STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

May 14, 2010

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

Attention: Eric Alsmeyer
NCDOT Coordinator, Division 5

Subject: **Application for Modification to Section 404 Individual Permit, Individual Section 401 Water Quality Certification, Individual Isolated Wetlands Permit and Neuse Buffer Authorization** and for the Rolesville Bypass from SR 2225 (Louisburg Road) to NC 96, Zebulon Road, Wake County, Federal Aid No. STP-401(4), State Project No. 81403001, WBS 34506.1.1, Division 5,
TIP R-2814 B.

Reference: Section 404 Individual Permit, issued July 14, 2009, USACE Action ID 2008-01316
Section 401 Individual Water Quality Certification, Isolated Wetlands Permit and Neuse Riparian Buffer Authorization issued June 16, 2009, NCDENR-DWQ Water Quality Certification Project No. 20090104 ver.1

$540.00 Debit WBS Element 34506.1.1.

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to construct a 18.5 mile long, widening and new location roadway in Wake and Franklin Counties known as the Rollesville Bypass. It is proposed as a four lane, median divided facility. NCDOT received the above stated permits for the entire project (Sections A, B, C and D) with final design approval for Section A. Section A is currently under construction. Sections C and D are still scheduled for post year.

Table 1. Description of Project Sections for Construction Purposes

Section	Project Termini	Let Date
R-2814A	Widen US 401 from SR 2044 to SR 2226	12/15/09 (under construction)
R-2814B	New Location from SR 2226 to NC 96	2/15/11
R-2814C	Widen US 401 from NC 96 to SR 1103	Post year
R-2814D	Widen US 401 from SR 1103 to SR 1700	Post year

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

The permits stated above only approved preliminary impacts for Section B. Section B now has final design. The purpose of this submittal is to request a modification to the Section 404 permit, Section 401 Water Quality Certification, Isolated Wetlands Permit and Neuse Buffer Authorization for Section B. Section B is on new location from SR 2225 (Louisburg Road) to NC 96, Zebulon Road, Wake County. The permit package consists of the cover letter, Hydraulic Review (Concurrence Point 4B and 4C) meeting minutes for Section B, EEP acceptance letter, Stormwater Management Plan, utility impact drawings, permit drawings and roadway plan sheets.

Section B lets February 15, 2011 with a review date of December 28, 2010.

This permit modification has been evaluated for compliance with the avoidance/minimization criteria and all surveys and conclusions summarized in the 2009 permit application (the permit application dated January 21, 2008 should have been dated 2009) are still valid including the following: ICE, Protected Species, Aquatic Life passage, FEMA compliance, Cultural Resources.

IMPACTS TO WATERS OF THE UNITED STATES

Impacts to wetlands for Section B are located in HUC 03020201 of the Neuse River Basin. Preliminary impacts were 4.24 acres and final permanent impacts are 4.12 acres. The wetland at Site 15 was determined to be isolated and will require mitigation. Site 5 is a new impact. It was not anticipated to be impacted in the FONSI or in the preliminary impacts.

Wetlands

Table 2. R-2814B Wetland Impacts Preliminary versus Final Design

Permit Site No.	Wetland Reference No.*	Riparian or Non-Riparian	Preliminary Permanent Impacts (Acres)	Final Permanent Fill (Acres)	Final Excavation (Acres)	Final Mechanized Clearing (Acres)
2	V	Riparian	0.20	0.17	<0.01	0.02
3	AA	Riparian	0.26	0.22		<0.01
4	X	Riparian	0.26	0.24	<0.01	0.01
5	A	Riparian	Not available		0.01	
7	D	Riparian	0.89	0.65	0.10	0.09
13	Y	Non-riparian	0.19	0.19		
14	F	Riparian	0.48	0.36	<0.01	0.06
15	FA	Non-riparian (Isolated)	1.58	1.58		
17	AB	Riparian	0.38	0.38		
Total			**4.24**	**3.79**	**0.12****	**0.19**

*refers to Figure 4 in FONSI ** number calculated due to rounding

Utility impacts

At Site 7, a sewer line is being relocated. The new line will permanently fill 0.004 acres of riparian wetlands and have mechanized clearing impacts of 0.02 acres. These impacts are in addition to the road impacts shown above.

Surface Waters

Preliminary permanent stream impacts for R-2814B were 2,674 linear feet and pond impacts were 10.07 acres. Final permanent stream impacts for R-2814B are 2,509 linear feet and pond impacts are 10.13 acres. Temporary stream impacts are 204 linear feet. Tables 3 and 4 list the site number, reference number, stream name, amount of permanent impacts, amount of mitigation required, pond impacts, DWQ classification, and DWQ index number. The stream reference numbers correspond to the Table 2 in the FONSI.

There are no streams listed on the Draft 2010 List of impaired waters [Section 303(d)] within the project area. The only 303(d) stream listed within 1.0 mile of the project area is Toms Creek. It is listed due to impaired biological integrity. This stream does not drain to any streams in the project area.

NCDOT is not proposing mitigation for bank stabilization activities unless the entire stream impacts are 150 feet or greater; at which point 1:1 mitigation ratio is proposed for the bank stabilization activities. We feel that the bank stabilization does not constitute loss of waters of the U.S.

In an email from the USACE dated April 1, 2009, the USACE determined that the stream at Site 18 will not require mitigation. Based on the original permit, no mitigation was required for Site 12.

Table 3. R-2814B Surface Waters

Permit Site No. (Reference No.)	Stream Name	Intermittent/ Perennial	DWQ Class	DWQ Index number
1 (Stream7)	UT to Harris Creek	Intermittent	C NSW	27-26
4 (Stream 8A)	UT to Harris Creek	Perennial	C NSW	27-26
5	UT to Harris Creek	Pond	C NSW	27-26
6 (Stream 9)	UT to Harris Creek	Perennial	C NSW	27-26
7 (Stream10 and 10A)	UT to Harris Creek	Perennial	C NSW	27-26
8 (Stream 20)	Harris Creek	Perennial	C NSW	27-26
9 (Stream 23 and 23A)	UT to Harris Creek	Perennial/ Intermittent	C NSW	27-26
11 (n/a)	Cedar Fork Creek	Perennial	WS-II NSW HQW	27-57-3
12 (Stream 23C)	UT to Cedar Fork Creek	Intermittent	WS-II NSW HQW	27-57-3
16 (Stream 25)	Perry Creek	Perennial	WS-II NSW HQW	27-57-2
18	UT to Perry Creek	Intermittent	WS-II NSW HQW	27-57-2

Table 4. R-2814B Surface Water Impacts Preliminary Versus Final

Permit Site No. (Reference No.)	Preliminary Permanent Stream Impacts (feet)	Final Permanent Stream Impacts (feet)	Final Temporary Stream Impacts (feet)	Pond Impacts (acres)	Preliminary Mitigation Obtained (feet)	Final Mitigation Needed (ratio)
1 (Stream7)	281	243	18	0	281	243 (2:1)
4 (Stream 8A)	115	95	10	0	115	95 (2:1)
4 (Stream 8A)		20 (BS)			0	0
5				1.53	0	0
6 (Stream 9)	22	0	25	0	22	0
6 (Stream 9)	0	14 (BS)	0	0	0	0
7 (Stream10 and 10A)	495	321	66	0	495	321 (2:1)
7 (Stream10 and 10A)	0	47 (BS)	0	0	0	47 (1:1)
8 (Stream 20)	518	355	18	0	518	355 (2:1)
8 (Stream 20)	0	153	0	0	0	153 (1:1)
9 (Stream 23 and 23A)	626	610	20	1.31	626	610 (2:1)
11 (n/a)	22	0	10	7.29	22	0
12 (Stream 23C)	258	258	0	0	0	0
16 (Stream 25)	337	189	23	0	337	189 (2:1)
16 (Stream 25)	0	135 (BS)	0	0	0	135 (1:1)
18	0	36	14	0	0	0
18	0	33 (BS)	0	0	0	0
Totals	**2674**	**2509**	**204**	**10.13**	**2416**	**2148**

BS= Bank Stabilization

The Pond Drainage Plan requested by NCDWQ will be submitted by NCDOT before construction.

Utility impacts

A temporary flat-bottom trench will be dug within the stream bed for the placement of the sewer line pipe. The trench will be 3.3 feet wide. The trench will be backfilled using local excavated material. Temporary impacts will be 3 feet. These temporary impacts are already in the area of temporary impacts from the culvert construction at Site 7.

BUFFER IMPACTS

Section B impacts buffers in the Neuse River Basin. Wetlands are present within the impacted buffer areas. The wetland impacts within the mitigable buffer areas have been subtracted out. Buffer impacts in these areas will be covered by mitigation for the overlapping wetland impacts.

Table 5. R-2814B Neuse Riparian Buffer Impacts (Preliminary)

	Impacts Other Than Road Crossings	Road Crossing	Road Crossing
Zone 1 Impact (sq. ft)	3,169	237,163	506
Zone 2 Impact (sq. ft)	5,693	136,497	0
Mitigation requirements (exempt, allowable or allowable with mitigation)	Allowable with mitigation	Allowable with mitigation	Allowable (impacts less than 150 linear feet or one-third of an acre).

Table 6. R-2814B Neuse Riparian Buffer Impacts (Final)

	Impacts Other Than Road Crossings	Road Crossing	Road Crossing	Non-electric utility line perpendicular crossing of streams
Zone 1 Impact (sq. ft)	2,133	232,756	4,331	208
Zone 2 Impact (sq. ft)	4,778	145,122	1,585	835
Mitigation requirements (exempt, allowable or allowable with mitigation)	Allowable with mitigation	Allowable with mitigation	Allowable (impacts less than 150 linear feet or one-third of an acre).	Exempt (Perpendicular crossings that disturb equal to or less than 40 feet of riparian buffer with a maintenance corridor equal to or less than 10 feet)

Table 7. R-2814B Total Neuse Riparian Buffer Impacts Requiring Mitigation (Preliminary)

	Zone 1 (sq. ft.)	Zone 2 (sq. ft.)
Buffer Impacts requiring mitigation	240,332	142,190
Minus buffers in wetlands	-50,381	-17,843
Total Buffer impacts requiring mitigation	**189,951**	**124,347**

Table 8. R-2814B Total Neuse Riparian Buffer Impacts Requiring Mitigation (Final)

	Zone 1 (sq. ft.)	Zone 2 (sq. ft.)
Buffer Impacts requiring mitigation	234,889	149,900
Minus buffers in wetlands	-47,404	-17,676
Total Buffer impacts requiring mitigation	**187,485**	**132,224**

Total Zone 1 buffer impacts requiring mitigation are 187,485 square feet (sq ft) and Zone 2 impacts requiring mitigation are 132,224 sq ft for Section B. The Neuse Buffer Authorization dated June 16, 2009 allowed NCDOT to debit 985,325 square feet (sq ft) of buffer mitigation form the Wiggins Mill Mitigation Site. The amount of final buffer impacts debited for Section A was 228,956 sq ft. The amount of mitigation left is 756,369 sq ft that NCDOT has already debited. The final amount of needed buffer mitigation for Section B is 790,791 sq ft. An additional 4,422 sq ft of mitigation is needed and will be provided for by EEP. See attached confirmation letter.

MITIGATION OPTIONS

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the waters of the United States. CEQ has defined mitigation of wetland and surface water impacts to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20). For this project, mitigation will be required for impacts associated with streams and wetlands.

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning phase and minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts.

Avoidance and Minimization

Impacts to jurisdictional streams and wetlands could not be avoided. Minimization efforts have taken place continually through the planning and design process.

R-2814B Minimization Measures

- During the Concurrence Point 2 meeting, alternatives along Section B were adjusted to minimize impacts to wetlands and cross streams more perpendicularly.
- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced.
- Design Standards in Sensitive Watersheds will be implemented

- Preformed scour holes (PSH) are located near Site 7, 14, 16 and 17. Because Site 17 is being considered a total take the PSH has been placed within a wetland.
- 2:1 slopes are within the wetlands and buffer areas except for the following:

  Site 2: Changing the slopes to 2:1 will require guardrail which will widen the shoulder 3 ft. The minimal amount of wetland saved (0.01 ac) is not cost effective given the cost of guardrail.

  Site 12 and 13: These sites were discussed at the 4B and 4C meetings and it was agreed that they would be total takes therefore flatter slopes were used.

  Site 15: In an email from DWQ representative Rob Ridings dated June 26, 2008, he confirmed that it is okay for NCDOT to leave the design as proposed in this application. Flatter slopes than 2:1 are used.

  Site 18: There is a grass swale that goes through the buffer at this location so the slope from the road is 4:1 or flatter to meet the grass swale criteria.

- Runoff from impervious surfaces has been diverted away from surface waters or has been treated using grass swales prior to entering jurisdictional waters.
- Grass swales are being used at several locations along the length of the project.
- Stream and wetland impacts were reduced from the FONSI and original permit.

Compensatory Mitigation

Compensatory mitigation requirements for the proposed Rolesville Bypass Section B are summarized in Table 9 below. Mitigation was debited from Jefferys Warehouse Mitigation Site for wetland impacts and Mark's Creek Mitigation Site for stream restoration and EEP for stream restoration equivalent. See Buffer section for buffer mitigation.

Table 9. Jurisdictional Impacts Requiring Mitigation

	HUC	Riparian Wetlands (ac)	Non-riparian Wetlands (ac)	Streams (ft)	Isolated Wetlands (ac)
R-2814 B Preliminary	03020201	2.47	0.19	2,416	1.58
R-2814 B Final	03020201	2.35	0.19	2,148	1.58

Riparian wetland impacts were reduced by 0.12 acres. NCDOT will credit back the Jeffreys Warehouse Mitigation Site for 0.12 acres and revise the debit ledger. Mitigable stream impacts were reduced by 268 feet. NCDOT will give back 268 feet to the Mark's Creek Mitigation Site and will revise the debit ledger. The EEP will be given back 603 feet of restoration equivalent.

REGULATORY APPROVALS

Application is hereby made for a modification to the Department of the Army Section 404 Individual Permit as required for the above-described activities for the proposed TIP project R-2814 Section B. The NCDOT understands that permit modifications will be required for Sections C and D after final design is complete and prior to construction. We are also hereby requesting an Modification the the Individual Section 401 Water Quality Certification, an Isolated Wetlands Permit and a Neuse Riparian Buffer Authorization from the Division of Water Quality. In compliance with Section 143-215.3D(e) of the NCAC, we will provide $540 to act as payment for processing the Section 401 permit. We are providing five copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their review.

A copy of this application will be posted on the NCDOT website at http://www.ncdot.org/doh/preconstruct/pe/neu/Permit.html. If you have any questions or need additional information, please call Rachelle Beauregard at 919-431-6764.

Sincerely,

E. F. Luck

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

cc:
w/attachment
Mr. Brian Wrenn, NCDWQ (5 Copies)
Ms. Jennifer Derby, USEPA
Mr. J. Wally Bowman, PE., Division Engineer
Mr. Chris Murray, DEO

W/o attachment (see website for attachments)
Dr. David Chang, P.E., Hydraulics
Mr. Mark Staley, Roadside Environmental
Mr. Greg Perfetti, P.E., Structure Design
Mr. Victor Barbour, P.E., Project Services Unit
Mr. Jay Bennett, P.E., Roadway Design
Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Scott McLendon, USACE, Wilmington
Mr. Gary Jordan, USFWS
Mr. Travis Wilson, NCWRC
Ms. Anne Deaton, NCDMF
Ms. Beth Harmon, EEP
Mr. Phillip Ayscue, NCDOT External Audit Branch
Ms. Beverly Robinson, PDEA Project Planning Engineer
Mr. Drew Joyner, PE, Human Environment Unit Head
Mr. Clarence W. Coleman, P.E., FHWA
Ms. LeiLani Paugh, NEU

Ecosystem Enhancement PROGRAM

May 11, 2010

Mr. Brian Wrenn
N. C. Division of Water Quality
Mail Service Center 1650
Raleigh, North Carolina 27699-1650

Dear Mr. Wrenn:

Subject: EEP Mitigation Acceptance Letter:

R-2814B, US 401 (Rolesville Bypass) from SR 2225 (Louisburg Road) to NC 96 (Zebulon Road), Wake County, Neuse River Basin (Cataloging Unit 03020201)

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide a portion of the buffer mitigation required for the subject project. The buffer impacts associated with this project are located in Cataloging Unit 03020201 of the Neuse River Basin. The majority of the buffer mitigation required for this project will be provided by existing NCDOT mitigation site(s); however, the mitigation site(s) do not have sufficient buffer mitigation credits to meet all required buffer mitigation for this project and additional buffer mitigation is needed from EEP. The NCDOT needs 4,442 square feet of buffer mitigation from EEP in order to fully offset the buffer impacts associated with this project. If the amount of mitigation required from EEP increases for this project, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required. All buffer mitigation requests and approvals are administrated through the Riparian Restoration Buffer Fund (Fund 2982).

The NCDOT will be responsible to ensure that the appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Authorization Certification, EEP will transfer funds from Fund 2984 (Tri-Party MOA Account) into Fund 2982 and commit to provide the appropriate buffer mitigation to offset the impacts associated with this project.

If you have any questions or need additional information, please contact Ms. Beth Harmon at (919) 715-1929.

Sincerely,

William D. Gilmore, P.E.
EEP Director

cc: Mr. Gregory J. Thorpe, P.E., PDEA, NCDOT
Mr. Eric Alsmeyer, USACE – Raleigh
File: R-2814B

Ecosystem Enhancement PROGRAM

May 11, 2010

Mr. Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

R-2814B, US 401 (Rolesville Bypass) from SR 2225 (Louisburg Road) to NC 96 (Zebulon Road) Wake County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide a portion of the buffer mitigation for the subject project. Based on the information supplied by you on April 29, 2010, the buffer impacts are located in CU 03020201 of the Neuse River Basin in the Central Piedmont (CP) Eco-Region. The majority of the buffer mitigation required for this project will be provided by existing NCDOT mitigation site(s); however, the mitigation site(s) do not have sufficient buffer mitigation credits to meet all required buffer mitigation for this project and additional buffer mitigation is needed from EEP. The NCDOT needs 4,442 square feet of buffer mitigation from EEP in order to fully offset the buffer impacts associated with this project. If the amount of mitigation required from EEP for this project increases, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required. All buffer mitigation requests and approvals are administrated through the Riparian Buffer Restoration Fund (Fund 2982).

The NCDOT will be responsible to ensure that the appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Authorization Certification, EEP will transfer funds from Fund 2984 (Tri-Party MOA Account) into Fund 2982 and commit to provide the appropriate buffer mitigation to offset the impacts associated with this project.

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

Sincerely,

for Bill Gilmore

William D. Gilmore, P.E.
EEP Director

cc: Mr. Eric Alsmeyer, USACE – Raleigh Regulatory Field Office
Mr. Brian Wrenn, Division of Water Quality, Wetlands/401 Unit
File: R-2814B

Final Memorandum of Meeting

Date: June 18, 2008

Place\Time: NCDOT, Hydraulics Unit Conference Room, 8:30 A.M.

Team Members:
Eric Alsmeyer – USACE (Absent)[1]
Gary Jordan – USFWS (Present)
Travis Wilson – NCWRC (Present)
Rob Ridings – NCDWQ (Absent)
Kathy Matthews – USEPA (Present)
Donnie Brew – FHWA (Absent)[2]
David Harris – NCDOT Roadside Environmental (Absent)
Jimmy Goodnight – NCDOT Roadway Design (Present)
Betsy Cox – NCDOT Structures (Present)
Derrick G. Weaver – NCDOT PDEA (Absent)[3]
Rachelle Beauregard – NCDOT Natural Environment (Present)
Dennis Jernigan – NCDOT Division 5 (Present)

[1] Substitute John Thomas (Present)
[2] Substitute Felix Davila (Present)
[3] Substitute Beverly Robinson (Present)

Participants:
Andrew Nottingham – NCDOT Hydraulics Unit
Tim Goins – NCDOT Roadway Design
Greg Price – NCDOT NEU
Tina Swiezy – RK&K Engineers
Jeff Meador – RK&K Engineers

Subject: NEPA\404 Merger Team – Concurrence Point 4B Meeting
R-2814B – US 401 Rolesville Bypass from SR 2225 (Louisbury Road) to NC 96 (Zebulon Road), Wake County

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The 30% Hydraulic Review was held to in order to reach agreement on concurrence point 4B for the US 401 Rolesville Bypass in Wake County. The following items were discussed and conclusions reached:

Andrew Nottingham opened the meeting with introductions and a brief description of the project. Andrew noted that an agreement had been made at the 4A meeting to remove the existing culvert carrying US 401 over Perry Creek. However, the Town of Rolesville has requested that the culvert and a portion of existing US 401 remain in place to provide access to a newly constructed neighborhood near the crossing. It was noted that access to 401 was the only access the neighborhood currently has. All team members agreed to allow the existing culvert to remain in place.

Jeff Meador provided a summary of the preliminary drainage design at each jurisdictional feature on the plans. The following comments and decisions were reached.

Gary Jordan asked if bottomless culverts had been considered at the major stream crossings. It was noted that bottomless culverts were not feasible at the Tributary to Harris Creek (-L- 77+85), Harris Creek (-L- 115+74) and Cedar Fork (-L- 200+04) since bedrock was not present to found the culverts on. See the discussion notes for Sheets 23-24 for the decision not to use a bottomless culvert at Perry Creek (-L- 275+39).

Sheets 4-5: No jurisdictional features.

Sheet 6: Roadway drainage at this site will be directed to a pre-formed scour hole outside of the stream buffers in this location. The wetlands outside of the proposed fill slope at Sta 40+00 Rt. will remain at the completion of the project. This wetland will not be considered a total take.

Sheets 7, 28: The existing pond in this location will be permanently drained. Mitigation for this impact will not be required. Draining the pond will not cause an impact to the wetlands shown on the upstream end of the pond since the hydrology to the area will not be removed. The landowner will have the ability to rebuild the dam outside of the right-of-way if he chooses. NCDOT will coordinate with the DWQ to determine if the stream call on sheet 28 is accurate. There is currently a stream shown on the upstream end of the existing 24" cross pipe. However, there is no stream shown between the downstream end of the pipe and the downstream wetlands. NCDOT proposes to replace the existing 24" cross pipe with 2-36" pipes at this location. Shoulder berm gutter is proposed on the mainline (-L-) roadway at in the vicinity of the stream crossing this site. The storm drainage system draining the shoulder berm gutter will be directed to a lateral grass swale at 56+50 Rt. +/- to provide stormwater treatment.

Sheets 8-9: A 9'x9' box culvert with baffles is proposed at this location. In addition, a 12'x8' pedestrian culvert is proposed. The pedestrian culvert is currently shown on the eastern side of the stream culvert. However, the pedestrian culvert may be moved to the west side of the stream culvert pending discussions with the geotechnical (excavation in rock) and utilities units (sanitary sewer relocation requirements). The meeting attendees favored moving the pedestrian culvert to the west side of the stream culvert but were agreeable with either location. The jurisdictional stream at Sta 78+00 Rt. +/- will be relocated parallel to the roadway on the downstream side of the roadway. It was requested that the pre-formed scour hole at 76+00 Rt. be moved out of the wetland if possible.

Sheet 10: No jurisdictional features.

Sheet 11: A 10'x10' box culvert with baffles is proposed at this location. A 12'x8' pedestrian culvert is also proposed on the western side of the stream culvert. Roadway drainage that is discharged directly into the buffers at this site will be treated using special cut roadway ditches because of the proposed roadway grade.

Sheet 12: No jurisdictional features.

Sheets 13-14: The existing pond at this location will be permanently drained. NCDOT will coordinate with DWQ to verify that there are two jurisdictional streams at the outlets of the pond as is currently shown. The upstream end of the channel will be relocated adjacent to the roadway for approximately 350 linear feet to minimize the skew on the proposed cross pipe. The relocation will not be constructed using natural channel design techniques because of the depth of cut required for the relocation. Therefore, the relocated channel will not be considered on-site mitigation. Shoulder berm gutter is proposed on the roadway at this site. The storm drainage system will be directed to lateral grass swales for stormwater treatment prior to entering the buffer.

Sheets 15-16: No jurisdictional features.

Sheet 17: A buffered stream runs adjacent to the project at this location. There is not a direct stream impact at this location. However, the buffer is impacted. NCDOT will coordinate with DWQ to make sure the upstream limit of the jurisdictional stream is shown correctly. If extended the channel feature turns and runs away from the proposed roadway. The proposed storm drainage system at this location does not discharge directly to the buffer.

Sheet 18: There are three existing ponds at this location. Only the largest pond at Sta. 200+00 is jurisdictional. The pond at this location is approximately 7.3 acres in size and will be permanently drained. The two non-jurisdictional ponds will also be drained as part of the project. A 10'x10' box culvert with baffles is proposed to carry the stream flow at this location. A 12'x8' pedestrian box culvert is

proposed on the southern side of the stream culvert. An outlet channel with a minimum 10' floodplain bench will be cut through the existing dam at this site. A channel will not be constructed through the existing pond on the upstream side of the roadway it will be allowed to form naturally. Shoulder berm gutter is proposed on the roadway at this site. The storm drainage system will be directed to lateral grass swale at 202+50 Lt in the existing pond buffer for stormwater treatment prior to entering the new stream buffer. Treatment of the roadway drainage in the storm drain system that outlets at 203+50 Rt. will be provided in the roadway ditches.

Sheet 19: The jurisdictional stream at this location begin just upstream of the project and ends under the project. No stormwater treatment is proposed at this location as the feature is impacted essentially along its entire length.

Sheet 20: The wetland at this location will be considered a total take. A ditch will be constructed adjacent to the roadway fill slope to direct water at this feature into the proposed cross pipe.

Sheet 21: The upstream wetland at this location is caused by a beaver dam but it was noted to be a high quality feature. The invert of the proposed cross pipe in this location will be set at the existing water surface elevation in order to avoid draining the remaining wetland. A note will be added to the plans informing the contractor and inspection personnel not to change the invert of this pipe in the field. Roadway drainage at this location will be directed to a pre-formed scour hole outside of the buffer and wetlands.

Sheet 22: The wetland shown on this sheet is an isolated wetland having only DWQ jurisdiction. The short channel segment located inside the wetland was determined to be non-jurisdictional. However, buffers are required for the short stream segment. NCDOT will coordinate with DWQ to determine if this location should be considered a total take since the suspected source of the wetland is most likely a spring that will be buried. Dennis Jernigan noted that a spring box should be provided as part of the drainage design. The spring box will be field adjusted during construction. Depending on the results of the coordination with DWQ, NCDOT will either utilize a conventional drainage design (lateral ditch from 252+00 to 257+00 Lt) or bring the offsite drainage into a storm drain system at 252+00 left and outlet the system at 257+00 Lt.

Sheets 23-24: A 2@12'x12' box culvert is proposed for Perry Creek at this site. The proposed culvert includes a 2' sill in the southern barrel and baffles in the northern barrel. A 12'x8' pedestrian culvert is proposed on the south side of the proposed stream culvert. A small amount of excavation will be required at the entrance to the pedestrian culvert. The USACE requested that the wetland at Sta. 267+00 Lt. be considered a total take. Gary Jordan asked if a bottomless culvert was considered at this location. Jeff Meador noted that a bottomless culvert had been considered since bedrock is evident. However, the meanders in the stream would cause the culvert to be more than 40' wide to accommodate the natural stream channel. Since the culvert will have to be blasted through bedrock a traditional culvert was determined to be the only feasible option. Roadway drainage at this site will be discharged to pre-formed scour holes outside of the stream buffer.

Sheets 25-26: No jurisdictional features.

Sheet 27: A small area of isolated wetlands exists at 319+00 Rt. No impacts to this wetland are expected as a result of this section of the project.

Sheet 28: See comments for sheets 8 and 27 above.

Sheet 29: No jurisdictional features.

Memorandum of Meeting

Date: December 16, 2009

Place\Time: NCDOT, Hydraulics Unit Conference Room, 8:00 A.M.

Team Members:
Eric Alsmeyer – USACE (Present)
Gary Jordan – USFWS (Present)
Travis Wilson – NCWRC (Absent)
Rob Ridings – NCDWQ (Present)
Kathy Matthews – USEPA (Absent) [1]
Felix Davila – FHWA (Present)
David Harris – NCDOT Roadside Environmental (Absent) [2]
Jimmy Goodnight – NCDOT Roadway Design (Absent) [3]
Betsy Cox – NCDOT Structures (Absent) [4]
Beverly Robinson – NCDOT PDEA (Present)
Rachelle Beauregard – NCDOT Natural Environment (Present)
Dennis Jernigan – NCDOT Division 5 (Absent) [5]

[1] Substitute Chris Militscher (Present)
[2] Substitute Mark Staley (Present)
[3] Substitute Tim Goins (Present)
[4] Substitute Theo Beach (Present)
[5] Substitute David Moore (Present)

Participants:
Stephen Morgan – NCDOT Hydraulics Unit
Chris Murray – NCDOT Division 5
Jeff Meador – RK&K Engineers

Subject:
NEPA\404 Merger Team – Concurrence Point 4C Meeting
R-2814B – US 401 Rolesville Bypass from SR 2225 (Louisbury Road) to NC 96 (Zebulon Road), Wake County

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The 100% Hydraulic Review was held to in order to reach agreement on concurrence point 4C for the US 401 Rolesville Bypass in Wake County. The following items were discussed and conclusions reached:

Stephen Morgan opened the meeting with introductions and a brief description of the purpose of the meeting.

Jeff Meador summarized project changes since the 4B meeting. The following changes to the plans were noted:

- As discussed at the 4B meeting the Town of Rolesville requested that the culvert carrying existing US 401 over Perry Creek be retained to provide access to the neighborhood at –L- 282+00 +/- left. The change has been made to the plans.

- The intersections within the project have been re-designed utilizing the "superstreet" concept. Minimal changes to jurisdictional features on the project have been made as a result of the design change.

Jeff Meador provided a summary of the impacts and proposed drainage design at each jurisdictional feature on the plans. The following comments and decisions were reached.

General:

Rob Ridings noted that pond drainage plans will be required by the Division of Water Quality for the three ponds that will be drained as a result of the project. The Division is especially interested in the pond drainage plan for the large pond on Cedar Fork since it is classified as a High Quality Water. The pond drainage plan is not required as part of the permit application but would be helpful. If the plans are not included in the permit application they will be required before construction begins as a condition of the permit.

Buffer impact drawings with contours are not needed by the Division of Water Quality. These sheets can be removed from the permit drawing package.

Sheet 2C: Detail H – the first station range should begin at 54+20. Detail W – the detail notes a Class B rip-rap liner. The plans do not show rip rap. The detail\plans should be checked and corrected to match. Detail Y – the plans show rip rap in the locations where the detail is used. Rip rap should be added to the detail.

During the review of this sheet Chris Murray noted that appropriate details for live staking and reforestation should be added to the plans. Mark Staley noted that the appropriate details would be included in the erosion control plans for the project.

Post meeting note: The calculations show a need for a Class B rip rap lining for Detail W. The channel detail and plans will show a Class B rip rap liner.

Sheet 6 (Sites 1 and 2):

Site 1: No comments

Site 2: The Division requested that a note be added to the plans directing the contractor not to bury the proposed 30" pipe that outlets to the wetland.

Sheet 7 (Sites 3, 4, 5 and 6): The proposed easement required to drain the pond should be shown on this sheet.

Site 3: Additional fill in wetlands should be shown to accommodate the proposed toe protection. The small remnant of wetlands at -L- 52+50 +/- left should be permitted to leave no remnant.

Site 4: The Division requested additional mechanized clearing where proposed ditch enters the wetland at –L- 54+35 Rt. A detail for the rip rap at the outlet of the proposed 78" pipe is needed.

Site 5: The Division requested additional excavation in wetlands at the proposed rock cross vane (approximately 10' past cross vane on all sides).

Site 6: Rip rap should be shown on the banks only at the proposed pipe outlet. Mitigation is not required for the impacts on the downstream side of this site. These impacts should broken out in the summary table. Additionally, bank stabilization should be broken out at this location. Gary Jordan asked if elliptical or arch pipe had been considered at this site as a means to eliminate the double proposed double pipe design. Jeff Meador noted that because of the low clearance between the flow line of the stream and the existing roadway grade double pipes would still be required.

Sheets 8-9 (Site 7): Jeff Meador noted that the proposed pedestrian culvert at this location had been moved from the east to the west side of the stream as discussed at the 4B meeting. The Division

requested additional excavation in wetlands and mechanized clearing at the northwest side of the stream culvert entrance to accommodate headwall construction. The Division also requested that the location of the pre-formed scour hole relative to the existing sanitary sewer line be investigated. Additional fill in wetlands should be shown to accommodate the proposed toe protection at this site.

Sheet 11 (Site 8): No comments

Sheets 13-14 (Site 9): The Division requested additional rip rap at the entrance to the proposed 72" pipe. As noted on sheet 2C the proposed channel will have rip rap along its entire length.

Sheets 17, 17A and 18 (Sites 10 and 11):

Site 10: No comments

Site 11: Several participants asked if mitigation was proposed at this site. Rachelle Beauregard noted that the property owner had been contacted about possible mitigation at this site but he has not returned calls to the Department. Rob Ridings noted that the Division of Water Quality was very open to mitigation at this site. Eric Alsmeyer stated that the Corps of Engineers would not push for mitigation at this location.

Sheet 19 (Site 12): No comments

Sheet 20 (Site 13): The Division requested that a note referencing the detail for the rock fill at 234+50 left be added to the plans.

Sheet 21 (Site 14): The Division requested that a note be added to the plans directing the contractor not to bury the proposed 48" pipe that outlets to the wetlands. Additional fill in wetlands should be shown to accommodate the proposed toe protection. The Division requested a 7'x7' area of excavation in wetlands to construct the proposed headwall for the 48" pipe. The proposed rip rap at 246+15 right will be shown on the channel bottom as well as the side slopes.

Sheet 22 (Site 15): Rachelle Beauregard requested that the impact for this site be added to the chart. It is currently shown as a footnote on the chart since it is an isolated wetland impact.

Sheets 23-24 (Sites 16, 17 and 18):

Site 16: No comments

Site 17: No comments

Site 18: The Division requested additional buffer impacts at the downstream side of the proposed pipe (all of Zone 1 within the existing right-of-way). The Division also requested that rip rap be placed on the banks only at the upstream channel tie in. Rip rap should be shown on the banks only at the proposed pipe outlet. Rachelle Beauregard requested that bank stabilization be broken out at this site.

R-2814B Stormwater Management Plan

II. Required Items Checklist

R-2814B is a roadway construction project in Wake County, NC. The mainline of the roadway (US 401 Rolesville Bypass) is a four lane roadway with grass medians and grass ditches, mostly on new location. The length of the mainline roadway is 5.82 miles. The mainline roadway will utilize closed storm drainage systems and ditches to drain the roadway right-of-way. Multiple grass swales are proposed to provide storm water treatment and conveyance through buffers.

The project drains to three main receiving waters all of which are in the Neuse River Basin. The receiving waters and their current water quality classification are listed below:

Receiving Stream	Classification
Harris Creek	C, NSW
Cedar Fork	WS-II, HQW, NSW
Perry Creek	WS-II, HQW, NSW

In addition to the mainline bypass construction, the project also includes modifications to several connecting roadways. These improvements include

Roadway Alignment	Description
Existing US 401	New connectors from existing roadway to bypass
SR 2226 Jonesville Rd	Widening for turn lanes
SR 1003 Rolesville Rd	Widening for turn lanes
SR 2306 Century Farm Rd	Realignment to Rolesville Road
SR 2300 Pulleytown Rd	Widening for turn lanes
NC 96 Zebulon Rd	Widening for turn lanes

The following notes apply to the four items listed under Designer's Initials:

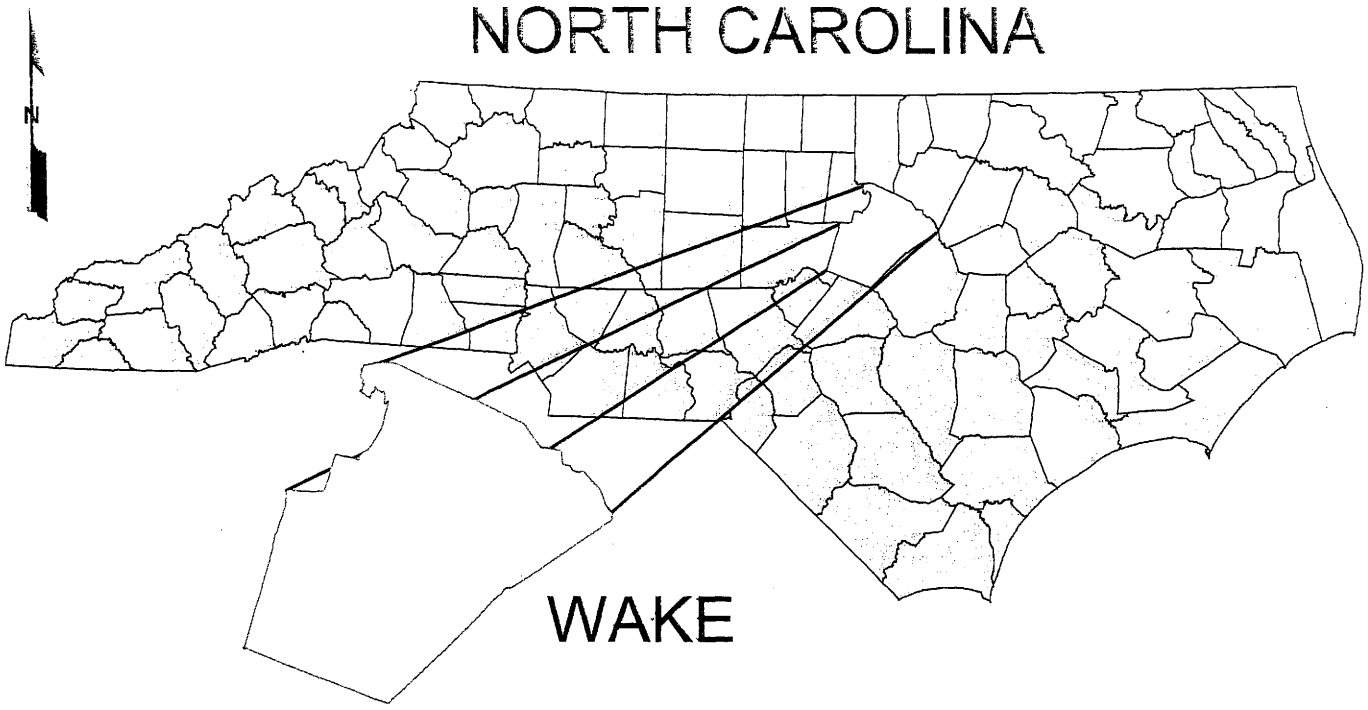
a. The amount of pavement has been set by the NCDOT Roadway Design Unit
b. Runoff from impervious surfaces has been diverted away from surface waters or has been treated using grass swales prior to entering jurisdictional waters.
c. Grass swales have been provided at various locations along the length of the project. Please see the list in this document for exact locations of the swales.
d. Vegetative ditches have been flattened to 3:1 or flatter to the extent possible. In locations where right-of-way is restricted, ditch slopes of 2:1 have been utilized to avoid excessive property impacts.

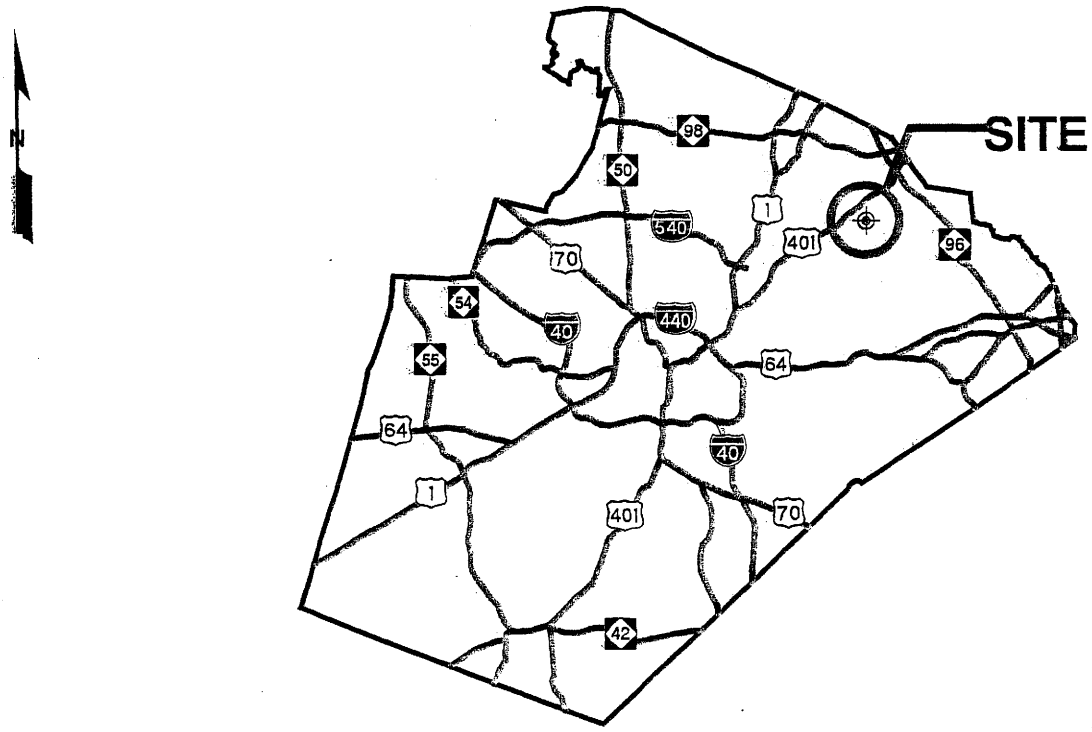
Proposed Grass Swale Locations

Line	Begin Station	End Station	Side
L	46+00	48+00	Lt
L	47+00	48+00	Median
L	47+00	48+00	Rt
L	49+50	50+87	Lt
L	49+50	52+00	Median
L	49+50	50+87	Rt
L	54+00	54+35	Rt
L	54+73	56+60	Rt
L	107+00	108+50	Lt
L	107+00	108+50	Rt
L	110+50	111+50	Rt
L	112+00	113+50	Lt
L	118+00	119+00	Rt
L	121+50	122+10	Rt
L	124+50	125+50	Lt
L	124+50	125+50	Rt
L	128+50	129+50	Lt
L	128+50	129+50	Rt
L	143+00	145+00	Rt
L	148+00	149+00	Lt
L	152+50	154+00	Lt
L	195+50	196+50	Lt
L	195+50	196+50	Median
L	195+00	197+50	Rt
L	199+80	201+50	Lt
L	205+00	206+00	Lt
L	207+00	208+00	Rt
L	210+50	211+50	Lt
L	210+50	211+50	Rt
L	213+50	214+50	Lt
L	281+25	282+50	Rt
Y6	15+08	17+00	Rt

Proposed Pre-Formed Scour Hole Location

Line	Station	Side
L	39+45	Rt
L	79+50	Lt
L	247+64	Rt
L	274+00	Rt
L	276+70	Lt
L	278+60	Lt





WETLAND AND STREAM
UTILITY

VICINITY MAP

NCDOT

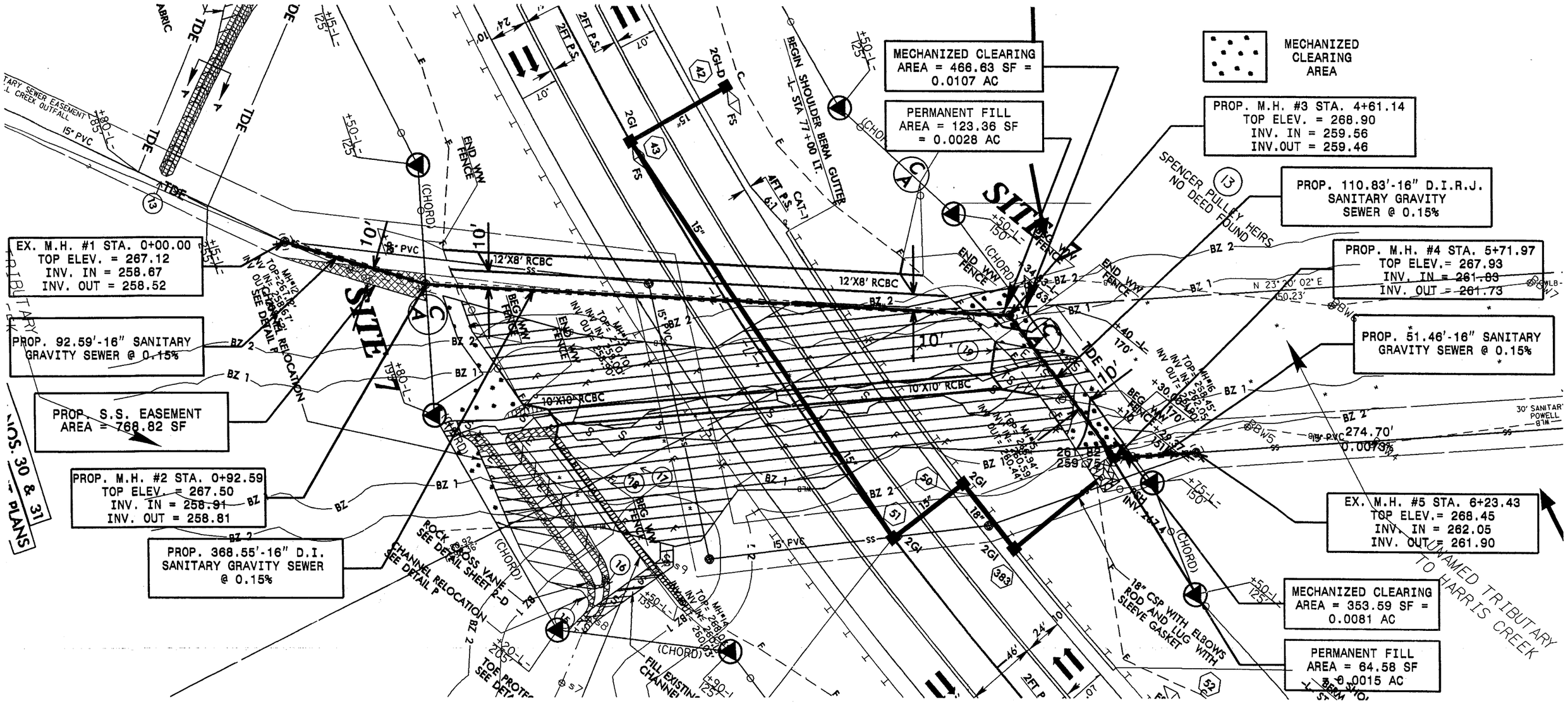
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

NOVEMBER 2009

Permit Drawing
Sheet 1 of 6

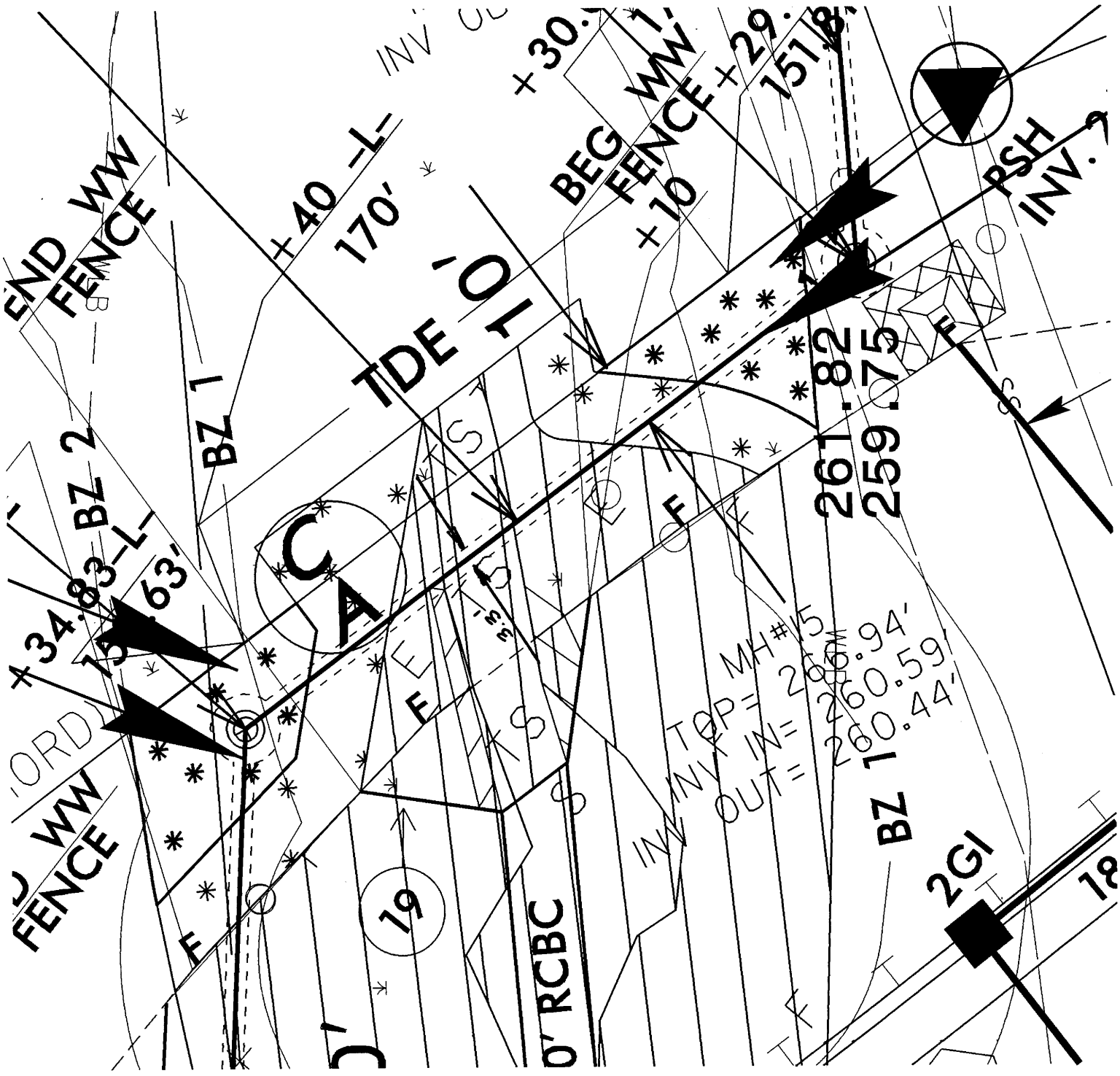
Wetland & Stream
Utility Impacts

Site 7



Permit Drawing
Sheet 2 of 6

Wetland & Stream
Utility Impacts
Site 7

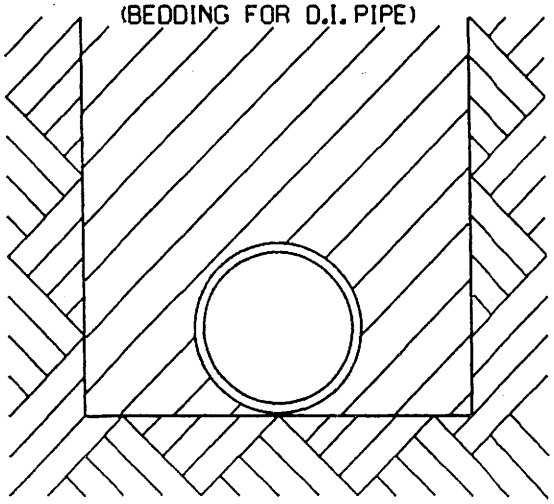


Permit Drawing
Sheet 3 of 6

MAXIMUM TRENCH WIDTH
AT TOP OF PIPE

NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)	NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)
4	28	20	44
6	30	24	48
8	32	30	54
10	34	36	60
12	36	42	66
14	38	48	72
16	40	54	78
18	42		

TYPE "2"
(BEDDING FOR D.I. PIPE)



PIPE BEDDED IN FLAT-BOTTOM TRENCH. TRENCH BACKFILLED IN LOOSE 6" LAYERS COMPACTED TO TOP OF TRENCH USING LOCAL EXCAVATED MATERIAL. ALL MATERIAL SHALL BE FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH. COMPACTION SHALL BE TO APPROX. 95% DENSITY IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY THE DEPARTMENT OF TRANSPORTATION.

PROP. NO.	PROPERTY OWNER NAME	PROP. OWNER ADDRESS
13	Spencer, Pulley Heirs	9412 Louisburg Rd., Wake Forest, NC 27587
14	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)

4/5/2010

Permit Drawing
Sheet 5 of 6

UTILITY WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
7	See Drawing	Sanitary Sewer	0.004			0.019				3		
TOTALS:			0.004			0.019				3		

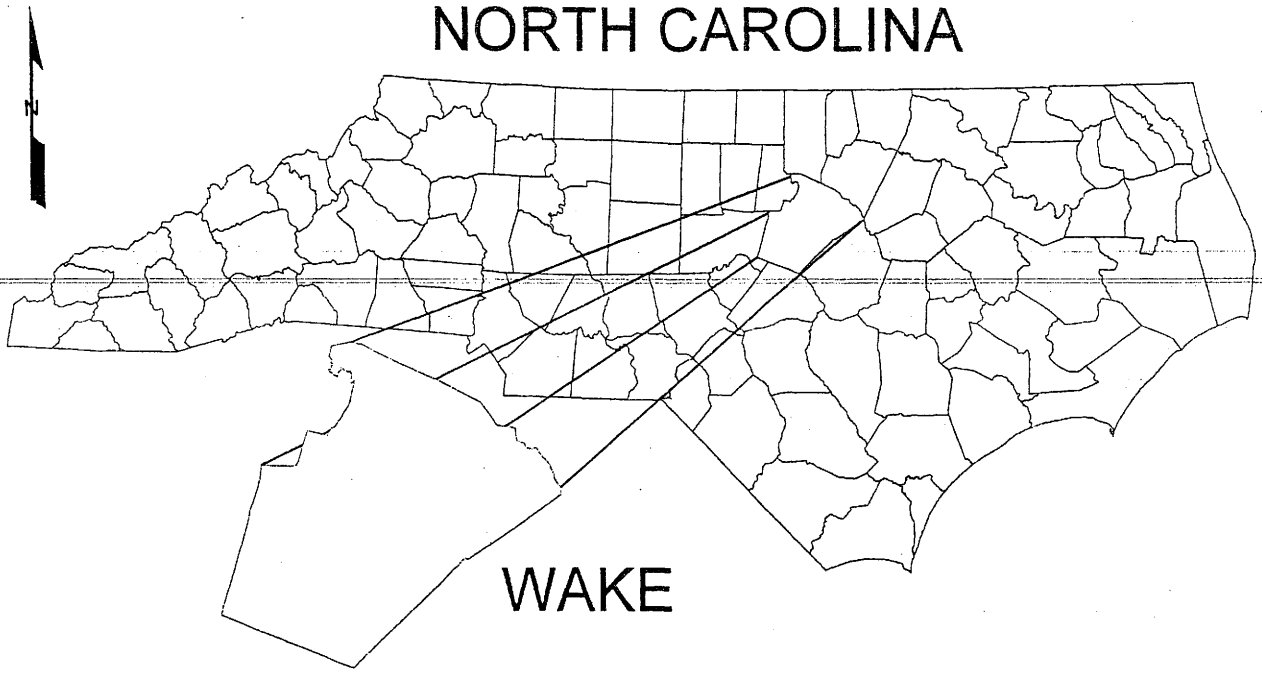
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

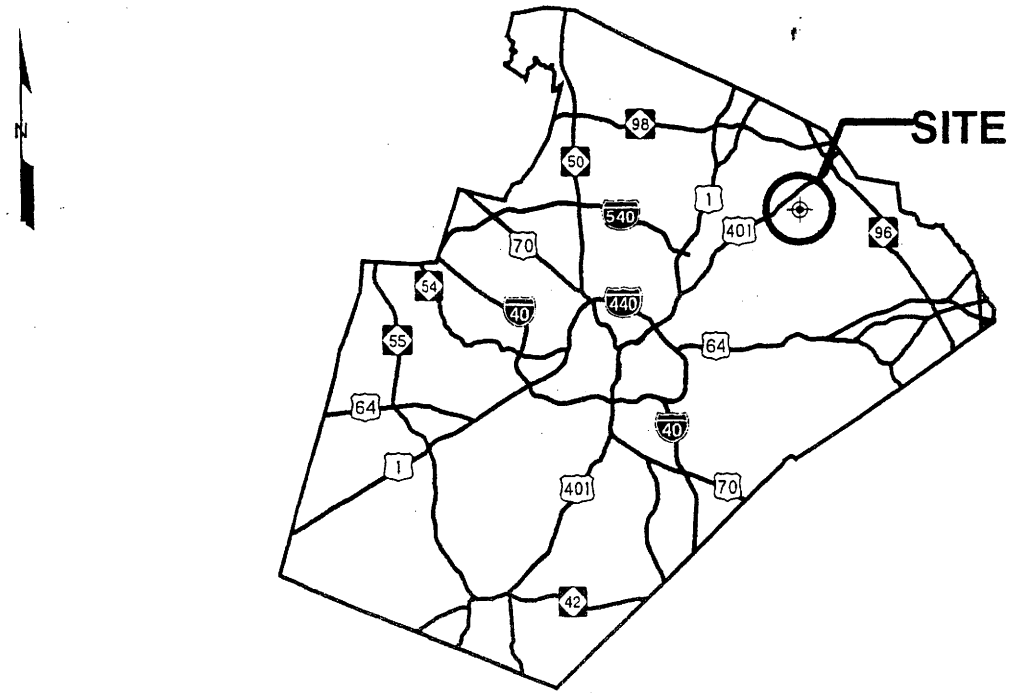
WAKE COUNTY
WBS - 34506.3.GV3 (R-2814B)

SHT 1 OF 1 4/5/2010

ATN Revised 3/31/05

Permit Drawing
Sheet 6 of 6





UTILITY

BUFFER VICINITY MAP

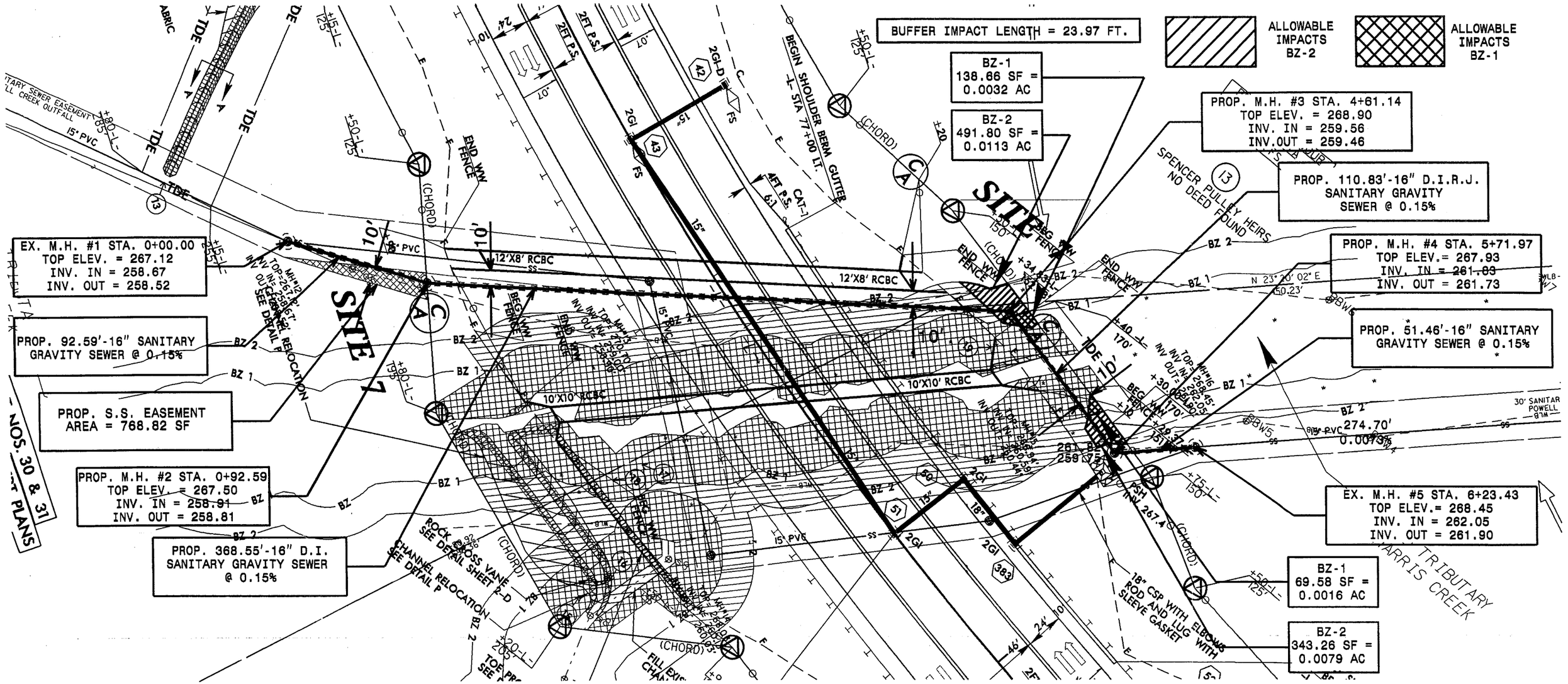
NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

4|5|2010

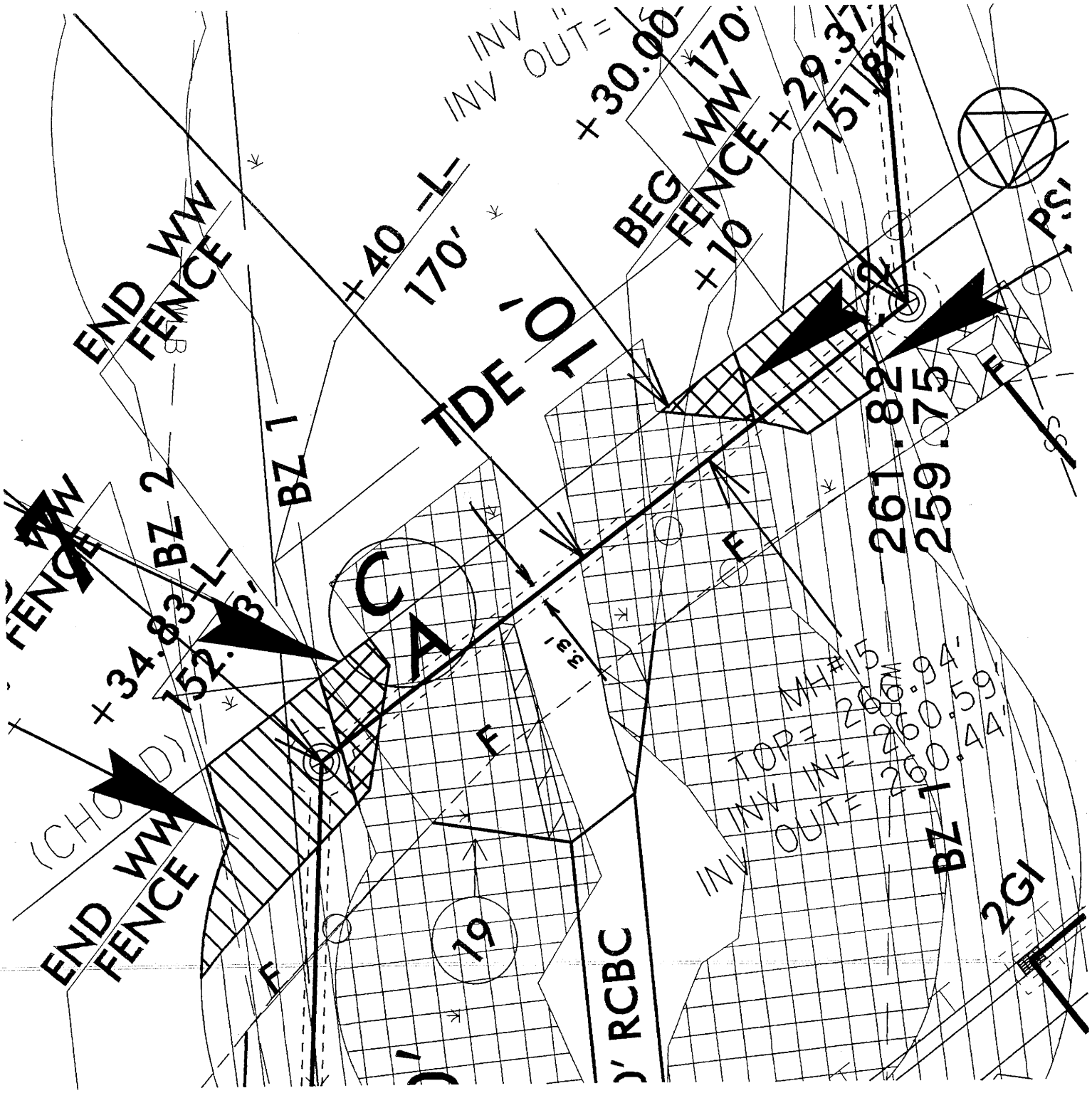
Buffer Drawing Sheet 1 of 5

Buffer Impacts - Utilities
Site 7



Buffer Drawing
Sheet 2 of 5

Buffer Impacts - Utilities Site 7



Buffer Drawing
Sheet 3 of 5

PROP. NO.	PROPERTY OWNER NAME	PROP. OWNER ADDRESS
13	Spencer, Pulley Heirs	9412 Louisburg Rd., Wake Forest, NC 27587
14	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)

4/5/2010

Buffer Drawing
Sheet 4 of 5

UTILITY BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
7	Sanitary Sewer	See Drawing				208	835	1043					
TOTAL:						208.0	835.0	1043.0	0.0	0.0	0.0		

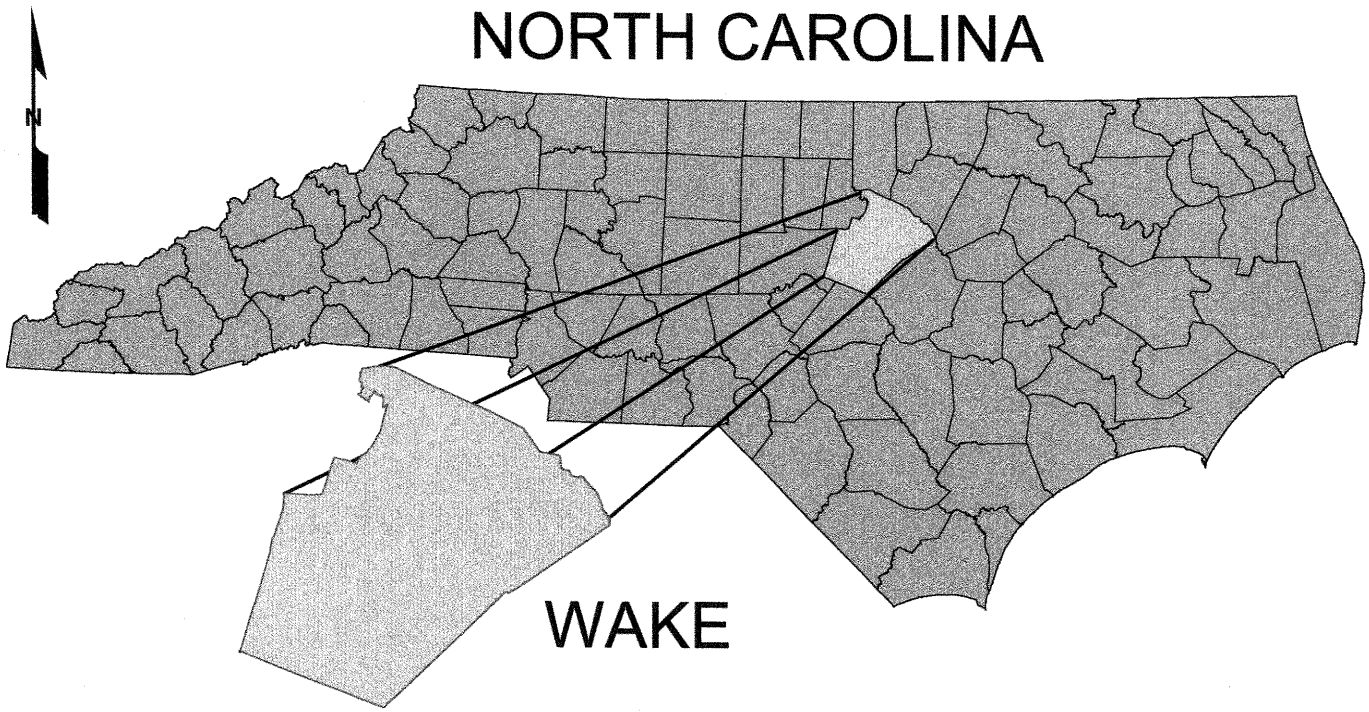
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

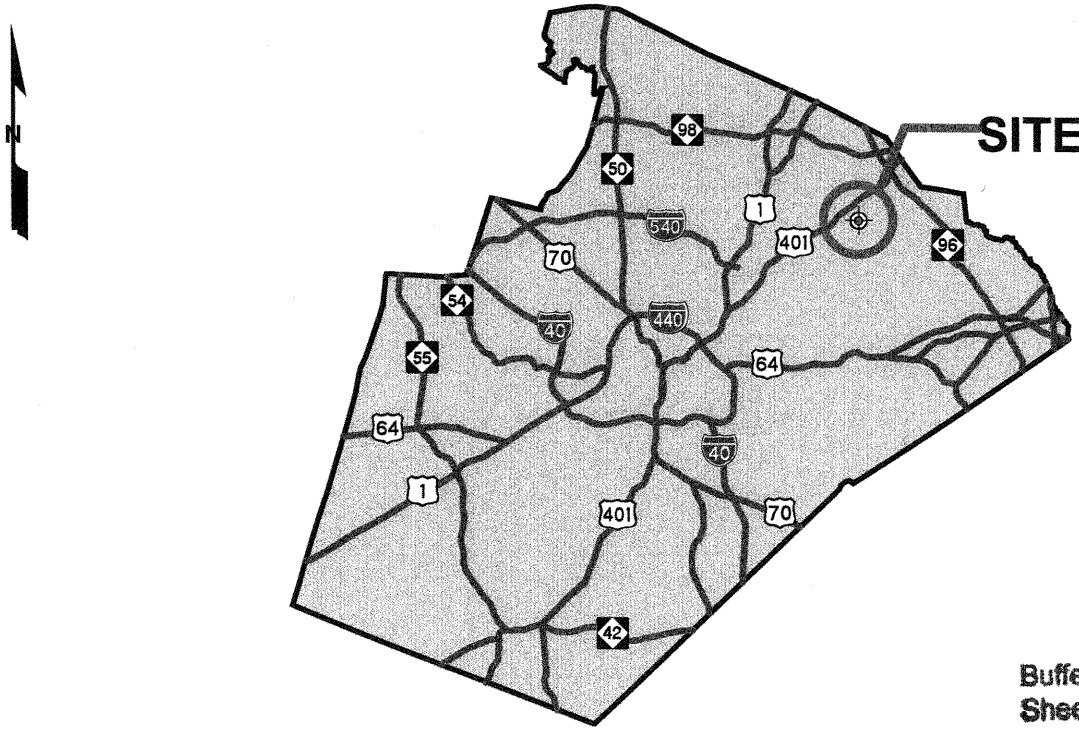
WAKE COUNTY
PROJECT: 34506.3.GV3 (R-2814B)

4/5/2010
SHEET 1 OF 1

Rev. May 2006

Buffer Drawing
Sheet 5 of 5





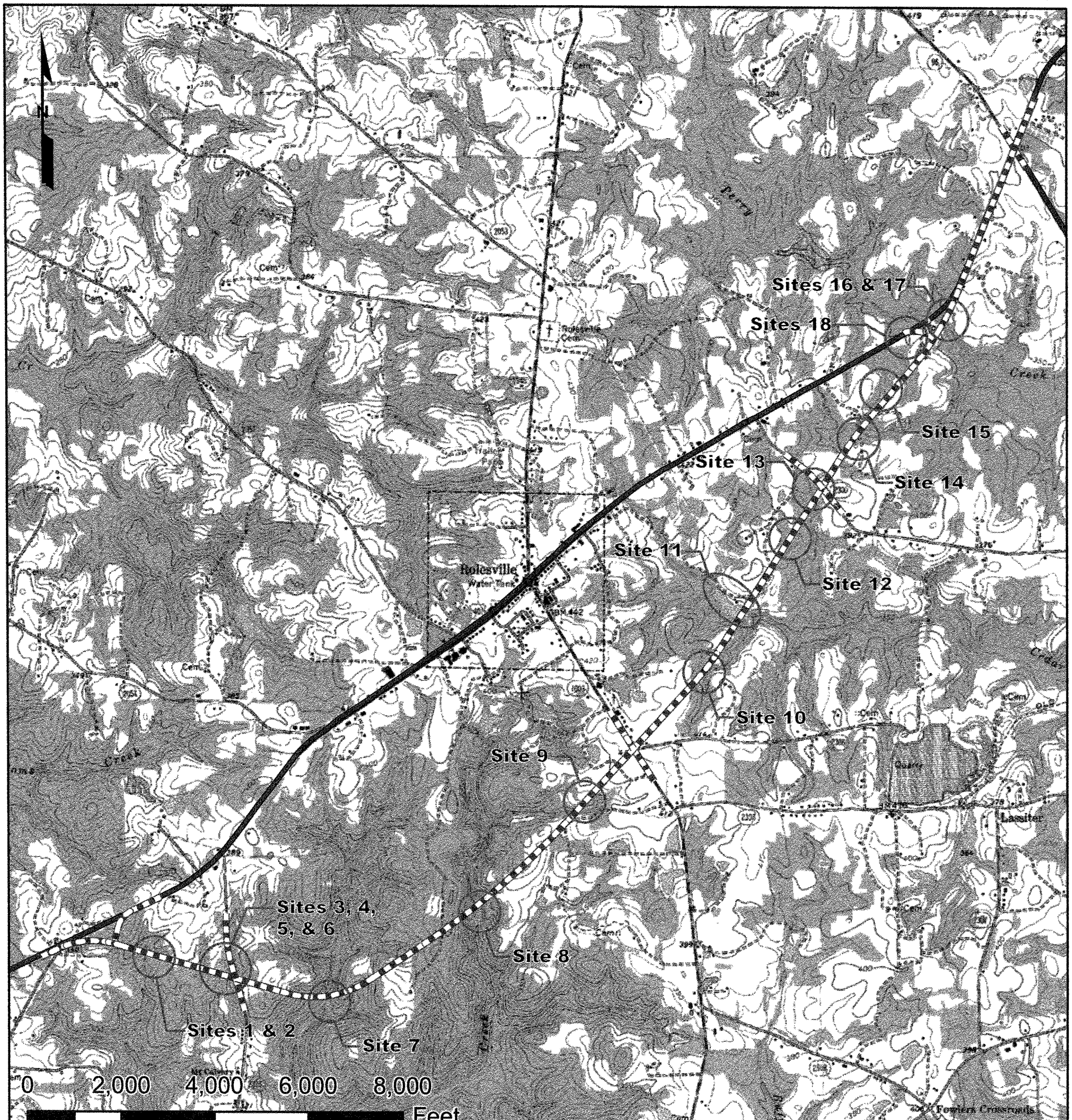
Buffer Drawing
Sheet 1 of 20

BUFFER VICINITY MAP

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

NOVEMBER 2009



1 inch = 3,000 feet

BUFFER LOCATION MAP

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

NOVEMBER 2009

Source: USGS 7.5 Minute Quadrangle, Rolesville, NC

PROP. NO.	PROPERTY OWNER NAME	PROP. OWNER ADDRESS
7	Neuse Baptist Church	8700 Capital Blvd., Raleigh, NC 27587
8	Alexander Family investments, LLC	906 Washington St., Cary, NC 27511
9	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587
12	Bobby L. Murray Heirs (J Brent King Exec.)	PO Box 40639, Raleigh, NC 27629
13	Spencer, Pulley Heirs	9412 Louisburg Rd., Wake Forest, NC 27587
14	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587
20	Shearon, Cameron E.& Beverly W.	4325 Galax Dr., Raleigh, NC 27612
21	Mitchell F. Rabil Family Irrevocable Trust	3321 Gondola Dr., Lexington KY, 40513
22	Shearon, Cameron E. & Beverly W.	4325 Galax Dr., Raleigh, NC 27612
34	Scarboro Family Limited Partnership	PO Box 84, Rolesville, NC 27571
35	Wall, Joe	7317 Pulley Town Rd., Wake Forest, NC 27587
36	Wall, Joe	7318 Pulley Town Rd., Wake Forest, NC 27587
38	Bobie Joe Wall & Vickie D. Wall	7309 Pulley Town Rd. Wake Forest, NC 27587
39	The SBJ Growth, L.P	PO Box 19067, Raleigh, NC
51	Bartholomew, Michael	PO BOX 573, Rolesville, NC 27571
52	Bartholomew, Richard C & Shirley B.	PO BOX 6, Rolesville, NC 27571
54	Keith, Jerry W. and Mary P	1124 Louisburg Rd., Wake Forest, NC 27587
54A	Bartholomew, Richard C. & Shirley B.	PO BOX 6, Rolesville, NC 27571
55	Stell, Meith & Mary Sue Et. Al.	1132 Louisburg Rd., Wake Forest, NC 27587
57	Sylvania Frazier & Lula Barnes McGhee	2725 Wait Ave., Wake Forest, NC 27857

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)

2/22/2010

Buffer Drawing
Sheet 3 of 20

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
2	-L- 41+07 RT			6
5	-L- 55+00		3937	1399
7	-L- 77+89		26830	8158
15 [1]	-L- 255+00		16637	8113
TOTAL:			47404	17676

[1] ALL IN ISOLATED WETLANDS

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)

2/22/2010
SHEET OF

Rev. Jan 2009

Buffer Drawing
Sheet 4 of 20

BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	60" RCP	-L- 38+11	X						13743	9262	23005		
2	30" RCP	-L- 41+07 RT			X					6	6		
5	78" RCP	-L- 55+00	X						24086	16852	40938		
6	2@42" RCP	-Y2- 17+31	X			856		856					
7	10'X10' RCBC	-L- 77+89	X						31468	16685	48153		
8	10'X10' RCBC	-L- 115+74	X						28702	15200	43902		
9	72" RCP	-L- 147+00	X						53503	31621	85124		
10	N\A	-L- 187+00 RT			X				2133	4772	6905		
11	10'X9' RCBC	-L- 200+04	X						25288	14205	39493		
12	42" RCP	-L- 219+03	X						17088	15041	32129		
15	N\A	-L- 255+00	X						19154	15890	35044		
16	2@12'X12' RCBC	-L- 275+39	X						19724	10366	30090		
18	2@36" RCP	-Y6- 15+17	X			3475	1585	5060					
TOTAL:						4331	1585	5916	234889	149900	384789		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)

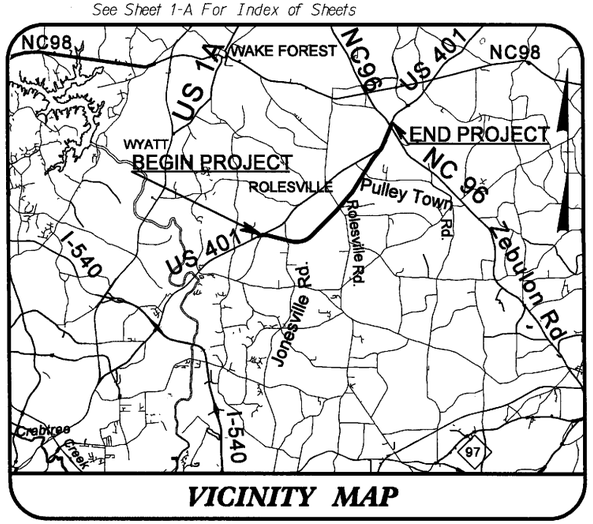
2/22/2010
SHEET OF

Rev. May 2006

Buffer Drawing
Sheet 5 of 20

TIP PROJECT: R-2814B

CONTRACT:



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2814B	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
34506.1.1	STP-401(4)	PE	

LOCATION: US 401 ROLESVILLE BYPASS FROM SR 2225, LOUISBURY ROAD TO NC 96, ZEBULON ROAD

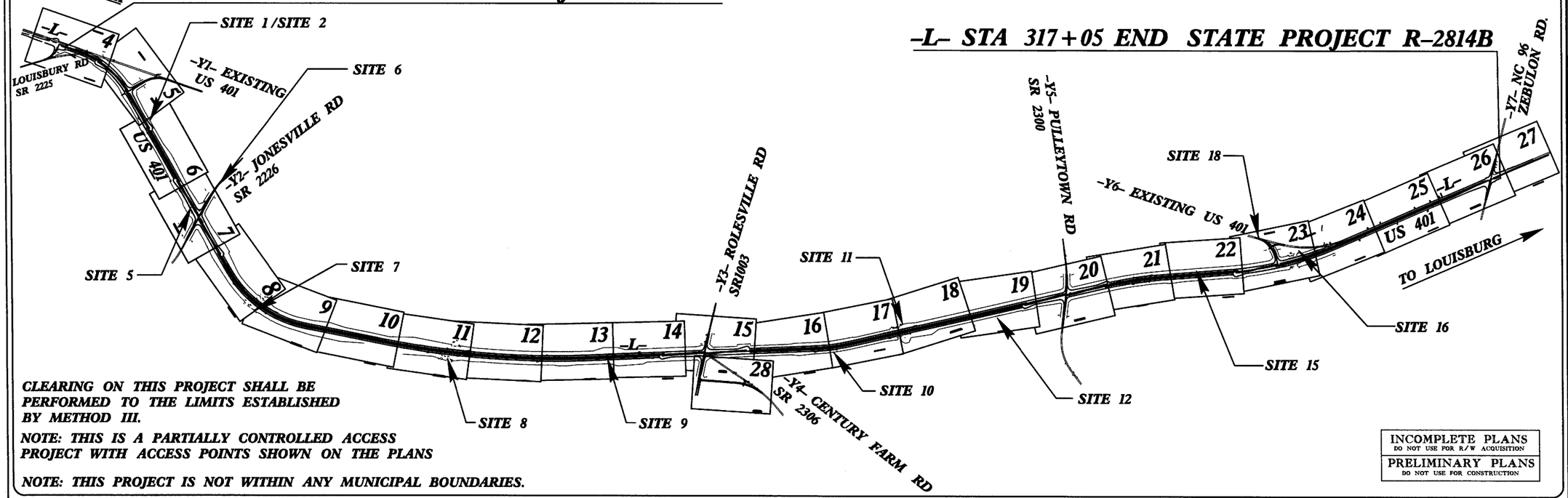
BUFFER IMPACTS

Buffer Drawing Sheet 6 of 20

NAD 83

TO RALEIGH -L- STA 16+31 BEGIN STATE PROJECT R-2814B

-L- STA 317+05 END STATE PROJECT R-2814B



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

NOTE: THIS IS A PARTIALLY CONTROLLED ACCESS PROJECT WITH ACCESS POINTS SHOWN ON THE PLANS

NOTE: THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2030 = 24600
ADT =
DHV = 55 %
D = 13 %
T = 7 % *
V = 60 MPH

* TTST 2 DUAL 5

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT STP-401(4) = 5.696 MILES
TOTAL LENGTH TIP PROJECT R-2814B = 5.696 MILES

PERMIT DRAWINGS PREPARED BY :

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

FOR THE DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 17, 2009

LETTING DATE: APRIL 19, 2011

JS GOODNIGHT
PROJECT ENGINEER

TD GOINS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

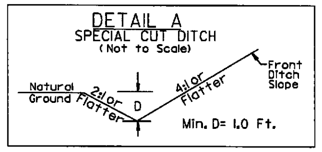
DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER *P.E.*

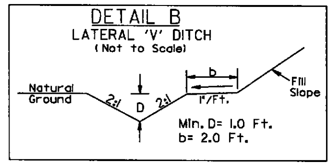
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2-C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

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

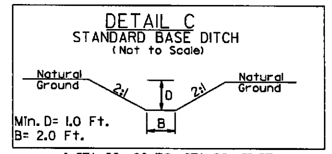
Buffer Drawing Sheet 7 of 20



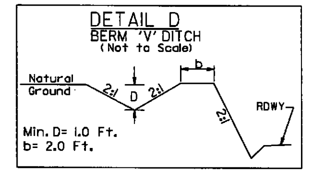
Y1 STA. 16+50 TO STA. 20+50 LT
Y3 STA. 23+50 TO STA. 24+35 LT
Y4 STA. 10+45 TO STA. 13+00 RT
Y4 STA. 20+00 TO STA. 22+29 LT
Y4 STA. 20+50 TO STA. 22+20 RT
Y5 STA. 21+17 TO STA. 26+90 LT
Y6 STA. 15+08 TO STA. 17+00 RT
Y6 STA. 18+25 TO STA. 20+79 LT
Y8 STA. 10+52 TO STA. 12+55 RT



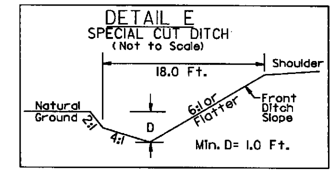
L STA. 32+40 TO STA. 33+00 LT
L STA. 97+50 TO STA. 98+50 RT
L STA. 139+50 TO STA. 143+00 RT
L STA. 190+75 TO STA. 191+50 LT
L STA. 237+00 TO STA. 239+00 RT
L STA. 257+25 TO STA. 258+25 RT
L STA. 261+50 TO STA. 263+50 RT
L STA. 279+50 TO STA. 281+25 RT
L STA. 285+50 TO STA. 286+50 RT
L STA. 305+70 TO STA. 308+50 LT
L STA. 319+35 TO STA. 321+00 RT
L STA. 319+75 TO STA. 320+50 LT
Y5 STA. 16+56 TO STA. 18+65 LT
Y5 STA. 18+97 TO STA. 19+28 LT
Y5 STA. 25+40 TO STA. 26+00 RT



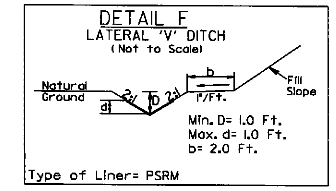
L STA. 22+03 TO STA. 22+81 RT
L STA. 100+44 TO STA. 101+00 LT
Y6 STA. 14+94 TO STA. 15+05 RT



