STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

April 19, 2011

U. S. Army Corps of Engineers
Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. Andy Williams
NCDOT Coordinator

SUBJECT: **Application for Section 404 Individual Permit and Section 401 Individual Water Quality Certification** for the proposed widening of:

R-2309AB - US 220 from SR 2182 (Horsepen Creek Rd) to 0.2 miles north of SR 2313 (Winfree Rd) in Greensboro, Guilford County, Division 7. Federal Aid Project No. STP-220(5), State Project No. 8.1491504, WBS Element No. 34418.1.4 and

R-2413C - US 220 south of the Haw River to the Intersection of US 220 and existing NC 68 in Guilford and Rockingham Counties, Division 7. State Project No. 6499008T, WBS Element No. 34429.1.1.

Debit $285.00 from WBS Element No. 34429.1.1 and $285.00 from WBS Element No. 34418.1.4.

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to widen and improve U.S. 220 from:

R-2309AB
A two-lane facility to a four-lane facility from SR 2182 (Horsepen Creek Rd) to 0.2 miles north of SR 2313 (Winfree Rd) in Greensboro, Guilford County, North Carolina and

R-2413C
A two-lane facility to a four-lane facility from south of the Haw River to the Intersection of US 220 and existing NC 68 in Guilford and Rockingham Counties, North Carolina.

Originally R-2413 C was denied application in 2003 based on independent utility and usability of the project alone. This problem was rectified with the construction of another section of US 220 (R-2309 AB) along with R-2413C. Andy Williams, U.S. Army Corps of Engineers (USACE), requested the two projects be combined under one permit application.

In addition to this cover letter, the application package for each project consists of an ENG Form 4345, North Carolina Ecosystem Enhancement Program (NCEEP) acceptance letters, November 2008 Habitat Evaluation Reports for Roanoke logperch and James spinymussel, July 2003 NC Cultural Resources R-2413 Memo, June 2003 NCDOT Cultural Resources R-2413 Memo, Interagency Hydraulic Design Review meeting minutes for R-2413C Concurrence Points 4B and 4C and Concurrence Point 4B for R-2309AB, Stormwater Management Plans, permit drawings, and half-size roadway plan sheets.

Project Schedule

Both sections have a review date of November 29, 2011 and a letting date of January 17, 2012. However, letting of project may advance as funding becomes available. There are two additional sections for R-2413, A and B, to be permitted in April 2014. Sections A and B have independent utility.

Purpose and Need

R-2309AB

The purpose of this section is to increase the traffic carrying capacity along the subject section of US 220 and to address the structural deficiencies of Bridge Numbers 301, 307, and 313, as well as the culvert north of SR 2182 (Horsepen Creek Road).

R-2413C

The purpose of this section is to provide a multi-lane improvement from south of the Haw River to the Intersection of US 220 and NC 68. The improved facility will divert additional through-traffic from existing US 220, which passes through Greensboro.

Summary of Impacts

R-2309AB

This section lies within the Piedmont Physiographic Province in the Cape Fear River Basin [Hydrologic Unit Code (HUC) 03030002]. This project will result in 1,432 linear feet of permanent stream impacts. Of the 1,432 feet of permanent impact, 332 linear feet will result from bank stabilization activities. Additionally, a total of 394 linear feet of temporary stream impacts will result from this project. There will also be a total of 0.79 acres of riparian wetland impacts due to permanent fill, excavation, and mechanized clearing. No impacts to jurisdictional resources will occur due to the relocation or installation of utilities in the project area.

R-2413C

This section lies within the Piedmont Physiographic Province in both the Cape Fear River Basin [Hydrologic Unit Code (HUC) 03030002] and Roanoke River Basin [Hydrologic Unit code (HUC) 03010103]. This project will result in 2,511 linear feet of permanent stream impacts with 1,904 feet located in HUC 03030002 and 607 feet located in HUC 03010103. Of the 2,511 feet of permanent impact, 269 linear feet will result from bank stabilization activities (192 feet in HUC 0303002 and 77 feet in HUC 03010103). Additionally, a total of 189 linear feet of temporary stream impacts will result from this project (HUC 03030002). There will be 1.61 acres of riparian wetland impacts due to permanent fill, excavation, and mechanized clearing (1.59 acres in HUC 03030002 and 0.02 in HUC 03010103). There will also be 0.01 acres of riparian wetland impacts due to hand clearing for installation of utilities (HUC 03030002).

Summary of Mitigation

Throughout the design and National Environmental Policy Act (NEPA) process, this project has been designed to avoid and minimize impacts to jurisdictional areas.

R-2309AB

The proposed project will permanently impact a total of 1,432 feet of warm water streams. Of the 8 streams impacted, 2 streams were deemed unimportant (no mitigation required) by the USACE. Therefore, of the 1,432 feet of total permanent stream impacts, 1,344 feet of impacts are in streams subject to mitigation. Of these 1,344 feet, there are 320 feet of bank stabilization, which do not constitute loss of waters of the U.S. and do not require mitigation by the USACE, resulting in 1,024 feet of stream impacts requiring USACE mitigation. Of the 320 feet of bank stabilization, 40 feet do not surpass the 150-foot mitigation threshold set by NCDWQ. (Note that there is an additional 12 feet of bank stabilization not included in the 320-foot total, which is in a stream deemed unimportant by the USACE.)

Therefore, the USACE is requiring 2:1 mitigation for 1,024 feet and the NCDWQ is requiring 1:1 mitigation for 1,344 feet. The 2,048 feet of mitigation provided by the NCEEP for permanent impacts to warm water streams covers all mitigation requirements for R-2309 AB.
NCEEP will also provide mitigation for the 0.79 acres of permanent riparian wetland impacts resulting from roadway fill, excavation, and mechanized clearing.

R-2413C

The proposed project will permanently impact a total of 2,511 feet of warm water streams; 1,904 feet in the Cape Fear River Basin and 607 feet in the Roanoke River Basin. Of the 12 streams impacted, one stream was deemed unimportant (no mitigation required) by the USACE. Therefore, of the 2,511 feet of total permanent stream impacts, 2,469 feet of impacts are in streams subject to mitigation. Of these 2,469 feet, there are 269 feet of bank stabilization, which do not constitute loss of waters of the U.S. and do not require mitigation by the USACE, resulting in 2,200 feet of stream impacts requiring USACE mitigation. Of the 2,200 feet requiring USACE mitigation, 342 feet do not surpass the 150-foot mitigation threshold set by NCDWQ. Similarly, of the 269 feet of bank stabilization, 100 feet do not surpass the 150-foot mitigation threshold set by NCDWQ.

Therefore, the USACE is requiring 2:1 mitigation for 2,200 feet (1,670 in Cape Fear and 530 in Roanoke) and the NCDWQ is requiring 1:1 mitigation for 2,027 feet (1,644 in Cape Fear and 383 in Roanoke). The 4,400 feet of mitigation provided by the NCEEP for permanent impacts to warm water streams covers all mitigation requirements for R-2413 C.

NCEEP and NCDOT both will provide compensatory riparian wetland mitigation for the 1.61 acres of riparian wetland impacts resulting from roadway fill, excavation, and mechanized clearing. The Bryan Boulevard Mitigation Sites located in Guilford County will provide 1.59 acres of compensatory riparian wetland mitigation in HUC 03030002 for NCDOT. NCEEP will provide for the remaining 0.02 acres of reparian wetland impacts located in HUC 03010103. NCDOT is not proposing mitigation for the 0.01 acres of riparian wetland impacts from hand clearing activities for utilities.

NEPA DOCUMENT STATUS

R-2309AB

An Environmental Assessment (EA) was approved in December 2004. A Finding of No Significant Impact (FONSI) was approved in November 2006. The EA and FONSI have been provided to regulatory review agencies. A Right of Way Consultation to update the EA and FONSI was provided in April 2008. Additional copies will be provided upon request.

R-2413C

An Environmental Assessment (EA) was approved in August 1993. A Finding of No Significant Impact (FONSI) was approved in March 1995 The EA and FONSI have been provided to regulatory review agencies. A Re-Evaluation of the EA and FONSI Memorandum was done August 2009 Additional copies will be provided upon request.

INDEPENDENT UTILITY

The subject project is in compliance with 23 CFR Part 771.111(f), which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;
(2) The project is usable and a reasonable expenditure due to both sections being constructed at the same time:
(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

RESOURCE STATUS

Wetland delineations within the R-2309 AB and R-2413 C construction footprint followed the field delineation method outlined in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). Stream identification and classification followed the *Identification Methods for the Origins of Intermittent and Perennial Streams* (North Carolina Division of Water Quality [NCDWQ]).

<u>R-2309AB</u>
Within the R-2309AB construction footprint, eight streams, two Lake Brandt sites, and three wetlands sites were identified. Jurisdictional areas were verified by USACE Regulatory Specialist John Thomas in February 2002 (USACE Action ID No. 200220447) and NCDWQ representative Sue Homewood. Jurisdictional features were re-verified by USACE Regulatory Specialist Andy Williams and conceded by NCDWQ representative Amy Euliss on September 16, 2008. No written Jurisdictional Determination (JD) was received from the USACE for the re-verification.

<u>R-2413C</u>
Thirteen streams and eight wetlands sites were identified within the R-2413C construction footprint. Jurisdictional areas were verified by USACE Regulatory Specialist Eric Alsmeyer in October 2001 (USACE Action ID No. 199503778). Jurisdictional features were re-verified by USACE Regulatory Specialist Andy Williams and conceded by NCDWQ representative Amy Euliss on September 16-17, 2008. No written JD was received from the USACE for the re-verification.

IMPACTS TO WATERS OF THE UNITED STATES

<u>R-2309AB</u>
The section is located in the Cape Fear River Basin in Guilford County, HUC 03030002. Jurisdictional features within the construction footprint that will be impacted by this project include two unnamed tributaries (UT) to Lake Brandt and Lake Brandt (NCDWQ Classification WS-III NSW CA; NCDWQ Index No. 16-11-5-[2]), four UTs to Mears Fork; (NCDWQ Classification C, NSW; NCDWQ Index No. 16-3), and one UT to Haw; (NCDWQ Classification C, NSW; NCDWQ Index No 16-[1]). There are ten riparian wetlands located within the project area.

<u>R-2413C</u>
The section is located in the Cape Fear and Roanoke River Basins in Guilford and Rockingham Counties. Jurisdictional features within the construction footprint that will be impacted by this

project include five unnamed tributaries (UTs) to the Haw River and the Haw River (NCDWQ Classification C, NSW; NCDWQ Index No. 16-[1]), two UTs to Troublesome Creek and Troublesome Creek (NCDWQ Classification WSIII, NSW; NCDWQ Index No. 16-6-[0.3]), and three UTs to Jacobs Creek (NCDWQ Classification C, NCDWQ Index No 23-32-[0.5]). There are nine riparian wetlands located within the project area.

Surface Waters

R-2309AB

Total surface water impacts for R-2309 AB are 1,432 linear feet of permanent stream impacts and 394 linear feet of temporary stream impacts. There are also 0.01 acres of surface water impacts for the bents for the bridge at Lake Brandt. There are Jurisdictional stream impacts are summarized below in Tables 1, 2, and 3

Table 1. Permanent impacts to jurisdictional streams for R-2309AB: Cape Fear HUC 0303002

Site	Stream JD ID	Classification	Impact Type	Impact Length (lin. ft.)	Proposed Mitigation Ratio	Proposed Mitigation Required (lin. ft.)
1	Stream 2 (UT Lake Brandt)	Perennial	10 x 11 RCBC	244	2:1	488
			Bank Stabilization	36	0[1]	0
6	Stream 6A (UT Lake Brandt)	Intermittent	36" RCP	3	0[2]	0
7	Stream 8 (UT Mears Fork)	Perennial	54" RCP/ 54" WSP	98	2:1	196
			Bank Stabilization	74	0[1]	0
8	Stream 10 (UT Mears Fork)	Perennial	Bank Stabilization	40	0[1,3]	0
9	Stream 10	Perennial	8' x 8' RCBC	171	2:1	342
			Bank Stabilization	69	0[1]	0
10	Stream 10	Perennial	Roadway fill / 54" & 48" RCP	354	2:1	708
			Bank Stabilization	58	0[1]	0
11	Stream 13 (UT Mears Fork)	Intermittent	42" WSP	73	0[2]	0
			Bank Stabilization	12	0[2]	0
12	Stream 14 (UT Haw)	Perennial	36" WSP & 36" RCP	157	2:1	314
			Bank Stabilization	43	0[1]	0
Total Impacts:				**1432**		**2048**

[1] Mitigation for bank stabilization not required by USACE and NCDWQ mitigation requirement met under the USACE 2:1 ratio for stream mitigation. [2] Streams deemed unimportant by the USACE [3] Do not meet mitigation threshold NCDWQ (150ft).

Table 2. Permanent impacts to surface waters for R-2309AB: Cape Fear HUC 03030002

Site	Surface Water ID	Classification	Impact Type	Impact Area (ac.)	Proposed Mitigation Ratio
3	Lake Brandt	WS-III NSW CA	72" CAP / Roadway Fill	0.36	0
4	Lake Brandt	WS-III NSW CA	Dual Bridges	1.42	0
Total Impacts				**1.78**	**0**

Table 3. Temporary impacts to jurisdictional streams for R-2309AB: Cape Fear HUC 03030002

Site	Stream JD ID	Classification	Impact Length (lin. ft.)
1	Stream 2	Perennial	162
4	Lake Brandt	Perennial	0.42*
7	Stream 8	Perennial	18
8	Stream 10	Perennial	34
9	Stream 9 (UT Mears Fork)	Intermittent	122
10	Stream 10	Perennial	16
11	Stream 13	Intermittent	20
12	Stream 14	Perennial	22
Total Impacts			**394**

* Note: There are 0.42 acres of temporary surface water impact for the temporary causeways for Lake Brandt Impacts not included in stream impact total.

There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply I (WS-I), or Water Supply II (WS-II) waters within 1.0 mile of the project area. None of the streams within the project area are listed on the 2010 303(d) List of Impaired Waters of North Carolina. However, there are three water sources within a mile of the project area that are listed on the 2010 303(d) List that are connected with waters in the project area: Horsepen Creek, Reedy Fork, and the Haw River. Horsepen Creek and Reedy Fork are listed as impaired due to ecological/biological integrity for benthos and/or fish community and the Haw is listed as impaired due to copper.

R-2413C

Total surface water impacts for R-2413 C are 2,511 linear feet of permanent stream impacts and 189 linear feet of temporary stream impacts. Jurisdictional stream impacts are summarized below in Tables 4 and 5.

Table 4. Permanent impacts to jurisdictional streams for R-2413C

Site	Stream JD ID	Classification	Impact Type	Impact Length (lin. ft.)	Proposed Mitigation Ratio	Proposed Mitigation Required (lin. ft.)
Streams in HUC 03030002 Cape Fear						
1	Stream 13 (UT Haw)	Intermittent	30"CSP	42	0[2]	0
4	Haw River	Perennial	Bank Stabilization	40	0[1,3]	0
5	Stream 3 (UT Haw)	Perennial	54" RCP	894	2:1	1,788
6	Stream 4 (UT Haw)	Perennial	Riprap	36	2:1[3]	72
7	Stream 6 (UT Haw)	Perennial	42" RCP	200	2:1	400
			Bank Stabilization	20	0[1]	0
8	Stream 7 (Troublesome Creek)	Perennial	2-12' x 10' RCBC	112	2:1[3]	224
			Bank Stabilization	30	0[1,3]	0
9	Stream 8 (UT Troublesome Creek)	Perennial	20' x 7' Bottomless	259	2:1	518
			Bank Stabilization	89	0[1]	0
10	Stream 9 (UT Troublesome Creek)	Perennial	36" RCP	169	2:1	338
			Bank Stabilization	13	0[1]	0
Stream Impacts				**1904**		**3,340**
Streams in HUC Roanoke 03010103						
11	Stream 10 (UT Jacobs Creek)	Perennial	54" RCP	218	2:1	436
			Bank Stabilization	11	0[1]	0
12	Stream 11 (UT Jacobs Creek)	Perennial	36" RCP	118	2:1	236
			Bank Stabilization	36	0[1]	0
13	Stream 12 (UT Jacobs Creek)	Perennial	2-48" CSP	52	2:1[3]	104
			Bank Stabilization	30	0[1,3]	0
14	Stream 3A (UT Haw)	Perennial	48" RCP	142	2:1[3]	284
Stream Impacts				**607**		**1,060**
Total Impacts				**2,511**		**4,400**

[1] Mitigation for bank stabilization not required by USACE and NCDWQ mitigation requirement met under the USACE 2:1 ratio for stream mitigation. [2] Streams deemed unimportant by the USACE. [3] Do not meet mitigation requirement for NCDWQ (150ft).

Table 5. Temporary impacts to jurisdictional streams for R-2413C

Site	Stream JD ID	Classification	Impact Length (lin. ft.)
Streams in Cape Fear HUC 03030002			
4	Haw River	Perennial	141
8	Stream 7	Perennial	48
Total Impacts			**189**

There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply I (WS-I), or Water Supply II (WS-II) waters within 1.0 mile of the project area. The Haw River and Troublesome Creek are listed on are listed on the 2010 303(d) List of Impaired Waters of North Carolina. The Haw River is listed as impaired for copper and Troublesome Creek is listed for dissolved oxygen. Both streams flow through the project area. There are no other water sources within a mile of the project area that are listed on the 2010 303(d) List.

Wetlands

Table 6. Permanent Impacts for Jurisdictional Wetland R-2309AB- (HUC 03030002)

Site	Wetland JD ID	Impact Type	Permanent Impacts (acres)	Proposed Mitigation Ratio	Mitigation Required (acres)
1	Wetland 1	Excavation	0.06	2:1	0.12
		Permanent Fill	0.07	2:1	0.14
2	Wetlands 12, 13, & 14	Mechanized Clearing	0.04	1:1	0.04
3	Wetlands 4, 4A, & 4B	Mechanized Clearing	0.04	1:1	0.04
		Permanent Fill	0.31	2:1	0.62
4	Wetlands 4B & 15	Mechanized Clearing	0.02	1:1	0.02
		Permanent Fill	0.21	2:1	0.42
5	Wetland 16	Excavation	0.01	2:1	0.02
		Mechanized Clearing	0.01	1:1	0.01
10	Wetland 6	Permanent Fill	0.02	2:1	0.04
Total Impacts			**0.79**		**1.47**

Table 7. Permanent Impacts for Jurisdictional Wetlands R-2413C

Site	Wetland JD ID	Impact Type	Permanent Impacts (acres)	Proposed Mitigation Ratio	Mitigation Required (acres)
Wetlands in HUC 03030002					
2	Wetland LSW	Permanent Fill	0.46	2:1	0.92
		Excavation	0.09	2:1	0.18
3	Wetland LSC	Mechanized Clearing	0.03	1:1	0.03
		Permanent Fill	0.24	2:1	0.48
Utility 1*	Wetland LSC	Hand clearing for Aerial line	0.01	N/A	0
5	Wetlands LNW, 1, 2, 3, & 4	Mechanized Clearing	0.06	1:1	0.06
		Permanent Fill	0.65	2:1	1.30
10	Wetland O	Permanent Fill	0.02	2:1	0.04
		Excavation	0.04	2:1	0.08
Wetland Impact			**1.60**		**3.09**
Wetlands in HUC 03030002					
11	Wetland PW	Permanent Fill	0.02	2:1	0.04
Wetland Impact			**0.02**		**0.04**
Total Impacts			**1.62**		**3.13**

*See Utility Permit Drawings Sheet No. 2

FEDERALLY PROTECTED SPECIES

R-2309AB

Plants and animals with a Federal classification of Endangered (E) or Threatened (T) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act (ESA) of 1973, as amended. As of September 22, 2010, the U.S. Fish and Wildlife Service (USFWS) list one federally protected species for Guilford County: Small whorled pogonia (*Isotria medeoloides*). A species description and biological conclusion for the small whorled pogonia was not stated in either the EA or FONSI because the species was not added to the USFWS county list of protected species until after the documents were completed. However, a Right of Way Consultation in April 2008 addressed the small whorled pogonia and the previously listed bald eagle (*Haliaeetus leucocephalus*). A copy of this consultation is available upon request.

A survey was done, after the consultation, by NCDOT biologists on May 22, 2008 and a biological conclusion of "No Effect" was given. A search of the North Carolina Natural Heritage Database (NCNHP: updated November 2010) revealed no known occurrences of any federally protected species within 1.0 mile of the limits of this section.

Since the EA and FONSI the bald eagle has been delisted for Guilford County. The bald eagle has been delisted as of August 2007 and is not subject to Section 7 consultation and a biological conclusion is not required. However, the bald eagle remains protected by the Bald and Golden Eagle

Protection Act. The USFWS has also issued guidance in the National Bald Eagle Management Guidelines. Under this guidance road projects fall under Category A. Category A is subdivided into whether or not the activity will be visible or not visible from the nest. If construction is visible from the nest, then a radius up to 660 feet from the project area is imposed when considering disturbance to the bald eagle. If construction activity is not visible from the nest due to a buffered area then a radius of up to 330 feet from the project area is imposed when considering disturbance to the bald eagle.

A bald eagle nest is located approximately 800 feet to the west of US 220 on the southern shore of Lake Brandt tailwater and approximately 530 feet north of Hamburg Mill Road. The 530 feet is a forested buffer between construction and the bald eagle nest. According to the USFWS guidance for bald eagles and correspondence with Gary Jordan (USFWS) on February 20, 2008, there is no need for a moratorium or any further action in regard to the bald eagle for this section. Therefore, there is no moratorium proposed for R-2309 AB.

<u>R-2413C</u>

As of September 22, 2010, the U.S. Fish and Wildlife Service (USFWS) lists three federally protected species for Rockingham County: Roanoke logperch (*Percina rex*), James spinymussel (*Pleurobema collina*), and smooth coneflower (*Echinacea laevigata*) and only the small whorled pogonia for Guilford County. Species description and biological conclusions for the Roanoke logperch, James spinymussel, and small whorled pogonia were not stated in either the EA or FONSI because the species were not added to the USFWS county list of protected species until after both documents were completed. However, the smooth coneflower was addressed in the FONSI. A re-evaluation memo was done in August 2009 to update the EA/FONSI. This memo addressed all four species. A copy of this memo is available upon request. A biological conclusion of "No Effect" was stated in the FONSI for the smooth coneflower and remains valid. Surveys for the Roanoke logperch and James spinymussel were performed on August 20, 2008 by NCDOT biologists and a biological conclusion of "No Effect" was given for both species. See attached survey reports. A survey by NCDOT biologists was performed on later date in May 2008 for small whorled pogonia and a biological conclusion of "No Effect" was given. A search of the North Carolina Natural Heritage Database (NCNHP; updated August 2010) revealed no known occurrences of any federally protected species within 1.0 mile of the limits of this section.

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).

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

Avoidance and minimization has been employed in the project area to the maximum extent practicable. The following measures were implemented each section of the project:

R-2309AB

- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced;
- To minimize impacts to Lake Brandt that parallels Hamburg Mill Road (SR 2135) to the east and is located on Bur-Mil Park property. NCDOT will maintain a 50-foot undisturbed buffer requirement associated with the perennial stream;
- Where possible, drainage systems were designed to outlet away from surface waters to allow time for infiltration in ditches or natural areas;
- Rip-rapped ditches and rip-rap along stream banks will be used where warranted to control erosion;
- Bank stabilization activities will not place rip-rap on the stream bottom;
- Best fit alignment has allowed wetland impacts to be reduced;
- Usage of expressway gutter in front of the Ogburn property, a part of the Summerfield Historic District, minimized the effects;
- A 23-foot wide median along the entire project is proposed instead of a 46-foot median;
- Grass swales will be utilized at 17 locations along the project. 3:1 or flatter side slope will be used for all grass swales;
- Discharge flow from highway at the edge of wetland to promote filtration of runoff through wetland prior to its entering the stream at –L- 188+00 LT and –L- 121+00 LT will be used;
- A temporary stilling basin and diversion channel will be constructed at –L- 57+02 to 58+44 RT to reduce sedimentation;
- Five Hazardous Spill Basins: -L- Station 57+13 LT, -L- 112+60 RT, -L-118+50 LT, -L- 121+70 LT, and –L- 142+25 LT will be constructed. Part of the project is within 0.5 miles of the Lake Brandt Critical Area;
- Pre-formed scour holes will be constructed at four locations:–L- Station 154+10 LT, –L- Station 209+43 LT, –L- Station 242+92 RT, and –L- Station 248+88 LT.

For additional avoidance/minimization for R-2309 AB see attached Stormwater Management Plan. Despite these best efforts of NCDOT, stream impacts for R-2309AB did increase from the impacts reported in the FONSI. This increase is mainly due to the bank stabilization used throughout the project.

R-2413C

- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced;
- Where possible, drainage systems were designed to outlet away from surface waters to allow time for infiltration in ditches or natural areas;
- Rip-rapped ditches and rip-rap along stream banks will be used where warranted to control erosion;
- Bank stabilization activities will not place rip-rap on the stream bottom;
- The wetland system hydrology at Site 5 is being retained due to the redirection of flow from a stream that was slated to be covered by roadway fill.
- Grassed swales will utilize 3:1 side slopes or flatter and will provide for 10-year non-erosive velocities where topography allows;
- A pre-formed scour hole will be constructed right of –L- Station 23+77 to provide sheet flow from the outlet pipe;

- A rip-rap energy dissipater basin has been specified left of -L- Station 26+29 at the outlet of the 54 inch RCP (1350 mm RCP) to slow the flow from the pipe while still allowing for hydrology to be provided to the wetland downstream;
- A bottomless culvert will be used at Site 9 to reduce impacts:
- Impacts to wetlands and surface waters were minimized using 2:1 side slopes:
- Bridges are proposed for the Haw River crossings;
- Section C was widened to avoid new location;
- Box culvert at Site 8 will be buried one foot;
- Cross-pipes located on jurisdictional streams have been increased one pipe size and will be buried 20 percent of their pipe diameter.

Compensatory Mitigation

R-2309AB

Mitigation requirements for R-2309 AB are summarized below in Tables 8 and 9. NCDOT proposes mitigation for 1,024 linear feet of permanent warm water stream impacts. Mitigation is not proposed for 408 linear feet of impacts at Sites 1 and 6- 12. Bank stabilization accounts for 332 linear feet of the 408 linear feet of impacts. Bank stabilization mitigation is not required by the USACE and the requirement for mitigation for the NCDWQ has been met under the USACE 2:1 ratio for stream mitigation. The remaining 76 linear feet of the 408 feet of impacts are for permanent streams deemed unimportant by the USACE and where the 150 linear feet NCDWQ mitigation rule applies. Additionally, NCDOT also proposes mitigation for 0.79 acres of permanent riparian wetland impacts. There will be 0.68 acres at 2:1 ratio and 0.11 acres at a 1:1 ratio. Compensatory mitigation will be provided by NCEEP.

Table 8. R-2309AB Stream Mitigation Summary- (HUC 03030002)

Impact Type	Proposed Mitigation Ratio	Impact Total (lin. ft.)	Proposed Mitigation	
			Actual	Required
Permanent Fill	2:1	1,024	1,024	1,024
Permanent Fill	0[2]	76	0	0
Bank Stabilization	0[1]	332	0	0
Total Impacts		1,432	1,024	2,048

[1] Mitigation for bank stabilization not required by USACE and NCDWQ mitigation requirement met under the USACE 2:1 ratio for stream mitigation.
[2] Streams deemed unimportant by the USACE and does not meet mitigation requirement for NCDWQ (150ft).

Table 9. R-2309AB Wetland Mitigation Summary- (HUC 03030002)

Impact Type	Proposed Mitigation Ratio	Impact Total (acres)	Proposed Mitigation	
			Actual	Required
Permanent Fill	2:1	0.61	0.61	1.22
Excavation	2:1	0.07	0.07	0.14
Mechanized Clearing	1:1	0.11	0.11	0.11
Total Impacts		**0.79**	**0.79**	**1.47**

R-2413C

Mitigation requirements for R-2413 C are summarized below in Tables 10 and 11. NCDOT proposes mitigation for 2,200 linear feet of permanent warm water stream impacts. Mitigation is not proposed for 311 linear feet of impacts at Sites 1, 4, 7-9, and 11 - 13 for bank stabilization and one intermittent stream. Bank stabilization accounts for 269 linear feet of the 311 linear feet of impacts.

Bank stabilization mitigation is not required by the USACE and the requirement for mitigation for the NCDWQ has been met under the USACE 2:1 ratio for stream mitigation. The remaining 42 linear feet of the 311 feet of impacts are for a permanent stream deemed unimportant by the USACE and where the 150 linear feet NCDWQ mitigation rule applies. Compensatory stream mitigation will be provided by NCEEP. The required mitigation for riparian wetland impacts is 1.59 acres in HUC 03030002 and 0.02 acres in HUC 03010103. NCDOT proposes to debit 1.59 acres from Bryan Boulevard Mitigation Sites (see section below). The remaining 0.02 acres of riparian wetlands in HUC 03010103 will be covered by EEP (see attached letter). Compensatory mitigation is not proposed for the 0.01 acres wetland impact for hand clearing activities for utilities.

Table 10. R-2413C Stream Mitigation Summary

HUC	Impact Type	Proposed Mitigation Ratio	Impact Total (lin. ft.)	Proposed Mitigation	
				Actual	Required
03030002	Permanent Fill	2:1	1,670	1,670	3,340
	Permanent Fill	0[2]	42	0	0
	Bank Stabilization	0[1]	192	0	0
Total Impacts			**1,904**	**1,670**	**3,340**
03010103	Permanent Fill	2:1	530	530	1,060
	Bank Stabilization	0[1]	77	0	0
Total Impacts			**607**	**530**	**1,060**
Grand Total Impacts			**2,511**	**2,200**	**4,400**

[1] Mitigation for bank stabilization not required by USACE and NCDWQ mitigation requirement met under the USACE 2:1 ratio for stream mitigation. [2] Stream deemed unimportant by the USACE and does not meet mitigation requirement for NCDWQ (150ft).

Table 11. R-2413C Wetland Mitigation Summary

HUC	Impact Type	Proposed Mitigation Ratio	Impact Total (lin. ft.)	Proposed Mitigation	
				Actual	Required
03030002	Permanent Fill	1:1*	1.37	1.37	1.37
	Excavation	1:1*	0.13	0.13	0 13
	Mechanized Clearing	1:1*	0.09	0.09	0.09
	Hand Clearing	0	0.01	0	0
Total Impacts			**1.60**	**1.59**	**1.59**
NCDOT Mitigation Debit Site					**-1.59**
Total Impacts – NCDOT Mitigation Site					**0**
03010103	Permanent Fill	2:1	0.02	0.02	0.04
Total Impacts			**0.02**	**0.02**	**0.04**
Grand Total Impacts					**0.02**

*Based on Mitigation provided by NCDOT at Bryan Boulevard Site

R-2413C NCDOT Compensatory Mitigation

The Bryan Boulevard Mitigation Sites are located in Guilford County, adjacent to the Bryan Boulevard Extension in HUC 03030002. Site 1 (Horsepen Creek) is located at the intersection of Bryan Boulevard and Fleming Road. Site 2 (Oak Ridge Road) is located near the intersection of Bryan Boulevard and Old Oak Ridge Road. These two sites provided 31.17 acres of mitigation to offset wetland impacts associated with project U-608, the extension of Bryan Boulevard. There will be 1.59 acres debited from the Bryan Boulevard Horsepen Creek and Oak Ridge Road Sites to offset the unavoidable riparian wetland impacts (see Table 12).

Table 12. R-2413C Riparian Wetland Offset Mitigation

ONEID	SITE NAME	SITE TIP	RIVER BASIN	DIVISION	COUNTY	TYPE	DEBIT AMOUNT	NOTES
WM 041-006	Bryan Boulevard Horsepen Creek & Oak Ridge Road	U-608	Cape Fear	7	Guilford	RW_REST	0.58	U-3110B
WM 041-006	Bryan Boulevard Horsepen Creek & Oak Ridge Road	U-608	Cape Fear	7	Guilford	RW_REST	1 59	R-2413 C
WM 041-006	Bryan Boulevard Horsepen Creek & Oak Ridge Road	U-608	Cape Fear	7	Guilford	RW_REST	1	U-608
WM 041-006	Bryan Boulevard Horsepen Creek & Oak Ridge Road	U-608	Cape Fear	7	Guilford	RW_REST	1.9	U-608
WM 041-006	Bryan Boulevard Horsepen Creek & Oak Ridge Road	U-608	Cape Fear	7	Guilford	RW_REST	24	U-608

CULTURAL RESOURCES

R-2309AB

The North Carolina Department of Cultural Resources, State Historic Preservation Office, and (SHPO) conducted an archeological consultation of the project and stated that an archaeological investigation would be required for this project in a July 3, 2000 letter. NCDOT prepared and submitted to the Historic Preservation Officer (HPO) an archaeological survey report on March 22, 2001. A response letter was received on April 24, 2001 that HPO concurred with NCDOT's finding that No National Register of Historic Places (NRHP) eligible archaeological sites were identified. No additional investigation was recommended. See EA for letters mentioned above.

A concurrence form for assessment effects was signed by NCDOT, SHPO, and FHWA on December 20, 2005. The only indentified property within the area of potential effect is the Ogburn property in the Summerfield Historic District. The Summerfield Historic District is listed on the National Register of Historic Places (NRHP). However, it was concluded during a merger meeting on January 3, 2006 that this project will have no adverse effect on the Summerfield Historic District, specifically the Ogburn property, due to the use of expressway gutter in this section of the project along US 220. See FONSI for letters mentioned above.

R-2413C

A survey for historic architectural resources was performed within the project's area of potential effect (APE). In a June 27, 2003 letter, the Historic Architecture Branch of the NCDOT stated that no properties listed in the National Register are located on this US 220 section of the proposed project. A letter of compliance, dated July 11, 2003, was received by NCDOT from the Office of State Archeology. The letter stated: "given the nature of the project, past land used, soils conditions and the limited Area of Potential Effect (APE), we do not recommend any archeological investigation fro Segment C of this project. See attached 2003 letters.

FEMA COMPLIANCE

There are streams within the project limits that are within Federal Emergency Management Agency (FEMA)-designated flood zones. Coordination between the NCDOT Hydraulics Unit and FEMA will occur prior to Let to ensure that NCDOT is in full compliance with applicable floodplain ordinances.

UTILITY IMPACTS

R-2309AB

No jurisdictional impacts will occur due to the removal or relocation of utilities.

R-2413C

There will be 0.01 acres of wetland impact due to hand clearing for aerial utility lines. Duke Energy will install overhead lines and part of the proposed line will run from –LREV – 22+85 to –LREV-26+60. A 15 foot strip of clearing will need to be done outside and inside the control access fencing within this area. Therefore a total of 30 feet (0.01 acres) will need to be hand cleared.

INDIRECT AND CUMULATIVE EFFECTS

Final Indirect and Cumulative Impact Assessment reports were completed in March 2003 (R-2309AB) and September 2005 (R-2413C). Since completion of these reports, the City of Greensboro updated the "Growth Strategy" map within its Comprehensive Plan, Guilford County adopted its own Comprehensive Plan (2006), and Greensboro Urban Area MPO adopted its 2035 Long Range Transportation Plan. The 2035 Long Range Transportation Plan maps the future land uses proposed for Guilford County and all municipalities. NCDWQ's list of 303(d) streams has also been updated. Both reports were assessed in September 2009 and 2010 against these new and updated plans and lists. All of the assumptions upon which the reports are based remain consistent with future land uses including proposed growth areas and utilities expansion, as well as with environmental resources. An email was sent out to Amy Euliss, NCDWQ, regarding the assessment on September 28, 2009. An agreement response was received on September 30, 2009 regarding the updated findings. An assessment for the Rockingham County section of R-2413C was updated at a later date in October 2010. The Rockingham County Land Use Plan from 2006 was reviewed. All of the assumptions upon which the 2005 R-2413C report and the 2010 updated report are based remain consistent with future land uses including proposed growth areas and utilities expansion, as well as with environmental resources. Additional copies of the reports will be provided upon request.

WILD AND SCENIC RIVERS

This project will not impact any designated Wild and Scenic Rivers or any rivers included in the list of study rivers (Public Law 90-542, as amended) or North Carolina Natural and Scenic Rivers.

ESSENTIAL FISH HABITAT

The project will not impact any essential fish habitat afforded protection under the Magnuson-Stevens Act of 1996 (16 U.S.C 1801 *et seq.*).

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Section 404 Individual Permit as required for the above-described activities for the proposed T.I.P. Projects R-2309 AB and R-2413 C. We are also hereby requesting a Section 401 Individual Water Quality Certification from NCDWQ. In compliance with Section 143-215.3D (e) of the NCAC, we will provide $570.00 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 (NCDENR), NCDWQ, for their review and approval.

Both TIPs fall within the Jordan Lake Water Supply Watershed. However, NCDOT is not requesting a Jordan Buffer Authorization because an approved FONSI was issued for this project in November 2006, which is prior to the adoption of the Jordan Lake Riparian Buffer Rules. Please see the memorandum submitted to NCDWQ regarding this subject, dated August 20, 2010.

A copy of this permit application and its distribution list will be posted on the NCDOT website at http://www.ncdot.org/doh/preconstruct/pe/neu/permit.html. Thank you for your time and assistance with this project. Please contact Deanna Riffey at either driffey@ncdot.gov or (919) 707-.6151 if you have any questions or need additional information.

Sincerely,

E. L. Lusk

for Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

cc:
NCDOT Permit Application Standard Distribution List

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT *(33 CFR 325)*	OMB APPROVAL NO. 0710-0003 EXPIRES: 31 August 2012

Public reporting burden for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)
First - Middle - Last –	First - Middle - Last –
Company – North Carolina Department of Transportation	Company –
E-mail Address – http://www.ncdot.gov	E-mail Address –
6. APPLICANT'S ADDRESS.	**9. AGENT'S ADDRESS**
Address - 1598 Mail Service Center	Address -
City – Raleigh State – NC Zip – 27699 Country – 1598	City – State – Zip – Country –
7. APPLICANT'S PHONE NOs. W/AREA CODE.	**10. AGENT'S PHONE NOs. W/AREA CODE**
a. Residence b. Business 919-707-5651 c. Fax 919-212-5785	a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, ______________________ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

R-2309AB proposed widening to US220 from SR 2182 (Horsepen Creek Rd.) to 0.2 miles north of SR 2313 (Winfree Rd.) and R-2413C proposed widening of US220 south of the Haw River to the Intersection of US220 and existing NC68 in Guilford and Rockingham Counties, NC

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
UTs to Mears Fork, Jacobs Creek, Lake Brandt, and Haw River, as well as Lake Brandt, Haw River, Troublesome Creek, and UTs to Troublesome Creek	Address
15. LOCATION OF PROJECT	
Latitude: °N 36.1465	
Longitude: °W 79.8664	City - State – Zip -

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section – Township – Range –

17 DIRECTIONS TO THE SITE

Please see attached vicinity map and cover letter.

18. Nature of Activity (Description of project, include all features)

The project involves widening to improve US220 from a two-lane facility to a four-lane facility from SR 2182 (Horsepen Creek Rd.) to 0.2 miles north of SR 2313 (Winfree Rd.) and from south of the Haw River to the Intersection of US220 and existing NC68

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

R-2309AB - The purpose of this project is to increase the traffic carrying capacity along the subject section of US220 and to address deficiencies of Bridge Numbers 301,307, and 3313, as well as the culvert north of SR 2182 (Horsepen Creek Rd.).
R-2413C- The purpose of this section is to provide a multi-lane improvement from south of the Haw River to the Intersection of US220 and NC 68.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Impacts will result from the widening of the existing roadway, bridges, and the placement of several pipes and a culvert.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

See attached cover letter & permit drawing package.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres See attached cover letter & permit drawing package.
Or
Liner Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

See attached cover letter & permit drawing package.

24. Is Any Portion of the Work Already Complete? Yes ☐ No ☑ IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

Address – Please see list of adjacent property landowners included with the permit drawing package.

City – State – Zip –

26. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

E. L. Lusk for Gregory J. Thorpe, PhD April 19, 2011

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Ecosystem Enhancement PROGRAM

March 21, 2011

Mr. Gregory J. Thorpe, Ph.D.
Manager, 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-2309AB, US 220 Widening from SR 2182 (Horse Pen Creek Road) to 0.2 miles North of SR 2313 (Winfree Road) in Greensboro, Guilford County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the compensatory stream and riparian wetland mitigation for the subject project. Based on the information supplied by you on March 10, 2011, the impacts are located in CU 03030002 of the Cape Fear River Basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Cape Fear 03030002 CP	Stream			Wetlands			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1 (at 3:1)	Zone 2 (at 1.5:1)
Impacts (feet/acres)	0	0	1,024	0.79	0	0	0	0
Mitigation Units (at 2:1)	0	0	2,048	1.36	0	0	0	0
Mitigation Units (at 1.1)	0	0	0	0.11	0	0	0	0
Mitigation Units (TOTAL)	**0**	**0**	**2,048**	**1.47**	**0**	**0**	**0**	**0**

This mitigation acceptance letter replaces the mitigation acceptance letters issued on September 7 and November 15, 2010. EEP commits to implementing sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project in accordance with the N.C. Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from EEP

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

Sincerely,

James B. Stanfill for

William D. Gilmore, P.E.
EEP Director

cc: Mr. Andy Williams, USACE – Raleigh Regulatory Field Office
Mr. Brian Wrenn, Division of Water Quality, Wetlands/401 Unit
File: R-2309AB Revised

Restoring... Enhancing... Protecting Our State

NCDENR

Ecosystem Enhancement PROGRAM

March 21, 2011

Mr. Greg 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 Mr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

R-2413C, NC 68 Connector – US 220 from the Haw River to Existing NC 68/US 220, Guilford and Rockingham Counties; Cape Fear and Roanoke River Basins

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the compensatory stream and riparian wetland mitigation for the unavoidable impacts associated with the above referenced project. Based on the information supplied by you on March 10, 2011, the impacts are located in CU 03030002 of the Cape Fear River Basin and 03010103 of the Roanoke River Basin in the Central Piedmont (CP) Eco-Region, and are as follows:

IMPACTS / MITIGATION UNITS	Stream			Wetlands			Buffer	
	Cold	Cool	Warm	RW	NRW	CM	Zone 1	Zone 2
Impacts – Cape Fear 03030002 (CP)			1,670					
Mitigation Units-Cape Fear 03030002 (up to 2:1)			3,340					
Impacts – Roanoke 03010103 (CP)			530	0.02				
Mitigation Units – Roanoke 03010103 (up to 2:1)			1,060	0.04				
Impacts – Total Project			2,200	0.02				
Mitigation Units – Total Project (up to 2:1)			4,400	0.04				

This mitigation acceptance letter replaces the mitigation acceptance letter issued on December 20, 2010. EEP commits to implementing sufficient compensatory stream and riparian wetland mitigation credits to offset the final permitted impacts associated with this project in accordance with the N.C. Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from EEP

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

Sincerely,

James B. Stanfill fa

William D. Gilmore, P.E.
EEP Director

cc: Mr. Andy Williams, USACE – Raleigh Regulatory Field Office
Mr. Brian Wrenn, Division of Water Quality, Wetlands/401 Unit
File: R-2413C Revised

Restoring... Enhancing... Protecting Our State

NCDENR

North Carolina Ecosystem Enhancement Program, 1652 Mail Service Center, Raleigh, NC 27699-1652 / 919-715-0476 / www.nceep.net

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 24, 2008

MEMORANDUM TO: Derrick Weaver P.E., Central Region Project Development Unit

NM

FROM: Neil Medlin, Environmental Supervisor Biological Surveys Group

SUBJECT: Habitat evaluation report for the James spinymussel (*Pleurobema collina*) associated with improvements to US 220, Guilford and Rockingham Counties, TIP No. R-2413C.

The proposed project calls for improvements of US 220 from south of the Haw River in Guilford County to the intersection of US 220 and existing NC 68 in Rockingham County. These improvements include grading, drainage, structures, culverts, paving, long-life pavement markings, snowplowable pavement markers, signing and signals. While most of the project is located in the Cape Fear River basin, the portion from the intersection of NC 65 north to the intersection of existing NC 68 is located in the Dan River basin in Rockingham County. The James spinymussel (*Pleurobema collina*) is listed by the United States Fish and Wildlife Service (USFWS) as potentially occurring in Rockingham County. The habitat requirements for the James spinymussel include creeks or river areas with subtrates of cobble and sand in reaches with slow to moderate current (Bogan, 2002).

Prior to conducting the habitat evaluation, a review of the North Carolina Natural Heritage Program (NHP) database was conducted (August 18, 2008) to determine if there were any records of rare mussels within the proposed project study area or receiving waters. **This review indicated that there are no known occurrences of the federally protected James spinymussel within the project study area.**

NCDOT biologists Neil Medlin (Permit Number NC – 2008 ES 30), Anne Burroughs, and Melissa Miller conducted a habitat evaluation at the project site on August 20, 2008. The streams potentially affected by this project are the headwaters of Jacobs Creek and upper portions of unnamed tributaries (UT) to Jacobs Creek. All of the streams evaluated during the site visit were too small ($\leq$ 1.5 meters) to provide potential habitat for the James spinymussel. As a result of this habitat evaluation and a review of GIS and NHP data, it appears that the James spinymussel does not exist in the project vicinity. **The biological conclusion for James spinymussel for R-2413C is "No Effect".**

References:

Reference: Bogan, Art, 2002. Workbook and Key to the Freshwater Bivalves of North Carolina

cc: Deanna Riffey, Project Manager, NEU

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 7, 2008

Memorandum To: Derrick Weaver, Central Project Development Unit

From: Neil Medlin, Environmental Supervisor
Biological Surveys Group

Subject: Habitat evaluation for the Roanoke logperch associated with improvements to US 220, Guilford and Rockingham Counties, TIP No. R-2413C.

The proposed project calls for improvements of US 220 from south of the Haw River in Guilford County to the intersection of US 220 and existing NC 68 in Rockingham County. These improvements include grading, drainage, structures, culverts, paving, long-life pavement markings, snowplowable pavement markers, signing and signals. While most of the project is located in the Cape Fear River basin, the portion from the intersection of NC 65 north to the intersection of existing NC 68 is located in the Dan River basin in Rockingham County. The Roanoke logperch (*Percinia rex*) is listed by the United States Fish and Wildlife Service (USFWS) as potentially occurring in Rockingham County.

The Roanoke logperch occupies medium to large warm-water streams and rivers of moderate gradient with relatively silt-free substrata. Habitat use by the species varies with age, spawning condition, and seasonal temperature. During different phases of life history and season, every major riverine habitat is exploited by the logperch.

Prior to conducting in-stream surveys, a review of the North Carolina Natural Heritage Program (NHP) database was conducted (August 18, 2008) to determine if there were any records of rare fish within the proposed project study area or receiving waters. **This review indicated that there are no known occurrences of the federally protected Roanoke Logperch within the project study area.** There is only one record of the Roanoke logperch in North Carolina; an area near the confluence of the Dan and Smith Rivers. The recently discovered (fall 2007) population of Roanoke logperch may represent a range expansion for the species.

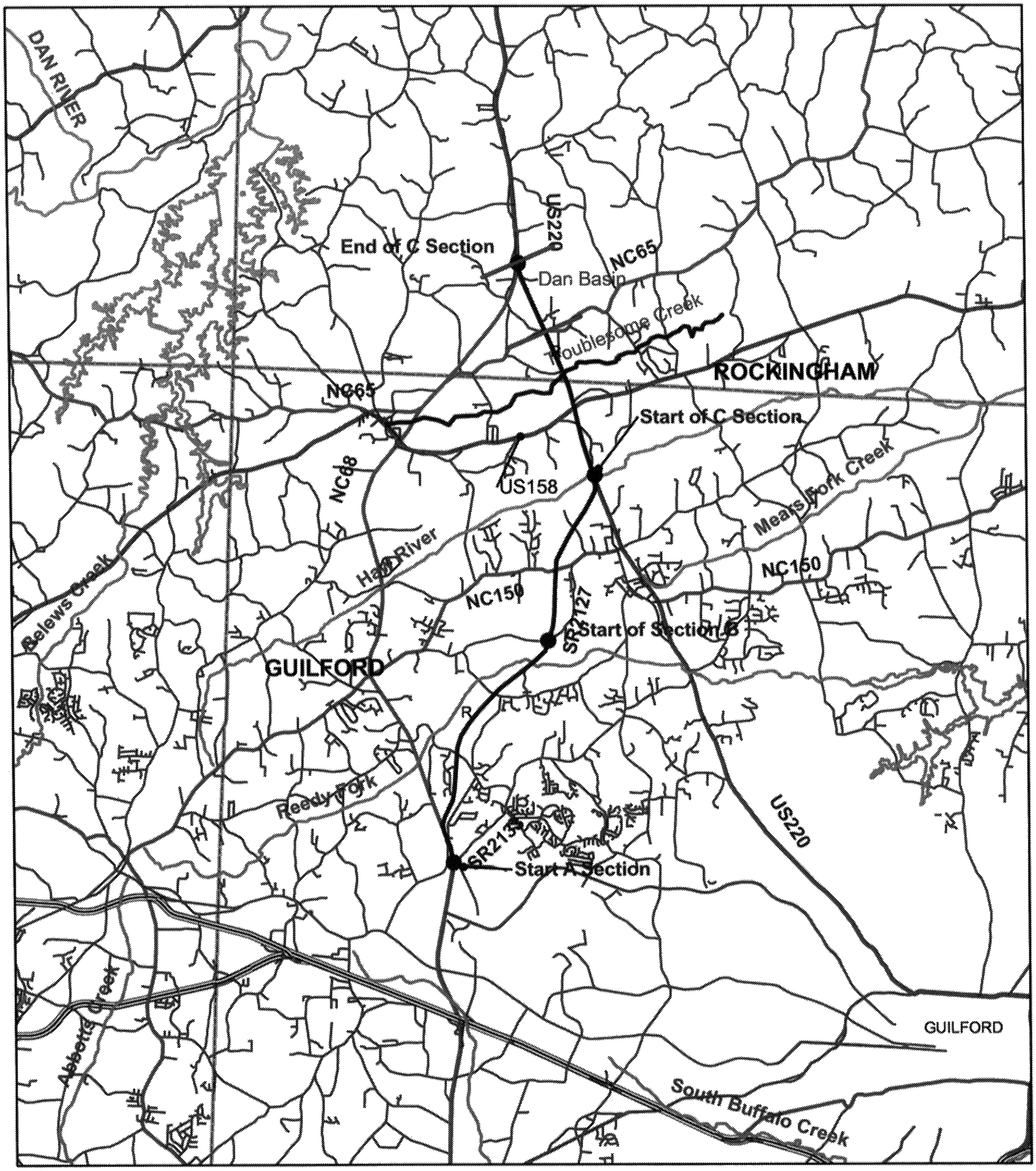
NCDOT biologists Neil Medlin (Permit Number NC – 2008 ES 30), Anne Burroughs, and Melissa Miller conducted a habitat evaluation at the project site on

August 20, 2008. The streams potentially affected by this project are the headwaters of Jacobs Creek and upper portions of unnamed tributaries (UT) to Jacobs Creek. All of the streams evaluated during the site visit were too small ($\leq$ 1.5 meters) to provide potential habitat for the Roanoke logperch. As a result of this habitat evaluation and a review of GIS and NHP data, it appears that the Roanoke logperch does not exist in the project vicinity. **The biological conclusion for Roanoke logperch for R-2413C is "No Effect".**

References:

United States Fish and Wildlife Service. 1991. Roanoke logperch (PERCINA REX) recovery plan. Agency draft. U.S. Fish and Wildl. Serv., Newton Corner, Massachusetts. 31 pp.

cc: Deanna Riffey, Project Manager, NEU



R-2413 Guilford / Rockingham

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

1501 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1501

LYNDO TIPPETT
SECRETARY

June 27, 2003

MEMORANDUM:

To: Rachelle Beauregard

From. Barbara Church

Subject: R-2413C. US 220 widening from south of Haw River to intersection of US 220 and existing NC 68, Guilford and Rockingham Counties.

The area of potential effect of the subject project was surveyed and a report documenting the results of that survey was prepared by Kitty Houston in August, 1992. That report is on file at the Department of Transportation and is available for review by the public. In June, 2003, the area of potential effect of that section of the subject project being considered here was revisited by checking the files at the North Carolina Historic Preservation Office and by a field review.

The subject project is a state funded project and therefore subject to compliance with GS 121-12(a). It is subject to compliance with Section 106 of the National Historic Preservation Act for permit areas only.

There are no properties listed in the National Register located on the section of US 220 covered by this part of the subject project, and therefore no compliance with GS 121-12(a) is required.

Permit areas have been examined in the field for the presence of properties potentially eligible for listing in the National Register, and no such property was identified. The only property identified in the survey located along this section of US 220 is the Ogburn House situated in the northeast quadrant of the intersection of US 220 and US 158 at an area known as Ogburns Crossroads. While this house appears to date from around the 1870s, it may contain an earlier building dating from around the time of the Civil War. The house is now clad in artificial siding and has lost its original porch. The property contains several surviving outbuildings. In 1996 the National Register Advisory Committee deferred a request by the owners to place the property on the State Study List and requested additional information. No further action appears to have been taken by either the owners or the Historic Preservation Office on this application for study listing.

Only approximately five acres are associated with the house, and the Ogburn property land is not within the nearest permit area. For this reason the property was not evaluated for eligibility to the National Register.

M. Penney

RECEIVED
JUL 22 2003
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

North Carolina Department of Cultural Resources
State Historic Preservation Office

David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Division of Historical Resources
David J. Olson, Director

July 11, 2003

MEMORANDUM

TO: Greg Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch
NCDOT Division of Highways

FROM: David Brook PSR for David Brook

SUBJECT: NC 68/US 220 Connector, Widening of US 220, Guilford and Rockingham Counties, R-2413, CH 90-1045

On July 8, 2003, staff of the Office of State Archaeology met with Brian Overton of your staff concerning Segment C of the above-mentioned project. This portion of the project includes only the widening of the existing US 220. Since this is a state funded project, mapping for the areas subject to US Army Corps of Engineers permits was examined for potential effects to National Register eligible archaeological resources.

Given the nature of the project, past land use, soils conditions and the limited Area of Potential Effect (APE), we do not recommend any archaeological investigation for Segment C of this project. Segments A and B are planned on new location as a connector between NC 68 and US 220. When additional information is available concerning the specific location of these segments, consultation with us will be necessary to determine the nature and extent of archaeological investigations to be undertaken.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

cc: Matt Wilkerson, NCDOT
Brian Overton, NCDOT

Subject: Minutes from Interagency 4B Hydraulic Design Review Meeting
On July 25, 2007 for R-2309AB in Guilford County

Team Members:

John Thomas-USACOE	(present)
Andy Williams-USACOE	(present)
Sue Homewood-NCDWQ	(present)
Travis Wilson-NCWRC	(present)
Gary Jordan-USFWS	(present)
Chris Militscher-EPA	(present)
Donnie Brew-FHWA	(present)
Rachelle Beauregard-NEU	(present)
Deanna Riffey-NEU	(present)
Elizabeth Lusk-NEU	(present)

Participants:
Marshall Clawson, NCDOT Hydraulics
Galen Cail, NCDOT Hydraulics
Audrey Burnette, KCI Associates
David Fu., KO & Associates
W. Herbert Turner, Jr., KO & Associates
Mike Robinson, NCDOT Construction
Scott Pridgen, NCDOT Roadway
Malcolm Watson, NCDOT Roadway
Mark Staley, NCDOT Roadside Env.
Omar Azizi, NCDOT Structures
Tim Coggins, NCDOT Structures

<u>General Comments:</u>
There are thirteen impact sites to streams, eight impact sites to surface waters and three impact sites to wetlands. Gary Jordan with USFWS stated the Bald Eagle has been removed from the endangered species list but is still protected.

There are two project commitments on planning document green sheets that would effect hydraulics design:
1. Hazardous spill basins will be required that are within ½ mile of the water supply critical area.
2. NCDOT will maintain a 50-foot undisturbed offset to minimize impacts to a perennial stream parallel to US 220 to the East and located on Bur-Mil Park Property.

<u>Plan Sheets 4:</u>
There are no streams or wetlands on this sheet.

<u>Plan Sheets 5:</u>
There are no streams or wetlands on this sheet. The existing outfalls will be maintained.

<u>Plan Sheets 6:</u>
Sites W-1 & S-2: The existing culvert is currently perched by approximately 5' above the streambed. The streambed is approximately 10' below the banks for, at least, several hundred feet downstream of the invert. It was suggested that the new culvert be constructed with sills/baffles to the existing streambed. Another option that was mentioned was to step down the stream itself outside of the box until the existing stream bed was reached. All options will be studied and presented at the 4C meeting.

Storm water diversion concept will be used on this sheet. The off-site storm water will be collected with separate storm system and will be drained to the existing grass swale on the southwest quadrant of the box culvert before entering the stream. The storm water from the roadway curb and gutter section will be drained to a hazardous spill basin on the northwest quadrant. A wetland pocket with 0.13 Acre will be a total loss on this quadrant. The location of the basin is selected for the following reasons. On the southeast quadrant, a wet detention pond has been constructed recently to collect the storm water from the Battleground North Apartments. On the northeast quadrant, a natural swale with a very large drainage area and a sewer line run through this quadrant. On the southwest quadrant, the property is well developed/ maintained and the existing grass swale will be retained for the off site runoff. There is no room for the new basin except the northwest quadrant. The reasons as to why the quadrant is selected for the new basin should be documented in the permit drawing package.

Plan Sheet 7-9:

No streams or wetlands on this sheet. Existing outfalls will be maintained.

Plan Sheets 10:

All roadway storm water on this sheet will not be allowed to be drained to the stream that parallels US 220 to the east and located on Bur-Mil Park Property. Two existing outfalls will be maintained to drain off site runoff.

Plan Sheets 11-12:

All roadway storm water collected on sheet 10 will be drained to a hazardous spill basin on the southeast quadrant of the spillway. This basin will be outside of the 50-foot undisturbed offset. Bur-Mil Park is owned by Guilford County, and the basin will not be on the Bur-Mil Park's property.

For the section along Lake Brandt (-L- 114+00 to 141+00), the roadway fill into the lake is significant. NCDOT Hydraulics Unit met with City of Greensboro regarding the surface water impacts to the lake. City of Greensboro has no problems with the impacts to the lake. Hydraulics Unit will provide the actual amounts of surface water impacts after the meeting. The roadway storm water will not be allowed to drain directly to the lake. Between the new road and Lake Higgins earth dam, two hazardous basins will be constructed on the northwest and southwest quadrants of bridge No.307 (-L-120+40).

Plan Sheet 13:

A hazardous spill basin (-L- 142+50 Lt) will be constructed at the north end of Lake Brandt to collect the roadway storm water. This basin including the rip rap at basin outlet pipe will be outside of the wetland.

The existing outfall at –Y6- 11+00 Rt will be maintained to drain offsite runoff to the lake.

The existing outfall at –L- 146+50 Lt to a natural swale will be maintained

Plan Sheet 14, 15:

No streams or wetlands on this sheet. Existing outfalls will be maintained.

Plan Sheet 16:
No sites.

Plan Sheet 17:
Site S-6: The existing 36" will be extended.

Plan Sheet 18 - 19:
No sites. The Critical Water Supply boundary ended on sheet 18.

Plan Sheet 20:
Site S-8 & S-10: The existing pipes will be extended. The existing pipes are already buried and will be left in place and extended to maintain low flow. An additional pipe will be installed and perched to supplement conveyance of larger frequency storms. Velocities at the outlets and outlet protection details will be provided at the 4C meeting. At site S-10 check the fill slopes to ensure there is no encroachment on the existing stream banks. 1.5:1 slopes roadway slopes may be required.

Plan Sheet 21:
Site S-10: Replace existing 72" RCP with box culvert, with the invert to be buried 1-0".

Plan Sheet 22 &23:
Site S-10: Stream shall be placed in a closed system and will not be relocated due to the steep side slopes adjacent to the stream.

Plan Sheet 24:
No sites.

Plan Sheet 25:
Site S-14: The existing pipe will be extended. The existing pipe is already buried and will be left in place and extended to maintain low flow. An additional pipe will be installed and perched to supplement conveyance of larger frequency storms. Velocities at the outlets and outlet protection details will be provided at the 4C meeting..

Plan Sheet 27:

No streams or wetlands on this sheet. Existing outfalls will be maintained.

End of Meeting.

Subject: Minutes from Interagency 4C Permit Drawing Review Meeting on May 13, 2009 for R-2309AB in Guilford County

Team Members:

Andrew E. Williams-USACE (present)
Gary Jordan-USFWS (absent)
Travis Wilson-NCWRC (absent)
Amy Euliss-NCDWQ (present)
Kathy Mathews-EPA (absent)
Felix Davila-FHWA (absent)
Deanna Riffey-NEU (present)
Beverly Robinson-PDEA (absent)
Patty Eason-Division 7 (present)
Chris Militscher, USEPA (present)

Participants:
Marshall Clawson, NCDOT Hydraulics
Terry Farr, NCDOT Roadway
Tim Coggins, NCDOT Structures
Maad Hassan, NCDOT-PDEA
Mark Staley, NCDOT-REU
Mike Robinson, NCDOT-Construction
Herb Turner, Ko/Florence & Hutcheson
David Fuh, Ko/Florence & Hutcheson
Omar Azizi-Structures

Site 1 (plan sheet 6)

1. As requested in 4B meeting, the reasons why the quadrant is selected for the hazardous spill basin are documented on sheet 6. The basin's wetland impact of 0.06 Acres is not excessive.
2. As suggested in 4B meeting, the box culvert will be constructed with internal steps down to the existing streambed. Profile along structure is included in the permit drawings. As shown in the profile with 2.5' sills throughout the culvert and 1' sill at outlet end, a flow transition to the existing streambed with a moderate culvert overall slope is provided.
3. Due to temporary diversion channel in TDE, the small tributary (jurisdictional stream) in NE quadrant will be impacted very slightly. TDE should be adjusted slightly to avoid this small amount of impact.

Site 2 (plan sheet 6)

1. Mechanized clearings in wetland are for stilling basin and temporary diversion channel. They are temporary impacts and the areas will be restored and reforested to their natural conditions after construction.

Site 3 (plan sheet 11,12)

1. Rock embankment and plating pattern should be turned off in the drawings in order to avoid clutter.
2. Original design at -L- 120+40 is a bridge, but it is not justified hydraulically with a small drainage area (6 Ac). Instead, a 72" pipe will be sufficient. In addition to flood conveyance, this pipe will be functioning as an equalizer pipe to maintain the hydrology feeding the wetland from the lake. Team agreed to the change.
3. The wetland area (-L- 117+70 to 118+80 LT) inside the hazardous spill basin should be considered as an impact (mechanized clearing) as well.

Site 4 (plan sheet 12, 13)

1. Rock embankment and plating pattern should be turned off in the drawings in order to avoid clutter.

Site 5 (plan sheet 13)

No comments.

Site 6 (plan sheet 17)

1. Team discussed if adequate to drain our project pavement runoff to the existing wet weather storage pond for treatment. After meeting, Andrew Williams (US Army Corps of Engineers) indicated that the pond was constructed to ensure that untreated wastewater will be contained during wet weather. A NWP verification was issued for the project on March 4, 2008. There is no outlet constructed on the pond.

2. Based on the meeting discussion and above information, NCDOT Hydraulics Unit decided to avoid any impact to the pond. The project PDE in pond will be eliminated, and the pavement runoff collected will be discharged on the upstream (left) side of the road to avoid the pond.

Site 7 (plan sheet 20)

1. As requested in 4B meeting, channel improvement detail sheet 2L is included in the permit drawings to show existing pipe extension for low flow, another pipe for overflow, and class I rip rap on banks only for outlet protection.

Site 8 (plan sheet 20)

1. As requested in 4B meeting, plan sheet shows no fill slope lateral encroachment on the existing stream banks.

2. The channel (approx. 25') downstream of existing 24" pipe is no longer a jurisdictional stream per NCDOT NEU updated jurisdictional determination.

Site 9 (plan sheet 21)

1. As requested in 4B meeting, plan sheet shows replacing exiting 72" RCP with box culvert. Because of the flat culvert slope (0.64%), sills are not required and outlet protection with class I rip rap (on banks only) should be fine.

Site 10 (plan sheet 22, 23)

1. As requested in 4B meeting, plan sheet shows stream placed in a closed system and is not relocated due to steep side slopes adjacent to the stream.

2. Team discussed if fish passage is an issue for the 54" storm system to replace the existing stream.

3. After meeting, Ko/Florence & Hutcheson has determined that the stream is perennial with average stream width 3.5' and average water depth 2" per NCDOT NEU Stream Impact Table for S10. As shown in channel improvements detail sheet 2L, 54" pipe will be buried 20%.

<u>Site 11 (plan sheet 23)</u>

No comments.

<u>Site 12 (plan sheet 25)</u>

1. As requested in 4B meeting, channel improvement detail sheet 2L is included in the permit drawings to show existing pipe extension for low flow, another pipe for overflow, and class I rip rap on banks only for outlet protection.

Meeting Adjourned

Subject: **Minutes of the Interagency Hydraulic Design Review Meeting on May 16, 2002, for R-2413C Guilford / Rockingham County.**

Team Members:
Eric Alsmeyer – USACE (Present)
David Cox – NCWRC (Present)
Cynthia Van der Wiele – NCDWQ (Present)
Alice Gordon – NCDOT PDEA (Present)
Howard Hall – USFWS (Absent)
Participants:
David Chang – NCDOT Hydraulics
Cathy Houser – NCDOT Design Services
Virginia Mabry – NCDOT Design Services
Marshall Clawson – NCDOT Hydraulics
Anne Hunt – NCDOT Hydraulics

The meeting began with a brief overview of the project. The following issues were discussed:

1. Spur for Section B: Alice Gordon questioned the independent utility of a spur for the proposed tie to R2413B. The spur would predetermine the location of R2413B. Cathy Houser agreed to remove the spur and asked if the northbound bridge would be able to be constructed as designed with 4 travel lanes. Eric Alsmeyer approved the 4-lane bridge design to be incorporated into the design. Cynthia Van der Wiele asked if the bridge design allowed any direct discharge into the water surface. Marshall Clawson responded that there is no direct discharge. Marshall Clawson noted that the removal of the spur would reduce the impact to the wetlands adjacent to the spur. Eric Alsmeyer agreed that there would be fewer impacts, but if only a sliver of wetlands remained to consider all the wetlands as filled.

ACTION TAKEN: *Spur was eliminated from the design.*

2. Detour Temporary Impacts: The impacts due to the detour road were discussed. Due to the location of the intersecting y-line and parallel section of Troublesome Creek, no alignment revisions were requested. Eric Alsmeyer requested that the permit summary sheet clearly reflect the impacts of the detour. Marshall Clawson agreed to revise the summary sheet.

ACTION TAKEN: *Sites 5 and 6 separated the detour impacts from the proposed on the summary sheet.*

ACTION UPDATE: *March-2011 Site numbers have changed. Sites 5 and 6 are now Sites 8 and 9 The detour is no longer needed. Construction staging will be done in the area of Troublesome Creek to avoid further impacts.*

3. Sills in Box Culverts: Eric Alsmeyer noted that one box culvert at Site 6 (station 57+70) did not contain a sill. Marshall Clawson stated that the width of the culvert match the stream width.

ACTION TAKEN: *No action required.*

ACTION UPDATE: *March-2011 Site number 6 has changed. Site is now Site 9*

4. <u>Wetland Impacts:</u> Eric Alsmeyer requested that the wetlands be considered totally taken for Site 7(station 66+40), Site 8(station 76+30) and Site 9(station 77+10). Marshall Clawson agreed to revise the permit.

ACTION TAKEN: *Sites 7 and 8 were wetlands impacts were adjusted. Site 9 was already considered a total take.*

ACTION UPDATE: *March-2011 Site numbers have changed. Sites 7, 8, and 9 are now Sites 10, 11, and 12. Wetland at Sites 10 and 11 are considered total takes. Site 12 wetland became part of stream.*

The meeting was adjourned.

STORMWATER MANAGEMENT PLAN

TIP No. R-2309AB
Project: 34418.1 4
Guilford County

ROADWAY DESCRIPTION

The project involves the construction of US 220 from SR 2182 (Horsepen Creek Road) to SR 2313 (Winfree Road) in Greensboro, Guildford County The overall length of the project is approximately 5.6 miles. The proposed widening would be from a two-lane roadway to a four-lane facility The major stream/lake crossings that requiring conveyances 72" pipe or larger in diameter are shown in Table 1 below The project drainage system consists of cross pipes, grated inlets with associated pipe systems, tail ditches, lateral stormwater ditches and grass swales.

Table 1 Major Stream/Lake Crossings

Location	Stream Name	Drainage Area	Proposed Structure	Bury Depth
-L- 56+36	Unnamed Tributary to Lake Brandt	292 Ac	10'x11' RCBC	2.5' (1'at outlet)
-L- 114+28	Lake Higgins Spillway on Brush Creek	12.6 Sq Mi	Dual Bridges	N/A
-L- 120+42	Lake Brandt on Brush Creek	6.2 Ac	72" CAP	1 0'
-L- 134+30	Lake Brandt on Reedy Fork	33.5 Sq Mi	Dual Bridges	N/A
-L- 247+02	Unnamed Tributary to Mears Fork Creek	138 Ac	8'x8' RCBC	1.0'

ENVIROMENTAL DESCRIPTION

The project is located in the Cape Fear River Basin. The streams listed in Table 1 have been classified as jurisdictional stream. In additional to the major crossings in Table 1, five minor stream crossings are subject to the stream impacts.

Since a portion of the proposed project is located within a water supply watershed protected critical area, hazardous spill basins will be required to prevent accidental hazardous spills that are within 0.5 mile of the critical area.

There are six wetland sites that will be impacted by the proposed project. Wetland impacts have been kept to a minimum by avoid ditching and channelization through wetlands.

BEST MANAGEMENT PRACTICES (BMP's)

The primary goal of Best Management Practices (BMP) is to prevent degradation of the state's surface waters through the location, construction and operation of the highway system. BMP's are activities, practices and procedures undertaken to prevent or reduce stormwater pollution.

The BMP's and measures that have been used on this project for the roadside drainage are as follows:

HAZARDOUS SPILL BASINS

Since a portion of the proposed project is located within a water supply watershed protected critical area, five hazardous spill basins have been provided to prevent accidental hazardous spills that are within 0.5 mile of the critical areas at the following locations:

-L- 57+13 LT (Forebay provided), -L- 112+60 RT(Forebay provided),
-L- 118+50 LT, -L- 121+70 LT,
-L- 142+25 LT (Forebay provided)

The Forbay dissipates the energy of the flow from a point discharge, allowing suspended particles to settle and trapping trash and debris. 3:1 flat side slope for the basins will be used to provide storm water treatment.

GRASS SWALES

Grassed swales have been utilized at the following locations:

-L- 59+50 to 64+50 RT	-L- 108+50 to 113+25 LT	-L- 122+00 to 130+80 LT
-Y5- 13+00 to 13+95 LT	-L- 141+65 to 145+00 RT	-Y6- 11+10 to 14+00 LT
-L- 234+57 to 235+67 LT	-L- 240+00 to 245+55 LT	-L- 256+50 to 260+00 RT
-L- 261+50 to 268+65 RT	-L- 282+50 to 285+34 Lt	-L- 298+45 to 300+32 LT
-L- 303+50 to 307+00 RT	-L- 307+35 to 309+50 RT	-L- 313+93 LT
-Y8- 8+27 to 9+46 RT	-Y8- 5+70 to 6+50 RT	

A Grass swale is a type of biofilter because the vegetation on the swale takes up some pollutants and helps filter sediment and other solid particles out of the runoff. They convey stormwater and provide stormwater management by retarding peak flow rates, lowering velocities of runoff and by infiltrating runoff water into the soil. The grass swale provides treatment for the discharge before entering the stream. 3:1 or flatter side slope will be used for all grass swales.

STORM WATER DIVERSION

-L- 42+00 to 57+00 LT The off-site flows will be separated from the on-site roadway pavement runoffs. The on-site pavement runoffs will be collected through curb and gutter section and be drained to the forebay and hazardous spill basin (57+13 LT) for treatment. Using separated storm system and roadside ditch, the off-site runoffs will be drained directly to the stream. This will optimize the BMP design.

UTILIZE EXISTING DRY DETENTION BASIN

The primary objective of the dry detention basin is controlling and reducing peak flow rates into receiving water bodies. Because storm water is detained in the basin, the settling of particles and particulate-bound pollutants is the primary pollutant removal mechanism. Every effort to install new slotted drains and storm systems in the highly commercialized area will be used to retain existing dry detention basins to collect pavement/parking lot runoff for treatment at the following locations:

-L- 21+50 LT	-L- 24+30 LT	-L- 25+40 LT	-L- 40+00 RT
-Y- 7+60 RT	-L- 181+00 LT	-L- 201+00 RT	-L- 201+80 LT

All these existing basins are in good condition and well maintained.

PREFORMED SCOUR HOLES with LEVEL SPREADER

Preformed scour holes with level spreader have been provided at the following locations:

-L- 154+10 LT	-L- 209+43 LT	-L- 242+92 RT
-L- 248+88 LT		

A preformed scour hole with level spreader is utilized at these locations in an effort to diffuse the concentrated flow from the storm drain outlet pipe into sheet flow to the surrounding grass/wooded area for treatment.

FILTER STRIPS

To minimize impacts to a perennial stream that parallels US 220 to the east from –L- 100+00 to 114+00 RT and located on Bur-Mil Park property, a 50-foot undisturbed buffer requirement associated with the perennial stream will be maintained by NCDOT It can reduce pollutants in storm water runoff before the runoff enters the stream.

AVOID DITCHING AND CHANNELIZATION THROUGH WETLANDS

Discharge flow from highway at the edge of wetland to promote filtration of runoff through wetland prior to its entering the stream for the following locations:

-L- 118+00 LT -L- 121+00 LT

The BMP's and measures that have been used on this project for the major stream crossings are as follows:

-L- 56+36, 10'x11' RCBC

The culvert will be buried 2.5' and buried 1' at outlet end to provide a moderate longitudinal slope. The culvert width matches the channel width to provide a continuum of water depth and width without substantial modifications of velocity The riprap for outlet protection will be placed on banks only and will not be placed in streambed. The normal functioning of sediment transport during bankful discharge can be maintained and the stream will not degrade or aggrade. The crossing will accommodate the natural stream channel with minimum disruption to the ecosystem and values unique to the floodplain.

-L- 114+28, Dual Bridges

Deck drains are not allowed to directly discharge into water All deck pavement runoff will be drained to wetland for treatment before entering the lake.

-L- 120+42 , 72" CAP
The culvert will be buried 1 foot below the lakebed. The culvert is also functioning as an equalizer pipe to connect Lake Brandt and the wetland between the road and the dam so that the hydrology feeding the wetland will be maintained. The impact to the wetland will be a minimum.

-L- 134+30, Dual Bridges
Deck drains are not allowed to directly discharge into water All deck pavement runoff will be treated through grass swale and wetland before entering the lake.

-L- 247+02, 8'x8' RCBC
The culvert will be buried 1' to provide a natural stream bed. The culvert width matches the channel width to provide a continuum of water depth and width without substantial modifications of velocity The riprap for outlet protection will be placed on banks only and will not be placed in streambed. The normal functioning of sediment transport during bankful discharge can be maintained and the stream will not degrade or aggrade. The crossing will accommodate the natural stream channel with minimum disruption to the ecosystem and values unique to the floodplain.

The BMP's and measures for the minor stream crossings have been used in this project are as follows:

1 The culvert will be buried 20% of the pipe diameter below the natural streambed.
2. The riprap for outlet protection will be placed on banks only and will not be placed in streambed.
3. The crossings will accommodate the natural stream channel with minimum disruption to the ecosystem and values unique to the floodplain.

They are at the followings locations:

-L- 201+35. drainage area = 7.8 Ac, extend 36" RCP to the existing 36" storm system for the offsite cross drainage. The onsite pavement runoff will be drained to the detention basin for treatment before entering the stream.

-L- 233+72: drainage area = 70 Ac, the existing 54" RCP is already buried and will be left in place and extended to maintain low flow The extension sections both up and downstream will be buried 0.9' The low flow pipe will provide a continuum of water depth and width without substantial modifications of velocity The normal functioning of sediment transport during bankful discharge can be maintained and the stream will not degrade or aggrade. An additional 54" pipe with trenchless installation at floodplain elevation provides conveyance for the larger storms.

-L- 269+74 drainage area = 44.8 Ac, extend 48" RCP, bury depth = 0.8', the stream downstream from - L- 266+20 to 268+90 LT will be placed in a closed storm drain system and will not be relocated due to the steep side slopes adjacent to the stream.

-L- 277+16: drainage area = 9.8 Ac, 42" steel pipe with trenchless installation to replace the existing 24" RCP, bury depth = 0.7'

-L- 295+38: drainage area = 20.3 Ac, the existing 36" RCP is already buried and will be left in place and extended to maintain low flow The extension sections both up and downstream will be buried 0.6' The low flow pipe will provide a continuum of water depth and width without substantial modifications of velocity The normal functioning of sediment transport during bankful discharge can be maintained and the stream will not degrade or aggrade. An additional 36" pipe with trenchless installation at floodplain elevation provides conveyance for the larger storms.

STORMWATER MANAGEMENT PLAN

Project: 6.499002T
TIP No. R-2413C
Guilford-Rockingham Counties 08/06/2009

Hydraulics Project Manager: Josh Dalton, P.E. (Sungate Design Group),
Anne Gamber, P.E. (NCDOT Hydraulics Unit)

ROADWAY DESCRIPTION

The project R-2413C consists of widening US 200 from south of the Haw River in Guilford County to the intersection of US 200 and existing NC 68 in Rockingham County. The total project length is 7.575 kilometers (4.73 miles). The proposed roadway (-L-) will consist of a 14 meter (46-feet) wide grassed median with two 3.6 meter (12-foot) wide lanes and 3.6 meter (12-foot) wide paved shoulders in each direction. The project storm drainage systems consist of cross-pipes, grated inlets and associated pipe systems, and grassed swales.

ENVIRONMENTAL DESCRIPTION

The project is located within the Cape Fear River Basin in Guilford-Rockingham Counties. The project creates impacts to nine (9) jurisdictional stream including three (3) major crossing that include the Haw River, Troublesome Creek, and UT to Troublesome Creek. The Haw River is classified as WS-V and NSW at the project crossing. Troublesome Creek is classified as WS-III and NSW. Jacobs Creek is classified as Class C waters. No streams are currently shown by NCDWQ on the 2008 303d list. There are five wetland areas impacted by the project. The Cape Fear River Basin is not currently subject to buffer rules; however efforts have been taken to minimize buffer impacts where practicable.

Jurisdictional Streams: Haw River, three unnamed tributaries to Haw River, Troublesome Creek, two unnamed tributaries to Troublesome Creek, and two unnamed tributaries to Jacobs Creek

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES

The primary goal of Best Management Practices (BMPs) is to prevent degradation of the states surface waters by the location, construction and operation of the highway system. The BMPs are activities, practices and procedures taken to prevent or reduce stormwater pollution. The BMP measures used on this project to reduce stormwater impacts are:

Grassed Swales:
Grassed swales will utilize 3:1 side slopes or flatter and will provide for 10-year non-erosive velocities where topography allows.

Preformed Scour Hole:
A preformed scour hole has been specified right of station 23+77 –L- to provide sheet flow from the outlet pipe.

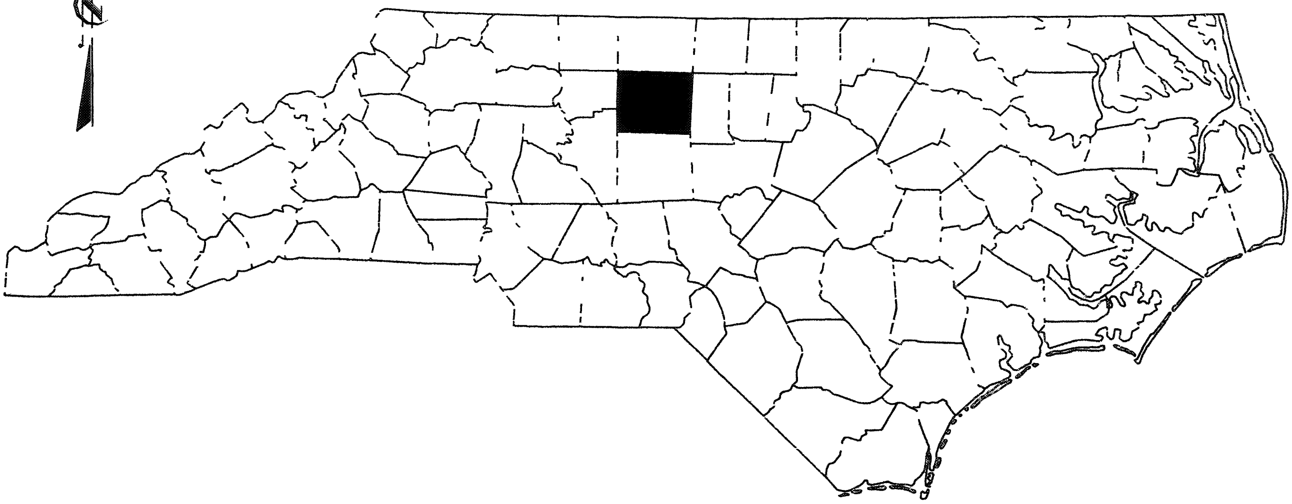
Rip Rap Energy Dissipator Basin:
A rip rap energy dissipator basin has been specified left of station 26+29 –L- at the outlet of the 1350mm RCP (54" RCP). The dissipator basin will slow the flow from the pipe while still allowing for hydrology to be provided to the large wetland downstream.

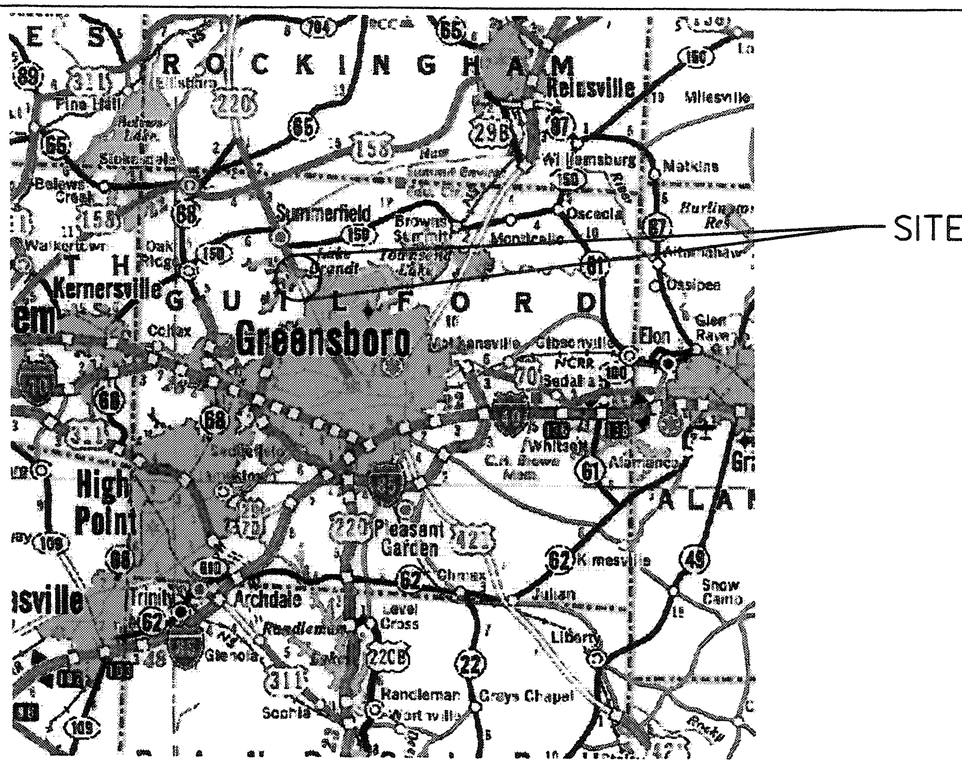
Bottomless Culvert at UT to Troublesome Creek:
Due to larger amounts of bedrock, a bottomless culvert will be used at the UT to Troublesome Creek crossing to reduce impacts.

MINIMIZATION OF IMPACTS

The impacts to wetlands and surface waters were minimized using 2:1 side slopes. Bridges are proposed for the Haw River crossings. The Box Culvert at the Troublesome Creek crossing will be buried one (1) foot. And all cross-pipes located on jurisdictional streams have been increased one pipe size and will be buried 20% of their pipe diameter.

NORTH CAROLINA





VICINITY MAP

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

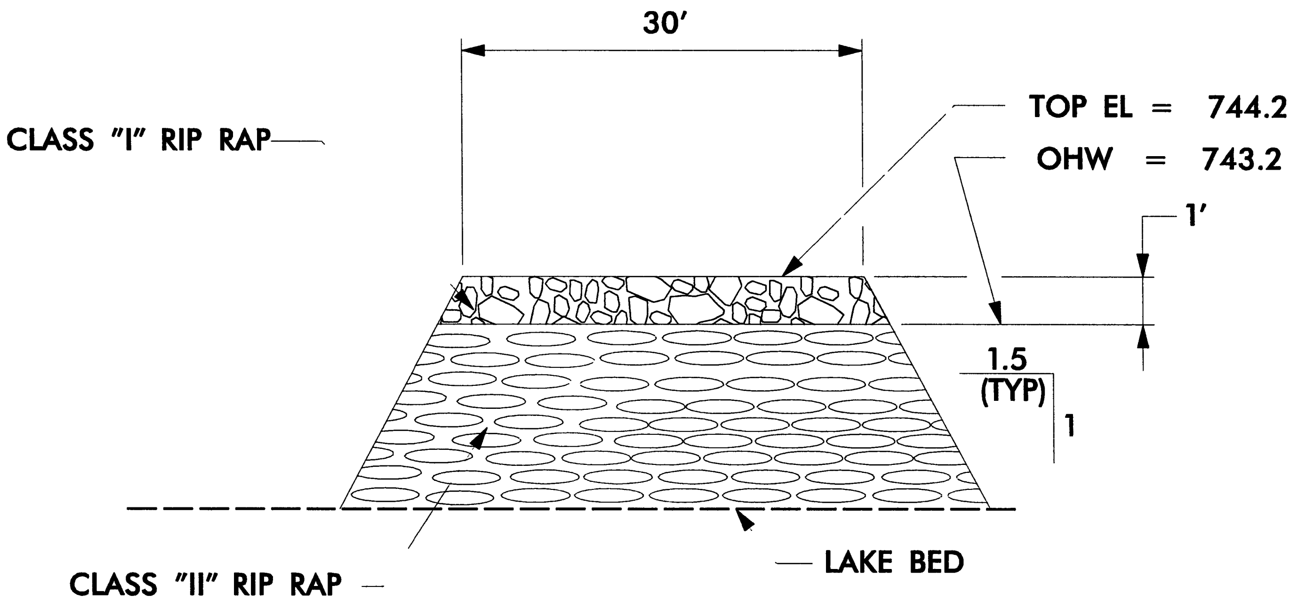
PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET 1 OF 45

10/16/2009
10:07:27 AM

DETAIL OF CAUSEWAY FOR PROPOSED BRIDGE -L- 154+00 TO 155+70



VOLUME OF CLASS "II" RIP RAP BELOW OHW:

LEFT LANE = 2105 CY
RIGHT LANE = 2145 CY

ENGLISH

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET 2 OF 45

10/16/2009
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SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
23	ROGER HERMAN & JOYCE GIOLA	4057 MAYNARD RD GREENSBORO NC, 27410	1
17	GRANITE/ HORSE PEN CREEK, LLC	P.O. BOX 1928 MT. AIRY NC, 27030	2
48	CITY OF GREENSBORO	P.O. BOX 3136 GREENSBORO NC, 27402	3,4
49	CITY OF GREENSBORO	P.O. BOX 3136 GREENSBORO NC, 27402	3
51	GUILFORD COUNTY AND CITY OF GREENSBORO	P.O. BOX 3427 GREENSBORO NC, 27402	5
75	KOTIS PROPERTIES, INC	P.O. BOX 9296 GREENSBORO NC, 27429	6
96	DONNIE M. MABE	471 US 220 NORTH SUMMERFIELD NC, 27358	7
101	NCDOT	P.O. BOX 14996 GREENSBORO NC, 27415	7
103	DONALD M. & BARBARA L. REID	7499 WEITZEL DRIVE SUMMERFIELD NC, 27358	7
105	LENA H. FLINCHUM	8520 STREAMVIEW DR APT L HUNTERSVILLE NC, 28078	8
111	CHUL H. & WHA JIN PARK	7507 WEITZEL DRIVE SUMMERFIELD NC, 27358	9
112	JERRY W. & WANDA C.	5002 MYERS FORK ROAD SUMMERFIELD NC,27358	9
115	CHARLES R. & MARIA BETH SMITH	7704 TANNERY RD SUMMERFIELD NC, 27358	9

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ENGLISH

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET 3 **OF** 45

SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
116	PEGGY P. MOORE (WOODWARD)	7708 TANNERY RD SUMMERFIELD NC, 27358	9
122	SESSOMS DEVELOPMENT INC.	P.O. BOX 711 SUMMERFIELD NC, 27358	10
127	COMMUNITY LUTHERAN CHURCH	7708 TANNERY RD SUMMERFIELD NC, 27358	11
128	CYNTHIA G. WELCH & JAMES E. GAMBLE	113 MARYWOOD DR HIGH POINT NC, 27265	11
141	ROSE FULTZ COOK	PO BOX 14462 GREENSBORO NC, 27415	12
142	WILLIAM C. & NORMA JEAN MABERSON	7904 SUMMERFIELD RD SUMMERFIELD NC, 27358	12
144	JOHN C. JR. & MARGARET E. CHANDLER	5108 US 220 N SUMMERFIELD NC, 27358	12

ENGLISH

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET 4 OF 45

10/16/2009
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WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp Fill In Wetlands (ac)	Excavation in Wetlands (ac)	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)
1	-L- 56+36	10'x11' RCBC	0 07		0 06			0 03	0 02	244	162	
1	-L- 56+36	Bank Stabilization						< 0 01		36		
2	-L- 57+02 to 58+44 RT	Temporary Stilling Basin				0.04						
		& Diversion Channel										
3	-L- 116+00 to 125+00	72" CAP / Roadway Fill	0 31			0 04		0 36				
4	-L- 126+50 to 141+00	Dual Bridges*	0 21			0 02		1 42				
4	-L- 134+00 to 135+70 RT	Temporary Causeway (RT)							0 20			
4	-L- 134+00 to 135+70 LT	Temporary Causeway (LT)							0 18			
4	-L- 134+00 to 134+60 LT	Temporary cofferdams (LT)							0.04			
5	-Y6- 14+14 to 14+52 LT	Roadway Cut			0 01	0 01						
6	-L- 201+22	Extend 36" RCP						< 0 01		3		
7	-L- 233+72	54" WSP & Extend 54" RCP						0 01	< 0 01	98	18	
7	-L- 233+72	Bank Stabilization						0 01		74		
8	-L- 240+00 RT	36" WSP							< 0 01		34	
8	-L- 240+00 RT	Bank Stabilization						< 0 01		40		
9	-L- 247+02	8'x8' RCBC						0.02	0.01	171	122	
9	-L- 247+02	Bank Stabilization						0.01		69		
10	-L- 266+05 LT - 270+05 RT	Roadway Fill / 54" & 48" RCP	0 02					0.02	< 0.01	354	16	
10	-L- 266+05 LT / 270+00 RT	Bank Stabilization						< 0 01		58		
11	-L- 277+16	42" WSP						< 0 01	< 0 01	73	20	
11	-L- 277+16	Bank Stabilization						< 0 01		12		
12	-L- 295+38	36" WSP & Extend 36" RCP						0 01	< 0 01	157	22	
12	-L- 295+38	Bank Stabilization						< 0 01		43		
TOTALS:			0.61		0.07	0.11		1.89	0.45	1432	394	

* Permanent SW impacts for proposed bents = 450 sq ft

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GUILFORD COUNTY
PROJECT - 34418 1 4 (R-2309AB)
SHEET 5 OF 45 January 28, 2010

ATN Revised 3/31/05

SHT ___ OF ___

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2309AB	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34418.1.4	STP-220(5)	P.E.	
34418.2.3	STPNHS-0220(5)	R/W & UTIL.	

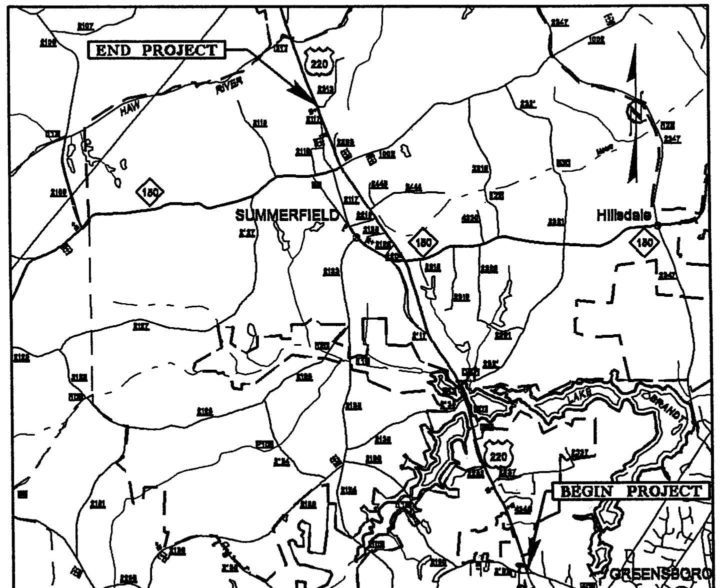
Permit Drawing
Sheet 6 of 45

GUILFORD COUNTY

LOCATION: US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.) IN GREENSBORO

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

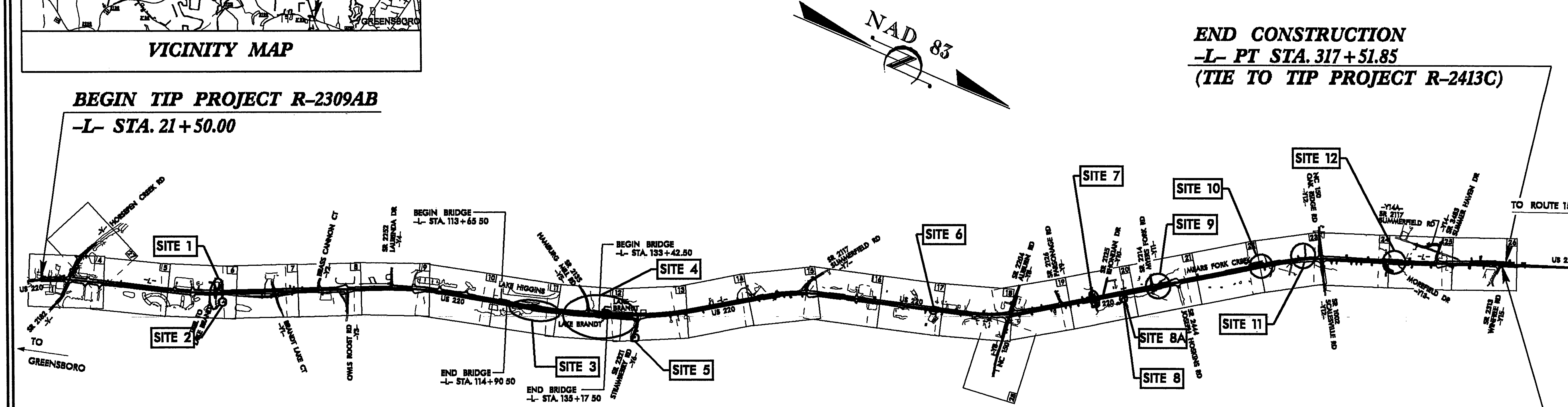
WETLAND AND STREAM IMPACTS PLAN



VICINITY MAP

BEGIN TIP PROJECT R-2309AB
-L- STA. 21+50.00

END CONSTRUCTION
-L- PT STA. 317+51.85
(TIE TO TIP PROJECT R-2413C)



END TIP PROJECT R-2309AB
-L- STA. 316+76.67 =
R-2413C -LREV1- STA. 13+50.00

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF SUMMERFIELD AND THE CITY OF GREENSBORO.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS LIMITED TO POINTS AS SHOWN ON THE PLANS.
NCDOT CONTACT: B. DOUG TAYLOR, P.E., PROJECT ENGINEER – ROADWAY DESIGN

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2012 = 28,882
ADT 2032 = 42,810
DHV = 11 %
D = 65 %
T = 7 % *
V = 60 MPH (SHLDR.)
V = 50 MPH (C&G)
FUNC. CLASS = ARTERIAL
* TTST 4% + DUAL 3%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2309AB = 5.535 MI.
LENGTH STRUCTURES TIP PROJECT R-2309AB = 0.057 MI.
TOTAL LENGTH OF TIP PROJECT R-2309AB = 5.592 MI.

Prepared in the Office of:
KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100
RALEIGH, N.C. 27607
(919) 851-6066
for the
DIVISION OF HIGHWAYS
2006 STANDARD SPECIFICATIONS
RIGHT OF WAY DATE: OCTOBER 17, 2008
LETTING DATE: JANUARY , 2012
BRIAN A. WILES, P.E.
PROJECT ENGINEER
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.
ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
STATE HIGHWAY DESIGN ENGINEER P.E.

