- Plan sheet 18/19: The currently proposed cut ditch has a steep slope (2.5% to 3.1%). To meet swale criteria, there is a potential for major impacts to the currently proposed ROW.

We believe our additional investigative efforts have satisfied the request for stormwater review and the project can be removed from On Hold status and the processing of our application can proceed.

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Erin Cheely at ekcheely@ncdot.gov or (919) 707-6108.

Sincerely,

Carla Dagnino

for Philip S. Harris III, P.E., C.P.M.
Environmental Analysis Unit Head

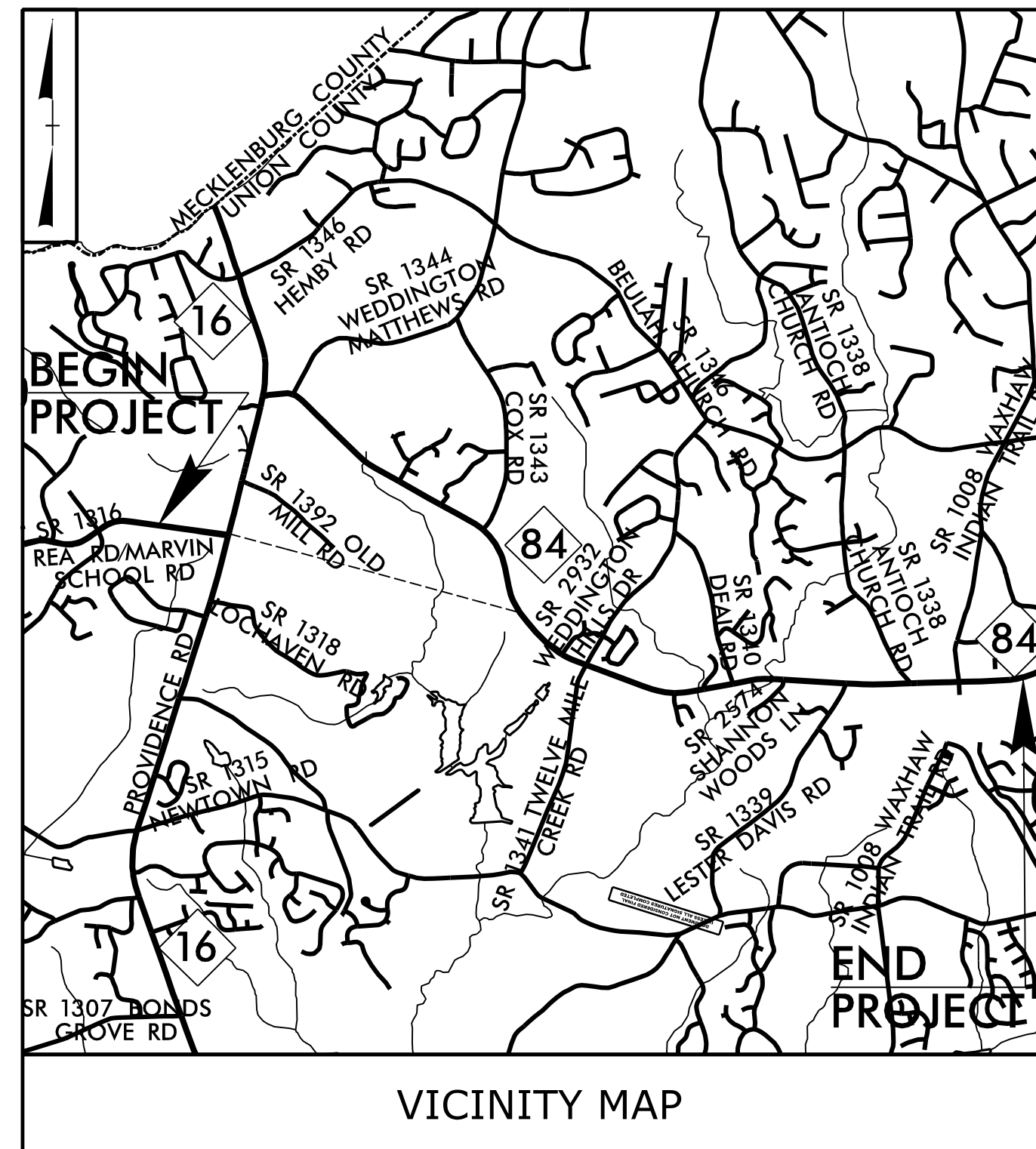
cc:

NCDOT Permit Application Standard Distribution List

TIP PROJECT: U-3467

CONTRACT:

See Sheet 1A For Index of Sheets



STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

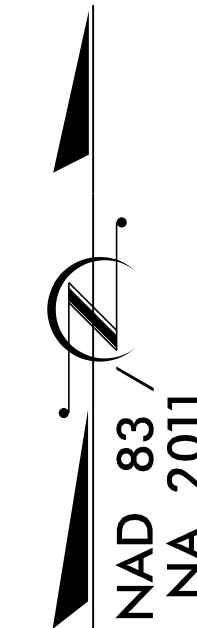
UNION COUNTY

**LOCATION: SR 1316 (REA ROAD EXTENSION)
FROM NC 16 TO SR 1008**

(WAXHAW-INDIAN TRAIL ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURES, & SIGNALS

DRAINAGE REDLINES
CALYX – 4-22-2019
PM – D. BOCKER
DE – A. THOMPSON

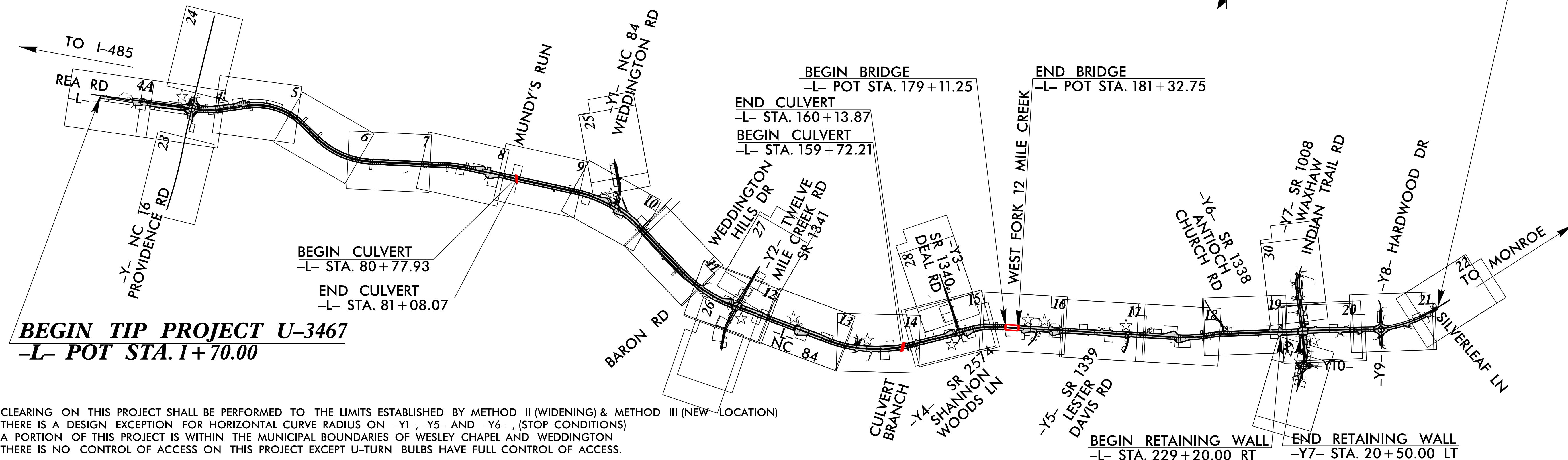


STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3467	1	
STATE PROJ.NO.	F.A. PROJ.NO.	DESCRIPTION	
39019.1.1	STP-1316(10)	P.E.	
39019.2.1	STP-1316(10)	R/W, UTL.	

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

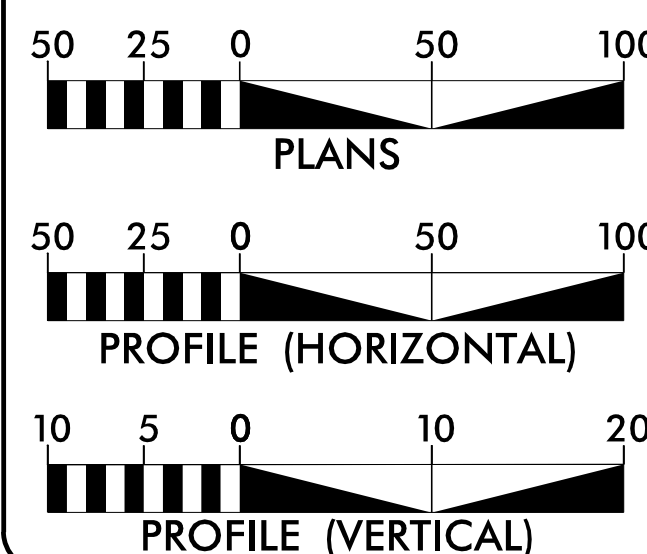
 UPGRADE EXISTING SIGNAL
 NEW SIGNAL

END TIP PROJECT U-3467
-L- POT STA. 258 + 50.00



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II (WIDENING) & METHOD III (NEW LOCATION). THERE IS A DESIGN EXCEPTION FOR HORIZONTAL CURVE RADIUS ON -Y1-, -Y5- AND -Y6-, (STOP CONDITIONS). A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF WESLEY CHAPEL AND WEDDINGTON. THERE IS NO CONTROL OF ACCESS ON THIS PROJECT EXCEPT U-TURN BULBS HAVE FULL CONTROL OF ACCESS.

GRAPHIC SCALES



DESIGN DATA

ADT 2019 = 23,608
 ADT 2039 = 32,648
 DHV = 10 %
 D = 60 %
 T = 4 % *
 V = 50 MPH
 * TTST =1% DUAL 3%
 FUNC CLASS=
 URBAN MINOR ARTERIAL
 REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-3467	=	4.822 MILES
LENGTH STRUCTURES TIP PROJECT U-3467	=	0.042 MILES
TOTAL LENGTH TIP PROJECT U-3467	=	<u>4.863 MILES</u>

Prepared in the Office of:

 **CALYX**
ENGINEERS + CONSULTANTS

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

MAY 31, 2018

LETTING DATE:
SEPTEMBER 17, 2019

NCDOT CONTACT:

JOHNNY BANKS
CALYX E & C
PROJECT MANAGER

STEPHEN C. BROWDE, PE
CALYX E & C
 PROJECT DESIGN ENGINEER

BY: BRYAN KEY, PE
CENTRAL PROJECT MANAGER IN TECHNICAL SERVICES

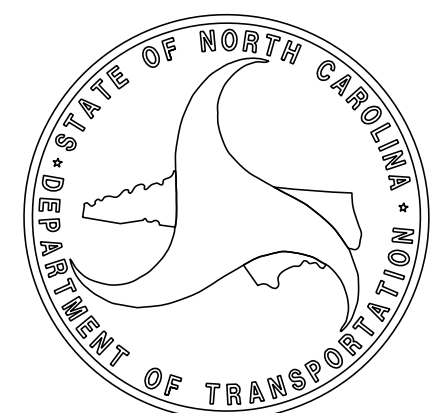
HYDRAULICS ENGINEER

SIGNATURE: _____ *P.E.*

**ROADWAY DESIGN
ENGINEER**

P.E.

SIGNATURE:



PROJECT REFERENCE NO.	SHEET NO.
U-3467	4A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

[illegible]

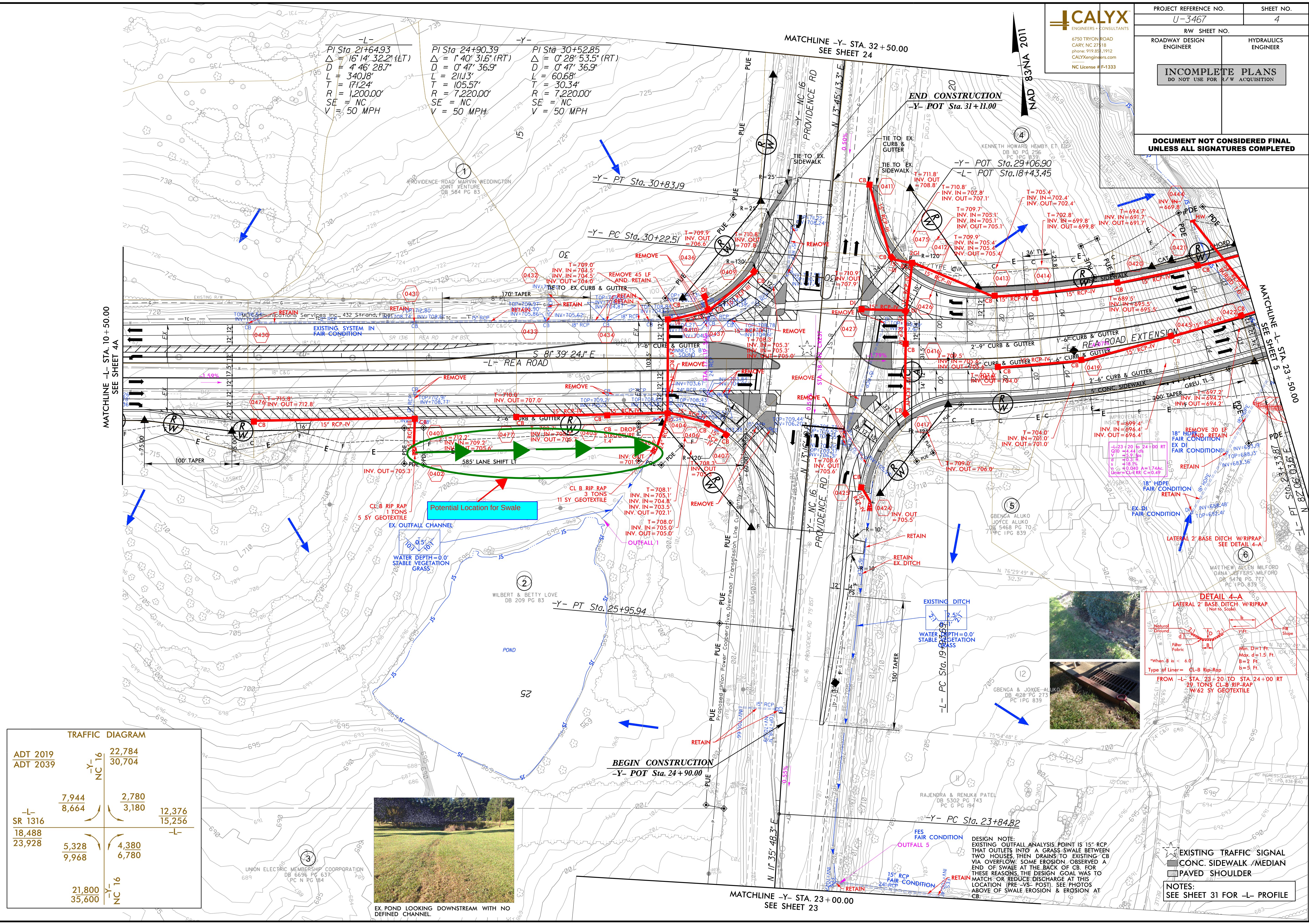
■ CONC. SIDEWALK /MEDIAN
 ■ PAVED SHOULDER

NOTES:
 SEE SHEET 31 FOR -L- PROFILE

DESIGN REVISION - 3/11/2019 - NC 16 INTERSECTION DESIGN REVISED IN COORDINATION WITH U-5769.