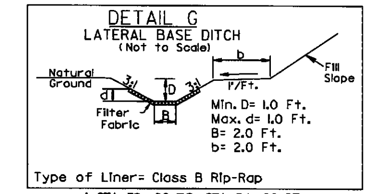
L STA. 28+00 TO STA. 30+35 LT
L STA. 33+00 TO STA. 34+50 LT
L STA. 39+50 TO STA. 41+00 LT
L STA. 42+00 TO STA. 51+50 LT
L STA. 70+50 TO STA. 75+00 LT
L STA. 95+00 TO STA. 97+50 RT
L STA. 99+50 TO STA. 106+00 RT
L STA. 109+50 TO STA. 113+50 LT
L STA. 119+50 TO STA. 123+00 RT
L STA. 180+00 TO STA. 190+00 LT
L STA. 205+00 TO STA. 217+50 LT
L STA. 233+00 TO STA. 237+00 RT
Y6 STA. 14+95 TO STA. 17+85 RT



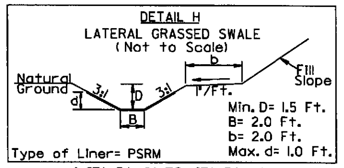
L STA. 24+50 TO STA. 25+00 RT
L STA. 29+00 TO STA. 29+50 RT
L LT STA. 29+70 TO STA. Y1 23+50 RT
L STA. 41+00 TO STA. 41+50 LT
L STA. 196+00 TO STA. 196+50 LT
L STA. 195+00 TO STA. 197+50 RT
L STA. 235+00 TO STA. 237+00 RT
L STA. 239+50 TO STA. 240+00 LT
L STA. 291+00 TO STA. 291+50 RT
L STA. 320+50 TO STA. 323+50 LT
L STA. 321+00 TO STA. 323+50 RT



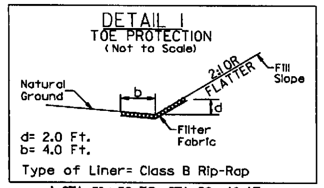
L STA. 23+00 TO STA. 25+00 LT
L STA. 32+00 TO STA. 32+40 LT
L STA. 41+50 TO STA. 42+00 LT
L STA. 98+50 TO STA. 99+50 RT
L STA. 133+50 TO STA. 135+50 RT
L STA. 190+00 TO STA. 190+75 LT
L STA. 202+80 TO STA. 205+00 LT
L STA. 250+00 TO STA. 252+00 LT
L STA. 284+88 TO STA. 287+50 LT
L STA. 298+01 TO STA. 300+50 LT
Y2 STA. 21+50 TO STA. 22+05 LT
Y3 STA. 21+20 TO STA. 22+20 RT



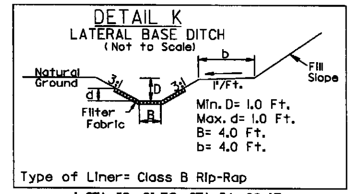
L STA. 52+00 TO STA. 54+00 RT
L STA. 145+00 TO STA. 147+50 RT
L STA. 144+55 TO STA. 148+00 LT
L STA. 149+00 TO STA. 150+50 LT
L STA. 201+50 TO STA. 202+45 LT



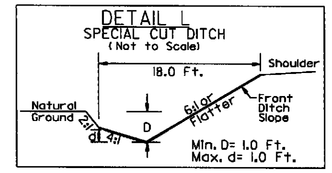
L STA. 54+00 TO STA. 54+35 RT
L STA. 114+18 TO STA. 115+02 RT



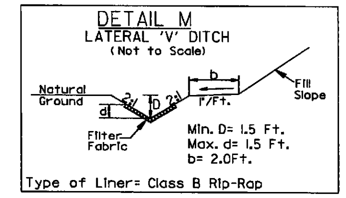
L STA. 51+50 TO STA. 52+60 LT
L STA. 77+27 TO STA. 78+60 RT
L STA. 113+75 TO STA. 115+52 LT
L STA. 115+20 TO STA. 117+50 RT
L STA. 138+50 TO STA. 142+00 LT
L STA. 147+20 TO STA. 151+00 RT
L STA. 184+50 TO STA. 186+00 RT
L STA. 244+75 TO STA. 207+00 LT
L STA. 229+00 LT TO STA. Y5 19+00 RT



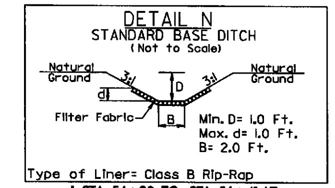
L STA. 52+21 TO STA. 54+80 LT
L STA. 275+15 TO STA. 276+00 RT



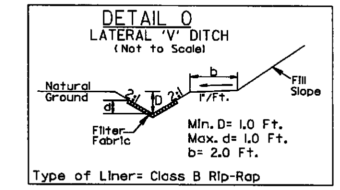
L STA. 21+00 TO STA. 22+00 LT
L STA. 41+00 TO STA. 41+50 LT
L STA. 99+00 TO STA. 99+50 LT
L STA. 189+50 TO STA. 190+00 LT
L STA. 249+00 TO STA. 250+00 LT
L STA. 250+00 TO STA. 250+50 RT



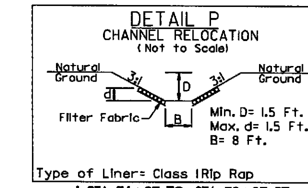
Y2 STA. 22+05 TO STA. 22+95 LT



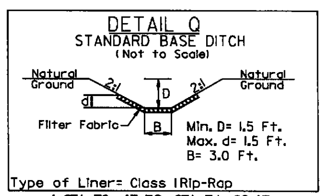
L STA. 54+80 TO STA. 56+41 LT



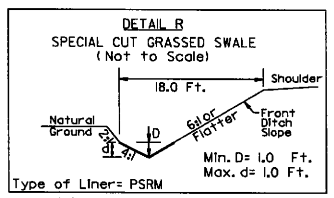
L STA. 22+81 TO STA. 24+00 RT
L STA. 41+00 TO STA. 41+50 LT
L STA. 83+50 TO STA. 85+50 LT
L STA. 286+50 TO STA. 287+00 RT
L STA. 298+00 TO STA. 299+00 RT



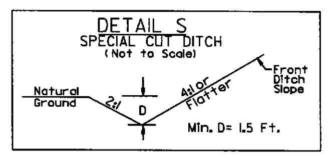
L STA. 76+97 TO STA. 78+27 RT



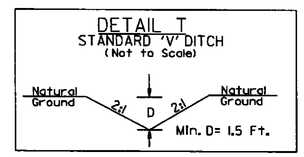
L STA. 73+67 TO STA. 74+88 LT



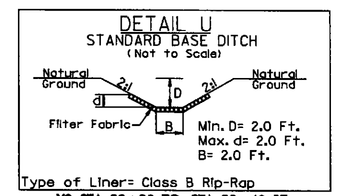
L STA. 108+50 TO STA. 111+50 RT
L STA. 124+50 TO STA. 128+50 LT
L STA. 124+50 TO STA. 128+50 RT



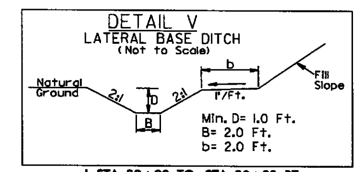
Y3 STA. 21+00 TO STA. 22+20 LT
Y4 STA. 10+45 TO STA. 12+50 LT



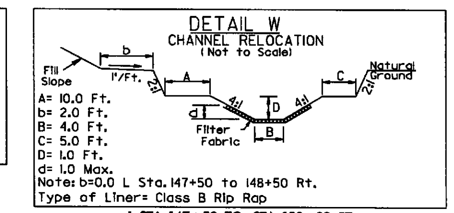
L STA. 164+00 TO STA. 164+20 RT
L STA. 164+00 TO STA. 164+97 RT
L STA. 269+65 TO STA. 270+30 RT
Y3 STA. 25+05 TO STA. 26+50 LT



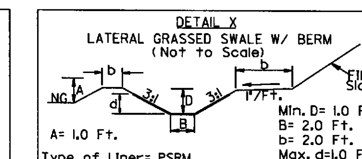
Y3 STA. 22+20 TO STA. 22+40 RT



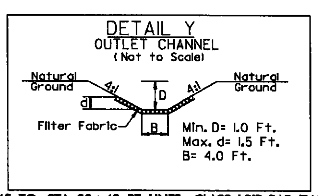
L STA. 30+00 TO STA. 30+32 RT
L STA. 134+00 TO STA. 138+00 LT
L STA. 137+00 TO STA. 138+50 RT
L STA. 217+50 TO STA. 221+00 LT
L STA. 224+50 TO STA. 227+00 LT
L STA. 239+00 TO STA. 246+15 RT
L STA. 251+50 TO STA. 257+25 RT
L STA. 276+00 TO STA. 278+00 RT
Y5 STA. 17+50 TO STA. 18+75 RT
Y7 STA. 17+50 TO STA. 19+30 RT



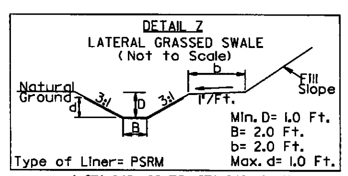
L STA. 147+50 TO STA. 150+83 RT



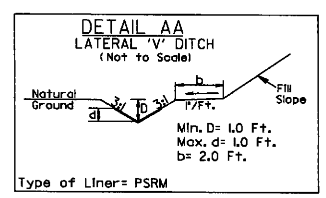
L STA. 143+00 TO STA. 145+00 RT
L STA. 148+00 TO STA. 149+00 LT
L STA. 152+50 TO STA. 154+00 LT



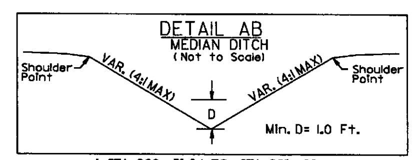
L STA. 38+45 TO STA. 38+48 RT, LINER=CLASS I RIP RAP (BANKS ONLY)
L STA. 54+73 RT, LINER=CLASS I RIP RAP (BANKS ONLY)
L STA. 144+24 TO STA. 144+56 LT, LINER=CLASS I RIP RAP (BANKS ONLY)
Y2 STA. 17+40 RT, LINER=CLASS I RIP RAP (BANKS ONLY), B VARIES 2'-9'
Y5 STA. 25+40 TO STA. 25+40 RT, LINER=CLASS B RIP RAP



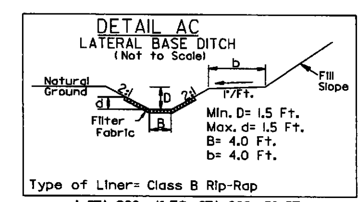
L STA. 148+00 TO STA. 149+00 LT
L STA. 150+50 TO STA. 154+00 LT
L STA. 199+80 TO STA. 201+50 LT
L STA. 281+25 TO STA. 283+50 RT (B=0.0')



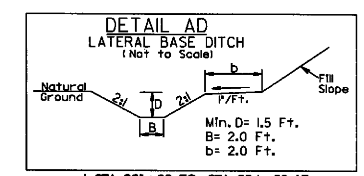
L STA. 198+00 TO STA. 200+30 RT



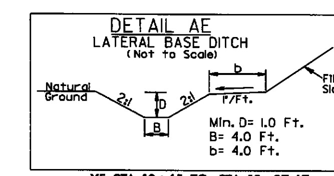
L STA. 200+51.84 TO STA. 201+00
L STA. 274+00 TO STA. 276+50



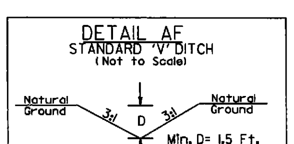
L STA. 200+41 TO STA. 203+50 RT



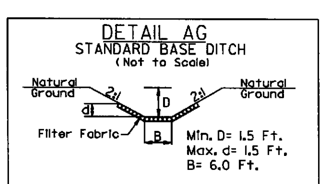
L STA. 221+00 TO STA. 224+50 LT
L STA. 252+00 TO STA. 257+25 LT
Y7 STA. 11+50 TO STA. 15+27 RT



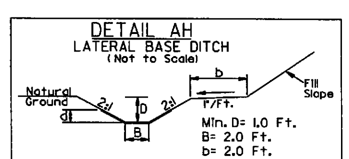
Y5 STA. 18+65 TO STA. 18+97 LT



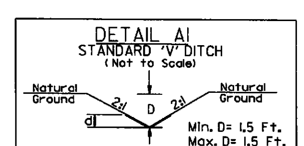
L STA. 296+88 TO STA. 298+01 LT



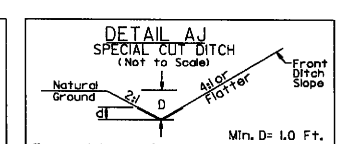
L STA. 54+80 TO STA. 54+81 LT



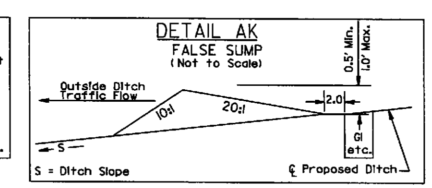
L STA. 138+50 TO STA. 139+50 RT
L STA. 203+50 TO STA. 206+00 RT
L STA. 250+50 TO STA. 251+50 RT
L STA. 278+00 TO STA. 279+50 RT

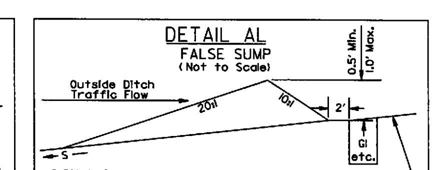


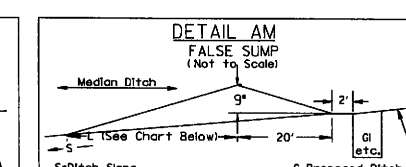
L STA. 290+47 TO STA. 291+00 LT



Y3 STA. 22+20 TO STA. 22+61.82 LT
Y5 STA. 26+00 TO STA. 26+90 RT







Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

6/2/99
02-22-10 07:57
r:\hydraulics\r2814b_hyd_ditchdet.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2-D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

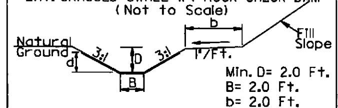
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing Sheet 8 of 20

DETAIL J

LAT. GRASSED SWALE W\ ROCK CHECK DAM
(Not to Scale)



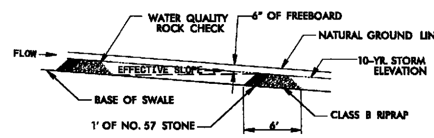
Type of Liner= PSRM

Min. D= 2.0 Ft.
B= 2.0 Ft.
b= 2.0 Ft.
Max d= 1.0 Ft.

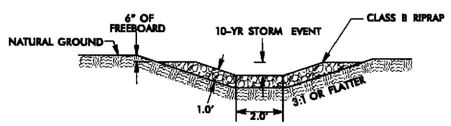
L STA. 54+73 TO STA. 56+60 RT

DETAIL J

TRAPEZOIDAL GRASSED SWALE
wROCK CHECK DAM
(Not to Scale)



PROFILE



TYPICAL SECTION

NOTES:

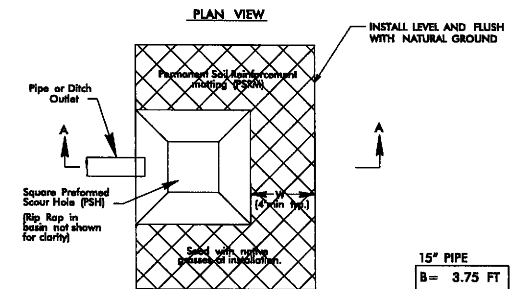
1. DO NOT USE INSIDE CLEAR RECOVERY AREA.
2. NOT PRACTICAL TO USE ON SLOPES > 5%.
3. FOR PERMANENT STRUCTURES IN GRASS SWALE.
4. CHECK DAMS SHOULD BE SPACED SUCH THAT THE BASE OF THE UPSTREAM CHECK IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM CHECK.

L STA. 54+73 TO STA. 56+60 RT

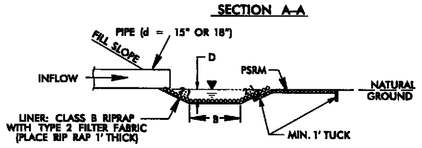
PREFORMED SCOUR HOLE

*NOT TO SCALE

PLAN VIEW



SECTION A-A



15" PIPE

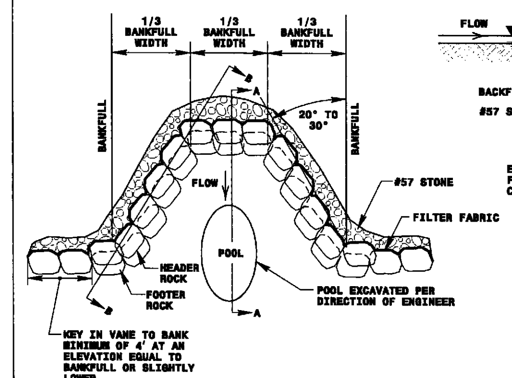
B=	3.75 FT
D=	1.0 FT
W=	4.0 FT

18" PIPE

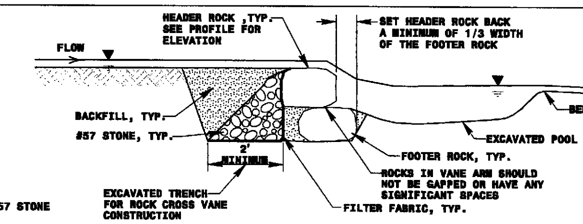
B=	4.5 FT
D=	1.0 FT
W=	4.0 FT

3/08

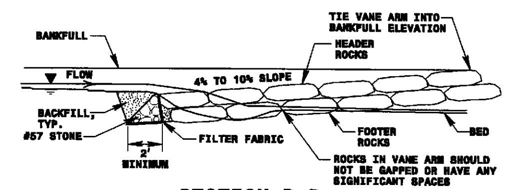
L STA. 39+45 RT
L STA. 79+50 LT
L STA. 247+64 RT
L STA. 274+00 RT
L STA. 276+70 LT
L STA. 278+60 LT



PLAN VIEW



SECTION A-A



SECTION B-B

	BOULDER DIMENSIONS (FT)		
STATION	HEIGHT	LENGTH	WIDTH
L 54+76	2'	4'	2'
L 78+12	2'	4'	2'
L 199+58	2'	4'	2'

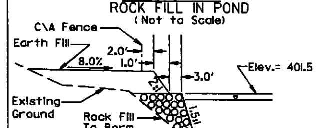
ROCK CROSS VANE DETAIL

NOT TO SCALE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

DETAIL AN

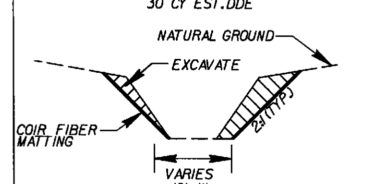
ROCK FILL IN POND
(Not to Scale)



L STA. 233+95 TO STA. 234+83 LT

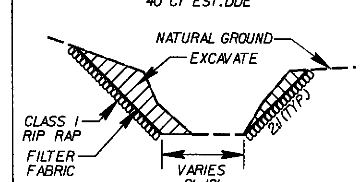
CULVERT INLET\OUTLET DETAILS HARRIS CREEK TRIBUTARY -L- STA 77+89

INLET CHANNEL (NTS)
30 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

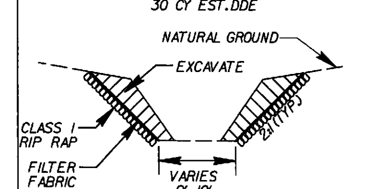
OUTLET CHANNEL (NTS)
40 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

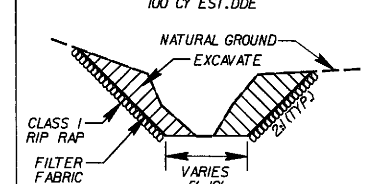
CULVERT INLET\OUTLET DETAILS HARRIS CREEK -L- STA 115+74

INLET CHANNEL (NTS)
30 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

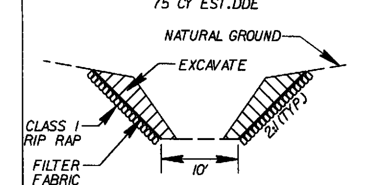
OUTLET CHANNEL (NTS)
100 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

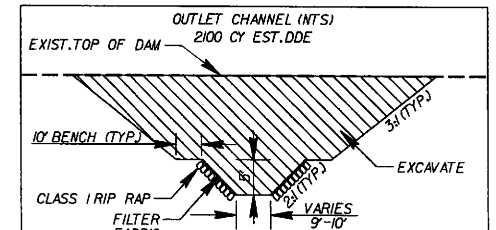
CULVERT INLET\OUTLET DETAILS CEDAR FORK -L- STA 200+04

INLET CHANNEL (NTS)
75 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

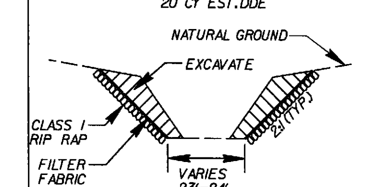
OUTLET CHANNEL (NTS)
2100 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS AND FLOODPLAIN BENCH TO TOP OF EXISTING BANKS AT CHANNEL TIE IN.

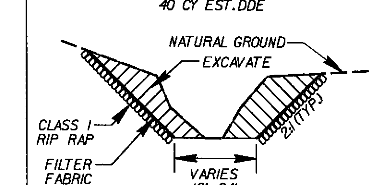
CULVERT INLET\OUTLET DETAILS PERRY CREEK -L- STA 275+39

INLET CHANNEL (NTS)
20 CY EST.DDE



ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

OUTLET CHANNEL (NTS)
40 CY EST.DDE



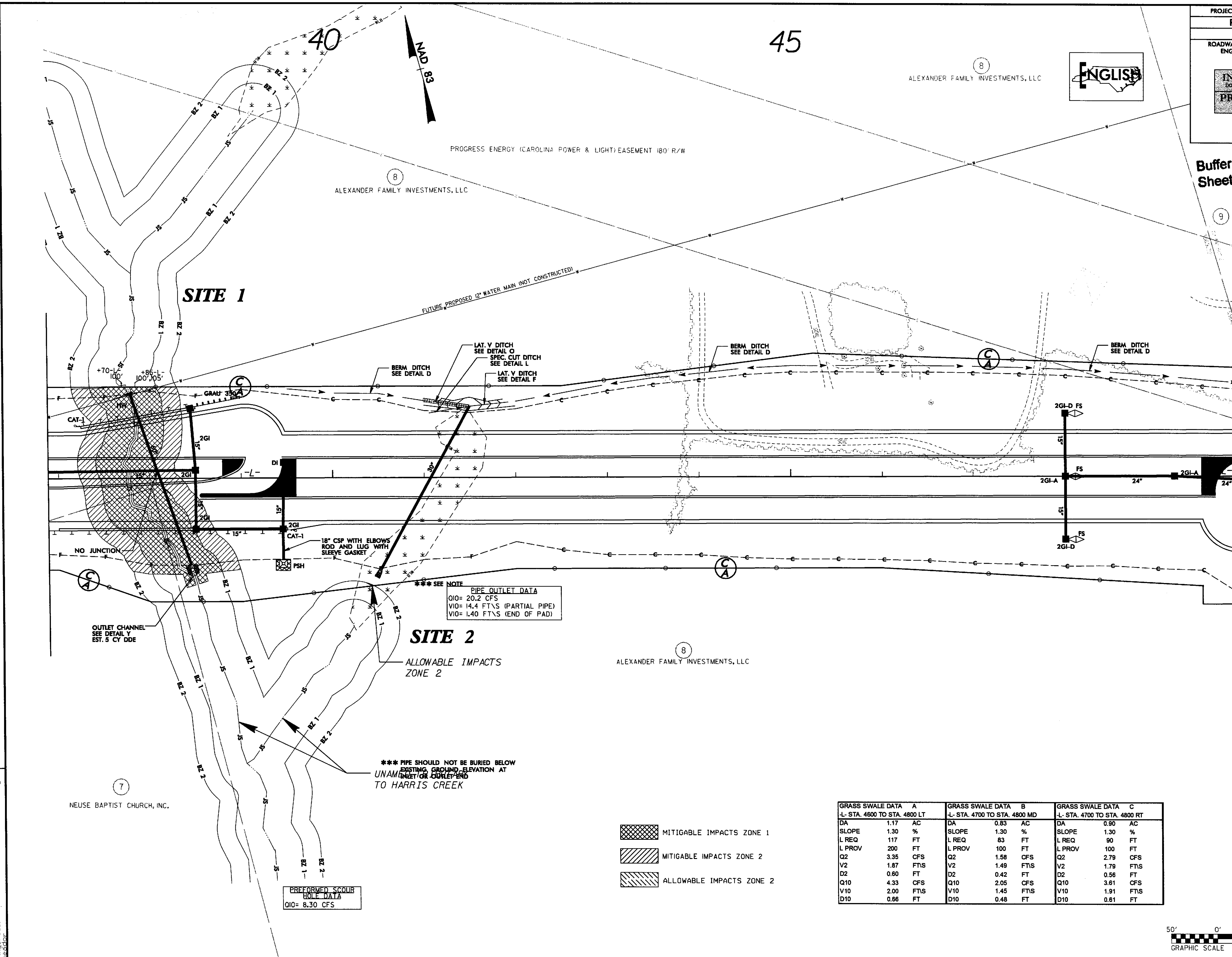
ADJUST SLOPES TO TIE PROPOSED BANKS TO TOP OF EXISTING BANKS AT CHANNEL IMPROVEMENT TIE IN.

02/22/00 07:53:05
r:\hyd\builcsv\r-2814b_hyd_ditchdet.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Buffer Drawing
Sheet 9 of 20



40
45
NAD 83
ENGLISH
ALEXANDER FAMILY INVESTMENTS, LLC
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
FUTURE PROPOSED 12" WATER MAIN (NOT CONSTRUCTED)
SITE 1
SITE 2
BERM DITCH SEE DETAIL D
LAT. V DITCH SEE DETAIL O
SPEC. CUT DITCH SEE DETAIL L
LAT. V DITCH SEE DETAIL F
18" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
NO JUNCTION
OUTLET CHANNEL SEE DETAIL Y EST. 5 CY DDE
*** SEE NOTE
ALLOWABLE IMPACTS ZONE 2
UNAMED TRIBUTARY TO HARRIS CREEK
*** PIPE SHOULD NOT BE BURIED BELOW EXISTING GROUND ELEVATION AT INLET OR OUTLET END
NEUSE BAPTIST CHURCH, INC.
REVISIONS
GRAPHIC SCALE

PIPE OUTLET DATA
Q10= 20.2 CFS
V10= 14.4 FT\S (PARTIAL PIPE)
V10= 1.40 FT\S (END OF PAD)

PREFORMED SCOUR HOLE DATA
Q10= 8.30 CFS

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 2

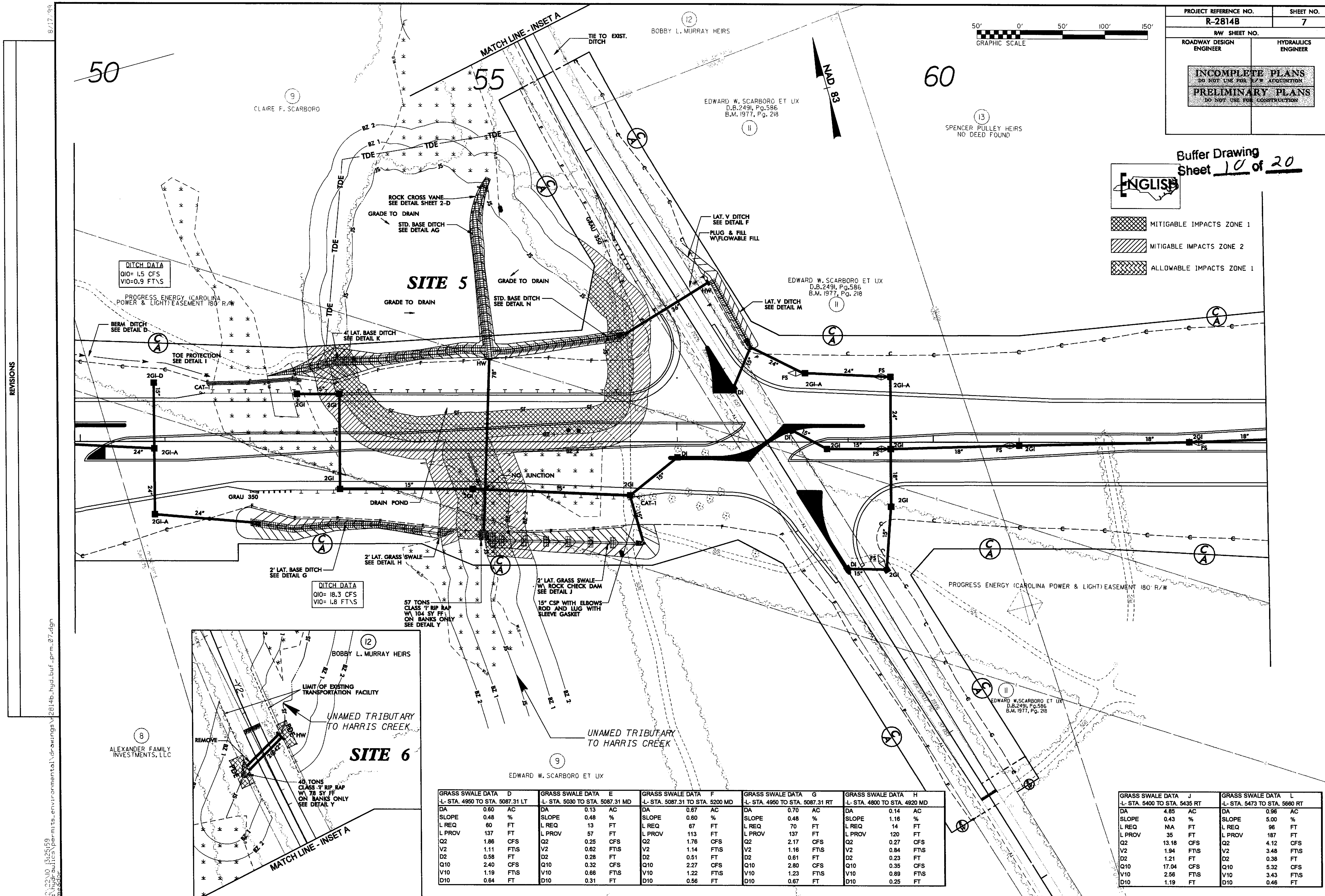
GRASS SWALE DATA A -L- STA. 4600 TO STA. 4800 LT			GRASS SWALE DATA B -L- STA. 4700 TO STA. 4800 MD			GRASS SWALE DATA C -L- STA. 4700 TO STA. 4800 RT		
DA	1.17	AC	DA	0.83	AC	DA	0.90	AC
SLOPE	1.30	%	SLOPE	1.30	%	SLOPE	1.30	%
L REQ	117	FT	L REQ	83	FT	L REQ	90	FT
L PROV	200	FT	L PROV	100	FT	L PROV	100	FT
Q2	3.35	CFS	Q2	1.58	CFS	Q2	2.79	CFS
V2	1.87	FT\S	V2	1.49	FT\S	V2	1.79	FT\S
D2	0.60	FT	D2	0.42	FT	D2	0.56	FT
Q10	4.33	CFS	Q10	2.05	CFS	Q10	3.61	CFS
V10	2.00	FT\S	V10	1.45	FT\S	V10	1.91	FT\S
D10	0.66	FT	D10	0.48	FT	D10	0.61	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing
Sheet 10 of 20



50' 0' 50' 100' 150'
GRAPHIC SCALE
NAD 83
ENGLISH
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
MATCH LINE - INSET A
TIE TO EXIST. DITCH
BOBBY L. MURRAY HEIRS
CLAIRE F. SCARBORO
EDWARD W. SCARBORO ET UX
D.B.2491, Pg.586
B.M. 1977, Pg. 218
SPENCER PULLEY HEIRS
NO DEED FOUND
ROCK CROSS VANE
SEE DETAIL SHEET 2-D
GRADE TO DRAIN
STD. BASE DITCH
SEE DETAIL AG
SITE 5
STD. BASE DITCH
SEE DETAIL N
LAT. V DITCH
SEE DETAIL F
PLUG & FILL
W\FLOWABLE FILL
LAT. V DITCH
SEE DETAIL M
DITCH DATA
Q10= 1.5 CFS
V10=0.9 FT\S
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
BERM DITCH
SEE DETAIL D
4' LAT. BASE DITCH
SEE DETAIL K
TOE PROTECTION
SEE DETAIL I
NO JUNCTION
DRAIN POND
GRAU 350
2' LAT. BASE DITCH
SEE DETAIL G
2' LAT. GRASS SWALE
SEE DETAIL H
DITCH DATA
Q10= 18.3 CFS
V10= 1.8 FT\S
57 TONS
CLASS 'I' RIP RAP
W\ 104 SY FF
ON BANKS ONLY
SEE DETAIL Y
2' LAT. GRASS SWALE
W\ ROCK CHECK DAM
SEE DETAIL J
15" CSP WITH ELBOWS
ROD AND LUG WITH
SLEEVE GASKET
UNAMED TRIBUTARY
TO HARRIS CREEK
ALEXANDER FAMILY
INVESTMENTS, LLC
LIMIT OF EXISTING
TRANSPORTATION FACILITY
UNAMED TRIBUTARY
TO HARRIS CREEK
SITE 6
REMOVE
40 TONS
CLASS 'I' RIP RAP
W\ 78 SY FF
ON BANKS ONLY
SEE DETAIL Y
MATCH LINE - INSET A
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
EDWARD W.SCARBORO ET UX
D.B.2491, Pg.586
B.M.1977, Pg. 218
REVISIONS
8/17/99
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GRASS SWALE DATA D -L- STA. 4950 TO STA. 5087.31 LT		
DA	0.60	AC
SLOPE	0.48	%
L REQ	60	FT
L PROV	137	FT
Q2	1.86	CFS
V2	1.11	FT\S
D2	0.58	FT
Q10	2.40	CFS
V10	1.19	FT\S
D10	0.64	FT

GRASS SWALE DATA E -L- STA. 5030 TO STA. 5087.31 MD		
DA	0.13	AC
SLOPE	0.48	%
L REQ	13	FT
L PROV	57	FT
Q2	0.25	CFS
V2	0.62	FT\S
D2	0.28	FT
Q10	0.32	CFS
V10	0.66	FT\S
D10	0.31	FT

GRASS SWALE DATA F -L- STA. 5087.31 TO STA. 5200 MD		
DA	0.67	AC
SLOPE	0.60	%
L REQ	67	FT
L PROV	113	FT
Q2	1.76	CFS
V2	1.14	FT\S
D2	0.51	FT
Q10	2.27	CFS
V10	1.22	FT\S
D10	0.56	FT

GRASS SWALE DATA G -L- STA. 4950 TO STA. 5087.31 RT		
DA	0.70	AC
SLOPE	0.48	%
L REQ	70	FT
L PROV	137	FT
Q2	2.17	CFS
V2	1.16	FT\S
D2	0.61	FT
Q10	2.80	CFS
V10	1.23	FT\S
D10	0.67	FT

GRASS SWALE DATA H -L- STA. 4800 TO STA. 4920 MD		
DA	0.14	AC
SLOPE	1.16	%
L REQ	14	FT
L PROV	120	FT
Q2	0.27	CFS
V2	0.84	FT\S
D2	0.23	FT
Q10	0.35	CFS
V10	0.89	FT\S
D10	0.25	FT

GRASS SWALE DATA J -L- STA. 5400 TO STA. 5435 RT		
DA	4.85	AC
SLOPE	0.43	%
L REQ	N\A	FT
L PROV	35	FT
Q2	13.18	CFS
V2	1.94	FT\S
D2	1.21	FT
Q10	17.04	CFS
V10	2.56	FT\S
D10	1.19	FT

GRASS SWALE DATA L -L- STA. 5473 TO STA. 5660 RT		
DA	0.96	AC
SLOPE	5.00	%
L REQ	96	FT
L PROV	187	FT
Q2	4.12	CFS
V2	3.48	FT\S
D2	0.38	FT
Q10	5.32	CFS
V10	3.43	FT\S
D10	0.46	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Buffer Drawing
Sheet 11 of 20

65 70 75

50' 0' 50' 100' 150'
GRAPHIC SCALE

ENGLISH

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

NAD 83

(13) SPENCER PULLEY HEIRS
DB 2964 PG 569

REVISIONS 8/17/99

BERM DITCH SEE DETAIL D

BERM DITCH SEE DETAIL D

2GI-D FS 15" 2GI FS 18" GRADE TO DRAIN 15" DI

2GI-D FS 15" 2GI FS 18" 2GI FS 18" 2GI-A FS

2GI-D FS 15" 2GI FS

2GI-D FS GRAU 350

24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

BDO 2GI FS 30" 15" JB W/SLAB LID

2GI-D FS 15" 2GI FS 15"

CAT-1

12'X8' RCBC

STD. BASE DITCH SEE DETAIL Q
EST. 225 TONS CLASS 'I' RIP RAP
405 SY FILTER FABRIC
350 CY DDE

TDE

CHANNEL RELOCATION SEE DETAIL F

SITE 7

BZ 2 BZ 1 JS

PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W

(13) SPENCER PULLEY HEIRS
DB 2964 PG 569

UNAMED TRIBUTARY TO HARRIS CREEK

05/12/10 13:28:08
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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Buffer Drawing
Sheet 12 of 20

80

85

90

NAD 83

ENGLISH

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PREFORMED SCOUR HOLE DATA
QI0= 9.47 CFS

(13) SPENCER PULLEY HEIRS
NO DEED FOUND

(14) E. WALTER SCARBORO & CLAIRE P. SCARBORO

(15) PHILIP OLIVE

SITE 7

UNAMED TRIBUTARY TO HARRIS CREEK

+34.88-L- 102.43'

+40 -L- 19'

+30.00-L- 170'

+29.37-L- 151.81'

TDE

FSH

12'X8' RCBC

12'X10' RCBC

18" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

2GI

2GI-D

2GI-A

GRAU 350

LAT. V DITCH SEE DETAIL O

CAT-1

JB W/SLAB LID

FILL EXISTING CHANNEL

ROCK CROSS VANE SEE DETAIL SHEET R-D

CHANNEL RELOCATION SEE DETAIL P

TOE PROTECTION SEE DETAIL I

BZ 1

BZ 2

ST

UNAMED TRIBUTARY TO HARRIS CREEK

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing
Sheet 13 of 20

8/17/99

REVISIONS

06/16/09: Added TDE upstream and downstream around the culvert on parcel 20.

105 110 115

ENGLISH

NAD 83/2001

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

16 ROBERT C. RHEIN INTERESTS, INC.

20 CAMERON E. SHEARON & BEVERLY W. SHEARON

SITE 8

BERM DITCH SEE DETAIL D

BDO

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

TOE PROTECTION SEE DETAIL I

2GI-D FS

2GI FS

2GI-A FS

CAT-1

2-2GI

GRAU 350

SPEC. CUT GRASS SWALE SEE DETAIL G

2' LAT. GRASS SWALE SEE DETAIL H

GRASS IV

4OTCB

JB w/MH

TDE

BZ 1

BZ 2

ST

16 ROBERT C. RHEIN INTERESTS, INC.

17 DONALD F. WILLIAMS & DOROTHY O. WILLIA

20 CAMERON E. SHEARON & BEVERLY W. SHEARON

HARRIS CREEK

50' 0' 50' 100' 150'

GRAPHIC SCALE

GRASS SWALE DATA A -L- STA. 10700 TO STA. 10850 LT		
DA	0.62	AC
SLOPE	2.90	%
L REQ	62	FT
L PROV	150	FT
Q2	1.77	CFS
V2	1.59	FT\S
D2	0.47	FT
Q10	2.29	CFS
V10	2.30	FT\S
D10	0.45	FT

GRASS SWALE DATA B -L- STA. 10700 TO STA. 10850 RT		
DA	0.60	AC
SLOPE	2.90	%
L REQ	60	FT
L PROV	150	FT
Q2	1.72	CFS
V2	1.58	FT\S
D2	0.47	FT
Q10	2.22	CFS
V10	2.28	FT\S
D10	0.44	FT

GRASS SWALE DATA D -L- STA. 11050 TO STA. 11150 RT		
DA	0.58	AC
SLOPE	4.00	%
L REQ	58	FT
L PROV	100	FT
Q2	1.66	CFS
V2	1.77	FT\S
D2	0.43	FT
Q10	2.14	CFS
V10	2.34	FT\S
D10	0.43	FT

GRASS SWALE DATA F -L- STA. 11200 TO STA. 11350 LT		
DA	1.08	AC
SLOPE	3.05	%
L REQ	108	FT
L PROV	150	FT
Q2	3.09	CFS
V2	1.87	FT\S
D2	0.58	FT
Q10	3.99	CFS
V10	2.70	FT\S
D10	0.54	FT

GRASS SWALE DATA B -L- STA. 11800 TO STA. 11900 RT		
DA	0.73	AC
SLOPE	1.16	%
L REQ	73	FT
L PROV	100	FT
Q2	2.09	CFS
V2	1.26	FT\S
D2	0.58	FT
Q10	2.70	CFS
V10	1.70	FT\S
D10	0.56	FT

GRASS SWALE DATA D -L- STA. 12150 TO STA. 12210 RT		
DA	0.60	AC
SLOPE	3.10	%
L REQ	60	FT
L PROV	60	FT
Q2	1.72	CFS
V2	1.62	FT\S
D2	0.46	FT
Q10	2.22	CFS
V10	2.14	FT\S
D10	0.45	FT

GRASS SWALE DATA F -L- STA. 12450 TO STA. 12550 LT		
DA	0.91	AC
SLOPE	4.00	%
L REQ	91	FT
L PROV	100	FT
Q2	2.60	CFS
V2	1.98	FT\S
D2	0.51	FT
Q10	3.36	CFS
V10	2.62	FT\S
D10	0.51	FT

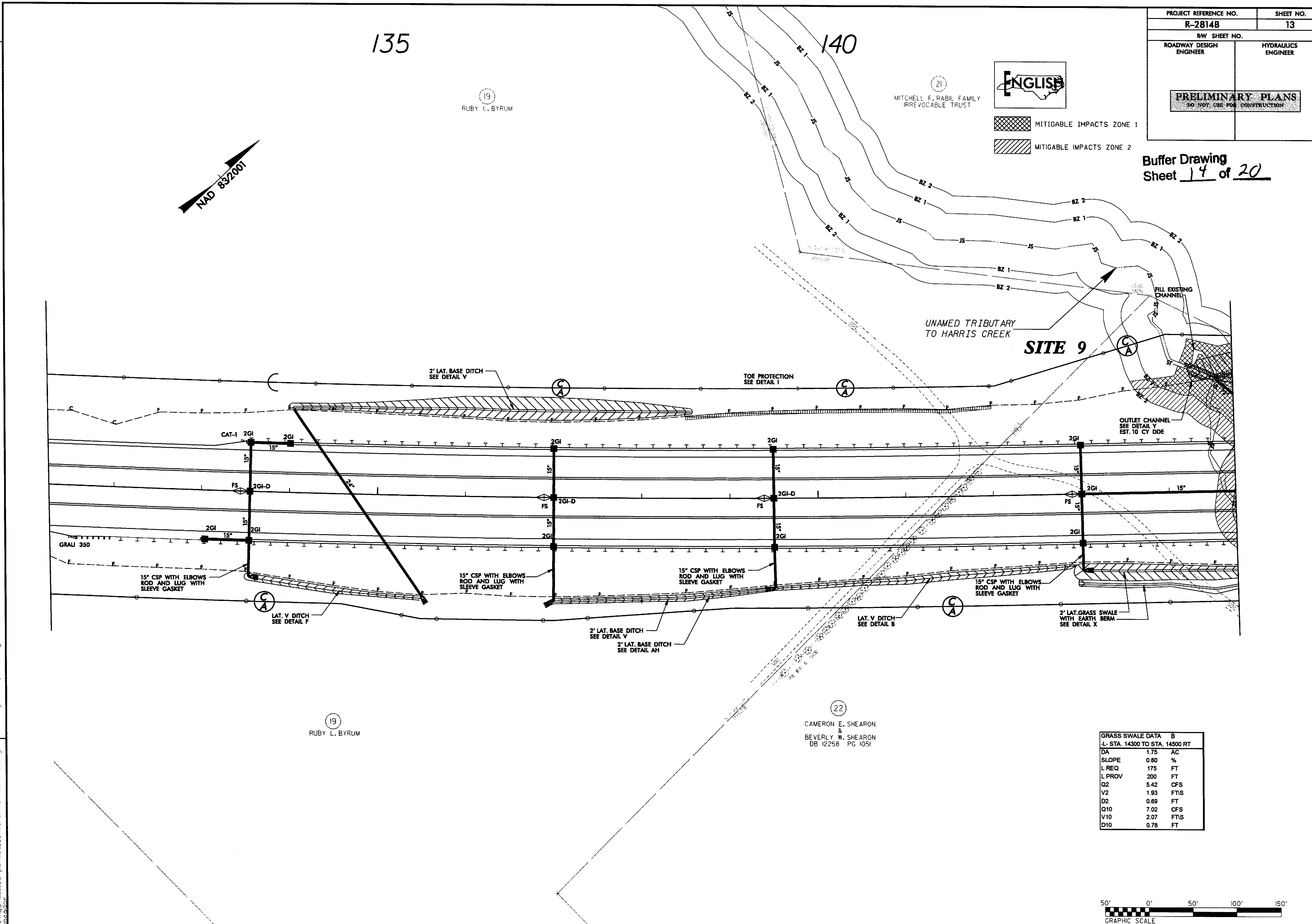
GRASS SWALE DATA G -L- STA. 12450 TO STA. 12550 RT		
DA	0.79	AC
SLOPE	4.00	%
L REQ	79	FT
L PROV	100	FT
Q2	2.26	CFS
V2	1.91	FT\S
D2	0.49	FT
Q10	2.92	CFS
V10	2.53	FT\S
D10	0.48	FT

GRASS SWALE DATA I -L- STA. 12850 TO STA. 12950 LT		
DA	0.59	AC
SLOPE	3.84	%
L REQ	59	FT
L PROV	100	FT
Q2	1.69	CFS
V2	1.75	FT\S
D2	0.44	FT
Q10	2.18	CFS
V10	2.31	FT\S
D10	0.43	FT

GRASS SWALE DATA J -L- STA. 12850 TO STA. 12950 RT		
DA	0.39	AC
SLOPE	3.84	%
L REQ	39	FT
L PROV	100	FT
Q2	1.12	CFS
V2	1.58	FT\S
D2	0.38	FT
Q10	1.44	CFS
V10	2.08	FT\S
D10	0.37	FT

REVISIONS

REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



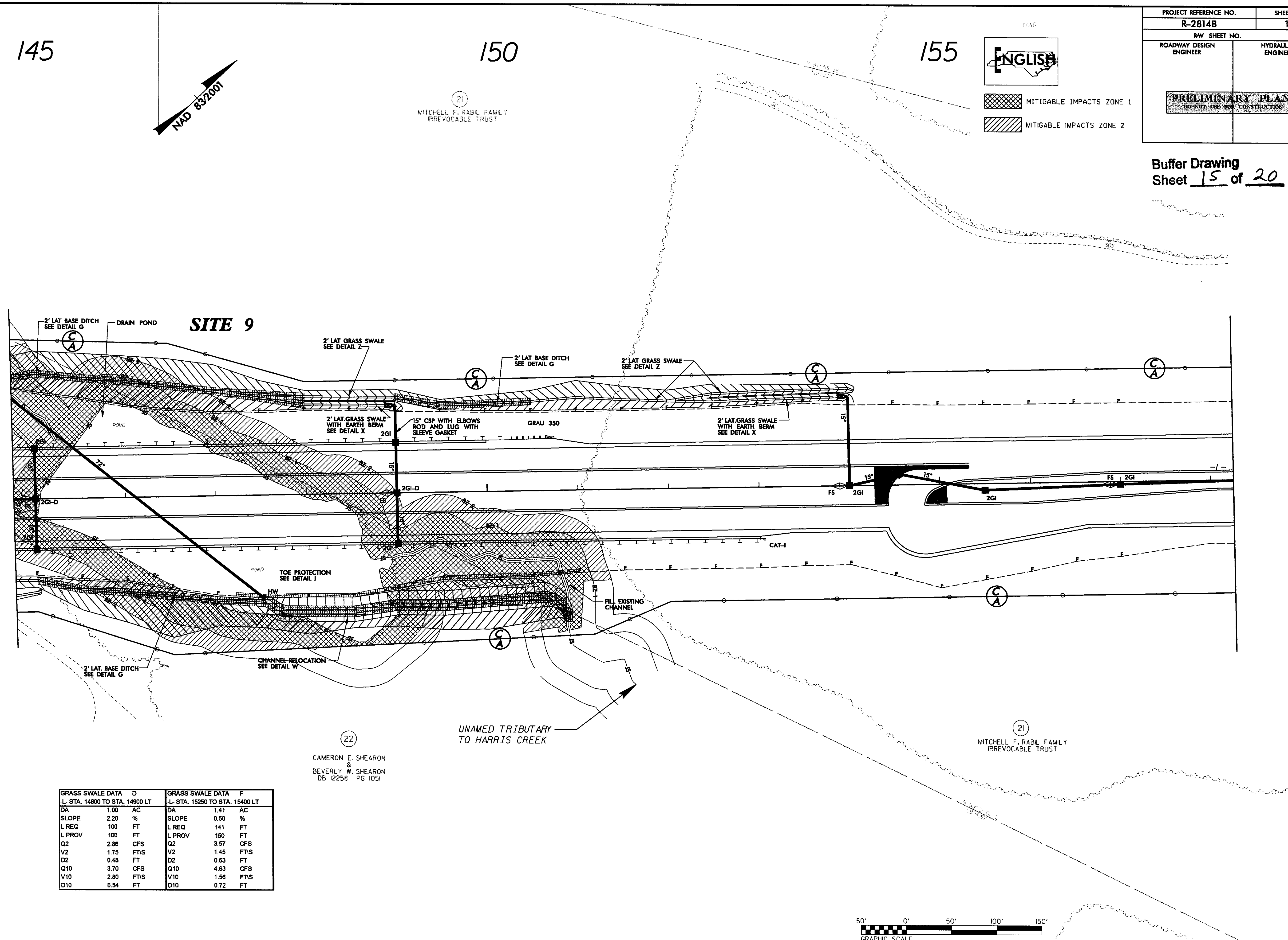
PROJECT REFERENCE NO.
R-2814B
SHEET NO.
13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ENGLISH
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
Buffer Drawing
Sheet 14 of 20
135
140
NAD 83/2001
19
RUBY L. BYRUM
21
MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST
22
CAMERON E. SHEARON & BEVERLY W. SHEARON DB 12258 PG 1051
UNAMED TRIBUTARY TO HARRIS CREEK
SITE 9
FILL EXISTING CHANNEL
2' LAT. BASE DITCH SEE DETAIL V
TOE PROTECTION SEE DETAIL I
OUTLET CHANNEL SEE DETAIL Y EST. 10 CY DDE
CAT-1
2GI
2GI-D
FS
15"
24"
GRAU 350
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
LAT. V DITCH SEE DETAIL F
2' LAT. BASE DITCH SEE DETAIL V
2' LAT. BASE DITCH SEE DETAIL AH
LAT. V DITCH SEE DETAIL B
2' LAT.GRASS SWALE WITH EARTH BERM SEE DETAIL X
BZ 1
BZ 2
JS
GRAPHIC SCALE
50' 0' 50' 100' 150'

GRASS SWALE DATA	B	
-L- STA. 14300 TO STA. 14500 RT		
DA	1.75	AC
SLOPE	0.80	%
L REQ	175	FT
L PROV	200	FT
Q2	5.42	CFS
V2	1.93	FT\S
D2	0.69	FT
Q10	7.02	CFS
V10	2.07	FT\S
D10	0.78	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing
Sheet 15 of 20



145
150
155
NAD 83/2001
ENGLISH
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
21
MITCHELL F. RABIL FAMILY
IRREVOCABLE TRUST
SITE 9
2' LAT BASE DITCH
SEE DETAIL G
DRAIN POND
2' LAT GRASS SWALE
SEE DETAIL Z
2' LAT BASE DITCH
SEE DETAIL G
2' LAT GRASS SWALE
SEE DETAIL Z
POND
2' LAT. GRASS SWALE
WITH EARTH BERM
SEE DETAIL X
15" CSP WITH ELBOWS
ROD AND LUG WITH
SLEEVE GASKET
GRAU 350
2' LAT. GRASS SWALE
WITH EARTH BERM
SEE DETAIL X
2GI
2GI-D
FS
15"
CAT-1
POND
TOE PROTECTION
SEE DETAIL I
HW
FILL EXISTING
CHANNEL
2' LAT. BASE DITCH
SEE DETAIL G
CHANNEL RELOCATION
SEE DETAIL W
UNAMED TRIBUTARY
TO HARRIS CREEK
22
CAMERON E. SHEARON
&
BEVERLY W. SHEARON
DB 12258 PG 1051
21
MITCHELL F. RABIL FAMILY
IRREVOCABLE TRUST
50' 0' 50' 100' 150'
GRAPHIC SCALE

GRASS SWALE DATA	D	
-L- STA. 14800 TO STA. 14900 LT		
DA	1.00	AC
SLOPE	2.20	%
L REQ	100	FT
L PROV	100	FT
Q2	2.86	CFS
V2	1.75	FT\S
D2	0.48	FT
Q10	3.70	CFS
V10	2.80	FT\S
D10	0.54	FT

GRASS SWALE DATA	F	
-L- STA. 15250 TO STA. 15400 LT		
DA	1.41	AC
SLOPE	0.50	%
L REQ	141	FT
L PROV	150	FT
Q2	3.57	CFS
V2	1.45	FT\S
D2	0.63	FT
Q10	4.63	CFS
V10	1.56	FT\S
D10	0.72	FT

REVISIONS
REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

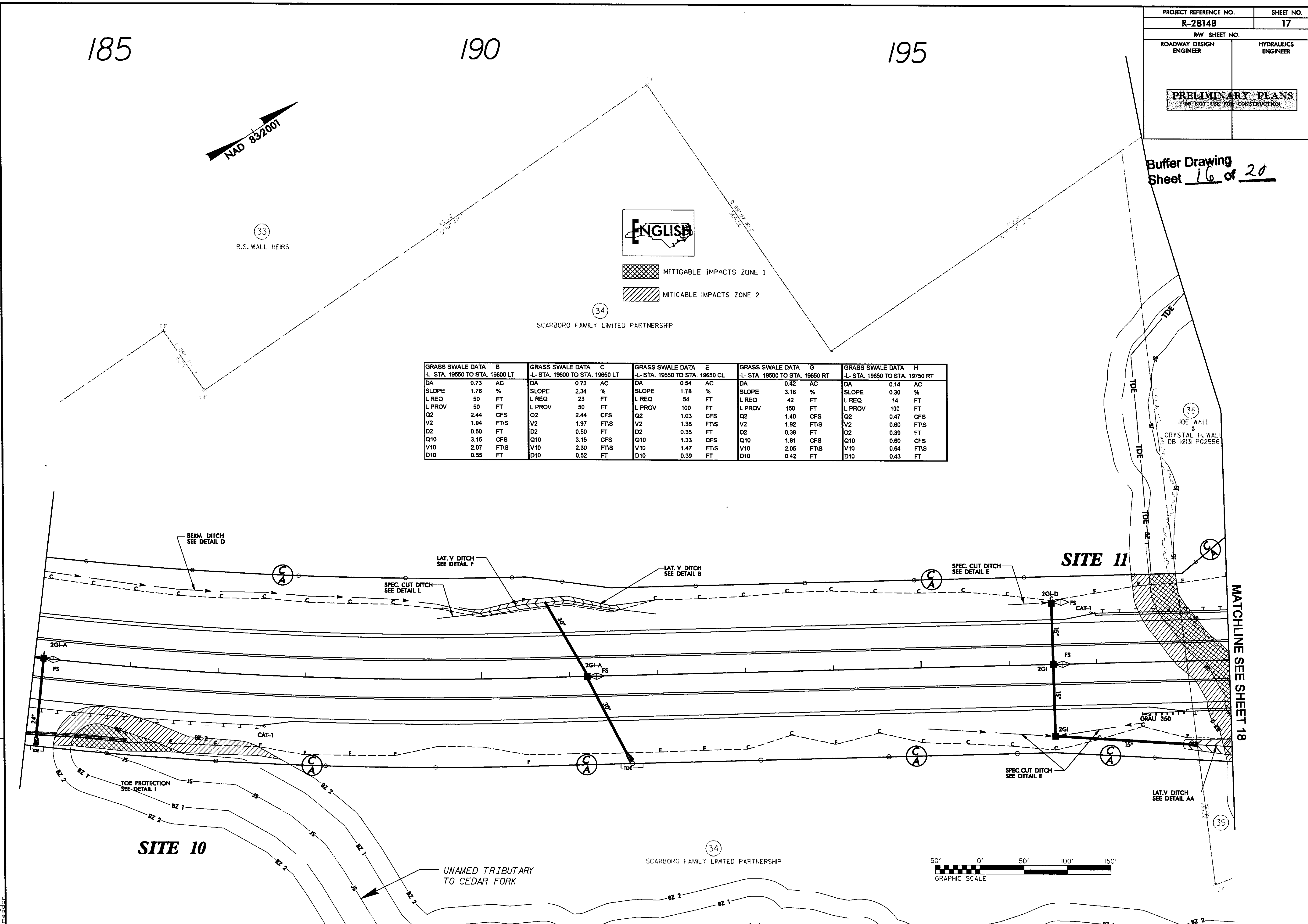
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing Sheet 16 of 20

REVISIONS

REVISED NAMES ON PARCEL 35 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



GRASS SWALE DATA B -L- STA. 19550 TO STA. 19600 LT			GRASS SWALE DATA C -L- STA. 19600 TO STA. 19650 LT			GRASS SWALE DATA E -L- STA. 19550 TO STA. 19650 CL			GRASS SWALE DATA G -L- STA. 19500 TO STA. 19650 RT			GRASS SWALE DATA H -L- STA. 19650 TO STA. 19750 RT		
DA	0.73	AC	DA	0.73	AC	DA	0.54	AC	DA	0.42	AC	DA	0.14	AC
SLOPE	1.76	%	SLOPE	2.34	%	SLOPE	1.78	%	SLOPE	3.16	%	SLOPE	0.30	%
L REQ	50	FT	L REQ	23	FT	L REQ	54	FT	L REQ	42	FT	L REQ	14	FT
L PROV	50	FT	L PROV	50	FT	L PROV	100	FT	L PROV	150	FT	L PROV	100	FT
Q2	2.44	CFS	Q2	2.44	CFS	Q2	1.03	CFS	Q2	1.40	CFS	Q2	0.47	CFS
V2	1.94	FT\S	V2	1.97	FT\S	V2	1.38	FT\S	V2	1.92	FT\S	V2	0.60	FT\S
D2	0.50	FT	D2	0.50	FT	D2	0.35	FT	D2	0.38	FT	D2	0.39	FT
Q10	3.15	CFS	Q10	3.15	CFS	Q10	1.33	CFS	Q10	1.81	CFS	Q10	0.60	CFS
V10	2.07	FT\S	V10	2.30	FT\S	V10	1.47	FT\S	V10	2.05	FT\S	V10	0.64	FT\S
D10	0.55	FT	D10	0.52	FT	D10	0.39	FT	D10	0.42	FT	D10	0.43	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Buffer Drawing Sheet 17 of 20

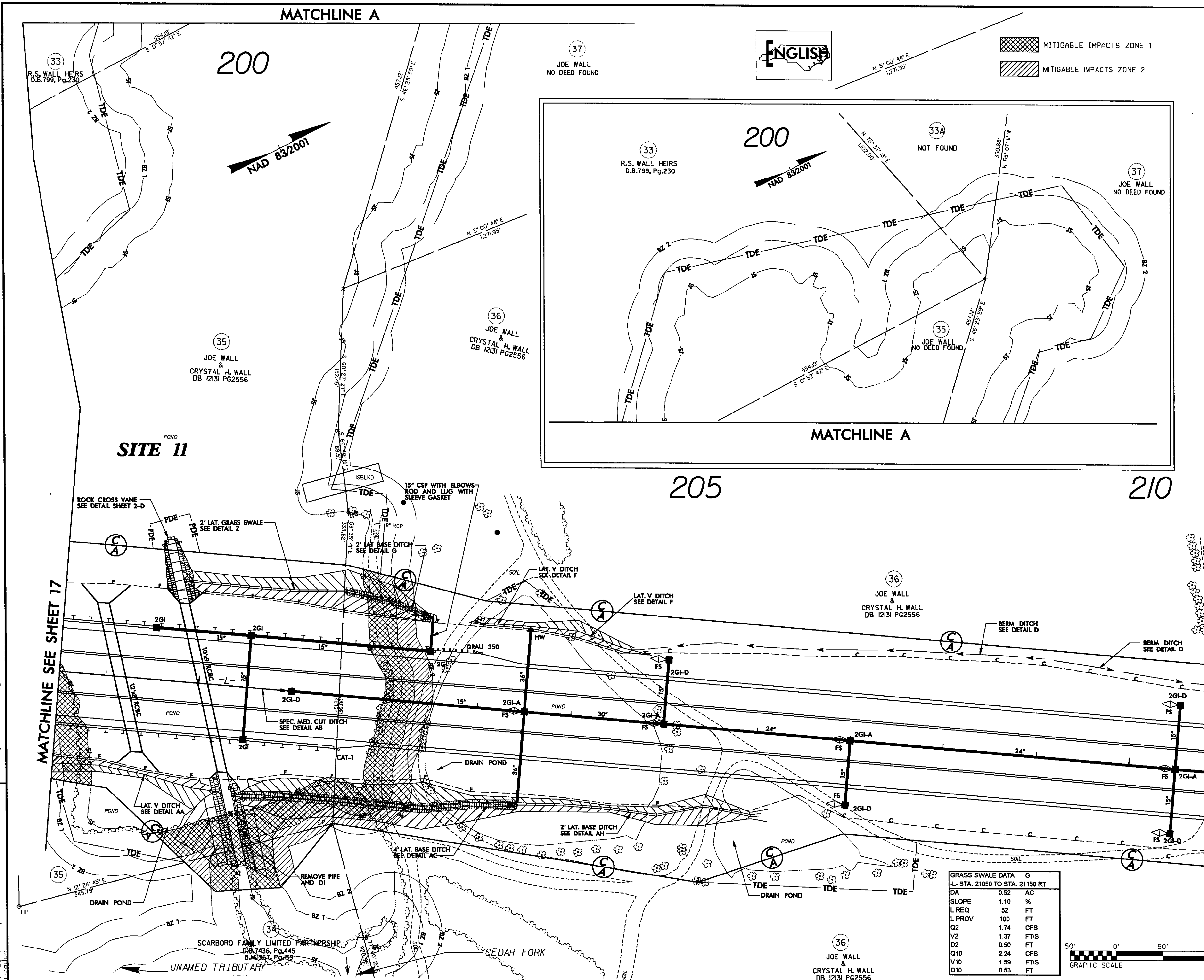
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

REVISIONS

REVISED NAMES ON PARCELS 35 AND 36 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



MATCHLINE SEE SHEET 17

GRASS SWALE DATA	B	
-L- STA. 19980 TO STA. 20150 LT		
DA	0.75	AC
SLOPE	0.40	%
L REQ	75	FT
L PROV	170	FT
Q2	3.22	CFS
V2	1.30	FT\S
D2	0.63	FT
Q10	4.16	CFS
V10	1.39	FT\S
D10	0.72	FT

GRASS SWALE DATA	D	
-L- STA. 20500 TO STA. 20600 LT		
DA	0.88	AC
SLOPE	1.10	%
L REQ	88	FT
L PROV	100	FT
Q2	2.94	CFS
V2	1.70	FT\S
D2	0.59	FT
Q10	3.80	CFS
V10	1.82	FT\S
D10	0.65	FT

GRASS SWALE DATA	E	
-L- STA. 20700 TO STA. 20800 RT		
DA	0.51	AC
SLOPE	1.10	%
L REQ	51	FT
L PROV	100	FT
Q2	1.70	CFS
V2	1.36	FT\S
D2	0.50	FT
Q10	2.20	CFS
V10	1.58	FT\S
D10	0.53	FT

GRASS SWALE DATA	F	
-L- STA. 21050 TO STA. 21150 LT		
DA	0.44	AC
SLOPE	1.10	%
L REQ	44	FT
L PROV	100	FT
Q2	1.47	CFS
V2	1.31	FT\S
D2	0.47	FT
Q10	1.90	CFS
V10	1.53	FT\S
D10	0.50	FT

GRASS SWALE DATA	G	
-L- STA. 21050 TO STA. 21150 RT		
DA	0.52	AC
SLOPE	1.10	%
L REQ	52	FT
L PROV	100	FT
Q2	1.74	CFS
V2	1.37	FT\S
D2	0.50	FT
Q10	2.24	CFS
V10	1.59	FT\S
D10	0.53	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing
Sheet 18 of 20

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220

NAD 83/2001

ENGLISH

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

(36) JOE WALL & CRYSTAL H. WALL DB 12131 PG2556

(37) JOE WALL

(38) BOBBIE JOE WALL & VICKIE D. WALL

GRASS SWALE DATA -L- STA. 21350 TO STA. 21450 LT		H
DA	0.49	AC
SLOPE	1.10	%
L REQ	49	FT
L PROV	100	FT
Q2	1.64	CFS
V2	1.35	FTS
D2	0.49	FT
Q10	2.11	CFS
V10	1.57	FTS
D10	0.52	FT

SITE 12

24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

BERM DITCH SEE DETAIL D

BDO

2GI

FS

24"

FS 2GI-A

-L-

BERM DITCH SEE DETAIL D

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL AD

2' LAT. BASE DITCH SEE DETAIL V

15"

FS 2GI-D

DI 15" -L- 15"

2GI-D

FDE

BZ 1

BZ 2

+00-L-
100.115'

UNAMED TRIBUTARY TO CEDAR FORK

(36) JOE WALL & CRYSTAL H. WALL DB 12131 PG2556

(39) THE SBJ GROWTH, L.P.

BZ 2
BZ 1
ST
IS

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

January 11,2010; Adjusted R/W CA lines,R/W markers and the proposed woven wire fence on parcel no.39.NWA.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing
Sheet 19 of 20

255

260

ENGLISH

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

(51)
MICHAEL BARTHOLOMEW

NAD 83/2001

** NOTE: FIELD ADJUST LOCATION OF SPRING BOX (STD. 840.41) FROM -L- STA 252+50 TO -L- STA 257+00 AS DIRECTED BY THE ENGINEER

SITE 15

UNAMED TRIBUTARY TO CEDAR FORK

ISOLATED WETLAND

ISOLATED WETLAND

LAT. V DITCH SEE DETAIL F

2' LAT. BASE DITCH SEE DETAIL AD

SPRING BOX **SEE NOTE

2GI

FS

GRADE TO DRAIN

HW

LAT. V DITCH SEE DETAIL B

LAT. V DITCH SEE DETAIL B

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL AH

SIDE TRUCK

(52)
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW

(52)
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW

(49)
ROBERT G. BARTHOLOMEW & JOYCE BARTHOLOMEW

(55)
MARY SUE KEITH STELL, ET AL

BZ 1

BZ 2

SF

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no.52, NWA.

8/17/99

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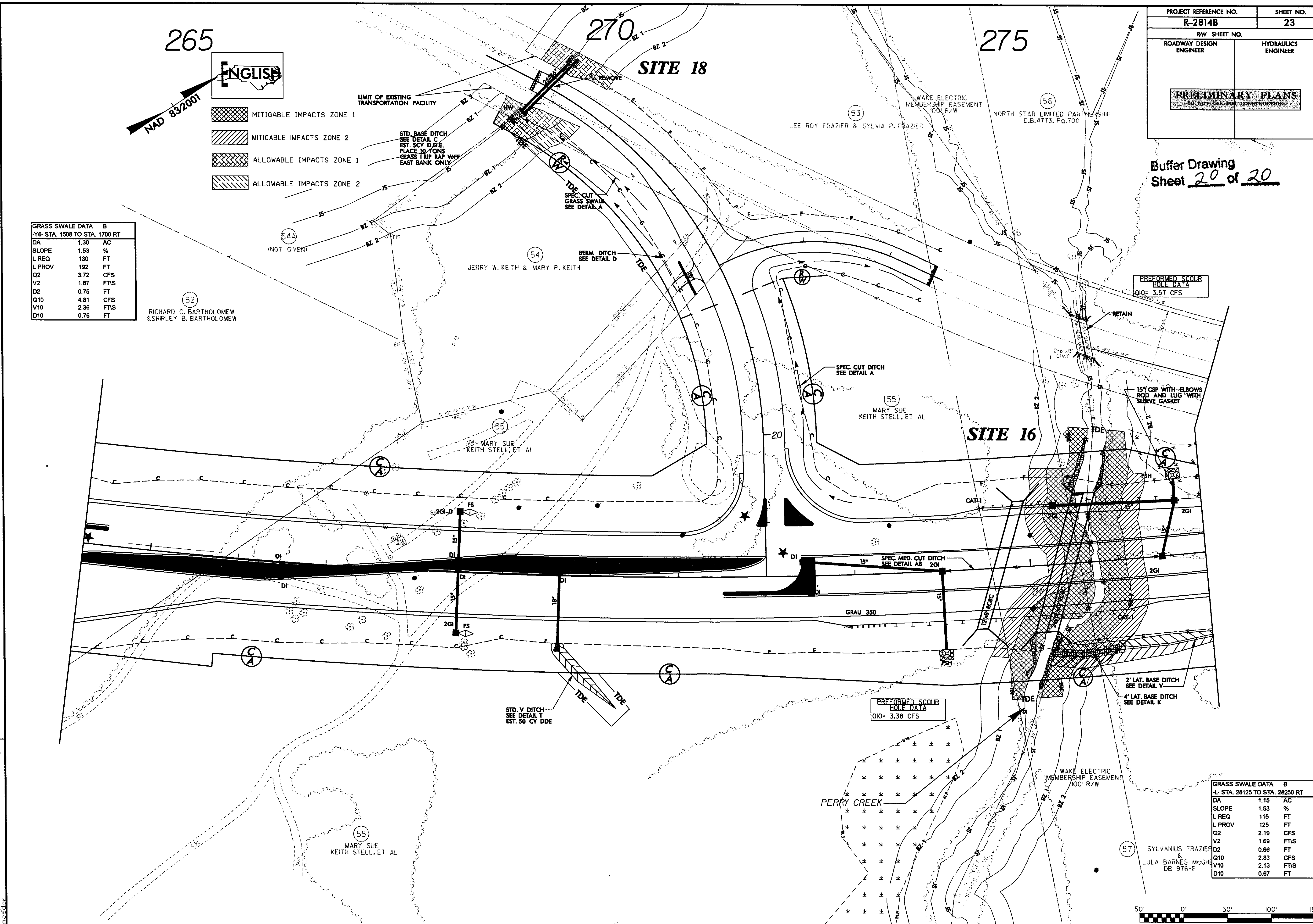
mcsloan

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Buffer Drawing Sheet 20 of 20



265
270
275
ENGLISH
NAD 83/2001
SITE 18
SITE 16
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
LIMIT OF EXISTING TRANSPORTATION FACILITY
STD. BASE DITCH SEE DETAIL C EST. 5CY D.D.E. PLACE 10 TONS CLASS I RIP RAP W/FF EAST BANK ONLY
SPEC. CUT GRASS SWALE SEE DETAIL A
BERM DITCH SEE DETAIL D
SPEC. CUT DITCH SEE DETAIL A
SPEC. MED. CUT DITCH SEE DETAIL AB
STD. V DITCH SEE DETAIL T EST. 50 CY DDE
REMOVE
RETAIN
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
2' LAT. BASE DITCH SEE DETAIL V
4' LAT. BASE DITCH SEE DETAIL K
PREFORMED SCOUR HOLE DATA Q10= 3.57 CFS
PREFORMED SCOUR HOLE DATA Q10= 3.38 CFS
GRAU 350
CAT-1
PERRY CREEK
(54A) (NOT GIVEN)
(52) RICHARD C. BARTHOLOMEW &SHIRLEY B. BARTHOLOMEW
(54) JERRY W. KEITH & MARY P. KEITH
(53) LEE ROY FRAZIER & SYLVIA P. FRAZIER
WAKE ELECTRIC MEMBERSHIP EASEMENT 100' R/W
(56) NORTH STAR LIMITED PARTNERSHIP D.B.4773, Pg.700
(55) MARY SUE KEITH STELL, ET AL
(57) SYLVANIUS FRAZIER & LULA BARNES McGHEE DB 976-E
50' 0' 50' 100' 150'
GRAPHIC SCALE

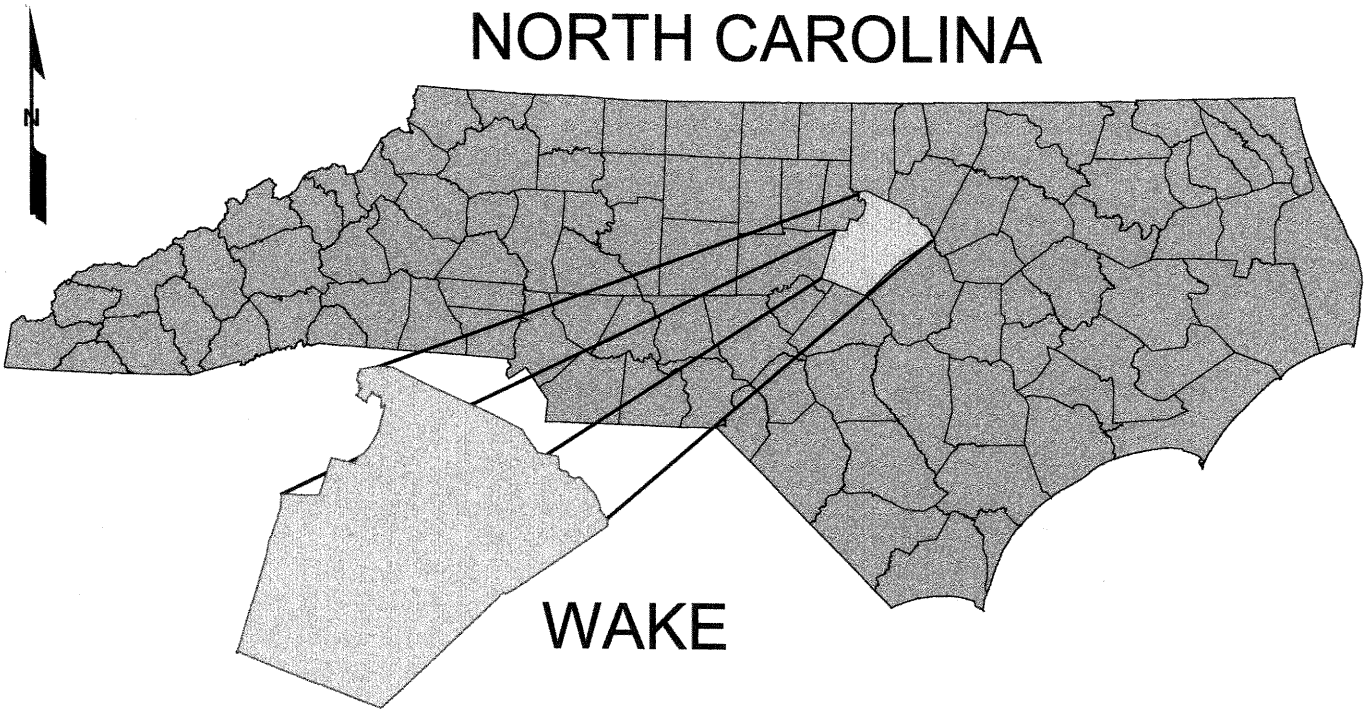
GRASS SWALE DATA	B	
-Y6- STA. 1508 TO STA. 1700 RT		
DA	1.30	AC
SLOPE	1.53	%
L REQ	130	FT
L PROV	192	FT
Q2	3.72	CFS
V2	1.87	FT\S
D2	0.75	FT
Q10	4.81	CFS
V10	2.36	FT\S
D10	0.76	FT

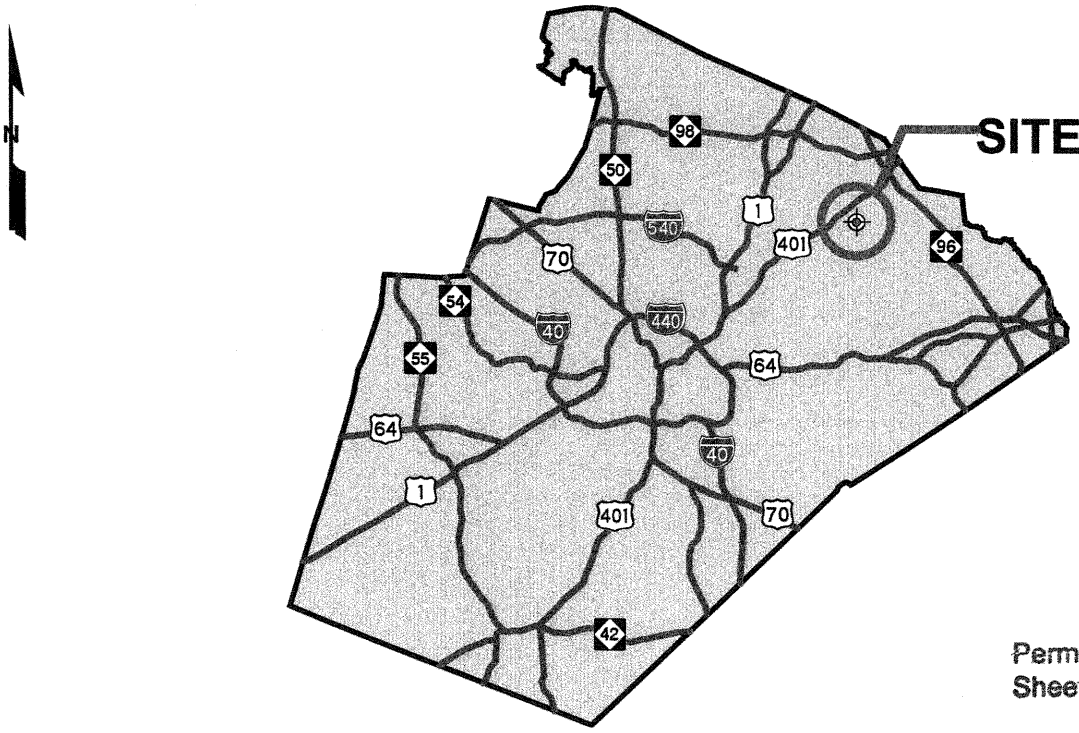
GRASS SWALE DATA	B	
-L- STA. 28125 TO STA. 28250 RT		
DA	1.15	AC
SLOPE	1.53	%
L REQ	115	FT
L PROV	125	FT
Q2	2.19	CFS
V2	1.69	FT\S
D2	0.66	FT
Q10	2.83	CFS
V10	2.13	FT\S
D10	0.67	FT

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel nos. 52 and 55.NNA.
January 11, 2010: Adjusted TDE lines on parcel no. 55.NNA.

