



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

October 11, 2010

US Army Corps of Engineers
Raleigh Regulatory Field Office
3331 Heritage Trade Dr., Suite 105
Wake Forest, NC 27587

Attention: Mr. John Thomas
NCDOT Coordinator, Division 9

Subject: **Application for a Modification to Section 404 Individual Permit and Individual Section 401 Water Quality Certification** for the widening of I-85 from north of SR 2120 (Long Ferry Road) in Rowan County to south of NC 150 in Davidson County. Federal Aid Project No. NHFIMF-85-3(197)81, WBS 34156.3.GV3, Division 9, TIP No. I-2304AC.

Debit \$570 from WBS 34156.3.GV3

Reference: Individual 404 Permit issued December 16, 2004, USACE Action ID 1998-21203
Individual 401 Certification No. 3455 issued March 19, 2004
Individual 401 Certification No. 3455 Modification issued November 22, 2004
Individual 404 Permit Extension issued April 1, 2009

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes a modification to the existing Individual Section 404 Permit and Section 401 Water Quality Certification for the above referenced project. Originally, the project was permitted with Sections AA and AB; however, the project is now being referred to as Sections AC and AD in order to accommodate contracts and financing. Section AC encompasses what was previously referred to as AA. Section AD includes the area previously referred to as AB. The Design Build contract was awarded on April 22, 2010 with anticipated start date in early fall 2010. Enclosed with this application are the revised permit drawings, and the Ecosystem Enhancement Program (EEP) letter.

The revised design does not compromise NCDOT's compliance with the existing permit conditions. The revision has been evaluated for compliance with the avoidance/minimization criteria and is in compliance with all previous issues, including the following:

- Protected Species
- Aquatic life passage
- FEMA compliance

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

TELEPHONE: 919-431-2000
FAX: 919-431-2001 or
919-431-2002

WEBSITE: WWW.NCDOT.ORG

LOCATION:
4701 ATLANTIC AVE.
SUITE 116
RALEIGH NC 27604

- Cultural resources

Permit Sites

The project is located in HUC 03040103 of the Yadkin River Basin. This modification application is specific to the remaining permit impact sites excluding Site 1 which was previously constructed on I-2511CB and Site 2 for which a permit modification application was submitted on September 1, 2010 and supplemental information submitted on September 13 and 23, 2010. This modification will result in the following total impacts due to construction of the proposed project:

- 1.01 acre Permanent Fill in Wetlands
- <0.01 acre of Excavation in Wetlands
- <0.01 acre Temporary Fill in Wetlands
- 0.06 acre Mechanized Clearing in Wetlands
- 0.18 acre Permanent Surface Water Impacts
- <0.01 acre Temporary Surface Water Impacts
- 1807 linear feet of Stream Impacts

This modification of the remaining sites (3-10, 12, and 13) results in a net decrease of 0.06 acres of permanent wetland impacts, decrease of 575 feet of permanent stream impacts, increase of less than 0.01 acres of temporary wetland impacts, and increase of less than 0.01 acres of temporary stream impacts. These changes are summarized in the table on page 4 of this application.

Site 1: There are no impacts at this location as this site was built under project I-2511CB.

Site 2: Site 2 was included in a previous permit modification application request and supplemental information. Site 2 is depicted on some permit drawings due to its location; however, this permit modification application is specific to remaining permit sites excluding Site 2.

Site 3: A slight reduction in stream impacts will occur at this location. Drainage pipes were adjusted slightly; however, grading associated with the Mechanically Stabilized Earth (MSE) wall prohibited placement of the pipe any closer to the MSE wall. As currently designed there will be 482 linear feet of stream impact. This site was previously permitted with 485 linear feet of stream impact. This is a 3 linear-foot reduction in stream impacts.

Site 4: The current design adjusted the angle of the pipes at the spring boxes and used an 18 inch corrugated steel pipe (CSP) from the roadway which was increased from the permitted 15 inch CSP. Site 4 has a 6-foot decrease in linear stream impacts from 190 linear feet to 184 linear feet based on the current design.

Site 5: A reduction in impacts will occur at this location due to adjustments made to the fill slope at this site. The current design will have 0.96 acre of wetland fill, 0.04 acre of mechanized clearing, and 550 linear feet of stream impacts. The original permit had 1.04 acre of wetland fill, 0.04 mechanized clearing, and 619 linear feet of stream impacts. This is 0.08 acre reduction in wetland fill and 69 linear feet of stream.

Site 6: The current design utilizes a 66 inch reinforced concrete pipe (RCP) into the box culvert, retains the existing 5x9 reinforced concrete box culvert (RCBC), and uses a 66 inch pipe tying to the ditch. This proposed design is the same as the previously permitted design with the exception that the original permit includes a 72 inch pipe tying to the ditch. The proposed design has 424 linear feet

of stream impact whereas the previous permit included 863 linear feet of impact. This is a 439-foot reduction of stream impact. This avoidance measure was made possible by removing a ditch section of stream between existing I-85 and Service Road D (SRD). Outlet protection was provided and the end of the existing 66 inch RCP and proposed 18 inch CSP.

Site 7: This site has no impact in the current design due to raising the grade at this location and eliminating the cut that would be necessary. The previous permit had <0.01 acre of wetland fill and <0.01 acre of mechanized clearing at this site. This is a reduction with wetland and mechanized clearing impacts.

Site 8: There was no permit drawing included in the original permit for Site 8. The permit impact summary table shows 97 linear feet of impact at this site. From the wetland file provided, the current design impacts 40 linear feet stream. This is a reduction of 57 linear feet of impact.

Site 9: The current design proposes a 48 inch RCP and the previous permit had a 42 inch pipe at this location. The proposed impact is 95 linear feet of stream, <0.01 acre of excavation in wetlands, and <0.01 acre of mechanized clearing. The 2004 permit included impacts of 128 linear feet of stream, <0.01 acre of wetland and <0.01 acre of mechanized clearing. Current design results in a decrease of 33 linear feet and similar wetland impacts.

Site 10: Site 10 includes the proposed US29/70 bridge over the Yadkin River. The previous permit did not include impacts in the summary table at this location; however, the permit drawings included a temporary work bridge. Proposed construction of the new US29/70 bridge will utilize the existing bridge at this location to construct the new bridge. Thus, the proposed construction at this location would reduce any impacts that would have been associated with the temporary work bridge. Construction of the new bridge will result in <0.01 acre of surface water impacts for the bridge piles and the bridge will be 32 feet wide. The existing bridge piles will be removed at the muck line in the river.

Site 11: There were no impacts at Site 11 in the original 2004 permit and the current design does not impact this site.

Site 12: This site is a newly added location that was not included in the previous permit. This site includes removal of the existing I-85 bridge over the Yadkin River and is adjacent to the wetland mitigation site associated with removal of the fill at the south end of the bridge approach. The removal of the existing bridge requires a work bridge. Construction of the work bridge will result in <0.01 acre of temporary fill in wetlands and <0.01 acre of temporary surface water impacts. The work bridge will consist of a mainline bridge with fingers that extend 10 feet beyond the footprint of the proposed I-85 bridge. The mainline bridge will be 20 spans and include 21 bents with 2 piles per bent. There will be 10 fingers with 3 bents per span. There will be no permanent wetland or stream impacts associated with removal of the existing I-85 bridge.

Site 13: (Formerly Site 1 of Section I-2304AB Permit) This site is now included in the I-2304AC project construction. The existing 2004 permit impact summary has 0.03 acre of wetland impacts and 0.02 acre of mechanized clearing. The current design has 0.05 acre of wetland impacts and 0.02 acre of mechanized clearing. This slight increase results from the need to tie the proposed SRD to the existing roadway until the I-2304AD project is built. The I-2304AD project is currently advertised and could possibly eliminate the need for this wetland impact. The impacts at this site are currently

included; however, they should be re-evaluated with the I-2304AD project for the option to further reduce impacts.

The following table presents the total impacts associated with the previous permit (2004), the current design impacts, and illustrates the differences. For specific site details, please see the permit impact summary table and permit drawings.

PERMIT IMPACT SUMMARY TABLE

Site No.	ORIGINAL PERMIT IMPACTS					REVISED IMPACTS						
	Perm. Fill In Wetland (ac)	Mech. Clearing In Wetland (ac)	Perm. SW Impacts (ac)	Fill In SW (Pond) (ac)	Existing Channel Impacts Perm. (ft)	Perm. Fill in Wetland (ac)	* Temp. Fill In Wetland (ac)	Mech. Clearing/ Excavat in Wetland (ac)	Perm. SW impact (ac)	*Temp SW impact (ac)	Existing Channel Impacts Perm. (ft)	Existing Channel Impacts Temp. (ft)
3			0.04		485				0.06		482	
4			0.01		190				0.01		184	
5	1.04	0.04	0.07		619	0.96		0.04	0.05		550	
6			0.13		863				0.05		424	
7	<0.01	<0.01										
8			0.01		97				<0.01		40	
9 **	<0.01	<0.01	0.01		128			<0.01	0.01		95	
10			0.05						<0.01		32	
12							<0.01			<0.01		38
13	0.03	0.02				0.05		0.02				
TOTALS***	1.07	0.06	0.32	0	2382	1.01	<0.01	0.06	0.18	<0.01	1807	38
NET CHANGE IN IMPACTS:						-0.06	+<0.0	0.00	-0.14	+<0.0	-575	+38

*There were no Temporary Impacts noted in the 2004 Permit.

**Site 9 revised impacts include both Mechanized Clearing and Excavation in Wetlands, totaling <0.01 ac.

*** Due to rounding, totals may reflect actual impacts of <0.005, where denoted as <0.01 ac in table.

Site 2 impacts were included in a previous permit modification submitted on September 1, 2010 and mitigation associated with that site was covered by the on-site mitigation with the Yadkin River Swamp Hardwood Restoration Site.

Mitigation

The roadway design has changed slightly since the original permit. Given the new design, there will be a total of 1.07 acres of riparian wetland impacts and 1807 feet of stream impacts. Please note, wetland impacts in the original permit were broken down into riverine and non-riverine. For this permit modification, all wetland impacts are considered to be riparian.

The original stream impacts in the 2004 permit were 4,455 linear feet for both the AA and AB sections. Of this 1,807 linear feet of stream impacts are contained in the AC (AA) section as modified in this application.

The Yadkin River Bridge Site is located with HUC 03040103 in Rowan County. The mitigation site occurs within Transportation Improvement Program (TIP) project I-2304AA. NCDOT will remove existing causeway fill in order to restore 2.74 acres of riverine wetlands. This project is still under construction as of 10/5/2010.

In order to offset unavoidable wetland impacts associated with I-2304AA and I-2304 AC, the Yadkin River Bridge Site will be debited of 0.21 acres of riverine wetland restoration for impacts at Site 2 on I-2304AC, 1.07 acres of riverine wetland restoration for revised impacts on I-2304AA, and 1.3 acres of riverine wetland restoration for hand clearing on I-2304AA. These debits are reflected in the debit ledger below.

River Basin	HUC	Mitigation Type	Available On-Site Credit	On-Site Assets	TIP Debit	TIP Debit	TIP Debit
					I-2304AC	I-2304AA	I-2304AA
Yadkin River	03040103	Riverine Wetland	2.74	0.16	.21	1.07 (revised)	1.3

Stormwater

Stormwater management has been incorporated across the project to the greatest extent practical. This project is 3.3 miles in length, including the bridges over the Yadkin River. Two miles of the project utilize portions of the existing I-85 pavement through this corridor; the remaining 1.2 miles of the project, including the 0.6 miles of bridge, are on new alignment which runs parallel to the existing I-85.

The project area does not lie within a water supply watershed, buffered basin, or an area with local buffer requirements. The area does contain a 303(d) listed stream (Yadkin River) and the sediment and erosion control on the project was designed for the 25-year storm. Erosion control measures include skimmer basins and wattles with polyacrylamide along with other more conventional tools. The Yadkin River will not have any direct discharges from the highway and the bridge will have an enclosed deck drainage system that will be discharged to dry detention basins on the south end of the bridge (see attached drawing). These dry detention basins collect waters from the bridge as well as portions of the L-line for treatment. A dry detention basin is also provided on the north end of the bridge to provide treatment for the L-line in that area. The dry detention basins provide treatment for 1.8 miles of the L-line (including the bridges over the Yadkin River). Grass swale treatment is also provided in series with the dry detention basins (grass swale comps are included). Thirty-six percent (36%) of the ditches on I-2304AC meet the grass swale criteria. Preformed scour holes are also provided at outlets that met pipe size and discharge requirements. Areas in which stormwater devices have not been provided were due to the topography not lending itself to incorporation of the devices or NCDOT right of way was not sufficient for inclusion.

The US 29/70 bridge will also have a closed drainage system; however, due to the presence of an historic boundary to the west and Norfolk Southern ROW actually extending across US 29/70, there was no opportunity for additional treatment beyond grass swale. Interchange areas typically allow for stormwater treatment but there are various limitations at the NC 150 interchange. The Quadrant A loop is in cut which does not allow for detention or even the use of a perched pipe. Quadrant B does not have a ramp or loop but is bounded by Service Road B (SRB). The area between SRB and the L line contains a grass covered noise berm which leaves no additional room for BMPs. Quadrant C has a jurisdictional stream running through the loop which leaves no room for measures. Quadrant D does not have a ramp or loop but is bounded by Service Road D. This area remains as a private property from the original ROW negotiations in 2003/2004.

REGULATORY APPROVALS

Section 404

Request is hereby made for a modification to the USACE Individual 404 Permit as required for the above-described activities.

Section 401

We are hereby requesting a modification to the Section 401 Water Quality Certification from the N.C. Division of Water Quality. In compliance with the NCAC Section 143 215.3D(e), we will provide \$570.00 to act as payment for processing the Section 401 permit modification previously noted in this application (See Subject line). We are providing five (5) copies of this modification request to the NCDWQ for their review and approval.

A copy of this permit modification application will be posted on the DOT website at: <http://www.ncdot.org/doh/preconstruct/pe/neu/permit.html>. If you have any questions or need additional information, please contact Sara Easterly at seeasterly@ncdot.gov or (919) 431-1605.