4/22/2019
R:\Drainage\U3467-Hyd-psh-04A_RedLines.dgn
bucker

8/17/99
DESIGN REVISION - 3/11/2019 - NC 16 INTERSECTION DESIGN REVISED IN COORDINATION WITH U-5769.
4/22/2019
R:\Tranage\U3467_Hyd_psh_04_Redlines.dgn
D:\Cadd\U3467_Hyd_psh_04_Redlines.dgn

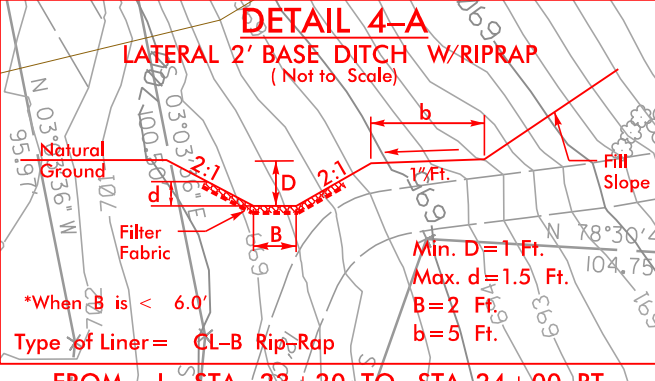


ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO. U-3467		SHEET NO. 4	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	

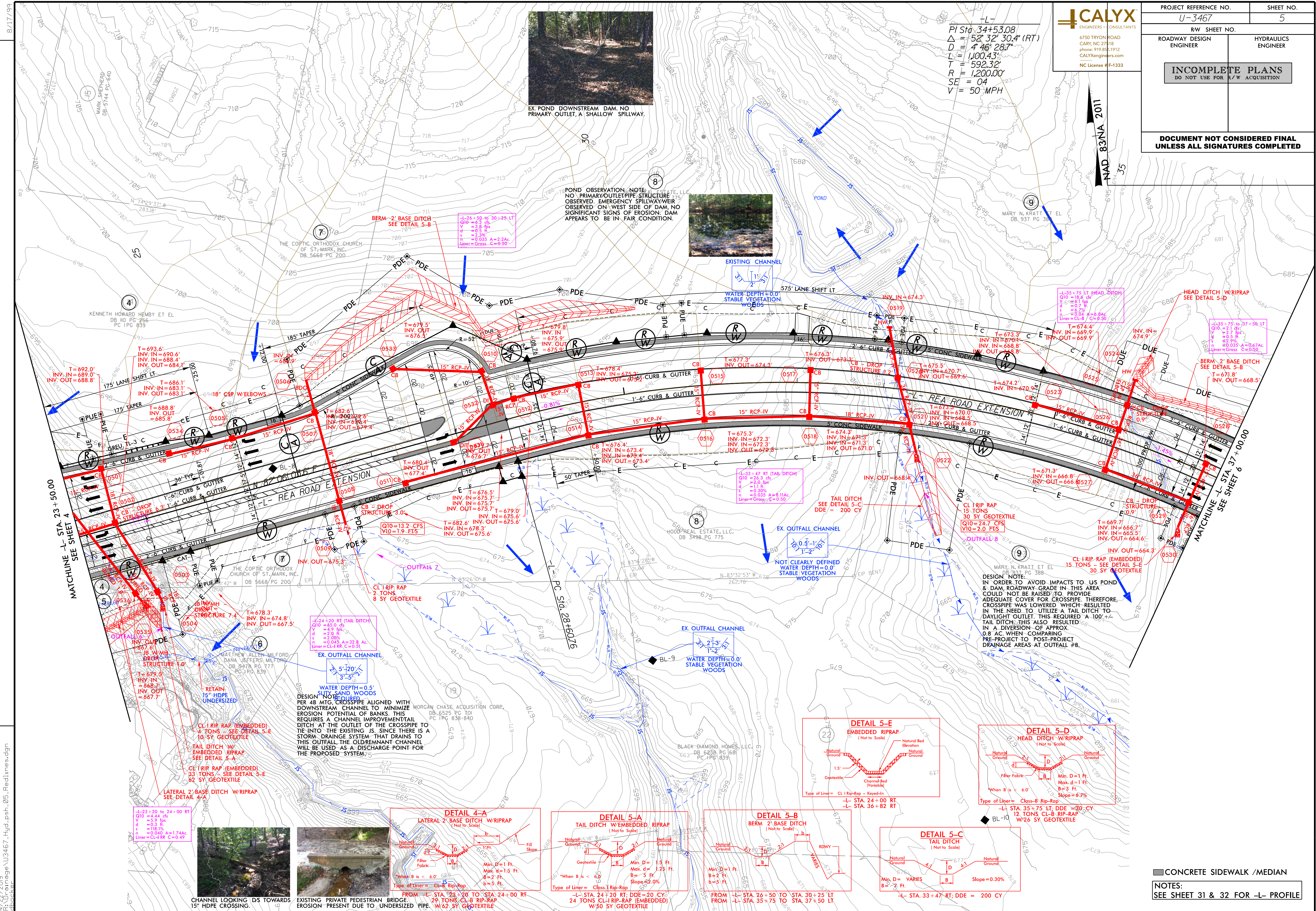
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN REVISION - 3/11/2019 - NC 16 INTERSECTION DESIGN REVISED IN COORDINATION WITH U-5769.

REVISIONS



PI Sta 34+53.08
 $\Delta = 52' 32" 30.4" (RT)$
 $D = 4' 46" 28.7"$
 $L = 1,000.43'$
 $T = 592.32'$
 $R = 1,200.00'$
 $SE = 04'$
 $V = 50' MPH$

EX. POND DOWNSTREAM DAM. NO PRIMARY OUTLET, A SHALLOW SPILLWAY.

POND OBSERVATION NOTE:
NO PRIMARY OUTLET PIPE STRUCTURE OBSERVED. EMERGENCY SPILLWAY/WEIR OBSERVED ON WEST SIDE OF DAM. NO SIGNIFICANT SIGNS OF EROSION. DAM APPEARS TO BE IN FAIR CONDITION.

EXISTING CHANNEL

WATER DEPTH=0.0'
STABLE VEGETATION

575' LANE SHIFT LT

L-35+75 LT (HEAD DITCH)
 $Q_{10} = 18.6$ cfs
 $d = 4.5$ ft
 $s = 0.035$
 $n = 0.035$
 $A = 2.3$ ac
 $Liner = CL-B$
 $C = 9.30$

HEAD DITCH W/ RIPRAP
SEE DETAIL 5-D

L-35+75 LT (HEAD DITCH)
 $Q_{10} = 18.6$ cfs
 $d = 4.5$ ft
 $s = 0.035$
 $n = 0.035$
 $A = 2.3$ ac
 $Liner = CL-B$
 $C = 9.30$

BERM 2' BASE DITCH
SEE DETAIL 5-B

L-35+75 LT (HEAD DITCH)
 $Q_{10} = 18.6$ cfs
 $d = 4.5$ ft
 $s = 0.035$
 $n = 0.035$
 $A = 2.3$ ac
 $Liner = CL-B$
 $C = 9.30$

CL-1 RIP RAP
15 TONS
30 SY GEOTEXTILE
 $Q_{10} = 24.7$ CFS
 $V_{10} = 2.0$ FTS

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

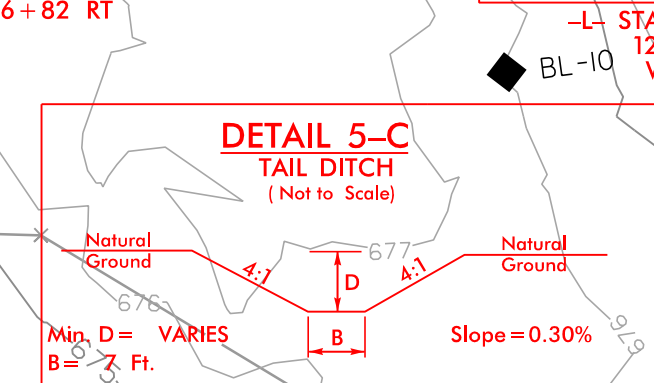
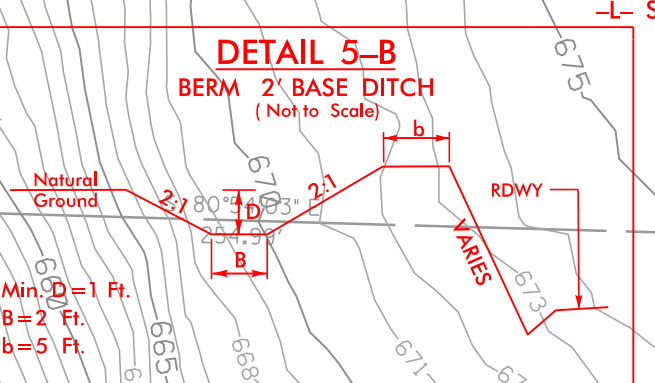
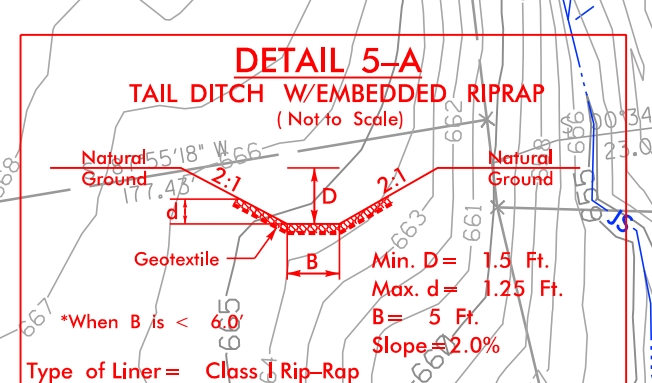
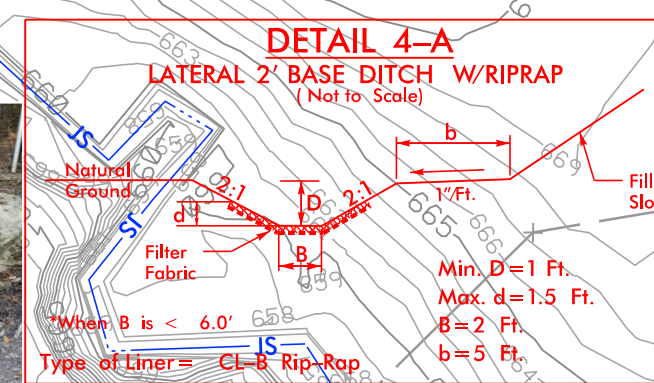
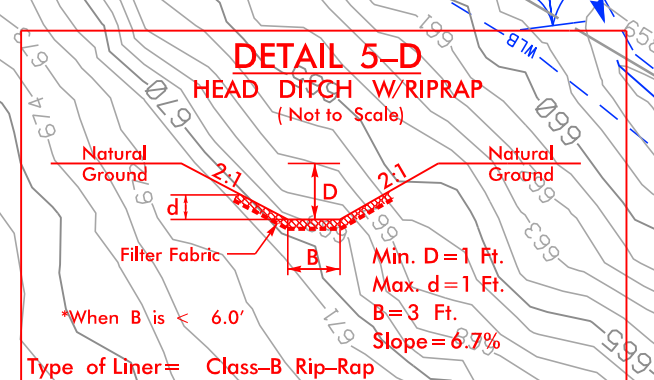
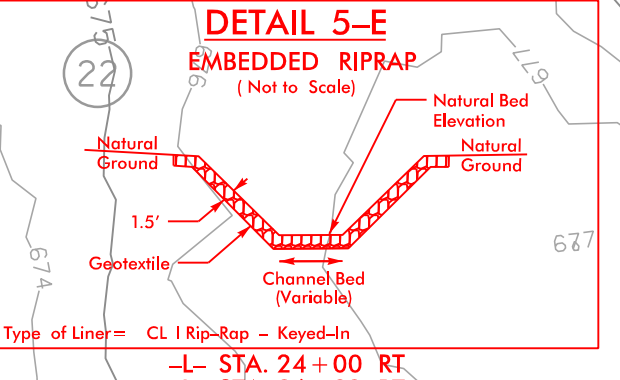
CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

CL-1 RIP RAP (EMBEDDED)
15 TONS - SEE DETAIL 5-E
30 SY GEOTEXTILE

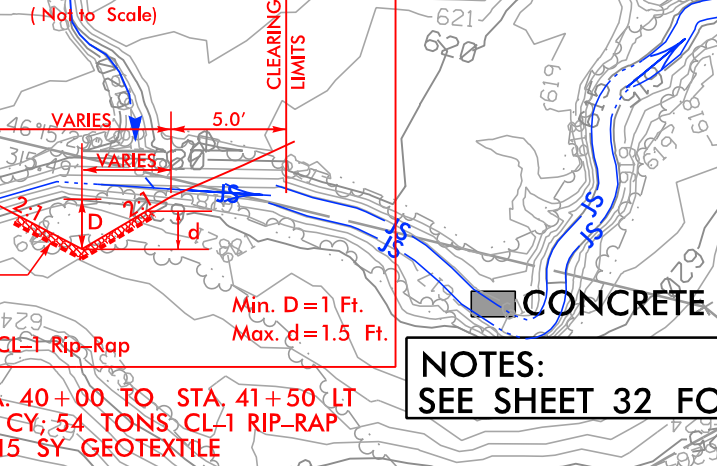
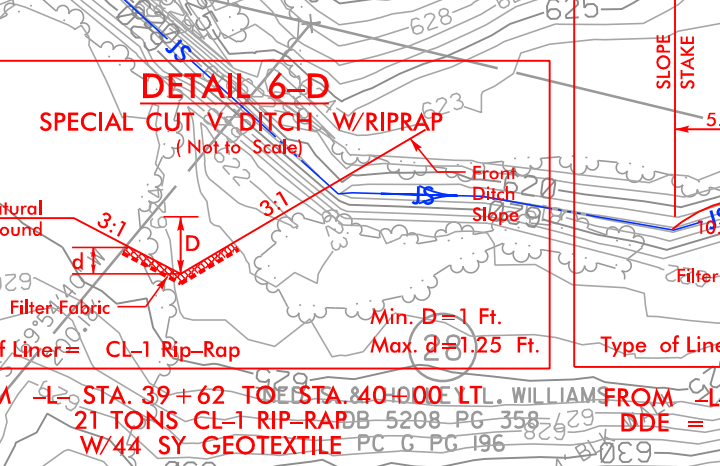
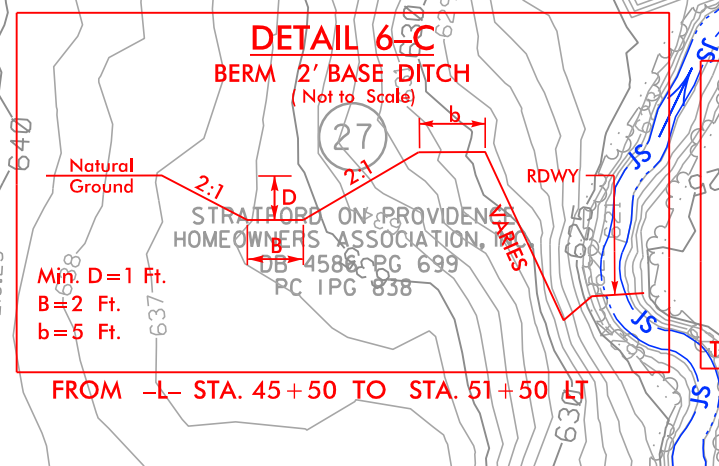
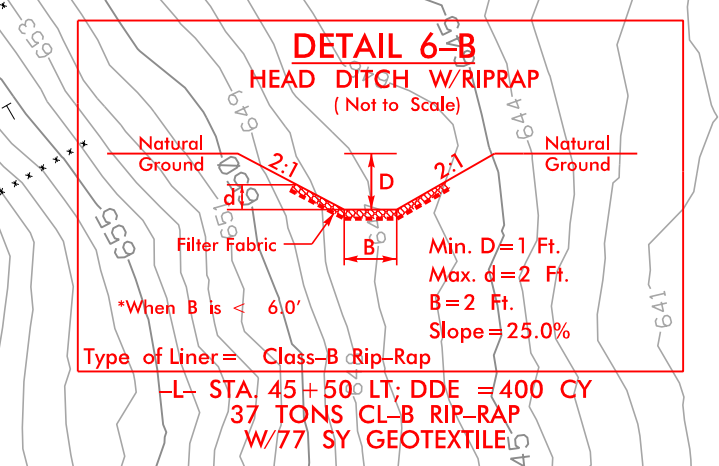
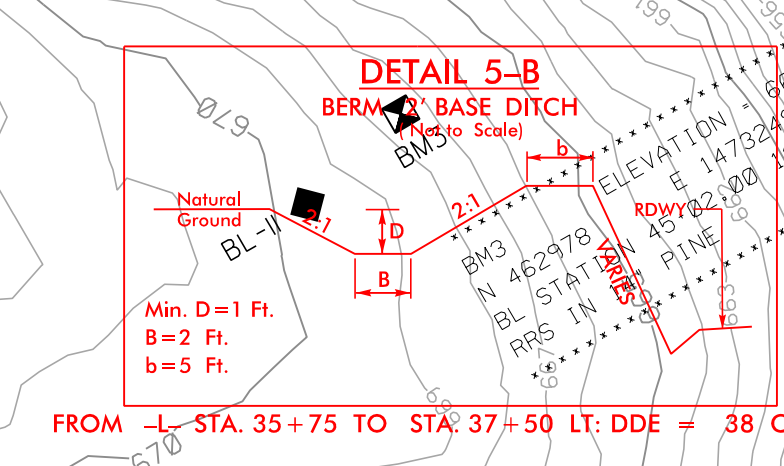
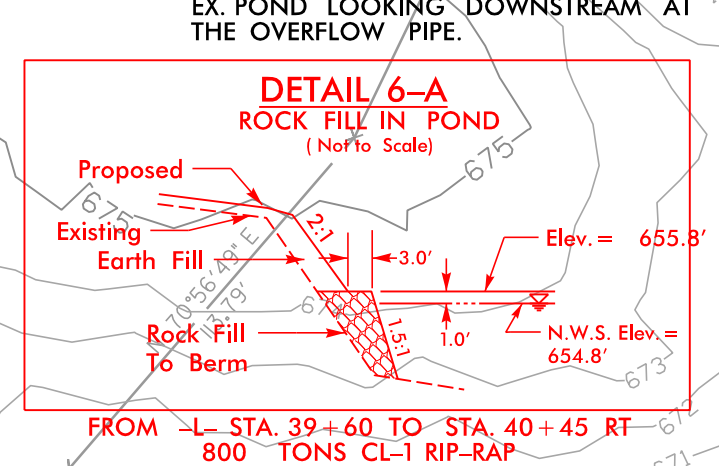
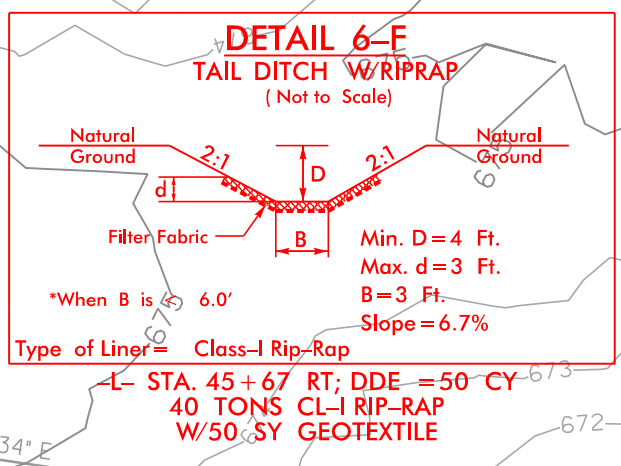
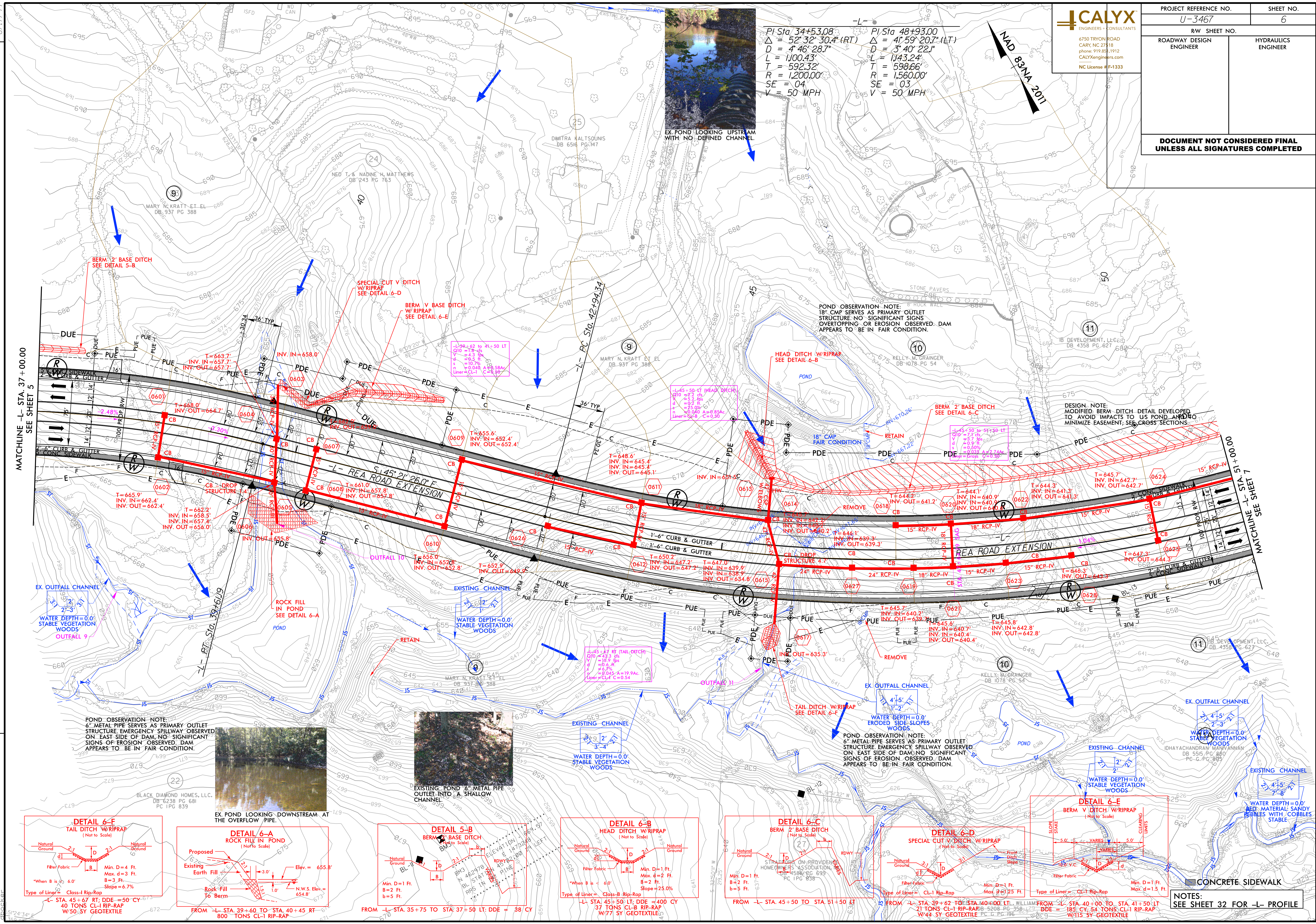