8/17/99





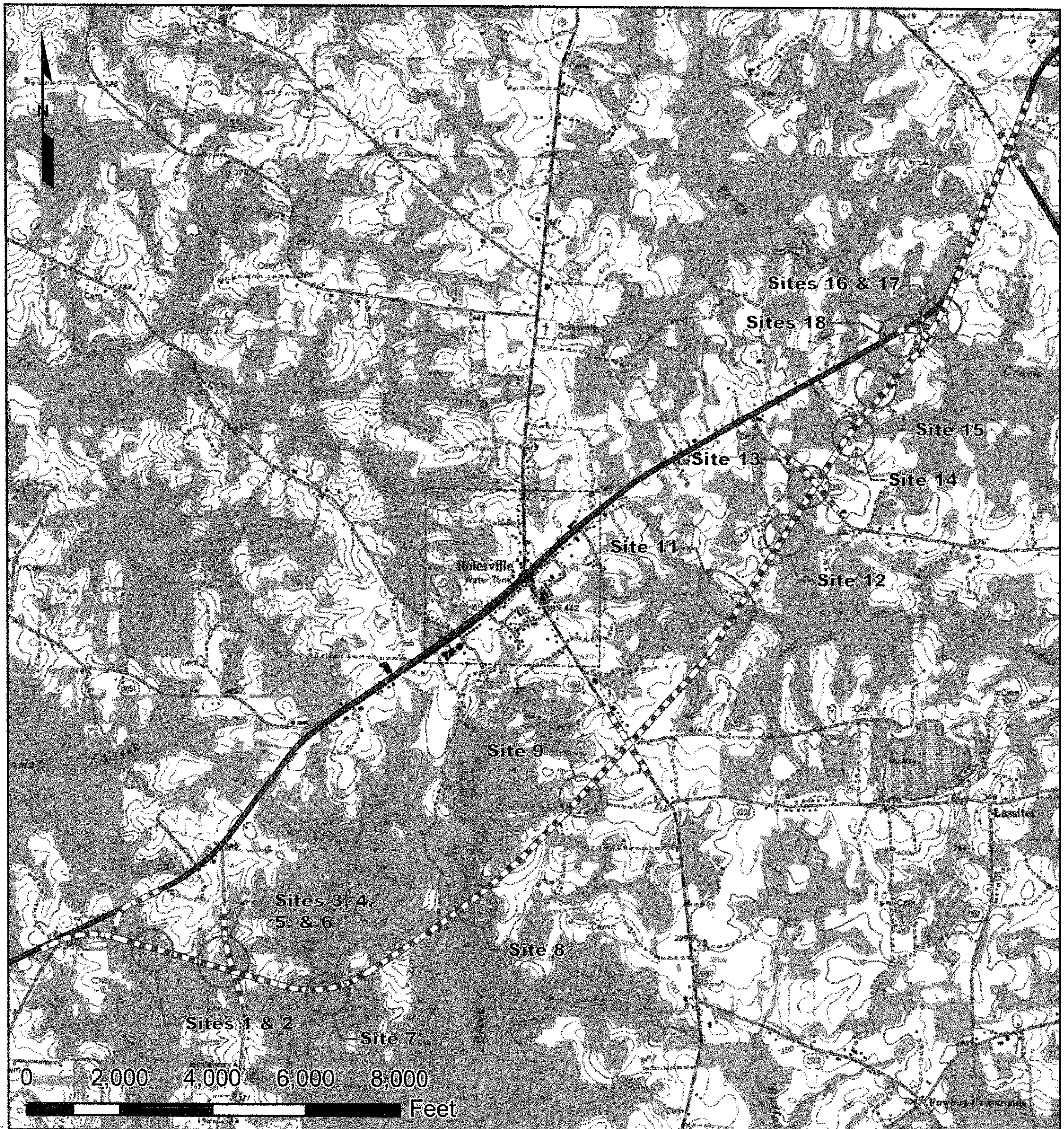
Permit Drawing
Sheet 1 of 64

STREAM AND WETLAND VICINITY MAP

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

NOVEMBER 2009



1 inch = 3,000 feet

STREAM AND WETLAND LOCATION MAP

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 34506.1.1 (R-2814B)
US 401 ROLESVILLE BYPASS
FROM SR 2225, LOUISBURY ROAD
TO NC 96, ZEBULON ROAD

NOVEMBER 2009

Source: USGS 7.5 Minute Quadrangle, Rolesville, NC

Permit Drawing
Sheet 2 of 64

PROP. NO.	PROPERTY OWNER NAME	PROP. OWNER ADDRESS
7	Neuse Baptist Church	8700 Capital Blvd., Raleigh, NC 27587
8	Alexander Family investments, LLC	906 Washington St., Cary, NC 27511
9	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587
12	Bobby L. Murray Heirs (J Brent King Exec.)	PO Box 40639, Raleigh, NC 27629
13	Spencer, Pulley Heirs	9412 Louisburg Rd., Wake Forest, NC 27587
14	Scarboro , E. Walter and Claire P.	9412 Louisburg Rd., Wake Forest, NC 27587
20	Shearon, Cameron E. & Beverly W.	4325 Galax Dr., Raleigh, NC 27612
21	Mitchell F. Rabil Family Irrevocable Trust	3321 Gondola Dr., Lexington KY, 40513
22	Shearon, Cameron E. & Beverly W.	4325 Galax Dr., Raleigh, NC 27612
33	R.S. Wall Heirs	1608 Falls Ct., Raleigh, NC 27615
33A	Wall, Alice W.	405 N. Main St., Rolesville, NC 27571
34	Scarboro Family Limited Partnership	PO Box 84, Rolesville, NC 27571
35	Wall, Joe & Crystal H.	7317 Pulley Town Rd., Wake Forest, NC 27587
36	Wall, Joe & Crystal H.	7318 Pulley Town Rd., Wake Forest, NC 27587
37	Wall, Joe	7318 Pulley Town Rd., Wake Forest, NC 27587
38	Bobie Joe Wall & Vickie D. Wall	7309 Pulley Town Rd. Wake Forest, NC 27587
39	The SBJ Growth, L.P	PO Box 19067, Raleigh, NC
49	Bartholomew, Robert G. & Joyce C.	No Known Address
50	Bartholomew, Richard C. & Shirley B.	PO BOX 6, Rolesville, NC 27571
51	Bartholomew, Michael	PO BOX 573, Rolesville, NC 27571
52	Bartholomew, Richard C & Shirley B.	PO BOX 6, Rolesville, NC 27571
54	Keith, Jerry W. and Mary P	1124 Louisburg Rd., Wake Forest, NC 27587
54A	Bartholomew, Richard C. & Shirley B.	PO BOX 6, Rolesville, NC 27571
55	Stell, Meith & Mary Sue Et. Al.	1132 Louisburg Rd., Wake Forest, NC 27587
57	Sylvania Frazier & Lula Barnes McGhee	2725 Wait Ave., Wake Forest, NC 27857

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
WBS - 34506.1.1 (R-2814B)

2/22/2010

Permit Drawing
Sheet 3 of 64

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation in Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing in Wetlands (ac)	WETLAND IMPACTS: Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	SURFACE WATER IMPACTS: Temp. SW impacts (ac)	SURFACE WATER IMPACTS: Existing Channel Impacts Permanent (ft)	SURFACE WATER IMPACTS: Existing Channel Impacts Temp. (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
1	-L- 38+11	60" RCP						0.02	<0.01	243	18	
2	-L- 41+07	30" RCP	0.17		<0.01	0.02						
3	-L- 52+50 LT	N\A	0.22			<0.01						
4	-L- 55+00 RT	78" RCP	0.24		<0.01	0.01		<0.01	<0.01	95	10	
4	-L- 55+00 RT	BANK STABILIZATION						<0.01		20		
5	-L- 55+00 LT [1]	78" RCP			0.01			1.51				
6	-Y2- 17+31 LT	2@42" RCP							<0.01		17	
6	-Y2- 17+31 RT	2@42" RCP							<0.01		8	
6	-Y2- 17+31 RT	BANK STABILIZATION						<0.01		14		
7	-L- 77+89	10'X10' RCBC	0.65		0.10	0.09		0.12	0.02	321	66	
7	-L- 77+89	BANK STABILIZATION						<0.01		47		
8	-L- 115+74	10'X10' RCBC						0.05	<0.01	355	18	
8	-L- 115+74	BANK STABILIZATION						0.03		153		
9	-L- 147+00 [2]	72" RCP						1.31	<0.01	610	20	
11	-L- 200+04 [3]	10'X9' RCBC						7.29	<0.01	0	10	
12	-L- 219+03	42" RCP						0.02		258		
13	-L- 229+75	36" RCP	0.19									
14	-L- 246+87	48" RCP	0.36		<0.01	0.06						
15	-L- 255+00 [4]	30" RCP	1.58									
16	-L- 275+39	2@12'X12' RCBC						0.05	<0.01	189	23	
16	-L- 275+39	BANK STABILIZATION						0.06		135		
17	-L- 277+50 LT	N\A	0.38									
18	-Y6- 15+17	2@36" RCP						<0.01	<0.01	36	14	
18	-Y6- 15+17	BANK STABILIZATION								33		
TOTALS:			3.79	0.00	0.12	0.19	0.00	10.47	0.04	2509	205	

[1] ENTIRE AREA IS IMPACT IN SURFACE WATER (POND)
[2] IMPACT IN SURFACE WATER (POND) IS 1.25 AC
[3] ENTIRE PERMANENT IMPACT AREA IS SURFACE WATER (POND)
[4] ISOLATED WETLAND TOTAL TAKE (1.58 AC)

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
WBS - 34506.1.1 (R-2814B)

SHEET 2/22/2010

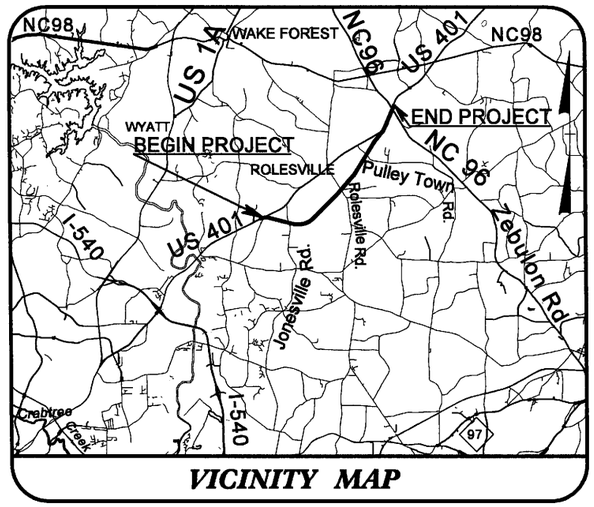
ATN Revised 3/31/05

Permit Drawing
Sheet 4 of 64

TIP PROJECT: R-2814B

CONTRACT:

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

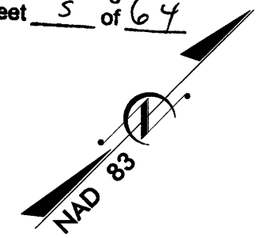
WAKE COUNTY

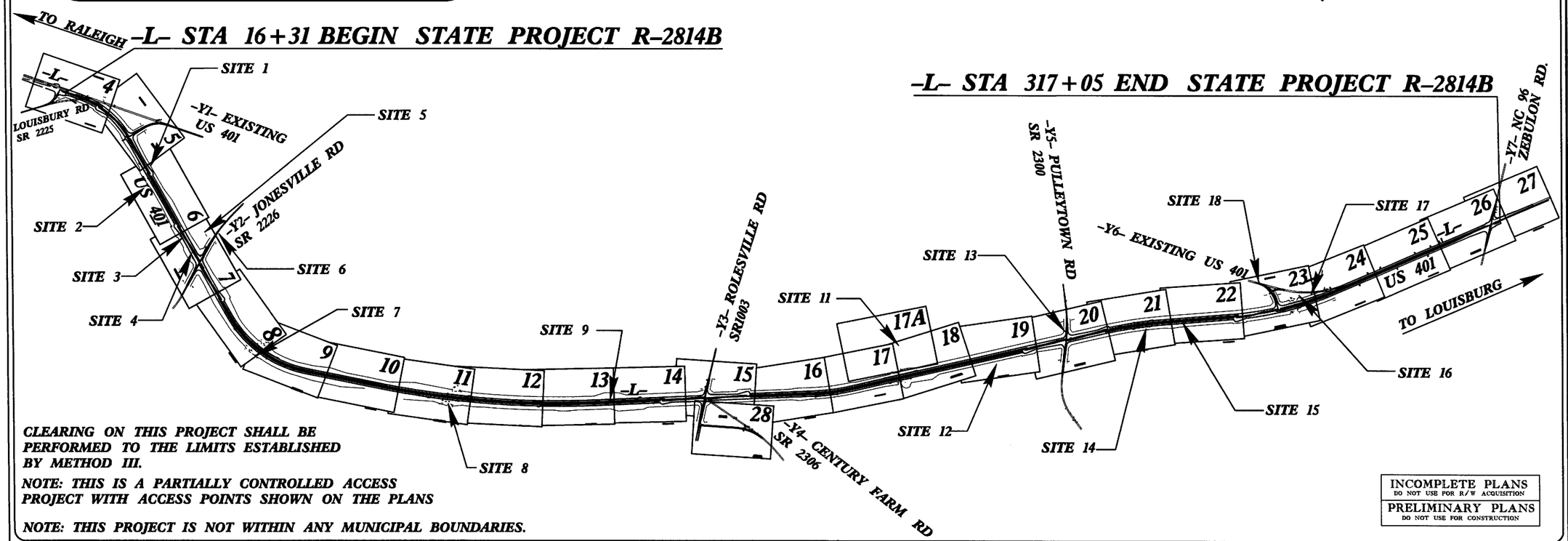
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2814B	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
34506.1.1	STP-401(4)	PE	

LOCATION: US 401 ROLESVILLE BYPASS FROM SR 2225, LOUISBURY ROAD TO NC 96, ZEBULON ROAD

WETLAND AND STREAM IMPACTS

Permit Drawing Sheet 5 of 64





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

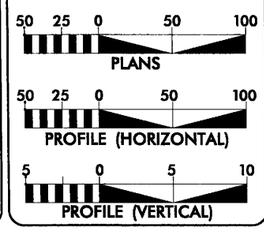
NOTE: THIS IS A PARTIALLY CONTROLLED ACCESS PROJECT WITH ACCESS POINTS SHOWN ON THE PLANS

NOTE: THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2030 = 24600
ADT =
DHV = 55 %
D = 13 %
T = 7 % *
V = 60 MPH

* TTST 2 DUAL 5

PROJECT LENGTH

LENGTH ROADWAY F. A. PROJECT STP-401(4) = 5.696 MILES
TOTAL LENGTH TIP PROJECT R-2814B = 5.696 MILES

PERMIT DRAWINGS PREPARED BY :

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

FOR THE DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 17, 2009

LETTING DATE: APRIL 19, 2011

JS GOODNIGHT
PROJECT ENGINEER

TD GOINS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

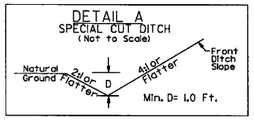
P.E.
STATE HIGHWAY DESIGN ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2-C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

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

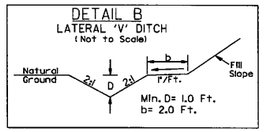
Permit Drawing
Sheet 6 of 64

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



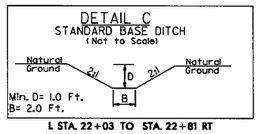
Y1 STA. 16+50 TO STA. 20+50 LT
Y3 STA. 23+50 TO STA. 24+35 LT
Y4 STA. 10+45 TO STA. 13+00 RT
Y4 STA. 20+00 TO STA. 22+29 LT
Y4 STA. 20+50 TO STA. 22+20 RT
Y5 STA. 21+17 TO STA. 26+90 LT
Y6 STA. 15+08 TO STA. 17+00 RT
Y6 STA. 18+25 TO STA. 20+79 LT
Y8 STA. 10+52 TO STA. 12+55 RT

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)



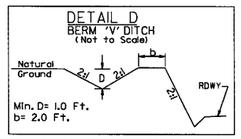
L STA. 32+40 TO STA. 33+00 LT
L STA. 97+50 TO STA. 98+50 RT
L STA. 139+50 TO STA. 143+00 RT
L STA. 190+75 TO STA. 191+50 LT
L STA. 237+00 TO STA. 239+00 RT
L STA. 257+25 TO STA. 258+25 RT
L STA. 261+50 TO STA. 263+50 RT
L STA. 279+50 TO STA. 281+25 RT
L STA. 285+50 TO STA. 286+50 RT
L STA. 305+70 TO STA. 308+50 LT
L STA. 319+35 TO STA. 321+00 RT
L STA. 319+75 TO STA. 320+50 LT
Y5 STA. 16+56 TO STA. 18+65 LT
Y5 STA. 18+97 TO STA. 19+28 LT
Y5 STA. 25+40 TO STA. 26+00 RT

DETAIL C
STANDARD BASE DITCH
(Not to Scale)



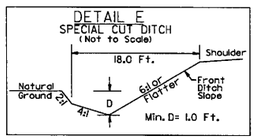
L STA. 22+03 TO STA. 22+81 RT
L STA. 100+44 TO STA.101+00 LT
Y6 STA. 14+94 TO STA.15+05 RT

DETAIL D
BERM 'V' DITCH
(Not to Scale)



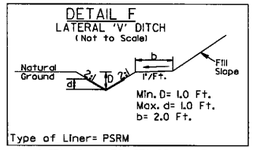
L STA. 28+00 TO STA. 30+35 LT
L STA. 33+00 TO STA. 34+50 LT
L STA. 39+50 TO STA. 41+00 LT
L STA. 42+00 TO STA. 51+50 LT
L STA. 70+50 TO STA. 75+00 LT
L STA. 95+00 TO STA. 97+50 RT
L STA. 99+50 TO STA. 106+00 RT
L STA. 109+50 TO STA. 113+50 LT
L STA. 119+50 TO STA. 123+00 RT
L STA. 180+00 TO STA. 190+00 LT
L STA. 205+00 TO STA. 217+50 LT
L STA. 233+00 TO STA. 237+00 RT
Y6 STA. 14+95 TO STA. 17+85 RT

DETAIL E
SPECIAL CUT DITCH
(Not to Scale)



L STA. 24+50 TO STA. 25+00 RT
L STA. 29+00 TO STA. 29+50 RT
L LT STA. 29+70 TO STA. Y1 23+50 RT
L STA. 41+00 TO STA. 41+50 LT
L STA. 196+00 TO STA. 196+50 LT
L STA. 195+00 TO STA. 197+50 RT
L STA. 235+00 TO STA. 237+00 RT
L STA. 239+50 TO STA. 240+00 LT
L STA. 291+00 TO STA. 291+50 RT
L STA. 320+50 TO STA. 323+50 LT
L STA. 321+00 TO STA. 323+50 RT

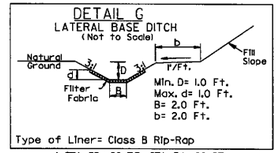
DETAIL F
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

L STA. 23+00 TO STA. 25+00 LT
L STA. 32+00 TO STA. 32+40 LT
L STA. 41+50 TO STA. 42+00 LT
L STA. 98+50 TO STA. 99+50 RT
L STA. 133+50 TO STA. 135+50 RT
L STA. 190+00 TO STA. 190+75 LT
L STA. 202+80 TO STA. 205+00 LT
L STA. 250+00 TO STA. 252+00 LT
L STA. 284+88 TO STA. 287+50 LT
L STA. 298+01 TO STA. 300+50 LT
Y2 STA. 21+50 TO STA. 22+05 LT
Y3 STA. 21+20 TO STA. 22+20 RT

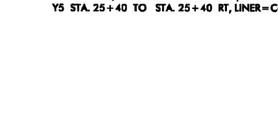
DETAIL G
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= Class B Rip-Rap

L STA. 52+00 TO STA. 54+00 RT
L STA. 145+00 TO STA. 147+50 RT
L STA. 144+55 TO STA. 148+00 LT
L STA. 149+00 TO STA. 150+50 LT
L STA. 201+50 TO STA. 202+45 LT

DETAIL H
LATERAL GRASSED SWALE
(Not to Scale)



Type of Liner= PSRM

L STA. 54+00 TO STA. 54+35 RT
L STA. 114+18 TO STA. 115+02 RT

DETAIL I
TOE PROTECTION
(Not to Scale)

Type of Liner= Class B Rip-Rap

L STA. 51+50 TO STA. 52+60 LT
L STA. 77+27 TO STA. 78+60 RT
L STA. 113+75 TO STA. 115+52 LT
L STA. 115+20 TO STA. 117+50 RT
L STA. 138+50 TO STA. 142+00 LT
L STA. 147+20 TO STA. 151+00 RT
L STA. 184+50 TO STA. 186+00 RT
L STA. 244+75 TO STA. 207+00 LT
L STA. 229+00 LT TO STA. Y5 19+00 RT

DETAIL K
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

L STA. 52+21 TO STA. 54+80 LT
L STA. 275+15 TO STA. 276+00 RT

DETAIL L
SPECIAL CUT DITCH
(Not to Scale)

L STA. 21+00 TO STA. 22+00 LT
L STA. 41+00 TO STA. 41+50 LT
L STA. 99+00 TO STA. 99+50 RT
L STA. 189+50 TO STA. 190+00 LT
L STA. 249+00 TO STA. 250+00 LT
L STA. 250+00 TO STA. 250+50 RT

DETAIL M
LATERAL 'V' DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

Y2 STA. 22+05 TO STA. 22+95 LT

DETAIL N
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

L STA. 54+80 TO STA. 56+41 LT

DETAIL O
LATERAL 'V' DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

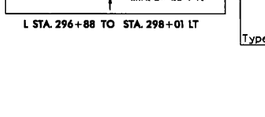
L STA. 22+81 TO STA. 24+00 RT
L STA. 41+00 TO STA. 41+50 LT
L STA. 83+50 TO STA. 85+50 LT
L STA. 286+50 TO STA. 287+00 RT
L STA. 298+00 TO STA. 299+00 RT

DETAIL P
CHANNEL RELOCATION
(Not to Scale)

Type of Liner= Class IRip Rap

L STA. 76+97 TO STA. 78+27 RT

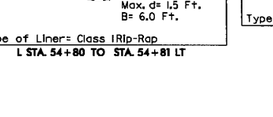
DETAIL Q
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class IRip-Rap

L STA. 73+67 TO STA. 74+88 LT

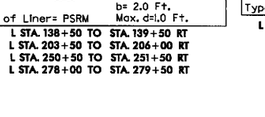
DETAIL R
SPECIAL CUT GRASSED SWALE
(Not to Scale)



Type of Liner= PSRM

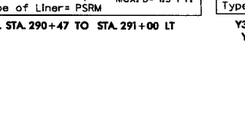
L STA. 108+50 TO STA. 111+50 RT
L STA. 124+50 TO STA. 128+50 LT
L STA. 124+50 TO STA. 128+50 RT

DETAIL S
SPECIAL CUT DITCH
(Not to Scale)



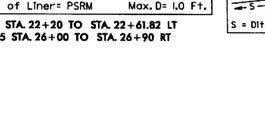
Y3 STA. 21+00 TO STA. 22+20 LT
Y4 STA. 10+45 TO STA. 12+50 LT

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



L STA. 164+00 TO STA. 164+20 RT
L STA. 164+00 TO STA. 164+97 RT
L STA. 269+65 TO STA. 270+30 RT
Y3 STA. 25+05 TO STA. 26+50 LT

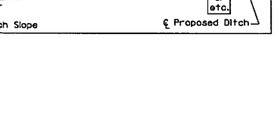
DETAIL U
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class B Rip-Rap

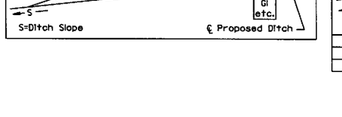
Y3 STA. 22+20 TO STA. 22+40 RT

DETAIL V
LATERAL BASE DITCH
(Not to Scale)



L STA. 30+00 TO STA. 30+32 RT
L STA. 134+00 TO STA. 138+00 LT
L STA. 137+00 TO STA. 138+50 RT
L STA. 217+50 TO STA. 221+00 LT
L STA. 224+50 TO STA. 227+00 LT
L STA. 239+00 TO STA. 246+15 RT
L STA. 251+50 TO STA. 257+25 RT
L STA. 276+00 TO STA. 278+00 RT
Y5 STA. 17+50 TO STA. 18+75 RT
Y7 STA. 17+50 TO STA. 19+30 RT

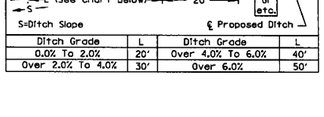
DETAIL W
CHANNEL RELOCATION
(Not to Scale)



Note: b=0.0 L Sta. 147+50 to 148+50 Rt.
Type of Liner= Class B Rip Rap

L STA. 147+50 TO STA. 150+83 RT

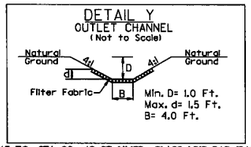
DETAIL X
LATERAL GRASSED SWALE W/ BERM
(Not to Scale)



Type of Liner= PSRM

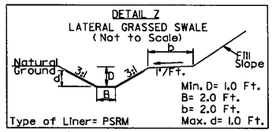
L STA. 143+00 TO STA. 145+00 RT
L STA. 148+00 TO STA. 149+00 LT
L STA. 152+50 TO STA. 154+00 LT

DETAIL Y
OUTLET CHANNEL
(Not to Scale)



L STA. 38+45 TO STA. 38+48 RT, LINER=CLASS I RIP RAP (BANKS ONLY)
L STA. 54+73 RT, LINER=CLASS I RIP RAP (BANKS ONLY)
L STA. 144+24 TO STA. 144+56 LT, LINER=CLASS I RIP RAP (BANKS ONLY)
Y2 STA. 17+40 RT, LINER=CLASS I RIP RAP (BANKS ONLY), B VARIES 2'-9'
Y5 STA. 25+40 TO STA. 25+40 RT, LINER=CLASS B RIP RAP

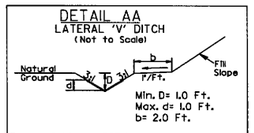
DETAIL Z
LATERAL GRASSED SWALE
(Not to Scale)



Type of Liner= PSRM

L STA. 148+00 TO STA. 149+00 LT
L STA. 150+50 TO STA. 154+00 LT
L STA. 199+80 TO STA. 201+50 LT
L STA. 281+25 TO STA. 283+50 RT (B=0.0')

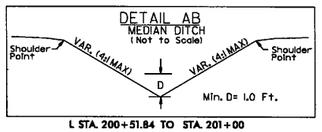
DETAIL AA
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

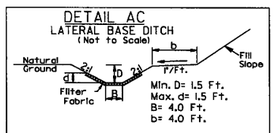
L STA. 198+00 TO STA. 200+30 RT

DETAIL AB
MEDIAN DITCH
(Not to Scale)



L STA. 200+51.84 TO STA. 201+00
L STA. 274+00 TO STA. 276+50

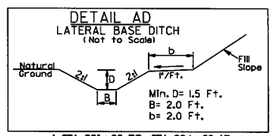
DETAIL AC
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= Class B Rip-Rap

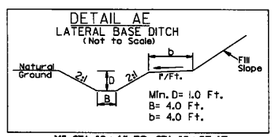
L STA. 200+41 TO STA. 203+50 RT

DETAIL AD
LATERAL BASE DITCH
(Not to Scale)



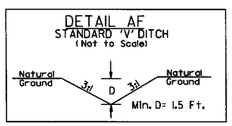
L STA. 221+00 TO STA. 224+50 LT
L STA. 252+00 TO STA. 257+25 LT
Y7 STA. 11+50 TO STA. 15+27 RT

DETAIL AE
LATERAL BASE DITCH
(Not to Scale)



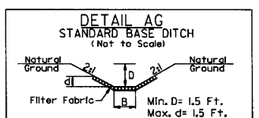
Y5 STA. 18+65 TO STA. 18+97 LT

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



L STA. 296+88 TO STA. 298+01 LT

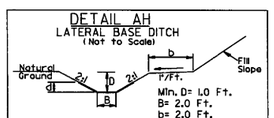
DETAIL AG
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class IRip-Rap

L STA. 54+80 TO STA. 54+81 LT

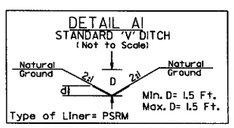
DETAIL AH
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= PSRM

L STA. 138+50 TO STA. 139+50 RT
L STA. 203+50 TO STA. 206+00 RT
L STA. 250+50 TO STA. 251+50 RT
L STA. 278+00 TO STA. 279+50 RT

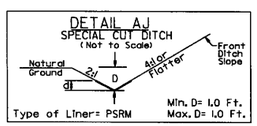
DETAIL AI
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

L STA. 290+47 TO STA. 291+00 LT

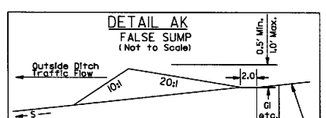
DETAIL AJ
SPECIAL CUT DITCH
(Not to Scale)



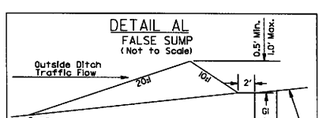
Type of Liner= PSRM

Y3 STA. 22+20 TO STA. 22+61.82 LT
Y5 STA. 26+00 TO STA. 26+90 RT

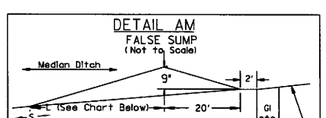
DETAIL AK
FALSE SUMP
(Not to Scale)



DETAIL AL
FALSE SUMP
(Not to Scale)



DETAIL AM
FALSE SUMP
(Not to Scale)



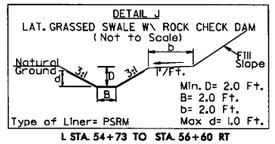
Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2-D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

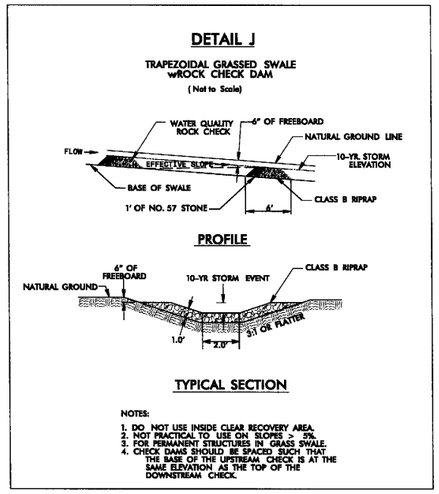
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

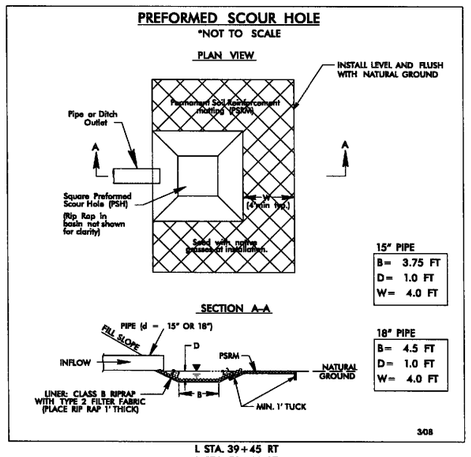
Permit Drawing
Sheet 7 of 64



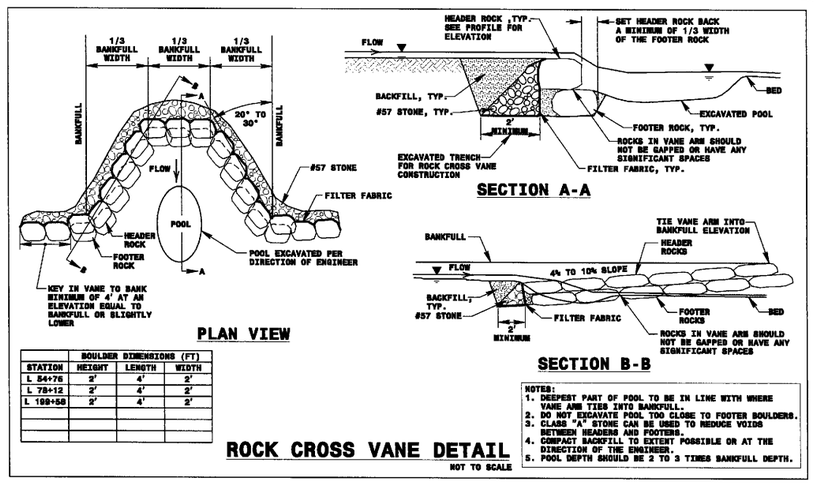
L STA. 54+73 TO STA. 56+60 RT



L STA. 54+73 TO STA. 56+60 RT



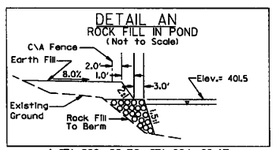
L STA. 39+45 RT
L STA. 79+50 LT
L STA. 247+64 RT
L STA. 274+00 RT
L STA. 276+70 LT
L STA. 278+60 LT



	BOULDER DIMENSIONS (FT)		
STATION	HEIGHT	LENGTH	WIDTH
L 84+76	2'	4'	2'
L 78+12	2'	4'	2'
L 199+58	2'	4'	2'

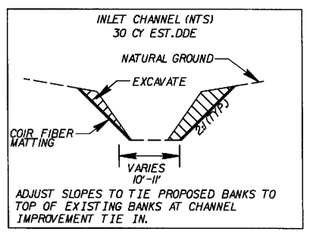
ROCK CROSS VANE DETAIL
NOT TO SCALE

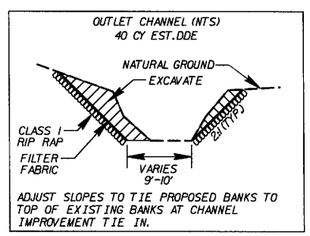
NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.



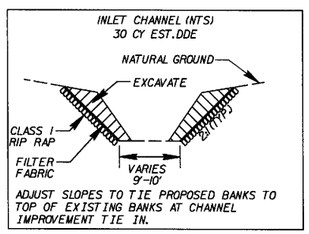
L STA. 233+95 TO STA. 234+83 LT

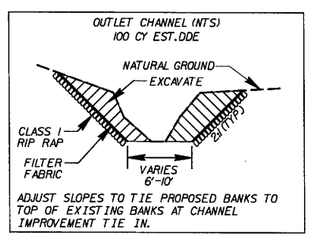
CULVERT INLET\OUTLET DETAILS
HARRIS CREEK TRIBUTARY
-L- STA 77+89



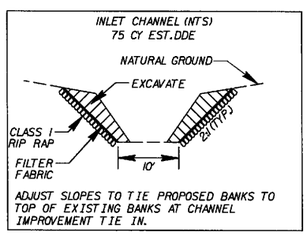


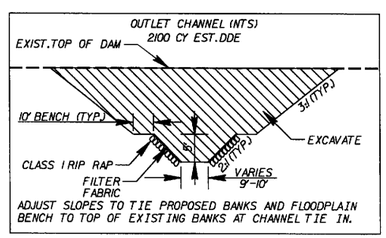
CULVERT INLET\OUTLET DETAILS
HARRIS CREEK
-L- STA 115+74



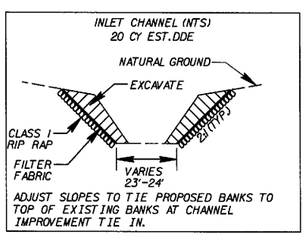


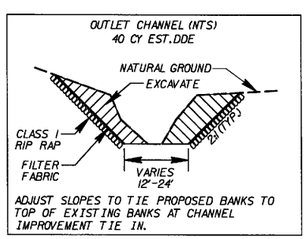
CULVERT INLET\OUTLET DETAILS
CEDAR FORK
-L- STA 200+04





CULVERT INLET\OUTLET DETAILS
PERRY CREEK
-L- STA 275+39

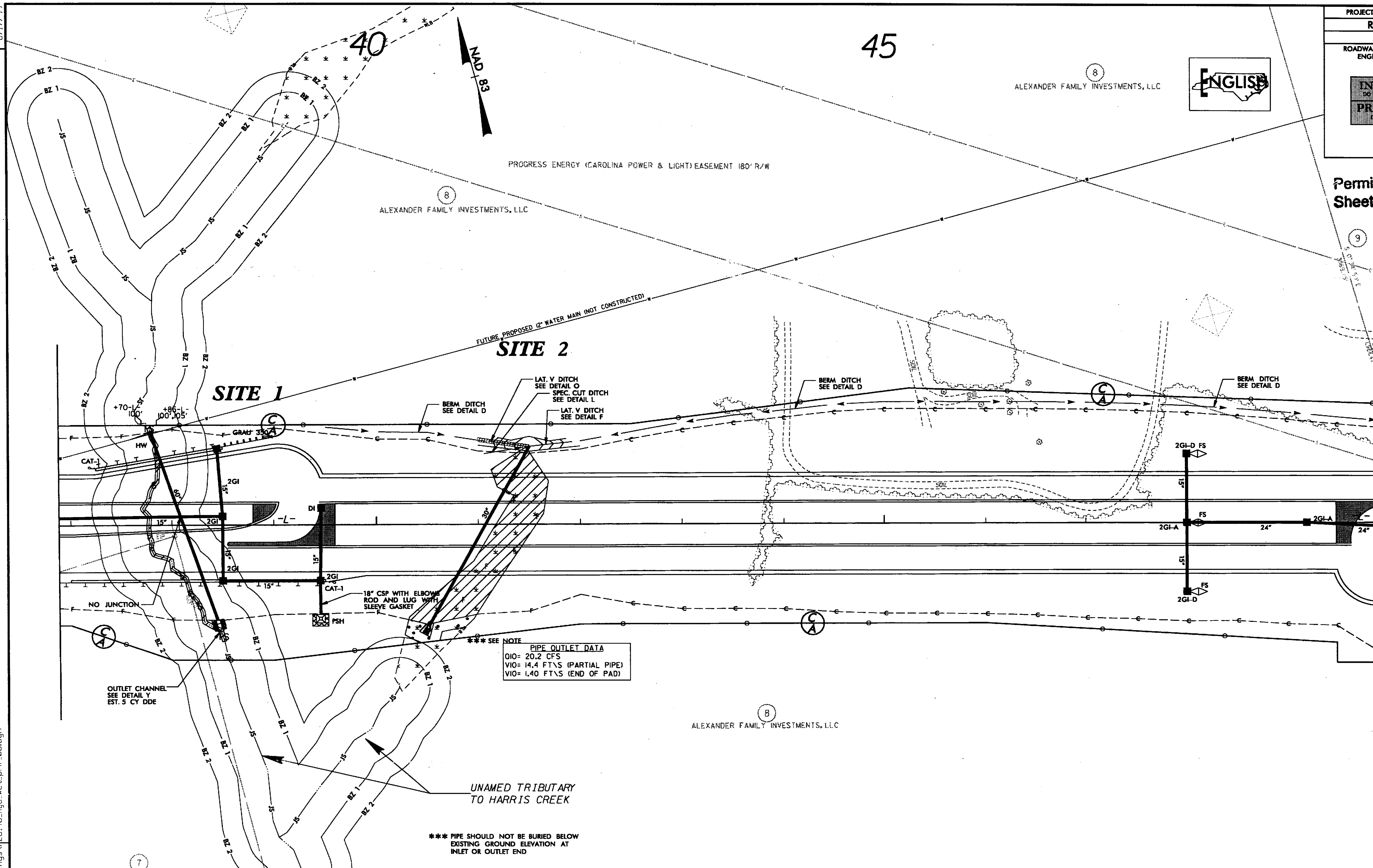




PROJECT REFERENCE NO.	SHEET NO.
R-2814B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Permit Drawing
Sheet 8 of 64



PIPE OUTLET DATA
Q10= 20.2 CFS
V10= 14.4 FT\S (PARTIAL PIPE)
V10= 1.40 FT\S (END OF PAD)

*** PIPE SHOULD NOT BE BURIED BELOW EXISTING GROUND ELEVATION AT INLET OR OUTLET END

PREFORMED SCOUR HOLE DATA
Q10= 8.30 CFS

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

GRASS SWALE DATA A -L- STA. 4600 TO STA. 4800 LT		
DA	1.17	AC
SLOPE	1.30	%
L REQ	117	FT
L PROV	200	FT
Q2	3.35	CFS
V2	1.87	FT\S
D2	0.60	FT
Q10	4.33	CFS
V10	2.00	FT\S
D10	0.66	FT

GRASS SWALE DATA B -L- STA. 4700 TO STA. 4800 MD		
DA	0.83	AC
SLOPE	1.30	%
L REQ	83	FT
L PROV	100	FT
Q2	1.58	CFS
V2	1.49	FT\S
D2	0.42	FT
Q10	2.05	CFS
V10	1.45	FT\S
D10	0.48	FT

GRASS SWALE DATA C -L- STA. 4700 TO STA. 4800 RT		
DA	0.90	AC
SLOPE	1.30	%
L REQ	90	FT
L PROV	100	FT
Q2	2.79	CFS
V2	1.79	FT\S
D2	0.56	FT
Q10	3.61	CFS
V10	1.91	FT\S
D10	0.61	FT

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

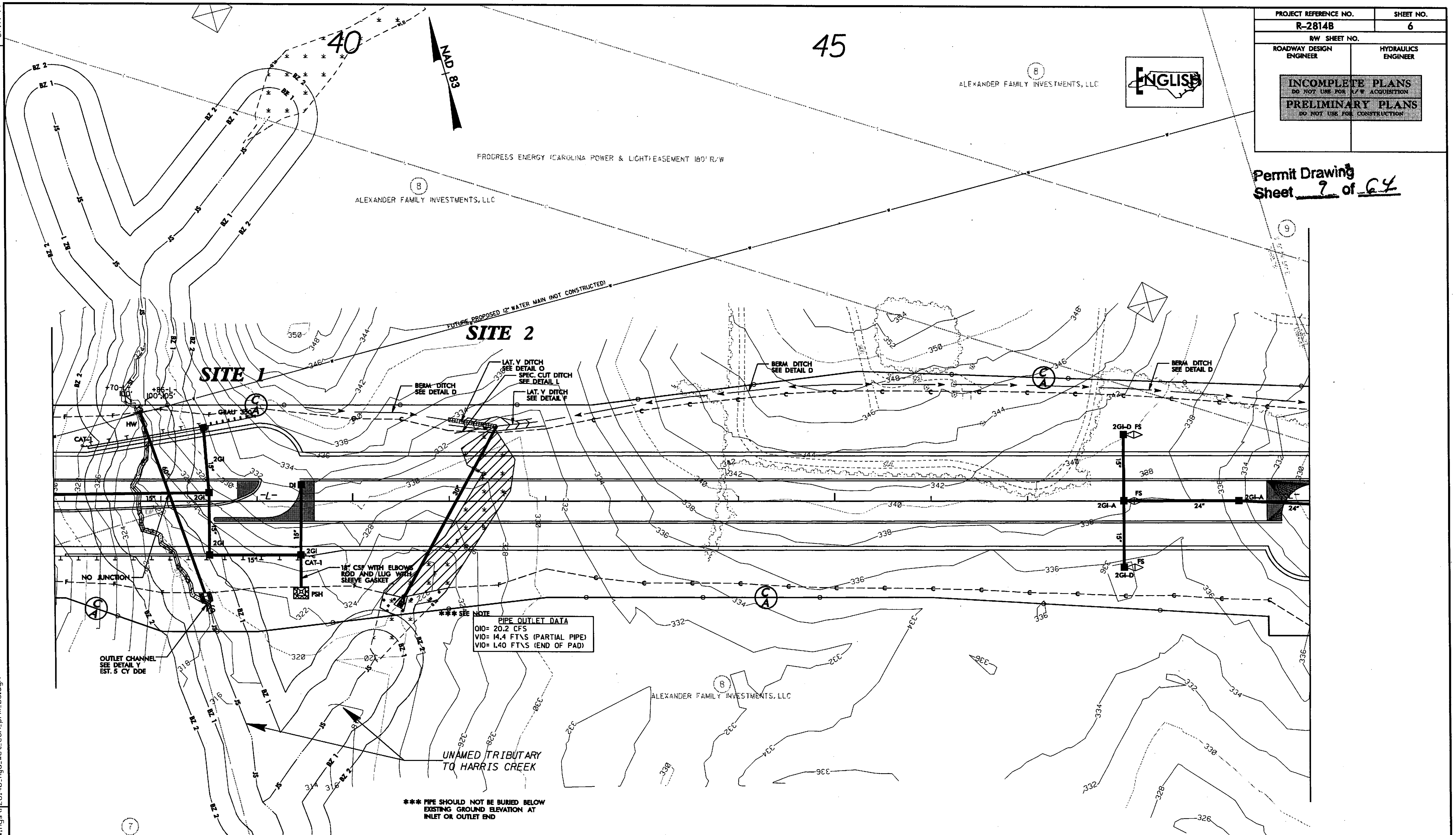
8/17/99

02\22\10 09:31:50
r:\hydraulics\permits_environmental\drawings\r2814b_hyd_wet_prm_06.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Permit Drawing
Sheet 9 of 64



PIPE OUTLET DATA
Q10= 20.2 CFS
V10= 14.4 FT\S (PARTIAL PIPE)
V10= 1.40 FT\S (END OF PAD)

*** PIPE SHOULD NOT BE BURIED BELOW EXISTING GROUND ELEVATION AT INLET OR OUTLET END

PREFORMED SCOUR HOLE DATA
Q10= 8.30 CFS

S — DENOTES IMPACTS IN SURFACE WATER

TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F — DENOTES FILL IN WETLAND

E — DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

GRASS SWALE DATA A		
-L- STA. 4600 TO STA. 4800 LT		
DA	1.17	AC
SLOPE	1.30	%
L REQ	117	FT
L PROV	200	FT
Q2	3.35	CFS
V2	1.87	FT\S
D2	0.60	FT
Q10	4.33	CFS
V10	2.00	FT\S
D10	0.66	FT

GRASS SWALE DATA B		
-L- STA. 4700 TO STA. 4800 MD		
DA	0.83	AC
SLOPE	1.30	%
L REQ	83	FT
L PROV	100	FT
Q2	1.58	CFS
V2	1.49	FT\S
D2	0.42	FT
Q10	2.05	CFS
V10	1.45	FT\S
D10	0.48	FT

GRASS SWALE DATA C		
-L- STA. 4700 TO STA. 4800 RT		
DA	0.90	AC
SLOPE	1.30	%
L REQ	90	FT
L PROV	100	FT
Q2	2.79	CFS
V2	1.79	FT\S
D2	0.56	FT
Q10	3.61	CFS
V10	1.91	FT\S
D10	0.61	FT

50' 0' 50' 100' 150'
GRAPHIC SCALE

02/22/10 10:09:07
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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	6A

SITE 1

250 200 150 100 50 ℄ 50 100 150 200 250

340 335 330 325 320 315 310

60" RCP
℄ -L- 38+11
PGL ELEV.= 339.24'
SKEW = 70°42'06"

2:1 (NORMAL)

2:1 (NORMAL)

WSE 50 327.0

WSE 100 327.8

NWS 322.6

EXIST. RIGHT TOP OF BANK

EXIST. LEFT TOP OF BANK

PROPOSED INLET
ELEV. 321.6
STREAM BED 322.6
BURIED 1.0'

ELEV. 319.5
PROPOSED 60" RCP
S = 2.21 %

EXIST. STREAMBED

PROPOSED OUTLET
ELEV. 317.2
STREAM BED 318.2
BURIED 1.0'

50' 0' 50'
HORIZONTAL SCALE

5' 0' 5'
VERTICAL SCALE

ENGLISH

Permit Drawing
Sheet 10 of 64

PLANS PREPARED BY :

RK&K

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

FOR
DIVISION OF HIGHWAYS

8-23-99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2814B	X-10

Permit Drawing
Sheet 11 of 64

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

345 340 335 330 325 320 315

2:1 6:1 0.020 6:1 6:1 0.020 6:1 6:1

330.078 333.26 330.078

D.P. 330.165

42+50.00

6:1 6:1 0.020 6:1 6:1 0.020 6:1

330.731 330.73

D.P. 330.818

42+00.00

WETLANDS WETLANDS

2:1 2:1 6:1 0.020 6:1 0.020 5.10:1

327.90 D.P. 332.772

41+50.00

6:1 6:1 0.020 6:1 6:1 0.020 2.78:1

332.039 D.P. 332.125 WETLANDS WETLANDS

326.88

41+00.00

4.49:1 6:1 0.020 6:1 6:1 0.020

332.692 D.P. 332.779

328.16

WETLANDS CLEARING LIMITS WETLANDS

40+50.00

—L—

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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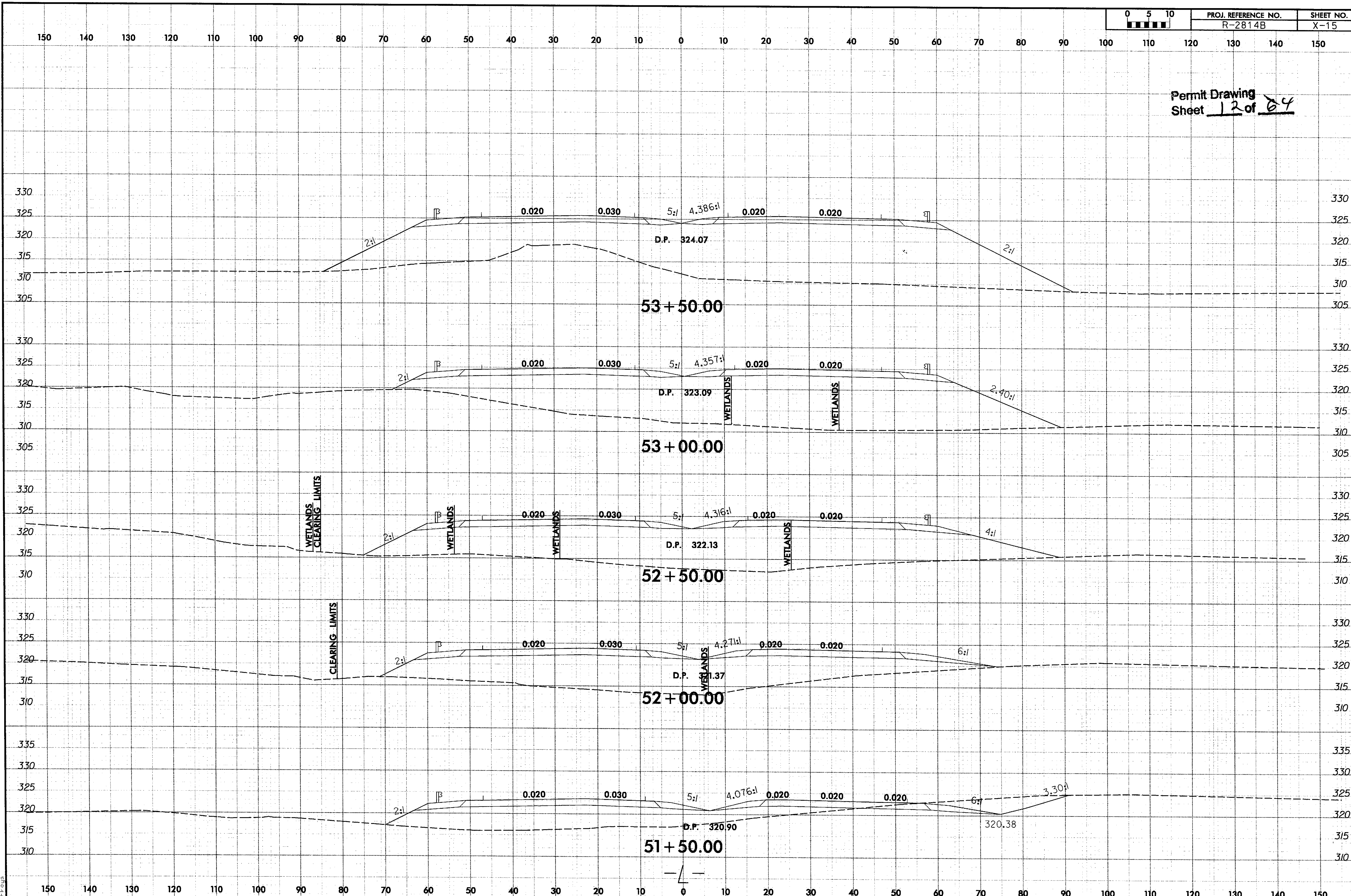
Fred



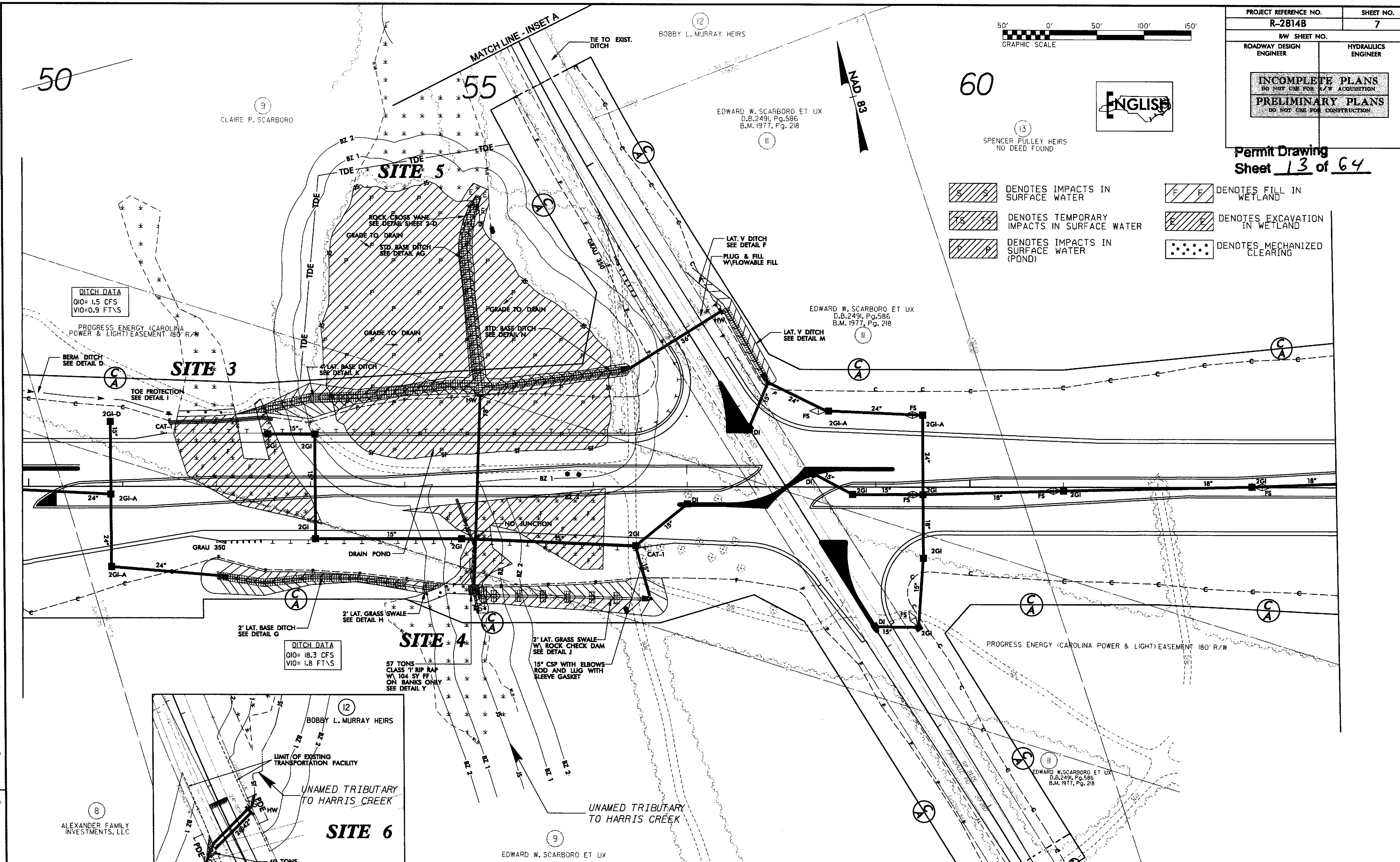
PROJ. REFERENCE NO.
R-2814B
SHEET NO.
X-15
0 5 10
Permit Drawing
Sheet 12 of 64
53 + 50.00
D.P. 324.07
0.020
0.030
5:1
4.386:1
2:1
53 + 00.00
D.P. 323.09
4.357:1
2.40:1
WETLANDS
52 + 50.00
D.P. 322.13
4.316:1
4:1
WETLANDS
CLEARING LIMITS
52 + 00.00
D.P. 321.37
4.271:1
6:1
51 + 50.00
D.P. 320.90
4.076:1
3.30:1
320.38

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 13 of 64



GRASS SWALE DATA D	-L- STA. 4950 TO STA. 5087.31 LT	
DA	0.60	AC
SLOPE	0.48	%
L REQ	60	FT
L PROV	137	FT
Q2	1.86	CFS
V2	1.11	FT\S
D2	0.58	FT
Q10	2.40	CFS
V10	1.19	FT\S
D10	0.64	FT

GRASS SWALE DATA E	-L- STA. 5030 TO STA. 5087.31 MD	
DA	0.13	AC
SLOPE	0.48	%
L REQ	13	FT
L PROV	57	FT
Q2	0.25	CFS
V2	0.62	FT\S
D2	0.28	FT
Q10	0.32	CFS
V10	0.66	FT\S
D10	0.31	FT

GRASS SWALE DATA F	-L- STA. 5087.31 TO STA. 5200 MD	
DA	0.67	AC
SLOPE	0.60	%
L REQ	67	FT
L PROV	113	FT
Q2	1.76	CFS
V2	1.14	FT\S
D2	0.51	FT
Q10	2.27	CFS
V10	1.22	FT\S
D10	0.56	FT

GRASS SWALE DATA G	-L- STA. 4950 TO STA. 5087.31 RT	
DA	0.70	AC
SLOPE	0.48	%
L REQ	70	FT
L PROV	137	FT
Q2	2.17	CFS
V2	1.16	FT\S
D2	0.61	FT
Q10	2.80	CFS
V10	1.23	FT\S
D10	0.67	FT

GRASS SWALE DATA H	-L- STA. 4800 TO STA. 4920 MD	
DA	0.14	AC
SLOPE	1.16	%
L REQ	14	FT
L PROV	120	FT
Q2	0.27	CFS
V2	0.84	FT\S
D2	0.23	FT
Q10	0.35	CFS
V10	0.89	FT\S
D10	0.25	FT

GRASS SWALE DATA J	-L- STA. 5400 TO STA. 5435 RT	
DA	4.85	AC
SLOPE	0.43	%
L REQ	N\A	FT
L PROV	35	FT
Q2	13.18	CFS
V2	1.94	FT\S
D2	1.21	FT
Q10	17.04	CFS
V10	2.56	FT\S
D10	1.19	FT

GRASS SWALE DATA L	-L- STA. 5473 TO STA. 5660 RT	
DA	0.96	AC
SLOPE	5.00	%
L REQ	96	FT
L PROV	187	FT
Q2	4.12	CFS
V2	3.48	FT\S
D2	0.38	FT
Q10	5.32	CFS
V10	3.43	FT\S
D10	0.46	FT

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mheador

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 14 of 64

8/17/99

REVISIONS

50 55 60

MATCH LINE - INSET A

MATCH LINE - INSET A

50' 0' 50' 100' 150'
GRAPHIC SCALE

NAD 83

ENGLISH

CLAIRE P. SCARBORO

BOBBY L. MURRAY HEIRS

EDWARD W. SCARBORO ET UX
D.B.2491, Pg.586
B.M. 1977, Pg. 218

SPENCER PURVEY HEIRS
DEED FOUND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

SITE 5

SITE 3

SITE 4

SITE 6

DITCH DATA
QIO= 1.5 CFS
VIO=0.9 FT\S

DITCH DATA
QIO= 18.3 CFS
VIO= 1.8 FT\S

KOCK CROSS VANE SEE DETAIL SHEET 7-D

GRADE TO DRAIN

STD. BASE DITCH SEE DETAIL AG

4' LAT. BASE DITCH SEE DETAIL K

BERM DITCH SEE DETAIL D

TOE PROTECTION SEE DETAIL I

2' LAT. BASE DITCH SEE DETAIL G

2' LAT. GRASS SWALE SEE DETAIL H

2' LAT. GRASS SWALE W\ ROCK CHECK DAM SEE DETAIL J

LAT. V DITCH SEE DETAIL F

PLUG & FILL W\FLOWABLE FILL

LAT. V DITCH SEE DETAIL M

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

57 TONS CLASS 'I' RIP RAP W\ 104 SY FF ON BANKS ONLY SEE DETAIL Y

46 TONS CLASS 'I' RIP RAP W\ 78 SY FF ON BANKS ONLY SEE DETAIL Y

DRAIN POND

GRAU 350

HW JUNCTION

PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W

ALEXANDER FAMILY INVESTMENTS, LLC

LIMIT OF EXISTING TRANSPORTATION FACILITY

UNAMED TRIBUTARY TO HARRIS CREEK

REMOVE

GRASS SWALE DATA D -L- STA. 4950 TO STA. 5087.31 LT		
DA	0.60	AC
SLOPE	0.48	%
L REQ	60	FT
L PROV	137	FT
Q2	1.86	CFS
V2	1.11	FT\S
D2	0.58	FT
Q10	2.40	CFS
V10	1.19	FT\S
D10	0.64	FT

GRASS SWALE DATA E -L- STA. 5030 TO STA. 5087.31 MD		
DA	0.13	AC
SLOPE	0.48	%
L REQ	13	FT
L PROV	57	FT
Q2	0.25	CFS
V2	0.62	FT\S
D2	0.28	FT
Q10	0.32	CFS
V10	0.66	FT\S
D10	0.31	FT

GRASS SWALE DATA F -L- STA. 5087.31 TO STA. 5200 MD		
DA	0.67	AC
SLOPE	0.60	%
L REQ	67	FT
L PROV	113	FT
Q2	1.76	CFS
V2	1.14	FT\S
D2	0.51	FT
Q10	2.27	CFS
V10	1.22	FT\S
D10	0.56	FT

GRASS SWALE DATA G -L- STA. 4950 TO STA. 5087.31 RT		
DA	0.70	AC
SLOPE	0.48	%
L REQ	70	FT
L PROV	137	FT
Q2	2.17	CFS
V2	1.16	FT\S
D2	0.61	FT
Q10	2.80	CFS
V10	1.23	FT\S
D10	0.67	FT

GRASS SWALE DATA H -L- STA. 4800 TO STA. 4920 MD		
DA	0.14	AC
SLOPE	1.16	%
L REQ	14	FT
L PROV	120	FT
Q2	0.27	CFS
V2	0.84	FT\S
D2	0.23	FT
Q10	0.35	CFS
V10	0.89	FT\S
D10	0.25	FT

GRASS SWALE DATA J -L- STA. 5400 TO STA. 5435 RT		
DA	4.85	AC
SLOPE	0.43	%
L REQ	N\A	FT
L PROV	35	FT
Q2	13.18	CFS
V2	1.94	FT\S
D2	1.21	FT
Q10	17.04	CFS
V10	2.56	FT\S
D10	1.19	FT

GRASS SWALE DATA L -L- STA. 5473 TO STA. 5660 RT		
DA	0.96	AC
SLOPE	5.00	%
L REQ	96	FT
L PROV	187	FT
Q2	4.12	CFS
V2	3.48	FT\S
D2	0.38	FT
Q10	5.32	CFS
V10	3.43	FT\S
D10	0.46	FT

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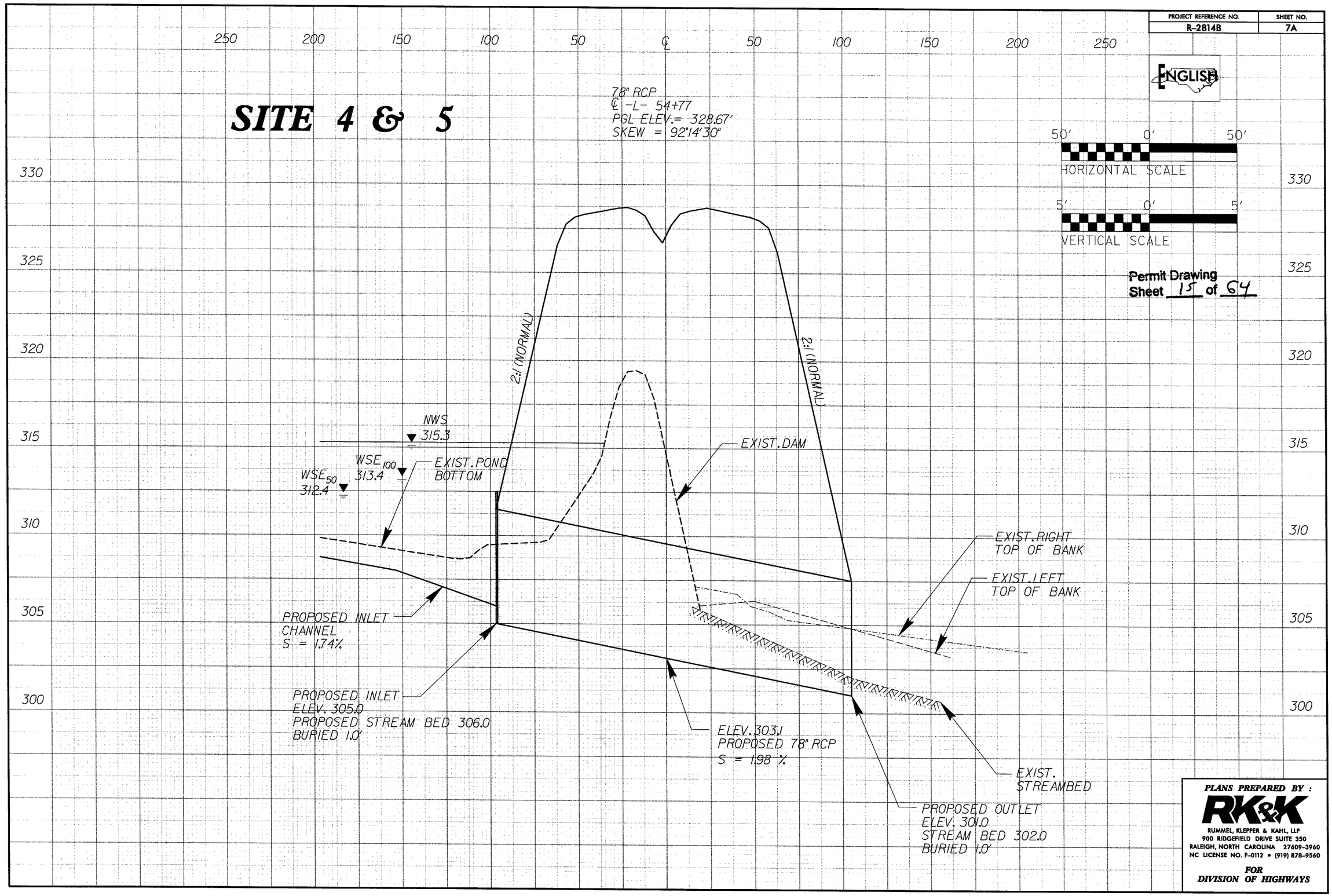
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	7A

SITE 4 & 5



ENGLISH

50' 0' 50'
HORIZONTAL SCALE

5' 0' 5'
VERTICAL SCALE

Permit Drawing
Sheet 15 of 64

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

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2814B	X-16

Permit Drawing
Sheet 16 of 64

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

335 330 325 320 315 310 305

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2:1 2:1

D.P. 328.19

WETLANDS WETLANDS

55+50.00

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D.P. 327.02

WETLANDS WETLANDS WETLANDS WETLANDS

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D.P. 325.95

WETLANDS WETLANDS WETLANDS CLEARING LIMITS

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D.P. 324.98

WETLANDS WETLANDS

54+00.00

—L—

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8/23/11

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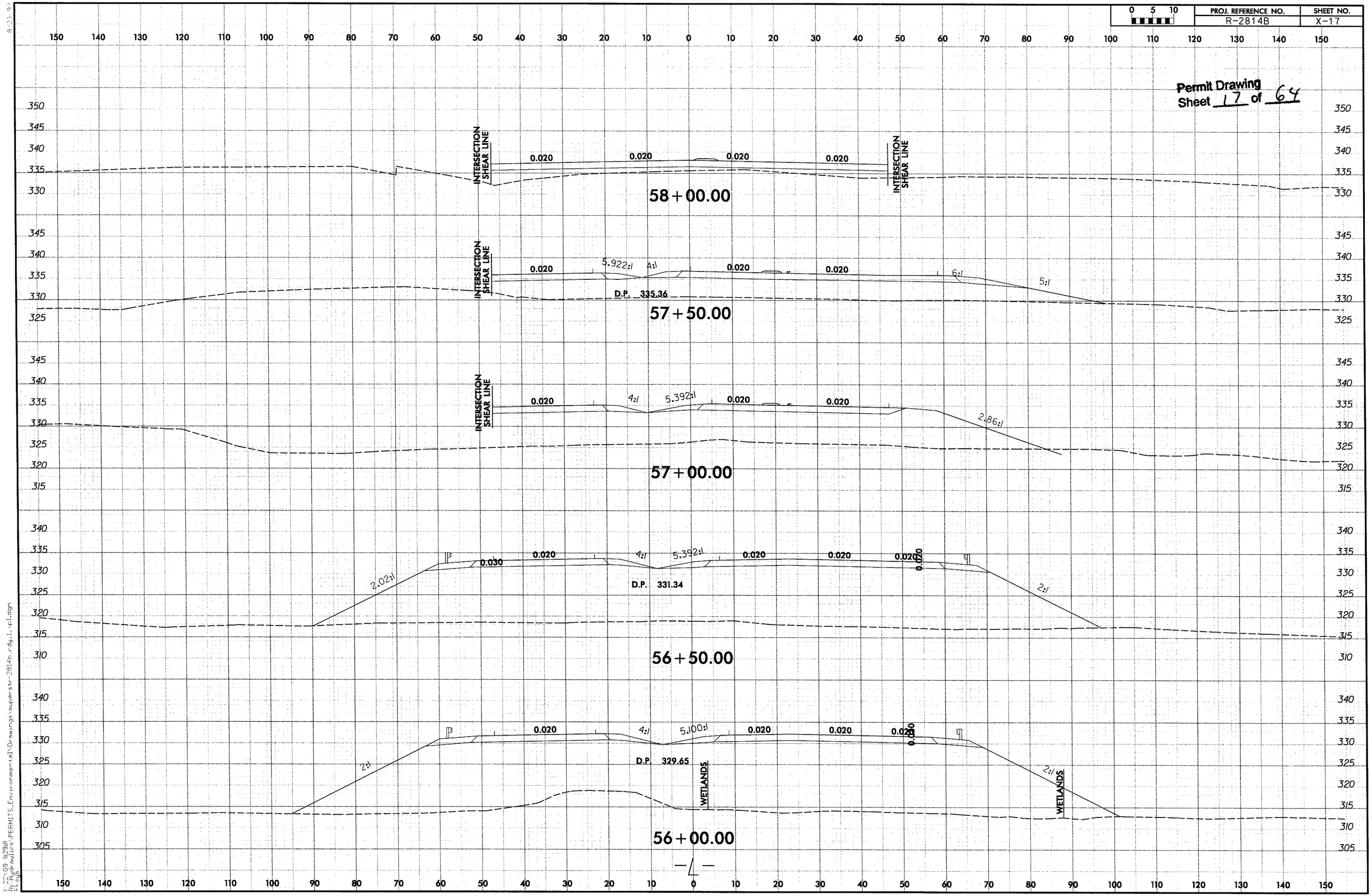
PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-17

Permit Drawing
Sheet 17 of 64



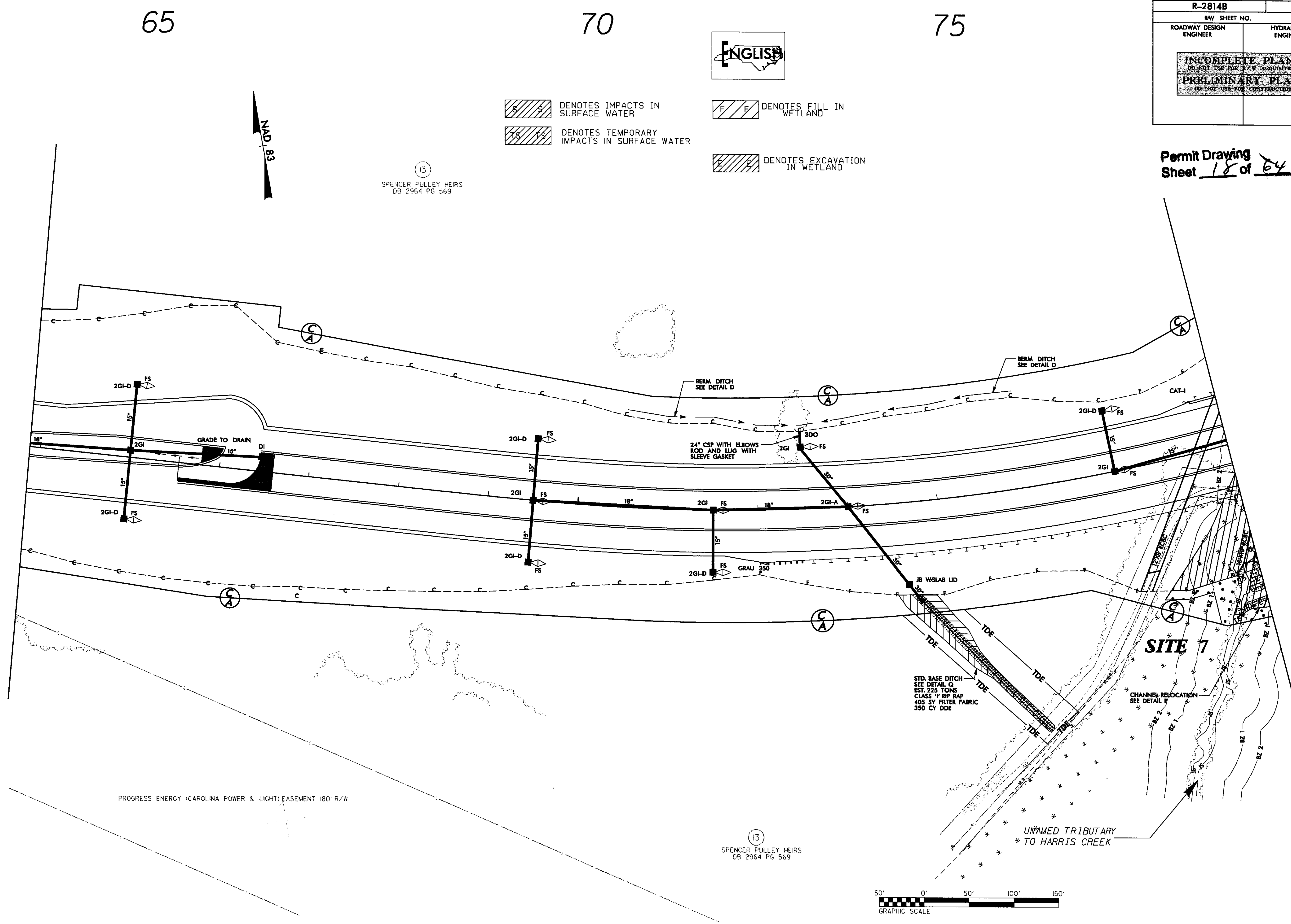
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 18 of 64

REVISIONS



65
70
75
ENGLISH
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
13
SPENCER PULLEY HEIRS
DB 2964 PG 569
BERM DITCH
SEE DETAIL D
24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
BDO
GRADE TO DRAIN
DI
2GI-D
2GI
2GI-A
FS
GRAU 350
JB W/SLAB LID
CAT-1
STD. BASE DITCH
SEE DETAIL Q
EST. 225 TONS
CLASS 'I' RIP RAP
405 SY FILTER FABRIC
350 CY DDE
TDE
SITE 7
CHANNEL RELOCATION
SEE DETAIL F
BZ 1
BZ 2
UNAMED TRIBUTARY
TO HARRIS CREEK
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
50' 0' 50' 100' 150'
GRAPHIC SCALE

8/17/99

r2814b_hyd_wet_prm_08.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 19 of 64

65 70 75

ENGLISH

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

SPENCER PULLEY HEIRS
DB 2964 PG 569

PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT (80' R/W)

SPENCER PULLEY HEIRS
DB 2964 PG 569

UNAMED TRIBUTARY TO HARRIS CREEK

SITE 7

24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

BERM DITCH SEE DETAIL D

STD. BASE DITCH SEE DETAIL Q
EST. 225 TONS CLASS "I" RIP RAP
405 SY FILTER FABRIC
350 CY DDE

CHANNEL RELOCATION SEE DETAIL F

GRADE TO DRAIN

JB W/SLAB LID

GRAPHIC SCALE 50' 0' 50' 100' 150'

REVISIONS 8/17/99

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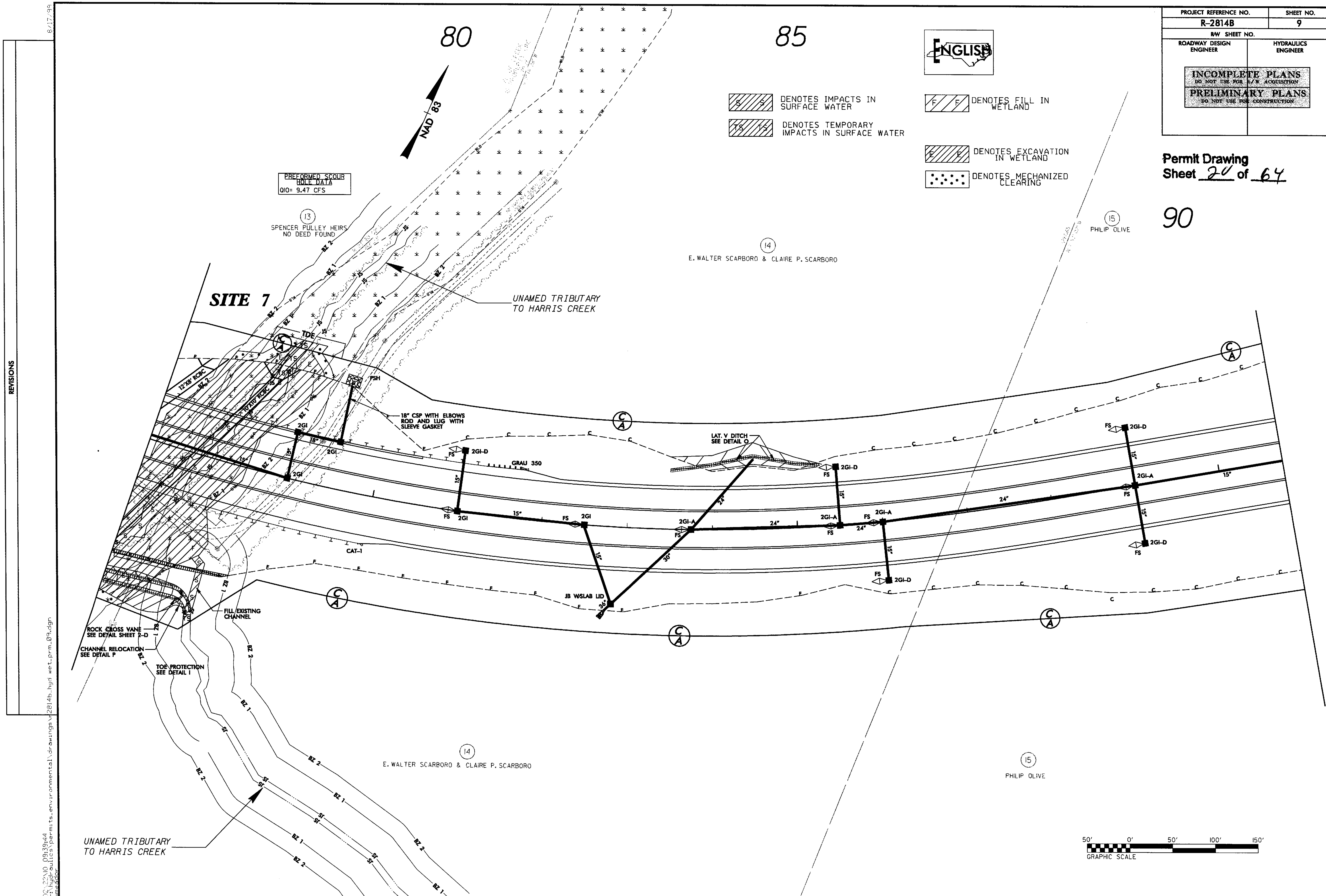

PROJECT REFERENCE NO.
R-2814B
SHEET NO.
9
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 20 of 64
ENGLISH
80
85
90
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
PREFORMED SCOUR HOLE DATA
Q10= 9.47 CFS
SITE 7
13
SPENCER PULLEY HEIRS
NO DEED FOUND
14
E. WALTER SCARBORO & CLAIRE P. SCARBORO
15
PHILIP OLIVE
UNAMED TRIBUTARY TO HARRIS CREEK
12'X8' RCBC
18" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
GRAU 350
CAT-1
LAT. V DITCH SEE DETAIL O
JB W/SLAB LID
FILL EXISTING CHANNEL
ROCK CROSS VANE SEE DETAIL SHEET 2-D
CHANNEL RELOCATION SEE DETAIL P
TOE PROTECTION SEE DETAIL I
2GI
2GI-A
2GI-D
FS
FSH
TDE
50' 0' 50' 100' 150'
GRAPHIC SCALE
REVISIONS
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

Permit Drawing
Sheet 21 of 64

ENGLISH

S/S DENOTES IMPACTS IN SURFACE WATER

TS/S DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

F/E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

80

85

90

NAD 83

PREFORMED SCOUR HOLE DATA
Q10= 9.47 CFS

SITE 7

UNAMED TRIBUTARY TO HARRIS CREEK

(13) SPENCER PULLEY HEIRS NO DEED FOUND

(14) E. WALTER SCARBORO & CLAIRE P. SCARBORO

(15) PHILIP OLIVE

TIDE

FSH

18" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE/GASKET

GRAU 35D

LAT. V-DITCH SEE DETAIL O

CAT-1

JB-WSLAB LID

FILL EXISTING CHANNEL

ROCK CROSS VANE SEE DETAIL SHEET B-D

CHANNEL RELOCATION SEE DETAIL P

TOE PROTECTION SEE DETAIL I

2GI, 2GI-A, 2GI-D, FS, 15", 18", 24", 30"

BZ 1, BZ 2, ST, C, F

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS 8/17/99

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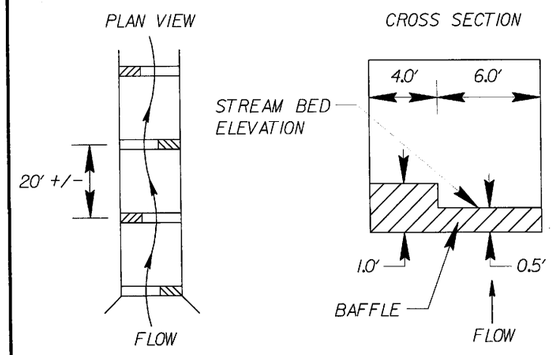
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	9A

SITE 7

ENGLISH

Permit Drawing Sheet 22 of 64

BAFFLE DETAILS



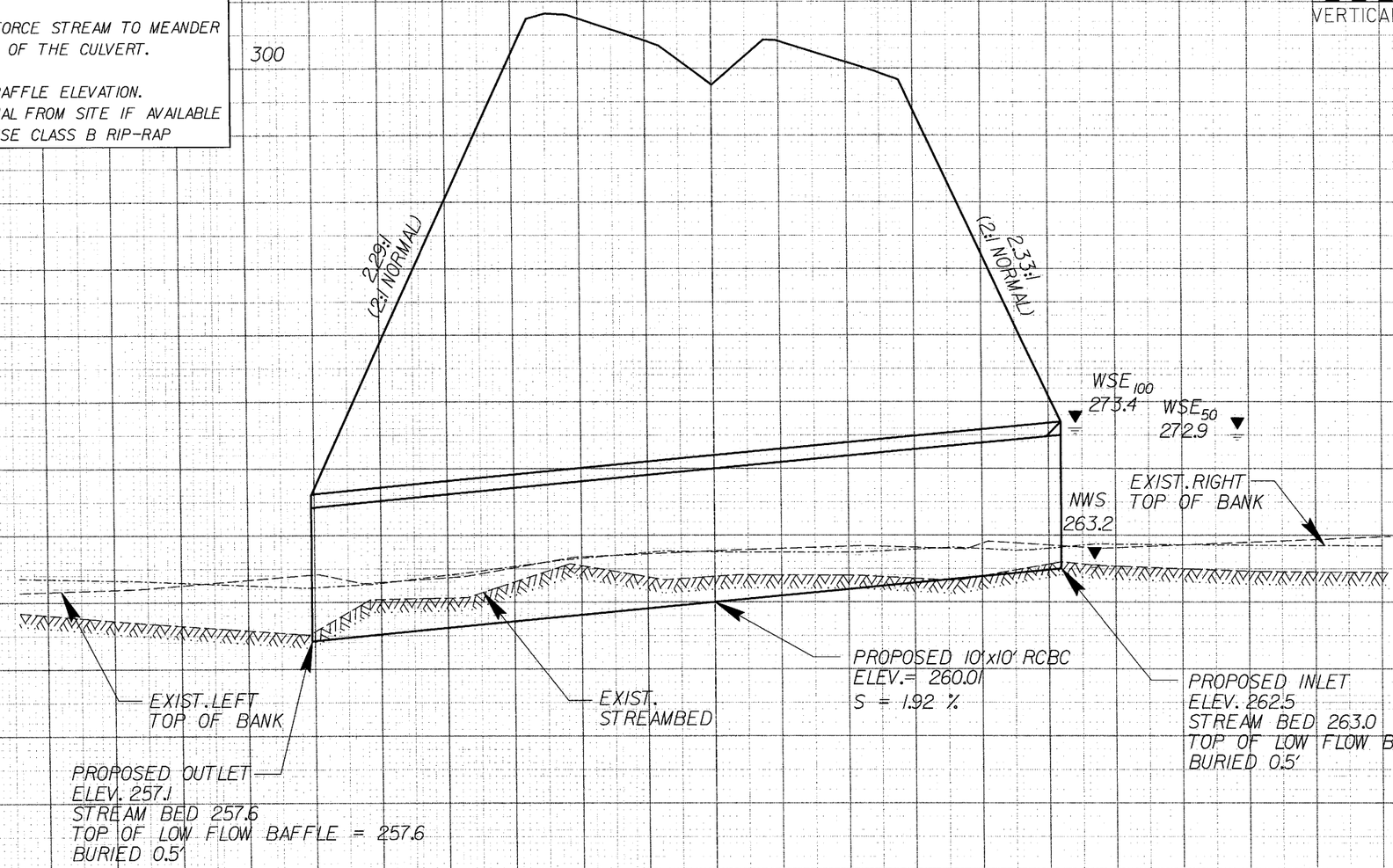
ALTERNATE BAFFLE SECTIONS TO FORCE STREAM TO MEANDER LEFT TO RIGHT ALONG THE LENGTH OF THE CULVERT.

PLACE BED MATERIAL TO TOP OF BAFFLE ELEVATION. STOCKPILE EXCEVATED BED MATERIAL FROM SITE IF AVAILABLE AND USE IN CULVERT. OTHERWISE,USE CLASS B RIP-RAP

STREAM CULVERT
℄ -L- 77+89.00
PGL ELEV.= 302.06'
SKEW = 120°00'00"

HORIZONTAL SCALE: 50' 0' 50'

VERTICAL SCALE: 10' 0' 10'



PLANS PREPARED BY :

RK&K

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

FOR DIVISION OF HIGHWAYS

PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-28

Permit Drawing
Sheet 23 of 64

77+50.00

D.P. 299.132

0.070 | 4.894:1 | 6:1 | 0.070

2:1

WETLANDS

WETLANDS

WETLANDS

77+00.00

D.P. 299.760

0.070 | 4.894:1 | 6:1 | 0.070

2.03:1

2:1

WETLANDS

76+50.00

D.P. 300.570

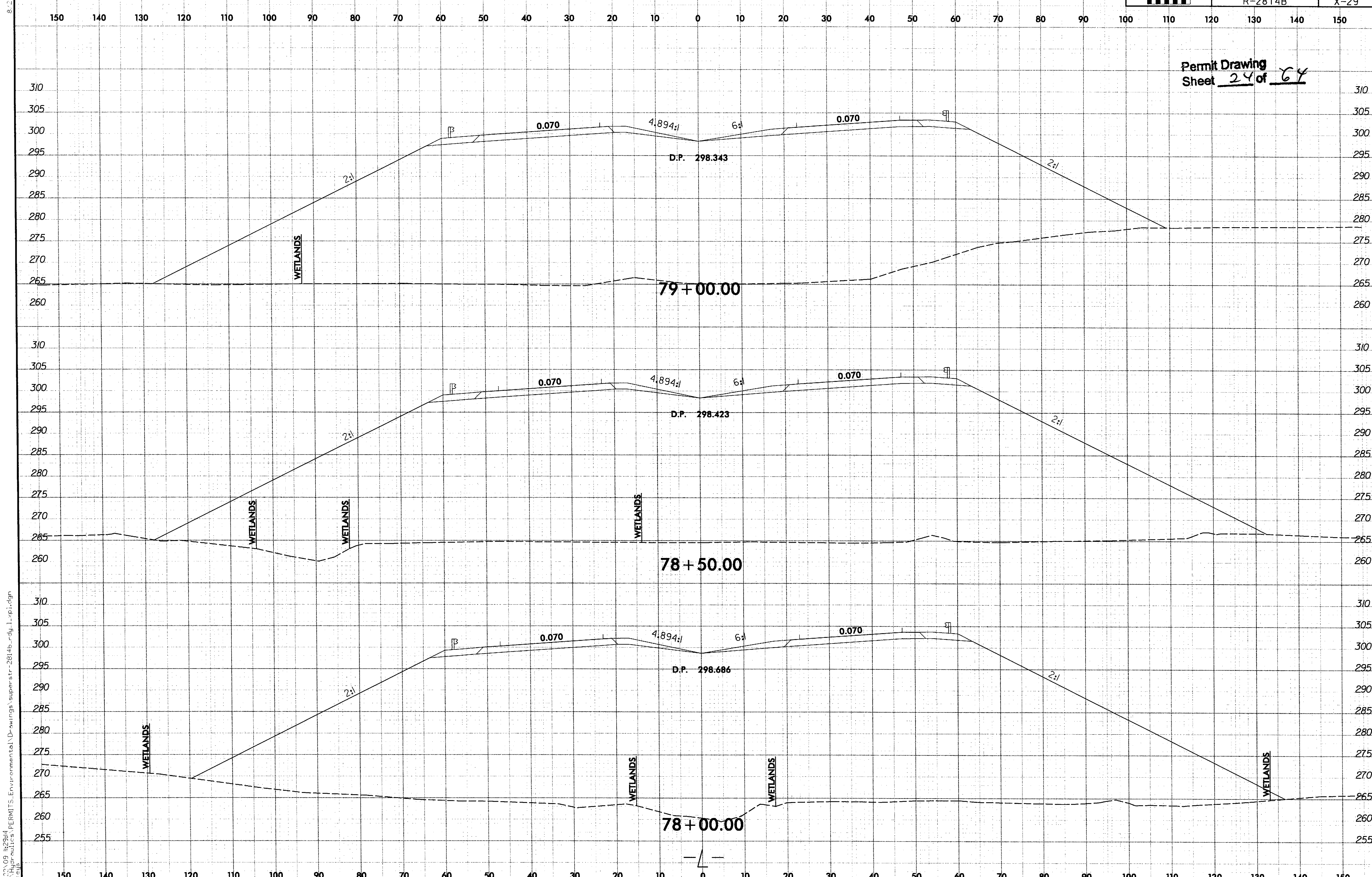
0.070 | 4.894:1 | 6:1 | 0.070

2:1

WETLANDS

PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-29

Permit Drawing
Sheet 24 of 64



PROJECT REFERENCE NO.	SHEET NO.
R-2814B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

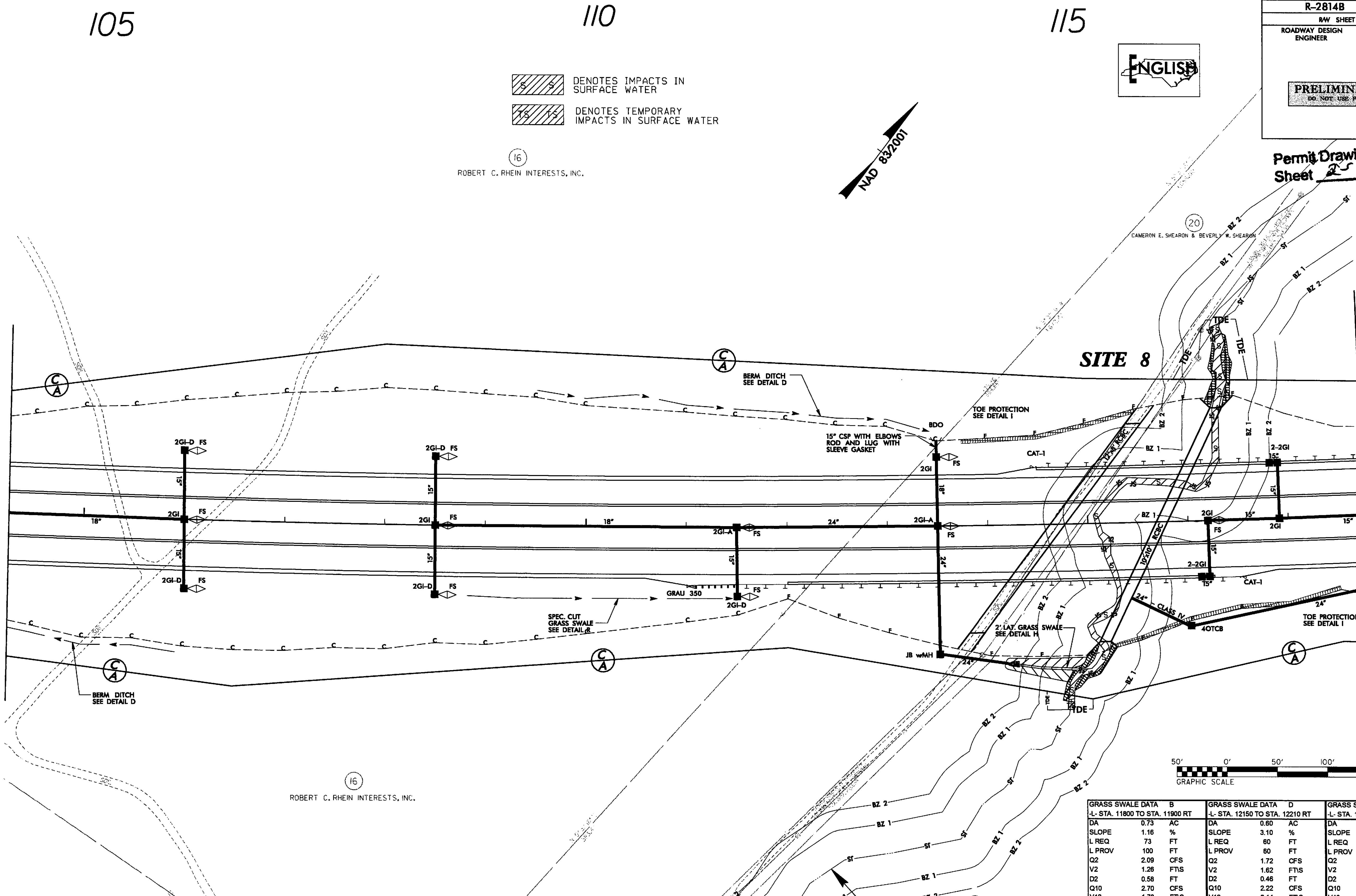
Permit Drawing Sheet 25 of 64

REVISIONS

06/16/09: Added TDE upstream and downstream around the culvert on parcel 20.