Sincerely,

E. J. Thorpe
for

Gregory J. Thorpe, Ph.D., Manager
Project Development and Environmental Analysis Branch

w/attachment

Mr. Brian Wrenn, NCDWQ (5 Copies)
Ms. Marla Chambers, NCWRC
Ms. Jennifer Derby, USEPA
Ms. Marella Buncick, USFWS

Mr. Drew Joyner, P.E., HEU Head
Mr. Clarence W. Coleman, P.E., FHWA
Ms. LeiLani Paugh, NEU
Mr. Randy Griffin, NEU
Mr. Eric Midkiff, P.E., PDEA

W/o attachment (see website for attachments)

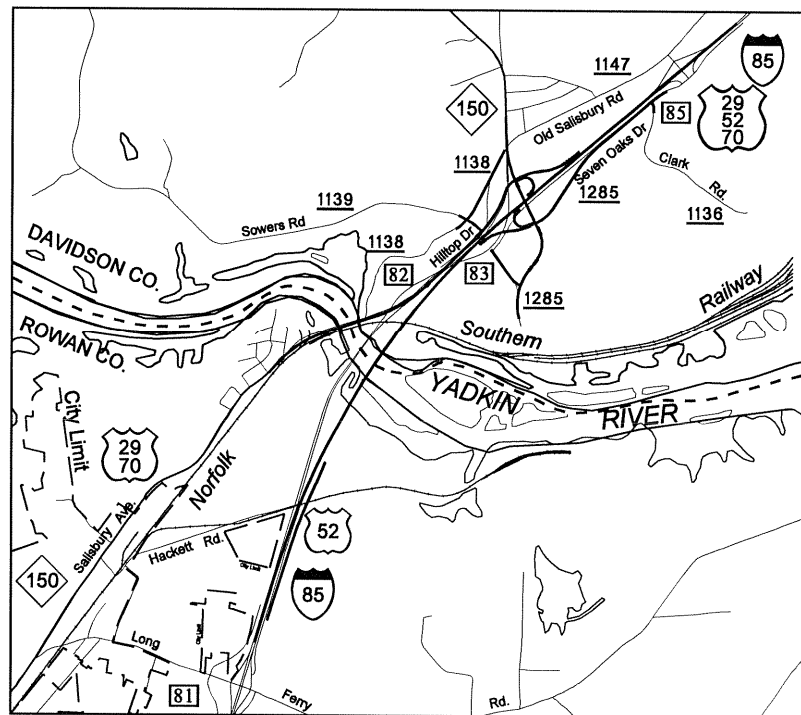
Dr. David Chang, P.E., Hydraulics
Mr. Mark Staley, Roadside Environmental
Mr. Dewayne Sykes, P.E., Utilities Unit
Mr. Greg Perfetti, P.E., Structure Design
Mr. S.P. Ivey, P.E., Division Engineer
Mr. Kent Boyer, DEO
Mr. Jay Bennett, P.E., Roadway Design
Mr. Majed Alghandour, P. E., Progr.and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Scott McLendon, USACE, Wilmington
Ms. Beth Harmon, EEP
Mr. Phillip Ayscue, NCDOT Ext. Audit Br.

NORTH CAROLINA

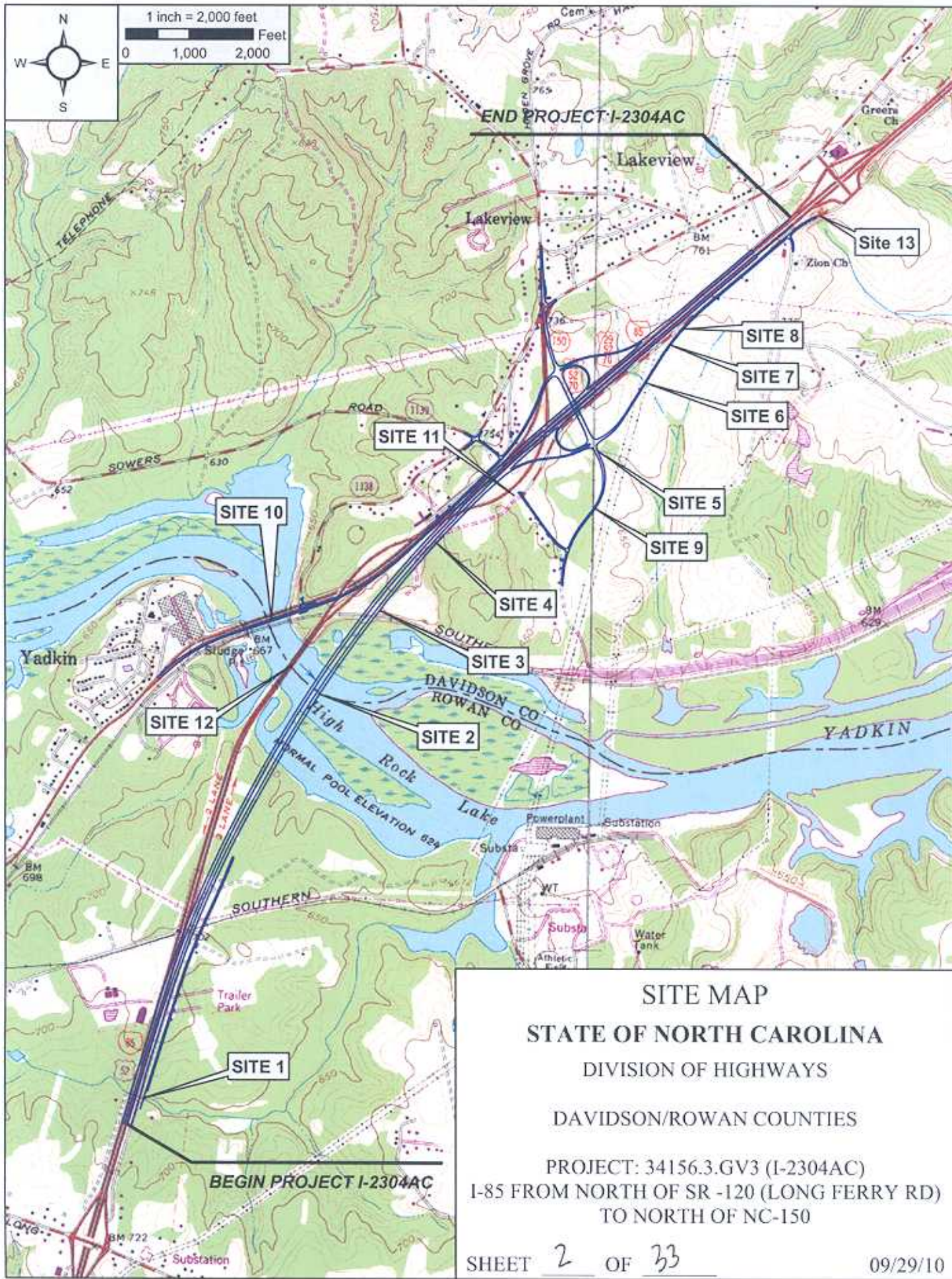
NAD 83

DAVIDSON COUNTY

ROWAN COUNTY



09 // 29 // 10



SITE MAP
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DAVIDSON/ROWAN COUNTIES
PROJECT: 34156.3.GV3 (I-2304AC)
I-85 FROM NORTH OF SR -120 (LONG FERRY RD)
TO NORTH OF NC-150
SHEET 2 OF 33 09/29/10

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES	SITE NO.
1	YADKIN INCORPORATED	P.O. BOX 688 BADIN, NC 28009	2,10
2	ALUMINUM COMPANY OF AMERICA	P.O. BOX 688 BADIN, NC 28009	2
3	TOLIVER ELECTRICAL COMPANY	P.O. BOX 1167 GRANITE QUARRY, NC 28072	3,4
4	JACK C. LITTLE, SUCCESSOR TRUSTEE U/E OF JUNE CARTER LITTLE	P.O. BOX 1420 LEXINGTON, NC 27293	5,6,9
5	SHED TIME, INC	5350 STATESVILLE BLVD. SALISBURY, NC 28147	6
6	EARNHARDT REAL PROPERTIES, LLC	1675 DALE EARNHARDT HWY 3 MOORESVILLE, NC 28115	7,8
7	ROBERT L. GRUBB TRUSTEE OF JUNE C. LITTLE	P.O. BOX 1420 LEXINGTON, NC 27293	13

NORTH CAROLINA

DIVISION OF HIGHWAYS
ROWAN/DAVIDSON COUNTY

PROJECT: 34156.1.1 / 34156.3.GV3
(I-2304AC)

RECONSTRUCTION OF I-85 FROM
NORTH OF SR 2120 IN
ROWAN COUNTY TO NORTH OF
NC 150 IN DAVIDSON COUNTY

SHEET 3 OF 33

09/29/10

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands	Temp. Fill In Wetlands	Excavation in Wetlands	Mechanized Clearing in Wetlands	Hand Clearing in Wetlands	Permanent SW impacts	Temp. SW impacts	Existing Channel Impacts Permanent	Existing Channel Impacts Temp.	Natural Stream Design
			(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ft)	(ft)
2	868+60 TO 897+27 -L-	BRIDGE	0.07	0.02		0.14	6.59	<0.01	0.02	90	68	
3	900+00 -L-	36" RCP						0.06		482		
4	909+45 TO 910+85 -L-	8" PVC						0.01		184		
5	9+00 -LPC-	48" RCP	0.96			0.04		0.05		550		
6	952+60 -L-	66" RCP						0.05		424		
7	27+10 -SRD-	Roadway Fill										
8	33+75 -SRD-	36" RCP						<0.01		40		
9	50+50 -Y1-	48" RCP/Roadway Cut			<0.01	<0.01		0.01		95		
10	31+07 TO 37+79 -SRB-	BRIDGE						<0.01		**32		
11												
12	Existig I-85 Bridge	Temp. Work Bridge		<0.01					<0.01		38	
13	59+00 -SRD- RT	Roadway Fill	0.05			0.02						
TOTALS:			1.08	0.02	<0.01	0.20	6.59	0.18	0.02	1807	106	0

** From bridge bent = 18.84 square feet.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

ROWAN/DAVIDSON COUNTY
WBS - 34156.1.1 (I-2304AC)

SHEET OF

4 of 33

10/4/2010

09/28/09

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

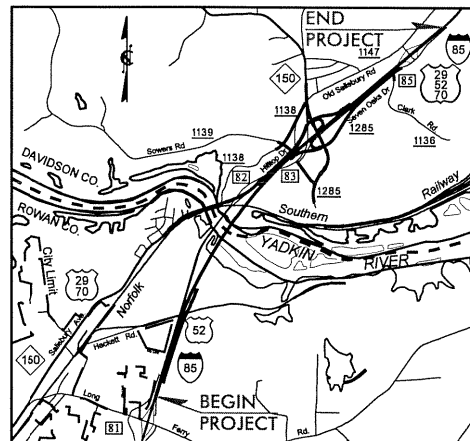
ROWAN & DAVIDSON COUNTY

LOCATION: FROM -E- STA. 807+00 TO 980+00

RECONSTRUCTION OF I-85 FROM NORTH OF SR 2120
IN ROWAN COUNTY TO NORTH OF NC 150 IN DAVIDSON COUNTY

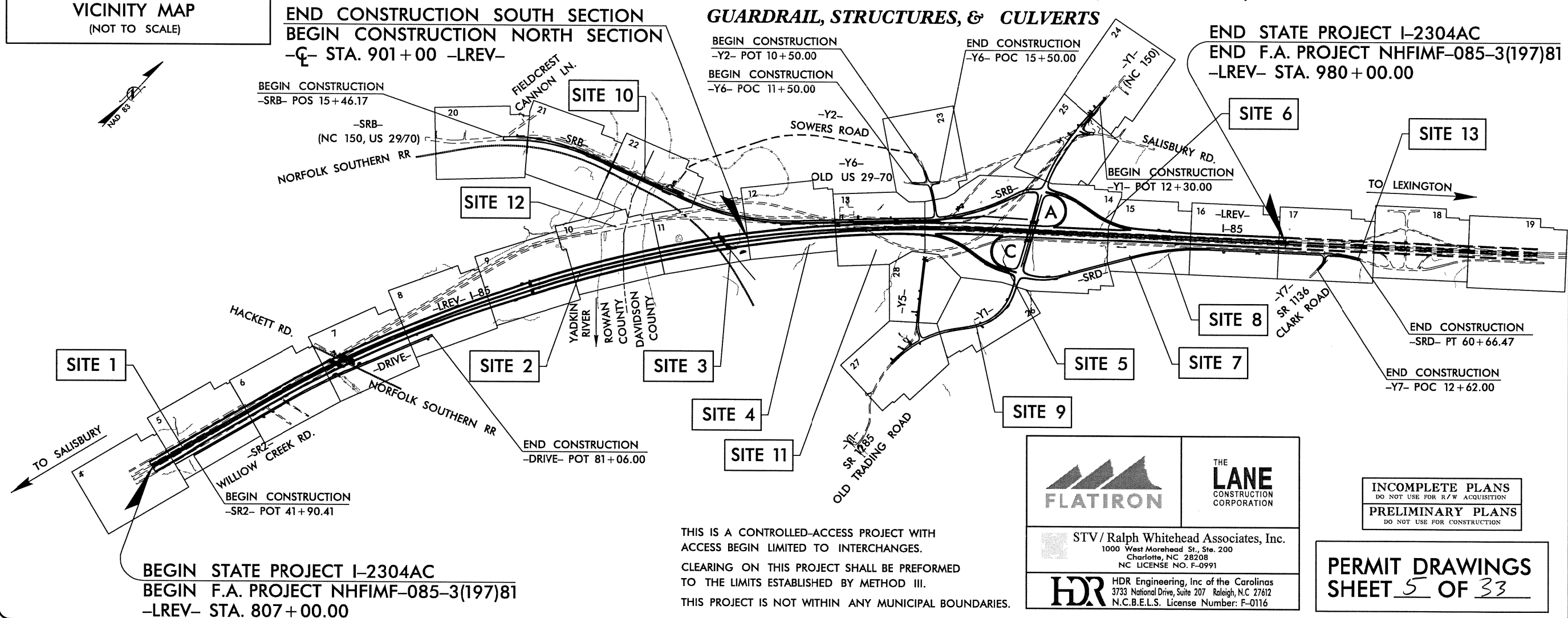
TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING, RESURFACING,

GUARDRAIL, STRUCTURES, & CULVERTS



VICINITY MAP
(NOT TO SCALE)

END CONSTRUCTION SOUTH SECTION
BEGIN CONSTRUCTION NORTH SECTION
-E- STA. 901+00 -LREV-



BEGIN STATE PROJECT I-2304AC
BEGIN F.A. PROJECT NHFIMF-085-3(197)81
-LREV- STA. 807+00.00

THIS IS A CONTROLLED-ACCESS PROJECT WITH
ACCESS BEGIN LIMITED TO INTERCHANGES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED
TO THE LIMITS ESTABLISHED BY METHOD III.
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.



STV / Ralph Whitehead Associates, Inc.
1000 West Morehead St., Ste. 200
Charlotte, NC 28208
NC LICENSE NO. F-0991

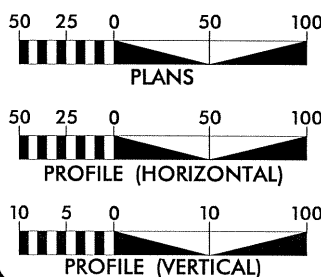


HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612
N.C.B.E.L.S. License Number: F-0116

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

PERMIT DRAWINGS
SHEET 5 OF 33

GRAPHIC SCALES



DESIGN DATA

ADT 2009 = 58,800
ADT 2035 = 109,200
DHV = 10 %
D = 55 %
T = 25 % *
V = 70 MPH
RURAL INTERSTATE
* TTST=19% DUAL=6%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT I-2304AC = 2.70 MI.
LENGTH STRUCTURE TIP PROJECT I-2304AC = 0.58 MI.
TOTAL LENGTH TIP PROJECT I-2304AC = 3.28 MI.