TIP PROJECT: R-2309AB
CONTRACT:

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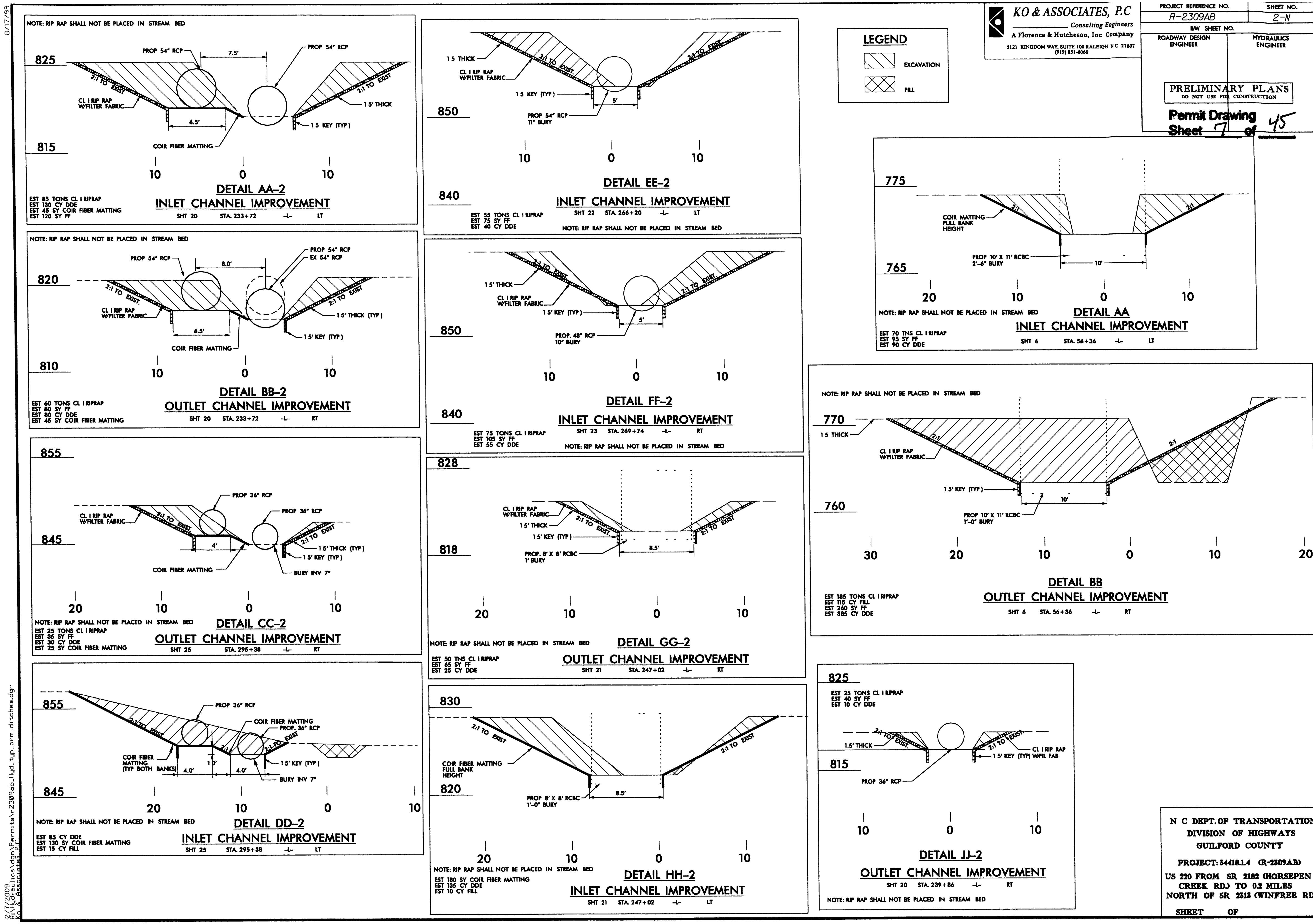
KO & ASSOCIATES, P.C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066
PROJECT REFERENCE NO. R-2309AB
SHEET NO. 2-N
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 7 of 45
LEGEND
EXCAVATION
FILL
NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED
PROP 54" RCP
7.5'
2:1 TO EXIST
CL I RIP RAP W/FILTER FABRIC
6.5'
1.5' THICK
1.5' KEY (TYP)
COIR FIBER MATTING
DETAIL AA-2
INLET CHANNEL IMPROVEMENT
SHT 20 STA. 233+72 -L- LT
EST 85 TONS CL I RIPRAP
EST 130 CY DDE
EST 45 SY COIR FIBER MATTING
EST 120 SY FF
PROP 54" RCP
EX 54" RCP
8.0'
1.5' THICK (TYP)
DETAIL BB-2
OUTLET CHANNEL IMPROVEMENT
SHT 20 STA. 233+72 -L- RT
EST 60 TONS CL I RIPRAP
EST 80 SY FF
EST 80 CY DDE
EST 45 SY COIR FIBER MATTING
PROP 36" RCP
4'
BURY INV 7"
DETAIL CC-2
OUTLET CHANNEL IMPROVEMENT
SHT 25 STA. 295+38 -L- RT
EST 25 TONS CL I RIPRAP
EST 35 SY FF
EST 30 CY DDE
EST 25 SY COIR FIBER MATTING
COIR FIBER MATTING (TYP BOTH BANKS)
4.0'
1.0'
DETAIL DD-2
INLET CHANNEL IMPROVEMENT
SHT 25 STA. 295+38 -L- LT
EST 85 CY DDE
EST 130 SY COIR FIBER MATTING
EST 15 CY FILL
PROP 54" RCP
11" BURY
5'
DETAIL EE-2
INLET CHANNEL IMPROVEMENT
SHT 22 STA. 266+20 -L- LT
EST 55 TONS CL I RIPRAP
EST 75 SY FF
EST 40 CY DDE
PROP. 48" RCP
10" BURY
DETAIL FF-2
INLET CHANNEL IMPROVEMENT
SHT 23 STA. 269+74 -L- RT
EST 75 TONS CL I RIPRAP
EST 105 SY FF
EST 55 CY DDE
PROP. 8' X 8' RCBC
1' BURY
8.5'
DETAIL GG-2
OUTLET CHANNEL IMPROVEMENT
SHT 21 STA. 247+02 -L- RT
EST 50 TNS CL I RIPRAP
EST 65 SY FF
EST 25 CY DDE
COIR FIBER MATTING FULL BANK HEIGHT
PROP 8' X 8' RCBC
1'-0" BURY
DETAIL HH-2
INLET CHANNEL IMPROVEMENT
SHT 21 STA. 247+02 -L- LT
EST 180 SY COIR FIBER MATTING
EST 135 CY DDE
EST 10 CY FILL
COIR MATTING FULL BANK HEIGHT
PROP 10' X 11' RCBC
2'-6" BURY
10'
DETAIL AA
INLET CHANNEL IMPROVEMENT
SHT 6 STA. 56+36 -L- LT
EST 70 TNS CL I RIPRAP
EST 95 SY FF
EST 90 CY DDE
PROP 10' X 11' RCBC
1'-0" BURY
DETAIL BB
OUTLET CHANNEL IMPROVEMENT
SHT 6 STA. 56+36 -L- RT
EST 185 TONS CL I RIPRAP
EST 115 CY FILL
EST 260 SY FF
EST 385 CY DDE
1.5' KEY (TYP) W/FIL FAB
DETAIL JJ-2
OUTLET CHANNEL IMPROVEMENT
SHT 20 STA. 239+86 -L- RT
EST 25 TONS CL I RIPRAP
EST 40 SY FF
EST 10 CY DDE
N C DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF
8/17/99
12/7/2009
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Ko & Associates, P.C.

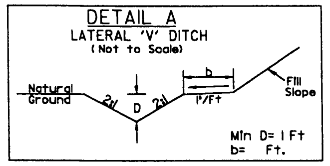
KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	2-M
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

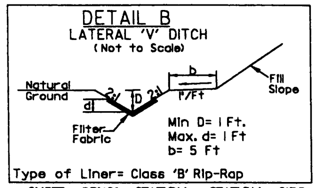
Permit Drawing
Sheet 8 of 45

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



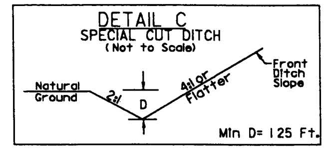
SHEET	RDWY	STATION - STATION	B	SIDE
15	-L-	168+95 - 169+20	5'	LT
27	-Y-	5+70 - 6+00	2'	RT

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



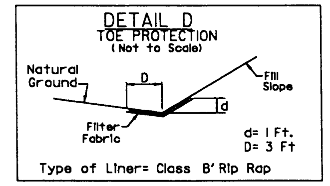
SHEET	RDWY	STATION - STATION	SIDE
15	-L-	169+15 - 170+30	RT

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



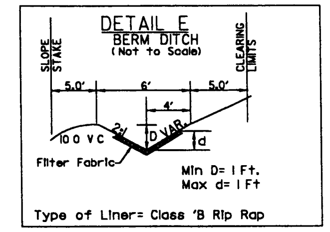
SHEET	RDWY	STATION - STATION	SIDE
8,9	-L-	83+50 - 88+00	LT
8	-Y3-	11+75 - 12+94	LT
16	-L-	184+00 - 185+00	LT
18	-L-	206+00 - 206+50	LT
22	-L-	259+00 - 260+00	RT
22	-L-	261+50 - 262+00	RT
25,26	-L-	304+50 - 307+00	LT
25	-Y14-	11+00 - 13+00	RT
25	-Y14-	11+00 - 13+00	LT
25	-Y14A-	10+38 - 13+00	LT
25	-Y14A-	12+00 - 15+00	RT
26	-L-	309+80 - 310+50	RT
26	-Y15-	11+50 - 12+00	LT
27	-Y-	0+50 - 3+10	RT

DETAIL D
TOE PROTECTION
(Not to Scale)



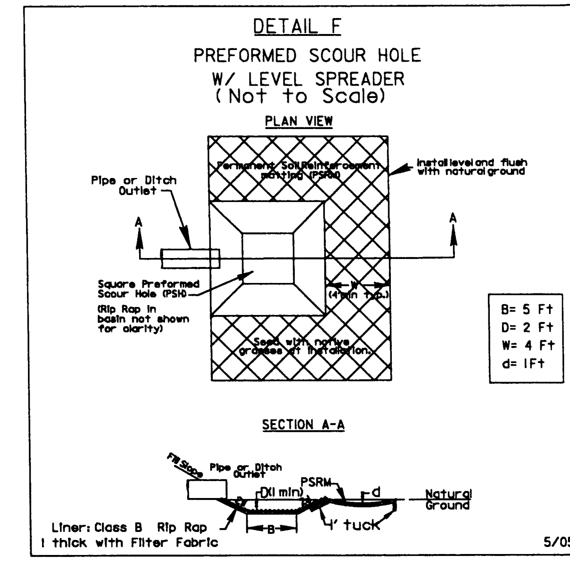
SHEET	RDWY	STATION - STATION	SIDE
6	-L-	52+40 - 55+60	RT
6	-L-	56+30 - 57+65	LT
10	-L-	101+00 - 101+75	RT
11	-L-	121+30 - 121+65	LT
15	-L-	165+75 - 168+50	LT
16	-L-	179+03 - 182+50	RT
17	-L-	200+05 - 201+90	LT
17	-L-	200+50 - 201+03	RT
20	-L-	229+00 - 230+55	RT
20	-L-	231+00 - 231+66	LT
20	-L-	234+00 - 235+00	RT
21	-L-	247+00 - 247+70	LT
22	-L-	266+39 - 267+00	LT
23	-L-	267+00 - 269+30	LT
23	-L-	269+06 - 269+65	RT
23	-L-	276+51 - 277+28	LT
24	-L-	286+50 - 287+20	LT
25	-L-	294+50 - 297+50	LT
25	-L-	294+00 - 296+15	RT

DETAIL E
BERM DITCH
(Not to Scale)



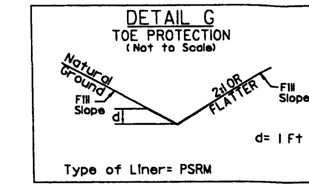
SHEET	RDWY	STATION - STATION	SIDE
5,6	-L-	38+80 - 47+60	LT
14,15	-L-	158+50 - 163+30	RT

DETAIL F
PREFORMED SCOUR HOLE
W/ LEVEL SPREADER
(Not to Scale)



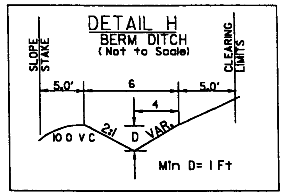
SHEET	RDWY	STATION - STATION	SIDE
14	-L-	154+10	LT
18	-L-	209+43	LT
21	-L-	242+92	RT
21	-L-	248+88	LT

DETAIL G
TOE PROTECTION
(Not to Scale)



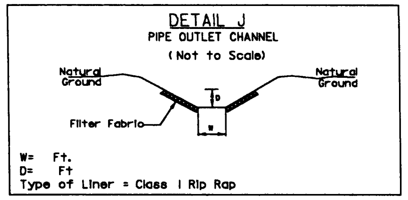
SHEET	RDWY	STATION - STATION	SIDE
4	-Y-	6+00 - 7+40	RT
4	-L-	29+65 - 30+08	LT
5	-L-	34+88 - 37+20	LT
6	-L-	48+50 - 51+65	LT
7	-L-	68+90 - 69+50	RT
7,8	-L-	68+12 - 72+70	LT
8	-L-	76+00 - 76+85	LT
8	-L-	77+65 - 78+20	LT
8	-L-	83+20 - 84+00	RT
10	-L-	98+50 - 100+90	LT
10	-L-	102+00 - 105+20	LT
10	-L-	106+75 - 108+50	LT
11	-L-	115+05 - 117+00	LT
27	-Y-	2+80 - 4+20	RT

DETAIL H
BERM DITCH
(Not to Scale)



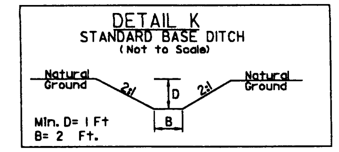
SHEET	RDWY	STATION - STATION	SIDE
5	-L-	37+60 - 38+80	LT

DETAIL J
PIPE OUTLET CHANNEL
(Not to Scale)



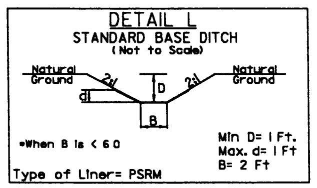
SHEET	RDWY	STATION - STATION	SIDE	W	D
6	-L-	56+20	LT	6'	5'
23	-L-	276+80	RT	7'	5

DETAIL K
STANDARD BASE DITCH
(Not to Scale)



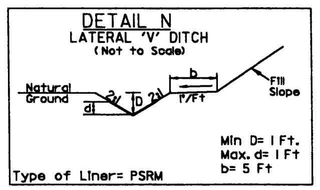
SHEET	RDWY	STATION - STATION	SIDE
8	-Y3-	11+75 - 11+90	RT

DETAIL L
STANDARD BASE DITCH
(Not to Scale)



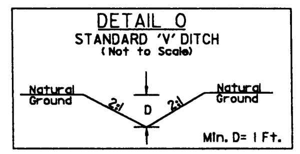
SHEET	RDWY	STATION - STATION	SIDE
8	-L-	75+70 - 76+80	RT

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



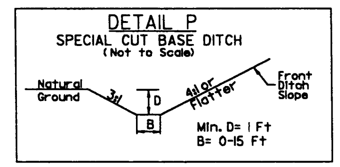
SHEET	RDWY	STATION - STATION	SIDE
9	-L-	88+00 - 89+20	LT

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



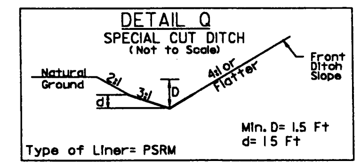
SHEET	RDWY	STATION - STATION	SIDE
7	-L-	64+30 - 65+10	RT
7	-L-	67+65 - 67+85	RT
9	-L-	95+60	LT

DETAIL P
SPECIAL CUT BASE DITCH
(Not to Scale)



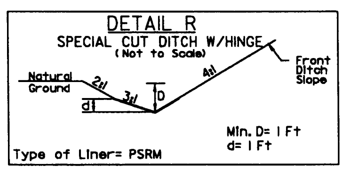
SHEET	RDWY	STATION - STATION	SIDE
11	-L-	122+00 - 122+50	LT

DETAIL Q
SPECIAL CUT DITCH
(Not to Scale)



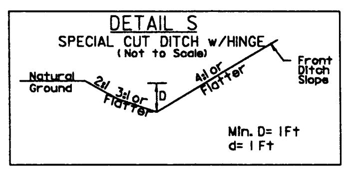
SHEET	RDWY	STATION - STATION	SIDE
10	-L-	108+50 - 110+50	LT
25	-Y14A-	12+00 - 15+00	RT

DETAIL R
SPECIAL CUT DITCH W/HINGE
(Not to Scale)



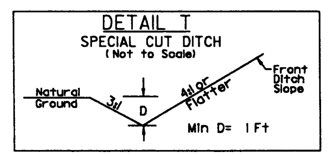
SHEET	RDWY	STATION - STATION	SIDE
10,11	-L-	110+50 - 113+20	LT

DETAIL S
SPECIAL CUT DITCH W/HINGE
(Not to Scale)



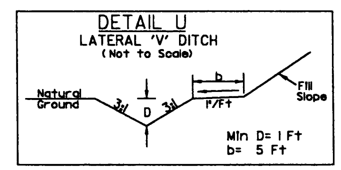
SHEET	RDWY	STATION - STATION	SIDE
11,12	-L-	122+50 - 130+76	LT
12	-Y5-	13+00 - 13+95	LT
20	-L-	234+57 - 235+67	LT
20,21	-L-	240+00 - 242+35	LT
21	-L-	242+35 - 245+55	LT
22	-L-	256+50 - 260+00	RT
22	-L-	261+50 - 265+50	RT
22,23	-L-	265+50 - 268+65	RT
25	-L-	282+50 - 285+34	LT
25	-L-	298+45 - 300+32	LT
25	-L-	303+50 - 307+00	RT
26	-L-	307+35 - 309+50	RT
19	-Y8-	8+27 - 9+46	RT
19	-Y8-	5+70 - 6+50	RT
28	-Y8-	14+00 - 14+98	LT

DETAIL T
SPECIAL CUT DITCH
(Not to Scale)



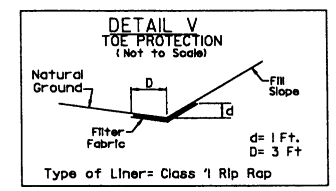
SHEET	RDWY	STATION - STATION	SIDE
13	-L-	143+00 - 145+00	RT
13	-Y6-	13+15 - 14+00	LT

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



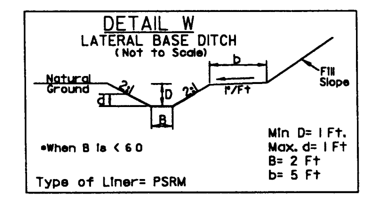
SHEET	RDWY	STATION - STATION	SIDE
13	-L-	141+65 - 143+00	RT
13	-Y6-	11+11 - 12+80	LT

DETAIL V
TOE PROTECTION
(Not to Scale)



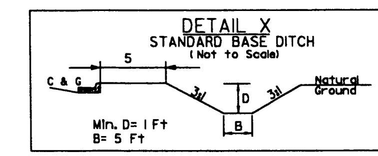
SHEET	RDWY	STATION - STATION	SIDE
15	-L-	167+10 - 168+70	LT
15	-L-	169+20 - 170+25	LT

DETAIL W
LATERAL BASE DITCH
(Not to Scale)



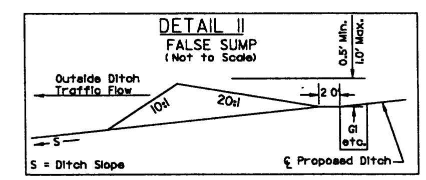
SHEET	RDWY	STATION - STATION	SIDE
6	-L-	53+30 - 56+20	LT

DETAIL X
STANDARD BASE DITCH
(Not to Scale)



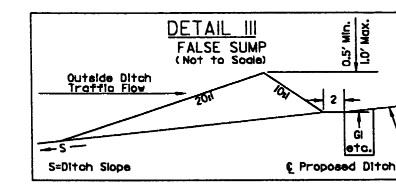
SHEET	RDWY	STATION - STATION	SIDE
7	-L-	59+50 - 64+50	RT

DETAIL II
FALSE SUMP
(Not to Scale)



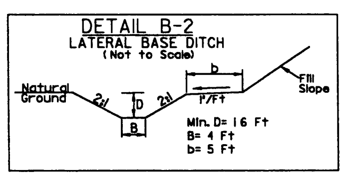
SHEET	RDWY	STATION - STATION	SIDE
7	-L-	64+75	RT
10	-L-	98+50	RT
10	-L-	100+60	RT
12	-L-	130+85	LT
27	-Y-	3+34	RT
18	-L-	210+87	LT
19	-Y8-	9+56	RT
20	-L-	230+63	RT
20	-L-	239+10	RT
21	-L-	253+50	LT
21	-Y11-	10+84	RT
22	-L-	266+78	RT
23	-L-	278+33	LT
24	-L-	279+52	LT
26	-L-	307+12	LT

DETAIL III
FALSE SUMP
(Not to Scale)



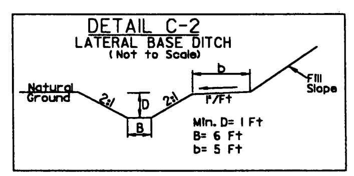
SHEET	RDWY	STATION - STATION	SIDE
10	-L-	105+30	LT
11	-L-	113+25	LT
13	-L-	146+60	RT
14	-L-	158+05	RT
16	-L-	176+50	LT
16	-L-	183+77	LT
16	-L-	188+25	LT
17	-L-	190+35	RT
17	-L-	191+09	RT
19	-L-	227+60	LT
20	-L-	229+36	LT
20	-Y10-	11+07	RT
21	-L-	246+55	LT
21	-L-	252+85	RT
21	-L-	250+38	RT
23	-L-	269+84	LT
23	-L-	271+87	LT
23	-L-	273+33	LT
24	-Y12-	9+09	LT
24	-Y12-	10+86	LT
24	-L-	291+93	LT

DETAIL B-2
LATERAL BASE DITCH
(Not to Scale)



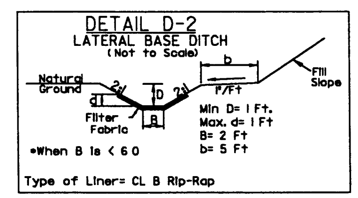
SHEET	RDWY	STATION - STATION	SIDE
26	-L-	307+50 - 311+80	LT (B=2')
26	-L-	311+80 - 313+93	LT
26	-L-	313+78 - 315+50	RT (D=1')

DETAIL C-2
LATERAL BASE DITCH
(Not to Scale)



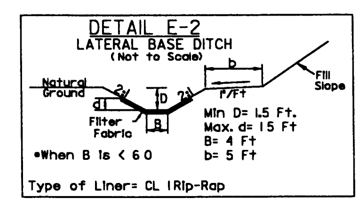
SHEET	RDWY	STATION - STATION	SIDE
22	-L-	260+00 - 261+50	RT

DETAIL D-2
LATERAL BASE DITCH
(Not to Scale)



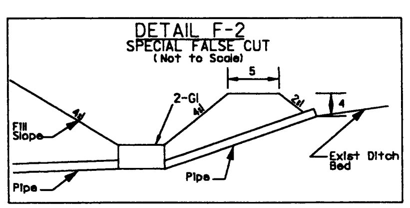
SHEET	RDWY	STATION - STATION	SIDE
18	-L-	209+42 - 210+60	LT
20	-L-	233+62 - 233+95	LT
26	-L-	315+50 - 315+90	RT

DETAIL E-2
LATERAL BASE DITCH
(Not to Scale)



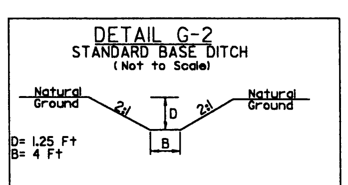
SHEET	RDWY	STATION - STATION	SIDE
16	-L-	176+85 - 178+93	LT
16	-L-	178+97 - 179+60	RT (D=2')
20	-L-	231+80 - 233+80	RT
21	-L-	245+85 - 249+80	RT

DETAIL F-2
SPECIAL FALSE CUT
(Not to Scale)



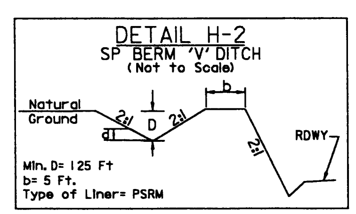
SHEET	RDWY	STATION - STATION	SIDE
20	-L-	239+50 - 240+50	LT

DETAIL G-2
STANDARD BASE DITCH
(Not to Scale)



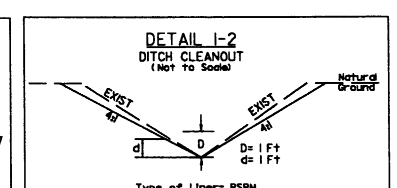
SHEET	RDWY	STATION - STATION	SIDE
22	-L-	260+90	LT

DETAIL H-2
SP BERM 'V' DITCH
(Not to Scale)



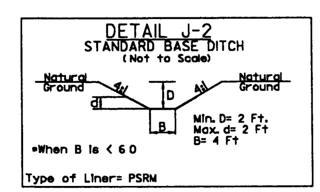
SHEET	RDWY	STATION - STATION	SIDE
23	-L-	269+75 - 272+00	LT

DETAIL I-2
DITCH CLEANOUT
(Not to Scale)



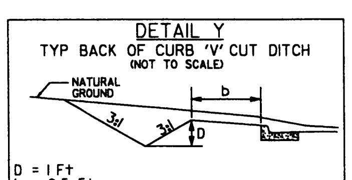
SHEET	RDWY	STATION - STATION	SIDE
18	-L-	202+50 - 205+64	LT

DETAIL J-2
STANDARD BASE DITCH
(Not to Scale)



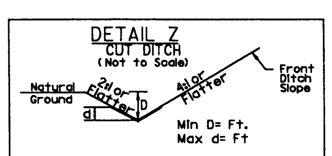
SHEET	RDWY	STATION - STATION	SIDE
26	-L-	313+93	LT

DETAIL Y
TYP BACK OF CURB 'V' CUT DITCH
(NOT TO SCALE)



SHEET	RDWY	STATION - STATION	SIDE
27	-Y-	1+50 - 2+50	RT
27	-Y-	4+20 - 5+15	RT

DETAIL Z
CUT DITCH
(Not to Scale)



SHEET	RDWY	STATION - STATION	SIDE
7	-Y1-	11+00 - 12+70	LT

N. C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

8/17/99

12/7/2009
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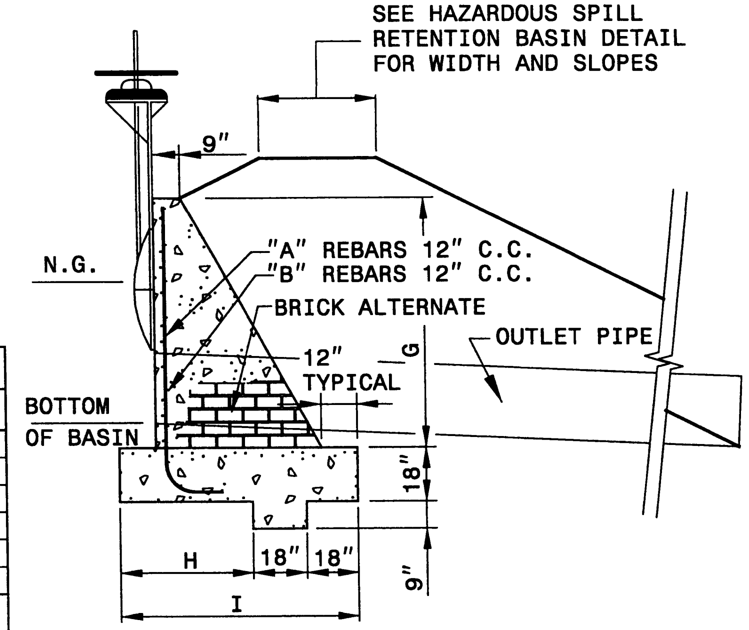
Ko & Associates, P.C.

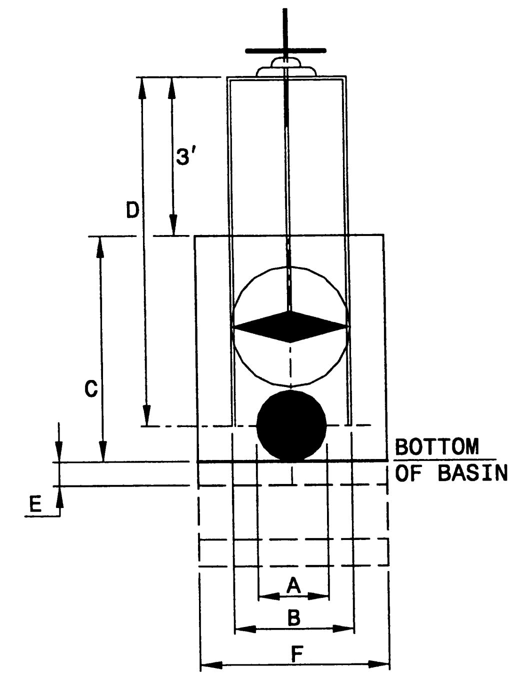
Permit Drawing
Sheet 9 of 45

GENERAL NOTES:
1- REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE HEADWALL AND SHALL BE PAID FOR ON YD^3 BASIS.
2- CONCRETE SHALL BE CLASS "B" THROUGHOUT STRUCTURE.
3- DELETE REINFORCING STEEL WHEN BRICK ALTERNATE IS USED.

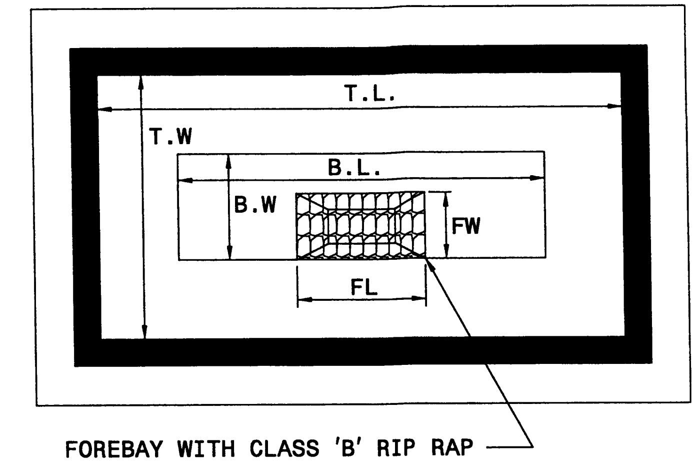
BASIN #		1	2	3	4	5
SLUICE GATE DIMENSIONS						
PIPE DIAMETER	A	30"	30"	18"	30"	18"
GATE DIAMETER	B	38¾"	38¾"	25"	38¾"	25"
HEADWALL HT.	C	6'3"	6'3"	3'9"	6'3"	3'9"
FRAME HEIGHT	D	60"	60"	36"	60"	36"
INVERT HEIGHT	E	10"	10"	10"	10"	10"
HEADWALL WIDTH	F	9'2"	9'2"	6'4"	9'2"	6'4"
HEADWALL DIMENSIONS						
PIPE DIAMETER	A	30"	30"	18"	30"	18"
HEADWALL HT.	G	7'1"	7'1"	4'7"	7'1"	4'7"
FOOTING DEPTH	H	2'6"	2'6"	18"	2'6"	18"
HEADWALL DEP	I	5'6"	5'6"	4'6"	5'6"	4'6"



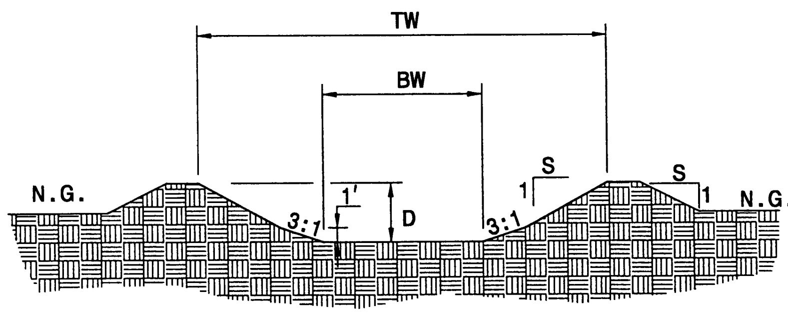
SECTION VIEW



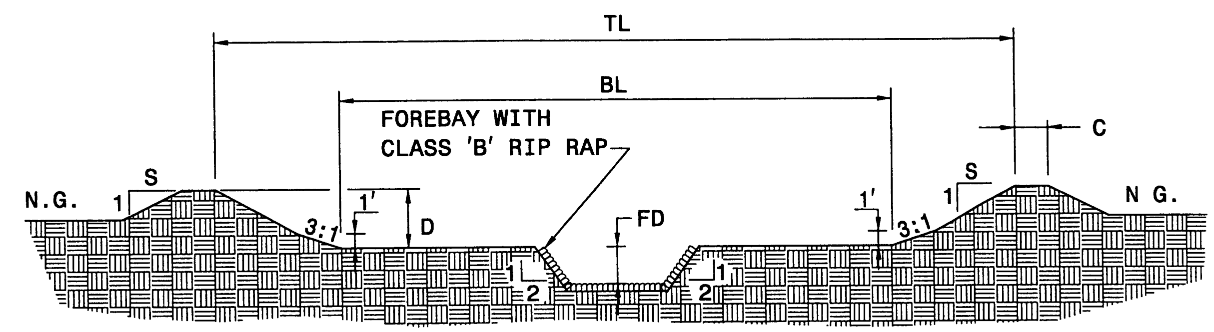
ELEVATION VIEW



PLAN VIEW OF BASIN



CROSS SECTION VIEW OF BASIN



CROSS SECTION VIEW OF BASIN

HAZARDOUS SPILL RETENTION BASIN														FOREBAY DIMENSION		
BASIN #	PIPE SIZE	TOP ELEV	BOTTOM ELEV	T W (ft)	B W (ft)	D (ft)	T L (ft)	B L (ft)	S	C (ft)	*G (CY)	CAPACITY (cu ft)	STATION	FL (ft)	FW (ft)	FD (ft)
1	30"	779	774	97	75	5	72-97	50-75	2	2	100	30800	-L- 57+13 LT	40	20	3
2	30"	760	753 5	58	30	6 5	78	50	2	5	110	17600	-L- 112+60 RT	30	15	3
3	18"	746 5	N/A	N/A	N/A	N/A	N/A	N/A	2	2	0	6500	-L- 118+50 LT	N/A	N/A	N/A
4	30"	748	744	33	15	4	58	48	2	2	180	16000	-L- 121+70 LT	N/A	N/A	N/A
5	18"	750 8	745 8	42	20	5	62	40	2	2	160	7500	-L- 142+25 LT	20	12	3

** Provided at new and/or improved roadway sections to aid in containment and clean up of accidental spills by truck traffic Basins are provided in particular locations including areas in proximity to sensitive waters and water supplies.

*G DENOTES EXCAVATION AMOUNT

NOTE: SEE PLAN SHEET FOR LOCATION OF OUTLET PIPE WITH SLUICE GATE

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

HAZARDOUS SPILL RETENTION BASIN

ORIGINAL BY:________ DATE:________
MODIFIED BY:________ DATE:________
CHECKED BY:________ DATE:________
FILE SPEC.:________

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

5/14/99

12/7/2009
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Ko & Associates, P.C.

8/17/99

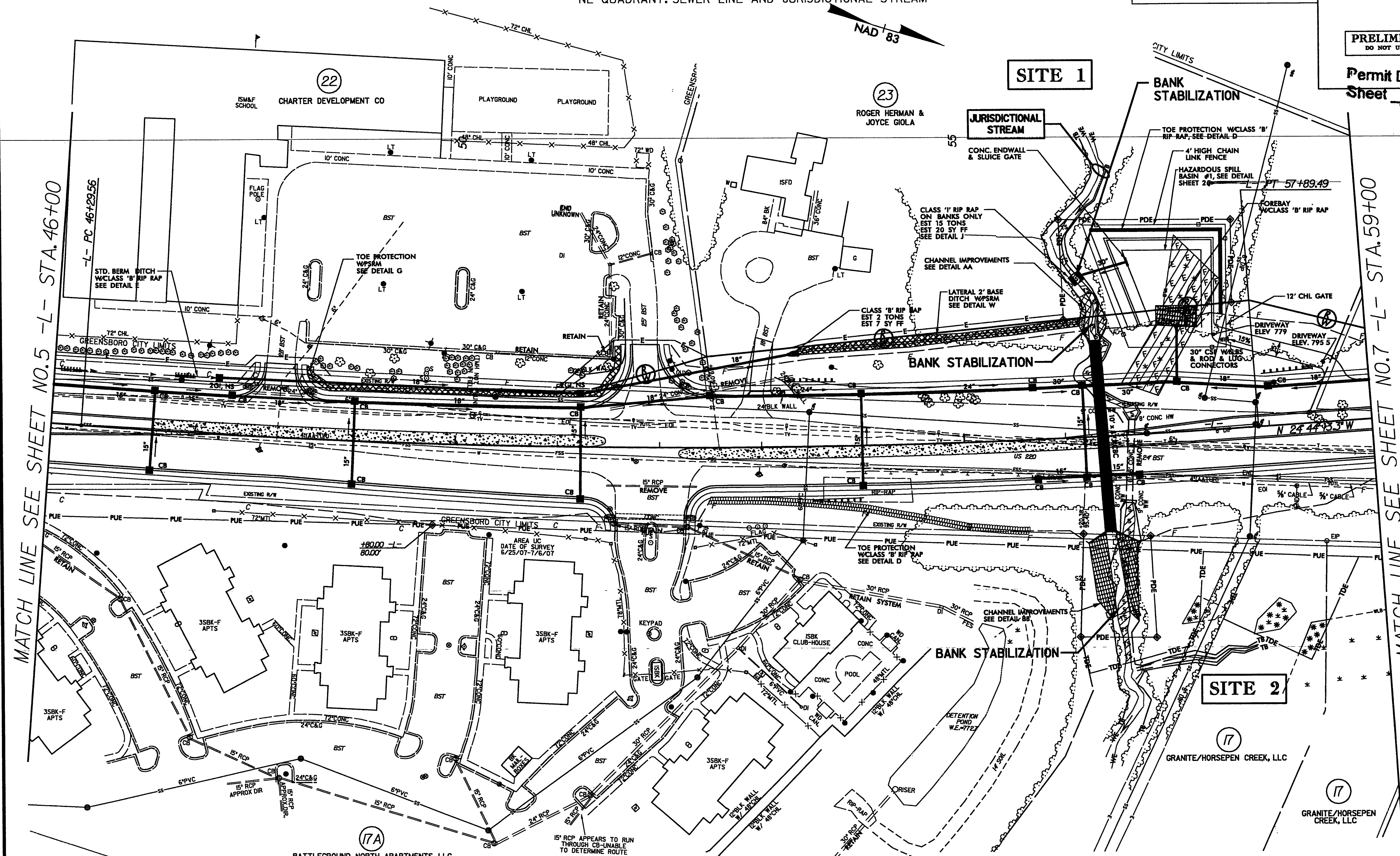
NW QUADRANT IS SELECTED FOR HAZARDOUS SPILL BASIN BECAUSE:
SW QUADRANT: WELL DEVELOPED PROPERTY AND LATERAL DITCH FOR OFF SITE RUNOFF
SE QUADRANT: DETENTION POND
NE QUADRANT: SEWER LINE AND JURISDICTIONAL STREAM

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 10 of 45



100 0 50 100
SCALE: 1"= 100' HORIZ.

SITE 1 AND 2 PLAN VIEW

LEGEND

—WLB—	WETLAND BOUNDARY		DENOTES FILL IN WETLAND
	DENOTES TEMPORARY IMPACTS IN SURFACE WATER		DENOTES EXCAVATION IN WETLAND
	DENOTES IMPACTS IN SURFACE WATER		DENOTES MECHANIZED CLEARING

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

12/7/2009
R:\Hydraulics\dgn\Permits\r2309ab_Hyd_prm_psh06.dgn
Ko & Associates PC

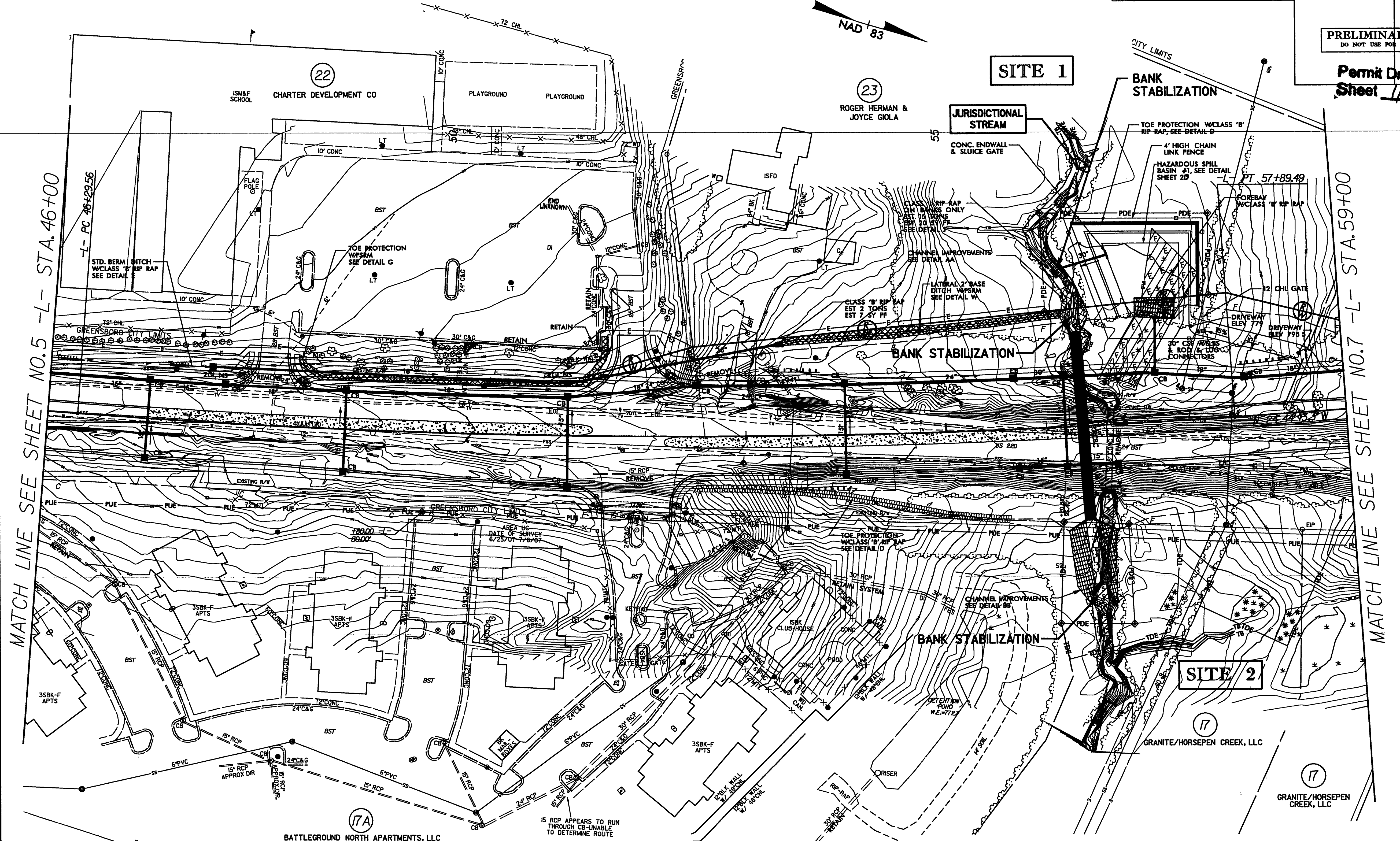
NW QUADRANT IS SELECTED FOR HAZARDOUS SPILL BASIN BECAUSE:
SW QUADRANT: WELL DEVELOPED PROPERTY AND LATERAL DITCH FOR OFF SITE RUNOFF
SE QUADRANT: DETENTION POND
NE QUADRANT: SEWER LINE AND JURISDICTIONAL STREAM

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 11 of 45



SCALE: 1" = 100' HORIZ.

SITE 1 AND 2
PLAN VIEW

LEGEND

- —WLB— WETLAND BOUNDARY
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND
- DENOTES EXCAVATION IN WETLAND
- DENOTES MECHANIZED CLEARING

N. C. DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF

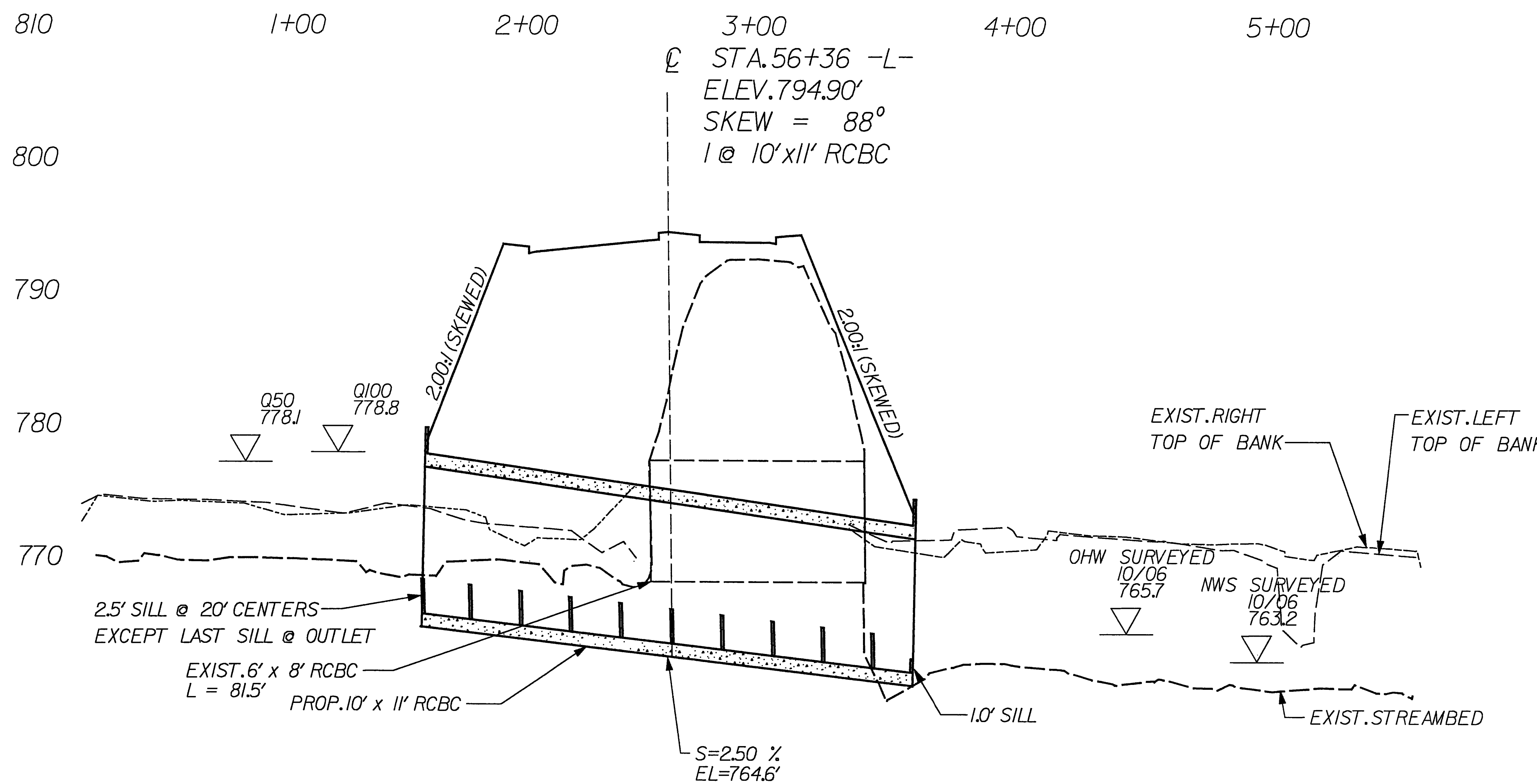
8/17/99
12/7/2009

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	PAS-S1
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 12 of 45



ENGLISH

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

SITE 1
PROFILE ALONG STRUCTURE
STA. 56 + 36 -L-

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

5/28/99

4/23/2009
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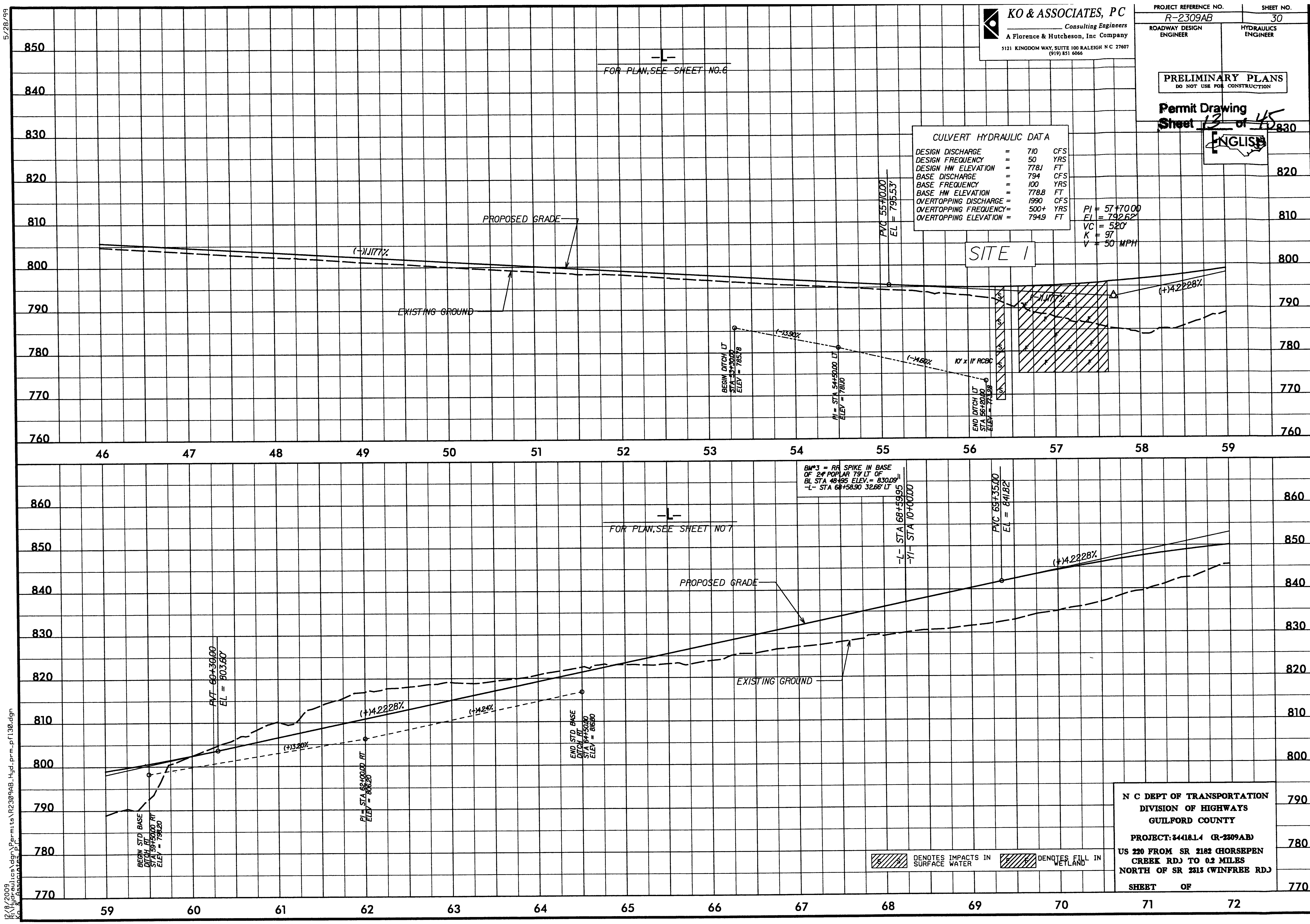
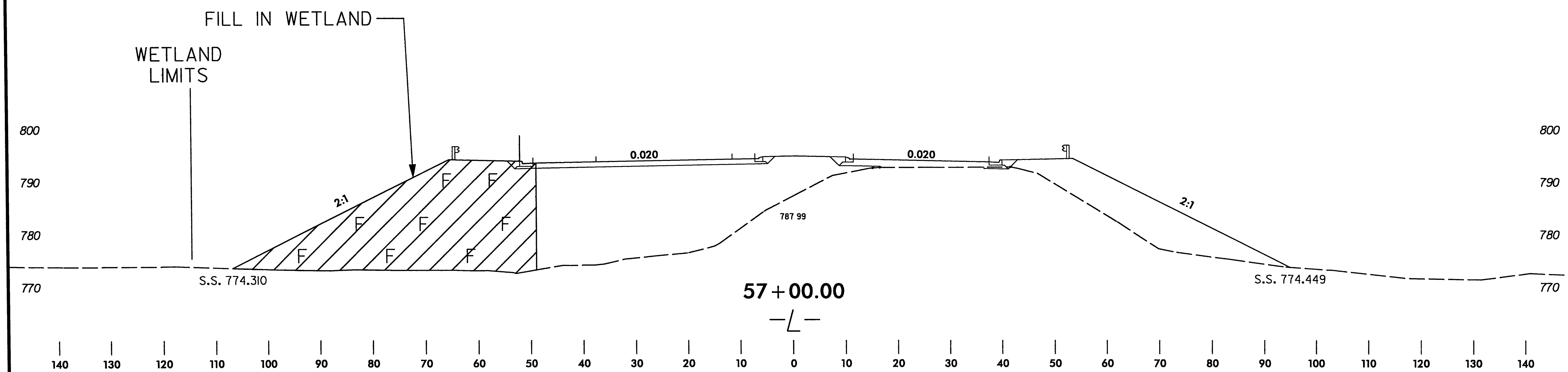

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066
PROJECT REFERENCE NO.
R-2309AB
SHEET NO.
30
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 13 of 45
ENGLISH
-L-
FOR PLAN,SEE SHEET NO.6
CULVERT HYDRAULIC DATA
DESIGN DISCHARGE = 710 CFS
DESIGN FREQUENCY = 50 YRS
DESIGN HW ELEVATION = 778.1 FT
BASE DISCHARGE = 794 CFS
BASE FREQUENCY = 100 YRS
BASE HW ELEVATION = 778.8 FT
OVERTOPPING DISCHARGE = 1990 CFS
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING ELEVATION = 794.9 FT
PVC 55+10.00
EL = 795.53'
PI = 57+70.00
EL = 792.62'
VC = 520'
K = 97
V = 50 MPH
SITE 1
PROPOSED GRADE
(-)1.1177%
EXISTING GROUND
(-)1.1177%
(+)4.2228%
BEGIN DITCH LT
STA 53+30.00
ELEV = 785.78
(-)1.390%
PI = STA 54+50.00 LT
ELEV = 781.10
(-)4.60%
10' x 11' RCBC
END DITCH LT
STA 56+20.00
ELEV = 773.28
BM#3 = RR SPIKE IN BASE OF 24" POPLAR 79' LT OF BL STA 48+95 ELEV.= 830.09'
-L- STA 68+58.90 32.66' LT
-L- STA 68+59.95
-Y1- STA 10+00.00
PVC 69+35.00
EL = 841.82
-L-
FOR PLAN,SEE SHEET NO.7
PROPOSED GRADE
(+)4.2228%
EXISTING GROUND
PVT 60+30.00
EL = 803.60'
(+)4.2228%
(+)4.24%
(+)3.20%
BEGIN STD BASE
DITCH RT
STA 59+50.00 RT
ELEV = 798.20
PI = STA 62+00.00 RT
ELEV = 806.20
END STD BASE
DITCH RT
STA 64+50.00
ELEV = 816.80
DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF
5/28/99
12/8/2009

PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	XSC SITE 1
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 14 of 45



SITE 1
X-SECTION

LEGEND

F F DENOTES FILL IN WETLAND

ENGLISH

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc. Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N.C. 27607
(919) 851 6066

N. C. DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD.)

SHEET OF

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11/10/2009

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851 6066

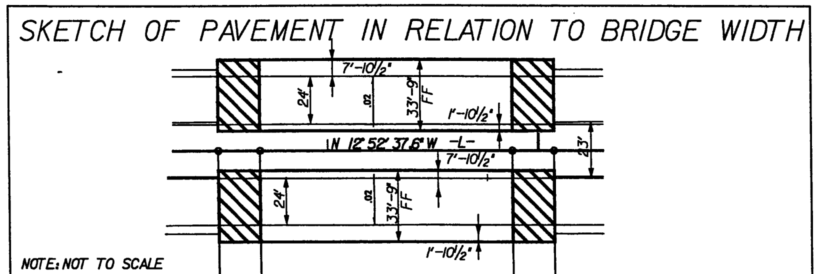
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

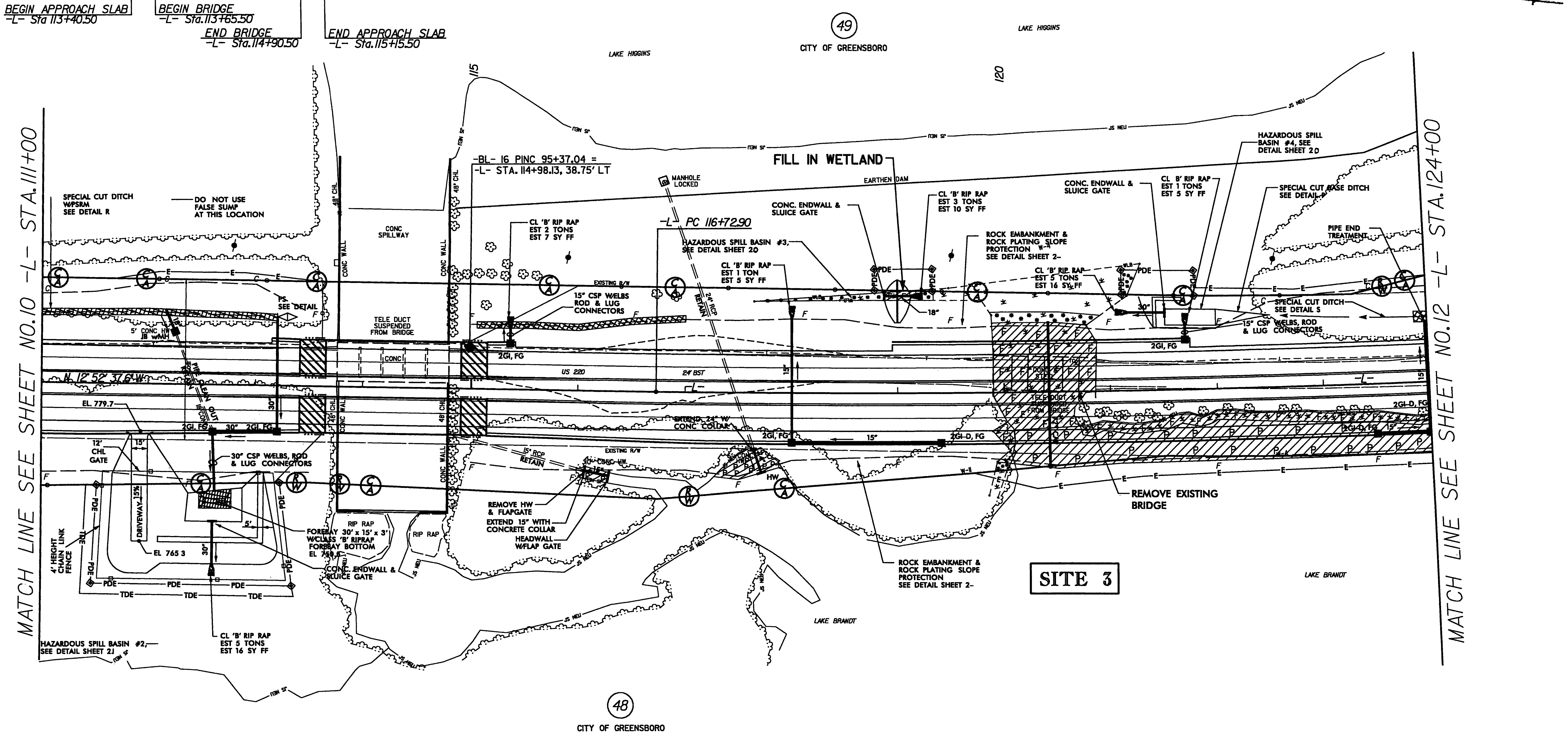
Permit Drawing
Sheet 13 of 45

NAD 83

SKETCH OF PAVEMENT IN RELATION TO BRIDGE WIDTH



BEGIN APPROACH SLAB
-L- Sta 113+40.50
BEGIN BRIDGE
-L- Sta.113+65.50
END BRIDGE
-L- Sta.114+90.50
END APPROACH SLAB
-L- Sta.115+15.50



ENGLISH

LEGEND

- —WLB— WETLAND BOUNDARY
- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

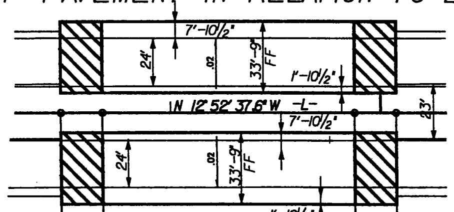
100 0 50 100
SCALE: 1"= 100' HORIZ.

SITE 3
PLAN VIEW

N C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF

8/17/99

SKETCH OF PAVEMENT IN RELATION TO BRIDGE WIDTH

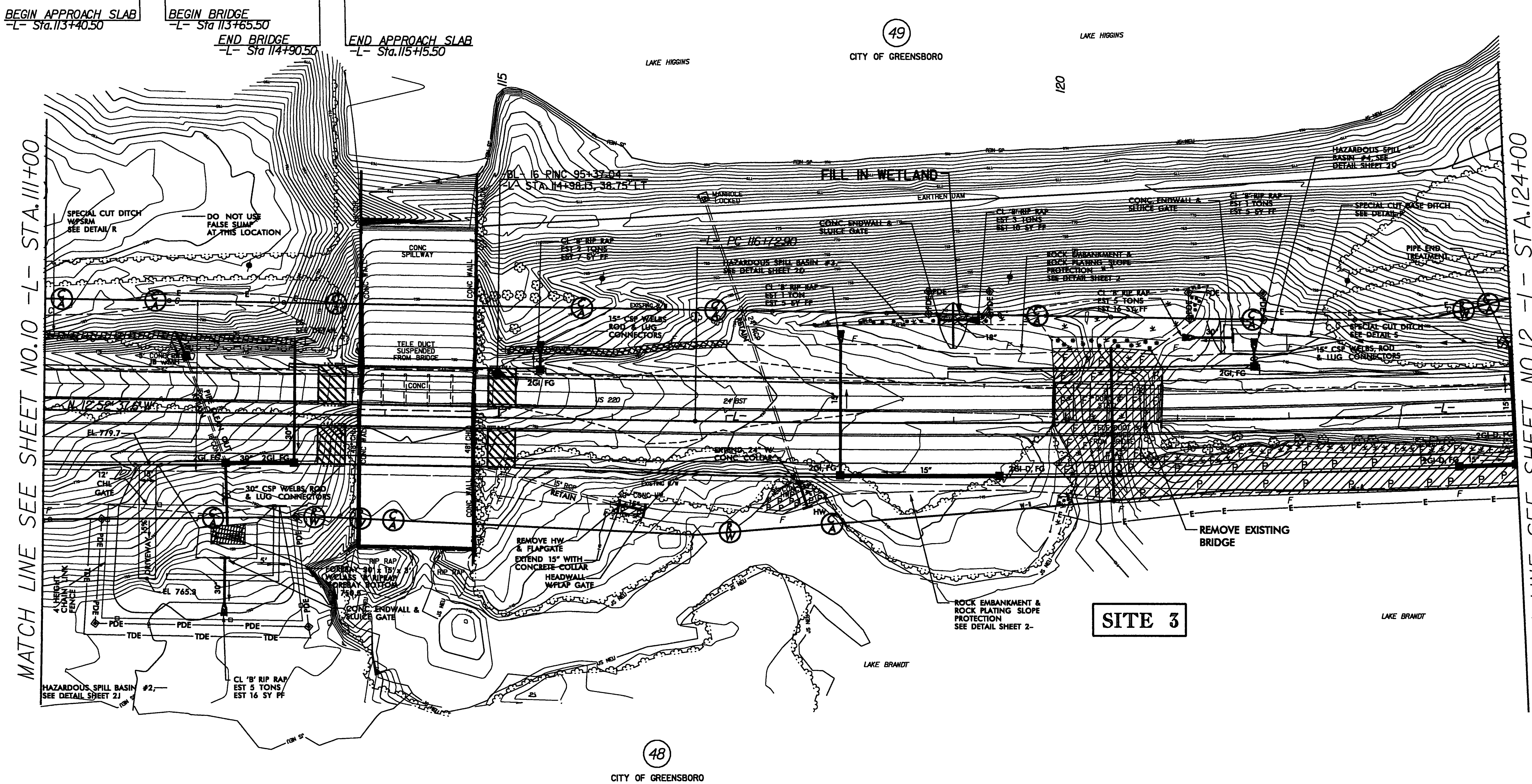


KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 15 of 45



ENGLISH

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES MECHANIZED CLEARING

100 0 50 100

SCALE: 1"= 100' HORIZ.

SITE 3
PLAN VIEW

N C. DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

12/8/2009
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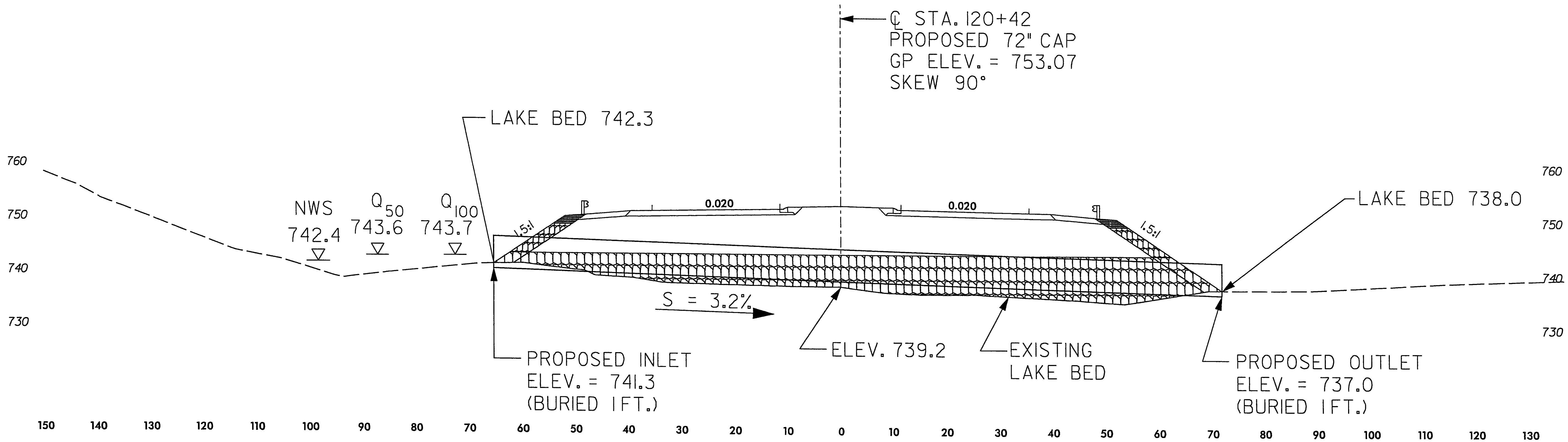
0 5 10

PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	PAS-S3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 17 of 45



SITE 3
PROFILE ALONG STRUCTURE
STA. 120 + 42 -L-

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4/24/2009

SCALE:
1"= 20' HORIZONTAL
1"= 20' VERTICAL

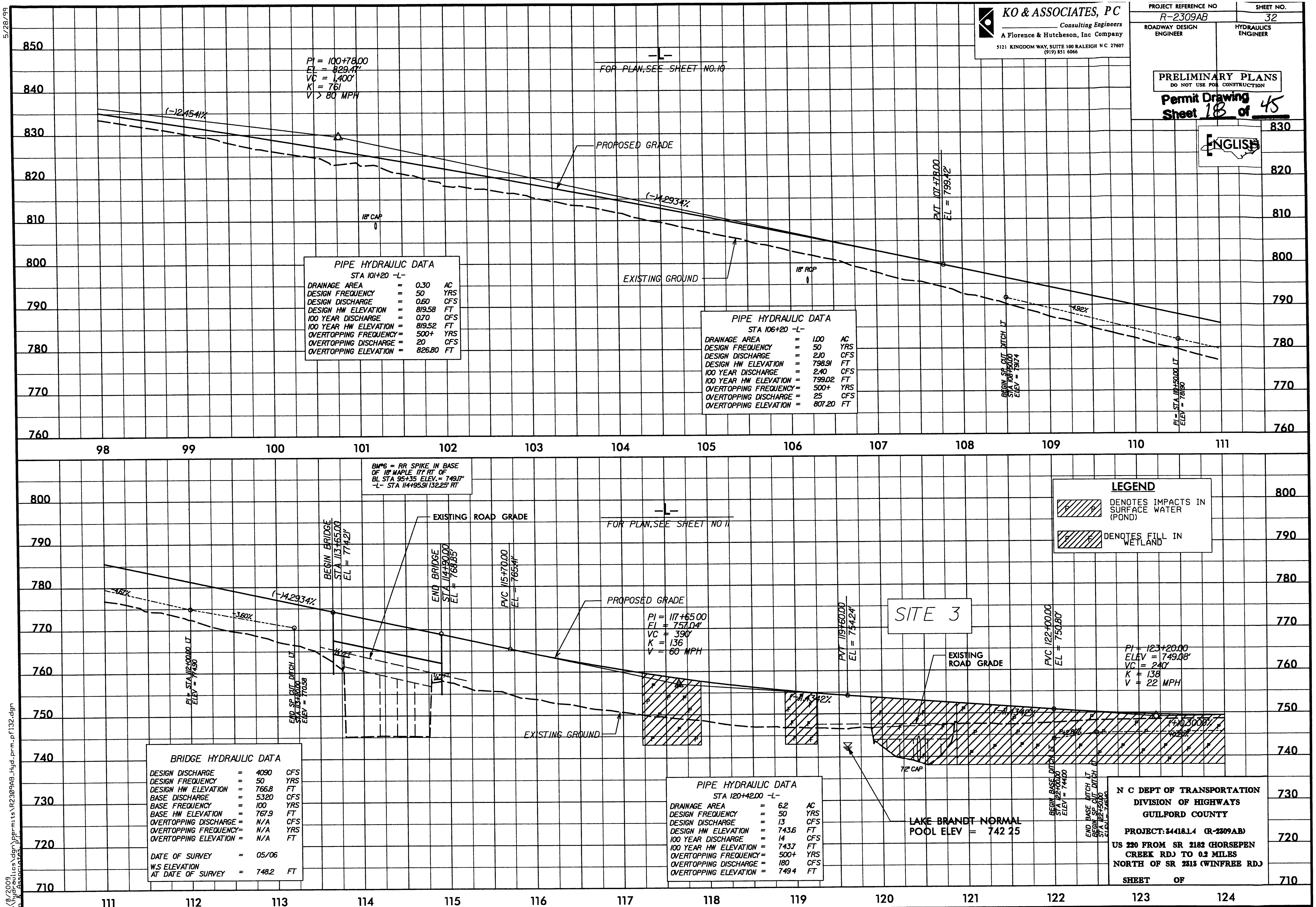
ENGLISH

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

N C. DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)

SHEET OF



PIPE HYDRAULIC DATA
STA 101+20 -L-

DRAINAGE AREA	=	0.30	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	0.60	CFS
DESIGN HW ELEVATION	=	819.58	FT
100 YEAR DISCHARGE	=	0.70	CFS
100 YEAR HW ELEVATION	=	819.52	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	20	CFS
OVERTOPPING ELEVATION	=	826.80	FT

PIPE HYDRAULIC DATA
STA 106+20 -L-

DRAINAGE AREA	=	1.00	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	2.10	CFS
DESIGN HW ELEVATION	=	798.91	FT
100 YEAR DISCHARGE	=	2.40	CFS
100 YEAR HW ELEVATION	=	799.02	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	25	CFS
OVERTOPPING ELEVATION	=	807.20	FT

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	=	4090	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	766.8	FT
BASE DISCHARGE	=	5320	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	767.9	FT
OVERTOPPING DISCHARGE	=	N/A	CFS
OVERTOPPING FREQUENCY	=	N/A	YRS
OVERTOPPING ELEVATION	=	N/A	FT
DATE OF SURVEY	=	05/06	
W.S ELEVATION AT DATE OF SURVEY	=	748.2	FT

PIPE HYDRAULIC DATA
STA 120+42.00 -L-

DRAINAGE AREA	=	6.2	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	13	CFS
DESIGN HW ELEVATION	=	743.6	FT
100 YEAR DISCHARGE	=	14	CFS
100 YEAR HW ELEVATION	=	743.7	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	180	CFS
OVERTOPPING ELEVATION	=	749.4	FT

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD)

SHEET OF

5/28/99
12/8/2009
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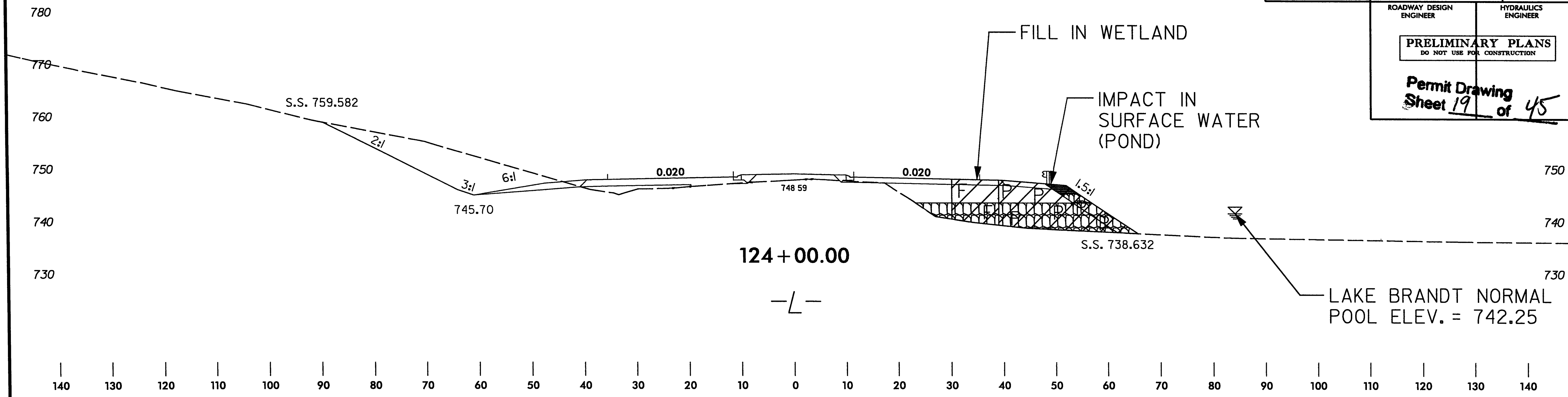
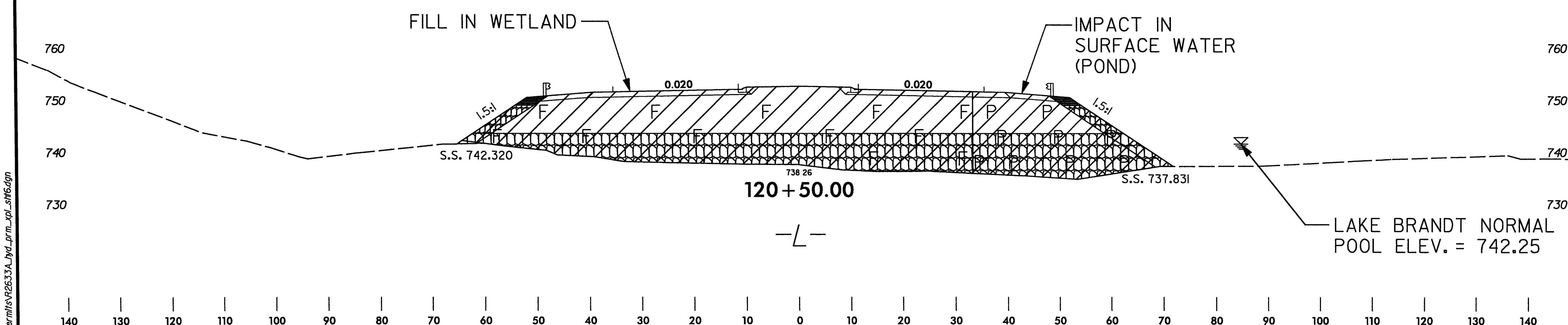
PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	XSC SITE 3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 19 of 45



SITE 3
X-SECTION



SITE 3
X-SECTION

ENGLISH

LEGEND

- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES FILL IN WETLAND

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD.)

SHEET OF

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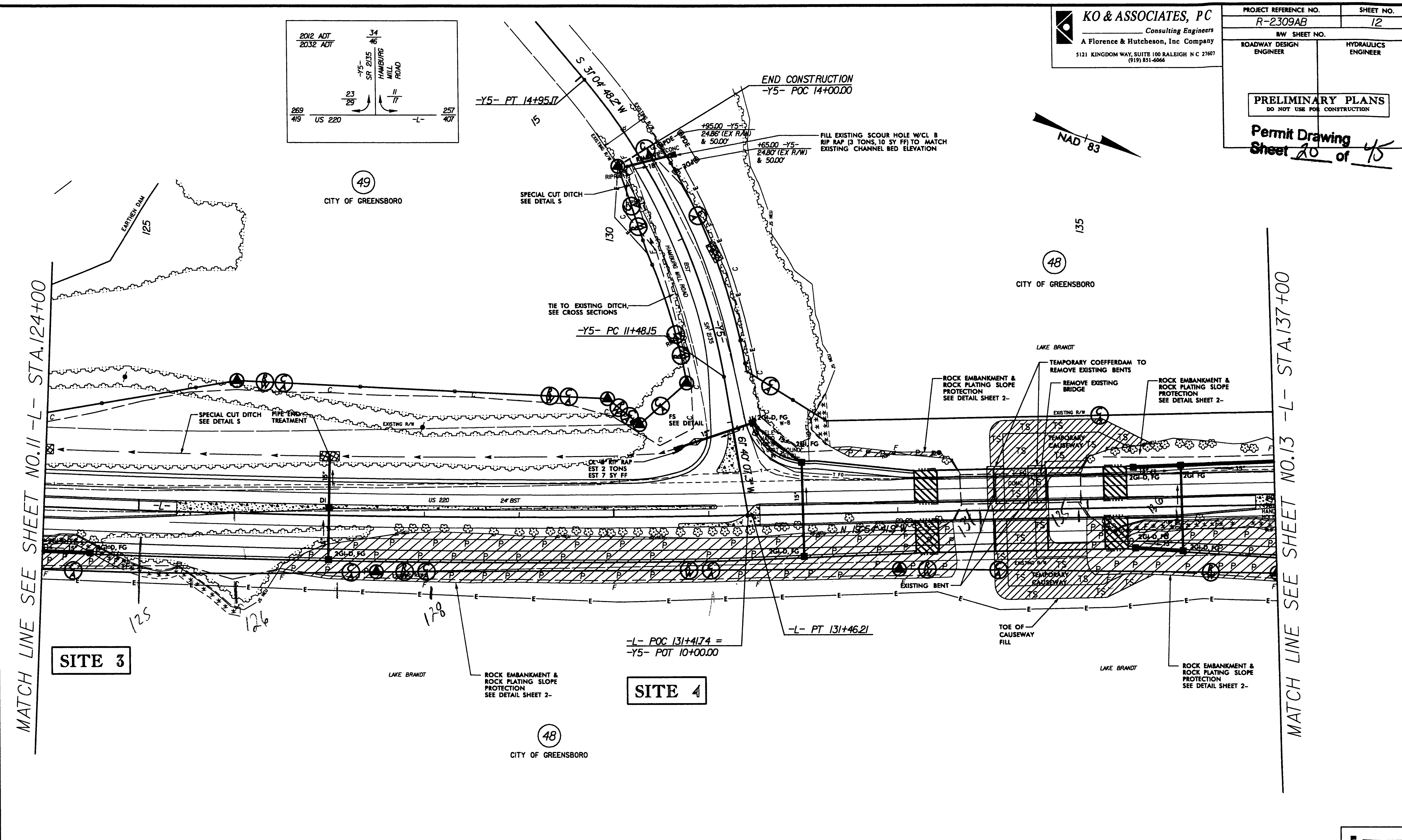
11/10/2009



ENGLISH

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

100 0 50 100

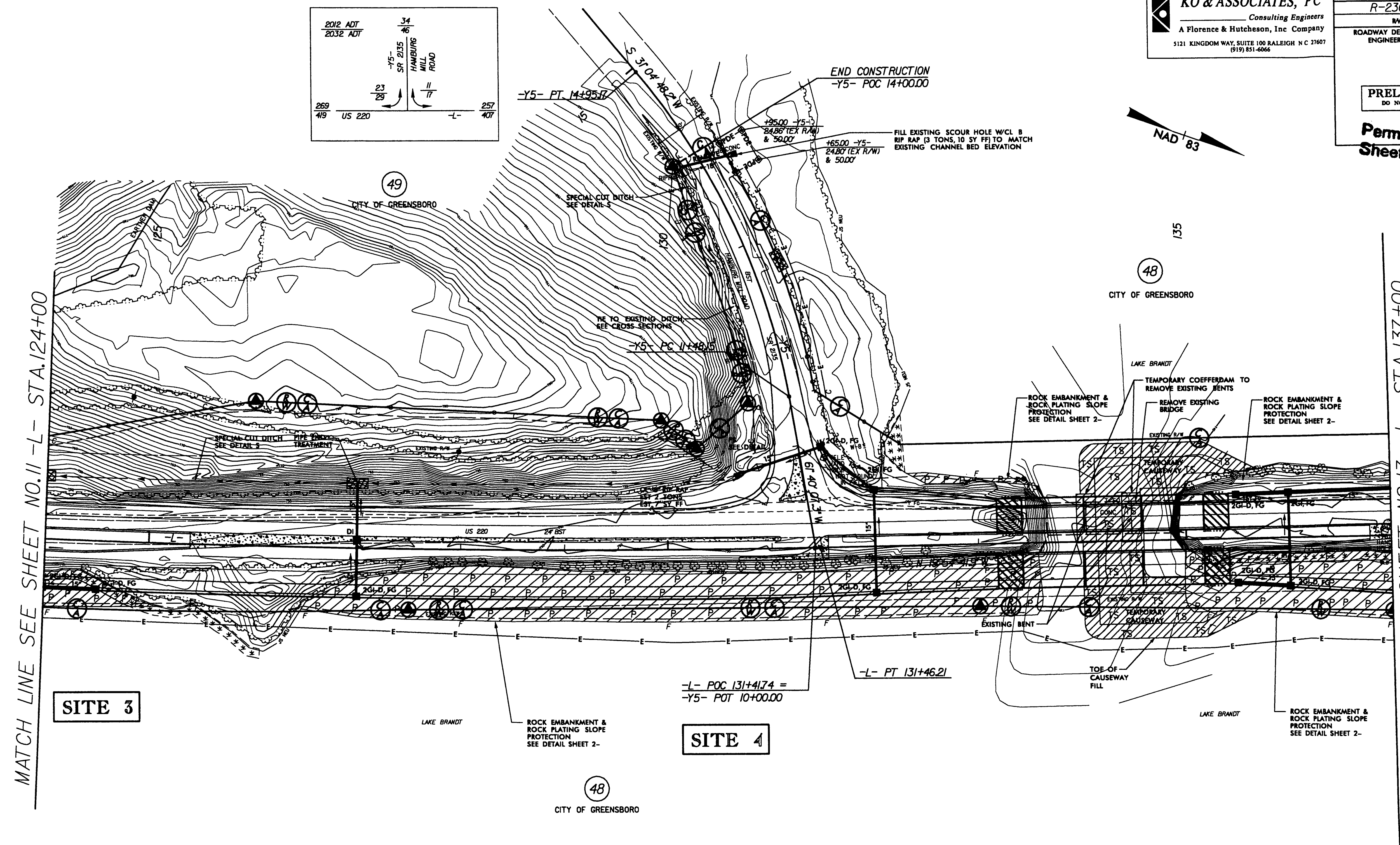
SCALE: 1"= 100' HORIZ.

SITE 3 AND 4
PLAN VIEW

N. C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD.)

SHEET OF

8/17/99



ENGLISH

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

100 0
50 100
SCALE: 1"= 100' HORIZ.

SITE 3 AND 4
PLAN VIEW

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2213 (WINFREE RD)

SHEET OF

12/8/2009
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KO & Associates PC

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 22 of 45

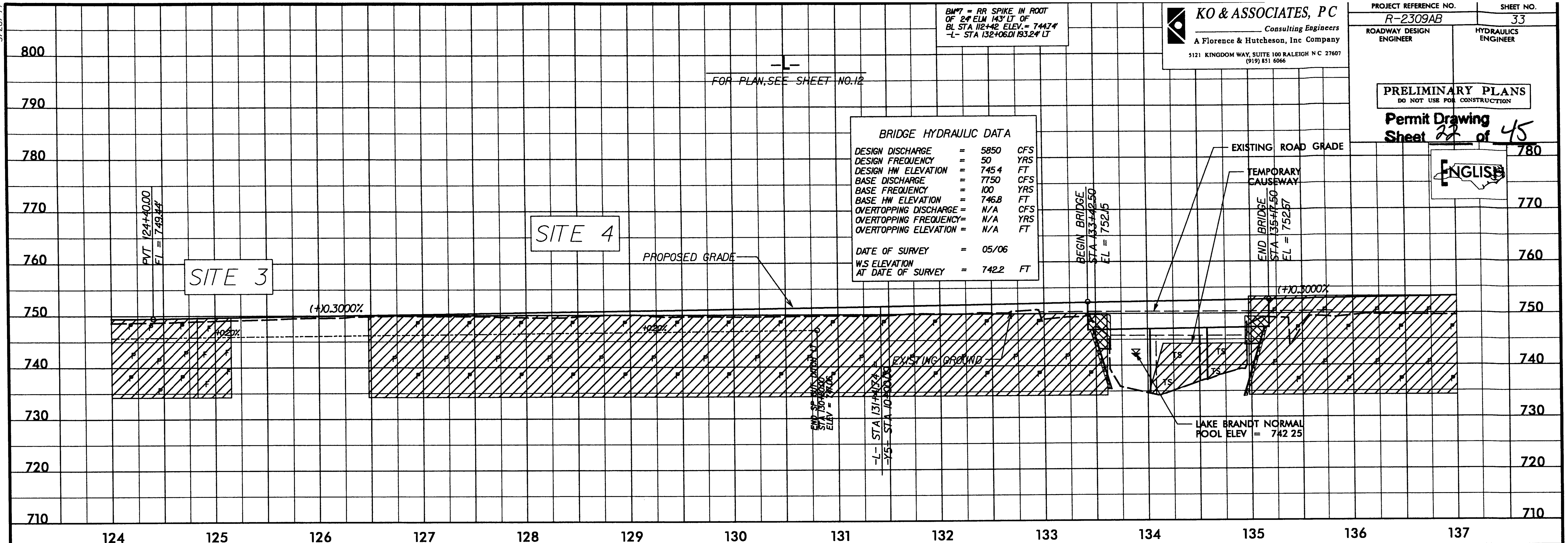
ENGLISH

BM#7 = RR SPIKE IN ROOT OF 24" ELM 143' LT OF BL STA 112+42 ELEV.= 744.74' -L- STA 132+06.01 193.24' LT

-L-
FOR PLAN, SEE SHEET NO.12

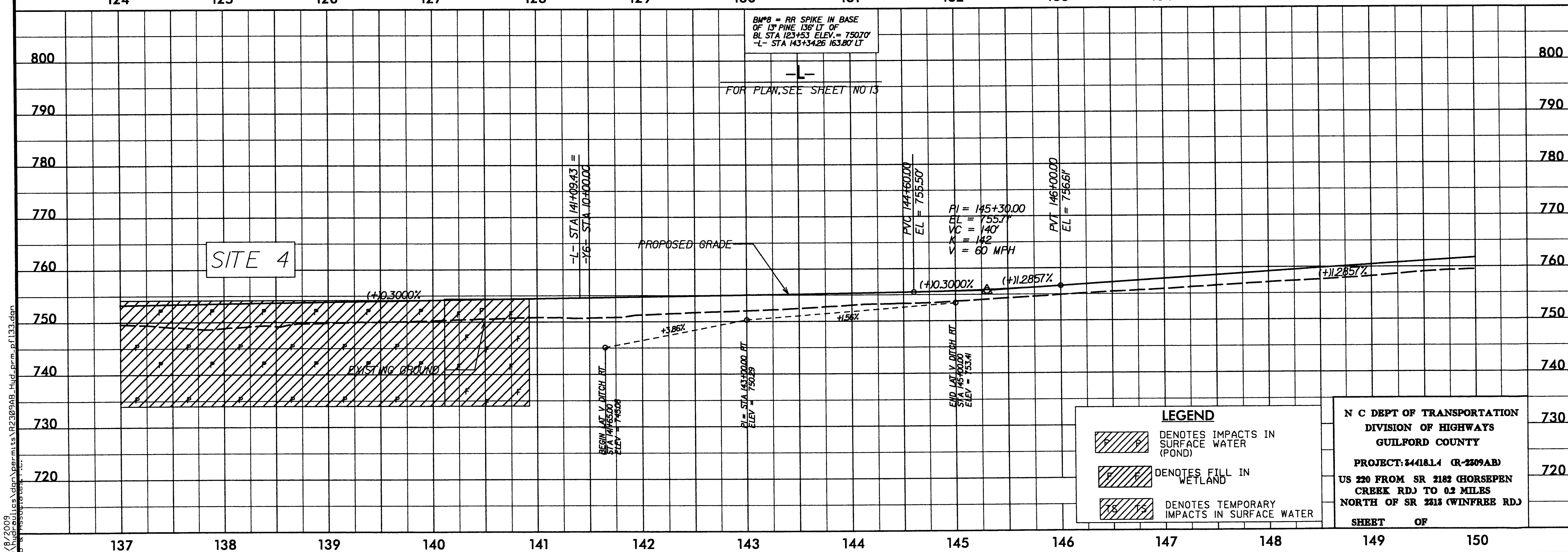
BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	=	5850	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	745.4	FT
BASE DISCHARGE	=	7750	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	746.8	FT
OVERTOPPING DISCHARGE	=	N/A	CFS
OVERTOPPING FREQUENCY	=	N/A	YRS
OVERTOPPING ELEVATION	=	N/A	FT
DATE OF SURVEY	=	05/06	
W.S ELEVATION AT DATE OF SURVEY	=	742.2	FT



BM#8 = RR SPIKE IN BASE OF 13" PINE 136' LT OF BL STA 123+53 ELEV.= 750.70' -L- STA 143+34.26 163.80' LT

-L-
FOR PLAN, SEE SHEET NO 13



LEGEND

P	DENOTES IMPACTS IN SURFACE WATER (POND)
F	DENOTES FILL IN WETLAND
TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

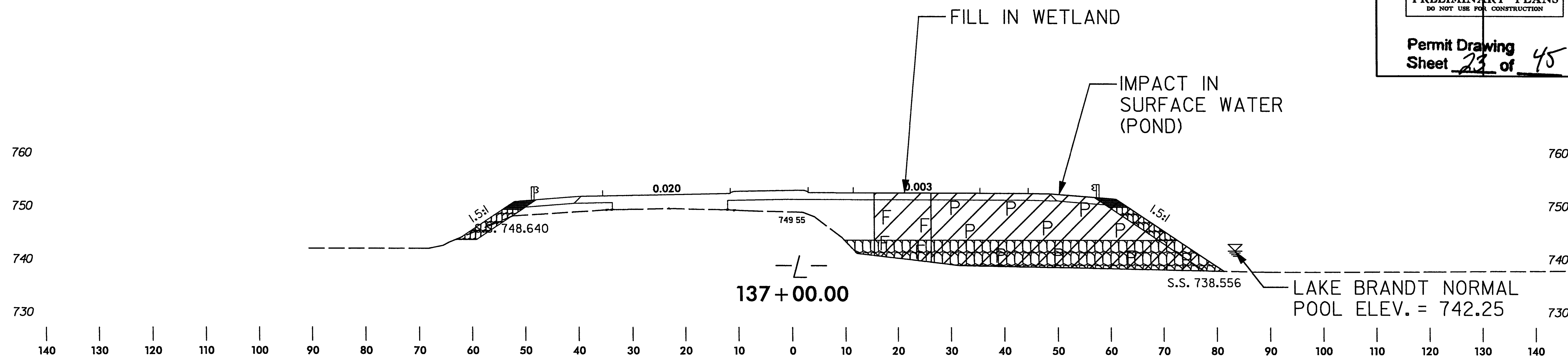
SHEET OF

5/28/99
12/8/2009

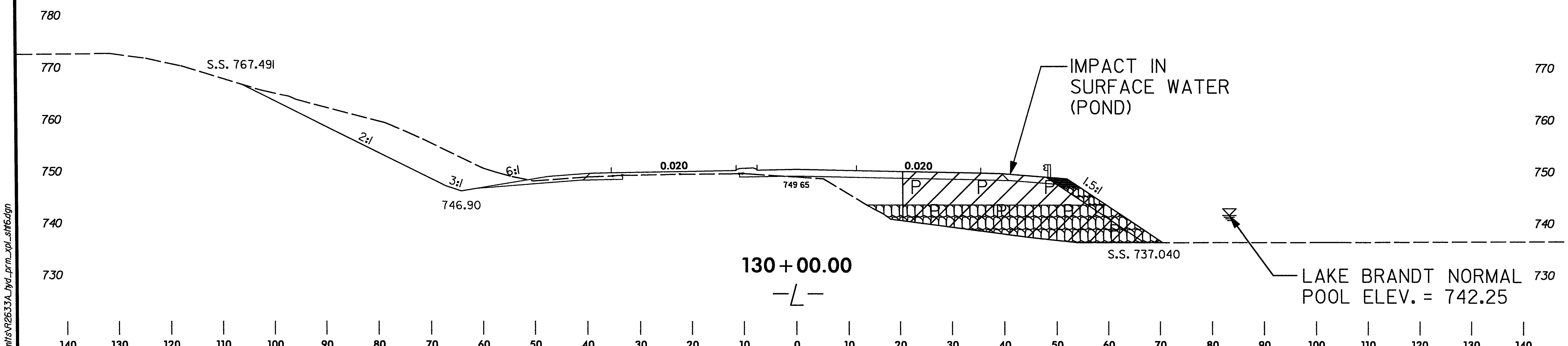
PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	XSC SITE 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 23 of 45



SITE 4
X-SECTION



SITE 4
X-SECTION

ENGLISH

LEGEND

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES FILL IN WETLAND

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

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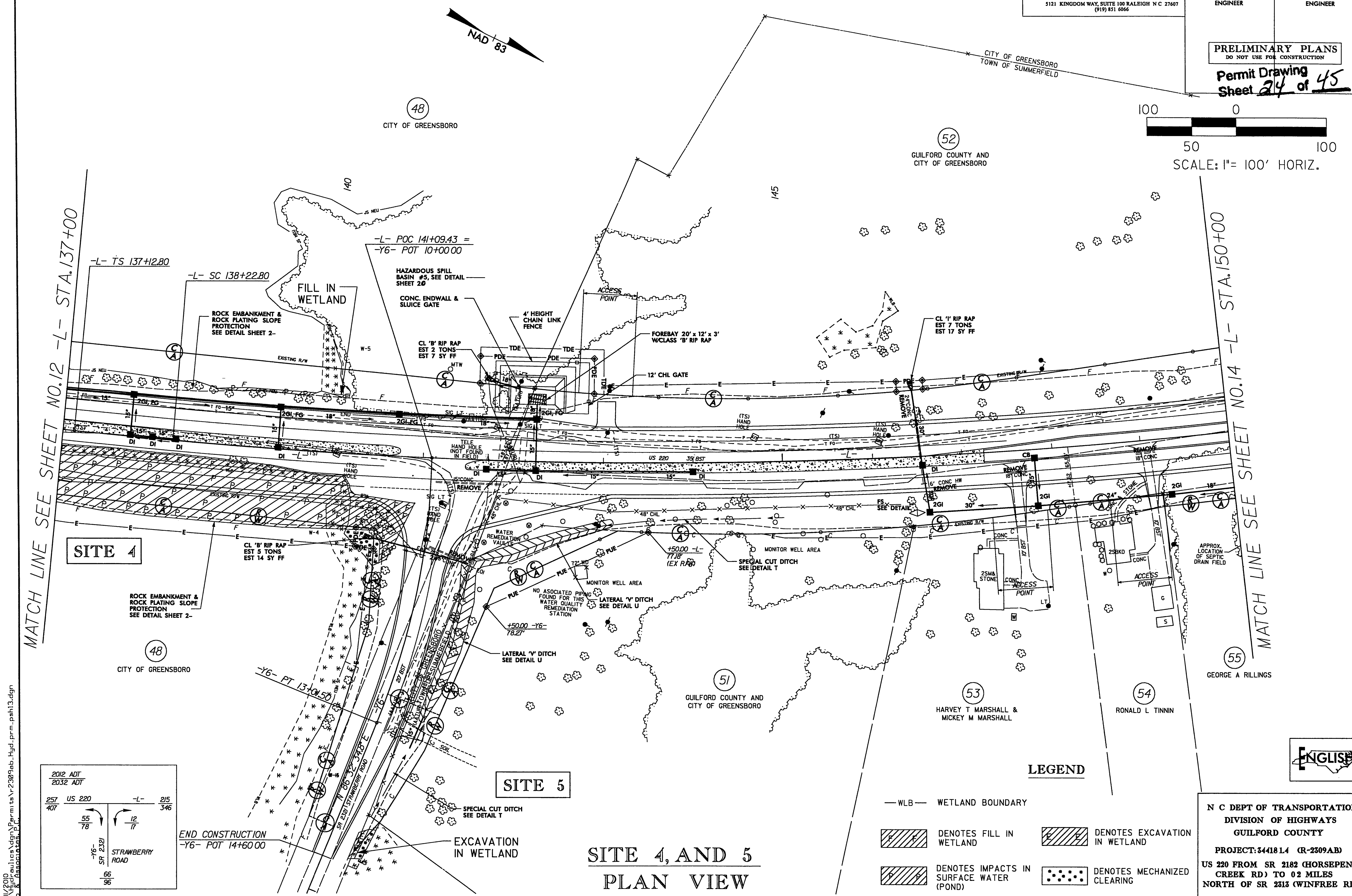
11/10/2009

KO & ASSOCIATES, P.C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 24 of 45



SITE 4, AND 5
PLAN VIEW

LEGEND

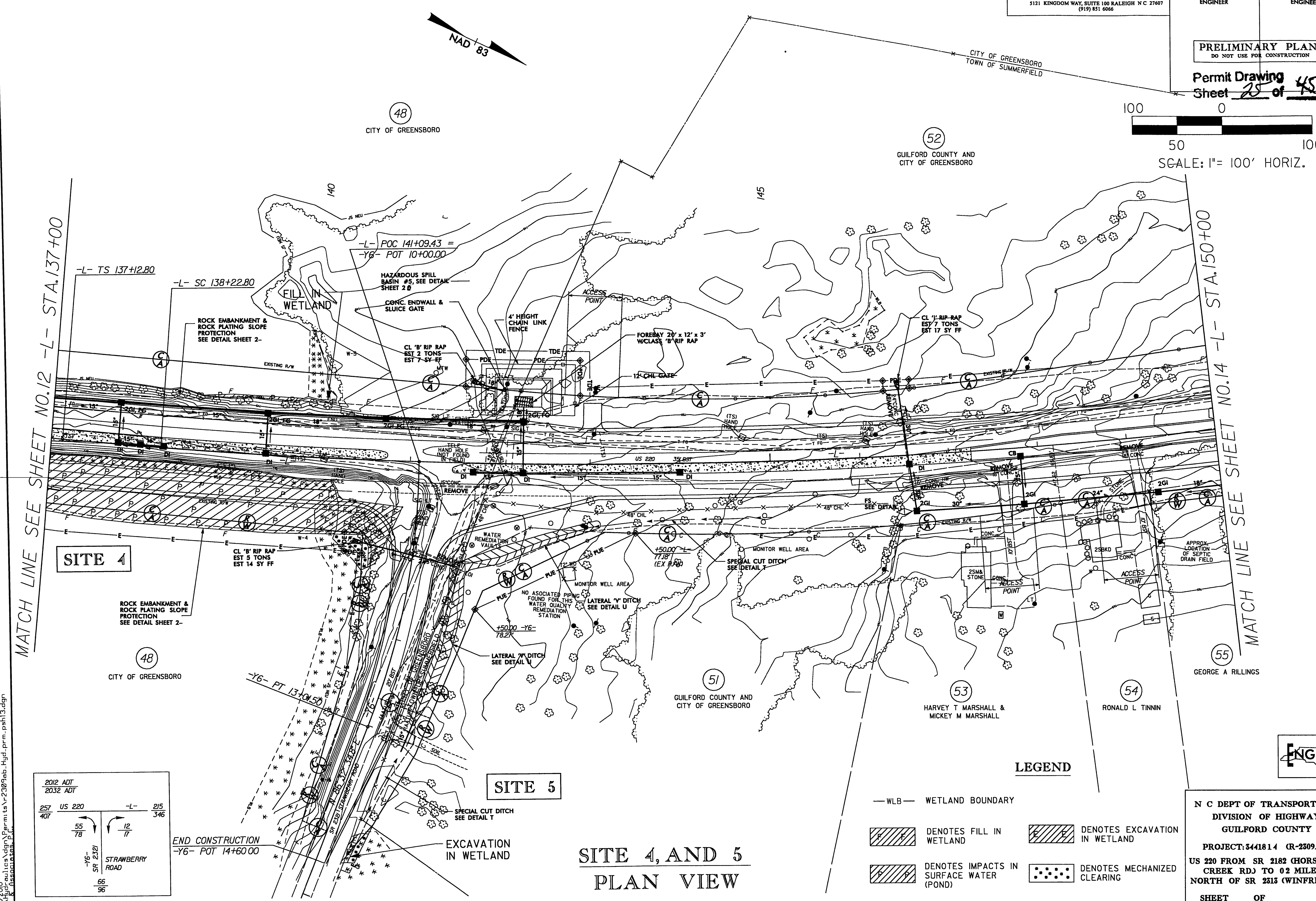
—WLB—	WETLAND BOUNDARY
F	DENOTES FILL IN WETLAND
E	DENOTES EXCAVATION IN WETLAND
P	DENOTES IMPACTS IN SURFACE WATER (POND)
	DENOTES MECHANIZED CLEARING

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

KO & ASSOCIATES, P C	PROJECT REFERENCE NO.	SHEET NO.
Consulting Engineers	R-2309AB	13
A Florence & Hutcheson, Inc Company	R/W SHEET NO.	
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607 (919) 851 6066	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 25 of 45