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



GRASS SWALE DATA A		
-L- STA. 10700 TO STA. 10850 LT		
DA	0.62	AC
SLOPE	2.90	%
L REQ	62	FT
L PROV	150	FT
Q2	1.77	CFS
V2	1.59	FT\S
D2	0.47	FT
Q10	2.29	CFS
V10	2.30	FT\S
D10	0.45	FT

GRASS SWALE DATA B		
-L- STA. 10700 TO STA. 10850 RT		
DA	0.60	AC
SLOPE	2.90	%
L REQ	60	FT
L PROV	150	FT
Q2	1.72	CFS
V2	1.58	FT\S
D2	0.47	FT
Q10	2.22	CFS
V10	2.28	FT\S
D10	0.44	FT

GRASS SWALE DATA D		
-L- STA. 11050 TO STA. 11150 RT		
DA	0.58	AC
SLOPE	4.00	%
L REQ	58	FT
L PROV	100	FT
Q2	1.66	CFS
V2	1.77	FT\S
D2	0.43	FT
Q10	2.14	CFS
V10	2.34	FT\S
D10	0.43	FT

GRASS SWALE DATA F		
-L- STA. 11200 TO STA. 11350 LT		
DA	1.08	AC
SLOPE	3.05	%
L REQ	108	FT
L PROV	150	FT
Q2	3.09	CFS
V2	1.87	FT\S
D2	0.58	FT
Q10	3.99	CFS
V10	2.70	FT\S
D10	0.54	FT

GRASS SWALE DATA B		
-L- STA. 11800 TO STA. 11900 RT		
DA	0.73	AC
SLOPE	1.16	%
L REQ	73	FT
L PROV	100	FT
Q2	2.09	CFS
V2	1.26	FT\S
D2	0.58	FT
Q10	2.70	CFS
V10	1.70	FT\S
D10	0.56	FT

GRASS SWALE DATA D		
-L- STA. 12150 TO STA. 12210 RT		
DA	0.60	AC
SLOPE	3.10	%
L REQ	60	FT
L PROV	60	FT
Q2	1.72	CFS
V2	1.62	FT\S
D2	0.46	FT
Q10	2.22	CFS
V10	2.14	FT\S
D10	0.45	FT

GRASS SWALE DATA F		
-L- STA. 12450 TO STA. 12550 LT		
DA	0.91	AC
SLOPE	4.00	%
L REQ	91	FT
L PROV	100	FT
Q2	2.60	CFS
V2	1.98	FT\S
D2	0.51	FT
Q10	3.36	CFS
V10	2.62	FT\S
D10	0.51	FT

GRASS SWALE DATA G		
-L- STA. 12450 TO STA. 12550 RT		
DA	0.79	AC
SLOPE	4.00	%
L REQ	79	FT
L PROV	100	FT
Q2	2.26	CFS
V2	1.91	FT\S
D2	0.49	FT
Q10	2.92	CFS
V10	2.53	FT\S
D10	0.48	FT

GRASS SWALE DATA I		
-L- STA. 12850 TO STA. 12950 LT		
DA	0.59	AC
SLOPE	3.84	%
L REQ	59	FT
L PROV	100	FT
Q2	1.69	CFS
V2	1.75	FT\S
D2	0.44	FT
Q10	2.18	CFS
V10	2.31	FT\S
D10	0.43	FT

GRASS SWALE DATA J		
-L- STA. 12850 TO STA. 12950 RT		
DA	0.39	AC
SLOPE	3.84	%
L REQ	39	FT
L PROV	100	FT
Q2	1.12	CFS
V2	1.58	FT\S
D2	0.38	FT
Q10	1.44	CFS
V10	2.08	FT\S
D10	0.37	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing Sheet # 26 of 64

105 110 115

ENGLISH

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/2001

(16) ROBERT C. RHEIN INTERESTS, INC.

(20) CAMERON E. SHEARON & BEVERLY W. SHEARON

SITE 8

BERM DITCH SEE DETAIL D

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

TOE PROTECTION SEE DETAIL V

SPEC. CUT GRASS SWALE SEE DETAIL R

GRAU 350

2' LAT. GRASS SWALE SEE DETAIL H

TOE PROTECTION SEE DETAIL I

HARRIS CREEK

(17) DONALD F. WILLIAMS & DOROTHY O. WILLIAMS

50' 0' 50' 100' 150'
GRAPHIC SCALE

GRASS SWALE DATA A -L- STA. 10700 TO STA. 10850 LT		
DA	0.62	AC
SLOPE	2.90	%
L REQ	62	FT
L PROV	150	FT
Q2	1.77	CFS
V2	1.59	FT\S
D2	0.47	FT
Q10	2.29	CFS
V10	2.30	FT\S
D10	0.45	FT

GRASS SWALE DATA B -L- STA. 10700 TO STA. 10850 RT		
DA	0.60	AC
SLOPE	2.90	%
L REQ	60	FT
L PROV	150	FT
Q2	1.72	CFS
V2	1.58	FT\S
D2	0.47	FT
Q10	2.22	CFS
V10	2.28	FT\S
D10	0.44	FT

GRASS SWALE DATA D -L- STA. 11050 TO STA. 11150 RT		
DA	0.58	AC
SLOPE	4.00	%
L REQ	58	FT
L PROV	100	FT
Q2	1.66	CFS
V2	1.77	FT\S
D2	0.43	FT
Q10	2.14	CFS
V10	2.34	FT\S
D10	0.43	FT

GRASS SWALE DATA F -L- STA. 11200 TO STA. 11350 LT		
DA	1.08	AC
SLOPE	3.05	%
L REQ	108	FT
L PROV	150	FT
Q2	3.09	CFS
V2	1.87	FT\S
D2	0.58	FT
Q10	3.99	CFS
V10	2.70	FT\S
D10	0.54	FT

GRASS SWALE DATA B -L- STA. 11800 TO STA. 11900 RT		
DA	0.73	AC
SLOPE	1.16	%
L REQ	73	FT
L PROV	100	FT
Q2	2.09	CFS
V2	1.26	FT\S
D2	0.56	FT
Q10	2.70	CFS
V10	1.70	FT\S
D10	0.56	FT

GRASS SWALE DATA D -L- STA. 12150 TO STA. 12210 RT		
DA	0.60	AC
SLOPE	3.10	%
L REQ	60	FT
L PROV	60	FT
Q2	1.72	CFS
V2	1.62	FT\S
D2	0.48	FT
Q10	2.22	CFS
V10	2.14	FT\S
D10	0.45	FT

GRASS SWALE DATA F -L- STA. 12450 TO STA. 12550 LT		
DA	0.91	AC
SLOPE	4.00	%
L REQ	91	FT
L PROV	100	FT
Q2	2.60	CFS
V2	1.98	FT\S
D2	0.51	FT
Q10	3.36	CFS
V10	2.62	FT\S
D10	0.51	FT

GRASS SWALE DATA G -L- STA. 12450 TO STA. 12550 RT		
DA	0.79	AC
SLOPE	4.00	%
L REQ	79	FT
L PROV	100	FT
Q2	2.26	CFS
V2	1.91	FT\S
D2	0.49	FT
Q10	2.92	CFS
V10	2.53	FT\S
D10	0.48	FT

GRASS SWALE DATA I -L- STA. 12850 TO STA. 12950 LT		
DA	0.59	AC
SLOPE	3.84	%
L REQ	59	FT
L PROV	100	FT
Q2	1.69	CFS
V2	1.75	FT\S
D2	0.44	FT
Q10	2.18	CFS
V10	2.31	FT\S
D10	0.43	FT

GRASS SWALE DATA J -L- STA. 12850 TO STA. 12950 RT		
DA	0.39	AC
SLOPE	3.84	%
L REQ	39	FT
L PROV	100	FT
Q2	1.12	CFS
V2	1.58	FT\S
D2	0.38	FT
Q10	1.44	CFS
V10	2.08	FT\S
D10	0.37	FT

REVISIONS
8/17/99
06/16/09: Added TDE upstream and downstream around the culvert on parcel 20.

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	11A

SITE 8

ENGLISH

Permit Drawing
Sheet 27 of 64

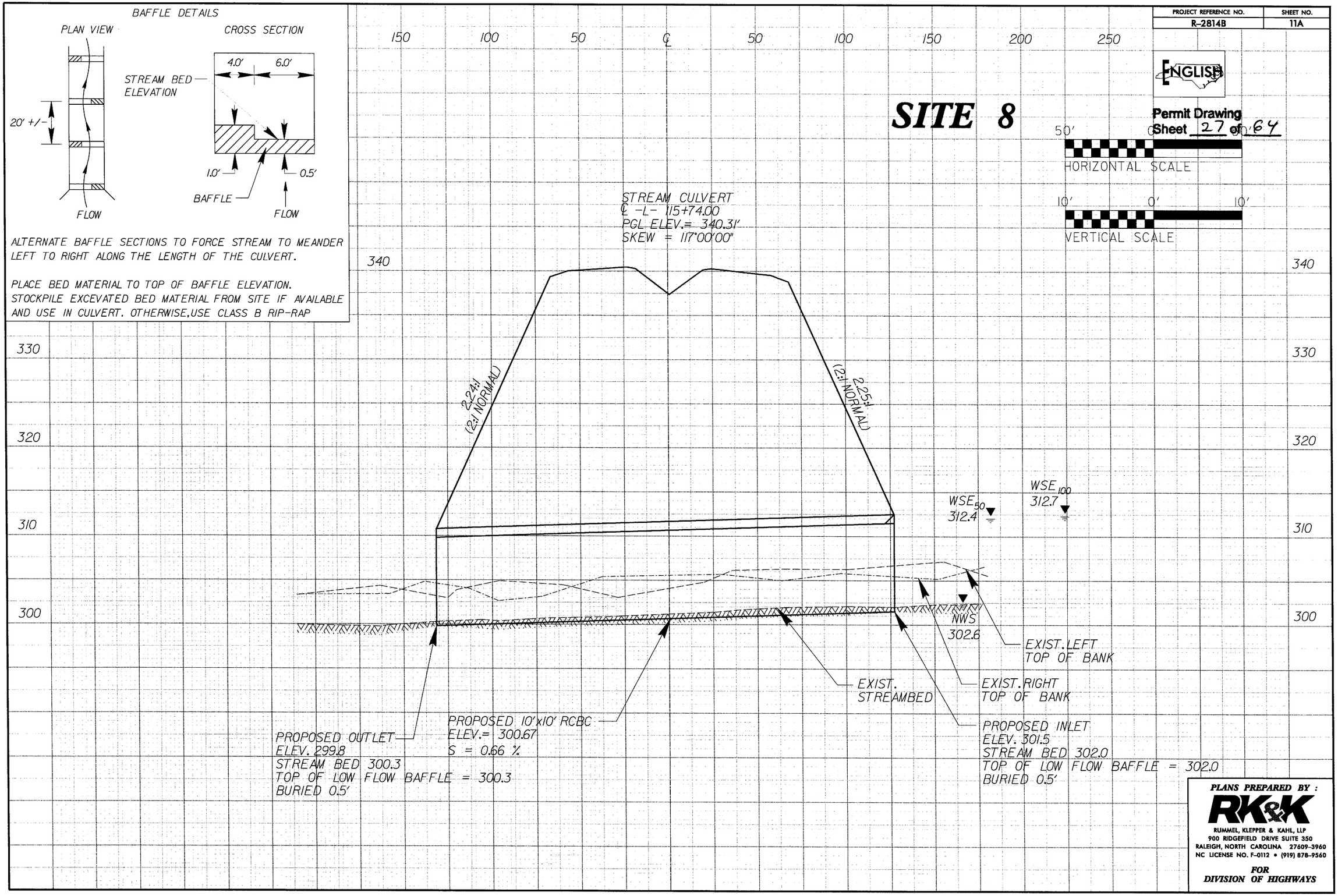
HORIZONTAL SCALE
50' 0' 50'

VERTICAL SCALE
10' 0' 10'

BAFFLE DETAILS

ALTERNATE BAFFLE SECTIONS TO FORCE STREAM TO MEANDER LEFT TO RIGHT ALONG THE LENGTH OF THE CULVERT.

PLACE BED MATERIAL TO TOP OF BAFFLE ELEVATION. STOCKPILE EXCEVATED BED MATERIAL FROM SITE IF AVAILABLE AND USE IN CULVERT. OTHERWISE,USE CLASS B RIP-RAP



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

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

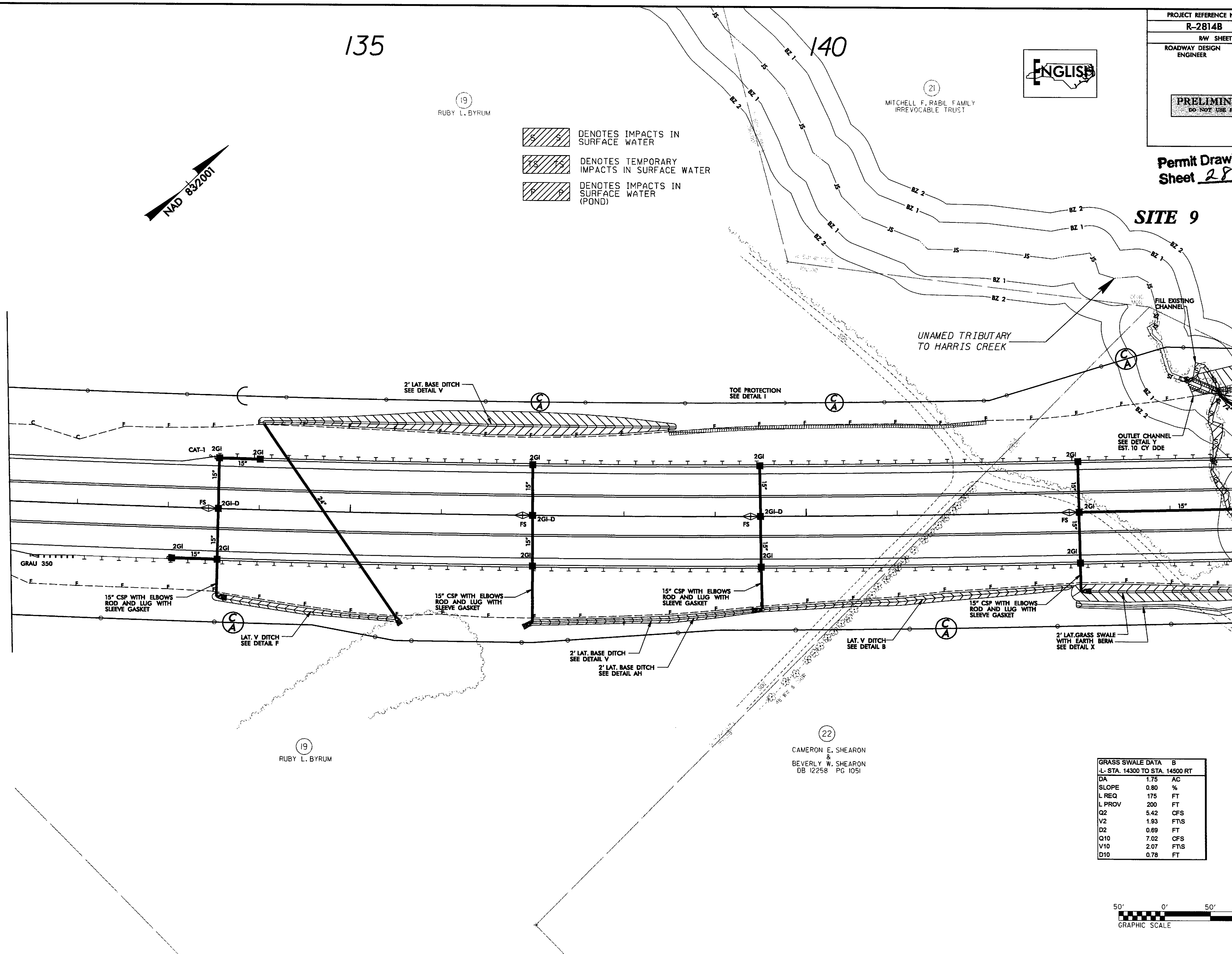
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 28 of 64

SITE 9

REVISIONS

REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



135
140
ENGLISH
(19) RUBY L. BYRUM
(21) MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
NAD 83/2001
UNAMED TRIBUTARY TO HARRIS CREEK
FILL EXISTING CHANNEL
2' LAT. BASE DITCH SEE DETAIL V
TOE PROTECTION SEE DETAIL I
OUTLET CHANNEL SEE DETAIL Y EST. 10 CY DDE
CAT-1
GRAU 350
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
LAT. V DITCH SEE DETAIL F
2' LAT. BASE DITCH SEE DETAIL V
2' LAT. BASE DITCH SEE DETAIL AH
LAT. V DITCH SEE DETAIL B
2' LAT.GRASS SWALE WITH EARTH BERM SEE DETAIL X
(19) RUBY L. BYRUM
(22) CAMERON E. SHEARON & BEVERLY W. SHEARON DB 12258 PG 1051
50' 0' 50' 100' 150'
GRAPHIC SCALE

GRASS SWALE DATA	B	
-L- STA. 14300 TO STA. 14500 RT		
DA	1.75	AC
SLOPE	0.80	%
L REQ	175	FT
L PROV	200	FT
Q2	5.42	CFS
V2	1.93	FT\S
D2	0.69	FT
Q10	7.02	CFS
V10	2.07	FT\S
D10	0.78	FT

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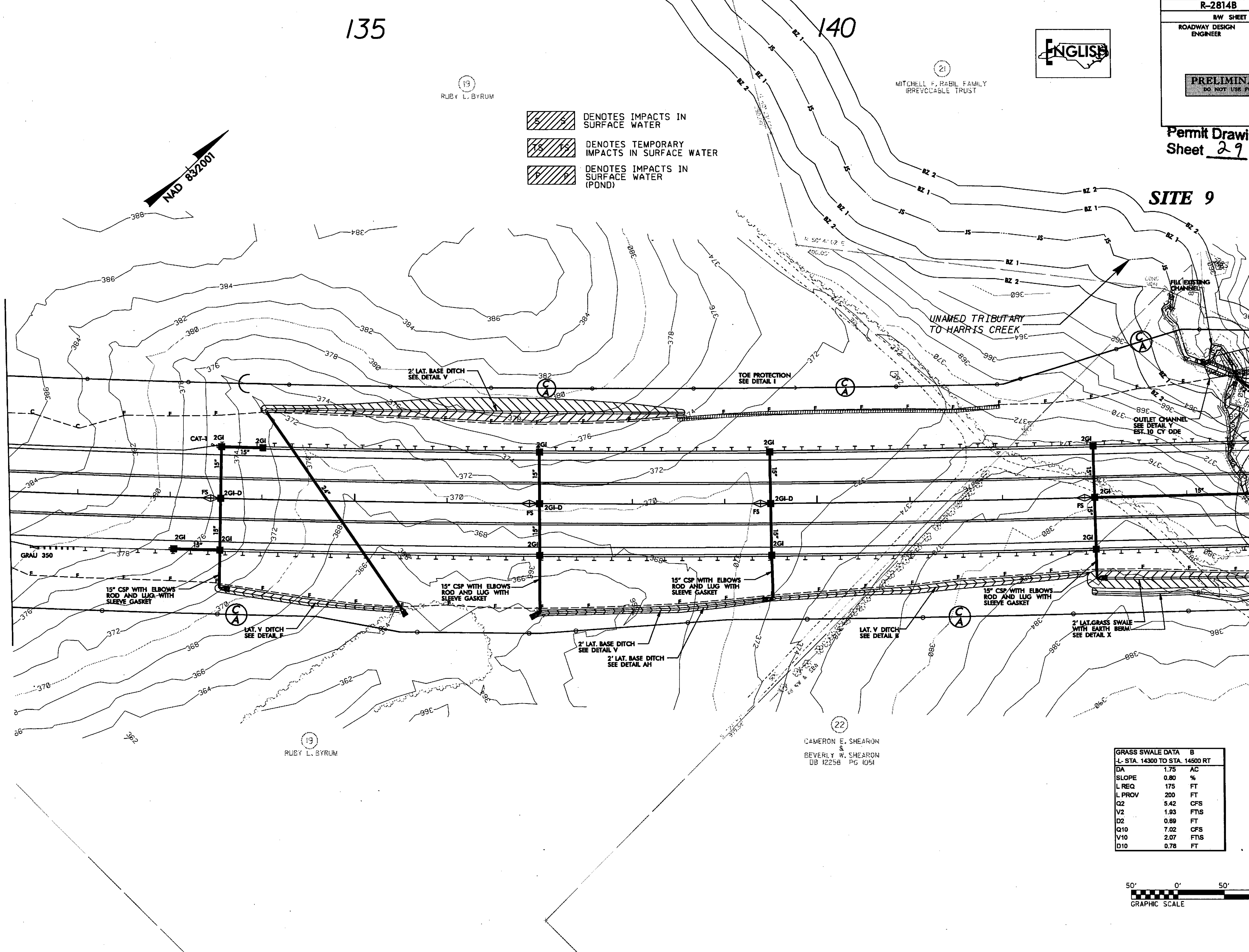
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 29 of 64

ENGLISH

SITE 9



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140
NAD 83/2001
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
RUBY L. BYRUM
MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST
UNAMED TRIBUTARY TO HARRIS CREEK
FILL EXISTING CHANNEL
2' LAT. BASE DITCH SEE DETAIL V
TOE PROTECTION SEE DETAIL I
OUTLET CHANNEL SEE DETAIL Y EST. 10 CY DDE
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
LAT. V DITCH SEE DETAIL F
2' LAT. BASE DITCH SEE DETAIL AH
2' LAT. GRASS SWALE WITH EARTH BERM SEE DETAIL X
GRAU 350
CAMERON E. SHEARON & BEVERLY W. SHEARON DB 12258 PG 1051

GRASS SWALE DATA	B	
-L- STA. 14300 TO STA. 14500 RT		
DA	1.75	AC
SLOPE	0.80	%
L REQ	175	FT
L PROV	200	FT
Q2	5.42	CFS
V2	1.93	FT\S
D2	0.69	FT
Q10	7.02	CFS
V10	2.07	FT\S
D10	0.78	FT

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS
REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	14
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 30 of 64

145 150 155

NAD 83/2001

(21) MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

SITE 9

2' LAT BASE DITCH SEE DETAIL G
DRAIN POND
2' LAT GRASS SWALE SEE DETAIL Z
2' LAT BASE DITCH SEE DETAIL G
2' LAT GRASS SWALE SEE DETAIL Z
2' LAT.GRASS SWALE WITH EARTH BERM SEE DETAIL X
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
GRAU 350
2' LAT.GRASS SWALE WITH EARTH BERM SEE DETAIL X
TOE PROTECTION SEE DETAIL I
FILL EXISTING CHANNEL
CAT-I
2' LAT. BASE DITCH SEE DETAIL G
CHANNEL RELOCATION SEE DETAIL W
UNAMED TRIBUTARY TO HARRIS CREEK

(22) CAMERON E. SHEARON & BEVERLY W. SHEARON DB 12258 PG 1051

(21) MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST

GRASS SWALE DATA D			GRASS SWALE DATA F		
-L- STA. 14800 TO STA. 14900 LT			-L- STA. 15250 TO STA. 15400 LT		
DA	1.00	AC	DA	1.41	AC
SLOPE	2.20	%	SLOPE	0.50	%
L REQ	100	FT	L REQ	141	FT
L PROV	100	FT	L PROV	150	FT
Q2	2.86	CFS	Q2	3.57	CFS
V2	1.75	FT\S	V2	1.45	FT\S
D2	0.48	FT	D2	0.63	FT
Q10	3.70	CFS	Q10	4.63	CFS
V10	2.80	FT\S	V10	1.56	FT\S
D10	0.54	FT	D10	0.72	FT

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS
REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 31 of 64

ENGLISH

REVISIONS

REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

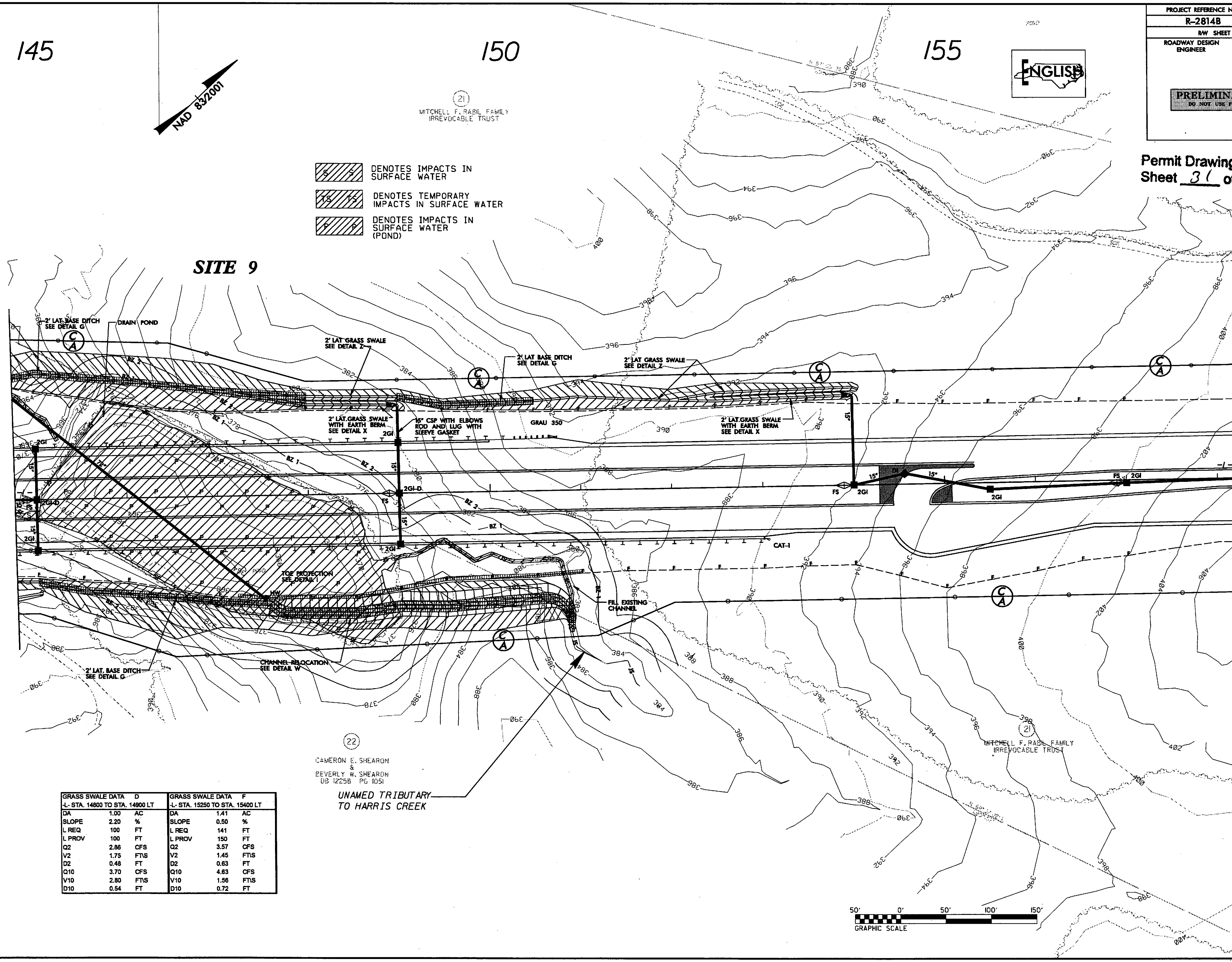
NAD 83/2001

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

SITE 9



GRASS SWALE DATA	D	
-L- STA. 14800 TO STA. 14900 LT		
DA	1.00	AC
SLOPE	2.20	%
L REQ	100	FT
L PROV	100	FT
Q2	2.86	CFS
V2	1.75	FT\S
D2	0.48	FT
Q10	3.70	CFS
V10	2.80	FT\S
D10	0.54	FT

GRASS SWALE DATA	F	
-L- STA. 15250 TO STA. 15400 LT		
DA	1.41	AC
SLOPE	0.50	%
L REQ	141	FT
L PROV	150	FT
Q2	3.57	CFS
V2	1.45	FT\S
D2	0.63	FT
Q10	4.63	CFS
V10	1.56	FT\S
D10	0.72	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	14A

SITE 9

ENGLISH

250 200 150 100 50 ℄ 50 100 150 200 250

400 390 385 380 375 370 365 360 355 350

72" RCP
℄ -L- 164+11
PGL ELEV.= 394.79'
SKEW = 39°20'03"

2:1 (NORMAL)

2:1 (NORMAL)

WSE_{50} 272.8

WSE_{100} 373.6

NWS 373.0

EXIST. DAM

EXIST. POND BOTTOM

PROPOSED INLET CHANNEL
S = 2.80%

PROPOSED INLET
ELEV. 365.9
PROPOSED STREAM BED 366.9
BURIED 1.0'

EXIST. LEFT TOP OF BANK

EXIST. RIGHT TOP OF BANK

EXIST. STREAMBED

ELEV. 360.4
PROPOSED 72" RCP
S = 3.08 %

PROPOSED OUTLET
ELEV. 354.2
PROPOSED STREAM BED 355.2
BURIED 1.0'

PROPOSED OUTLET CHANNEL
S = 0.90%

50' 0' 50'
HORIZONTAL SCALE

5' 0' 5'
VERTICAL SCALE

Permit Drawing
Sheet 22 of 64

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

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

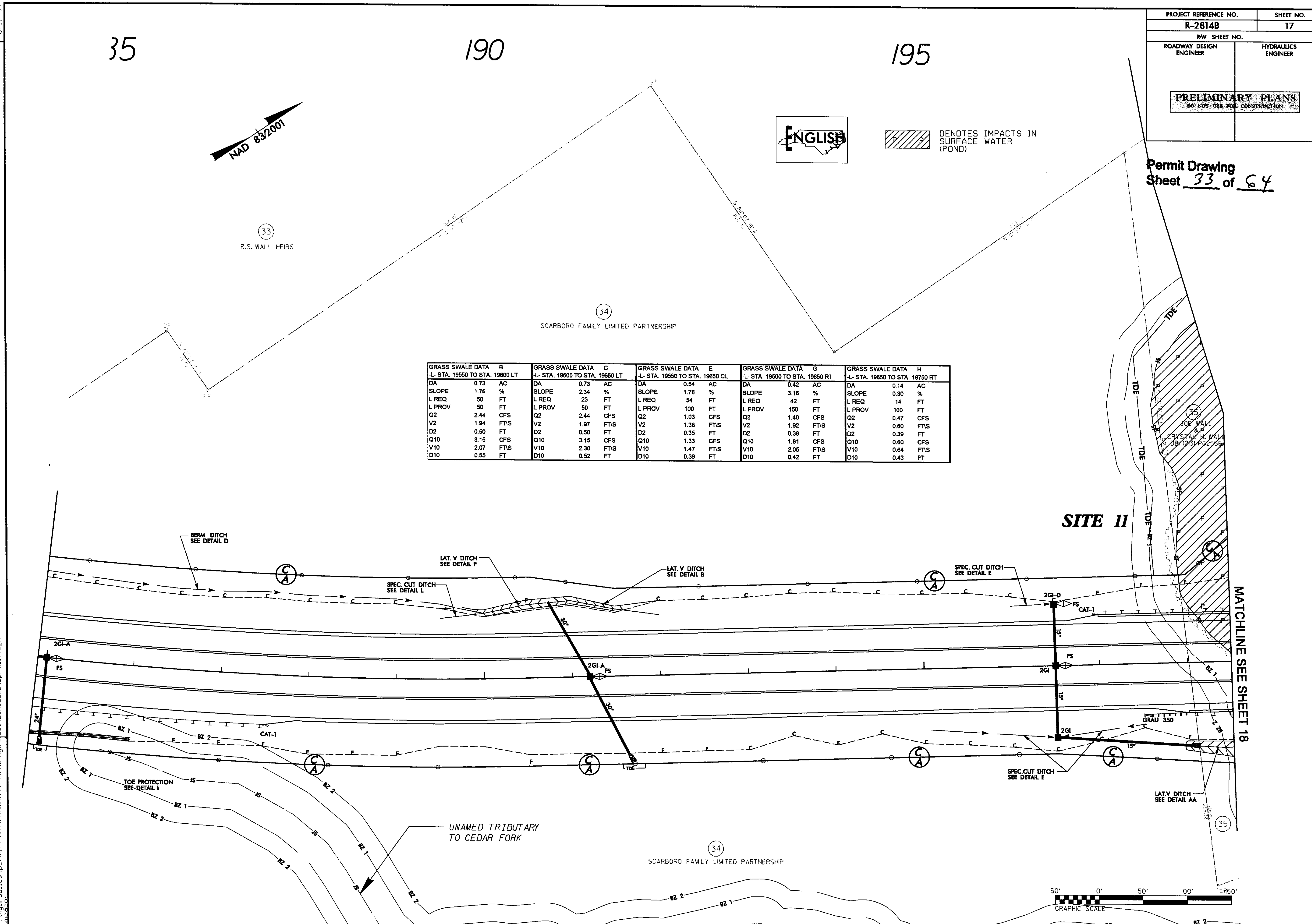
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 33 of 64

REVISIONS

REVISED NAMES ON PARCEL 35 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

GRASS SWALE DATA B -L- STA. 19550 TO STA. 19600 LT			GRASS SWALE DATA C -L- STA. 19600 TO STA. 19650 LT			GRASS SWALE DATA E -L- STA. 19550 TO STA. 19650 CL			GRASS SWALE DATA G -L- STA. 19500 TO STA. 19650 RT			GRASS SWALE DATA H -L- STA. 19650 TO STA. 19750 RT		
DA	0.73	AC	DA	0.73	AC	DA	0.54	AC	DA	0.42	AC	DA	0.14	AC
SLOPE	1.76	%	SLOPE	2.34	%	SLOPE	1.78	%	SLOPE	3.16	%	SLOPE	0.30	%
L REQ	50	FT	L REQ	23	FT	L REQ	54	FT	L REQ	42	FT	L REQ	14	FT
L PROV	50	FT	L PROV	50	FT	L PROV	100	FT	L PROV	150	FT	L PROV	100	FT
Q2	2.44	CFS	Q2	2.44	CFS	Q2	1.03	CFS	Q2	1.40	CFS	Q2	0.47	CFS
V2	1.94	FT\S	V2	1.97	FT\S	V2	1.38	FT\S	V2	1.92	FT\S	V2	0.60	FT\S
D2	0.50	FT	D2	0.50	FT	D2	0.35	FT	D2	0.38	FT	D2	0.39	FT
Q10	3.15	CFS	Q10	3.15	CFS	Q10	1.33	CFS	Q10	1.81	CFS	Q10	0.60	CFS
V10	2.07	FT\S	V10	2.30	FT\S	V10	1.47	FT\S	V10	2.05	FT\S	V10	0.64	FT\S
D10	0.55	FT	D10	0.52	FT	D10	0.39	FT	D10	0.42	FT	D10	0.43	FT



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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 34 of 64

8/17/99

REVISIONS
REVISED NAMES ON PARCEL 35 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

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35 190 195

NAD 83/2001

ENGLISH

DENOTES IMPACTS IN SURFACE WATER (POND)

(33) R.S. WALL HEIRS

(34) SCARBORO FAMILY LIMITED PARTNERSHIP

GRASS SWALE DATA -L- STA. 19550 TO STA. 19600 LT	B	
DA	0.73	AC
SLOPE	1.76	%
L REQ	50	FT
L PROV	50	FT
Q2	2.44	CFS
V2	1.94	FT\S
D2	0.50	FT
Q10	3.15	CFS
V10	2.07	FT\S
D10	0.55	FT

GRASS SWALE DATA -L- STA. 19600 TO STA. 19650 LT	C	
DA	0.73	AC
SLOPE	2.34	%
L REQ	23	FT
L PROV	50	FT
Q2	2.44	CFS
V2	1.97	FT\S
D2	0.50	FT
Q10	3.15	CFS
V10	2.30	FT\S
D10	0.52	FT

GRASS SWALE DATA -L- STA. 19550 TO STA. 19650 CL	E	
DA	0.54	AC
SLOPE	1.78	%
L REQ	54	FT
L PROV	100	FT
Q2	1.03	CFS
V2	1.38	FT\S
D2	0.35	FT
Q10	1.33	CFS
V10	1.47	FT\S
D10	0.39	FT

GRASS SWALE DATA -L- STA. 19500 TO STA. 19650 RT	G	
DA	0.42	AC
SLOPE	3.16	%
L REQ	42	FT
L PROV	150	FT
Q2	1.40	CFS
V2	1.92	FT\S
D2	0.38	FT
Q10	1.81	CFS
V10	2.05	FT\S
D10	0.42	FT

GRASS SWALE DATA -L- STA. 19650 TO STA. 19750 RT	H	
DA	0.14	AC
SLOPE	0.30	%
L REQ	14	FT
L PROV	100	FT
Q2	0.47	CFS
V2	0.60	FT\S
D2	0.39	FT
Q10	0.60	CFS
V10	0.64	FT\S
D10	0.43	FT

SITE 11

BERM DITCH SEE DETAIL D
LAT. V DITCH SEE DETAIL F
LAT. V DITCH SEE DETAIL B
SPEC. CUT DITCH SEE DETAIL C
SPEC. CUT DITCH SEE DETAIL E
2GI-A
2GI-D
2GI
CAT-1
TOE PROTECTION SEE DETAIL I
SPEC.CUT DITCH SEE DETAIL E
LAT.V DITCH SEE DETAIL AA
TDE
BZ 1
BZ 2
JS
FS

UNAMED TRIBUTARY TO CEDAR FORK

SCARBORO FAMILY LIMITED PARTNERSHIP

GRAPHIC SCALE 50' 0' 50' 100' 150'

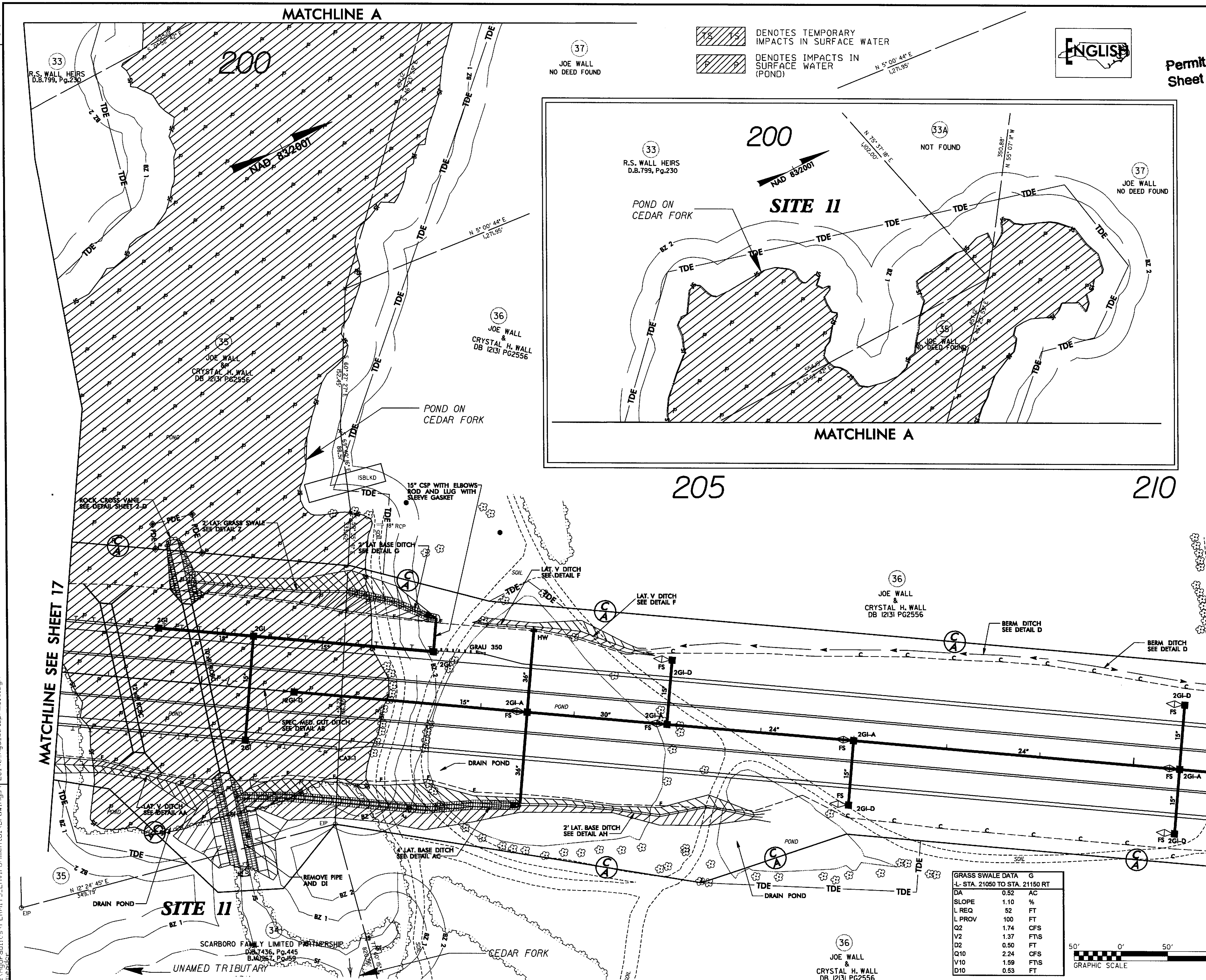
MATCHLINE SEE SHEET 18

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Permit Drawing Sheet 35 of 64

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
REVISED NAMES ON PARCELS 35 AND 36 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



GRASS SWALE DATA B		
-L- STA. 19980 TO STA. 20150 LT		
DA	0.75	AC
SLOPE	0.40	%
L REQ	75	FT
L PROV	170	FT
Q2	3.22	CFS
V2	1.30	FT\S
D2	0.63	FT
Q10	4.16	CFS
V10	1.39	FT\S
D10	0.72	FT

GRASS SWALE DATA D		
-L- STA. 20500 TO STA. 20600 LT		
DA	0.88	AC
SLOPE	1.10	%
L REQ	88	FT
L PROV	100	FT
Q2	2.94	CFS
V2	1.70	FT\S
D2	0.59	FT
Q10	3.80	CFS
V10	1.82	FT\S
D10	0.65	FT

GRASS SWALE DATA E		
-L- STA. 20700 TO STA. 20800 RT		
DA	0.51	AC
SLOPE	1.10	%
L REQ	51	FT
L PROV	100	FT
Q2	1.70	CFS
V2	1.36	FT\S
D2	0.50	FT
Q10	2.20	CFS
V10	1.58	FT\S
D10	0.53	FT

GRASS SWALE DATA F		
-L- STA. 21050 TO STA. 21150 LT		
DA	0.44	AC
SLOPE	1.10	%
L REQ	44	FT
L PROV	100	FT
Q2	1.47	CFS
V2	1.31	FT\S
D2	0.47	FT
Q10	1.90	CFS
V10	1.53	FT\S
D10	0.50	FT

GRASS SWALE DATA G		
-L- STA. 21050 TO STA. 21150 RT		
DA	0.52	AC
SLOPE	1.10	%
L REQ	52	FT
L PROV	100	FT
Q2	1.74	CFS
V2	1.37	FT\S
D2	0.50	FT
Q10	2.24	CFS
V10	1.59	FT\S
D10	0.53	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	18
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

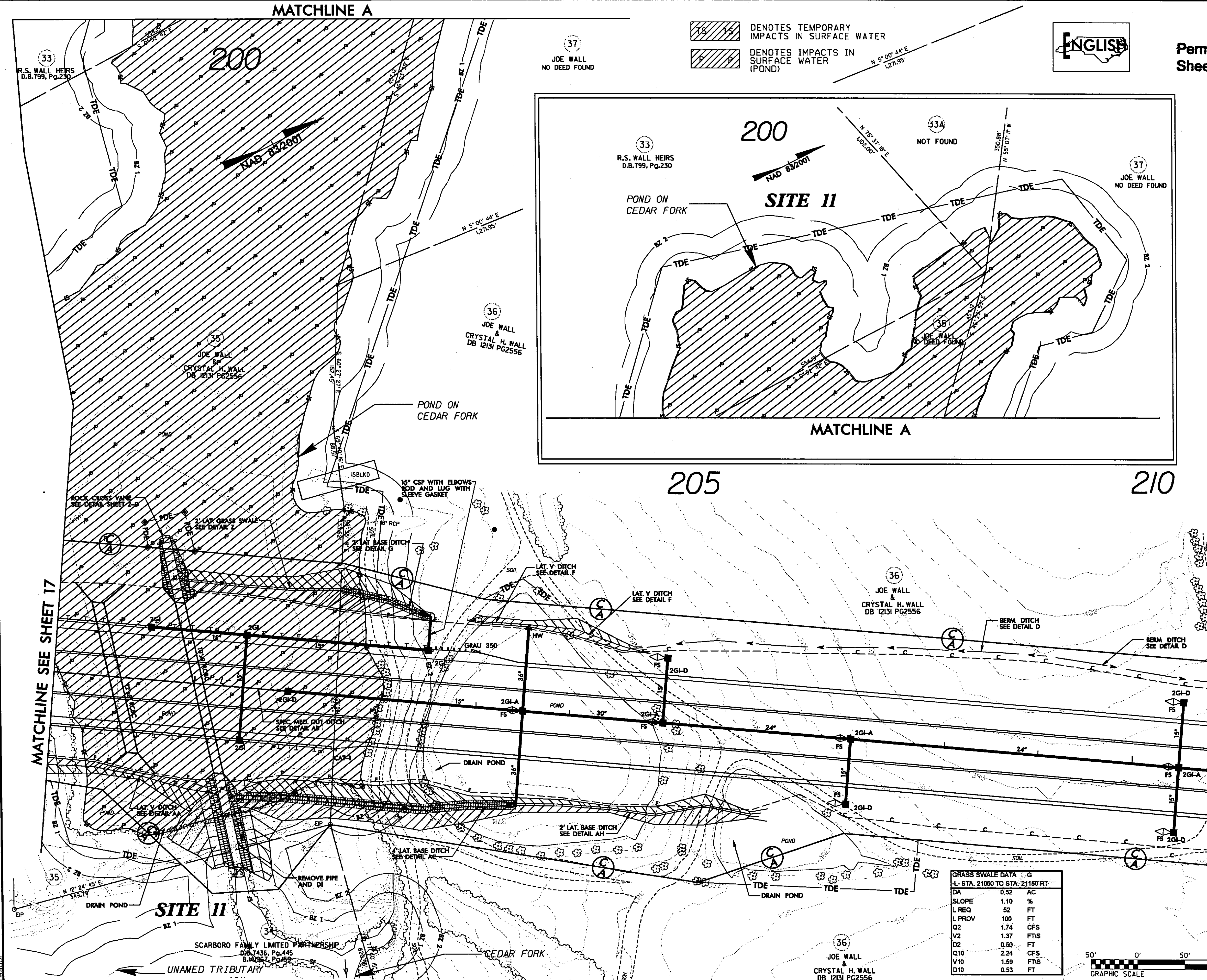
Permit Drawing
Sheet 36 of 64

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
REVISED NAMES ON PARCELS 35 AND 36 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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



GRASS SWALE DATA	B	
-L- STA. 19980 TO STA. 20150 LT		
DA	0.75	AC
SLOPE	0.40	%
L REQ	75	FT
L PROV	170	FT
Q2	3.22	CFS
V2	1.30	FT\S
D2	0.63	FT
Q10	4.16	CFS
V10	1.39	FT\S
D10	0.72	FT

GRASS SWALE DATA	D	
-L- STA. 20500 TO STA. 20600 LT		
DA	0.88	AC
SLOPE	1.10	%
L REQ	88	FT
L PROV	100	FT
Q2	2.94	CFS
V2	1.70	FT\S
D2	0.59	FT
Q10	3.80	CFS
V10	1.82	FT\S
D10	0.65	FT

GRASS SWALE DATA	E	
-L- STA. 20700 TO STA. 20800 RT		
DA	0.51	AC
SLOPE	1.10	%
L REQ	51	FT
L PROV	100	FT
Q2	1.70	CFS
V2	1.36	FT\S
D2	0.50	FT
Q10	2.20	CFS
V10	1.58	FT\S
D10	0.53	FT

GRASS SWALE DATA	F	
-L- STA. 21050 TO STA. 21150 LT		
DA	0.44	AC
SLOPE	1.10	%
L REQ	44	FT
L PROV	100	FT
Q2	1.47	CFS
V2	1.31	FT\S
D2	0.47	FT
Q10	1.90	CFS
V10	1.53	FT\S
D10	0.50	FT

GRASS SWALE DATA	G	
-L- STA. 21050 TO STA. 21150 RT		
DA	0.52	AC
SLOPE	1.10	%
L REQ	52	FT
L PROV	100	FT
Q2	1.74	CFS
V2	1.37	FT\S
D2	0.50	FT
Q10	2.24	CFS
V10	1.59	FT\S
D10	0.53	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	18A

SITE 11

ENGLISH

Permit Drawing
Sheet 37 of 64

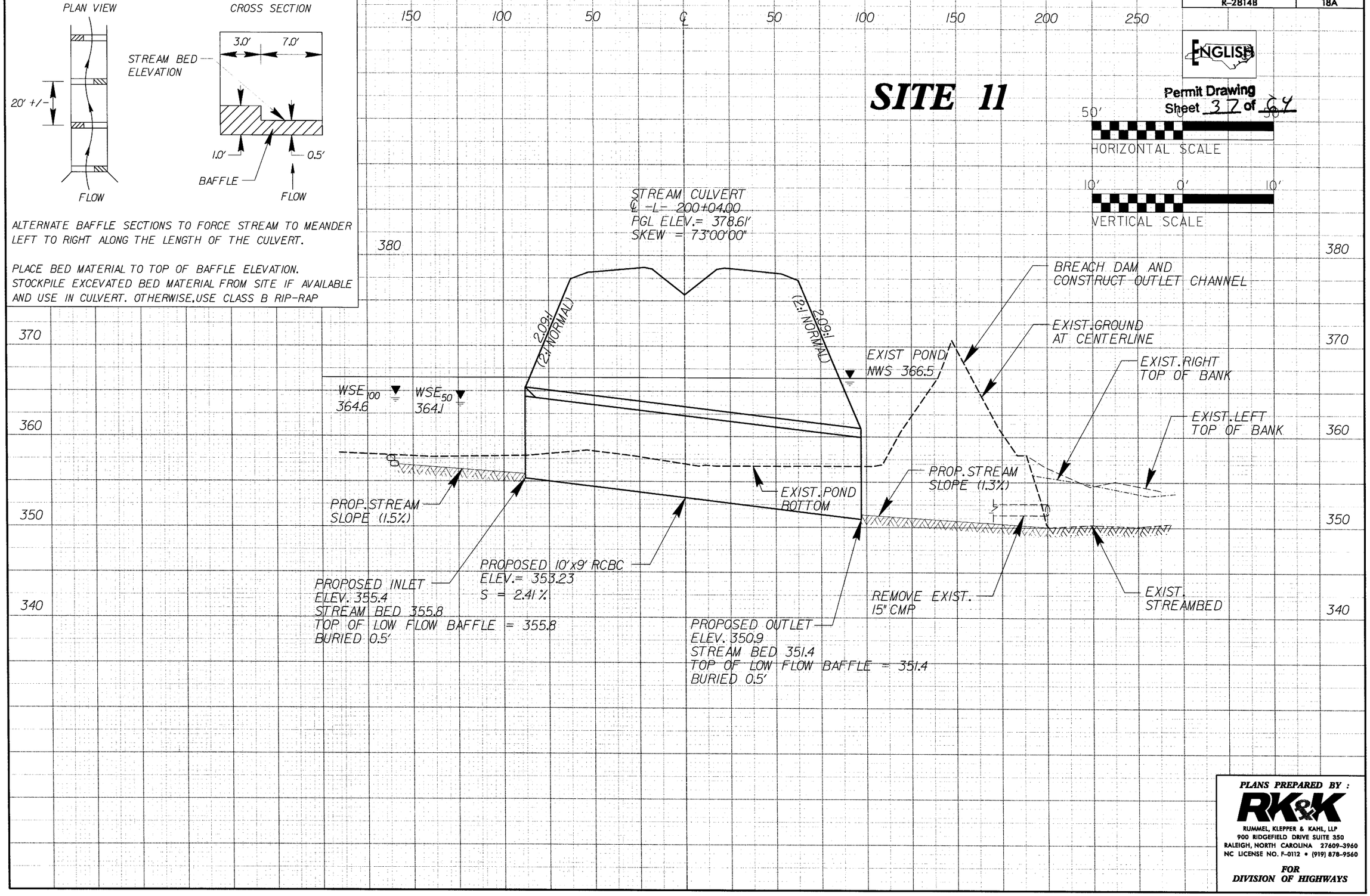
50' 0 50'
HORIZONTAL SCALE

10' 0' 10'
VERTICAL SCALE

BAFFLE DETAILS

ALTERNATE BAFFLE SECTIONS TO FORCE STREAM TO MEANDER LEFT TO RIGHT ALONG THE LENGTH OF THE CULVERT.

PLACE BED MATERIAL TO TOP OF BAFFLE ELEVATION. STOCKPILE EXCEVATED BED MATERIAL FROM SITE IF AVAILABLE AND USE IN CULVERT. OTHERWISE,USE CLASS B RIP-RAP



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

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 38 of 64

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220

NAD 83/2001

(36) JOE WALL & CRYSTAL H. WALL DB 12131 PG2556

(37) JOE WALL

(38) BOBBIE JOE WALL & VICKIE D. WALL

DENOTES IMPACTS IN SURFACE WATER

GRASS SWALE DATA -L- STA. 21350 TO STA. 21450 LT		H
DA	0.49	AC
SLOPE	1.10	%
L REQ	49	FT
L PROV	100	FT
Q2	1.64	CFS
V2	1.35	FTS
D2	0.49	FT
Q10	2.11	CFS
V10	1.57	FTS
D10	0.52	FT

SITE 12

24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

BERM DITCH SEE DETAIL D

BDO

FS 2GI

24"

FS 2GI-A

-L- 24"

BERM DITCH SEE DETAIL D

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL AD

2' LAT. BASE DITCH SEE DETAIL V

HW

15"

FS 2GI-D

DI 15" -L- 15"

2GI-D

BZ 1

BZ 2

PDE

UNAMED TRIBUTARY TO CEDAR FORK

+00-L-
100',115'.

(36) JOE WALL & CRYSTAL H. WALL DB 12131 PG2556

(39) THE SBJ GROWTH, L.P.

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

January 11,2010 Adjusted R/W CA lines,R/W markers and the proposed woven wire fence on parcel no.39,NWA.

8/17/09

02/22/10 09:56:34
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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 39 of 64

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220

NAD 83/2001

DENOTES IMPACTS IN SURFACE WATER

GRASS SWALE DATA -L- STA. 21350 TO STA. 21450 LT	H	
DA	0.49	AC
SLOPE	1.10	%
L REQ	49	FT
L PROV	100	FT
Q2	1.64	CFS
V2	1.35	FTS
D2	0.49	FT
Q10	2.11	CFS
V10	1.67	FTS
D10	0.52	FT

SITE 12

(36) JOE WALL & CRYSTAL H. WALL DB 1213I PG2556

(37) JOE WALL

(38) BOBBIE JOE WALL & VICKIE D. WALL

(39) THE SBJ GROWTH, L.P.

24" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

BERM DITCH SEE DETAIL D

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL AD

BDD

FS 2GI

FS 2GI-A

FS 2GI-D

DI 15" -L- 15" 2GI-D

HW

PDE

BZ 1

BZ 2

UNAMED TRIBUTARY TO CEDAR FORK

+00-L-
100.115'

GRAPHIC SCALE 50' 0' 50' 100' 150'

REVISIONS

January 11,2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no.39.NWA.

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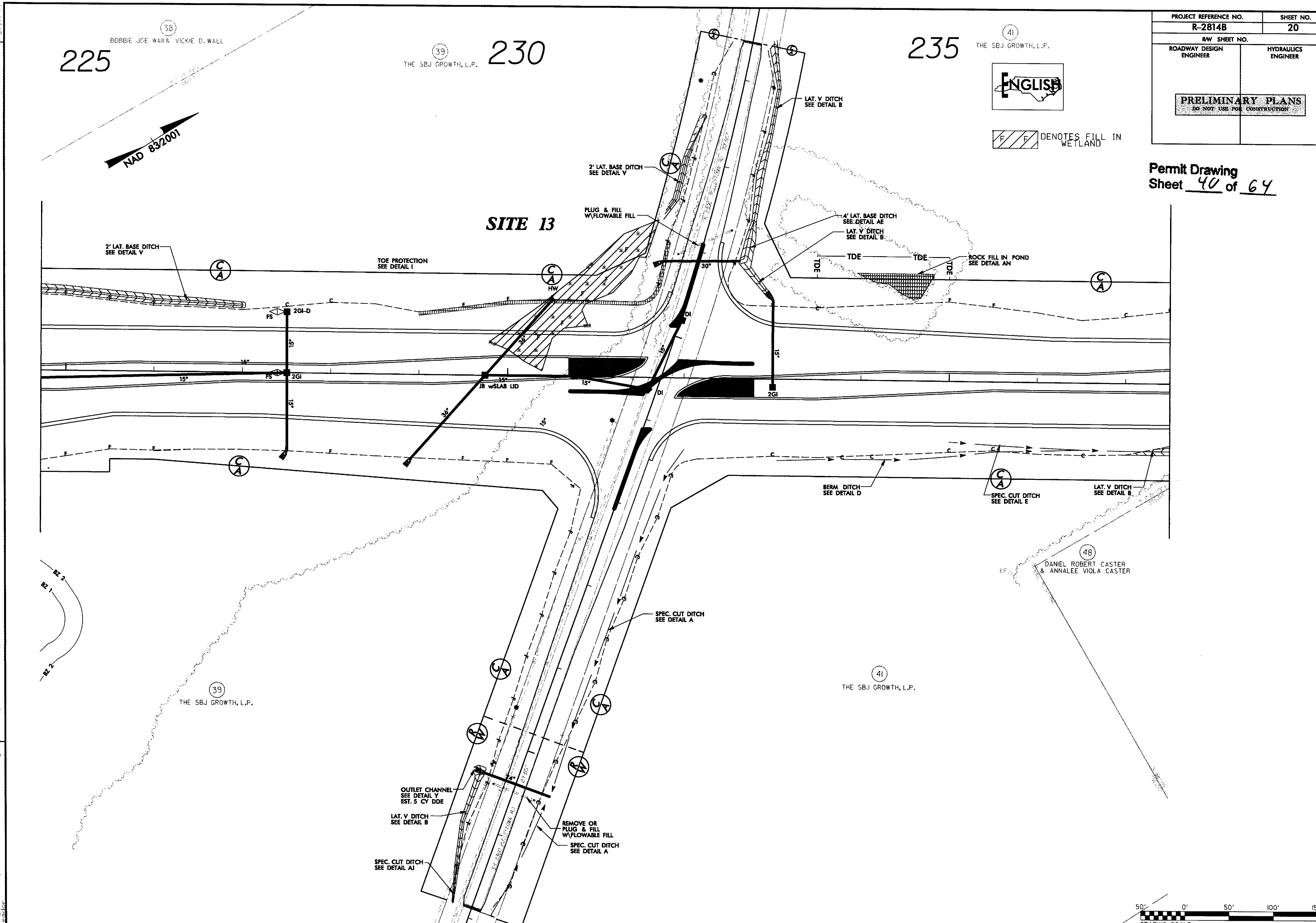
mwade

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 40 of 64



225
230
235
BOBBIE JOE WALL & VICKIE D. WALL
THE SBJ GROWTH, L.P.
NAD 83/2001
ENGLISH
DENOTES FILL IN WETLAND
SITE 13
2' LAT. BASE DITCH SEE DETAIL V
TOE PROTECTION SEE DETAIL I
PLUG & FILL W\FLOWABLE FILL
LAT. V DITCH SEE DETAIL B
4' LAT. BASE DITCH SEE DETAIL AE
ROCK FILL IN POND SEE DETAIL AN
TDE
2GI-D
2GI
FS
HW
DI
JB w/SLAB LID
BERM DITCH SEE DETAIL D
SPEC. CUT DITCH SEE DETAIL E
SPEC. CUT DITCH SEE DETAIL A
DANIEL ROBERT CASTER & ANNALEE VIOLA CASTER
OUTLET CHANNEL SEE DETAIL Y EST. 5 CY DDE
REMOVE OR PLUG & FILL W\FLOWABLE FILL
SPEC. CUT DITCH SEE DETAIL AJ
GRAPHIC SCALE

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no. 39, NNA.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 41 of 64

ENGLISH

F F DENOTES FILL IN WETLAND

225

230

235

38 BOBBIE JOE WALL & VICKIE D. WALL

39 THE SBJ GROWTH, L.P.

41 THE SBJ GROWTH, L.P.

48 DANIEL ROBERT CASTER & ANALEE VIOLA CASTER

NAD 83/2001

SITE 13

2' LAT. BASE DITCH SEE DETAIL V

TOE PROTECTION SEE DETAIL I

PLUG & FILL W/FLOWABLE FILL

LAT. Y DITCH SEE DETAIL B

2' LAT. BASE DITCH SEE DETAIL V

4' LAT. BASE DITCH SEE DETAIL AR

LAT. Y DITCH SEE DETAIL B

ROCK FILL IN POND SEE DETAIL AN

TDE

2GI-D

2GI

JB w/SLAB LID

BERM DITCH SEE DETAIL D

SPEC. CUT DITCH SEE DETAIL E

LAT. Y DITCH SEE DETAIL B

SPEC. CUT DITCH SEE DETAIL A

OUTLET CHANNEL SEE DETAIL Y EST. 5 CY DDE

LAT. Y DITCH SEE DETAIL B

REMOVE OR PLUG & FILL W/FLOWABLE FILL

SPEC. CUT DITCH SEE DETAIL A

SPEC. CUT DITCH SEE DETAIL A3

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

January 11,2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no.39.NWA.

8/17/99

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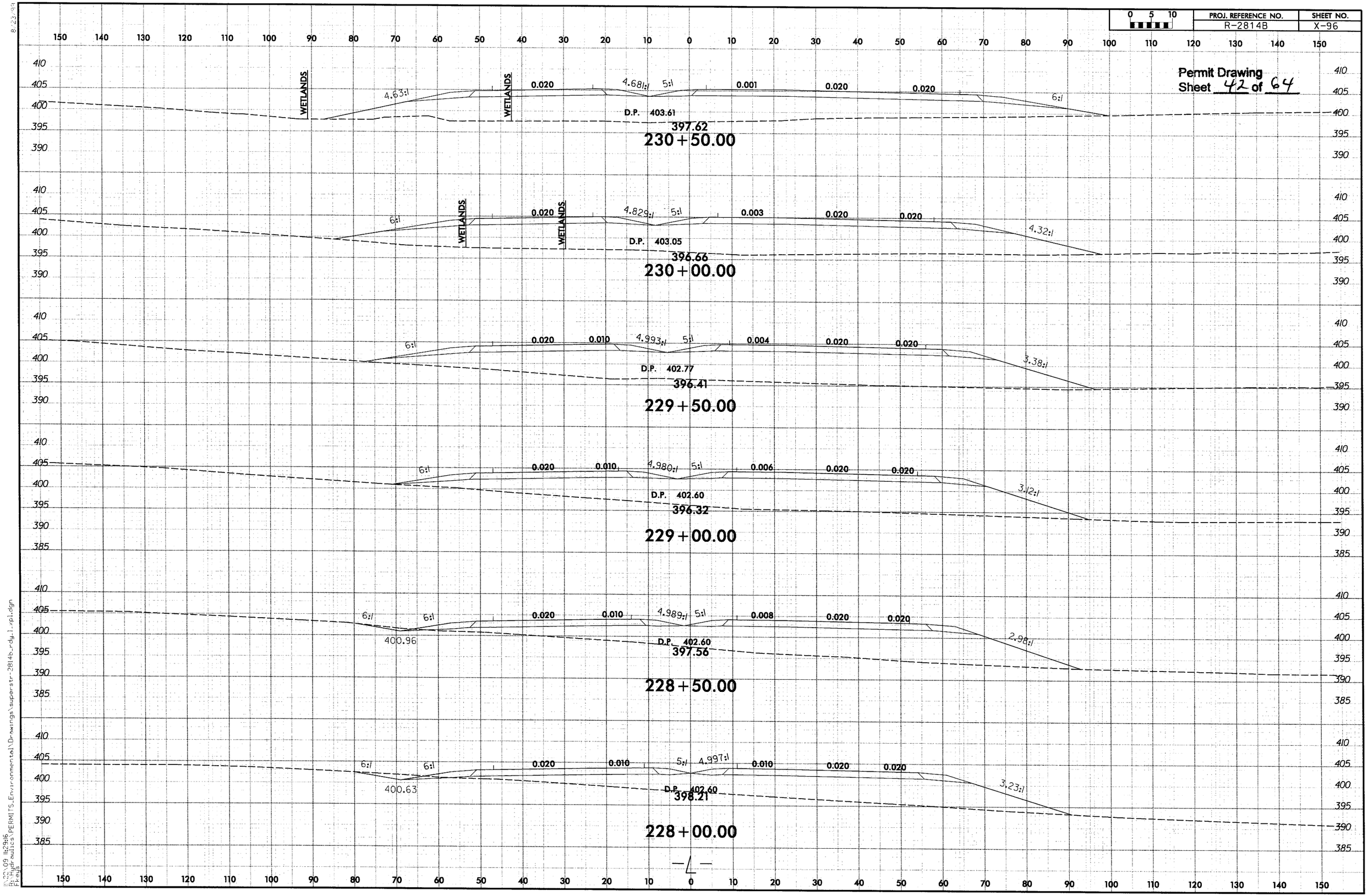
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2814B	X-96

Permit Drawing
Sheet 42 of 64



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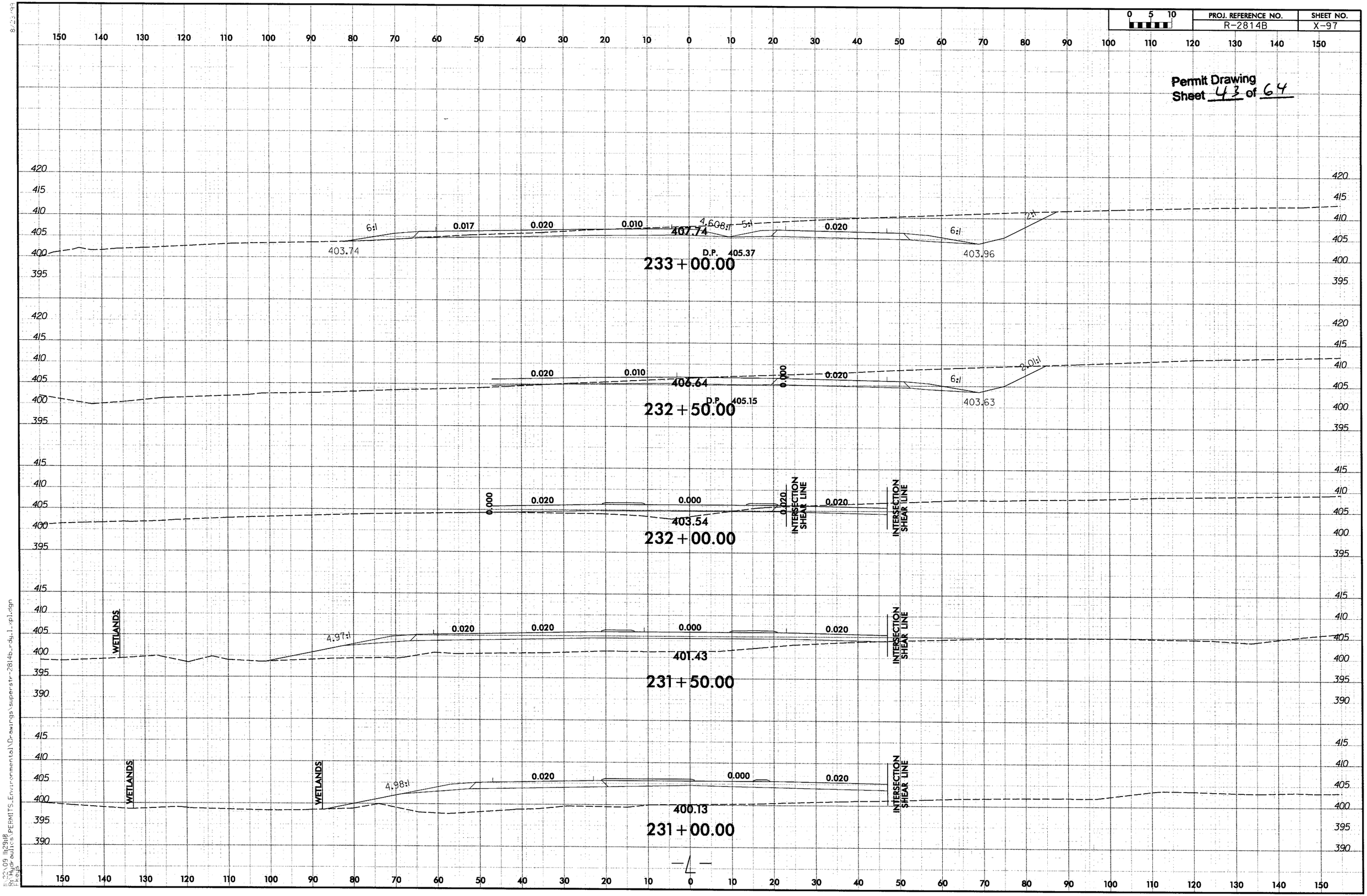
PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-97

Permit Drawing
Sheet 43 of 64



PROJECT REFERENCE NO.	SHEET NO.
R-2814B	21
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

Permit Drawing
Sheet 44 of 64

240

245

250

41
THE SBJ GROWTH, L.P.

49
ROBERT G. BARTHOLOMEW
& JOYCE BARTHOLOMEW

50
RICHARD C. BARTHOLOMEW
& SHIRLEY B. BARTHOLOMEW

51

48
DANIEL ROBERT CASTER
& ANNALEE VIOLA CASTER

NAD 83/2001

F/F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

E/E DENOTES EXCAVATION IN WETLAND

*** NOTE: THE INLET INVERT OF THE PROPOSED PIPE AT -L- 246+87 SHOULD BE SET TO 385.3 TO MAINTAIN NORMAL WATER LEVEL IN THE EXISTING WETLAND. THE INLET INVERT OF THE PIPE SHOULD NOT BE FIELD ADJUSTED. DO NOT BURY OUTLET OF PIPE BELOW EXISTING GROUND.

SITE 14

180

SPEC. CUT DITCH SEE DETAIL E

TOE PROTECTION SEE DETAIL I

*** SEE NOTE

SPEC. CUT DITCH SEE DETAIL L

LAT. V DITCH SEE DETAIL F

CAT-1

GRAU 350

2GI-D

2GI

15"

D1

FS

LAT. V DITCH SEE DETAIL B

2' LAT. BASE DITCH SEE DETAIL V'

2' LAT. BASE DITCH SEE DETAIL V PLACE 5 TONS CLASS 'B' RIP RAP W\ 13 SY FF AT DITCH TERMINUS

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

PSH

SPEC. CUT DITCH SEE DETAIL L

BZ 1

BZ 2

ST

JS

DITCH DATA
QIO= 12.4 CFS
VIO=2.0 FT\S

PIPE OUTLET DATA
QIO= 48.0 CFS
VIO= 14.8 FT\S (PARTIAL PIPE)
VIO= 1.40 FT\S (END OF PAD)

PREFORMED SCOUR HOLE DATA
QIO= 4.55 CFS

POND ON UNAMED TRIBUTARY TO PERRY CREEK

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

REVISED PARCELS 49 AND 50 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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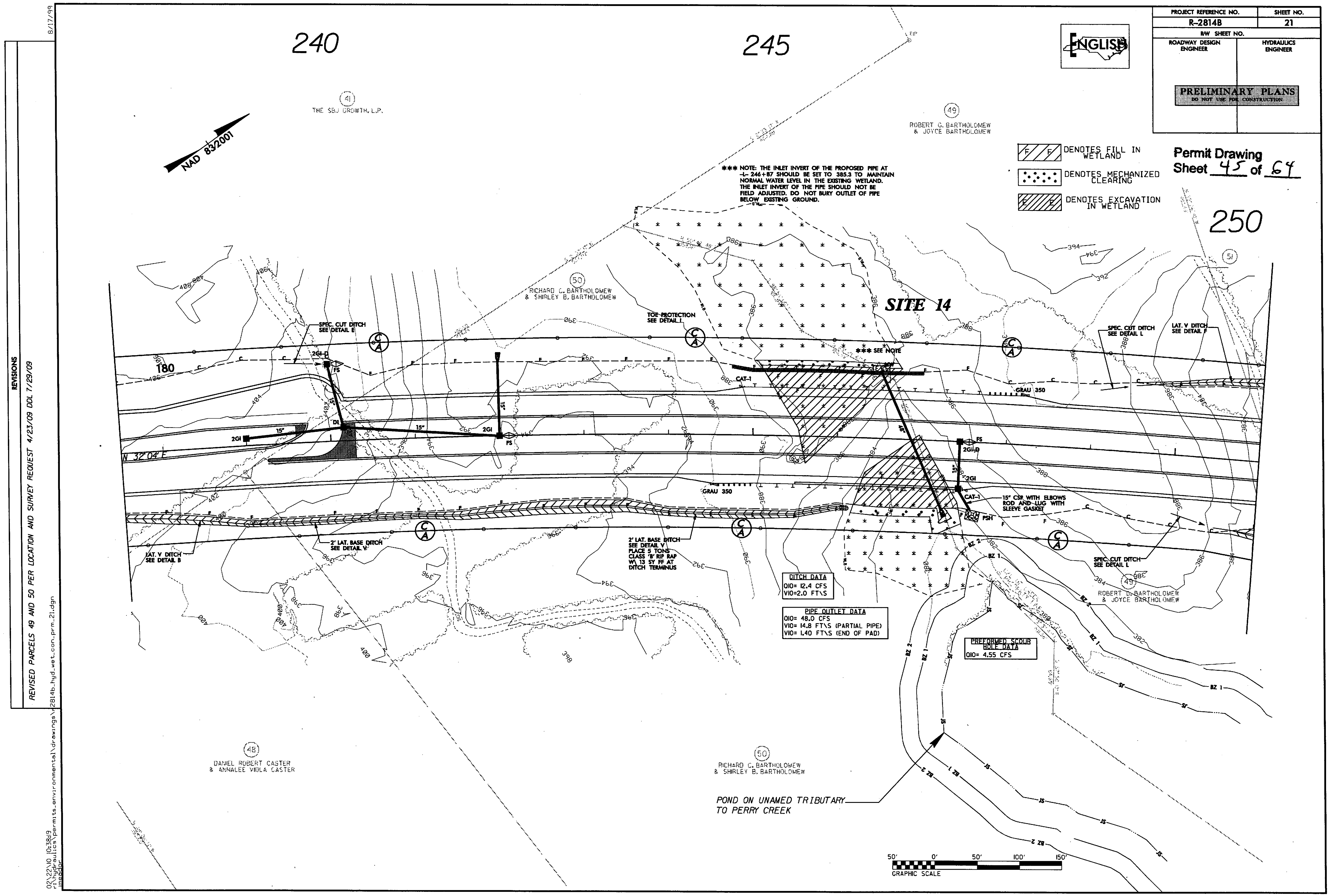

PROJECT REFERENCE NO. R-2814B
SHEET NO. 21
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 45 of 64
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES EXCAVATION IN WETLAND
*** NOTE: THE INLET INVERT OF THE PROPOSED PIPE AT -L- 246+87 SHOULD BE SET TO 385.3 TO MAINTAIN NORMAL WATER LEVEL IN THE EXISTING WETLAND. THE INLET INVERT OF THE PIPE SHOULD NOT BE FIELD ADJUSTED. DO NOT BURY OUTLET OF PIPE BELOW EXISTING GROUND.
240
245
250
SITE 14
NAD 83/2001
THE SBJ GROWTH, L.P.
ROBERT C. BARTHOLOMEW & JOYCE BARTHOLOMEW
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW
DANIEL ROBERT CASTER & ANNALEE VIOLA CASTER
SPEC. CUT DITCH SEE DETAIL E
TOE PROTECTION SEE DETAIL I
SPEC. CUT DITCH SEE DETAIL L
LAT. V DITCH SEE DETAIL F
LAT. V DITCH SEE DETAIL B
2' LAT. BASE DITCH SEE DETAIL V
2' LAT. BASE DITCH SEE DETAIL V PLACE 5 TONS CLASS 'B' RIP RAP W\ 13 SY FF AT DITCH TERMINUS
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
DITCH DATA
Q10= 12.4 CFS
V10=2.0 FT\S
PIPE OUTLET DATA
Q10= 48.0 CFS
V10= 14.8 FT\S (PARTIAL PIPE)
V10= 1.40 FT\S (END OF PAD)
PREFORMED SCOUR HOLE DATA
Q10= 4.55 CFS
POND ON UNAMED TRIBUTARY TO PERRY CREEK
GRAPHIC SCALE
REVISIONS
REVISED PARCELS 49 AND 50 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09
8/17/99

PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-101

Permit Drawing
Sheet 46 of 64

WETLANDS

0.020 | 6:1 | 5.53:1 | 0.020

2:1

D.P. 392.819

389.14

245+00.00

2.0

2:1 2:1

386.65

WETLANDS

3.62:1

0.020 | 6:1 | 5.53:1 | 0.020

D.P. 393.641

390.20

244+50.00

2.0

2:1 2:1

388.32

4.38:1

0.020 | 6:1 | 5.53:1 | 0.020

6:1

392.87

D.P. 394.262

244+00.00

2.0

2:1 2:1

390.00

4.17:1

0.020 | 6:1 | 5.53:1 | 0.020

6:1

393.19

D.P. 394.984

243+50.00

2.0

2:1 2:1

390.63

4.53:1

0.020 | 6:1 | 5.53:1 | 0.020

6:1

394.42

D.P. 395.705

243+00.00

2.0

2:1 2:1

391.26

3.81:1

0.020 | 6:1 | 5.53:1 | 0.020

6:1

394.35

D.P. 396.227

242+50.00

2.0

2:1 2:1

391.89

8/23/09

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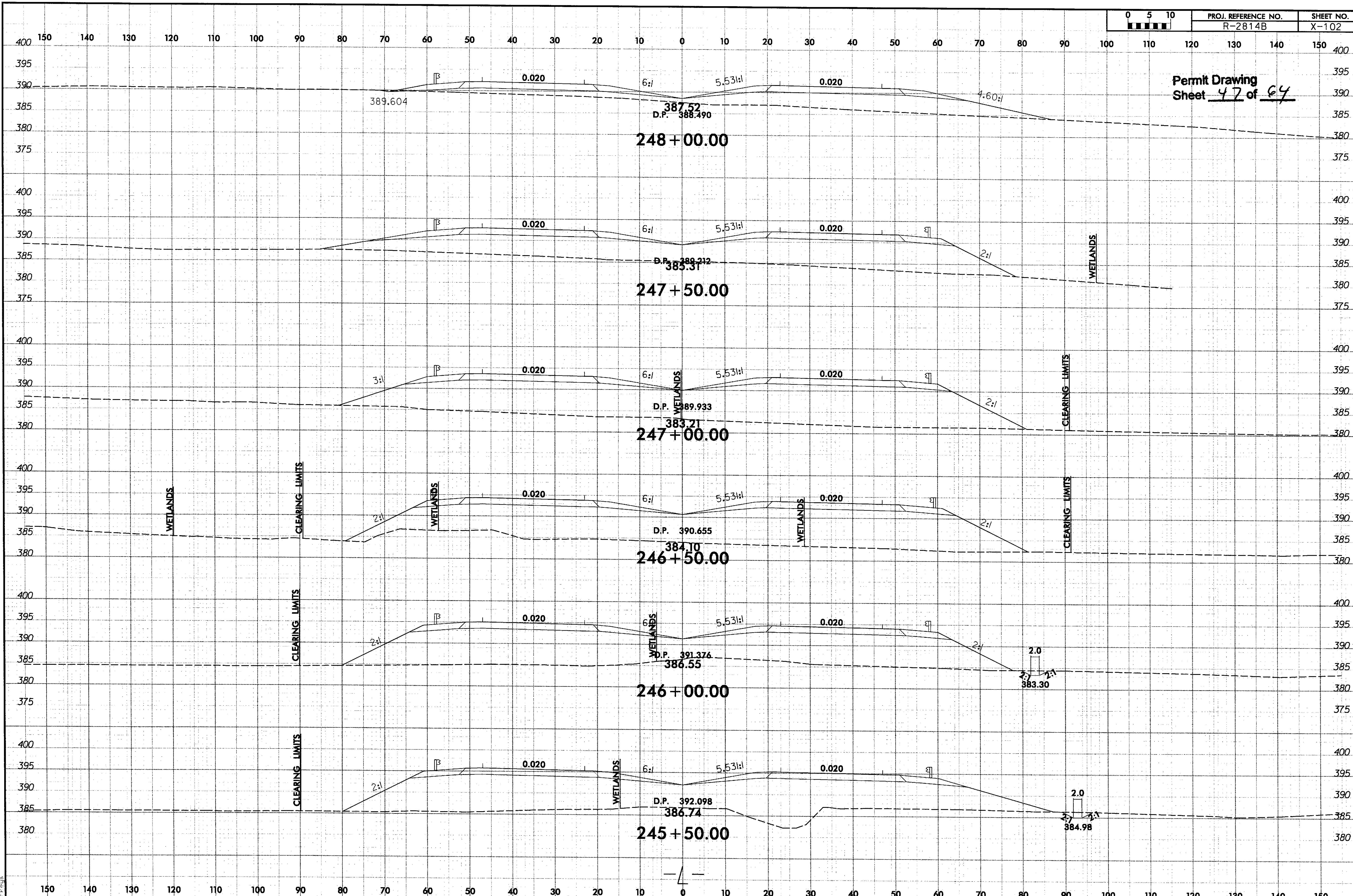
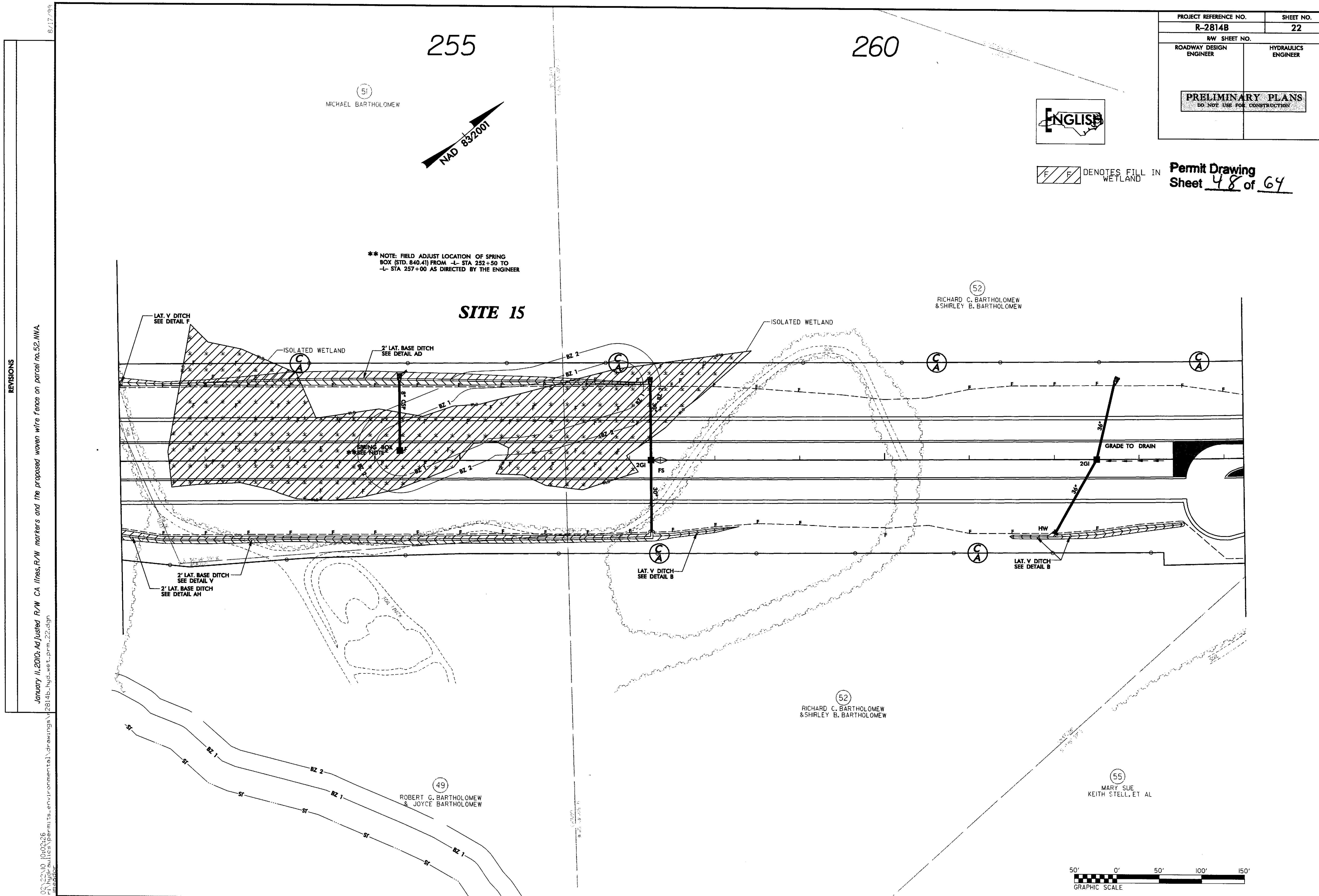


PROJ. REFERENCE NO. R-2814B
SHEET NO. X-102
0 5 10
Permit Drawing
Sheet 47 of 64
248+00.00
389.604
387.52
D.P. 388.490
6:1
5.531:1
4.60:1
0.020
247+50.00
D.P. 389.212
383.31
2:1
WETLANDS
247+00.00
3:1
D.P. 389.933
383.21
CLEARING LIMITS
246+50.00
D.P. 390.655
384.10
246+00.00
D.P. 391.376
386.55
2.0
383.30
245+50.00
D.P. 392.098
386.74
384.98



PROJECT REFERENCE NO.
R-2814B
SHEET NO.
22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ENGLISH
DENOTES FILL IN WETLAND
Permit Drawing
Sheet 48 of 64
255
260
MICHAEL BARTHOLOMEW
NAD 83/2001
** NOTE: FIELD ADJUST LOCATION OF SPRING BOX (STD. 840.41) FROM -L- STA 252+50 TO -L- STA 257+00 AS DIRECTED BY THE ENGINEER
SITE 15
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW
LAT. V DITCH SEE DETAIL F
ISOLATED WETLAND
2' LAT. BASE DITCH SEE DETAIL AD
ISOLATED WETLAND
SPRING BOX ** SEE NOTE
GRADE TO DRAIN
2GI
FS
HW
LAT. V DITCH SEE DETAIL B
LAT. V DITCH SEE DETAIL B
2' LAT. BASE DITCH SEE DETAIL V
2' LAT. BASE DITCH SEE DETAIL AH
ROBERT G. BARTHOLOMEW & JOYCE BARTHOLOMEW
MARY SUE KEITH STELL, ET AL
GRAPHIC SCALE
REVISIONS
January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no. 52, NNA.
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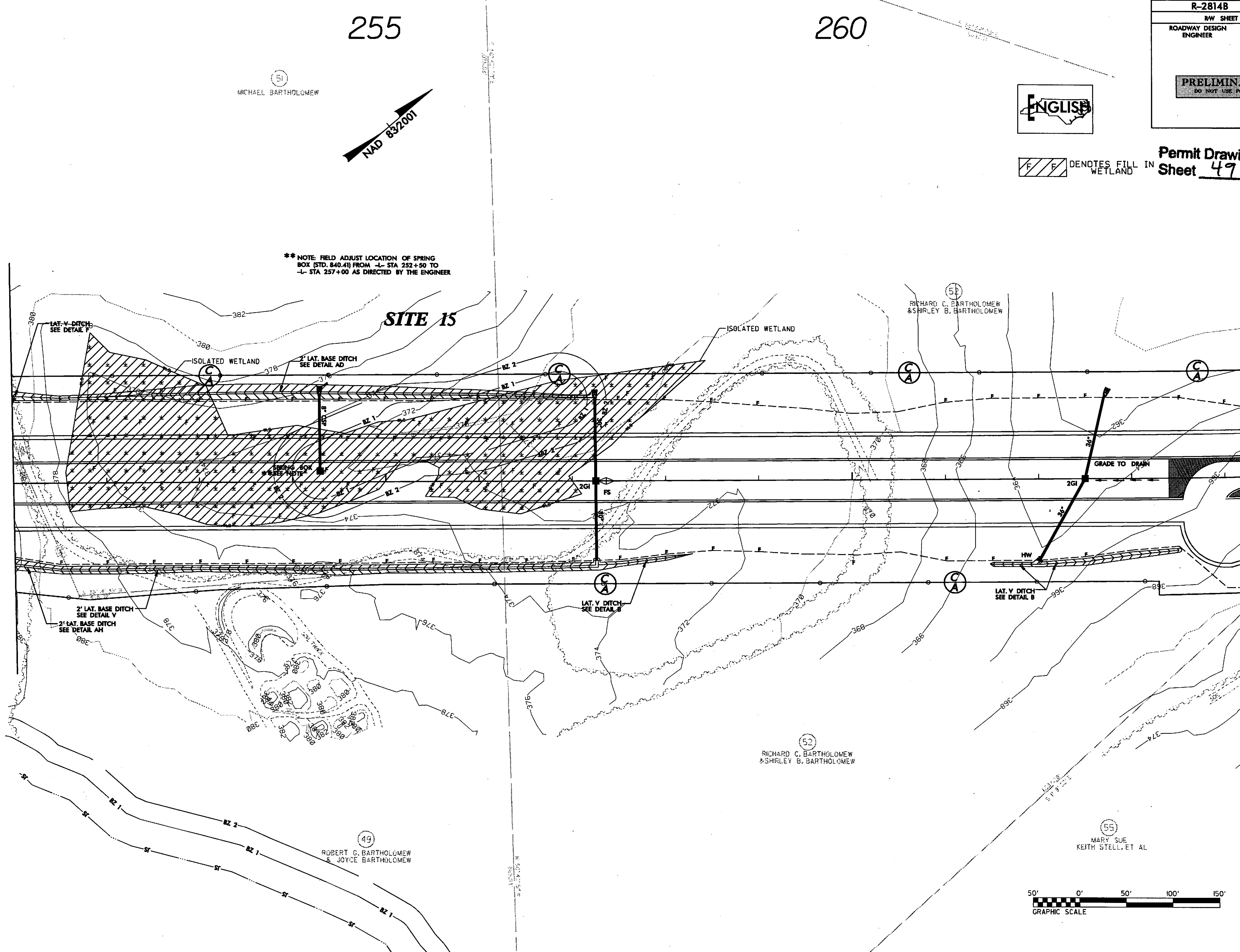
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	22
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

DENOTES FILL IN WETLAND

Permit Drawing
Sheet 49 of 64



255
260
NAD 83/2001
51
MICHAEL BARTHOLOMEW
** NOTE: FIELD ADJUST LOCATION OF SPRING BOX (STD. 840.41) FROM -L- STA 252+50 TO -L- STA 257+00 AS DIRECTED BY THE ENGINEER
SITE 15
LAT. V DITCH SEE DETAIL F
ISOLATED WETLAND
2' LAT. BASE DITCH SEE DETAIL AD
ISOLATED WETLAND
52
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW
SPRING BOX SEE NOTE
2GI
FS
GRADE TO DRAIN
HW
2' LAT. BASE DITCH SEE DETAIL V
2' LAT. BASE DITCH SEE DETAIL AH
LAT. V DITCH SEE DETAIL B
LAT. V DITCH SEE DETAIL B
52
RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW
49
ROBERT G. BARTHOLOMEW & JOYCE BARTHOLOMEW
55
MARY SUE KEITH STELL, ET AL
50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no.52.NNA.