CONCRETE SIDEWALK / MEDIAN
NOTES:
SEE SHEET 31 & 32 FOR -L- PROFILE

8/17/99

RIGHT OF WAY REVISION = 11/07/2018 - ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 10 AND 11. ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 9, 10 AND 11.
RIGHT OF WAY REVISION = 11/07/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 9, 10 AND 11.

4/22/2018
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NOTES:
SEE SHEET 32 FOR -L- PROFILE

CALYX
ENGINEERS & CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.881.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO. <i>U-3467</i>		SHEET NO. <i>6</i>	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

PI Sta 34+53.08
 $\Delta = 52^\circ 32' 30.4" (RT)$
 $D = 4' 46" 28.7"$
 $L = 1,000.43'$
 $T = 592.32'$
 $R = 1,200.00'$
 $SE = 04$
 $V = 50 \text{ MPH}$

PI Sta 48+93.00
 $\Delta = 41^\circ 59' 20.7" (LT)$
 $D = 3' 40" 22.1"$
 $L = 1,433.24'$
 $T = 598.66'$
 $R = 1,560.00'$
 $SE = 03$
 $V = 50 \text{ MPH}$



POND OBSERVATION NOTE:
18" CMP SERVES AS PRIMARY OUTLET
STRUCTURE. NO SIGNIFICANT SIGNS
OF EROSION OBSERVED. DAM
APPEARS TO BE IN FAIR CONDITION.

DESIGN NOTE:
MODIFIED BERM DITCH DETAIL DEVELOPED
TO AVOID IMPACTS TO US POND AREA TO
MINIMIZE EASEMENT. SEE CROSS SECTIONS.

POND OBSERVATION NOTE:
6" METAL PIPE SERVES AS PRIMARY OUTLET
STRUCTURE. EMERGENCY SPILLWAY OBSERVED
ON EAST SIDE OF DAM. NO SIGNIFICANT
SIGNS OF EROSION OBSERVED. DAM
APPEARS TO BE IN FAIR CONDITION.



POND OBSERVATION NOTE:
6" METAL PIPE SERVES AS PRIMARY OUTLET
STRUCTURE. EMERGENCY SPILLWAY OBSERVED
ON EAST SIDE OF DAM. NO SIGNIFICANT
SIGNS OF EROSION OBSERVED. DAM
APPEARS TO BE IN FAIR CONDITION.

WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

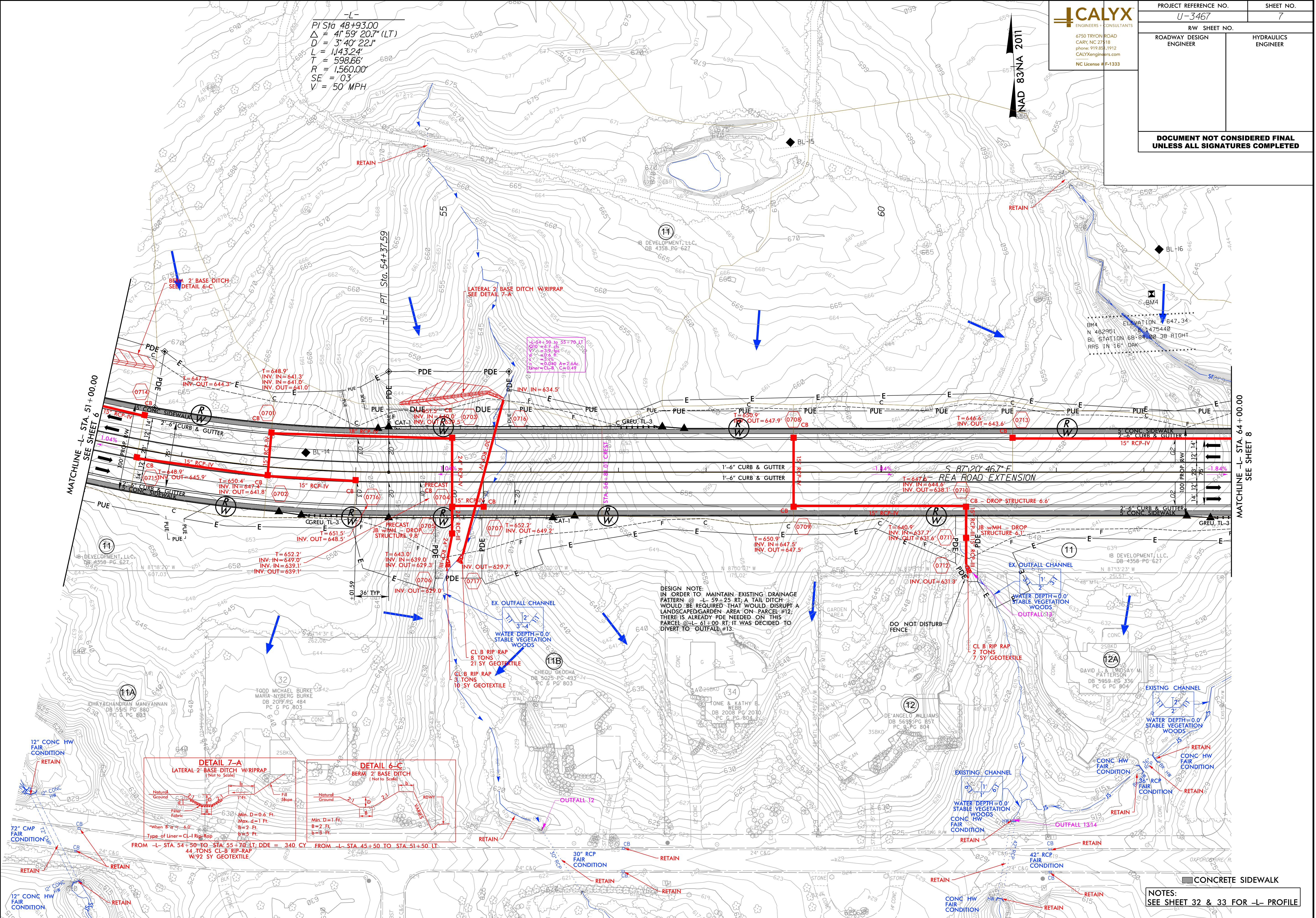
WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

RIGHT OF WAY REVISION -- 11/07/2018 -- ADJUSTED PERMANENT UTILITY EASEMENT ON PARCEL 11.
RIGHT OF WAY REVISION -- 11/07/2018 -- ADDED PARCELS 11A, 11B AND 12A-ADDED CONSTRUCTION EASEMENT ON PARCELS 11 AND 12.
RIGHT OF WAY REVISION -- 11/07/2018 -- ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 11 AND 12.
RIGHT OF WAY REVISION -- 02/04/2019 -- ADDED PERMANENT DRAINAGE EASEMENT ON PARCEL 11B.
RIGHT OF WAY REVISION -- 02/04/2019 -- ADJUSTED PERMANENT DRAINAGE EASEMENT ON PARCEL 12-ADDED 'DO NOT DISTURB' FENCE LABEL TO PARCEL 12.

8.17.17.99

4/22/2018
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J. Becker

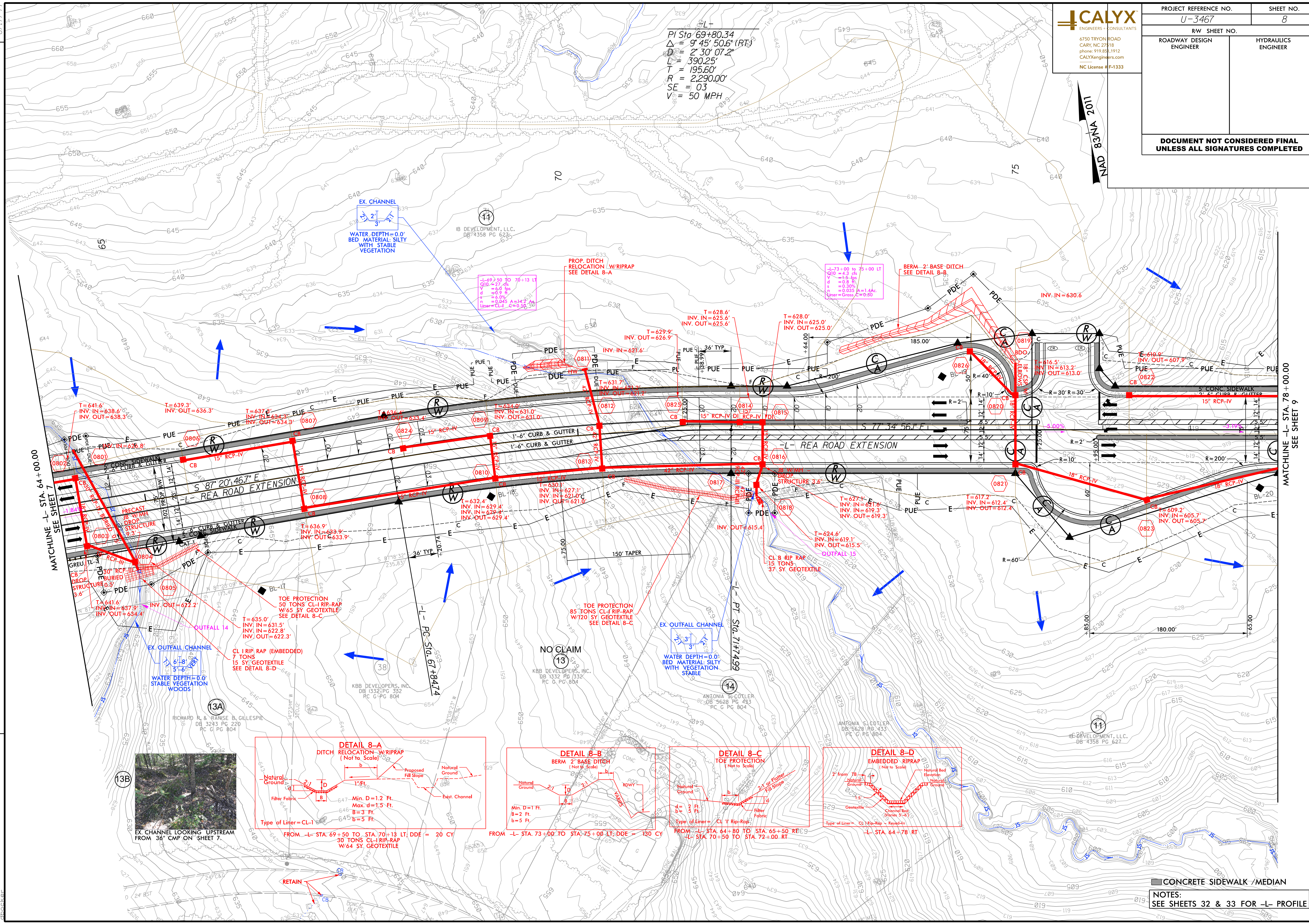


CALYX
ENGINEERS & CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO.		SHEET NO.
U-3467		7
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		

NOTES:
SEE SHEET 32 & 33 FOR -L- PROFILE

4/22/2019
R:\Drainage\U3467_Hyd_psh_08_Redlines.dgn



NAD 83NA 2011



MUNDY'S RUN CREEK UPSTREAM
OF CULVERT SITE LOOKING
DOWNSTREAM.

PI Sta 98+94.39
 $\Delta = 33^\circ 49' 47.0''$ (RT)
 $D = 2' 29' 28.0''$
 $L = 1,358.01'$
 $T = 699.45'$
 $R = 2,300.00'$
 $SE = 03$
 $V = 50$ MPH