2012 ADT / 2032 ADT		
257 / 407	US 220 -L-	215 / 346
55 / 78		12 / 17
-Y6- SR 2321	STRAWBERRY ROAD	
66 / 96		

SITE 4, AND 5
PLAN VIEW

LEGEND

- —WLB— WETLAND BOUNDARY
- DENOTES FILL IN WETLAND
- DENOTES EXCAVATION IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES MECHANIZED CLEARING

ENGLISH

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)

SHEET OF

8/17/99

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KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

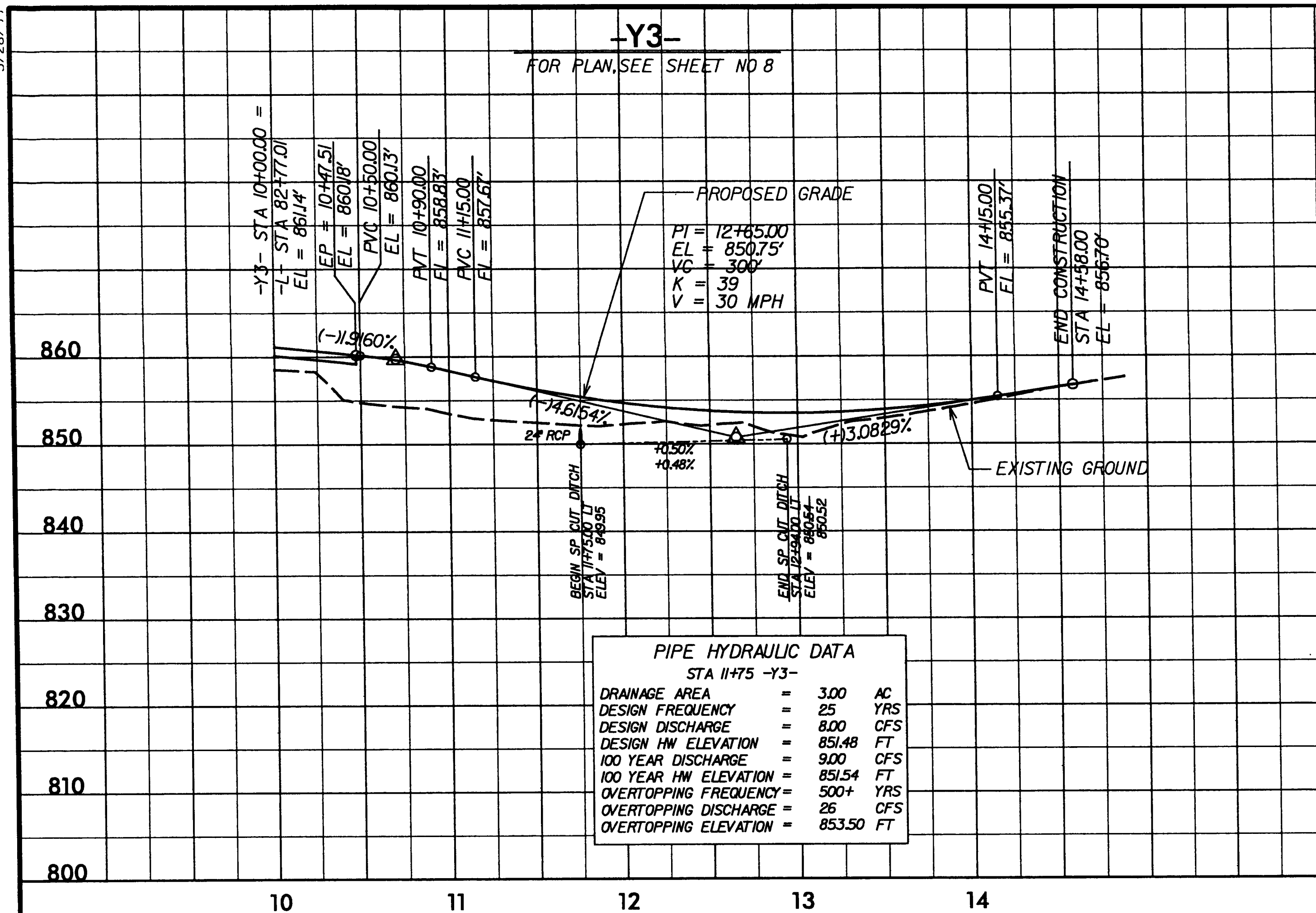
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 26 of 45

ENGLISH

-Y3-

FOR PLAN, SEE SHEET NO 8



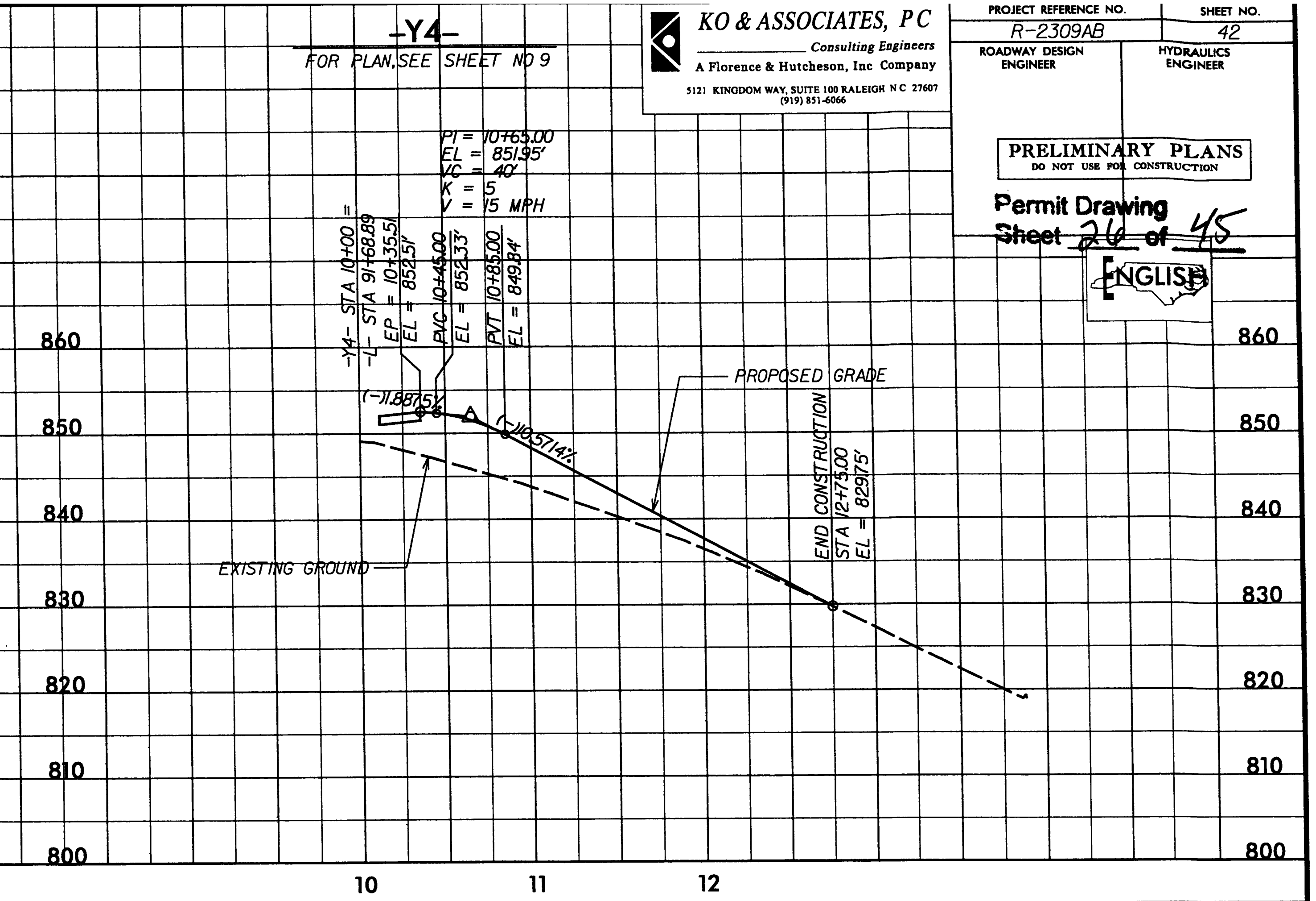
PIPE HYDRAULIC DATA

STA 11+75 -Y3-

DRAINAGE AREA	=	3.00	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	8.00	CFS
DESIGN HW ELEVATION	=	851.48	FT
100 YEAR DISCHARGE	=	9.00	CFS
100 YEAR HW ELEVATION	=	851.54	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	26	CFS
OVERTOPPING ELEVATION	=	853.50	FT

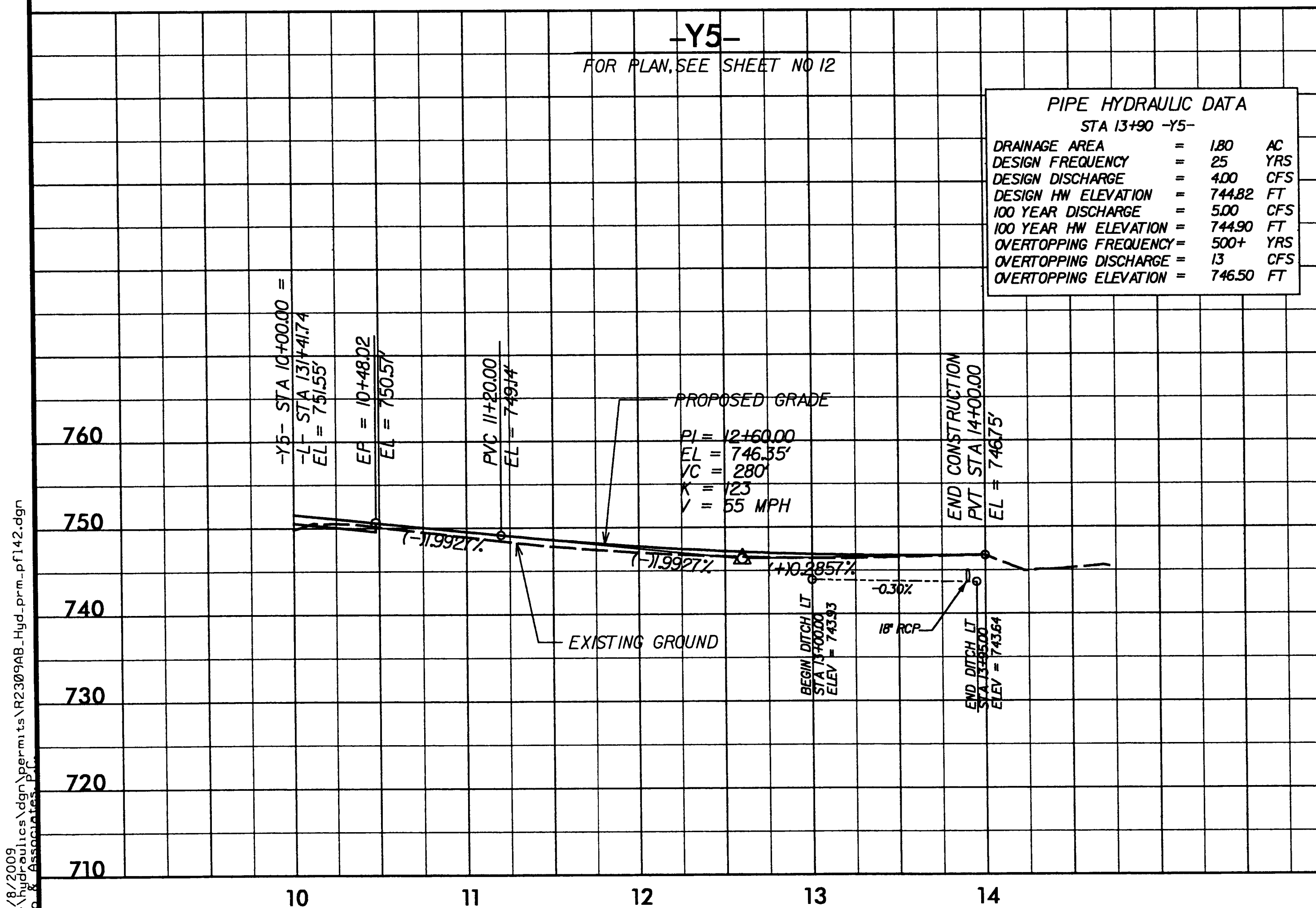
-Y4-

FOR PLAN, SEE SHEET NO 9



-Y5-

FOR PLAN, SEE SHEET NO 12



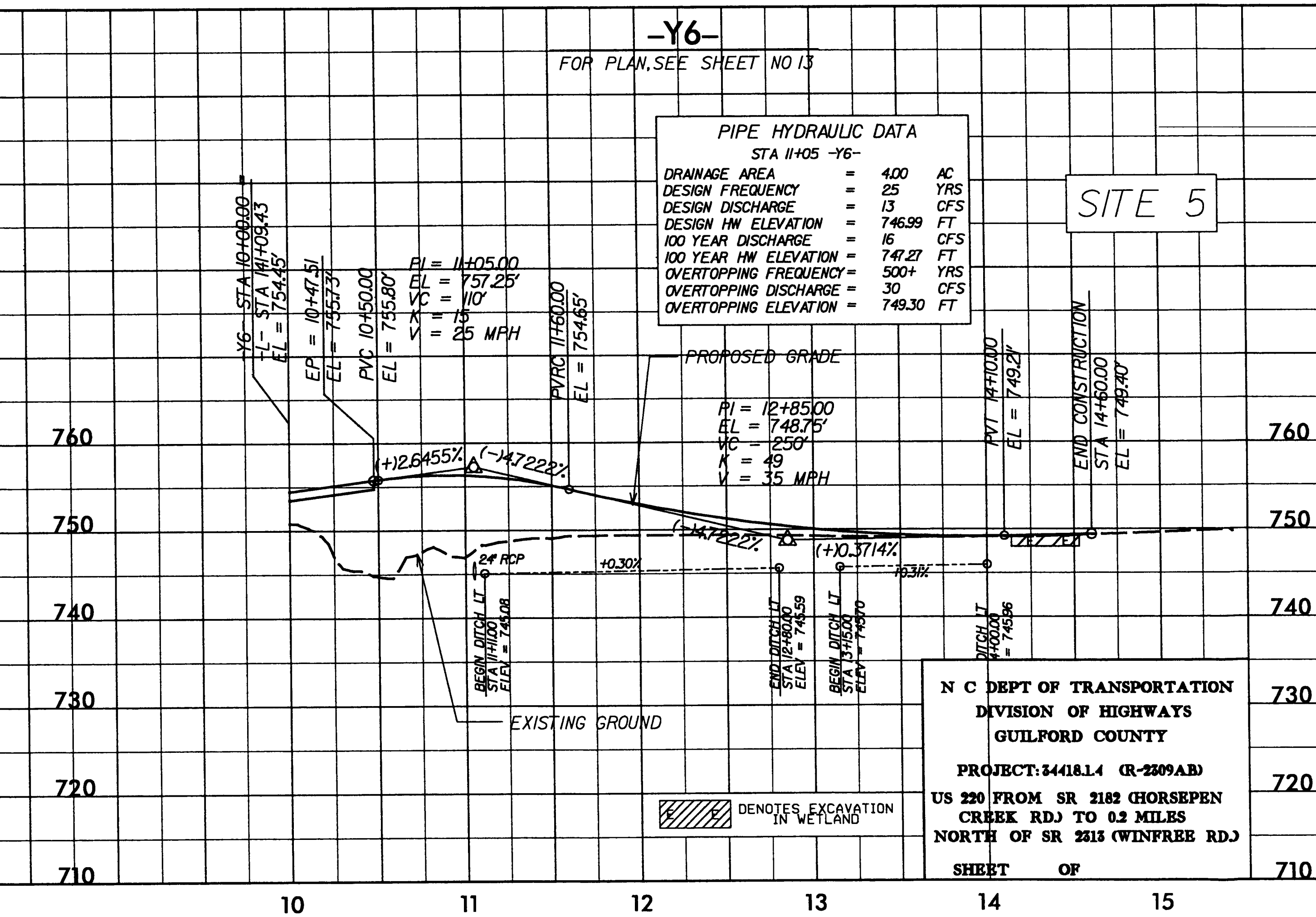
PIPE HYDRAULIC DATA

STA 13+90 -Y5-

DRAINAGE AREA	=	1.80	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	4.00	CFS
DESIGN HW ELEVATION	=	744.82	FT
100 YEAR DISCHARGE	=	5.00	CFS
100 YEAR HW ELEVATION	=	744.90	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	13	CFS
OVERTOPPING ELEVATION	=	746.50	FT

-Y6-

FOR PLAN, SEE SHEET NO 13



PIPE HYDRAULIC DATA

STA 11+05 -Y6-

DRAINAGE AREA	=	4.00	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	13	CFS
DESIGN HW ELEVATION	=	746.99	FT
100 YEAR DISCHARGE	=	16	CFS
100 YEAR HW ELEVATION	=	747.27	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	30	CFS
OVERTOPPING ELEVATION	=	749.30	FT

SITE 5

DENOTES EXCAVATION IN WETLAND

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

5/28/99

12/8/2009
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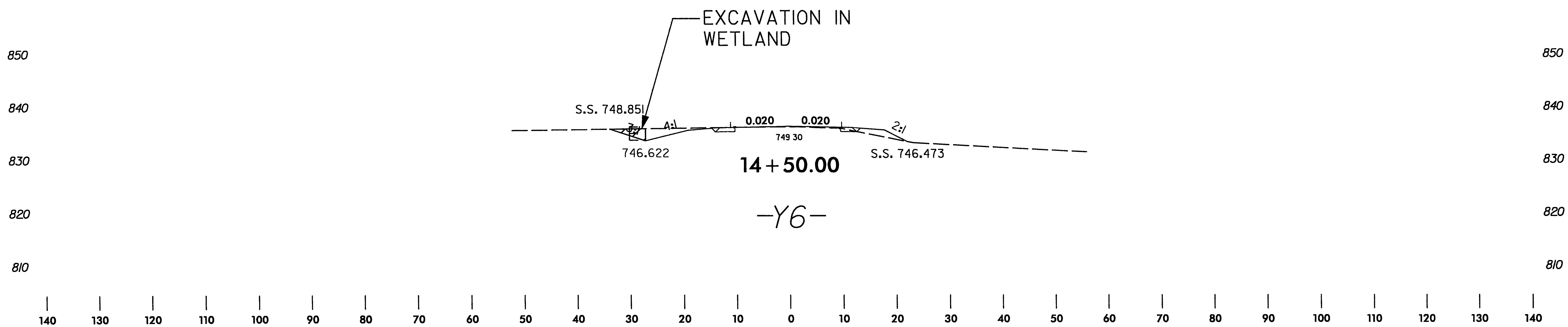
PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	XSC SITE 5

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 27 of 45



SITE 5
X-SECTION

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11/10/2009

LEGEND

- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES EXCAVATION IN WETLAND
- DENOTES FILL IN WETLAND

ENGLISH

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

N. C. DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

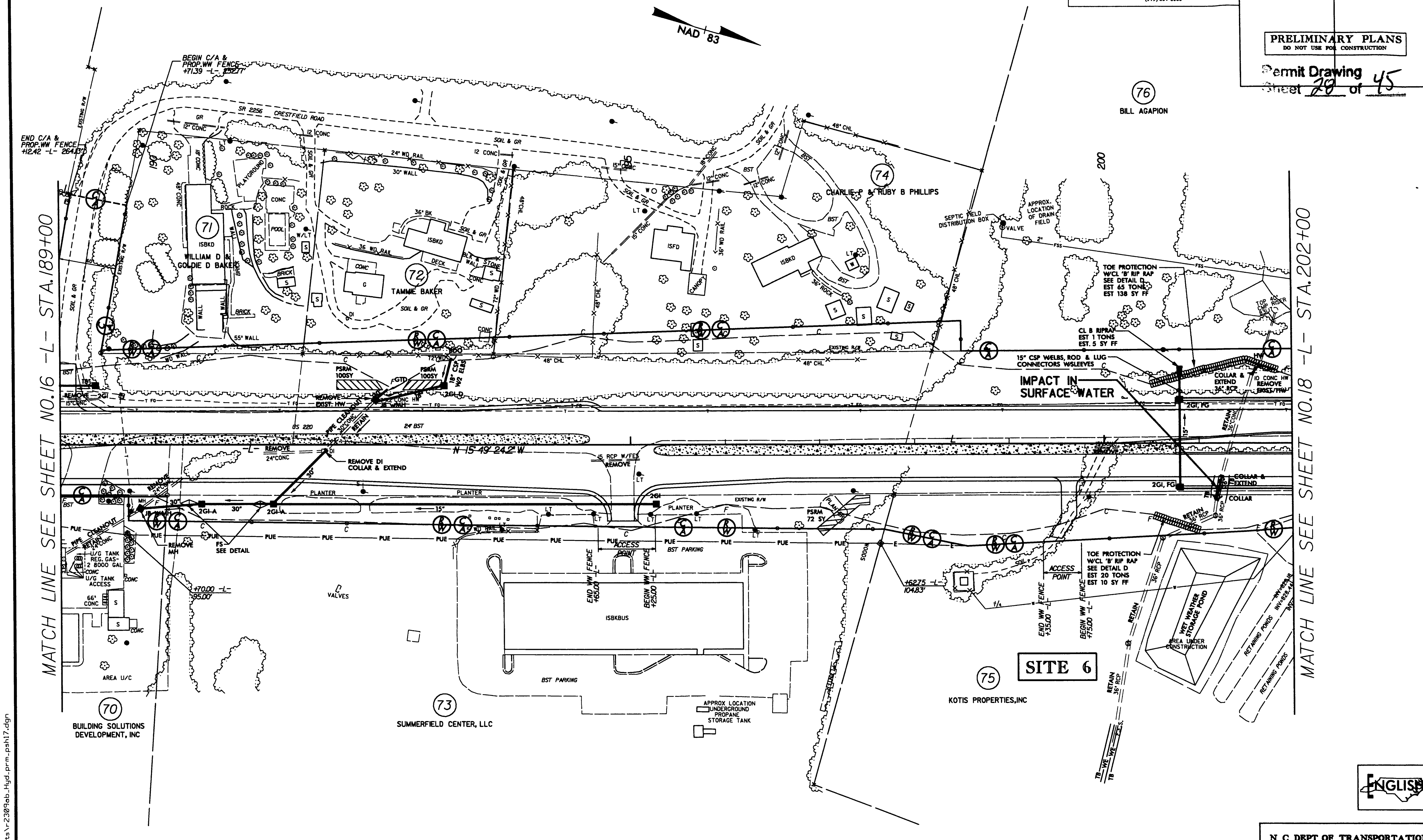
SHEET OF

KO & ASSOCIATES, PC
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 29 of 45



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SCALE: 1"= 100' HORIZ.

SITE 6
PLAN VIEW

LEGEND

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD)

SHEET OF

8/17/99
12/8/2009
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8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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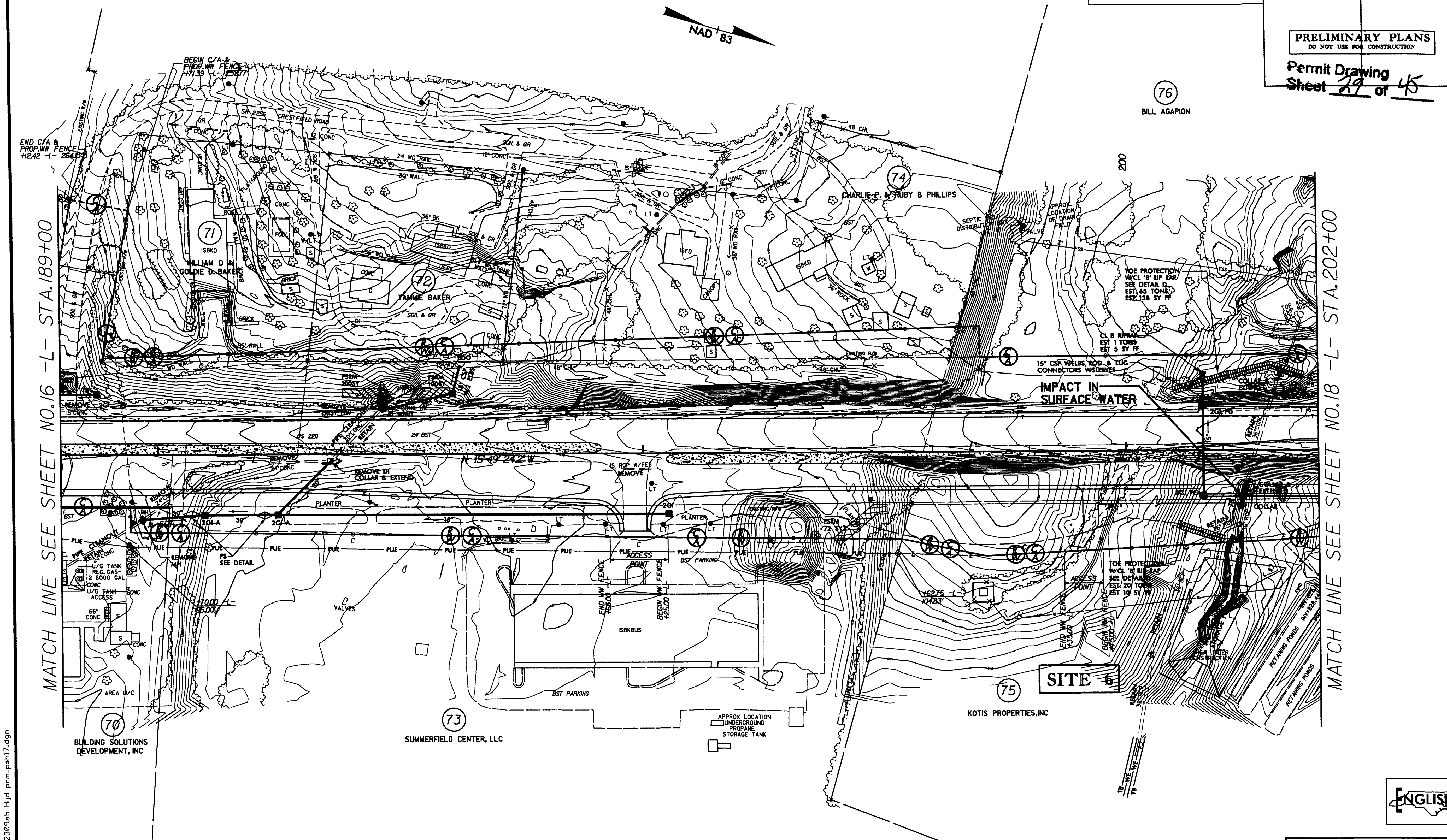
Permit Drawing
Sheet 29 of 45



ENGLISH

100 0 50 100
SCALE: 1"= 100' HORIZ.

SITE 6
PLAN VIEW

LEGEND

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2215 (WINFREE RD)
SHEET OF

12/8/2009
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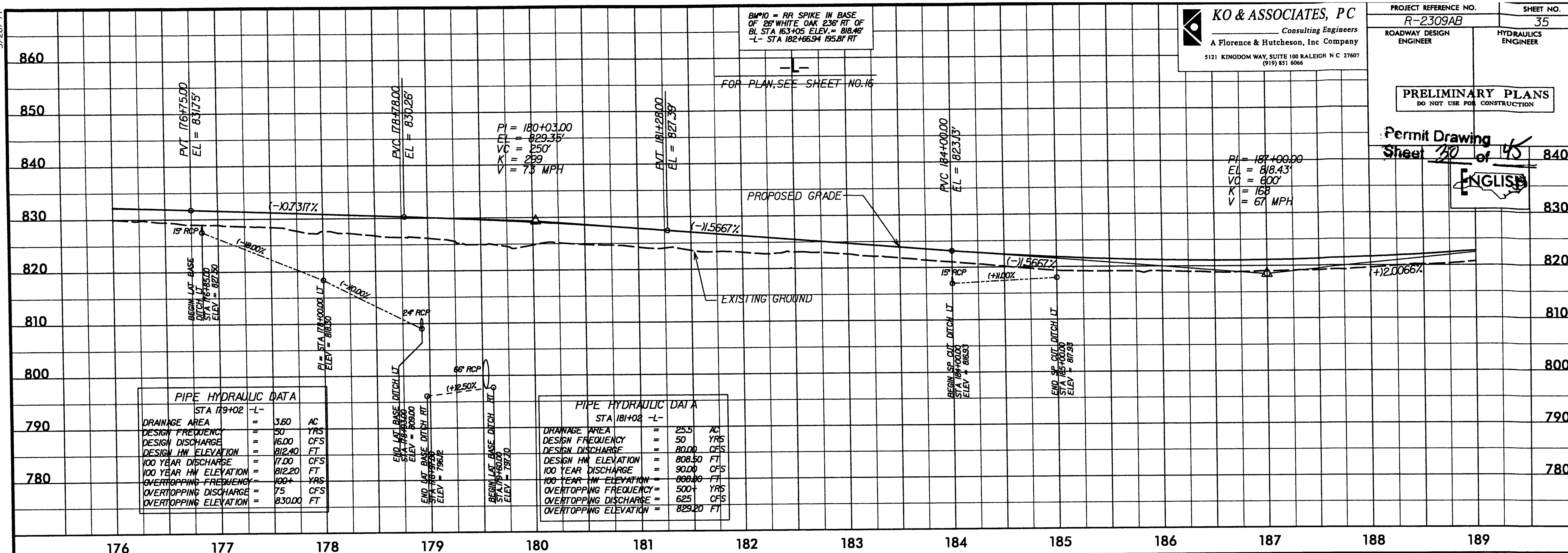
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 30 of 45

ENGLISH

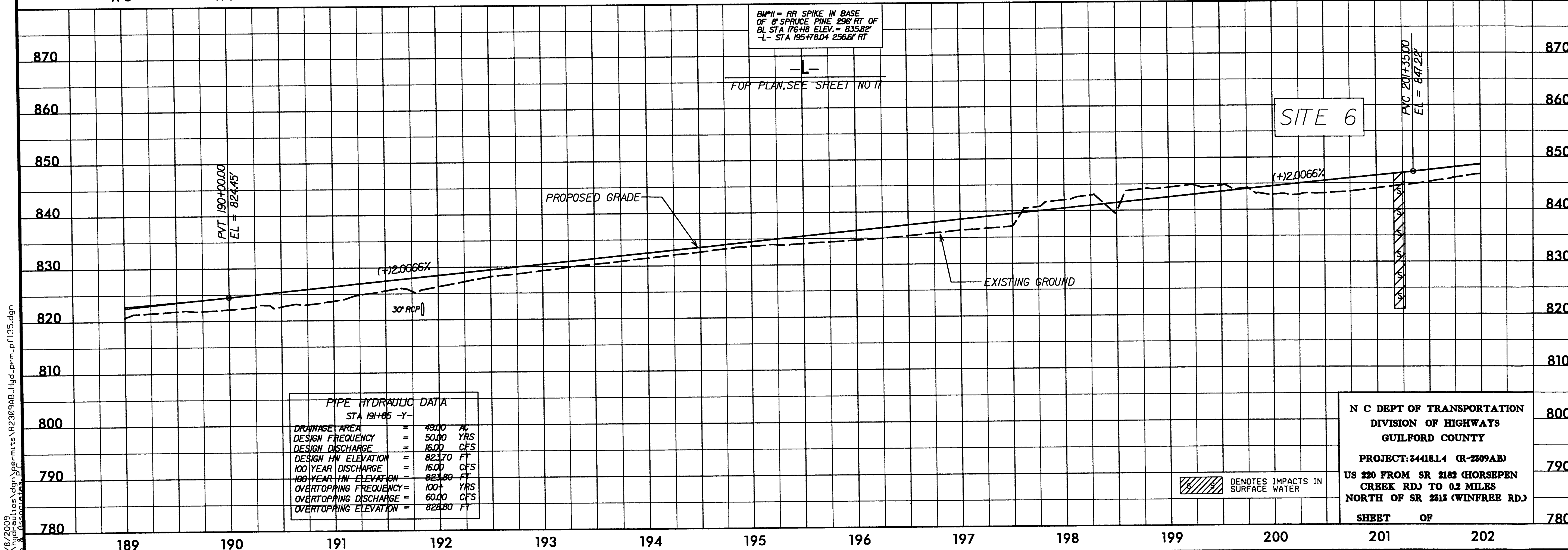


PIPE HYDRAULIC DATA
STA 179+02 -L-

DRAINAGE AREA	=	3.60	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	16.00	CFS
DESIGN HW ELEVATION	=	812.40	FT
100 YEAR DISCHARGE	=	17.00	CFS
100 YEAR HW ELEVATION	=	812.20	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	75	CFS
OVERTOPPING ELEVATION	=	830.00	FT

PIPE HYDRAULIC DATA
STA 181+02 -L-

DRAINAGE AREA	=	25.5	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	80.00	CFS
DESIGN HW ELEVATION	=	808.50	FT
100 YEAR DISCHARGE	=	90.00	CFS
100 YEAR HW ELEVATION	=	808.80	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	625	CFS
OVERTOPPING ELEVATION	=	829.20	FT



PIPE HYDRAULIC DATA
STA 191+85 -Y-

DRAINAGE AREA	=	49.00	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	16.00	CFS
DESIGN HW ELEVATION	=	823.70	FT
100 YEAR DISCHARGE	=	16.00	CFS
100 YEAR HW ELEVATION	=	823.80	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	60.00	CFS
OVERTOPPING ELEVATION	=	828.80	FT

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

5/28/99

12/8/2009
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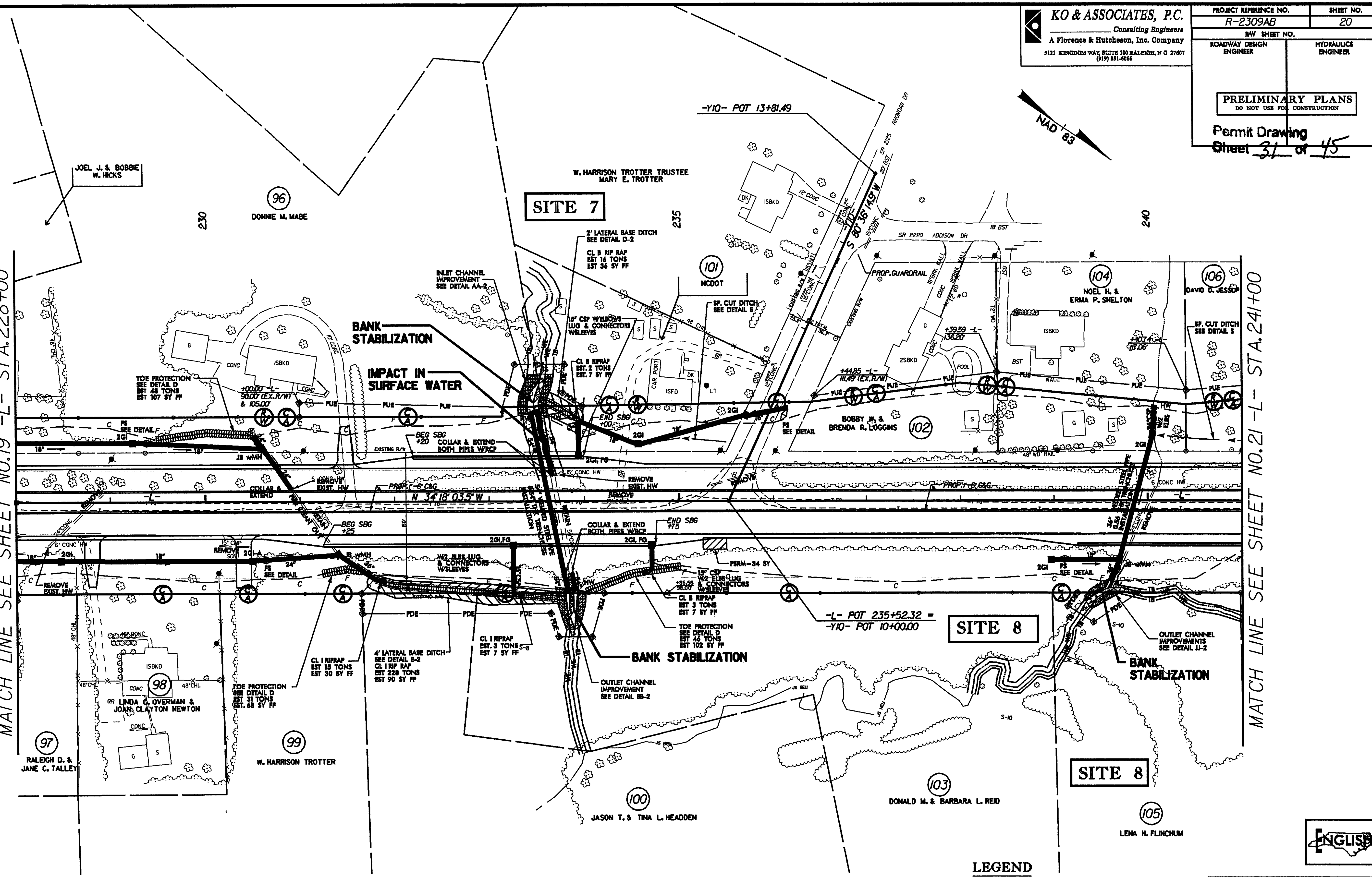
Consulting Engineers
A Florence & Hutcheson, Inc. Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 31 of 45

8/17/99



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SCALE: 1"= 100' HORIZ.

SITE 7, AND 8
PLAN VIEW

LEGEND

- —WLB— WETLAND BOUNDARY
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2213 (WINFREE RD.)
SHEET OF

10-FEB-2010 11:14
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Consulting Engineers
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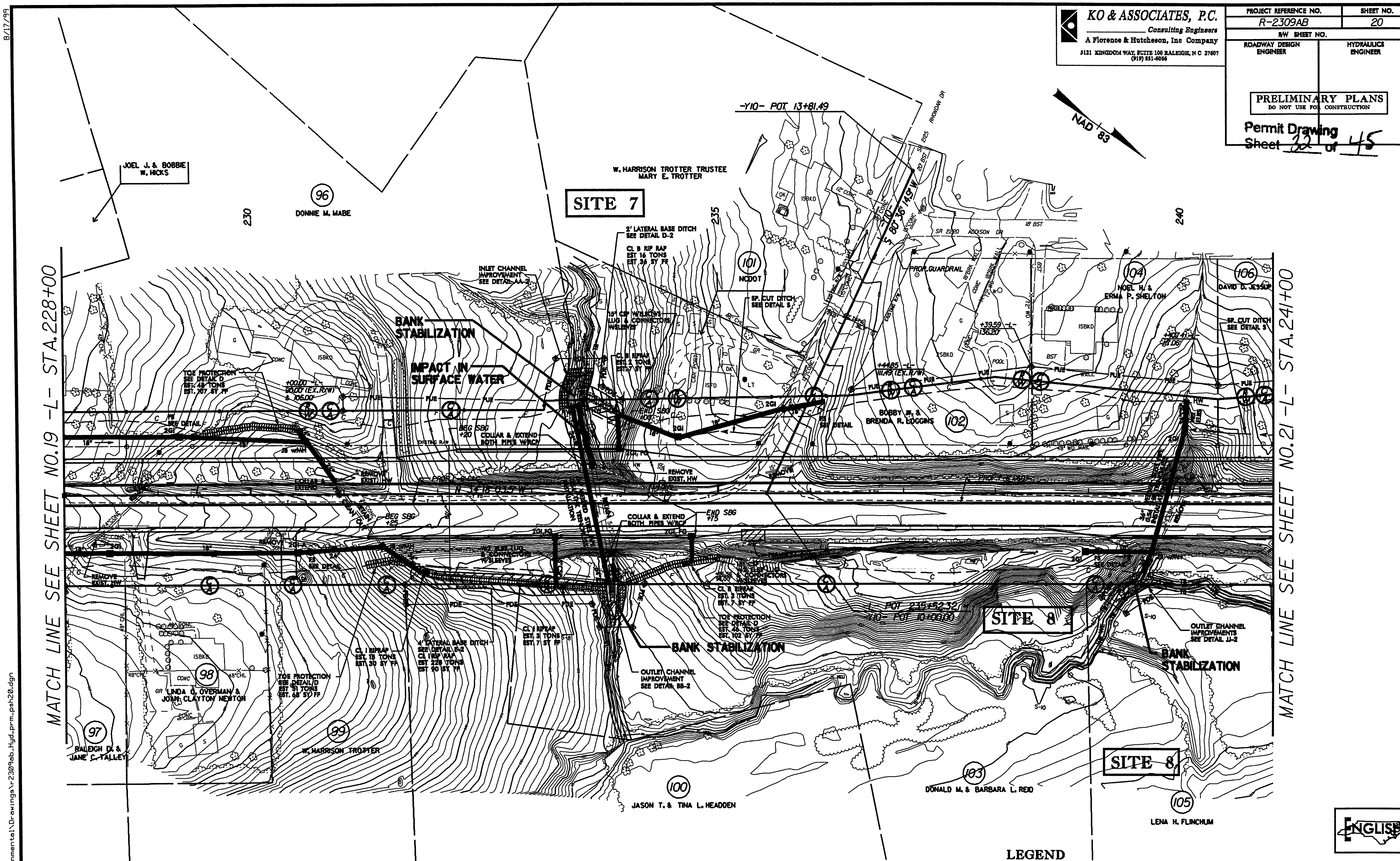
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 32 of 45



LEGEND

WLB — WETLAND BOUNDARY

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

100 0 50 100

SCALE: 1" = 100' HORIZ.

SITE 7, AND 8
PLAN VIEW

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2213 (WINFREE RD.)

SHEET OF

8/17/99

10-FEB-2010 11:31
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Consulting Engineers
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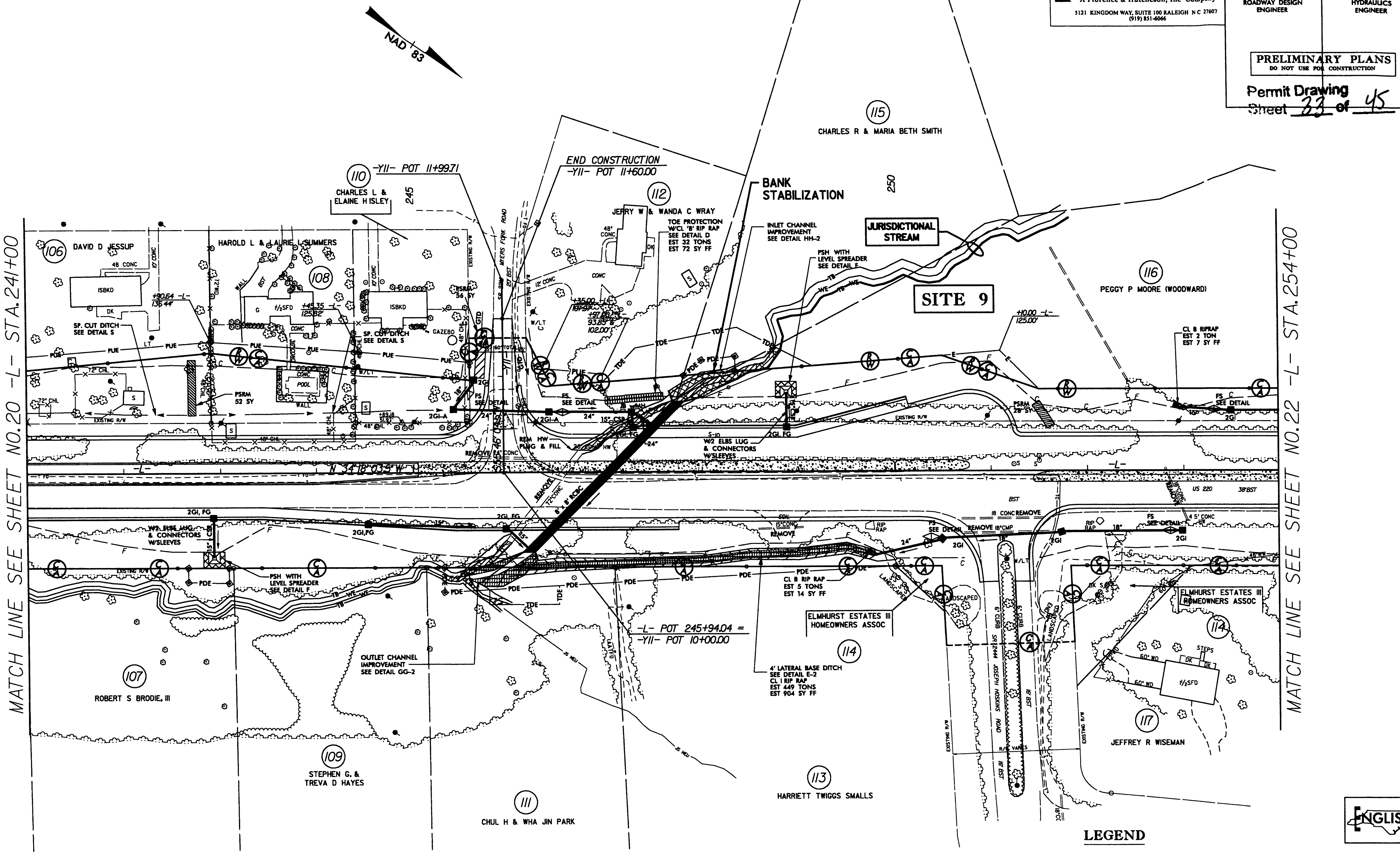
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 33 of 45

8/17/99



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50 100
SCALE: 1"= 100' HORIZ.

SITE 9
PLAN VIEW

LEGEND

—WLB— WETLAND BOUNDARY

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

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2/8/2009
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Consulting Engineers
A Florence & Hutcheson, Inc Company
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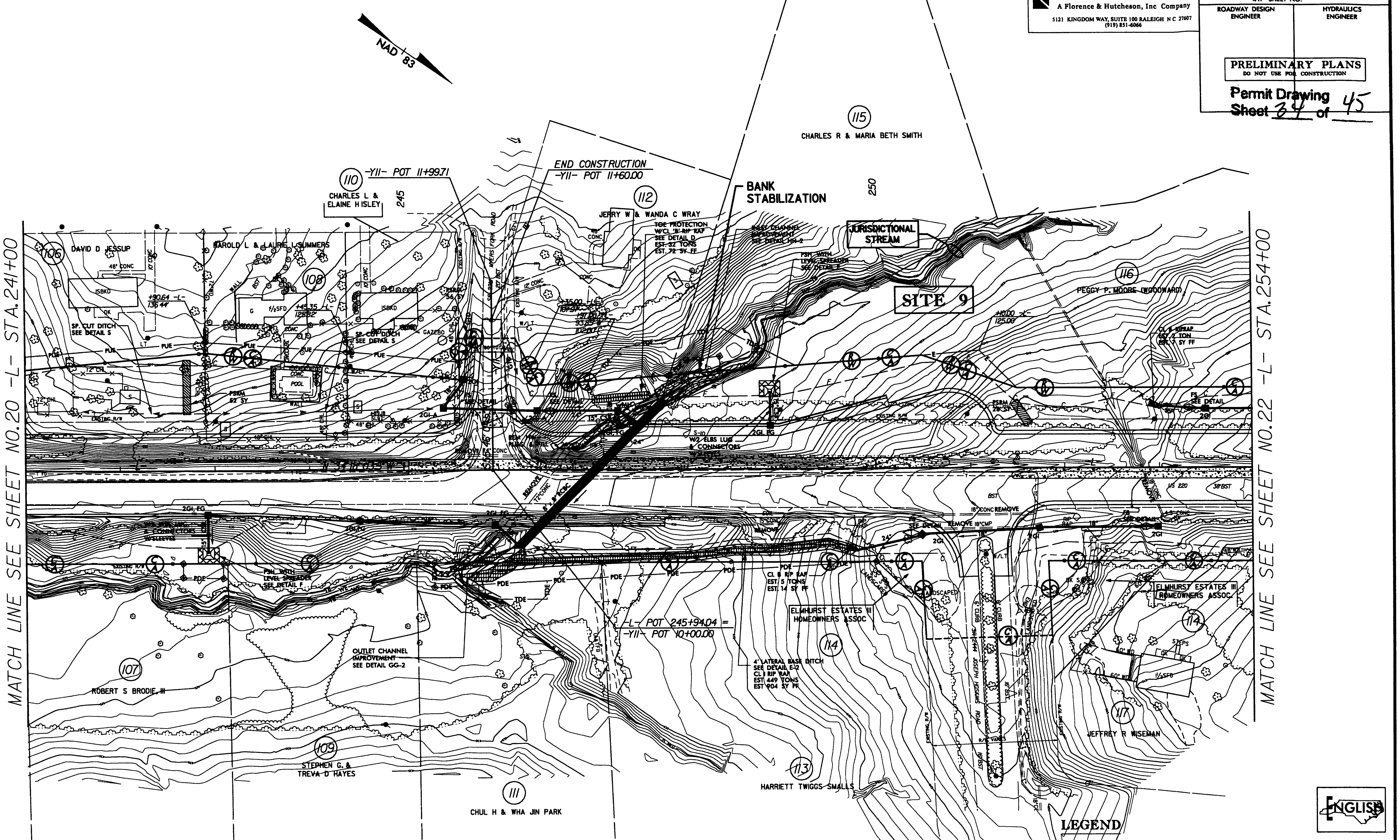
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 34 of 45



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SCALE: 1"= 100' HORIZ.

SITE 9
PLAN VIEW

ENGLISH

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2513 (WINFREE RD)
SHEET OF

12/8/2009
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5/28/99

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Consulting Engineers
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(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	PAS-S9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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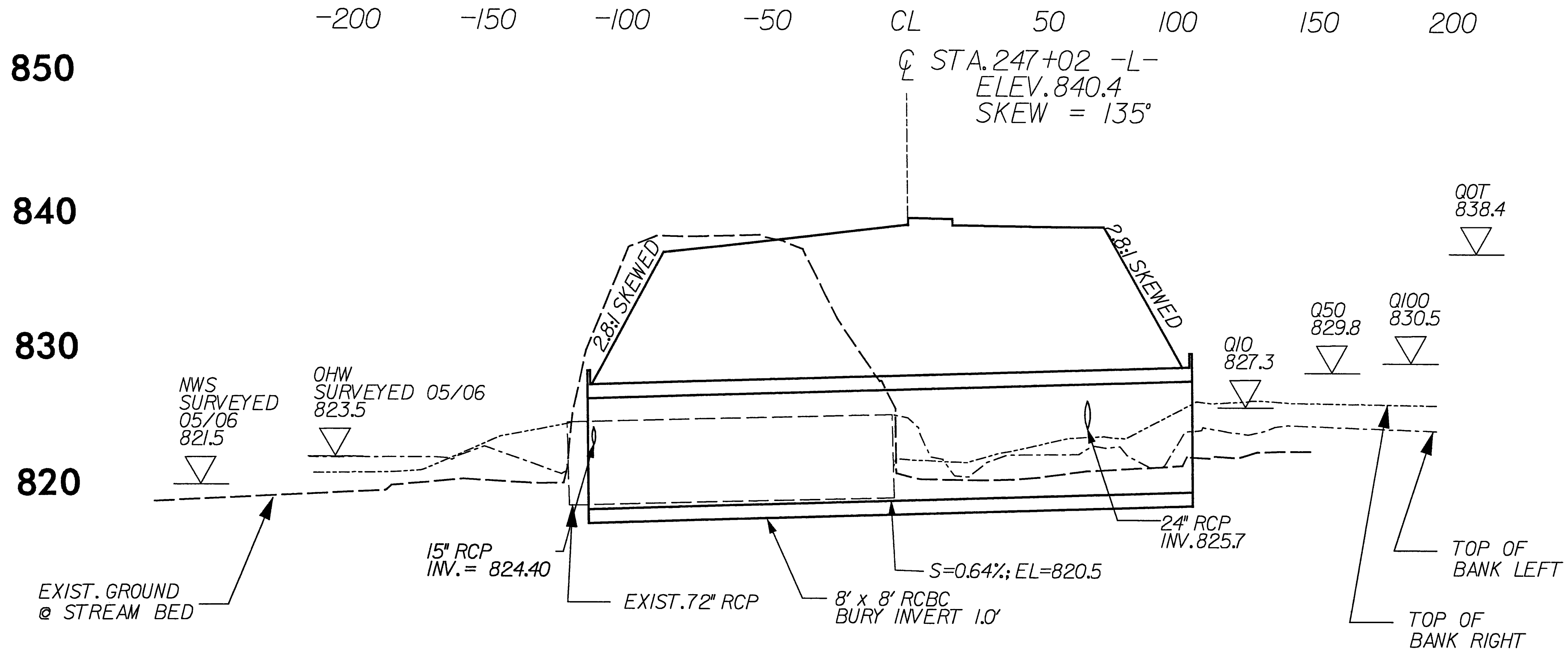
Permit Drawing
Sheet 35 of 45



ENGLISH

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

SITE 9
PROFILE ALONG STRUCTURE
STA. 247 + 02

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

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4/23/2009
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A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

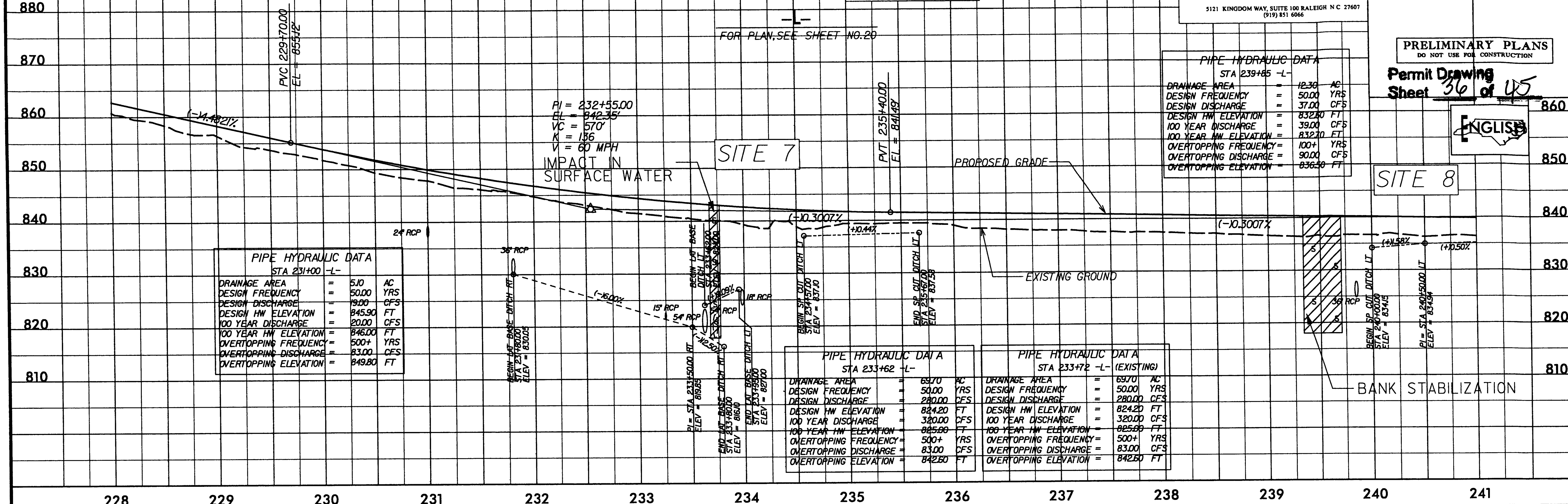
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	37
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 36 of 45

ENGLISH

BM#13 = RR SPIKE IN ROOT OF 36" WHITE OAK 13' RT OF BL STA 215+78 ELEV.= 828.26' -L- STA 235+31.81 171.69' RT



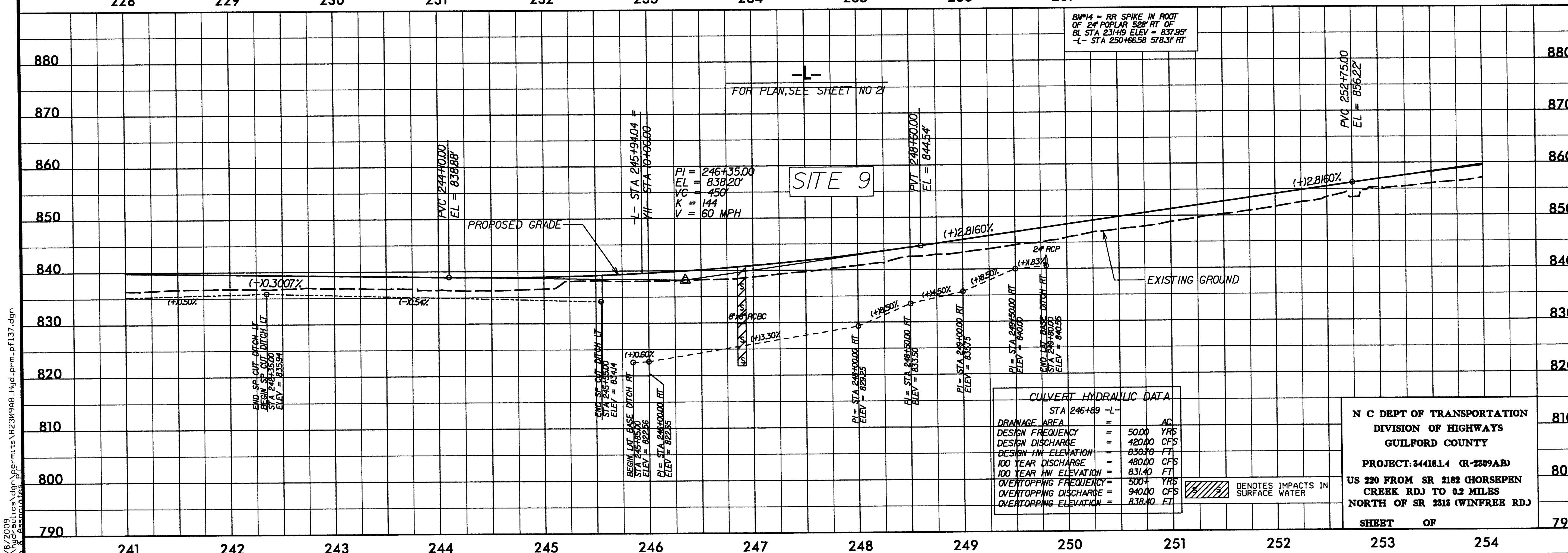
PIPE HYDRAULIC DATA STA 239+85 -L-			
DRAINAGE AREA	=	12.30	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	37.00	CFS
DESIGN HW ELEVATION	=	832.50	FT
100 YEAR DISCHARGE	=	39.00	CFS
100 YEAR HW ELEVATION	=	832.70	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	90.00	CFS
OVERTOPPING ELEVATION	=	836.50	FT

PIPE HYDRAULIC DATA STA 231+00 -L-			
DRAINAGE AREA	=	5.10	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	19.00	CFS
DESIGN HW ELEVATION	=	845.90	FT
100 YEAR DISCHARGE	=	20.00	CFS
100 YEAR HW ELEVATION	=	846.00	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	83.00	CFS
OVERTOPPING ELEVATION	=	849.80	FT

PIPE HYDRAULIC DATA STA 233+62 -L-			
DRAINAGE AREA	=	69.70	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	280.00	CFS
DESIGN HW ELEVATION	=	824.20	FT
100 YEAR DISCHARGE	=	320.00	CFS
100 YEAR HW ELEVATION	=	825.00	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	83.00	CFS
OVERTOPPING ELEVATION	=	842.60	FT

PIPE HYDRAULIC DATA STA 233+72 -L- (EXISTING)			
DRAINAGE AREA	=	69.70	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	280.00	CFS
DESIGN HW ELEVATION	=	824.20	FT
100 YEAR DISCHARGE	=	320.00	CFS
100 YEAR HW ELEVATION	=	825.00	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	83.00	CFS
OVERTOPPING ELEVATION	=	842.60	FT

BM#14 = RR SPIKE IN ROOT OF 24" POPLAR 528' RT OF BL STA 231+19 ELEV = 837.95' -L- STA 250+66.58 578.31' RT



CULVERT HYDRAULIC DATA STA 246+89 -L-			
DRAINAGE AREA	=		AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	420.00	CFS
DESIGN HW ELEVATION	=	830.70	FT
100 YEAR DISCHARGE	=	480.00	CFS
100 YEAR HW ELEVATION	=	831.40	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	940.00	CFS
OVERTOPPING ELEVATION	=	838.40	FT

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)
SHEET OF

5/28/99
12/8/2009
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(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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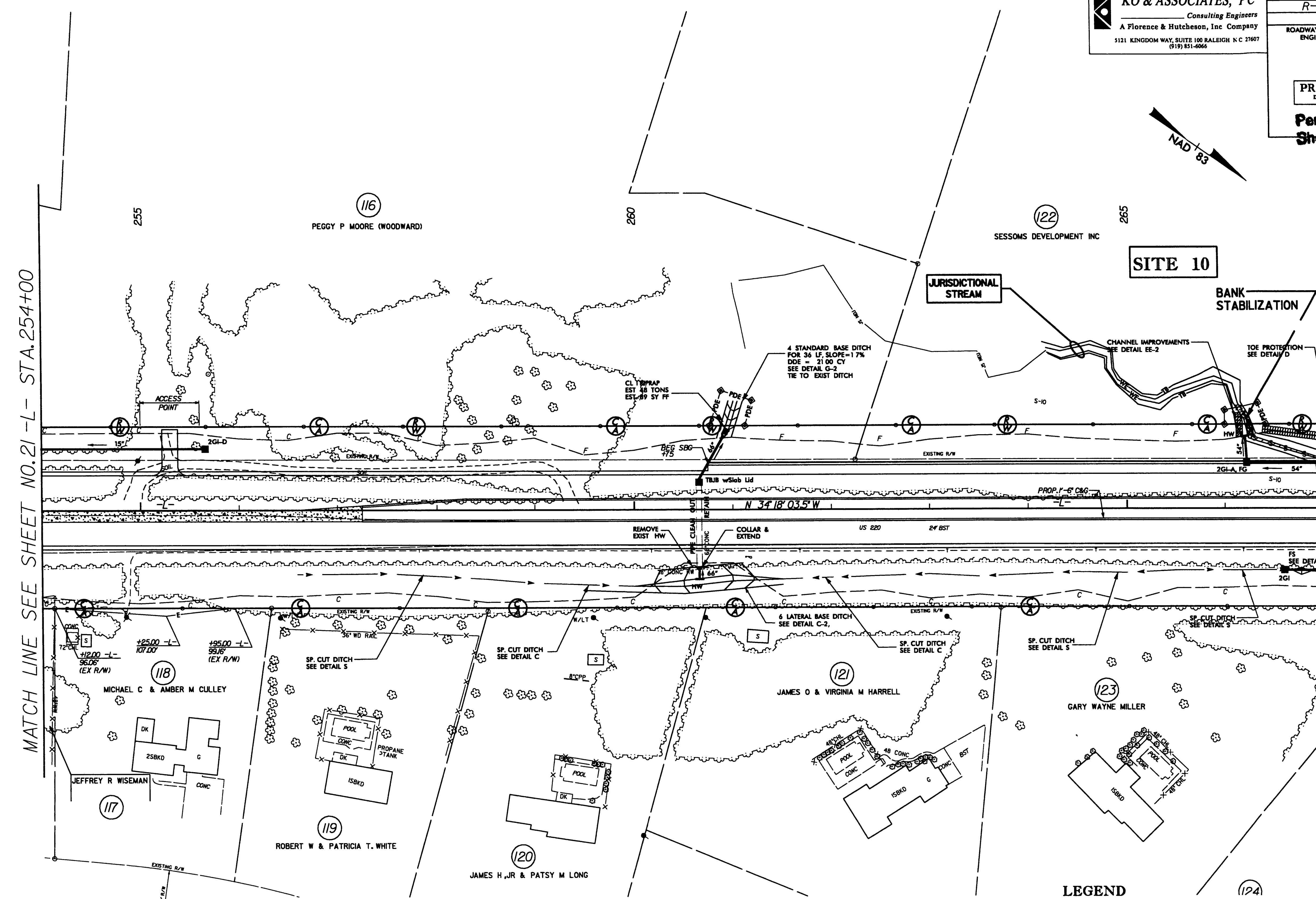
Permit Drawing
Sheet 37 of 45



100 0 50 100
SCALE: 1"= 100' HORIZ.

SITE 10
PLAN VIEW

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 3441814 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

8/17/99
12/8/2009
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Ko & Associates, PC

8/17/99

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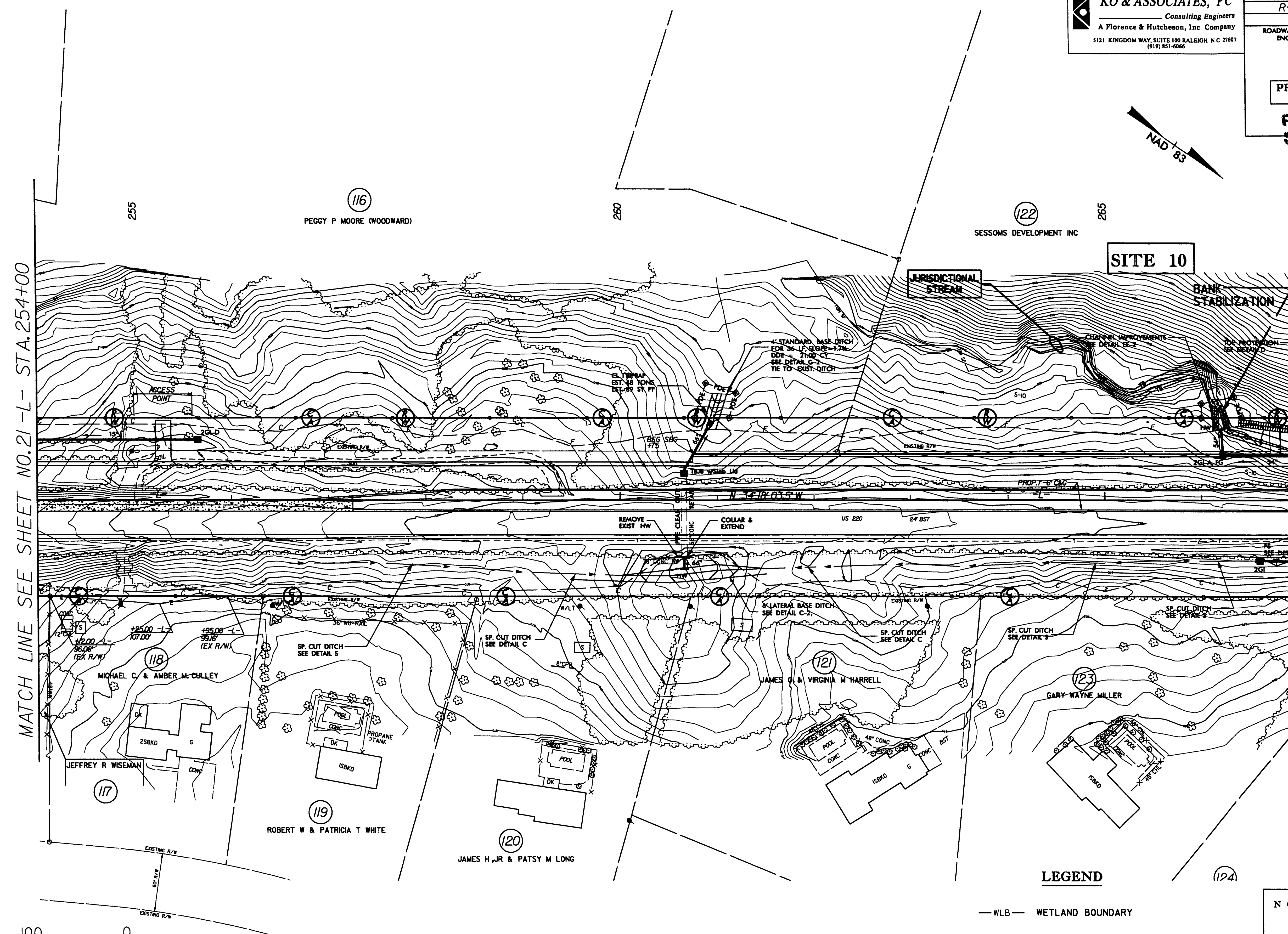
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 38 of 45



100 0 50 100

SCALE: 1"= 100' HORIZ.

SITE 10
PLAN VIEW

ENGLISH

LEGEND

—WLB— WETLAND BOUNDARY

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)
SHEET OF

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Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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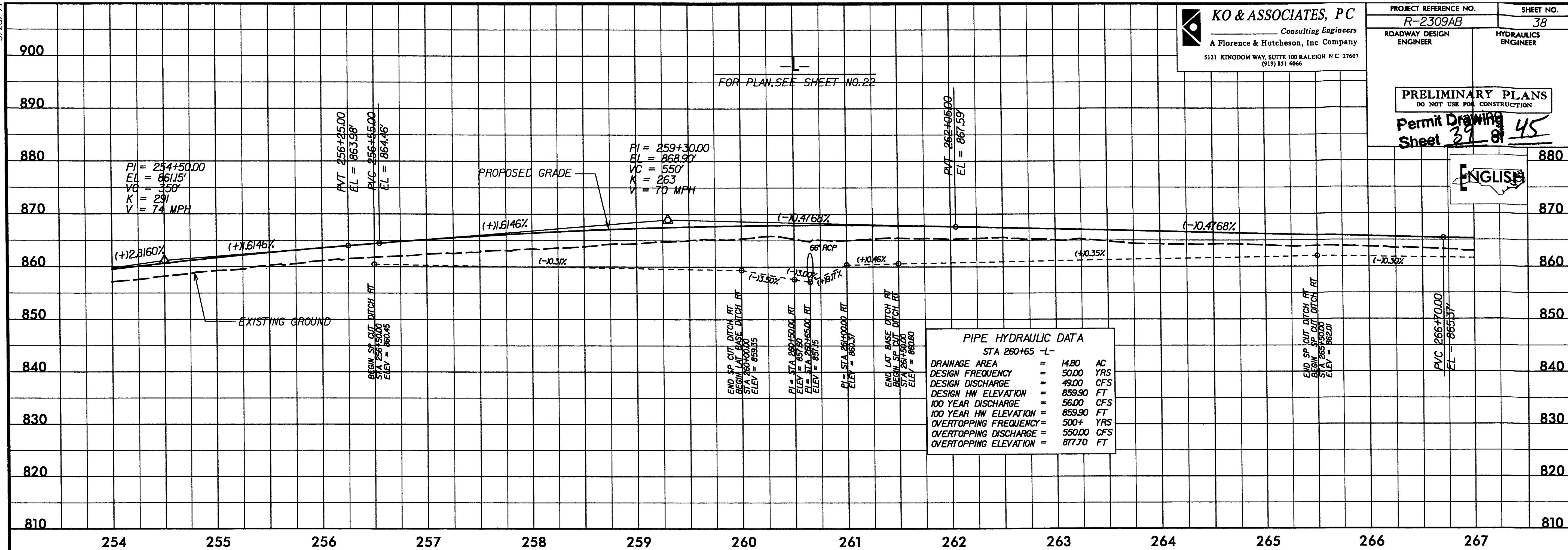
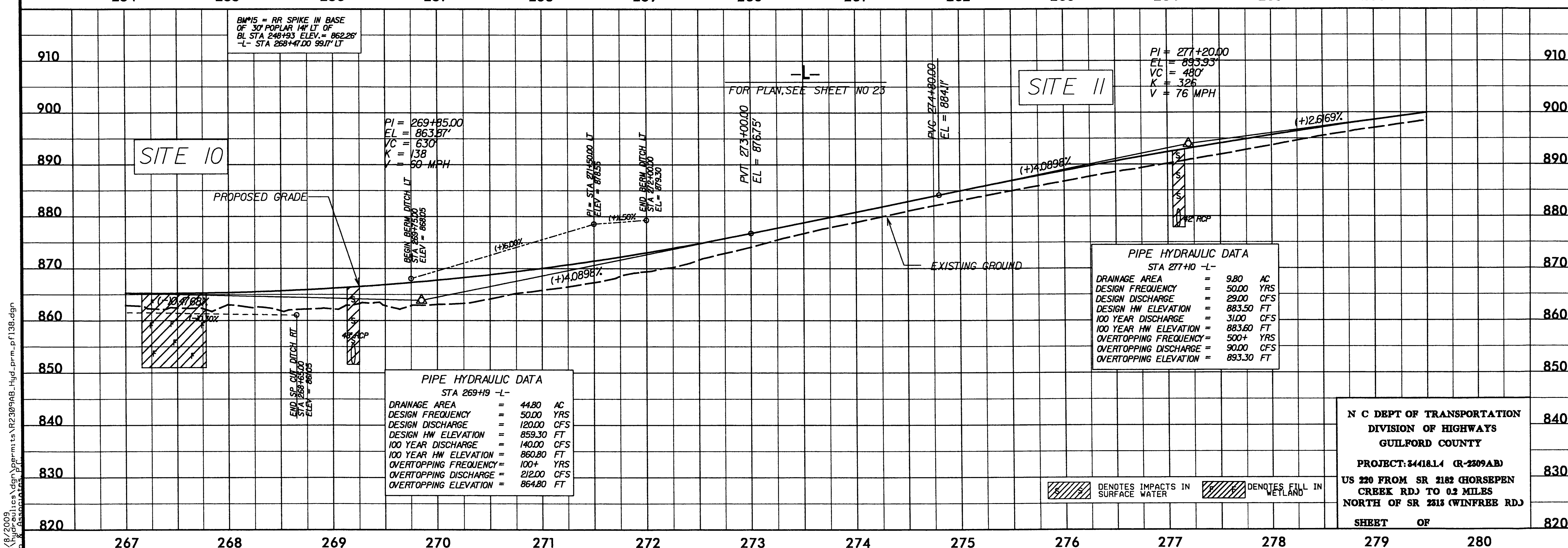
Permit Drawing
Sheet 39 of 45

ENGLISH





PIPE HYDRAULIC DATA			
STA 260+65 -L-			
DRAINAGE AREA	=	14.80	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	49.00	CFS
DESIGN HW ELEVATION	=	859.90	FT
100 YEAR DISCHARGE	=	56.00	CFS
100 YEAR HW ELEVATION	=	859.90	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	550.00	CFS
OVERTOPPING ELEVATION	=	877.70	FT

PIPE HYDRAULIC DATA			
STA 269+19 -L-			
DRAINAGE AREA	=	44.80	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	120.00	CFS
DESIGN HW ELEVATION	=	859.30	FT
100 YEAR DISCHARGE	=	140.00	CFS
100 YEAR HW ELEVATION	=	860.80	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	212.00	CFS
OVERTOPPING ELEVATION	=	864.80	FT

PIPE HYDRAULIC DATA			
STA 277+10 -L-			
DRAINAGE AREA	=	9.80	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	29.00	CFS
DESIGN HW ELEVATION	=	883.50	FT
100 YEAR DISCHARGE	=	31.00	CFS
100 YEAR HW ELEVATION	=	883.60	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	90.00	CFS
OVERTOPPING ELEVATION	=	893.30	FT

DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

PROJ. REFERENCE NO.	SHEET NO.
R-2309AB	XSC SITE 10

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
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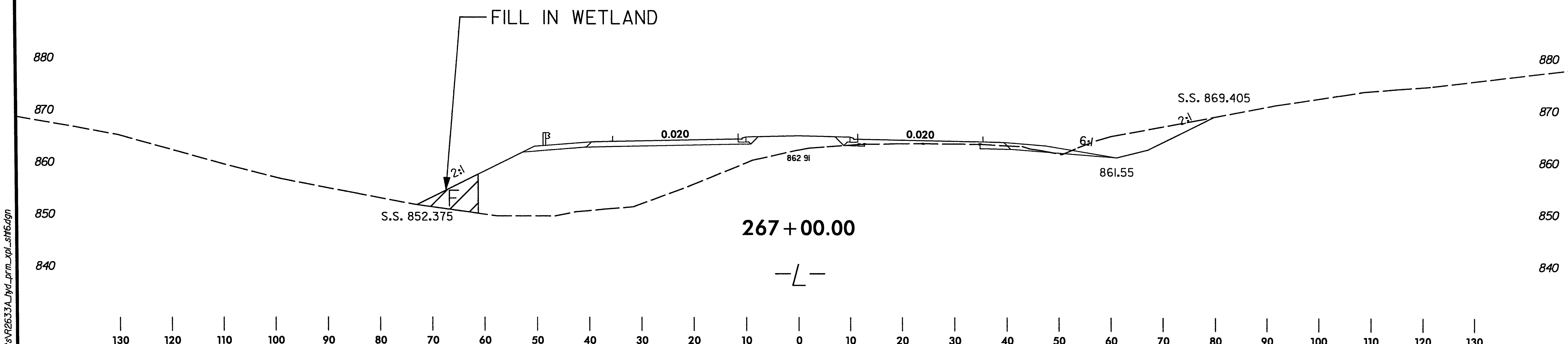
Permit Drawing
Sheet 40 of 45



SITE 10
X-SECTION

LEGEND

F F DENOTES FILL IN WETLAND

R:\Hydraulics\dgn\Permits\R2633A_byd_prm_xpl_sit6.dgn

11/10/2009

ENGLISH

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

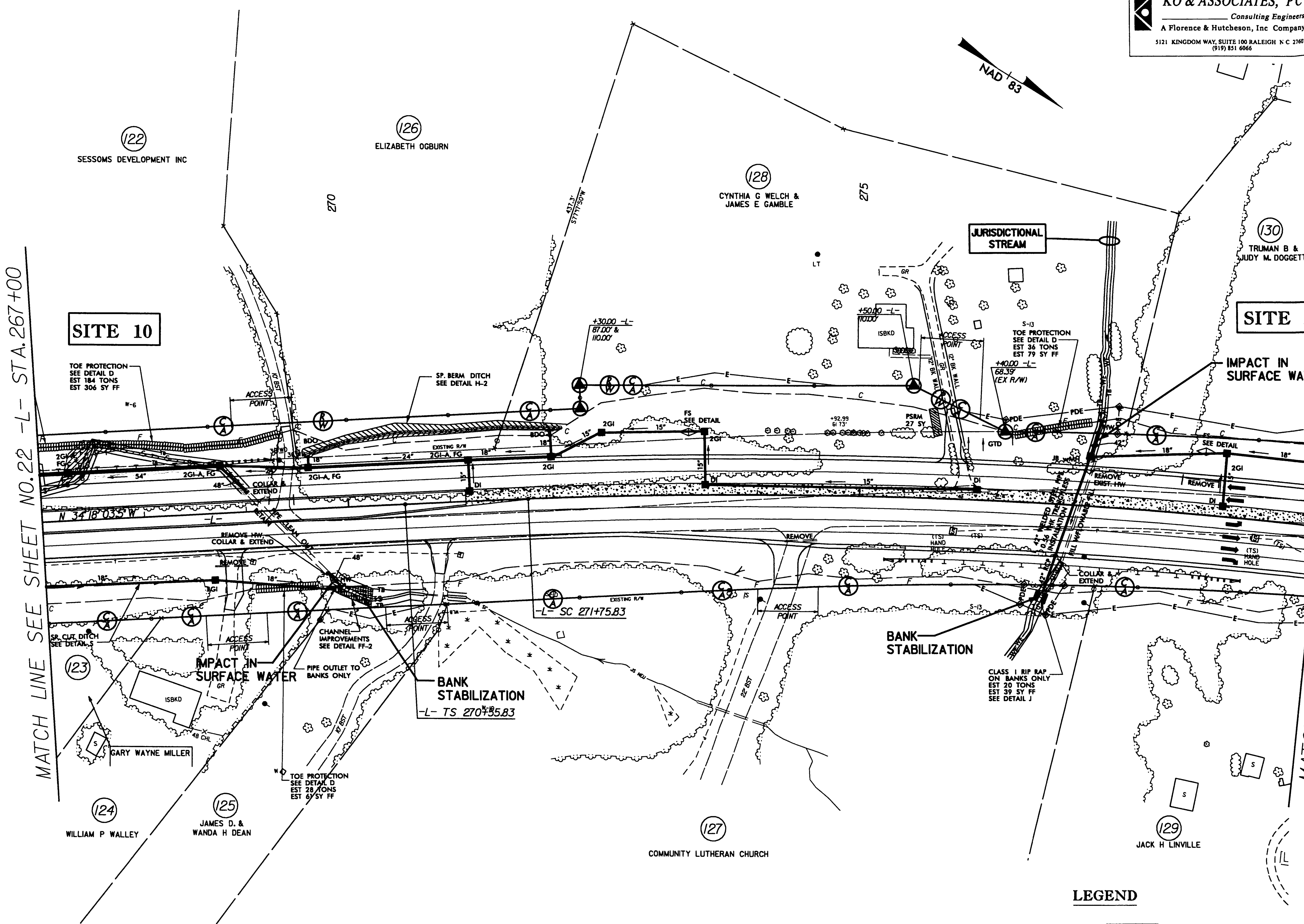
SHEET OF

KO & ASSOCIATES, PC
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 41 of 45



LEGEND

WLB — WETLAND BOUNDARY

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

100 0 50 100
SCALE: 1" = 100' HORIZ.

SITE 10 AND 11
PLAN VIEW

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2315 (WINFREE RD)
SHEET OF

8/17/99
12/10/2009
R:\Hydraulics\dgn\Permits\r2309ab_hyd_prm_psh23.dgn
Ko & Associates, P.C.

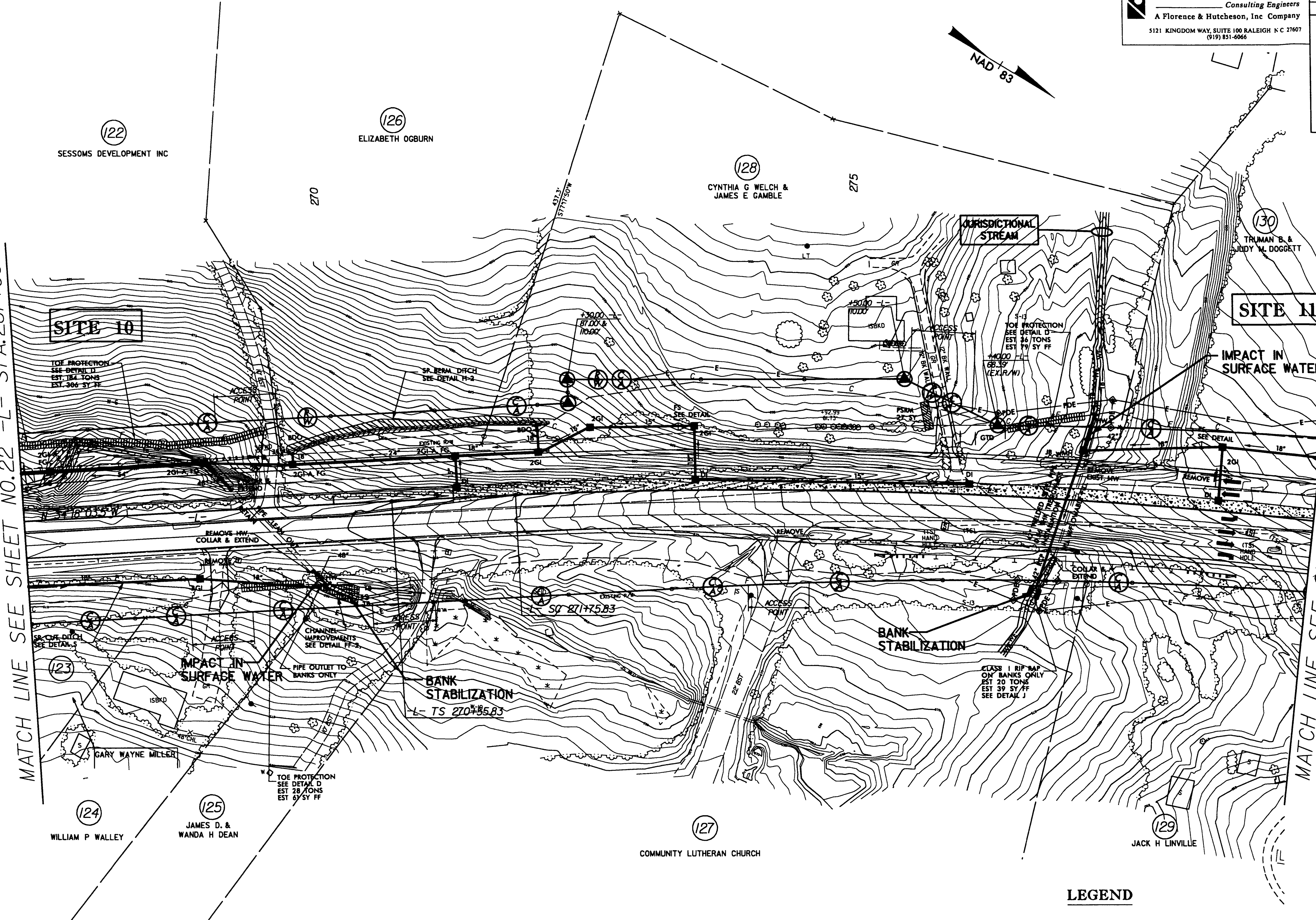
8/17/99

KO & ASSOCIATES, PC
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 42 of 45



LEGEND

—WLB— WETLAND BOUNDARY

DENOTES FILL IN WETLAND

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

ENGLISH

100 0 50 100

SCALE: 1" = 100' HORIZ.

SITE 10 AND 11
PLAN VIEW

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)

SHEET OF

12/10/2009
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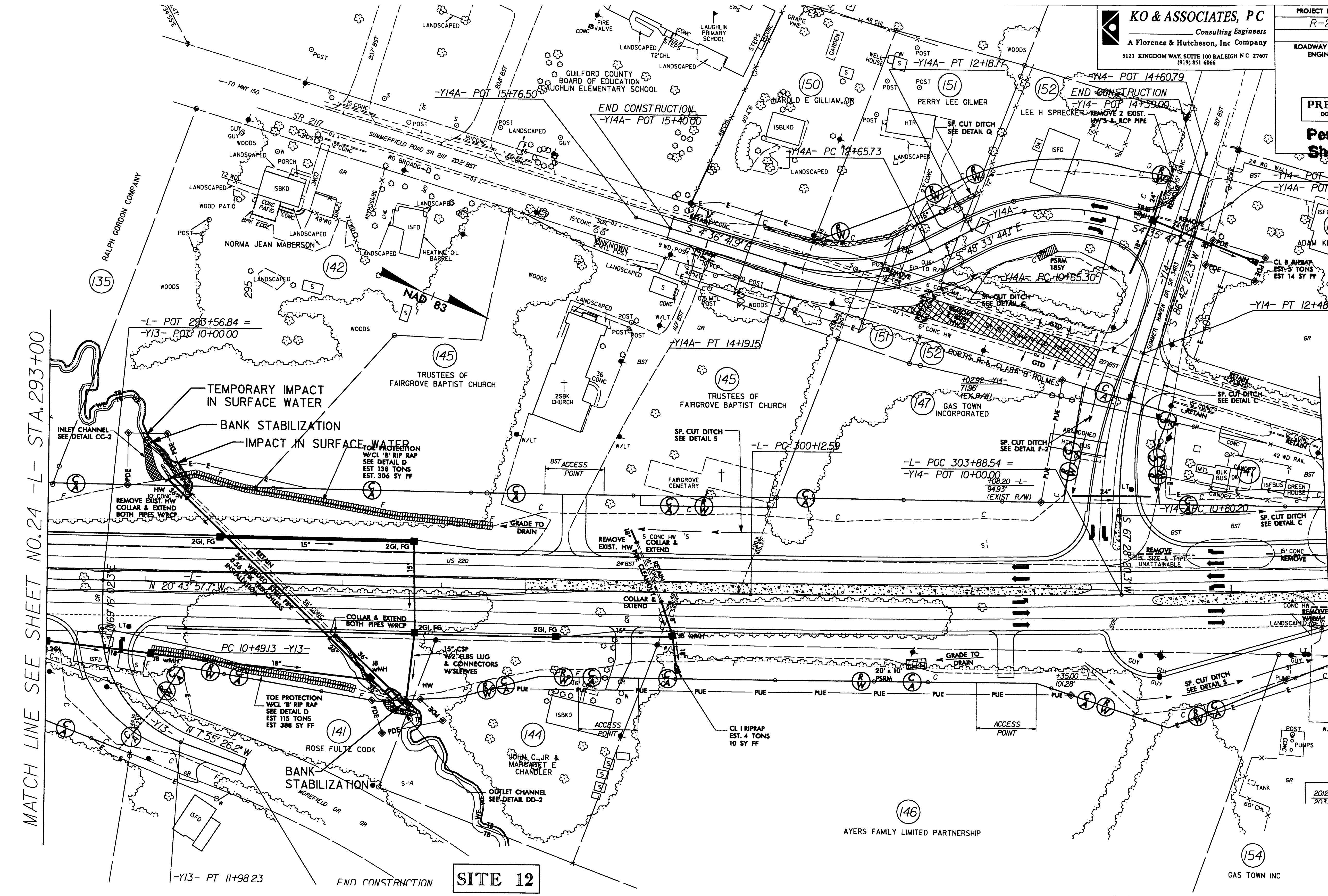
Ko & Associates, P.C.

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO	SHEET NO.
R-2309AB	25
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 43 of 45



SITE 12

100 0 50 100
SCALE: 1" = 100' HORIZ.

SITE 12
PLAN VIEW

LEGEND

—WLB— WETLAND BOUNDARY

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)

SHEET OF

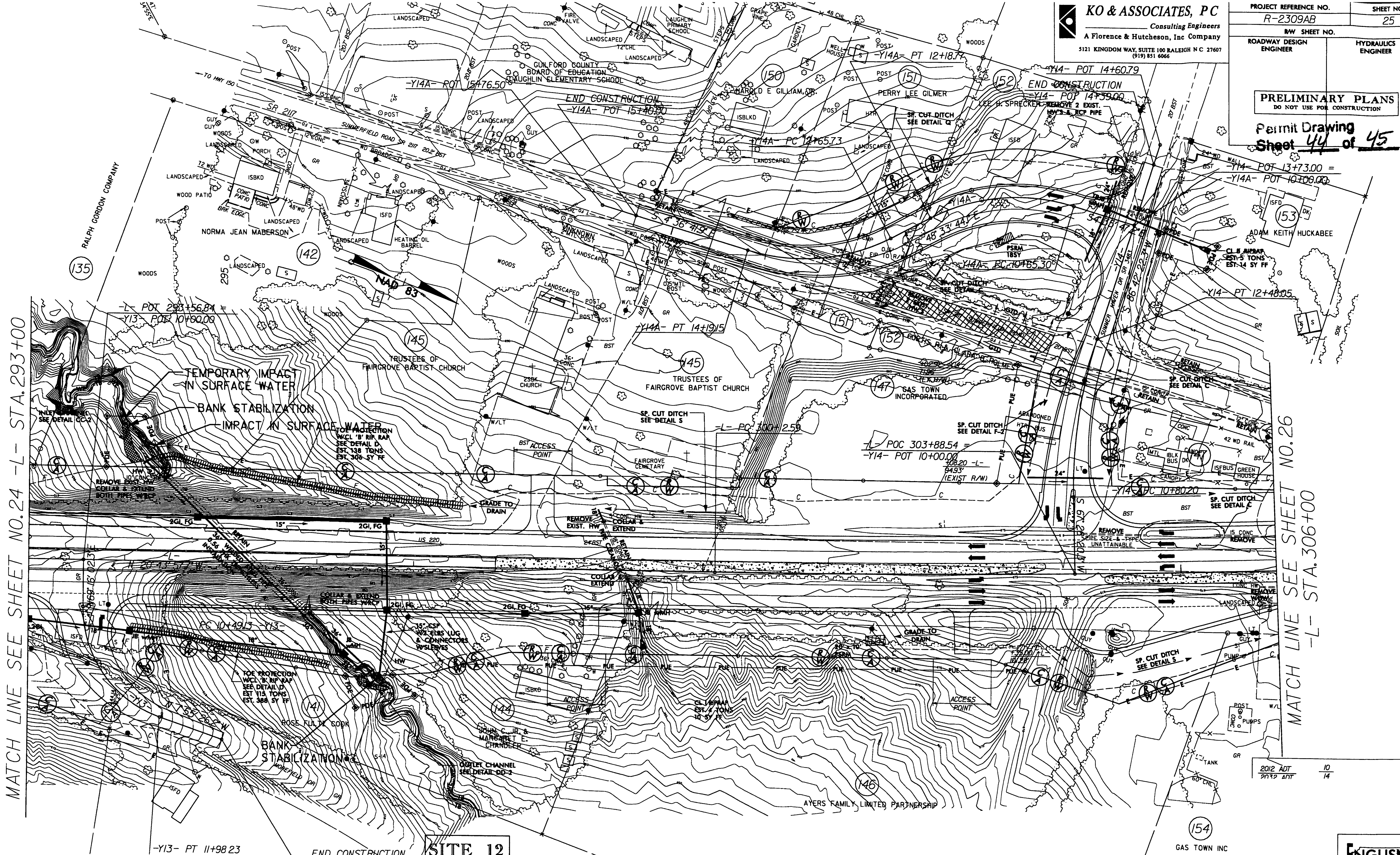
8/17/2010
R:\Hydraulics\dgn\Permits\r2309ab_Hyd_prm_psh25.dgn
Ko & Associates, P.C.

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 44 of 45



100 0 50 100
SCALE: 1"= 100' HORIZ.

SITE 12
PLAN VIEW

LEGEND

—WLB— WETLAND BOUNDARY

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S DENOTES IMPACTS IN SURFACE WATER

ENGLISH

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)

US 220 FROM SR 2182 (HORSEPEN CREEK RD) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD)

SHEET OF

5/28/99

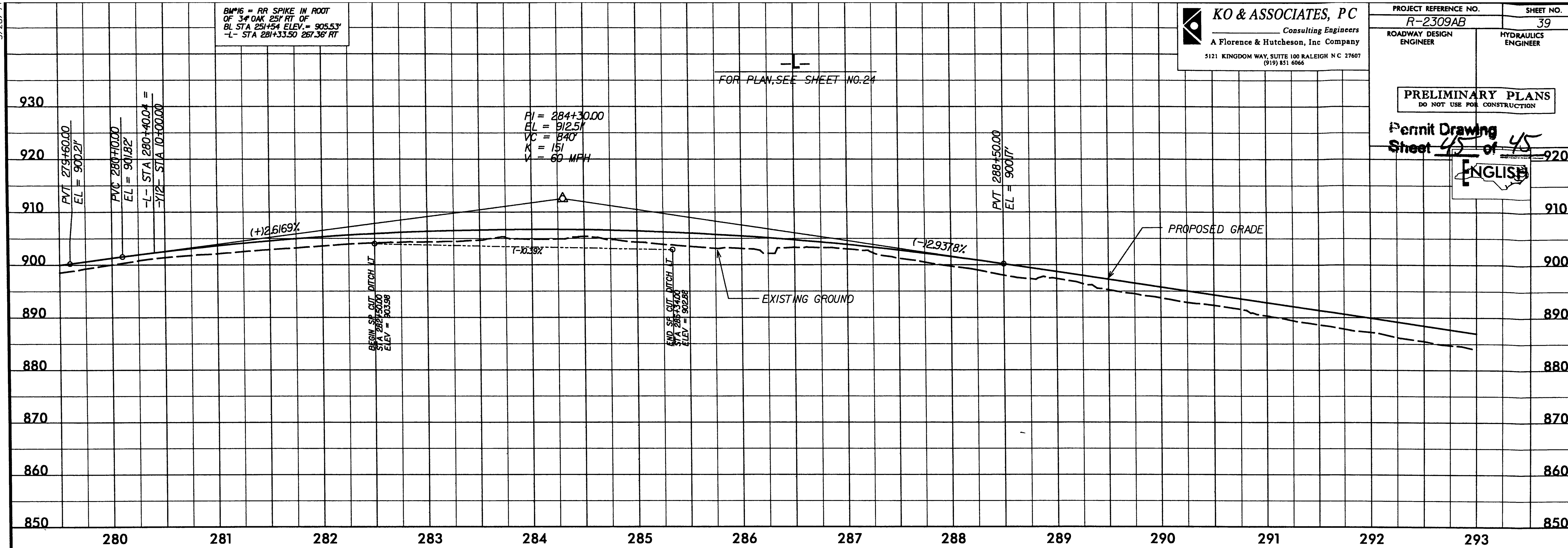
KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

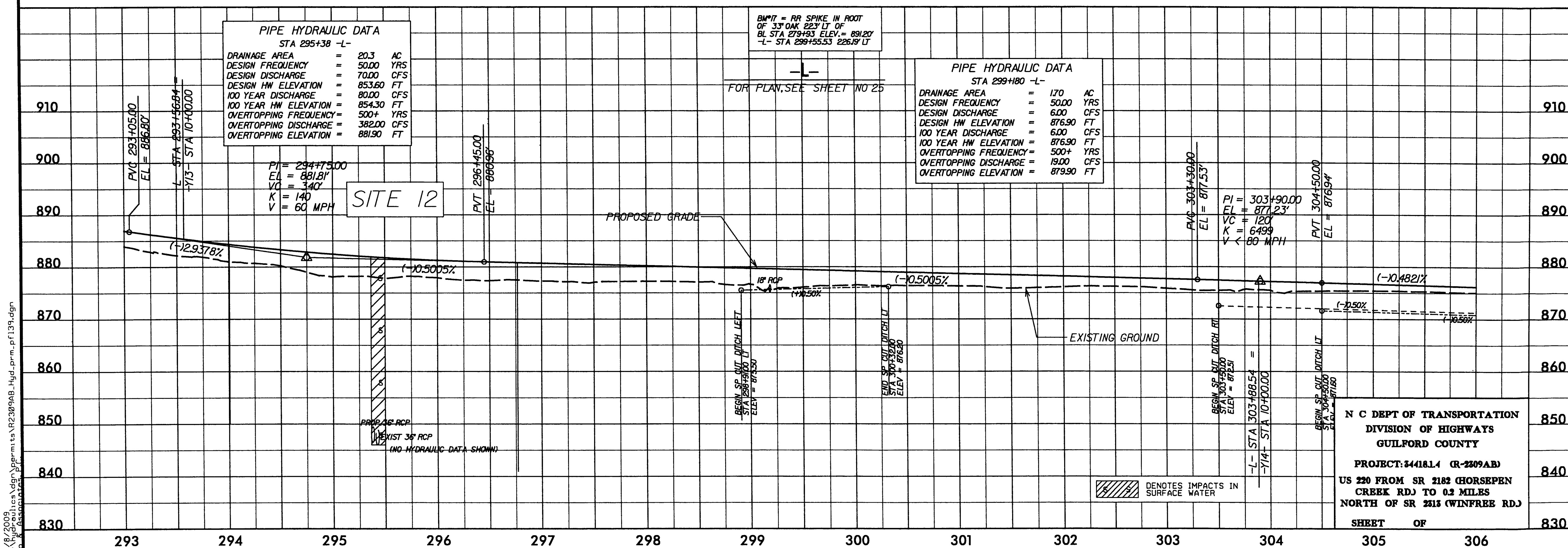
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 45 of 45

ENGLISH





PIPE HYDRAULIC DATA
STA 295+38 -L-

DRAINAGE AREA	=	20.3	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	70.00	CFS
DESIGN HW ELEVATION	=	853.60	FT
100 YEAR DISCHARGE	=	80.00	CFS
100 YEAR HW ELEVATION	=	854.30	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	382.00	CFS
OVERTOPPING ELEVATION	=	881.90	FT

PIPE HYDRAULIC DATA
STA 299+180 -L-

DRAINAGE AREA	=	1.70	AC
DESIGN FREQUENCY	=	50.00	YRS
DESIGN DISCHARGE	=	6.00	CFS
DESIGN HW ELEVATION	=	876.90	FT
100 YEAR DISCHARGE	=	6.00	CFS
100 YEAR HW ELEVATION	=	876.90	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	19.00	CFS
OVERTOPPING ELEVATION	=	879.90	FT

N C DEPT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD COUNTY

PROJECT: 34418.1.4 (R-2309AB)
US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.)