8/17/99

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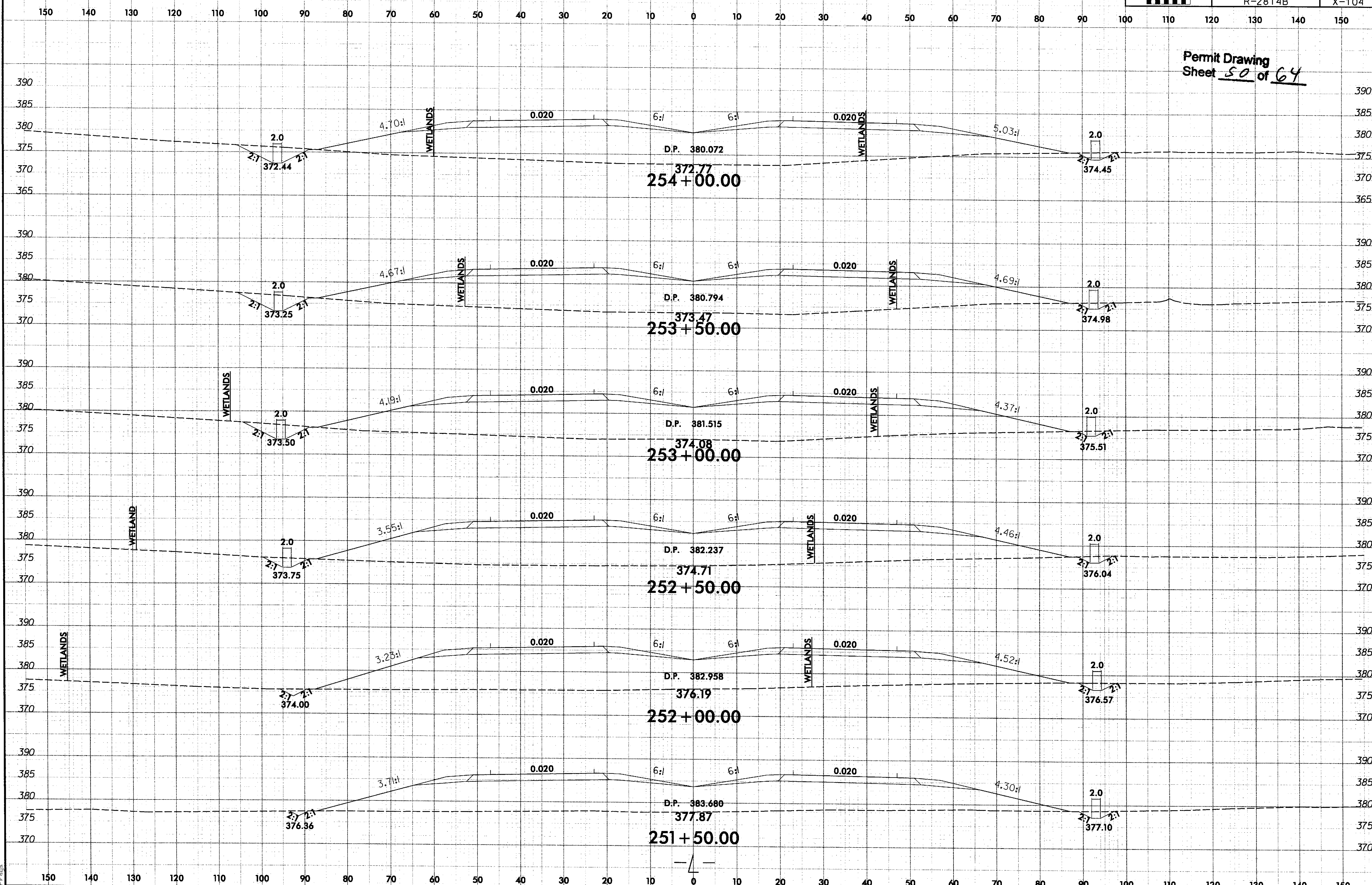
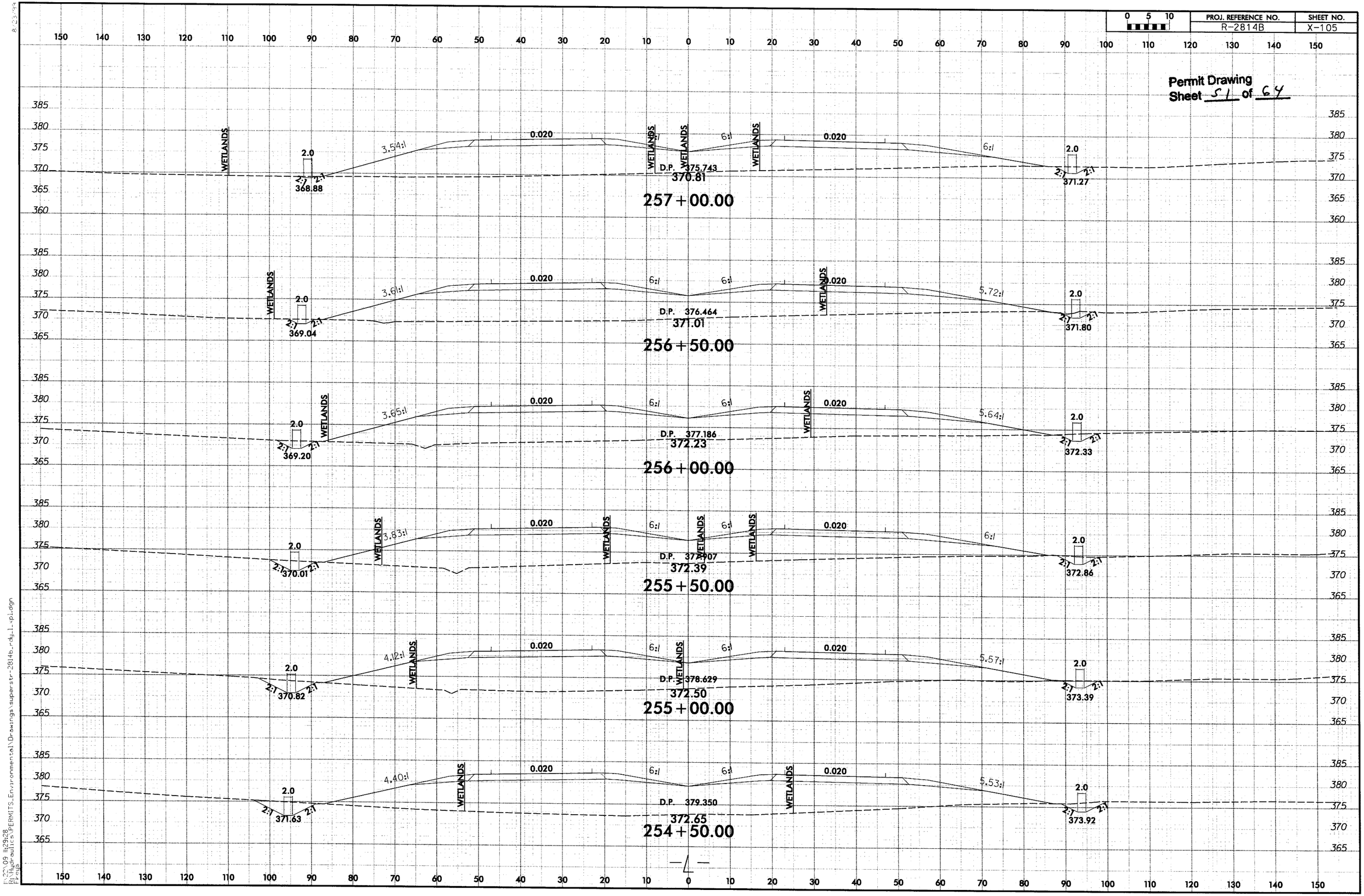
PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-104

Permit Drawing
Sheet 50 of 64

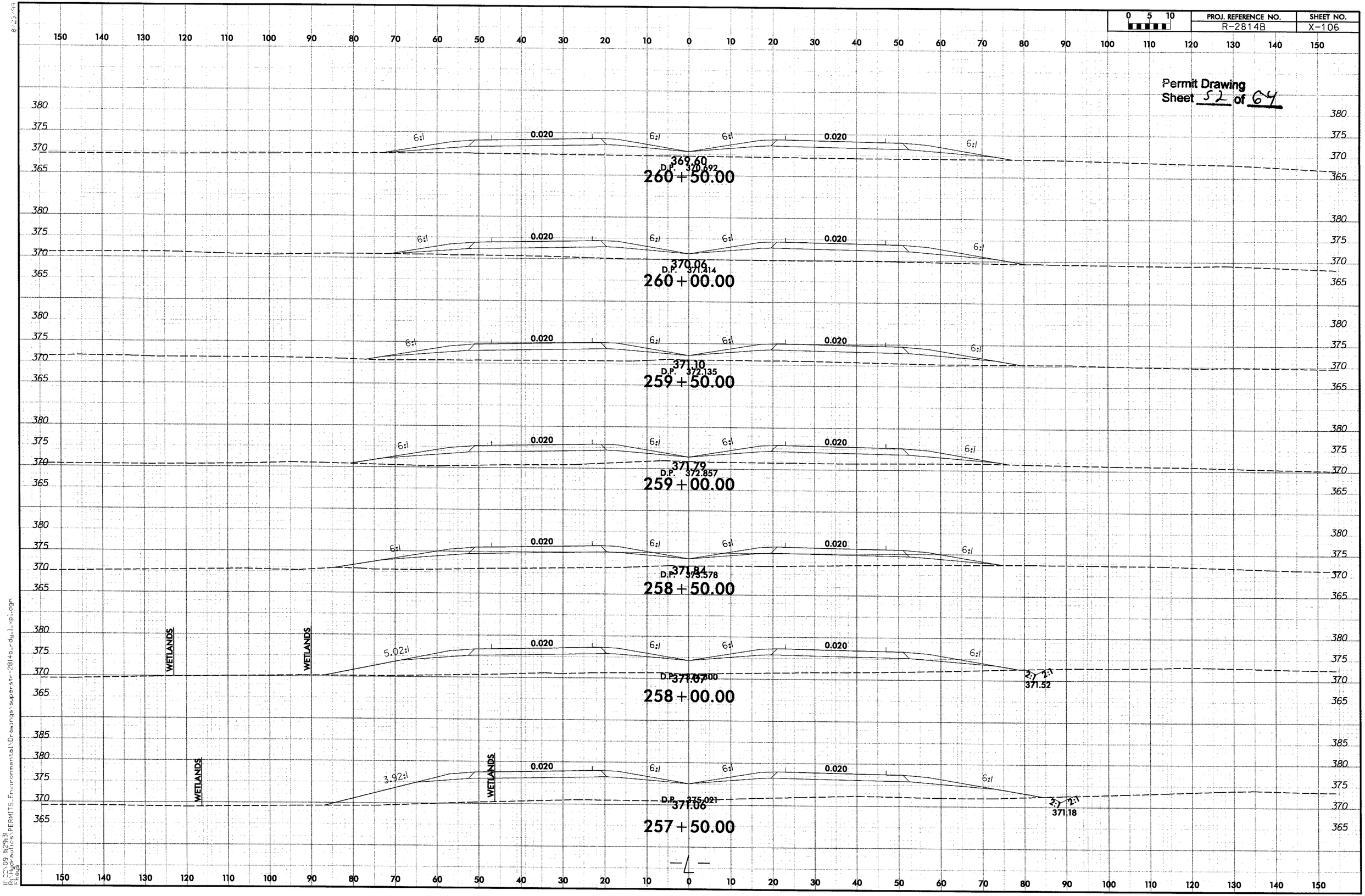


PROJ. REFERENCE NO.	SHEET NO.
R-2814B	X-105

Permit Drawing
Sheet 51 of 64



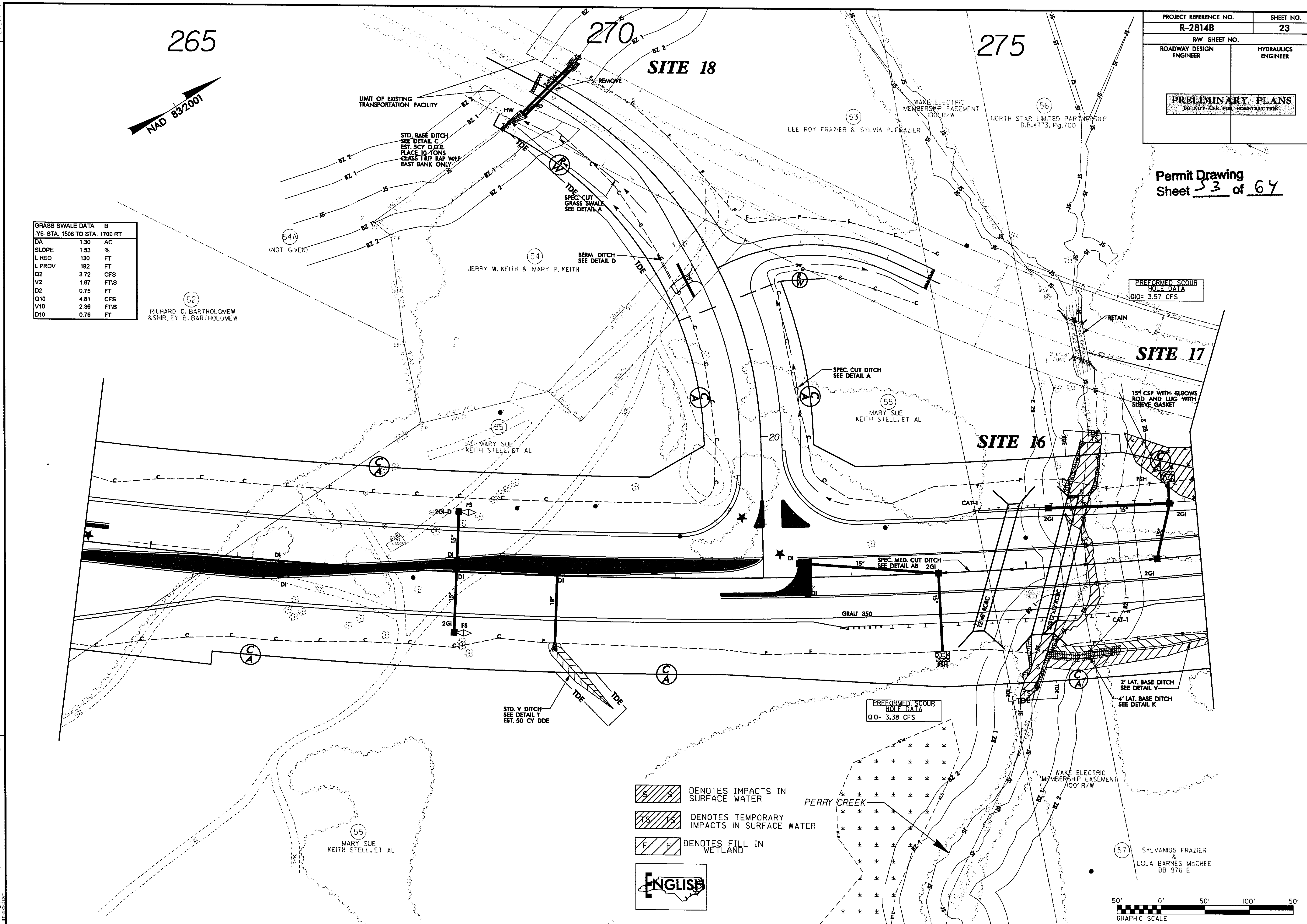
Permit Drawing
Sheet 52 of 64



PROJECT REFERENCE NO.	SHEET NO.
R-2814B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 53 of 64



265
270
275
SITE 18
SITE 17
SITE 16
NAD 83/2001
LIMIT OF EXISTING TRANSPORTATION FACILITY
REMOVE
STD. BASE DITCH
SEE DETAIL C
EST. 5CY D.D.E.
PLACE 10 TONS
CLASS I RIP RAP W/FF
EAST BANK ONLY
SPEC. CUT GRASS SWALE SEE DETAIL A
BERM DITCH SEE DETAIL D
SPEC. CUT DITCH SEE DETAIL A
SPEC. MED. CUT DITCH SEE DETAIL AB
STD. V DITCH SEE DETAIL T EST. 50 CY DDE
2' LAT. BASE DITCH SEE DETAIL V
4' LAT. BASE DITCH SEE DETAIL K
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
RETAIN
PREFORMED SCOUR HOLE DATA Q10= 3.57 CFS
PREFORMED SCOUR HOLE DATA Q10= 3.38 CFS
WAKE ELECTRIC MEMBERSHIP EASEMENT 100' R/W
LEE ROY FRAZIER & SYLVIA P. FRAZIER
NORTH STAR LIMITED PARTNERSHIP D.B.4773, Pg.700
JERRY W. KEITH & MARY P. KEITH
RICHARD C. BARTHOLOMEW &SHIRLEY B. BARTHOLOMEW
(NOT GIVEN)
MARY SUE KEITH STELL, ET AL
SYLVANIUS FRAZIER & LULA BARNES McGHEE DB 976-E
PERRY CREEK
GRAU 350
CAT-1
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
ENGLISH
GRAPHIC SCALE

GRASS SWALE DATA	B	
-Y6- STA. 1508 TO STA. 1700 RT		
DA	1.30	AC
SLOPE	1.53	%
L REQ	130	FT
L PROV	192	FT
Q2	3.72	CFS
V2	1.87	FT\S
D2	0.75	FT
Q10	4.81	CFS
V10	2.36	FT\S
D10	0.76	FT

REVISIONS

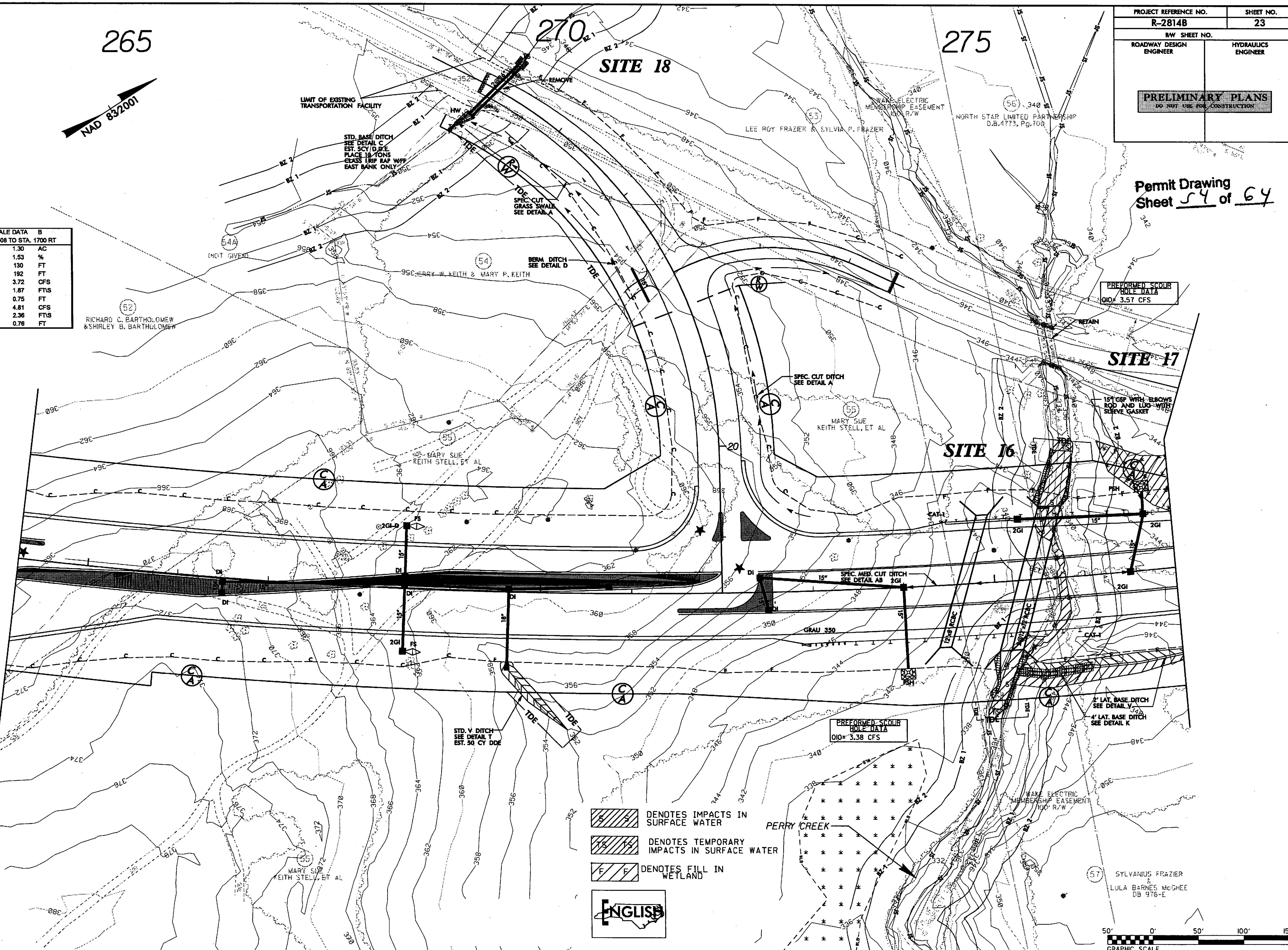
January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel nos. 52 and 55.NNA.

January 11, 2010: Adjusted TDE lines on parcel no. 55.NNA.

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 54 of 64



265
270
275
SITE 18
SITE 17
SITE 16
NAD 83/2001
LIMIT OF EXISTING TRANSPORTATION FACILITY
REMOVE
HW
STD. BASE DITCH SEE DETAIL C EST. 5CY D.D.E. PLACE 10 TONS CLASS I RIP RAP W/FF EAST BANK ONLY
SPEC. CUT GRASS SWALE SEE DETAIL A
BERM DITCH SEE DETAIL D
SPEC. CUT DITCH SEE DETAIL A
WAKE ELECTRIC MEMBERSHIP EASEMENT 100' R/W
NORTH STAR LIMITED PARTNERSHIP D.B.4773, Pg.700
LEE ROY FRAZIER & SYLVIA P. FRAZIER
JERRY W. KEITH & MARY P. KEITH
RICHARD C. BARTHOLOMEW &SHIRLEY B. BARTHOLOMEW
(NOT GIVEN)
MARY SUE KEITH STELL, ET AL
PREFORMED SCOUR HOLE DATA Q10= 3.57 CFS
RETAIN
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
SPEC. MED. CUT DITCH SEE DETAIL AB
GRAU 350
STD. V DITCH SEE DETAIL T EST. 50 CY DDE
PREFORMED SCOUR HOLE DATA Q10= 3.38 CFS
2' LAT. BASE DITCH SEE DETAIL V
4' LAT. BASE DITCH SEE DETAIL K
PERRY CREEK
SYLVANIUS FRAZIER & LULA BARNES McGHEE DB 976-E
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
ENGLISH
50' 0' 50' 100' 150'
GRAPHIC SCALE

GRASS SWALE DATA	B	
-Y6- STA. 1508 TO STA. 1700 RT		
DA	1.30	AC
SLOPE	1.53	%
L REQ	130	FT
L PROV	192	FT
Q2	3.72	CFS
V2	1.87	FT\S
D2	0.75	FT
Q10	4.81	CFS
V10	2.36	FT\S
D10	0.76	FT

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel nos. 52 and 55.NNA.

January 11, 2010: Adjusted TDE lines on parcel no. 55.NNA.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	23A

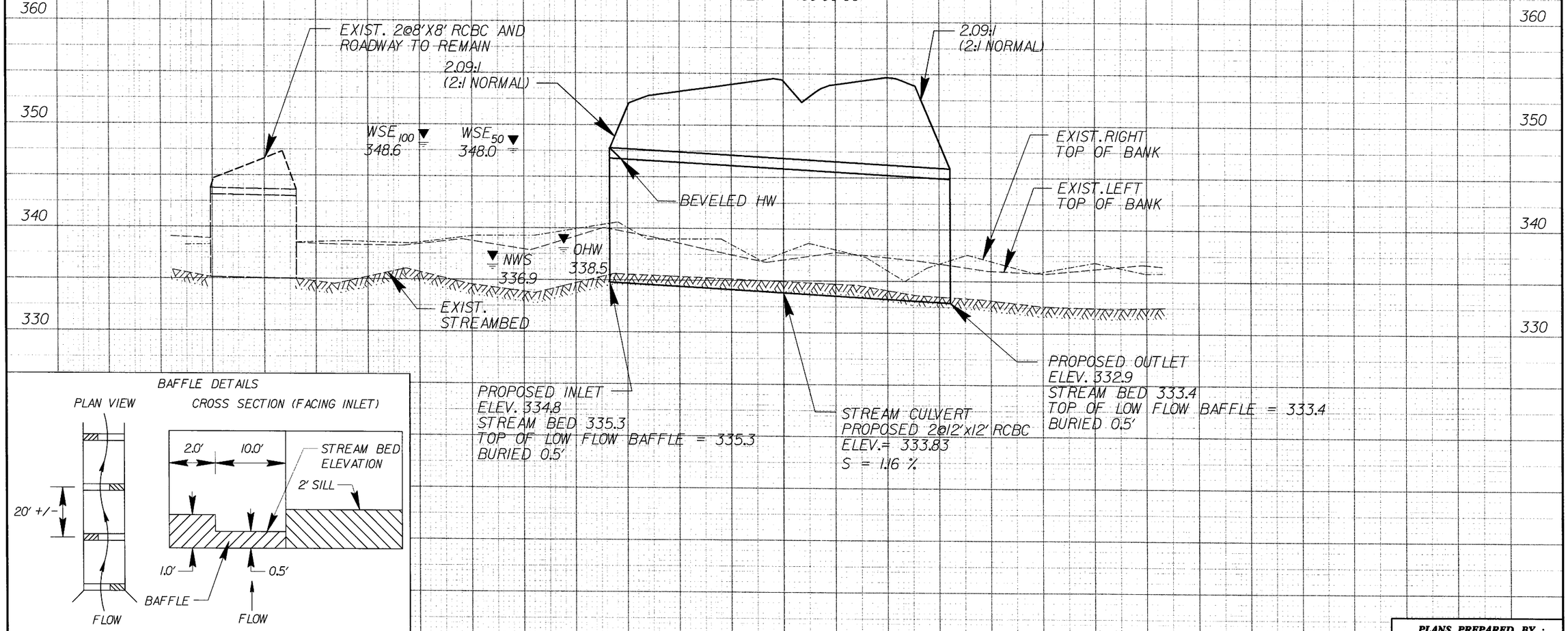
ENGLISH

Permit Drawing Sheet 55 of 64

SITE 16

HORIZONTAL SCALE: 50' 0' 50'

VERTICAL SCALE: 10' 0' 10'



BAFFLE DETAILS

ALTERNATE BAFFLE SECTIONS TO FORCE STREAM TO MEANDER LEFT TO RIGHT ALONG THE LENGTH OF THE CULVERT. SILL AT INLET END ONLY

PLACE BED MATERIAL TO TOP OF BAFFLE ELEVATION. STOCKPILE EXCAVATED BED MATERIAL FROM SITE IF AVAILABLE AND USE IN CULVERT. OTHERWISE, USE CLASS B RIP-RAP

PLANS PREPARED BY :

RK&K

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

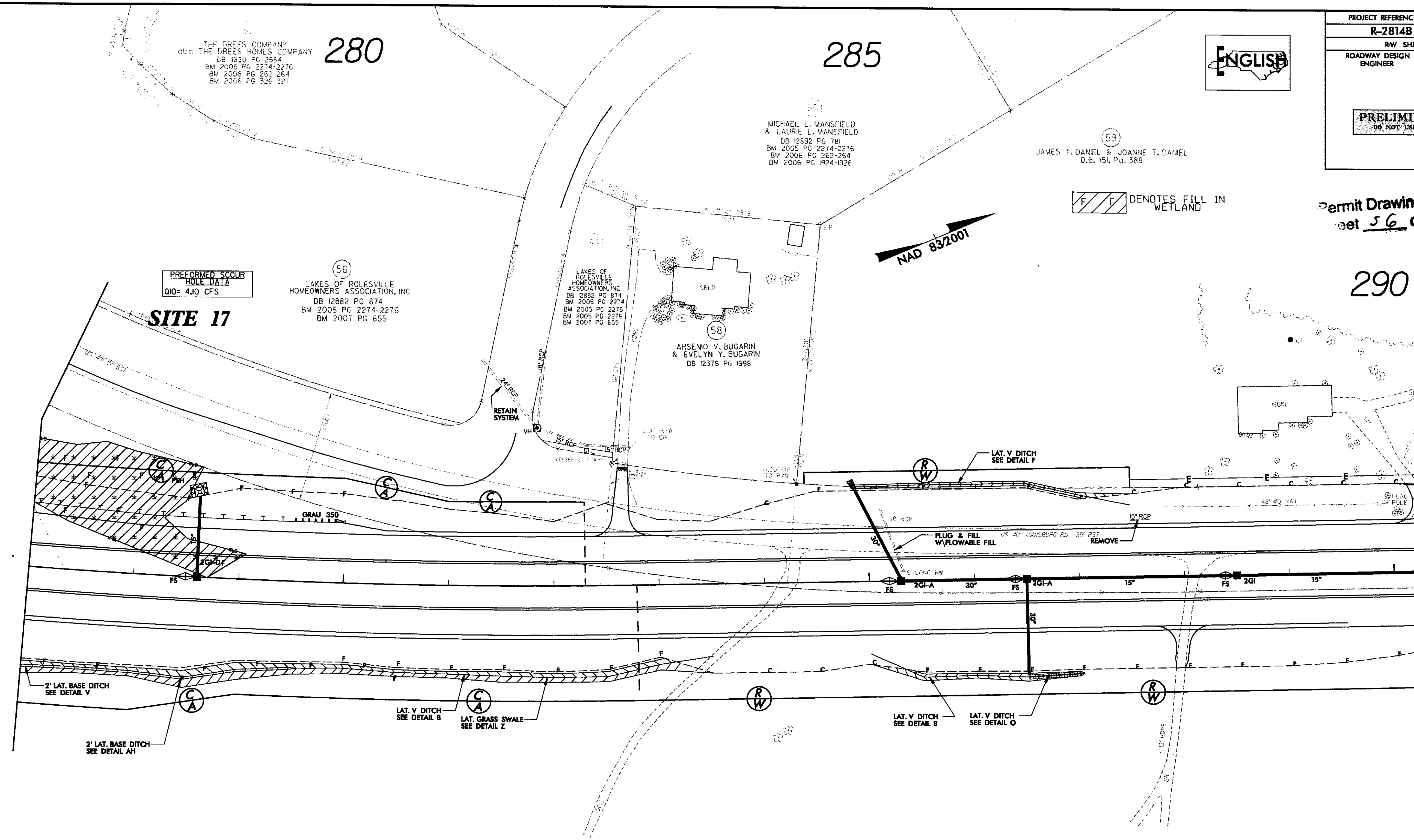
FOR DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 56 of 64

REVISIONS
REVISED NAMES ON PARCEL 57 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



280
285
290
THE DREES COMPANY
dba THE DREES HOMES COMPANY
DB 11820 PG 2564
BM 2005 PG 2274-2276
BM 2006 PG 262-264
BM 2006 PG 326-327
MICHAEL L. MANSFIELD
& LAURIE L. MANSFIELD
DB 12892 PG 781
BM 2005 PG 2274-2276
BM 2006 PG 262-264
BM 2006 PG 1924-1926
59
JAMES T. DANIEL & JOANNE T. DANIEL
D.B. 1151, Pg. 388
ENGLISH
DENOTES FILL IN WETLAND
NAD 83/2001
PREFORMED SCOUR HOLE DATA
Q10= 4.10 CFS
SITE 17
56
LAKES OF ROLESVILLE
HOMEOWNERS ASSOCIATION, INC
DB 12882 PG 874
BM 2005 PG 2274-2276
BM 2007 PG 655
LAKES OF ROLESVILLE HOMEOWNERS ASSOCIATION, INC
DB 12882 PG 874
BM 2005 PG 2274
BM 2005 PG 2275
BM 2005 PG 2276
BM 2007 PG 655
58
ARSENIO V. BUGARIN
& EVELYN Y. BUGARIN
DB 12378 PG 1998
RETAIN SYSTEM
LAT. V DITCH SEE DETAIL F
PLUG & FILL W\FLOWABLE FILL
REMOVE
GRAU 350
2GI-A
2GI
FS
30"
15"
2' LAT. BASE DITCH SEE DETAIL V
LAT. V DITCH SEE DETAIL B
LAT. GRASS SWALE SEE DETAIL Z
2' LAT. BASE DITCH SEE DETAIL AH
LAT. V DITCH SEE DETAIL B
LAT. V DITCH SEE DETAIL O

GRASS SWALE DATA	B	
-L- STA. 28125 TO STA. 28250 RT		
DA	1.15	AC
SLOPE	1.53	%
L REQ	115	FT
L PROV	125	FT
Q2	2.19	CFS
V2	1.69	FT\S
D2	0.66	FT
Q10	2.83	CFS
V10	2.13	FT\S
D10	0.67	FT

57
SYLVANIUS FRAZIER
&
LULA BARNES McGHEE
DB 976-E

50' 0' 50' 100' 150'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

Permit Drawing
Sheet 57 of 64

280

285

290

THE DREES COMPANY
dba THE DREES HOMES COMPANY
DB 11820 PG 2564
BM 2005 PG 2274-2276
BM 2006 PG 262-264
BM 2006 PG 326-327

MICHAEL L. MANSFIELD
& LAURIE L. MANSFIELD
DB 12892 PG 781
BM 2005 PG 2274-2276
BM 2006 PG 262-264
BM 2006 PG 1924-1926

JAMES T. DANIEL & JOANNE T. DANIEL
D.B. 851, PG. 388

F/F DENOTES FILL IN WETLAND

NAD 83/2001

PREFORMED SCOUR HOLE DATA
Q10= 4.10 CFS

SITE 17

LAKES OF ROLESVILLE HOMEOWNERS ASSOCIATION, INC
DB 12882 PG 874
BM 2005 PG 2274-2276
BM 2007 PG 655

LAKES OF ROLESVILLE HOMEOWNERS ASSOCIATION, INC
DB 12882 PG 874
BM 2005 PG 2274
BM 2005 PG 2275
BM 2005 PG 2276
BM 2007 PG 655

ARSENIO V. BUGARIN
& EVELYN V. BUGARIN
DB 12378 PG 1998

RETAIN SYSTEM

LAT. V DITCH SEE DETAIL F

PLUG & FILL W/FLOWABLE FILL

REMOVE

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL AH

LAT. V DITCH SEE DETAIL B

LAT. GRASS SWALE SEE DETAIL Z

LAT. V DITCH SEE DETAIL B

LAT. V DITCH SEE DETAIL O

GRASS SWALE DATA B		
-L- STA. 28125 TO STA. 28250 RT		
DA	1.15	AC
SLOPE	1.53	%
L REQ	115	FT
L PROV	125	FT
Q2	2.19	CFS
V2	1.69	FT\S
D2	0.66	FT
Q10	2.83	CFS
V10	2.13	FT\S
D10	0.87	FT

57
SYLVANUS FRAZIER
&
LULA BARNES McGHEE
DB 976-E

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS
8/17/99
REVISED NAMES ON PARCEL 57 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

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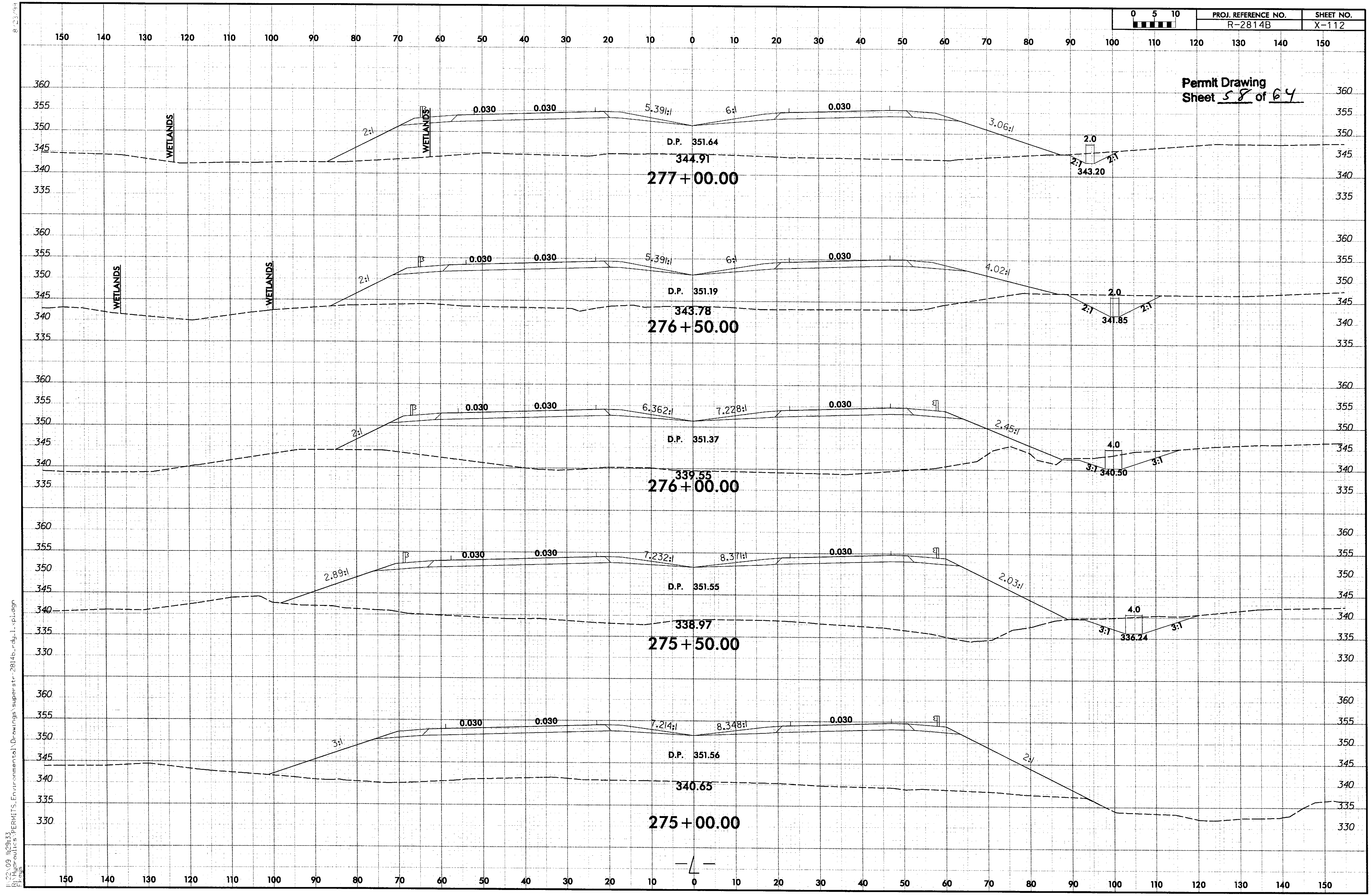
PROJ. REFERENCE NO.
R-2814B
SHEET NO.
X-112
Permit Drawing
Sheet 58 of 64
WETLANDS
WETLANDS
2:1
0.030
0.030
5.391:1
6:1
0.030
3.06:1
2.0
2:1
2:1
343.20
D.P. 351.64
344.91
277+00.00
WETLANDS
WETLANDS
2:1
0.030
0.030
5.391:1
6:1
0.030
4.02:1
2.0
2:1
2:1
341.85
D.P. 351.19
343.78
276+50.00
2:1
0.030
0.030
6.362:1
7.228:1
0.030
2.45:1
4.0
3:1
3:1
340.50
D.P. 351.37
339.55
276+00.00
2.89:1
0.030
0.030
7.232:1
8.371:1
0.030
2.03:1
4.0
3:1
3:1
336.24
D.P. 351.55
338.97
275+50.00
3:1
0.030
0.030
7.214:1
8.348:1
0.030
2:1
D.P. 351.56
340.65
275+00.00

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2814B	X-113

Permit Drawing
Sheet 59 of 64

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

365 360 355 350 345

6:1 B 0.030 5.39:1 6:1 0.030 6:1 2:1 2:1

D.P. 353.41
353.19
354.77

280+00.00

365 360 355 350 345

0.030 5.39:1 6:1 0.030 6:1 2.0 2:1 2:1

D.P. 352.56
352.10
354.00

279+50.00

365 360 355 350 345

B 0.030 WETLANDS WETLANDS 5.39:1 6:1 0.030 6:1 2.0 2:1 2:1

D.P. 354.72
350.17
351.30

279+00.00

365 360 355 350 345

WETLANDS WETLANDS WETLANDS WETLANDS 2:1 B 0.030 5.39:1 6:1 0.030 5.92:1 2.0 2:1 2:1

D.P. 353.87
349.34
348.60

278+50.00

360 355 350 345 340

WETLANDS WETLANDS 2:1 B 0.030 5.39:1 6:1 0.030 3.38:1 2.0 2:1 2:1

D.P. 353.02
347.50
345.90

278+00.00

360 355 350 345 340

WETLANDS WETLANDS 2:1 B 0.030 0.030 5.39:1 6:1 0.030 3.09:1 2.0 2:1 2:1

D.P. 352.25
345.60
344.55

277+50.00

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

8/23/94

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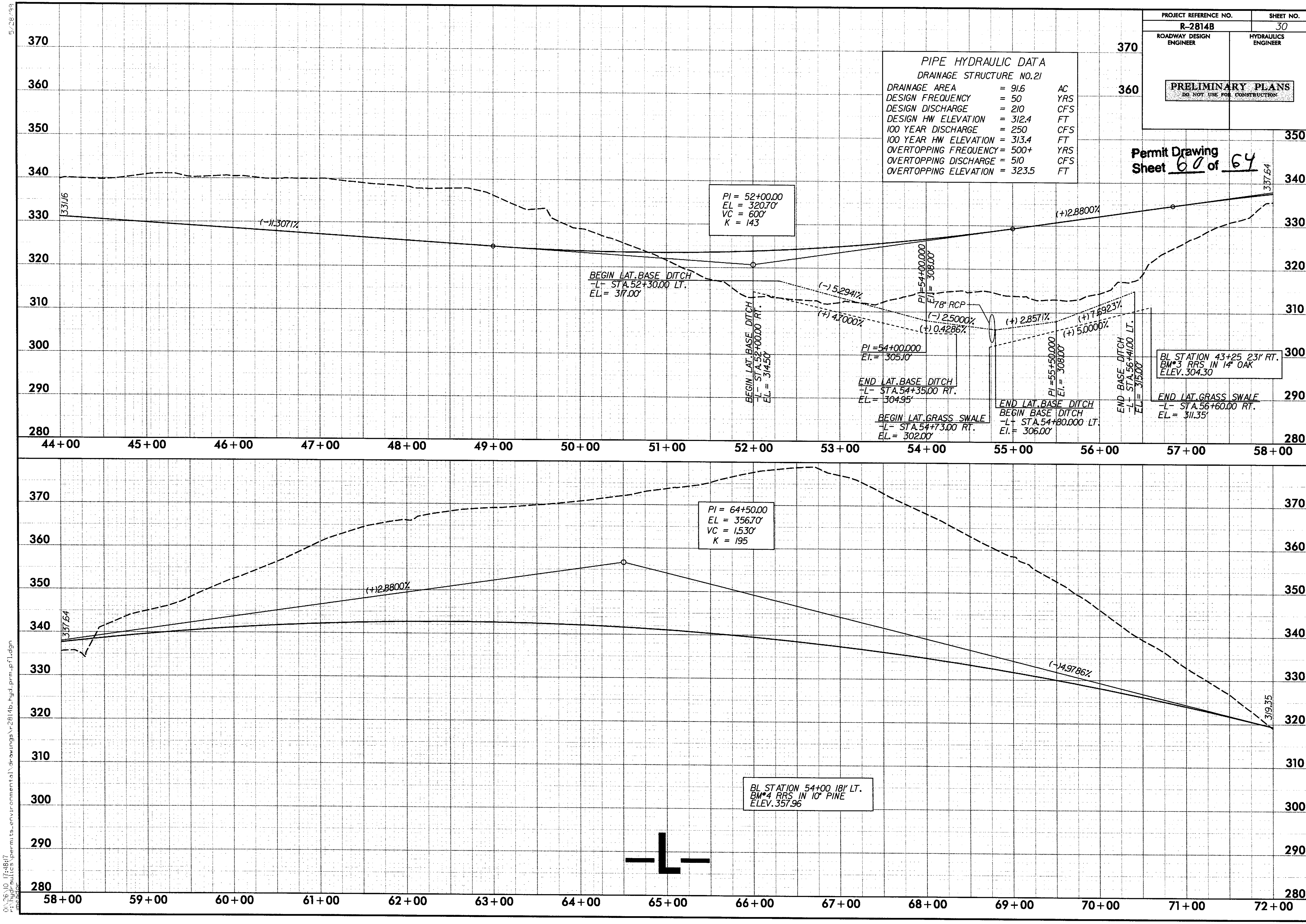
jlynch


PROJECT REFERENCE NO.
R-2814B
SHEET NO.
30
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 60 of 64
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.21
DRAINAGE AREA = 91.6 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 210 CFS
DESIGN HW ELEVATION = 312.4 FT
100 YEAR DISCHARGE = 250 CFS
100 YEAR HW ELEVATION = 313.4 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 510 CFS
OVERTOPPING ELEVATION = 323.5 FT
PI = 52+00.00
EL = 320.70'
VC = 600'
K = 143
331.16
(-)1.3071%
(+)2.8800%
337.64
BEGIN LAT.BASE DITCH
-L- STA.52+30.00 LT.
EL.= 317.00'
BEGIN LAT. BASE DITCH
-L- STA.52+00.00 RT.
EL.= 314.50'
(-) 5.2941%
(+) 4.7000%
PI=54+00.000
EL= 308.00'
78" RCP
(-) 2.5000%
(+) 0.4286%
(+) 2.8571%
(+) 7.6923%
(+) 5.0000%
PI =54+00.000
El.= 305.10'
END LAT.BASE DITCH
-L- STA.54+35.00 RT.
EL.= 304.95'
BEGIN LAT.GRASS SWALE
-L- STA.54+73.00 RT.
EL.= 302.00'
END LAT.BASE DITCH
BEGIN BASE DITCH
-L- STA.54+80.000 LT.
El.= 306.00'
PI =55+50.000
El.= 308.00'
END BASE DITCH
-L- STA.56+41.00 LT.
EL.= 315.00'
BL STATION 43+25 23.1' RT.
BM#3 RRS IN 14" OAK
ELEV. 304.30
END LAT.GRASS SWALE
-L- STA.56+60.00 RT.
EL.= 311.35'
PI = 64+50.00
EL = 356.70'
VC = 1,530'
K = 195
(+)2.8800%
(-)4.9786%
337.64
319.35
BL STATION 54+00 18.1' LT.
BM#4 RRS IN 10" PINE
ELEV. 357.96
-L-
44+00
45+00
46+00
47+00
48+00
49+00
50+00
51+00
52+00
53+00
54+00
55+00
56+00
57+00
58+00
59+00
60+00
61+00
62+00
63+00
64+00
65+00
66+00
67+00
68+00
69+00
70+00
71+00
72+00
280
290
300
310
320
330
340
350
360
370

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Permit Drawing
Sheet 61 of 64

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1000	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 272.9	FT
BASE DISCHARGE	= 1100	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 273.4	FT
OVERTOPPING DISCHARGE	= 5527	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 303.4	FT

PI = 78+50.00
EL = 287.00'
VC = 1,270'
K = 137

319.35
(-)4.9786%
12' X 8' RCBC
10' X 10' RCBC
BAFFLES SEE PIPE PROFILE
(+)4.2917%
BEGIN LAT.V DITCH -L- STA.83+50.00 LT. EL.= 304.68'
PI =84+50.000 El.= 302.50'
(-) 2.1800%
(+) 10.000%
END LAT.V DITCH -L- STA.85+50.00 LT. EL.= 312.60'
319.19

BL STATION 68+11 152' LT.
BM#5 RRS IN 14" GUM
ELEV.277.80

340 330 320 310 300 290 280 270 260 250
72+00 73+00 74+00 75+00 76+00 77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00

319.19
(+)4.2917%
BEGIN LAT.V DITCH -LT- STA.97+50.00 RT. EL.= 363.40'
30" RCP
PI =98+50.000 El.= 359.50'
(-) 3.9000%
BEGIN SP.CUT DITCH -L- STA.99+00.00 RT. EL.= 363.00'
(+) 7.0000%
(+) 7.0800%
END LAT.V DITCH -L- STA.99+50.00 RT. EL.= 366.50'
END SP.CUT DITCH EL.= 366.54'
370.27

BL STATION 83+99 141' RT.
BM#6 RRS IN 24" POPLAR
ELEV.374.82

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.71

DRAINAGE AREA	= 6.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 29	CFS
DESIGN HW ELEVATION	= 362.4	FT
100 YEAR DISCHARGE	= 31	CFS
100 YEAR HW ELEVATION	= 362.5	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 71	CFS
OVERTOPPING ELEVATION	= 367.9	FT

380 370 360 350 340 330 320 310 300 290
86+00 87+00 88+00 89+00 90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00

5/28/99
Dir: CAVO 17:48:27
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msaylor

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 62 of 64

PI = 102+50.00
EL = 390.00'
VC = 1,680'
K = 193

(+)4.2917%

(−)14.4000%

370.27

BEGIN SP.CUT GRASS SWALE
-L- STA.1108+50.00 RT.
EL = 359.07'

(−) 3.9100%

(−) 4.0000%

PI =110+50.000
El.= 351.25'

END SP.CUT GRASS SWALE
-L- STA.1111+50.00 LT.
EL = 347.25' RT.

342.92

BL STATION 103+93 118' LT.
BM#7 RRS IN 20" PINE
ELEV. 309.43

PI = 115+00.00
EL = 335.00'
VC = 820'
K = 137

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 950	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 312.4	FT
BASE DISCHARGE	= 1000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 312.7	FT
OVERTOPPING DISCHARGE	= 5169	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 339.9	FT

342.92

(−)4.4000%

BEGIN LAT.GRASS SWALE
-L- STA.1114+18.00 RT.
EL.= 303.00'

12' X 8' RCBC

END LAT.GRASS SWALE
-L- STA.1115+02.00 RT.
EL.= 300.40'

(−) 3.0952%

10' X 10' RCBC
BAFFLES SEE PIPE PROFILE

(+)11.6000%

PI = 122+00.00
EL = 346.20'
VC = 550'
K = 168

(+)4.8667%

(+) 4.8367%

(+) 4.0000%

374.89

BEGIN SP.CUT GRASS SWALE
-L- STA.1124+50.00 LT./RT.
EL = 355.35'

PI =1125+50.000
El.= 359.35' LT./RT.

400 390 380 370 360 350 340 330 320 310 300

100+00 101+00 102+00 103+00 104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00 112+00 113+00 114+00 116+00 117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00 127+00 128+00

5/28/99

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mmadar

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 63 of 64

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.173

DRAINAGE AREA	= 6.9	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 27	CFS
DESIGN HW ELEVATION	= 388.1	FT
100 YEAR DISCHARGE	= 29	CFS
100 YEAR HW ELEVATION	= 388.3	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 63	CFS
OVERTOPPING ELEVATION	= 393.9	FT

BL STATION 182+03 133' RT.
BM#13 RRS IN 12" OAK
ELEV. 380.32

405.42
(-)11.7764%
BEGIN SP.CUT DITCH -L- STA.189+50.00 LT. EL = 392.05'
(-) 5.3200%
END SP.CUT DITCH BEGIN LAT.V DITCH -L- STA.190+00.00 LT. EL = 389.39'
PI =190+75.000 El.= 385.40'
(+) 2.6667%
30" RCP
END LAT.V DITCH -L- STA.191+50.00 LT. EL = 387.40'
(-) 3.1600%
BEGIN SP.CUT DITCH -L- STA.195+00.00 RT. EL = 382.84'
(-) 2.3400%
BEGIN SP.CUT DITCH -L- STA.196+00.00 LT. EL = 381.07'
END SP.CUT DITCH -L- STA.196+50.00 LT. EL = 379.90' PI = 196+50.00 RT. EL = 378.10'
(+) 0.3000%
END SP.CUT DITCH -L- STA.197+50.00 RT. EL = 378.40'
380.57

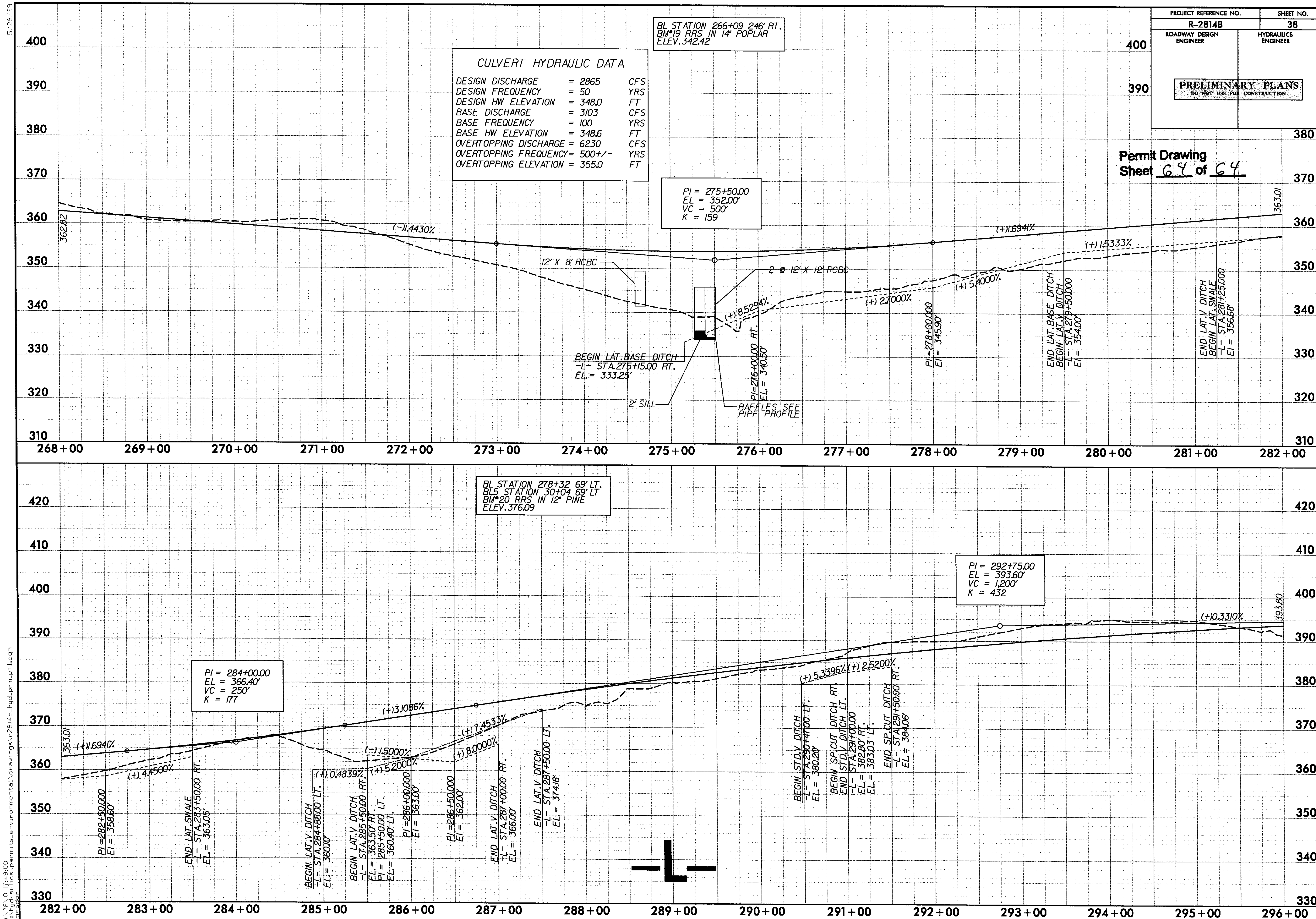
BL STATION 191+46 174' RT.
BM#14 RRS IN 18" GUM
ELEV. 372.82

PI = 200+00.00
EL = 377.00'
VC = 450'
K = 156

380.57
(-)11.7764%
(-) 0.3115%
(+)11.1111%
390.33
BEGIN SP.MED.CUT DITCH -L- STA.200+51.84 MED. EL.= 375.58'
END SP.MED.CUT DITCH -L- STA.201+00.00 MED. EL.= 375.43'
10' X 9' RCBC
12' X 8' RCBC
END LAT.GRASS SWALE
BEGIN LAT.BASE DITCH -L- STA.201+50.00 LT. EL.= 356.72'
BAFFLES SEE PIPE PROFILE
(-)10.0667%
(-)6.3333%
(+)12.9263%
(+)1.6000%
(+) 5.1333%
(-) 6.1429%
(+) 7.3333%
(+)1.9000%
(+) 5.4000%
BEGIN LAT.V DITCH -L- STA.198+00.00 RT. EL.= 373.00'
PI =199+50.000 El.= 357.90'
BEGIN LAT.GRASS SWALE -L- STA.199+80.00 LT. EL = 354.00'
END LAT.V DITCH -L- STA.200+30.00 RT. EL = 351.24'
BEGIN LAT.BASE DITCH -L- STA.200+41.00 RT. EL.= 351.20'
END LAT.BASE DITCH -L- STA.202+45.00 LT. EL.= 369.00'
BEGIN LAT.V DITCH -L- STA.202+80.00 LT. EL = 373.30'
PI =203+50.000 El.= 369.00' LT. El.= 367.00' RT.
PI =204+50.000 El.= 368.90'
END LAT.V DITCH -L- STA.205+00.00 LT. EL = 380.00'
END LAT.BASE DITCH -L- STA.206+00.00 RT. EL = 377.00'

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 900	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 363.1	FT
BASE DISCHARGE	= 1000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 363.6	FT
OVERTOPPING DISCHARGE	= 3717	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 378.6	FT


PROJECT REFERENCE NO. R-2814B
SHEET NO. 38
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 64 of 64
BL STATION 266+09 246' RT.
BM#19 RRS IN 14" POPLAR
ELEV. 342.42
CULVERT HYDRAULIC DATA
DESIGN DISCHARGE = 2865 CFS
DESIGN FREQUENCY = 50 YRS
DESIGN HW ELEVATION = 348.0 FT
BASE DISCHARGE = 3103 CFS
BASE FREQUENCY = 100 YRS
BASE HW ELEVATION = 348.6 FT
OVERTOPPING DISCHARGE = 6230 CFS
OVERTOPPING FREQUENCY = 500+/- YRS
OVERTOPPING ELEVATION = 355.0 FT
PI = 275+50.00
EL = 352.00'
VC = 500'
K = 159
(-)1.4430%
(+)1.6941%
(+)1.5333%
12' X 8' RCBC
2 @ 12' X 12' RCBC
(+)8.5294%
(+)2.7000%
(+)5.4000%
BEGIN LAT. BASE DITCH
-L- STA. 275+15.00 RT.
EL = 333.25'
2' SILL
BAFFLES SEE PIPE PROFILE
PI=276+00.00 RT.
EL = 340.50'
PI=278+00.000
El = 345.90'
END LAT. BASE DITCH
BEGIN LAT. V DITCH
-L- STA. 279+50.000
El = 354.00'
END LAT. V DITCH
BEGIN LAT. SWALE
-L- STA. 281+25.000
El = 356.68'
362.82
363.01
268+00 269+00 270+00 271+00 272+00 273+00 274+00 275+00 276+00 277+00 278+00 279+00 280+00 281+00 282+00
BL STATION 278+32 69' LT.
BL5 STATION 30+04 69' LT
BM#20 RRS IN 12" PINE
ELEV. 376.09
PI = 292+75.00
EL = 393.60'
VC = 1,200'
K = 432
(+)0.3310%
393.80
PI = 284+00.00
EL = 366.40'
VC = 250'
K = 177
(+)3.1086%
363.01
(+)1.6941%
(+)4.4500%
(+)0.4839%
(-)1.5000%
(+)5.2000%
(+)7.4533%
(+)8.0000%
(+)5.3396%
(+)2.5200%
PI=282+50.000
El = 358.60'
END LAT. SWALE
-L- STA. 283+50.00 RT.
EL = 363.05'
BEGIN LAT. V DITCH
-L- STA. 284+88.00 LT.
EL = 360.10'
BEGIN LAT. V DITCH
-L- STA. 285+50.00 RT.
EL = 363.50' RT.
PI = 285+50.00 LT.
EL = 360.40' LT.
PI=286+00.000
El = 363.00'
PI=286+50.000
El = 362.00'
END LAT. V DITCH
-L- STA. 287+00.00 RT.
EL = 366.00'
END LAT. V DITCH
-L- STA. 287+50.00 LT.
EL = 374.18'
BEGIN STD. V DITCH
-L- STA. 290+47.00 LT.
EL = 380.20'
BEGIN SP. CUT DITCH RT.
END STD. V DITCH LT.
-L- STA. 291+00.00
EL = 382.80' RT.
EL = 383.03' LT.
END SP. CUT DITCH
-L- STA. 291+50.00 RT.
EL = 384.06'
-L-
282+00 283+00 284+00 285+00 286+00 287+00 288+00 289+00 290+00 291+00 292+00 293+00 294+00 295+00 296+00

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

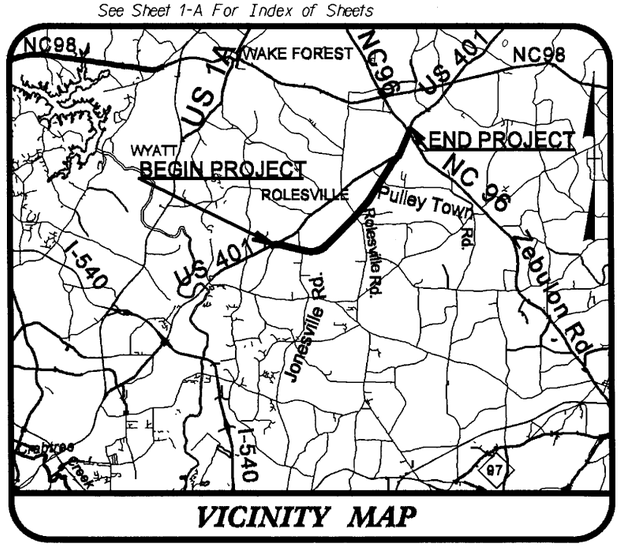
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2814B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34506.1.1	STP-401(4)	PE
34506.2.GV1	STP-0401(199)	R/W & UTILITIES

TIP PROJECT: R-2814B

LOCATION: US 401 ROLESVILLE BYPASS FROM SR 2225, LOUISBURY ROAD TO NC 96, ZEBULON ROAD

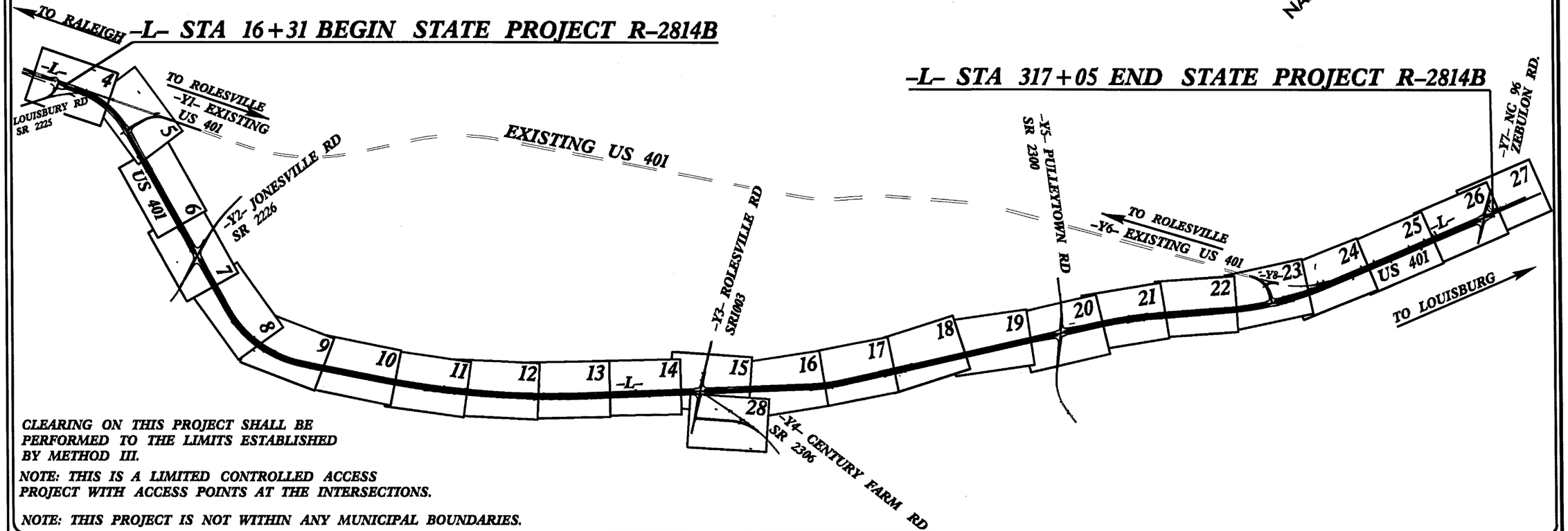
TYPE OF WORK: GRADING, DRAINAGE, PAVING, CULVERTS, AND SIGNALS



VICINITY MAP

-L- STA 16+31 BEGIN STATE PROJECT R-2814B

-L- STA 317+05 END STATE PROJECT R-2814B



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

NOTE: THIS IS A LIMITED CONTROLLED ACCESS PROJECT WITH ACCESS POINTS AT THE INTERSECTIONS.

NOTE: THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 0 5 10

DESIGN DATA

ADT 2005 = 16100
ADT 2030 = 24600
DHV = 55 %
D = 13 %
T = 7 % *
V = 60 MPH

* TTST 2 DUAL 5

PROJECT LENGTH

LENGTH ROADWAY F. A. PROJECT STP-401(4) = 5.696 MILES
TOTAL LENGTH TIP PROJECT R-2814B = 5.696 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 17, 2009

LETTING DATE: FEBRUARY 15, 2011

JS GOODNIGHT
PROJECT ENGINEER

TD GOINS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SEAL
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

09/08/09

FEB-2010 16:08
roadway\Proj\r2814b_rdy_tsh.dgn
$USERNAME$$$$

3/15/06

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	1-B

Note: Not to Scale

****S.U.E. = Subsurface Utility Engineering***

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite Marker
- Existing Control of Access
- Proposed Control of Access
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

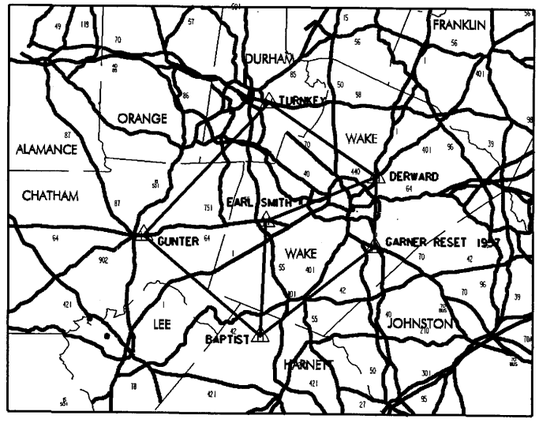
PROJECT REFERENCE NO.	SHEET NO.
R-2814-B	1C
Location and Surveys	

SURVEY CONTROL SHEET R-2814-B

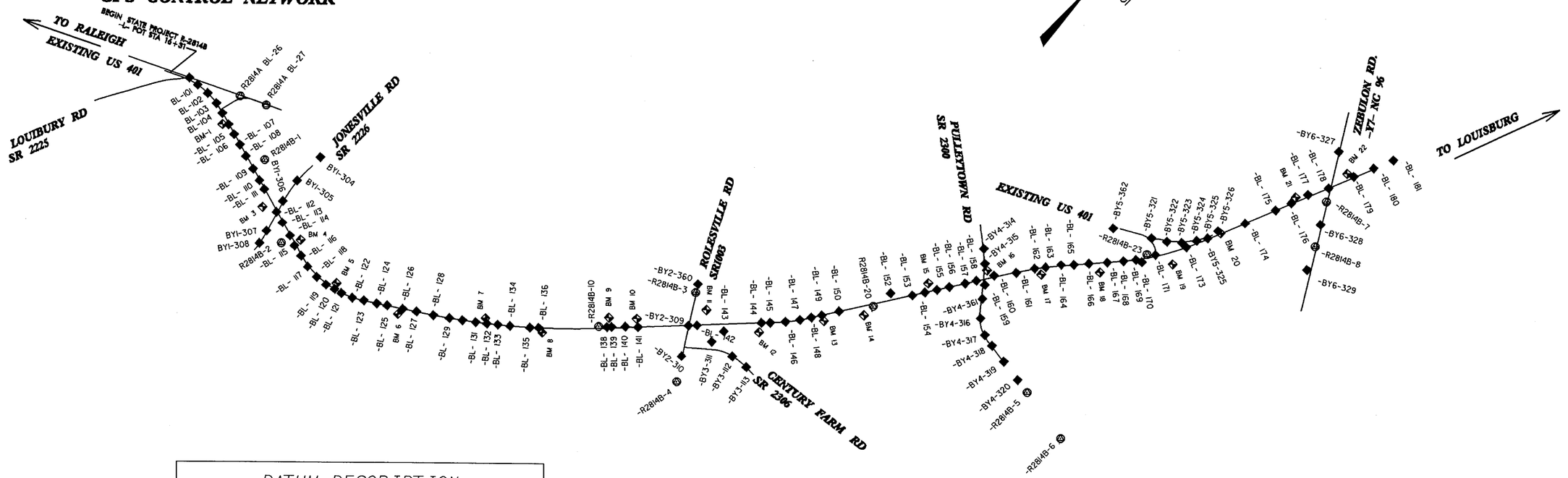
WAKE COUNTY

LOCATION: ROLESVILLE BYPASS (US #401) FROM SR 2225 (LOUISBURY RD) TO EXISTING US #401 NORTH OF NC #96

R-2814B



GPS CONTROL NETWORK



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT GPS MONUMENT "R2814-13" WITH NAD 1983/2001 STATE PLANE GRID COORDINATES OF NORTHING: 813012.58 EASTING: 2182668.07 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99994428 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2814-13" TO -L- STATION 16+31.00 IS N 47°33'01.7" E 43,779.69' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 88

NOTES:

1. THIS SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE HARN (HIGH ACCURACY REFERENCE NETWORK) NAD 1986 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE NAD83 COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAY BE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.
2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
   HTTP://WWW.NCDOT.ORG/DOI/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:
   R2814B_L2_GPSCALIB_081001.HTML
   R2814B_L2_WGS84_081001.TXT
   R2814B_L2_LOCAL_081001.TXT
   R2814B-L2_CONTROL_081001.TXT

   THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

Ⓐ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

NOTE: DRAWING NOT TO SCALE

10/01/08

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10/01/08

PROJECT REFERENCE NO.	SHEET NO.
R-2814-B	1D
Location and Surveys	

SURVEY CONTROL SHEET R-2814-B
WAKE COUNTY

LOCATION: ROLESVILLE BYPASS (US #401) FROM SR 2225 (LOUISBURY RD) TO EXISTING US #401 NORTH OF NC #96

GPS Calibration ReportGPS Calibration Report
Project : R2814BE VRS

TIP Number R-2814B

User name ggreen Date & Time12:58:30 PM 1/7/2008
Coordinate SystemUS State Plane 1983(at ground) ZoneNorth Carolina 3200
Horizontal Datum NAD 1983 (Conus)

Vertical Datum NGVD88 Geoid Model GEOID03 (Conus) NC Sub Grid
Coordinate Units US survey feet
Distance Units US survey feet
Height Units US survey feet

LOCAL SITE INFORMATION
Localized around R2814B-13
Latitude 35°58'56.17528"N
Longitude 78°22'57.32950"W
Site Scale Factor 1.0000557231
Height 297.012sft

The North Carolina Department of Transportation uses a Localized Coordinate System which is very similar to North Carolina Zone 3200 from which it is derived
Please take care in utilizing these coordinates to eliminate confusion of the two systems
This file is to aid in the use of Real Time Kinematic (RTK) GPS during construction layout

Datum Transformation Parameters
Datum Transformation computation not requested
Updated Default Projection (Transverse Mercator) Definition
Updated default projection not requested

Horizontal Adjustment Parameters
Northing coordinate of rotation center 806225.345sft
Easting coordinate of rotation center 2174650.275sft
Rotation about the center point 0°00'00"
Translation north 0.001sft
Translation east 0.006sft
Scale factor 1.00000030

Vertical Adjustment Parameters
Northing coordinate of origin point 783595.150sft
Easting coordinate of origin point 2153317.093sft
Vertical separation at origin -0.091sft
Slope north 4.390 ppm
Slope east - 4.007 ppm

Geoid Model Definition
GEOID03 (Conus) NC Sub Grid

Residual Differences Between GPS (WGS84) And Local Coordinates Summary

Maximum error	Root Mean Square error	Point
Horizontal 0.013sft	0.001	DERWARD GPS
Vertical 0.038sft	0.003	R2814-12 GPS
3-dimensional 0.039sft	0.003	R2814-12 GPS

WGS84 CoordinatesCalculated point
FOR DISPLAY ONLY Local Coordinates

Point R2814B-1 GPS	Northing 783595.150sft	Point R2814B-1
Latitude 35°54'06.92524"N	Easting 2153317.093sft	Northing 783595.151sft
Longitude 78°28'56.30653"W	Elevation 360.107sft	Easting 2153317.095sft
Height 251.025sft	Horz error 0.002sft	Elevation 360.095sft
	Vert error 0.013sft	Utilized Horz and Vert
	3D error 0.013sft	Quality Adjusted quality
PointR2814B-2 GPS	Northing 782514.199sft	Point R2814B-2
Latitude 35°53'56.15084"N	Easting 2154950.277sft	Northing 782514.200sft
Longitude 78°28'36.52479"W	Elevation 371.777sft	Easting 2154950.278sft
Height 262.603sft	Horz error 0.002sft	Elevation 371.768sft
	Vert error 0.009sft	Utilized Horz and Vert
	3D error 0.009sft	Quality Adjusted quality
Point R2814B-3 GPS	Northing 788498.005sft	Point R2814B-3
Latitude 35°54'54.92665"N	Easting 2162423.613sft	Northing 788498.005sft
Longitude 78°27'05.28968"W	Elevation 423.457sft	Easting 2162423.612sft
Height 314.125sft	Horz error 0.001sft	Elevation 423.455sft
	Vert error 0.002sft	Utilized Horz and Vert
	3D error 0.002sft	Quality Adjusted quality
Point R2814B-4 GPS	Northing 786739.982sft	Point R2814B-4
Latitude 35°54'37.47874"N	Easting 2163565.245sft	Northing 786739.982sft
Longitude 78°26'51.53004"W	Elevation 410.149sft	Easting 2163565.244sft
Height 300.731sft	Horz error 0.001sft	Elevation 410.151sft
	Vert error 0.002sft	Utilized Horz and Vert
	3D error 0.002sft	Quality Adjusted quality
PointR2814B-10 GPS	Northing786360.571sft	Point R2814B-10
Latitude35°54'33.84393"N	Easting2161420.569sft	Northing786360.571sft
Longitude78°27'17.62613"W	Elevation375.014sft	Easting2161420.568sft
Height265.672sft	Horz error0.000sft	Elevation375.012sft
	Vert error0.002sft	UtilizedHorz and Vert
	3D error0.002sft	QualityAdjusted quality

WGS84 CoordinatesCalculated point
FOR DISPLAY ONLY Local Coordinates

Point R2814B-20 GPS	Northing 791186.779sft	Point R2814B-20
Latitude 35°55'21.34627"N	Easting 2165503.665sft	Northing 791186.777sft
Longitude 78°26'27.66217"W	Elevation 382.661sft	Easting 2165503.663sft
Height 273.266sft	Horz error 0.002sft	Elevation 382.661sft
	Vert error 0.000sft	Utilized Horz and Vert
	3D error 0.002sft	Quality Adjusted quality
Point R2814B-5 GPS	Northing792297.525sft	Point R2814 B-5
Latitude 35°55'32.11248"N	Easting2169373.918sft	Northing 792297.525sft
Longitude 78°25'40.53037"W	Elevation 393.854sft	Easting 2169373.916sft
Height 284.327sft	Horz error 0.002sft	Elevation 393.859sft
	Vert error 0.005sft	Utilized Horz and Vert
	3D error 0.006sft	Quality Adjusted quality
Point R2814B-6 GPS	Northing 792103.580sft	Point R2814B-6
Latitude 35°55'30.12070"N	Easting 2170664.624sft	Northing 792103.579sft
Longitude 78°25'24.85126"W	Elevation 381.475sft	Easting 2170664.621sft
Height 271.891sft	Horz error 0.003sft	Elevation 381.483sft
	Vert error 0.008sft	Utilized Horz and Vert
	3D error 0.008sft	Quality Adjusted quality
Point R2814-23 GPS	Northing 796514.724sft	Point R2814-23
Latitude 35°56'13.83323"N	Easting 2169080.584sft	Northing 796514.723sft
Longitude 78°25'43.80179"W	Elevation 364.396sft	Easting 2169080.582sft
Height 254.973sft	Horz error 0.003sft	Elevation 364.396sft
	Vert error 0.000sft	Utilized Horz and Vert
	3D error 0.003sft	Quality Adjusted quality
Point R2814b-7 GPS	Northing 800310.758sft	Point R2814b-7
Latitude 35°56'51.25561"N	Easting 2171116.984sft	Northing 800310.756sft
Longitude 78°25'18.77025"W	Elevation 396.322sft	Easting 2171116.981sft
Height 286.898sft	Horz error 0.003sft	Elevation 396.322sft
	Vert error 0.000sft	Utilized Horz and Vert
	3D error 0.003sft	Quality Adjusted quality

NOTES:

1. *THIS SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE HARN (HIGH ACCURACY REFERENCE NETWORK) NAD 1996 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAY BE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.*
2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCTION/HIGHWAY/LOCATION/PROJECT/

THE FILES TO BE FOUND ARE AS FOLLOWS:
RM14B_LS_GPSCALIB_081001.HTML
RM14B_LS_WORM4_081001.TXT
RM14B_LS_LOCAL_081001.TXT
RM14B_LS_CONTROL_081001.TXT

THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

⊙ *INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.*
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT GPS MONUMENT "R2814-13" WITH NAD 1983/2001 STATE PLANE GRID COORDINATES OF NORTHING: 81301.258 EASTING: 2.182668.07
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99994428
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2814-13" TO -L- STATION 16+31.00 IS
N 47°33'01.7" E 437.968'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 88

23-FEB-2010 16:24
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$$$$USERNAME$$$$

10/01/08

PROJECT REFERENCE NO.	SHEET NO.
R-2814-B	1E
Location and Surveys	

SURVEY CONTROL SHEET R-2814-B

WAKE COUNTY

LOCATION: ROLESVILLE BYPASS (US #401) FROM SR 2225 (LOUISBURY RD) TO EXISTING US #401 NORTH OF NC #96

WGS84 Coordinates FOR DISPLAY ONLY	Calculated point	Local Coordinates
Point R2814B-8 GPS	Northing 799390.459sft	Point R2814B-8
Latitude 35°56'42.12310"N	Easting 2171666.440sft	Northing 799390.457sft
Longitude 78°25'12.15337"W	Elevation 382.605sft	Easting 2171666.437sft
Height 273.138sft	Horz error 0.004sft	Elevation 382.607sft
	Vert error0.002sft	Utilized Horz and Vert
	3D error0.004sft	Quality Adjusted quality
Point R2814-11 GPS	Northing 804449.319sft	Point r2814-11
Latitude 35°57'32.05455"N	Easting 2173309.562sft	Northing 804449.317sft
Longitude 78°24'51.80806"W	Elevation 359.177sft	Easting 2173309.560sft
Height 249.751sft	Horz error 0.004sft	Elevation 359.176sft
	Vert error 0.001sft	Utilized Horz and Vert
	3D error 0.004sft	Quality Adjusted quality
Point R2814-12 GPS	Northing 803550.455sft	Point R2814-12
Latitude 35°57'23.13250"N	Easting 2173878.610sft	Northing803550.456sft
Longitude 78°24'44.95125"W	Elevation364.825sft	Easting2173878.618sft
Height 255.356sft	Horz error0.007sft	Elevation364.787sft
	Vert error0.038sft	UtilizedHorz and Vert
	3D error0.039sft	QualityAdjusted quality
Point ACADEMY GPS	Northing 807619.512sft	Point ACADEMY
Latitude 35°58'03.23586"N	Easting 2176173.046sft	Northing 807619.509sft
Longitude 78°24'16.74736"W	Elevation 379.854sft	Easting 2176173.044sft
Height 270.373sft	Horz error 0.004sft	Elevation 379.855sft
	Vert error 0.001sft	Utilized Horz and Vert
	3D error 0.004sft	Quality Adjusted quality
Point R2814-15 GPS	Northing808020.350sft	Point R2814-15
Latitude35°58'07.10599"N	Easting2177745.997sft	Northing 808020.347sft
Longitude78°23'57.58353"W	Elevation360.926sft	Easting 2177745.994sft
Height251.388sft	Horz error0.004sft	Elevation 360.929sft
	Vert error0.003sft	Utilized Horz and Vert
	3D error0.005sft	Quality Adjusted quality

WGS84 Coordinates FOR DISPLAY ONLY	Calculated point	Local Coordinates
Point R2814B-9	Northing 817151.473sft	Point R2814-9
Latitude 35°59'36.87827"N	Easting 2186292.897sft	Northing 817151.472sft
Longitude 78°22'12.90798"W	Elevation 345.897sft	Easting 2186292.894sft
Height 236.173sft	Horz error 0.002sft	Elevation 345.904sft
	Vert error 0.007sft	Utilized Horz and Vert
	3D error 0.007sft	Quality Adjusted quality
Point R2814-13	Northing 813012.583sft	Point R2814-13
Latitude 35°58'56.17482"N	Easting 2182668.072sft	Northing 813012.580sft
Longitude 78°22'57.32996"W	Elevation 406.657sft	Easting 2182668.070sft
Height 297.013sft	Horz error 0.004sft	Elevation 406.663sft
	Vert error 0.006sft	Utilized Horz and Vert
	3D error 0.008sft	Quality Adjusted quality
Point R2814-14	Northing 812018.071sft	Point R2814-14
Latitude 35°58'46.25669"N	Easting 2184021.904sft	Northing 812018.067sft
Longitude 78°22'40.93396"W	Elevation 397.812sft	Easting 2184021.900sft
Height 288.094sft	Horz error 0.005sft	Elevation 397.822sft
	Vert error 0.010sft	Utilized Horz and Vert
	3D error 0.011sft	Quality Adjusted quality
Point R2814-16 GPS	Northing 824978.221sft	Point R2814-16
Latitude 36°00'54.03488"N	Easting 2190078.611sft	Northing 824978.220sft
Longitude 78°21'26.22488"W	Elevation 378.492sft	Easting 2190078.609sft
Height 268.743sft	Horz error 0.002sft	Elevation 378.495sft
	Vert error 0.003sft	Utilized Horz and Vert
	3D error 0.004sft	Quality Adjusted quality
Point R2814-17 GPS	Northing 824449.112sft	Point R2814-17
Latitude 36°00'48.74911"N	Easting 2190913.532sft	Northing 824449.112sft
Longitude 78°21'16.10433"W	Elevation 375.146sft	Easting 2190913.531sft
Height 265.354sft	Horz error 0.001sft	Elevation 375.152sft
	Vert error 0.005sft	Utilized Horz and Vert
	3D error 0.006sft	Quality Adjusted quality

WGS84 Coordinates FOR DISPLAY ONLY	Calculated point	Local Coordinates
Point R2814-18 GPS	Northing 838621.452sft	Point R2814-18
Latitude 36°03'08.64891"N	Easting 2194681.938sft	Northing 838621.456sft
Longitude 78°20'29.09275"W	Elevation 280.244sft	Easting 2194681.940sft
Height 170.524sft	Horz error 0.004sft	Elevation 280.244sft
	Vert error 0.000sft	Utilized Horz and Vert
	3D error 0.004sft	Quality Adjusted quality
PointR2814-19 GPS	Northing 840428.996sft	Point R2814-19
Latitude 36°03'26.48467"N	Easting 2195262.485sft	Northing 840429.001sft
Longitude 78°20'21.87675"W	Elevation 291.275sft	Easting 2195262.489sft
Height 181.561sft	Horz error 0.006sft	Elevation 291.274sft
	Vert error 0.001sft	Utilized Horz and Vert
	3D error 0.007sft	Quality Adjusted quality
Point R2814-21 GPS	Northing 850170.949sft	Point R2814-21
Latitude 36°05'02.34239"N	Easting 2202349.874sft	Northing 850170.954sft
Longitude 78°18'54.74746"W	Elevation 310.542sft	Easting 2202349.878sft
Height 200.697sft	Horz error 0.006sft	Elevation 310.543sft
	Vert error 0.001sft	Utilized Horz and Vert
	3D error 0.006sft	Quality Adjusted quality
Point R2814-22 GPS	Northing 850796.649sft	Point R2814-22
Latitude 36°05'08.61421"N	Easting 2201104.709sft	Northing 850796.653sft
Longitude 78°19'09.86394"W	Elevation 325.138sft	Easting 2201104.713sft
Height 215.351sft	Horz error 0.005sft	Elevation 325.136sft
	Vert error 0.002sft	Utilized Horz and Vert
	3D error 0.006sft	Quality Adjusted quality
Point DERWARD GPS	Northing 760854.788sft	Point DERWARD
Latitude 35°50'23.37672"N	Easting 2124692.767sft	Northing 760854.794sft
Longitude 78°34'45.40202"W	Elevation 340.142sft	Easting 2124692.778sft
Height 231.857sft	Horz error 0.013sft	Elevation 340.157sft
	Vert error 0.015sft	Utilized Horz and Vert
	3D error 0.020sft	Quality Adjusted quality

NOTES:

1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE HARN (HIGH ACCURACY REFERENCE NETWORK) NAD 8396 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAY BE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.