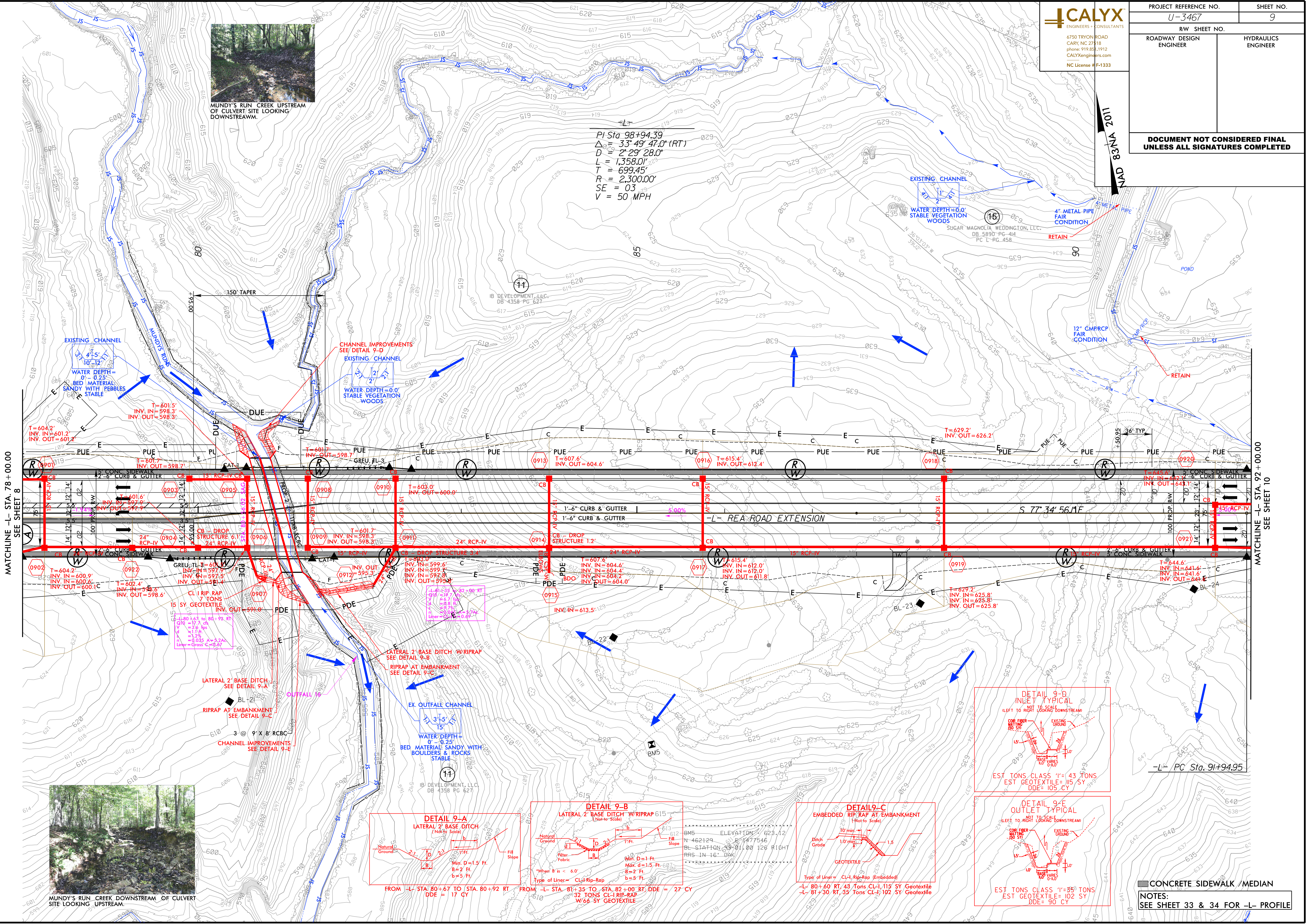
EXISTING CHANNEL
WATER DEPTH=6.0'
STABLE VEGETATION
WOODS

4" METAL PIPE
FAIR
CONDITION

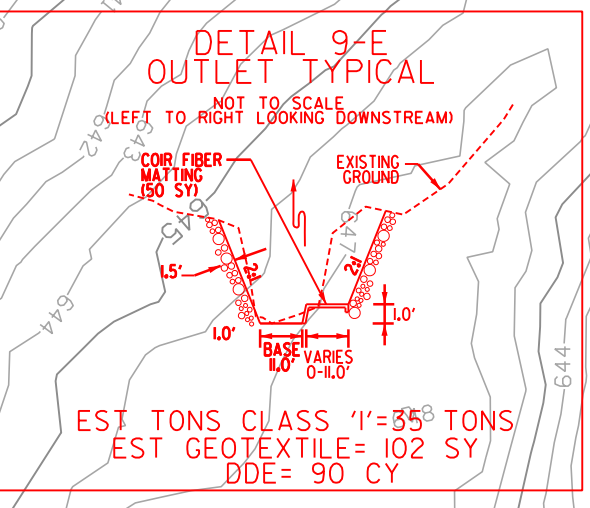
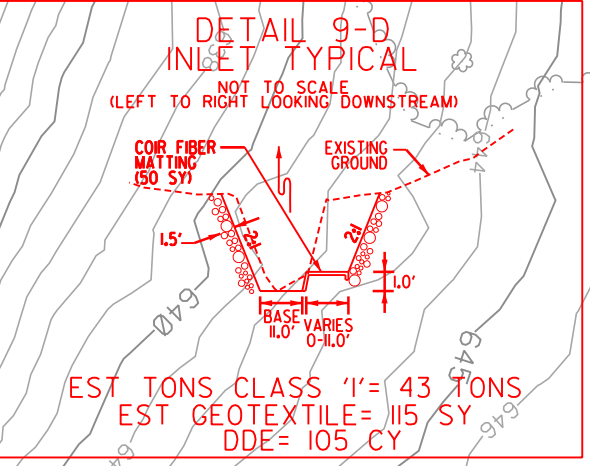
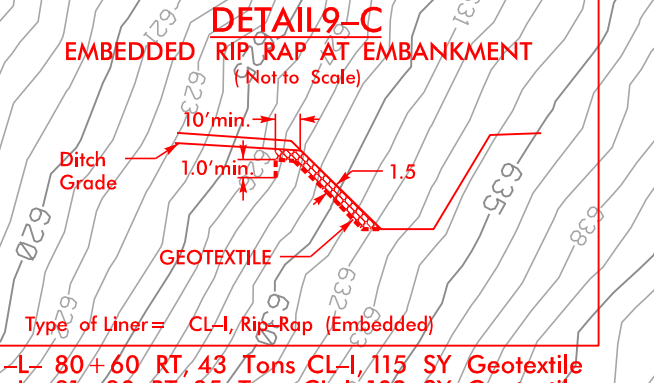
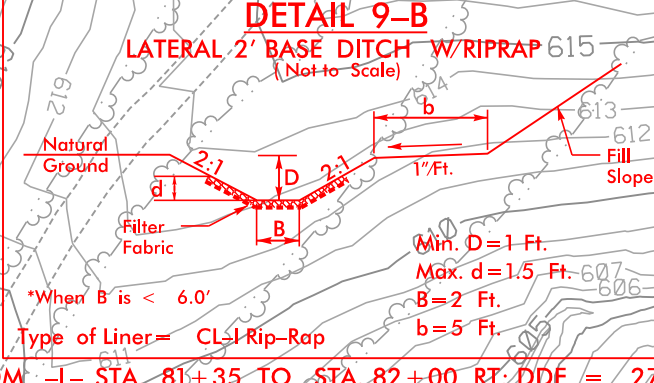
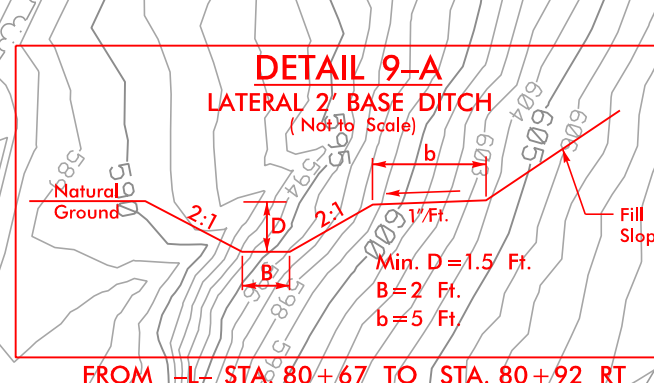
RETAIN

12" CMPRPC
FAIR
CONDITION

RETAIN



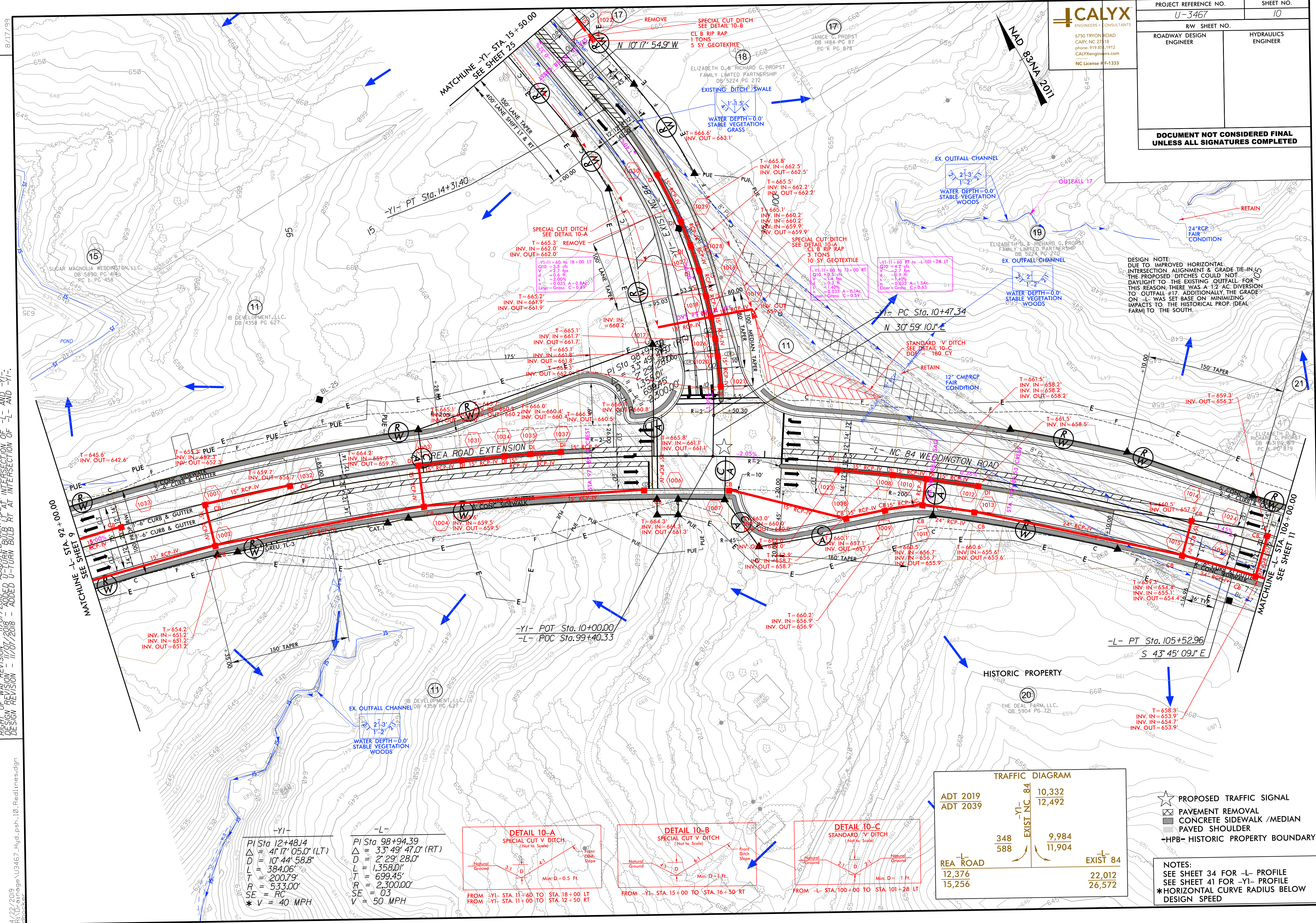
MUNDY'S RUN CREEK DOWNSTREAM
OF CULVERT
SITE LOOKING UPSTREAM.



CONCRETE SIDEWALK / MEDIAN
NOTES:
SEE SHEET 33 & 34 FOR -L- PROFILE

DESIGN NOTE:
DUE TO IMPROVED HORIZONTAL
INTERSECTION ALIGNMENT & GRADE TIE-INS,
THE PROPOSED DITCHES COULD NOT
DAYLIGHT TO THE EXISTING OUTFALL FOR
THIS REASON, THERE WAS A 12" AG DIVERSION
TO OUTFALL #17. ADDITIONALLY, THE GRADE
ON -L- WAS SET BASE ON MINIMIZING
IMPACTS TO THE HISTORICAL PROP. (DEAL
FARM) TO THE SOUTH.

REVISIONS
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 10, 11, 18, AND 19.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 10, 11, 18, AND 19.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED CONTROL OF INTERSECTION OF -L- AND -YI-
DESIGN REVISION - 11/07/2018 - ADDED U-TURN BULB AT INTERSECTION OF -L- AND -YI-.



TRAFFIC DIAGRAM			
ADT 2019 ADT 2039	-YI- EXIST NC 84	10,332 12,492	-L- EXIST 84
		348 588	
REA ROAD 12,376 15,256	-YI- EXIST NC 84	9,984 11,904	-L- EXIST 84
		22,012 26,572	

- ★ PROPOSED TRAFFIC SIGNAL
 - ▨ PAVEMENT REMOVAL
 - ▨ CONCRETE SIDEWALK / MEDIAN
 - ▨ PAVED SHOULDER
 - ▨ HPB= HISTORIC PROPERTY BOUNDARY
- NOTES:
SEE SHEET 34 FOR -L- PROFILE
SEE SHEET 41 FOR -YI- PROFILE
* HORIZONTAL CURVE RADIUS BELOW
DESIGN SPEED

PROJECT REFERENCE NO. <i>U-3467</i>		SHEET NO. <i>11</i>	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

-L-
PI Sta 122+19.72
 $\Delta = 25^{\circ} 49' 52.8''$ (LT)
 $D = 2,307.2'$
 $L = 1,032.43'$
 $T = 525.14'$
 $R = 2,290.00'$
 $SE = 03$
 $V = 50$ MPH

NAD 83 NA 2011

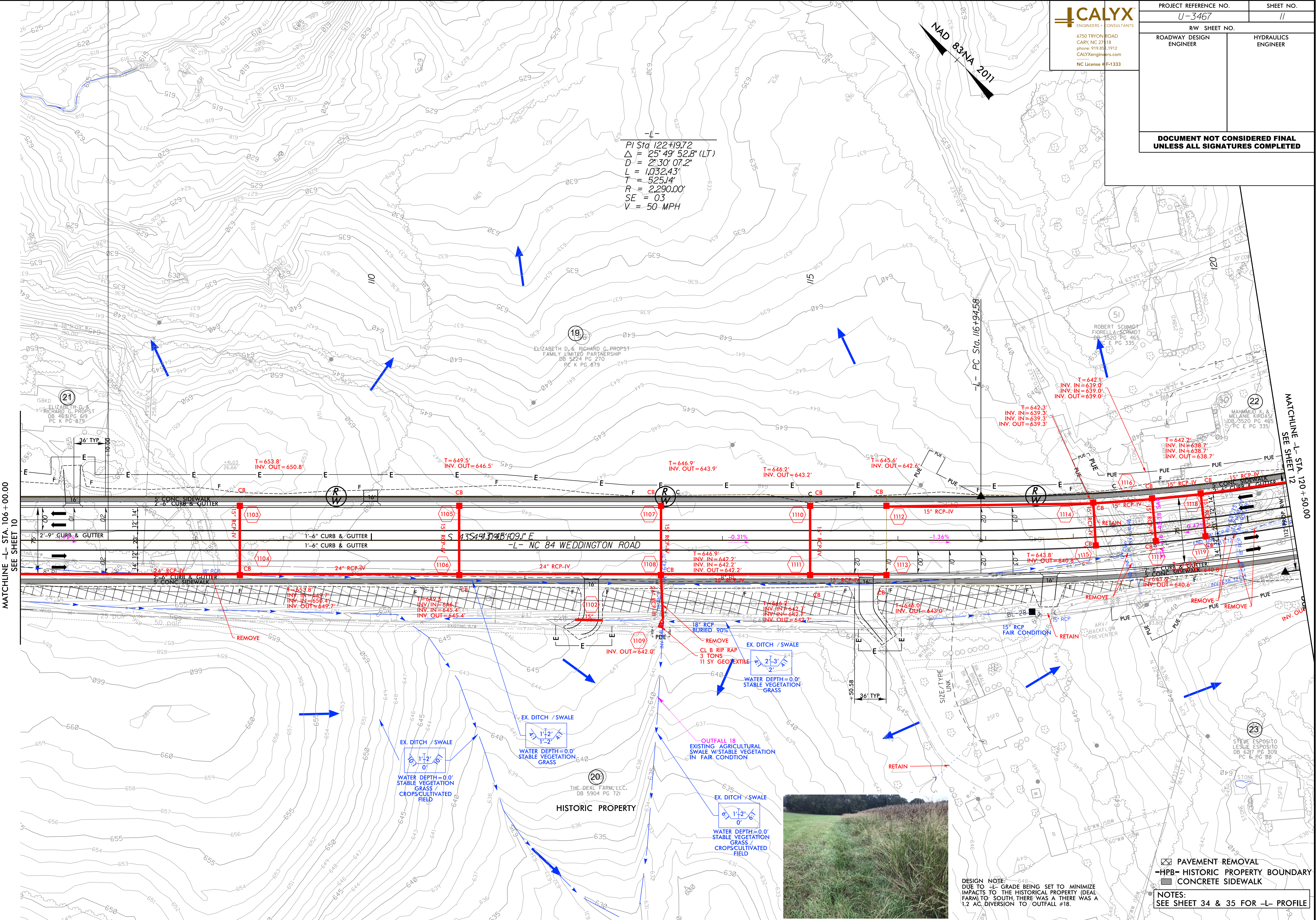
-L- PC Sta. 116+94.58

MATCHLINE -L- STA. 120+50.00
SEE SHEET 12

MATCHLINE -L- STA. 106+00.00
SEE SHEET 10

REVISIONS

4/22/2018
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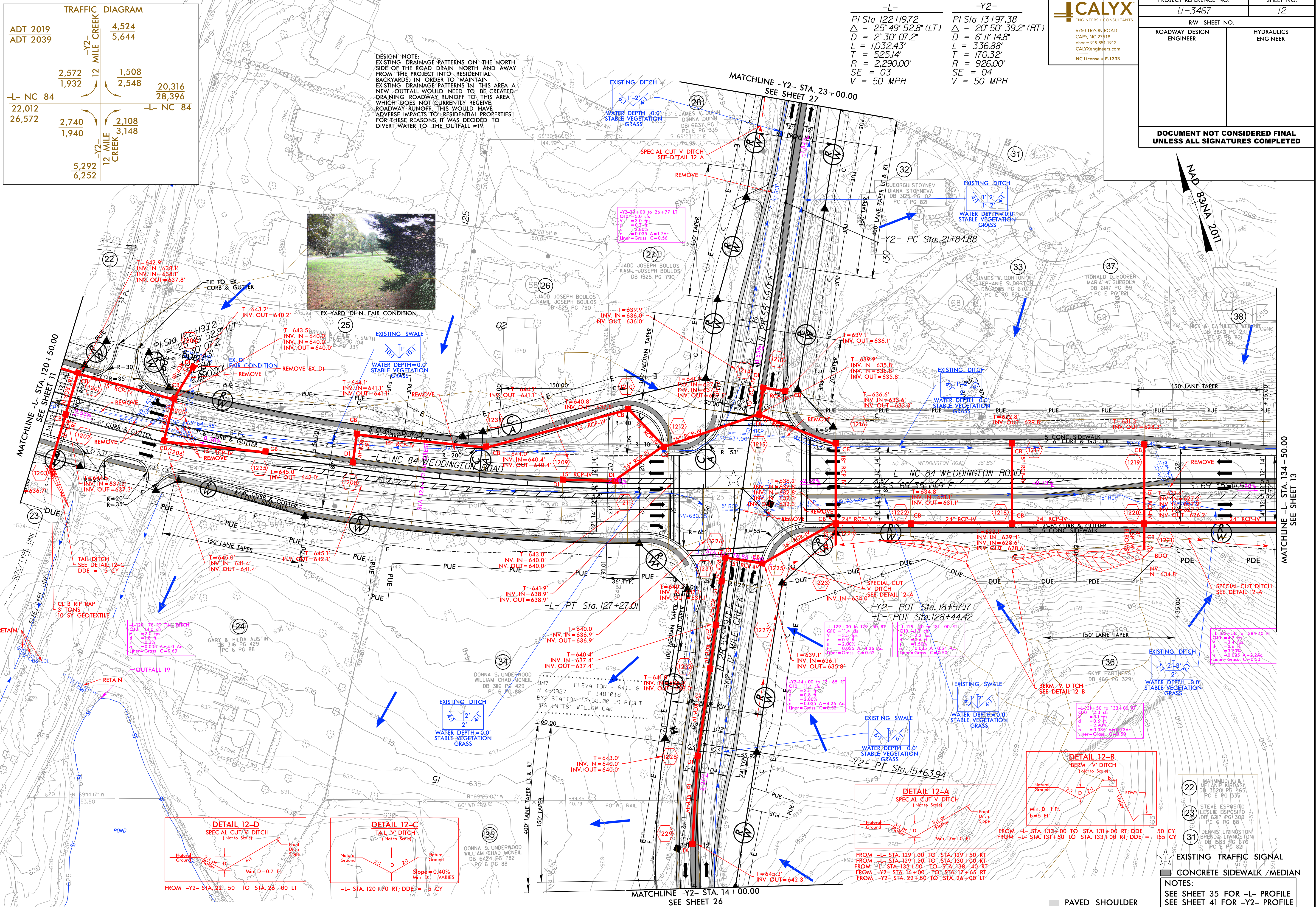