DIVISION OF HIGHWAYS

1000 Birch Ridge Dr., Raleigh NC, 27610

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:
APRIL 22, 2010

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN
ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA



STATE HIGHWAY D

TIP PROJECT: I-2304AC

CONTRACT: C 202383

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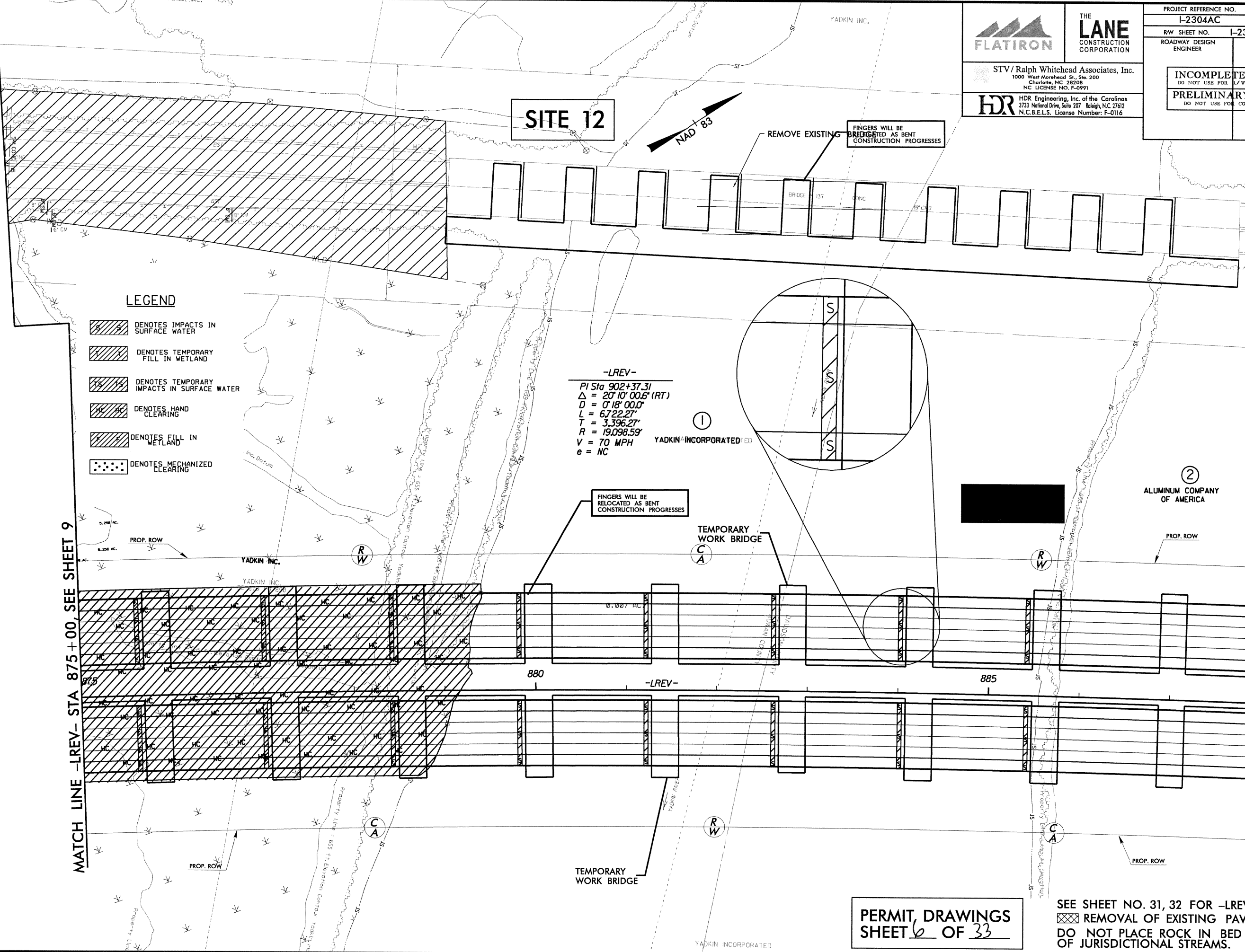
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REVISIONS

MATCH LINE -LREV- STA 875 + 00, SEE SHEET 9

MATCH LINE -LREV- STA 888 + 00, SEE SHEET 11



LEGEND

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

-LREV-
PI Sta 902+37.31
 $\Delta = 20' 10' 00.5''$ (RT)
 $D = 0' 18' 00.0''$
 $L = 6722.27'$
 $T = 3396.27'$
 $R = 19098.59'$
 $V = 70$ MPH
 $e = NC$

PERMIT DRAWINGS
SHEET 6 OF 33

SEE SHEET NO. 31, 32 FOR -LREV- PROFILE.
 REMOVAL OF EXISTING PAVEMENT
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.



THE
LANE
CONSTRUCTION
CORPORATION

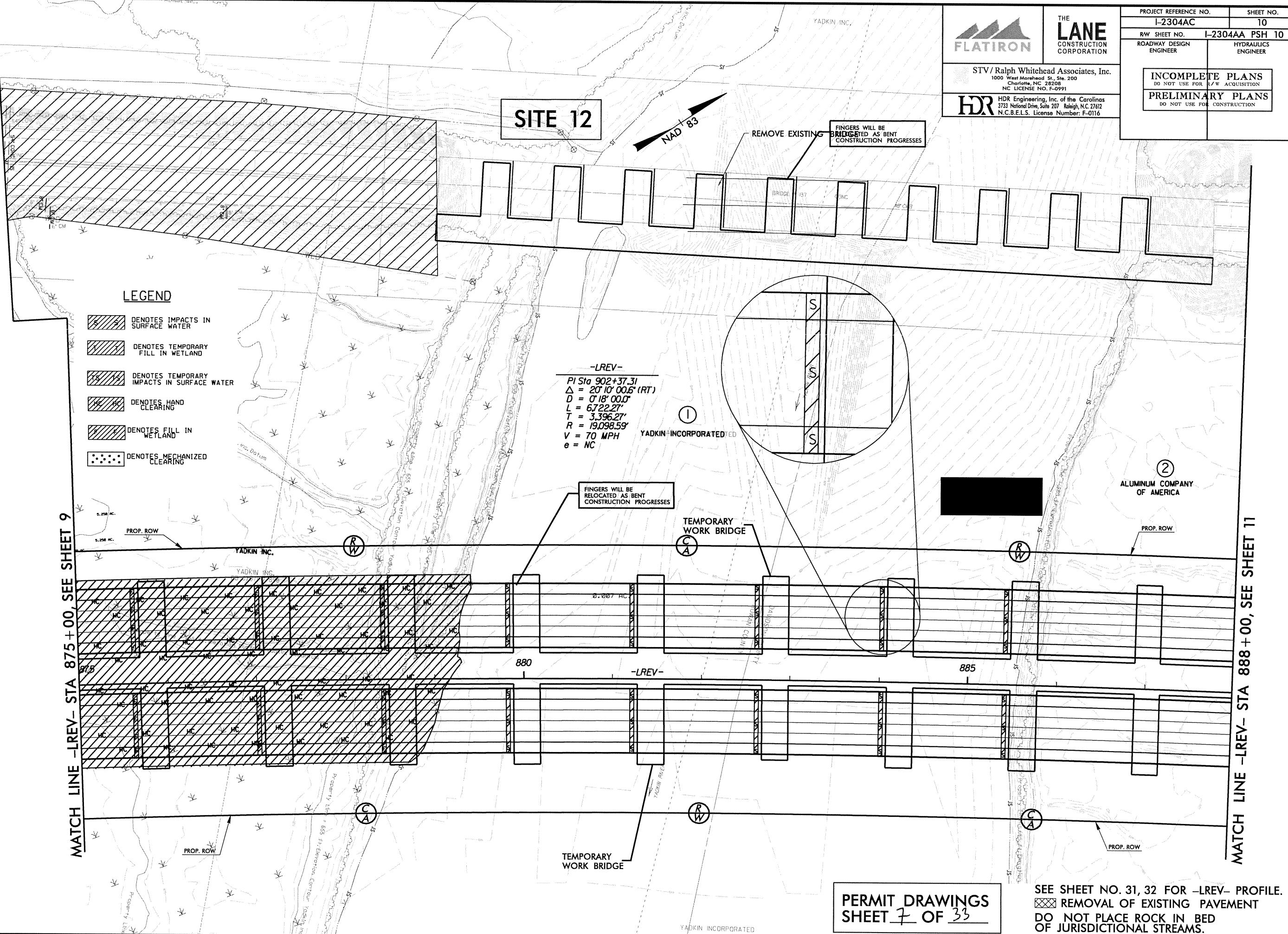
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Charlotte, NC 28208
NC LICENSE NO. F-0991

HDR HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, NC 27612
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.	SHEET NO.
I-2304AC	10
RW SHEET NO.	I-2304AA PSH 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR L/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PLOT DRIVER: NCDOT.pdf_color_eng-100.plt
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SCALE: 1:100
FILE: Ralph.Whitehead.and.Associates\RW\H.Flatiron\Lane.Yadkin.I.85\12304AC\Hydraulics\PERMITS.Environmental\Drawings\12304AC.HYD.PR\PLANS\12304AC.dgn

REVISIONS



- LEGEND**
- DENOTES IMPACTS IN SURFACE WATER
 - DENOTES TEMPORARY FILL IN WETLAND
 - DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 - DENOTES HAND CLEARING
 - DENOTES FILL IN WETLAND
 - DENOTES MECHANIZED CLEARING

-LREV-
PI Sta 902+37.31
Δ = 20°10'00.5" (RT)
D = 0°18'00.0"
L = 6722.27'
T = 3396.27'
R = 19098.59'
V = 70 MPH
e = NC

PERMIT DRAWINGS
SHEET 7 OF 33

SEE SHEET NO. 31, 32 FOR -LREV- PROFILE.
REMOVAL OF EXISTING PAVEMENT
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

STV / Ralph Whitehead Associates, Inc.
1000 West Morehead St., Ste. 200
Charlotte, NC 28208
NC LICENSE NO. F-9991

THE LANE CONSTRUCTION CORPORATION

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.	SHEET NO.
I-2304AC	10
R/W SHEET NO.	I-2304AA PSH 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

LEGEND

-  DENOTES TEMPORARY FILL IN WETLAND
 DENOTES FILL IN WETLAND
 DENOTES HAND CLEARING
 DENOTES MECHANIZED CLEARING

MATCH LINE -REV- STA 888+00, SEE SHEET 10

PERMIT DRAWINGS
SHEET 9 OF 33

SEE SHEET NO. 32, 33 FOR -LREV- PROFILE.
SEE SHEET NO. 42 FOR -SRBREV- PROFILE.
REMOVAL OF EXISTING PAVEMENT
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

ALUMINUM COMPANY
OF AMERICA

DECK DRAINS
OUTSIDE SHOULDERS:
BEGIN STA: 868+75
END STA: 889+75
6" DRAINS @ 12' SPACING
TRUNK LINE
24" UV RESISTANT PVC

FINGERS WILL BE
RELOCATED AS BENT
CONSTRUCTION PROGRESSES

TEMPORARY
WORK BRIDGE

TEMPORARY WORK BRIDGE

MATCH LINE -LREV- STA 901+00, SEE SHEET 12

MATCH LINE -SRBREV-
STA 53+00,
SEE SHEET 12

GRASS SWALE DATA
DA = 3.61 AC
SLOPE = 2.18%
L REQ. = 361.20 FT
L PRO. = 650.00 FT
Q2 = 9.45 CFS
V2 = 3.12 FPS
Q10 = 12.14 CFS
V10 = 3.32 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.89 AC
SLOPE = 4.00%
L REQ. = 88.60 FT
L PRO. = 651 FT
Q2 = 2.70 CFS
V2 = 2.86 FPS
Q10 = 3.47 CFS
V10 = 3.05 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 1.80 AC
SLOPE = 5.05%
L REQ. = 180.00 FT
L PRO. = 191.00 FT
Q2 = 3.14 CFS
V2 = 3.98 FPS
Q10 = 4.03 CFS
V10 = 4.29 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 0.13 AC
SLOPE = 0.50%
L REQ. = 13.00 FT
L PRO. = 64.00 FT
Q2 = 0.23 CFS
V2 = 0.89 FPS
Q10 = 0.29 CFS
V10 = 0.94 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.80 AC
SLOPE = 5.68%
L REQ. = 179.60 FT
L PRO. = 158.00 FT
Q2 = 3.13 CFS
V2 = 4.14 FPS
Q10 = 4.02 CFS
V10 = 4.47 FPS
SIDE SLOPES = 2

ACCESS TO HAZARDOUS
SPILL BASINS PROVIDED
AROUND GUARDRAIL

DRY DETENTION/
HAZARDOUS SPILL BASIN
35'W X 110'X 4' 5"D
BOTTOM EL.=662.0'
MIN. VOLUME=19,207
VOL. PROVIDED=19,218
SPILLWAY ELEV=667.0'

GRASS SWALE DATA
DA = 1.40 AC
SLOPE = 2.33%
L REQ. = 139.80 FT
L PRO. = 682.00 FT
Q2 = 4.27 CFS
V2 = 2.32 FPS
Q10 = 5.48 CFS
V10 = 2.47 FPS
SIDE SLOPES = 10

TOLIVER ELECTRICAL
COMPANY, INC



FLATIRON

THE
LANE
CONSTRUCTION
CORPORATION

STV/Ralph Whitehead Associates, Inc.
1000 West Morehead St., Ste. 200
Charlotte, NC 28208
NC LICENSE NO. E-0991

HDR HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.		SHEET NO.	
I-2304AC		11	
R/W SHEET NO.		I-2304AA PSH 11	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	