SHEET OF

12/8/2009
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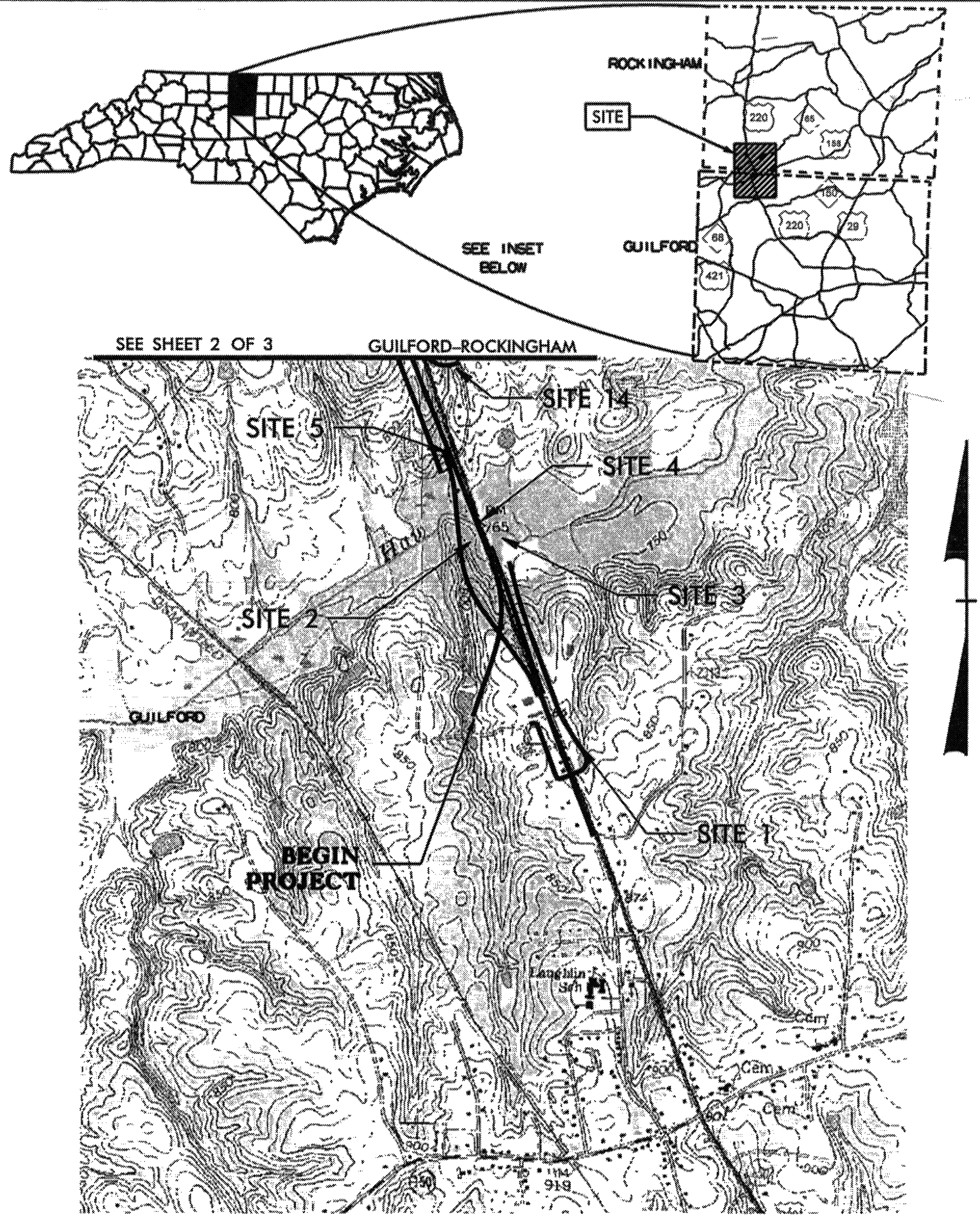
KO & Associates PC



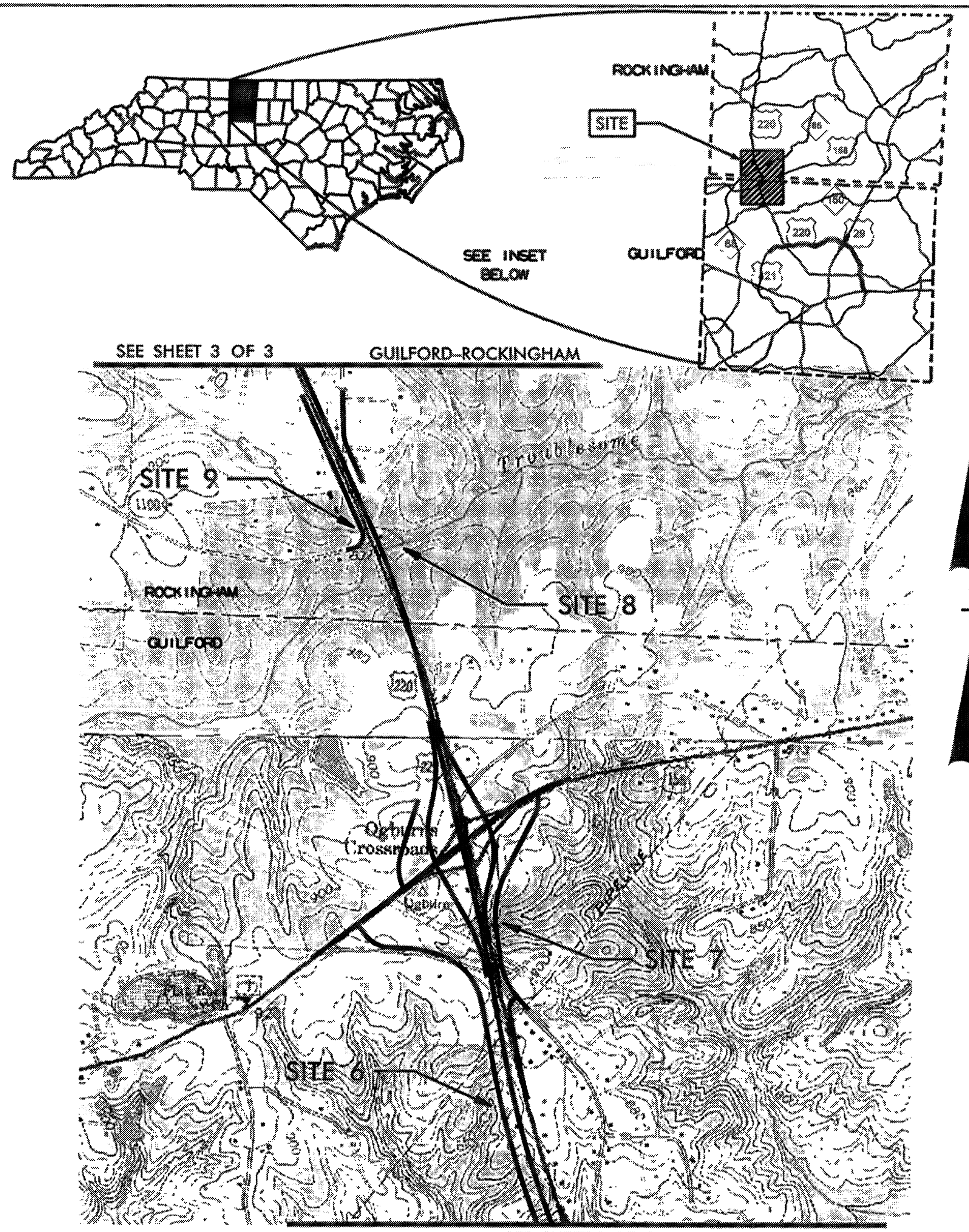
WETLAND/STREAM
IMPACTS
(1 OF 3)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

GUILFORD-ROCKINGHAM COUNTY

PROJECT:6.499002T (R-2413C)
US 220 SOUTH OF HAW RIVER
TO THE INTERSECTION OF US 220
AND EXISTING NC 68

SHEET 1 OF 40 8-14-09

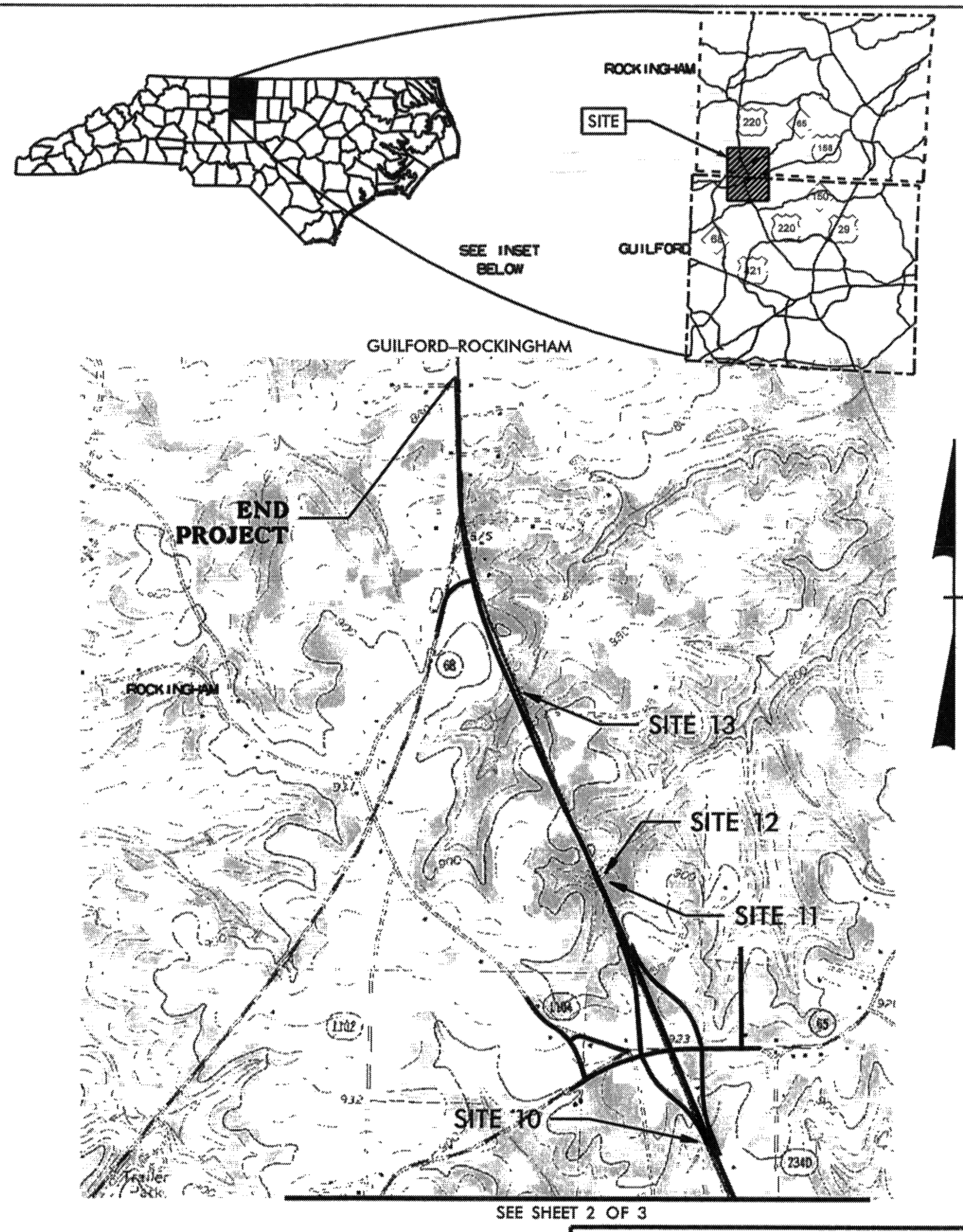


WETLAND/STREAM
IMPACTS
(2 OF 3)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD-ROCKINGHAM COUNTY

PROJECT:6.499002T (R-2413C)
US 220 SOUTH OF HAW RIVER
TO THE INTERSECTION OF US 220
AND EXISTING NC 68

SHEET 2 OF 40 8-14-09



WETLAND/STREAM
IMPACTS
(3 OF 3)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

GUILFORD-ROCKINGHAM COUNTY

PROJECT:6.499002T (R-2413C)
US 220 SOUTH OF HAW RIVER
TO THE INTERSECTION OF US 220
AND EXISTING NC 68

SHEET 3 OF 40 8-14-09

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES

ALL AFFECTED AREAS ARE PROPERTY OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, WHICH MAY NOT BE REFLECTED ON PLANS

WETLAND/STREAM IMPACTS

NCDOT

DIVISION OF HIGHWAYS

GUILFORD-ROCKINGHAM COUNTY

PROJECT: 6.499002T (R-2413C)

US 220 SOUTH OF HAW RIVER
TO THE INTERSECTION OF US 220
AND EXISTING NC 68

SHEET 4 OF 40 10/16/09

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)
1	9+36/10+57 Y23	30" CSP								42		
2	23+23/24+15 LREV LT	Roadway Fill	0.46		0.09							
3	22+45/23+61 LREV RT	Roadway Fill	0.24			0.03						
4	23+91/24+83 LREV	Bank Stabilization								40		
4	23+91/24+83 LREV	Work Bridge/Riprap						<0.01	0.02		141	
5	25+07/28+62 LREV	54" RCP	0.65			0.06		0.07		894		
6	35+59/35+71 LREV LT	Rip Rap						<0.01		36		
7	41+93/42+32 LREV RT	42" RCP						0.01		200		
7	41+93/42+32 LREV RT	Bank Stabilization								20		
8	56+47/56+61 LREV	2-12' x 10' RCBC						0.07	0.02	112	48	
8	56+47/56+61 LREV	Bank Stabilization								30		
9	57+19/57+80 LREV	1-20' X 7' Bottomless						0.09		259		
9	57+19/57+80 LREV	Bank Stabilization								89		
10	66+24/66+74 LREV	36" RCP	0.02		0.04			0.01		169		
10	66+24/66+74 LREV	Bank Stabilization								13		
11	75+98/77+07 LREV	54" RCP	0.02					0.02		218		
11	75+98/77+07 LREV	Bank Stabilization								11		
12	77+09/77+15 LREV	36" RCP						0.01		118		
12	77+09/77+15 LREV	Bank Stabilization								36		
13	84+09/85+07 LREV	2 - 48" CSP						0.00		52		
13	84+09/85+07 LREV	Bank Stabilization								30		
14	11+70 Y27	48" RCP						0.01		142		
TOTALS.			1.39		0.13	0.09		3.50	0.04	2511	189	

ENGLISH IMPACTS

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

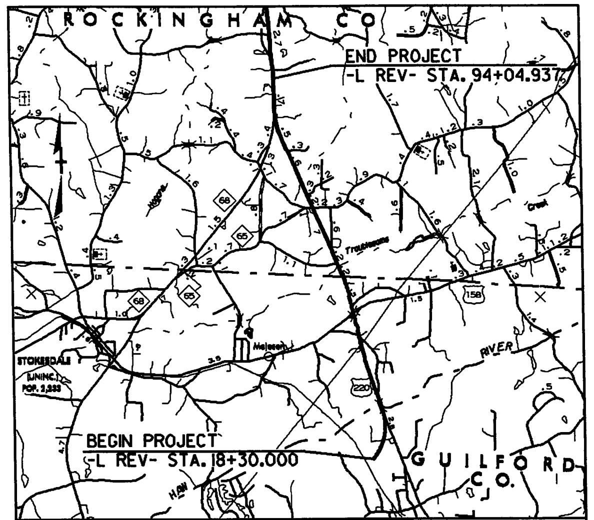
GUILFORD-ROCKINGHAM COUNTY
WBS - 6 499002T (R-2413C)

SHEET 5 of 40 revised 3/11/2011

ATN Revised 3/31/05

CONTRACT: 6.499008T TIP PROJECT: R-2413C

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



VICINITY MAP OF PROJECT 6.499008T

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD–ROCKINGHAM COUNTIES

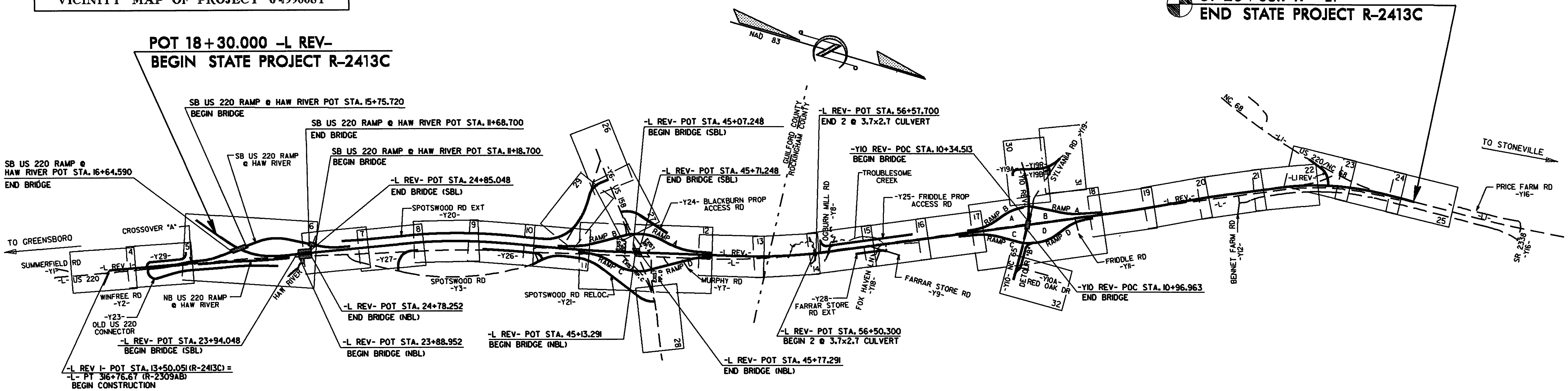
LOCATION: US 220 FROM SOUTH OF HAW RIVER TO THE INTERSECTION OF US 220 AND EXISTING NC 68
TYPE OF WORK: GRADING, DRAINAGE, STRUCTURES, CULVERTS, PAVING, LONG-LIFE PAVEMENT MARKINGS, SNOWPLOWABLE PAVEMENT MARKERS, SIGNING & SIGNALS

METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND /OR MILLIMETERS UNLESS OTHERWISE NOTED

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413C	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
6.499002T		P. E., R /W	
6.499008T		UTIL, CONST.	

Permit Drawing
Sheet 6 of 40



NCDOT CONTACT: B. DOUG TAYLOR, P.E., PROJECT ENGINEER
MALCOLM WATSON, P.E., PROJECT DESIGN ENGINEER

NOTE: THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS LIMITED TO INTERCHANGES

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC RATIO

5 0 10
PLANS
5 0 10
PROFILE (HORIZONTAL)
1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT 2012 = 37400
ADT 2032 = 64000
DHV = 11 %
D = 65 %
T = 15 %
(10% TTST + 5% DUALS)
V = 110 km/h
FUNC. CLASS.: INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY PROJECT	7.413	KM.
LENGTH STRUCTURES PROJECT	0.162	KM.
TOTAL LENGTH STATE PROJECT 6.499008T	7.575	KM.

NOTE: SB LANE BRIDGE STATIONING USED TO DETERMINE LENGTH OF ROADWAY & STRUCTURES

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 16, 1997

LETTING DATE:
JANUARY 17, 2012

DENNIS MORY, P.E.
PROJECT ENGINEER

HENRY BARE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN

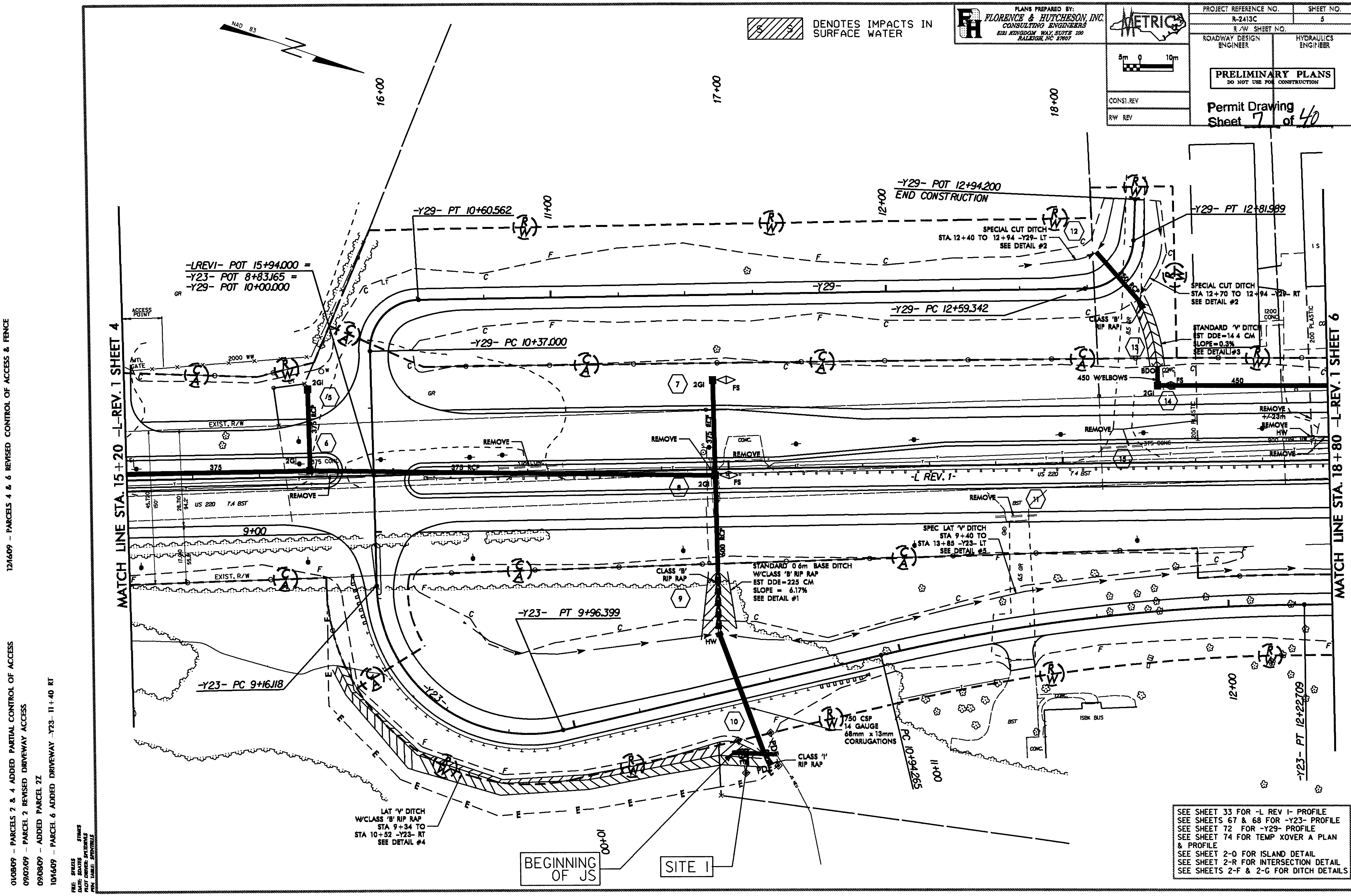
SIGNATURE: P.E.

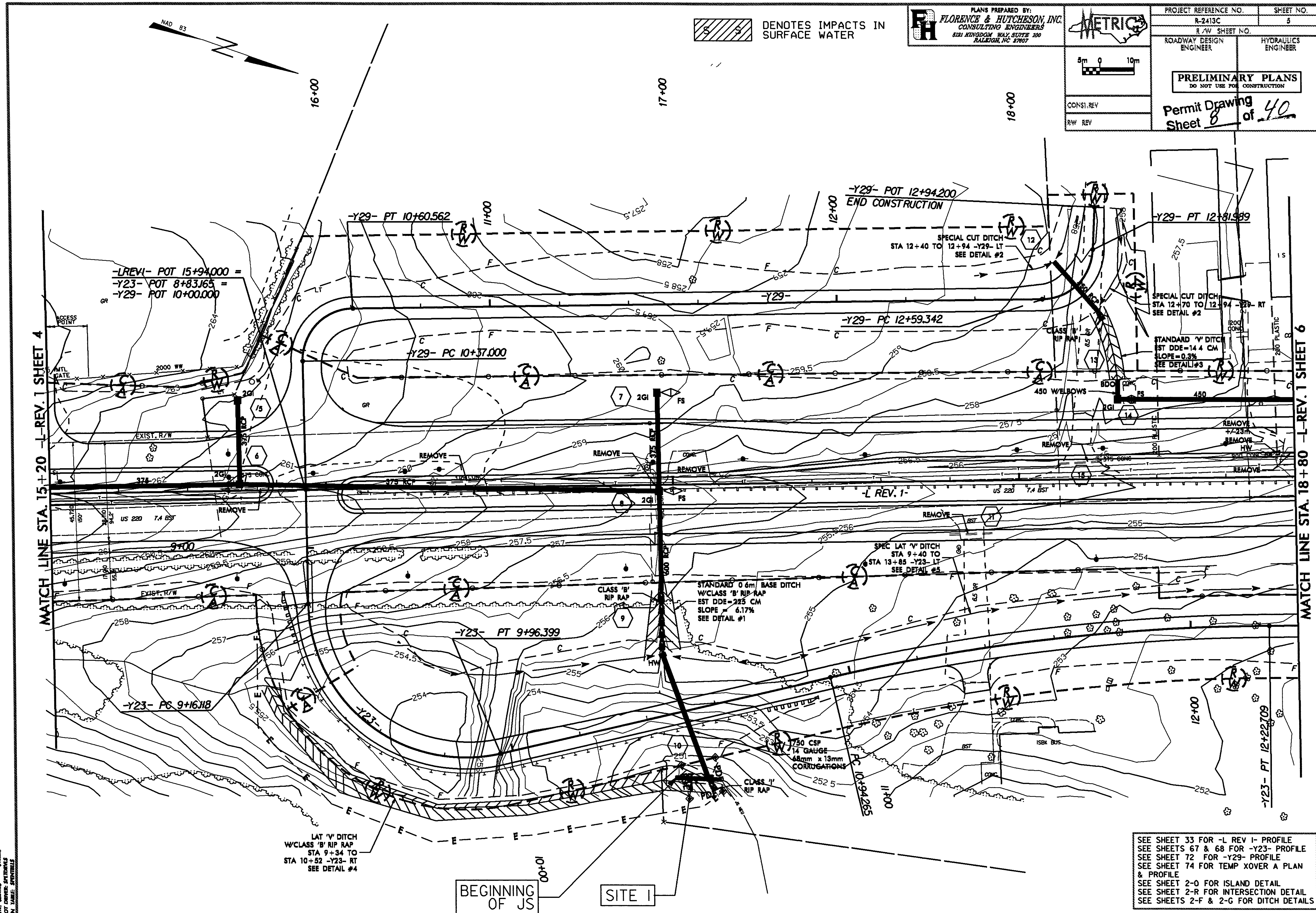
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY ENGINEER – DESIGN P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED FOR DIVISION ADMINISTRATOR DATE


DENOTES IMPACTS IN SURFACE WATER
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 7 of 40
CONS1.REV
R/W REV
-Y29- POT 12+94.200
END CONSTRUCTION
-Y29- PT 10+60.562
-Y29- PT 12+81.989
-LREV1- POT 15+94.000 =
-Y23- POT 8+83.165 =
-Y29- POT 10+00.000
-Y29- PC 12+59.342
-Y29- PC 10+37.000
SPECIAL CUT DITCH
STA 12+40 TO 12+94 -Y29- LT
SEE DETAIL #2
SPECIAL CUT DITCH
STA 12+70 TO 12+94 -Y29- RT
SEE DETAIL #2
STANDARD 'V' DITCH
EST DDE=14.4 CM
SLOPE=0.3%
SEE DETAIL #3
MATCH LINE STA. 15+20 -L-REV. 1 SHEET 4
MATCH LINE STA. 18+80 -L-REV. 1 SHEET 6
-L REV. 1-
US 220 7.4 BST
SPEC LAT 'V' DITCH
STA 9+40 TO
STA 13+85 -Y23- LT
SEE DETAIL #5
STANDARD 0.6m BASE DITCH
W/CLASS 'B' RIP RAP
EST DDE=225 CM
SLOPE = 6.17%
SEE DETAIL #1
CLASS 'B' RIP RAP
-Y23- PT 9+96.399
-Y23- PC 9+16.118
750 CSP
14 GAUGE
68mm x 13mm
CORRUGATIONS
CLASS 'I' RIP RAP
PC 10+94.265
-Y23- PT 12+22.709
LAT 'V' DITCH
W/CLASS 'B' RIP RAP
STA 9+34 TO
STA 10+52 -Y23- RT
SEE DETAIL #4
BEGINNING OF JS
SITE 1
SEE SHEET 33 FOR -L REV 1- PROFILE
SEE SHEETS 67 & 68 FOR -Y23- PROFILE
SEE SHEET 72 FOR -Y29- PROFILE
SEE SHEET 74 FOR TEMP XOVER A PLAN & PROFILE
SEE SHEET 2-O FOR ISLAND DETAIL
SEE SHEET 2-R FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS
12/16/09 - PARCELS 4 & 6 REVISED CONTROL OF ACCESS & FENCE
01/08/09 - PARCELS 2 & 4 ADDED PARTIAL CONTROL OF ACCESS
09/02/09 - PARCEL 2 REVISED DRIVEWAY ACCESS
09/08/09 - ADDED PARCEL 2Z
10/16/09 - PARCEL 6 ADDED DRIVEWAY -Y23- 11+40 RT



12/16/09 – PARCELS 4 & 6 REVISED CONTROL OF ACCESS & FENCE

01/08/09 – PARCELS 2 & 4 ADDED PARTIAL CONTROL OF ACCESS
09/02/09 – PARCEL 2 REVISED DRIVEWAY ACCESS
09/08/09 – ADDED PARCEL 2Z
10/16/09 – PARCEL 6 ADDED DRIVEWAY -Y23- 11+40 RT

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	67
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV

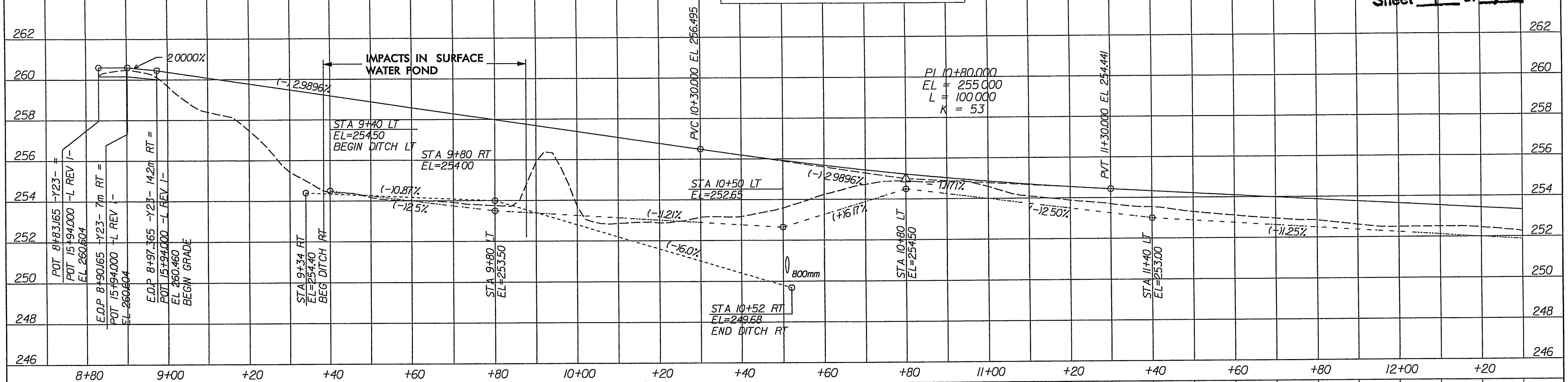
Permit Drawing
Sheet 9 of 40

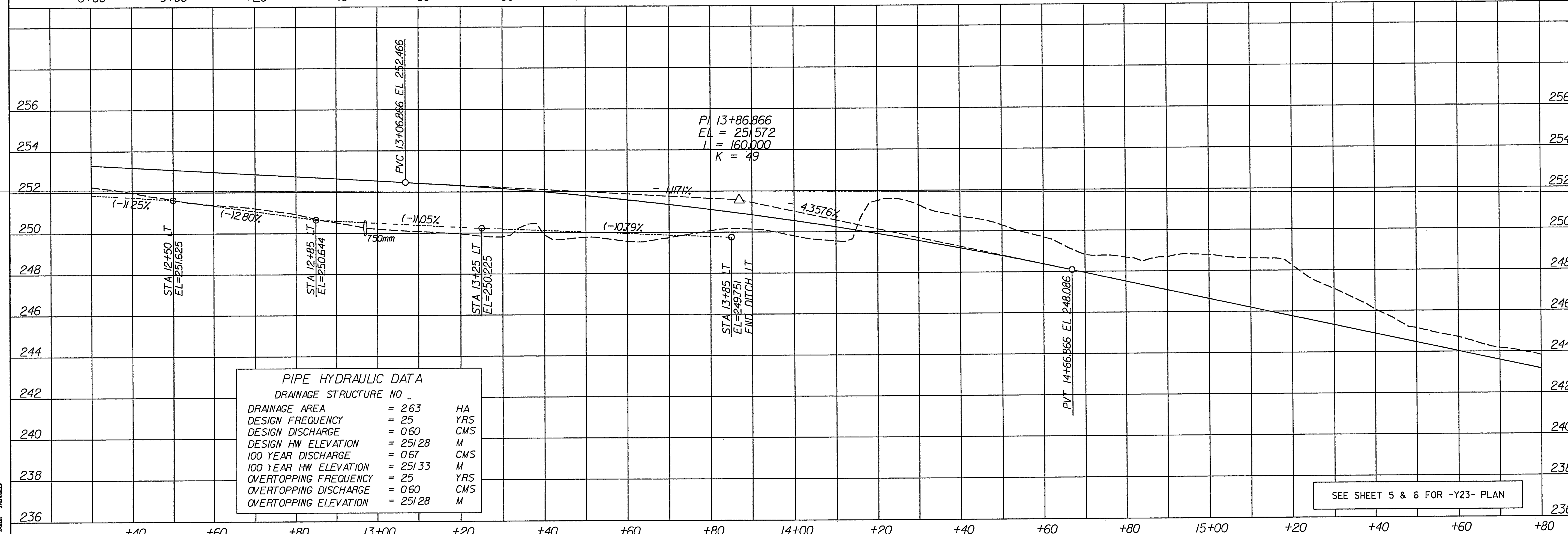
SITE 1

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO _

DRAINAGE AREA	= 2.59	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.60	CMS
DESIGN HW ELEVATION	= 253.37	M
100 YEAR DISCHARGE	= 0.66	CMS
100 YEAR HW ELEVATION	= 253.43	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.71+	CMS
OVERTOPPING ELEVATION	= 254.50	M





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO _

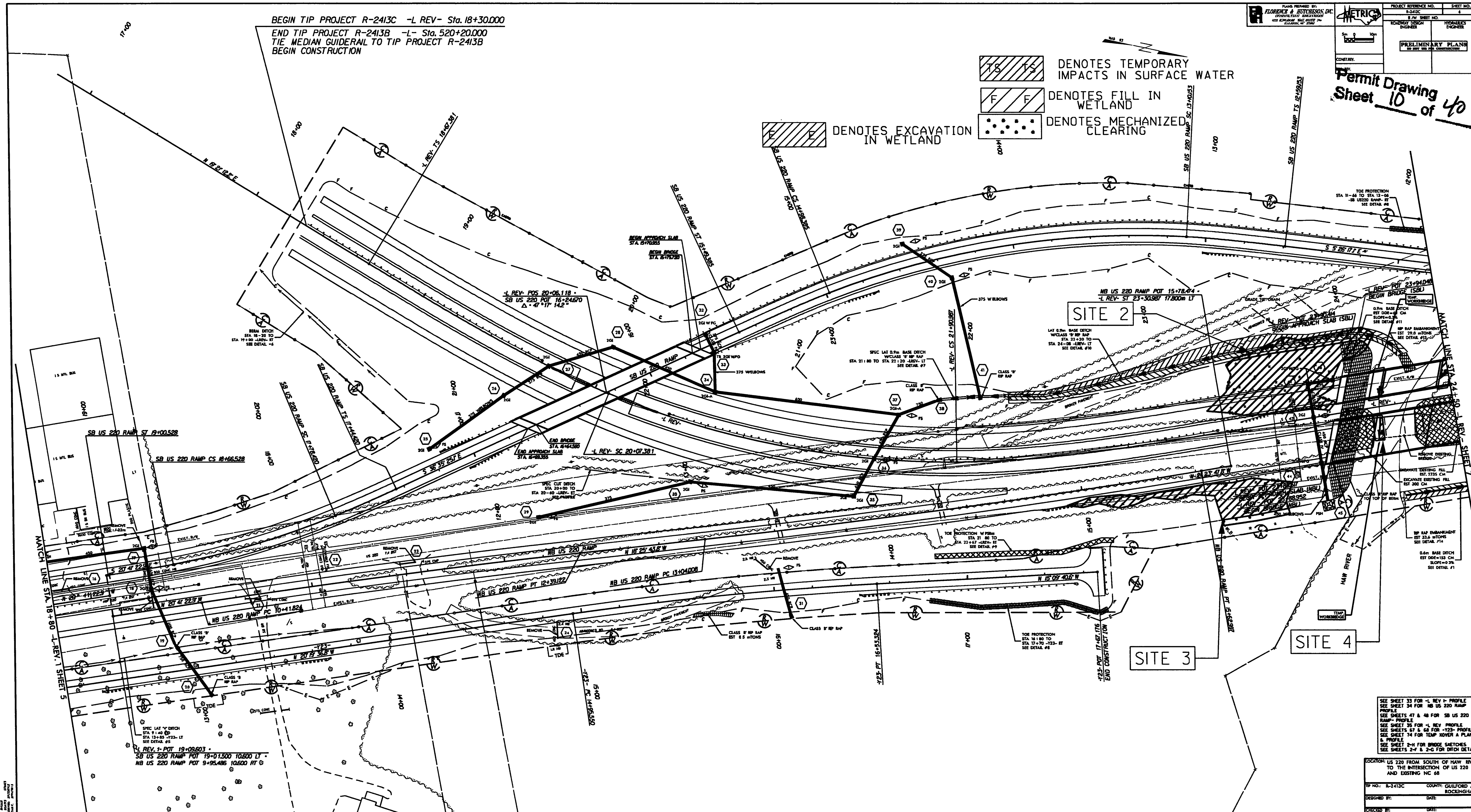
DRAINAGE AREA	= 2.63	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.60	CMS
DESIGN HW ELEVATION	= 251.28	M
100 YEAR DISCHARGE	= 0.67	CMS
100 YEAR HW ELEVATION	= 251.33	M
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 0.60	CMS
OVERTOPPING ELEVATION	= 251.28	M

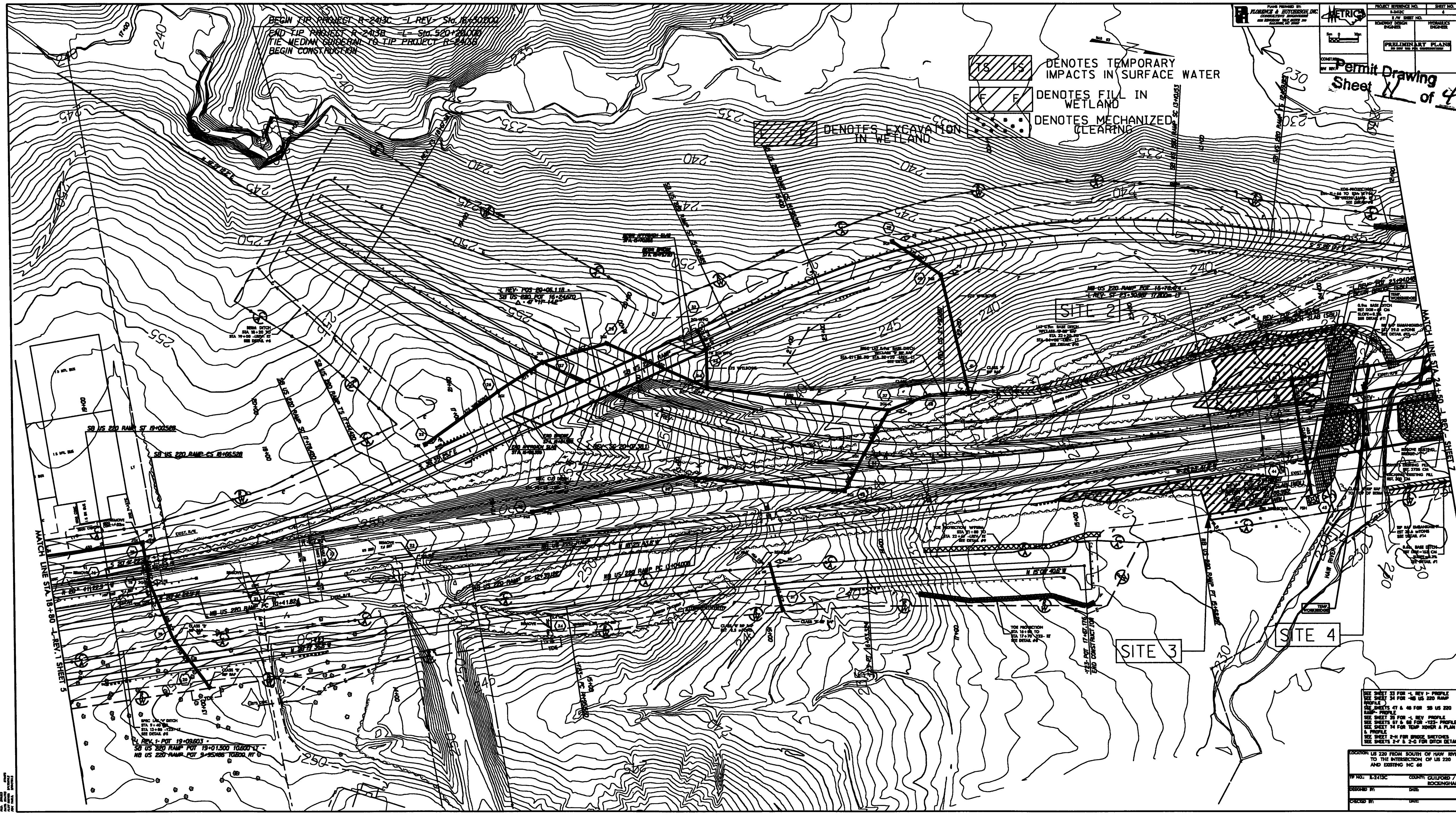
SEE SHEET 5 & 6 FOR -Y23- PLAN

-Y23- OLD US 220 CONNECTOR

6/09/99

101609 - PARCEL 6 PROPERTY NAME UPDATED
110309 - PARCEL 10 ADDED TEMPORARY CONSTRUCTION EASEMENT





10/16/09 - PARCEL 6 PROPERTY NAME UPDATED
11/03/09 - PARCEL 10 ADDED TEMPORARY CONSTRUCTION EASEMENT

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

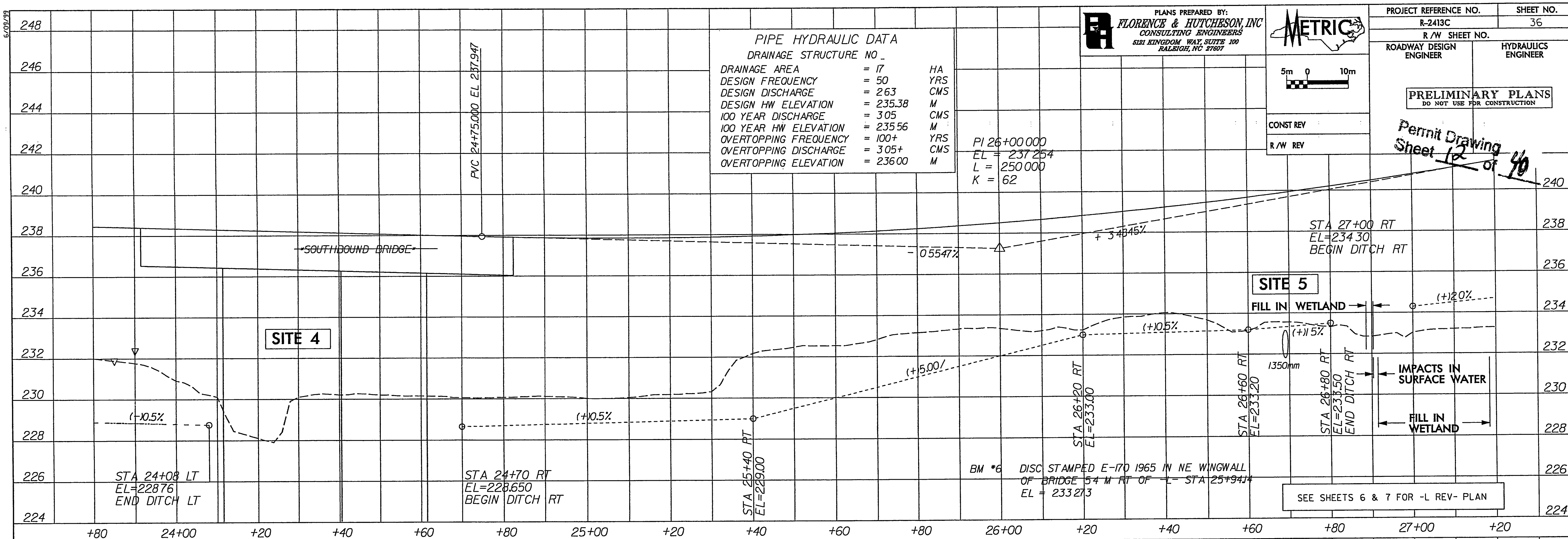
Permit Drawing
Sheet 12 of 40

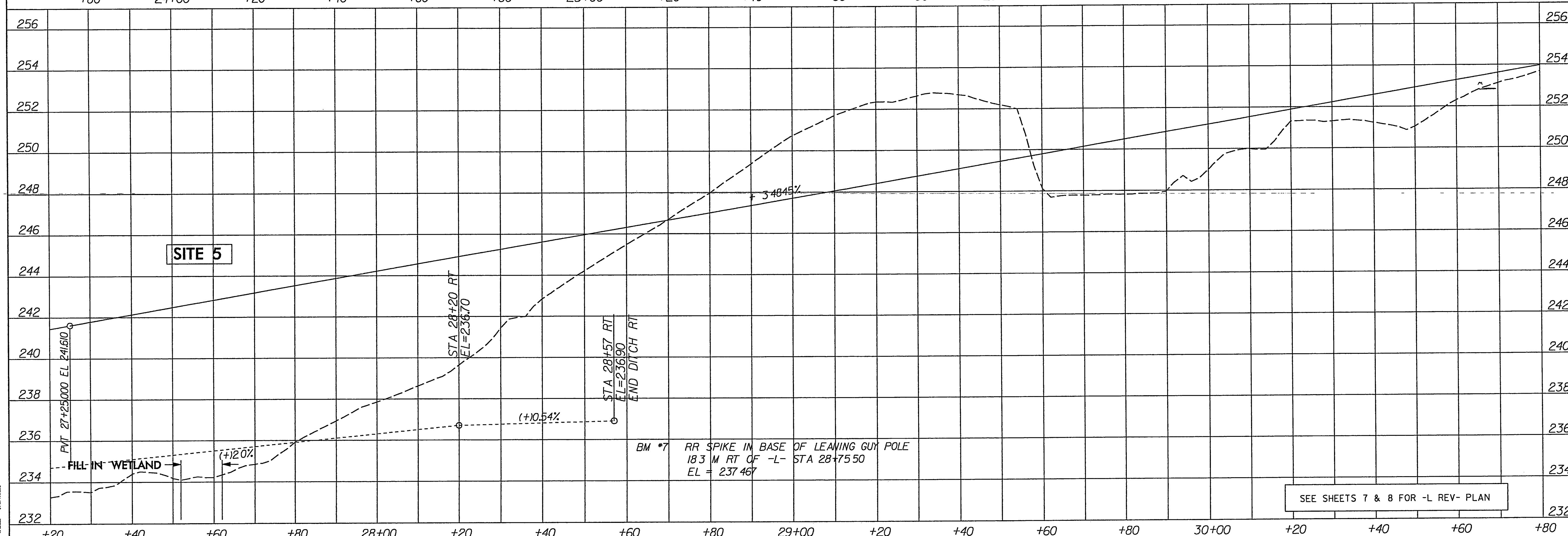
6/09/99

PIPE HYDRAULIC DATA

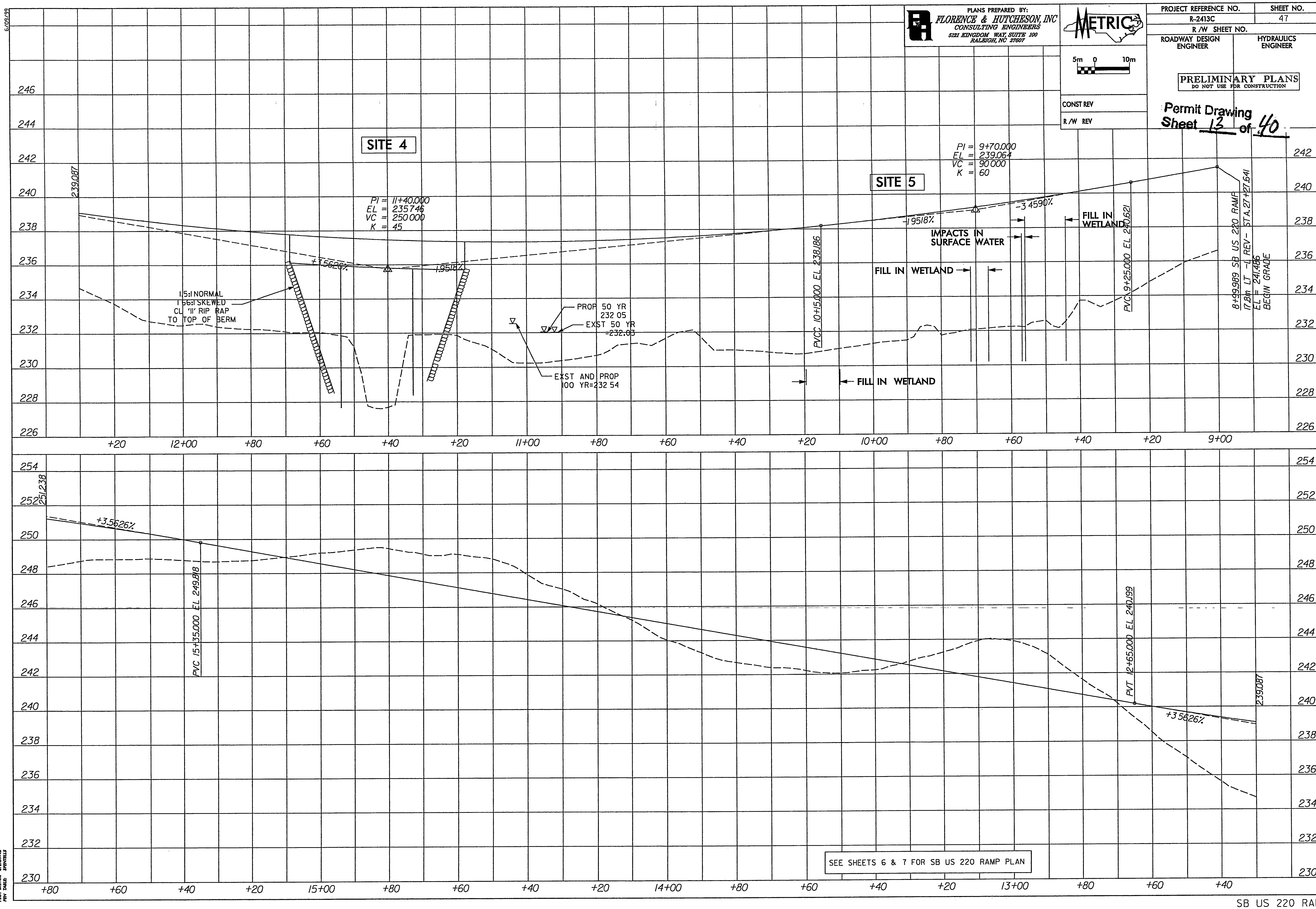
DRAINAGE STRUCTURE NO _

DRAINAGE AREA	= 17	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 2.63	CMS
DESIGN HW ELEVATION	= 235.38	M
100 YEAR DISCHARGE	= 3.05	CMS
100 YEAR HW ELEVATION	= 235.56	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 3.05+	CMS
OVERTOPPING ELEVATION	= 236.00	M





-L REV-



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
5m 0 10m
PROJECT REFERENCE NO.
SHEET NO.
R-2413C
47
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
Permit Drawing
Sheet 12 of 40
SITE 4
SITE 5
PI = 11+40.000
EL = 235.746
VC = 250.000
K = 45
PI = 9+70.000
EL = 239.064
VC = 90.000
K = 60
239.087
+3.5626%
1.9518%
-1.9518%
-3.4590%
1.5:1 NORMAL
1.66:1 SKEWED
CL 'II' RIP RAP
TO TOP OF BERM
PROP 50 YR
232.05
EXST 50 YR
232.03
EXST AND PROP
100 YR=232.54
PVCC 10+15.000 EL 238.186
PVC 9+25.000 EL 240.621
8+99.989 SB US 220 RAMP
17.8m LT -L- REV- STA.27+27.641
EL = 241.486
BEGIN GRADE
IMPACTS IN SURFACE WATER
FILL IN WETLAND
FILL IN WETLAND
FILL IN WETLAND
251.238
+3.5626%
PVC 15+35.000 EL 249.818
PVT 12+65.000 EL 240.199
239.087
+3.5626%
SEE SHEETS 6 & 7 FOR SB US 220 RAMP PLAN
SB US 220 RAMP

PROJECT REFERENCE NO. R-2413C | SHEET NO. 7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

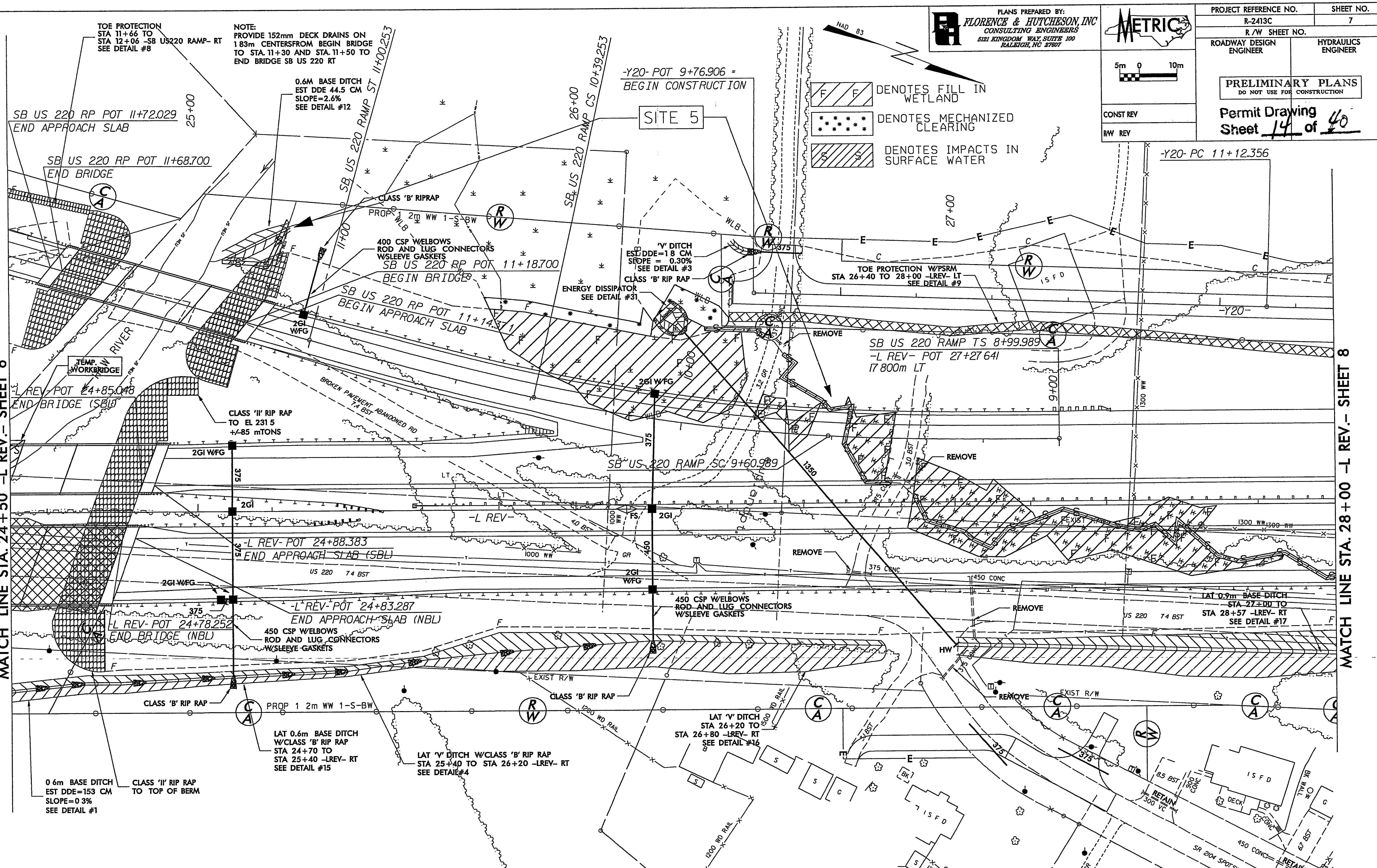
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 14 of 40

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

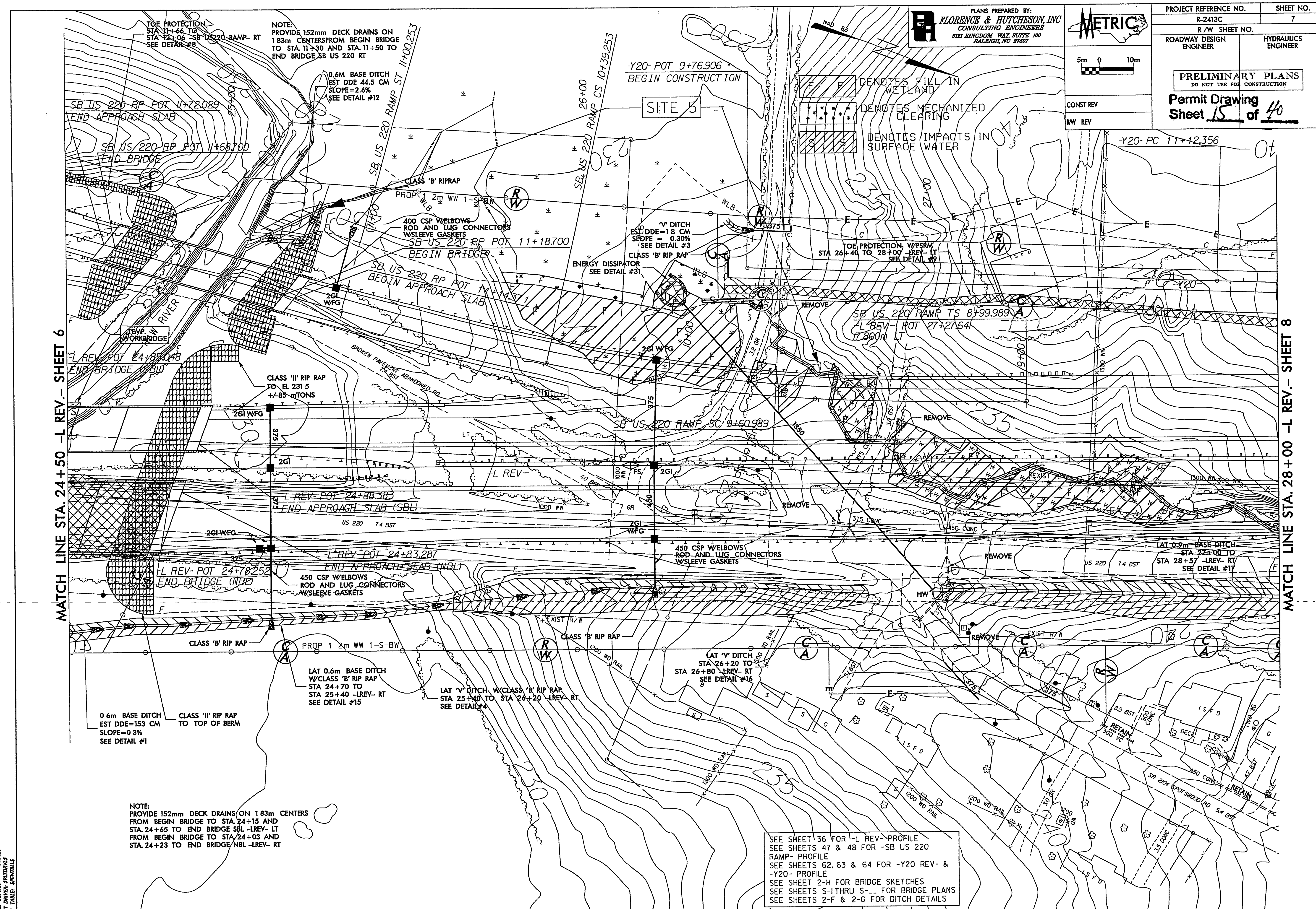
CONST REV
R/W REV

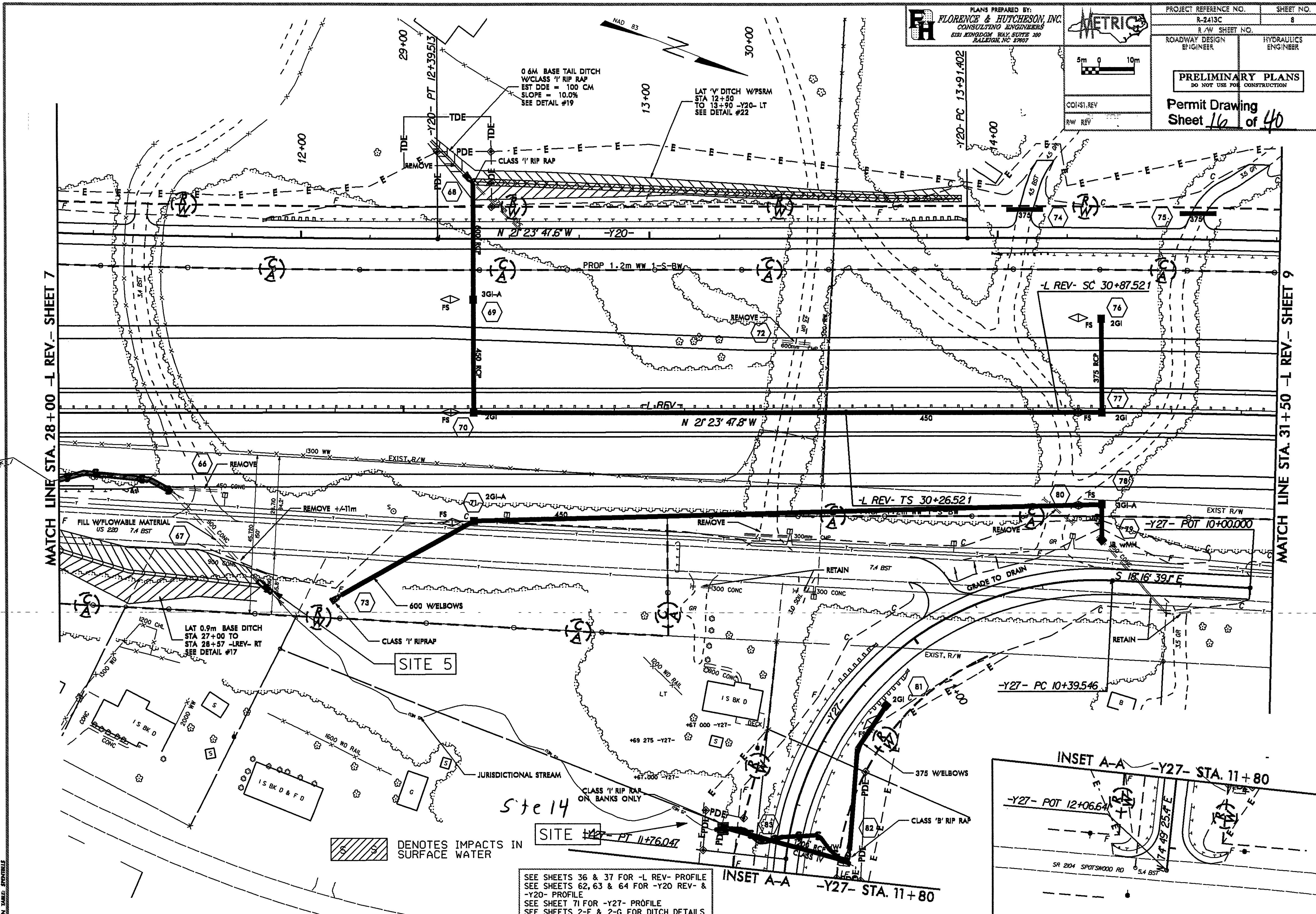


NOTE:
PROVIDE 152mm DECK DRAINS ON 1.83m CENTERS
FROM BEGIN BRIDGE TO STA. 24+15 AND
STA. 24+65 TO END BRIDGE SBL -LREV- LT
FROM BEGIN BRIDGE TO STA. 24+03 AND
STA 24+23 TO END BRIDGE NBL -LREV- RT

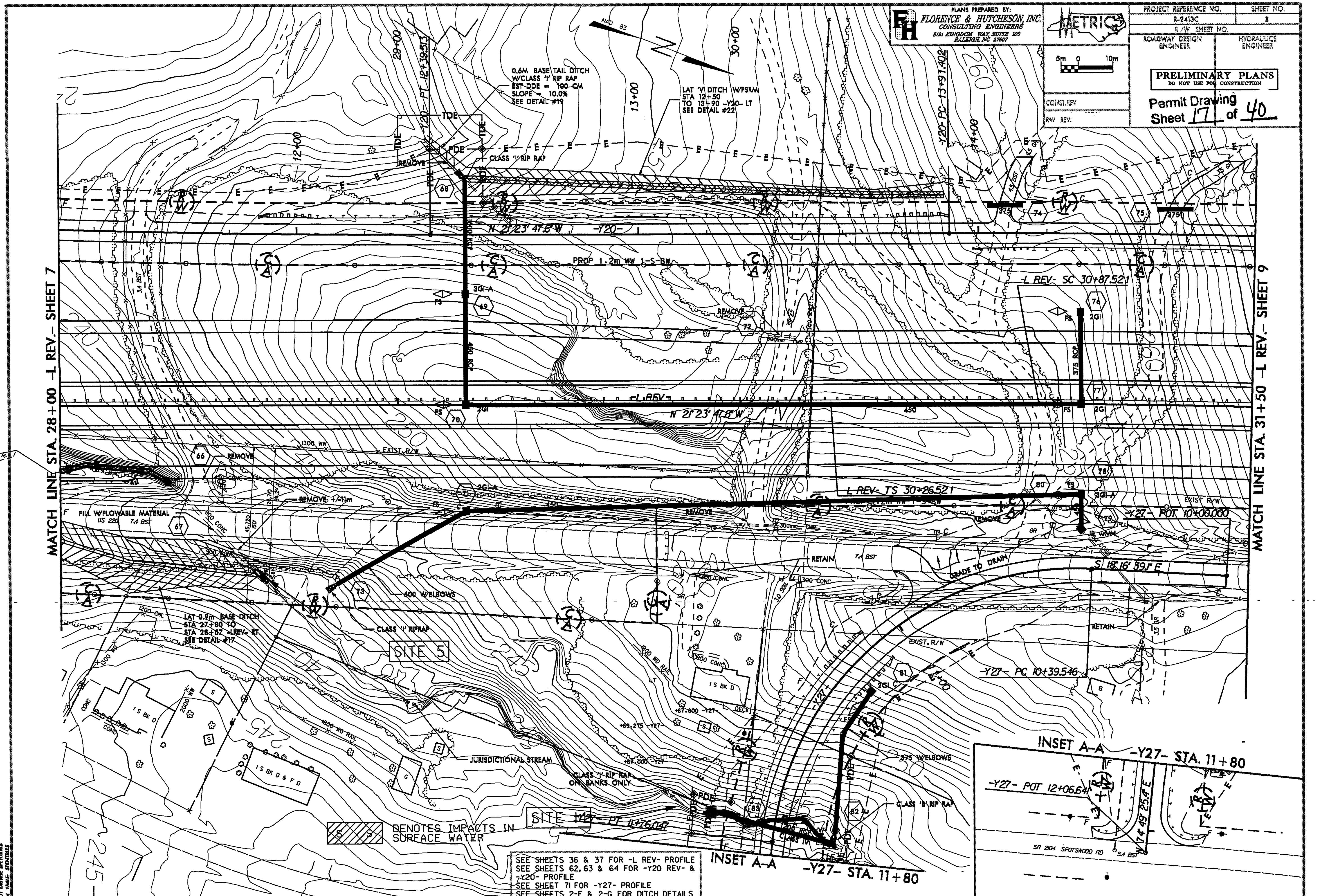
SEE SHEET 36 FOR -L REV- PROFILE
SEE SHEETS 47 & 48 FOR -SB US 220 RAMP- PROFILE
SEE SHEETS 62, 63 & 64 FOR -Y20 REV- & -Y20- PROFILE
SEE SHEET 2-H FOR BRIDGE SKETCHES
SEE SHEETS S-1 THRU S-__ FOR BRIDGE PLANS
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: $FILE$ DATE: $DATE$ $TIME$ PLOT DRIVER: $PLTDRV$ PEN TABLE: $PENTBL$


PROJECT REFERENCE NO. R-2413C
SHEET NO. 7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 15 of 40
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
CONST REV
R/W REV
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
SITE 5
-Y20- POT 9+76.906
BEGIN CONSTRUCTION
-Y20- PC 11+12.356
MATCH LINE STA. 24+50 -L REV.- SHEET 6
MATCH LINE STA. 28+00 -L REV.- SHEET 8
TOE PROTECTION
STA 11+66 TO
STA 12+06 -SB US220 RAMP- RT
SEE DETAIL #8
NOTE:
PROVIDE 152mm DECK DRAINS ON 1.83m CENTERS FROM BEGIN BRIDGE TO STA. 11+30 AND STA. 11+50 TO END BRIDGE SB US 220 RT
0.6M BASE DITCH
EST DDE 44.5 CM
SLOPE=2.6%
SEE DETAIL #12
SB US 220 RP POT 11+72.029
END APPROACH SLAB
SB US 220 RP POT 11+68.700
END BRIDGE
SB US 220 RAMP ST 11+00.253
SB US 220 RAMP CS 10+39.253
CLASS 'B' RIPRAP
PROP 1.2m WW 1-S-BW
400 CSP W/ELBOWS
ROD AND LUG CONNECTORS
W/SLEEVE GASKETS
SB US 220 RP POT 11+18.700
BEGIN BRIDGE
SB US 220 RP POT 11+14.371
BEGIN APPROACH SLAB
'V' DITCH
EST DDE=1.8 CM
SLOPE = 0.30%
SEE DETAIL #3
CLASS 'B' RIP RAP
ENERGY DISSIPATOR
SEE DETAIL #31
TOE PROTECTION W/PSRM
STA 26+40 TO 28+00 -LREV- LT
SEE DETAIL #9
SB US 220 RAMP TS 8+99.989
-L REV- POT 27+27.641
17.800m LT
REMOVE
TEMP. WORKBRIDGE
RIVER
-L REV- POT 24+83.048
END BRIDGE (SBL)
CLASS 'II' RIP RAP
TO EL 231.5
+/-85 mTONS
2GI W/FG
2GI
BROKEN PAVEMENT ABANDONED RD
SB US 220 RAMP SC 9+60.989
-L REV-
-L REV- POT 24+88.383
END APPROACH SLAB (SBL)
US 220 7.4 BST
-L REV- POT 24+83.287
END APPROACH SLAB (NBL)
-L REV- POT 24+78.252
END BRIDGE (NBL)
450 CSP W/ELBOWS
ROD AND LUG CONNECTORS
W/SLEEVE GASKETS
LAT 0.9m BASE DITCH
STA 27+00 TO
STA 28+57 -LREV- RT
SEE DETAIL #17
HW
EXIST R/W
CLASS 'B' RIP RAP
PROP 1.2m WW 1-S-BW
LAT 0.6m BASE DITCH
W/CLASS 'B' RIP RAP
STA 24+70 TO
STA 25+40 -LREV- RT
SEE DETAIL #15
LAT 'V' DITCH W/CLASS 'B' RIP RAP
STA 25+40 TO STA 26+20 -LREV- RT
SEE DETAIL #4
LAT 'V' DITCH
STA 26+20 TO
STA 26+80 -LREV- RT
SEE DETAIL #16
0.6m BASE DITCH
EST DDE=153 CM
SLOPE=0.3%
SEE DETAIL #1
CLASS 'II' RIP RAP
TO TOP OF BERM
1200 WD RAIL
SR 2104 SPOTSWOOD RD 5.4 BST
RETAIN
ISFD
NOTE:
PROVIDE 152mm DECK DRAINS ON 1.83m CENTERS
FROM BEGIN BRIDGE TO STA. 24+15 AND
STA. 24+65 TO END BRIDGE SBL -LREV- LT
FROM BEGIN BRIDGE TO STA 24+03 AND
STA. 24+23 TO END BRIDGE NBL -LREV- RT
SEE SHEET 36 FOR -L REV- PROFILE
SEE SHEETS 47 & 48 FOR -SB US 220 RAMP- PROFILE
SEE SHEETS 62, 63 & 64 FOR -Y20 REV- & -Y20- PROFILE
SEE SHEET 2-H FOR BRIDGE SKETCHES
SEE SHEETS S-1THRU S-__ FOR BRIDGE PLANS
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

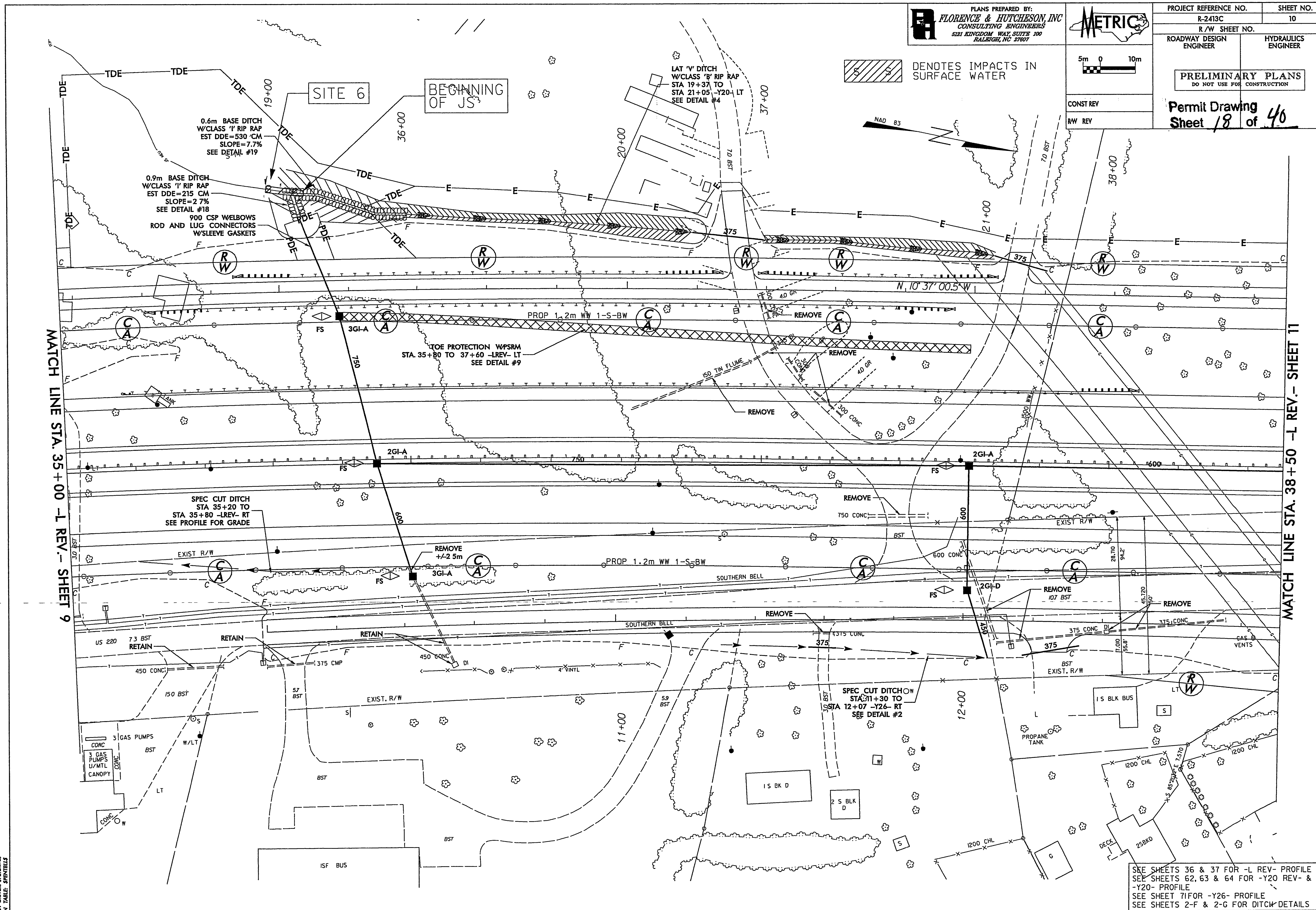


6/17/10 - ELIMINATED PARCEL 21Z REVISED DRAINAGE
2/15/10 - PARCEL 18Z ADDED TEMPORARY DRAINAGE EASEMENT
2/15/10 - PARCEL 19Z ADDED PERMANENT DRAINAGE EASEMENT
2/15/10 - PARCEL 20Z REVISED PERMANENT DRAINAGE EASEMENT

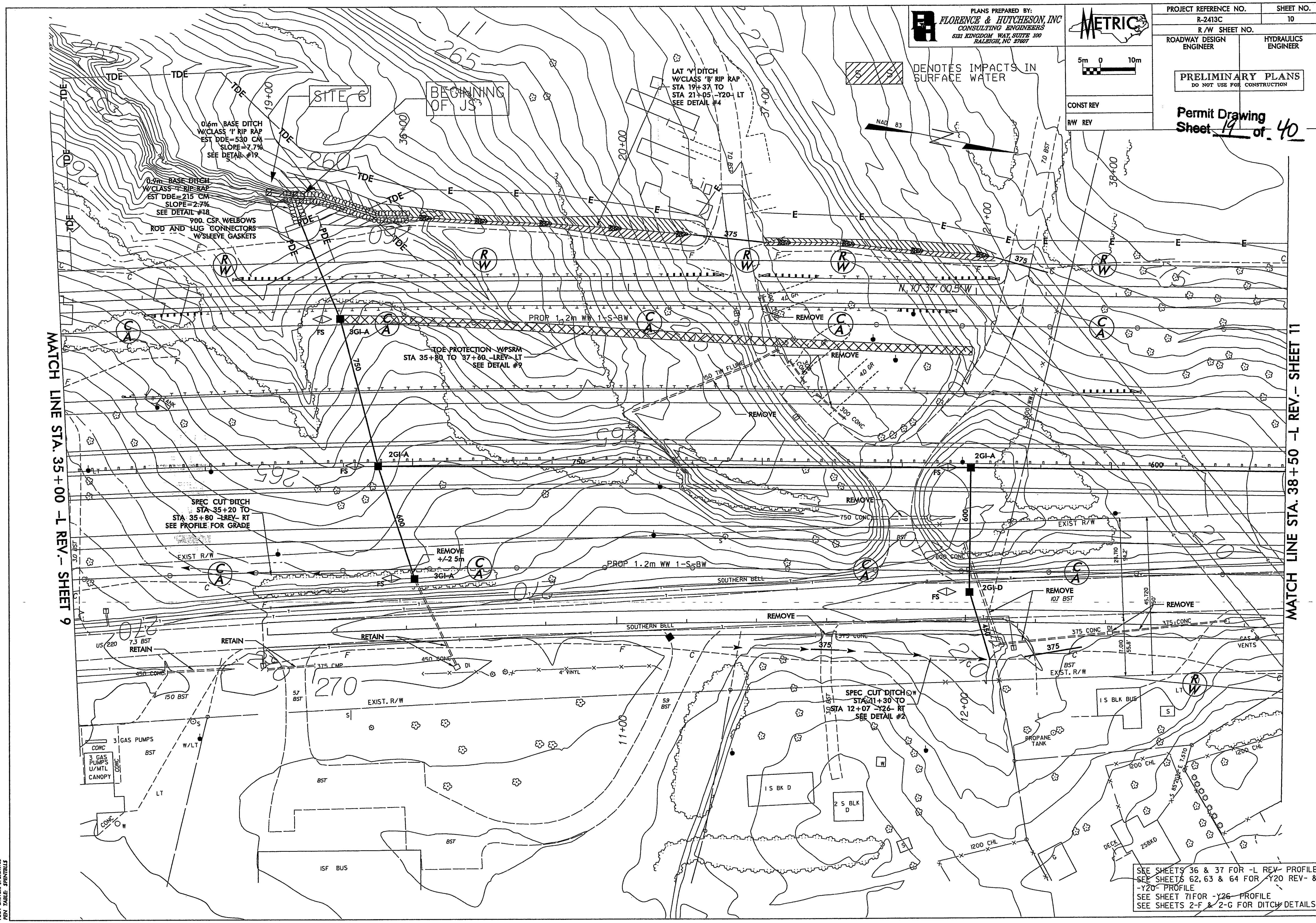


6/17/10 – ELIMINATED PARCEL 21Z REVISED DRAINAGE
2/15/10 – PARCEL 18Z ADDED TEMPORARY DRAINAGE EASEMENT
2/15/10 – PARCEL 19Z ADDED PERMANANT DRAINAGE EASEMENT
2/15/10 – PARCEL 20Z REVISED PERMANANT DRAINAGE EASEMENT

FILE: $FILEL$
DATE: $DATE$ $TIME$
PLOT DRIVER: $PLTDRVR$
PEN TABLE: $PENTBL$

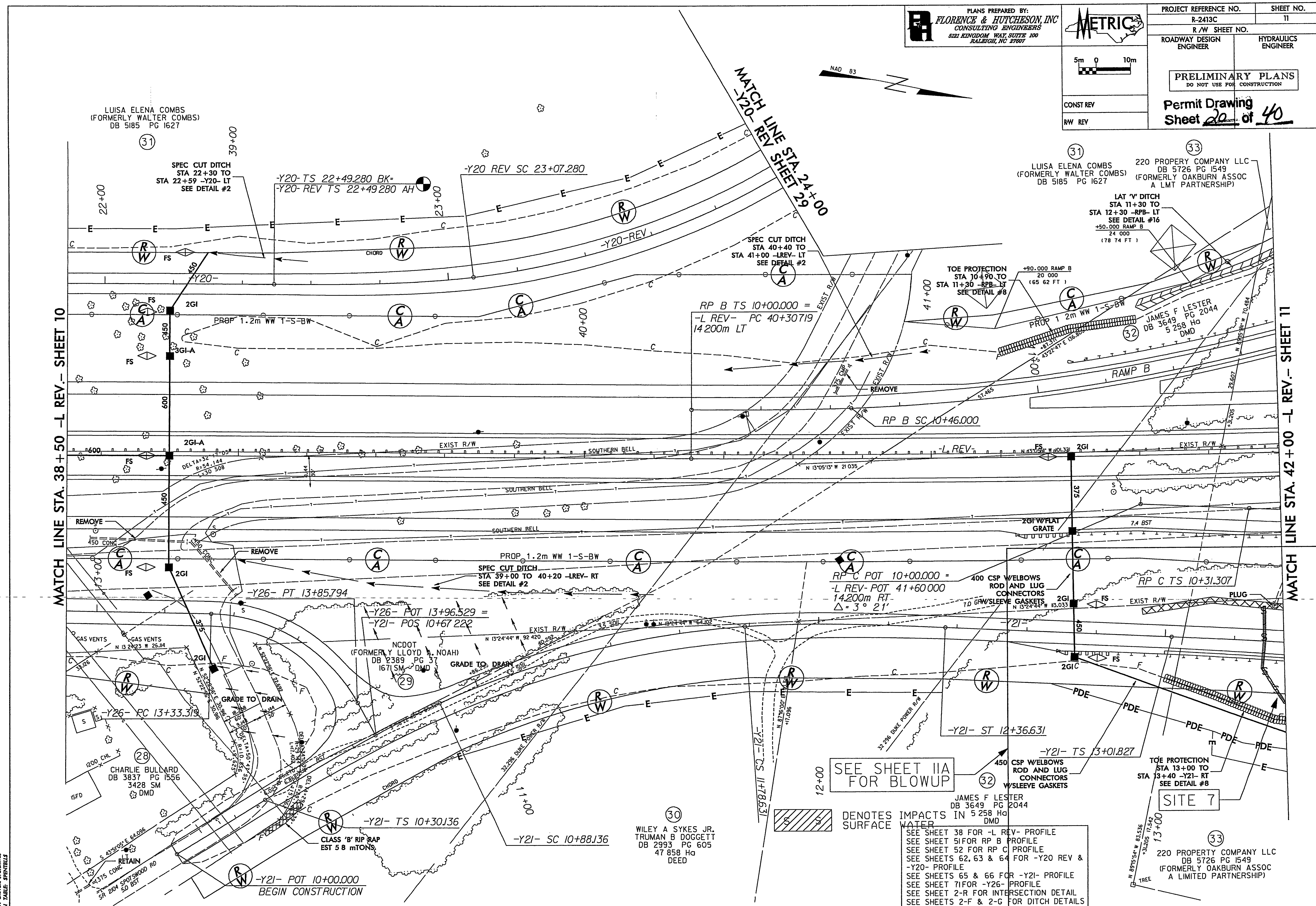


11/03/09 - PARCEL 26 REVISED TEMPORARY DRAINAGE EASEMENT

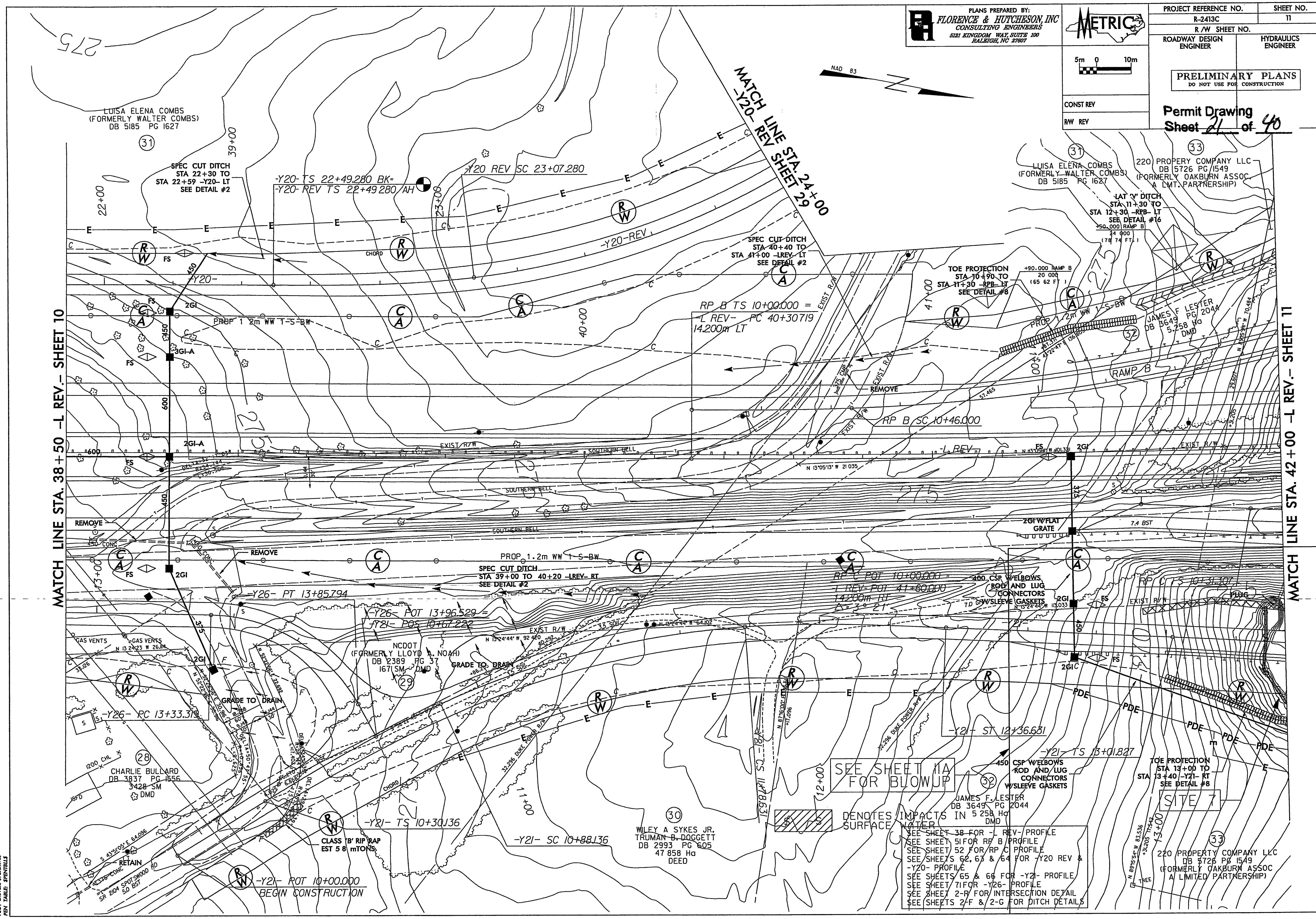


1V0309 - PARCEL 26 REVISED TEMPORARY DRAINAGE EASEMENT

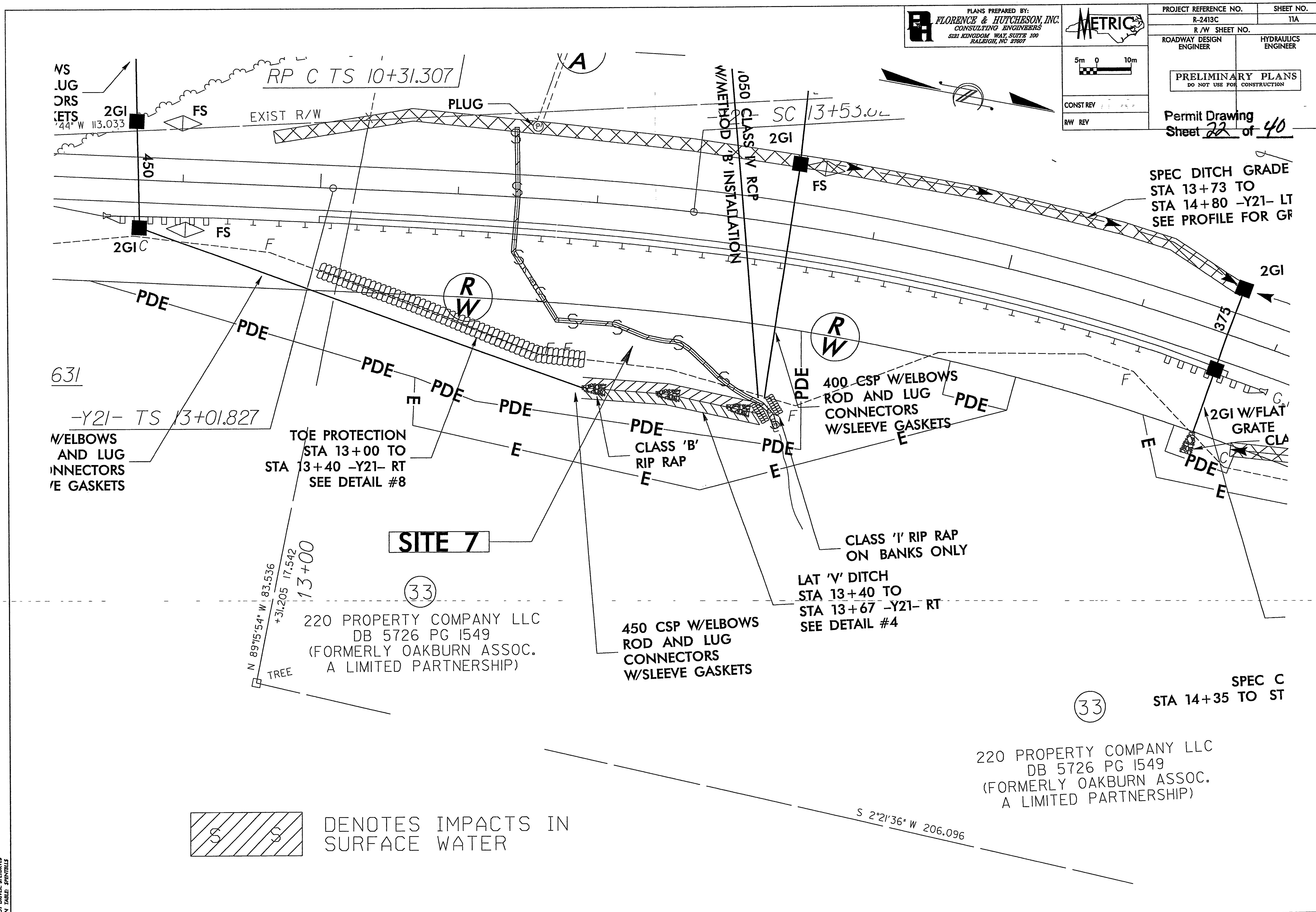
FILE: $FILE$
DATE: $DATE$
PLOT DRIVER: $PLTDRV$
PEN TABLE: $PENTBL$
$TIME$



11/03/09 - PARCEL 30 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 31 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 33 REVISED PERMANENT DRAINAGE EASEMENT



11/03/09 - PARCEL 30 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 31 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 33 REVISED PERMANENT DRAINAGE EASEMENT


PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
11A
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
5m 0 10m
CONST REV
R/W REV
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 22 of 40
RP C TS 10+31.307
EXIST R/W
PLUG
2GI
FS
450
1050 CLASS IV RCP
W/METHOD 'B' INSTALLATION
SC 13+53.0
SPEC DITCH GRADE
STA 13+73 TO
STA 14+80 -Y21- LT
SEE PROFILE FOR GR
375
PDE
E
F
R/W
631
-Y21- TS 13+01.827
W/ELBOWS
AND LUG
NNECTORS
E GASKETS
TOE PROTECTION
STA 13+00 TO
STA 13+40 -Y21- RT
SEE DETAIL #8
CLASS 'B'
RIP RAP
400 CSP W/ELBOWS
ROD AND LUG
CONNECTORS
W/SLEEVE GASKETS
2GI W/FLAT
GRATE
SITE 7
CLASS 'I' RIP RAP
ON BANKS ONLY
LAT 'V' DITCH
STA 13+40 TO
STA 13+67 -Y21- RT
SEE DETAIL #4
13+00
+31.205 17.542
N 89°15'54" W 83.536
TREE
33
220 PROPERTY COMPANY LLC
DB 5726 PG 1549
(FORMERLY OAKBURN ASSOC.
A LIMITED PARTNERSHIP)
450 CSP W/ELBOWS
ROD AND LUG
CONNECTORS
W/SLEEVE GASKETS
SPEC C
STA 14+35 TO ST
33
220 PROPERTY COMPANY LLC
DB 5726 PG 1549
(FORMERLY OAKBURN ASSOC.
A LIMITED PARTNERSHIP)
S 2°21'36" W 206.096
DENOTES IMPACTS IN
SURFACE WATER

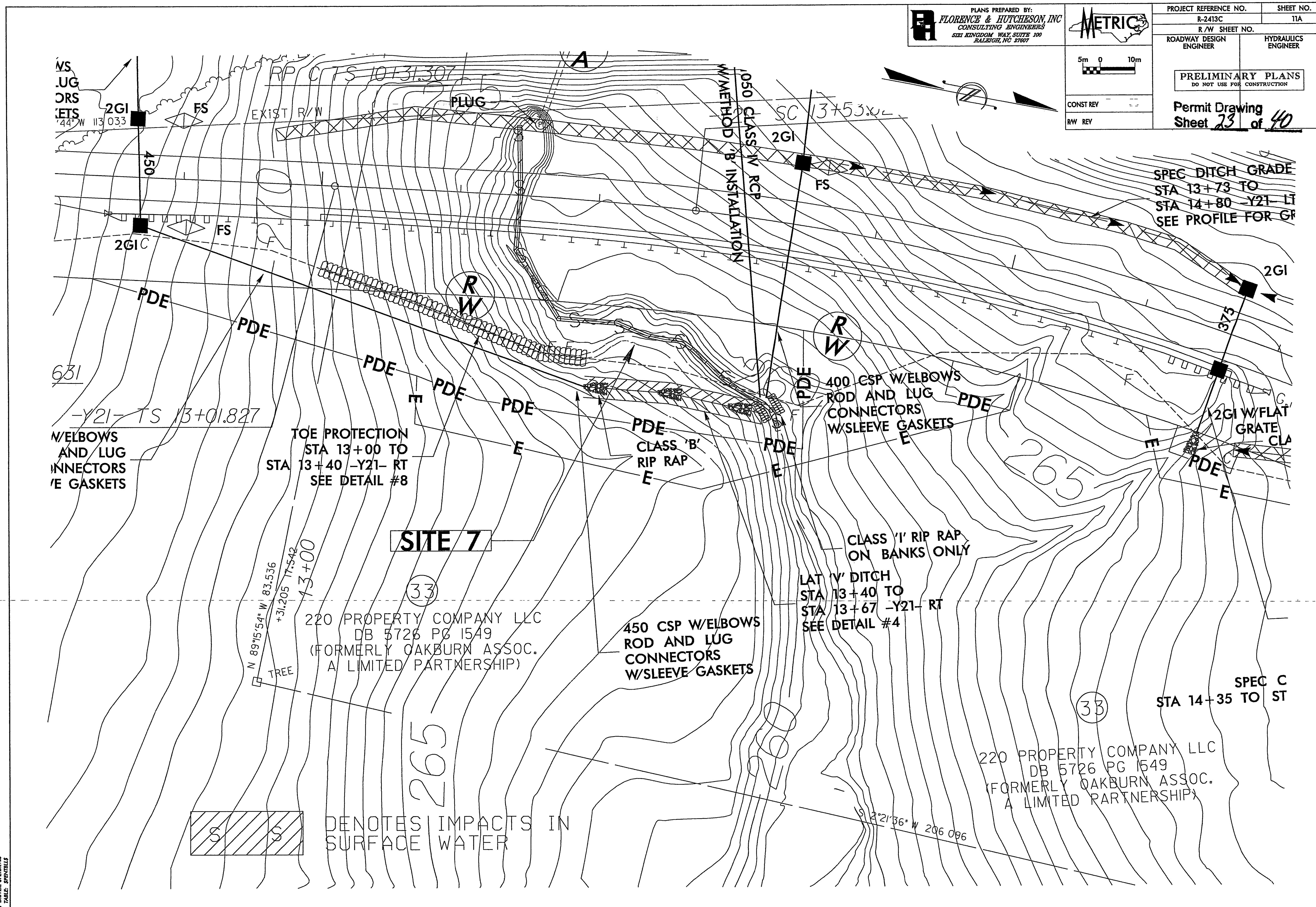
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	11A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 23 of 40



03/23/09 - ADDED PARCEL NO. 357 DESIGNATION TO PUE
11/03/09 - PARCEL NO. 33 REVISED PERMANENT DRAINAGE EASEMENT
REVISED TEMPORARY CONSTRUCTION EASEMENT
REVISED TEMPORARY DRAINAGE EASEMENT

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
6321 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

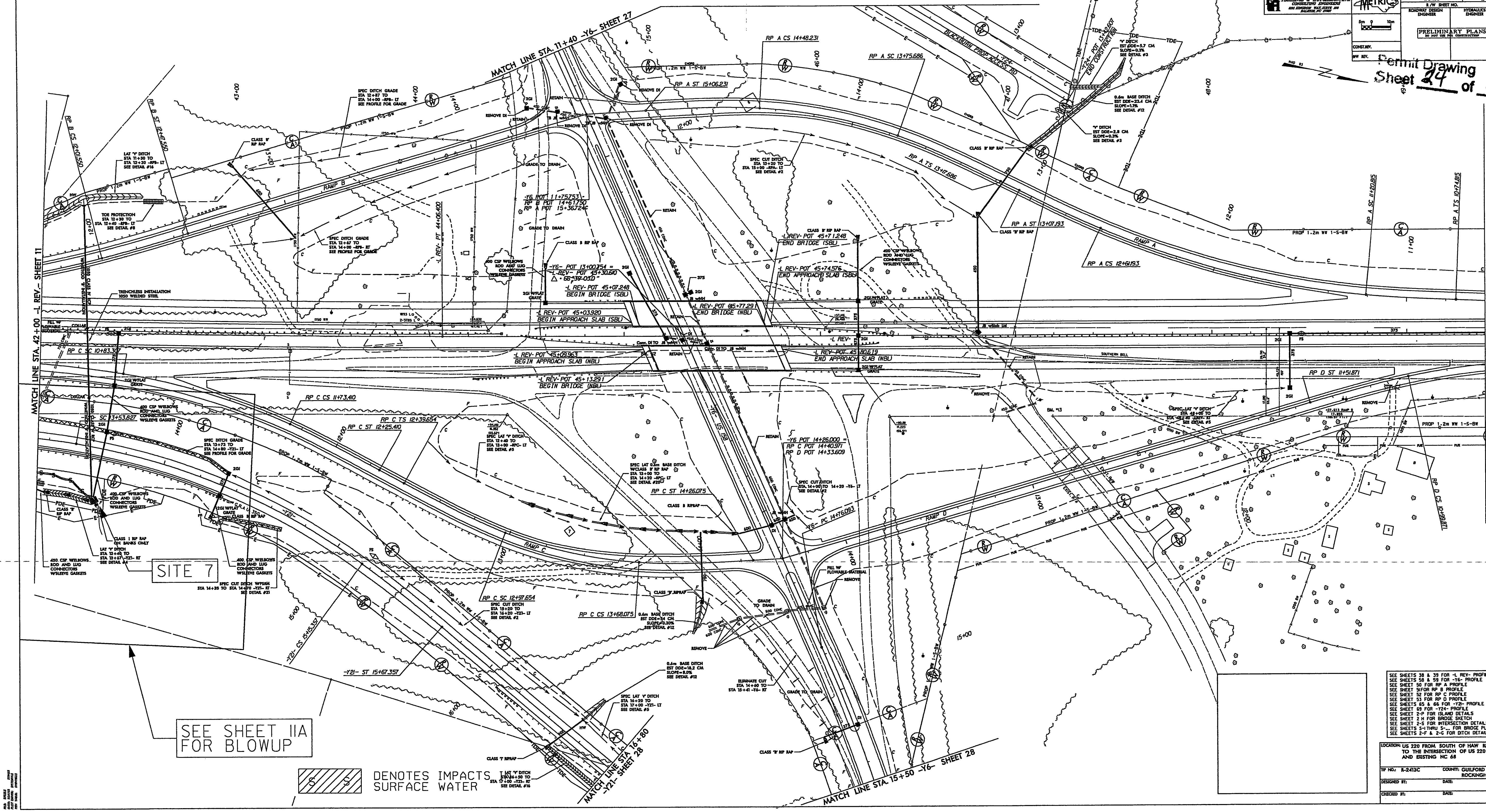
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.
R/W REV.