TRAFFIC DIAGRAM			
ADT 2019	ADT 2039	-Y2- 12 MILE CREEK	4,524
			5,644
-L- NC 84	-L- NC 84	-Y2- 12 MILE CREEK	2,572
			1,932
22,012	26,572	-Y2- 12 MILE CREEK	1,508
			2,548
2,740	2,108	-Y2- 12 MILE CREEK	20,316
			28,396
1,940	3,148	-Y2- 12 MILE CREEK	5,292
			6,252

DESIGN NOTE:
EXISTING DRAINAGE PATTERNS ON THE NORTH SIDE OF THE ROAD DRAIN NORTH AND AWAY FROM THE PROJECT INTO RESIDENTIAL BACKYARDS. IN ORDER TO MAINTAIN EXISTING DRAINAGE PATTERNS IN THIS AREA A NEW OUTFALL WOULD NEED TO BE CREATED. DRAINING ROADWAY RUNOFF TO THIS AREA WHICH DOES NOT CURRENTLY RECEIVE ROADWAY RUNOFF. THIS WOULD HAVE ADVERSE IMPACTS TO RESIDENTIAL PROPERTIES. FOR THESE REASONS, IT WAS DECIDED TO DIVERT WATER TO THE OUTFALL #19.



RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 24, 33, 34, 37 AND 38.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 24, 25, 26, 27, 33, 34, 36, 37 AND 38.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED RIGHT OF WAY ON PARCELS 26, 27 AND 36.
RIGHT OF WAY REVISION - 11/07/2018 - ADDED CONTROL OF ACCESS ON PARCELS 26 AND 27.
DESIGN REVISION - 11/07/2018 - ADDED U-TURN BULB LT AT INTERSECTION OF -L- AND -Y2-



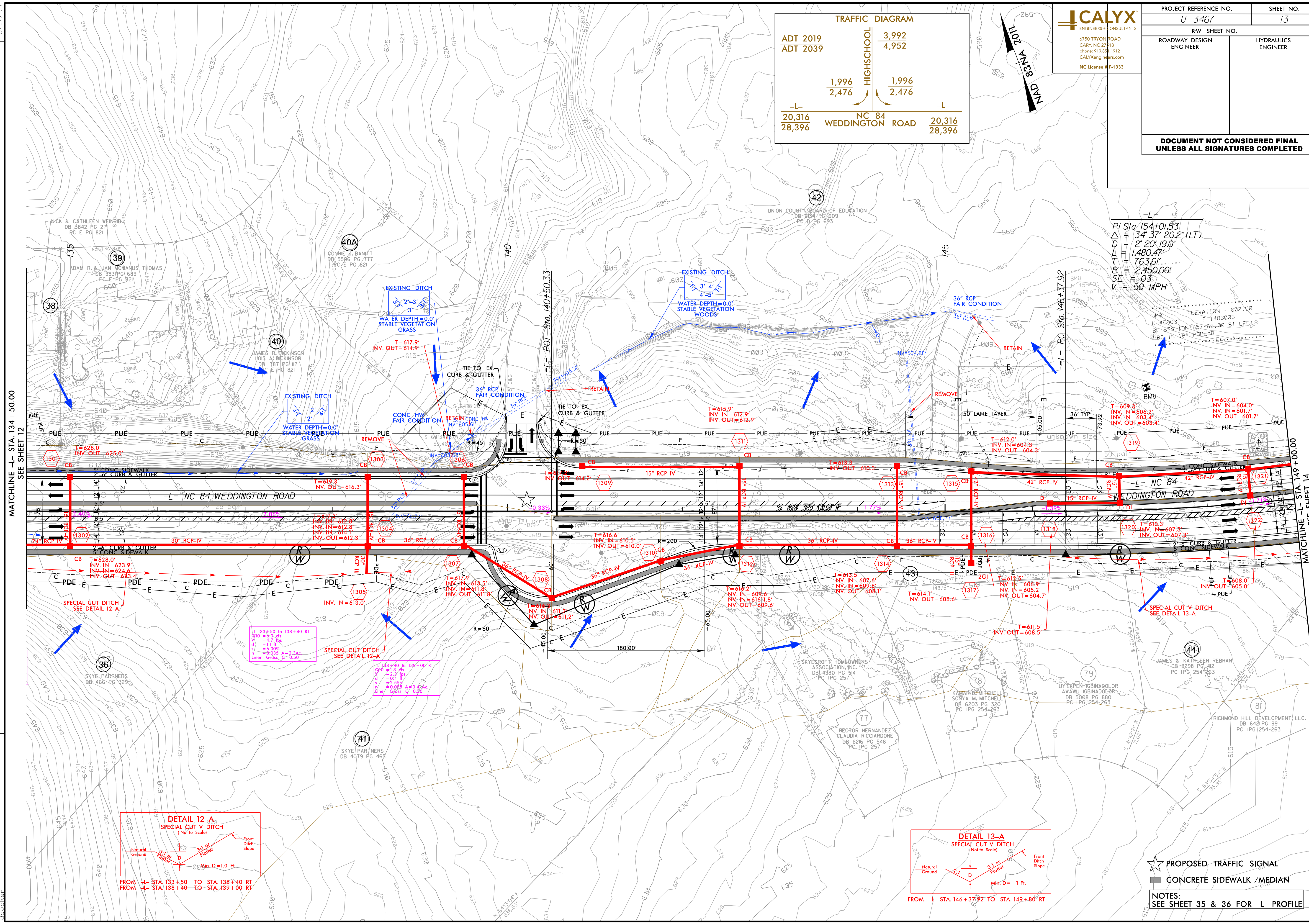
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MAHMOUD K. & MELANIE KIRASIS
DB 3520 PG 465
PC E PG 335
STEVE ESPPOSITO
DB 621 PG 309
PC E PG 88
DENNIS LIVINGSTON
DB 153 PG 570
PC E PG 821

EXISTING TRAFFIC SIGNAL
CONCRETE SIDEWALK / MEDIAN
NOTES:
SEE SHEET 35 FOR -L- PROFILE
SEE SHEET 41 FOR -Y2- PROFILE

REVISIONS

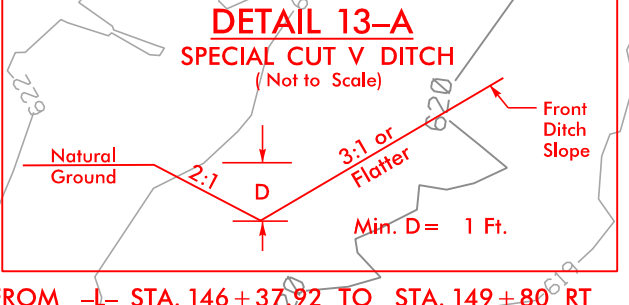
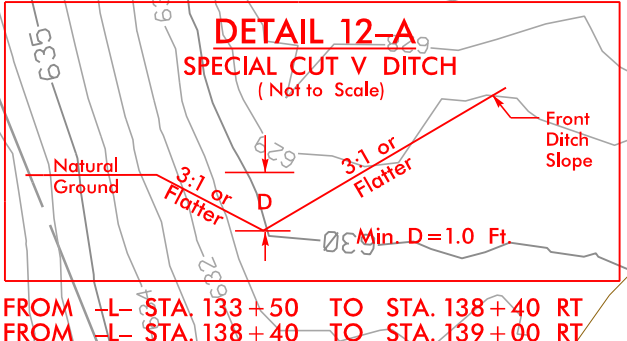
NO.	DATE	DESCRIPTION
1	11/07/2018	RIGHT OF WAY REVISION
2	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40 AND 42.
3	11/07/2018	ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
4	11/07/2018	ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 40, 43 AND 44.
5	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
6	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
7	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
8	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
9	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
10	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
11	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
12	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
13	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
14	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
15	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
16	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
17	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
18	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
19	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
20	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
21	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
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83	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.
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100	11/07/2018	ADJUSTED PERMANENT UTILITY EASEMENT ON PARCELS 38, 39, 40, 43 AND 44.



TRAFFIC DIAGRAM	
ADT 2019	3,992
ADT 2039	4,952
HIGHSCHOOL	
1,996	1,996
2,476	2,476
WEDDINGTON ROAD	
20,316	20,316
28,396	28,396

CALYX
ENGINEERS & CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
PHONE: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO.	
U-3467	
SHEET NO.	
13	
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



★ PROPOSED TRAFFIC SIGNAL
■ CONCRETE SIDEWALK / MEDIAN

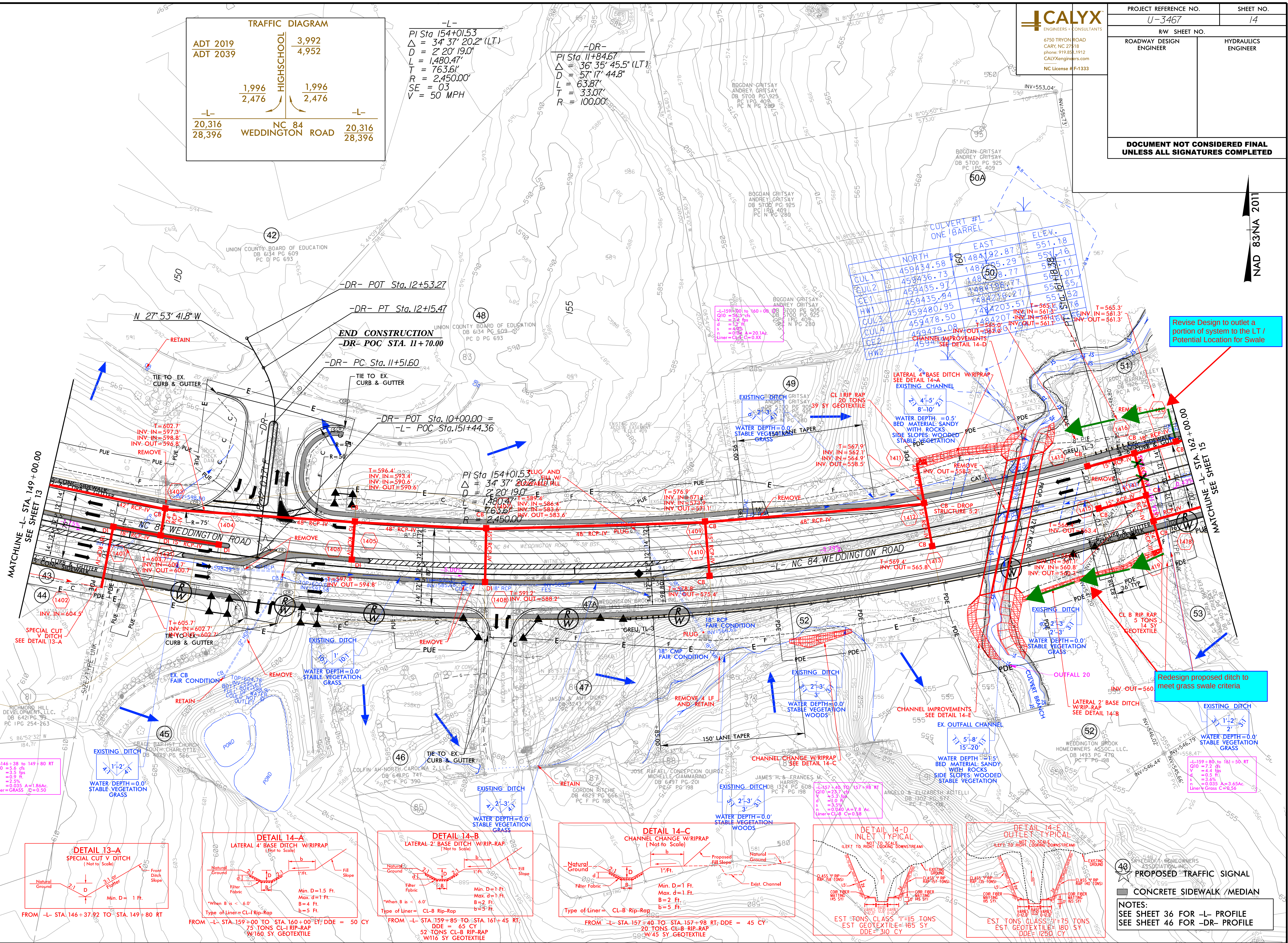
NOTES:
SEE SHEET 35 & 36 FOR -L- PROFILE

- Redesign proposed ditch to meet grass swale criteria

- Redesign proposed ditch to meet grass swale criteria

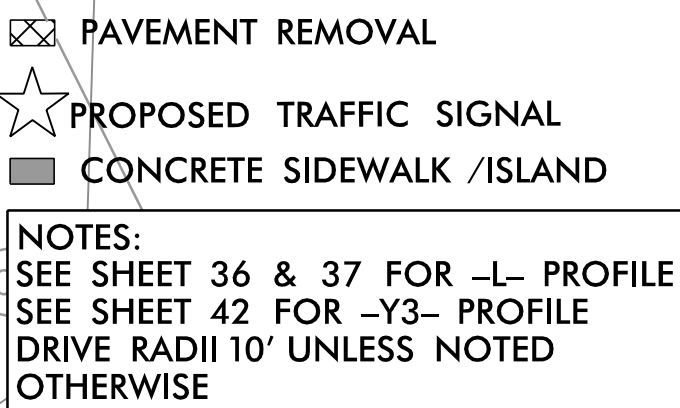
43 SKYECROFT HOMEOWNERS ASSOCIATION, INC. 51
PROPOSED TRAFFIC SIGNAL
CONCRETE SIDEWALK / MEDIAN
NOTES:
SEE SHEET 36 FOR -L- PROFILE
SEE SHEET 46 FOR -DR- PROFILE