2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

THE FILES TO BE FOUND ARE AS FOLLOWS:
R2814B_LS_GPSCALIB_081001.HTML
R2814B_LS_WGS84_081001.TXT
R2814B_LS_LOCAL_081001.TXT
R2814B_LS_CONTROL_081001.TXT

THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

⊙ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT GPS MONUMENT "R2814-13"
WITH NAD 1983/2001 STATE PLANE GRID COORDINATES OF
NORTHING: 813012.58 EASTING: 2182668.07
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99994428
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2814-13" TO -L- STATION 16+31.00 IS
N 47°33'01.7" E 4377.969'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 88

23-FEB-2010 16:27
R:\Roadway\Proj\r2814b_ls_1e_090309.dgn
$$$$USERNAME$$$$

10/01/08

SURVEY CONTROL SHEET R-2814-B

PROJECT REFERENCE NO.	SHEET NO.
R-2814-B	1F
Location and Surveys	

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
B23	R2814A BL-23	783516.2100	2150433.8790	346.85	17+16.51	16.52 LT
B24	R2814A BL-24	783687.6560	2150783.9100	347.50	21+02.46	34.49 LT
101	R2814B BL-101	783716.1060	2151005.9300	342.53	23+21.97	5.19 LT
102	R2814B BL-102	783744.0110	2151302.9600	366.10	26+20.88	1.52 LT
103	R2814B BL-103	783721.2950	2151610.5610	359.81	29+28.69	1.28 LT
104	R2814B BL-104	783656.6810	2151863.2000	349.15	31+89.64	5.11 RT
105	R2814B BL-105	783573.1310	2152155.6190	353.86	34+93.79	6.44 RT
106	R2814B BL-106	783503.9400	2152402.0080	324.22	37+49.71	6.23 RT
107	R2814B BL-107	783430.0700	2152663.8560	328.73	40+21.78	6.33 RT
108	R2814B BL-108	783345.3660	2152949.4160	336.59	43+19.61	10.43 RT
109	R2814B BL-109	783252.7300	2153276.3170	338.33	46+59.38	10.95 RT
110	R2814B BL-110	783170.4200	2153566.7010	331.99	49+61.21	11.43 RT
111	R2814B BL-111	783106.3700	2153788.7890	313.94	51+92.34	12.86 RT
112	R2814B BL-112	782940.8110	2154362.1880	333.79	57+89.15	16.74 RT
113	R2814B BL-113	782863.8550	2154632.2080	357.97	60+69.92	17.59 RT
114	R2814B BL-114	782773.2340	2154978.0410	370.51	64+19.67	13.21 RT
115	R2814B BL-115	782688.3760	2155285.5420	378.57	66+69.36	31.03 RT
116	R2814B BL-116	782624.5750	2155472.0450	352.78	69+42.83	28.96 RT
117	R2814B BL-117	782563.0630	2155762.2450	313.08	72+36.91	23.28 RT
118	R2814B BL-118	782541.6240	2156070.4440	296.88	75+42.53	25.98 RT
119	R2814B BL-119	782564.9110	2156345.2910	264.32	78+15.31	23.88 RT
120	R2814B BL-120	782625.0010	2156563.4600	297.39	80+39.44	7.24 RT
121	R2814B BL-121	782678.8860	2156730.8050	310.28	82+14.81	3.52 RT
122	R2814B BL-122	782782.7320	2156984.2760	307.92	84+86.30	5.83 RT
123	R2814B BL-123	782929.7580	2157214.6370	332.53	87+61.42	6.23 LT
124	R2814B BL-124	783096.2420	2157474.2310	375.41	90+69.86	1.47 LT
125	R2814B BL-125	783229.9540	2157675.5880	384.67	93+11.56	1.13 LT
126	R2814B BL-126	783432.6510	2157988.0588	358.40	96+77.33	1.05 LT
127	R2814B BL-127	783614.9690	2158246.8140	367.66	100+00.42	4.91 LT
128	R2814B BL-128	783828.5870	2158573.1190	379.01	103+90.43	0.86 LT
129	R2814B BL-129	784043.4680	2158877.6560	402.03	107+63.16	0.55 LT
130	R2814B BL-130	784222.5960	2159121.2480	371.84	110+65.54	0.81 LT
131	R2814B BL-131	784407.3530	2159366.2170	334.02	113+72.37	0.78 RT
132	R2814B BL-132	784568.1340	2159569.6440	311.07	116+31.65	0.61 RT
133	R2814B BL-133	784725.9700	2159764.2660	344.84	118+82.22	1.11 RT
134	R2814B BL-134	784909.4580	2159980.1840	359.49	121+65.56	0.33 LT
135	R2814B BL-135	785215.0820	2160331.0320	382.82	126+30.85	1.96 RT
136	R2814B BL-136	785355.3190	2160476.8280	392.01	128+33.09	3.01 LT
10	R2814B-10	786360.5880	2161420.5670	374.98	142+13.60	42.24 LT
138	R2814B BL-138	786485.3160	2161560.9640	376.41	144+00.41	23.00 LT
139	R2814B BL-139	786561.8440	2161630.6820	375.23	145+03.93	23.30 LT
140	R2814B BL-140	786791.0120	2161849.7060	376.63	148+20.86	16.64 LT
141	R2814B BL-141	786992.0790	2162057.7940	387.38	151+09.69	0.94 RT
309	R2814B BY2-309	787844.0840	2162842.2600	411.38	162+67.83	3.70 RT
142	R2814B BL-142	787989.8660	2162975.9880	420.35	164+65.65	3.81 RT
143	R2814B BL-143	788336.1410	2163308.0040	426.55	170+80.38	162.11 RT
144	R2814B BL-144	789089.3940	2163976.5040	421.38	179+52.25	1.36 LT
145	R2814B BL-145	789236.3820	2164116.9150	413.76	181+55.48	2.85 RT
146	R2814B BL-146	789501.2380	2164345.9540	397.91	185+05.68	2.41 LT
147	R2814B BL-147	789765.6770	2164546.5470	395.67	188+37.93	3.70 LT
148	R2814B BL-148	789989.6510	2164689.8810	384.32	191+04.13	6.81 LT
149	R2814B BL-149	790197.6870	2164822.9290	392.79	193+50.99	4.47 LT
150	R2814B BL-150	790543.7870	2165035.9020	377.21	197+57.36	7.74 LT
20	R2814-20	791186.7380	2165503.6920	382.65	205+50.63	47.29 RT
152	R2814B BL-152	791679.6860	2165574.1660	398.34	210+05.79	154.69 LT
153	R2814B BL-153	792003.6780	2165960.3150	392.15	214+85.36	0.53 RT
154	R2814B BL-154	792255.9670	2166113.8820	390.18	217+80.68	3.27 LT
155	R2814B BL-155	792498.6630	2166264.5900	391.06	220+66.36	4.40 LT
156	R2814B BL-156	792747.2330	2166421.5930	390.75	223+60.36	3.32 LT
157	R2814B BL-157	793068.4310	2166622.8720	398.15	227+39.42	3.28 LT
158	R2814B BL-158	793293.7440	2166757.3270	397.50	230+01.74	8.96 LT
159	R2814B BL-159	793365.2410	2166968.8190	407.94	231+70.36	125.53 RT
160	R2814B BL-160	793668.0400	2166958.0580	405.09	234+23.80	36.51 LT
161	R2814B BL-161	794069.9950	2167261.7650	402.53	239+27.40	6.27 RT
162	R2814B BL-162	794436.0380	2167489.2490	392.96	243+58.06	9.37 LT
163	R2814B BL-163	794636.6060	2167645.5500	386.86	246+12.06	2.54 LT
164	R2814B BL-164	794932.4180	2167860.1200	387.94	249+76.64	19.44 LT
165	R2814B BL-165	795147.9840	2168065.3430	374.29	252+73.65	2.51 LT
166	R2814B BL-166	795414.8920	2168292.4990	371.07	256+24.13	2.41 LT
167	R2814B BL-167	795737.4400	2168569.8360	369.45	260+49.51	0.13 LT
168	R2814B BL-168	796024.4690	2168812.5980	367.22	264+25.45	0.39 LT
169	R2814B BL-169	796249.0150	2168987.6310	368.62	267+10.22	1.17 LT
170	R2814B BL-170	796309.7940	2169123.3330	363.42	268+38.54	72.62 RT
23	R2814-23	796514.7230	2169080.5820	364.40	269+82.45	79.50 LT
171	R2814B BL-171	796646.8050	2169222.4990	359.62	271+71.89	32.77 LT
172	R2814B BL-172	797000.3820	2169459.3300	339.80	275+98.29	7.81 LT
173	R2814B BL-173	797278.4950	2169601.3650	350.50	279+11.40	5.31 LT
324	R2814B BY5-324	797550.1200	2169662.9050	360.15	281+86.12	59.35 LT
325	R2814B BY5-325	797769.6060	2169798.8760	367.54	284+41.29	15.12 LT
326	R2814B BY5-326	798063.3640	2169918.6550	375.29	287+58.52	12.73 LT
174	R2814B BL-174	798031.7120	2170156.8660	393.77	293+74.68	2.11 LT
175	R2814B BL-175	799345.4500	2170437.2180	399.89	301+41.50	6.24 LT
176	R2814B BL-176	799717.3860	2170578.2440	396.92	305+39.21	13.09 LT
177	R2814B BL-177	800081.3000	2170733.9300	401.83	309+34.91	3.36 LT
178	R2814B BL-178	800568.1350	2170930.1210	400.85	314+59.79	1.56 LT
179	R2814B BL-179	801166.2170	2171148.9090	402.86	320+96.36	20.80 LT
180	R2814B BL-180	801630.5590	2171335.6810	403.29	325+96.86	18.62 LT
181	R2814B BL-181	802079.4370	2171524.9980	402.55	OUTSIDE PROJECT LIMITS	

BY2

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
360	R2814B BY2-360	788671.7920	2162323.7050	423.19	165+27.75	937.81 LT
3	R2814B-3	788498.0050	2162423.6120	423.45	164+67.11	746.74 LT
A309	R2814B BY2-309	787844.0840	2162842.2600	411.38	162+67.83	3.70 RT
310	R2814B BY2-310	787236.2120	2163230.4170	403.58	160+81.89	700.55 RT
4	R2814B-4	786739.9820	2163565.2440	410.15	159+42.24	1282.66 RT

BY3

POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
B309	R2814B BY2-309	787844.0840	2162842.2600	411.83	19+68.61	13.75 RT
311	R2814B BY3-311	787968.4300	2163479.4780	422.01	22+09.33	589.21 LT
312	R2814B BY3-312	788067.4920	2164051.6740	414.48	24+36.08	1123.82 LT
313	R2814B BY3-313	788123.3610	2164458.0480	412.58	26+04.95	1488.93 LT

BY4

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
314	R2814B BY4-314	793937.5700	2166359.8350	412.12	233+36.30	687.62 LT
315	R2814B BY4-315	793712.8850	2166620.8660	405.59	232+84.48	347.12 LT
A159	R2814B BL-159	793365.2410	2166960.8190	407.94	231+70.36	125.53 RT
361	R2814B BY4-361	793098.7610	2167147.4560	404.33	230+43.62	425.17 RT
316	R2814B BY4-316	792752.9240	2167434.0460	399.19	229+02.70	851.64 RT
317	R2814B BY4-317	792548.5630	2167771.3520	390.87	229+08.60	1245.98 RT
318	R2814B BY4-318	792491.7210	2168060.2350	388.23	230+13.80	1520.97 RT
319	R2814B BY4-319	792425.9020	2168503.3230	397.44	231+93.26	1931.40 RT
320	R2814B BY4-320	792348.9210	2169014.6130	396.94	234+02.12	2409.79 RT

BY5

POINT	DESC.	NORTH	EAST	ELEVATION	Y5 STATION	OFFSET
362	R2814B BY5-362	796394.8100	2168107.8020	359.58	12+05.53	3029.05 LT
321	R2814B BY5-321	796853.4090	2168891.3560	350.59	14+56.53	3874.68 LT
322	R2814B BY5-322	797052.5130	2169194.1310	346.40	15+00.93	4221.31 LT
323	R2814B BY5-323	797278.1710	2169450.6480	351.23	15+20.73	4559.36 LT
A324	R2814B BY5-324	797550.1200	2169662.9050	360.15	15+14.96	4904.01 LT
A325	R2814B BY5-325	797769.6060	2169798.8760	367.54	15+02.94	5159.36 LT
A326	R2814B BY5-326	798063.3640	2169918.6550	375.29	14+66.72	5461.70 LT

BY6

POINT	DESC.	NORTH	EAST	ELEVATION	Y6 STATION	OFFSET
327	R2814B BY6-327	801329.9120	2170500.0840	408.90	18+93.35	4779.27 LT
A178	R2814B BL-178	800568.1350	2170930.1210	400.85	19+57.88	4230.74 LT
7	R2814B-7	800310.7560	2171116.9810	396.32	19+86.78	4088.77 LT
328	R2814B BY6-328	799841.6260	2171392.4960	389.28	OUTSIDE PROJECT LIMITS	
8	R2814-8	799390.4570	2171666.4370	382.61	OUTSIDE PROJECT LIMITS	
329	R2814B BY6-329	798954.8880	2171934.7470	383.36	OUTSIDE PROJECT LIMITS	

BY7

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
B21	R2814A BL-21	783003.4330	2149368.6170	352.26	OUTSIDE PROJECT LIMITS	
B22	R2814A BL-22	783280.3940	2149935.4890	349.91	OUTSIDE PROJECT LIMITS	
A23	R2814A BL-23	783516.2100	2150433.8790	346.85	17+16.51	16.52 LT
A24	R2814A BL-24	783687.6560	2150783.9100	347.50	21+02.46	34.49 LT
B25	R2814A BL-25	783957.4550	2151327.1440	365.15	26+44.96	214.78 LT
B26	R2814A BL-26	784224.6570	2151875.9260	377.96	30+69.50	547.98 LT
B27	R2814A BL-27	784502.5070	2152449.7250	373.39	35+24.87	967.86 LT

BY IS LOUISBURY ROAD AND IS PART OF R2814A. THESE VALUES ARE REFERENCED TO R2814B DATUM.

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
301	R2814B BY-301	783129.4240	2150311.6590	338.76	OUTSIDE PROJECT LIMITS	
302	R2814B BY-302	782644.0290	2150046.7380	328.40	OUTSIDE PROJECT LIMITS	
303	R2814B BY-303	782045.2910	2149722.7150	330.01	OUTSIDE PROJECT LIMITS	

BY1 IS JONESVILLE ROAD. Y1 IS A NEW L ALIGNMENT ACCESS FROM EXISTING US 401 AND HAS NO DIRECT RELATIONSHIP TO BY1.

BY1

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
304	R2814B BY1-304	784545.9050	2154170.8180	359.86	51+69.71	1476.33 LT
305	R2814B BY1-305	783788.4470	2154182.0190	329.72	53+85.89	750.29 LT
306	R2814B BY1-306	783222.6390	2154287.2100	327.81	56+40.56	234.20 LT
A112	R2814B BL-112	782940.8110	2154362.1880	333.79	57+89.15	16.74 RT
307	R2814B BY1-307	782464.8770	2154507.4760	343.14	60+58.05	435.44 RT
308	R2814B BY1-308	782153.5490	2154591.0060	339.21	62+22.87	712.46 RT

NOTES:

1. *THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE HARN GRADE ACCURACY REFERENCE NETWORK NAD 1983 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE HARN COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAY BE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.*
2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
   HTTP://WWW.NCDOT.ORG/DOES/PRECONSTRUCT/DESIGNWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:
   R2814B_LS_SPECIALIN_DESCR.HTML
   R2814B_LS_WGS84_DESCR.TXT
   R2814B_LS_LOCAL_DESCR.TXT
   R2814B_LS_CONTROL_DESCR.TXT

   THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

⊙ *INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.*
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

501 ELEVATION = 351.46
N 783475 E 2152050
L STATION 34+18 130 RIGHT
BM=1 RRS IN 30' WH. OAK

377 ELEVATION = 332.72
N 783744 E 2152470
L STATION 37+50 244 LEFT
BM= 2 RRS IN 16' MAPLE

513 ELEVATION = 304.30
N 782798 E 2154053
L STATION 55+32 246 RIGHT
BM= 3 RRS IN 14' OAK

502 ELEVATION = 357.96
N 782880 E 2155284
L STATION 66+21 154 LEFT
BM=4 RRS IN 18' PINE

512 ELEVATION = 277.80
N 782763 E 2156492
L STATION 80+02 144 LEFT
BM= 5 RRS IN 14' GUM

503 ELEVATION = 374.82
N 783269 E 2157988
L STATION 95+94 148 RIGHT
BM=6 RRS IN 24' POPLAR

347 ELEVATION = 389.43
N 784634 E 2159462
L STATION 115+89 118 LEFT
BM= 7 RRS IN 20" PINE

504 ELEVATION = 388.71
N 785338 E 2160610
L STATION 129+18 181 RIGHT
BM= 8 RRS IN 12" PINE

349 ELEVATION = 364.97
N 786668 E 2161443
L STATION 144+55 234 LEFT
BM= 9 RRS IN 12" PINE

511 ELEVATION = 398.79
N 787106 E 2161908
L STATION 150+93 187 LEFT
BM= 10 RRS IN 12" PINE

505 ELEVATION = 423.71
N 788393 E 2162882
L STATION 166+99 338 LEFT
BM= 11 RRS IN 26' PINE

506 ELEVATION = 420.47
N 788895 E 2164094
L STATION 178+88 216 RIGHT
BM= 12 RRS IN 20" PINE

507 ELEVATION = 380.32
N 790138 E 2164943
L STATION 193+65 129 RIGHT
BM= 13 RRS IN 12' OAK

508 ELEVATION = 372.82
N 790885 E 2165500
L STATION 202+93 204 RIGHT
BM= 14 RRS IN 18" GUM

509 ELEVATION = 396.72
N 792462 E 2166822
L STATION 219+07 191 LEFT
BM= 15 RRS IN 24' OAK

510 ELEVATION = 402.42
N 793635 E 2166760
L STATION 232+93 188 LEFT
BM= 16 RRS IN 12" PINE

372 ELEVATION = 392.74
N 794444 E 2167689
L STATION 244+83 147 RIGHT
BM= 17 RRS IN 14" GUM

376 ELEVATION = 372.85
N 795453 E 2168614
L STATION 258+62 217 RIGHT
BM= 18 RRS IN 14" GUM

358 ELEVATION = 342.42
N 796793 E 2169616
L STATION 274+95 230 RIGHT
BM=19 RRS IN 14" POPLAR

374 ELEVATION = 376.09
N 798063 E 2169844
L STATION 287+30 82 LEFT
BM= 20 RRS IN 12" PINE

373 ELEVATION = 397.25
N 799884 E 2170550
L STATION 306+31 181 LEFT
BM= 21 RRS IN 20' PINE

375 ELEVATION = 404.82
N 801106 E 2170995
L STATION 319+83 141 LEFT
BM= 22 RRS IN 20' PINE

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT GPS MONUMENT "R2814-13" WITH NAD 1983/2001 STATE PLANE GRID COORDINATES OF NORTHING: 813012.58 EASTING: 2182668.07 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99994428 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2814-13" TO -L- STATION 16+31.00 IS N 47°33'01.7" E 4377.69' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 88

23-FEB-2010 16:30
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$$$$USERNAME$$$$

6/2/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

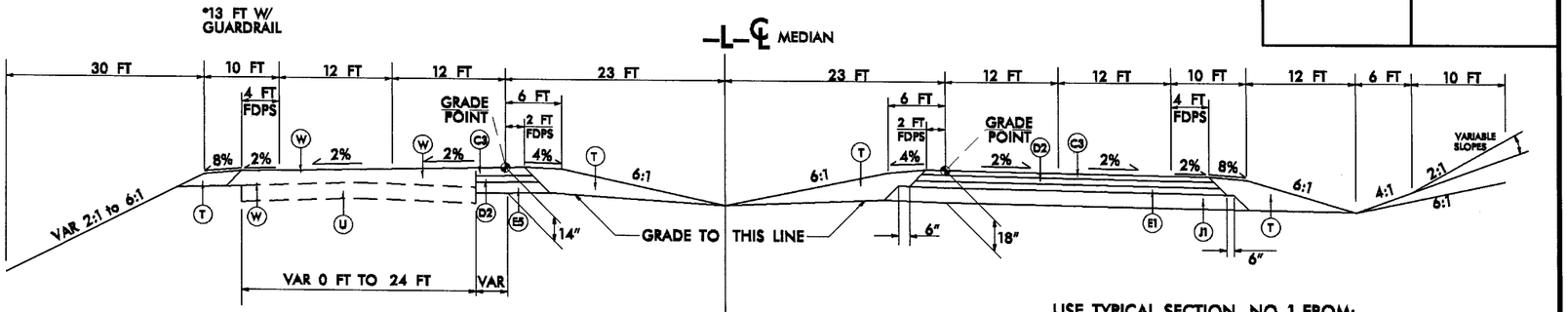
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE

PRELIMINARY PAVEMENT DESIGN

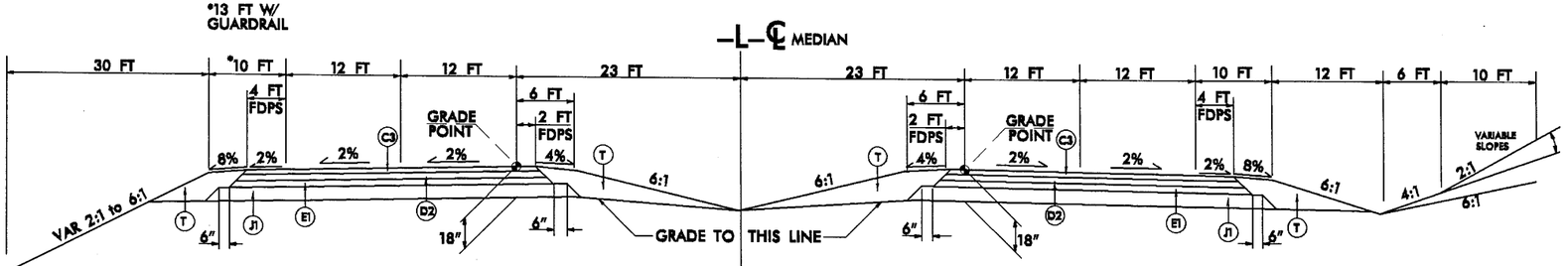
C1	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 260 LBS. PER SQ. YD.
C2	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C3	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF 2 LAYERS
C4	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 3" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 3" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
E2	PROP. APPROX. 4" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E3	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
E4	PROP. APPROX. 5½" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YD.
E5	PROP. APPROX. 7" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD. IN EACH OF TWO LAYERS
E6	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT GREATER THAN 5½" IN DEPTH OR LESS THAN 4" IN DEPTH
J1	PROP. 8" AGGREGATE BASE COURSE.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	8" x 12" CONCRETE CURB
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL BELOW, RIGHT)

NOTE: PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.



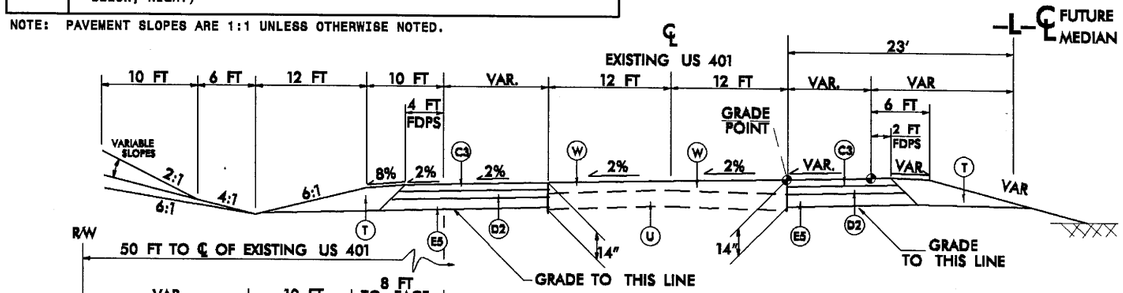
TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1 FROM:
-L- STA. 17+21.48 TO -L- STA. 21+43
-L- STA. 282+75 TO -L- STA. 317+05



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2 FROM:
-L- STA. 21+43 TO -L- STA. 282+75

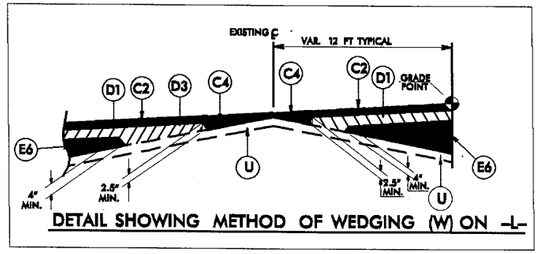


TYPICAL SECTION NO. 3

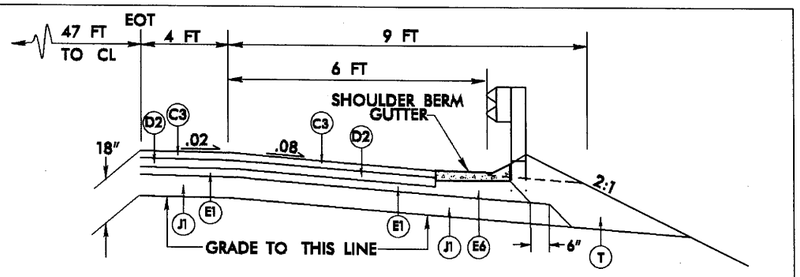
USE TYPICAL SECTION NO. 3 FROM:
-L- STA. 317+05 TO -L- STA. 323+85

TYPICAL SECTION NO. 3A

USE TYPICAL SECTION NO. 3A IN CONJUNCTION WITH TYPICAL SECTION NO. 3 FROM:
-L- STA. 317+05 TO -L- STA. 320+02



DETAIL SHOWING METHOD OF WEDGING (W) ON -L-



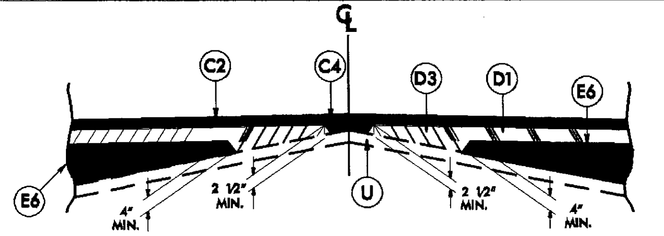
DETAIL SHOWING PAVED SHOULDER WITH SHOULDER BERM GUTTER (ALSO SEE STD. 846.03)

R-2814B	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

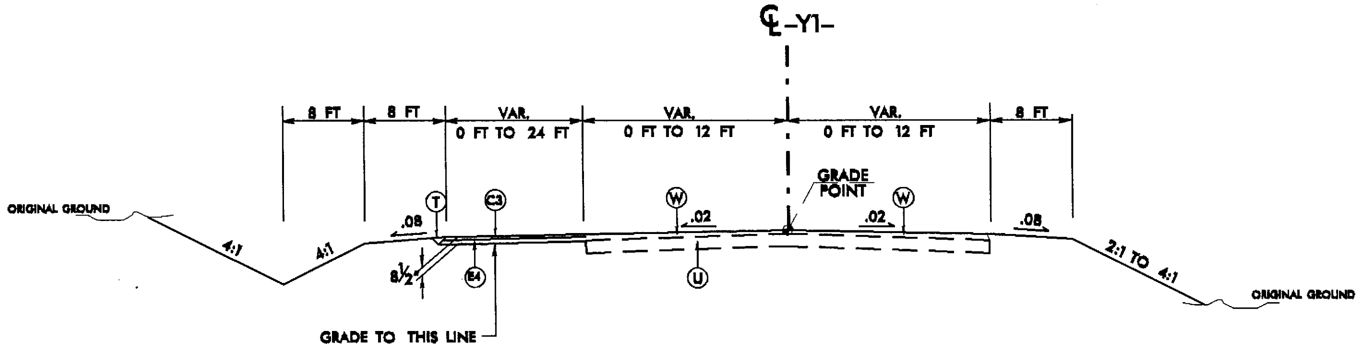
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

C2	1.5" S9.5B
C3	3" S9.5B
C4	VAR. DEPTH S9.5B
D1	2.5" I19.0B
D3	VAR. DEPTH I19.0B
E2	4.0" B25.0B

E3	5.0" B25.0B
E4	5.5" B25.0B
E6	VAR. DEPTH B25.0B
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W	WEDGING (SEE DETAIL LEFT)

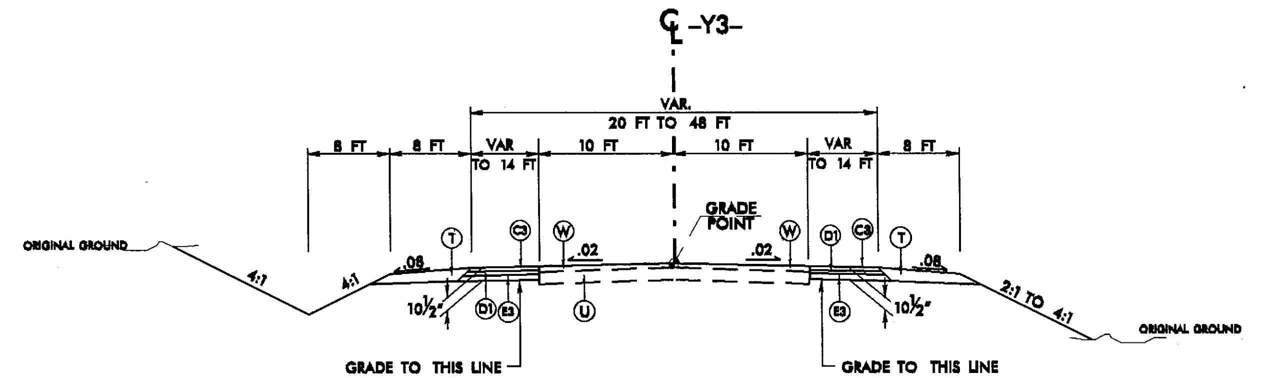


DETAIL SHOWING METHOD OF WEDGING -Y- LINES



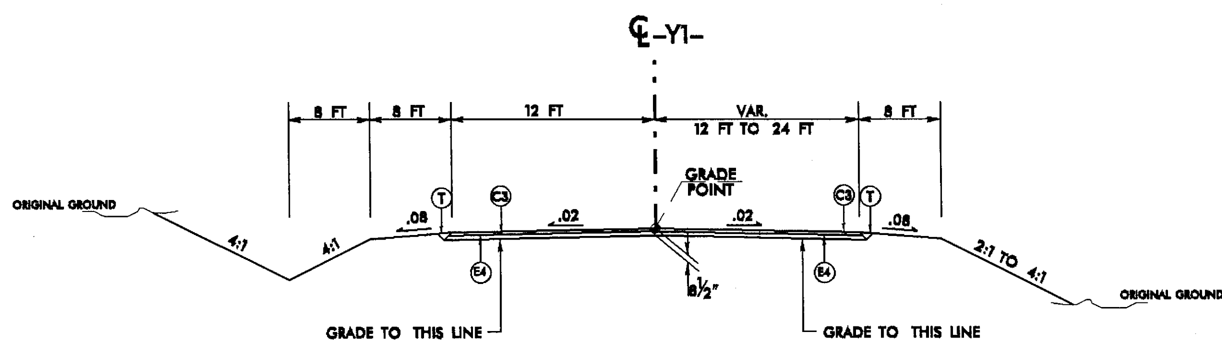
TYPICAL SECTION NO. 4

USE TYPICAL SECTION NO. 4 FROM:
-Y1- STA. 16+00 TO 18+62



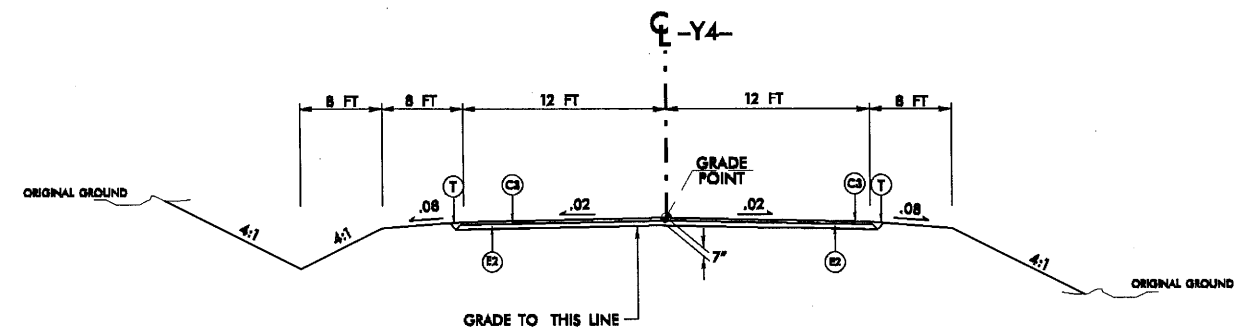
TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7 FROM:
-Y3- STA. 15+71 TO 19+12.59
-Y3- STA. 20+09.77 TO 25+27



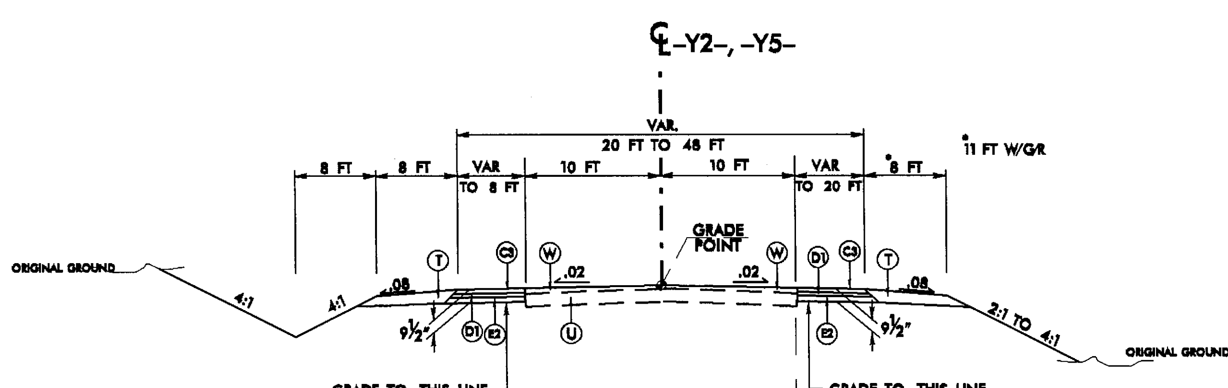
TYPICAL SECTION NO. 5

USE TYPICAL SECTION NO. 5 FROM:
-Y1- STA. 18+62 TO 24+67.22



TYPICAL SECTION NO. 8

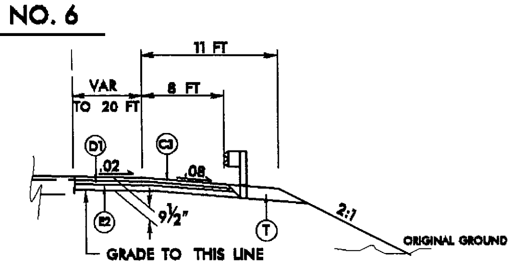
USE TYPICAL SECTION NO. 8 FROM:
-Y4- STA. 10+12.12 TO 20+20



TYPICAL SECTION NO. 6

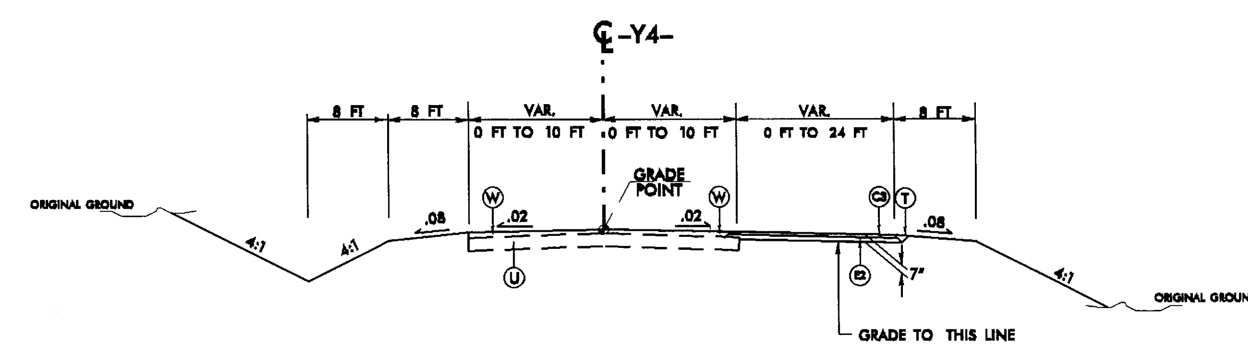
USE TYPICAL SECTION NO. 6 FROM:
-Y2- STA. 19+00 TO 23+43.73
-Y2- STA. 24+54.55 TO 28+87
-Y5- STA. 16+56 TO 20+00.07
-Y5- STA. 20+99.34 TO 26+90

(-Y2- STA. 17+00 TO 19+00 RESURFACE WITH C2 ONLY)



USE TYPICAL SECTION NO. 6A FROM:
-Y2- STA. 21+00 TO 22+08

TYPICAL SECTION NO. 6A



TYPICAL SECTION NO. 9

USE TYPICAL SECTION NO. 9 FROM:
-Y4- STA. 20+20 TO 22+29.49

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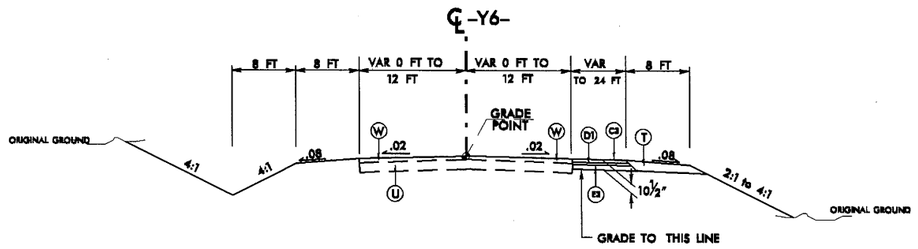
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	2-B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

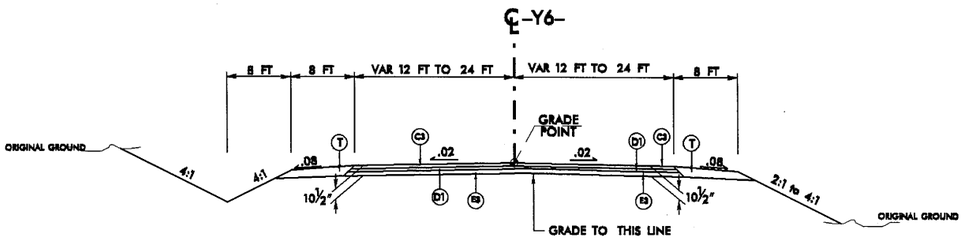
C1	2.5" S9.5A
C3	3" S9.5B
D1	2.5" I19.0B
D2	4" I19.0B
E1	3" B25.0B
E3	5" B25.0B

E6	VAR. DEPTH B25.0B
J1	8" ABC
R1	2'X6" C&G
R2	8"X12" CURB
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W	WEDGING (SEE SHT 2A)



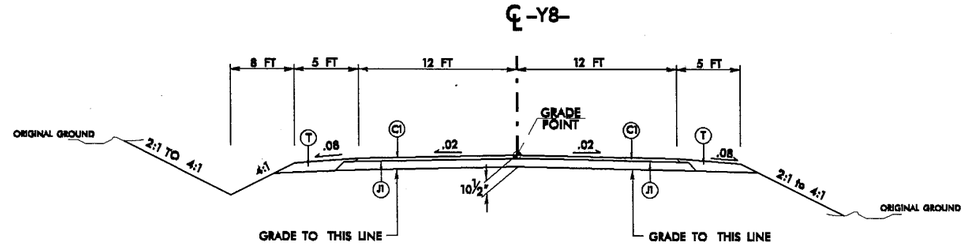
TYPICAL SECTION NO. 10

USE TYPICAL SECTION NO. 10 FROM:
-Y6- STA. 15+00 TO 16+70



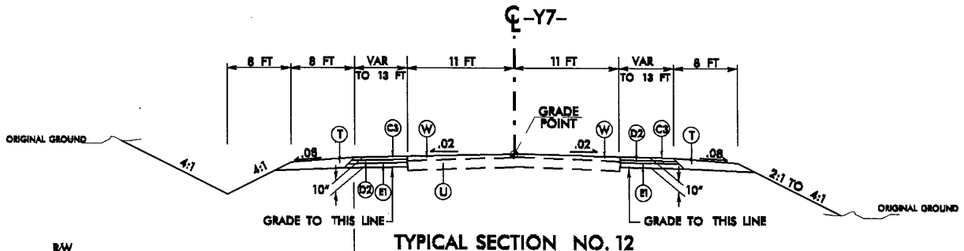
TYPICAL SECTION NO. 11

USE TYPICAL SECTION NO. 11 FROM:
-Y6- STA. 16+70 TO 21+14.40



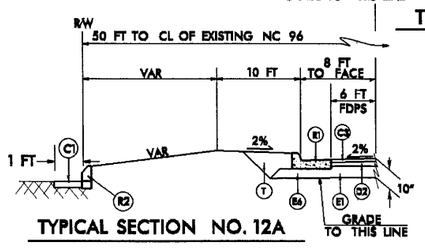
TYPICAL SECTION NO. 13

USE TYPICAL SECTION NO. 13 FROM:
-Y8- STA 10+24.02 TO 11+10



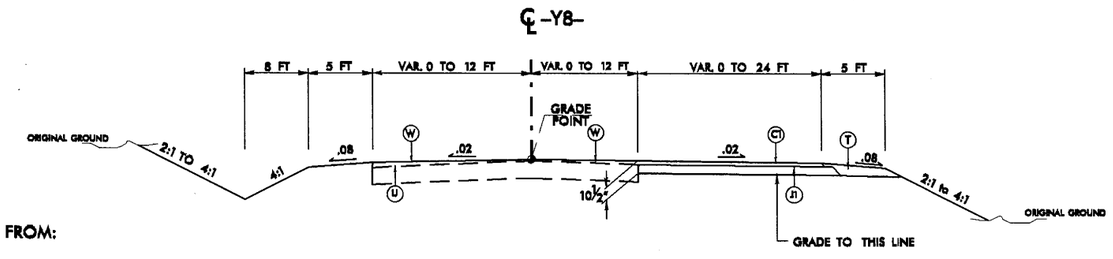
TYPICAL SECTION NO. 12

USE TYPICAL SECTION NO. 12 FROM:
-Y7- STA. 11+50 TO 14+83.59
-Y7- STA. 16+01.06 TO 19+38



TYPICAL SECTION NO. 12A

USE TYPICAL SECTION NO. 12A IN CONJUNCTION WITH TYPICAL SECTION NO. 7 FROM:
-Y7- STA 11+50 TO 13+35



TYPICAL SECTION NO. 14

USE TYPICAL SECTION NO. 14 FROM:
-Y8- STA 11+10 TO 12+55

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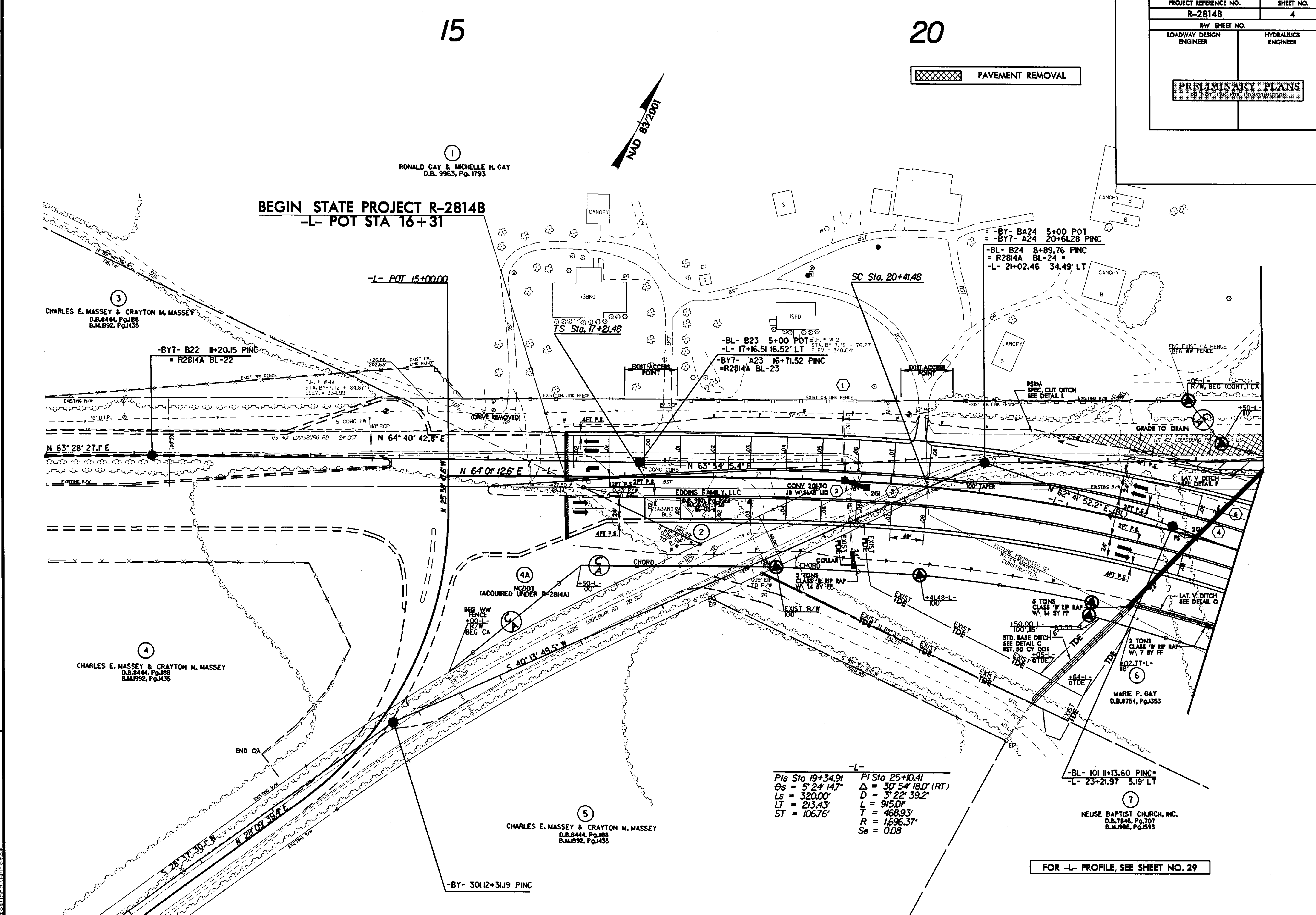
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers, woven wire fence and TDE lines on parcel no. 6 on sheets 4 and 5. NNA.



15
20
PAVEMENT REMOVAL
NAD 83/2001
RONALD GAY & MICHELLE H. GAY
D.B. 9963, Pg. 1793
BEGIN STATE PROJECT R-2814B
-L- POT STA 16+31
-L- POT 15+00.00
CHARLES E. MASSEY & CRAYTON M. MASSEY
D.B.8444, Pg.188
B.M.1992, Pg.1435
-BY7- B22 11+20.15 PINC
= R2814A BL-22
TS Sta. 17+21.48
-BL- B23 5+00 POT=
-L- 17+16.51 16.52' LT
-BY7- A23 16+71.52 PINC
=R2814A BL-23
SC Sta. 20+41.48
= -BY- BA24 5+00 POT
= -BY7- A24 20+61.28 PINC
-BL- B24 8+89.76 PINC
= R2814A BL-24 =
-L- 21+02.46 34.49' LT
CANOPY
N 63° 28' 27.1" E
N 64° 40' 42.8" E
N 64° 01' 12.6" E
N 63° 54' 15.4" E
N 82° 41' 52.2" E (BL)
N 25° 58' 45.6" W
US 401 LOUISBURG RD 24' BST
EDDINS FAMILY, LLC
CONV. 2GI TO JB W\SLAB LID
(DRIVE REMOVED)
EXIST ACCESS POINT
NCDOT
(ACQUIRED UNDER R-2814A)
BEG WW FENCE
END C/A
S 40° 13' 49.5" W
SR 2225 LOUISBURG RD 20' BST
N 28° 09' 39.4" E
S 28° 31' 10.1" W
5 TONS CLASS 'B' RIP RAP W\ 14 SY FF
2 TONS CLASS 'B' RIP RAP W\ 7 SY FF
FUTURE PROPOSED 12" WATER MAIN (NOT CONSTRUCTED)
GRADE TO DRAIN
LAT. V DITCH SEE DETAIL F
LAT. V DITCH SEE DETAIL O
STD. BASE DITCH SEE DETAIL C EST. 50 CY DDE
PSRM SPEC. CUT DITCH SEE DETAIL L
END EXIST CA FENCE BEG WW FENCE
R/W, BEG (CONT.) CA
MARIE P. GAY
D.B.8754, Pg.1353
-BL- 101 11+13.60 PINC=
-L- 23+21.97 5.19' LT
NEUSE BAPTIST CHURCH, INC.
D.B.7846, Pg.707
B.M.1996, Pg.1593
-BY- 301 12+31.19 PINC
-L-
PIs Sta 19+34.91
θs = 5° 24' 14.7"
Ls = 320.00'
LT = 213.43'
ST = 106.76'
PI Sta 25+10.41
Δ = 30° 54' 18.0" (RT)
D = 3° 22' 39.2"
L = 915.01'
T = 468.93'
R = 1,696.37'
Se = 0.08
FOR -L- PROFILE, SEE SHEET NO. 29

8/17/99

23-FEB-2010 16:08
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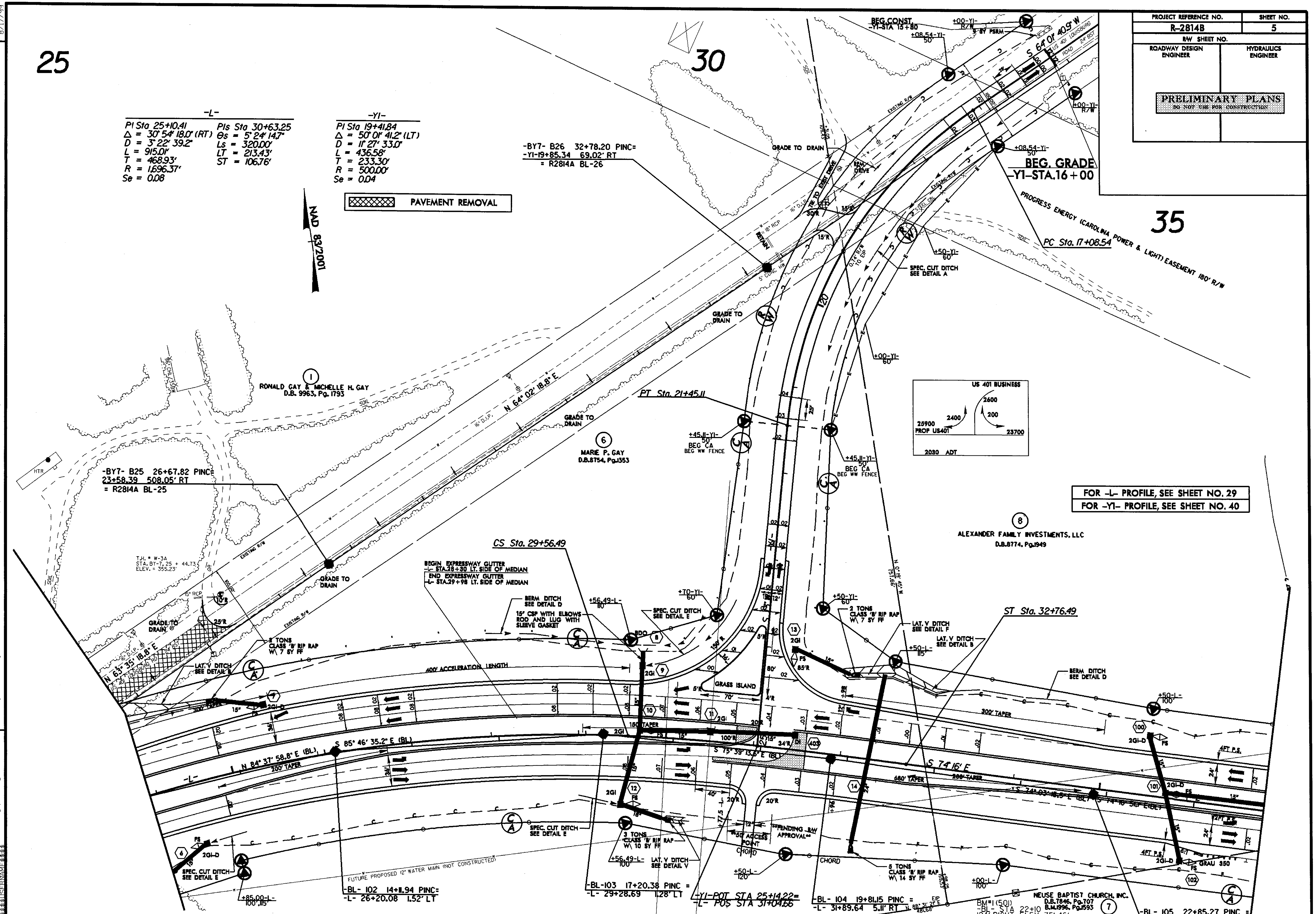
8/17/99

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and proposed woven wire fence on parcel no. 6. NNA.



PROJECT REFERENCE NO. R-2814B
SHEET NO. 5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
25
30
35
-L-
PI Sta 25+10.41
Δ = 30° 54' 18.0" (RT)
D = 3° 22' 39.2"
L = 915.01'
T = 468.93'
R = 1,696.37'
Se = 0.08
PIs Sta 30+63.25
θs = 5° 24' 14.7"
Ls = 320.00'
LT = 213.43'
ST = 106.76'
-Y1-
PI Sta 19+41.84
Δ = 50° 01' 41.2" (LT)
D = 11° 27' 33.0"
L = 436.58'
T = 233.30'
R = 500.00'
Se = 0.04
PAVEMENT REMOVAL
NAD 83/2001
-BY7- B26 32+78.20 PINC=
-Y1-19+85.34 69.02' RT
= R2814A BL-26
BEG. CONST. -Y1-STA 15+80
BEG. GRADE
-Y1-STA.16+00
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
PC Sta. 17+08.54
SPEC. CUT DITCH SEE DETAIL A
GRADE TO DRAIN
RONALD GAY & MICHELLE H. GAY D.B. 9963, Pg. 1793
MARIE P. GAY D.B.8754, Pg.1353
N 64° 02' 18.8" E
PT Sta. 21+45.11
BEG CA BEG WW FENCE
US 401 BUSINESS
25900 PROP US401
2030 ADT
23700
FOR -L- PROFILE, SEE SHEET NO. 29
FOR -Y1- PROFILE, SEE SHEET NO. 40
ALEXANDER FAMILY INVESTMENTS, LLC D.B.8774, Pg.1949
-BY7- B25 26+67.82 PINC=
23+58.39 508.05' RT
= R2814A BL-25
CS Sta. 29+56.49
BEGIN EXPRESSWAY GUTTER -L- STA.28+30 LT. SIDE OF MEDIAN
END EXPRESSWAY GUTTER -L- STA.29+98 LT. SIDE OF MEDIAN
BERM DITCH SEE DETAIL D
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
SPEC. CUT DITCH SEE DETAIL E
2 TONS CLASS 'B' RIP RAP W\ 7 SY FF
LAT. V DITCH SEE DETAIL F
LAT. V DITCH SEE DETAIL B
ST Sta. 32+76.49
GRASS ISLAND
400' ACCELERATION LENGTH
300' TAPER
150' TAPER
200' TAPER
680' TAPER
S 85° 46' 35.2" E (BL)
N 84° 37' 58.8" E (BL)
S 75° 39' 13.5" E (BL)
S 74° 16' E
3 TONS CLASS 'B' RIP RAP W\ 10 SY FF
LAT. V DITCH SEE DETAIL V
"PENDING R/W APPROVAL"
50' ACCESS POINT
CHORD
5 TONS CLASS 'B' RIP RAP W\ 14 SY FF
FUTURE PROPOSED 12" WATER MAIN (NOT CONSTRUCTED)
-BL- 102 14+11.94 PINC= -L- 26+20.08 1.52' LT
-BL-103 17+20.38 PINC = -L- 29+28.69 1.28' LT
-Y1-POT STA 25+14.22= -L- POS STA 31+04.66
-BL- 104 19+81.15 PINC = -L- 31+89.64 5.11' RT
BM#1 (501) -BL- STA 22+10 124' RIGHT ELEV. 351.46'
NEUSE BAPTIST CHURCH, INC. D.B.7846, Pg.707 B.M.1996, Pg.593
-BL- 105 22+85.27 PINC =

23-FEB-2010 16:08
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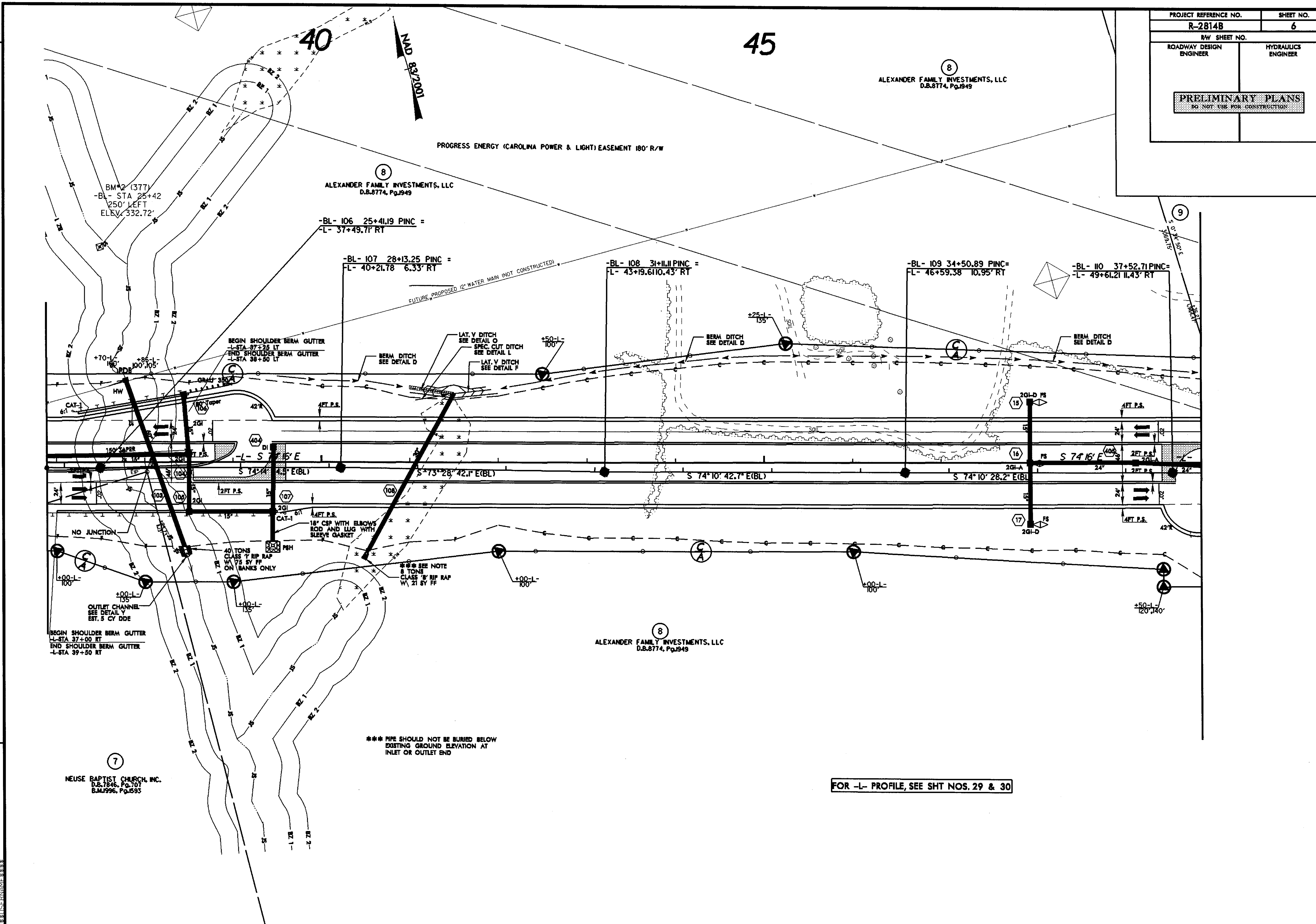
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



40
45
NAD 83/2001
8 ALEXANDER FAMILY INVESTMENTS, LLC D.B.8774, Pg.1949
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
BM#2 (377) -BL- STA 25+42 250' LEFT ELEV. 332.72'
-BL- 106 25+41.19 PINC = -L- 37+49.71' RT
-BL- 107 28+13.25 PINC = -L- 40+21.78 6.33' RT
-BL- 108 31+11.11 PINC = -L- 43+19.61 10.43' RT
-BL- 109 34+50.89 PINC= -L- 46+59.38 10.95' RT
-BL- 110 37+52.71 PINC= -L- 49+61.21 11.43' RT
FUTURE PROPOSED 12" WATER MAIN (NOT CONSTRUCTED)
BEGIN SHOULDER BERM GUTTER -L-STA 37+25 LT
END SHOULDER BERM GUTTER -L-STA 38+50 LT
BERM DITCH SEE DETAIL D
LAT. V DITCH SEE DETAIL O
SPEC. CUT DITCH SEE DETAIL L
LAT. V DITCH SEE DETAIL F
S 74°14' 4.5" E(BL)
S 73°28' 42.1" E(BL)
S 74°10' 42.7" E(BL)
S 74°10' 28.2" E(BL)
S 74°16' E
18" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
40 TONS CLASS 'I' RIP RAP W\ 75 SY FF ON BANKS ONLY
*** SEE NOTE 8 TONS CLASS 'B' RIP RAP W\ 21 SY FF
NO JUNCTION
OUTLET CHANNEL SEE DETAIL Y EST. 5 CY DDE
BEGIN SHOULDER BERM GUTTER -L-STA 37+00 RT
END SHOULDER BERM GUTTER -L-STA 39+50 RT
8 ALEXANDER FAMILY INVESTMENTS, LLC D.B.8774, Pg.1949
7 NEUSE BAPTIST CHURCH, INC. D.B.7846, Pg.707 B.M.1996, Pg.1593
*** PIPE SHOULD NOT BE BURIED BELOW EXISTING GROUND ELEVATION AT INLET OR OUTLET END

FOR -L- PROFILE, SEE SHT NOS. 29 & 30

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W Markers and proposed woven wire fence on parcel nos. 8 and 9. Added PDE on parcel no. 8.NNA.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SR 2226 JONESVILLE RD.
5900 / 200 / 500 / 23700 PROP US401 / 24600 / 1600 / 2200 / 9000
2030 ADT

MATCH LINE A (BELOW LT)

BEGIN GRADE
-Y2-STA 19+00

50 55 60

NAD 83/2001

(9) CLAIRE P. SCARBORO
D.B. 07-E Pg.2280

(12) BOBBY L. MURRAY HEIRS
D.B.8902,Pg.2630
B.M.1998, Pg.129
B.M.1999, Pg.2071

(11) EDWARD W. SCARBORO ET UX
D.B.2491, Pg.586
B.M. 1977, Pg. 218

(13) SPENCER PULLEY HEIRS
NO DEED FOUND

-Y2-
PI Sta 16+96.34
Δ = 16° 13' 02.7" (LT)
D = 1° 54' 35.5"
L = 849.14'
T = 427.43'
R = 3,000.00'
Se = 0.04

-BYI- 306 18+33.04 PINC=
-Y2-21+13.66 15.09' RT
-Y2-PT STA 21+18.05

-L-POT STA 58+04.54=
-Y2-POT STA 23+99.14

-BL-III 39+83.85 PINC=
-L- 51+92.34 12.86' RT

-BL- 112 45+80.67 PINC=
-L- 57+89.15 16.74' RT
= -BYI- 21+24.68 PINC

-BL- 113 48+61.44 PINC=
-L- 60+69.92 17.59' RT

-BYI- 307 26+22.29 PINC=
-Y2-29+02.76 15.53' RT

ROCK CROSS VANE SEE DETAIL SHEET 2-D
GRADE TO DRAIN
STD. BASE DITCH SEE DETAIL AG
BEGIN SHOULDER BERM GUTTER -L- STA.82+50 LT.
END SHOULDER BERM GUTTER -Y2- STA.22+08 RT.
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
BERM DITCH SEE DETAIL D
TOE PROTECTION SEE DETAIL I
4' LAT. BASE DITCH SEE DETAIL K
STD. BASE DITCH SEE DETAIL N
LAT. V DITCH SEE DETAIL F
PLUG & FILL W\FLOWABLE FILL
LAT. V DITCH SEE DETAIL M
15 TONS CLASS 'I' RIP RAP W\ 30 SY FF
8 TONS CLASS 'B' RIP RAP W\ 14 SY FF
2' LAT. BASE DITCH SEE DETAIL G
2' LAT. GRASS SWALE SEE DETAIL H PLACE 6 TONS CLASS 'B' RIP RAP W\ 16 SY FF AT DITCH TIE IN
57 TONS CLASS 'I' RIP RAP W\ 104 SY FF ON BANKS ONLY SEE DETAIL V
2' LAT. GRASS SWALE SEE DETAIL J
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
PLACE 7 TONS CLASS 'B' RIP RAP W\ 17 SY FF AT DITCH TIE IN
6 TONS CLASS 'B' RIP RAP W\ 12 SY FF
5 TONS CLASS 'B' RIP RAP W\ 14 SY FF
GRAU 350
180' Taper
DRAIN POND
NO JUNCTION
380' TAPER
300' TAPER
200' TAPER
4FT P.S.
2FT P.S.
2GI
2GI-A
2GI-D
CAT-1
RIP RAP
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180' R/W
END RESURF. -Y2- STA 28+87
END CONST -Y2-STA 29+00
END WW FENCE +00-Y2- 60' EXIST.R/W END CA
+70-Y2-END WW FENCE 60' END CA
BM#3 (513) -BL- STA 43+25 231' RIGHT ELEV. 304.30'

FOR -L- PROFILE, SEE SHEET NO. 30
FOR -Y2- PROFILE, SEE SHEET NO. 40

(8) ALEXANDER FAMILY INVESTMENTS, LLC
D.B.8774, Pg.949

(9) EDWARD W. SCARBORO ET UX
D.B.2491, Pg.586
B.M.1977, Pg.218

INSET A
MATCH LINE A (ABOVE)

REVISIONS
January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcels nos.8 and 9.NWA.

8/17/99

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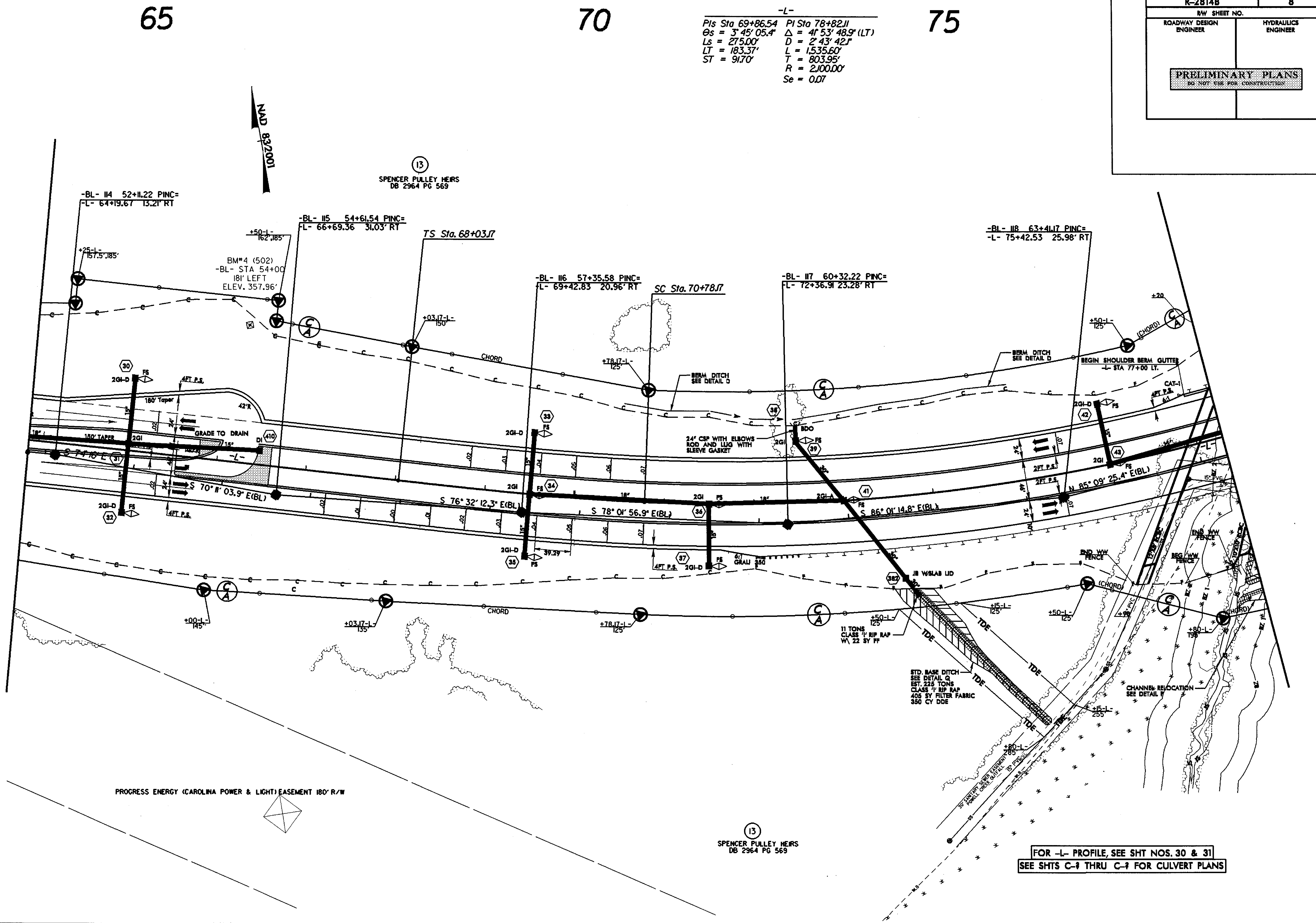
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


65
70
75
-L-
PIs Sta 69+86.54
Θs = 3° 45′ 05.4″
Ls = 275.00′
LT = 183.37′
ST = 91.70′
PI Sta 78+82.11
Δ = 41° 53′ 48.9″ (LT)
D = 2° 43′ 42.1″
L = 1,535.60′
T = 803.95′
R = 2,100.00′
Se = 0.07
NAD 83/2001
13
SPENCER PULLEY HEIRS
DB 2964 PG 569
-BL- 114 52+11.22 PINC=
-L- 64+19.67 13.21′ RT
-BL- 115 54+61.54 PINC=
-L- 66+69.36 31.03′ RT
TS Sta. 68+03.17
BM#4 (502)
-BL- STA 54+00
181′ LEFT
ELEV. 357.96′
-BL- 116 57+35.58 PINC=
-L- 69+42.83 20.96′ RT
SC Sta. 70+78.17
-BL- 117 60+32.22 PINC=
-L- 72+36.91 23.28′ RT
-BL- 118 63+41.17 PINC=
-L- 75+42.53 25.98′ RT
CHORD
BERM DITCH
SEE DETAIL D
BEGIN SHOULDER BERM GUTTER
-L- STA 77+00 LT.
GRADE TO DRAIN
180′ Taper
150′ TAPER
24″ CSP WITH ELBOWS
ROD AND LUG WITH
SLEEVE GASKET
S 70° 11′ 03.9″ E(BL)
S 76° 32′ 12.3″ E(BL)
S 78° 01′ 56.9″ E(BL)
S 86° 01′ 14.8″ E(BL)
N 85° 09′ 25.4″ E(BL)
JB W/SLAB LID
11 TONS
CLASS 'I' RIP RAP
W\ 22 SY FF
STD. BASE DITCH
SEE DETAIL Q
EST. 225 TONS
CLASS 'I' RIP RAP
405 SY FILTER FABRIC
350 CY DDE
END WW FENCE
BEG WW FENCE
CHANNEL RELOCATION
SEE DETAIL F
TDE
PROGRESS ENERGY (CAROLINA POWER & LIGHT) EASEMENT 180′ R/W
13
SPENCER PULLEY HEIRS
DB 2964 PG 569

FOR -L- PROFILE, SEE SHT NOS. 30 & 31
SEE SHTS C-# THRU C-# FOR CULVERT PLANS

8/17/99

REVISIONS

January 11, 2010: Adjusted R/W -CA lines, R/W markers and the proposed woven wire fence on parcel no.13.NNA.

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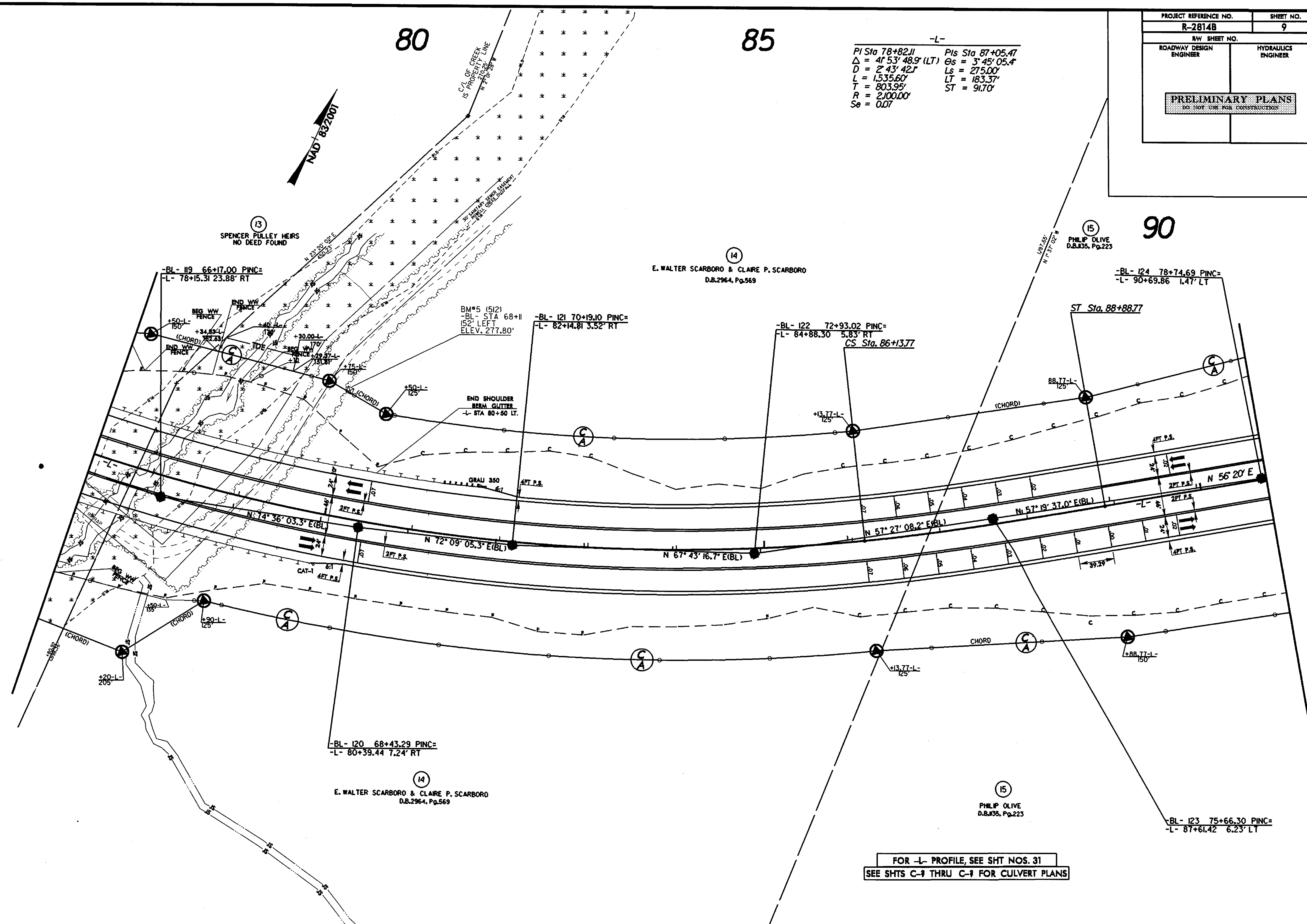
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



80
85
90
NAD 83/2001
C/L OF CREEK IS PROPERTY LINE
-L-
PI Sta 78+82.11
Δ = 41° 53' 48.9" (LT)
D = 2° 43' 42.1"
L = 1,535.60'
T = 803.95'
R = 2,100.00'
Se = 0.07
PIs Sta 87+05.47
θs = 3° 45' 05.4"
Ls = 275.00'
LT = 183.37'
ST = 91.70'
13
SPENCER PULLEY HEIRS
NO DEED FOUND
14
E. WALTER SCARBORO & CLAIRE P. SCARBORO
D.B.2964, Pg.569
15
PHILIP OLIVE
D.B.1135, Pg.223
-BL- 119 66+17.00 PINC=
-L- 78+15.31 23.88' RT
BM#5 (5121)
-BL- STA 68+11
152' LEFT
ELEV. 277.80'
-BL- 121 70+19.10 PINC=
-L- 82+14.81 3.52' RT
-BL- 122 72+93.02 PINC=
-L- 84+88.30 5.83' RT
CS Sta. 86+13.77
ST Sta. 88+88.77
-BL- 124 78+74.69 PINC=
-L- 90+69.86 1.47' LT
END SHOULDER BERM GUTTER
-L- STA 80+60 LT.
GRAU 350
N 74° 36' 03.3" E(BL)
N 72° 09' 05.3" E(BL)
N 67° 43' 16.7" E(BL)
N 57° 27' 08.2" E(BL)
N 57° 19' 37.0" E(BL)
N 56° 20' E
-BL- 120 68+43.29 PINC=
-L- 80+39.44 7.24' RT
-BL- 123 75+66.30 PINC=
-L- 87+61.42 6.23' LT

FOR -L- PROFILE, SEE SHT NOS. 31
SEE SHTS C-# THRU C-# FOR CULVERT PLANS

REVISIONS

January 11, 2010: Added TDE on parcel no.14, NNA.