Permit Drawing
Sheet 24 of 38

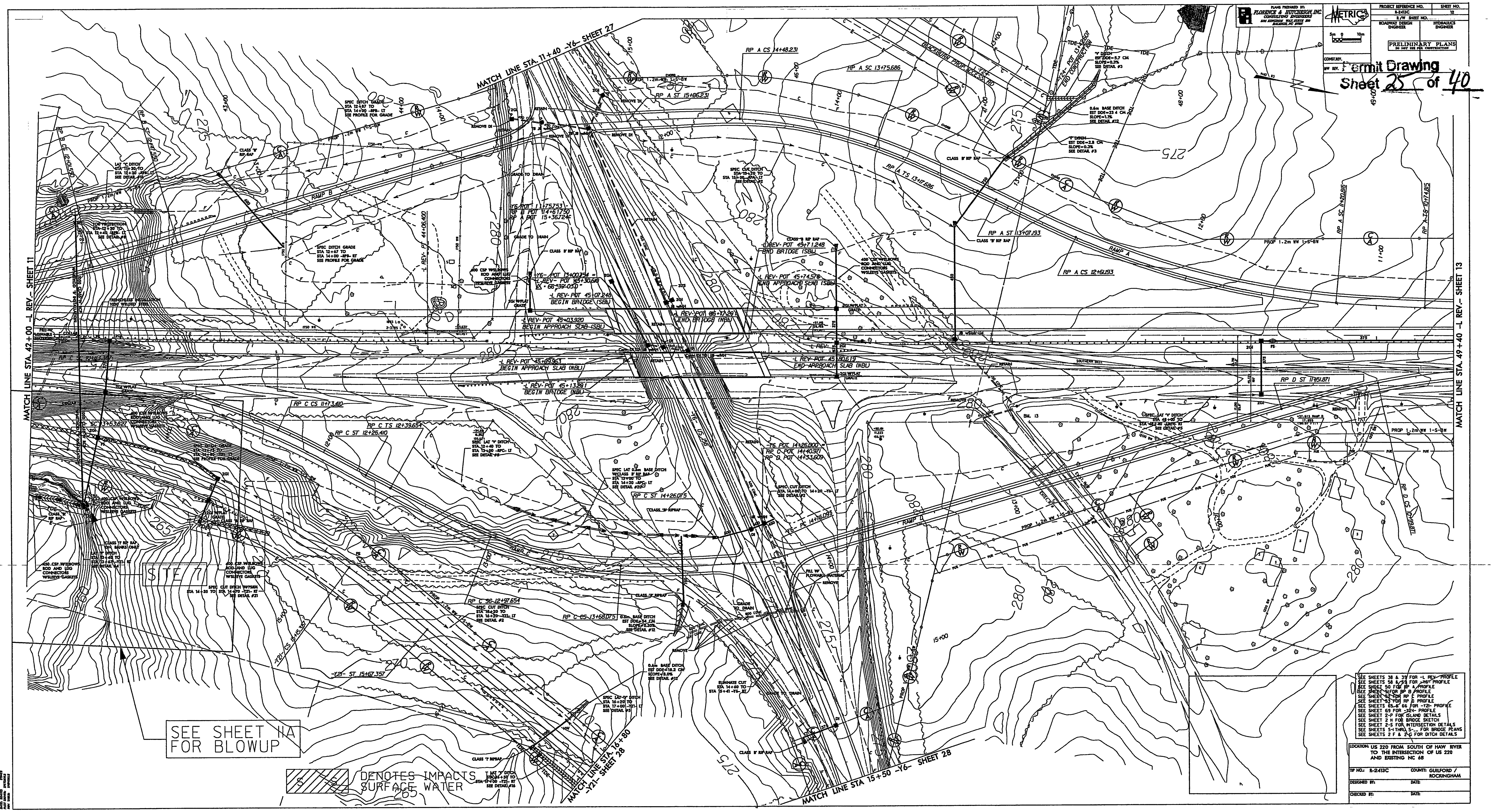


SEE SHEETS 38 & 39 FOR -L REV- PROFILE
SEE SHEETS 58 & 59 FOR -Y6- PROFILE
SEE SHEET 50 FOR RP A PROFILE
SEE SHEET 51 FOR RP B PROFILE
SEE SHEET 52 FOR RP C PROFILE
SEE SHEET 53 FOR RP D PROFILE
SEE SHEETS 65 & 66 FOR -Y21- PROFILE
SEE SHEET 69 FOR -Y24- PROFILE
SEE SHEET 2-P FOR ISLAND DETAILS
SEE SHEET 2 H FOR BRIDGE SKETCH
SEE SHEET 2-S FOR INTERSECTION DETAILS
SEE SHEETS S-1 THRU S-__ FOR BRIDGE PLANS
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

LOCATION: US 220 FROM SOUTH OF HAW RIVER TO THE INTERSECTION OF US 220 AND EXISTING NC 68

TIP NO.:	R-2413C	COUNTY:	GUILFORD / ROCKINGHAM
DESIGNED BY:		DATE:	
CHECKED BY:		DATE:	

03/23/09 - ADDED PARCEL NO. 35Z DESIGNATION TO PUE
11/03/09 - PARCEL NO. 33 REVISED PERMANENT DRAINAGE EASEMENT
REVISED TEMPORARY CONSTRUCTION EASEMENT
REVISED TEMPORARY DRAINAGE EASEMENT



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

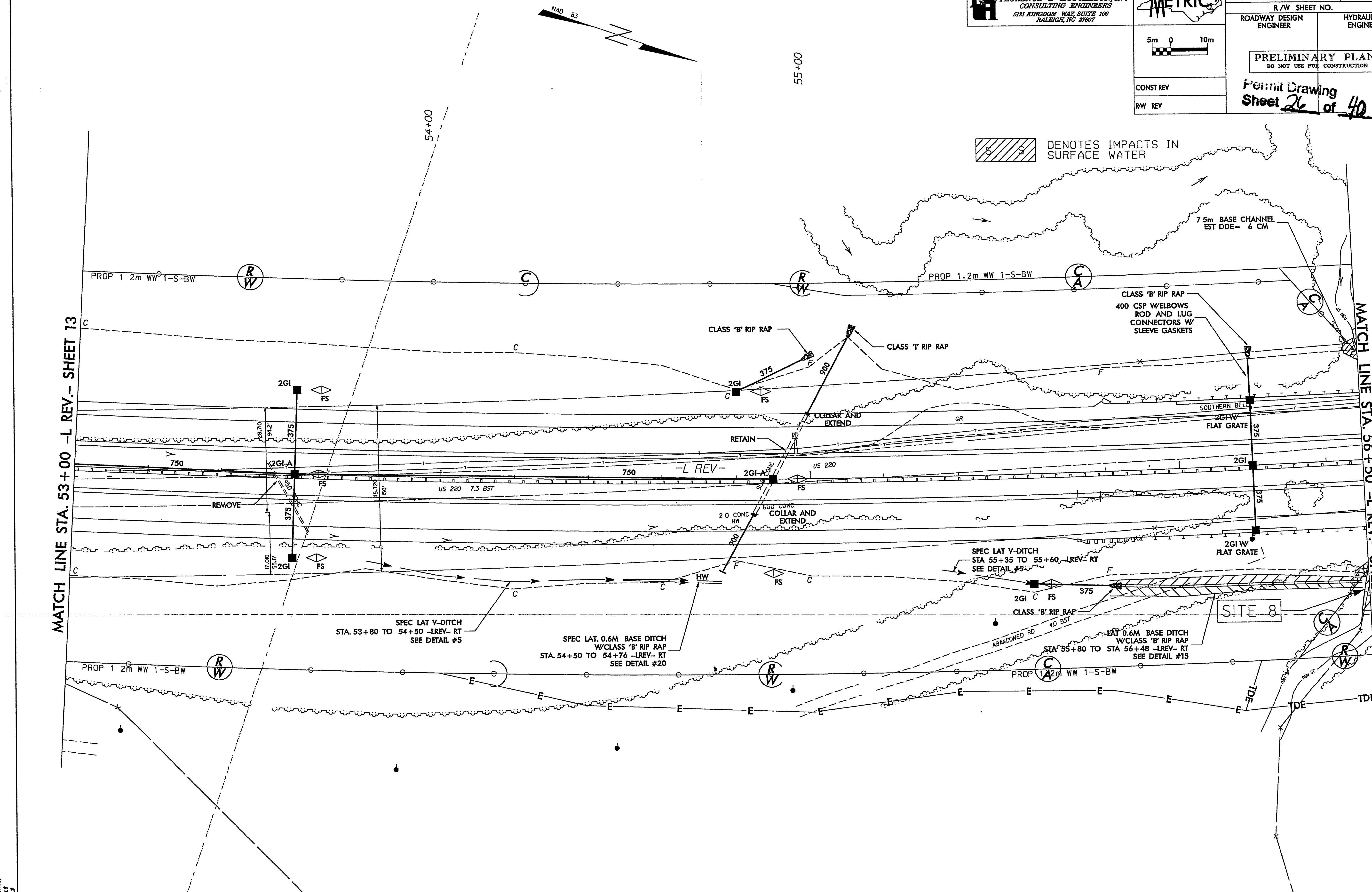
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV

Permit Drawing
Sheet 26 of 40



SEE SHEET 40 FOR -L REV- PROFILE
SEE SHEET 77 FOR TEMP XOVER D PLAN & PROFILE
SEE SHEET 81 & 82 FOR XOVRH PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: $FILES
DATE: $DATE$ $TIME$
PLOT DRIVER: $PLTDRV$
PEN TABLE: $PENTBL$

PLANS PREPARED BY: FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 200
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

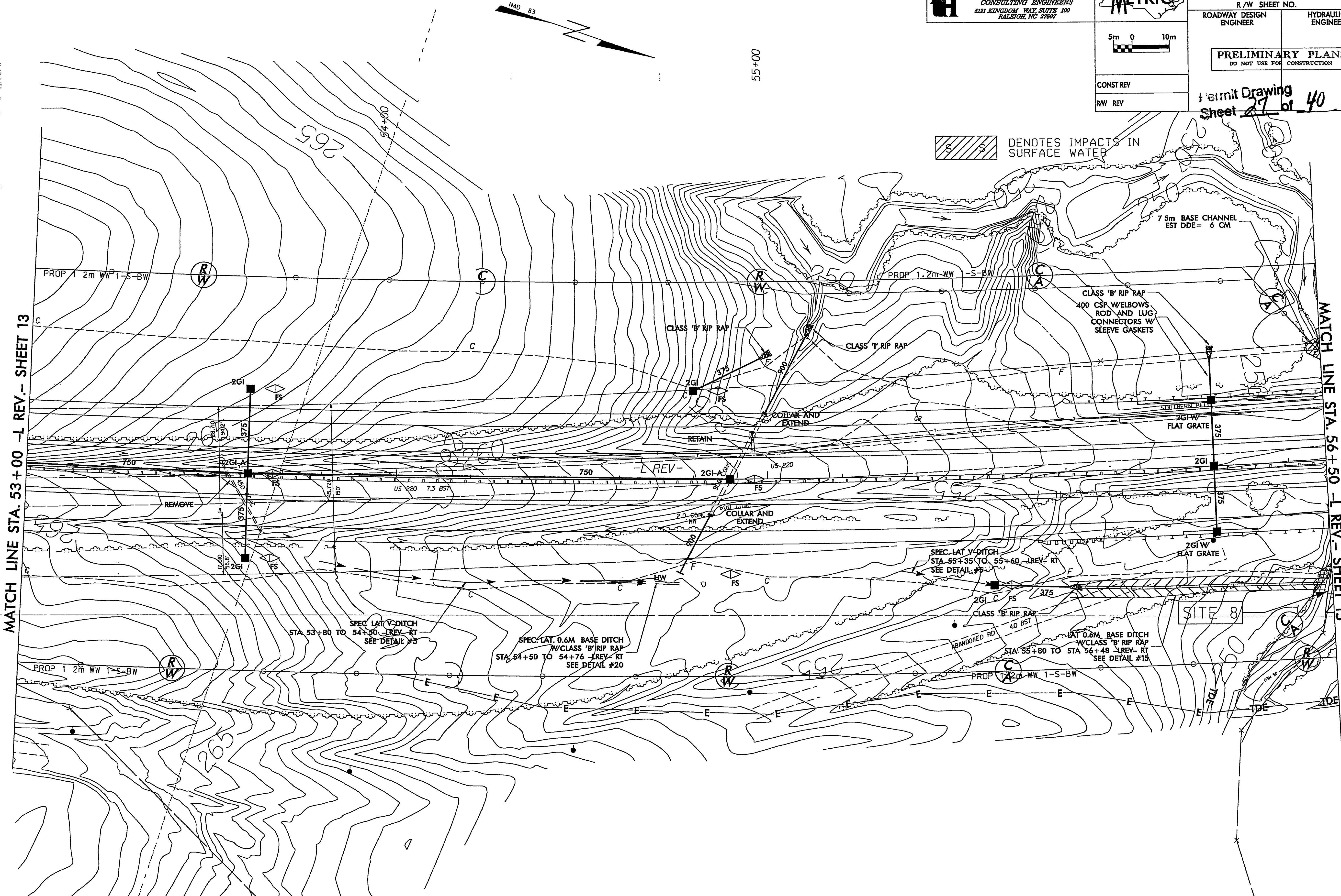
CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

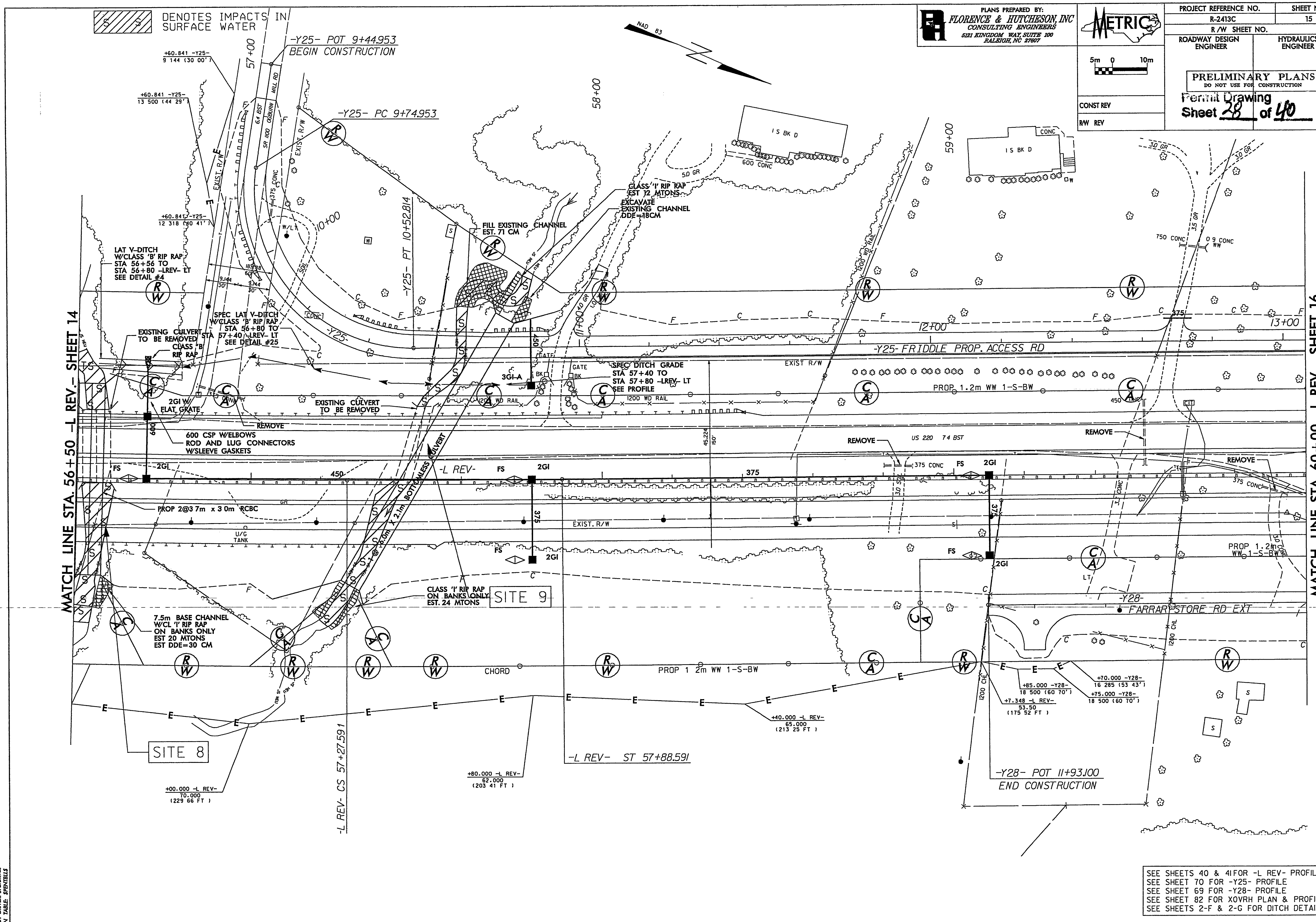
Permit Drawing
Sheet 27 of 40

DENOTES IMPACTS IN SURFACE WATER

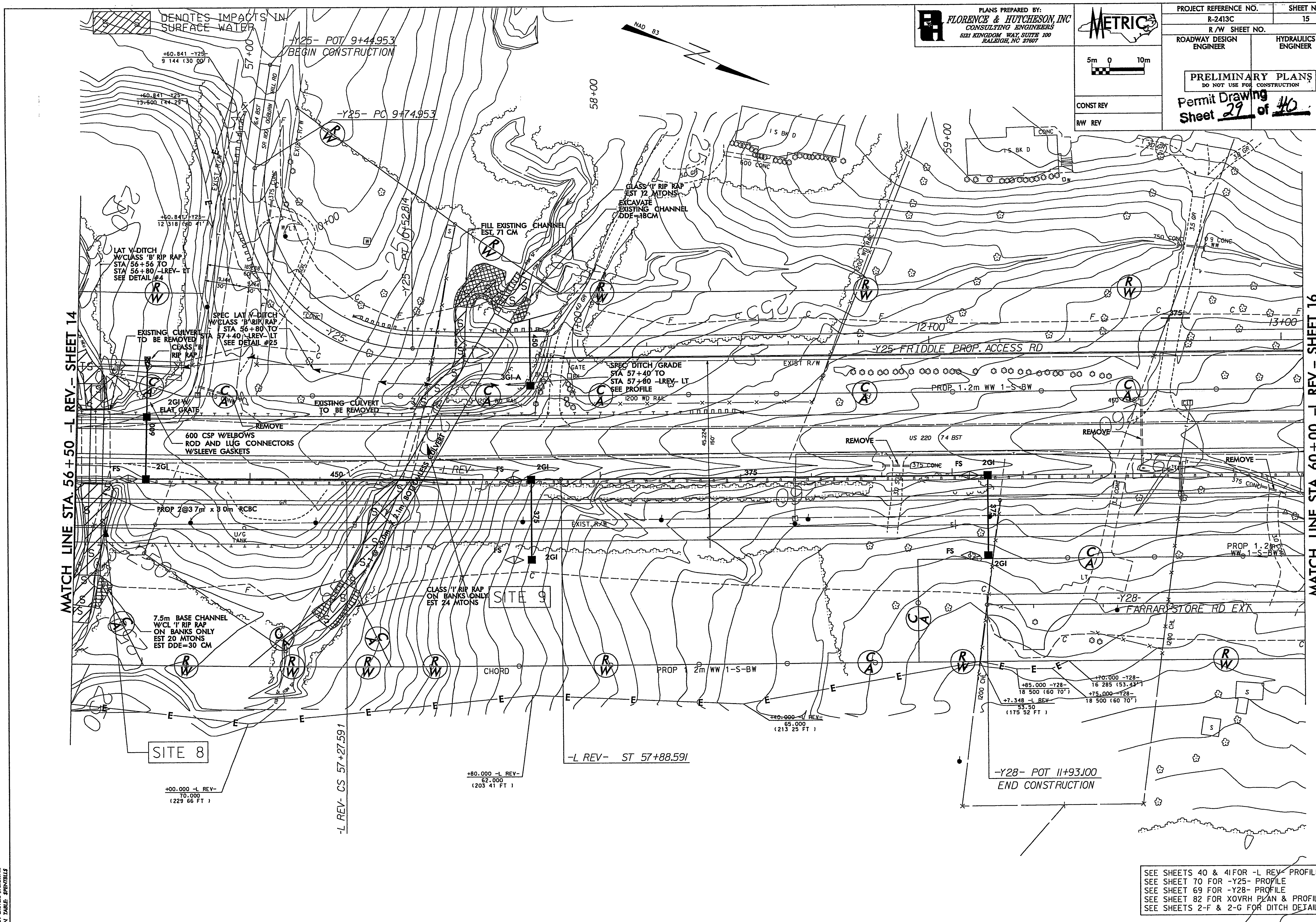


SEE SHEET 40 FOR -L REV- PROFILE
SEE SHEET 77 FOR TEMP XOVER D PLAN & PROFILE
SEE SHEET 81& 82 FOR XOVRH PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: $FILE$
DATE: $DATE$ $TIME$
PLOT DRIVER: $PLTDRV$
PEN TABLE: $PENTBL$



11/03/09 - PARCEL 35 ADDED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 42 ADDED TEMPORARY CONSTRUCTION EASEMENT



11/03/09 - PARCEL 35 ADDED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 42 ADDED TEMPORARY CONSTRUCTION EASEMENT

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

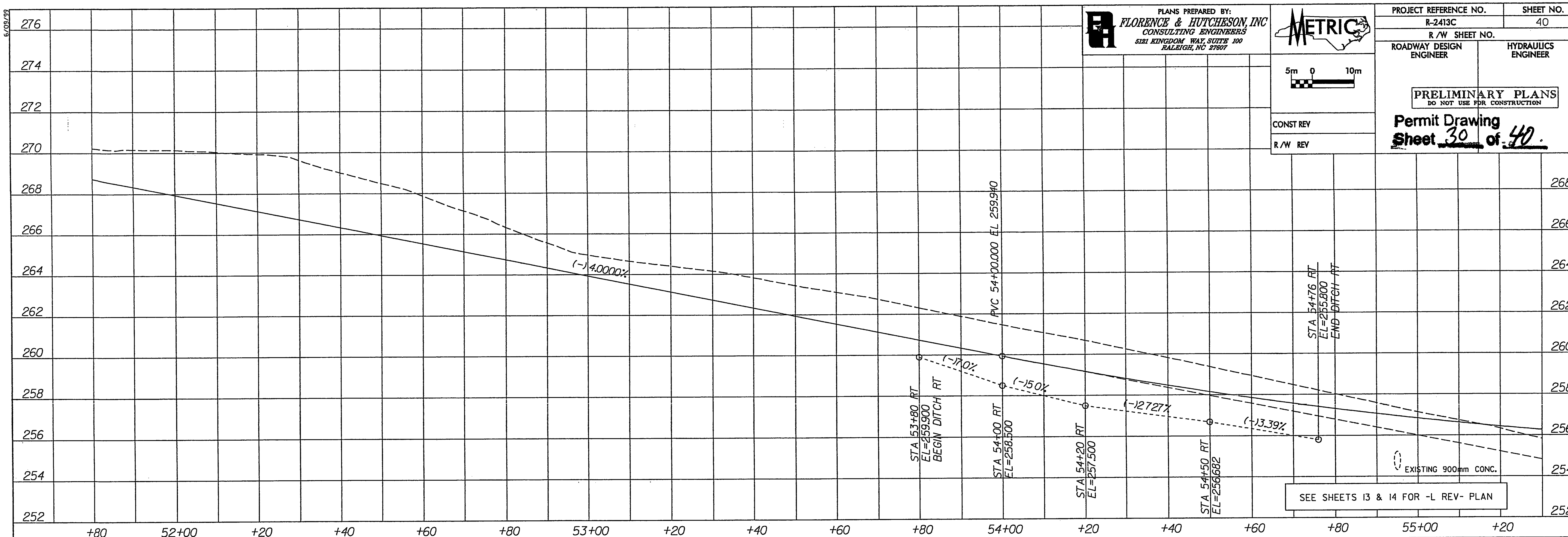
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	40
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

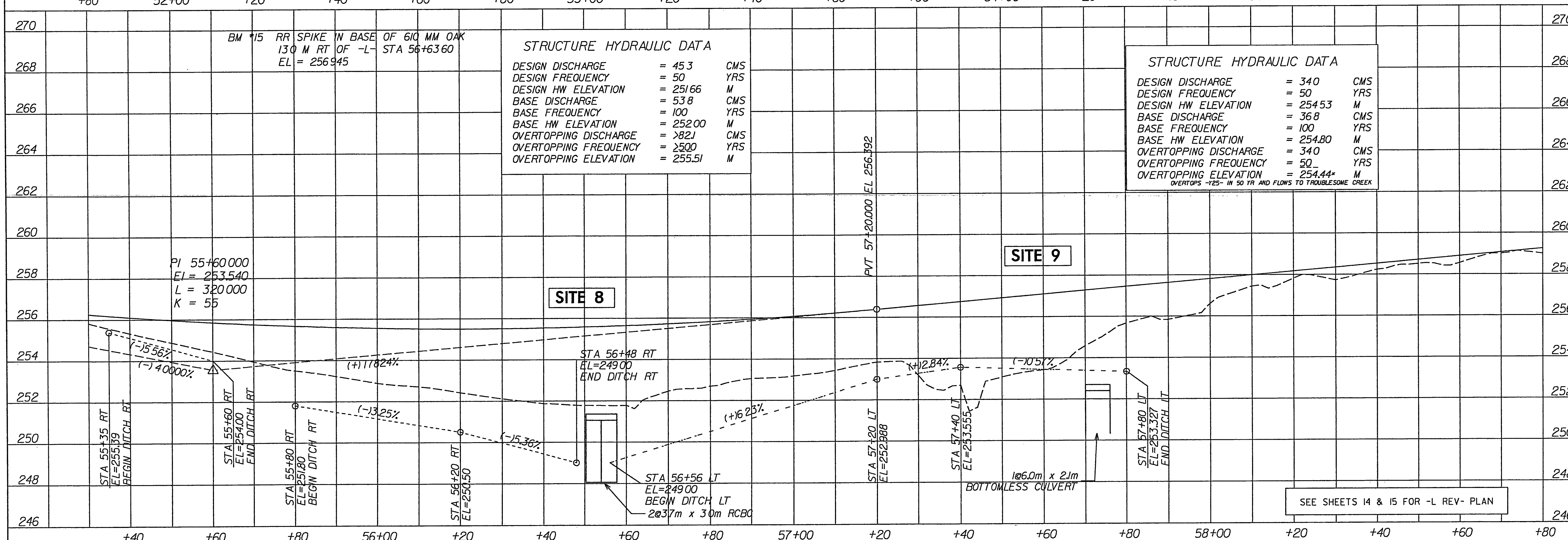
CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 30 of 40.





STRUCTURE HYDRAULIC DATA

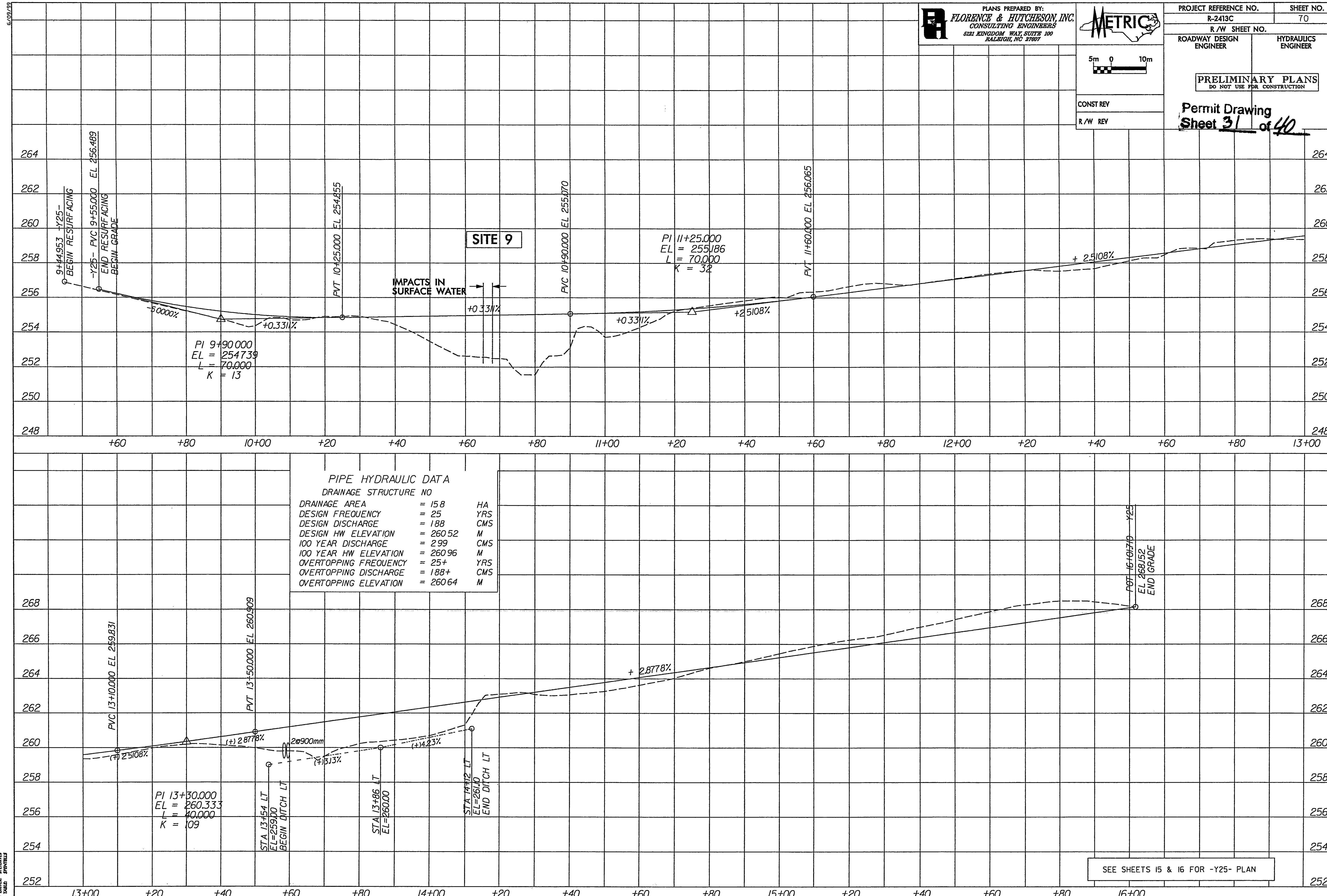
DESIGN DISCHARGE	= 45.3	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 251.66	M
BASE DISCHARGE	= 53.8	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 252.00	M
OVERTOPPING DISCHARGE	= >82.1	CMS
OVERTOPPING FREQUENCY	= ≥500	YRS
OVERTOPPING ELEVATION	= 255.51	M

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 34.0	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 254.53	M
BASE DISCHARGE	= 36.8	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 254.80	M
OVERTOPPING DISCHARGE	= 34.0	CMS
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING ELEVATION	= 254.44*	M

*OVERTOPS -Y25- IN 50 YR AND FLOWS TO TROUBLESOME CREEK

-L REV-

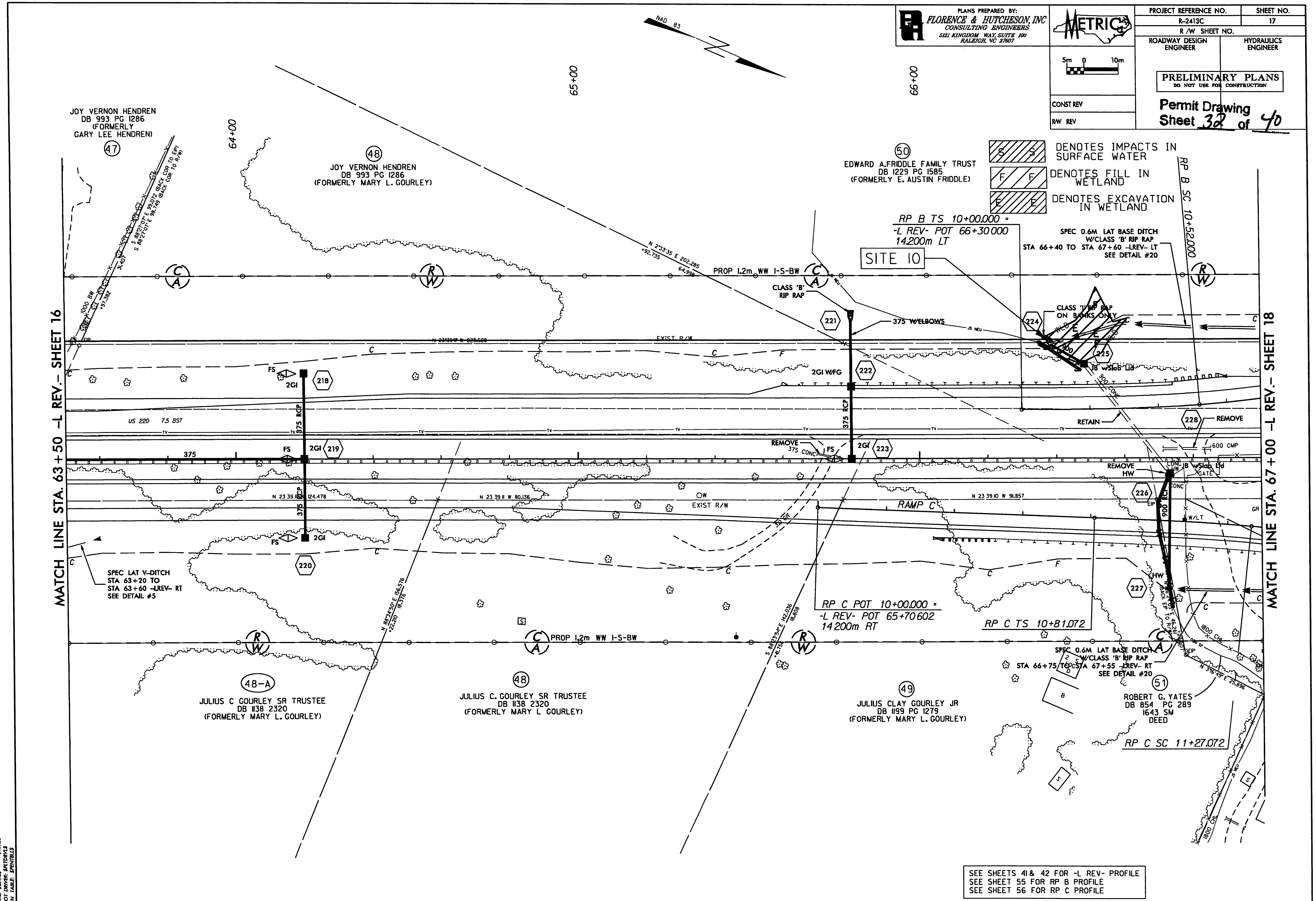


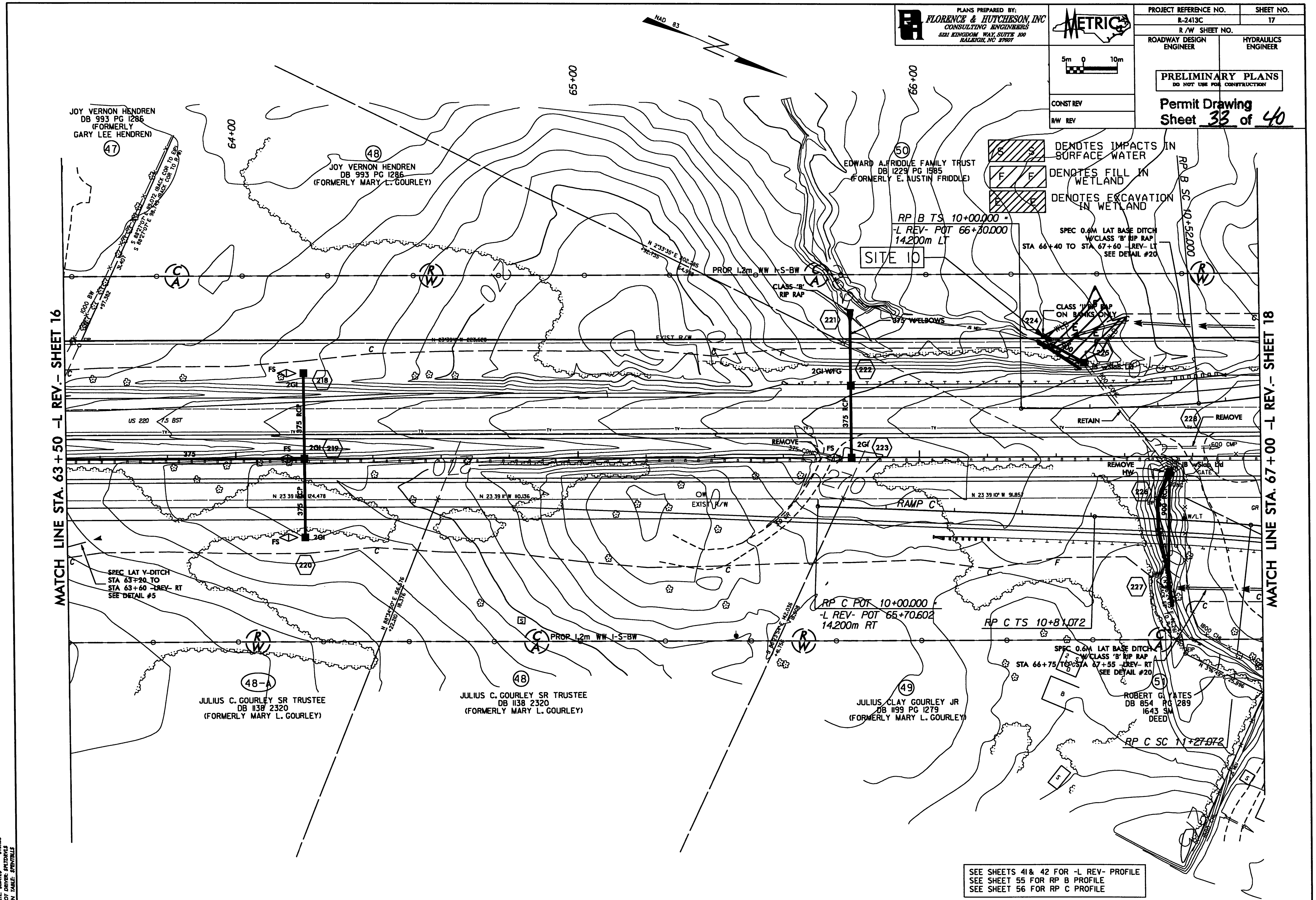
PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO

DRAINAGE AREA	= 15.8	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 1.88	CMS
DESIGN HW ELEVATION	= 260.52	M
100 YEAR DISCHARGE	= 2.99	CMS
100 YEAR HW ELEVATION	= 260.96	M
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 1.88+	CMS
OVERTOPPING ELEVATION	= 260.64	M

-Y25- FRIDDLE PROPERTY ACCESS RD.


PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
5m 0 10m
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
Permit Drawing
Sheet 32 of 40
NAD 83
64+00
65+00
66+00
JOY VERNON HENDREN
DB 993 PG 1286
(FORMERLY
GARY LEE HENDREN)
47
48
JOY VERNON HENDREN
DB 993 PG 1286
(FORMERLY MARY L. GOURLEY)
50
EDWARD A.FRIDDLE FAMILY TRUST
DB 1229 PG 1585
(FORMERLY E. AUSTIN FRIDDLE)
DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
RP B SC 10+52.000
RP B TS 10+00.000 =
-L REV- POT 66+30.000
14.200m LT
SITE 10
SPEC 0.6M LAT BASE DITCH
W/CLASS 'B' RIP RAP
STA 66+40 TO STA 67+60 -LREV- LT
SEE DETAIL #20
PROP 1.2m WW I-S-BW
CLASS 'B' RIP RAP
375 W/ELBOWS
CLASS 'I' RIP RAP ON BANKS ONLY
EXIST R/W
2GI W/FG
2GI
375 RCP
US 220 7.5 BST
REMOVE
375 CONC
RETAIN
600 CMP
REMOVE HW
RAMP C
EXIST R/W
SPEC LAT V-DITCH
STA 63+20 TO
STA 63+60 -LREV- RT
SEE DETAIL #5
RP C POT 10+00.000 =
-L REV- POT 65+70.602
14.200m RT
RP C TS 10+81.072
SPEC 0.6M LAT BASE DITCH
W/CLASS 'B' RIP RAP
STA 66+75 TO STA 67+55 -LREV- RT
SEE DETAIL #20
MATCH LINE STA. 63+50 -L REV.- SHEET 16
MATCH LINE STA. 67+00 -L REV.- SHEET 18
48-A
JULIUS C GOURLEY SR TRUSTEE
DB 1138 2320
(FORMERLY MARY L. GOURLEY)
48
JULIUS C. GOURLEY SR TRUSTEE
DB 1138 2320
(FORMERLY MARY L GOURLEY)
49
JULIUS CLAY GOURLEY JR
DB 1199 PG 1279
(FORMERLY MARY L. GOURLEY)
51
ROBERT G. YATES
DB 854 PG 289
1643 SM
DEED
RP C SC 11+27.072
SEE SHEETS 41 & 42 FOR -L REV- PROFILE
SEE SHEET 55 FOR RP B PROFILE
SEE SHEET 56 FOR RP C PROFILE


PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
Permit Drawing
Sheet 33 of 40
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
JOY VERNON HENDREN
DB 993 PG 1286
(FORMERLY
GARY LEE HENDREN)
47
48
JOY VERNON HENDREN
DB 993 PG 1286
(FORMERLY MARY L. GOURLEY)
50
EDWARD A. FRIDDLE FAMILY TRUST
DB 1229 PG 1585
(FORMERLY E. AUSTIN FRIDDLE)
RP B TS 10+00.000
-L REV- POT 66+30.000
14.200m LT
SITE 10
SPEC 0.6M LAT BASE DITCH
W/CLASS 'B' RIP RAP
STA 66+40 TO STA 67+60 -LREV- LT
SEE DETAIL #20
RP B SC 10+52.000
PROP 1.2m WW I-S-BW
CLASS 'B' RIP RAP
375 W/ELBOWS
CLASS 'I' RIP RAP ON BANKS ONLY
EXIST R/W
US 220
RETAIN
REMOVE
RAMP C
MATCH LINE STA. 63+50 -L REV.- SHEET 16
MATCH LINE STA. 67+00 -L REV.- SHEET 18
SPEC LAT V-DITCH
STA 63+20 TO
STA 63+60 -LREV- RT
SEE DETAIL #5
RP C POT 10+00.000
-L REV- POT 65+70.602
14.200m RT
RP C TS 10+81.072
SPEC 0.6M LAT BASE DITCH
W/CLASS 'B' RIP RAP
STA 66+75 TO STA 67+55 -LREV- RT
SEE DETAIL #20
48-A
JULIUS C. GOURLEY SR TRUSTEE
DB 1138 2320
(FORMERLY MARY L. GOURLEY)
JULIUS C. GOURLEY SR TRUSTEE
DB 1138 2320
(FORMERLY MARY L. GOURLEY)
49
JULIUS CLAY GOURLEY JR
DB 1199 PG 1279
(FORMERLY MARY L. GOURLEY)
ROBERT G. YATES
DB 854 PG 289
1643 SM
DEED
RP C SC 11+27.072
51
SEE SHEETS 41 & 42 FOR -L REV- PROFILE
SEE SHEET 55 FOR RP B PROFILE
SEE SHEET 56 FOR RP C PROFILE

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

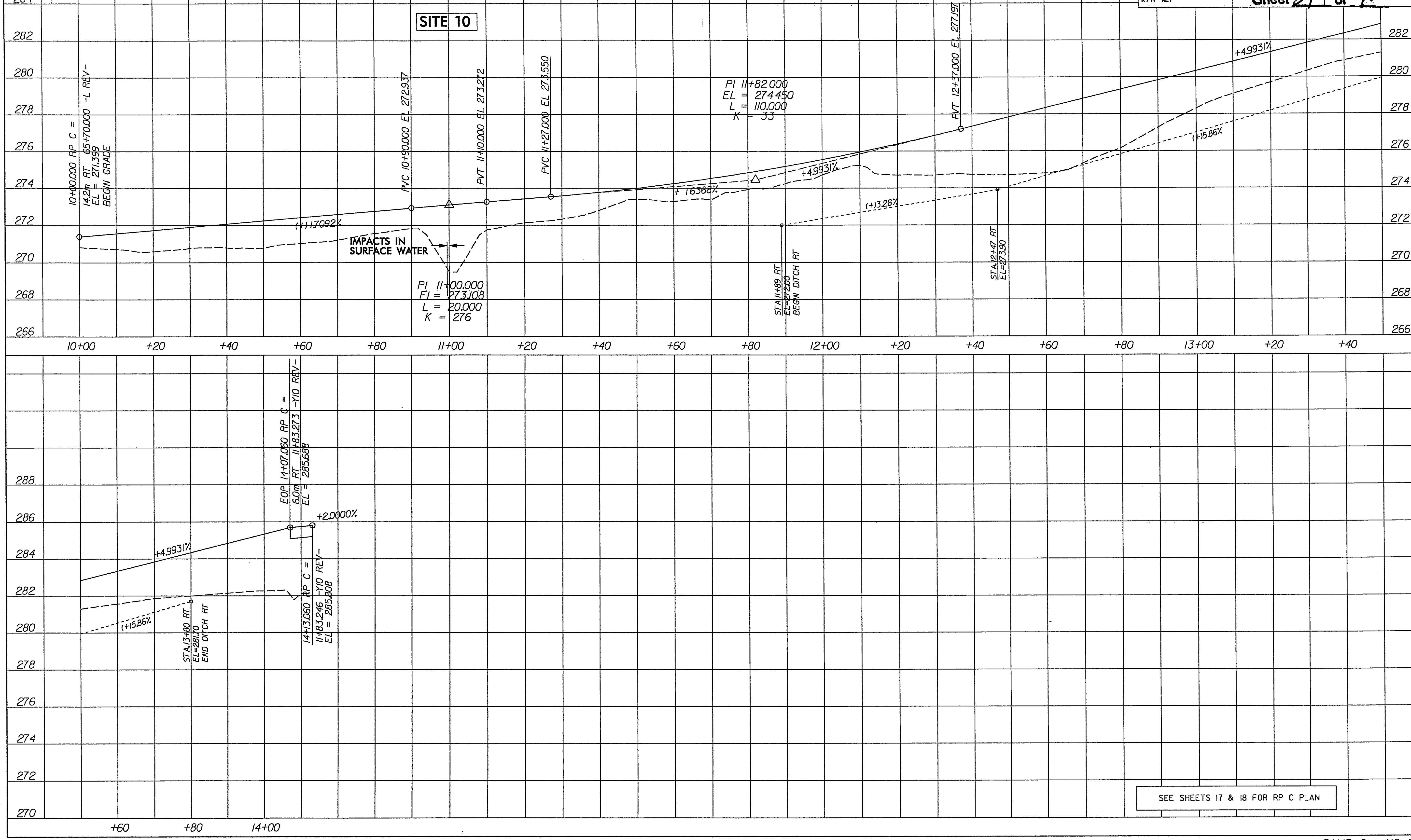
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	56
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

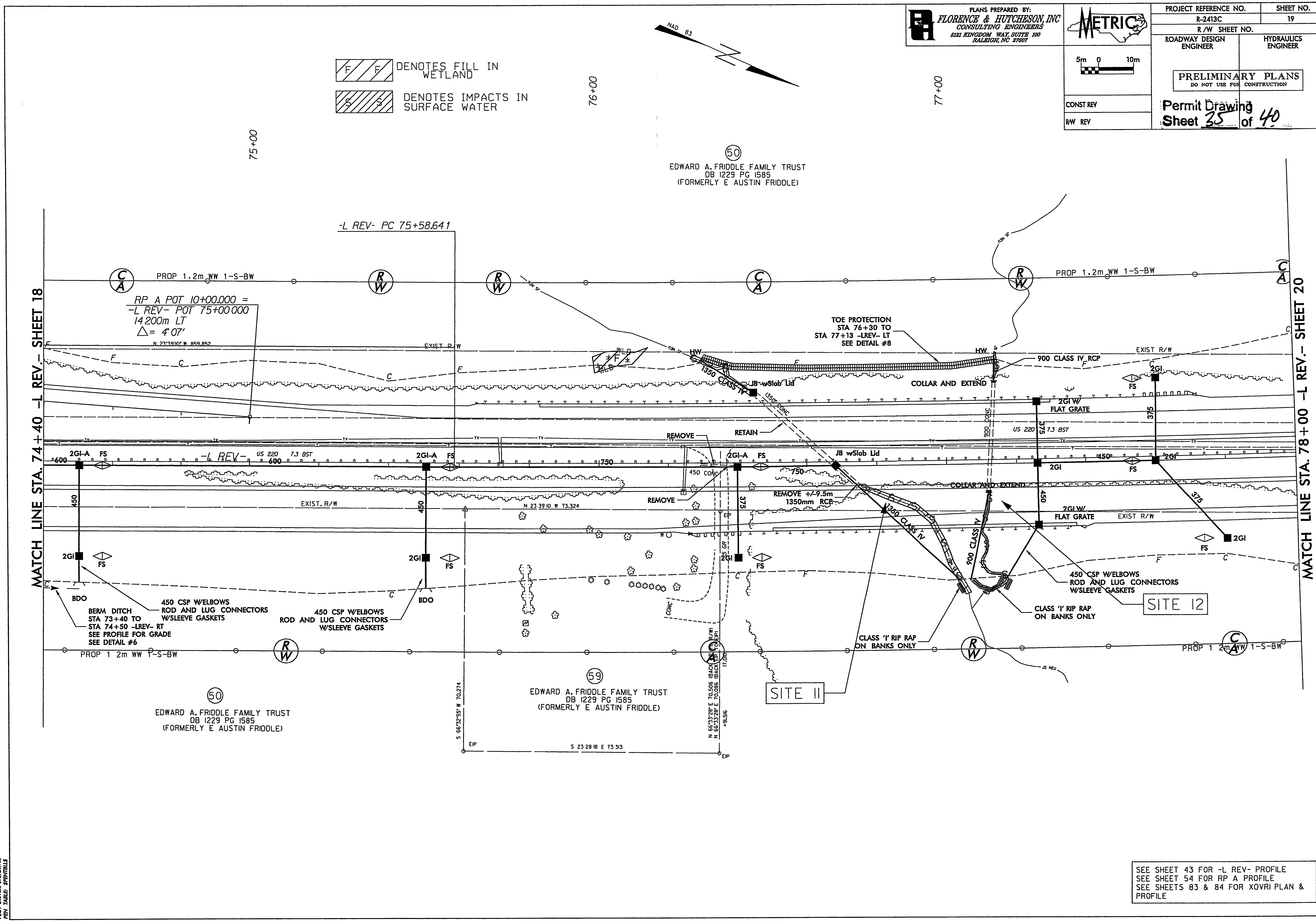
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV

Permit Drawing
Sheet 34 of 40



RAMP C - NC 65



SEE SHEET 43 FOR -L REV- PROFILE
SEE SHEET 54 FOR RP A PROFILE
SEE SHEETS 83 & 84 FOR XOVRI PLAN & PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

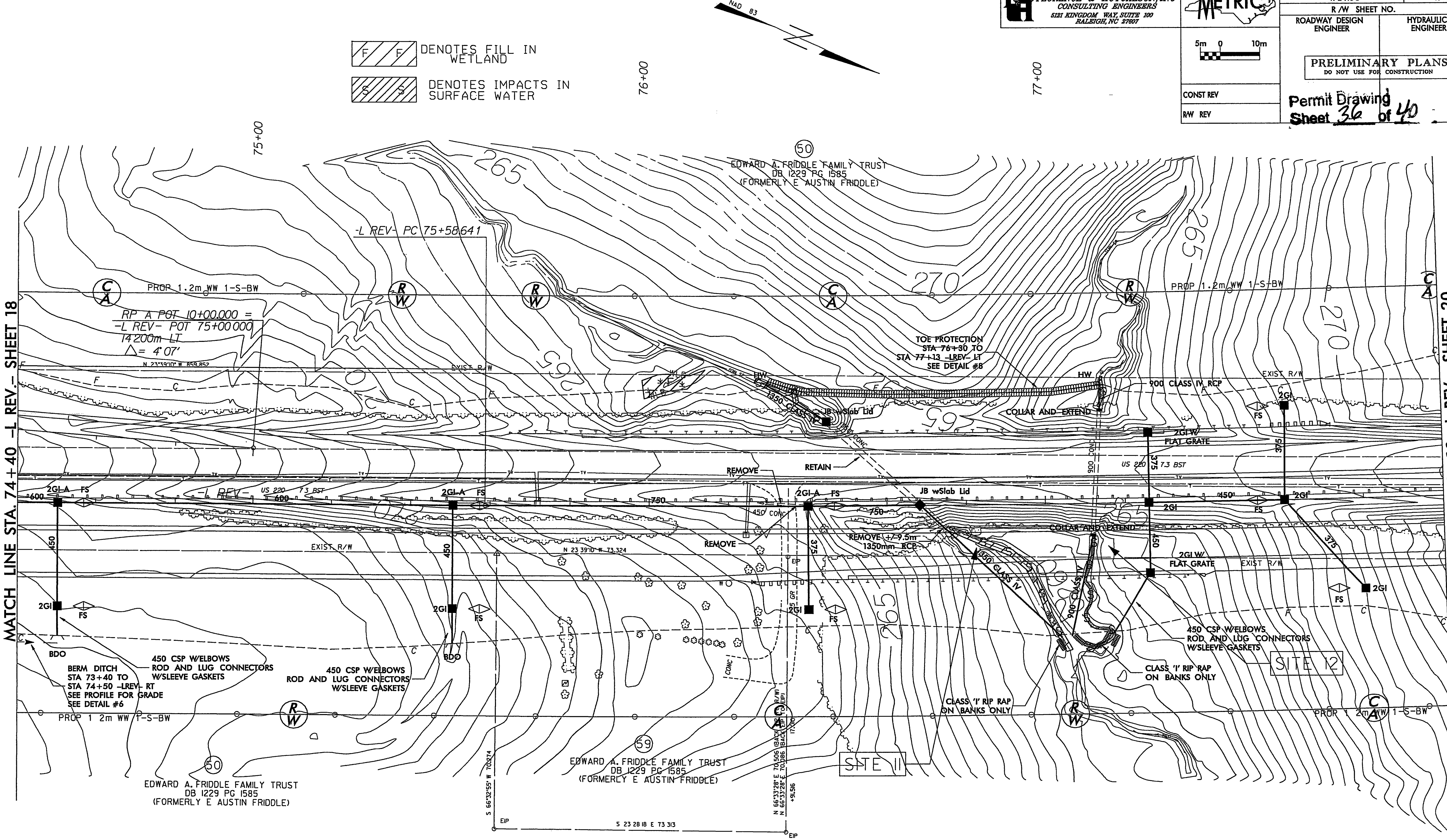
CONST REV

R/W REV

Permit Drawing
Sheet 36 of 40

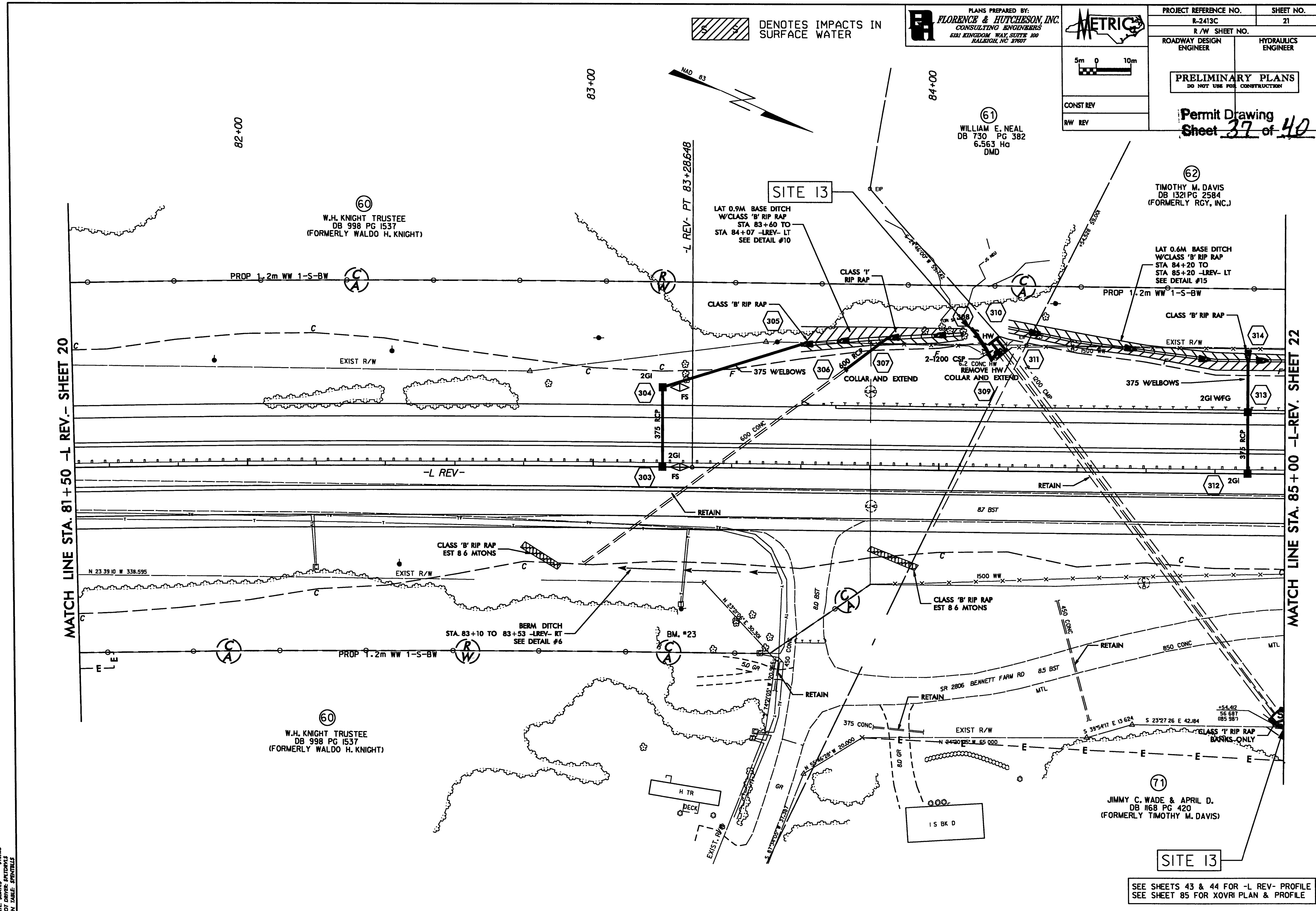
F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER



SEE SHEET 43 FOR -L REV- PROFILE
SEE SHEET 54 FOR RP A PROFILE
SEE SHEETS 83 & 84 FOR XOVRI PLAN & PROFILE

FILE: $FILES
DATE: $DATES $TIMES
PLOT DRIVER: $PLTDRVL$
PEN TABLE: $PENTBLL$


DENOTES IMPACTS IN SURFACE WATER
PLANS PREPARED BY: FLORENCE & HUTCHESON, INC. CONSULTING ENGINEERS 5121 KINGDOM WAY, SUITE 100 RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO. R-2413C
SHEET NO. 21
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 37 of 40
CONST REV
R/W REV
SITE 13
WILLIAM E. NEAL DB 730 PG 382 6.563 Ha DMD
TIMOTHY M. DAVIS DB 1321 PG 2584 (FORMERLY RGY, INC.)
W.H. KNIGHT TRUSTEE DB 998 PG 1537 (FORMERLY WALDO H. KNIGHT)
JIMMY C. WADE & APRIL D. DB 1168 PG 420 (FORMERLY TIMOTHY M. DAVIS)
MATCH LINE STA. 81+50 -L REV.- SHEET 20
MATCH LINE STA. 85+00 -L-REV. SHEET 22
LAT 0.9M BASE DITCH W/CLASS 'B' RIP RAP STA 83+60 TO STA 84+07 -LREV- LT SEE DETAIL #10
LAT 0.6M BASE DITCH W/CLASS 'B' RIP RAP STA 84+20 TO STA 85+20 -LREV- LT SEE DETAIL #15
BERM DITCH STA. 83+10 TO 83+53 -LREV- RT SEE DETAIL #6
CLASS 'B' RIP RAP EST 8.6 MTONS
SR 2806 BENNETT FARM RD
SEE SHEETS 43 & 44 FOR -L REV- PROFILE
SEE SHEET 85 FOR XOVRI PLAN & PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

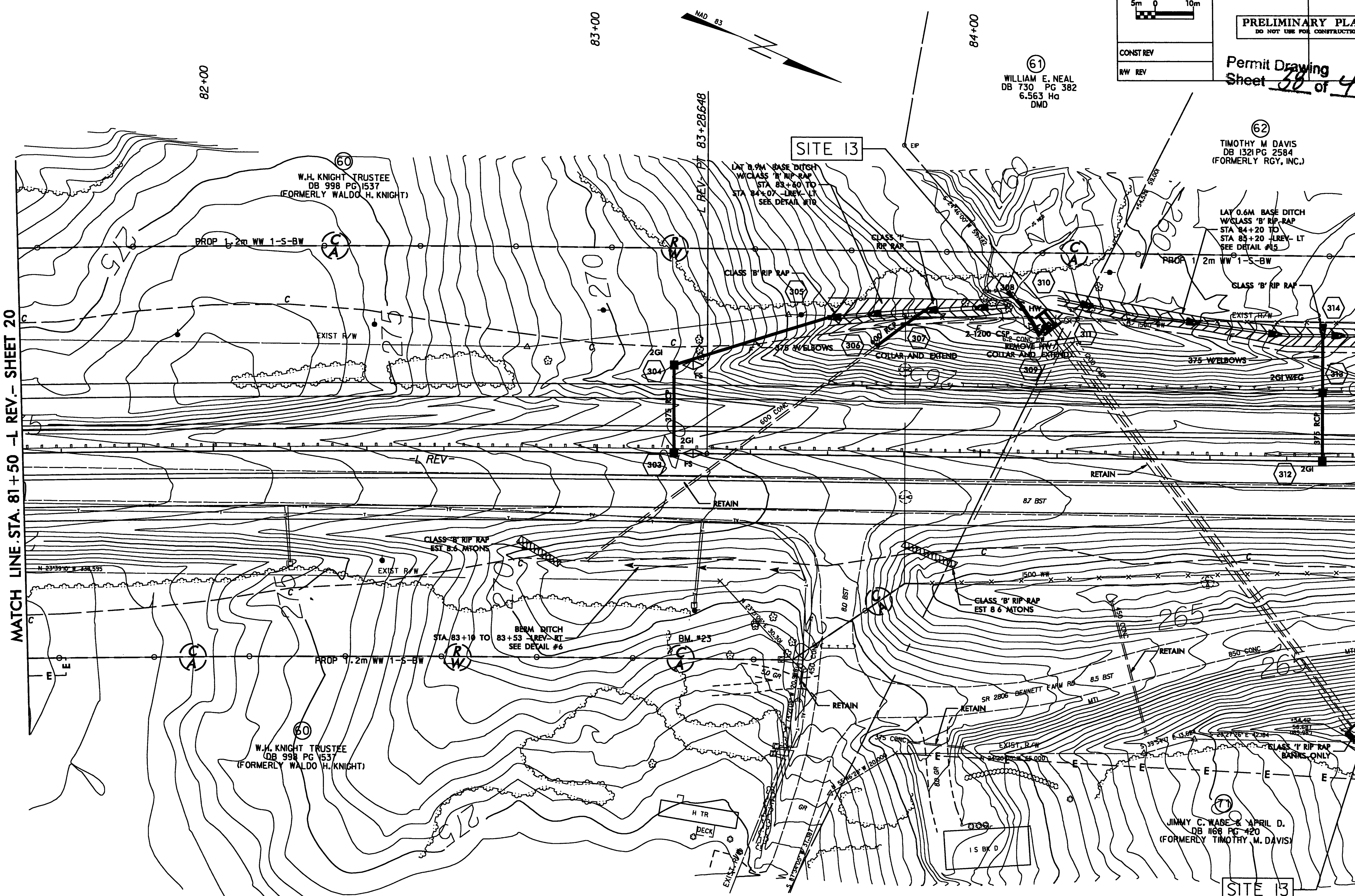
CONST REV

R/W REV

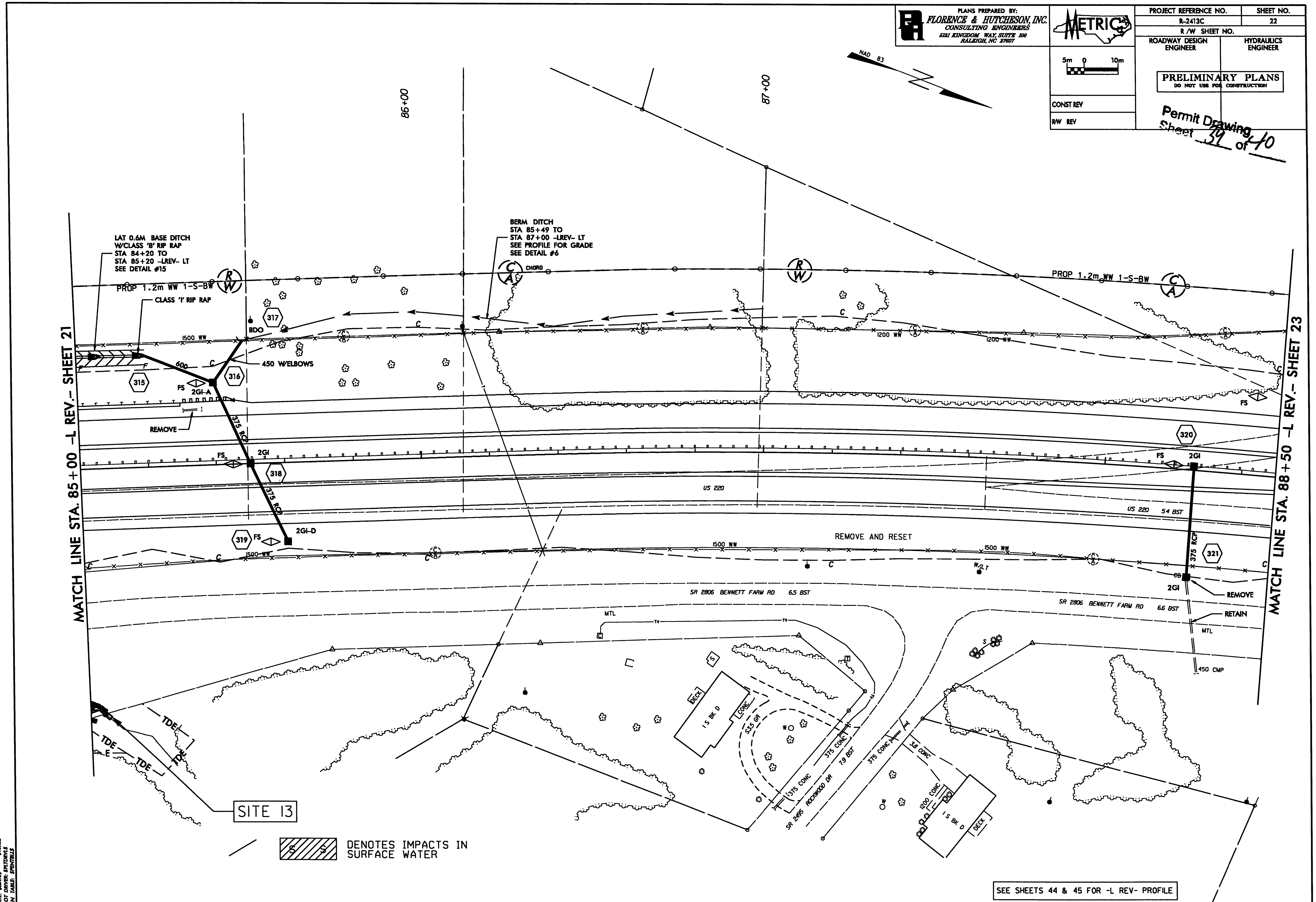
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 38 of 40

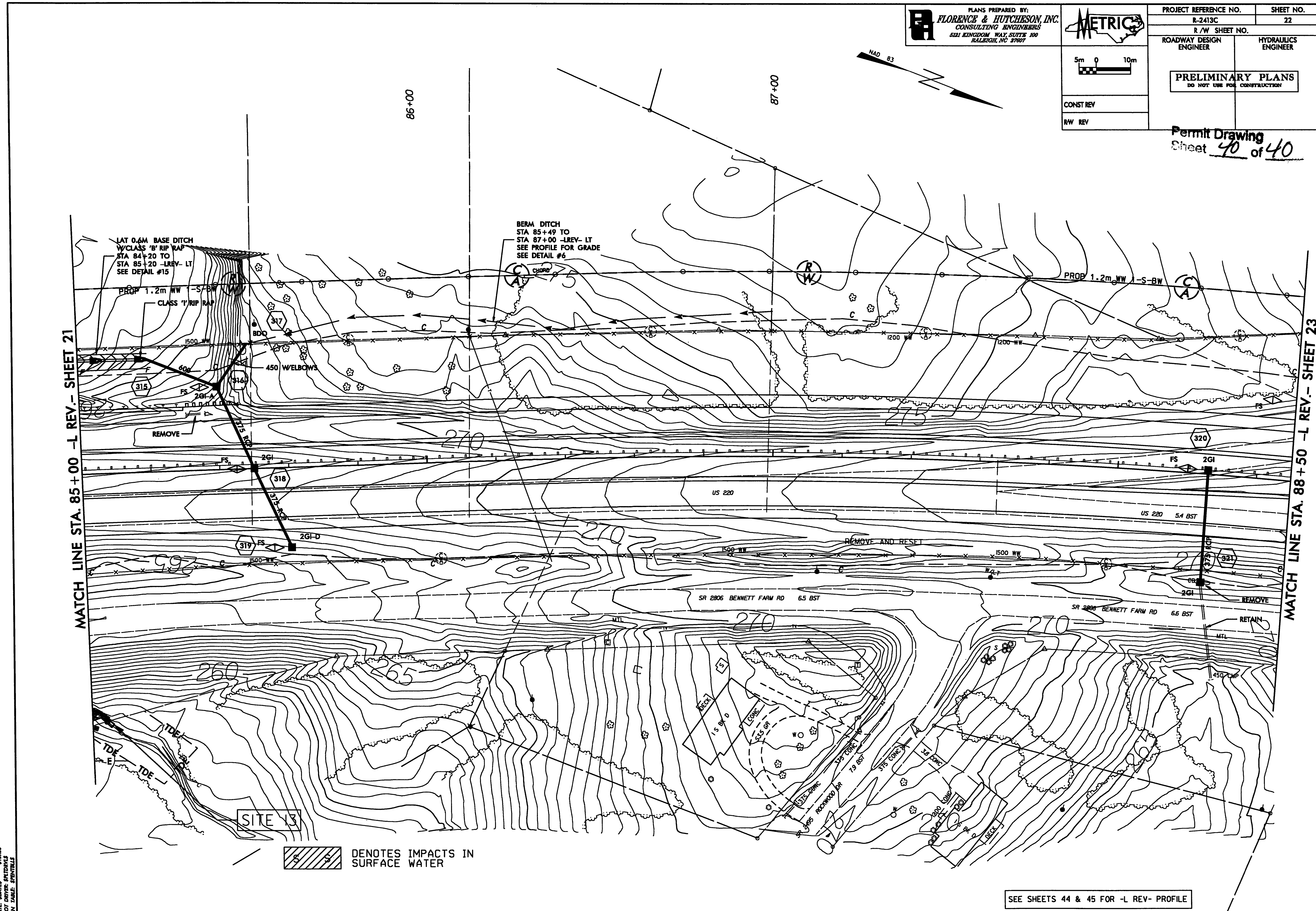
DENOTES IMPACTS IN SURFACE WATER



SEE SHEETS 43 & 44 FOR -L REV- PROFILE
SEE SHEET 85 FOR XOVRI PLAN & PROFILE



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO. R-2413C
SHEET NO. 22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
Permit Drawing
Sheet 39 of 40
NAD 83
86+00
87+00
LAT 0.6M BASE DITCH W/CLASS 'B' RIP RAP STA 84+20 TO STA 85+20 -LREV- LT SEE DETAIL #15
CLASS 'I' RIP RAP
BERM DITCH STA 85+49 TO STA 87+00 -LREV- LT SEE PROFILE FOR GRADE SEE DETAIL #6
PROP 1.2m WW 1-S-BW
450 W/ELBOWS
REMOVE
US 220
US 220 54 BST
REMOVE AND RESET
SR 2806 BENNETT FARM RD 6.5 BST
SR 2806 BENNETT FARM RD 6.6 BST
SR 2495 ROCKWOOD DR 7.9 BST
RETAIN
450 CMP
MATCH LINE STA. 85+00 -L REV.- SHEET 21
MATCH LINE STA. 88+50 -L REV.- SHEET 23
SITE 13
DENOTES IMPACTS IN SURFACE WATER
SEE SHEETS 44 & 45 FOR -L REV- PROFILE



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO. R-2413C
SHEET NO. 22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
Permit Drawing
Sheet 40 of 40
NAD 83
86+00
87+00
LAT 0.6M BASE DITCH W/CLASS 'B' RIP RAP STA 84+20 TO STA 85+20 -LREV- LT SEE DETAIL #15
BERM DITCH STA 85+49 TO STA 87+00 -LREV- LT SEE PROFILE FOR GRADE SEE DETAIL #6
PROP 1.2m WW 1-S-BW
CLASS 'I' RIP RAP
450 W/ELBOWS
REMOVE
US 220
US 220 5.4 BST
REMOVE AND RESET
SR 2806 BENNETT FARM RD 6.5 BST
SR 2806 BENNETT FARM RD 6.6 BST
RETAIN
MATCH LINE STA. 85+00 -L REV.- SHEET 21
MATCH LINE STA. 88+50 -L REV.- SHEET 23
SITE 13
DENOTES IMPACTS IN SURFACE WATER
SEE SHEETS 44 & 45 FOR -L REV- PROFILE

TIP PROJECT: R-2413C

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

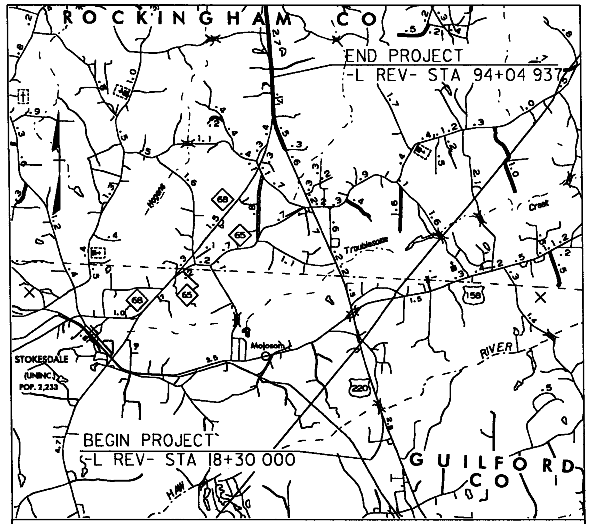
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC
ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE SHOWN

TIP NO	SHEET NO
R-2413C	PO-1

Utility Permit Drawings

Permit Drawing Sheet 1 of 3

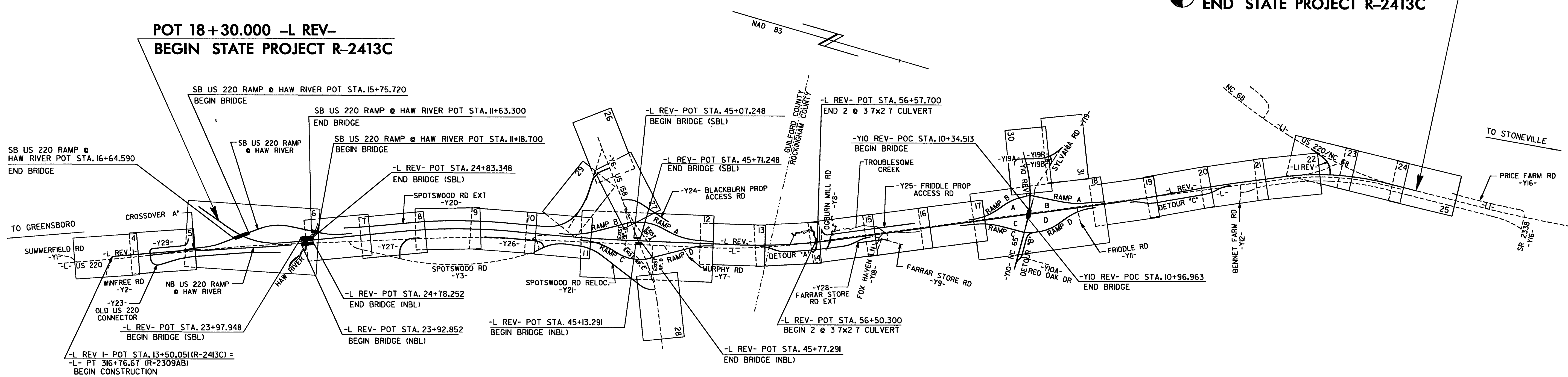


VICINITY MAP OF PROJECT 6.499008T

PERMIT DRAWINGS
GUILFORD–ROCKINGHAM COUNTIES

LOCATION: US 220 FROM SOUTH FO HAW RIVER TO THE INTERSECTION OF US 220 AND EXISTING NC 68

TYPE OF WORK: PDEA PERMIT



NCDOT CONTACT: B. DOUG TAYLOR, P.E., PROJECT ENGINEER
MALCOLM WATSON, P.E., PROJECT DESIGN ENGINEER

NOTE: THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS LIMITED TO INTERCHANGES

GRAPHIC SCALES

PLANS

PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

INDEX OF SHEETS

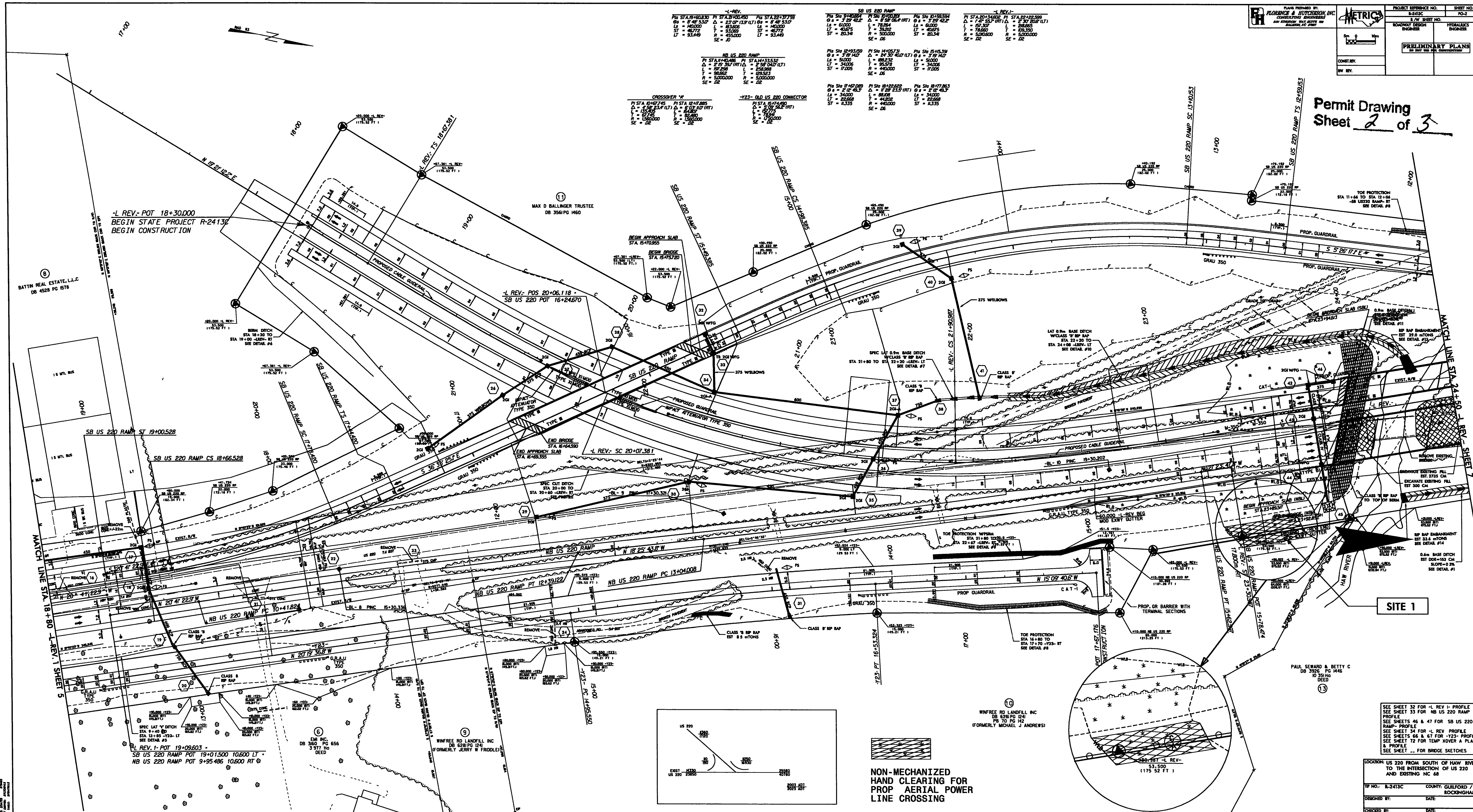
WATER AND SEWER OWNERS ON PROJECT

(1) DUKE ENERGY
(2) AT&T
(3) BELLSOUTH
(4) CATV

PREPARED IN THE OFFICE OF:
DIVISION OF HIGHWAYS
UTILITIES ENGINEERING SECTION
1591 MAIL SERVICES CENTER
RALEIGH NC 27699-1591
PHONE (919) 250-4128
FAX (919) 250-4119

Roger Worthington, P.E.	UTILITIES SECTION ENGINEER
Steve McKee, P.E.	UTILITIES SQUAD LEADER PROJECT ENGINEER
Johgre Hinton	UTILITIES PROJECT DESIGNER

UTILITIES PERMIT PLAN SHEET



UTILITIES IMPACT SUMMARY SHEET

			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)
1	24+10/26+23 -L-	UTILITIES					0.011					
TOTALS.							0.011					

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GUILDFORD-ROCKINGHAM COUNTIES
WBS - 34429 1 1 (R-2413C)

SHEET 3 of 3 8/27/2010

ATN Revised 3/31/05

TIP PROJECT: R-2309AB

CONTRACT:

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

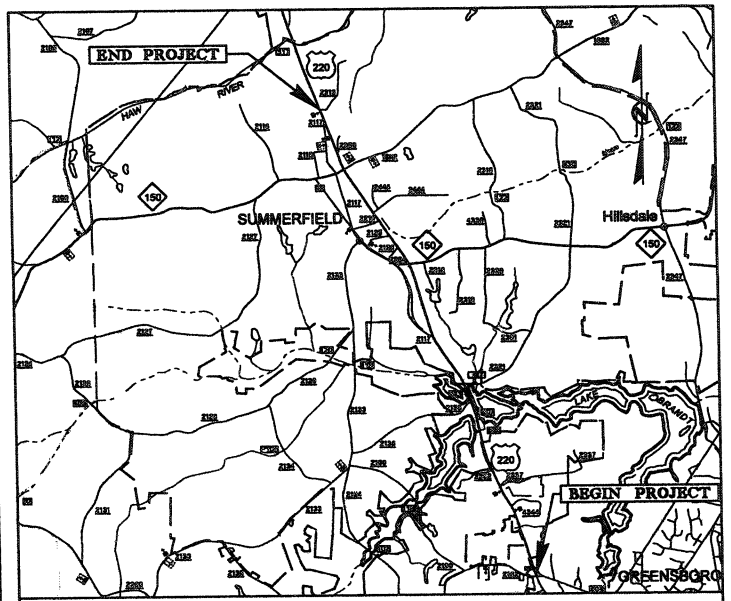
GUILFORD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2309AB	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34418.1.4	STP-220(5)	P.E.
34418.2.3	STPNHS-0220(5)	R/W & UTIL.