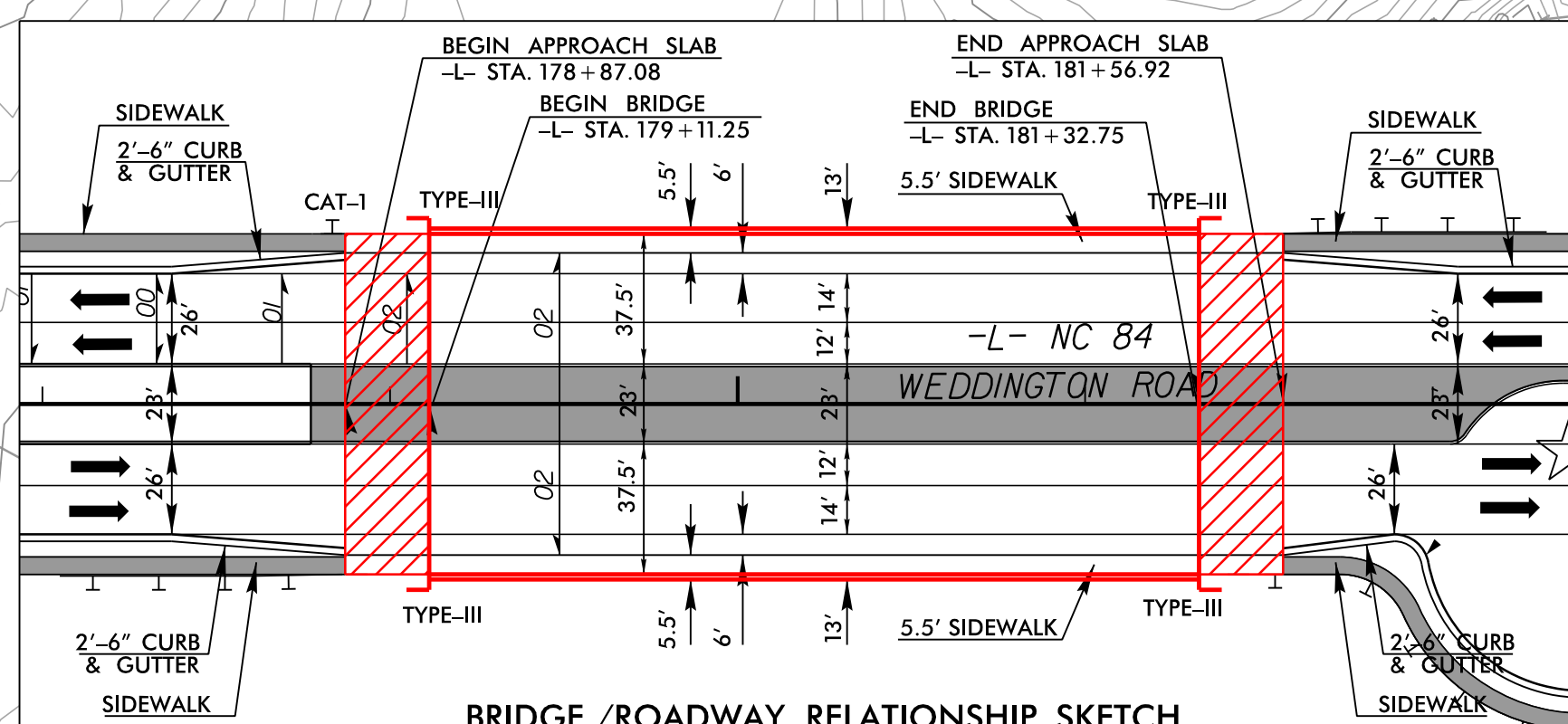
NOTES:
SEE SHEET 36 FOR -L- PROFILE
SEE SHEET 46 FOR -DR- PROFILE



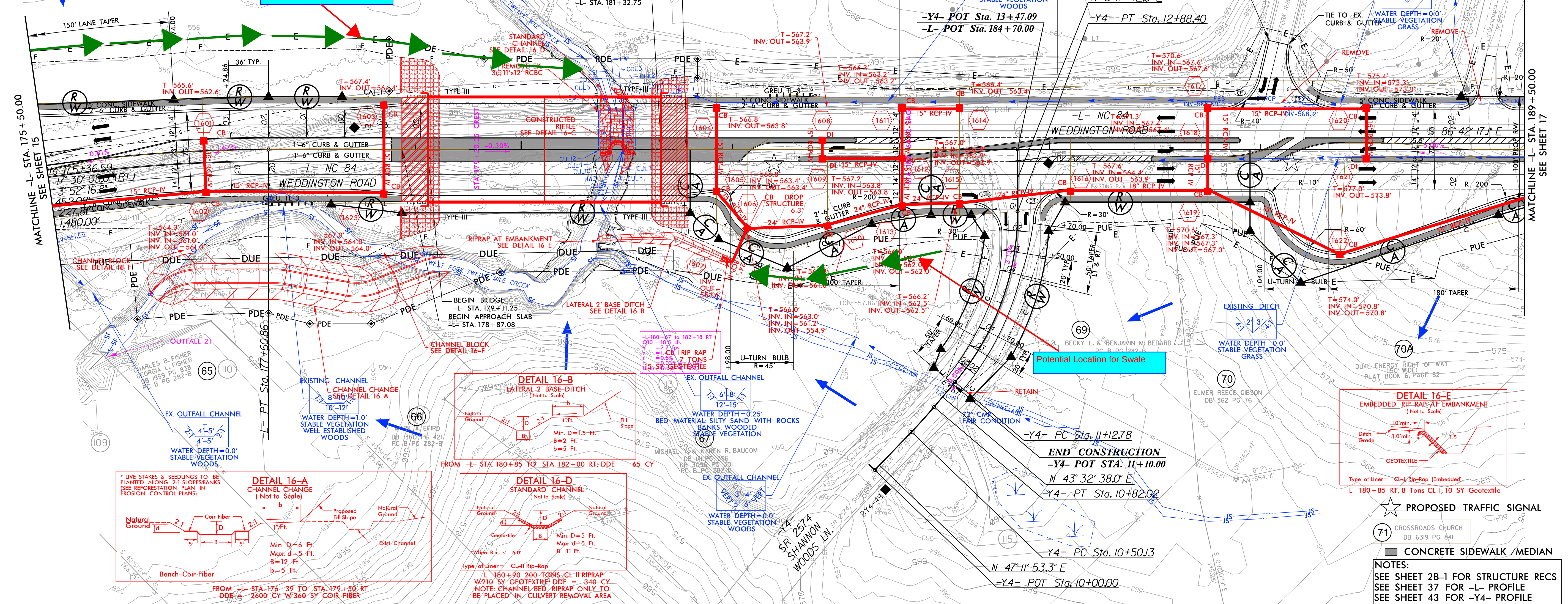
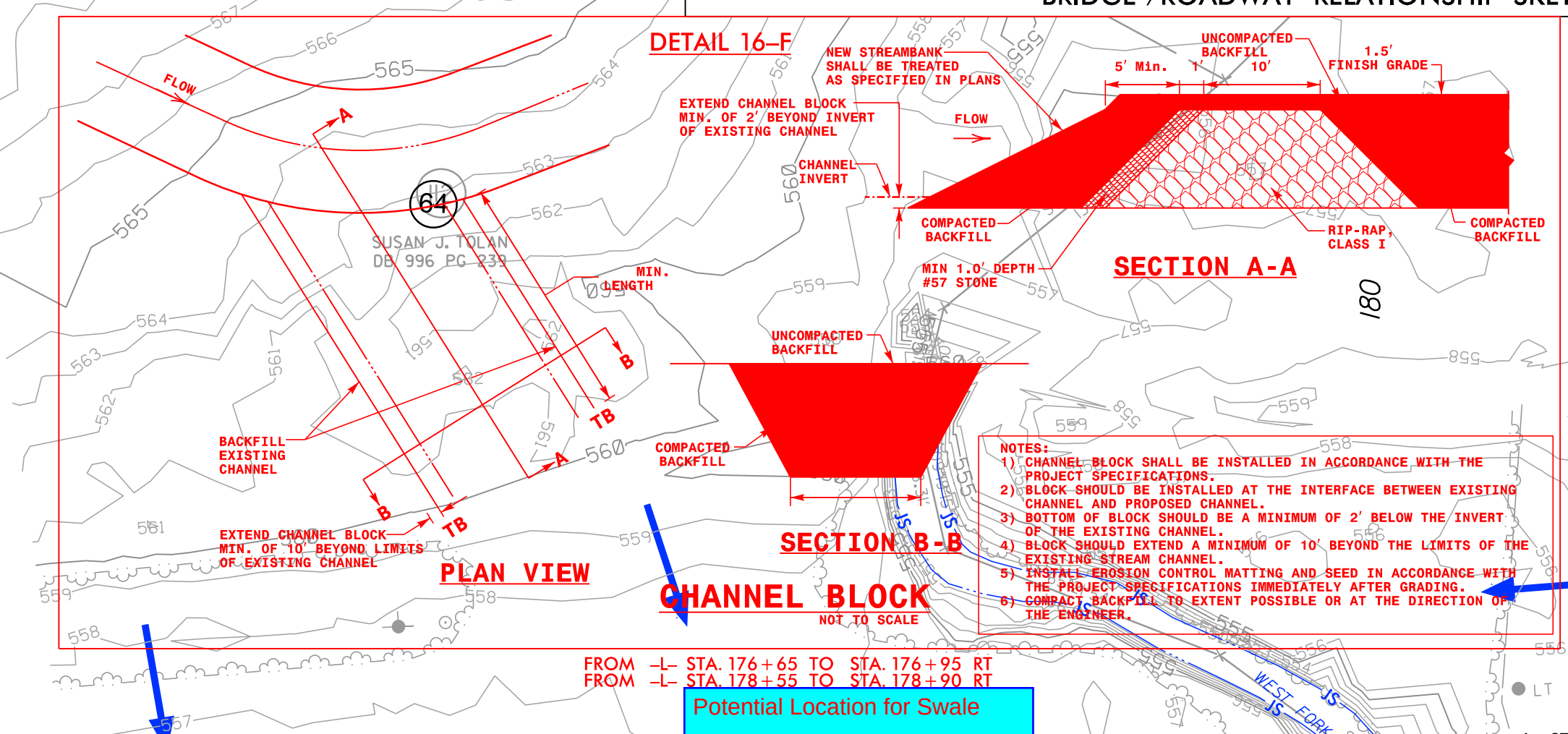
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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dbocker





CUL5	459805.22	1486233.74	562.69
CUL6	459803.85	1486256.6	562.56
CE13	459804.17	1486256.0	562.43
HW1	459766.21	1486272.8	552.88
CUL7	459767.08	1486261.20	549.55
CUL8	459767.08	1486260.46	549.12
CUL9	459767.08	1486249.43	548.99
CUL10	459767.65	1486248.82	549.73
CUL11	459768.22	1486237.1	548.93
CUL12	459768.22	1486260.76	560.65
CE2	459767.00	1486261.04	562.46
HW2	459767.03		

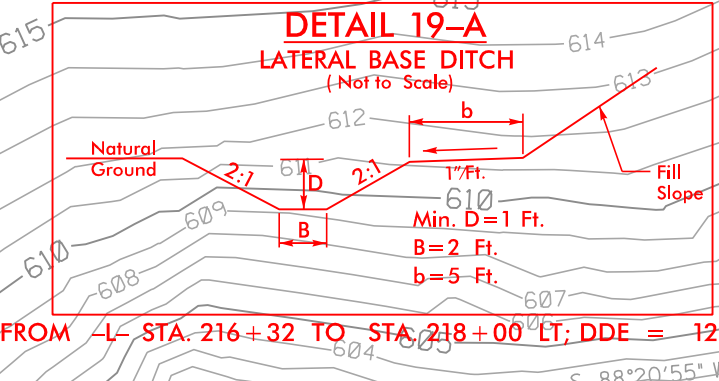
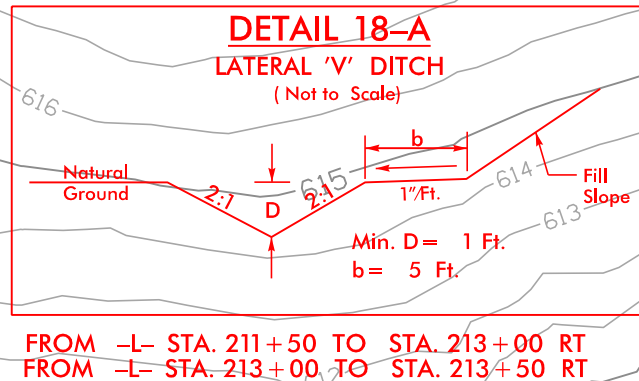
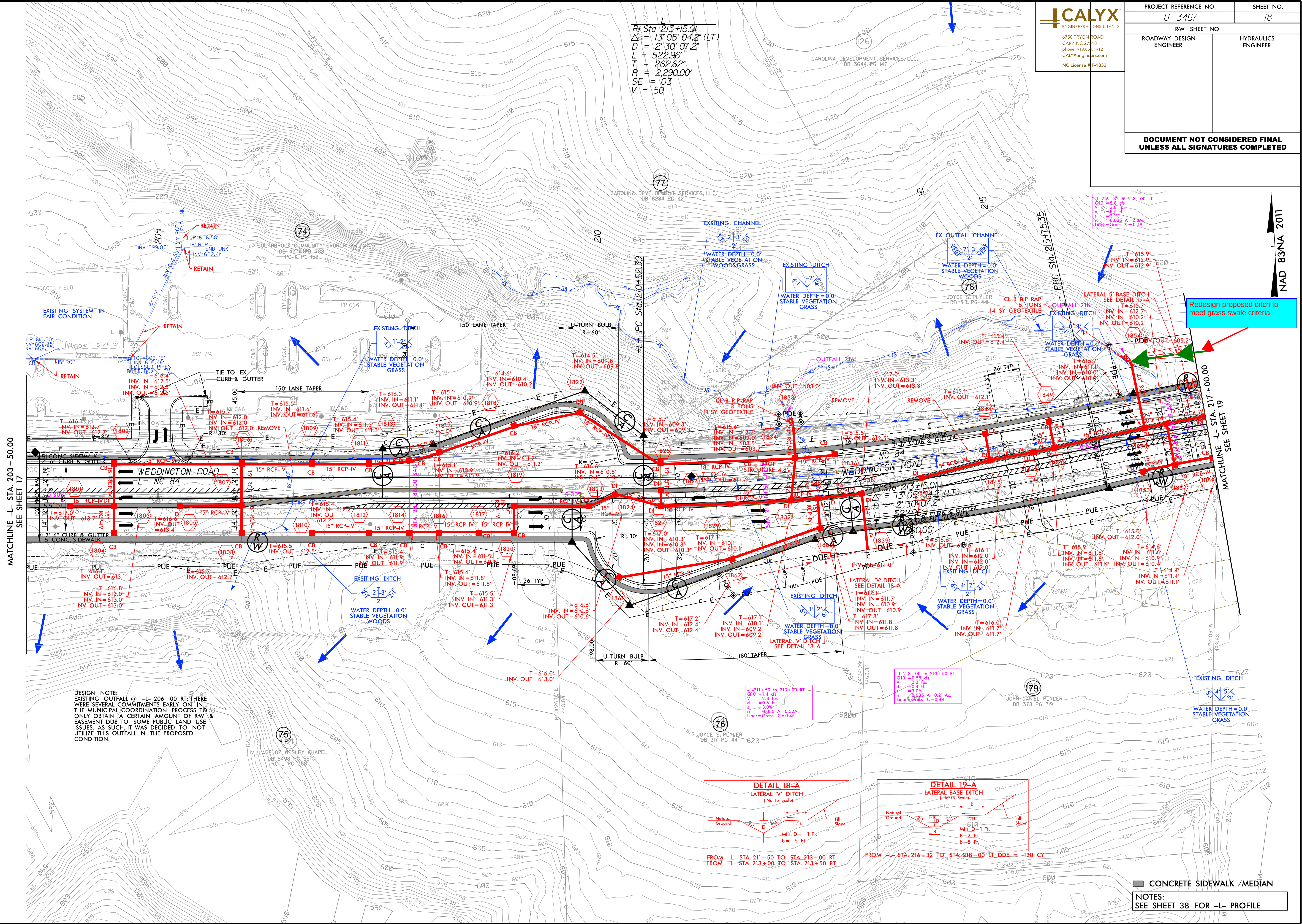


REVISIONS	
RIGHT OF WAY REVISION	- 11/07/2018 - ADJUSTED CONTROL OF ACCESS AND RIGHT OF WAY ON PARCELS 67, 70 AND 70A.
RIGHT OF WAY REVISION	- 11/07/2018 - ADJUSTED PERMANENT DRAINAGE EASEMENT ON PARCEL 66.
RIGHT OF WAY REVISION	- 11/07/2018 - ADJUSTED DUAL UTILITY EASEMENT ON PARCEL 67.
RIGHT OF WAY REVISION	- 11/07/2018 - ADDED PARCEL 70A.
DESIGN REVISION	- 11/07/2018 - MODIFIED U-TURN BULB RT. AT INTERSECTION OF -L- AND WESTFORK RUN
RIGHT OF WAY REVISION	- 12/17/2018 - MODIFIED PERMANENT DRAINAGE EASEMENT ON PARCEL 67, MODIFIED PERMANENT UTILITY EASEMENT ON PARCELS 67, 69, 70 AND 70A.
	- MODIFIED TEMPORARY CONSTRUCTION EASEMENT ON PARCELS 68, 69, 70 AND 70A, MODIFIED DRAINAGE AND UTILITY EASEMENT ON PARCELS 66 AND 67, REMOVED PERMANENT UTILITY EASEMENT ON PARCEL 68, ADDED PERMANENT UTILITY EASEMENT AND DRAINAGE AND UTILITY EASEMENT ON PARCEL 65.

NOTES:
SEE SHEET 2B-1 FOR STRUCTURE RECS
SEE SHEET 37 FOR -L- PROFILE
SEE SHEET 43 FOR -Y4- PROFILE

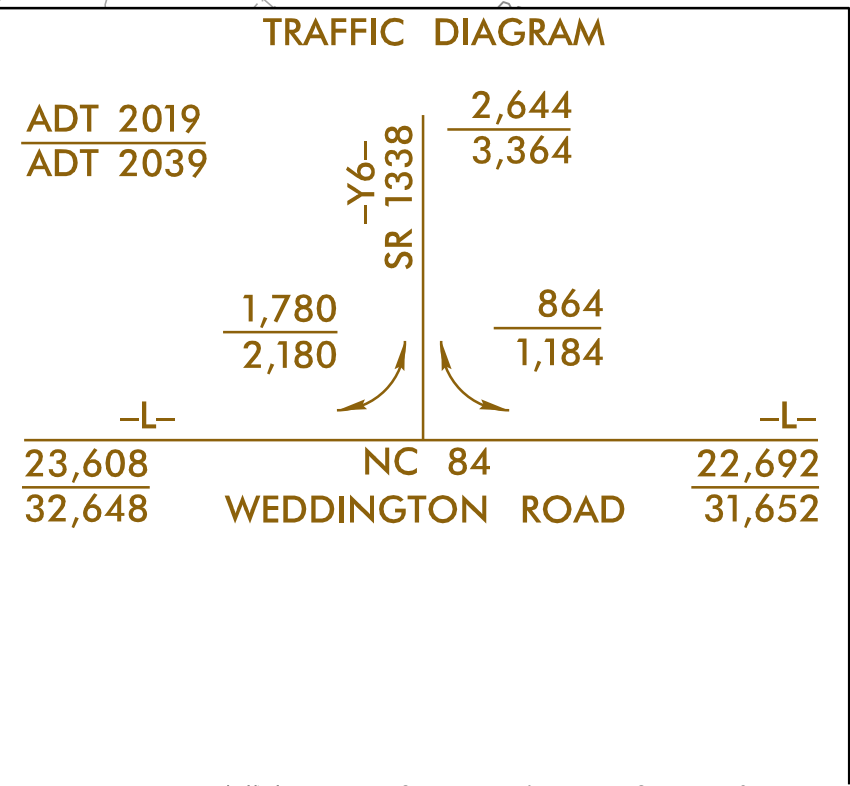
PROJECT REFERENCE NO.		SHEET NO.
U-3467		18
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		

RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 74 AND 78.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED PERMANENT DRAINAGE EASEMENT ON PARCELS 76, 78 AND 79.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED DUAL UTILITY EASEMENT ON PARCEL 79.
RIGHT OF WAY REVISION - 12/07/2018 - MODIFIED PERMANENT DRAINAGE EASEMENT ON PARCELS 76 AND 79.
RIGHT OF WAY REVISION - 12/07/2018 - MODIFIED PERMANENT DRAINAGE EASEMENT ON PARCELS 75 AND 76.
RIGHT OF WAY REVISION - 12/07/2018 - MODIFIED TEMPORARY CONSTRUCTION EASEMENT ON PARCELS 75 AND 76.
RIGHT OF WAY REVISION - 12/07/2018 - MODIFIED TEMPORARY CONSTRUCTION EASEMENT ON PARCELS 76 AND 79.