8/17/99

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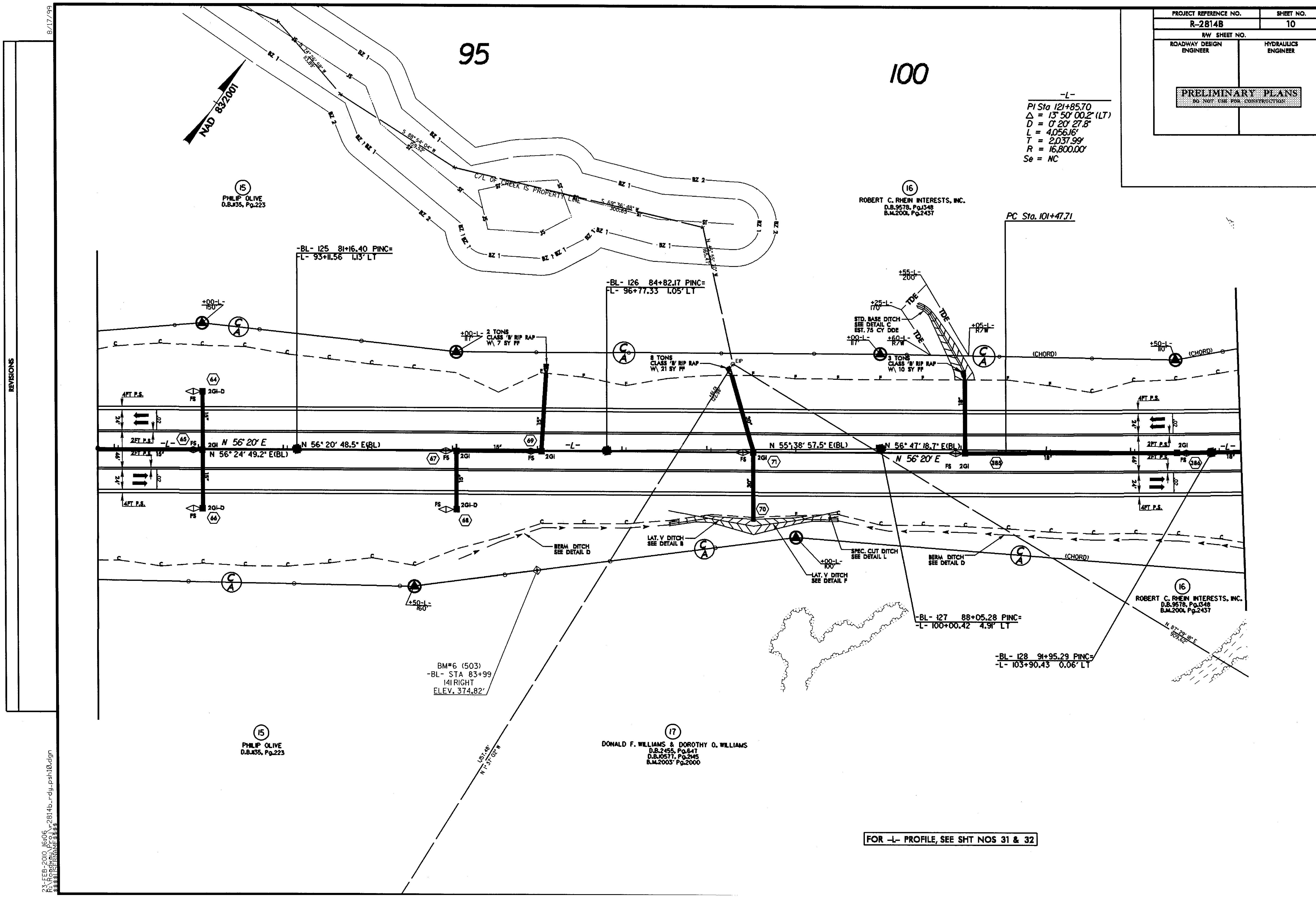

PROJECT REFERENCE NO.
R-2814B
SHEET NO.
10
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
95
100
NAD 83/2001
-L-
PI Sta 121+85.70
Δ = 13° 50' 00.2" (LT)
D = 0° 20' 27.8"
L = 4,056.16'
T = 2,037.99'
R = 16,800.00'
Se = NC
C/L OF CREEK IS PROPERTY LINE
15
PHILIP OLIVE
D.B.135, Pg.223
16
ROBERT C. RHEIN INTERESTS, INC.
D.B.9578, Pg.1348
B.M.2001, Pg.2437
17
DONALD F. WILLIAMS & DOROTHY O. WILLIAMS
D.B.2455, Pg.647
D.B.10577, Pg.2145
B.M.2003, Pg.2000
PC Sta. 101+47.71
-BL- 125 81+16.40 PINC=
-L- 93+11.56 1.13' LT
-BL- 126 84+82.17 PINC=
-L- 96+77.33 1.05' LT
-BL- 127 88+05.28 PINC=
-L- 100+00.42 4.91' LT
-BL- 128 91+95.29 PINC=
-L- 103+90.43 0.06' LT
N 56° 20' E
N 56° 24' 49.2" E(BL)
N 56° 20' 48.5" E(BL)
N 55° 38' 57.5" E(BL)
N 56° 47' 18.7" E(BL)
2 TONS CLASS 'B' RIP RAP W\ 7 SY FF
8 TONS CLASS 'B' RIP RAP W\ 21 SY FF
3 TONS CLASS 'B' RIP RAP W\ 10 SY FF
STD. BASE DITCH SEE DETAIL C EST. 75 CY DDE
LAT. V DITCH SEE DETAIL B
LAT. V DITCH SEE DETAIL F
SPEC. CUT DITCH SEE DETAIL L
BERM DITCH SEE DETAIL D
(CHORD)
4FT P.S.
2FT P.S.
2GI
2GI-D
FS
TDE
BM#6 (503)
-BL- STA 83+99
141 RIGHT
ELEV. 374.82'
FOR -L- PROFILE, SEE SHT NOS 31 & 32
REVISIONS
8/17/99
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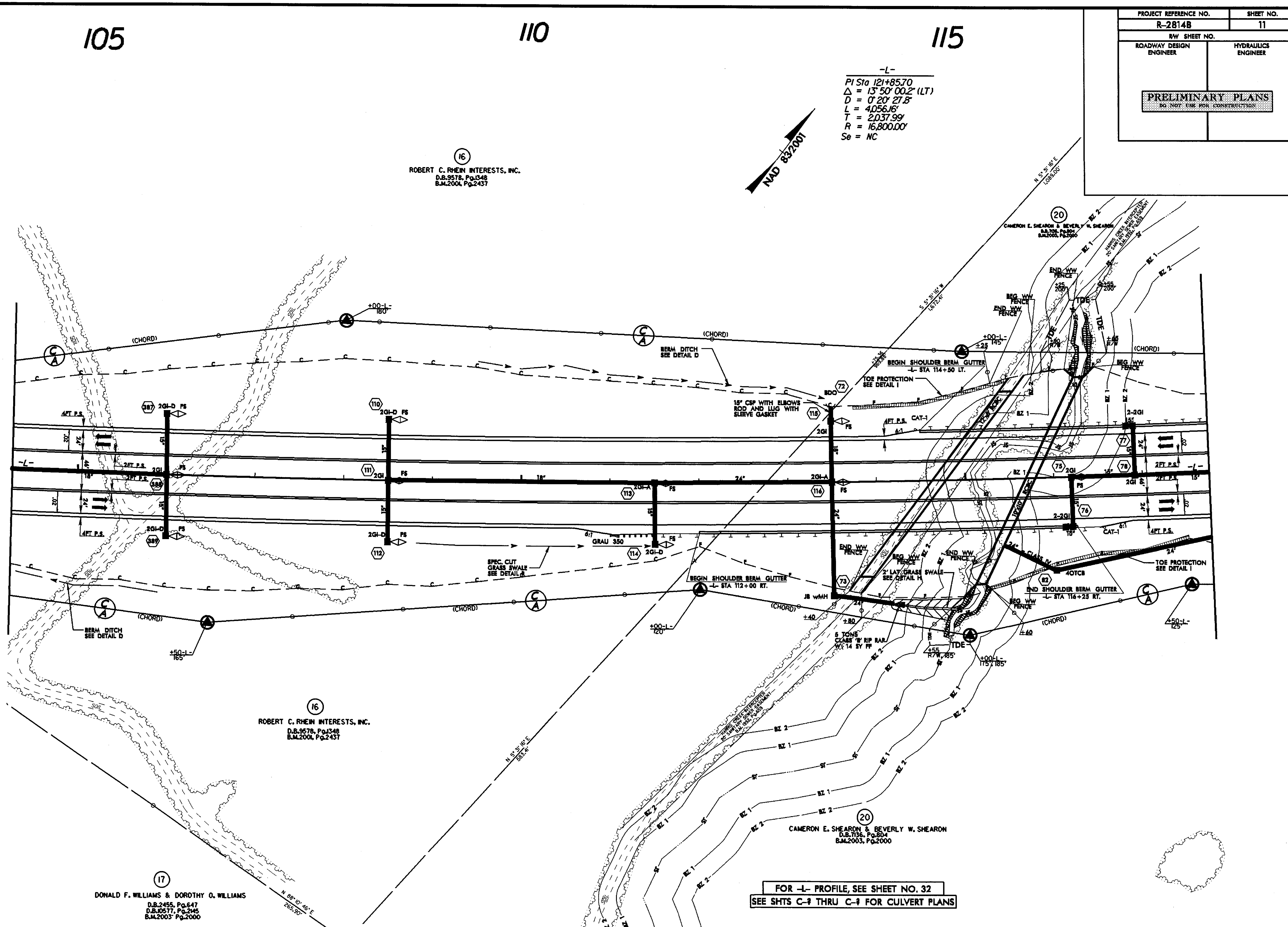
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



105
110
115
-L-
PI Sta 121+85.70
Δ = 13° 50' 00.2" (LT)
D = 0° 20' 27.8"
L = 4,056.16'
T = 2,037.99'
R = 16,800.00'
Se = NC
NAD 83/2001
16
ROBERT C. RHEIN INTERESTS, INC.
D.B.9578, Pg.1348
B.M.2001, Pg.2437
20
CAMERON E. SHEARON & BEVERLY W. SHEARON
D.B.7136, Pg.804
B.M.2003, Pg.2000
17
DONALD F. WILLIAMS & DOROTHY O. WILLIAMS
D.B.2455, Pg.647
D.B.10577, Pg.2145
B.M.2003' Pg.2000
BERM DITCH SEE DETAIL D
SPEC. CUT GRASS SWALE SEE DETAIL
BEGIN SHOULDER BERM GUTTER -L- STA 114+50 LT.
BEGIN SHOULDER BERM GUTTER -L- STA 112+00 RT.
END SHOULDER BERM GUTTER -L- STA 116+25 RT.
TOE PROTECTION SEE DETAIL I
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
2' LAT. GRASS SWALE SEE DETAIL H
5 TONS CLASS 'B' RIP RAP W/ 14 SY FF
BEG WW FENCE
END WW FENCE
TDE
GRAU 350
(CHORD)

FOR -L- PROFILE, SEE SHEET NO. 32

SEE SHTS C-# THRU C-# FOR CULVERT PLANS

REVISIONS

06/16/09: Added TDE upstream and downstream around the culvert on parcel 20.

8/17/99

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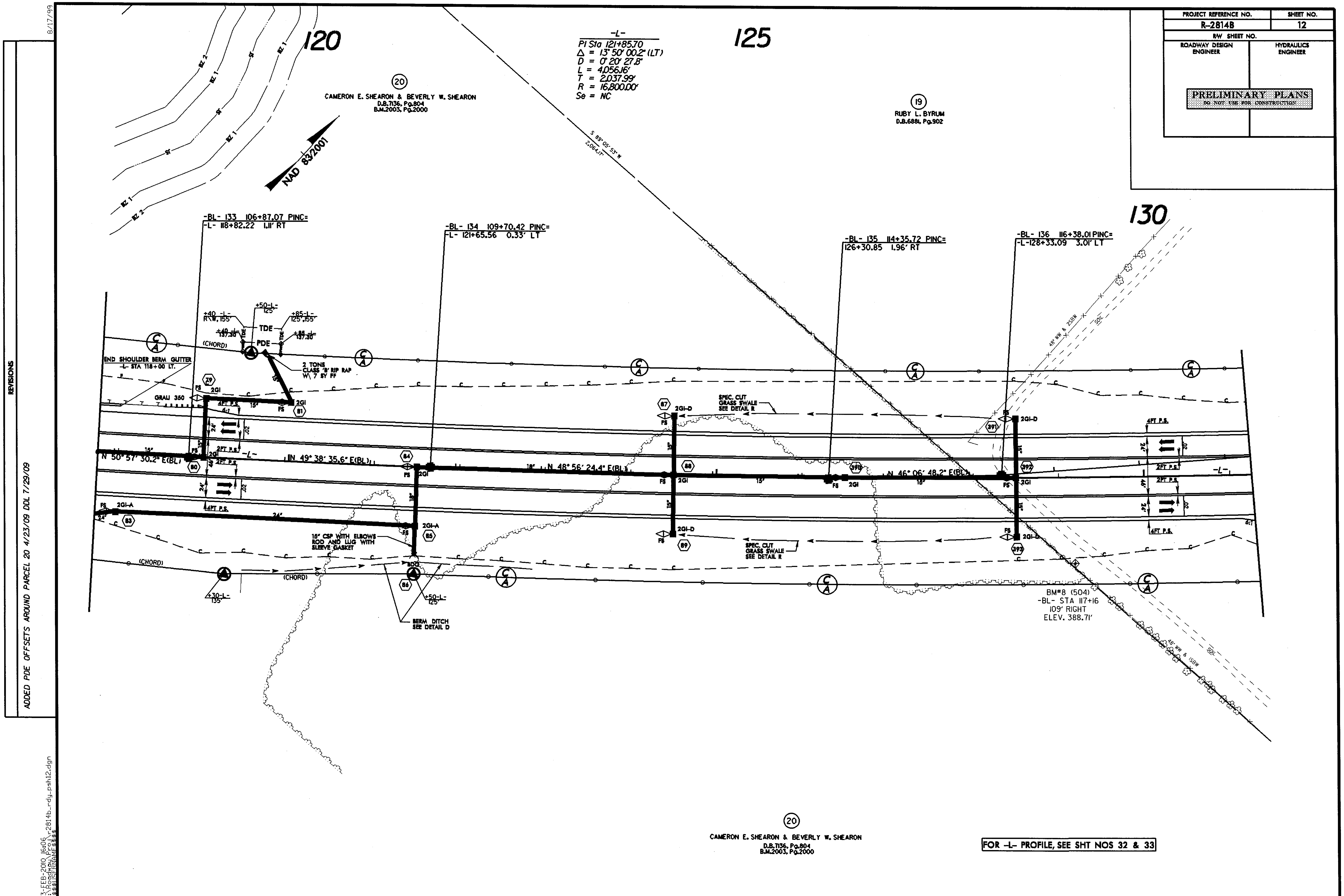

PROJECT REFERENCE NO.
R-2814B
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
120
125
130
-L-
PI Sta 121+85.70
Δ = 13° 50' 00.2" (LT)
D = 0° 20' 27.8"
L = 4,056.16'
T = 2,037.99'
R = 16,800.00'
Se = NC
CAMERON E. SHEARON & BEVERLY W. SHEARON
D.B.7136, Pg.804
B.M.2003, Pg.2000
RUBY L. BYRUM
D.B.6881, Pg.902
NAD 83/2001
-BL- 133 106+87.07 PINC=
-L- 118+82.22 1.11' RT
-BL- 134 109+70.42 PINC=
-L- 121+65.56 0.33' LT
-BL- 135 114+35.72 PINC=
126+30.85 1.96' RT
-BL- 136 116+38.01 PINC=
-L-128+33.09 3.01' LT
END SHOULDER BERM GUTTER
-L- STA 118+00 LT.
2 TONS CLASS 'B' RIP RAP W\ 7 SY FF
SPEC. CUT GRASS SWALE SEE DETAIL R
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
BERM DITCH SEE DETAIL D
N 50° 57' 30.2" E(BL)
N 49° 38' 35.6" E(BL)
N 48° 56' 24.4" E(BL)
N 46° 06' 48.2" E(BL)
BM#8 (504)
-BL- STA 117+16
109' RIGHT
ELEV. 388.71'
FOR -L- PROFILE, SEE SHT NOS 32 & 33
REVISIONS
ADDED PDE OFFSETS AROUND PARCEL 20 4/23/09 DDL 7/29/09
8/17/99
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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
8/17/99
REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

135

140

-L-
PI Sta 121+85.70
Δ = 13° 50' 00.2" (LT)
D = 0° 20' 27.8"
L = 4,056.16'
T = 2,037.99'
R = 16,800.00'
Se = NC

NAD 83/2001

(19) RUBY L. BYRUM
D.B.6881, Pg.902

(21) MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST
D.B.5695, Pg.745
B.M.1936, Pg.60

N 60° 23' 58" E
250.00'

N 50° 41' 02" E
400.00'

=R2814B-10 (GPS)
-BL- 10 130+16.86 PINC=
-L- 142+13.60 42.24' LT

PT Sta. 142+03.88

57 TONS CLASS 'A' RIP RAP W\ 104 SY FF ON BANKS ONLY

RBM#9 (349)
-BL- STA 132+60
210' LEFT
ELEV. 364.97'

CONC MON

FILL EXISTING CHANNEL

+00-L-
180

+03.88-L-
125

2' LAT. BASE DITCH SEE DETAIL V

TOE PROTECTION SEE DETAIL I

BEGIN SHOULDER BERM GUTTER -L- STA. 133+50 LT.

4FT P.S.

CAT-1

2GI

N 43° 11' 30.4" E(BL)

2FT P.S.

2GI-D

GRAU 350

BEGIN SHOULDER BERM GUTTER -L- STA. 133+00 RT.

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

2 TONS CLASS 'B' RIP RAP W\ 7 SY FF

LAT. V DITCH SEE DETAIL F

+60-L-
125

3 TONS CLASS 'B' RIP RAP W\ 11 SY FF

(CHORD)

+50-L-
140

2 TONS CLASS 'B' RIP RAP W\ 7 SY FF

+00-L-
140

2' LAT. BASE DITCH SEE DETAIL AH

+00-L-
125

2 TONS CLASS 'B' RIP RAP W\ 7 SY FF

LAT. V DITCH SEE DETAIL B

+03.88-L-
125

N 48° 22' 56.2" E

OUTLET CHANNEL SEE DETAIL Y
EST. 10 CY DDE

N 42° 20' 02" E(BL)

L2FT P.S.

N 42° 30' E

2' LAT. GRASS SWALE WITH EARTH BERM SEE DETAIL X

2 TONS CLASS 'B' RIP RAP W\ 7 SY FF

-BL- 138 132+04.66 PINC=
-L- 144+00.41 23.00' LT

S 42° 47' E
850.58'

(19) RUBY L. BYRUM
D.B.6881, Pg.902

(22) CAMERON E. SHEARON & BEVERLY W. SHEARON
DB 12258 PG 1051

FOR -L- PROFILE, SEE SHEET NO. 33

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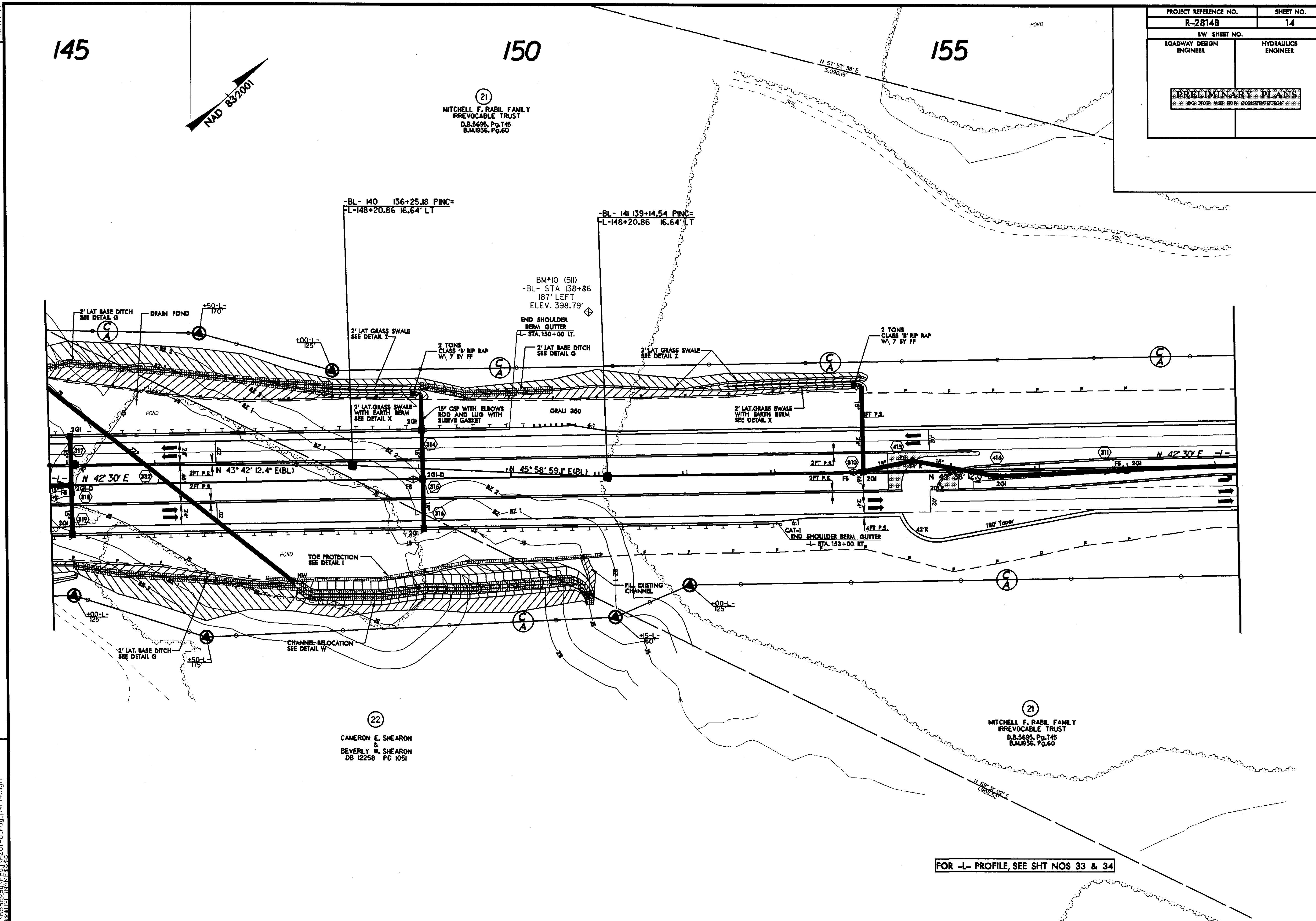

PROJECT REFERENCE NO.
R-2814B
SHEET NO.
14
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
145
150
155
NAD 83/2001
21
MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST
D.B.5695, Pg.745
B.M.1936, Pg.60
-BL- 140 136+25.18 PINC=
-L-148+20.86 16.64' LT
-BL- 141 139+14.54 PINC=
-L-148+20.86 16.64' LT
BM#10 (511)
-BL- STA 138+86
187' LEFT
ELEV. 398.79'
N 57° 53' 38" E
3,090.19'
2' LAT BASE DITCH SEE DETAIL G
DRAIN POND
2' LAT GRASS SWALE SEE DETAIL Z
2 TONS CLASS 'B' RIP RAP W\ 7 SY FF
END SHOULDER BERM GUTTER -L- STA. 150+00 LT.
2' LAT BASE DITCH SEE DETAIL G
2' LAT GRASS SWALE SEE DETAIL Z
2' LAT.GRASS SWALE WITH EARTH BERM SEE DETAIL X
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
GRAU 350
N 42° 30' E
N 43° 42' 12.4" E(BL)
N 45° 58' 59.1" E(BL)
TOE PROTECTION SEE DETAIL I
FILL EXISTING CHANNEL
CHANNEL RELOCATION SEE DETAIL W
END SHOULDER BERM GUTTER -L- STA. 153+00 RT.
180' Taper
22
CAMERON E. SHEARON
&
BEVERLY W. SHEARON
DB 12258 PG 1051
N 69° 31' 02" E
FOR -L- PROFILE, SEE SHT NOS 33 & 34

REVISIONS

REVISED NAMES ON PARCEL 22 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

160 165 170

UNDER CONSTRUCTION

NAD 83/2001

SR 1003 ROLESVILLE RD.
6700 100 23300 11200
24600 PROP US401 800
3000 2400
2030 ADT

NEW CURB BY DEVELOPER

-Y3-
PI Sta 17+69.83
Δ = 1° 09' 01.7" (LT)
D = 0° 31' 15.1"
L = 220.87'
T = 110.44'
R = 11,000.00'
Se= NC

RETAIN

RETAIN EXIST. CB

+10-Y1- 50', EXIST R/W

+71-Y3- 60', EXIST R/W END CA BEG WW FENCE

BEGIN CONST -Y3-STA 15+71

-BL- 142 152+70.51 PINC=
-L- 164+65.65 3.81' RT

BM=11 (505)
-BL- STA 154+12
389' LEFT
ELEV. 423.71'

PC Sta. 16+59.39

PT Sta. 18+80.26

(25) KATHLEEN W. SHEARON D.B.1287, Pg.480

(26) ROBERT ROGERS D.B.1299, Pg.468

(27) JANIE P. PULLEY D.B.1834, Pg.463

(23) JAMES & PHYLLIS PULLEY D.B.1642, Pg.542

(28) ROBERT ARTHUR ALEXANDER & KELLY STELL ALEXANDER D.B.3912, Pg.705

(21) MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST D.B.5695, Pg.745 B.M.1936, Pg.60

(29) SCARBORO FAMILY LIMITED PARTNERSHIP D.B.7436, Pg.445 B.M.1967, Pg.159

-BL- 150+72.68 PINC=
-L-162+67.83 3.70' RT
-BY2- 309 14+76.91 PINC
-BY3- 5+00.00 POT

-L-POT STA 162+83.02=
-Y3-POT STA 19+61.18

-BL- 143 159+05.29 PINC=
-L-170+80.38 162.11' RT

MATCH SHEET 28

MATCH SHEET 16

PAVEMENT REMOVAL
FOR -L- PROFILE, SEE SHEET NO. 34
FOR -Y3- PROFILE, SEE SHEET NO. 41

REVISIONS
January 11,2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no.28.NWA.

8/17/99

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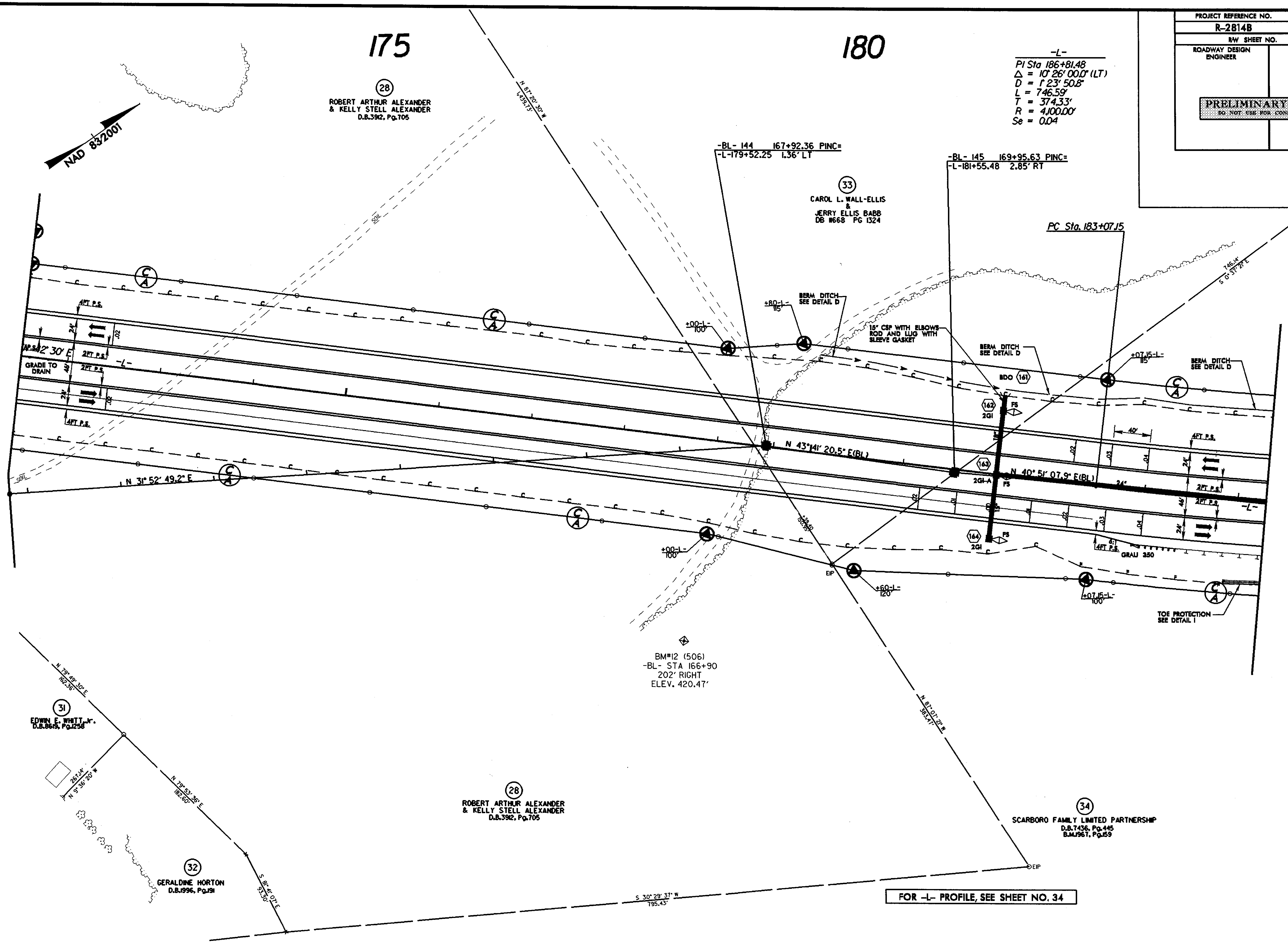
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



175
180
NAD 83/2001
28
ROBERT ARTHUR ALEXANDER & KELLY STELL ALEXANDER D.B.3912, Pg.705
-L-
PI Sta 186+81.48
Δ = 10° 26' 00.0" (LT)
D = 1° 23' 50.8"
L = 746.59'
T = 374.33'
R = 4,100.00'
Se = 0.04
-BL- 144 167+92.36 PINC= -L-179+52.25 1.36' LT
-BL- 145 169+95.63 PINC= -L-181+55.48 2.85' RT
33
CAROL L. WALL-ELLIS & JERRY ELLIS BABB DB 1668 PG 1324
PC Sta. 183+07.15
BERM DITCH SEE DETAIL D
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
GRADE TO DRAIN
4FT P.S.
2FT P.S.
N 43°41' 20.5" E(BL)
N 40° 51' 07.9" E(BL)
N 31° 52' 49.2" E
TOE PROTECTION SEE DETAIL I
BM#12 (506) -BL- STA 166+90 202' RIGHT ELEV. 420.47'
31
EDWIN E. WHITT, Jr. D.B.8615, Pg.1258
32
GERALDINE HORTON D.B.1996, Pg.191
34
SCARBORO FAMILY LIMITED PARTNERSHIP D.B.7436, Pg.445 B.M.1967, Pg.159
S 30° 29' 37" W 795.43'

FOR -L- PROFILE, SEE SHEET NO. 34

REVISIONS

REVISED NAMES ON PARCEL 33 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

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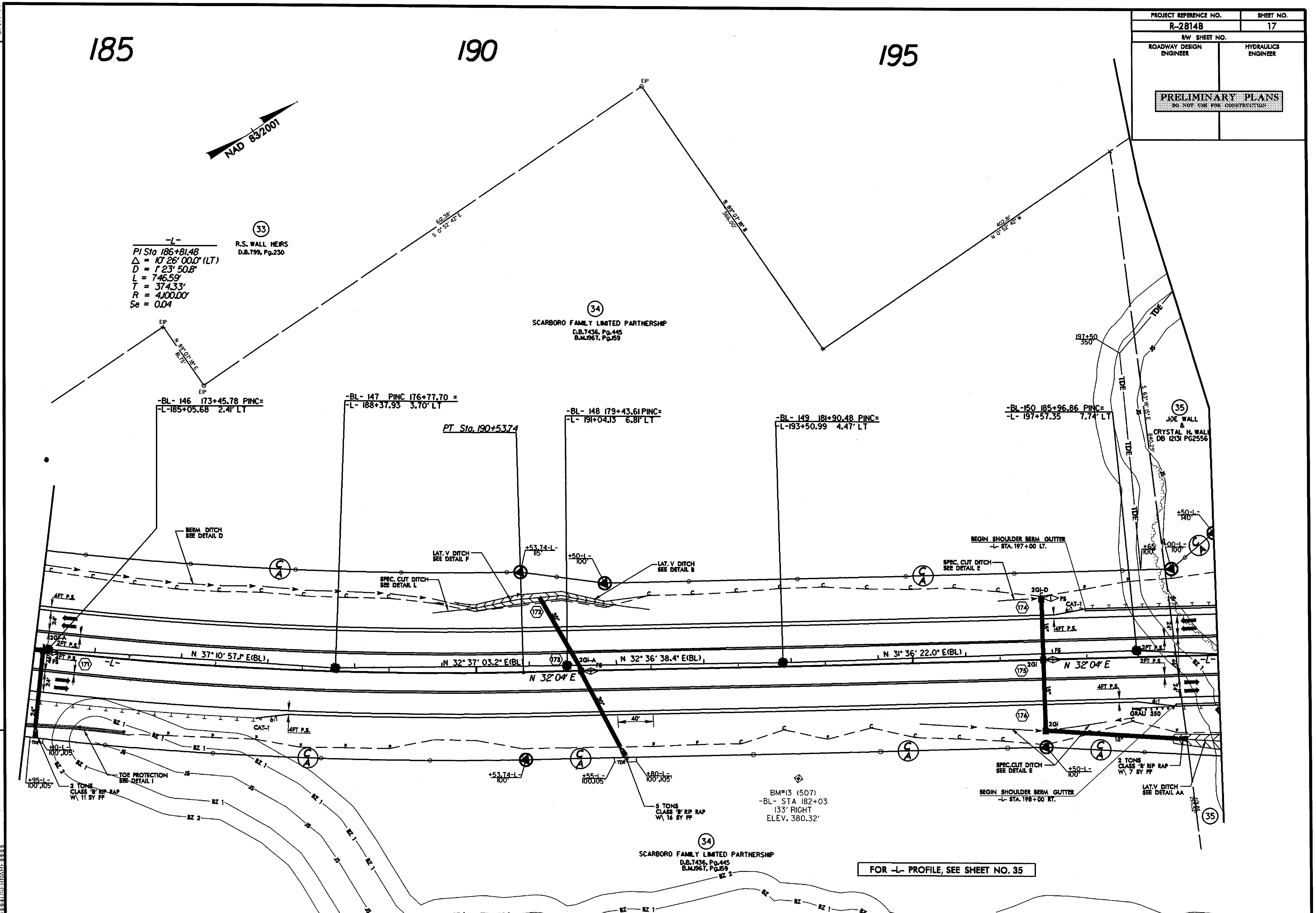
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
REVISED NAMES ON PARCEL 35 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99



185
190
195
NAD 83/2001
-L-
PI Sta 186+81.48
Δ = 10° 26' 00.0" (LT)
D = 1° 23' 50.8"
L = 746.59'
T = 374.33'
R = 4,100.00'
Se = 0.04
33
R.S. WALL HEIRS
D.B.799, Pg.230
34
SCARBORO FAMILY LIMITED PARTNERSHIP
D.B.7436, Pg.445
B.M.1967, Pg.159
35
JOE WALL
&
CRYSTAL H. WALL
DB 12131 PG2556
EIP
-BL- 146 173+45.78 PINC=
-L-185+05.68 2.41' LT
-BL- 147 PINC 176+77.70 =
-L- 188+37.93 3.70' LT
PT Sta. 190+53.74
-BL- 148 179+43.61 PINC=
-L- 191+04.13 6.81' LT
-BL- 149 181+90.48 PINC=
-L-193+50.99 4.47' LT
-BL-150 185+96.86 PINC=
-L- 197+57.35 7.74' LT
197+50
350
BERM DITCH
SEE DETAIL D
LAT. V DITCH
SEE DETAIL F
SPEC. CUT DITCH
SEE DETAIL L
LAT. V DITCH
SEE DETAIL B
SPEC. CUT DITCH
SEE DETAIL E
BEGIN SHOULDER BERM GUTTER
-L- STA. 197+00 LT.
N 37° 10' 57.1" E(BL)
N 32° 37' 03.2" E(BL)
N 32° 36' 38.4" E(BL)
N 31° 36' 22.0" E(BL)
N 32° 04' E
TDE
4FT P.S.
2FT P.S.
2GI-A
2GI-D
2GI
CAT-1
6:1
TOE PROTECTION
SEE DETAIL I
3 TONS
CLASS 'B' RIP RAP
W\ 11 SY FF
5 TONS
CLASS 'B' RIP RAP
W\ 16 SY FF
2 TONS
CLASS 'B' RIP RAP
W\ 7 SY FF
BM#13 (507)
-BL- STA 182+03
133' RIGHT
ELEV. 380.32'
SPEC.CUT DITCH
SEE DETAIL E
BEGIN SHOULDER BERM GUTTER
-L- STA. 198+00 RT.
LAT.V DITCH
SEE DETAIL AA
FOR -L- PROFILE, SEE SHEET NO. 35

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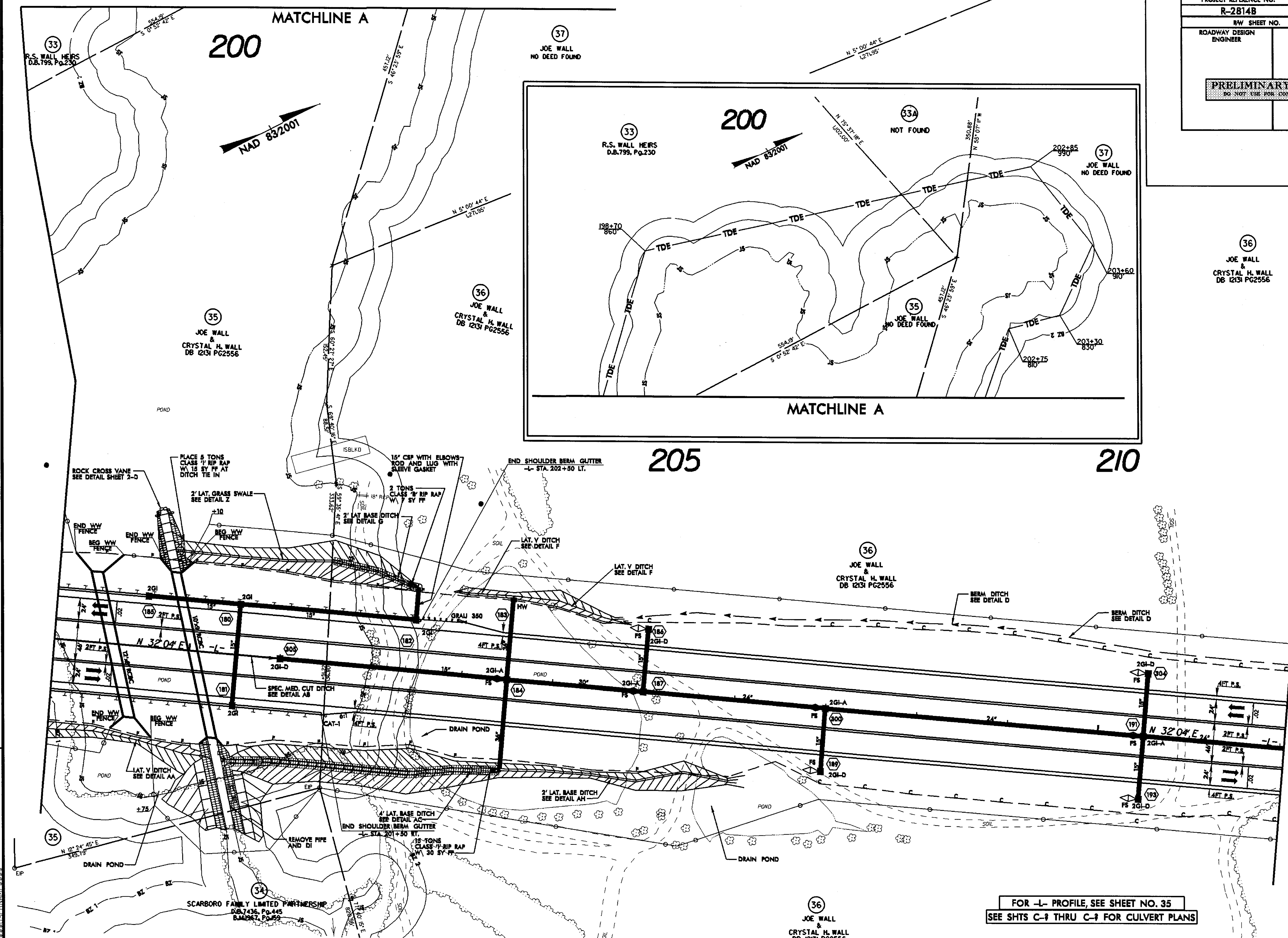
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

REVISED NAMES ON PARCELS 35 AND 36 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



MATCHLINE A
200
205
210
NAD 83/2001
33
R.S. WALL HEIRS
D.B.799, Pg.230
33A
NOT FOUND
37
JOE WALL
NO DEED FOUND
35
JOE WALL
&
CRYSTAL H. WALL
DB 12131 PG2556
36
JOE WALL
&
CRYSTAL H. WALL
DB 12131 PG2556
34
SCARBORO FAMILY LIMITED PARTNERSHIP
D.B.7436, Pg.445
B.M.1967, Pg.159
N 5° 00' 44" E
1,271.95'
S 0° 52' 42" E
554.19'
S 46° 23' 59" E
457.12'
N 55° 07' 11" W
350.88'
N 75° 37' 18" E
1,102.00'
N 12° 24' 45" E
345.19'
198+70
860
202+85
990
203+60
910
203+30
830
202+75
810
TDE
N 32° 04' E
-L-
ROCK CROSS VANE
SEE DETAIL SHEET 2-D
PLACE 5 TONS
CLASS 'I' RIP RAP
W/ 15 SY FF AT
DITCH TIE IN
2' LAT. GRASS SWALE
SEE DETAIL Z
15" CSP WITH ELBOWS-
ROD AND LUG WITH
SLEEVE GASKET
2 TONS
CLASS 'B' RIP RAP
W/ 7 SY FF
2' LAT BASE DITCH
SEE DETAIL G
END SHOULDER BERM GUTTER
-L- STA. 202+50 LT.
LAT. V DITCH
SEE DETAIL F
BERM DITCH
SEE DETAIL D
END WW FENCE
BEG WW FENCE
SPEC. MED. CUT DITCH
SEE DETAIL AB
DRAIN POND
LAT. V DITCH
SEE DETAIL AA
2' LAT. BASE DITCH
SEE DETAIL AH
4' LAT. BASE DITCH
SEE DETAIL AC
END SHOULDER BERM GUTTER
-L- STA. 201+50 RT.
15 TONS
CLASS 'I' RIP RAP
W/ 30 SY FF
REMOVE PIPE
AND DI
GRAU 350
POND
SOIL
EIP
2GI
2GI-A
2GI-D
HW
CAT-1
4FT P.S.
2FT P.S.
180
181
182
183
184
185
186
187
189
191
193
300
303
304

FOR -L- PROFILE, SEE SHEET NO. 35

SEE SHTS C-? THRU C-? FOR CULVERT PLANS

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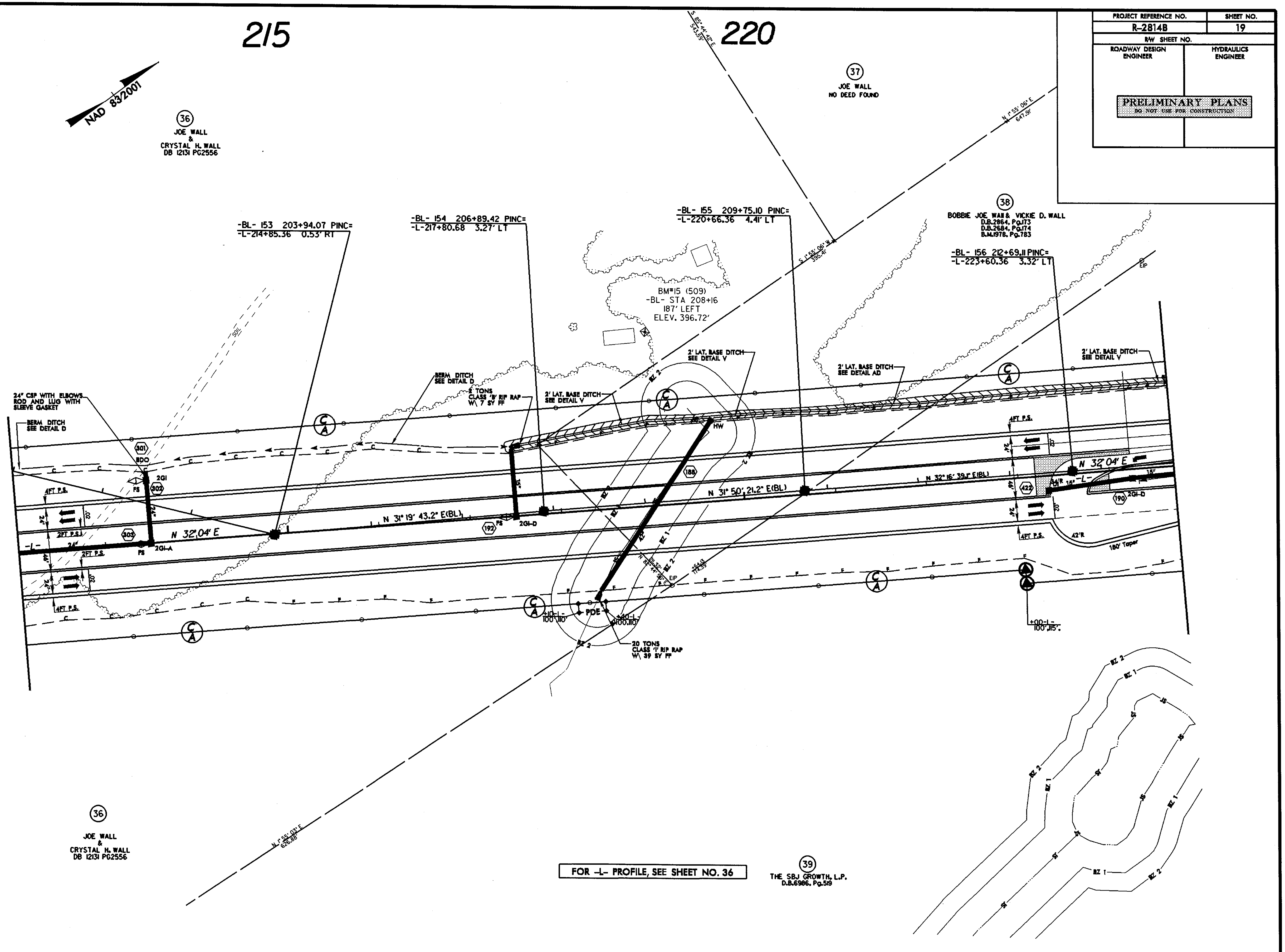
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



215
220
NAD 83/2001
36
JOE WALL
&
CRYSTAL H. WALL
DB 12131 PG2556
37
JOE WALL
NO DEED FOUND
38
BOBBIE JOE WALL & VICKIE D. WALL
D.B.2864, Pg.173
D.B.2684, Pg.174
B.M.1978, Pg.783
-BL- 153 203+94.07 PINC=
-L-214+85.36 0.53' RT
-BL- 154 206+89.42 PINC=
-L-217+80.68 3.27' LT
-BL- 155 209+75.10 PINC=
-L-220+66.36 4.41' LT
-BL- 156 212+69.11 PINC=
-L-223+60.36 3.32' LT
BM#15 (509)
-BL- STA 208+16
187' LEFT
ELEV. 396.72'
BERM DITCH
SEE DETAIL D
2 TONS
CLASS 'B' RIP RAP
W\ 7 SY FF
2' LAT. BASE DITCH
SEE DETAIL V
2' LAT. BASE DITCH
SEE DETAIL AD
24" CSP WITH ELBOWS,
ROD AND LUG WITH
SLEEVE GASKET
N 32°04' E
N 31° 19' 43.2" E(BL)
N 31° 50' 21.2" E(BL)
N 32° 16' 39.3" E(BL)
2GI-A
2GI-D
HW
PDE
+10-L-
100.110'
+40-L-
100.110'
+00-L-
100.115'
20 TONS
CLASS 'I' RIP RAP
W\ 39 SY FF
180' Taper
FOR -L- PROFILE, SEE SHEET NO. 36
39
THE SBJ GROWTH, L.P.
D.B.6986, Pg.519

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven w/re fence on parcel no.39. NNA

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	20

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

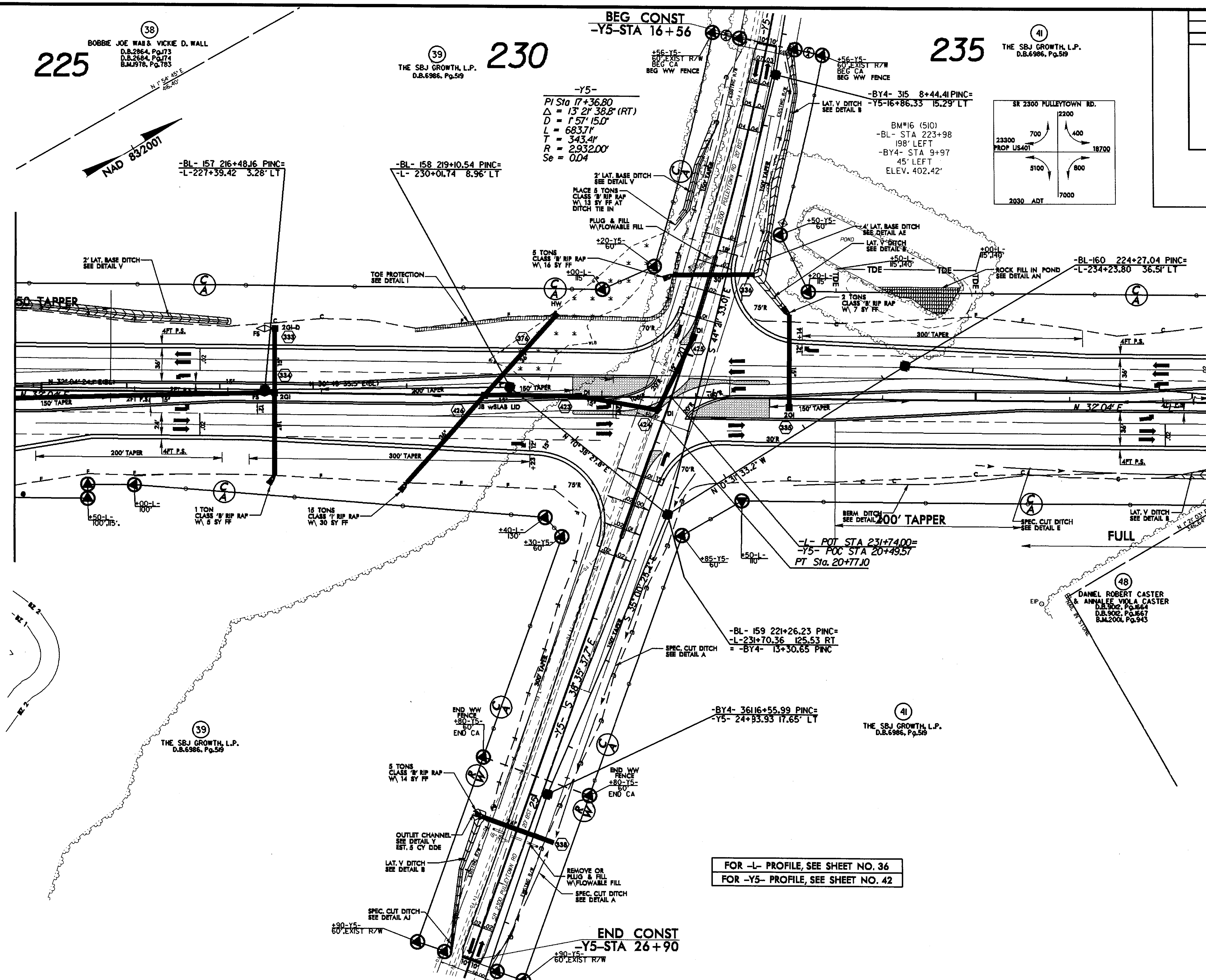
PRELIMINARY PLANS

DO NOT USE FOR CONSTRUCTION

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel no. 39.NNA.

8/17/99



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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
8/17/09
REVISED PARCELS 49 AND 50 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

240

245

250

-L-
PI Sta 244+63.00
Δ = 8° 19' 00.0" (RT)
D = 0° 42' 58.3"
L = 1,161.23'
T = 581.63'
R = 8,000.00'
Se = 0.02

NAD 83/2001

41 THE SBJ GROWTH, L.P. D.B.6986, Pg.519

49 ROBERT G. BARTHOLOMEW & JOYCE BARTHOLOMEW DB 13045 PG642

50 RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW D.B.2937, Pg.241

51

-BL- 161 229+32.43 PINC=
-L-239+27.40 6.27' RT

-BL-162 233+63.40 PINC=
-L-243+58.06 9.37' LT

-BL- 164 PINC 239+83.12=
-L-249+76.64 19.44' LT

*** NOTE: THE INLET INVERT OF THE PROPOSED PIPE AT -L- 246+87 SHOULD BE SET TO 385.3 TO MAINTAIN NORMAL WATER LEVEL IN THE EXISTING WETLAND. THE INLET INVERT OF THE PIPE SHOULD NOT BE FIELD ADJUSTED. DO NOT BURY OUTLET OF PIPE BELOW EXISTING GROUND.

S 2° 33' 17" W 404.89'
S 2° 33' 17" W 637.07'
N 2° 33' 17" E 435.55'
N 50° 42' 48" E 315.86'
N 39° 17' 12" W 124.59'

PC Sta. 238+81.36

PT Sta. 250+42.59

150' TAPPER

200' TAPER

180' TAPER

+81.36 115'

+81.36 110'

+42.59 115'

+42.59 110'

SPEC. CUT DITCH SEE DETAIL E

SPEC. CUT DITCH SEE DETAIL L

LAT. V DITCH SEE DETAIL F

LAT. V DITCH SEE DETAIL B

TOE PROTECTION SEE DETAIL I

1 TON CLASS 'B' RIP RAP W\ 5 SY FF

2' LAT. BASE DITCH SEE DETAIL V

2' LAT. BASE DITCH SEE DETAIL V PLACE 5 TONS CLASS 'B' RIP RAP W\ 13 SY FF AT DITCH TERMINUS

BEGIN SHOULDER BERM GUTTER -L- STA. 245+50 RT.

END SHOULDER BERM GUTTER -L- STA. 247+50 RT.

17 TONS CLASS 'I' RIP RAP W\ 36 SY FF

15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET

GRAU 350

CAT-1

2GI

2GI-D

PSH

4FT P.S.

2FT P.S.

BM#17 (372)
-BL- STA 234+92
152' RIGHT
ELEV. 392.74'

C/L OF CREEK IS PROPERTY LINE

POND

S 52° 58' 48" E 69.98'
S 78° 37' 41" E 188.06'

-BL- 163 236+17.68 PINC=
-L-246+12.06 2.54' LT.

FOR -L- PROFILE, SEE SHT NOS 36 & 37

48 DANIEL ROBERT CASTER & ANNALEE VIOLA CASTER D.B.902, Pg.1664 D.B.902, Pg.1667 B.M.2004, Pg.943

50 RICHARD C. BARTHOLOMEW & SHIRLEY B. BARTHOLOMEW D.B. 13045 PG 1642

49 ROBERT G. BARTHOLOMEW & JOYCE BARTHOLOMEW D.B.2106, Pg.601

N 88° 00' 11" W 399.06'

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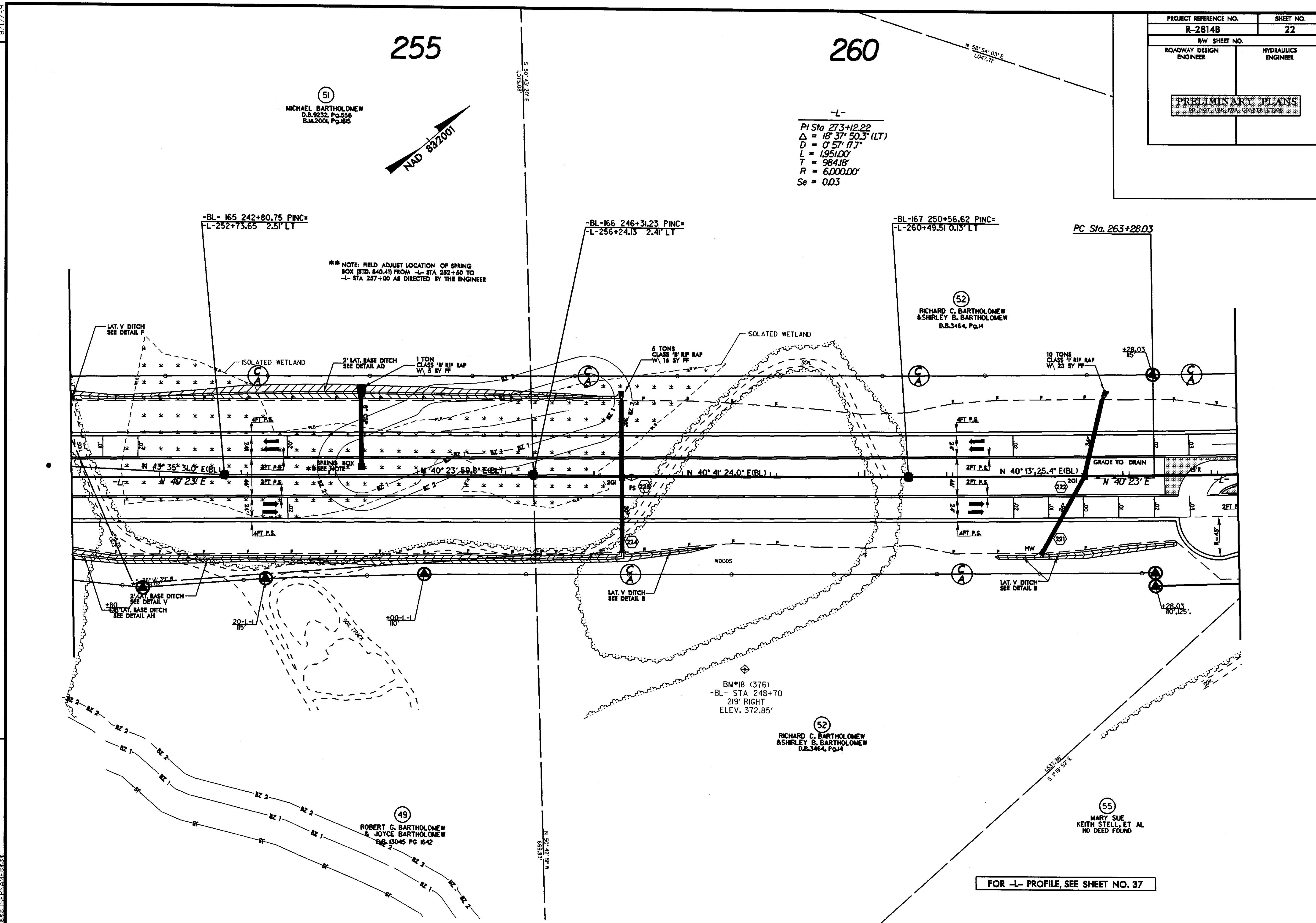
REVISIONS

January 11, 2010: Adjusted R/W 'CA lines, R/W markers and the proposed woven wire fence on parcel no. 52. NNA.


PROJECT REFERENCE NO. R-2814B
SHEET NO. 22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
255
260
NAD 83/2001
51
MICHAEL BARTHOLOMEW
D.B.9232, Pg.556
B.M.2001, Pg.1815
-L-
PI Sta 273+12.22
Δ = 18° 37' 50.3" (LT)
D = 0° 57' 17.7"
L = 1,951.00'
T = 984.18'
R = 6,000.00'
Se = 0.03
-BL- 165 242+80.75 PINC=
-L-252+73.65 2.51' LT
-BL-166 246+31.23 PINC=
-L-256+24.13 2.41' LT
-BL-167 250+56.62 PINC=
-L-260+49.51 0.13' LT
PC Sta. 263+28.03
** NOTE: FIELD ADJUST LOCATION OF SPRING BOX (STD. 840.41) FROM -L- STA 252+50 TO -L- STA 257+00 AS DIRECTED BY THE ENGINEER
52
RICHARD C. BARTHOLOMEW
&SHIRLEY B. BARTHOLOMEW
D.B.3464, Pg.14
LAT. V DITCH
SEE DETAIL F
ISOLATED WETLAND
2' LAT. BASE DITCH
SEE DETAIL AD
1 TON
CLASS 'B' RIP RAP
W\ 5 SY FF
5 TONS
CLASS 'B' RIP RAP
W\ 16 SY FF
10 TONS
CLASS 'I' RIP RAP
W\ 23 SY FF
N 43° 35' 31.0" E(BL)
N 40° 23' E
N 40° 23' 59.8" E(BL)
N 40° 41' 24.0" E(BL)
N 40° 13' 25.4" E(BL)
GRADE TO DRAIN
SPRING BOX
SEE NOTE
4FT P.S.
2FT P.S.
WOODS
LAT. V DITCH
SEE DETAIL B
2' LAT. BASE DITCH
SEE DETAIL V
2' LAT. BASE DITCH
SEE DETAIL AH
BM#18 (376)
-BL- STA 248+70
219' RIGHT
ELEV. 372.85'
52
RICHARD C. BARTHOLOMEW
&SHIRLEY B. BARTHOLOMEW
D.B.3464, Pg.14
49
ROBERT G. BARTHOLOMEW
& JOYCE BARTHOLOMEW
D.B. 13045 PG 1642
55
MARY SUE
KEITH STELL, ET AL
NO DEED FOUND
FOR -L- PROFILE, SEE SHEET NO. 37

23-FEB-2010 16:18
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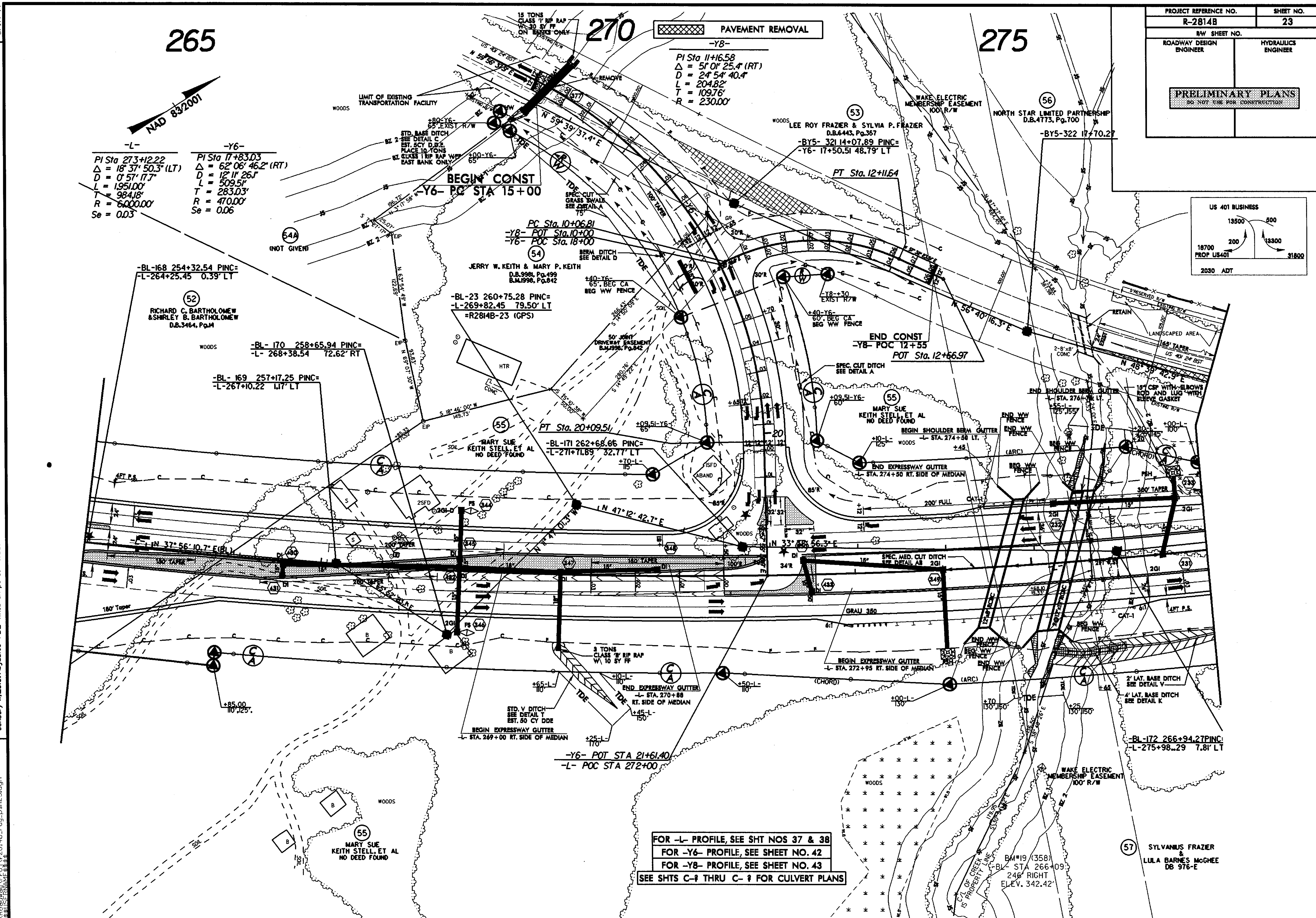
8/17/99

REVISIONS

January 11, 2010: Adjusted R/W CA lines, R/W markers and the proposed woven wire fence on parcel nos. 52 and 55.NNA.
January 11, 2010: Adjusted TDE lines on parcel no. 55.NNA.



PROJECT REFERENCE NO. R-2814B
SHEET NO. 23
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
265
270
275
PAVEMENT REMOVAL
NAD 83/2001
-L-
PI Sta 273+12.22
Δ = 18° 37' 50.3" (LT)
D = 0° 57' 17.7"
L = 1,951.00'
T = 984.18'
R = 6,000.00'
Se = 0.03
-Y6-
PI Sta 17+83.03
Δ = 62° 06' 46.2" (RT)
D = 12° 11' 26.1"
L = 509.51'
T = 283.03'
R = 470.00'
Se = 0.06
-Y8-
PI Sta 11+16.58
Δ = 51° 01' 25.4" (RT)
D = 24° 54' 40.4"
L = 204.82'
T = 109.76'
R = 230.00'
BEGIN CONST
-Y6- PC STA 15+00
END CONST
-Y8- POC 12+55
POT Sta. 12+66.97
PC Sta. 10+06.81
-Y8- POT Sta. 10+00
-Y6- POC Sta. 18+00
PT Sta. 12+11.64
PT Sta. 20+09.51
-Y6- POT STA 21+61.40
-L- POC STA 272+00
-BL-168 254+32.54 PINC=
-L-264+25.45 0.39' LT
-BL- 170 258+65.94 PINC=
-L- 268+38.54 72.62' RT
-BL- 169 257+17.25 PINC=
-L-267+10.22 1.17' LT
-BL-23 260+75.28 PINC=
-L-269+82.45 79.50' LT
=R2814B-23 (GPS)
-BL-171 262+68.66 PINC=
-L-271+71.89 32.77' LT
-BY5- 321 14+07.89 PINC=
-Y6- 17+50.51 48.79' LT
-BY5-322 17+70.27
-BL-172 266+94.27PINC=
-L-275+98.29 7.81' LT
RICHARD C. BARTHOLOMEW
&SHIRLEY B. BARTHOLOMEW
D.B.3464, Pg.14
JERRY W. KEITH & MARY P. KEITH
D.B.9981, Pg.499
B.M.1998, Pg.842
LEE ROY FRAZIER & SYLVIA P. FRAZIER
D.B.6443, Pg.357
NORTH STAR LIMITED PARTNERSHIP
D.B.4773, Pg.700
WAKE ELECTRIC
MEMBERSHIP EASEMENT
100' R/W
MARY SUE
KEITH STELL, ET AL
NO DEED FOUND
SYLVANIUS FRAZIER
&
LULA BARNES McGHEE
DB 976-E
(NOT GIVEN)
LIMIT OF EXISTING TRANSPORTATION FACILITY
15 TONS CLASS 'I' RIP RAP W/ 30 SY FF ON BANKS ONLY
STD. BASE DITCH SEE DETAIL C EST. 5CY D.D.E. PLACE 10 TONS CLASS I RIP RAP W/FF EAST BANK ONLY
SPEC. CUT GRASS SWALE SEE DETAIL A
BERM DITCH SEE DETAIL D
50' JOINT DRIVEWAY EASEMENT B.M.1998, Pg.842
SPEC. CUT DITCH SEE DETAIL A
SPEC. MED. CUT DITCH SEE DETAIL AB
3 TONS CLASS 'B' RIP RAP W/ 10 SY FF
STD. V DITCH SEE DETAIL T EST. 50 CY DDE
BEGIN EXPRESSWAY GUTTER -L- STA. 269+00 RT. SIDE OF MEDIAN
END EXPRESSWAY GUTTER -L- STA. 270+88 RT. SIDE OF MEDIAN
BEGIN EXPRESSWAY GUTTER -L- STA. 272+95 RT. SIDE OF MEDIAN
END EXPRESSWAY GUTTER -L- STA. 274+50 RT. SIDE OF MEDIAN
BEGIN SHOULDER BERM GUTTER -L- STA. 274+58 LT.
END SHOULDER BERM GUTTER -L- STA. 276+ LT.
15" CSP WITH ELBOWS ROD AND LUG WITH SLEEVE GASKET
2' LAT. BASE DITCH SEE DETAIL V
4' LAT. BASE DITCH SEE DETAIL K
US 401 BUSINESS
13500 500 200 13300 18700 PROP US401 31800
2030 ADT
BM#19 (358)
-BL- STA 266+09
246' RIGHT
ELEV. 342.42'
C/L OF CREEK LINE IS PROPERTY LINE
N 56° 39' 37.4" E
N 56° 40' 16.3" E
N 48° 38' 42.9" E
N 47° 12' 42.7" E
N 37° 56' 10.7" E(BL)
N 33° 32' 56.3" E
FOR -L- PROFILE, SEE SHT NOS 37 & 38
FOR -Y6- PROFILE, SEE SHEET NO. 42
FOR -Y8- PROFILE, SEE SHEET NO. 43
SEE SHTS C-? THRU C-? FOR CULVERT PLANS

23-FEB-2010 16:19
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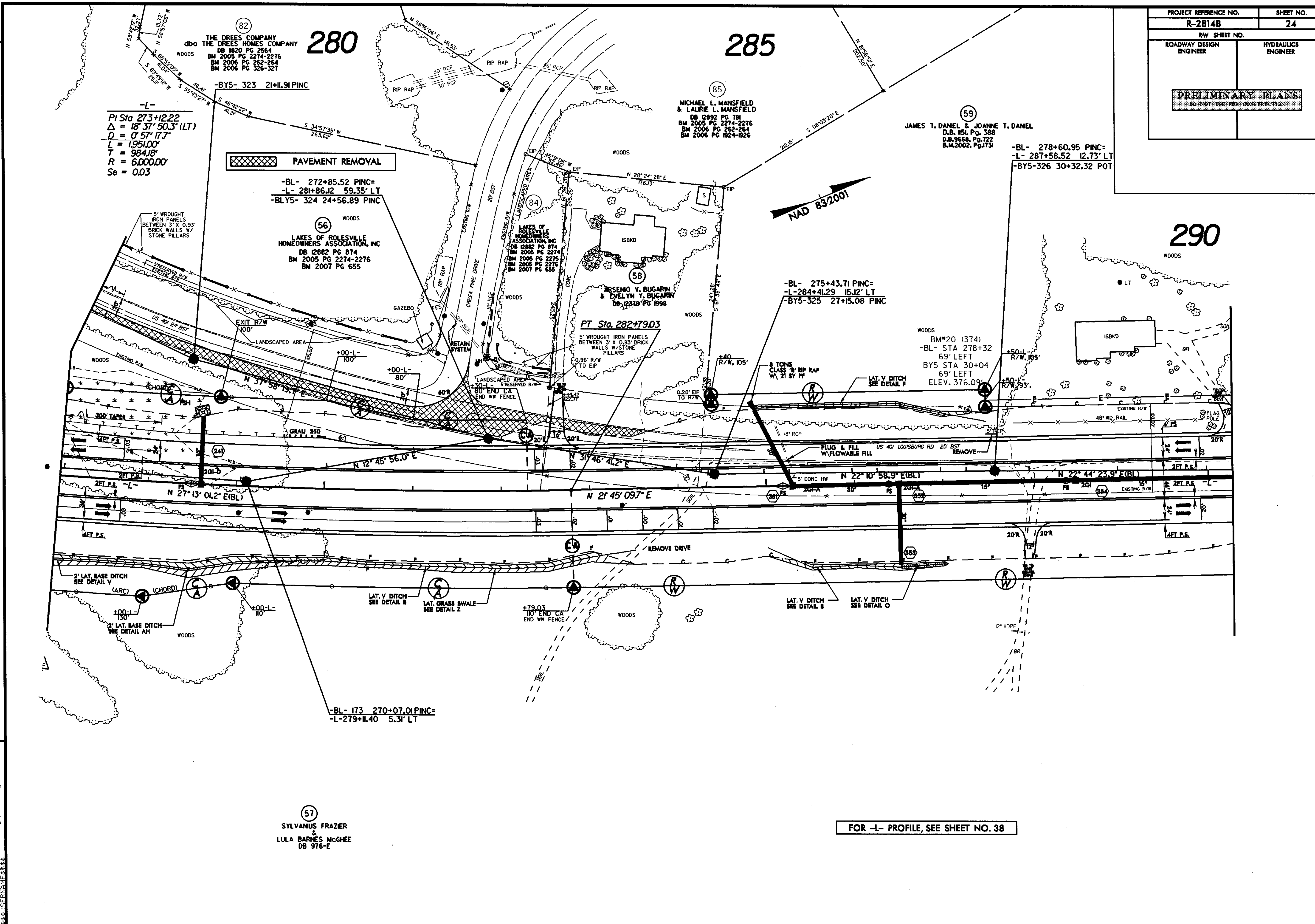
REVISIONS

REVISED NAMES ON PARCEL 57 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



FOR -L- PROFILE, SEE SHEET NO. 38

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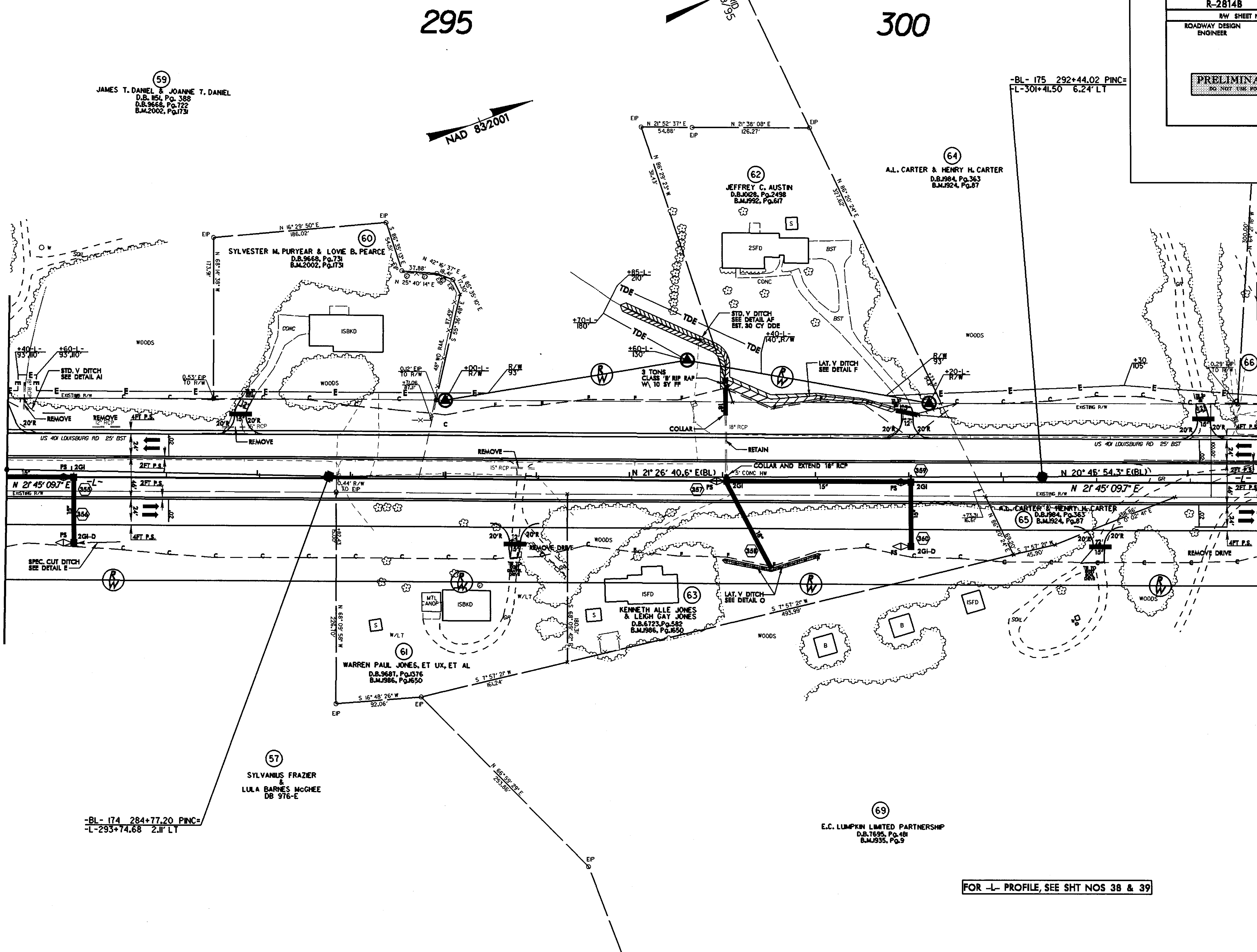
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

REVISED NAMES ON PARCEL 57 PER LOCATION AND SURVEY REQUEST 4/23/09 DDL 7/29/09



295
300
GRID 83/95
NAD 83/2001
59
JAMES T. DANIEL & JOANNE T. DANIEL
D.B. 1151, Pg. 388
D.B.9668, Pg.722
B.M.2002, Pg.1731
60
SYLVESTER M. PURYEAR & LOVIE B. PEARCE
D.B.9668, Pg.731
B.M.2002, Pg.1731
62
JEFFREY C. AUSTIN
D.B.1028, Pg.2498
B.M.1992, Pg.617
64
A.L. CARTER & HENRY H. CARTER
D.B.1984, Pg.363
B.M.1924, Pg.87
-BL- 175 292+44.02 PINC=
-L-301+41.50 6.24' LT
65
A.L. CARTER & HENRY H. CARTER
D.B.1984, Pg.363
B.M.1924, Pg.87
66
63
KENNETH ALLE JONES
& LEIGH GAY JONES
D.B.6723,Pg.582
B.M.1986, Pg.1650
61
WARREN PAUL JONES, ET UX, ET AL
D.B.9687, Pg.1376
B.M.1986, Pg.1650
57
SYLVANIUS FRAZIER
&
LULA BARNES McGHEE
DB 976-E
-BL- 174 284+77.20 PINC=
-L-293+74.68 2.11' LT
69
E.C. LUMPKIN LIMITED PARTNERSHIP
D.B.7695, Pg.481
B.M.1935, Pg.9
US 401 LOUISBURG RD 25' BST
N 21° 45' 09.7" E
N 21° 26' 40.6" E(BL)
N 20° 45' 54.3" E(BL)
STD. V DITCH SEE DETAIL AI
STD. V DITCH SEE DETAIL AF EST. 30 CY DDE
LAT. V DITCH SEE DETAIL F
LAT. V DITCH SEE DETAIL O
SPEC. CUT DITCH SEE DETAIL E
3 TONS CLASS 'B' RIP RAP W\ 10 SY FF
COLLAR AND EXTEND 18" RCP
REMOVE
RETAIN
REMOVE DRIVE
WOODS

FOR -L- PROFILE, SEE SHT NOS 38 & 39

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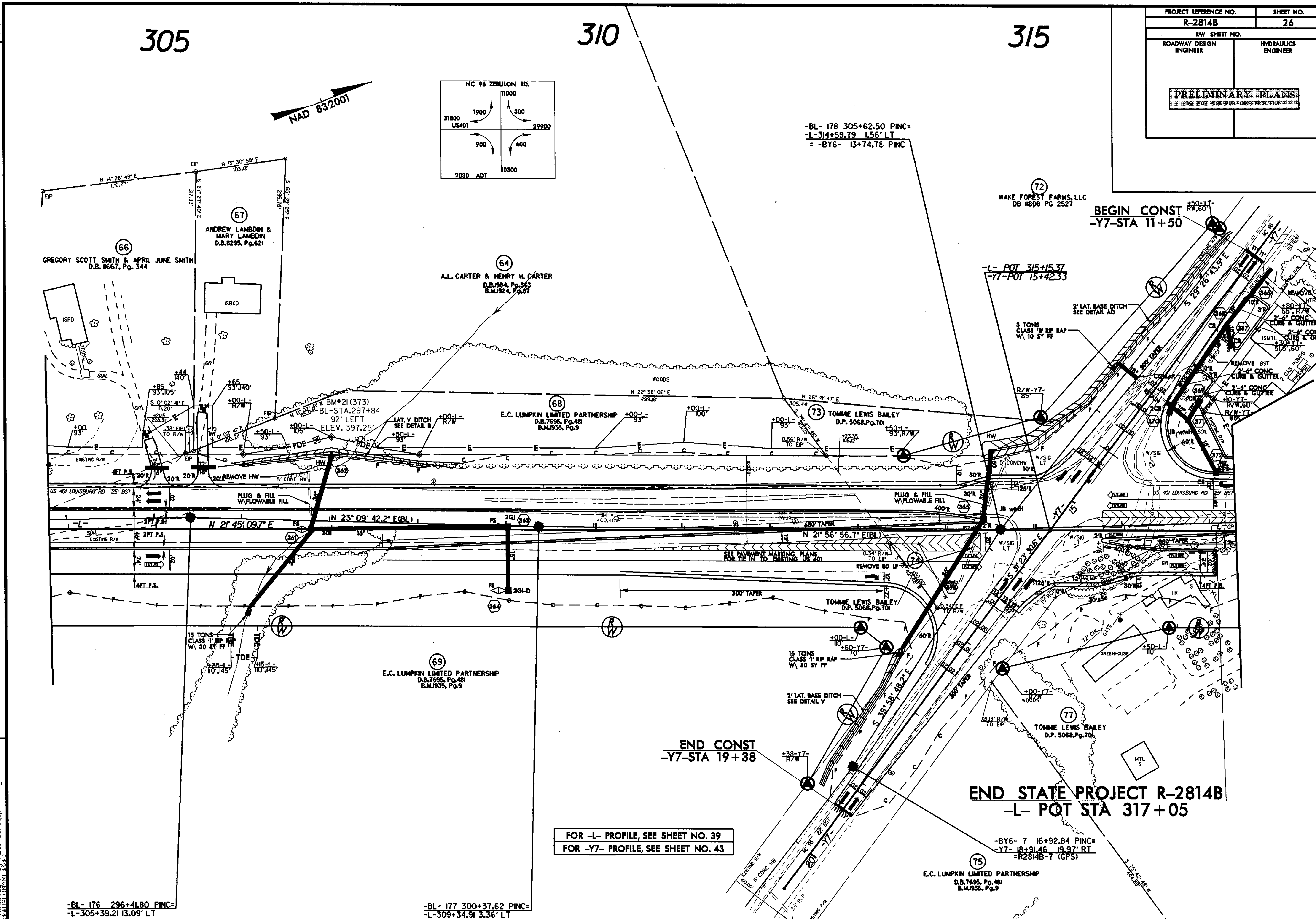
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
REVISED CHANNELIZATION ON PARCEL 76 TO SHOW 2'-6"C&G WITH CB'S AND MODIFIED PDE. MODIFIED PDE @ -L- STA.320+00 AROUND 'V' DITCH PER MTG. WITH R/W ON 8-13-09. TDG 12-01-09

8/17/99



305
310
315
NAD 83/2001
NC 96 ZEBULON RD.
2030 ADT
GREGORY SCOTT SMITH & APRIL JUNE SMITH
D.B. #667, Pg. 344
ANDREW LAMBDIN & MARY LAMBDIN
D.B.8295, Pg.621
A.L. CARTER & HENRY H. CARTER
D.B.1984, Pg.363
B.M.1924, Pg.87
E.C. LUMPKIN LIMITED PARTNERSHIP
D.B.7695, Pg.481
B.M.1935, Pg.9
TOMMIE LEWIS BAILEY
D.P. 5068,Pg.701
WAKE FOREST FARMS, LLC
DB 11808 PG 2527
WOODS
US 401 LOUISBURG RD
BM#21 (373)
-BL-STA.297+84
92' LEFT
ELEV. 397.25'
N 23° 09' 42.2" E(BL)
N 21° 45' 09.7" E
N 21° 56' 56.7" E(BL)
-BL- 178 305+62.50 PINC=
-L-314+59.79 1.56' LT
= -BY6- 13+74.78 PINC
-L- POT 315+15.37
-Y7-POT 15+42.33
BEGIN CONST
-Y7-STA 11+50
END CONST
-Y7-STA 19+38
END STATE PROJECT R-2814B
-L- POT STA 317+05
-BY6- 7 16+92.84 PINC=
-Y7- 18+91.46 19.97' RT
=R2814B-7 (GPS)
SEE PAVEMENT MARKING PLANS FOR TIE IN TO EXISTING US 401
FOR -L- PROFILE, SEE SHEET NO. 39
FOR -Y7- PROFILE, SEE SHEET NO. 43
-BL- 176 296+41.80 PINC=
-L-305+39.21 13.09' LT
-BL- 177 300+37.62 PINC=
-L-309+34.91 3.36' LT

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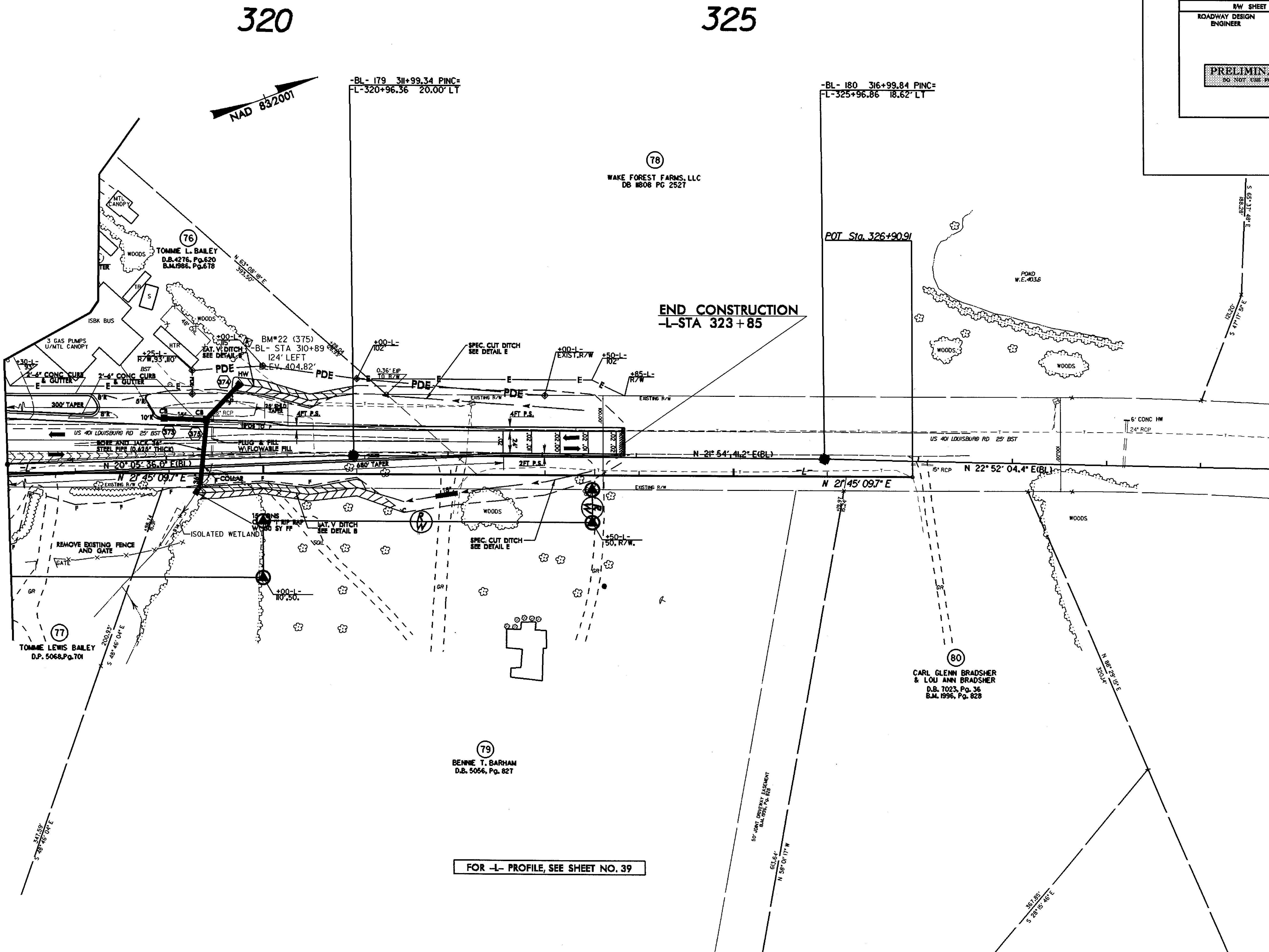
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

REVISED CHANNELIZATION ON PARCEL 76 TO SHOW 2'-6" C&G WITH CB'S AND MODIFIED PDE. MODIFIED PDE @ -L- STA.320+00 AROUND 'V' DITCH PER MTG. WITH R/W ON 8-13-09. TDG 12-01-09



320
325
NAD 83/2001
-BL- 179 311+99.34 PINC=
-L-320+96.36 20.00' LT
-BL- 180 316+99.84 PINC=
-L-325+96.86 18.62' LT
78
WAKE FOREST FARMS, LLC
DB 1808 PG 2527
76
TOMMIE L. BAILEY
D.B.4276, Pg.620
B.M.1986, Pg.678
WOODS
MTL CANOPY
ISBK BUS
3 GAS PUMPS U/MTL CANOPY
BM#22 (375)
-BL- STA 310+89
124' LEFT
ELEV. 404.82'
SPEC. CUT DITCH SEE DETAIL E
END CONSTRUCTION
-L-STA 323+85
POT Sta. 326+90.91
POND W.E.403.6
2'-6" CONC CURB & GUTTER
300' TAPER
US 401 LOUISBURG RD 25' BST
BORE AND JACK 54" STEEL PIPE (0.626" THICK)
PLUG & FILL W/FLOWABLE FILL
680' TAPER
N 20° 05' 36.0" E(BL)
N 21° 45' 09.7" E
N 21° 54' 41.2" E(BL)
N 22° 52' 04.4" E(BL)
EXISTING R/W
6' CONC HW
24" RCP
ISOLATED WETLAND
REMOVE EXISTING FENCE AND GATE
LAT. V DITCH SEE DETAIL B
SPEC. CUT DITCH SEE DETAIL E
77
TOMMIE LEWIS BAILEY
D.P. 5068,Pg.701
79
BENNIE T. BARHAM
D.B. 5056, Pg. 827
80
CARL GLENN BRADSHER
& LOU ANN BRADSHER
D.B. 7023, Pg. 36
B.M. 1996, Pg. 828
FOR -L- PROFILE, SEE SHEET NO. 39

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99

NAD 83/2001

MATCH SHEET 15

21 MITCHELL F. RABIL FAMILY IRREVOCABLE TRUST D.B.5695, Pg.745 B.M.1936, Pg.60

29 SCARBORO FAMILY LIMITED PARTNERSHIP D.B.7436, Pg.445 B.M.1967, Pg.159

30 FRANKLIN DELLNO DAVIS & BARBARA ANNE DAVIS D.B.4806, Pg.140

31 EDWIN E. WHITT, JR. D.B.8619, Pg.1258

32 GERALDINE HORTON D.B.1936, Pg.191

NOTE: GRADE DITCH AT -Y3- STA 23+10.92 TO A MINIMUM ELEVATION OF 407.20.