LOCATION: US 220 FROM SR 2182 (HORSEPEN CREEK RD.) TO 0.2 MILES NORTH OF SR 2313 (WINFREE RD.) IN GREENSBORO

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

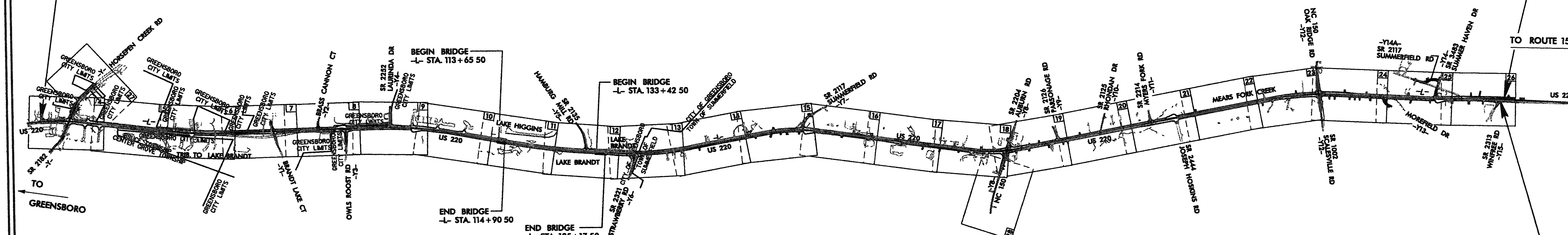


VICINITY MAP

NAD 83

BEGIN TIP PROJECT R-2309AB
-L- STA. 21+50.00

END CONSTRUCTION
-L- PT STA. 317+51.85
(TIE TO TIP PROJECT R-2413C)



END TIP PROJECT R-2309AB
-L- STA. 316+76.67 =
R-2413C -LREV1- STA. 13+50.00

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF SUMMERFIELD AND THE CITY OF GREENSBORO.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS LIMITED TO POINTS AS SHOWN ON THE PLANS.
NCDOT CONTACT: B DOUG TAYLOR, P E., PROJECT ENGINEER – ROADWAY DESIGN

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2012 = 28,882
ADT 2032 = 42,810
DHV = 11 %
D = 65 %
T = 7 % *
V = 60 MPH (SHLDR.)
V = 50 MPH (C&G)
FUNC CLASS = ARTERIAL
* TTST 4% + DUAL 3%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2309AB = 5.535 MI
LENGTH STRUCTURES TIP PROJECT R-2309AB = 0 057 MI
TOTAL LENGTH OF TIP PROJECT R-2309AB = 5 592 MI

Prepared In the Office of:

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100
RALEIGH, N C. 27607
(919) 851-6066
for the

DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
OCTOBER 17, 2008

LETTING DATE:
JANUARY , 2012

BRIAN A. WILES, P.E.
PROJECT ENGINEER

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

12/4/2009
r:\roadway\proj\r-2309ab_rdy_tsh.dgn

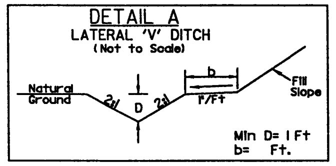
8/17/99

KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	2-M
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

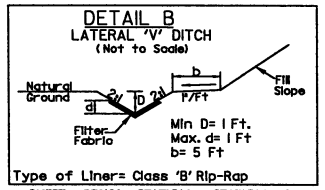
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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



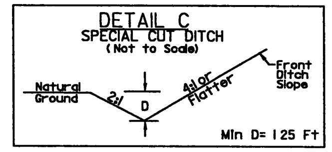
SHEET	RDWY	STATION – STATION	B	SIDE
15	-L-	168+95 – 169+20	5'	LT
27	-Y-	5+70 – 6+00	2'	RT

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



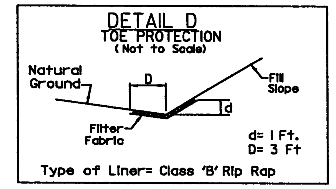
SHEET	RDWY	STATION – STATION	SIDE
15	-L-	169+15 – 170+30	RT

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



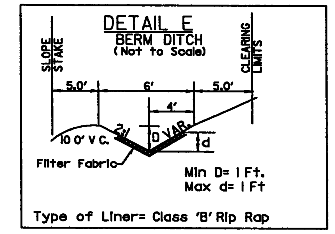
SHEET	RDWY	STATION – STATION	SIDE
8,9	-L-	83+50 – 88+00	LT
8	-Y3-	11+75 – 12+94	LT
16	-L-	184+00 – 185+00	LT
18	-L-	206+00 – 206+50	LT
22	-L-	259+00 – 260+00	RT
22	-L-	261+50 – 262+00	RT
25,26	-L-	304+50 – 307+00	LT
25	-Y14-	11+00 – 13+00	RT
25	-Y14-	11+00 – 13+00	LT
25	-Y14A-	10+38 – 13+00	LT
25	-Y14A-	12+00 – 15+00	RT
26	-L-	309+80 – 310+50	RT
26	-Y15-	11+50 – 12+00	LT
27	-Y-	0+50 – 3+10	RT

DETAIL D
TOE PROTECTION
(Not to Scale)



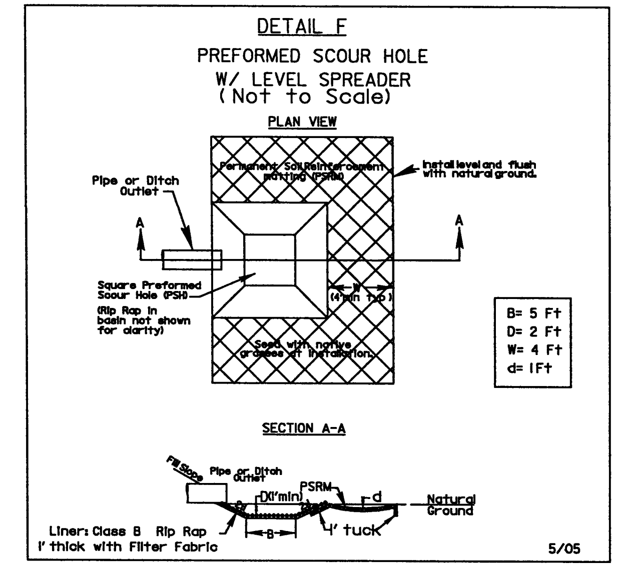
SHEET	RDWY	STATION – STATION	SIDE
6	-L-	52+40 – 55+60	RT
6	-L-	56+30 – 57+65	LT
10	-L-	101+00 – 101+75	RT
11	-L-	121+30 – 121+65	LT
15	-L-	165+75 – 168+50	RT
16	-L-	179+03 – 182+50	RT
17	-L-	200+05 – 201+90	LT
17	-L-	200+50 – 201+03	RT
20	-L-	229+00 – 230+55	RT
20	-L-	231+00 – 231+66	LT
20	-L-	234+00 – 235+00	RT
21	-L-	247+00 – 247+70	LT
22	-L-	266+39 – 267+00	LT
23	-L-	267+00 – 269+30	LT
23	-L-	269+06 – 269+65	RT
23	-L-	276+51 – 277+28	LT
24	-L-	286+50 – 287+20	LT
25	-L-	294+50 – 297+50	LT
25	-L-	294+00 – 296+15	RT

DETAIL E
BERM DITCH
(Not to Scale)



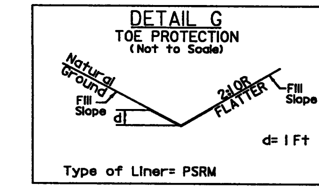
SHEET	RDWY	STATION – STATION	SIDE
5,6	-L-	38+80 – 47+60	LT
14,15	-L-	158+50 – 163+30	RT

DETAIL F
PREFORMED SCOUR HOLE
W/ LEVEL SPREADER
(Not to Scale)



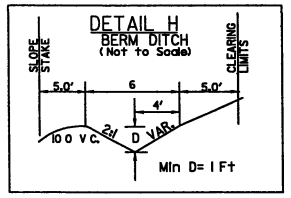
SHEET	RDWY	STATION – STATION	SIDE
14	-L-	154+10	LT
18	-L-	209+43	LT
21	-L-	242+92	RT
21	-L-	248+88	LT

DETAIL G
TOE PROTECTION
(Not to Scale)



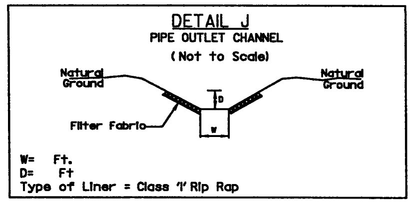
SHEET	RDWY	STATION – STATION	SIDE
4	-Y-	6+00 – 7+40	RT
4	-L-	29+65 – 30+08	LT
5	-L-	34+88 – 37+20	LT
6	-L-	48+50 – 51+65	LT
7	-L-	68+90 – 69+50	RT
7,8	-L-	68+12 – 72+70	LT
8	-L-	76+00 – 76+85	LT
8	-L-	77+65 – 78+20	LT
8	-L-	83+20 – 84+00	RT
10	-L-	98+50 – 100+90	LT
10	-L-	102+00 – 105+20	LT
10	-L-	106+75 – 108+50	LT
11	-L-	115+05 – 117+00	LT
27	-Y-	2+80 – 4+20	RT

DETAIL H
BERM DITCH
(Not to Scale)



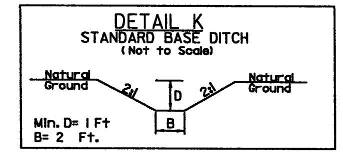
SHEET	RDWY	STATION – STATION	SIDE
5	-L-	37+60 – 38+80	LT

DETAIL J
PIPE OUTLET CHANNEL
(Not to Scale)



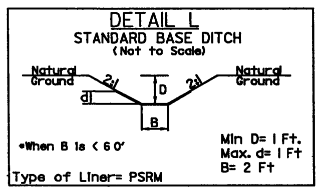
SHEET	RDWY	STATION	SIDE	W	D
6	-L-	56+20	LT	6'	5'
23	-L-	276+80	RT	7'	5'

DETAIL K
STANDARD BASE DITCH
(Not to Scale)



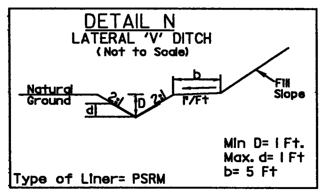
SHEET	RDWY	STATION – STATION	SIDE
8	-Y3-	11+75 – 11+90	RT

DETAIL L
STANDARD BASE DITCH
(Not to Scale)



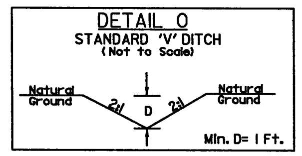
SHEET	RDWY	STATION – STATION	SIDE
8	-L-	75+70 – 76+80	RT

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



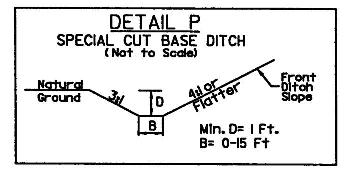
SHEET	RDWY	STATION – STATION	SIDE
9	-L-	88+00 – 89+20	LT

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



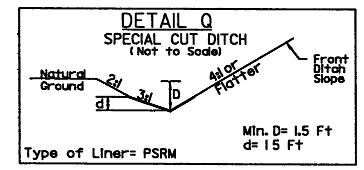
SHEET	RDWY	STATION – STATION	SIDE
7	-L-	64+30 – 65+10	RT
7	-L-	67+65 – 67+85	RT
9	-L-	95+60	LT

DETAIL P
SPECIAL CUT BASE DITCH
(Not to Scale)



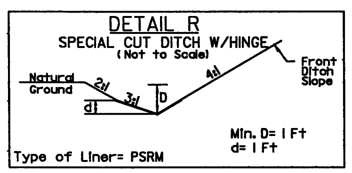
SHEET	RDWY	STATION – STATION	SIDE
11	-L-	122+00 – 122+50	LT

DETAIL Q
SPECIAL CUT DITCH
(Not to Scale)



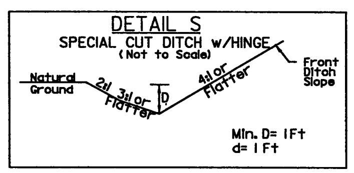
SHEET	RDWY	STATION – STATION	SIDE
10	-L-	108+50 – 110+50	LT
25	-Y14A-	12+00 – 15+00	RT

DETAIL R
SPECIAL CUT DITCH W/HINGE
(Not to Scale)



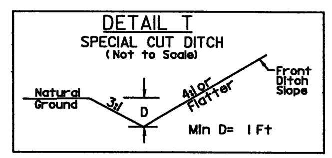
SHEET	RDWY	STATION – STATION	SIDE
10,11	-L-	110+50 – 113+20	LT

DETAIL S
SPECIAL CUT DITCH W/HINGE
(Not to Scale)



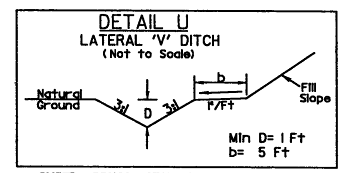
SHEET	RDWY	STATION – STATION	SIDE
11,12	-L-	122+50 – 130+76	LT
12	-Y5-	13+00 – 13+95	LT
20	-L-	234+57 – 235+67	LT
20,21	-L-	240+00 – 242+35	LT
21	-L-	242+35 – 245+55	LT
22	-L-	256+50 – 260+00	RT
22	-L-	261+50 – 265+50	RT
22,23	-L-	265+50 – 268+65	RT
25	-L-	282+50 – 285+34	LT
25	-L-	298+45 – 300+32	LT
25	-L-	303+50 – 307+00	RT
26	-L-	307+35 – 309+50	RT
19	-Y8-	8+27 – 9+46	RT
19	-Y8-	5+70 – 6+50	RT
28	-Y8-	14+00 – 14+98	LT

DETAIL T
SPECIAL CUT DITCH
(Not to Scale)



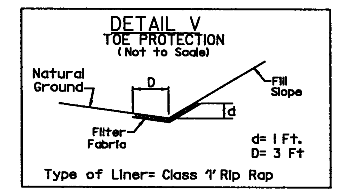
SHEET	RDWY	STATION – STATION	SIDE
13	-L-	143+00 – 145+00	RT
13	-Y6-	13+15 – 14+00	LT

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



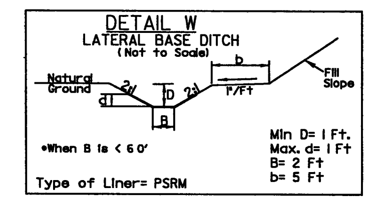
SHEET	RDWY	STATION – STATION	SIDE
13	-L-	141+65 – 143+00	RT
13	-Y6-	11+11 – 12+80	LT

DETAIL V
TOE PROTECTION
(Not to Scale)



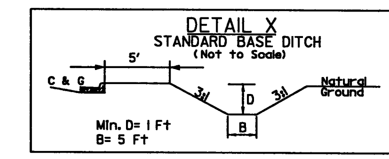
SHEET	RDWY	STATION – STATION	SIDE
15	-L-	167+10 – 168+70	LT
15	-L-	169+20 – 170+25	LT

DETAIL W
LATERAL BASE DITCH
(Not to Scale)



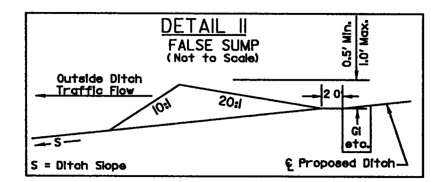
SHEET	RDWY	STATION – STATION	SIDE
6	-L-	53+30 – 56+20	LT

DETAIL X
STANDARD BASE DITCH
(Not to Scale)



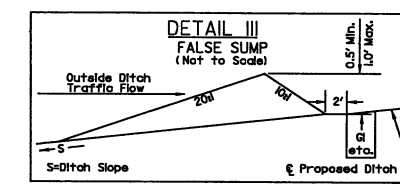
SHEET	RDWY	STATION – STATION	SIDE
7	-L-	59+50 – 64+50	RT

DETAIL II
FALSE SUMP
(Not to Scale)



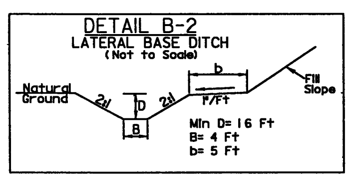
SHEET	RDWY	STATION – STATION	SIDE
7	-L-	64+75	RT
10	-L-	98+50	RT
10	-L-	100+60	RT
12	-L-	130+85	LT
27	-Y-	3+34	RT
18	-L-	210+87	LT
19	-Y8-	9+56	RT
20	-L-	230+63	RT
20	-L-	239+10	RT
21	-L-	253+50	LT
21	-Y11-	10+84	RT
22	-L-	266+78	RT
23	-L-	278+33	LT
24	-L-	279+52	LT
26	-L-	307+12	LT

DETAIL III
FALSE SUMP
(Not to Scale)



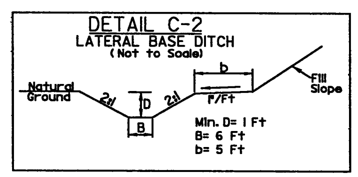
SHEET	RDWY	STATION – STATION	SIDE
10	-L-	105+30	LT
11	-L-	113+25	LT
13	-L-	146+60	RT
14	-L-	158+05	RT
16	-L-	176+50	LT
16	-L-	183+77	LT
16	-L-	188+25	LT
17	-L-	190+35	RT
17	-L-	191+09	RT
19	-L-	227+60	LT
20	-L-	229+36	LT
20	-Y10-	11+07	RT
21	-L-	246+55	LT
21	-L-	252+85	RT
21	-L-	250+38	RT
23	-L-	269+84	LT
23	-L-	271+87	LT
23	-L-	273+33	LT
24	-Y12-	9+09	LT
24	-Y12-	10+86	LT
24	-L-	291+93	LT

DETAIL B-2
LATERAL BASE DITCH
(Not to Scale)



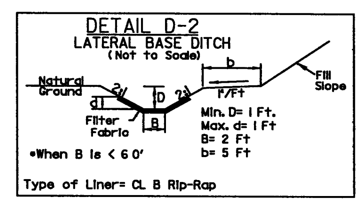
SHEET	RDWY	STATION – STATION	SIDE
26	-L-	307+50 – 311+80	LT (B=2')
26	-L-	311+80 – 313+93	LT
26	-L-	313+78 – 315+50	RT (D=1')

DETAIL C-2
LATERAL BASE DITCH
(Not to Scale)



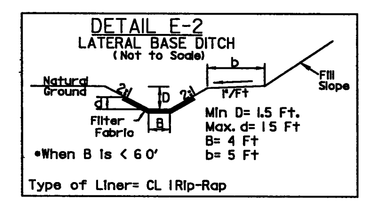
SHEET	RDWY	STATION – STATION	SIDE
22	-L-	260+00 – 261+50	RT

DETAIL D-2
LATERAL BASE DITCH
(Not to Scale)



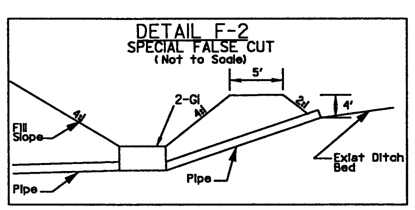
SHEET	RDWY	STATION – STATION	SIDE
18	-L-	209+42 – 210+60	LT
20	-L-	233+62 – 233+95	LT
26	-L-	315+50 – 315+90	RT

DETAIL E-2
LATERAL BASE DITCH
(Not to Scale)



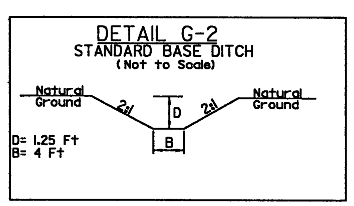
SHEET	RDWY	STATION – STATION	SIDE
16	-L-	176+85 – 178+93	LT
16	-L-	178+97 – 179+60	RT (D=2')
20	-L-	231+80 – 233+80	RT
21	-L-	245+85 – 249+80	RT

DETAIL F-2
SPECIAL FALSE CUT
(Not to Scale)



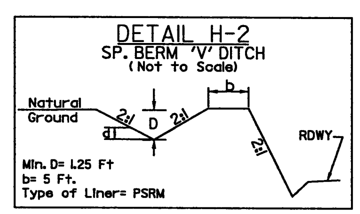
SHEET	RDWY	STATION – STATION	SIDE
20	-L-	239+50 – 240+50	LT

DETAIL G-2
STANDARD BASE DITCH
(Not to Scale)



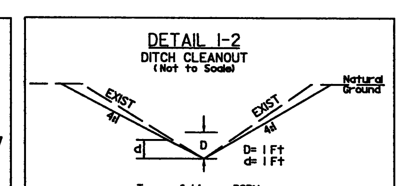
SHEET	RDWY	STATION – STATION	SIDE
22	-L-	260+90	LT

DETAIL H-2
SP. BERM 'V' DITCH
(Not to Scale)



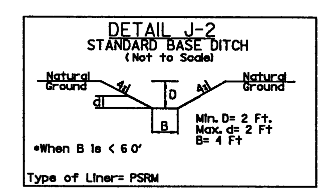
SHEET	RDWY	STATION – STATION	SIDE
23	-L-	269+75 – 272+00	LT

DETAIL I-2
DITCH CLEANOUT
(Not to Scale)



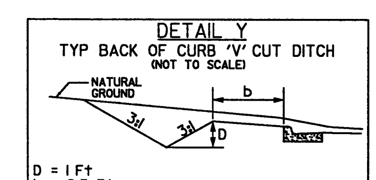
SHEET	RDWY	STATION – STATION	SIDE
18	-L-	202+50 – 205+64	LT

DETAIL J-2
STANDARD BASE DITCH
(Not to Scale)



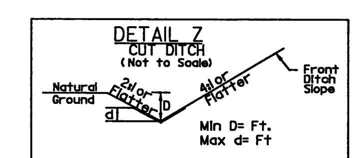
SHEET	RDWY	STATION – STATION	SIDE
26	-L-	313+93	LT

DETAIL Y
TYP BACK OF CURB 'V' CUT DITCH
(NOT TO SCALE)



SHEET	RDWY	STATION – STATION	SIDE
27	-Y-	1+50 – 2+50	RT
27	-Y-	4+20 – 5+15	RT

DETAIL Z
CUT DITCH
(Not to Scale)



SHEET	RDWY	STATION – STATION	SIDE
7	-Y1-	11+00 – 12+70	LT

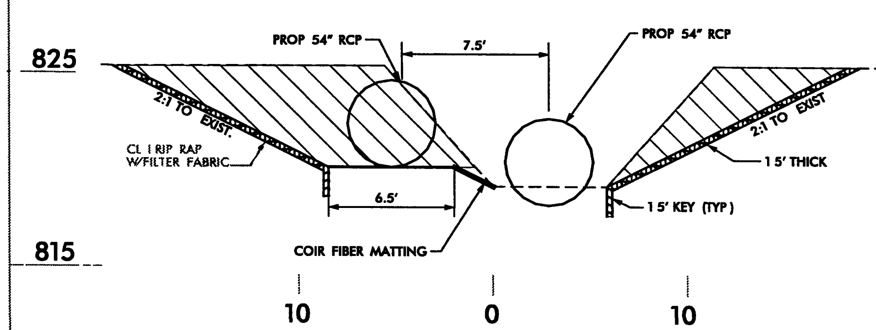
12/4/2003
r:\roadway\proj\r2309ab_rdy_typ_ditches.dgn
Ko & Associates, PC

KO & ASSOCIATES, P.C. Consulting Engineers	PROJECT REFERENCE NO.	SHEET NO.
A Florence & Hutcheson, Inc Company	R-2309AB	2-N
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607 (919) 851-6066	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

LEGEND
EXCAVATION
FILL

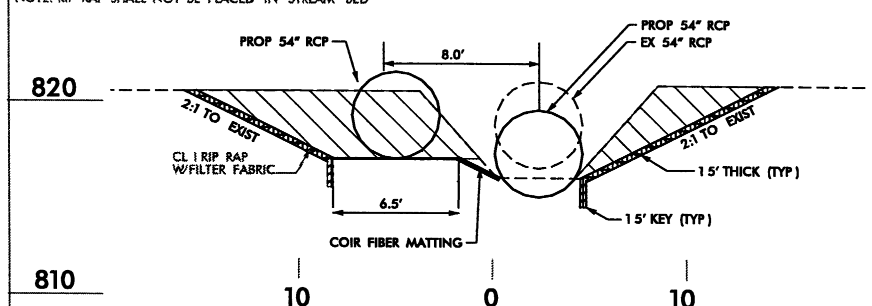
NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED



EST 85 TONS CL I RIPRAP
EST 130 CY DDE
EST 45 SY COIR FIBER MATTING
EST 120 SY FF

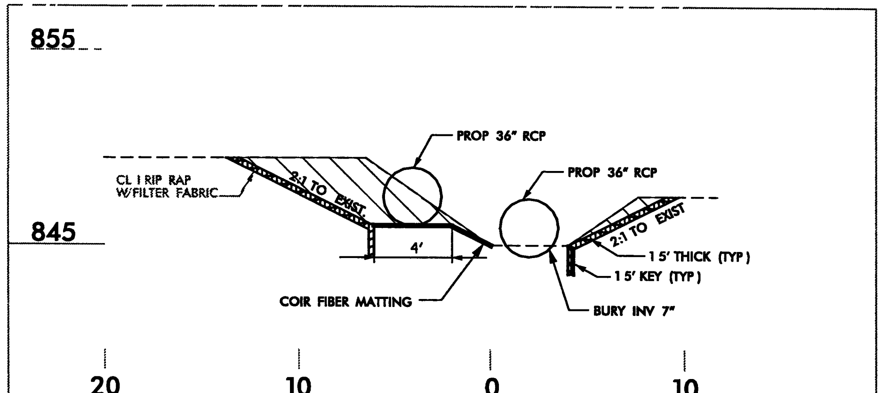
DETAIL AA-2
INLET CHANNEL IMPROVEMENT
SHT 20 STA. 233+72 -L- LT

NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED



EST 60 TONS CL I RIPRAP
EST 80 SY FF
EST 80 CY DDE
EST 45 SY COIR FIBER MATTING

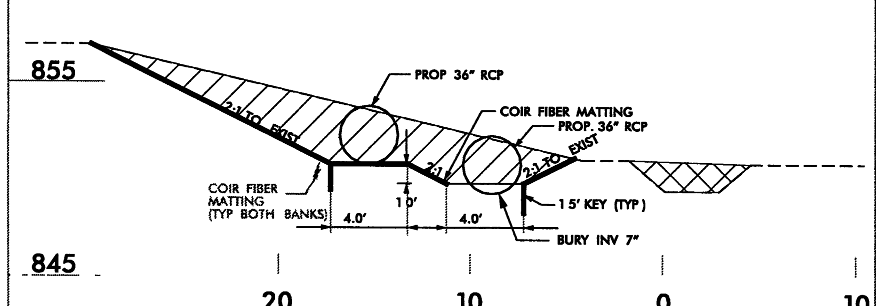
DETAIL BB-2
OUTLET CHANNEL IMPROVEMENT
SHT 20 STA. 233+72 -L- RT



NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

EST 25 TONS CL I RIPRAP
EST 35 SY FF
EST 30 CY DDE
EST 25 SY COIR FIBER MATTING

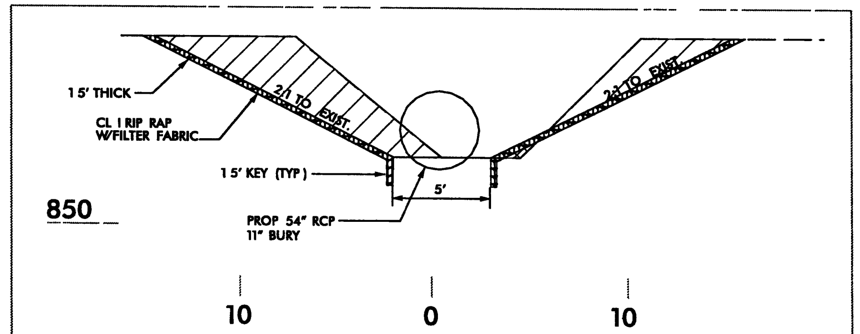
DETAIL CC-2
OUTLET CHANNEL IMPROVEMENT
SHT 25 STA. 295+38 -L- RT



NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

EST 85 CY DDE
EST 130 SY COIR FIBER MATTING
EST 15 CY FILL

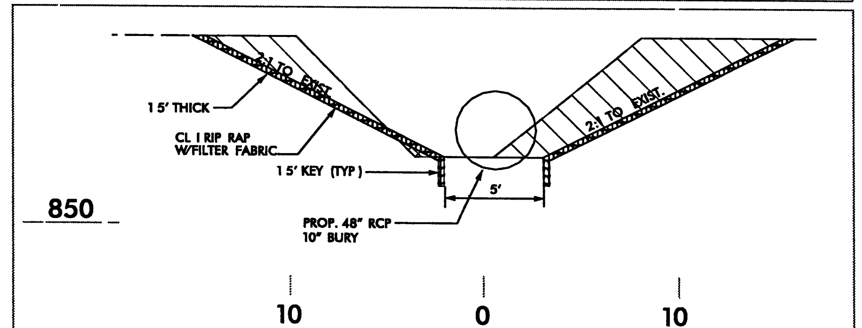
DETAIL DD-2
INLET CHANNEL IMPROVEMENT
SHT 25 STA. 295+38 -L- LT



EST 55 TONS CL I RIPRAP
EST 75 SY FF
EST 40 CY DDE

DETAIL EE-2
INLET CHANNEL IMPROVEMENT
SHT 22 STA. 266+20 -L- LT

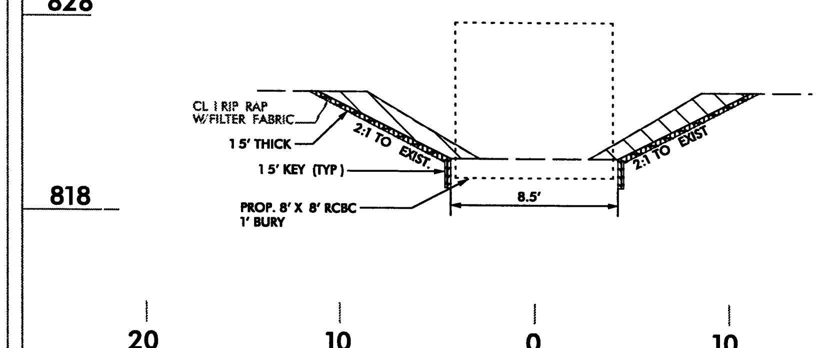
NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED



EST 75 TONS CL I RIPRAP
EST 105 SY FF
EST 55 CY DDE

DETAIL FF-2
INLET CHANNEL IMPROVEMENT
SHT 23 STA. 269+74 -L- RT

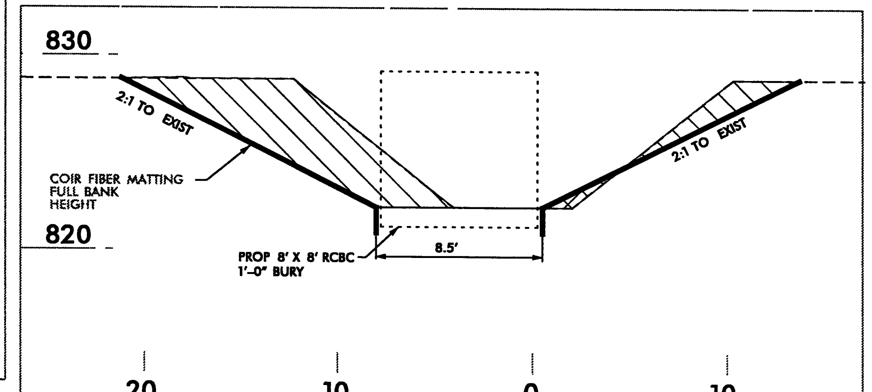
NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED



NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

EST 50 TNS CL I RIPRAP
EST 65 SY FF
EST 25 CY DDE

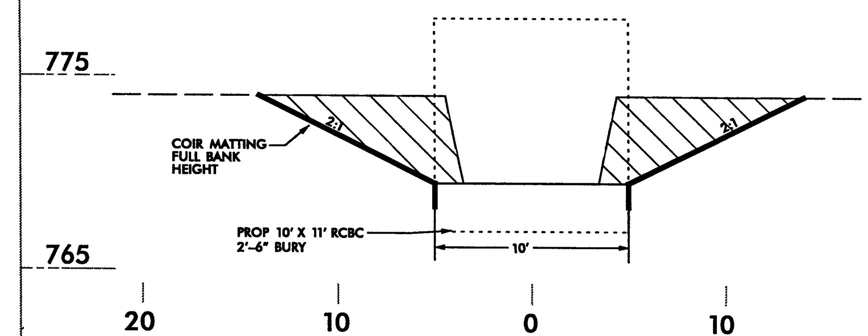
DETAIL GG-2
OUTLET CHANNEL IMPROVEMENT
SHT 21 STA. 247+02 -L- RT



NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

EST 180 SY COIR FIBER MATTING
EST 135 CY DDE
EST 10 CY FILL

DETAIL HH-2
INLET CHANNEL IMPROVEMENT
SHT 21 STA. 247+02 -L- LT

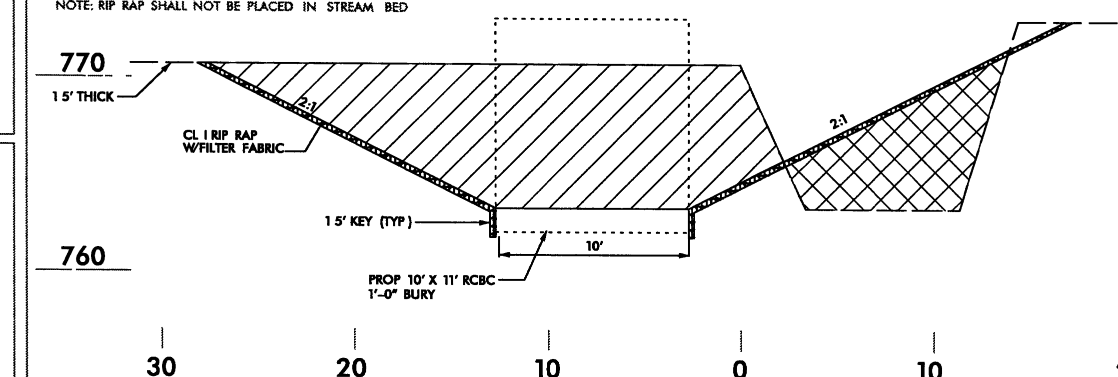


NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

EST 70 TNS CL I RIPRAP
EST 95 SY FF
EST 90 CY DDE

DETAIL AA
INLET CHANNEL IMPROVEMENT
SHT 6 STA. 56+36 -L- LT

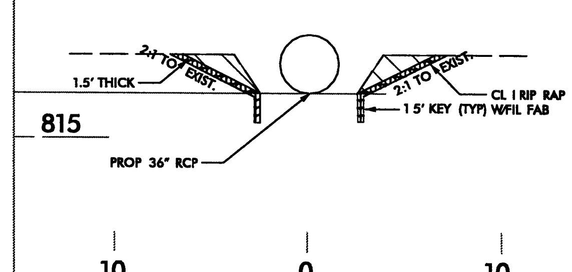
NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED



EST 185 TONS CL I RIPRAP
EST 115 CY FILL
EST 260 SY FF
EST 385 CY DDE

DETAIL BB
OUTLET CHANNEL IMPROVEMENT
SHT 6 STA. 56+36 -L- RT

EST 25 TONS CL I RIPRAP
EST 40 SY FF
EST 10 CY DDE



DETAIL JJ-2
OUTLET CHANNEL IMPROVEMENT
SHT 20 STA. 239+86 -L- RT

NOTE: RIP RAP SHALL NOT BE PLACED IN STREAM BED

8/17/99
12/4/2009
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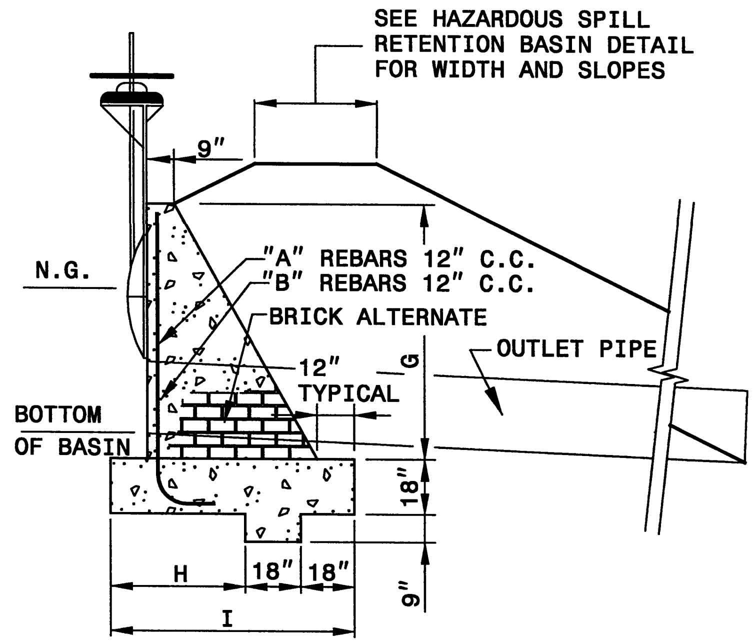
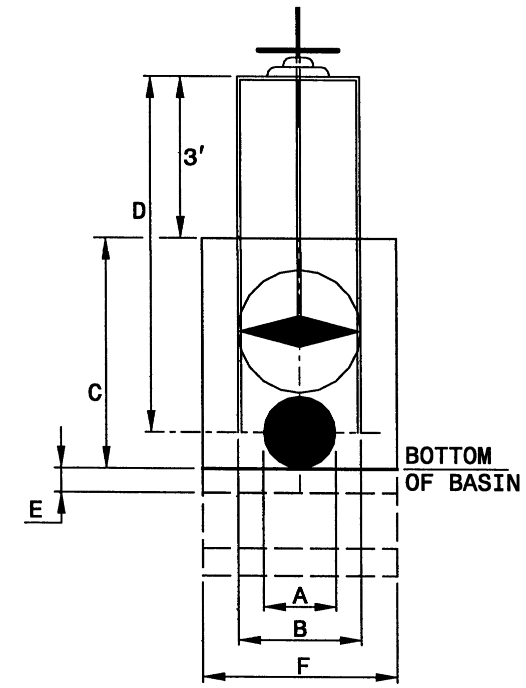
Ko & Associates, P.C.

GENERAL NOTES:
1- REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE HEADWALL AND SHALL BE PAID FOR ON YD^3 BASIS.
2- CONCRETE SHALL BE CLASS "B" THROUGHOUT STRUCTURE.
3- DELETE REINFORCING STEEL WHEN BRICK ALTERNATE IS USED.

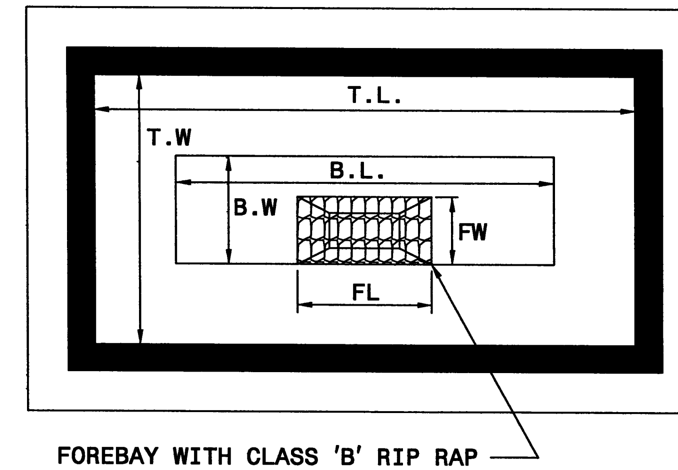
BASIN #		1	2	3	4	5
SLUICE GATE DIMENSIONS						
PIPE DIAMETER	A	30"	30"	18"	30"	18"
GATE DIAMETER	B	38¾"	38¾"	25"	38¾"	25"
HEADWALL HT.	C	6'3"	6'3"	3'9"	6'3"	3'9"
FRAME HEIGHT	D	60"	60"	36"	60"	36"
INVERT HEIGHT	E	10"	10"	10"	10"	10"
HEADWALL WIDTH	F	9'2"	9'2"	6'4"	9'2"	6'4"
HEADWALL DIMENSIONS						
PIPE DIAMETER	A	30"	30"	18"	30"	18"
HEADWALL HT.	G	7'1"	7'1"	4'7"	7'1"	4'7"
FOOTING DEPTH	H	2'6"	2'6"	18"	2'6"	18"
HEADWALL DEP.	I	5'6"	5'6"	4'6"	5'6"	4'6"



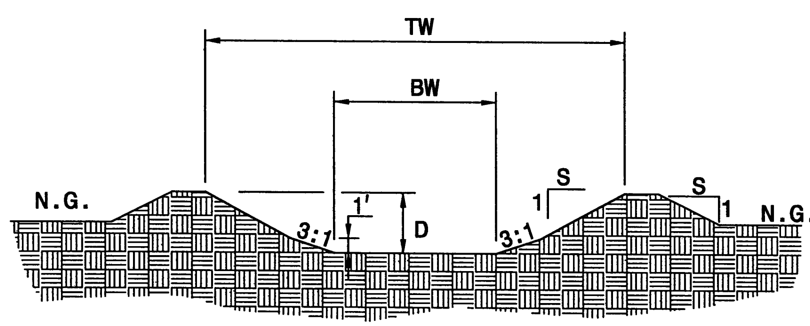
SECTION VIEW



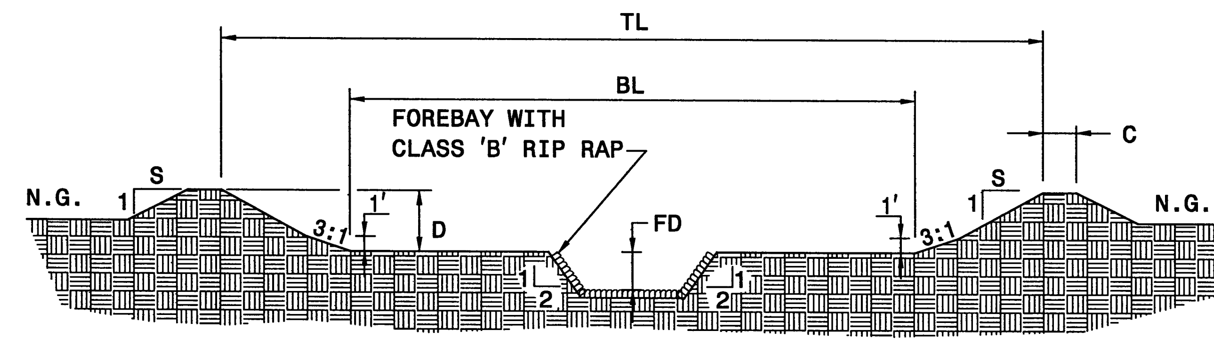
ELEVATION VIEW



PLAN VIEW OF BASIN



CROSS SECTION VIEW OF BASIN



CROSS SECTION VIEW OF BASIN

HAZARDOUS SPILL RETENTION BASIN														FOREBAY DIMENSION		
BASIN #	PIPE SIZE	TOP ELEV.	BOTTOM ELEV	T.W. (ft)	B.W. (ft)	D (ft)	T.L. (ft)	B L. (ft)	S	C (ft)	*G (CY)	CAPACITY (cu. ft.)	STATION	FL (ft)	FW (ft)	FD (ft)
1	30"	779	774	97	75	5	72-97	50-75	2	2	100	30800	-L- 57+13 LT.	40	20	3
2	30"	760	753.5	58	30	6.5	78	50	2	5	110	17600	-L- 112+60 RT.	30	15	3
3	18"	746.5	N/A	N/A	N/A	N/A	N/A	N/A	2	2	0	6500	-L- 118+50 LT.	N/A	N/A	N/A
4	30"	748	744	33	15	4	58	48	2	2	180	16000	-L- 121+70 LT.	N/A	N/A	N/A
5	18"	750.8	745.8	42	20	5	62	40	2	2	160	7500	-L- 142+25 LT.	20	12	3

** Provided at new and/or improved roadway sections to aid in containment and clean up of accidental spills by truck traffic Basins are provided in particular locations including areas in proximity to sensitive waters and water supplies.

*G DENOTES EXCAVATION AMOUNT.

NOTE: SEE PLAN SHEET FOR LOCATION OF OUTLET PIPE WITH SLUICE GATE.

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

HAZARDOUS SPILL RETENTION BASIN

ORIGINAL BY:_____ DATE:_____
MODIFIED BY:_____ DATE:_____
CHECKED BY:_____ DATE:_____
FILE SPEC.:_____

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc. Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

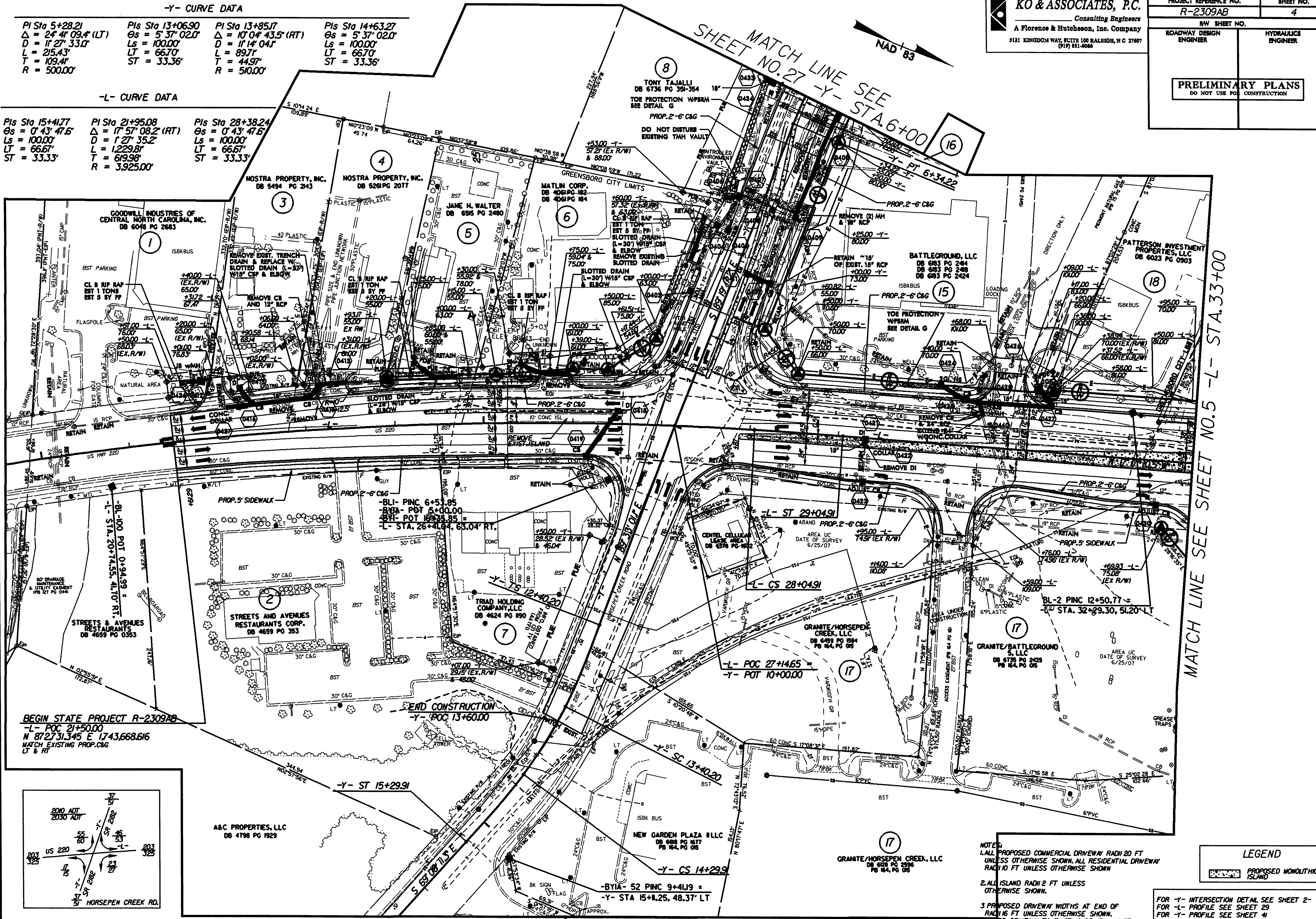
-Y- CURVE DATA

PI Sta 5+28.21	PIs Sta 13+06.90	PI Sta 13+85.17	PIs Sta 14+63.27
Δ = 24° 41' 09.4" (LT)	Θs = 5° 37' 02.0"	Δ = 10° 04' 43.5" (RT)	Θs = 5° 37' 02.0"
D = 11° 27' 33.0"	Ls = 100.00'	D = 11° 14' 04.1"	Ls = 100.00'
L = 215.43'	LT = 66.70'	L = 89.71'	LT = 66.70'
T = 109.41'	ST = 33.36'	T = 44.97'	ST = 33.36'
R = 500.00'		R = 510.00'	

-L- CURVE DATA

PIs Sta 15+41.77	PI Sta 21+95.08	PIs Sta 28+38.24
Θs = 0° 43' 47.6"	Δ = 17° 57' 08.2" (RT)	Θs = 0° 43' 47.6"
Ls = 100.00'	D = 1° 27' 35.2"	Ls = 100.00'
LT = 66.67'	L = 1,229.81'	LT = 66.67'
ST = 33.33'	T = 619.98'	ST = 33.33'
	R = 3,925.00'	

REVISIONS
12/9/08 – Property Owner Name Changes and Deed Book Changes Parcels 5, 11, 12, 13, 14, and 17
07/28/09 – Property Owner Name Change and Deed Book and Page Change Parcel 8
10/12/09 – Removed C/A from Parcels 15, 17 and 18. R/W along -Y- not complete for Parcels 6, 8 and 15.



NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PROPOSED MONOLITHIC ISLAND

FOR -Y- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 29
FOR -Y- PROFILE SEE SHEET 41

8/17/99
14-JAN-2010 14:11
r2309ab_rdy_psh04.dgn

8/17/99

REVISIONS

12/9/08 – Property Owner and Deed Book Changes Parcels 17, 19, and 21
06/29/09 – Property Owner Change Parcel 17A
10/12/09 – Removed C/A from Parcels 17, 17A, 18, 19, 20, 21 and 22. Added TCE 34+60 LT to 37+27.43 LT on Parcels 19 and 20.

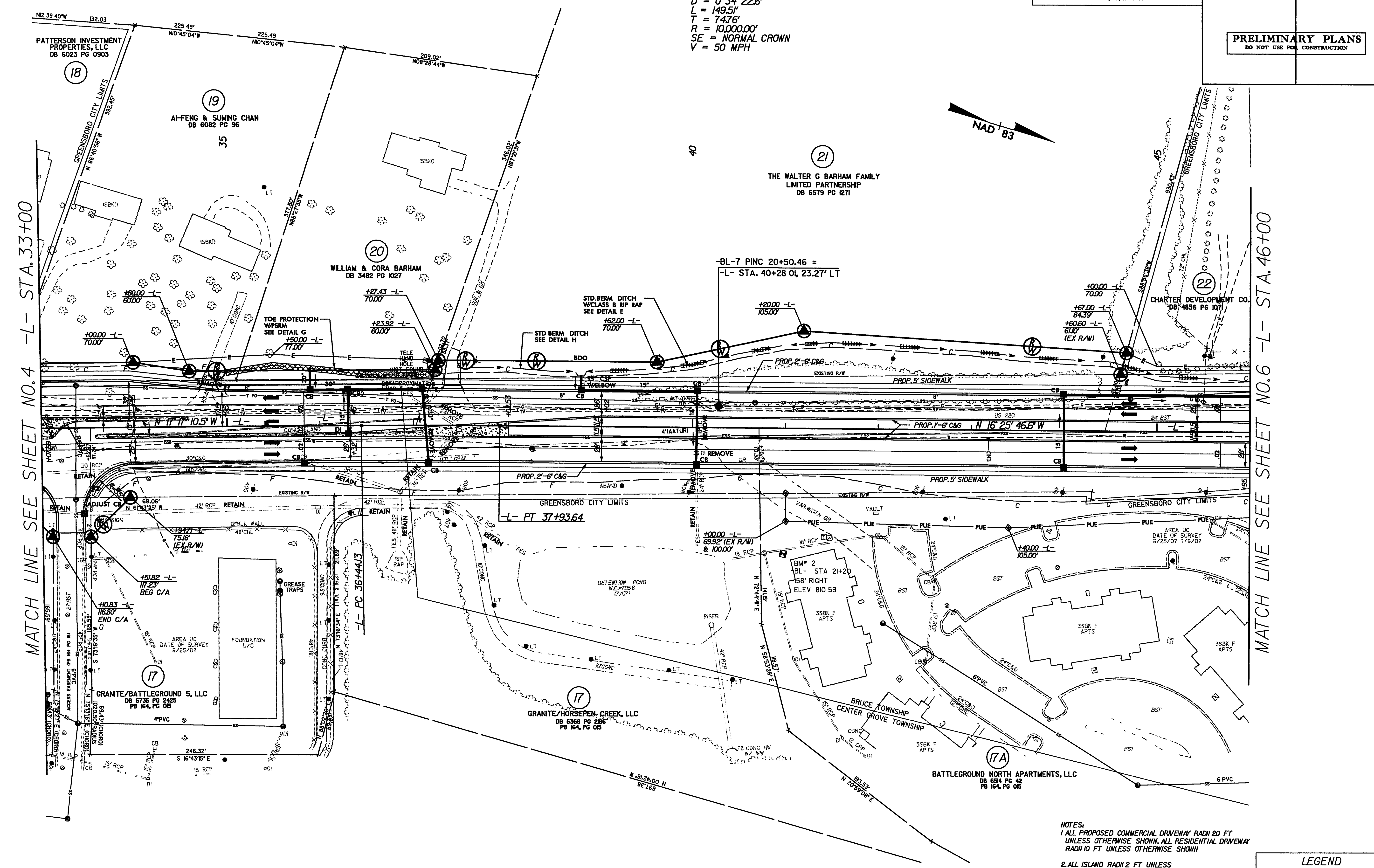
KO & ASSOCIATES, P.C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- CURVE DATA

PI Sta 37+18.88
Δ = 0° 51' 23.9" (RT)
D = 0° 34' 22.6"
L = 149.51'
T = 74.76'
R = 10,000.00'
SE = NORMAL CROWN
V = 50 MPH



NOTES:
1 ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3 PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND
PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 29

12/10/2009
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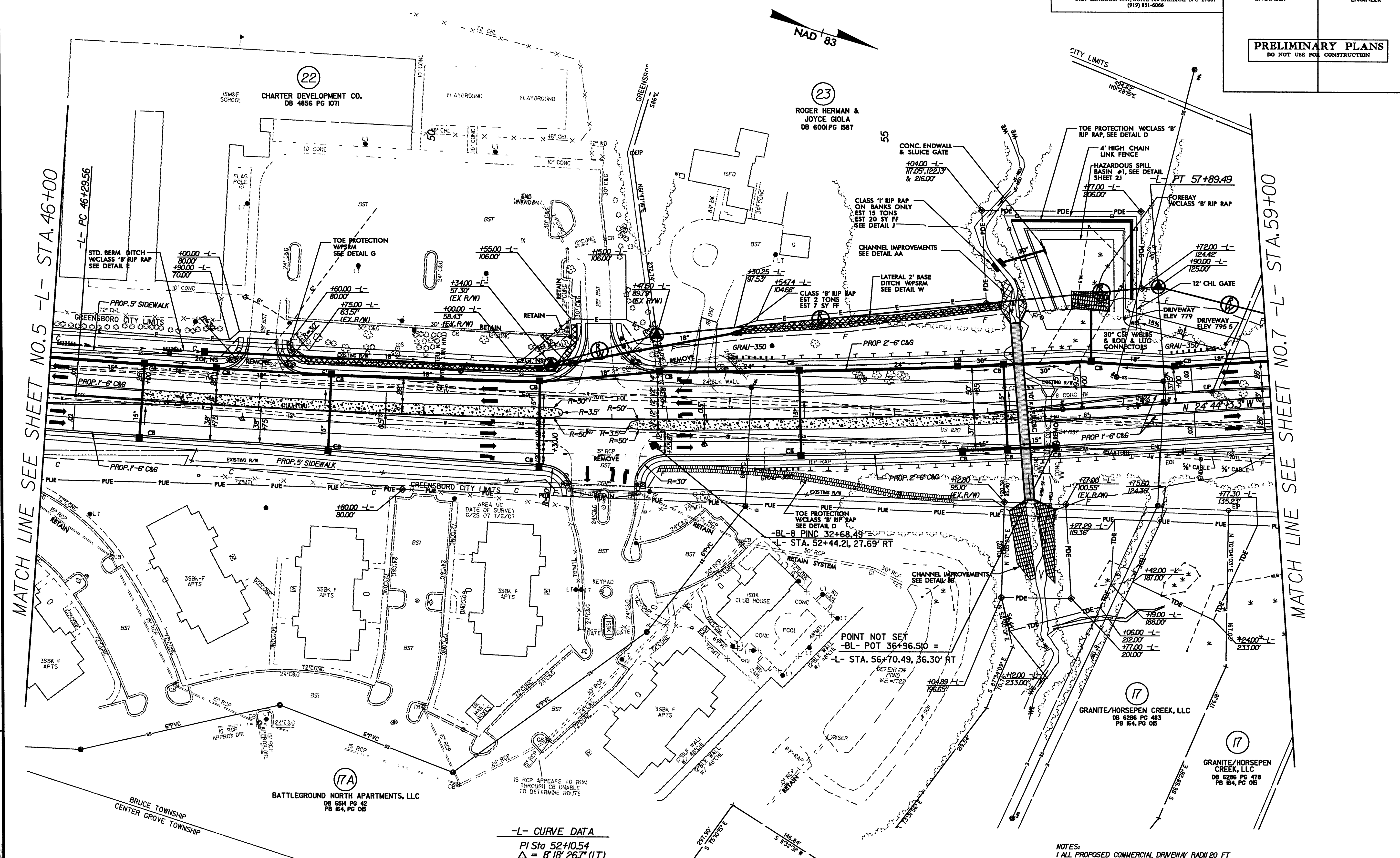
KO & ASSOCIATES, P.C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L- CURVE DATA
PI Sta 52+10.54
Δ = 8° 18' 26.7" (LT)
D = 0° 42' 58.3"
L = 1,159.93'
T = 580.98'
R = 8,000.00'
SE = NORMAL CROWN
V = 50 MPH

NOTES:
1 ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3 PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND
PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 30

REVISIONS
12/9/08 - Property Owner Name Change Parcel 17
06/29/09 - Property Owner Change Parcel 17A
06/29/09 - Parcel 17 revised TDE right station 56+00 to 57+00
10/12/09 - Removed C/A from Parcels 17, 17A, 22 and 23. Revised TCE 51+00 LT to 51+55 LT on Parcel 22.

8/17/99
12/10/2009
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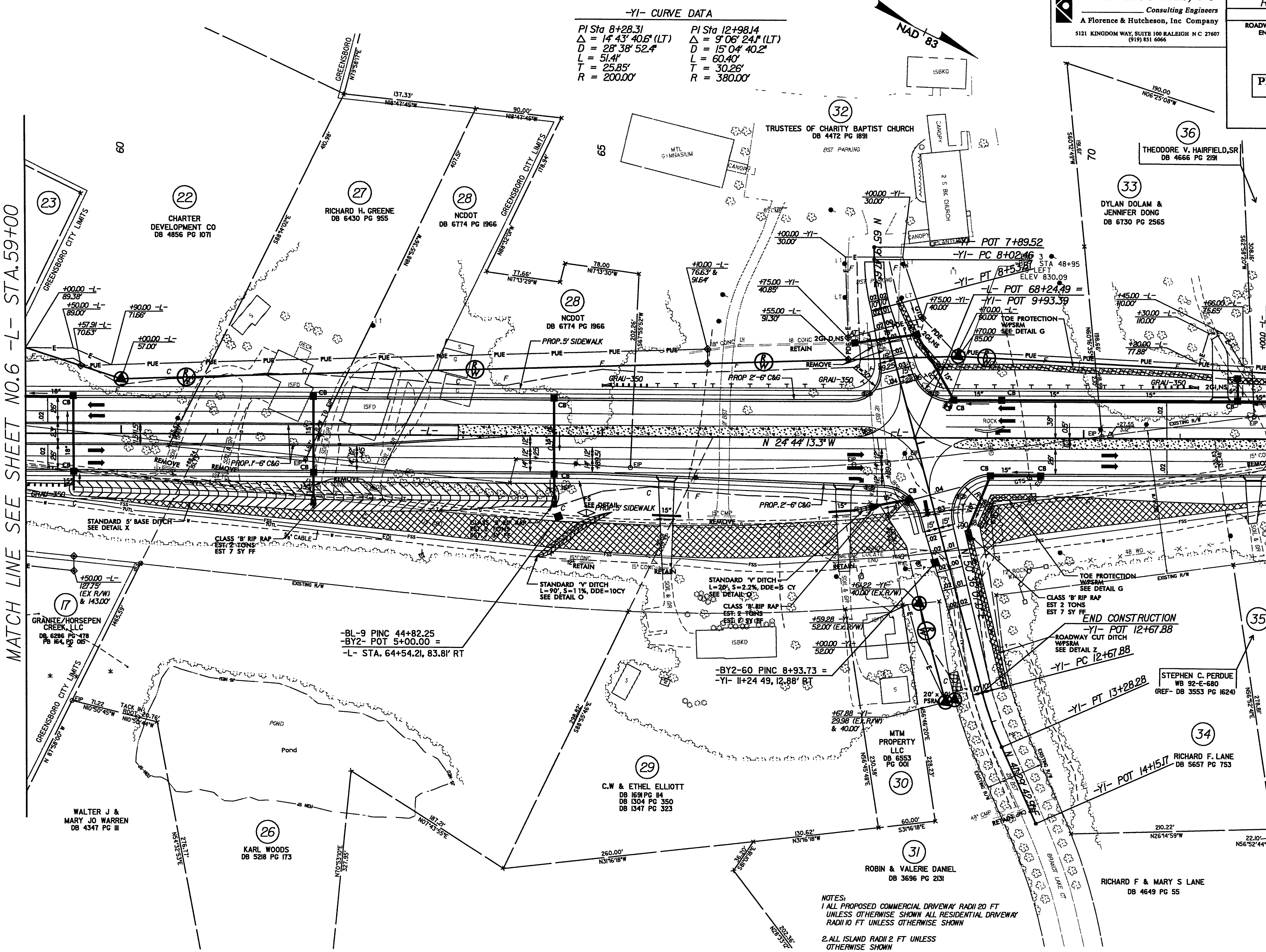
(919) 851 6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1- CURVE DATA

PI Sta 8+28.31	PI Sta 12+98.14
Δ = 14° 43' 40.6" (LT)	Δ = 9° 06' 24.1" (LT)
D = 28° 38' 52.4"	D = 15° 04' 40.2"
L = 51.41'	L = 60.40'
T = 25.85'	T = 30.26'
R = 200.00'	R = 380.00'



NOTES:
1 ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3 PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND
- PAVEMENT REMOVAL
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 30
FOR -Y1- PROFILE SEE SHEET 41

REVISIONS
12/9/08 - Property Owner Name and Deed Book Changes Parcels 17, 21, 26, 27, 28, 30, 33, and 34.
10/12/09 - Removed C/A from Parcels 17, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36. Added TCE 59+00 LT to 59+90 LT on Parcel 22.
Parcels 31, 32 and 34 NOT COMPLETE PENDING -Y1- DESIGN.

8/17/99

12/10/2009
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R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

KO & ASSOCIATES, P C
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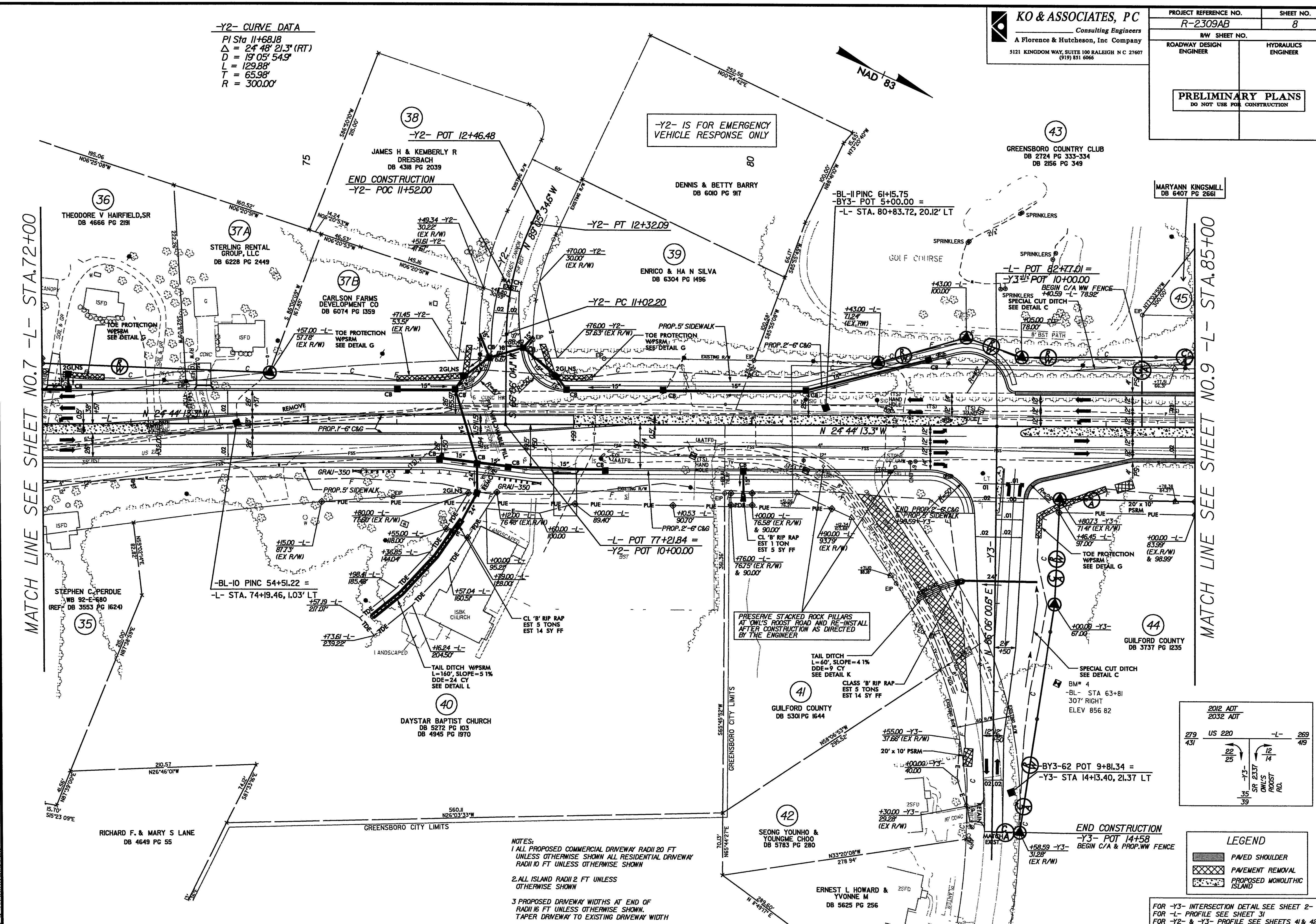
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851 6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y2- CURVE DATA
PI Sta 11+68.18
Δ = 24° 48' 21.3" (RT)
D = 19° 05' 54.9"
L = 129.88'
T = 65.98'
R = 300.00'



2012 ADT / 2032 ADT		
US 220 (279 / 431)	-L-	269 / 419
22 / 25		12 / 14
-Y3- SR 2337 OWL'S ROOST RD.	35 / 39	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND
- PAVED SHOULDER
- PAVEMENT REMOVAL
- PROPOSED MONOLITHIC ISLAND

FOR -Y3- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 31
FOR -Y2- & -Y3- PROFILE SEE SHEETS 41 & 42

REVISIONS
12/9/08 - Property Owner and Deed Book Changes Parcels 37A, 37B, 39, and 40
10/12/09 - Removed C/A from Parcels 35, 36, 37A, 37B, 39, 40, 41, 42 and 43.
12/01/09 - Removed PUE from Parcels 43 and 45 left 84+40 to 84+70.

8/17/99

12/10/2009
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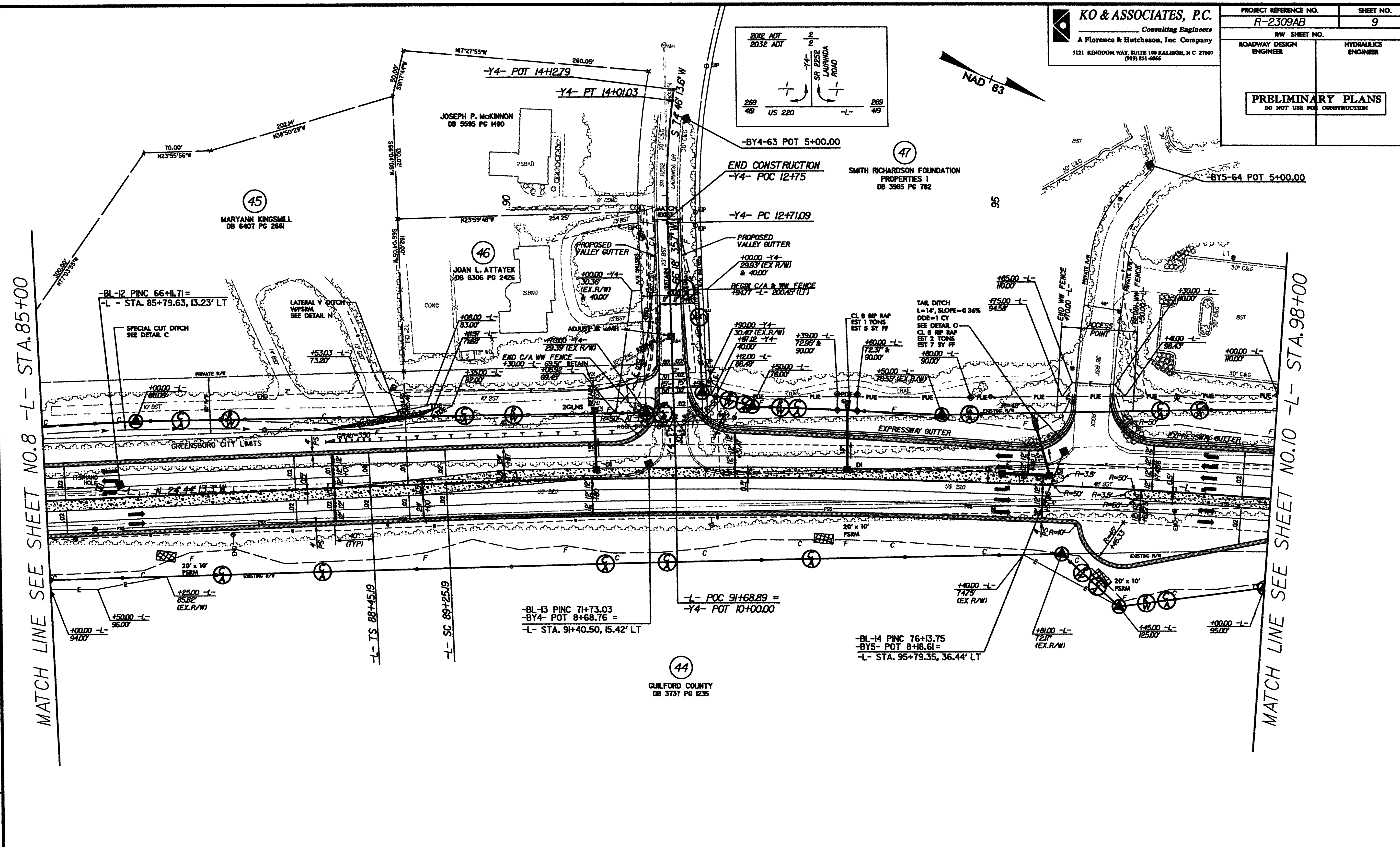
Ko & Associates, P.L.

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L- CURVE DATA

PIs Sta 88+98.52	PI Sta 97+15.72	PIs Sta 105+27.81
Θs = 0° 17' 11.3"	Δ = 11° 17' 13.0" (RT)	Θs = 0° 17' 11.3"
Ls = 80.00'	D = 0° 42' 58.3"	Ls = 80.00'
LT = 53.33'	L = 1,575.96'	LT = 53.33'
ST = 26.67'	T = 790.54'	ST = 26.67'
	R = 8,000.00'	
	SE = 0.02	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

-Y4- CURVE DATA

PI Sta 13+36.18
Δ = 8° 27' 37.9" (RT)
D = 6° 30' 39.2"
L = 129.94'
T = 65.09'
R = 880.00'

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.

3 PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 31
FOR -Y4- PROFILE SEE SHEET 42

REVISIONS
12/9/08 - Property Owner and Deed Book Changes Parcels 45 and 46

8/17/99

12/10/2009
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8/17/99

REVISIONS

KO & ASSOCIATES, P.C.
Consulting Engineers
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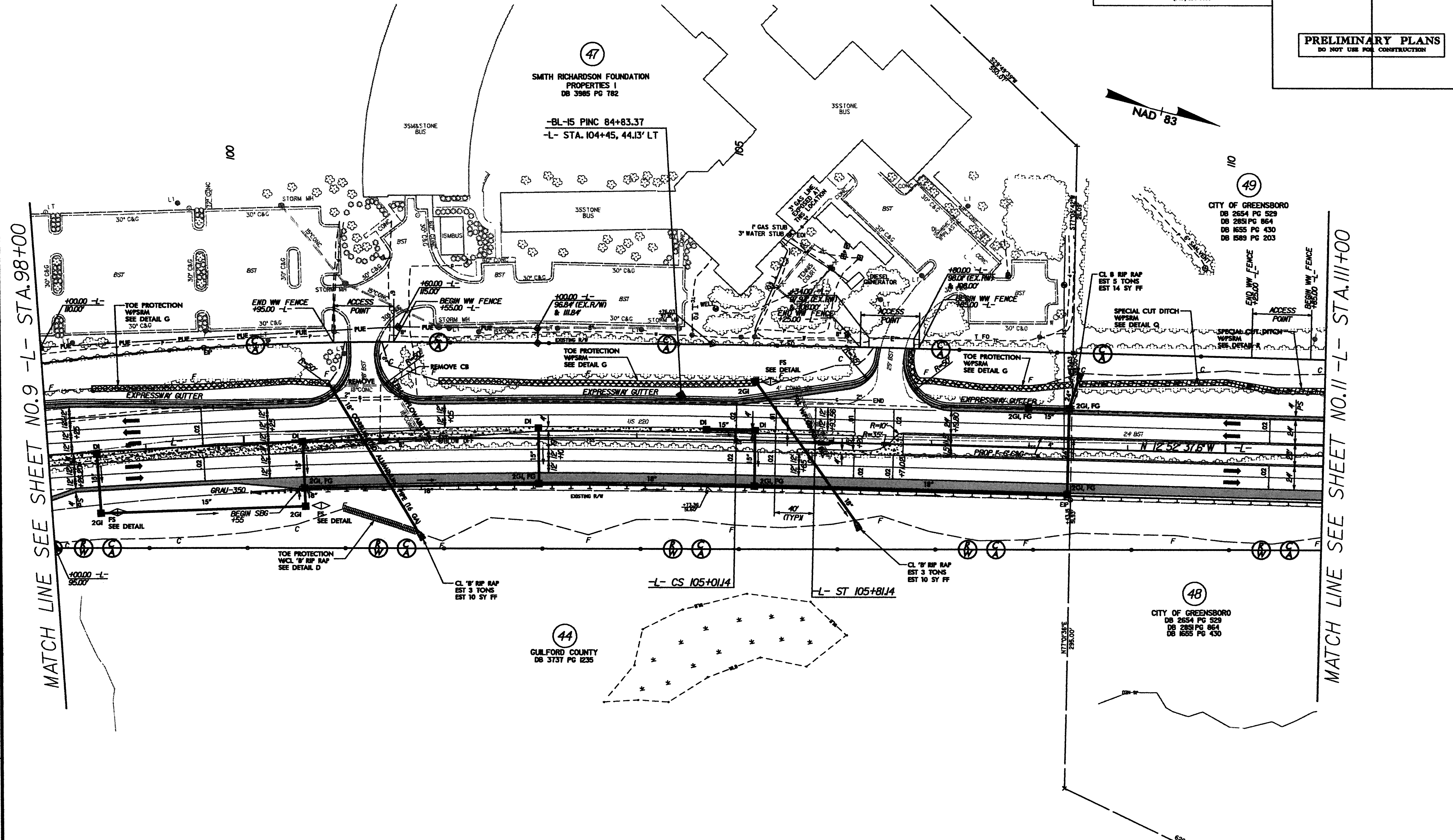
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L- CURVE DATA

PIs Sta 88+98.52	PI Sta 97+15.72	PIs Sta 105+27.81
Θs = 0° 17' 11.3"	Δ = 11° 17' 13.0" (RT)	Θs = 0° 17' 11.3"
Ls = 80.00'	D = 0° 42' 58.3"	Ls = 80.00'
LT = 53.33'	L = 1,575.96'	LT = 53.33'
ST = 26.67'	T = 790.54'	ST = 26.67'
	R = 8,000.00'	
	SE = 0.02	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.

3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 32

12/10/2009
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8/17/99

REVISIONS

10/12/09 - Removed TCE 117+25 RT to 117+75 RT and revised TCE from 119+70 RT to 121+30 RT on Parcel 48. Removed Access Point Station 116+00 LT on Parcel 49.

KO & ASSOCIATES, P.C.
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5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
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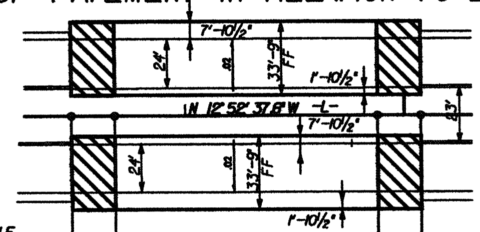
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

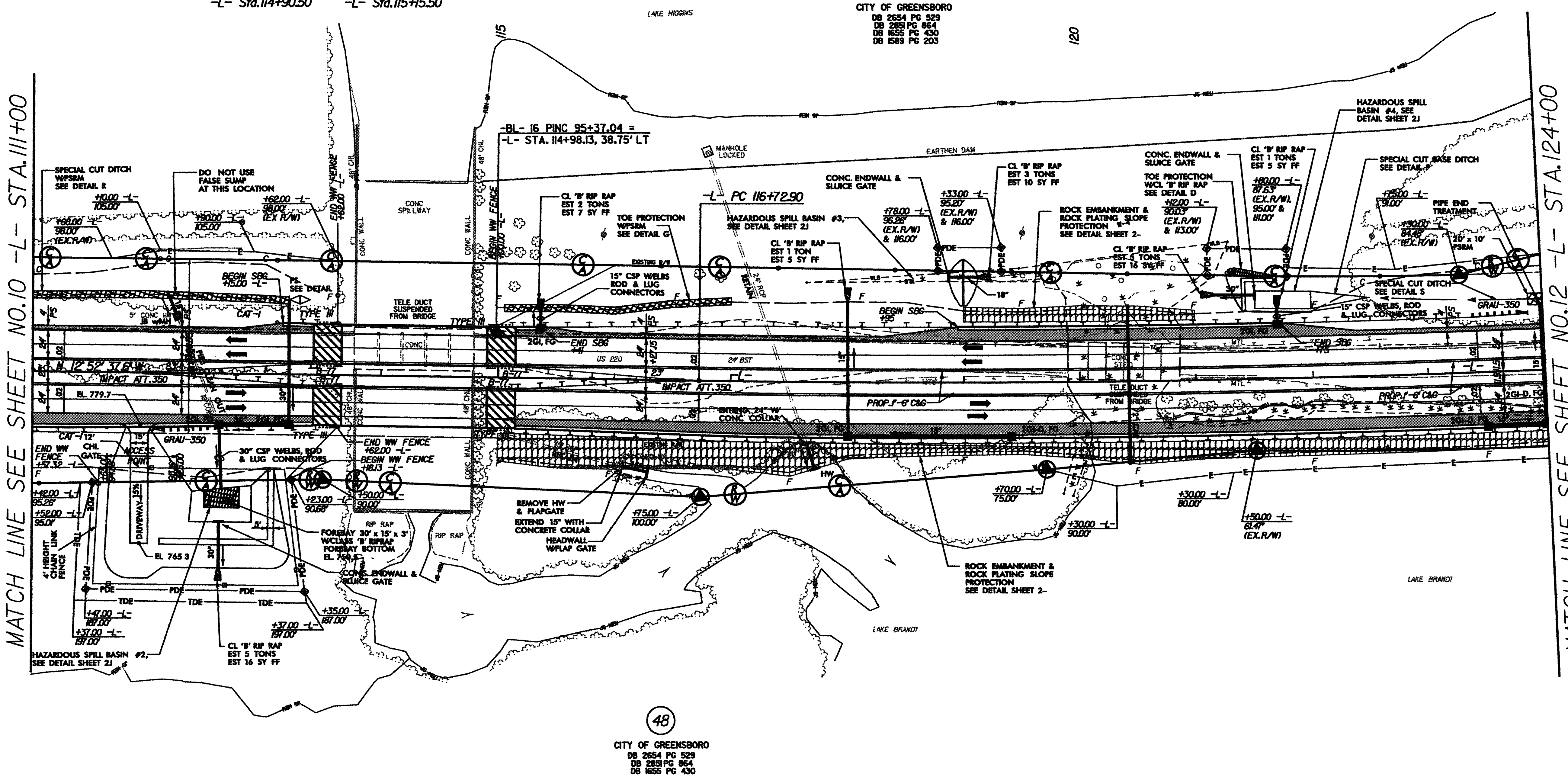
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SKETCH OF PAVEMENT IN RELATION TO BRIDGE WIDTH



BEGIN APPROACH SLAB -L- Sta.113+40.50
BEGIN BRIDGE -L- Sta.113+65.50
END BRIDGE -L- Sta.114+90.50
END APPROACH SLAB -L- Sta.115+15.50

NAD 83



-L- CURVE DATA

PI Sta 124+10.48
Δ = 7° 02' 04.3" (LT)
D = 0° 28' 38.9"
L = 1,473.31'
T = 737.58'
R = 12,000.00'
SE = NORMAL CROWN
V = 60 MPH

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH

LEGEND

- PAVED SHOULDER
- APPROACH SLAB
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 32

12/10/2009
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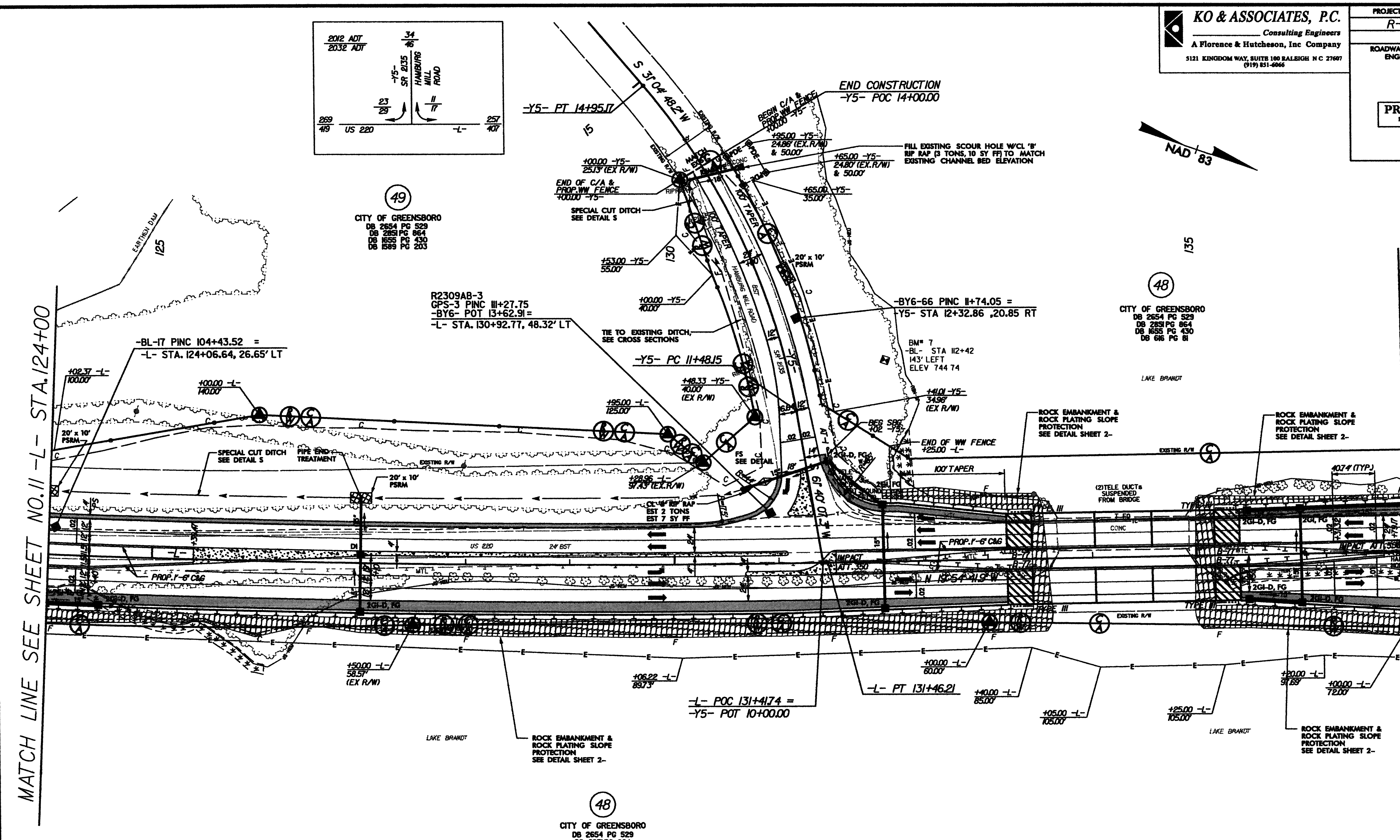
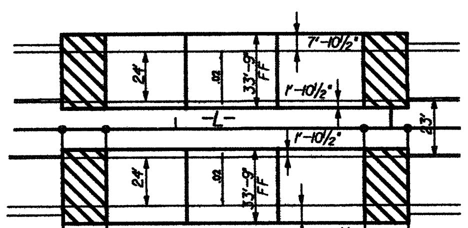
KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SKETCH OF PAVEMENT IN RELATION TO BRIDGE WIDTH



BEGIN APPROACH SLAB
-L- Sta.133+17.50

BEGIN BRIDGE
-L- Sta.133+42.50

END BRIDGE
-L- Sta.135+17.50

END APPROACH SLAB
-L- Sta.135+42.50

-L- CURVE DATA

PI Sta 124+10.48
Δ = 7° 02' 04.3" (LT)
D = 0° 28' 38.9"
L = 1,473.31'
T = 737.58'
R = 12,000.00'
SE = NORMAL CROWN
V = 60 MPH

-Y5- CURVE DATA

PI Sta 13+25.90
Δ = 30° 35' 19.1" (LT)
D = 8° 48' 53.0"
L = 347.02'
T = 177.75'
R = 650.00'

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND

- PAVED SHOULDER
- APPROACH SLAB
- PROPOSED MONOLITHIC ISLAND

FOR -Y5- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 33
FOR -Y5- PROFILE SEE SHEET 42

REVISIONS
101209 - Revised TCE 133+40 RT to 136+20 RT on Parcel 48.

8/17/99
12/10/2009
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KO & ASSOCIATES, P.C.
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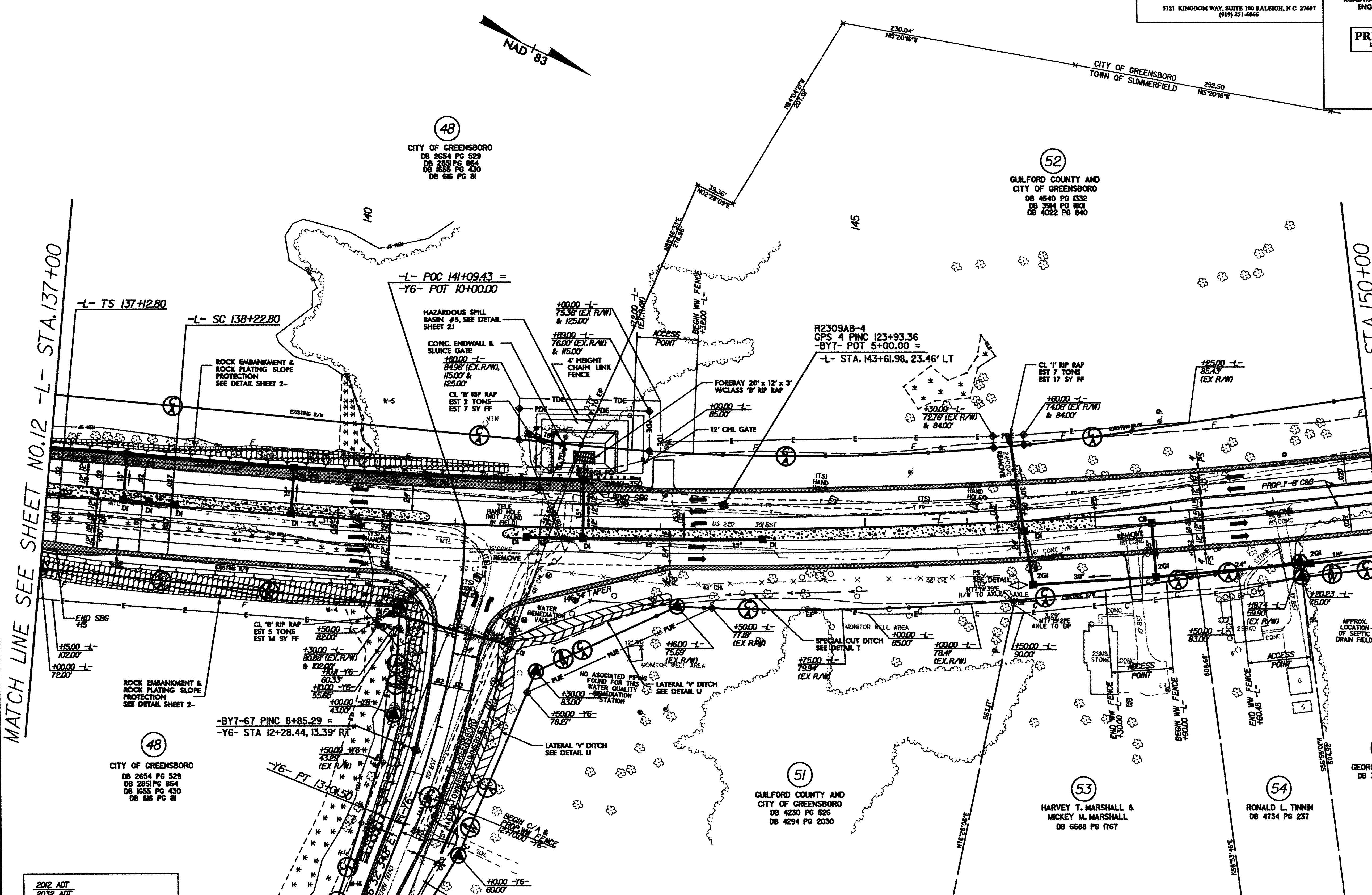
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
12/9/08 - Property Owner Name Change Parcel 53
10/12/09 - Revised TCE 144+75 RT to 146+50 RT on Parcels 51 and 53. Added TCE 143+00 LT to 148+75 LT on Parcel 52.

8/17/99



2012 ADT		
2032 ADT		
257/407 US 220	-L-	215/346
55/78	12/17	
-Y6- SR 2321 STRAWBERRY ROAD	66/96	

-L- CURVE DATA

PIs Sta 137+86.13	PI Sta 144+93.04	PIs Sta 151+94.13
Θs = 0° 32' 19.2"	Δ = 13° 04' 18.7" (LT)	Θs = 0° 32' 19.2"
Ls = 110.00'	D = 0° 58' 45.9"	Ls = 110.00'
LT = 73.33'	L = 1,334.66'	LT = 73.33'
ST = 36.67'	T = 670.24'	ST = 36.67'
	R = 5,850.00'	
	SE = 0.027	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

-Y6- CURVE DATA

PI Sta 11+52.42
Δ = 20° 44' 17.3" (RT)
D = 6° 52' 41.7"
L = 301.50'
T = 152.42'
R = 833.00'

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -Y6- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 33
FOR -Y6- PROFILE SEE SHEET 42

12/10/2009
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PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	14

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

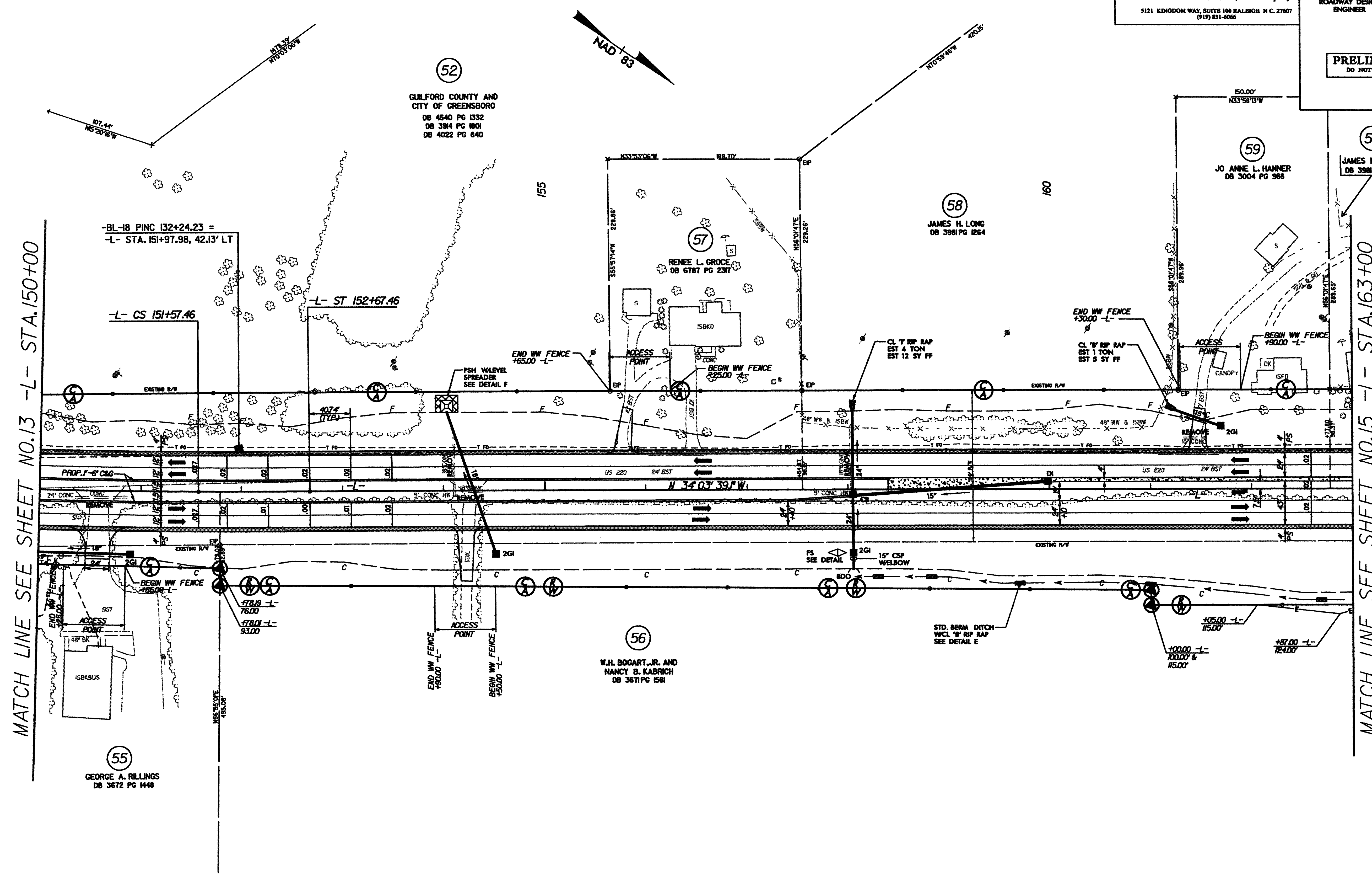
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C. 27607
(919) 851-6066

8/17/99

REVISIONS

12/9/08 - Property Owner Name Change Parcel 57



-L- CURVE DATA

PIs Sta 137+86.13	PI Sta 144+93.04	PIs Sta 151+94.13
θs = 0° 32' 19.2"	Δ = 13° 04' 18.7" (LT)	θs = 0° 32' 19.2"
Ls = 110.00'	D = 0° 58' 45.9"	Ls = 110.00'
LT = 73.33'	L = 1,334.66'	LT = 73.33'
ST = 36.67'	T = 670.24'	ST = 36.67'
	R = 5,800.00'	
	SE = 0.027	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:

1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.

3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND

- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 34

12/10/2009
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Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C 27607
(919) 851-6066

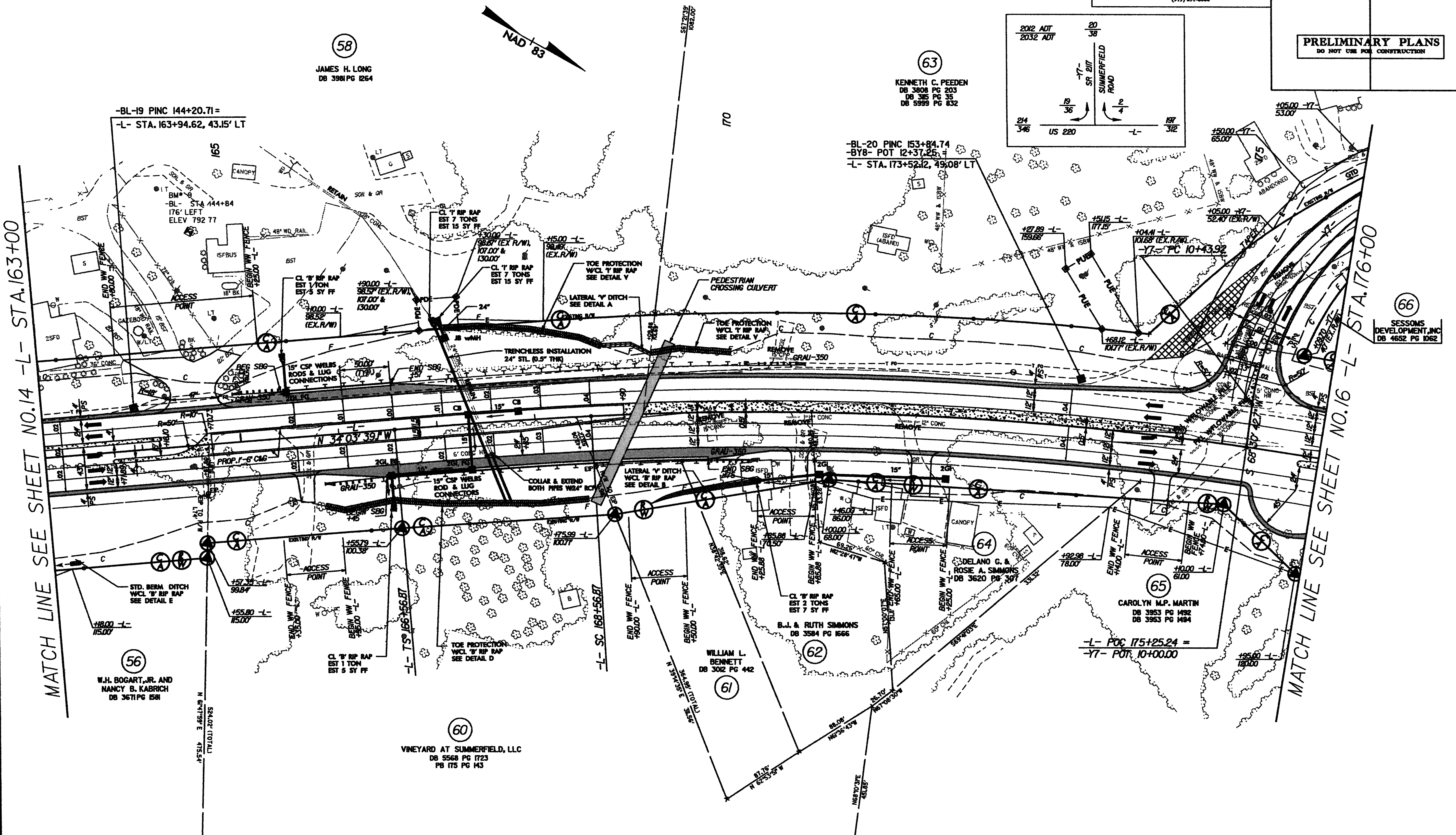
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

12/9/08 – Deed Book Changes Parcel 63
03/25/09 – Access change to Parcel 65
10/12/09 – Revised -Y7- alignment, R/W and easements.
12/01/09 – Parcel 60 Revised R/W and C/A to existing R/W eliminated Access Point 167+15 to 167+75 RT.
Parcels 61 and 62 revised R/W and C/A.



-L- CURVE DATA

PIs Sta 167+90.21
Θs = 1° 38' 13.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

PI Sta 173+16.51
Δ = 14° 57' 48.3" (RT)
D = 1° 38' 13.3"
L = 914.06'
T = 459.65'
R = 3,500.00'
SE = 0.04
RUNOFF = SEE PLANS
V = 60 MPH

PIs Sta 178+37.60
Θs = 1° 38' 13.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

-Y7- CURVE DATA

PI Sta 12+09.06
Δ = 57° 39' 36.4" (RT)
D = 19° 05' 54.9"
L = 301.91'
T = 165.13'
R = 300.00'

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PAVEMENT REMOVAL
- PROPOSED MONOLITHIC ISLAND

FOR -Y7- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 34
FOR -Y7- PROFILE SEE SHEET 43

12/10/2009
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Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

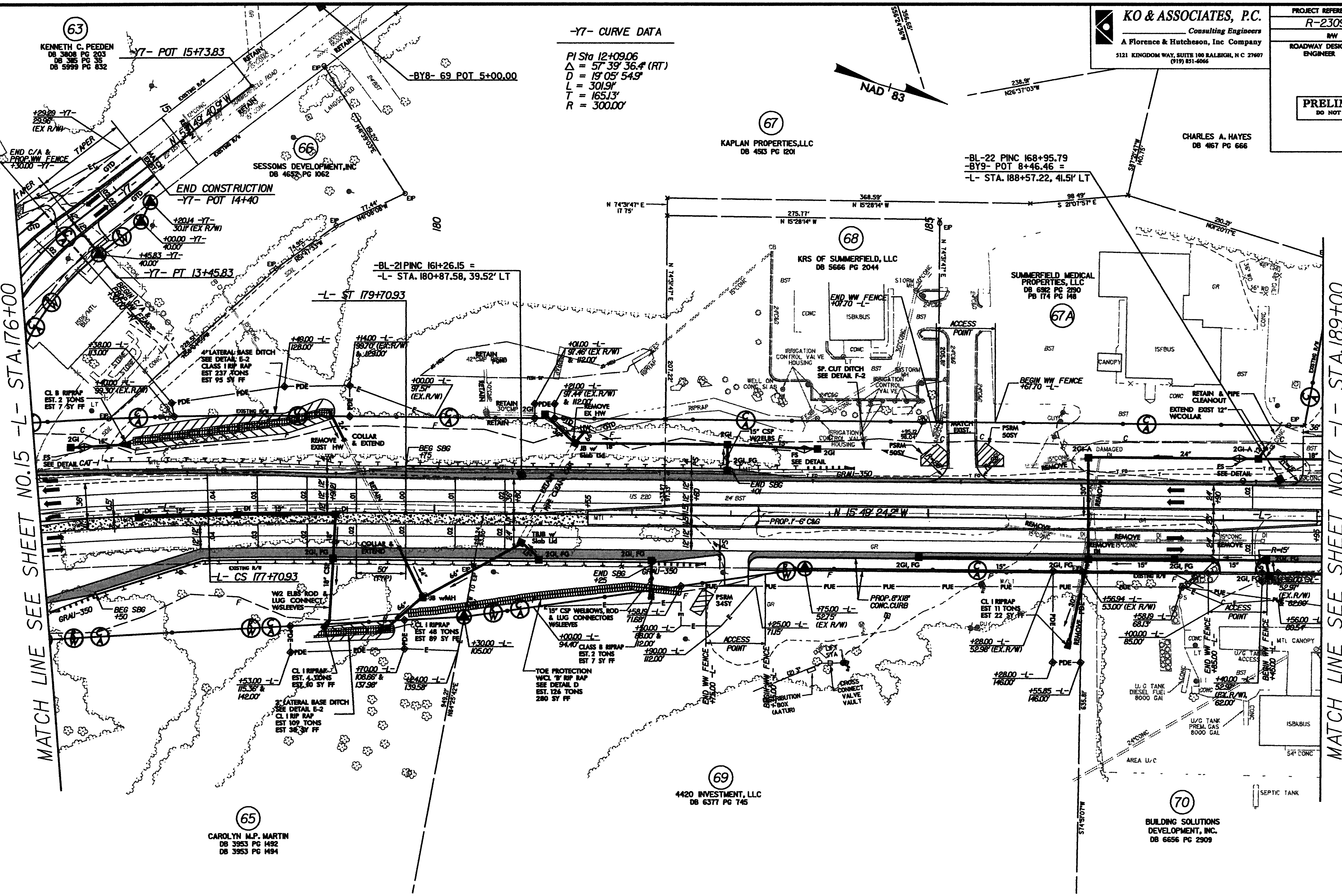
8/17/99

REVISIONS

12/9/08 - Property Owner and Deed Book Changes Parcels 63, 69, and 70
06/29/09 - Added Parcel 67A
10/12/09 - Revised -Y7- alignment, R/W and easements. Revised TCE 181+00 RT to 182+50 RT on Parcel 69 and added TCE 187+58.19 RT to 188+56 RT on Parcel 70.

-Y7- CURVE DATA

PI Sta 12+09.06
Δ = 57° 39' 36.4" (RT)
D = 19° 05' 54.9"
L = 301.91'
T = 165.13'
R = 300.00'



-L- CURVE DATA

PIs Sta 167+90.21	PIs Sta 173+16.51	PIs Sta 178+37.60
Θs = 1° 38' 13.3"	Δ = 14° 57' 48.3" (RT)	Θs = 1° 38' 13.3"
Ls = 200.00'	D = 1° 38' 13.3"	Ls = 200.00'
LT = 133.34'	L = 914.06'	LT = 133.34'
ST = 66.67'	T = 459.65'	ST = 66.67'
	R = 3,500.00'	
	SE = 0.04	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -Y7- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 35
FOR -Y7- PROFILE SEE SHEET 43

12/10/2009
r2309ab_rdy_psh16.dgn

8/17/99

REVISIONS

12/9/08 - Property Owner Name and Deed Book Changes Parcels 70, 72, and 73
06/29/09 - Parcel 75 Deleted PDE right station 201+00
10/12/09 - Added Access Point Station 199+55 RT on Parcel 75.

KO & ASSOCIATES, P.C.
Consulting Engineers
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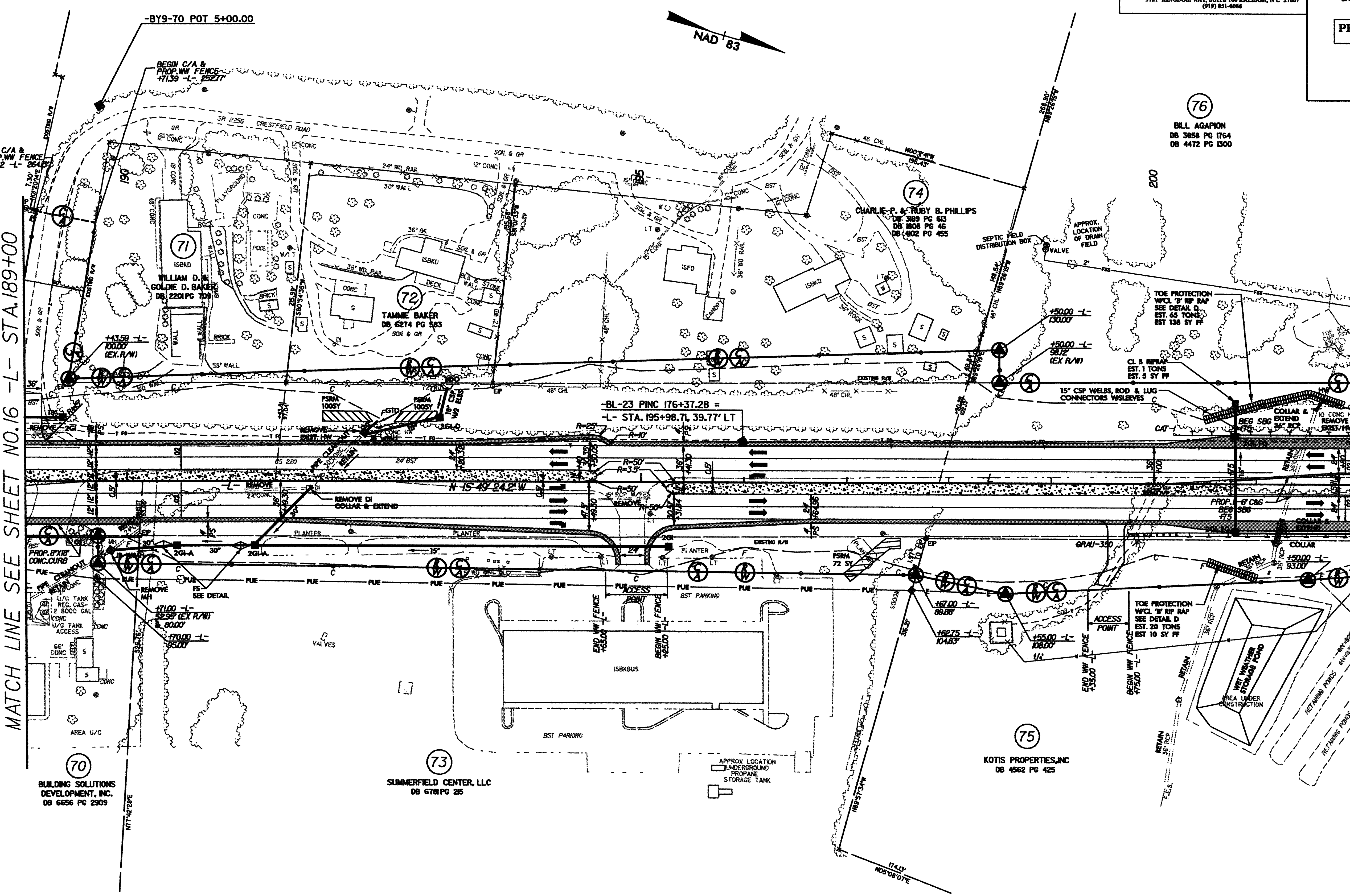
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NOTES:

1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.

3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 18 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND

- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 35

12/10/2009
r2309ab_rdy_psh17.dgn

8/17/99

-L- CURVE DATA

PIs Sta 208+63.53	PI Sta 213+97.30	PIs Sta 219+25.59
Θs = 1° 38' 13.3"	Δ = 15° 12' 12.7" (LT)	Θs = 1° 38' 13.3"
Ls = 200.00'	D = 1° 38' 13.3"	Ls = 200.00'
LT = 133.34'	L = 928.73'	LT = 133.34'
ST = 66.67'	T = 467.11'	ST = 66.67'
	R = 3,500.00'	
	SE = 0.03	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

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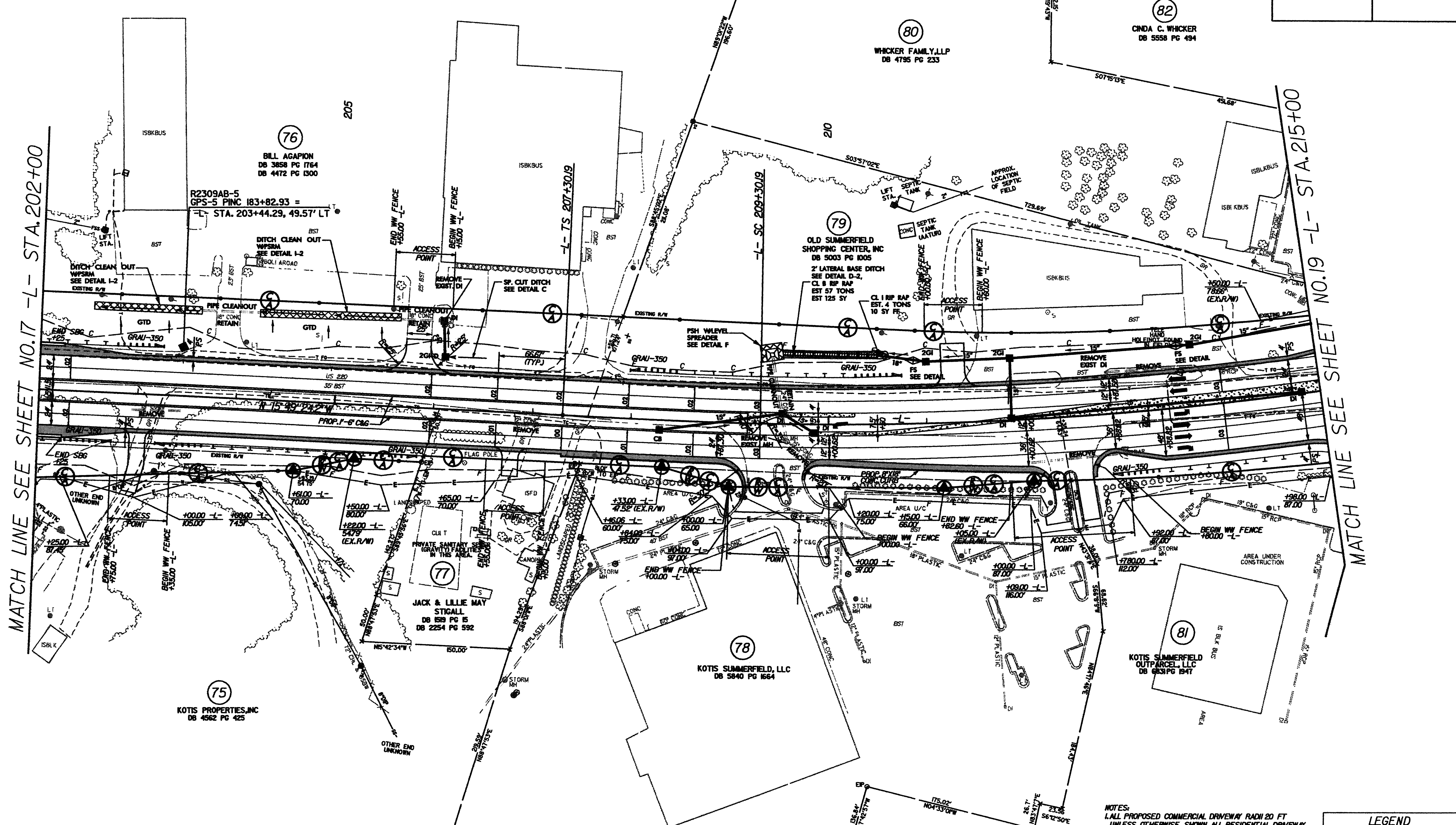
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN

3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 36

REVISIONS
12/9/08 - Property Owner Name and Deed Book Changes Parcels 80 and 81
03/25/09 - Removed Concrete Curb in front of Parcel 79
10/12/09 - Added or Revised TCE 202+50 RT to 215+00 RT on Parcels 75, 77, 78 and 81. Added Left-over -L- 210+00 and Access Point Station 209+00 RT on Parcel 78.
Added TCE 214+50 LT to 215+00 LT on Parcel 79.