CONCRETE SIDEWALK / MEDIAN
NOTES:
SEE SHEET 38 FOR -L- PROFILE

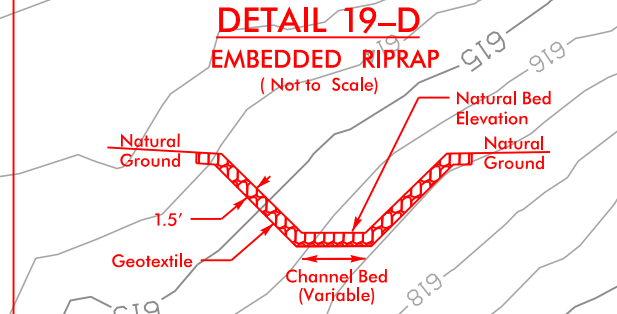
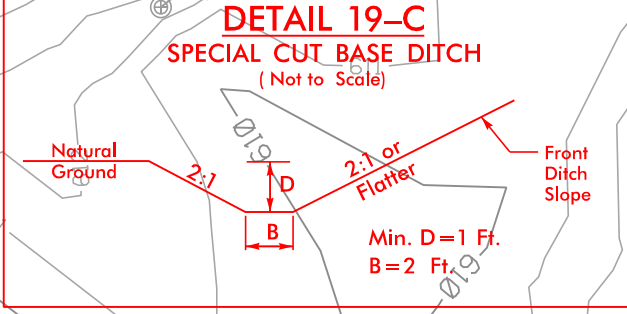
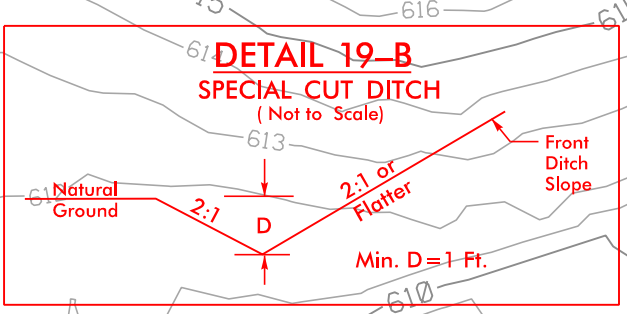
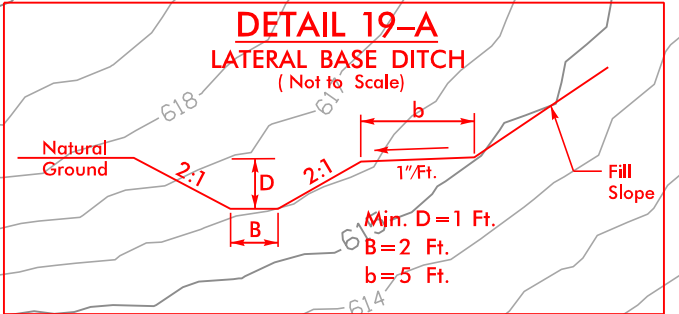
PROJECT REFERENCE NO.		SHEET NO.
U-3467		19
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		



DESIGN NOTE:
EXISTING OTCB APPEARS TO HAVE OLD
EROSION CONTROL
MEASURES IN PLACE THAT ARE PROHIBITING
THE NATURAL FLOW OF RUNOFF TO THE
OTCB. THEREFORE SOME PONDING HAS
OCCURRED. THESE EROSION CONTROL
MEASURES SHOULD BE REMOVED, AND THE
AREA REGRADED FOR POSITIVE DRAINAGE.
THEREFORE, "GRADE TO DRAIN" NOTE ADDED
TO PLANS.

Redesign proposed ditch to
meet grass swale criteria

Revise Design to outlet a
portion of system to the RT /
Potential Location for Swale



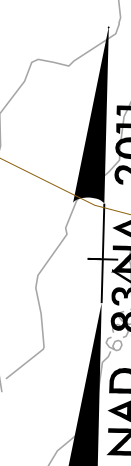
DESIGN NOTE (OUTFALL #22 & #23):
EXISTING CONDITIONS SHOW A PORTION THE -Y6- ROADWAY RUNOFF DRAINING TO
OUTFALL 23. IT SHOULD BE NOTED THAT OUTFALL 23 IS AN EXISTING STORMWATER
DETENTION FACILITY FOR THE COMMERCIAL DEVELOPMENT AT THE SOUTHWEST QUADRANT
OF THE NC 84 - WEDDINGTON RD / SR 1008 - WAXHAW INDIAN TRAIL RD.
INTERSECTION (NC DOT DISCHARGE GOING INTO A PRIVATE STORM DRAINAGE / DETENTION
FACILITY). IN ORDER TO MINIMIZE RISK OF FUTURE OFFSITE PROPERTY CONCERNS WITH
THE DOWNSTREAM - PRIVATE STORMWATER DETENTION FACILITY WITH A PROPOSED INCREASE
IN DISCHARGE AS A RESULT OF THE U-3467 PROJECT, IT SEEMS MORE APPROPRIATE TO
DISCHARGE DOWNSTREAM - OF OUTFALL 23. ADDITIONALLY, OUTFALL 23 DRAINS
DOWNSTREAM TO OUTFALL 22 AND CROSSES THE 10' GRAVEL DRIVE VIA 2' @ 30" RCPs.
THE CURRENT DESIGN FOR MORE ROADWAY RUNOFF WITHIN NC DOT RWY INSTEAD OF
DRAINING THROUGH A PRIVATE SYSTEM, AND ALSO, REDUCES FUTURE DOWNSTREAM
PROPERTY ISSUES WITH THE COMMERCIAL DEVELOPMENT.

- PAVEMENT REMOVAL
- CONCRETE SIDEWALK / MEDIAN

NOTES:
SEE SHEET 38 & 39 FOR -L- PROFILE
SEE SHEETS 43 FOR -Y6- PROFILE
SEE SHEET 2B-7 FOR WALL DETAIL

RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCELS 78 AND 84.
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED PERMANENT DRAINAGE EASEMENT ON PARCELS 78,
RIGHT OF WAY REVISION - 12/17/2018 - MODIFIED PERMANENT DRAINAGE EASEMENT ON PARCELS 76, 82, AND 84. MODIFIED DRAINAGE AND UTILITY EASEMENT ON
PARCELS 76 AND 79. REMOVED PERMANENT UTILITY EASEMENT ON PARCEL 82.

4/22/2019
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D:\Projects\U3467_Hyd_psh_19_Redlines.dgn



EXISTING TRAFFIC SIGNAL

■ CONCRETE SIDEWALK /MEDIAN

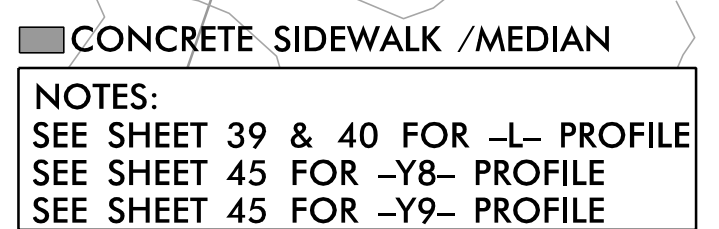
■ PAVED SHOULDER

NOTES:

SEE SHEETS 34 FOR -L- PROFILE

SEE SHEET 44 FOR -Y7- PROFILE

SEE SHEET 2B-7 FOR WALL DETAIL



4/22/2019
R:\D:\image\U3467_Hyd_psh_21_Redlines.dgn

■ CONCRETE SIDEWALK / MEDIAN
 ■ PAVED SHOULDER
 NOTES:
 SEE SHEET 40 FOR -L- PROFILE

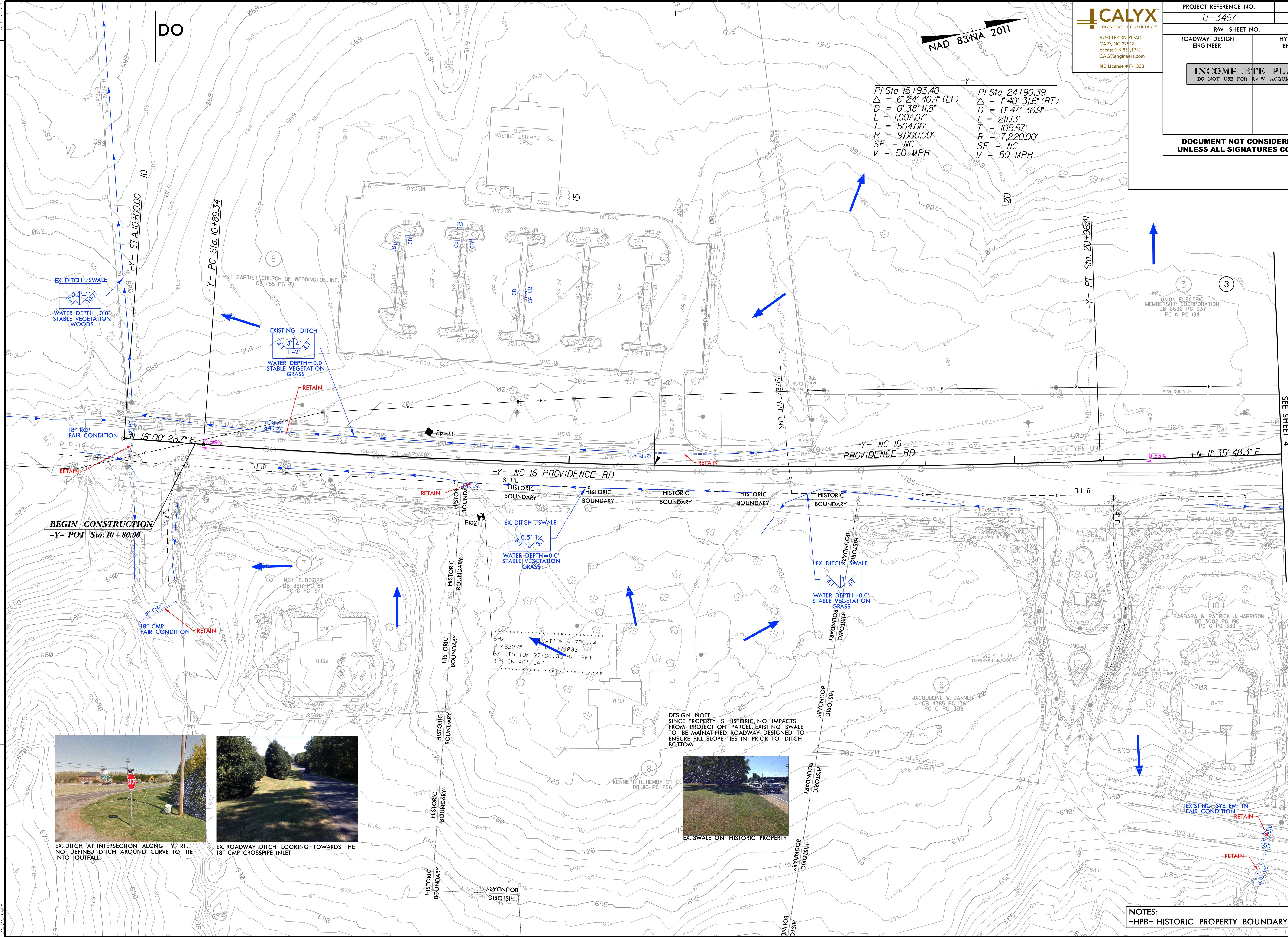
4/22/2019
I:\Drainage\U3467_Hyd_psh_22_Redlines.dgn

PROJECT REFERENCE NO.		SHEET NO.	
U-3467		23	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

NAD 83/NA 2011

PI Sta 15+93.40
 $\Delta = 6^{\circ} 24' 40.4"$ (LT)
 $D = 0^{\circ} 38' 11.8"$
 $L = 1,007.07'$
 $T = 504.06'$
 $R = 9,000.00'$
 $SE = NC$
 $V = 50 \text{ MPH}$

PI Sta 24+90.39
 $\Delta = 1^{\circ} 40' 31.6"$ (RT)
 $D = 0^{\circ} 47' 36.9"$
 $L = 211.13'$
 $T = 105.57'$
 $R = 7,220.00'$
 $SE = NC$
 $V = 50 \text{ MPH}$



EX DITCH / SWALE
0.5'-1'-10"
WATER DEPTH=0.0'
STABLE VEGETATION
WOODS

EXISTING DITCH
3'-4'-1'-2'
WATER DEPTH=0.0'
STABLE VEGETATION
GRASS

18" RCP
FAIR CONDITION
RETAIN

BEGIN CONSTRUCTION
-Y- POT Sta: 10+80.00

18" CMP
FAIR CONDITION
RETAIN

EX DITCH / SWALE
0.5'-1'-10"
WATER DEPTH=0.0'
STABLE VEGETATION
GRASS

EX DITCH / SWALE
0.5'-1'-10"
WATER DEPTH=0.0'
STABLE VEGETATION
GRASS

DESIGN NOTE:
SINCE PROPERTY IS HISTORIC, NO IMPACTS
FROM PROJECT ON PARCEL EXISTING SWALE
TO BE MAINTAINED. ROADWAY DESIGNED TO
ENSURE FILL SLOPE TIES IN PRIOR TO DITCH
BOTTOM.



EX SWALE ON HISTORIC PROPERTY



EX DITCH AT INTERSECTION ALONG -Y- RT.
NO DEFINED DITCH AROUND CURVE TO TIE
INTO OUTFALL



EX ROADWAY DITCH LOOKING TOWARDS THE
18" CMP CROSSPIPE INLET

NOTES:
-HPB- HISTORIC PROPERTY BOUNDARY

MATCHLINE -Y- STA 23+00.00
SEE SHEET 4

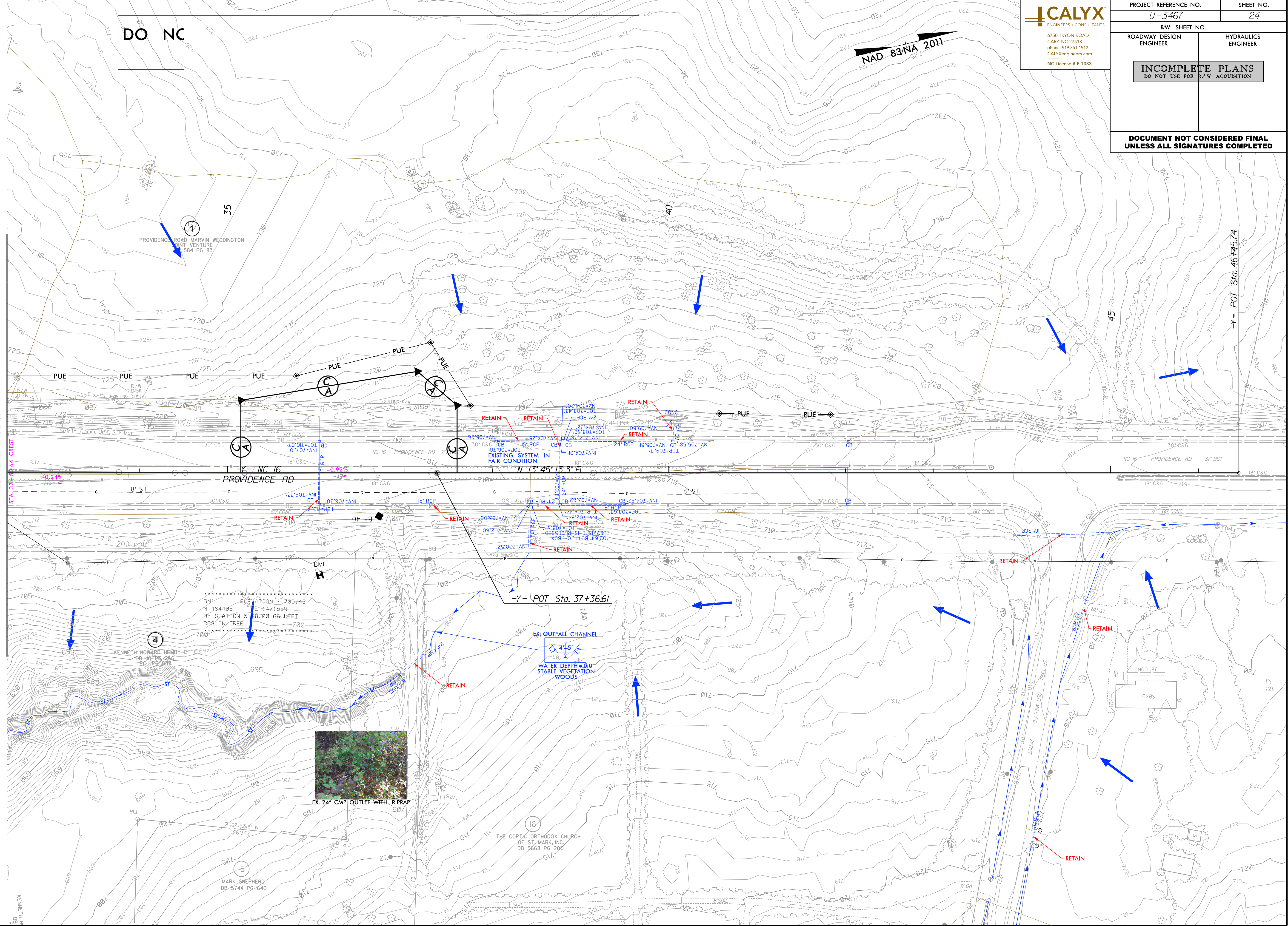
DESIGN REVISION - 3/1/2019 - NC 16 INTERSECTION DESIGN REVISED IN COORDINATION WITH U-5769.