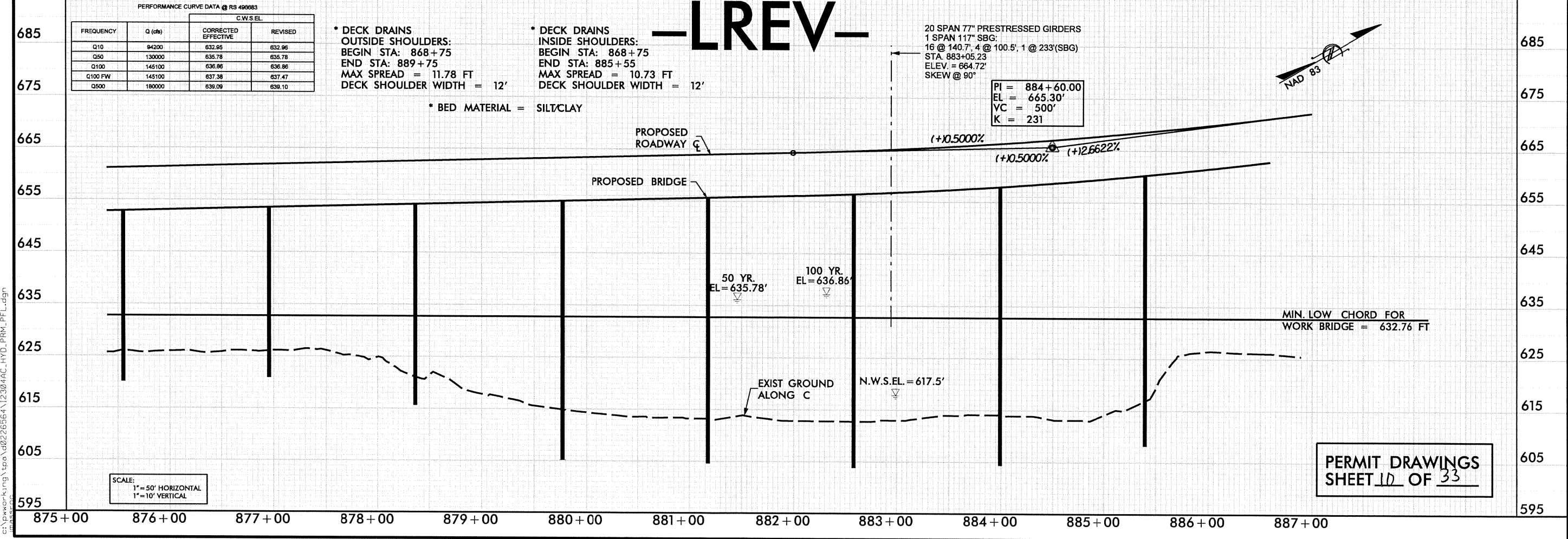
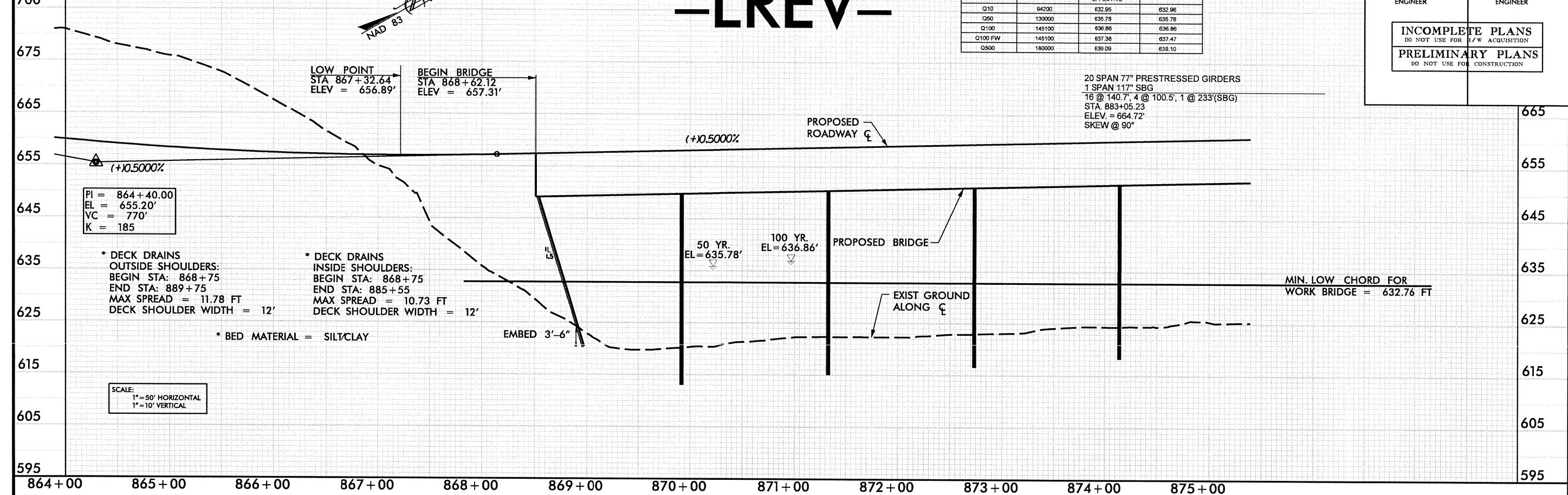
INCOMPLETE PLANS

DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS

DO NOT USE FOR CONSTRUCTION

5/28/99



5/28/99

PERFORMANCE CURVE DATA @ RS 496683			
C.W.S. EL.			
FREQUENCY	Q (cfs)	CORRECTED EFFECTIVE	REVISED
Q10	94200	632.95	632.96
Q50	130000	635.78	635.78
Q100	145100	636.86	636.86
Q100 FW	145100	637.38	637.47
Q500	180000	639.09	639.10

* DECK DRAINS
OUTSIDE SHOULDERS:
BEGIN STA: 868+75
END STA: 889+75
MAX SPREAD = 11.78 FT
DECK SHOULDER WIDTH = 12'

* DECK DRAINS
INSIDE SHOULDERS:
BEGIN STA: 868+75
END STA: 885+55
MAX SPREAD = 10.73 FT
DECK SHOULDER WIDTH = 12'

* BED MATERIAL = SILT/CLAY

-LREV-

END BRIDGE
STA 897+48.33
ELEV = 699.60'

(+12.6622%

(+12.6622%

20 SPAN 77" PRESTRESSED GIRDERS
1 SPAN 117" SBG:
16 @ 140.7', 4 @ 100.5', 1 @ 233'(SBG)
STA. 883+05.23
ELEV. = 664.72'
SKEW @ 90°

PROPOSED
ROADWAY ∇

PROPOSED
BRIDGE

PROPOSED 117" SBG

MSE WALL

EXIST GROUND
ALONG ∇

EMBED 1'-6"

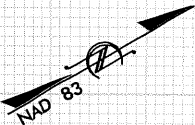
50 YR.
EL = 635.78'

100 YR.
EL = 636.86'

MIN. LOW CHORD FOR
WORK BRIDGE = 632.76 FT

SCALE:
1" = 50' HORIZONTAL
1" = 10' VERTICAL

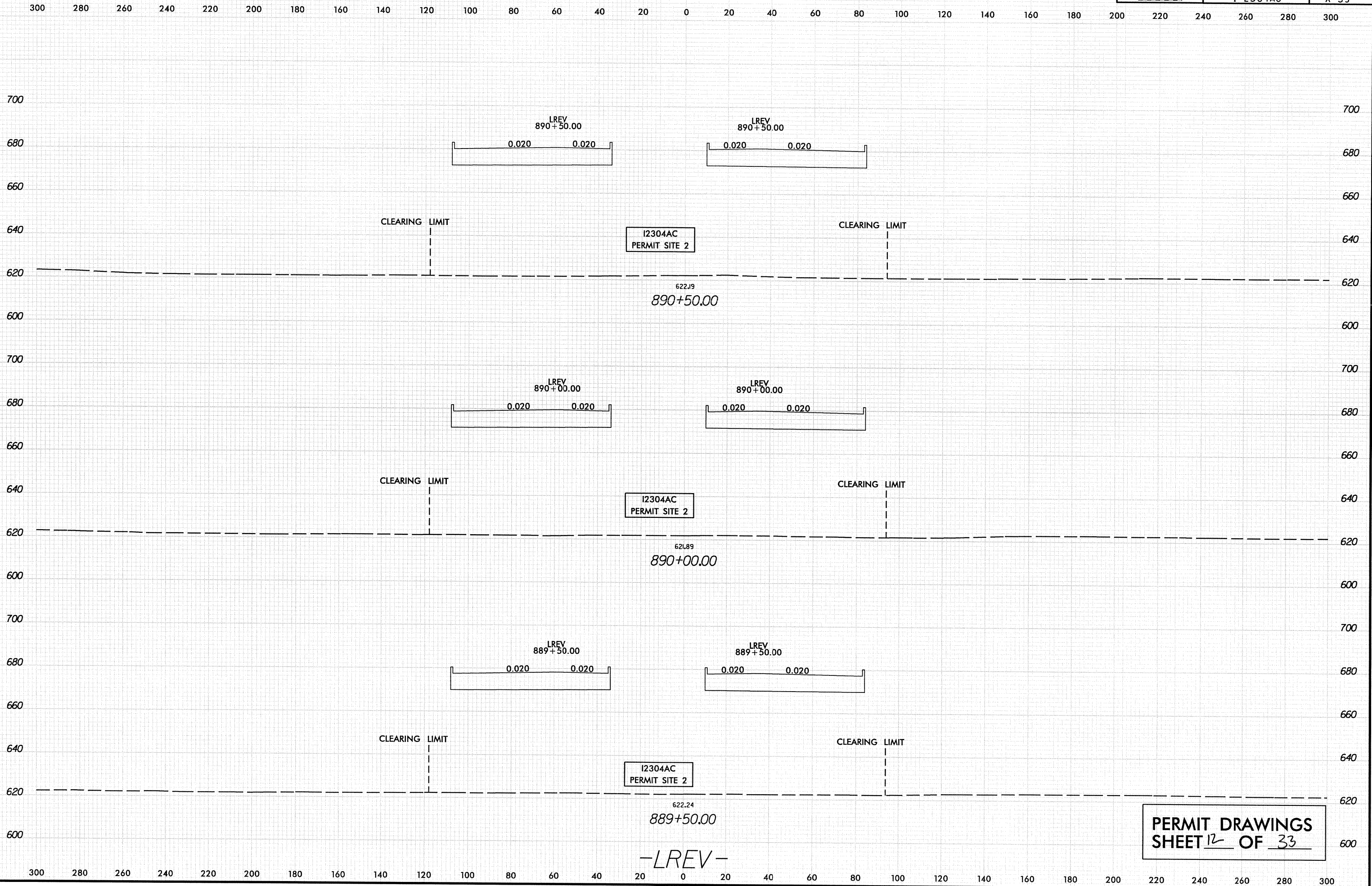
PROFILE ALONG STRUCTURE

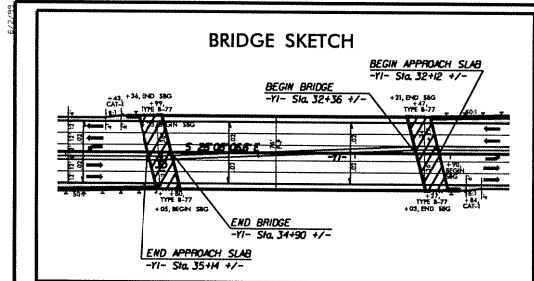
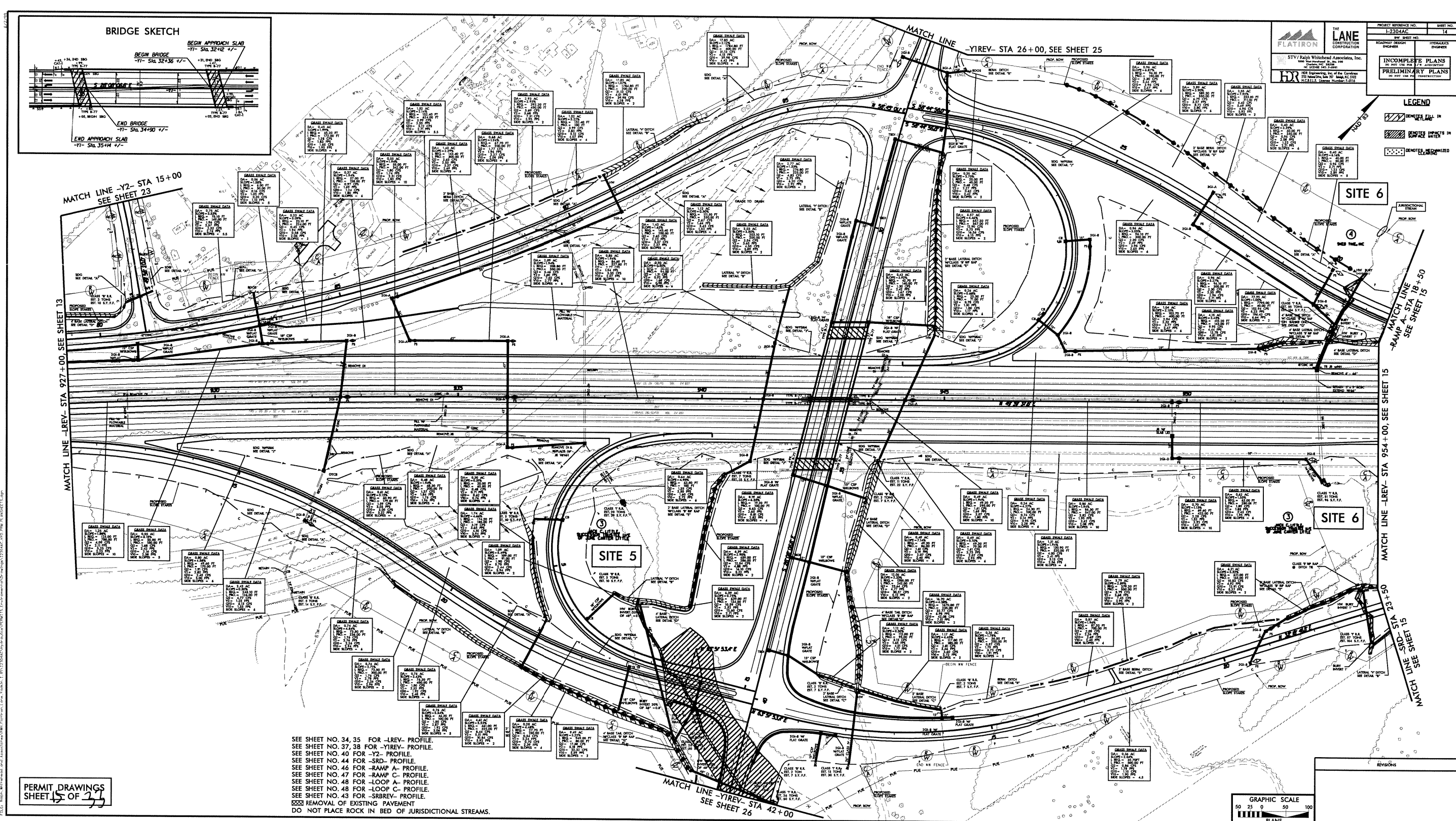


887+00 888+00 889+00 890+00 891+00 892+00 893+00 894+00 895+00 896+00 897+00 898+00

PERMIT DRAWINGS
SHEET 11 OF 33

8/23/99





THE LANE
CONSTRUCTION CORPORATION

STV / Ralph Whitehead Associates, Inc.
1000 Westwood Blvd., Suite 100
Beverly Hills, CA 90210
Tel: 310.274.1100
Fax: 310.274.1101