12/10/2009
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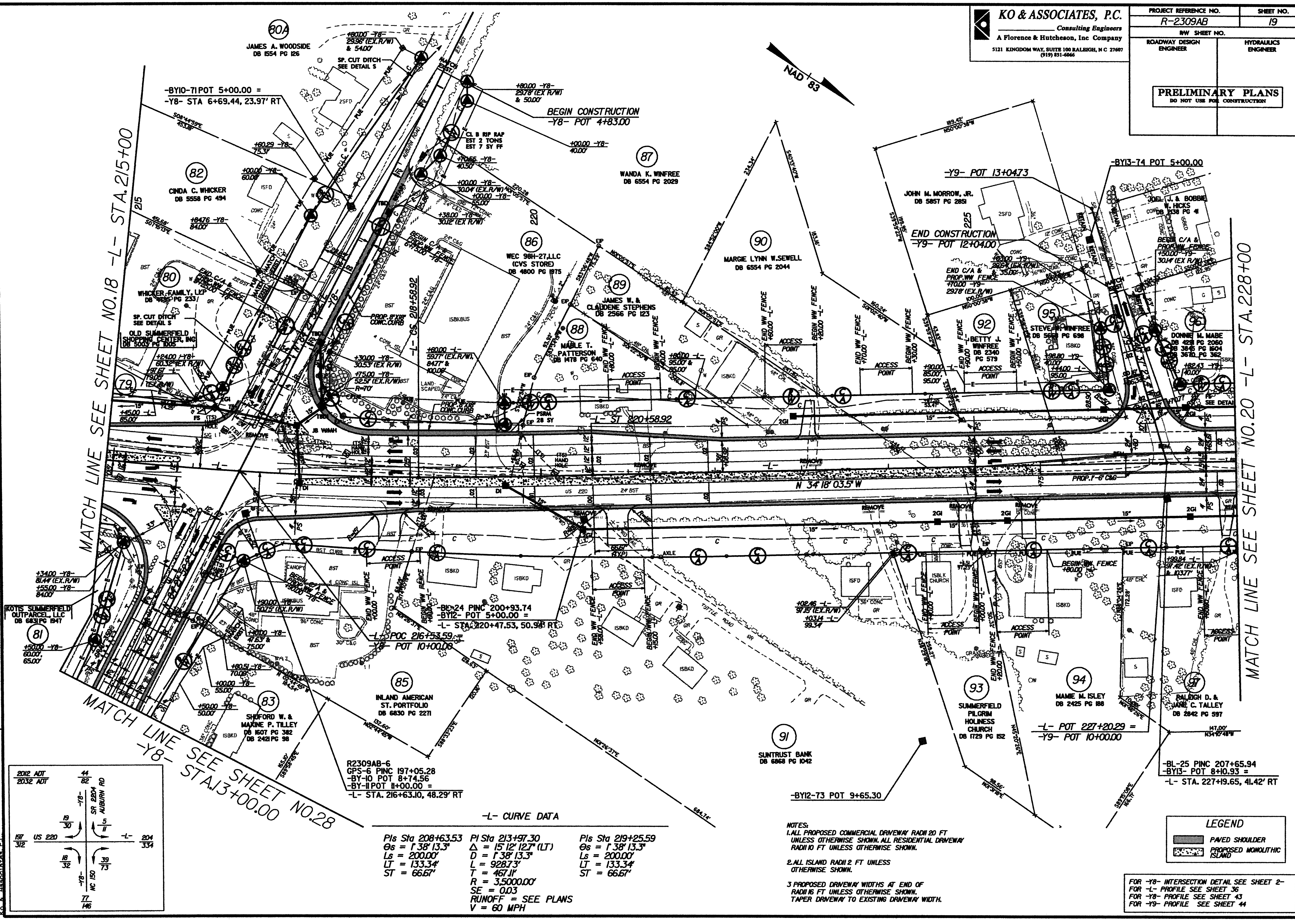


-L- CURVE DATA

PI Sta 208+63.53	PI Sta 213+97.30	PI Sta 219+25.59
Θs = 1° 38' 13.3"	Δ = 15° 12' 12.7" (LT)	Θs = 1° 38' 13.3"
Ls = 200.00'	D = 1° 38' 13.3"	Ls = 200.00'
LT = 133.34'	L = 928.73'	LT = 133.34'
ST = 66.67'	T = 467.11'	ST = 66.67'
	R = 3,500.00'	
	SE = 0.03	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

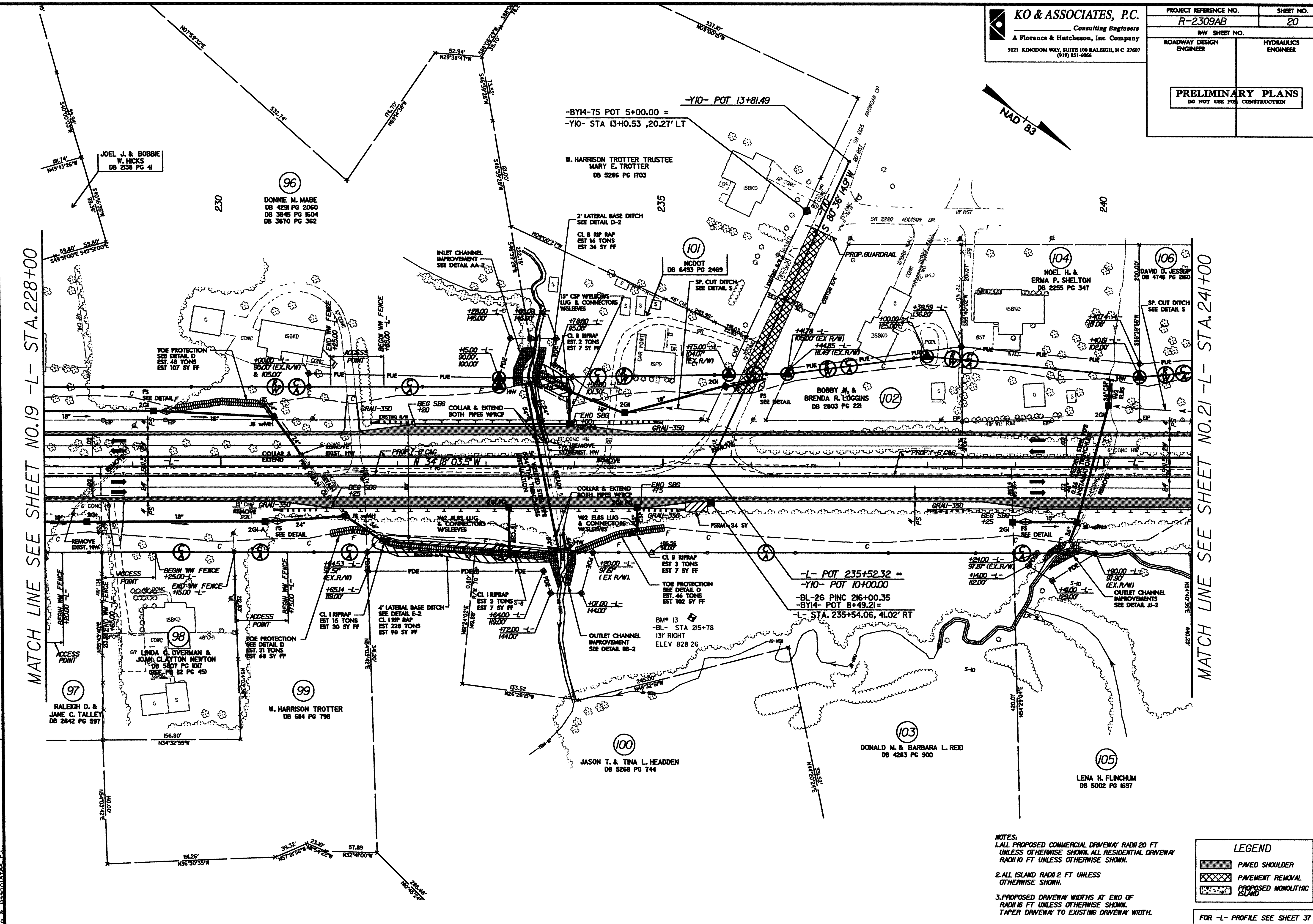
FOR -Y8- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 36
FOR -Y8- PROFILE SEE SHEET 43
FOR -Y9- PROFILE SEE SHEET 44

REVISIONS
12/9/08 - Added Parcel 80A and Property Owner Name and Deed Book Changes to Parcels 80, 81, 85, 87, 90, and 91
10/12/09 - Added TCE 215+00 LT to 215+97.67 LT on Parcels 79 and 80. Added TCE 11+80.51 LT to 13+00 LT -Y8- on Parcel 83. Shifted Access Point for Parcel 91 Station 220+85.

8/17/99
12/10/2009

REVISIONS

12/9/08 - Property Owner Name and Deed Book Changes Parcels 99 and 101
10/12/09 - Eliminated Access Point for Parcel 101 on left.



8/17/99

12/10/2009

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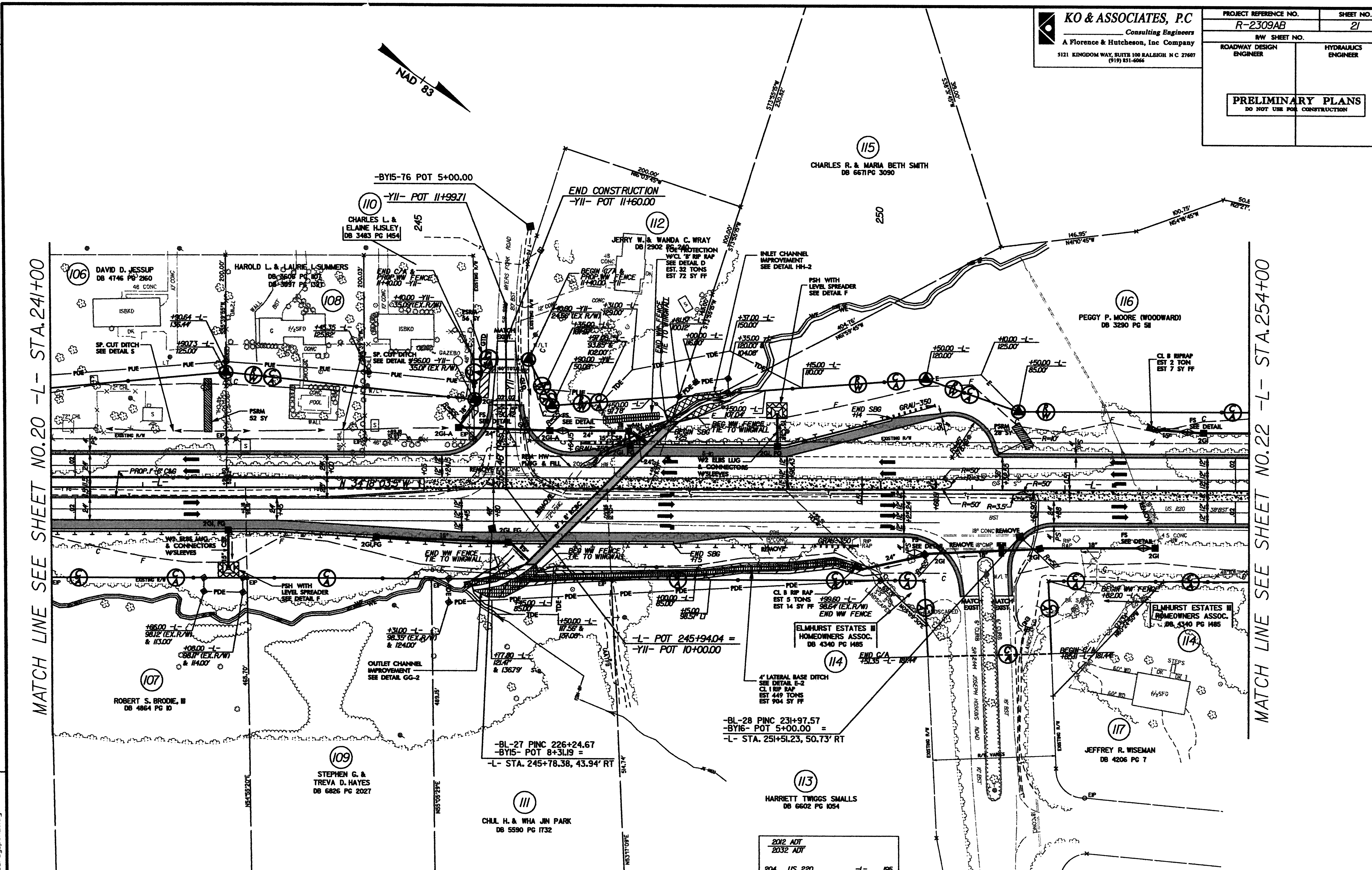
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS
12/9/08 - Property Owner and Deed Book Changes Parcels 109, 113, and 115
6/15/09 - Property Owner Change Parcel 114
10/12/09 - Added TCE 250+50 LT to 251+50 LT on Parcel 116.



2012 ADT		
2032 ADT		
204 / 334	US 220 -L-	195 / 325
11 / 14	SR 2444 JOSEPH HOSKINS ROAD	2 / 5
	13 / 19	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 37
FOR -Y11- PROFILE SEE SHEET 44

12/10/2009
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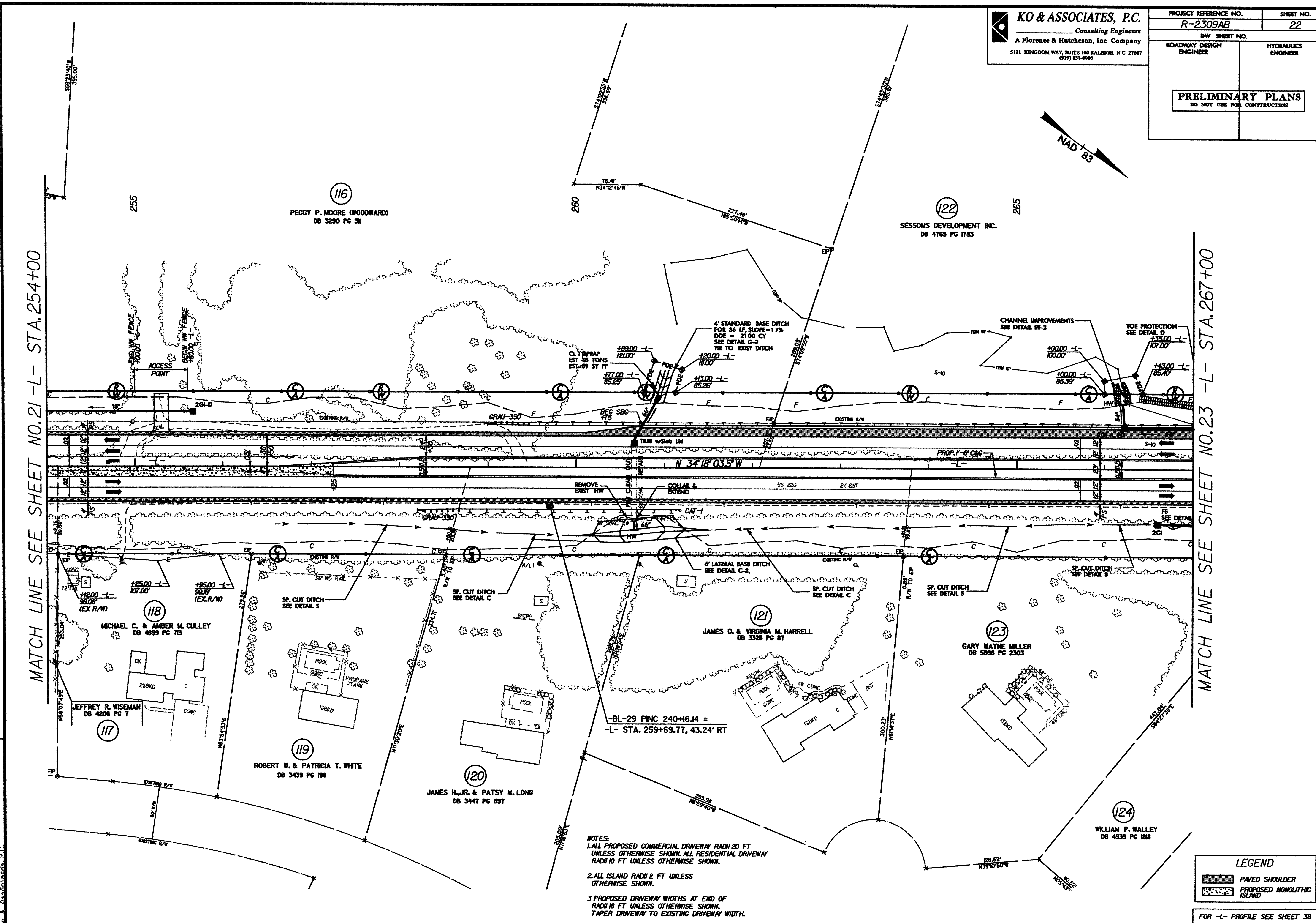
8/17/99

REVISIONS



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8/17/99

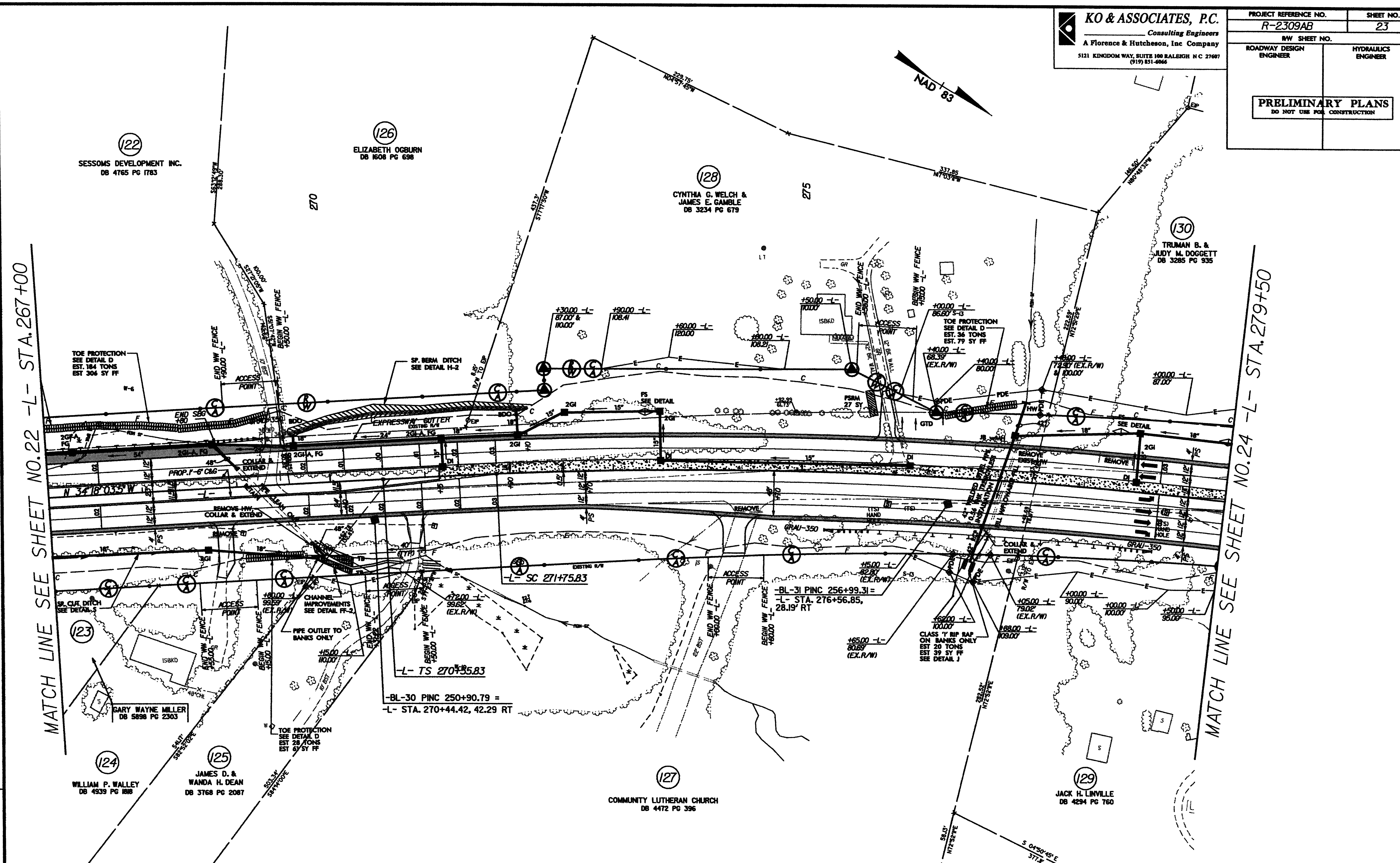
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

12/9/08 - Property Owner Name Change Parcel 128
10/12/09 - Added TCE 269+80 RT to 270+72 RT on Parcel 125, Revised TCE 276+88 RT to 279+50 RT on Parcels 127 and 129
Added PDE and revised TCE 276+00 LT to 279+50 LT on Parcels 128 and 130.



-L- CURVE DATA

PIs Sta 271+35.83	PI Sta 277+09.88	PIs Sta 282+79.89
Θs = 0° 41' 15.2"	Δ = 12° 11' 35.5" (RT)	Θs = 0° 41' 15.2"
Ls = 120.00'	D = 1° 08' 45.3"	Ls = 120.00'
LT = 80.00'	L = 1,064.06'	LT = 80.00'
ST = 40.00'	T = 534.05'	ST = 40.00'
	R = 5,000.00'	
	SE = 0.03	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

FOR -L- PROFILE SEE SHEET 38

12/10/2009
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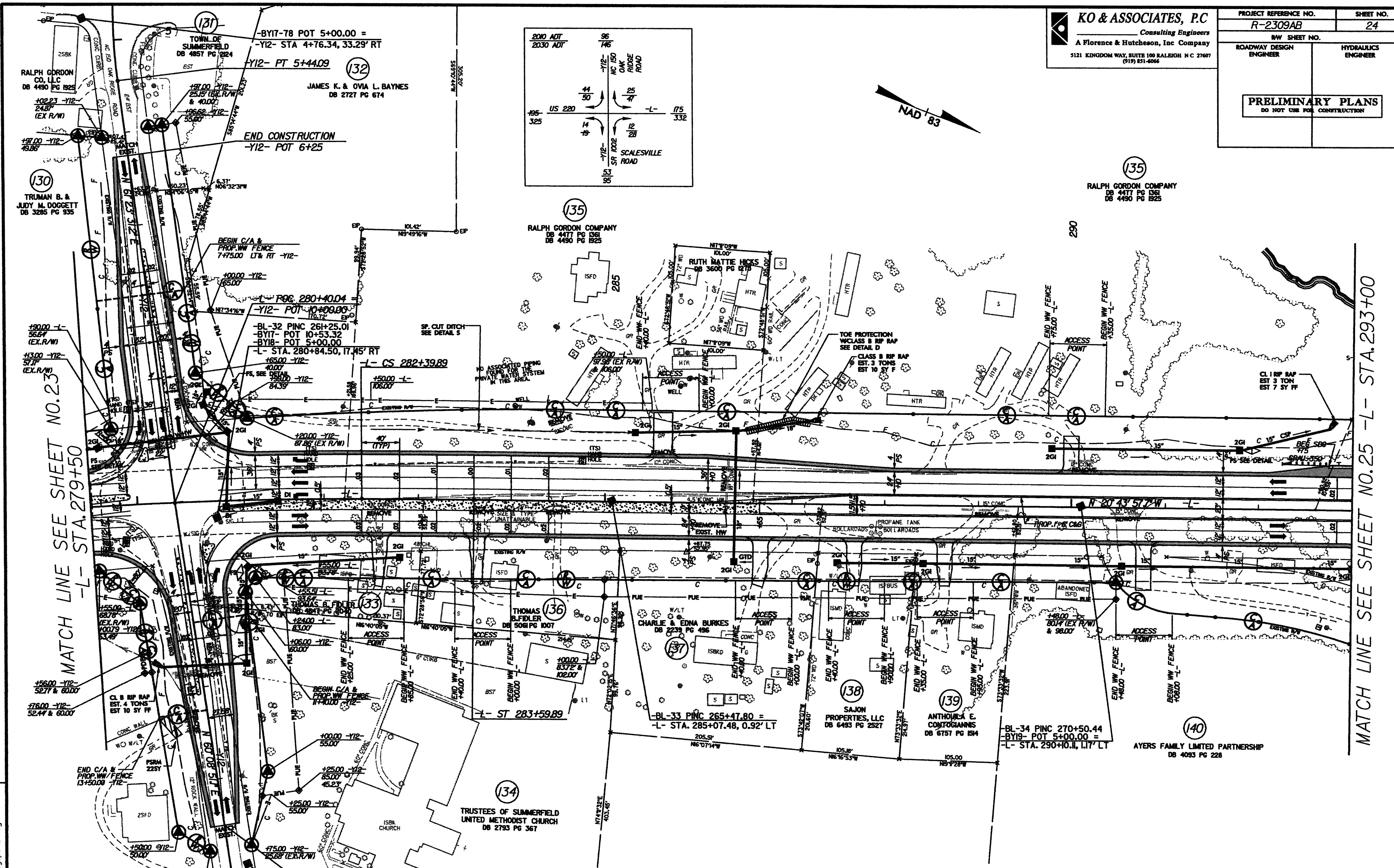
PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

KO & ASSOCIATES, P.C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



REVISIONS

12/8/08 - Property Owner Name Changes Parcels 138 and 139
10/12/09 - Revised TCE 279+50 RT to 280+00 RT on Parcel 129, Added Access Point 290+78 RT for Parcel 140.
Revised R/W and C/A lines along -Y12- Left on Parcel 135. Revised TCE 279+50 LT to 279+90 LT on Parcel 130.

-Y12- CURVE DATA

PI Sta 4+73.37
Δ = 13° 34' 13.6" (LT)
D = 9° 32' 57.5"
L = 142.11'
T = 71.39'
R = 600.00'

-L- CURVE DATA

PIs Sta 271+35.83	PI Sta 277+09.88	PIs Sta 282+79.89
θs = 0° 41' 15.2"	Δ = 12° 11' 35.5" (RT)	θs = 0° 41' 15.2"
Ls = 120.00'	D = 1° 08' 45.3"	Ls = 120.00'
LT = 80.00'	L = 1064.06'	LT = 80.00'
ST = 40.00'	T = 534.05'	ST = 40.00'
	R = 5,000.00'	
	SE = 0.03	
	RUNOFF = SEE PLANS	
	V = 60 MPH	

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
PAVED SHOULDER
PROPOSED MONOLITHIC ISLAND

FOR -Y12- INTERSECTION DETAIL SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 39
FOR -Y12- PROFILE SEE SHEET 44

8/17/99
12/10/2009

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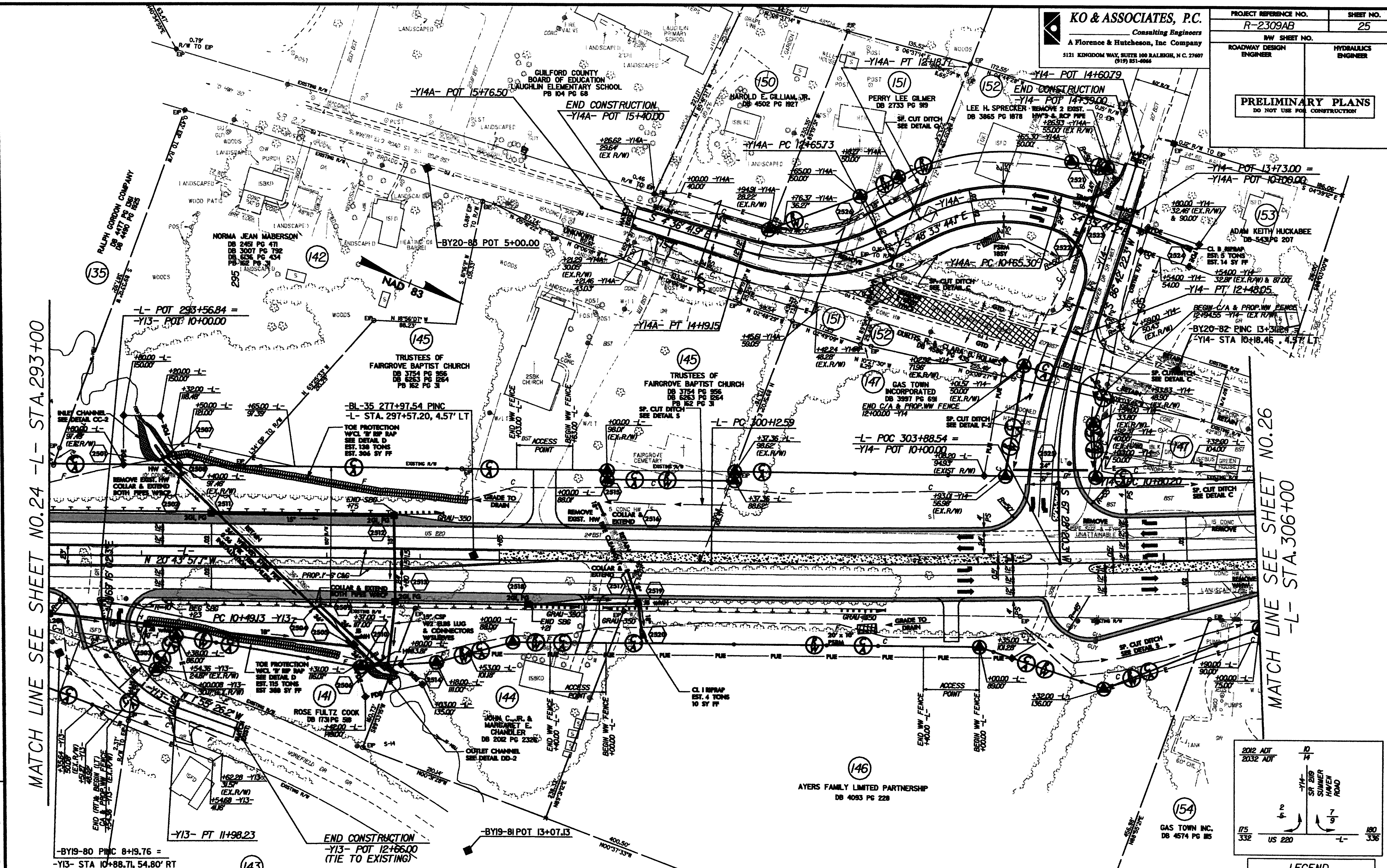
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS	
12/9/08 – Property Owner Name Change Parcel 143 5/1/09 – Parcel 145 Added Access Point 10/12/09 – Added TCE -Y13- LT on Parcel 141, and added TCE 304+32 RT to 306+00 RT on Parcels 146 and 154.	12/22/09 – Property Line Revisions Parcels 135, 142, 145, 147, 150 and 151. Parcel 145 Proposed R/W and C/A revised around cemetary. TCE Revision -Y14A- Right 15+26.64.



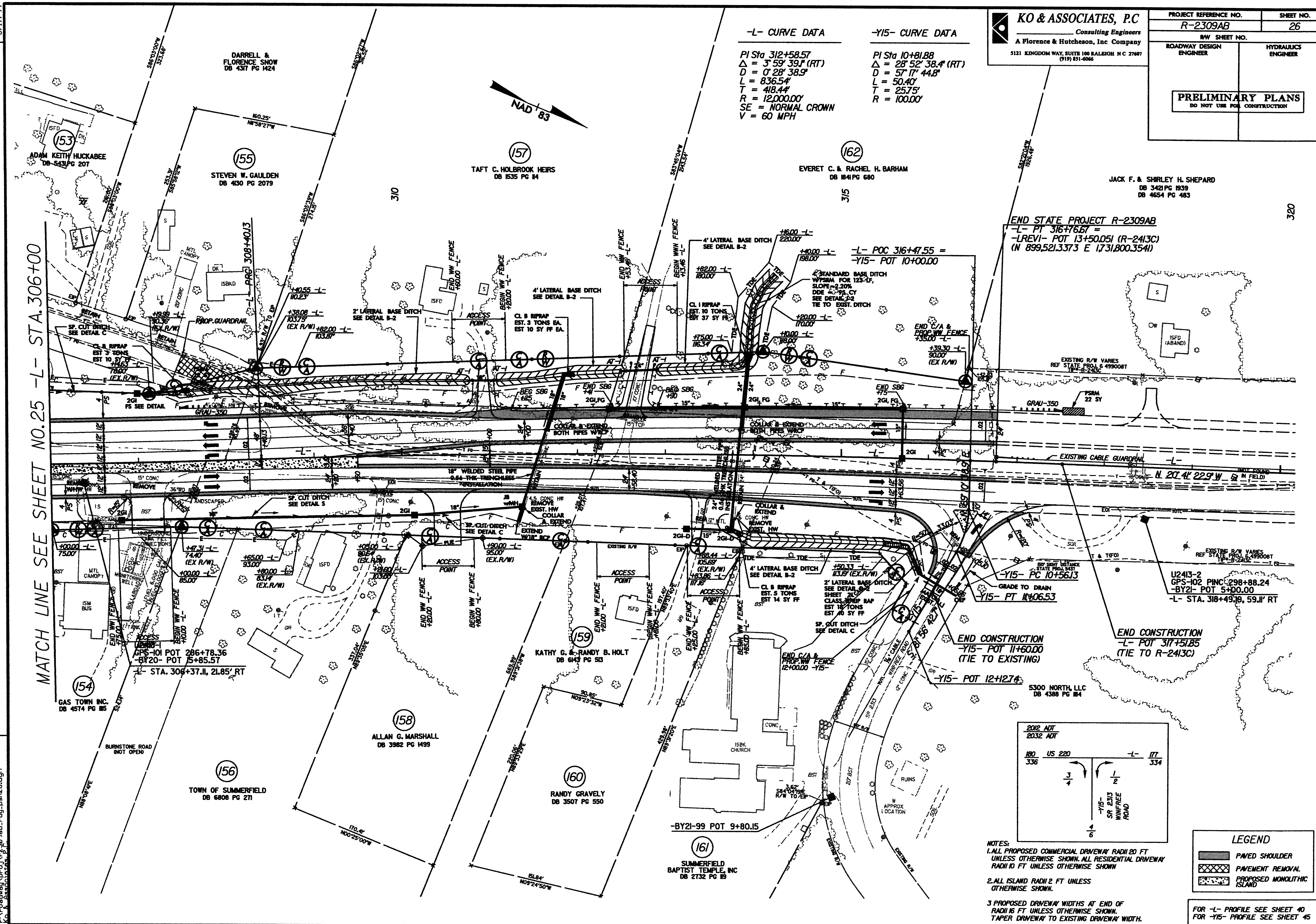
-L- CURVE DATA	-Y13- CURVE DATA	-Y14- CURVE DATA	-Y14A- CURVE DATA	
PI Sta 304+26.52	PI Sta 11+35.02	PI Sta 11+64.92	PI Sta 11+46.04	PI Sta 13+46.44
Δ = 3°57' 04.3" (LT)	Δ = 71°11' 28.5" (LT)	Δ = 19°14' 02.1" (RT)	Δ = 43°57' 56.8" (LT)	Δ = 43°57' 02.2" (RT)
D = 0°28' 38.9"	D = 47°44' 47.3"	D = 11°27' 33.0"	D = 28°38' 52.4"	D = 28°38' 52.4"
L = 827.54'	L = 149.10'	L = 167.85'	L = 153.47'	L = 153.42'
T = 413.93'	T = 85.90'	T = 84.72'	T = 80.74'	T = 80.70'
R = 12,000.00'	R = 120.00'	R = 500.00'	R = 200.00'	R = 200.00'
SE = NORMAL CROWN				
V = 60 MPH				

NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.
2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.
3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PAVEMENT REMOVAL
- PROPOSED MONOLITHIC ISLAND

FOR -Y13- INTERSECTION DETAIL SEE SHEET 2-
FOR -Y14-&-Y14A- INTERSECTION DETAILS SEE SHEET 2-
FOR -L- PROFILE SEE SHEET 39
FOR -Y13- PROFILE SEE SHEET 45
FOR -Y14- PROFILE SEE SHEET 45
FOR -Y14A- PROFILE SEE SHEET 45

1/8/2010
R:\Roadway\Proj\r2309ab_rdy_psh25.dgn



REVISIONS

12/9/08 - Property Owner Name Changes Parcels 156 and 159
03/25/09 - Parcel Access changes for Parcels 156 and 158
10/12/09 - Revised TCE 306+00 RT to 307+00 RT on Parcel 154.

8/17/99

12/10/2009
r2309ab_rdy_psh26.dgn

8/17/99

-Y- CURVE DATA

PI Sta 5+28.21
Δ = 24° 41' 09.4" (LT)
D = 11° 27' 33.0"
L = 215.43'
T = 109.41'
R = 500.00'

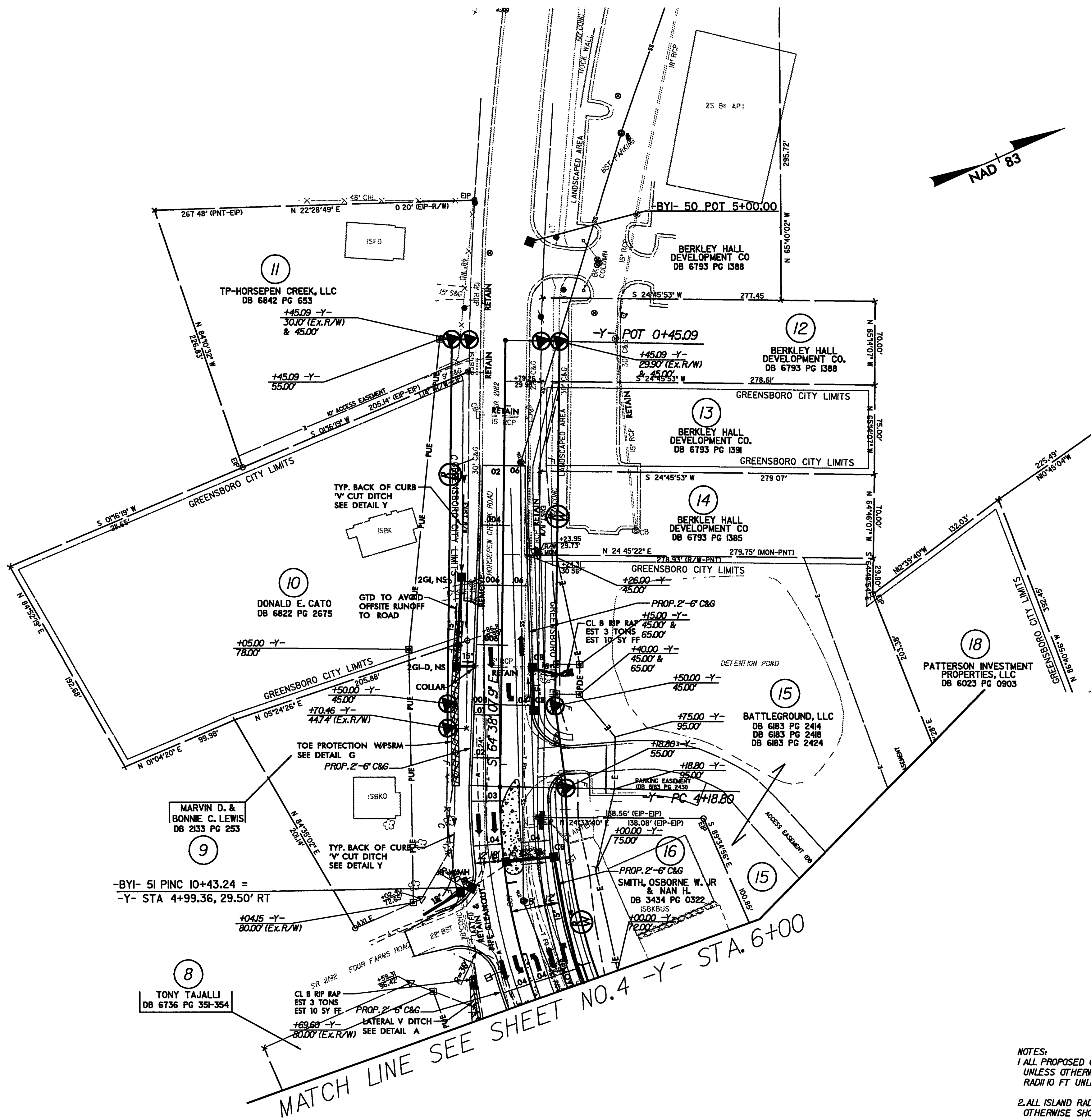
KO & ASSOCIATES, P C
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH N C 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

07/28/09 - Property Owner Name Change and Deed Book and Page Change Parcel 8



NOTES:
1 ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN

3 PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND

PROPOSED MONOLITHIC ISLAND

FOR -Y- PROFILE SEE SHEET 41

12/10/2009
r:\roadway\proj\r2309ab_rdy_psh27.dgn
KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
R-2309AB	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

KO & ASSOCIATES, P.C.
Consulting Engineers
A Florence & Hutcheson, Inc Company
5121 KINGDOM WAY, SUITE 100 RALEIGH, N C 27607
(919) 851-6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

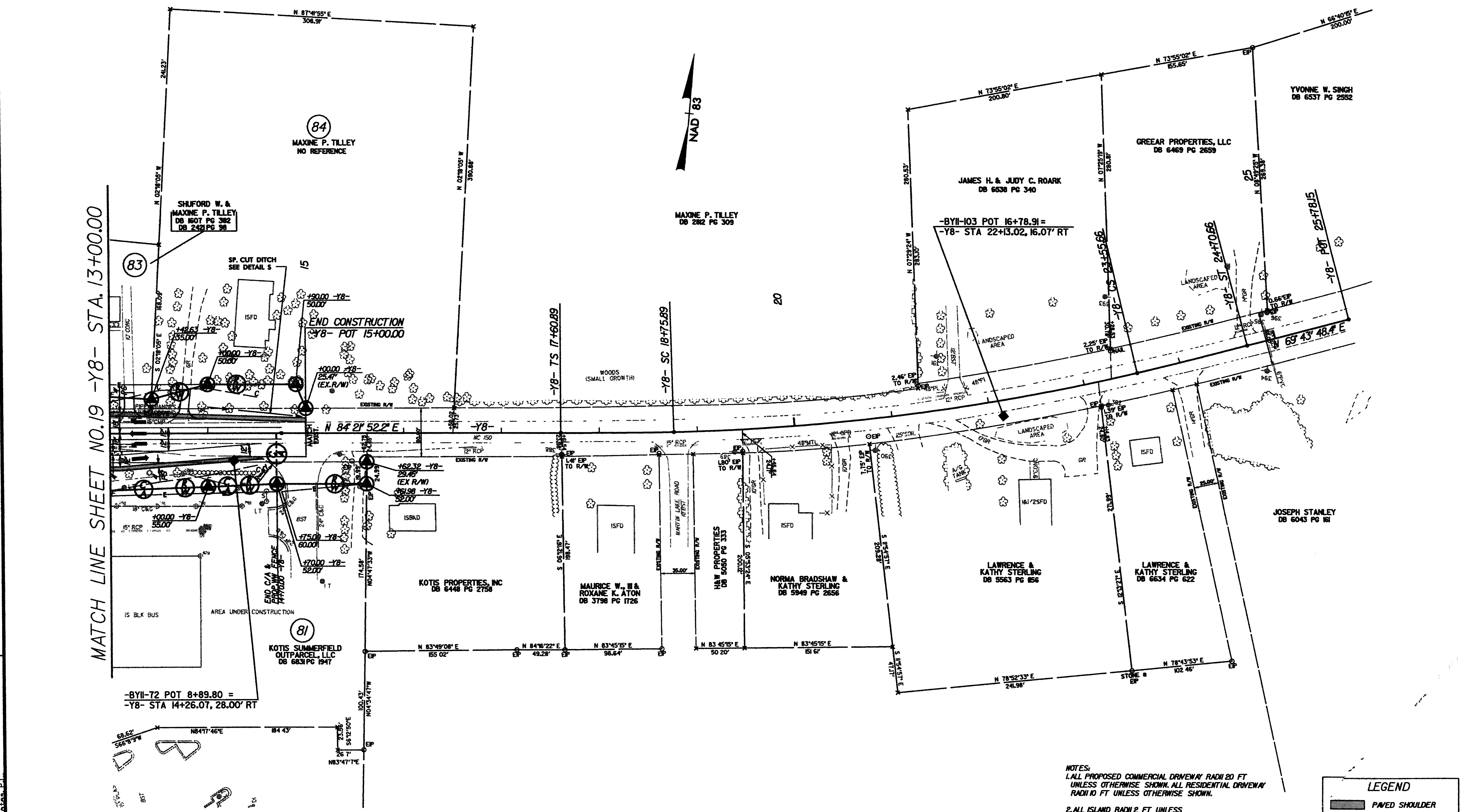
REVISIONS

10/12/09 - Added TCE 13+00 LT to 14+00 LT on Parcels 83 and 84.

8/17/99

-Y8- CURVE DATA

PIs Sta 18+37.56	PI Sta 21+16.65	PIs Sta 23+94.00
Θs = 1° 25' 56.6"	Δ = 11° 57' 06.1" (LT)	Θs = 1° 25' 56.6"
Ls = 115.00'	D = 2° 29' 28.0"	Ls = 115.00'
LT = 76.67'	L = 479.77'	LT = 76.67'
ST = 38.34'	T = 240.76'	ST = 38.34'
	R = 2,300.00'	



NOTES:
1. ALL PROPOSED COMMERCIAL DRIVEWAY RADII 20 FT UNLESS OTHERWISE SHOWN. ALL RESIDENTIAL DRIVEWAY RADII 10 FT UNLESS OTHERWISE SHOWN.

2. ALL ISLAND RADII 2 FT UNLESS OTHERWISE SHOWN.

3. PROPOSED DRIVEWAY WIDTHS AT END OF RADII 16 FT UNLESS OTHERWISE SHOWN. TAPER DRIVEWAY TO EXISTING DRIVEWAY WIDTH.

LEGEND
- PAVED SHOULDER
- PROPOSED MONOLITHIC ISLAND

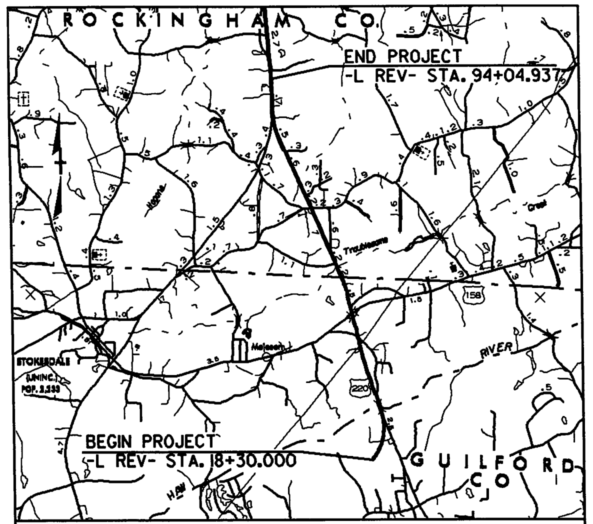
FOR -Y8- INTERSECTION DETAIL SEE SHEET 2-
FOR -Y8- PROFILE SEE SHEET 43

12/10/2009
r:\roadway\proj\r2309ab_rdy_psh28.dgn

TIP PROJECT: R-2413C

CONTRACT: 6.499008T

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



VICINITY MAP OF PROJECT 6.499008T

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD–ROCKINGHAM COUNTIES

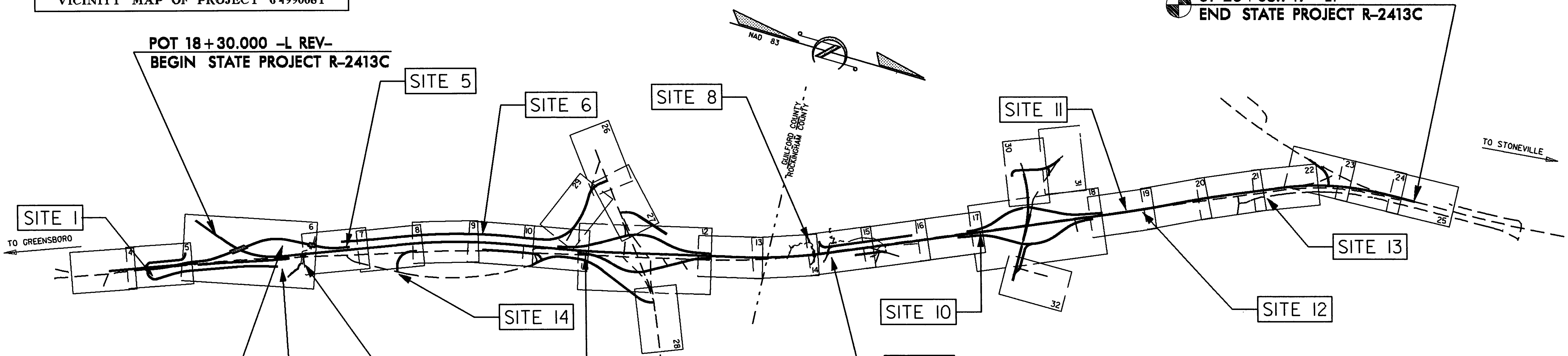
LOCATION: US 220 FROM SOUTH OF HAW RIVER TO THE INTERSECTION OF US 220 AND EXISTING NC 68
TYPE OF WORK: GRADING, DRAINAGE, STRUCTURES, CULVERTS, PAVING, LONG-LIFE PAVEMENT MARKINGS, SNOWPLOWABLE PAVEMENT MARKERS, SIGNING & SIGNALS

METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND /OR MILLIMETERS UNLESS OTHERWISE NOTED

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413C	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
6.499002T		P.E., R/W
6.499008T		UTIL, CONST.



WETLAND/ STEAM IMPACTS

NCDOT CONTACT: B. DOUG TAYLOR, P.E., PROJECT ENGINEER
MALCOLM WATSON, P.E., PROJECT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE: THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS LIMITED TO INTERCHANGES

GRAPHIC RATIO

PLANS

PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

DESIGN DATA

ADT 2012 = 37400
ADT 2032 = 64000
DHV = 11 %
D = 65 %
T = 15 %
(10% TTST + 5% DUALS)
V = 110 km/h
FUNC. CLASS.: INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY PROJECT	7.413	KM.
LENGTH STRUCTURES PROJECT	0.162	KM.
TOTAL LENGTH STATE PROJECT 6.499008T	7.575	KM.

NOTE: SB LANE BRIDGE STATIONING USED TO DETERMINE LENGTH OF ROADWAY & STRUCTURES

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 16, 1997

LETTING DATE:
JANUARY 17, 2012

DENNIS MORY, P.E.
PROJECT ENGINEER

HENRY BARE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY ENGINEER - DESIGN P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED FOR DIVISION ADMINISTRATOR DATE

PLANS PREPARED BY: FLORENCE & HUTCHESON, INC CONSULTING ENGINEERS 5121 KINGDOM WAY, SUITE 100 RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

CONST REV

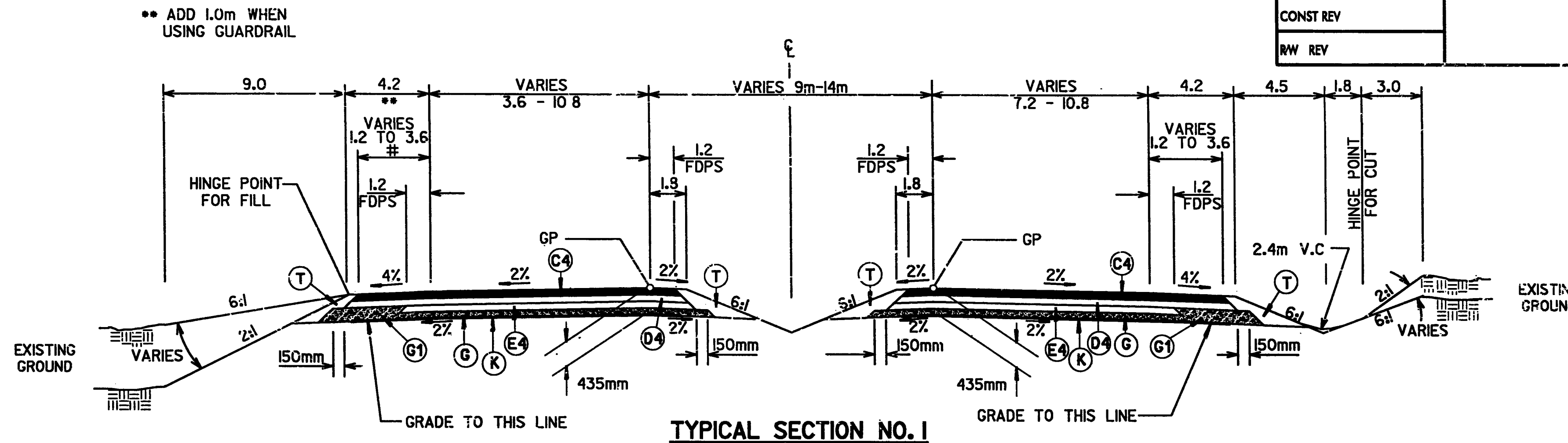
R/W REV

GENERAL NOTE: SEE PLANS FOR LOCATION OF TURN LANES, TAPERS, CUL-DE-SACS, ETC.

PAVEMENT SCHEDULE

C	PROP. APPROX 40mm ASPHALT CONC. SURFACE COURSE, TYPE S9 5B, AT AN AVERAGE RATE OF 96 kg PER Sq METER.
C1	PROP. APPROX 50mm ASPHALT CONC. SURFACE COURSE, TYPE S9 5B, AT AN AVERAGE RATE OF 120 kg PER Sq METER.
C2	PROP. APPROX 80mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 96 kg PER Sq METER, IN EACH OF TWO LAYERS
C3	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 2.40 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50mm IN DEPTH
C4	PROP. APPROX 80mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 96 kg PER Sq METER, IN EACH OF TWO LAYERS
C5	PROP. VAR. DEPTH ASPHALT CONC SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 2.40 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50mm IN DEPTH.
D	PROP. APPROX. 65mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 159.25 kg PER Sq. METER
D1	PROP. APPROX. 80mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 196 kg PER Sq. METER.
D2	PROP. APPROX. 100mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 245 kg PER Sq. METER.
D3	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19 0B, AT AN AVERAGE RATE OF 2.45 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 65mm OR GREATER THAN 110mm IN DEPTH.
D4	PROP. APPROX. 80mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 196 kg PER Sq. METER.
D5	PROP. APPROX. 100mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 245 kg PER Sq. METER.
D6	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 65mm OR GREATER THAN 110mm IN DEPTH.
E	PROP. APPROX 80mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 196 kg PER SQ. METER.
E1	PROP. APPROX 100mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 245 Kg PER SQ METER.
E2	PROP. APPROX 140mm ASPHALT CONC. BASE COURSE, TYPE B25 0B, AT AN AVERAGE RATE OF 343 Kg PER SQ. METER
E3	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 2.45 Kg PER SQ. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 75mm OR GREATER THAN 140mm IN DEPTH.
E4	PROP. APPROX 75mm ASPHALT CONC. BASE COURSE, TYPE B25 0C, AT AN AVERAGE RATE OF 183.75 kg PER SQ. METER.
E5	PROP. APPROX 80mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 196 kg PER SQ METER.
E6	PROP. APPROX 100mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 245 kg PER SQ. METER.
E7	PROP. APPROX. 160mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 196 Kg PER SQ METER IN EACH OF TWO LAYERS
E8	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 Kg PER SQ. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 75mm OR GREATER THAN 140mm IN DEPTH.
G	PROP. APPROX 200mm CEMENT TREATED BASE COURSE (PLANT MIXED). OR PROP. 200mm ABC WITH THE TOP 180mm TO BE CEMENT TREATED (ROAD MIXED).
G1	PROP. VAR. DEPTH CEMENT TREATED BASE COURSE.
J	PROP. 150mm AGGREGATE BASE COURSE.
J1	PROP. 200mm AGGREGATE BASE COURSE.
J2	PROP. VAR. DEPTH AGGREGATE BASE COURSE.
K	BASE TO BE TREATED WITH LIME TO A DEPTH OF 200mm AT A RATE OF 11 Kg PER SQ METER AS DIRECTED BY THE ENGINEER (SLURRY METHOD - 30%) OR BASE TO BE TREATED WITH CEMENT TO A DEPTH OF 180mm AT A RATE OF 30 Kg PER SQ. METER AS DIRECTED BY THE ENGINEER. (70%) OR BASE TO BE TREATED WITH AGGREGATE AT A RATE OF 135 Kg PER SQ METER (10%) AND CEMENT AT A RATE OF 30 Kg PER SQ. METER TO A DEPTH OF 180mm AS DIRECTED BY THE ENGINEER. (70%)
P	PRIME COAT AT THE RATE OF 1 58 L PER SQ. METER
R	750mm CONCRETE CURB & GUTTER.
R1	EXPRESSWAY GUTTER.
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

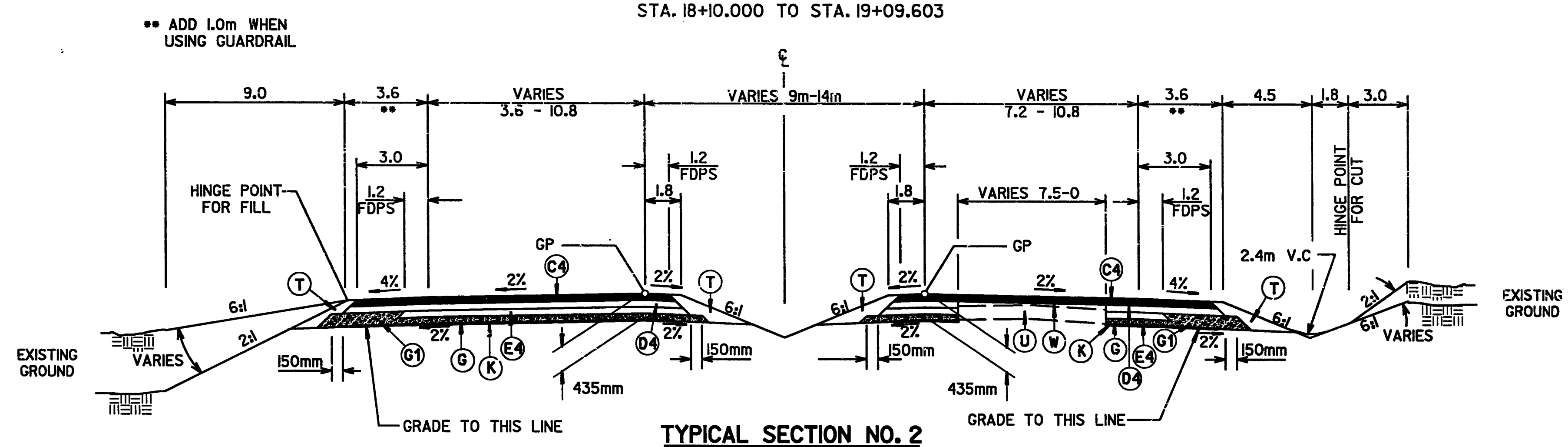


TYPICAL SECTION NO. 1

-L REV.- (US 220) SB
STA. 18+30.000 TO STA. 23+97.948 (BRIDGE)
STA. 24+83.348 (BRIDGE) TO STA. 45+07.248 (BRIDGE)
STA. 45+71.248 (BRIDGE) TO STA. 94+04.937

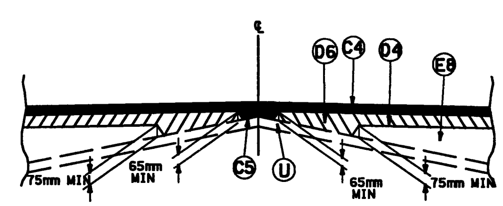
-L REV.- (US 220) NB
STA. 18+30.000 TO STA. 23+92.852 (BRIDGE)
STA. 24+78.252 (BRIDGE) TO STA. 45+13.291 (BRIDGE)
STA. 45+77.291 (BRIDGE) TO STA. 94+04.937

-L REV. 1-
STA. 18+10.000 TO STA. 19+09.603



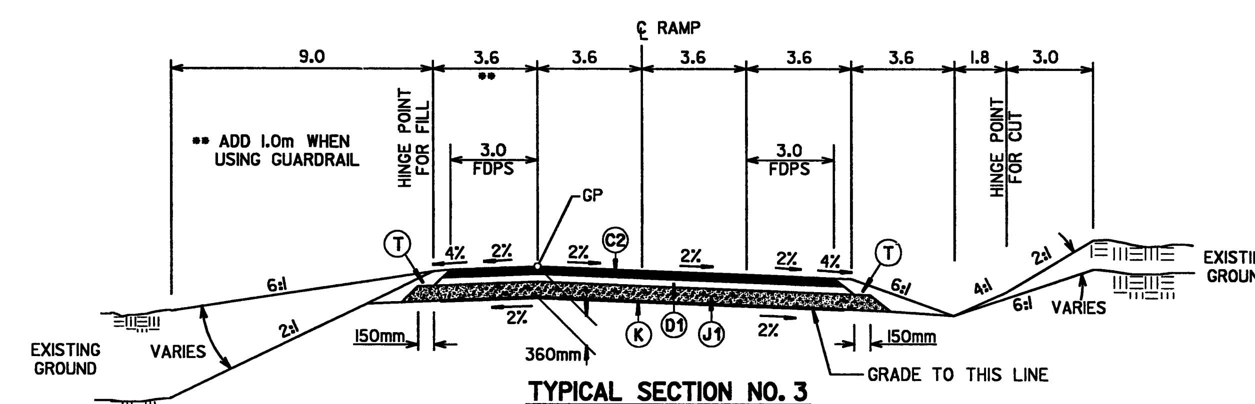
TYPICAL SECTION NO. 2

-L1 REV.-
STA. 13+50.051 TO STA. 18+10.000



DETAIL SHOWING METHOD OF WEDGING

USE IN CONJUNCTION WITH TYPICAL SECTION 2



TYPICAL SECTION NO. 3
(TWO LANE RAMP)

NORTHBOUND US 220 RAMP
STA. 9+95.486 TO STA. 14+06 956

PAVEMENT SCHEDULE			
C	40mm TYPE S9 5B	E5	80mm TYPE B25 OC
C1	50mm TYPE S9.5B	E6	100mm TYPE B25 OC
C2	80mm TYPE S9.5B	E7	160mm TYPE B25 OC
C3	VAR. DEPTH TYPE S9.5B	E8	VAR DEPTH TYPE B25 OC
C4	80mm TYPE S9.5C	G	200mm CEMENT TREATED BASE COURSE
C5	VAR. DEPTH TYPE S12.5C	G1	VAR. DEPTH CEMENT TREATED BASE COURSE
D	65mm TYPE I19 OB	J	150mm AGGREGATE BASE COURSE
D1	80mm TYPE I19.OB	J1	200mm AGGREGATE BASE COURSE
D2	100mm TYPE I19.OB	J2	VAR DEPTH AGGREGATE BASE COURSE
D3	VAR. DEPTH TYPE I19.OB	K	CEMENT/LIME STABILIZATION
D4	80mm TYPE I19.OC	P	PRIME COAT
D5	100mm TYPE I19 OC	R	750mm CONCRETE CURB & GUTTER
D6	VAR. DEPTH TYPE I19.OC	R1	EXPRESSWAY GUTTER
E	80mm TYPE B25.OB	R2	SHOULDER BERM GUTTER
E1	100mm TYPE B25 OB	T	EARTH MATERIAL
E2	140mm TYPE B25.OB	U	EXISTING PAVEMENT
E3	VAR. DEPTH TYPE B25 OB	W	VAR DEPTH ASPHALT PAVEMENT
E4	75mm TYPE B25.OC		

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

GENERAL NOTE: SEE PLANS FOR LOCATION OF TURN LANES, TAPERS, CUL-DE-SACS, ETC.

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

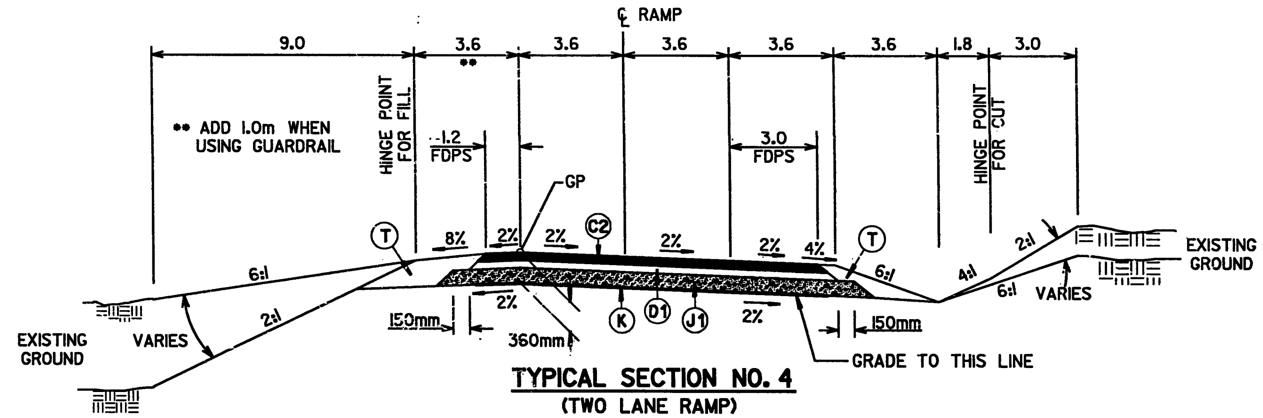
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

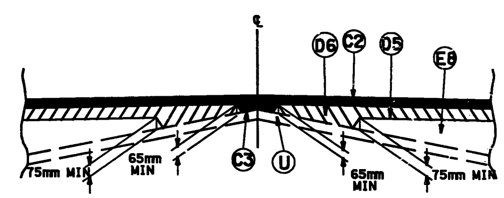
RW REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

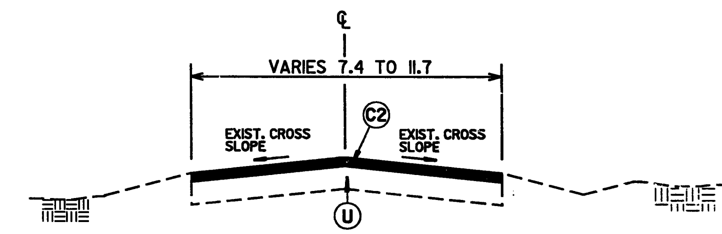


TYPICAL SECTION NO. 4
(TWO LANE RAMP)

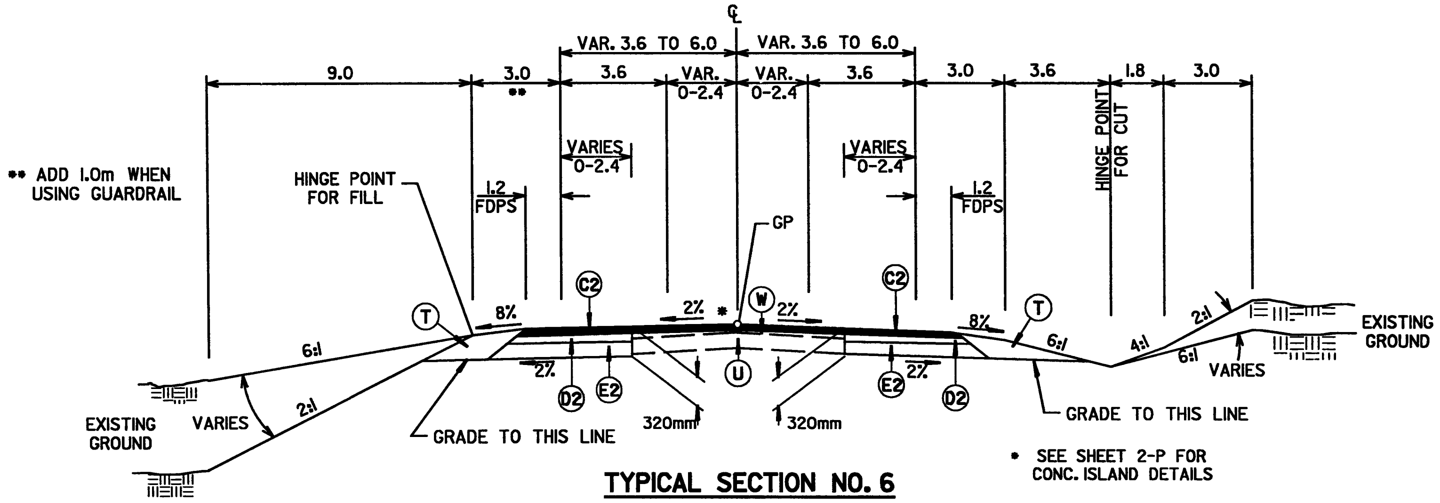
SOUTHBOUND US 220 RAMP @ HAW RIVER
STA. 10+31.984 TO STA. 11+18.700 (BRIDGE)
STA. 11+63.300 (BRIDGE) TO STA. 15+75.720 (BRIDGE)
STA. 16+64.590 (BRIDGE) TO STA. 19+01.500



DETAIL SHOWING METHOD OF WEDGING
USE IN CONJUNCTION WITH TYPICAL SECTIONS 5 AND 6

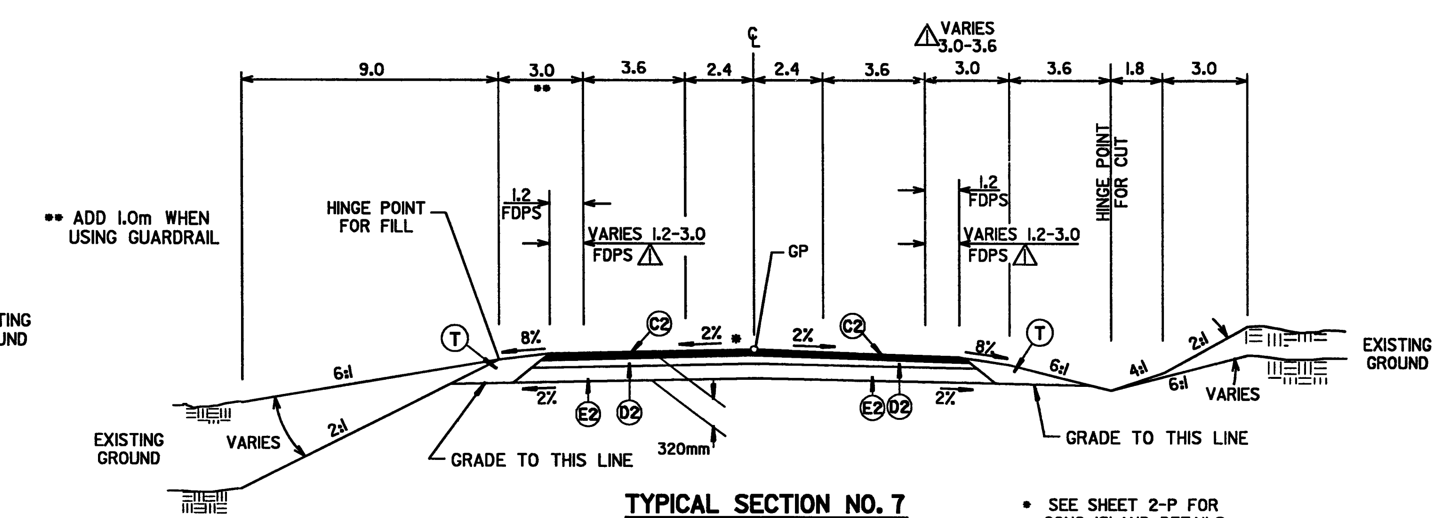


TYPICAL SECTION NO. 5
-Y6- (US 158)
STA. 6+30.000 TO STA. 10+00.000



TYPICAL SECTION NO. 6
-Y6- (US 158)
STA. 10+00.000 TO STA. 11+90.000
STA. 15+20.000 TO STA. 17+50.000

• SEE SHEET 2-P FOR CONC. ISLAND DETAILS



TYPICAL SECTION NO. 7
-Y6- (US 158)
STA. 11+90.000 TO STA. 15+20.000
STA. 11+90.000 TO STA. 12+70.000
STA. 13+30.000 TO STA. 14+10.000

• SEE SHEET 2-P FOR CONC. ISLAND DETAILS

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV

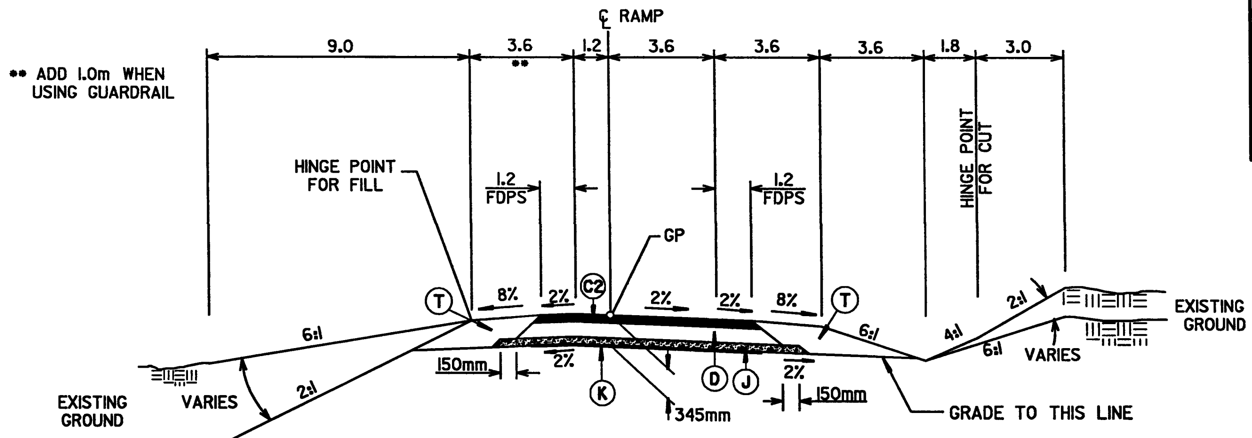
GENERAL NOTE: SEE PLANS FOR LOCATION OF TURN LANES, TAPERS, CUL-DE-SACS, ETC.

PAVEMENT SCHEDULE

C	40mm TYPE S9 5B	E5	80mm TYPE B25 OC
C1	50mm TYPE S9.5B	E6	100mm TYPE B25.0C
C2	80mm TYPE S9.5B	E7	160mm TYPE B25.0C
C3	VAR. DEPTH TYPE S9.5B	E8	VAR DEPTH TYPE B25 OC
C4	80mm TYPE S9 5C	G	200mm CEMENT TREATED BASE COURSE
C5	VAR DEPTH TYPE S12 5C	G1	VAR. DEPTH CEMENT TREATED BASE COURSE
D	65mm TYPE I19.0B	J	150mm AGGREGATE BASE COURSE
D1	80mm TYPE I19.0B	J1	200mm AGGREGATE BASE COURSE
D2	100mm TYPE I19.0B	J2	VAR. DEPTH AGGREGATE BASE COURSE
D3	VAR. DEPTH TYPE I19.0B	K	CEMENT/LIME STABILIZATION
D4	80mm TYPE I19.0C	P	PRIME COAT
D5	100mm TYPE I19.0C	R	750mm CONCRETE CURB & GUTTER
D6	VAR. DEPTH TYPE I19.0C	R1	EXPRESSWAY GUTTER
E	80mm TYPE B25.0B	R2	SHOULDER BERM GUTTER
E1	100mm TYPE B25.0B	T	EARTH MATERIAL
E2	140mm TYPE B25.0B	U	EXISTING PAVEMENT
E3	VAR. DEPTH TYPE B25.0B	W	VAR. DEPTH ASPHALT PAVEMENT
E4	75mm TYPE B25.0C		

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

** ADD 1.0m WHEN USING GUARDRAIL



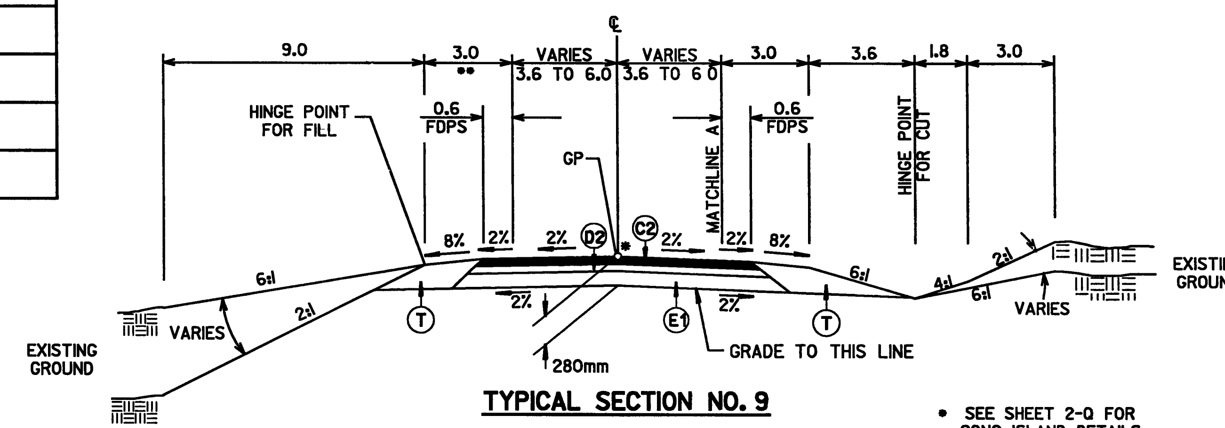
TYPICAL SECTION NO. 8
(ONE LANE RAMP)

US 158 RAMP A
STA 11+59.287 TO STA. 15+10.644

US 158 RAMP B
STA. 11+35.431 TO STA. 14+23.747

US 158 RAMP C
STA. 11+26.797 TO STA. 14+15.037

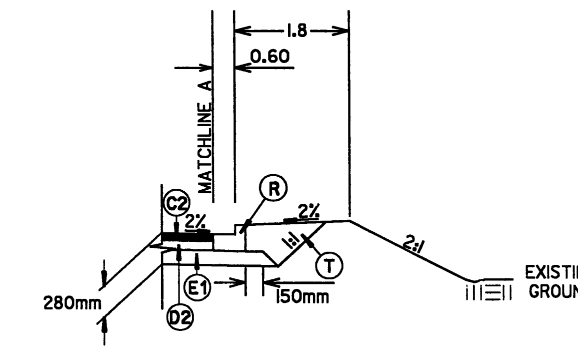
US 158 RAMP D
STA. 11+06.505 TO STA. 13+99.105



TYPICAL SECTION NO. 9

-Y10- (NC 65)
STA. 6+64.672 TO STA. 9+20.000
STA. 11+93.400 TO STA. 13+90.000

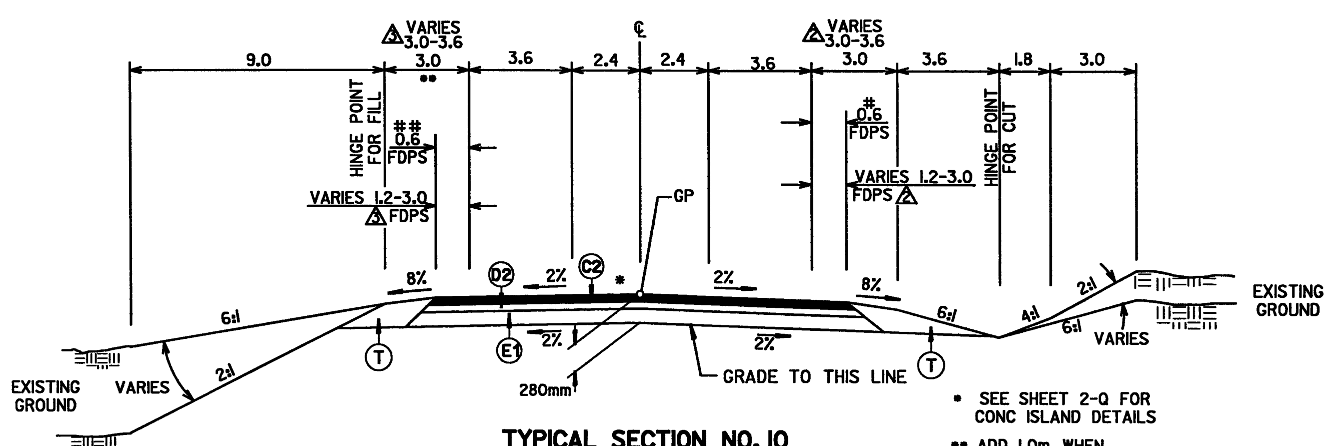
* SEE SHEET 2-Q FOR CONC. ISLAND DETAILS
** ADD 1.0m WHEN USING GUARDRAIL



PARTIAL SECTION NO. 9A

-Y10 REV.- (NC 65)
STA. 12+21.631 TO P.T. STA. 12+27.399 LB

-Y10- (NC 65)
STA. 12+39.122 LA TO STA. 13+01.581

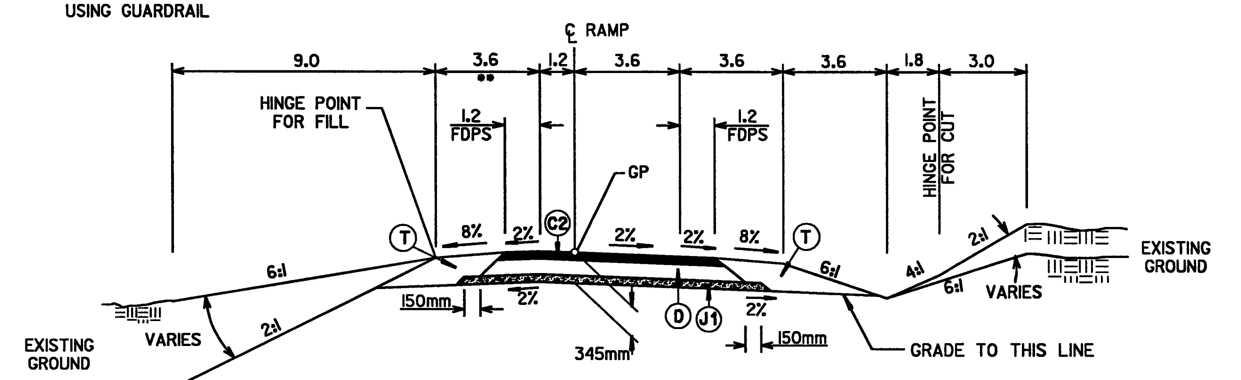


TYPICAL SECTION NO. 10

-Y10- (NC 65)
STA. 9+20.000 TO STA. 10+34.513 (BRIDGE)
STA. 10+96.963 (BRIDGE) TO STA. 11+93.400
△ STA. 9+83.000 TO STA. 10+33.000 (USE 3.0m P.S. AND 3.6m TOTAL SHLD. FROM STA 9+60.582 TO STA 9+83.000)
△ STA. 10+98.000 TO STA. 11+48.000 (USE 3.0m P.S. AND 3.6m TOTAL SHLD. FROM STA 11+48.000 TO STA 11+72.564)

* SEE SHEET 2-Q FOR CONC ISLAND DETAILS
** ADD 1.0m WHEN USING GUARDRAIL

** ADD 1.0m WHEN USING GUARDRAIL



TYPICAL SECTION NO. 11
(ONE LANE RAMP)

NC 65 RAMP A
STA. 11+44.337 TO STA. 14+54.493

NC 65 RAMP B
STA. 11+06.917 TO STA. 14+02.468

NC 65 RAMP C
STA. 11+64.309 TO STA. 14+15.037

NC 65 RAMP D
STA. 11+06.444 TO STA. 14+66.677

GENERAL NOTE: SEE PLANS FOR LOCATION OF TURN LANES, TAPERS, CUL-DE-SACS, ETC.

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5m 0 10m

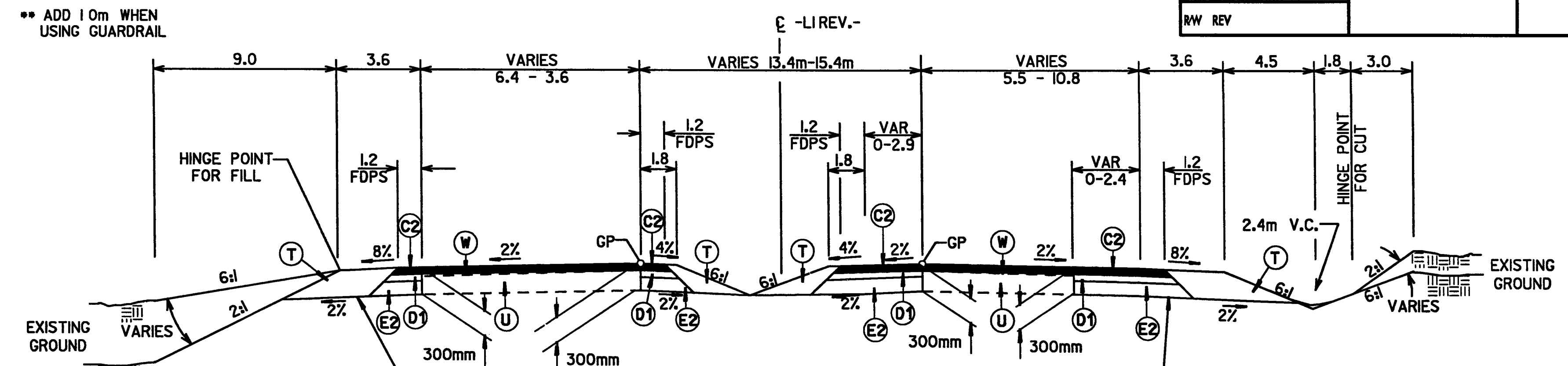
CONST REV

RW REV

PAVEMENT SCHEDULE

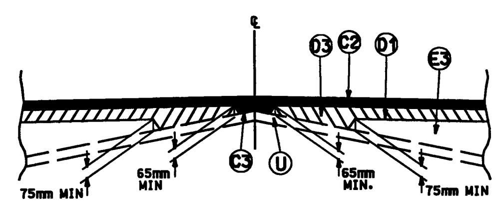
C	40mm TYPE S9 5B	E5	80mm TYPE B25 0C
C1	50mm TYPE S9 5B	E6	100mm TYPE B25 0C
C2	80mm TYPE S9 5B	E7	160mm TYPE B25 0C
C3	VAR DEPTH TYPE S9.5B	E8	VAR. DEPTH TYPE B25 0C
C4	80mm TYPE S9 5C	G	200mm CEMENT TREATED BASE COURSE
C5	VAR. DEPTH TYPE S12.5C	G1	VAR. DEPTH CEMENT TREATED BASE COURSE
D	65mm TYPE I19.0B	J	150mm AGGREGATE BASE COURSE
D1	80mm TYPE I19.0B	J1	200mm AGGREGATE BASE COURSE
D2	100mm TYPE I19.0B	J2	VAR. DEPTH AGGREGATE BASE COURSE
D3	VAR. DEPTH TYPE I19 0B	K	CEMENT/LIME STABILIZATION
D4	80mm TYPE I19.0C	P	PRIME COAT
D5	100mm TYPE I19.0C	R	750mm CONCRETE CURB & GUTTER
D6	VAR. DEPTH TYPE I19 0C	R1	EXPRESSWAY GUTTER
E	80mm TYPE B25.0B	R2	SHOULDER BERM GUTTER
E1	100mm TYPE B25.0B	T	EARTH MATERIAL
E2	140mm TYPE B25.0B	U	EXISTING PAVEMENT
E3	VAR. DEPTH TYPE B25 0B	W	VAR DEPTH ASPHALT PAVEMENT
E4	75mm TYPE B25.0C		

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

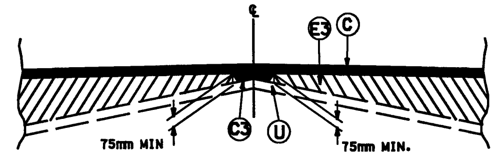


TYPICAL SECTION NO. 12

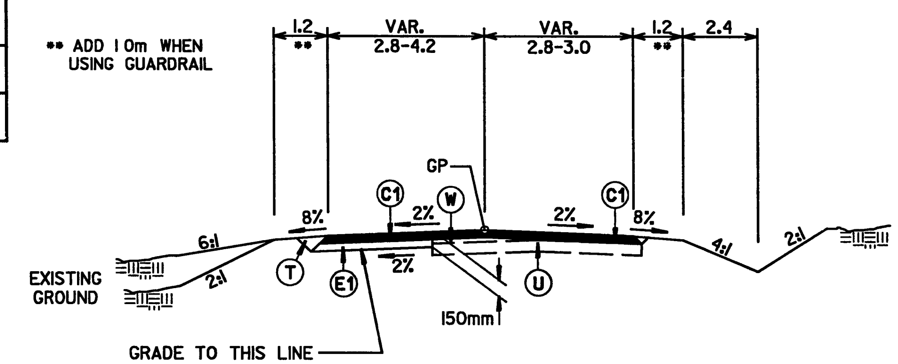
-LIREV.- (NC 68)
STA. 16+43.309 TO STA. 17+43.309 (WIDENING)
STA. 17+43.309 TO STA. 18+60.000 (NEW PAVEMENT)



DETAIL SHOWING METHOD OF WEDGING
USE IN CONJUNCTION WITH TYPICAL SECTION 12

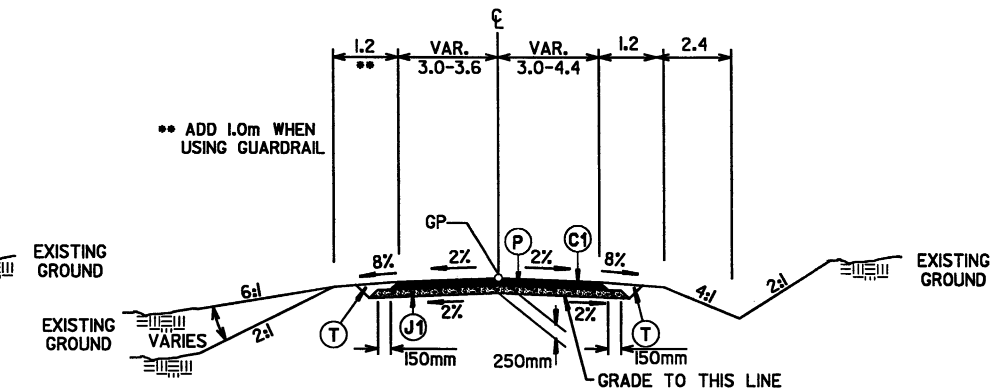


DETAIL SHOWING METHOD OF WEDGING
USE IN CONJUNCTION WITH TYPICAL SECTIONS 16 AND 17



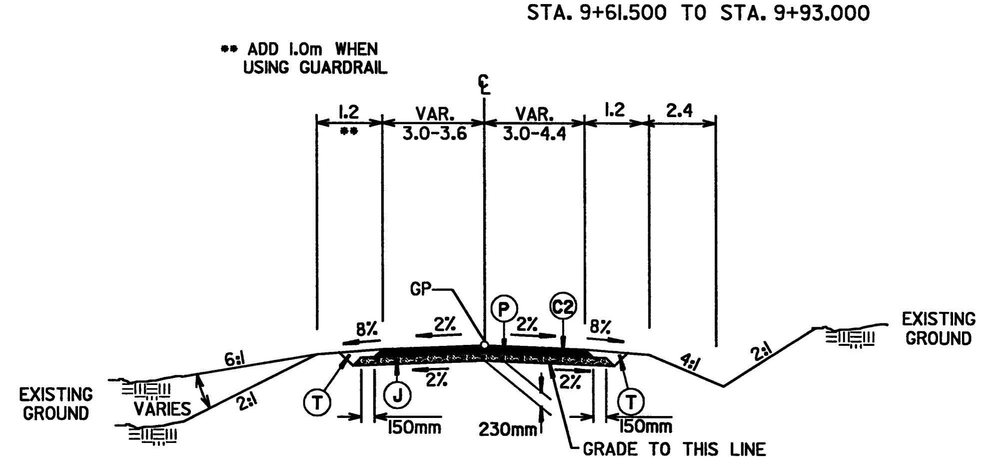
TYPICAL SECTION NO. 13

-Y28- (FARRAR STORE ROAD)
STA. 9+61.500 TO STA. 9+93.000



TYPICAL SECTION NO. 14

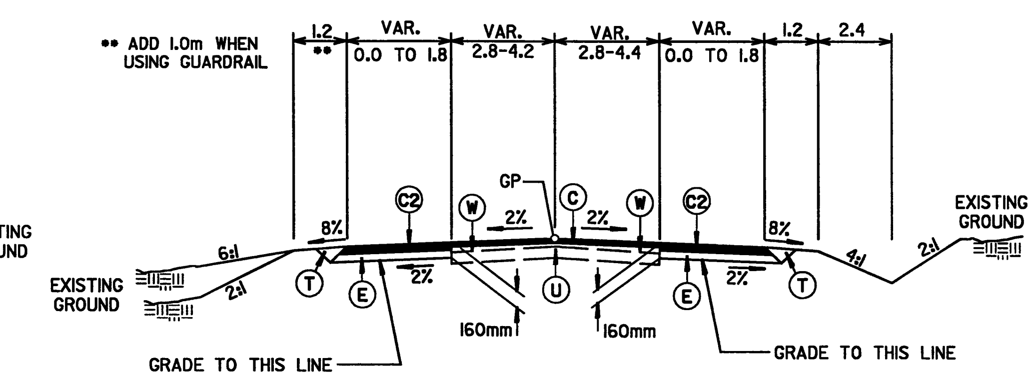
-Y23- (OLD US 220 CONN.)
STA. 9+20.000 TO STA. 17+67.176
-Y28- (FARRAR STORE ROAD EXT.)
STA. 9+93.000 TO STA. 11+93.100



TYPICAL SECTION NO. 15

-Y21- (SPOTSWOOD ROAD RELOC.)
STA. 10+37.915 TO STA. 18+46.925
-Y26- (OLD US 220)
STA. 11+30.870 TO STA. 13+72.815
-Y27-
STA. 10+53.972 TO STA. 12+03.590
-Y29-
STA. 10+37.000 TO STA. 12+94.200

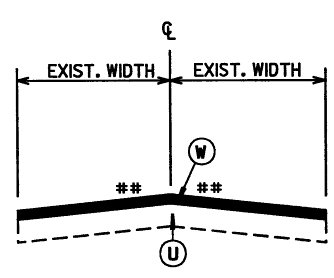
-Y20- (SPOTSWOOD ROAD EXT.)
STA. 9+76.906 TO STA. 22+49.280 (BK)
STA. 27+47.330 TO STA. 28+72.000
-Y20-REV (SPOTSWOOD ROAD EXT.)
STA. 22+49.280 (AH) TO STA. 24+83.670
-Y24- (BLACKBURN PROPERTY ACCESS ROAD)
STA. 10+16.662 TO STA. 13+42.607



TYPICAL SECTION NO. 16

-Y20-REV (SPOTSWOOD ROAD EXT.)
STA. 24+83.670 TO STA. 27+20.315 (BK)
-Y20- (SPOTSWOOD ROAD EXT.)
STA. 27+20.442 (AH) TO STA. 27+47.330
-Y26- (OLD US 220)
STA. 10+00.000 TO STA. 11+30.870

-Y21- (SPOTSWOOD ROAD RELOC.)
STA. 10+00.000 TO STA. 10+37.915
-Y25- (FRIDDLE PROPERTY ACCESS ROAD)
STA. 9+55.000 TO STA. 9+90.950
-Y27-
STA. 10+00.000 TO STA. 10+53.972



TYPICAL SECTION NO. 17

-Y25- (FRIDDLE PROPERTY ACCESS RD.)
STA. 9+44.953 TO STA. 9+55.000

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
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RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

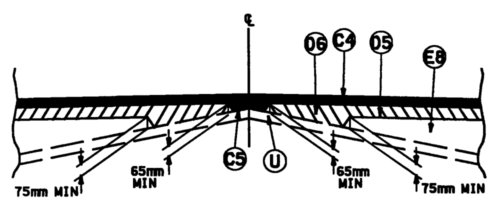
CONST REV

R/W REV

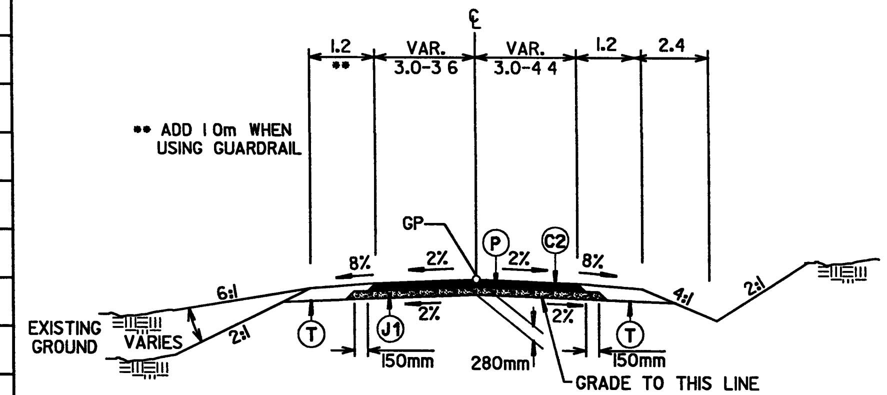
GENERAL NOTE: SEE PLANS FOR LOCATION OF TURN LANES, TAPERS, CUL-DE-SACS, ETC.