REVISIONS

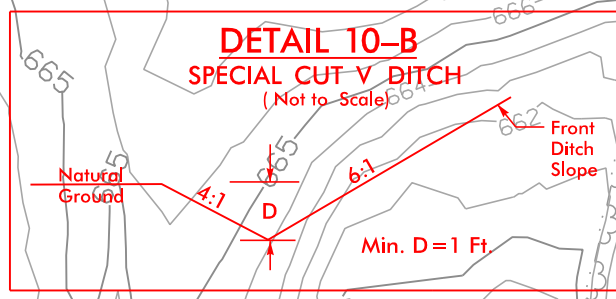
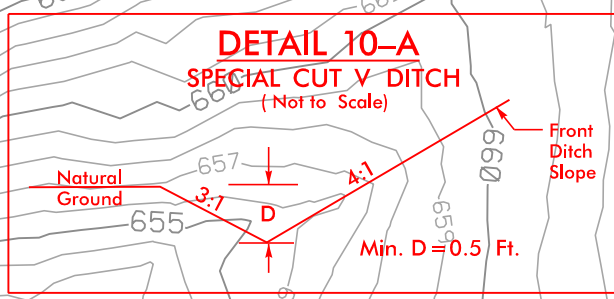
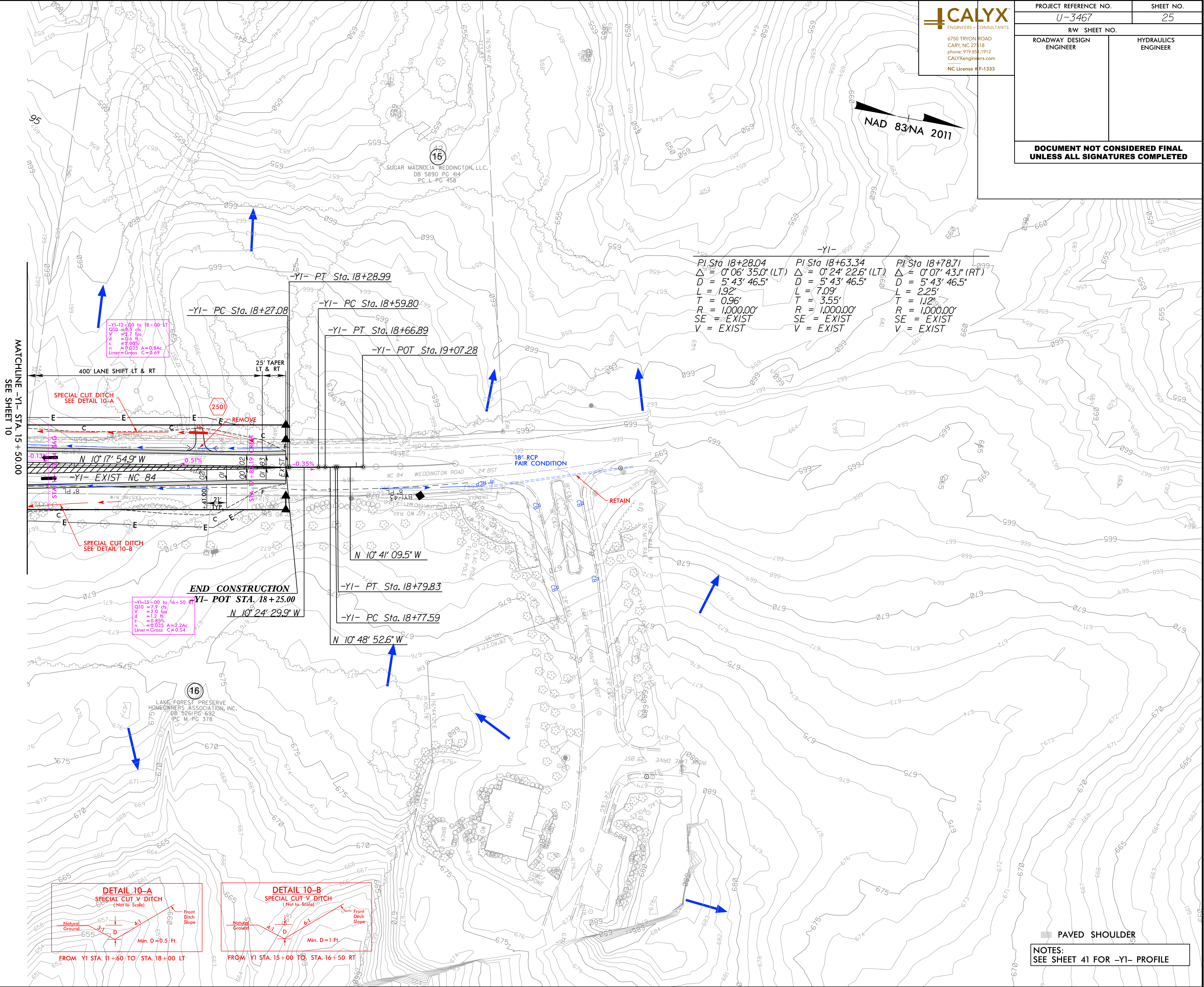
PROJECT REFERENCE NO. U-3467		SHEET NO. 24	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

REVISIONS
DESIGN REVISION - 3/11/2019 - NC 16 INTERSECTION DESIGN REVISED IN COORDINATION WITH U-5769.

MATCHLINE - Y- STA 32 + 50.00
SEE SHEET 4



PROJECT REFERENCE NO.		SHEET NO.
U-3467		25
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		



PAVED SHOULDER

NOTES:
SEE SHEET 41 FOR -YI- PROFILE

RIGHT OF WAY REVISION - 07/06/2018 - ADJUSTED CONSTRUCTION EASEMENT ON PARCEL 16.

4/22/2018 R:\Tronage\U3467_Hyd_psh_25.Redlines.dgn

REVISIONS

8/17/99

REVISIONS

$PI Sta 13+97.38$
 $\Delta = 20^\circ 50' 39.2'' (RT)$
 $D = 6^\circ 11' 14.8''$
 $L = 336.88'$
 $T = 170.32'$
 $R = 926.00'$
 $SE = 04^\circ 09'$
 $V = 50 MPH$

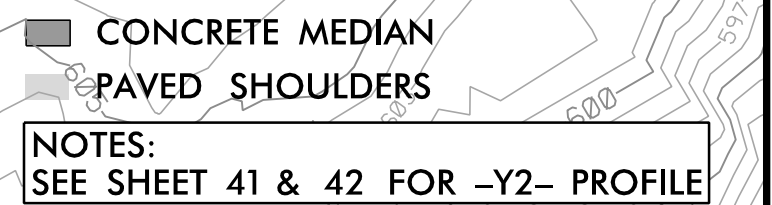
Y2=10+60 to 14+00 RT
Q10 = 3.4 cfs
V = 3.0 fps
d = 0.5 ft.
s = 3.35%
n = 0.035 A=1.10 Ac
Linear= Gross C=0.50

WATER DEPTH=0.05
STABLE VEGETATION
GRASS

PC Std. 12+27.06

CONCRETE MEDIAN
PAVED SHOULDER

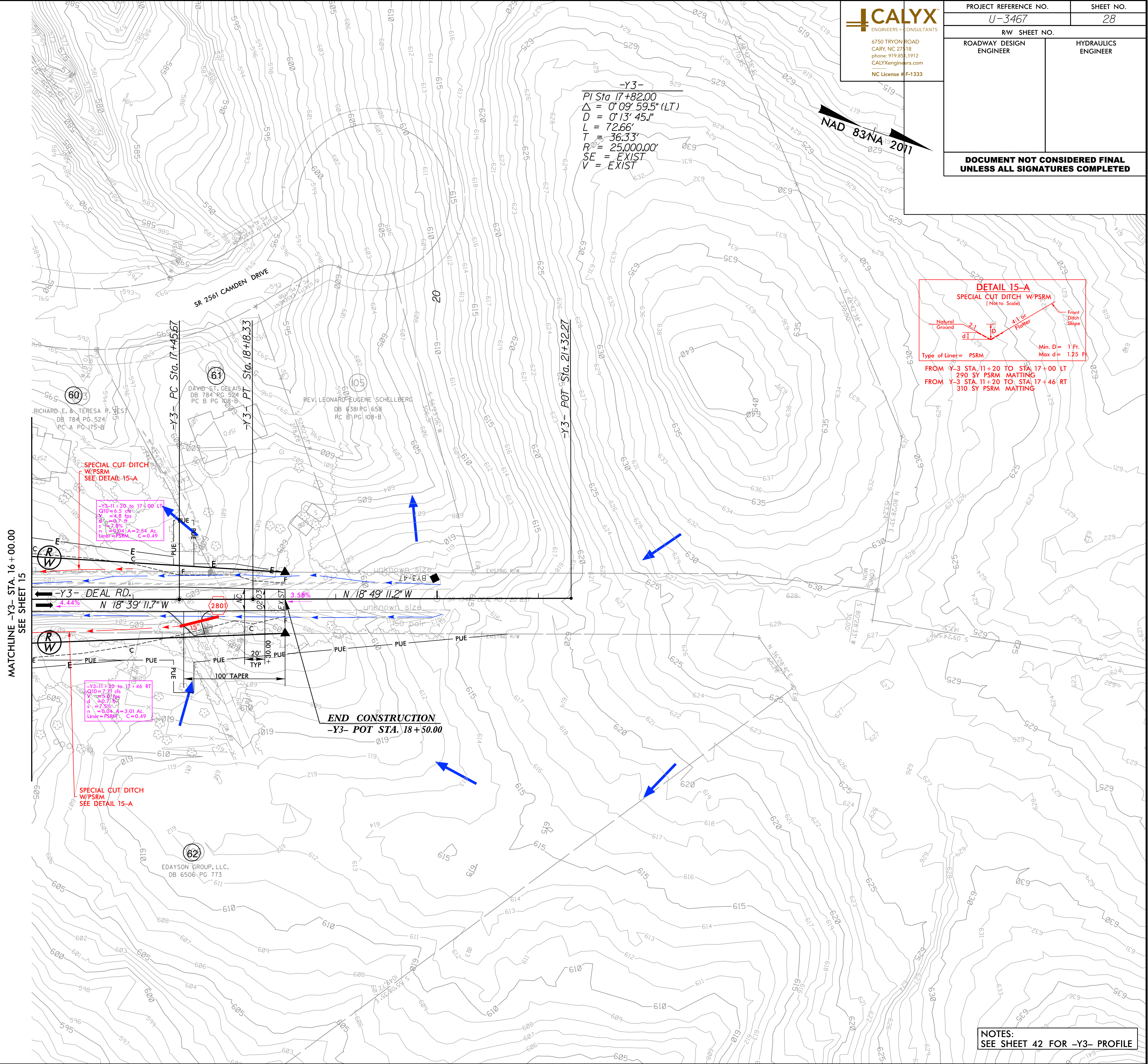
NOTES:
SEE SHEET 41 & 42 FOR -Y2- PROFILE



REVISIONS

CALYX
ENGINEERS + CONSULTANTS
6750 TRYON ROAD
CARY, NC 27518
phone: 919.851.1912
CALYXengineers.com
NC License # F-1333

PROJECT REFERENCE NO.		SHEET NO.
U-3467		28
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		



NOTES:
SEE SHEET 42 FOR -Y3- PROFILE

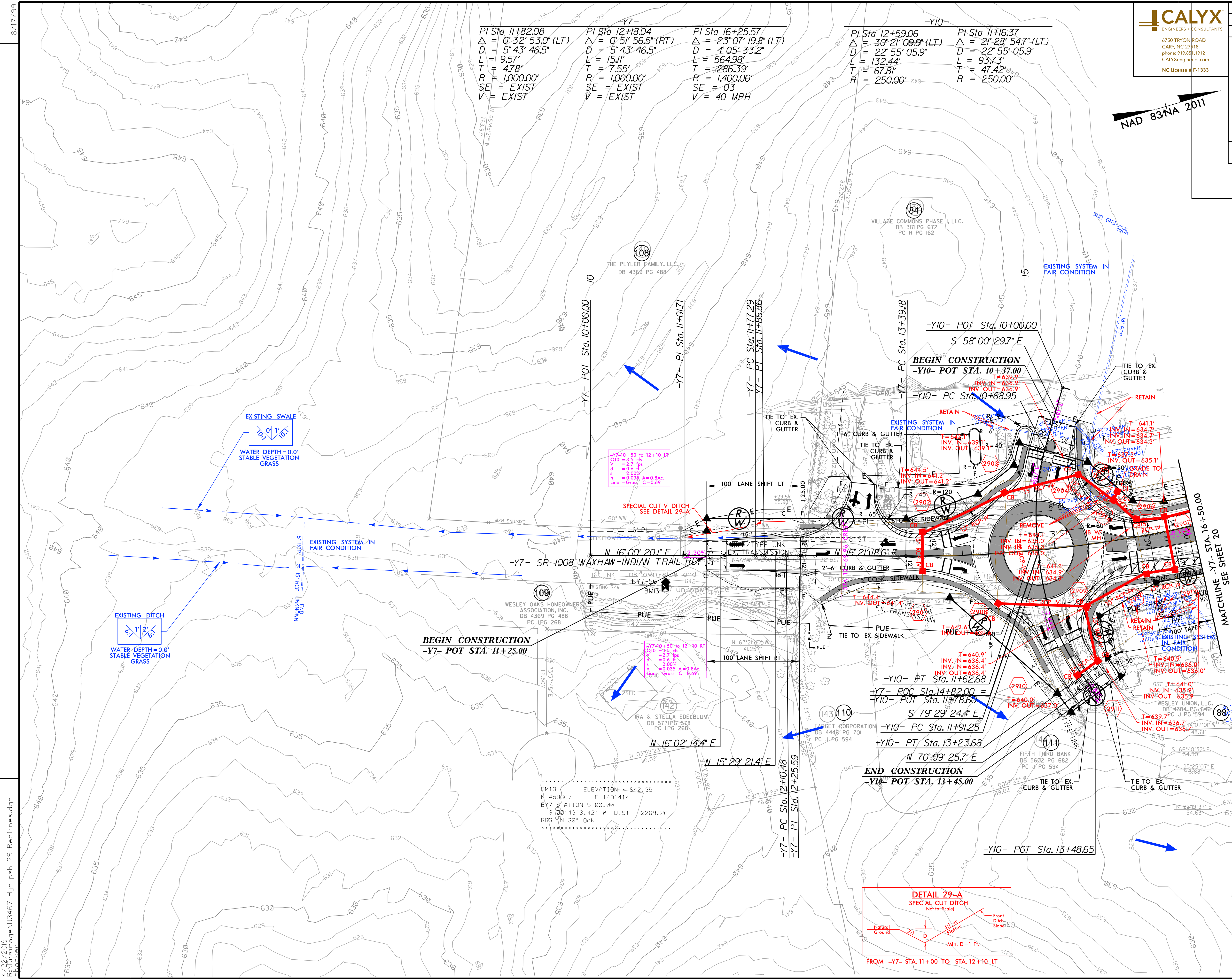
RIGHT OF WAY REVISION - 11/07/2018 - ADJUSTED RIGHT OF WAY ON PARCELS 88 AND 111.
RIGHT OF WAY REVISION - 12/17/2018 - MODIFIED PERMANENT UTILITY EASEMENT ON PARCELS 84, 88, 109, 110, AND 111. MODIFIED TEMPORARY CONSTRUCTION EASEMENT ON PARCELS 84, 88, AND 111.

REVISIONS



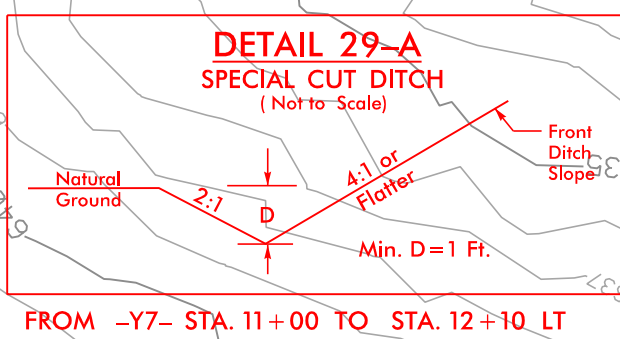
PROJECT REFERENCE NO.		SHEET NO.	
U-3467		29	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	

NAD 83/NA 2011



Y7-10+50 to 12+10 LT
Q10 = 3.5' ds
V = 2.7' lbs
d = 0.6' ft
s = 2.00%
n = 0.035 A = 0.8Ac
Liner = Grass C = 0.69

Y7-10+50 to 12+10 RT
Q10 = 3.5' ds
V = 2.7' lbs
d = 0.6' ft
s = 2.00%
n = 0.035 A = 0.8Ac
Liner = Grass C = 0.69



PAVED SHOULDERS
CONCRETE SIDEWALK /MEDIAN

NOTES:
SEE SHEET 44 FOR -Y7- PROFILE
SEE SHEET 46 FOR -Y10- PROFILE