PROJECT REFERENCE NO. 1-2304AC
SHEET NO. 14

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

INCOMPLETE PLANS
PRELIMINARY PLANS

LEGEND

[Symbol]	DEMOLITION WALL IN
[Symbol]	DEMOLITION UTILITY IN
[Symbol]	DEMOLITION RETAINMENT WALL IN

SEE SHEET NO. 34, 35 FOR -LREV- PROFILE.
SEE SHEET NO. 37, 38 FOR -YREV- PROFILE.
SEE SHEET NO. 40 FOR -Y2- PROFILE.
SEE SHEET NO. 44 FOR -SRD- PROFILE.
SEE SHEET NO. 46 FOR -RAMP A- PROFILE.
SEE SHEET NO. 47 FOR -RAMP C- PROFILE.
SEE SHEET NO. 48 FOR -LOOP A- PROFILE.
SEE SHEET NO. 48 FOR -LOOP C- PROFILE.
SEE SHEET NO. 49 FOR -SRREV- PROFILE.
REMOVAL OF EXISTING PAVEMENT
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

PERMIT DRAWINGS
SHEET 15 OF 33

8/17/95



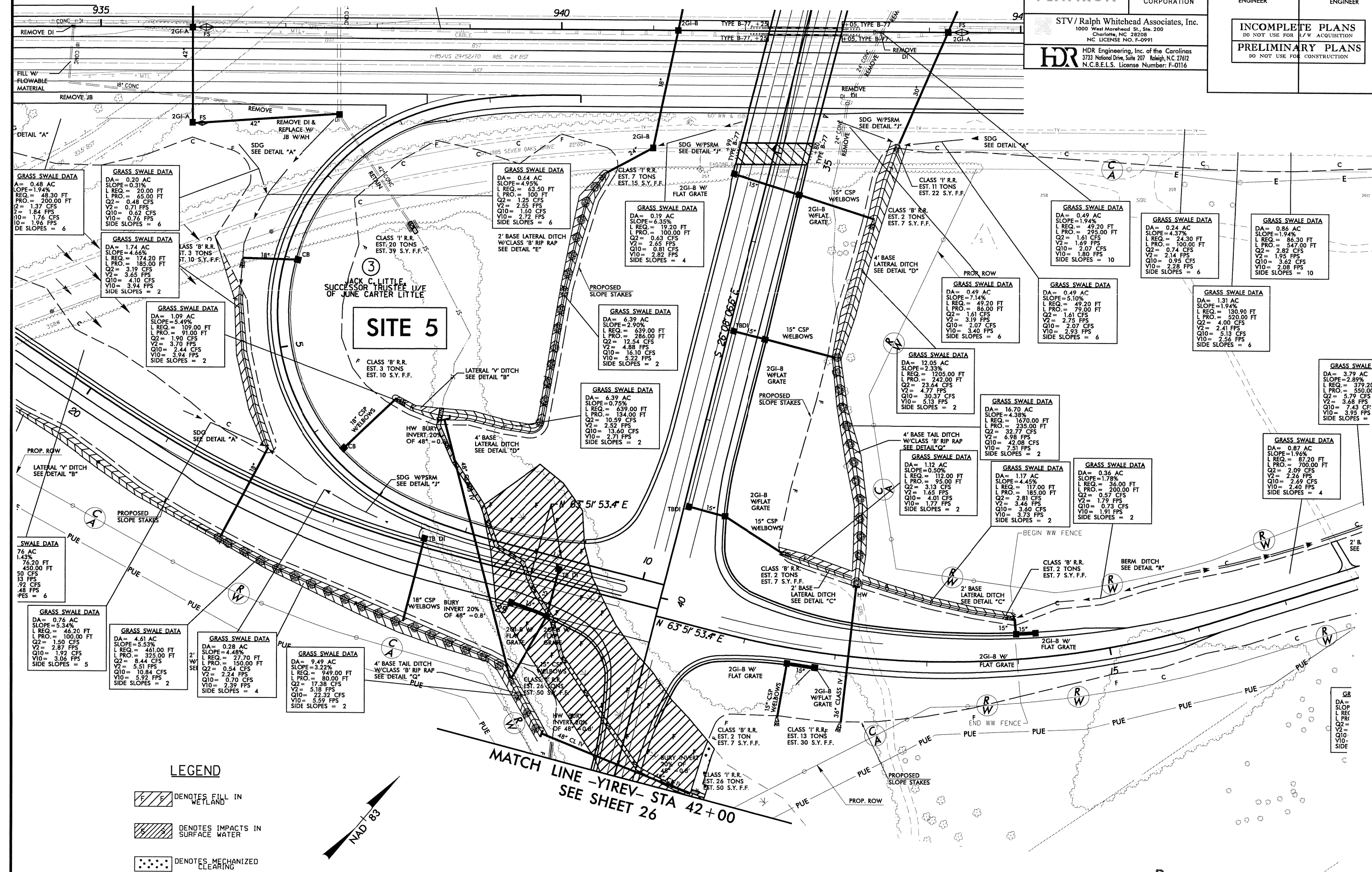
THE
LANE
CONSTRUCTION
CORPORATION

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Charlotte, NC 28208
NC LICENSE NO. F-0991



HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, NC 27602
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.	SHEET NO.
I-2304AC	14A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



GRASS SWALE
DA = 3.79 AC
SLOPE = 1.94%
L REQ. = 379.20 FT
L PRO. = 550.00 FT
Q2 = 5.79 CFS
Q10 = 3.68 CFS
Q10 = 7.43 CFS
V10 = 3.95 FPS
SIDE SLOPES =

GRASS SWALE DATA
DA = 0.87 AC
SLOPE = 1.96%
L REQ. = 87.20 FT
L PRO. = 700.00 FT
Q2 = 2.09 CFS
Q10 = 2.69 CFS
Q10 = 2.40 CFS
V10 = 2.40 FPS
SIDE SLOPES = 4

GRASS SWALE DATA
DA = 0.36 AC
SLOPE = 1.78%
L REQ. = 36.00 FT
L PRO. = 200.00 FT
Q2 = 0.57 CFS
Q10 = 0.73 CFS
V10 = 1.91 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.17 AC
SLOPE = 4.45%
L REQ. = 117.00 FT
L PRO. = 185.00 FT
Q2 = 2.81 CFS
Q10 = 3.46 FPS
V10 = 3.73 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.12 AC
SLOPE = 0.50%
L REQ. = 112.00 FT
L PRO. = 95.00 FT
Q2 = 3.13 CFS
Q10 = 1.65 FPS
Q10 = 4.01 CFS
V10 = 1.77 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 12.05 AC
SLOPE = 2.33%
L REQ. = 1205.00 FT
L PRO. = 242.00 FT
Q2 = 23.64 CFS
Q10 = 4.77 FPS
V10 = 5.13 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 5.10%
L REQ. = 49.20 FT
L PRO. = 49.00 FT
Q2 = 1.61 CFS
Q10 = 2.75 FPS
V10 = 2.93 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 7.14%
L REQ. = 49.20 FT
L PRO. = 86.00 FT
Q2 = 1.61 CFS
Q10 = 3.19 FPS
V10 = 3.40 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 295.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

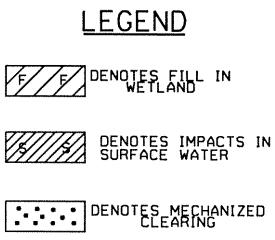
GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 100.00 FT
Q2 = 1.61 CFS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

LEGEND

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

Permit Drawing
Sheet 17 of 33

PLOT DRIVER: NCDOT_permit.mts, NOCON.tbl
PENTABLE: NCDOT_permit.mts, NOCON.tbl
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USER: jmoseroc DATE: 9/10/2010
FILE: Ralph Whitehead and Associates\RW\Flatiron Lane\Drawings\I-2304AC\HYD\PRM\PLANSHEET15.dgn



Permit Drawing
Sheet 18 of 33

LEGEND

DENOTES IMPACTS IN
SURFACE WATER

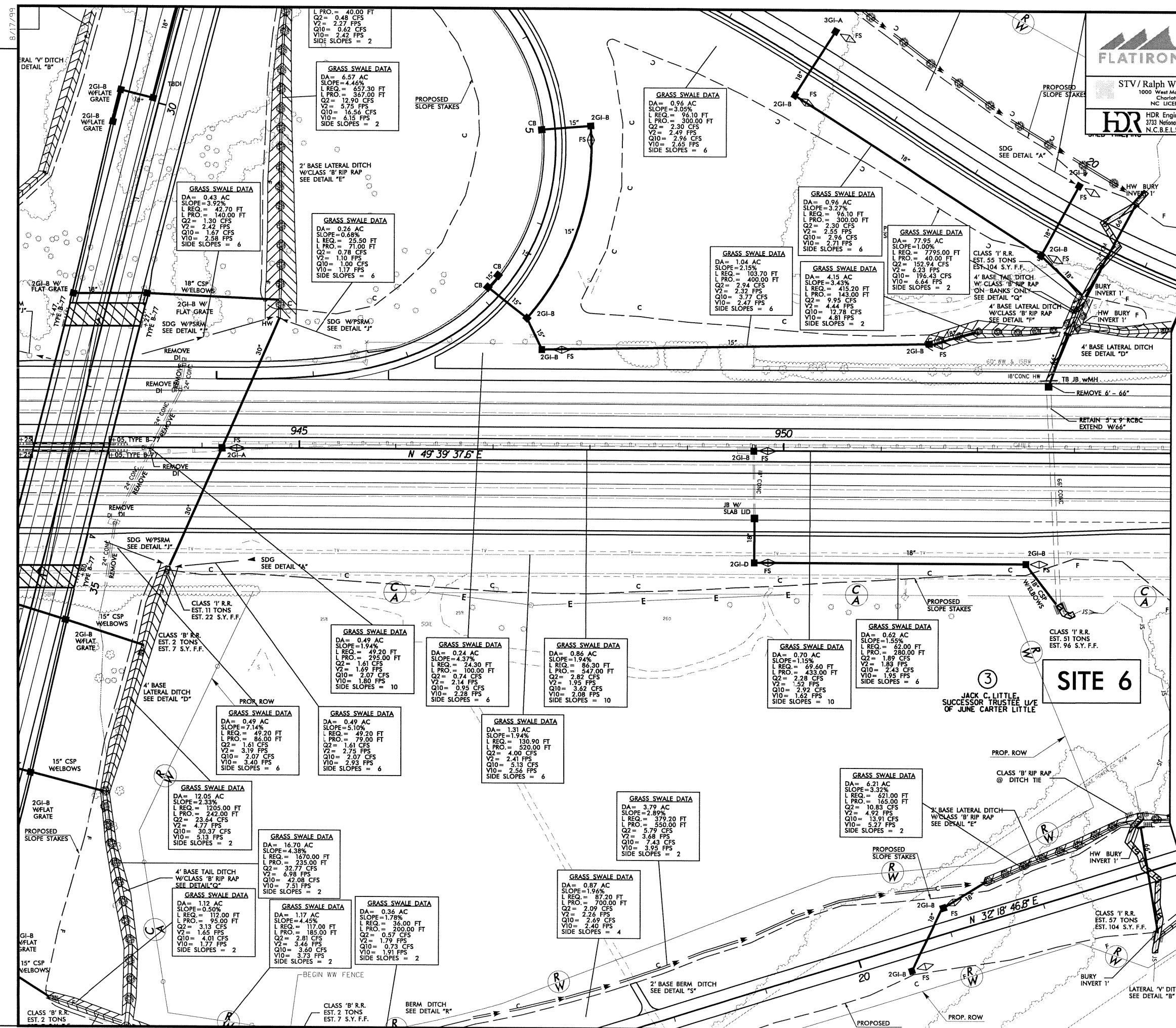
NAD 83

Plan view of the bridge deck showing the match line and stationing. The deck is divided into sections by a match line. The stationing is indicated as STA 18+50 and SEE SHEET 15.

MATCH LINE -LREV- STA 954+00, SEE SHEET 15

MATCH LINE
 STA 23+50
 -SRD- STA SHEET 15
 SEE

Permit Drawing
Sheet 19 of 33



PLOT DRIVER:	NCDOT.pdf,color_eng.100.plt
PENTABLE:	NCDOT_permits.NOCON.tbl
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TIME:	7:42:56 AM
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REVISIONS	

REVISIONS

LEGEND

 DENOTES IMPACTS IN SURFACE WATER

NAD-83

MATCH LINE
-RAMP A- STA 18+50
SEE SHEET 15

MATCH LINE -LREV- STA 954+00, SEE SHEET 15

LINE 23+50
MATCH STA 15
-SRD- SEE SHEET

Permit Drawing
Sheet 20 of 33



FLATIRON

THE
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N.C.B.E.L.S. License Number: F-0116

HX

R HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612
N.C.B.E.L.S. License Number: F-0116

GRASS SWALE DATA
DA = 0.96 AC
SLOPE = 3.05%
L REQ. = 96.10 FT
L PRO. = 300.00 FT
Q2 = 2.30 CFS
Y2 = 2.49 FPS
Q10 = 2.96 CFS
Y10 = 2.65 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.96 AC
SLOPE = 3.27%
L REQ. = 96.10 FT
L PRO. = 300.00 FT
Q2 = 2.30 CFS
V2 = 2.55 FPS
Q10 = 2.96 CFS
V10 = 2.71 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 77.95 AC
SLOPE = 1.00%
L REQ. = 7795.00 FT
L PRO. = 40.00 FT
Q2 = 152.94 CFS
V2 = 6.23 FPS
Q10 = 196.43 CFS
V10 = 6.64 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.04 AC
SLOPE = 2.15%
L REQ. = 103.70 FT
L PRO. = 400.00 FT
Q2 = 2.94 CFS
V2 = 2.32 FPS
Q10 = 3.77 CFS
V10 = 2.47 FPS
SIDE SLOPES = 6

GRASS SWALE DATA

DA = 6.57 AC
 SLOPE = 4.46%
 L REQ. = 657.30 FT
 L PRO. = 367.00 FT
 Q2 = 12.90 CFS
 V2 = 5.75 FPS
 Q10 = 16.56 CFS
 V10 = 6.15 FPS
 SIDE SLOPES = 2