-Y3-POT STA 24+77.79=
-Y4-POT STA 10+00

-BY3- 311 11+49.24 PINC=
-Y4- 16+21.46 18.73' LT

-BY2- 310 21+98.14 PINC=
-Y3- 26+89.84 16.84' RT

-BY3- 312 17+29.94 PINC=
-Y4- 21+41.45 9.41' RT

POT Sta. 27+75.10

PC Sta. 16+90.46

PT Sta. 22+29.49

END CONST
-Y3-STA 25+27

END CONST
-Y4-STA 22+29.49

-Y4-
PI Sta 19+68.33
Δ = 34° 18' 57.0" (RT)
D = 6° 21' 58.3"
L = 539.03'
T = 277.87'
R = 900.00'
Se = 0.06

PAVEMENT REMOVAL
FOR -Y3- PROFILE, SEE SHEET NO. 41
FOR -Y4- PROFILE, SEE SHEET NO. 41

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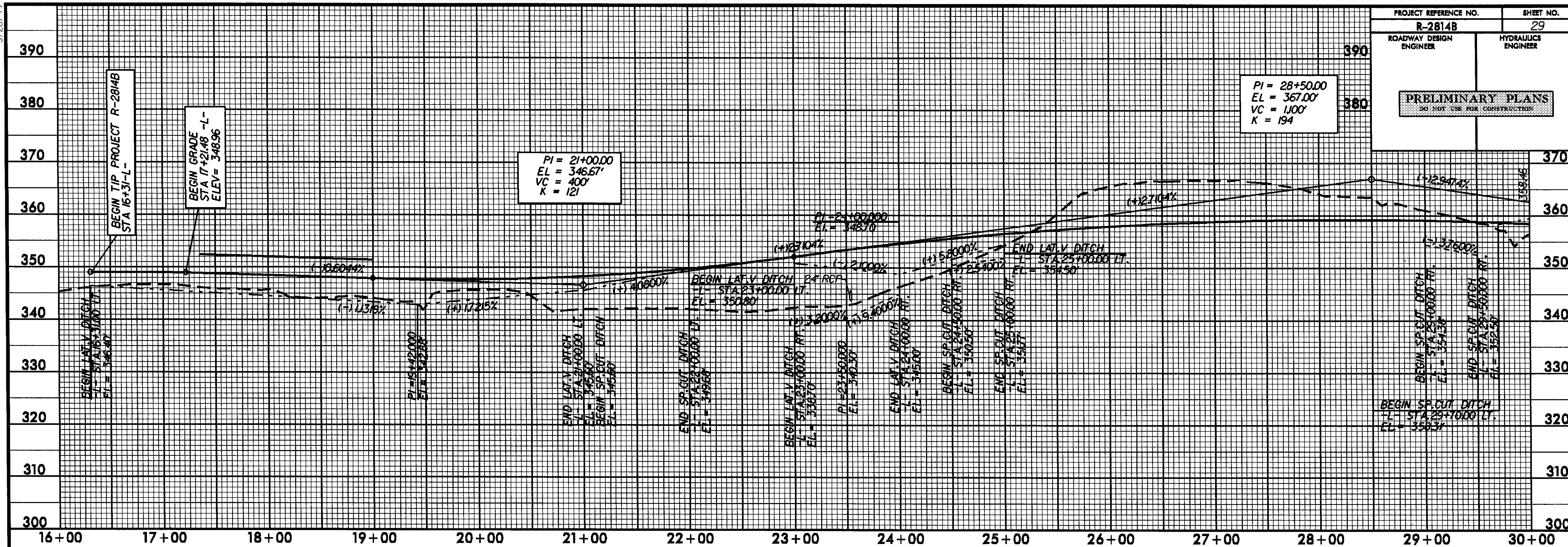
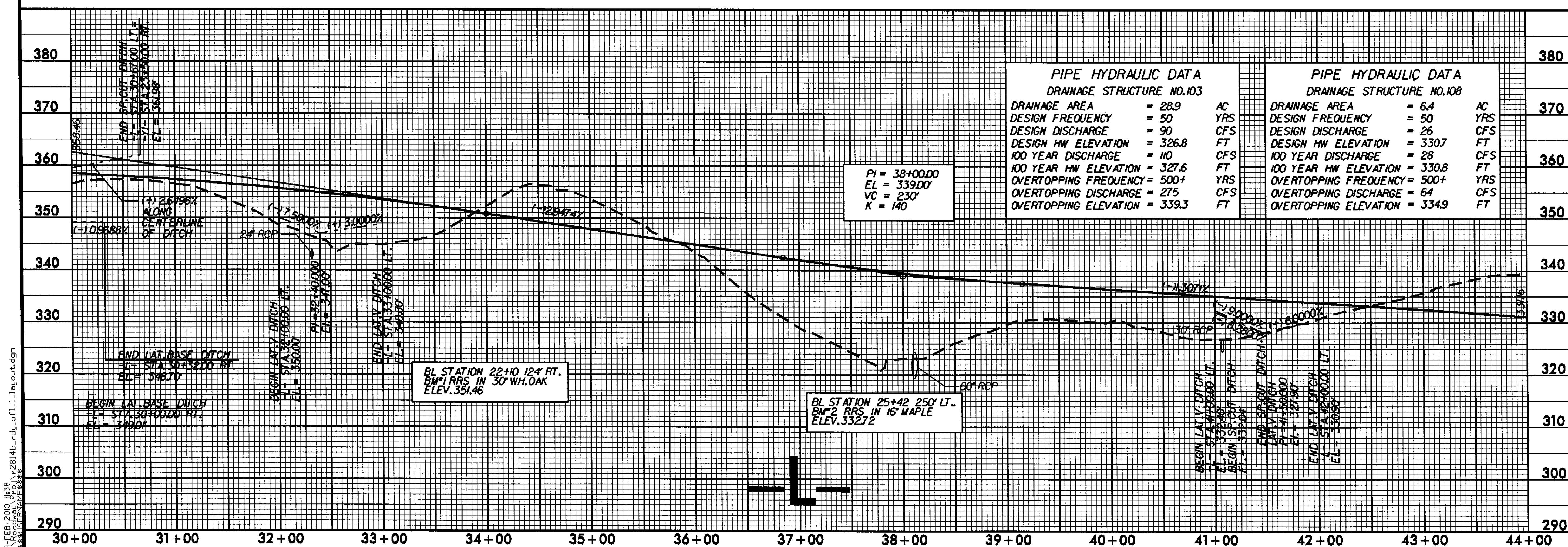
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 103

DRAINAGE AREA	=	28.9	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	90	CFS
DESIGN HW ELEVATION	=	326.8	FT
100 YEAR DISCHARGE	=	110	CFS
100 YEAR HW ELEVATION	=	327.6	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	275	CFS
OVERTOPPING ELEVATION	=	339.3	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 108

DRAINAGE AREA	=	6.4	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	26	CFS
DESIGN HW ELEVATION	=	330.7	FT
100 YEAR DISCHARGE	=	28	CFS
100 YEAR HW ELEVATION	=	330.8	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	64	CFS
OVERTOPPING ELEVATION	=	334.9	FT

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	30

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 21

DRAINAGE AREA	= 91.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 210	CFS
DESIGN HW ELEVATION	= 312.4	FT
100 YEAR DISCHARGE	= 250	CFS
100 YEAR HW ELEVATION	= 313.4	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 510	CFS
OVERTOPPING ELEVATION	= 323.5	FT

PI = 52+00.00
EL = 320.70'
VC = 600'
K = 143

337.64'
(-)4.500%
(-)1.529%
(+)2.880%
(+)2.857%
(+)1.250%
(+)0.428%
(+)3.000%
337.64'

BEGIN LAT. BASE DITCH
-L- STA. 52+30.00 LT.
EL. = 317.00'

BEGIN LAT. BASE DITCH
-L- STA. 52+00.00 RT.
EL. = 314.50'

PI = 54+00.000
EL = 306.00

18" RCP

PI = 54+00.000
EL = 305.10'

END LAT. BASE DITCH
-L- STA. 54+35.00 RT.
EL. = 304.95'

BEGIN LAT. GRASS SWALE
-L- STA. 54+75.00 RT.
EL. = 302.00'

END LAT. BASE DITCH
BEGIN BASE DITCH
-L- STA. 54+60.000 LT.
EL. = 306.00'

PI = 56+50.000
EL = 308.00

END BASE DITCH
-L- STA. 56+40.00 LT.
EL. = 305.00

END LAT. GRASS SWALE
-L- STA. 56+60.00 RT.
EL. = 311.35'

BL STATION 43+25 23' RT.
BM#3 RRS IN 14" OAK
ELEV. 304.30

44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00

PI = 64+50.00
EL = 356.70'
VC = 1,530'
K = 195

357.64'
(+)2.880%
(-)4.978%
311.35'

BL STATION 54+00 18' LT.
BM#4 RRS IN 10" PINE
ELEV. 357.96

58+00 59+00 60+00 61+00 62+00 63+00 64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00

280 290 300 310 320 330 340 350 360 370

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1000	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 272.9	FT
BASE DISCHARGE	= 1100	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 273.4	FT
OVERTOPPING DISCHARGE	= 5527	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 303.4	FT

PI = 78+50.00
EL = 287.00'
VC = 1,270'
K = 137

12' X 8' RCBC

10' X 10' RCBC

BL STATION 68+11 152' LT.
BM#5 RRS IN 14" GUM
ELEV. 277.80

BEGIN LAT. V. DITCH
LT. STA. 83+50.00 RT.
EL. = 363.40'

PI = 84+50.00
EL. = 362.50'

END LAT. V. DITCH
LT. STA. 85+50.00 RT.
EL. = 362.50'

BEGIN SPOIL DITCH
LT. STA. 99+00.00 RT.
EL. = 363.00'

PI = 98+50.00
EL. = 359.50'

END SPOIL DITCH
LT. STA. 98+00.00 RT.
EL. = 366.54'

30' R.C.P.

BL STATION 83+99 141' RT.
BM#6 RRS IN 24" POPLAR
ELEV. 374.82

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.71

DRAINAGE AREA	= 6.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 29	CFS
DESIGN HW ELEVATION	= 362.4	FT
100 YEAR DISCHARGE	= 31	CFS
100 YEAR HW ELEVATION	= 362.5	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 71	CFS
OVERTOPPING ELEVATION	= 367.9	FT

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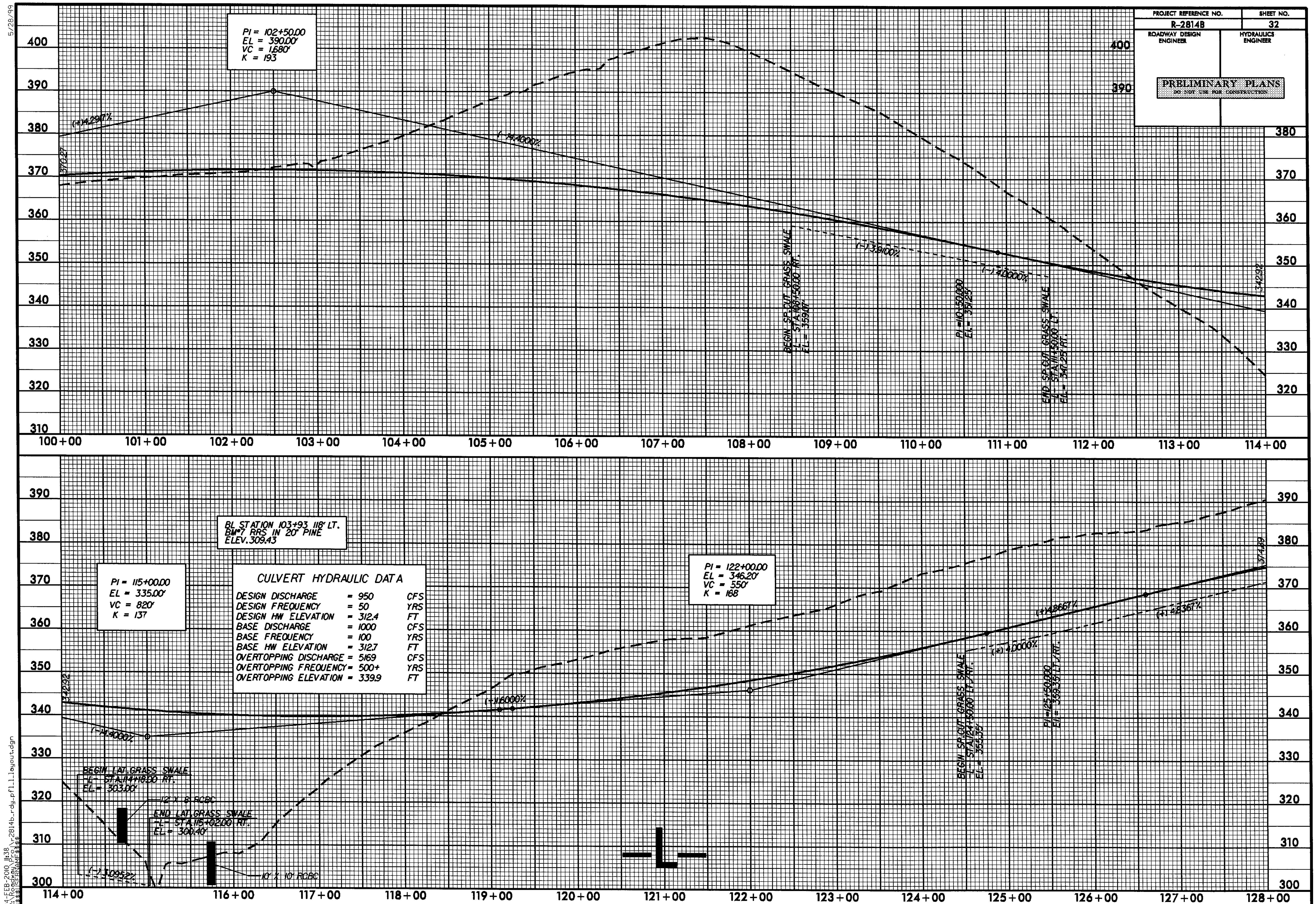
PROJECT REFERENCE NO.
R-2814B
SHEET NO.
32
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PI = 102+50.00
EL = 390.00'
VC = 1,680'
K = 193
(+)4.2917%
(-)1.4000%
370.27
(-)1.3910%
(-)1.40000%
BEGIN SP. CUT GRASS SWALE
PI = 110+50.00
END SP. CUT GRASS SWALE
342.92
100+00
101+00
102+00
103+00
104+00
105+00
106+00
107+00
108+00
109+00
110+00
111+00
112+00
113+00
114+00
BL STATION 103+93 118' LT.
BM*7 RRS IN 20" PINE
ELEV. 309.43
PI = 115+00.00
EL = 335.00'
VC = 820'
K = 137
CULVERT HYDRAULIC DATA
DESIGN DISCHARGE = 950 CFS
DESIGN FREQUENCY = 50 YRS
DESIGN HW ELEVATION = 312.4 FT
BASE DISCHARGE = 1000 CFS
BASE FREQUENCY = 100 YRS
BASE HW ELEVATION = 312.7 FT
OVERTOPPING DISCHARGE = 5169 CFS
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING ELEVATION = 339.9 FT
PI = 122+00.00
EL = 346.20'
VC = 550'
K = 168
(+)1.6000%
(+)4.0000%
(+)4.8667%
(+)4.8367%
374.89
BEGIN SP. CUT GRASS SWALE
PI = 125+50.00
342.92
(-)1.4000%
BEGIN LAT. GRASS SWALE
-L- STA. 114+18.00 RT.
EL = 303.00'
12' X 8' RCBC
END LAT. GRASS SWALE
-L- STA. 115+02.00 RT.
EL = 300.40'
10' X 10' RCBC
(-)3.0952%
-L-
114+00
116+00
117+00
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00
128+00
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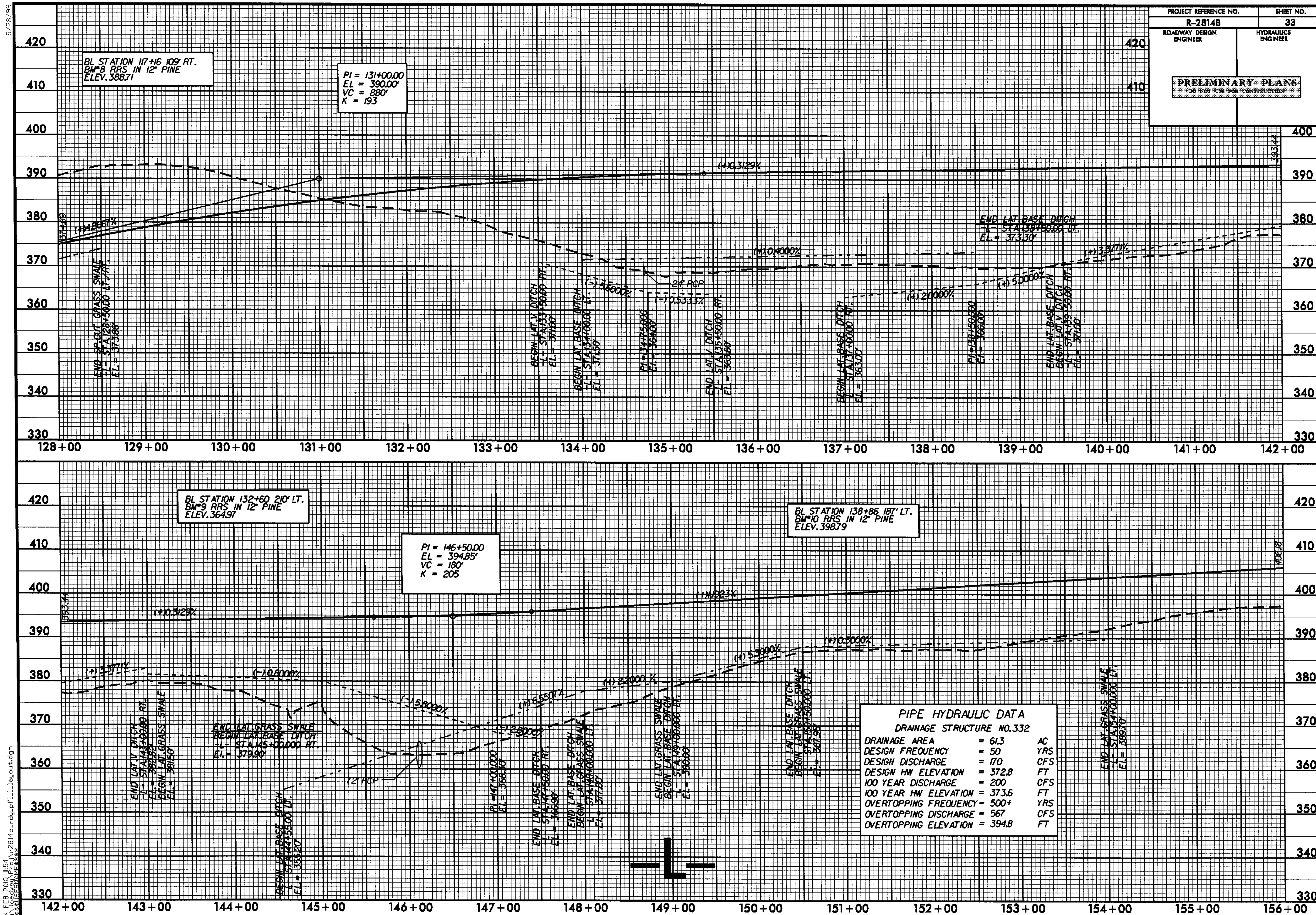
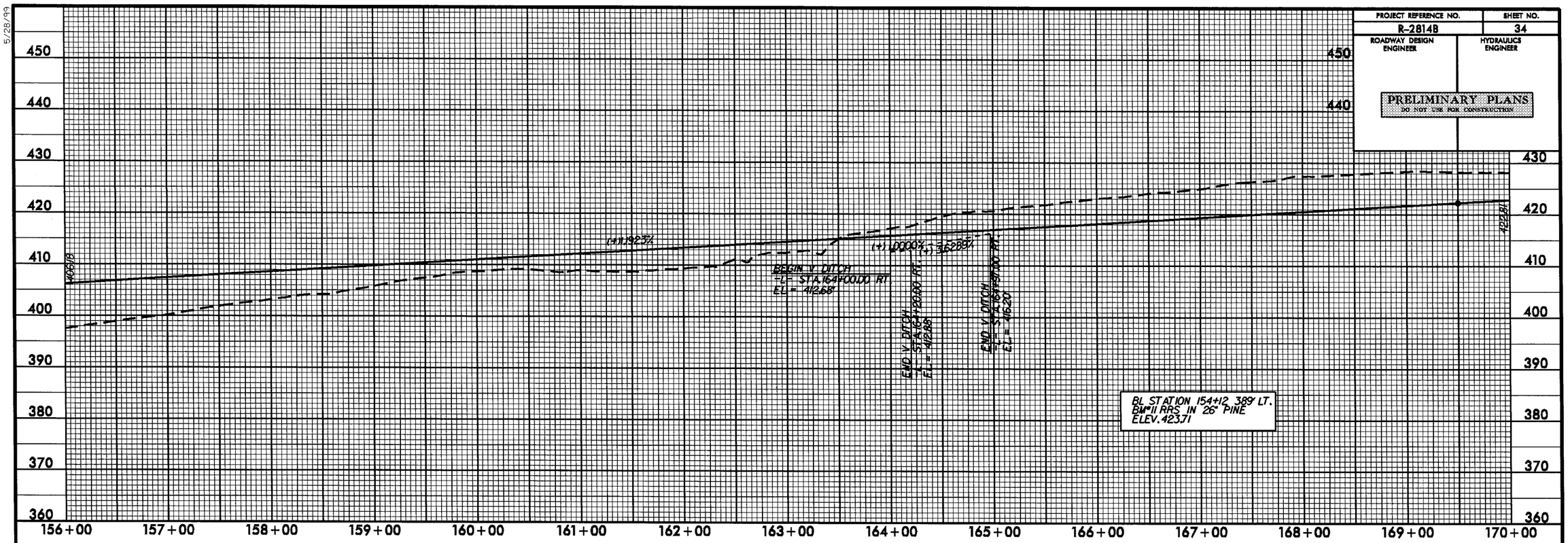


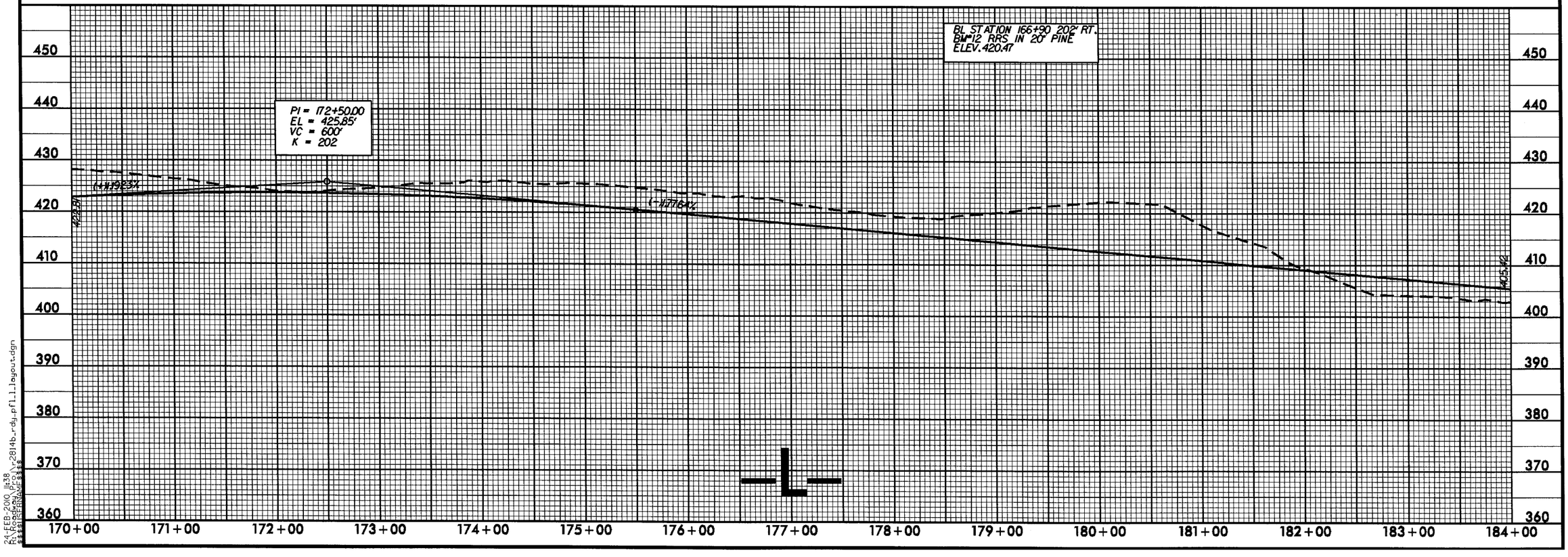
PROJECT REFERENCE NO.
R-2814B
SHEET NO.
33
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
BL STATION 117+16 109' RT.
BM#8 RRS IN 12" PINE
ELEV. 388.71
PI = 131+00.00
EL = 390.00'
VC = 880'
K = 193
(+)0.3129%
(+)4.8661%
END LAT. BASE DITCH
-L- STA.138+50.00 LT.
EL = 373.36'
(+)0.4000%
(+)3.3771%
24" RCP
(-)0.5333%
(+)2.0000%
(+)5.0000%
BL STATION 132+60 210' LT.
BM#9 RRS IN 12" PINE
ELEV. 364.97
PI = 146+50.00
EL = 394.85'
VC = 180'
K = 205
BL STATION 138+86 187' LT.
BM#10 RRS IN 12" PINE
ELEV. 398.79
(+)0.3129%
(+)3.3771%
(-)0.6000%
(-)5.8000%
(+)6.5507%
(+)2.2000 %
(+)5.3000%
(+)0.3000%
END LAT. GRASS SWALE
BEGIN LAT. BASE DITCH
-L- STA.145+00.000 RT.
EL = 379.90'
72" RCP
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.332
DRAINAGE AREA = 61.3 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 170 CFS
DESIGN HW ELEVATION = 372.8 FT
100 YEAR DISCHARGE = 200 CFS
100 YEAR HW ELEVATION = 373.6 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 567 CFS
OVERTOPPING ELEVATION = 394.8 FT
-L-

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2814B	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PROJECT REFERENCE NO.	SHEET NO.
R-2814B	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

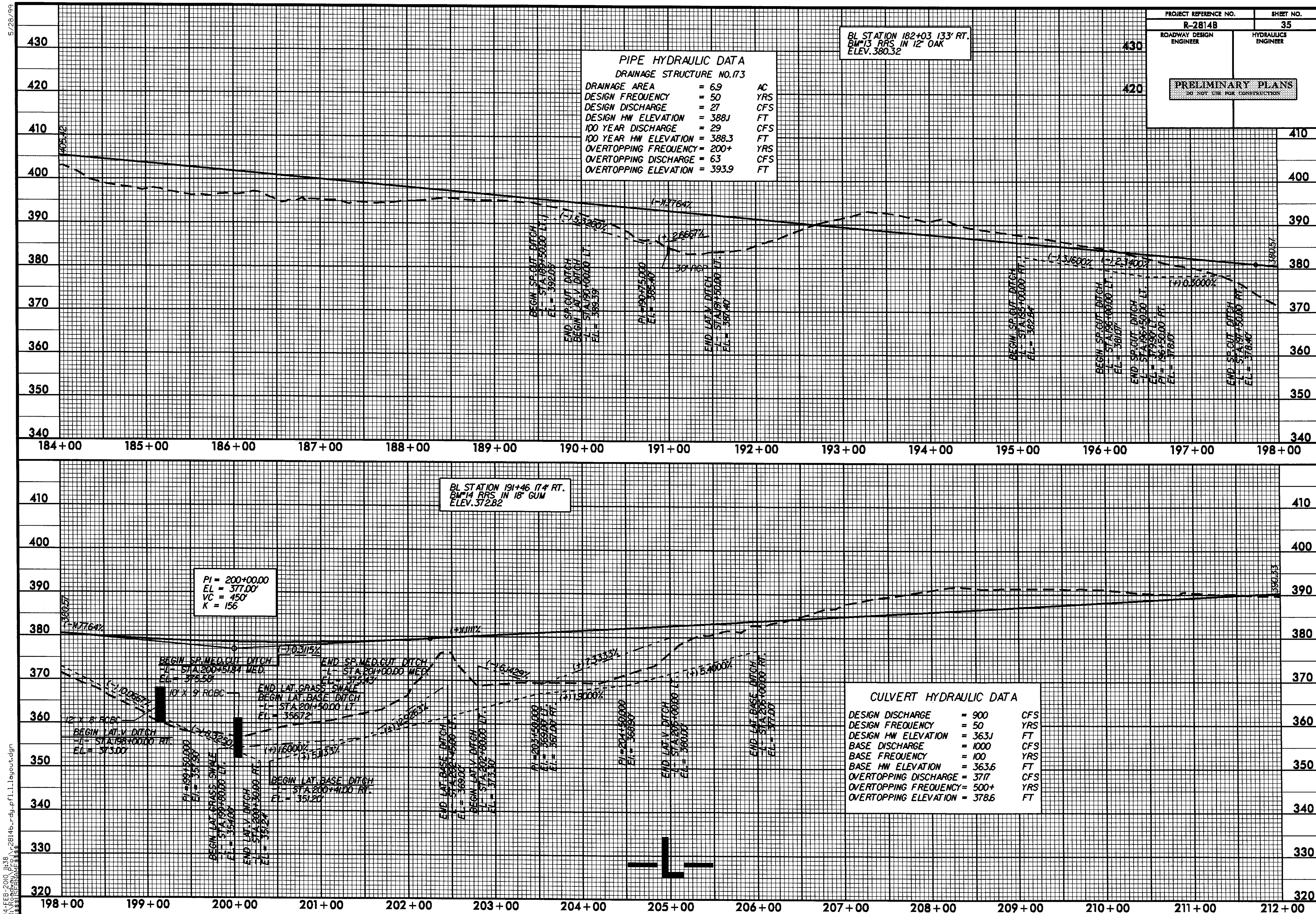
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 173

DRAINAGE AREA	=	6.9	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	27	CFS
DESIGN HW ELEVATION	=	388.1	FT
100 YEAR DISCHARGE	=	29	CFS
100 YEAR HW ELEVATION	=	388.3	FT
OVERTOPPING FREQUENCY	=	200+	YRS
OVERTOPPING DISCHARGE	=	63	CFS
OVERTOPPING ELEVATION	=	393.9	FT

BL STATION 182+03 133' RT.
BM#13 RRS IN 12" OAK
ELEV. 380.32



405.92
(-)1.7764%
(-)1.5326%
(+)2.6667%
30" RCP
380.57
(-)1.3600%
(-)2.3400%
(+)0.5000%
184+00
185+00
186+00
187+00
188+00
189+00
190+00
191+00
192+00
193+00
194+00
195+00
196+00
197+00
198+00
BL STATION 191+46 174' RT.
BM#14 RRS IN 18" GUM
ELEV. 372.82
PI = 200+00.00
EL = 377.00'
VC = 450'
K = 156
(-)0.3115%
(+)1.1111%
BEGIN SP. MED. CUT DITCH
-L- STA. 200+51.84 MED.
END SP. MED. CUT DITCH
-L- STA. 201+00.00 MED.
10' X 9' RCBC
12' X 8' RCBC
BEGIN LAT. V DITCH
-L- STA. 198+00.00 RT.
EL = 373.00'
END LAT. GRASS SWALE
BEGIN LAT. BASE DITCH
-L- STA. 201+50.00 LT.
EL = 356.72
BEGIN LAT. BASE DITCH
-L- STA. 200+41.00 RT.
EL = 351.20'
(+)1.3000%
(+)5.4000%
390.33
198+00
199+00
200+00
201+00
202+00
203+00
204+00
205+00
206+00
207+00
208+00
209+00
210+00
211+00
212+00
-L-

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	900	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	363.1	FT
BASE DISCHARGE	=	1000	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	363.6	FT
OVERTOPPING DISCHARGE	=	3717	CFS
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING ELEVATION	=	378.6	FT

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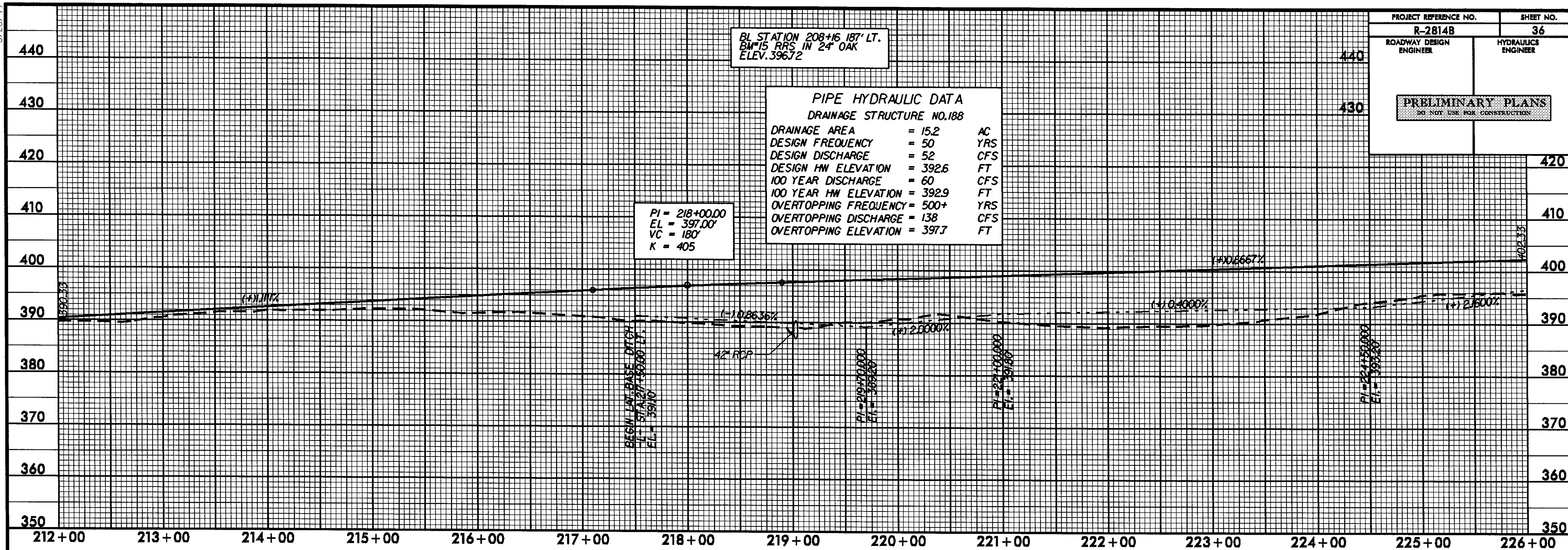
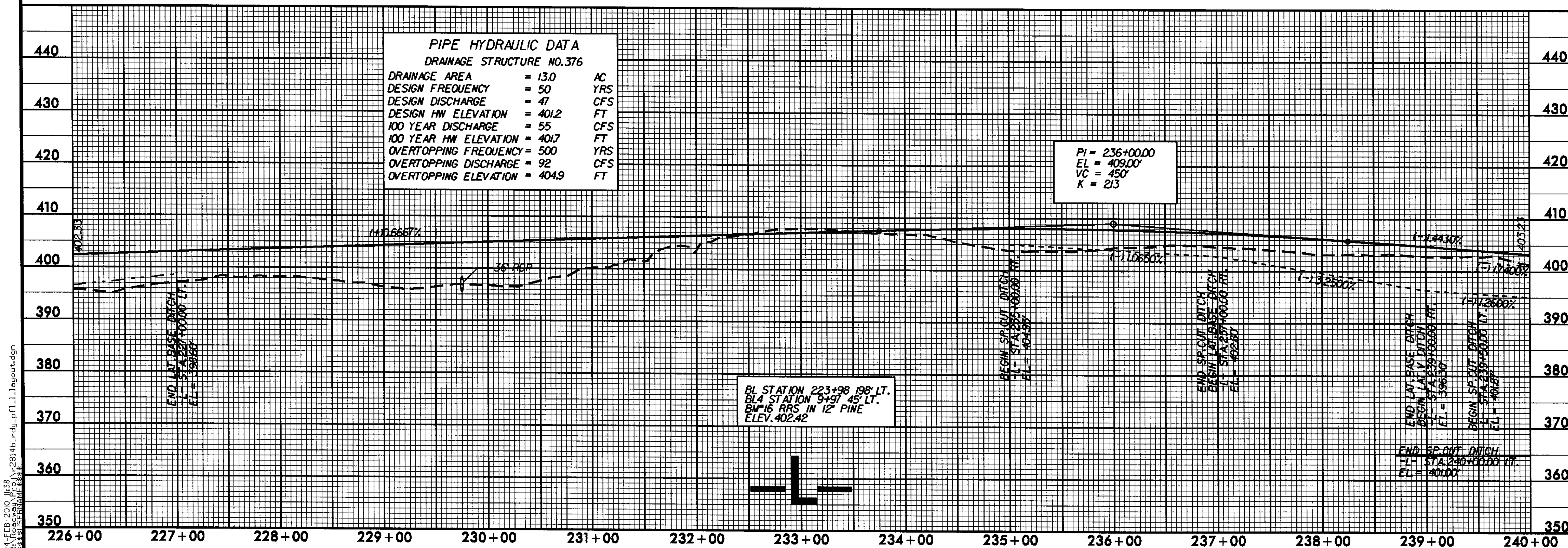
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 188

DRAINAGE AREA	= 15.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 52	CFS
DESIGN HW ELEVATION	= 392.6	FT
100 YEAR DISCHARGE	= 60	CFS
100 YEAR HW ELEVATION	= 392.9	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 138	CFS
OVERTOPPING ELEVATION	= 397.7	FT



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 376

DRAINAGE AREA	= 13.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 47	CFS
DESIGN HW ELEVATION	= 401.2	FT
100 YEAR DISCHARGE	= 55	CFS
100 YEAR HW ELEVATION	= 401.7	FT
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 92	CFS
OVERTOPPING ELEVATION	= 404.9	FT

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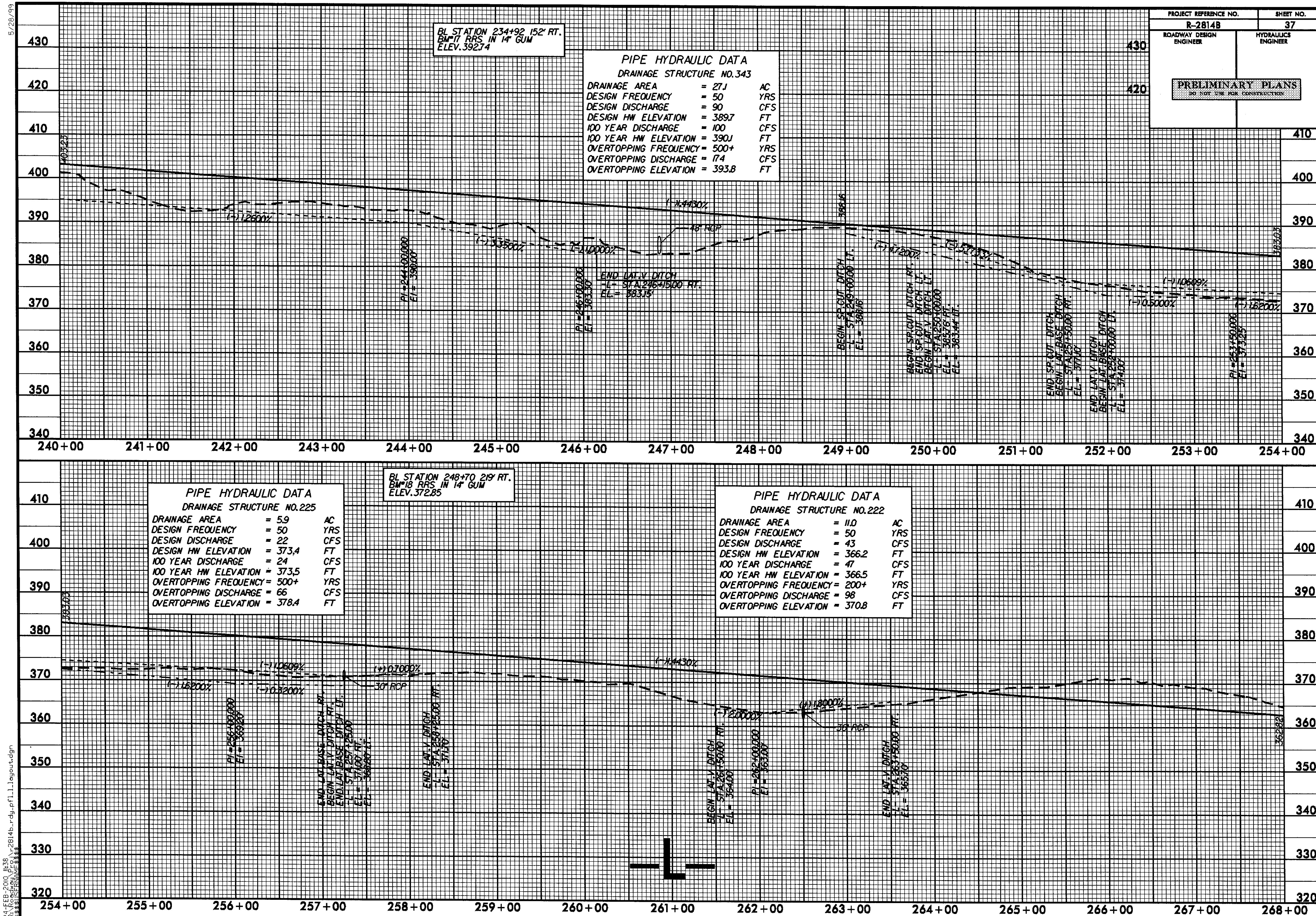

PROJECT REFERENCE NO.
R-2814B
SHEET NO.
37
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
BL STATION 234+92 152' RT.
BM#17 RRS IN 14" GUM
ELEV. 392.74
(-)1.4430%
(-)1.2600%
(-)3.3560%
(-)4.0000%
48" RCP
(-)4.7200%
(-)1.0609%
(-)0.5000%
(-)1.6200%
END LAT. V DITCH
-L- STA. 246+15.00 RT.
EL.= 383.35'
BL STATION 248+70 219' RT.
BM#18 RRS IN 14" GUM
ELEV. 372.85
(-)1.0609%
(-)1.6200%
(-)0.3200%
(+)0.7000%
30" RCP
(-)1.4430%
(-)2.0000%
(+)1.8000%
36" RCP
240+00
241+00
242+00
243+00
244+00
245+00
246+00
247+00
248+00
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
257+00
258+00
259+00
260+00
261+00
262+00
263+00
264+00
265+00
266+00
267+00
268+00
-L-

PIPE HYDRAULIC DATA DRAINAGE STRUCTURE NO. 343		
DRAINAGE AREA	= 27.1	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 90	CFS
DESIGN HW ELEVATION	= 389.7	FT
100 YEAR DISCHARGE	= 100	CFS
100 YEAR HW ELEVATION	= 390.1	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 174	CFS
OVERTOPPING ELEVATION	= 393.8	FT

PIPE HYDRAULIC DATA DRAINAGE STRUCTURE NO. 225		
DRAINAGE AREA	= 5.9	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 22	CFS
DESIGN HW ELEVATION	= 373.4	FT
100 YEAR DISCHARGE	= 24	CFS
100 YEAR HW ELEVATION	= 373.5	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 66	CFS
OVERTOPPING ELEVATION	= 378.4	FT

PIPE HYDRAULIC DATA DRAINAGE STRUCTURE NO. 222		
DRAINAGE AREA	= 11.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 43	CFS
DESIGN HW ELEVATION	= 366.2	FT
100 YEAR DISCHARGE	= 47	CFS
100 YEAR HW ELEVATION	= 366.5	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 98	CFS
OVERTOPPING ELEVATION	= 370.8	FT

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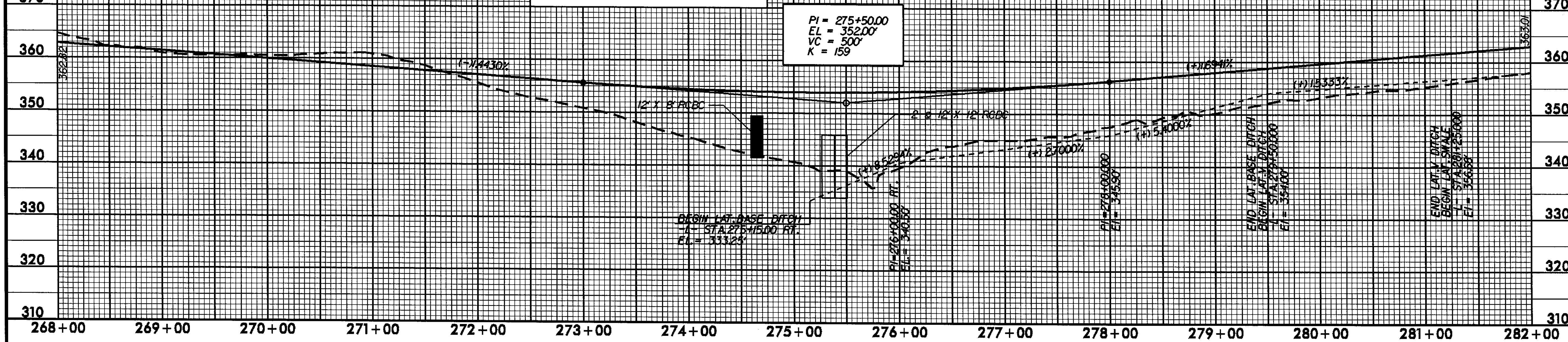
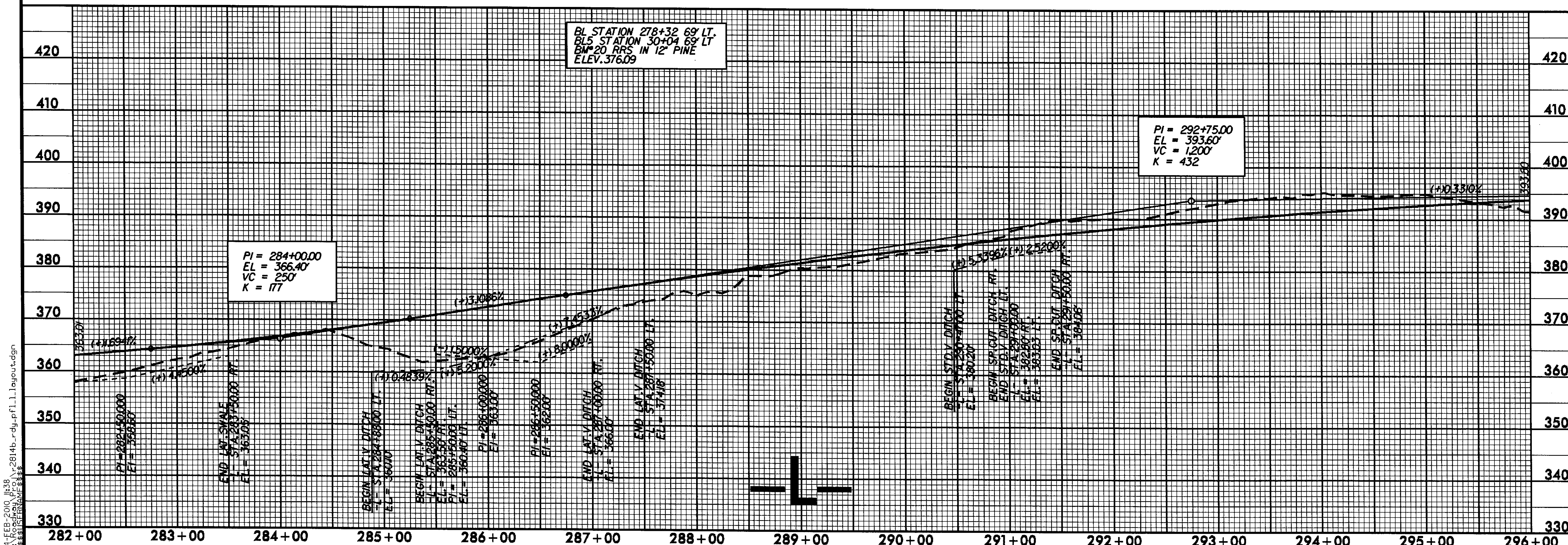
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	2865	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	348.0	FT
BASE DISCHARGE	=	3103	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	348.6	FT
OVERTOPPING DISCHARGE	=	6230	CFS
OVERTOPPING FREQUENCY	=	500+/-	YRS
OVERTOPPING ELEVATION	=	355.0	FT





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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	39

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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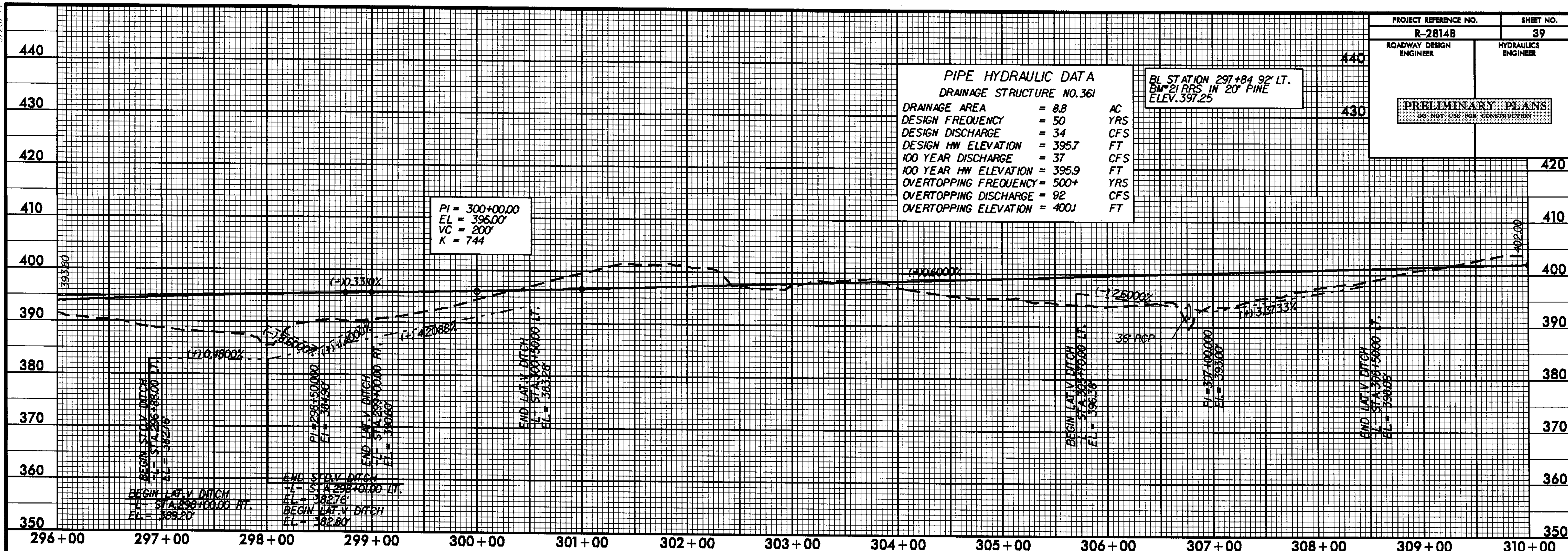
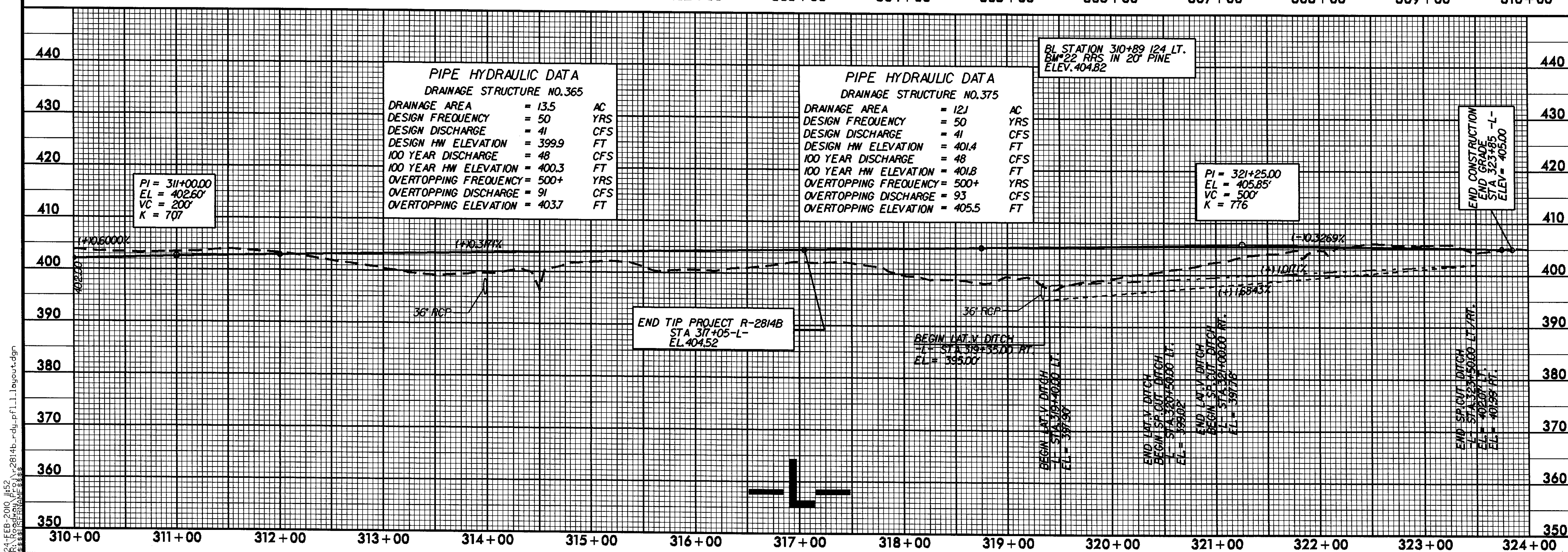


BL STATION 297+84 92' LT.
BM#21 RRS IN 20" PINE
ELEV. 397.25
PI = 300+00.00
EL = 396.00'
VC = 200'
K = 744
393.80
(+)0.3310%
(+)0.6000%
(-)1.26000%
(+)3.3733%
(-)7.5600%
(+)1.4000%
(+)4.2088%
(+)0.4800%
36" RCP
402.00
BEGIN STD.V DITCH -L- STA. 296+88.00 LT. EL = 382.16'
BEGIN LAT.V DITCH -L- STA. 298+00.00 RT. EL = 385.20'
PI = 298+50.000 EL = 384.90'
END LAT.V DITCH -L- STA. 299+00.00 RT. EL = 390.60'
END STD.V DITCH -L- STA. 298+01.00 LT. EL = 382.76'
BEGIN LAT.V DITCH EL = 382.80'
END LAT.V DITCH -L- STA. 300+50.00 LT. EL = 383.26'
BEGIN LAT.V DITCH -L- STA. 305+75.00 LT. EL = 396.38'
PI = 307+00.000 EL = 393.00'
END LAT.V DITCH -L- STA. 308+50.00 LT. EL = 398.06'
440
430
420
410
400
390
380
370
360
350
296+00
297+00
298+00
299+00
300+00
301+00
302+00
303+00
304+00
305+00
306+00
307+00
308+00
309+00
310+00

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 361

DRAINAGE AREA	= 8.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 34	CFS
DESIGN HW ELEVATION	= 395.7	FT
100 YEAR DISCHARGE	= 37	CFS
100 YEAR HW ELEVATION	= 395.9	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 92	CFS
OVERTOPPING ELEVATION	= 400.1	FT



BL STATION 310+89 124 LT.
BM#22 RRS IN 20" PINE
ELEV. 404.82
PI = 311+00.00
EL = 402.60'
VC = 200'
K = 707
PI = 321+25.00
EL = 405.85'
VC = 500'
K = 776
END CONSTRUCTION END GRADE STA 323+85 -L- ELEV = 405.00
(+)0.6000%
(+)0.3171%
(-)0.3269%
(+)1.0111%
(+)1.6843%
402.20
36" RCP
36" RCP
END TIP PROJECT R-2814B
STA 317+05 -L-
EL. 404.52
BEGIN LAT.V DITCH -L- STA. 319+35.00 RT. EL = 395.00'
BEGIN LAT.V DITCH -L- STA. 319+40.00 LT. EL = 397.90'
END LAT.V DITCH BEGIN SP. CUT DITCH -L- STA. 320+50.00 LT. EL = 399.02'
END LAT.V DITCH BEGIN SP. CUT DITCH -L- STA. 321+00.00 RT. EL = 397.16'
END SP. CUT DITCH -L- STA. 323+50.00 LT./RT. EL = 402.01' LT. EL = 401.99' RT.
-L-
440
430
420
410
400
390
380
370
360
350
310+00
311+00
312+00
313+00
314+00
315+00
316+00
317+00
318+00
319+00
320+00
321+00
322+00
323+00
324+00

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 365

DRAINAGE AREA	= 13.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 41	CFS
DESIGN HW ELEVATION	= 399.9	FT
100 YEAR DISCHARGE	= 48	CFS
100 YEAR HW ELEVATION	= 400.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 91	CFS
OVERTOPPING ELEVATION	= 403.7	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 375

DRAINAGE AREA	= 12.1	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 41	CFS
DESIGN HW ELEVATION	= 401.4	FT
100 YEAR DISCHARGE	= 48	CFS
100 YEAR HW ELEVATION	= 401.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 93	CFS
OVERTOPPING ELEVATION	= 405.5	FT

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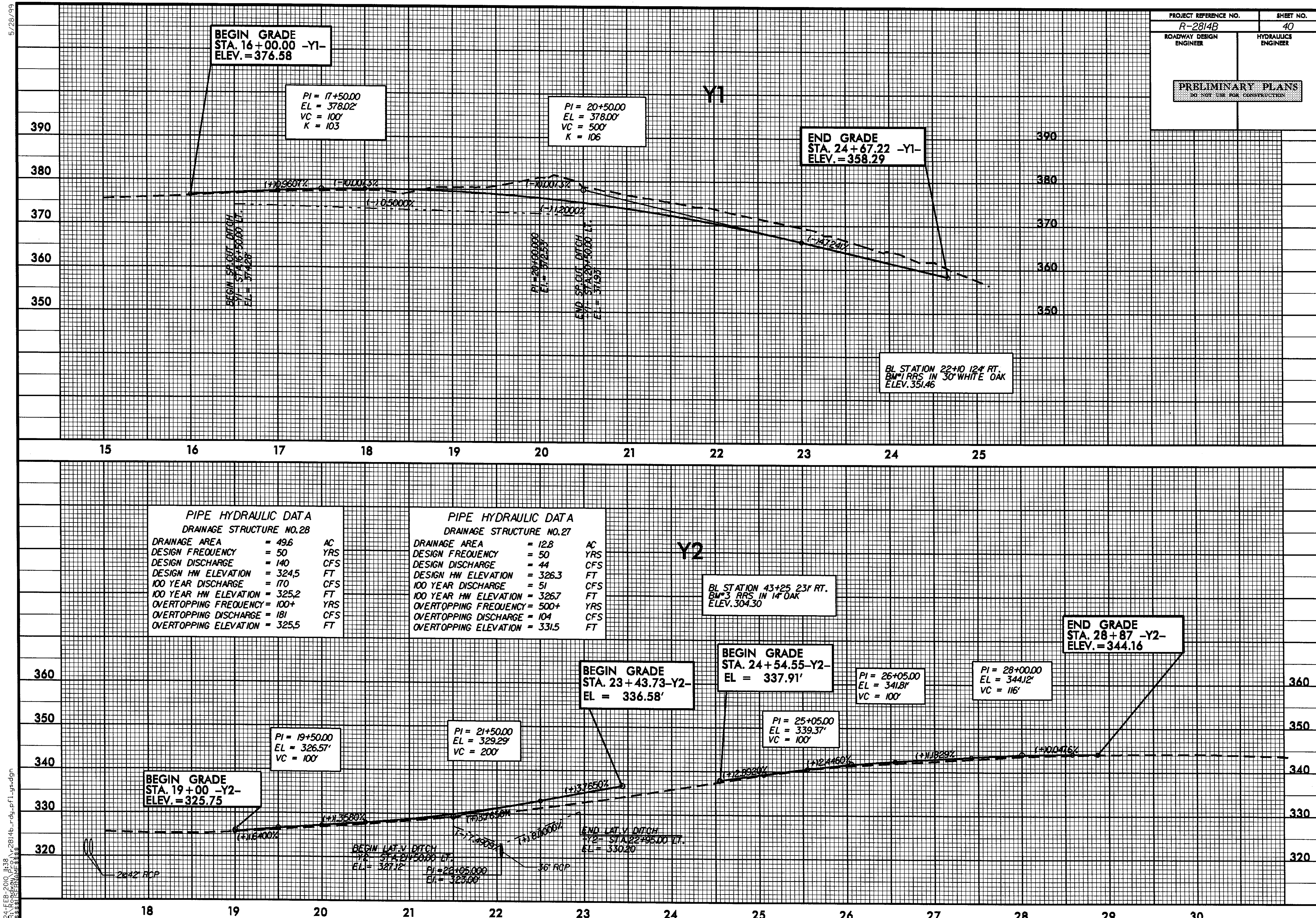
PROJECT REFERENCE NO.
R-2814B
SHEET NO.
40
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Y1
BEGIN GRADE
STA. 16+00.00 -Y1-
ELEV.=376.58
PI = 17+50.00
EL = 378.02'
VC = 100'
K = 103
PI = 20+50.00
EL = 378.00'
VC = 500'
K = 106
END GRADE
STA. 24+67.22 -Y1-
ELEV.=358.29
(+)0.9607%
(-)0.0073%
(-)0.5000%
(-)0.0073%
(-)1.2000%
BEGIN SP. CUT DITCH
-Y1- STA.16+50.00 LT.
EL = 374.28
PI = 20+00.000
EL = 372.25'
END SP. CUT DITCH
-Y1- STA.20+50.00 LT.
EL = 371.93
BL STATION 22+10 124' RT.
BM#1 RRS IN 30" WHITE OAK
ELEV. 351.46
390
380
370
360
350
15
16
17
18
19
20
21
22
23
24
25
Y2
BL STATION 43+25 23' RT.
BM#3 RRS IN 14" OAK
ELEV. 304.30
END GRADE
STA. 28+87 -Y2-
ELEV.=344.16
BEGIN GRADE
STA. 23+43.73-Y2-
EL = 336.58'
BEGIN GRADE
STA. 24+54.55-Y2-
EL = 337.91'
PI = 26+05.00
EL = 341.81'
VC = 100'
PI = 28+00.00
EL = 344.12'
VC = 116'
PI = 25+05.00
EL = 339.37'
VC = 100'
PI = 21+50.00
EL = 329.29'
VC = 200'
PI = 19+50.00
EL = 326.57'
VC = 100'
BEGIN GRADE
STA. 19+00 -Y2-
ELEV.=325.75
(+)1.6400%
(+)1.3580%
(+)3.7656%
(+)3.7650%
(+)2.8920%
(+)2.4460%
(+)1.1829%
(+)0.0476%
(-)7.4950%
(+)8.1000%
BEGIN LAT. V DITCH
-Y2- STA.21+50.00 LT.
EL= 327.12'
PI = 22+05.000
EL = 323.00'
END LAT. V DITCH
-Y2- STA.22+95.00 LT.
EL= 330.20
2@42" RCP
36" RCP
360
350
340
330
320
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PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.28

DRAINAGE AREA	= 49.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 140	CFS
DESIGN HW ELEVATION	= 324.5	FT
100 YEAR DISCHARGE	= 170	CFS
100 YEAR HW ELEVATION	= 325.2	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 181	CFS
OVERTOPPING ELEVATION	= 325.5	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.27

DRAINAGE AREA	= 12.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 44	CFS
DESIGN HW ELEVATION	= 326.3	FT
100 YEAR DISCHARGE	= 51	CFS
100 YEAR HW ELEVATION	= 326.7	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 104	CFS
OVERTOPPING ELEVATION	= 331.5	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2814B	41
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BL STATION 154+12 389' LT.
BM#11 RRS IN 26" PINE
ELEV. 423.71

Y3

BEGIN GRADE
STA. 15+71.00 -Y3-
ELEV. = 422.10

PI = 17+50.00
EL = 419.00'
VC = 200'
K = 148

(-)17.38%

(-)13.06(4)%

END GRADE
STA.19+12.59-Y3-
EL = 413.99'

BEGIN GRADE
STA. 20+09.77-Y3-
EL = 413.69'

PI = 21+60.00
EL = 409.28'
VC = 250'
K = 77

(-)12.9345%

(+)0.3000%

(-)1.1800%

(-)1.1750%

36" RCP

BEGIN SP.CUT DITCH
-Y3- STA.21+00.00 LT.
EL.= 406.36'

BEGIN LAT.V DITCH
-Y3- STA.21+20.00 RT.
EL.= 405.50'

PI=22+20.000 LT.
EL= 404.20'
END LAT.V DITCH RT.
EL= 403.75'

END SP.CUT DITCH
-Y3- STA.22+61.82 LT.
EL= 406.62'

PI = 24+00.00
EL = 410.00'
K = 86
VC = 230'

(-)1.1765%

(-)12.3622%

END GRADE
STA. 25+27.00 -Y3-
ELEV. = 407.00

BEGIN SP.CUT DITCH
-Y3- STA.23+60.00 LT.
EL= 405.50'

BEGIN V DITCH
-Y3- STA.25+05.00 LT.
EL= 409.00'

END V DITCH
-Y3- STA.26+50.00 LT.
EL= 402.73'

END SP.CUT DITCH
-Y3- STA.24+35.00 LT.
EL= 404.50'

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.96

DRAINAGE AREA	= 9.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 36	CFS
DESIGN HW ELEVATION	= 407.1	FT
100 YEAR DISCHARGE	= 40	CFS
100 YEAR HW ELEVATION	= 407.3	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 74	CFS
OVERTOPPING ELEVATION	= 409.6	FT

Y4

BEGIN GRADE
STA. 10+12.12 -Y4-
ELEV. = 407.88

PI = 17+50.00
EL = 419.60'
VC = 500'
K = 193

(+)1.5883%

(-)1.0000%

(+)2.0878%

(+)2.1843%

24" RCP

BEGIN SP.CUT DITCH
-Y4- STA.10+45.00 LT./RT.
EL = 404.50' LT.
EL = 404.00' RT.

END SP.CUT DITCH
-Y4- STA.10+45.00 LT.
EL= 408.78'

END SP.CUT DITCH
-Y4- STA.15+00.00 RT.
EL= 409.67'

BEGIN SP.CUT DITCH
-Y4- STA.20+00.00 LT.
EL= 415.82'

BEGIN SP.CUT DITCH
-Y4- STA.20+50.00 RT.
EL= 413.24'

END GRADE
STA. 22+29.49 -Y4-
ELEV. = 414.81

(-)2.5782%

(-)2.7765%

END SP.CUT DITCH
-Y4- STA.22+26.00 RT.
EL= 408.52'

END SP.CUT DITCH
-Y4- STA.22+29.00 LT.
EL= 409.00'

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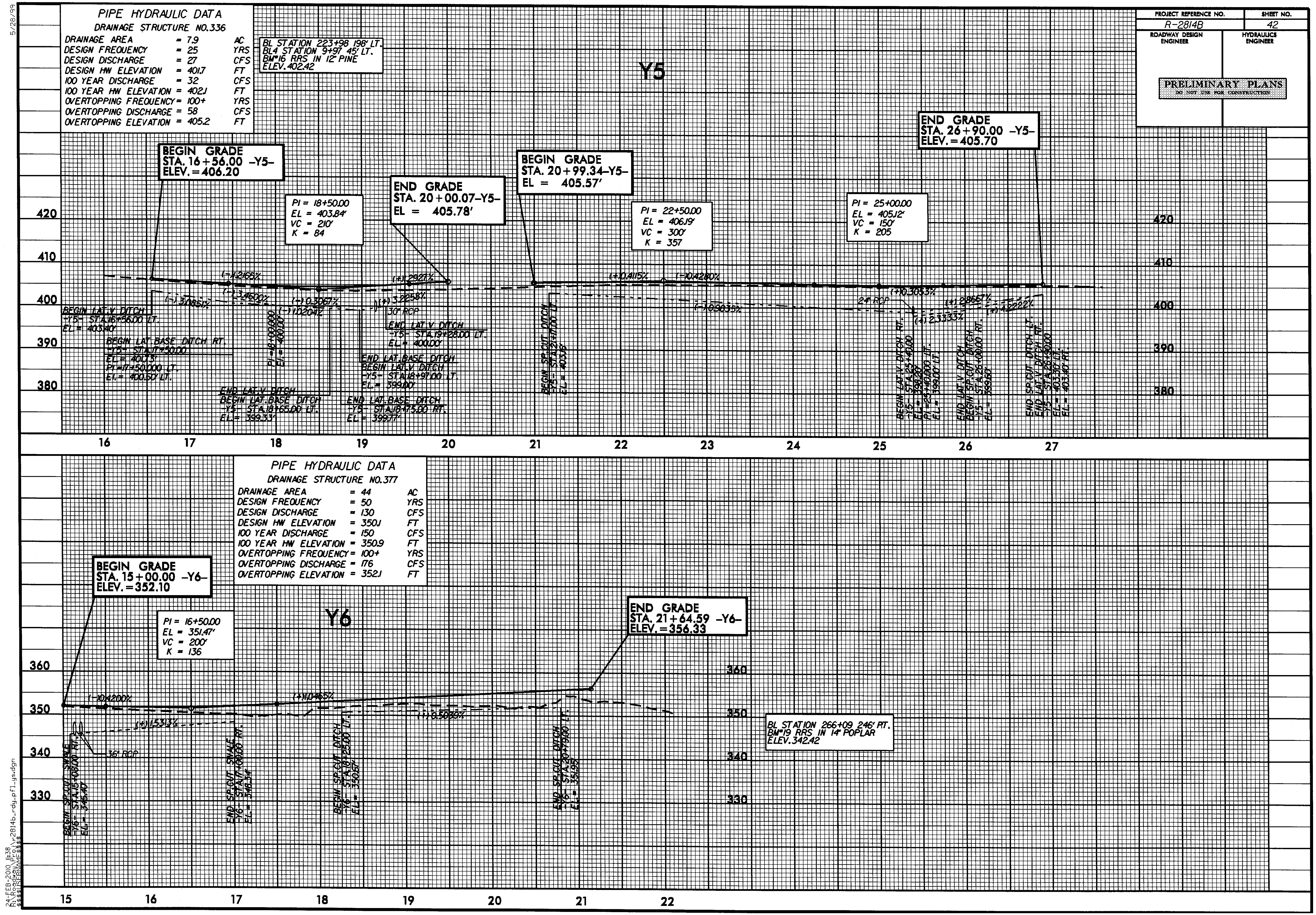
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PROJECT REFERENCE NO. R-2814B
SHEET NO. 42
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.336
DRAINAGE AREA = 7.9 AC
DESIGN FREQUENCY = 25 YRS
DESIGN DISCHARGE = 27 CFS
DESIGN HW ELEVATION = 401.7 FT
100 YEAR DISCHARGE = 32 CFS
100 YEAR HW ELEVATION = 402.1 FT
OVERTOPPING FREQUENCY = 100+ YRS
OVERTOPPING DISCHARGE = 58 CFS
OVERTOPPING ELEVATION = 405.2 FT
BL STATION 223+98 198' LT.
BL4 STATION 9+97 45' LT.
BM#16 RRS IN 12" PINE
ELEV. 402.42
Y5
BEGIN GRADE STA. 16+56.00 -Y5- ELEV.=406.20
PI = 18+50.00 EL = 403.84' VC = 210' K = 84
END GRADE STA. 20+00.07-Y5- EL = 405.78'
BEGIN GRADE STA. 20+99.34-Y5- EL = 405.57'
PI = 22+50.00 EL = 406.19' VC = 300' K = 357
PI = 25+00.00 EL = 405.12' VC = 150' K = 205
END GRADE STA. 26+90.00 -Y5- ELEV.=405.70
(-)1.2165%
(+)1.2927%
(+)0.4115%
(-)0.4280%
(+)0.3053%
24" RCP
30" RCP
420
410
400
390
380
16
17
18
19
20
21
22
23
24
25
26
27
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.377
DRAINAGE AREA = 44 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 130 CFS
DESIGN HW ELEVATION = 350.1 FT
100 YEAR DISCHARGE = 150 CFS
100 YEAR HW ELEVATION = 350.9 FT
OVERTOPPING FREQUENCY = 100+ YRS
OVERTOPPING DISCHARGE = 176 CFS
OVERTOPPING ELEVATION = 352.1 FT
BEGIN GRADE STA. 15+00.00 -Y6- ELEV.=352.10
PI = 16+50.00 EL = 351.47' VC = 200' K = 136
Y6
END GRADE STA. 21+64.59 -Y6- ELEV.=356.33
(-)0.4200%
(+)1.0465%
(+)1.5313%
(+)0.5689%
36" RCP
BL STATION 266+09 246' RT.
BM#19 RRS IN 14" POPLAR
ELEV. 342.42
360
350
340
330
15
16
17
18
19
20
21
22
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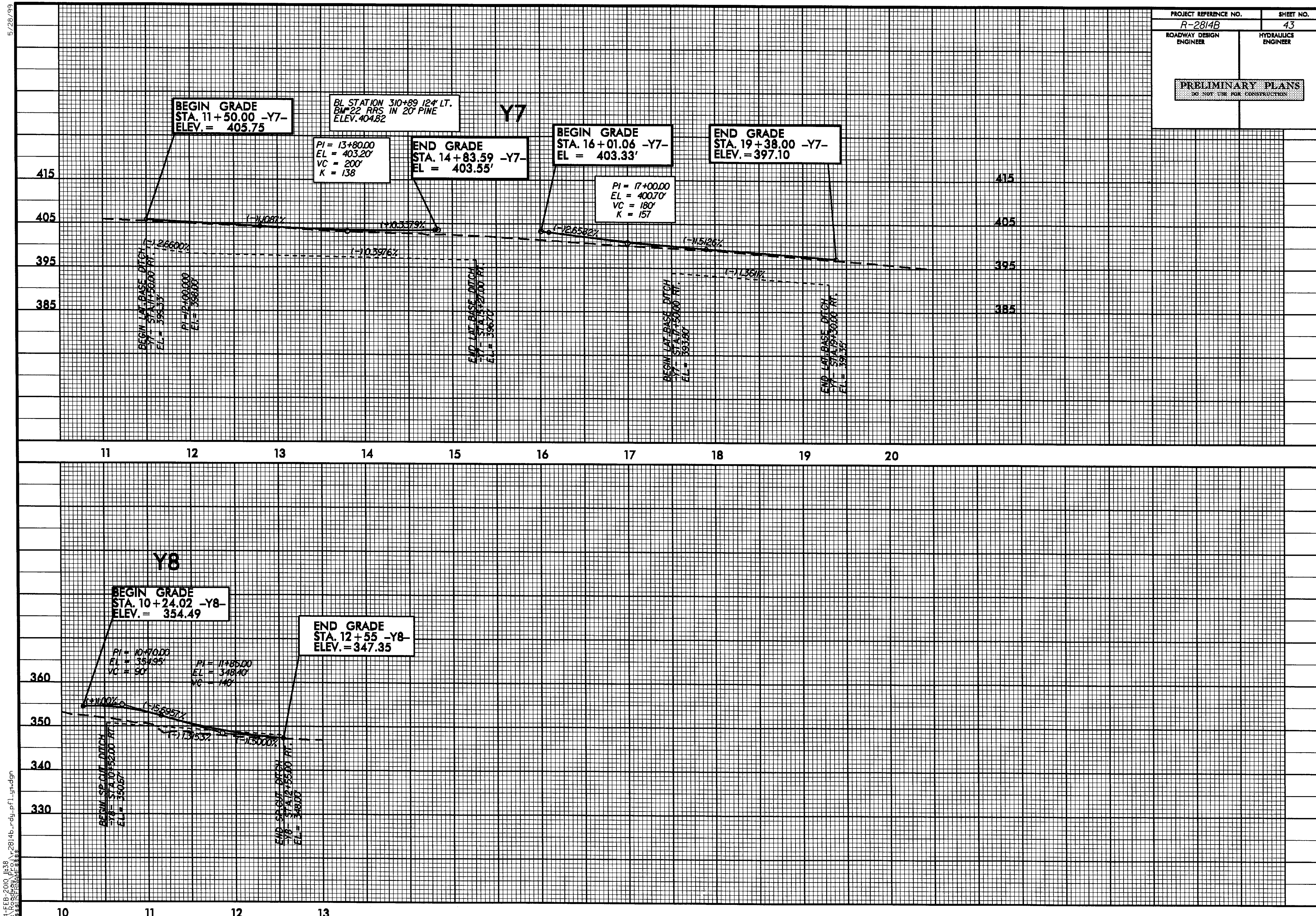
PROJECT REFERENCE NO.	SHEET NO.
R-2814B	43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99



Y7
BEGIN GRADE
STA. 11+50.00 -Y7-
ELEV. = 405.75
BL STATION 310+89 124' LT.
BM#22 RRS IN 20" PINE
ELEV. 404.82
PI = 13+80.00
EL = 403.20'
VC = 200'
K = 138
END GRADE
STA. 14+83.59 -Y7-
EL = 403.55'
BEGIN GRADE
STA. 16+01.06 -Y7-
EL = 403.33'
PI = 17+00.00
EL = 400.70'
VC = 180'
K = 157
END GRADE
STA. 19+38.00 -Y7-
ELEV. = 397.10
(-)1.1087%
(+)0.3379%
(-)2.6600%
(-)0.3976%
(-)2.6582%
(-)1.5126%
(-)1.3611%
BEGIN LAT. BASE DITCH -Y7- STA. 11+50.00 RT. EL = 399.33'
PI = 12+00.000 EL = 398.00'
END LAT. BASE DITCH -Y7- STA. 15+27.00 RT. EL = 396.70'
BEGIN LAT. BASE DITCH -Y7- STA. 17+50.00 RT. EL = 393.80'
END LAT. BASE DITCH -Y7- STA. 19+30.00 RT. EL = 391.35'
415
405
395
385
11
12
13
14
15
16
17
18
19
20
Y8
BEGIN GRADE
STA. 10+24.02 -Y8-
ELEV. = 354.49
END GRADE
STA. 12+55 -Y8-
ELEV. = 347.35
PI = 10+70.00
EL = 354.95'
VC = 90'
PI = 11+85.00
EL = 348.40'
VC = 140'
(+)1.100%
(-)5.6957%
(-)1.3153%
(-)1.5000%
BEGIN SP. CUT DITCH -Y8- STA. 10+52.00 RT. EL = 350.67'
END SP. CUT DITCH -Y8- STA. 12+55.00 RT. EL = 348.00'
360
350
340
330
10
11
12
13

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$$$$USERNAME$$$$