GRASS SWALE DATA
DA = 0.26 AC
SLOPE = 0.68%
L REQ. = 25.50 FT
L PRO. = 71.00 FT
Q2 = 0.78 CFS
V2 = 1.10 FPS
Q10 = 1.00 CFS
V10 = 1.17 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.43 AC
SLOPE = 3.92%
L REQ. = 42.70 FT
L PRO. = 140.00 FT
Q2 = 1.30 CFS
V2 = 2.42 FPS
Q10 = 1.67 CFS
V10 = 2.58 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.49 AC
SLOPE = 1.94%
L REQ. = 49.20 FT
L PRO. = 295.00 FT
Q2 = 1.61 CFS
V2 = 1.69 FPS
Q10 = 2.07 CFS
V10 = 1.80 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.24 AC
SLOPE = 4.37%
L REQ. = 24.30 FT
L PRO. = 100.00 FT
Q2 = 0.74 CFS
V2 = 2.14 FPS
Q10 = 0.95 CFS
V10 = 2.28 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 0.86 AC
SLOPE = 1.94%
L REQ. = 86.30 FT
L PRO. = 547.00 FT
Q2 = 2.82 CFS
V2 = 1.95 FPS
Q10 = 3.62 CFS
V10 = 2.08 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA = 0.70 AC
SLOPE = 1.15%
REQ. = 69.60 FT
PRO. = 433.00 FT
Q2 = 2.28 CFS
Q2 = 1.52 FPS
Q10 = 2.92 CFS
Q10 = 1.62 FPS
SIDE SLOPES = 10

GRASS SWALE DATA
DA= 0.62 AC
SLOPE=1.55%
L REQ.= 62.00 FT
L PRO.= 280.00 FT
Q2= 1.89 CFS
V2= 1.83 FPS
Q10= 2.43 CFS
V10= 1.95 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA = 1.31 AC
SLOPE = 1.94%
L REQ. = 130.90 FT
L PRO. = 520.00 FT
Q2 = 4.00 CFS
V2 = 2.41 FPS
Q10 = 5.13 CFS
V10 = 2.56 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
 DA= 0.49 AC
 SLOPE=5.10%
 L REQ.= 49.20 FT
 L PRO.= 79.00 FT
 Q2= 1.61 CFS
 V2= 2.75 FPS
 Q10= 2.07 CFS
 V10= 2.93 FPS
 SIDE SLOPES = 6

GRASS SWALE DATA
 DA = 0.49 AC
 SLOPE = 7.14%
 L REQ. = 49.20 FT
 L PRO. = 86.00 FT
 Q2 = 1.61 CFS
 V2 = 3.19 FPS
 Q10 = 2.07 CFS
 V10 = 3.40 FPS
 SIDE SLOPES = 6

GRASS SWALE DATA
DA = 12.05 AC
SLOPE = 2.33%
L REQ. = 1205.00 FT
L PRO. = 242.00 FT
Q2 = 23.64 CFS
V2 = 4.77 FPS
Q10 = 30.37 CFS
V10 = 5.13 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
A = 16.70 AC
LOPE = 4.38%
REQ. = 1670.00 FT
PRO. = 235.00 FT
2 = 32.77 CFS
2 = 6.98 FPS
10 = 42.08 CFS
0 = 7.51 FPS
DE SLOPES = 2

GRASS SWALE DATA
A = 0.36 AC
SLOPE = 1.78%
REQ. = 36.00 FT
PRO. = 200.00 FT
Q2 = 0.57 CFS
Q1 = 1.79 FPS
Q10 = 0.73 CFS
Q0 = 1.91 FPS
DE SLOPES = 2

GRASS SWALE DATA
DA = 0.87 AC
SLOPE = 1.96%
L REQ. = 87.20 FT
L PRO. = 700.00 FT
Q2 = 2.09 CFS
V2 = 2.26 FPS
Q10 = 2.69 CFS
V10 = 2.40 FPS
SIDE SLOPES = 4

GRASS SWALE DATA
A = 3.79 AC
SLOPE = 2.89%
REQ. = 379.20 FT
PRO. = 550.00 FT
Q = 5.79 CFS
V = 3.68 FPS
T = 7.43 CFS
D = 3.95 FPS
DE SLOPES = 2

GRASS SWALE DATA
 DA= 6.21 AC
 SLOPE= 3.32%
 L REQ.= 621.00 FT
 L PRO.= 165.00 FT
 Q2= 10.83 CFS
 V2= 4.92 FPS
 Q10= 13.91 CFS
 V10= 5.27 FPS
 SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.12 AC
SLOPE = 0.50%
L REQ. = 112.00 FT
L PRO. = 95.00 FT
Q2 = 3.13 CFS
V2 = 1.65 FPS
Q10 = 4.01 CFS
V10 = 1.77 FPS
SIDE SLOPES = 2

GRASS SWALE DATA
DA = 1.17 AC
SLOPE = 4.45%
L REQ. = 117.00 FT
L PRO. = 185.00 FT
Q2 = 2.81 CFS
V2 = 3.46 FPS
Q10 = 3.60 CFS
V10 = 3.73 FPS
SIDE SLOPES = 2

GRASS SW
DA = 0.36
SLOPE = 1.78%
L REQ. = 36
L PRO. = 20
Q2 = 0.57
V2 = 1.79 F
Q10 = 0.73
V10 = 1.91 F
SIDE SLOPES

PLOT DRIVER: NCDOT_pdf_color_eng-100.plt
PENTABLE: NCDOT_permit5.tbl
USER: jmassrac DATE: 9/10/2010 TIME: 7:52:56 AM SCALE: 1:100

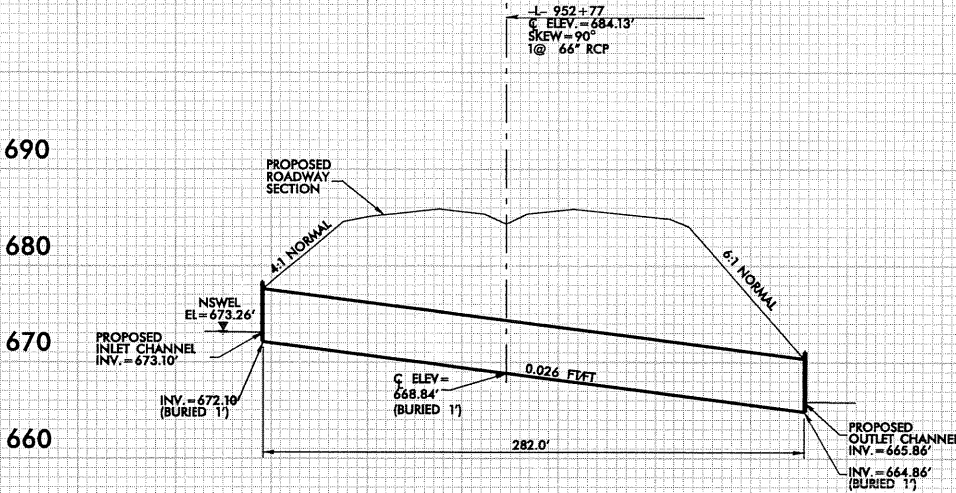
5/28/99

SCALE: \$SCALE\$

PENTABLE: \$PENTBL\$
TIME: 3:55:22 PM

PLOT DRIVER: \$PLTDRV\$
USER: \$USER\$
DATE: 9/9/2010
FILE: \$PWVARVAULTPATHDESC\$

SITE 6 I-2304AC

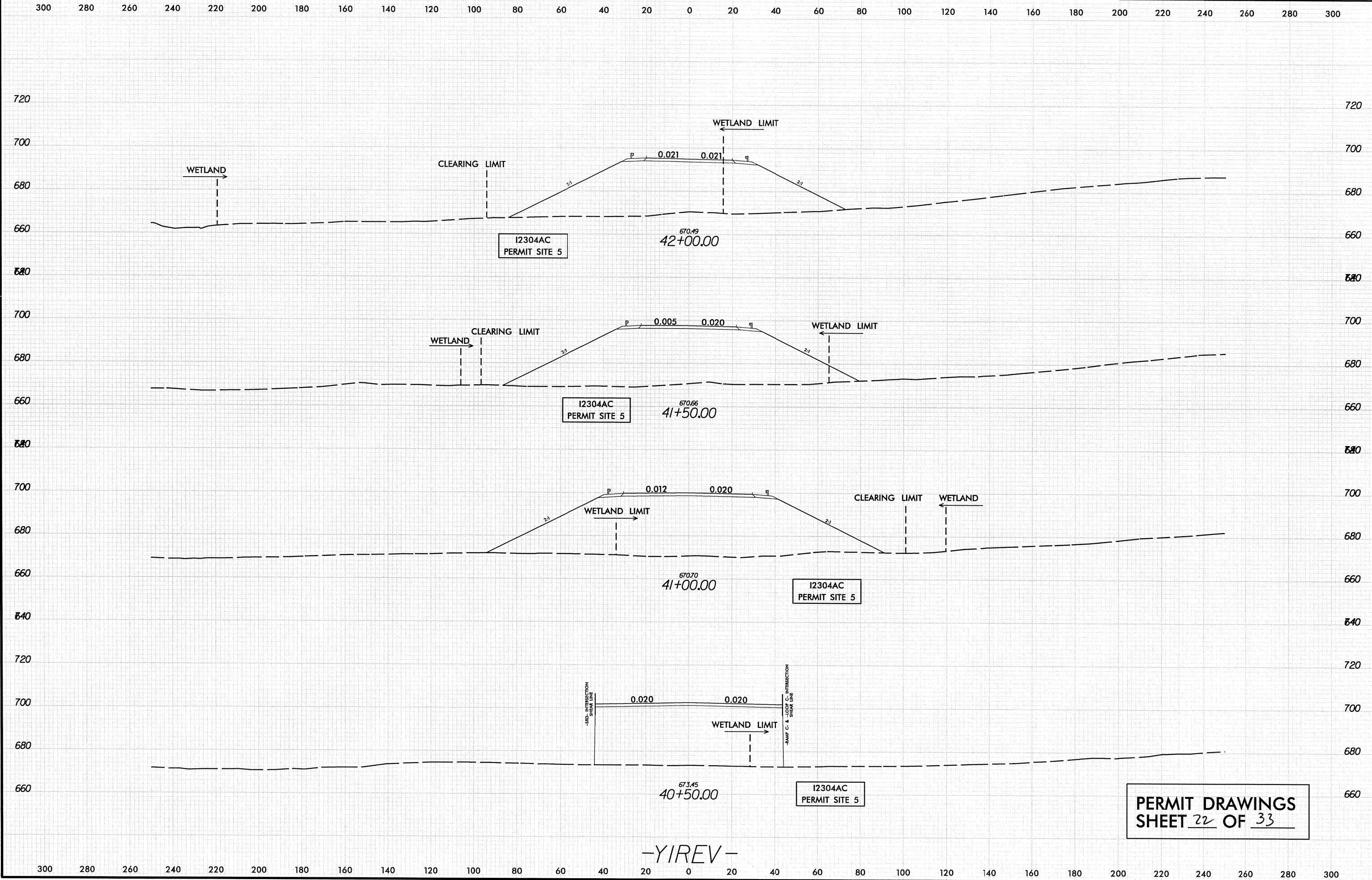


PROFILE ALONG C OF 66 IN RCP

PROJECT REFERENCE NO.		SHEET NO.	
I-2304AC			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PERMIT DRAWINGS
SHEET 21 OF 33

8/23/09



-YIREV-

PERMIT DRAWINGS
SHEET 22 OF 33

PLOT DRIVER: NCDOT_permit.dwg, color_eng, 100.plt
USER: jmassrcc DATE: 9/10/2010
FILE: Ralph.Whitehead.and.Associates\RW\H.Flatiron-Lane-Yodkin, I.85\12304AC\Hydrolics\PERMITS.Environmental\Drawings\12304AC-HYD-PRM-PLANSHEETS.dgn

REVISIONS



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CONSTRUCTION
CORPORATION

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1000 West Morehead St., Ste. 200
Charlotte, NC 28208
NC LICENSE NO. F-0991



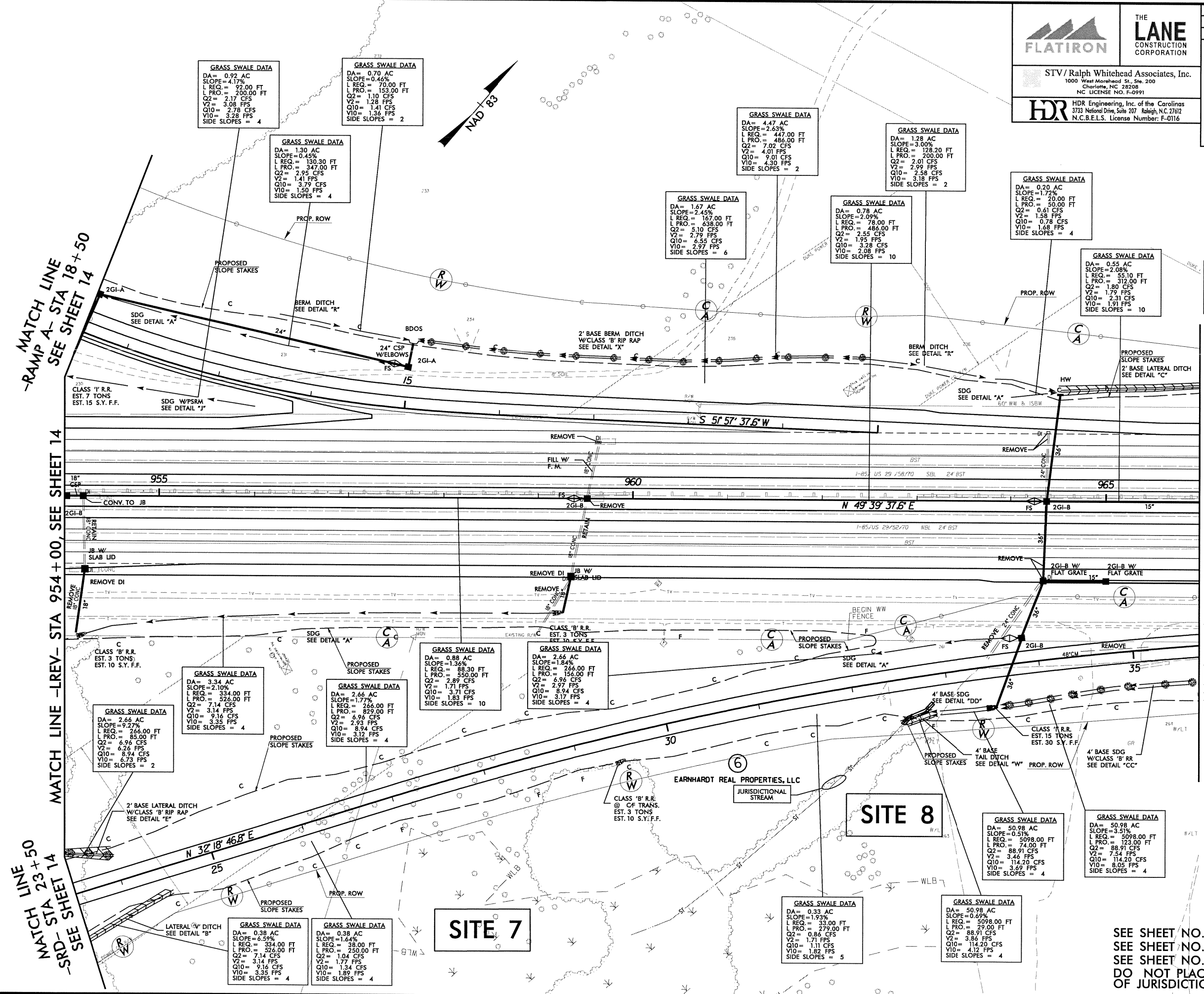
HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, NC 27612
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.	SHEET NO.
I-2304AC	15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR L/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

LEGEND

-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING

PERMIT DRAWINGS
SHEET 23 OF 33



SEE SHEET NO. 35 FOR -LREV- PROFILE.
SEE SHEET NO. 46 FOR -RAMP A- PROFILE.
SEE SHEET NO. 44 FOR -SRD- PROFILE.
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

 DENOTES IMPACTS IN SURFACE WATER

 DENOTES MECHANIZED CLEARING

PERMIT DRAWINGS
SHEET 24 OF 33



SEE SHEET NO. 35 FOR -LREV- PROFILE.
SEE SHEET NO. 46 FOR -RAMP A- PROFILE.
SEE SHEET NO. 44 FOR -SRD- PROFILE.
DO NOT PLACE ROCK IN BED
OF JURISDICTIONAL STREAMS.

MATCH LINE -LREV- STA 993+00, SEE SHEET 18

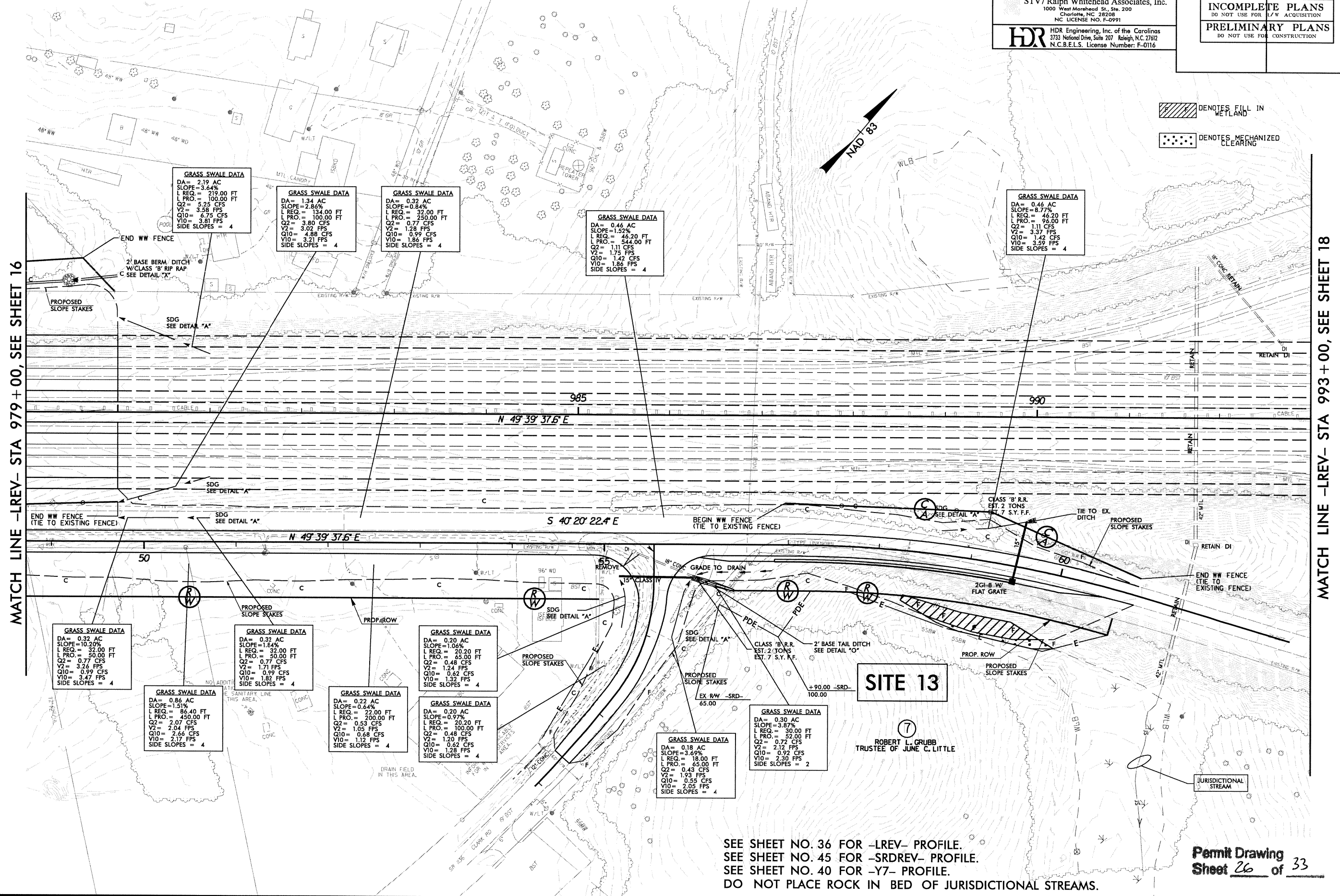
SEE SHEET NO. 36 FOR -LREV- PROFILE.
SEE SHEET NO. 45 FOR -SRDREV- PROFILE.
SEE SHEET NO. 40 FOR -Y7- PROFILE.
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

Permit Drawing
Sheet 25 of 33

PLOT DRIVER: NCDOT_pdf_color_eng_100.plt
PENTABLE: NCDOT_permits_NOCON.tbl
USER: jmassroc DATE: 9/28/2010 TIME: 6:11:34 PM SCALE: 1:100

PLOT DRIVER: NCDOT_pof_color_eng.100.plt
PENTABLE: NCDOT_permits.NOCN.tbl
USER: jmassoc DATE: 9/28/2010 TIME: 6:11:34 PM SCALE: 1:100
FILE: Ralph_Whitehead_and_Associates\NRH\FlatIron_Lane_Yadkin_1.85\T3044C\Hydraulics\PERMITS_EnvironmentalDrawings\T3044C-HYD_PRM_PLANSHEET1.dgn

REVISIONS



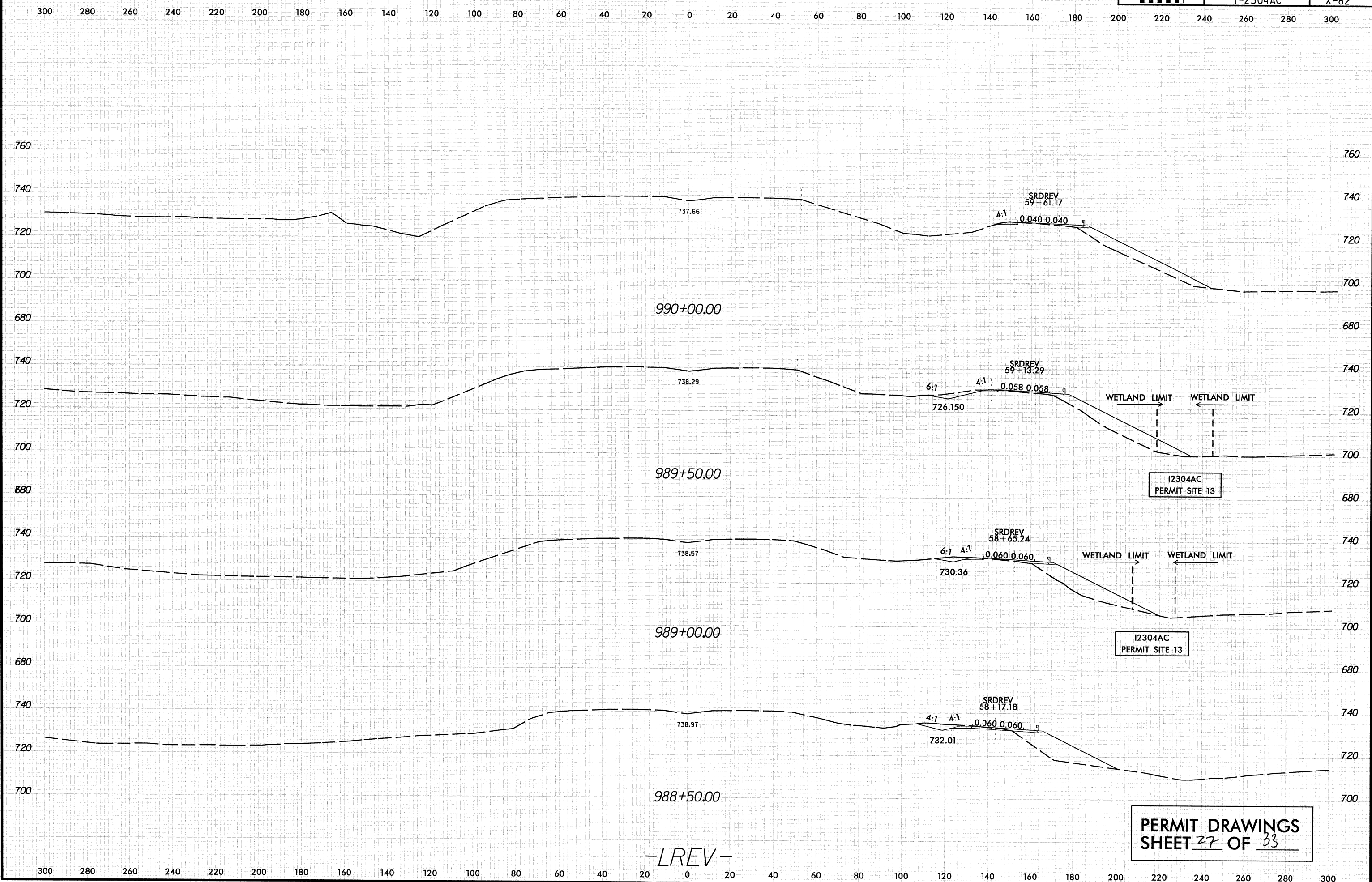
SEE SHEET NO. 36 FOR -LREV- PROFILE.
SEE SHEET NO. 45 FOR -SRDREV- PROFILE.
SEE SHEET NO. 40 FOR -Y7- PROFILE.
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.

PLOT DRIVER: NCDOT_pdf_color_eng.100.plt
PENTABLE: NCDOT_permits.tbl
USER: jmassroc DATE: 9/28/2010 TIME: 6:12:47 PM SCALE: 1:100
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16
MATCH LINE -LREV- STA 979+00, SEE SHEET 16

MATCH LINE -LREV- STA 993+00, SEE SHEET 18

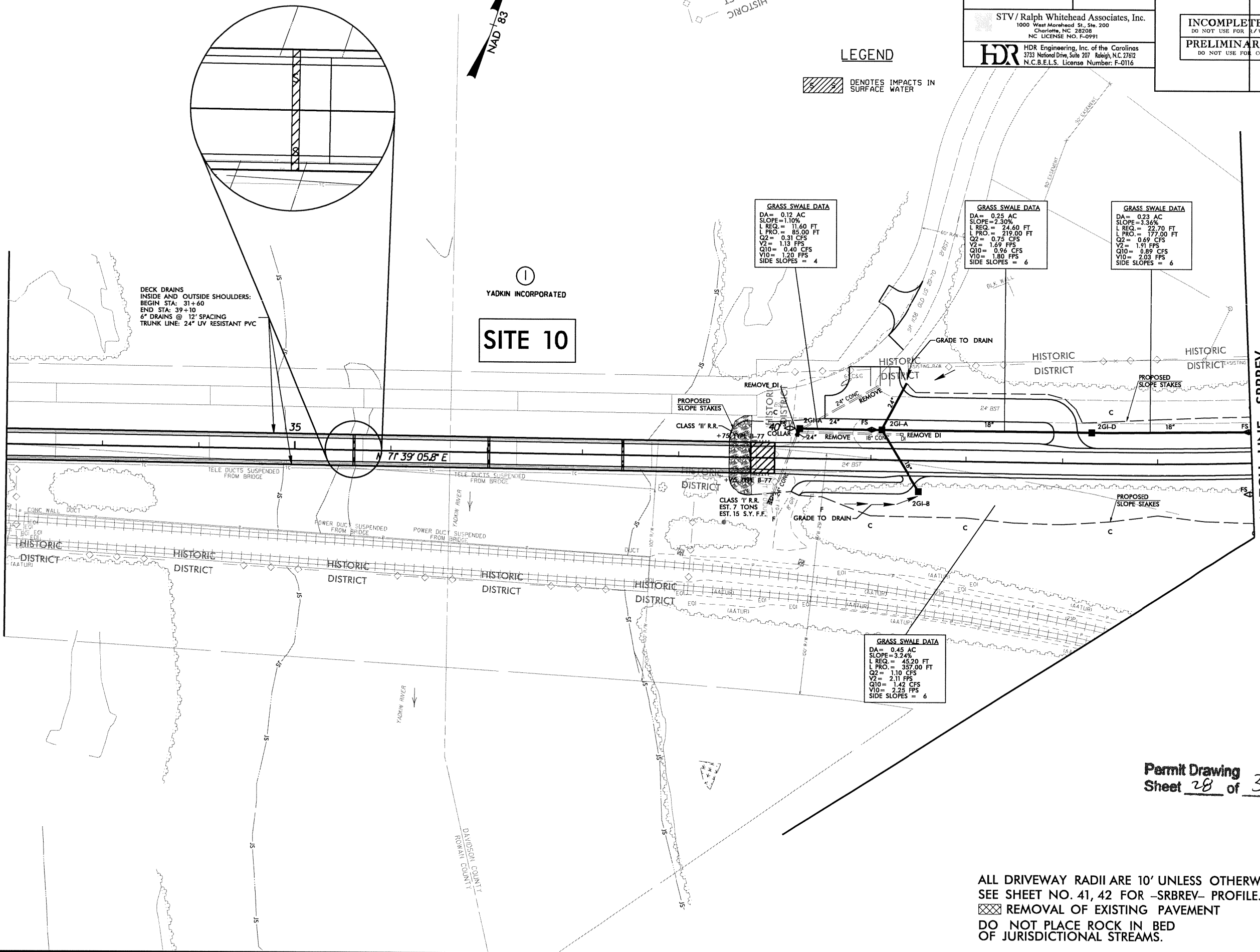
8/23/19



9/29/2010
c:\pwworking\tpa\0226564\12304AC_HYD_PRM_XPL_LREV.dgn
imassrac

REVISIONS

MATCH LINE -SRBREV- STA 32+00, SEE SHEET 21



MATCH LINE -SRBREV- STA 45+00, SEE SHEET 11

Permit Drawing
Sheet 28 of 33

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
SEE SHEET NO. 41, 42 FOR -SRBREV- PROFILE.
REMOVAL OF EXISTING PAVEMENT
DO NOT PLACE ROCK IN BED OF JURISDICTIONAL STREAMS.



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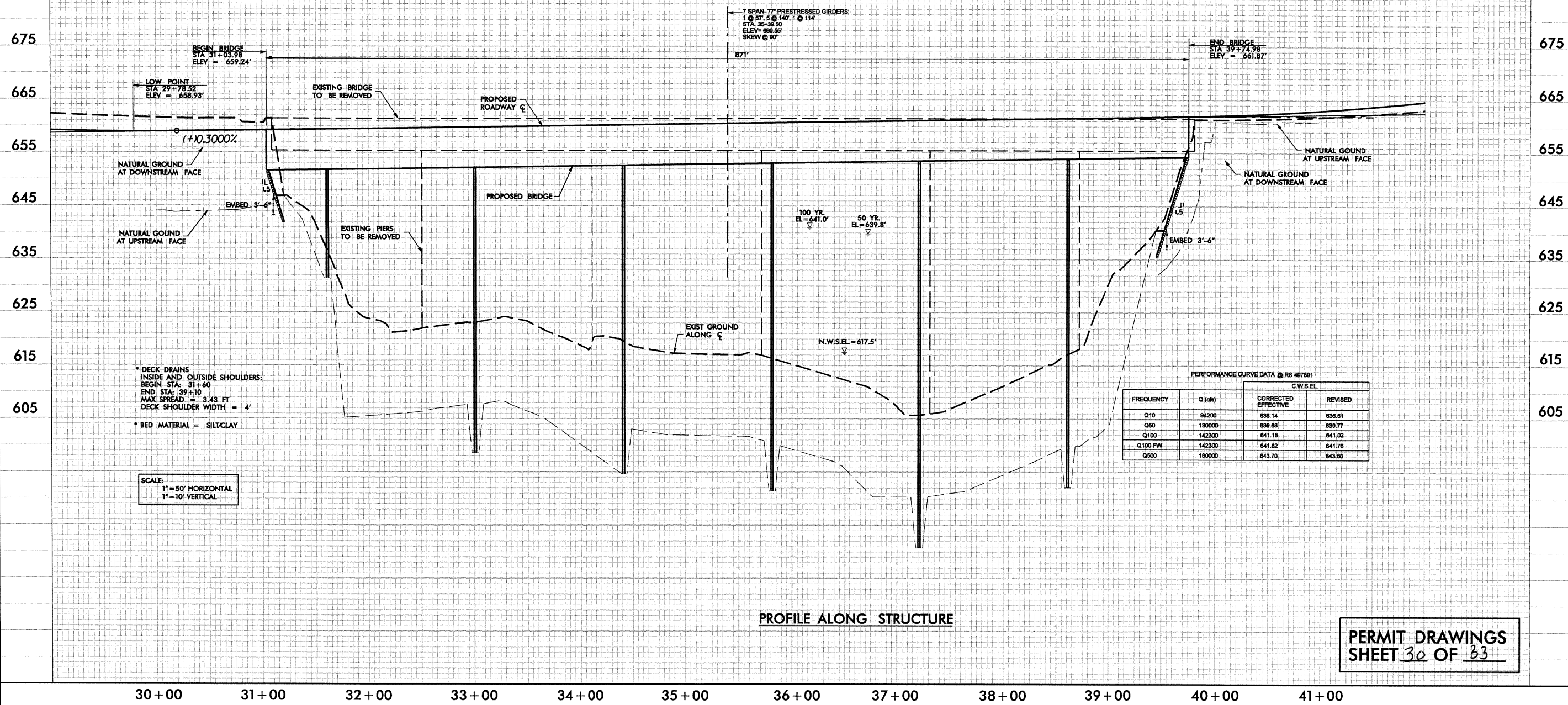
PROJECT REFERENCE NO.		SHEET NO.
I-2304AC		22
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION		
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

5/14/99

9/8/2010
C:\pawork\king\tpa\0226564\I2304AC_RDY_PFL031.dgn

PROJECT REFERENCE NO.		SHEET NO.
I-2304AC		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION		
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

-SRBREV-



PROFILE ALONG STRUCTURE

PERMIT DRAWINGS
SHEET 30 OF 33

PLOT DRIVER: NCDOT.pdf_color_eng_100.plt
USER: jmassroc DATE: 9/10/2010
FILE: Ralph.Whitehead.and.Associates\RW\Flatiron.Lane.Yadkin.I.85\123044C\Hydrolics\PERMITS.Environmental\Drawings\123044C.HYD.PR\PLANS\PLANSHEETS.dgn

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N.C.B.E.L.S. License Number: F-0116

THE LANE
CONSTRUCTION CORPORATION

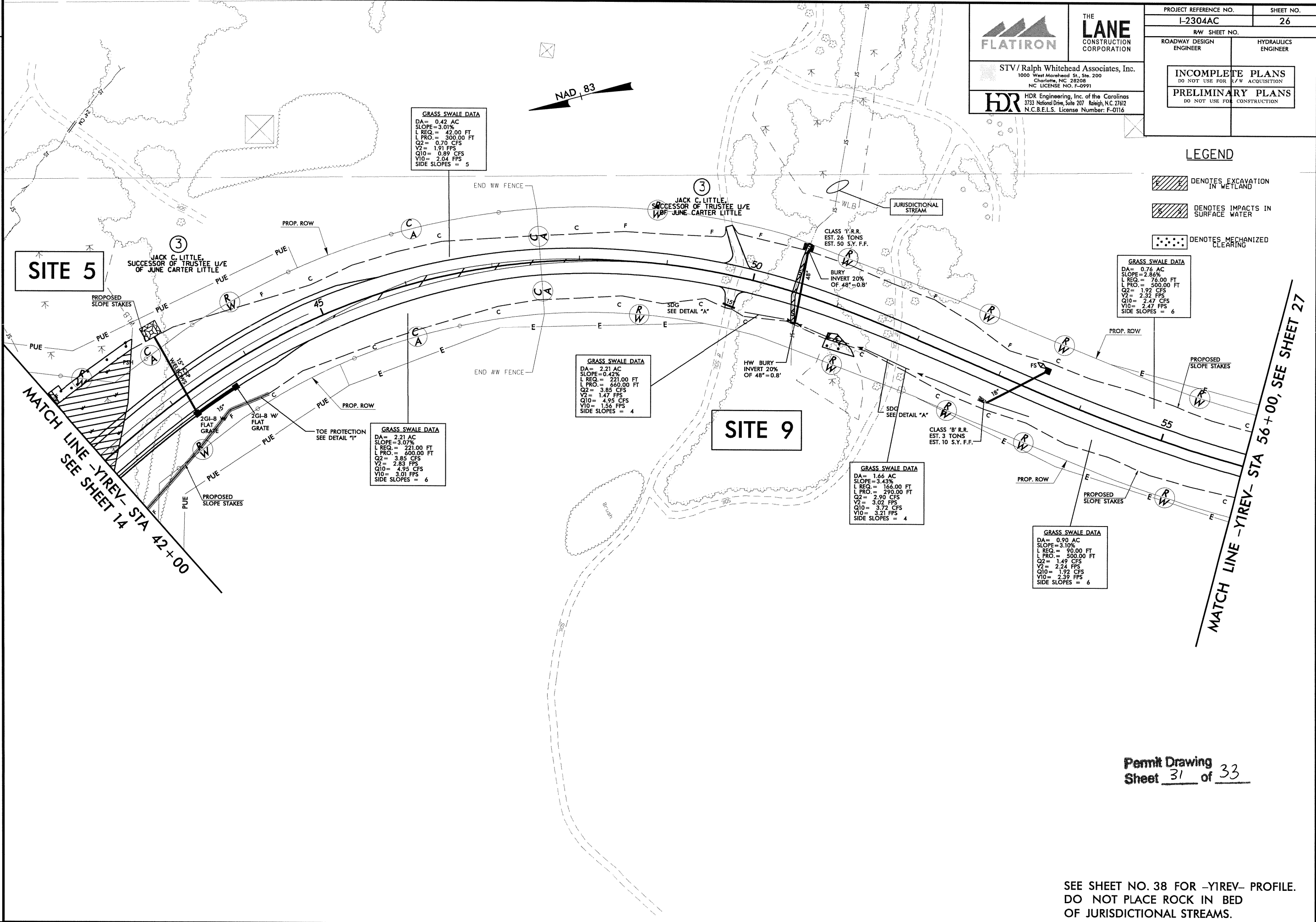
PROJECT REFERENCE NO. I-2304AC	SHEET NO. 26
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR L/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

LEGEND

-  DENOTES EXCAVATION IN WETLAND
-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING



Permit Drawing
Sheet 31 of 33

SEE SHEET NO. 38 FOR -YIREV- PROFILE.
DO NOT PLACE ROCK IN BED
OF JURISDICTIONAL STREAMS.



THE
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NC LICENSE NO. F-9991

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3733 National Drive, Suite 207 Raleigh, N.C. 27612
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE NO.		SHEET NO.
I-2304AC		26
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR U/W ACQUISITION		
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

LEGEND

- DENOTES EXCAVATION IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES MECHANIZED CLEARING

GRASS SWALE DATA
DA= 0.76 AC
SLOPE= 2.86%
L REQ.= 76.00 FT
L PRO.= 500.00 FT
Q2= 1.92 CFS
V2= 2.32 FPS
Q10= 2.47 CFS
V10= 2.47 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA= 2.21 AC
SLOPE= 0.42%
L REQ.= 221.00 FT
L PRO.= 600.00 FT
Q2= 3.85 CFS
V2= 1.47 FPS
Q10= 4.95 CFS
V10= 1.56 FPS
SIDE SLOPES = 4

GRASS SWALE DATA
DA= 2.21 AC
SLOPE= 3.07%
L REQ.= 221.00 FT
L PRO.= 600.00 FT
Q2= 3.85 CFS
V2= 2.83 FPS
Q10= 4.95 CFS
V10= 3.01 FPS
SIDE SLOPES = 6

GRASS SWALE DATA
DA= 1.66 AC
SLOPE= 3.43%
L REQ.= 166.00 FT
L PRO.= 290.00 FT
Q2= 2.90 CFS
V2= 3.02 FPS
Q10= 3.72 CFS
V10= 3.21 FPS
SIDE SLOPES = 4

GRASS SWALE DATA
DA= 0.90 AC
SLOPE= 3.10%
L REQ.= 90.00 FT
L PRO.= 500.00 FT
Q2= 1.49 CFS
V2= 2.24 FPS
Q10= 1.92 CFS
V10= 2.39 FPS
SIDE SLOPES = 6

SITE 5

SITE 9

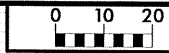
MATCH LINE -YIREV- STA 42+00
SEE SHEET 14

MATCH LINE -YIREV- STA 56+00, SEE SHEET 27

Permit Drawing
Sheet 32 of 33

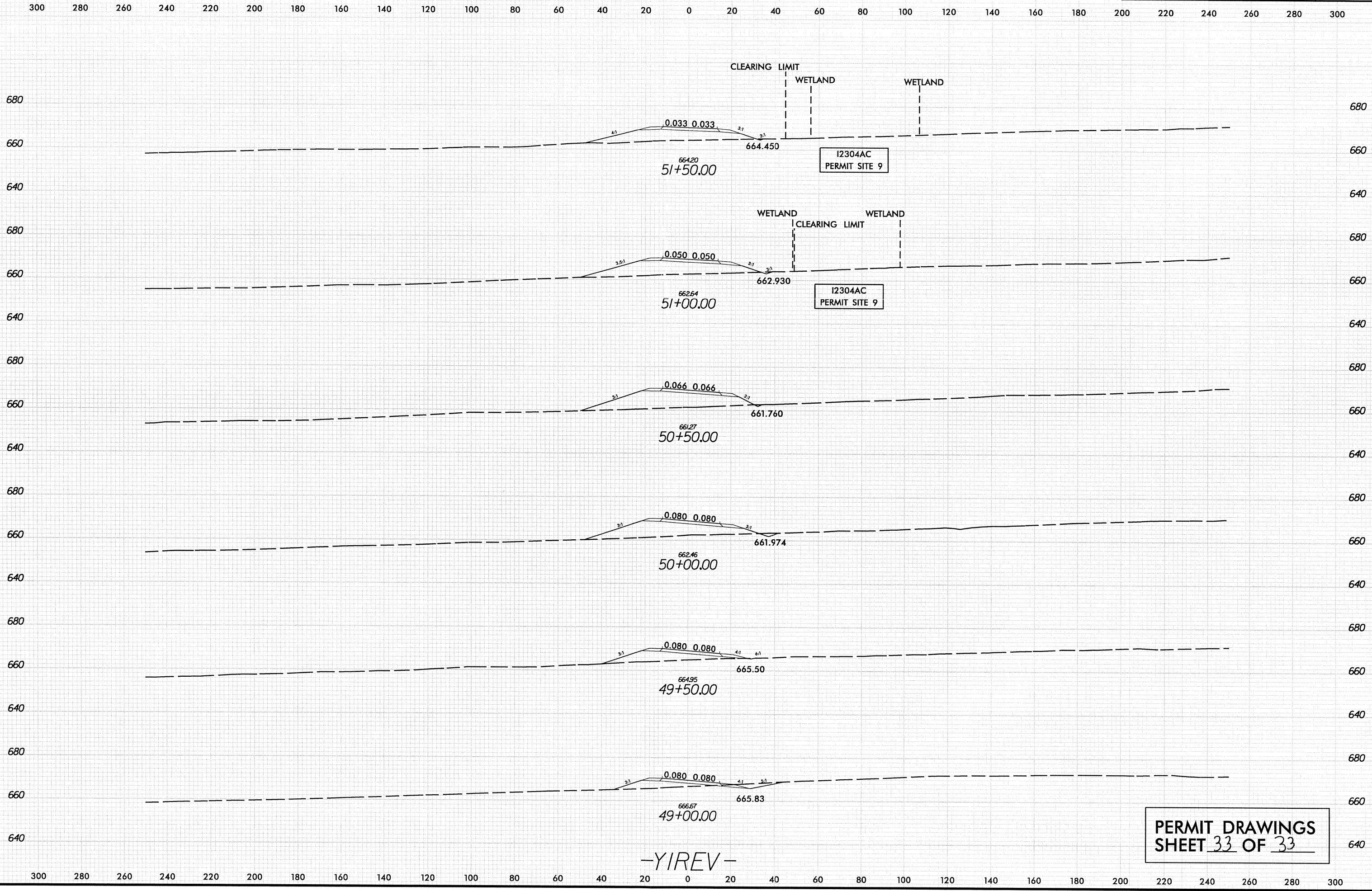
SEE SHEET NO. 38 FOR -YIREV- PROFILE.
DO NOT PLACE ROCK IN BED
OF JURISDICTIONAL STREAMS.

8/23/99



PROJ. REFERENCE NO.
I-2304AC

SHEET NO.
X-106



-YIREV-

PERMIT DRAWINGS
SHEET 33 OF 33

9/29/2010
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imssr.ac