PAVEMENT SCHEDULE			
C	40mm TYPE S9 5B	E5	80mm TYPE B25 OC
C1	50mm TYPE S9 5B	E6	100mm TYPE B25 OC
C2	80mm TYPE S9 5B	E7	160mm TYPE B25 OC
C3	VAR. DEPTH TYPE S9.5B	E8	VAR. DEPTH TYPE B25 OC
C4	80mm TYPE S9 5C	G	200mm CEMENT TREATED BASE COURSE
C5	VAR. DEPTH TYPE S12.5C	G1	VAR. DEPTH CEMENT TREATED BASE COURSE
D	65mm TYPE I19.0B	J	150mm AGGREGATE BASE COURSE
D1	80mm TYPE I19.0B	J1	200mm AGGREGATE BASE COURSE
D2	100mm TYPE I19 0B	J2	VAR. DEPTH AGGREGATE BASE COURSE
D3	VAR. DEPTH TYPE I19.0B	K	CEMENT/LIME STABILIZATION
D4	80mm TYPE I19.0C	P	PRIME COAT
D5	100mm TYPE I19 OC	R	750mm CONCRETE CURB & GUTTER
D6	VAR. DEPTH TYPE I19.0C	R1	EXPRESSWAY GUTTER
E	80mm TYPE B25.0B	R2	SHOULDER BERM GUTTER
E1	100mm TYPE B25.0B	T	EARTH MATERIAL
E2	140mm TYPE B25.0B	U	EXISTING PAVEMENT
E3	VAR. DEPTH TYPE B25 0B	W	VAR DEPTH ASPHALT PAVEMENT
E4	75mm TYPE B25 OC		

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

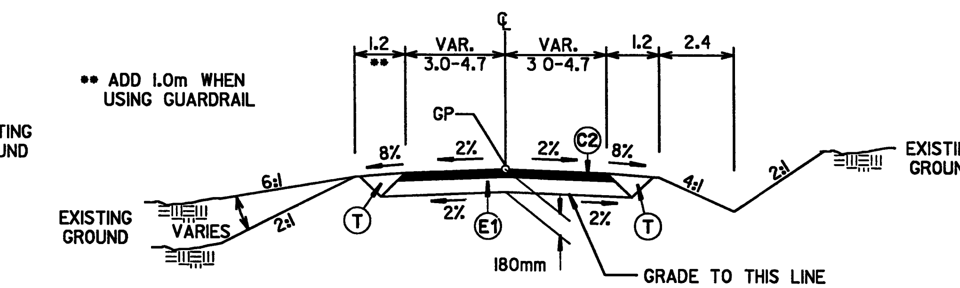


DETAIL SHOWING METHOD OF WEDGING
USE IN CONJUNCTION WITH TYPICAL SECTIONS 21, 22 AND 23



TYPICAL SECTION NO. 18

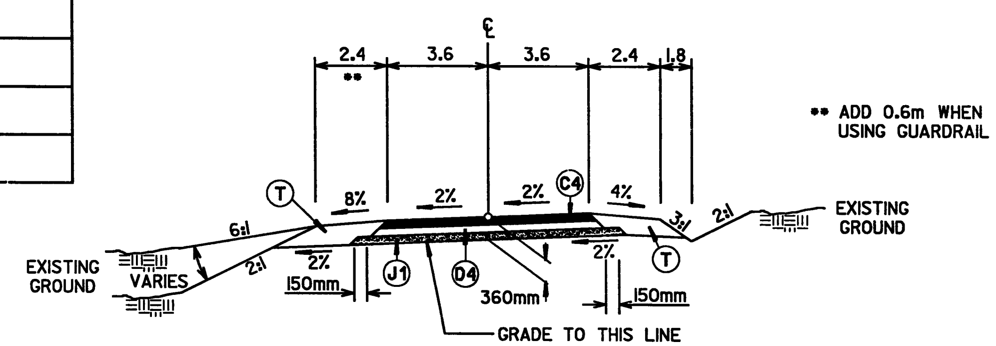
-Y25- (FRIDDLE PROPERTY ACCESS ROAD)
STA. 9+90.950 TO STA. 16+01.710



TYPICAL SECTION NO. 19

-Y19R- (SYLVANIA ROAD RELOC.)
STA. 10+20.318 TO STA. 12+95.000

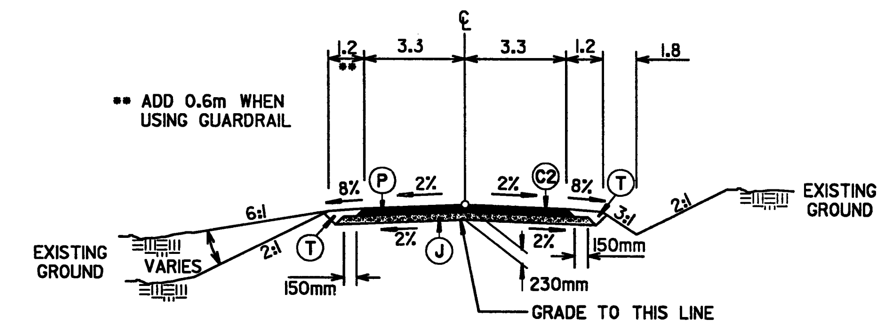
-Y19B- (TIE TO EXIST. SYLVANIA RD)
STA. 10+05.000 TO STA. 10+56.406



TYPICAL SECTION NO. 20

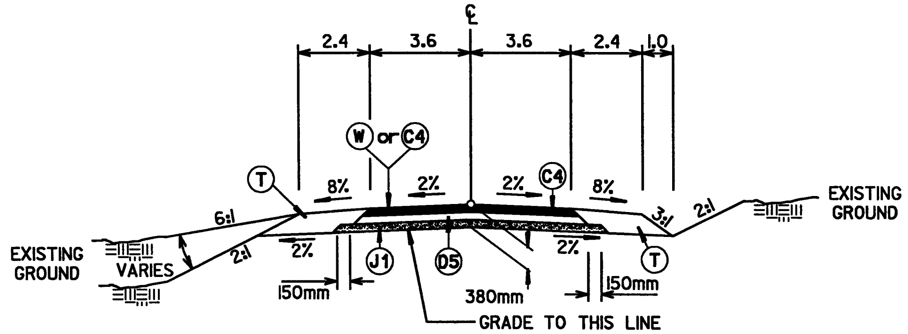
DETOUR A
STA. 10+00.000 TO STA. 16+72.073

DETOUR C
STA. 10+58.000 TO STA. 16+14.093



TYPICAL SECTION NO. 21

DETOUR B
STA. 10+00.000 TO STA. 12+69.009



TYPICAL SECTION NO. 22

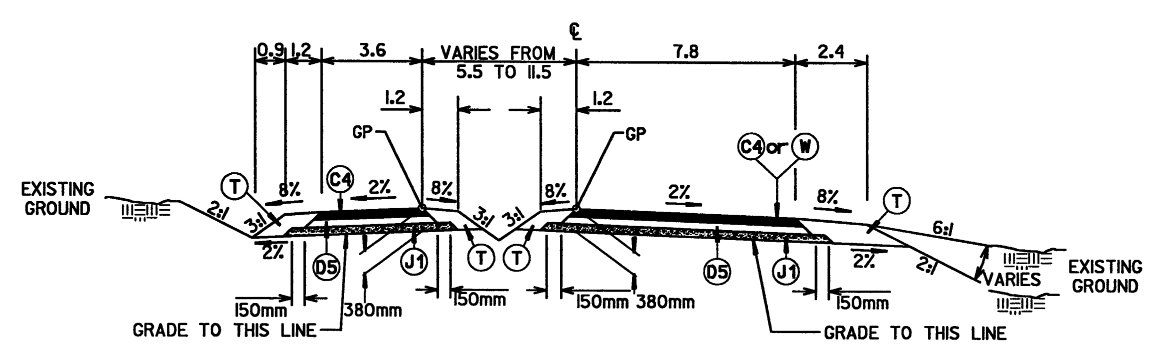
TEMP. CROSSOVER A
STA. 10+51.171 TO STA. 11+36.123

TEMP. CROSSOVER C
STA. 10+48.710 TO STA. 10+87.562

TEMP. CROSSOVER D
STA. 10+47.905 TO STA. 11+20.610

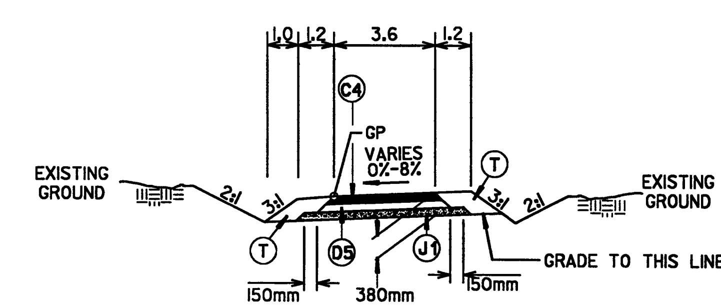
TEMP. CROSSOVER E
STA. 10+49.028 TO STA. 11+21.376

TEMP. CROSSOVER F
STA. 10+43.318 TO STA. 11+20.000



TYPICAL SECTION NO. 23

TEMP. CROSSOVER B
STA. 10+24.601 TO STA. 10+71.624
STA. 10+01.749, 5.5m LT TO STA. 10+71.623, 5.5m LT



TYPICAL SECTION NO. 24

TEMP. CROSSOVER G
STA. 10+00.000 TO STA. 10+93.580

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

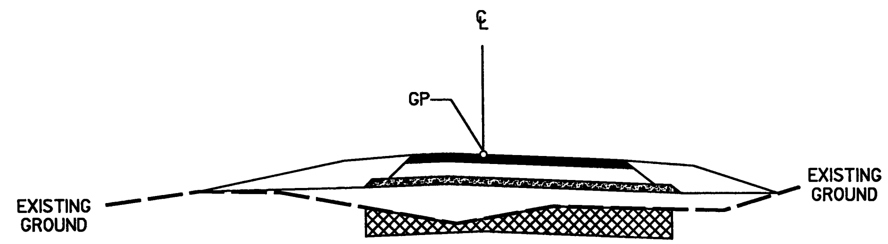
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-E
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

CONST REV

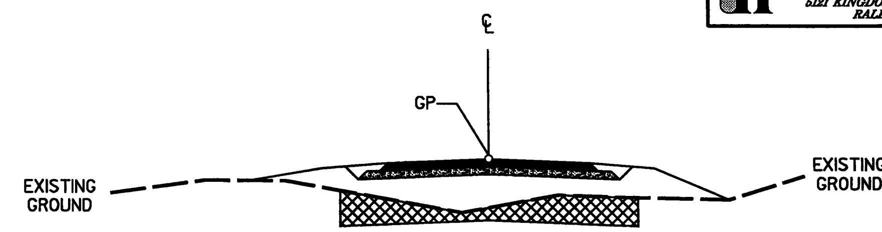
R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



UNDERCUT EXCAVATION TYPICAL SECTION

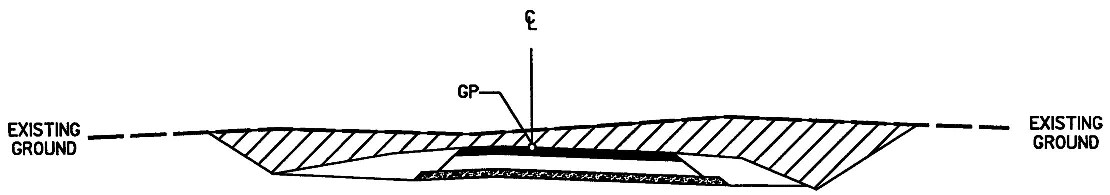
RAMP B @ NC 65
STA. 12+05.000 TO STA. 14+19.000



UNDERCUT EXCAVATION TYPICAL SECTION

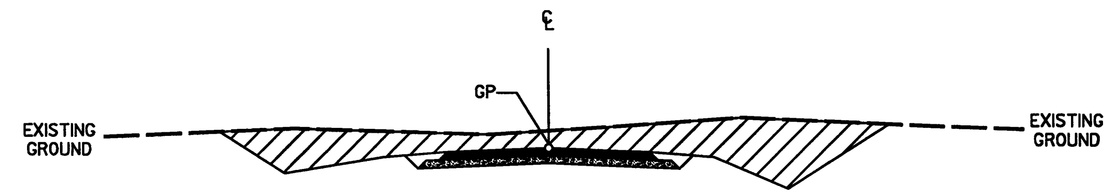
-Y20- (SPOTSWOOD ROAD EXT.)
STA. 27+20.000 TO STA. 28+72.000

THE FOLLOWING AREAS CONTAIN SOILS WHICH EXHIBIT POOR ENGINEERING CHARACTERISTICS AND SHOULD BE UNDERCUT. TYPICALLY, THE UNDERCUT SHOULD EXTEND A DISTANCE OF 0.3 METERS BEYOND THE EDGE OF PROPOSED PAVEMENT FOR EACH LANE. THE DEPTH OF UNDERCUT WILL BE DETERMINED BY THE PRESENCE OF SUITABLE SOILS OR TO A DEPTH OF 1 METER BELOW SUBGRADE ELEVATION, WHICHEVER IS LESS.



UNSUITABLE UNCLASSIFIED EXCAVATION

RAMP B @ NC 65
STA. 11+90.000 TO STA. 13+27.000



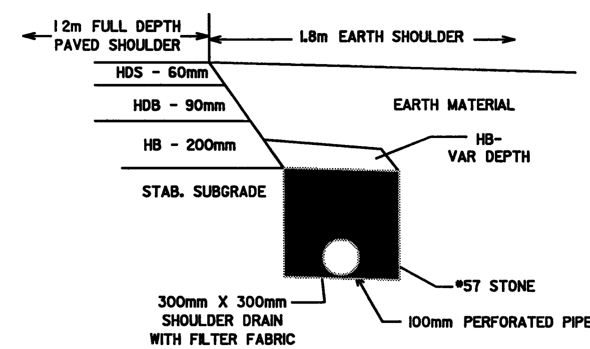
THE FOLLOWING AREAS CONTAIN SOIL WHICH IS UNSUITABLE AND SHOULD BE WASTED.

UNSUITABLE UNCLASSIFIED EXCAVATION

-Y20- (SPOTSWOOD ROAD EXT.)
STA. 27+20.000 TO STA. 28+60.000

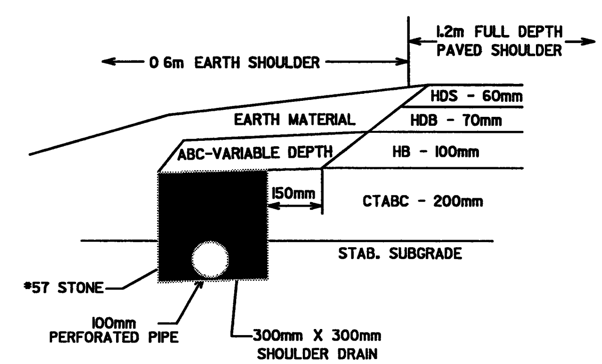
SUMMARY OF SHOULDER DRAINS

LINE	STATION TO STATION	SHOULDER DRAIN PIPE	SHOULDER DRAINS	OUTLET PIPES	CONCRETE PADS	REMARKS
NB -LREV 1-	(-LREV 1-) STA. 17+65 TO (NB US220 RP.) STA. 10+20	170	170	2	2	
SB -LREV 1-	(-LREV 1-) STA. 17+65 TO (NB US220 RP.) STA. 18+80	168	168	2	0	
SB US220 RAMP	STA. 10+00 TO STA. 11+15	115	115	1	1	
NB US220 RAMP	STA. 15+20 TO STA. 15+78	58	58			
NB -LREV-	STA. 23+30 TO STA. 23+80	50	50	1	1	
NB -LREV-	STA. 21+80 TO STA. 23+80	200	200	2	1	
NB -LREV-	STA. 24+80 TO STA. 26+00	120	120	1	1	
NB -LREV-	STA. 43+60 TO STA. 46+60	300	300	4	4	
NB -LREV-	STA. 55+00 TO STA. 57+20	220	220	1	0	
NB -LREV-	STA. 69+80 TO STA. 71+80	200	200	2	2	
NB -LREV-	STA. 76+20 TO STA. 78+00	180	180	1	1	
NB -LREV-	STA. 79+60 TO STA. 82+00	240	240	3	3	
NB -LREV-	STA. 83+90 TO STA. 85+90	200	200	1	1	
NB -LREV-	STA. 87+50 TO STA. 89+90	240	240	2	1	
NB -LREV-	STA. 91+50 TO STA. 93+50	200	200	1	0	
SB -LREV-	STA. 21+80 TO STA. 24+20	240	240	2	2	
SB -LREV-	STA. 25+10 TO STA. 26+00	90	90	1	0	
SB -LREV-	STA. 43+60 TO STA. 46+60	300	300	4	4	
SB -LREV-	STA. 55+00 TO STA. 57+20	220	220	1	1	
SB -LREV-	STA. 69+80 TO STA. 71+80	200	200	2	2	
SB -LREV-	STA. 76+20 TO STA. 78+00	180	180	1	1	
SB -LREV-	STA. 79+60 TO STA. 82+00	240	240	3	2	
SB -LREV-	STA. 83+90 TO STA. 85+90	200	200	1	0	
SB -LREV-	STA. 87+50 TO STA. 89+50	200	200	2	1	
SB -LREV-	STA. 92+60 TO STA. 93+50	90	90	1	0	
	TOTAL	4621	4621	42*	31	
				*(5.1m/PIPE)		
	SAY	4630	4630	220	31	



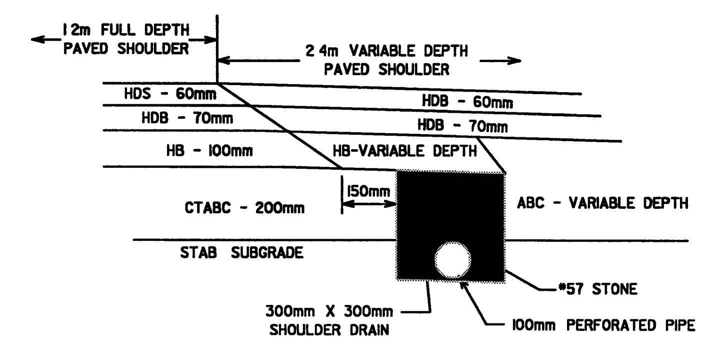
SHOULDER DRAIN DETAIL

SOUTHBOUND US 220 RAMP OUTSIDE SHOULDER



SHOULDER DRAIN DETAIL

-L- MEDIAN SHOULDER



SHOULDER DRAIN DETAIL

-L- OUTSIDE SHOULDER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

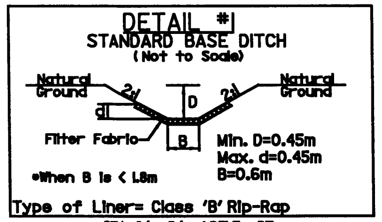
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-F
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

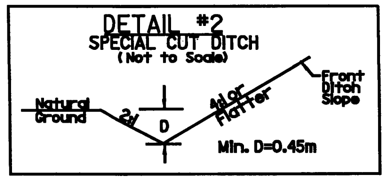
CONST REV

R/W REV

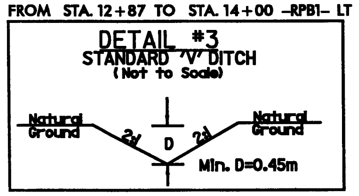
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



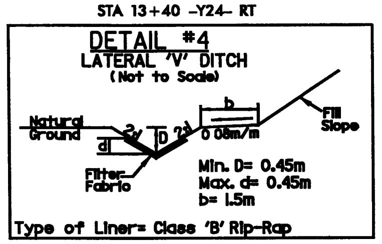
STA. 16+96 -LREV1- RT
FROM STA. 24+18 TO STA. 24+70 -LREV- RT



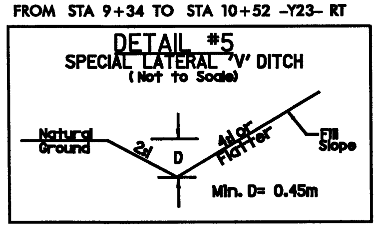
FROM STA. 33+80 TO STA. 34+60 -LREV- LT
FROM STA. 39+00 TO STA. 40+20 -LREV- RT
FROM STA. 40+40 TO STA. 41+00 -LREV- LT
FROM STA. 89+00 -LREV- LT TO STA. 18+52 -L1REV- RT
FROM STA. 10+00 TO STA. 10+20 -Y6- LT
FROM STA. 10+40 TO STA. 11+00 -Y6- LT
FROM STA. 14+00 TO STA. 14+20 -Y6- LT
FROM STA. 6+80 TO STA. 7+04 -Y10- LT
FROM STA. 13+45 TO STA. 13+80 -Y10- LT
FROM STA. 10+17 TO STA. 10+40 -Y19R- RT
FROM STA. 10+10 TO STA. 10+40 -Y19R- LT
FROM STA. 22+30 TO STA. 22+59 -Y20- LT
FROM STA. 15+20 TO STA. 16+20 -Y21- LT
FROM STA. 11+30 TO STA. 12+07 -Y26- RT
FROM STA. 9+87 TO STA. 10+82 -Y28- LT
FROM STA. 12+40 TO STA. 12+94 -Y29- LT
FROM STA. 12+70 TO STA. 12+94 -Y29- RT
FROM STA. 13+20 TO STA. 15+00 -RPA1- LT
FROM STA. 12+87 TO STA. 14+00 -RPB1- LT



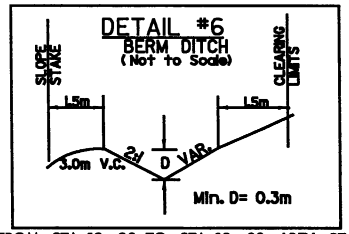
STA. 18+29 -LREV1- LT
STA. 9+76 -Y20- LT
STA. 13+40 -Y24- LT
STA. 13+40 -Y24- RT



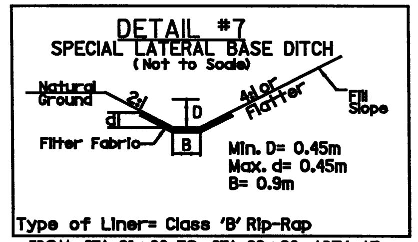
FROM STA. 25+40 TO STA. 26+20 -LREV- RT
FROM STA. 12+50 TO STA. 13+90 -Y20- LT
FROM STA. 19+37 TO STA. 21+05 -Y20- LT
FROM STA. 13+40 TO STA. 13+67 -Y21- RT
FROM STA. 9+34 TO STA. 10+52 -Y23- RT



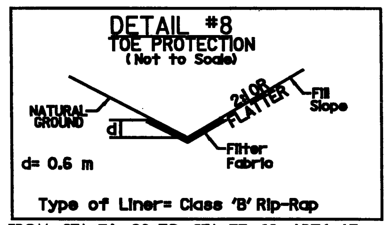
FROM STA. 48+00 TO STA. 48+40 -LREV- RT
FROM STA. 53+80 TO STA. 54+50 -LREV- RT
FROM STA. 55+35 TO STA. 55+60 -LREV- RT
FROM STA. 63+20 TO STA. 63+60 -LREV- RT
FROM STA. 92+55 TO STA. 93+40 -LREV- LT
FROM STA. 15+80 TO STA. 16+13 -Y6- RT
FROM STA. 16+40 TO STA. 17+00 -Y6- LT
FROM STA. 7+00 TO STA. 9+20 -Y10- RT
FROM STA. 7+24 TO STA. 8+40 -Y10- LT
FROM STA. 11+00 TO STA. 11+54 -Y10- LT
FROM STA. 10+80 TO STA. 11+80 -Y19R- RT
FROM STA. 26+00 TO STA. 27+20 -Y20REV- RT
FROM STA. 27+80 TO STA. 28+60 -Y20- LT
FROM STA. 16+20 TO STA. 17+00 -Y21- LT
FROM STA. 9+40 TO STA. 13+85 -Y23- LT
FROM STA. 10+60 TO STA. 11+60 -Y24- RT
FROM STA. 13+54 TO STA. 14+12 -Y25- LT
FROM STA. 9+65 TO STA. 10+05 -Y28- RT
FROM STA. 13+60 TO STA. 14+40 -RPA- RT
FROM STA. 12+40 TO STA. 13+00 -RPC- LT
FROM STA. 14+00 TO STA. 14+55 -RPD2- RT
FROM STA. 11+60 TO STA. 12+60 -XOVRH- RT



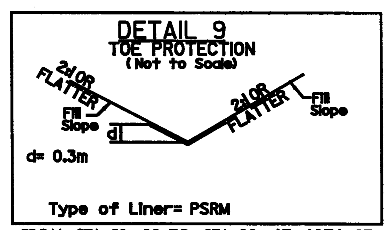
FROM STA. 18+20 TO STA. 19+00 -LREV- RT
FROM STA. 48+80 TO STA. 50+95 -LREV- RT
FROM STA. 49+60 TO STA. 51+20 -LREV- LT
FROM STA. 69+08 TO STA. 69+80 -LREV- LT
FROM STA. 73+40 TO STA. 74+50 -LREV- RT
FROM STA. 83+10 TO STA. 83+53 -LREV- RT
FROM STA. 85+49 TO STA. 87+00 -LREV- LT



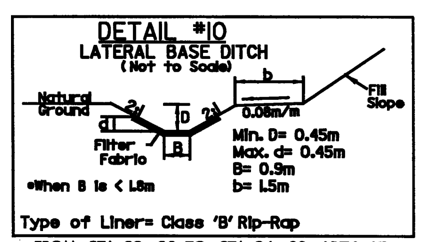
FROM STA. 21+80 TO STA. 22+20 -LREV- LT



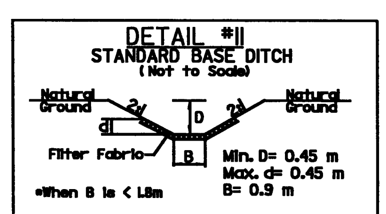
FROM STA. 76+30 TO STA. 77+13 -LREV- LT
FROM STA. 11+66 TO STA. 12+06 -SB US 220- RT
FROM STA. 16+65 TO STA. 17+05 -Y20- LT
FROM STA. 13+00 TO STA. 13+40 -Y21- RT
FROM STA. 16+80 TO STA. 17+70 -Y23- RT
FROM STA. 10+90 TO STA. 11+30 -RPB- LT
FROM STA. 12+30 TO STA. 12+40 -RPB- LT



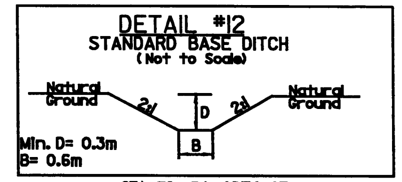
FROM STA. 21+80 TO STA. 22+67 -LREV- RT
FROM STA. 26+40 TO STA. 28+00 -LREV- LT
FROM STA. 33+00 TO STA. 33+80 -LREV- LT
FROM STA. 35+80 TO STA. 37+60 -LREV- LT
FROM STA. 12+93 TO STA. 14+33 -Y21- LT



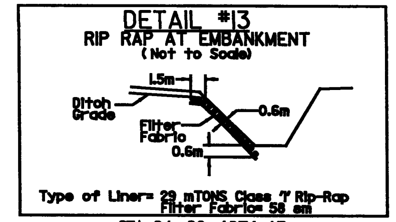
FROM STA. 22+20 TO STA. 24+08 -LREV- LT
FROM STA. 83+60 TO STA. 84+07 -LREV- LT



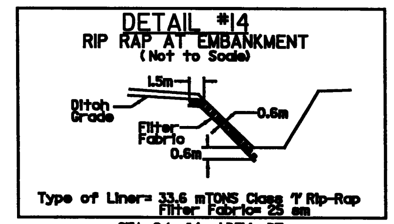
FROM STA. 24+08 TO STA. 24+28 -LREV- LT



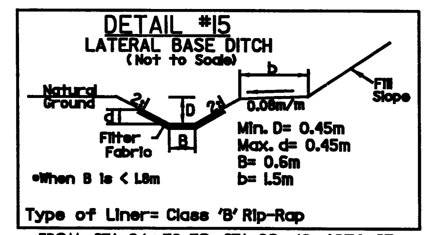
STA. 70+54 -LREV- LT
FROM STA. 11+13 TO STA. 11+28 -SB US220- RT
STA. 17+94 -Y20- LT
STA. 16+55 -Y21- LT
STA. 14+00 -RPC- RT



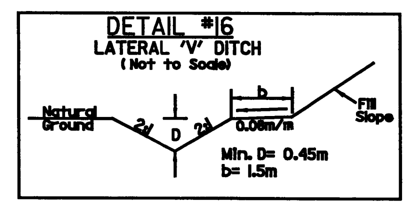
STA. 24+28 -LREV- LT



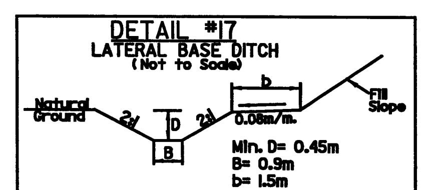
STA. 24+16 -LREV- RT



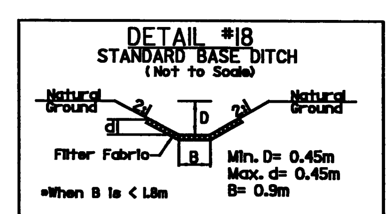
FROM STA. 24+70 TO STA. 25+40 -LREV- RT
FROM STA. 84+20 TO STA. 85+20 -LREV- LT



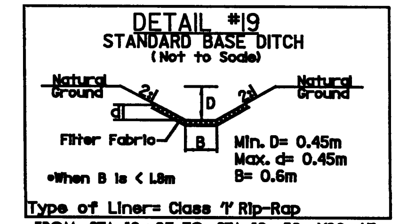
FROM STA. 26+20 TO STA. 26+80 -LREV- RT
FROM STA. 11+30 TO STA. 12+30 -RPB- LT
FROM STA. 11+95 TO STA. 12+80 -Y10- LT
FROM STA. 16+50 TO STA. 17+00 -Y21- RT
FROM STA. 14+55 TO STA. 14+70 -RPD2- LT



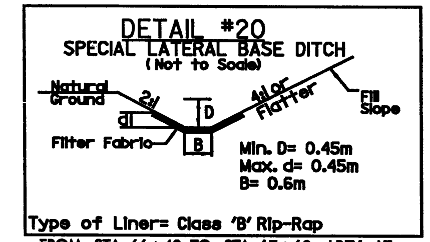
FROM STA. 27+00 TO STA. 28+57 -LREV- RT



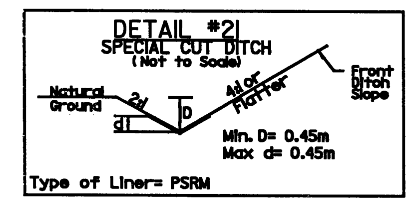
STA. 19+06 -Y20- LT



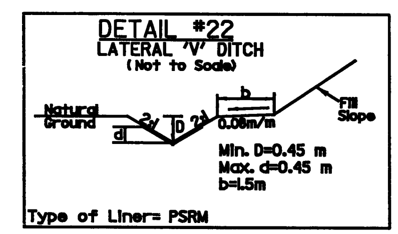
FROM STA. 12+37 TO STA. 12+50 -Y20- LT
FROM STA. 19+02 TO STA. 19+37 -Y20- LT



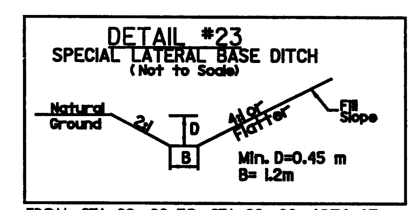
FROM STA. 66+40 TO STA. 67+60 -LREV- LT
FROM STA. 66+75 TO STA. 67+55 -LREV- RT
FROM STA. 13+00 TO STA. 14+20 -RPC- LT
FROM STA. 13+70 TO STA. 13+97 -XOVRH- RT



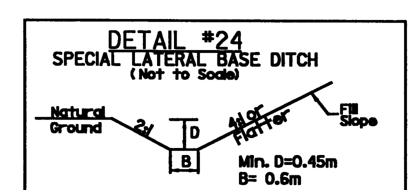
FROM STA. 91+20 TO STA. 93+20 -LREV- RT
FROM STA. 14+35 TO STA. 14+70 -Y21- RT
FROM STA. 16+50 TO STA. 17+30 -Y6- RT



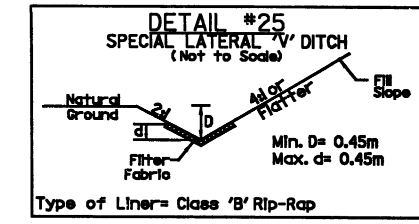
FROM STA. 12+50 TO STA. 13+90 -Y20- LT



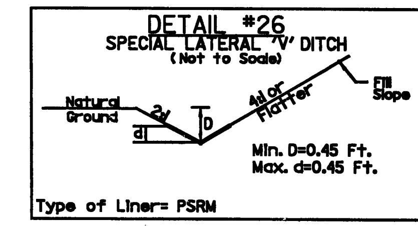
FROM STA. 89+80 TO STA. 90+80 -LREV- LT



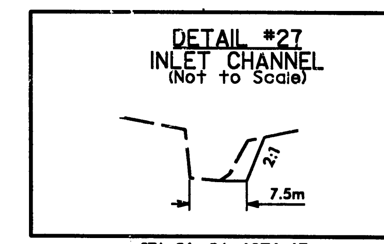
FROM STA 61+00 TO STA 63+20 -LREV- RT



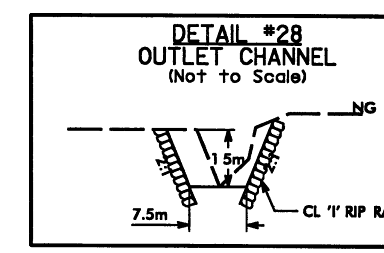
FROM STA. 56+80 TO STA. 57+40 -LREV- LT
FROM STA. 79+00 TO STA. 79+40 -LREV- LT
FROM STA. 79+10 TO STA. 80+00 -LREV- RT
FROM STA. 11+89 TO STA. 13+80 -RPC2- RT



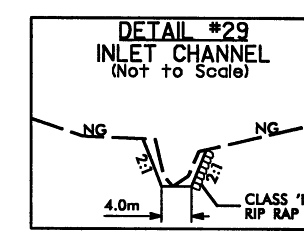
FROM STA. 12+60 TO STA. 13+70 -XOVRH- RT



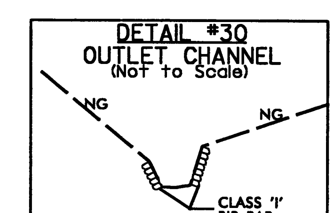
STA. 56+54 -LREV- LT



STA. 56+54 -LREV- RT



STA. 57+72 -LREV- LT



STA. 57+28 -LREV- RT

FILE: R:\Drainage\r2413c_hyd_details.dgn
DATE: 11/6/2009 1:54:10 PM
PLOT DRIVER: V:\Ral_FloHut_Server_Files\CAD\F&HCAD\PLOTDRV\Metric_plan_half\Rdwy_metr_half_551.plt
PEN TABLE: V:\Ral_FloHut_Server_Files\CAD\F&HCAD\PENTABS\ F&H\R2413C_Plans.tbl

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	2-G
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

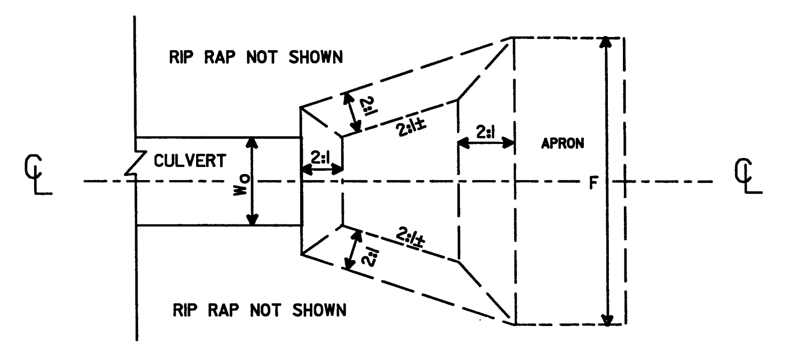
DETAIL #31
RIP-RAPPED ENERGY DISSIPATOR BASIN

DIM. (ft)	RIP RAP BASIN #
	1
A	0.6m
B	0.6m
C	0.6m
D	0.9m
E	1.8m
F	4.8m
G	7.8m

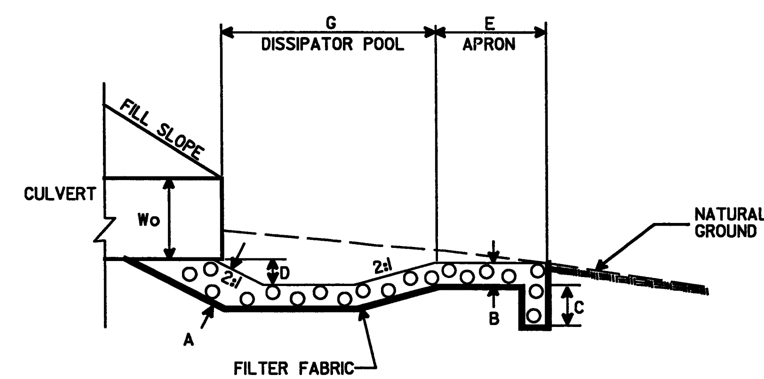
ALL DIMENSIONS APPROXIMATE

CLASS 'I' RIPRAP
EST. 56.2 mTONS
EST. 55.7 SM F.F.

BASIN #	LOCATION (AT OUTLET)
1	26+29 -LREV- LT



PLAN

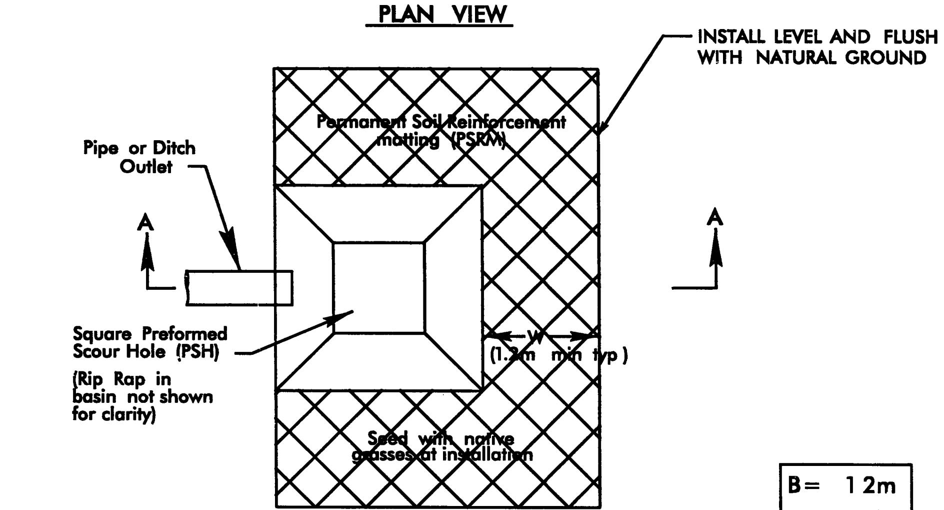


℄ SECTION

7/08

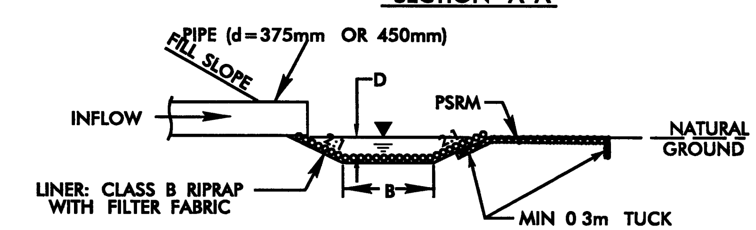
DETAIL #32 PREFORMED SCOUR HOLE
*NOT TO SCALE

PLAN VIEW



B= 1 2m
D= 0 6m
W= 1 2m

SECTION A-A



3/08

STA. 23+77 -LREV- RT

FILE: R:\Drainage\r2413c_hyd_details2.dgn
DATE: 11/6/2009 1:54:32 PM
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PEN TABLE: V:\Ral FloHut Server Files\CAD\F&HCAD\PENTABS\ F&H\R2413C Plans.tbl

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	4
R/W SHEET NO.	

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV

DATUM DESCRIPTION

The Localized Coordinates used on this project are based on the State Plane Coordinates of traverse station "U2413-1" established by NCGS.

The NAD 83 State Plane Coordinates of "U2413-1" are:

Northing: 273,885.6884 (m) Easting: 527,983.5894 (m)

The Combined Grid Factor used on this project (ground to grid) is: 0.9999891

The bearing and ground distance from -L- POT Station 10+00.000 to U2413-1 is:

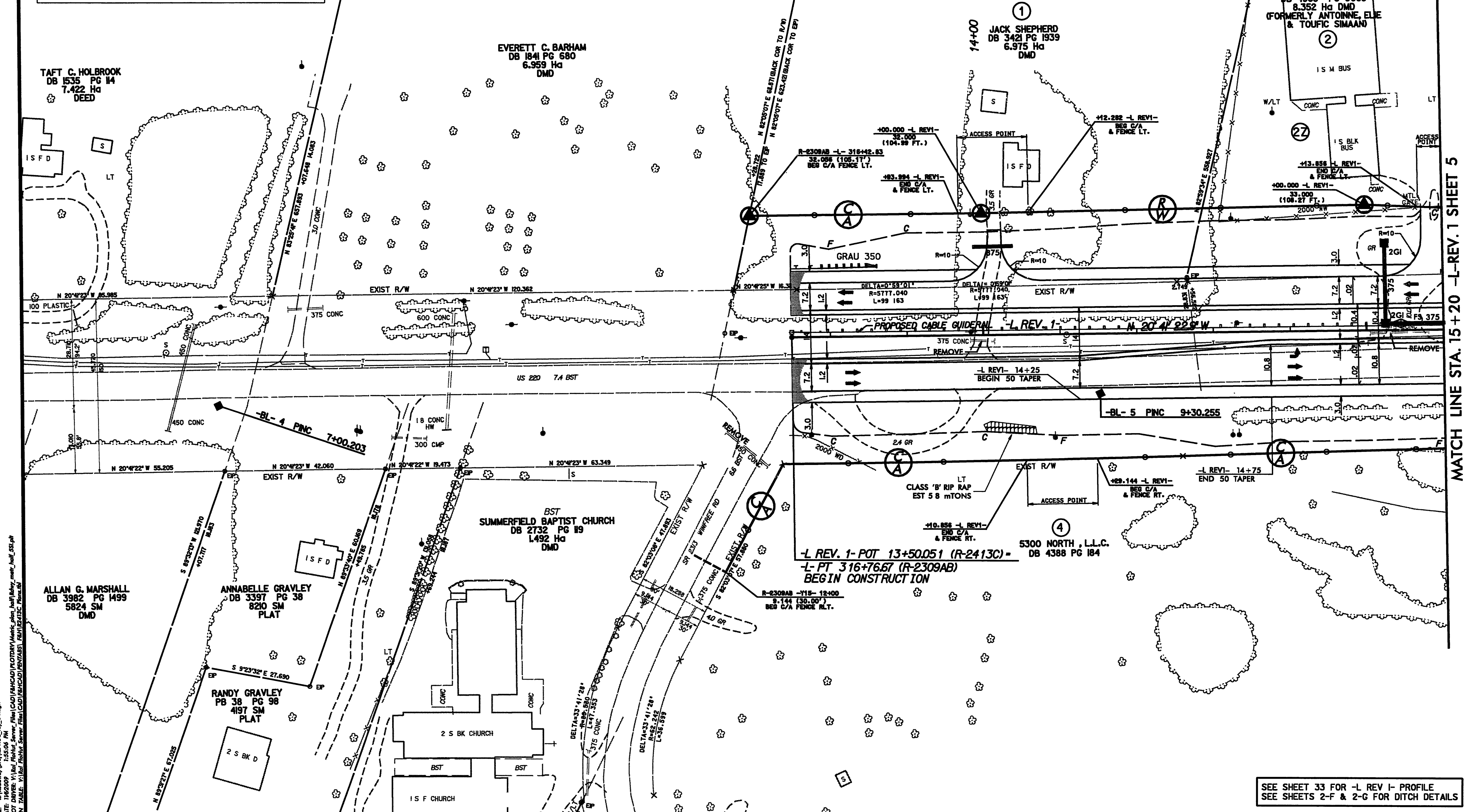
N 15-25-20 W 34.013 m

The bearing and ground distance from -L1- POT Station 34+00.000 to U2413-1 is:

S 17-25-54 E 9,545.585 m

All distances shown are in horizontal ground meters.

Vertical datum used is NGVD 29.



SEE SHEET 33 FOR -L REV I- PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

01/08/09 - PARCELS 1, 2 & 4 ADDED PARTIAL CONTROL OF ACCESS
09/02/09 - PARCEL 2 REVISED DRIVEWAY ACCESS
09/08/09 - ADDED PARCEL 2Z

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

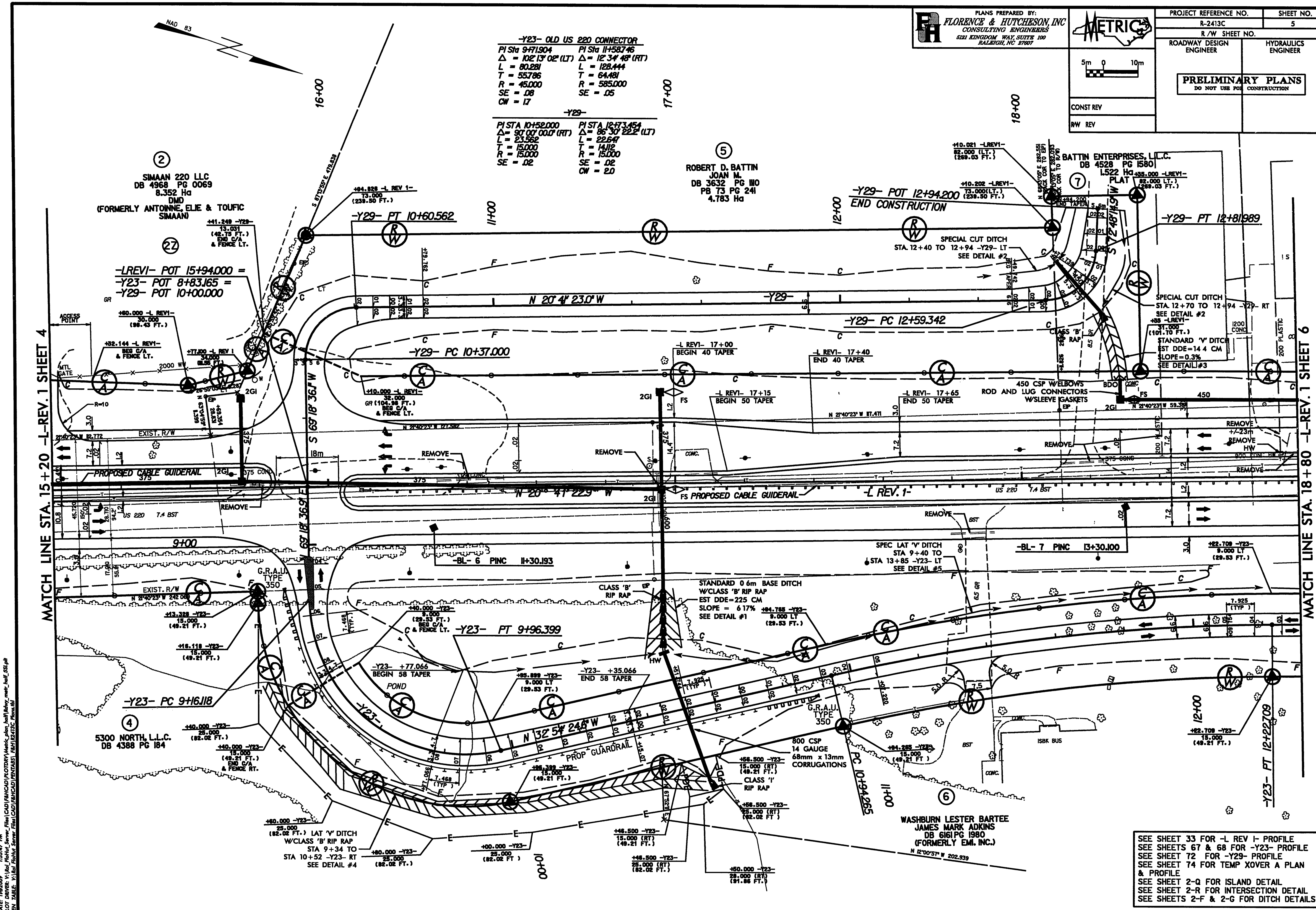
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

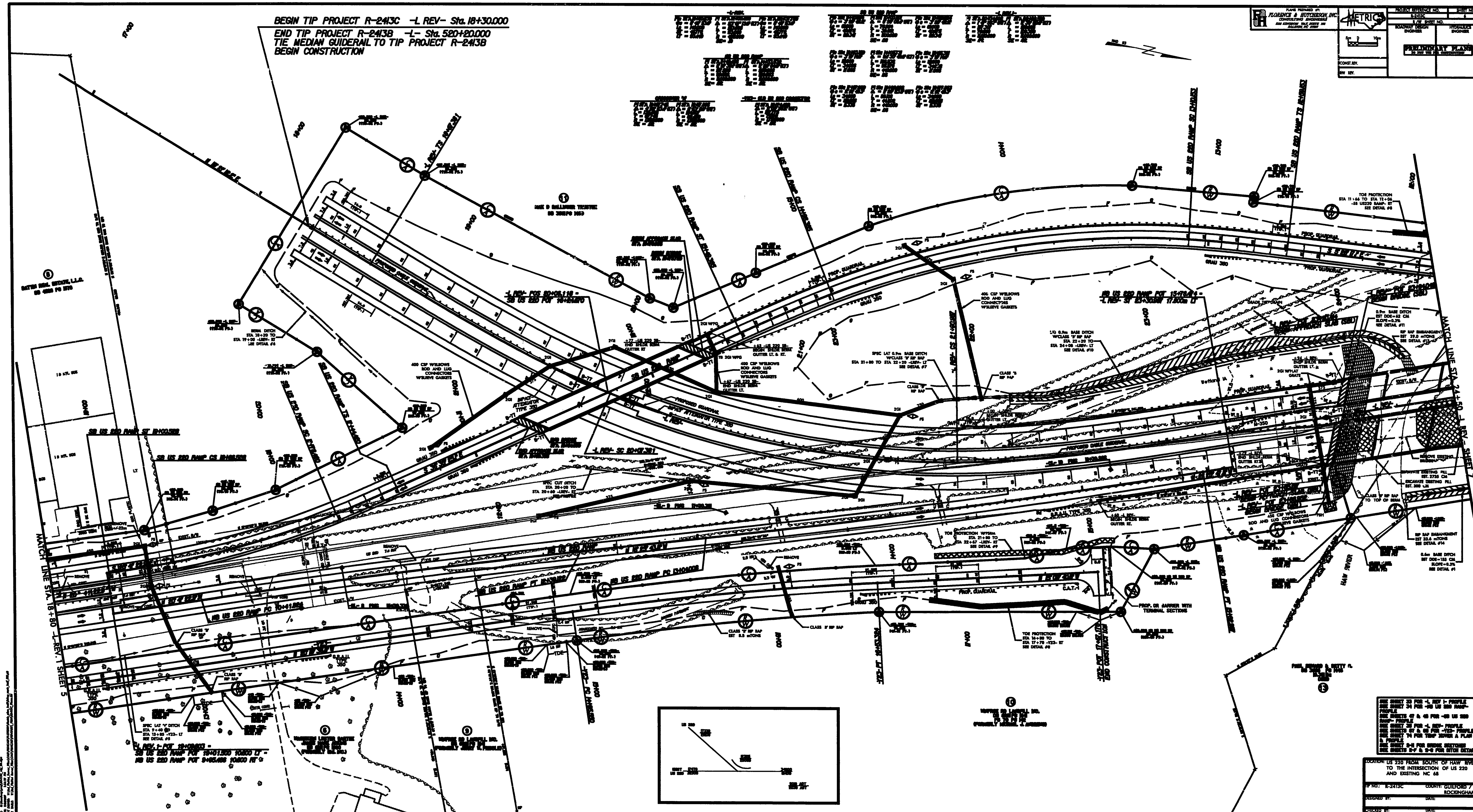
R/W REV



SEE SHEET 33 FOR -L REV I- PROFILE
SEE SHEETS 67 & 68 FOR -Y23- PROFILE
SEE SHEET 72 FOR -Y29- PROFILE
SEE SHEET 74 FOR TEMP XOVER A PLAN & PROFILE
SEE SHEET 2-Q FOR ISLAND DETAIL
SEE SHEET 2-R FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

01/08/09 - PARCELS 2 & 4 ADDED PARTIAL CONTROL OF ACCESS
09/02/09 - PARCEL 2 REVISED DRIVEWAY ACCESS
09/08/09 - ADDED PARCEL 2Z
10/16/09 - PARCEL 6 ADDED DRIVEWAY -Y23- 11+40 RT

101609 - PARCEL 6 PROPERTY NAME UPDATED
110309 - PARCEL 10 ADDED TEMPORARY CONSTRUCTION EASEMENT



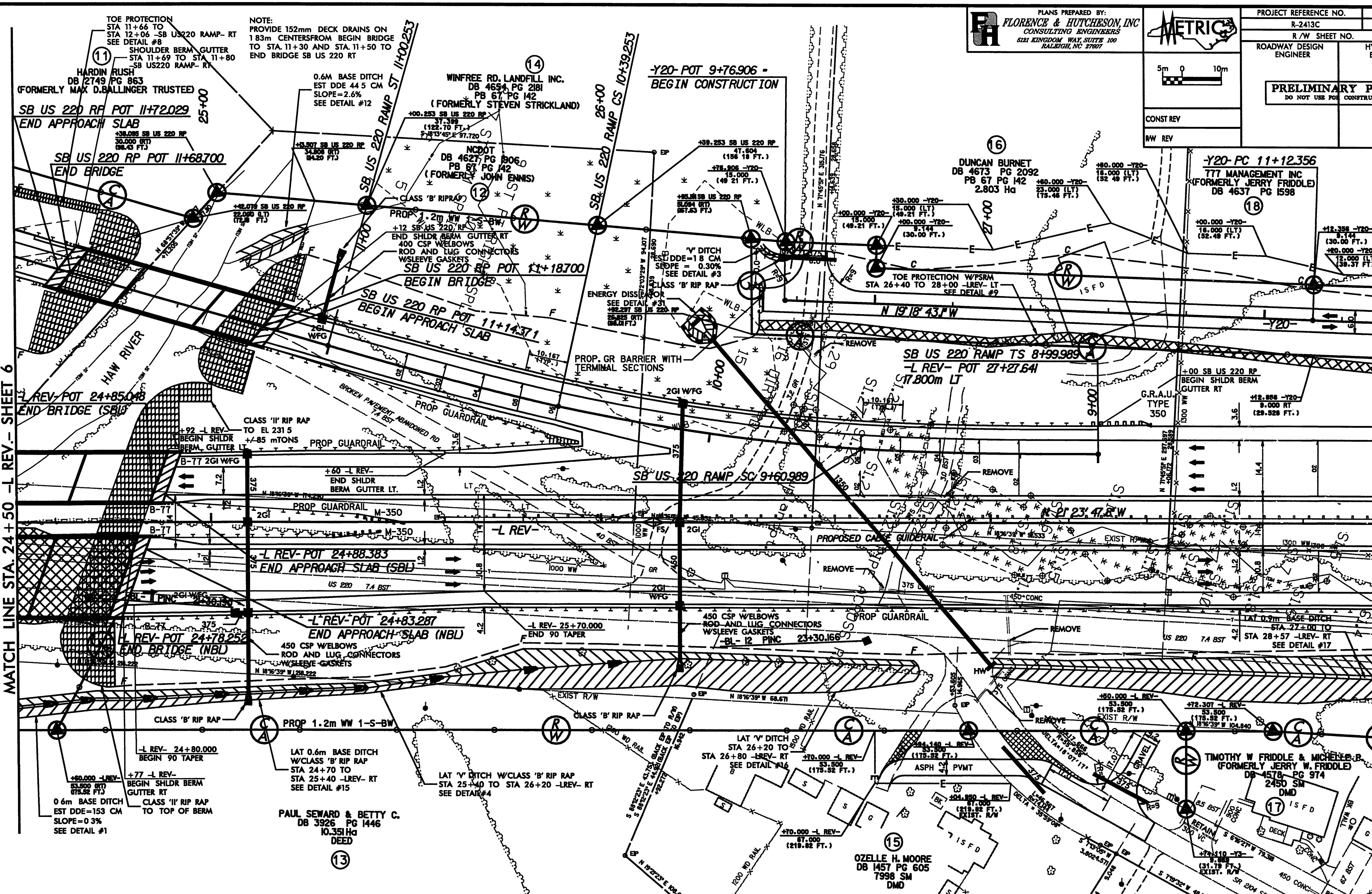
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV

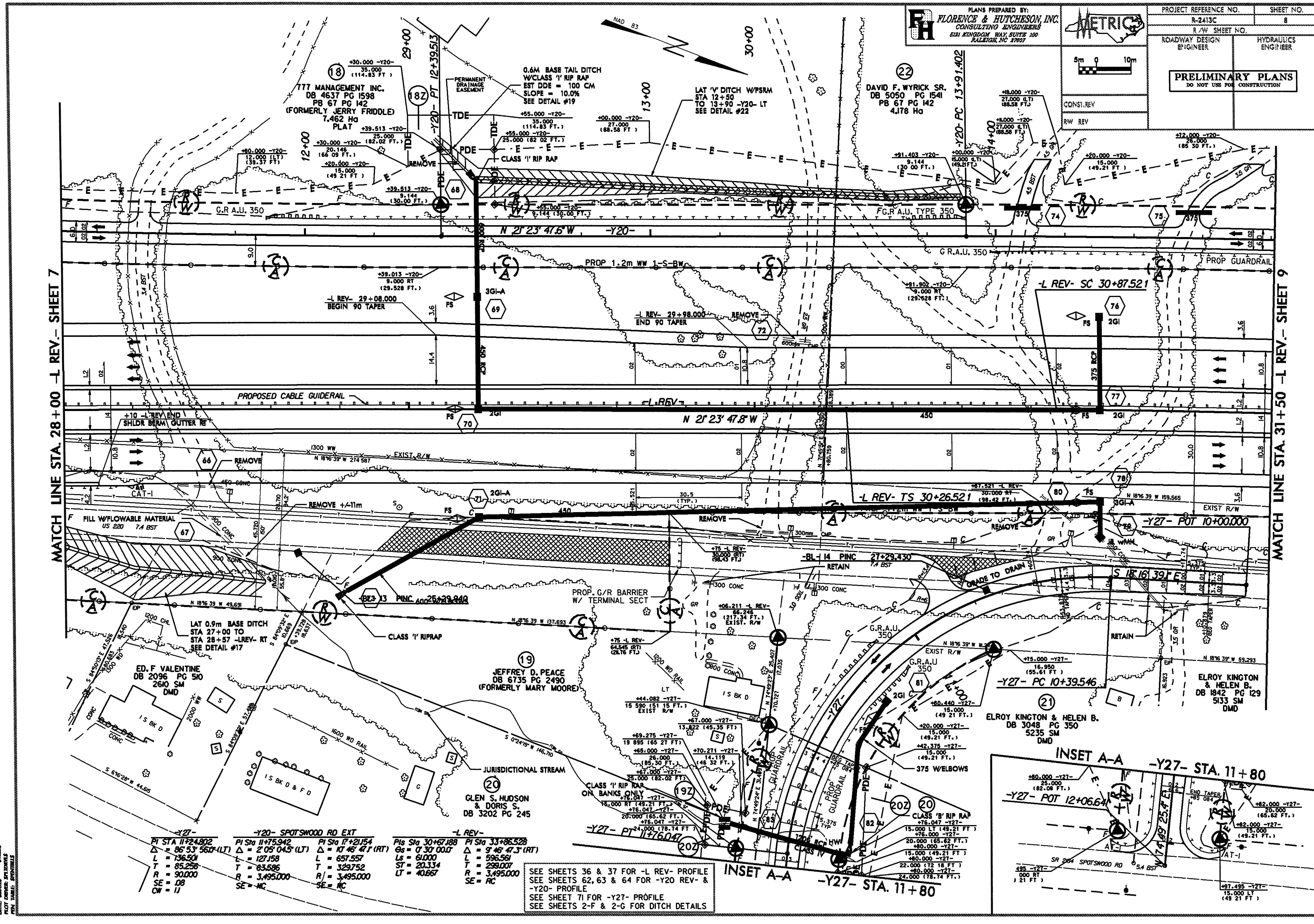


NOTE:
PROVIDE 152mm DECK DRAINS ON 1.83m CENTERS
FROM BEGIN BRIDGE TO STA. 24+15 AND
STA. 24+65 TO END BRIDGE SBL -LREV- LT
FROM BEGIN BRIDGE TO STA. 24+03 AND
STA. 24+23 TO END BRIDGE NBL -LREV- RT

SB US 220 RAMP			-Y20- SPOTSWOOD RD EXT
PI Sta 9+40.664	PI Sta 10+00.201	PI Sta 10+59.594	PI STA 11+75.942
Θs = 3°29' 42.2"	Δ = 8°58' 06.4" (RT)	Θs = 3°29' 42.2"	Δ = 2°05' 04.5" (LT)
Ls = 61.000	L = 78.264	Ls = 61.000	L = 127.158
LT = 40.675	T = 39.212	LT = 40.675	T = 63.586
ST = 20.341	R = 500.000	ST = 20.341	R = 3,495.000
	SE = .06		SE = NC

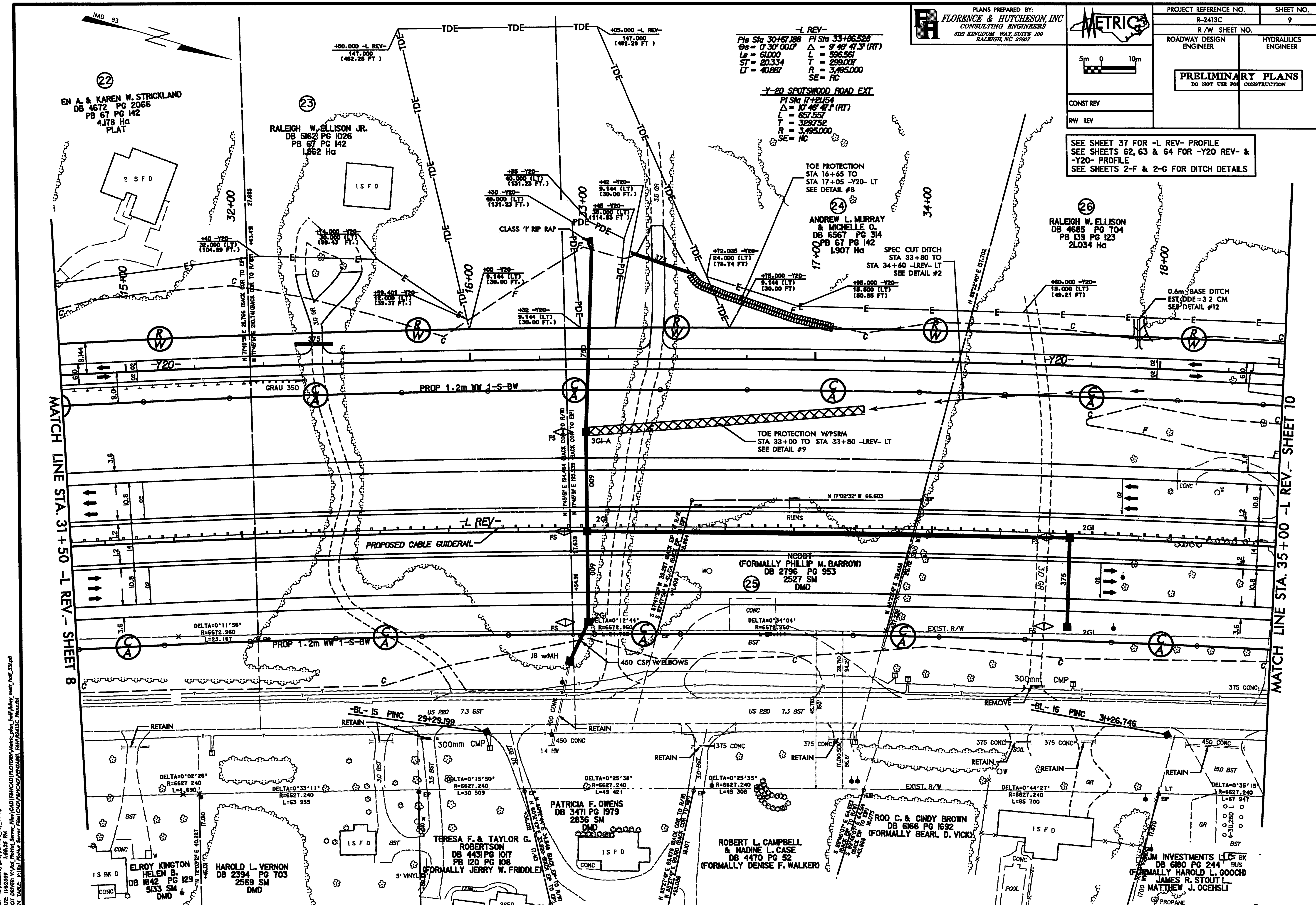
SEE SHEET 36 FOR -L REV- PROFILE
SEE SHEETS 47 & 48 FOR -SB US 220 RAMP- PROFILE
SEE SHEETS 62, 63 & 64 FOR -Y20 REV- & -Y20- PROFILE
SEE SHEET 2-H FOR BRIDGE SKETCHES
SEE SHEETS S-1 THRU S-__ FOR BRIDGE PLANS
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

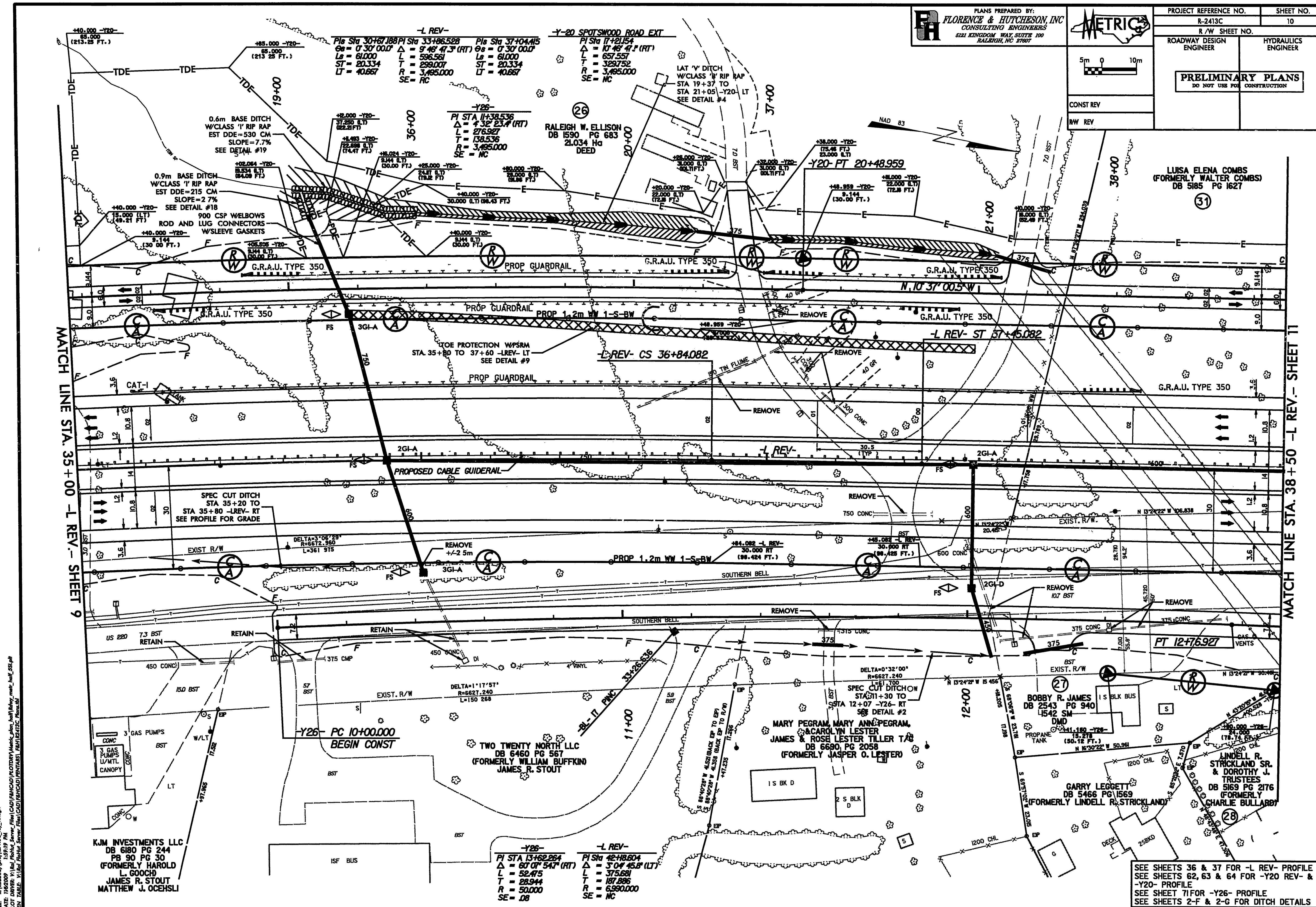
FILE: R:\Roadway\proj\R2413C_rdy_07.dgn
DATE: 11/6/2009 1:57:26 PM



6/17/10 - ELIMINATED PARCEL 21Z REVISED DRAINAGE
2/15/10 - PARCEL 18Z ADDED TEMPORARY DRAINAGE EASEMENT
2/15/10 - PARCEL 19Z ADDED PERMANANT DRAINAGE EASEMENT
2/15/10 - PARCEL 20Z REVISED PERMANANT DRAINAGE EASEMENT

11/03/09 - PARCEL 24 REVISED PERMANANT DRAINAGE EASEMENT





11/03/09 - PARCEL 26 REVISED TEMPORARY DRAINAGE EASEMENT

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV

RAMP B

Pls Sta 10+30.669	PI Sta 11+24.237	Pls Sta 12+16.886
Θs = 2° 15' 09.6"	Δ = 15° 14' 05.4" (LT)	Θs = 2° 15' 09.6"
Ls = 46.000	L = 155.550	Ls = 46.000
ST = 15.336	T = 78.237	ST = 15.336
LT = 30.669	R = 585.000	LT = 30.669
	SE= .05	

-Y21- SPOTSWOOD RD.REL.

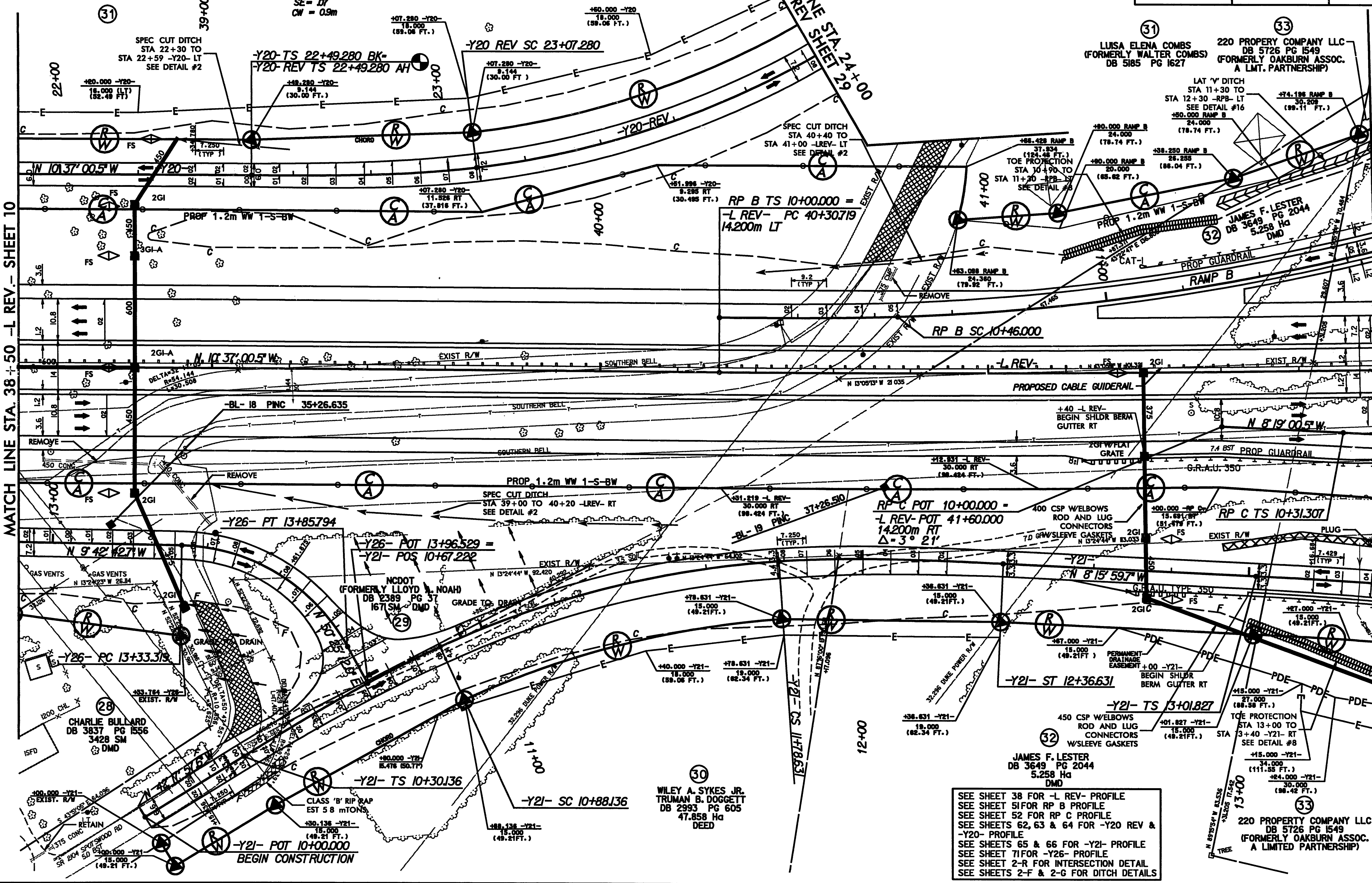
Pls Sta 10+68.830	PI Sta 11+33.884	Pls Sta 11+97.990
Θs = 6° 38' 46.7"	Δ = 20° 44' 24.4" (RT)	Θs = 6° 38' 46.7"
Ls = 58.000	L = 90.496	Ls = 58.000
ST = 19.358	T = 45.749	ST = 19.358
LT = 38.694	R = 250.000	LT = 38.694
	SE= .08	
	CW = 1.1m	

-Y21- SPOTSWOOD RD.REL.

Pls Sta 13+36.504	PI Sta 14+36.057	Pls Sta 15+32.699
Θs = 4° 15' 22.5"	Δ = 26° 26' 34.0" (RT)	Θs = 4° 15' 22.5"
Ls = 52.000	L = 161.530	Ls = 52.000
ST = 17.342	T = 82.230	ST = 17.342
LT = 34.677	R = 350.000	LT = 34.677
	SE= .07	
	CW = 0.9m	

-Y-20 REV SPOTSWOOD ROAD EXT

Pls Sta 22+87.978	PI Sta 24+12.310	Pls Sta 25+17.493
Θs = 7° 13' 27.3"	Δ = 49° 05' 16.8" (LT)	Θs = 5° 27' 20.0"
Ls = 58.000	L = 197.052	Ls = 30.000
ST = 19.363	T = 105.030	ST = 13.162
LT = 38.699	R = 230.000	LT = 16.861
	SE= .08	
	CW = 1.1m	



SEE SHEET 38 FOR -L REV- PROFILE
SEE SHEET 51 FOR RP B PROFILE
SEE SHEET 52 FOR RP C PROFILE
SEE SHEETS 62, 63 & 64 FOR -Y20 REV & -Y20- PROFILE
SEE SHEETS 65 & 66 FOR -Y21- PROFILE
SEE SHEET 71 FOR -Y26- PROFILE
SEE SHEET 2-R FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

11/03/09 – PARCEL 30 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 – PARCEL 31 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 – PARCEL 33 REVISED PERMANENT DRAINAGE EASEMENT

FILE: R:\Roadway\proj\R2413C_rdy_11.dgn
DATE: 11/6/2009 2:00:09 PM
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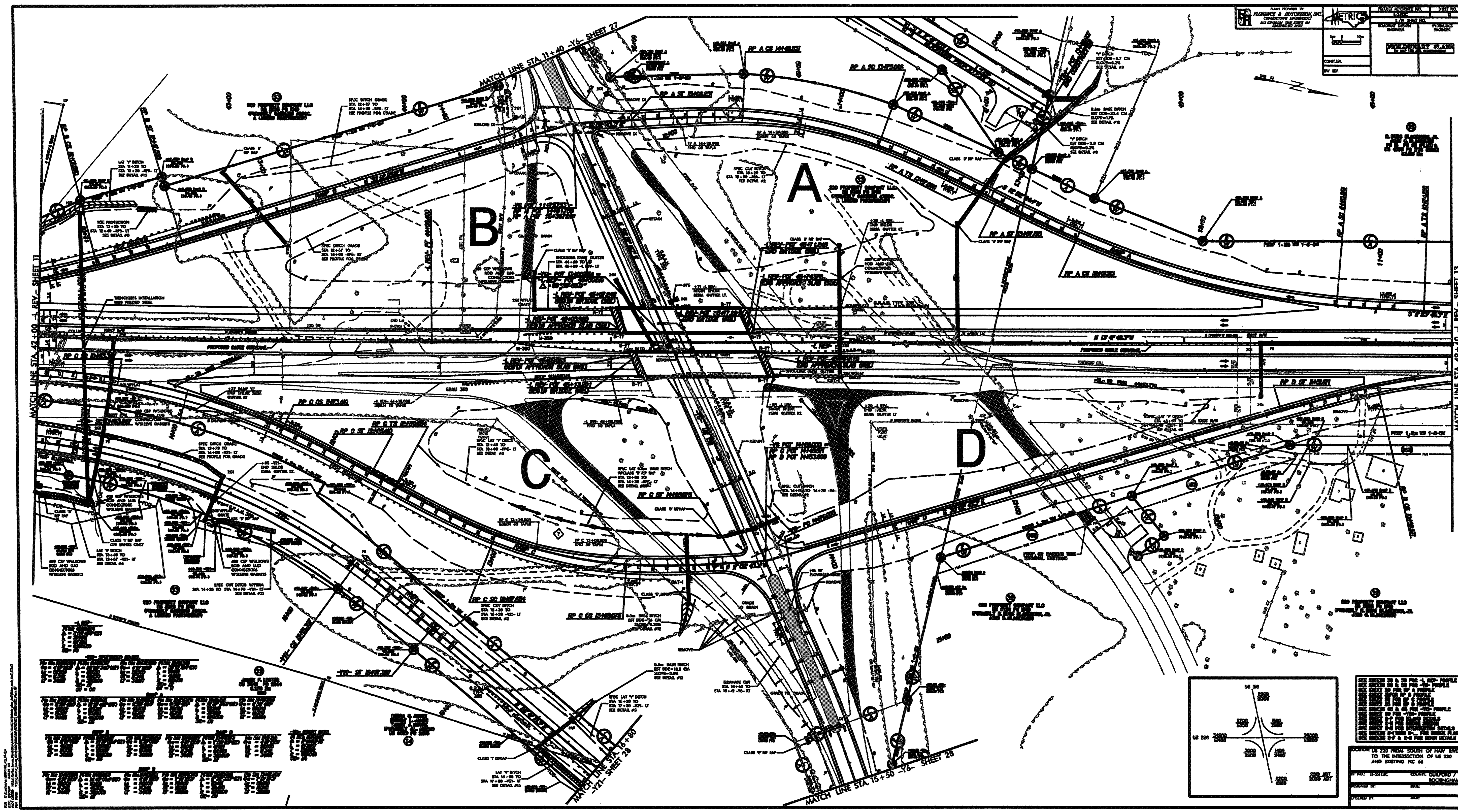
PEN TABLE: V:\Ral_FloHut_Server_Files\CAD\F&HCAD\PENTABS\F&H\R2413C_Plans.tbl

03/23/09 - ADDED PARCEL NO. 35Z DESIGNATION TO PUE
11/03/09 - PARCEL NO. 33 REVISED PERMANENT DRAINAGE EASEMENT
REVISED TEMPORARY CONSTRUCTION EASEMENT
REVISED TEMPORARY DRAINAGE EASEMENT



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

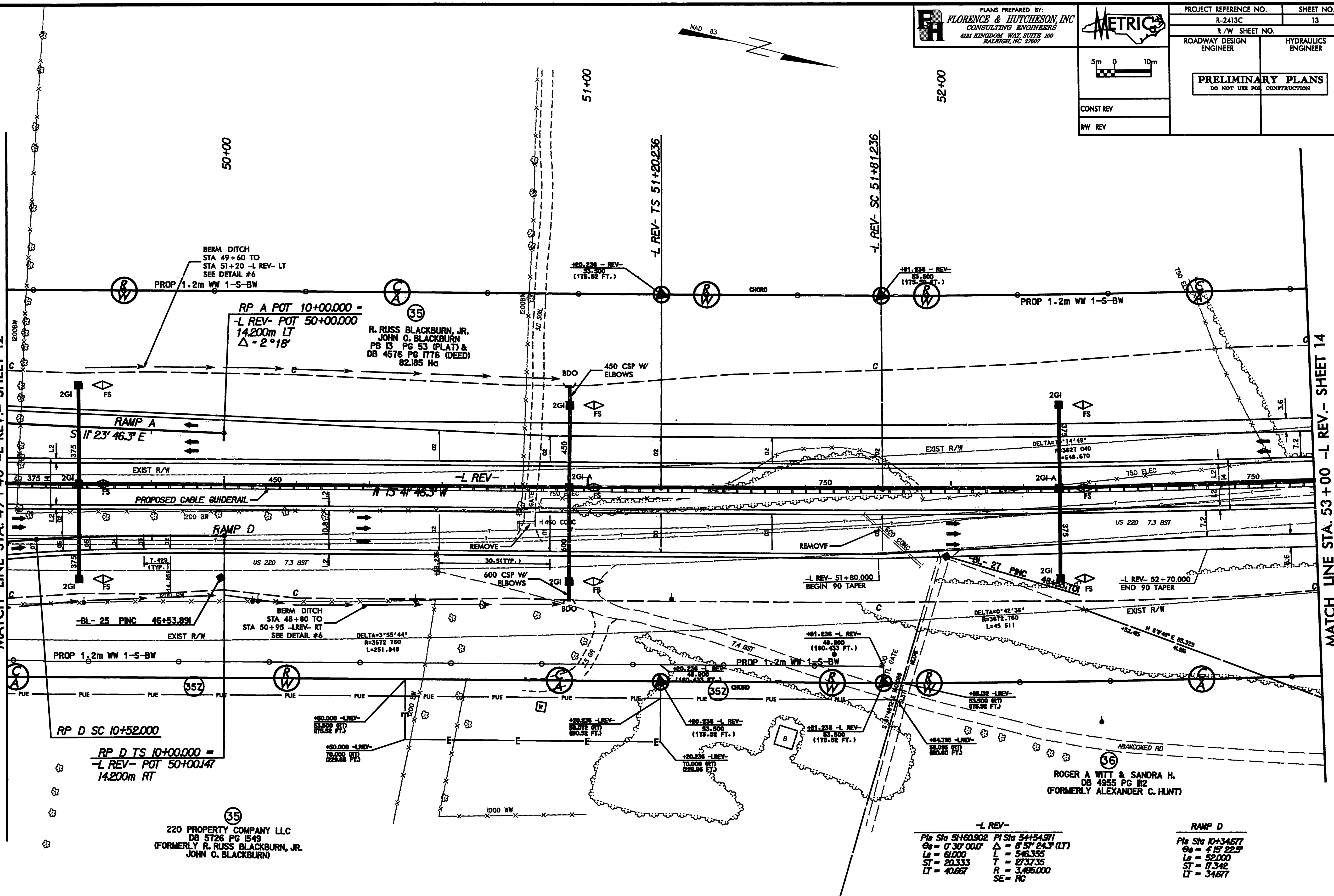
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L REV-

PIs Sta 51+60.902	PI Sta 54+54.971
Θs = 0° 30' 00.0"	Δ = 8° 57' 24.3" (LT)
Ls = 61.000	L = 546.355
ST = 20.333	T = 273.735
LT = 40.667	R = 3,495.000
	SE = RC

RAMP D

PIs Sta 10+34.677
Θs = 4° 15' 22.5"
Ls = 52.000
ST = 17.342
LT = 34.677

SEE SHEETS 39 & 40 FOR -L REV- PROFILE
SEE SHEET 50 FOR RP A PROFILE
SEE SHEET 53 FOR RP D PROFILE
SEE SHEET 81 FOR XOVRH PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

03/23/09 – ADDED PARCEL NO. 35Z DESIGNATION TO PUE

FILE: R:\Roadway\proj\R2413C_rdy_13.dgn
DATE: 11/6/2009 2:02:15 PM
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PEN TABLE: V:\Ral_FloHut_Server_Files\CAD\F&HCAD\PENTABS\F&H\R2413C_Plans.tbl

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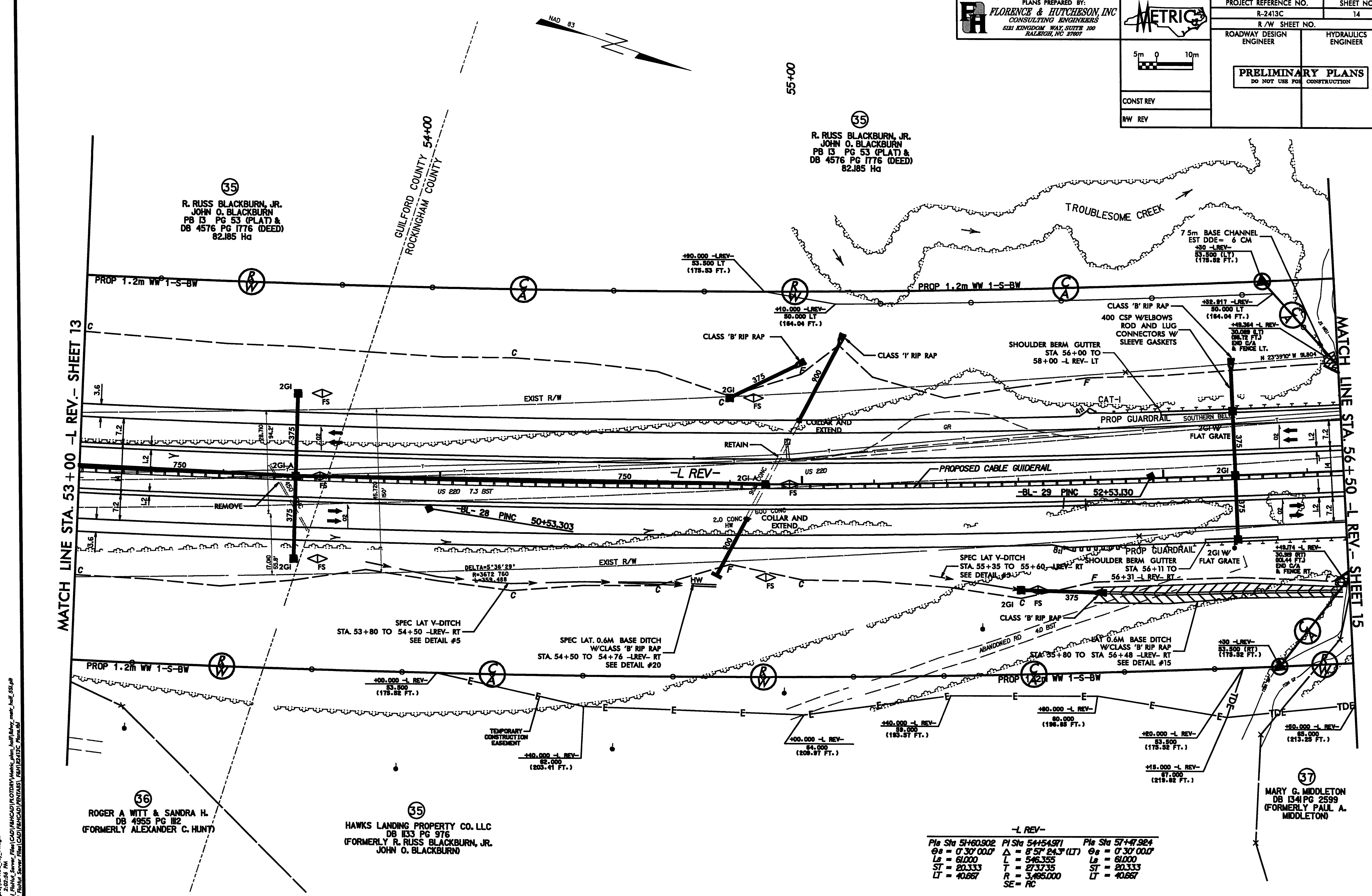
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



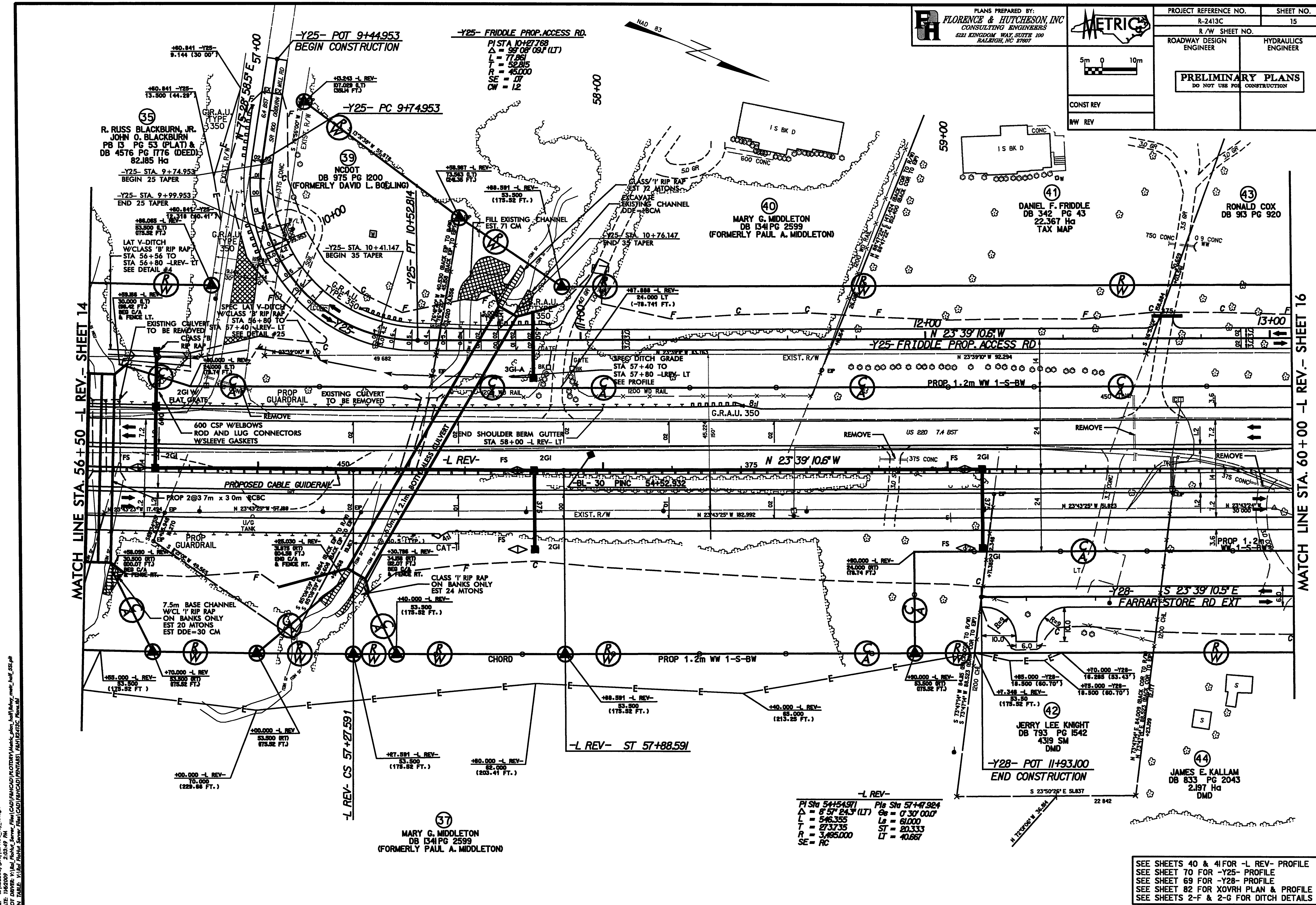
-L REV-

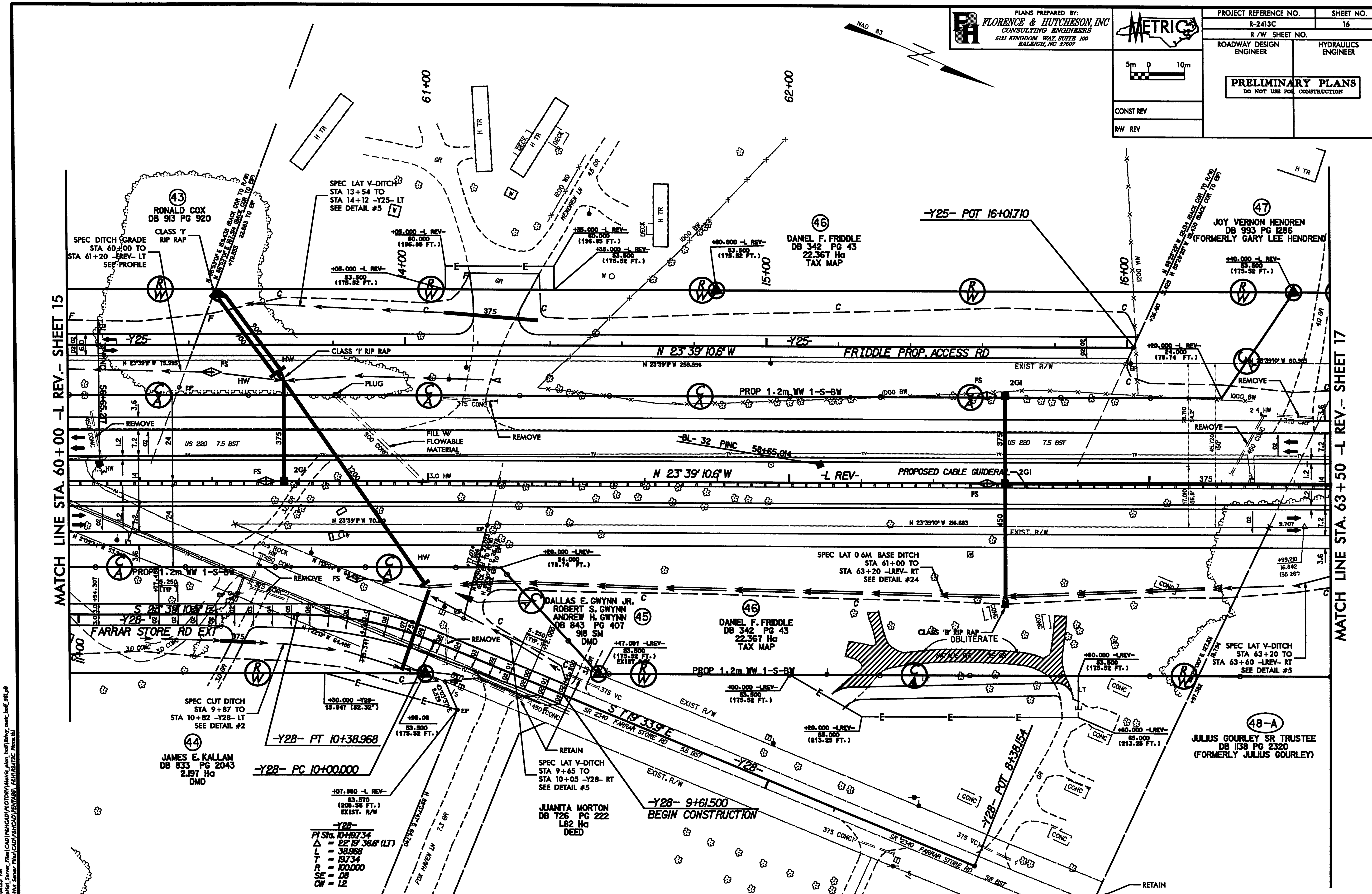
Pls Sta 51+60.902	PI Sta 54+54.971	Pls Sta 57+47.924
Θs = 0°30'00.0"	Δ = 8°57'24.3" (LT)	Θs = 0°30'00.0"
Ls = 61.000	L = 546.355	Ls = 61.000
ST = 20.333	T = 273.735	ST = 20.333
LT = 40.667	R = 3,495.000	LT = 40.667
	SE = RC	

SEE SHEET 40 FOR -L REV- PROFILE
SEE SHEET 77 FOR TEMP XOVER D PLAN & PROFILE
SEE SHEET 81 & 82 FOR XOVRH PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

11/03/09 - PARCEL 35 ADDED TEMPORARY CONSTRUCTION EASEMENT

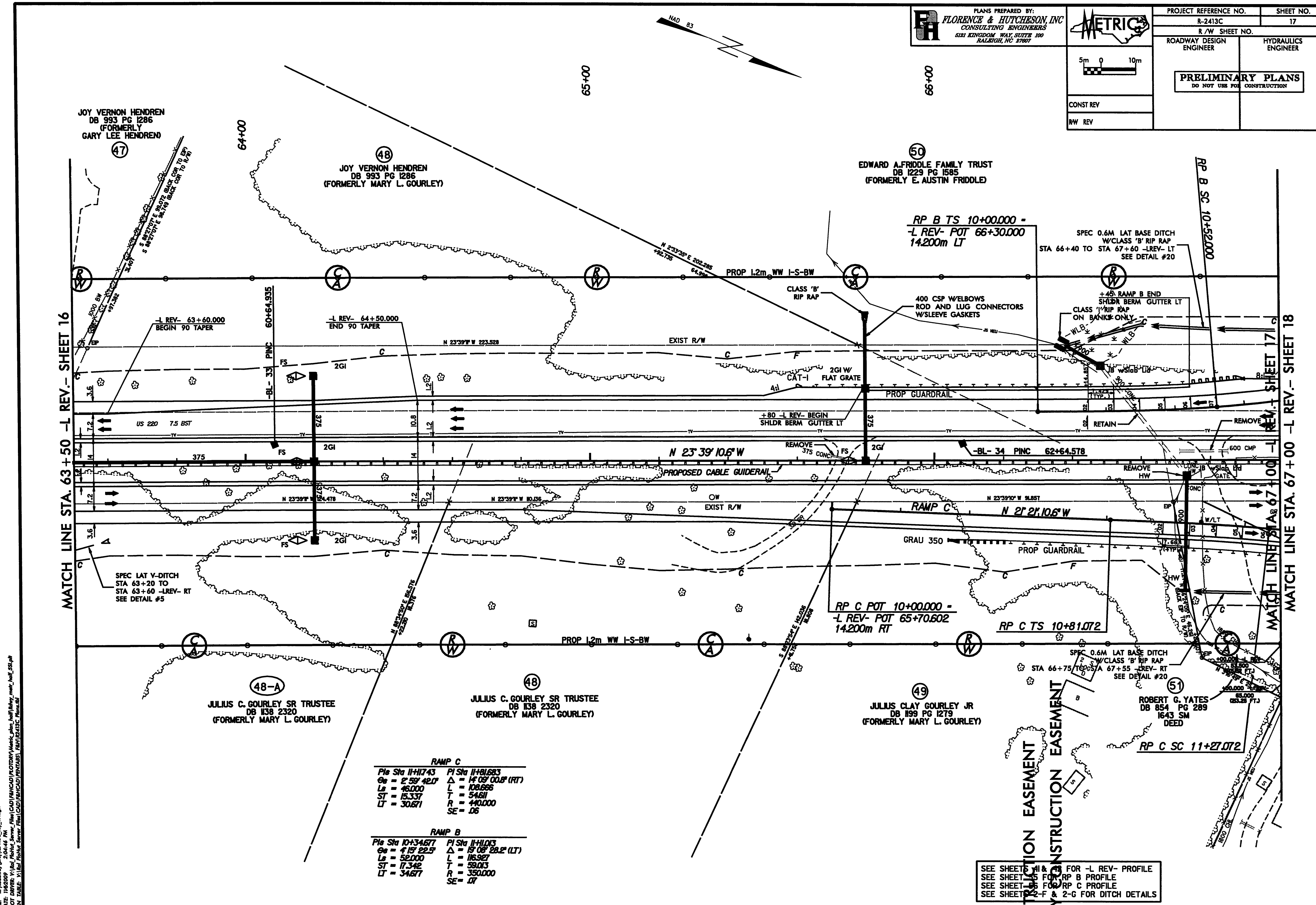
11/03/09 - PARCEL 42 ADDED TEMPORARY CONSTRUCTION EASEMENT





SEE SHEET 41 FOR -L REV- PROFILE
SEE SHEET 70 FOR -Y25- PROFILE
SEE SHEET 69 FOR -Y28- PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

11/03/09 - PARCEL 44 REVISED TEMPORARY CONSTRUCTION EASEMENT



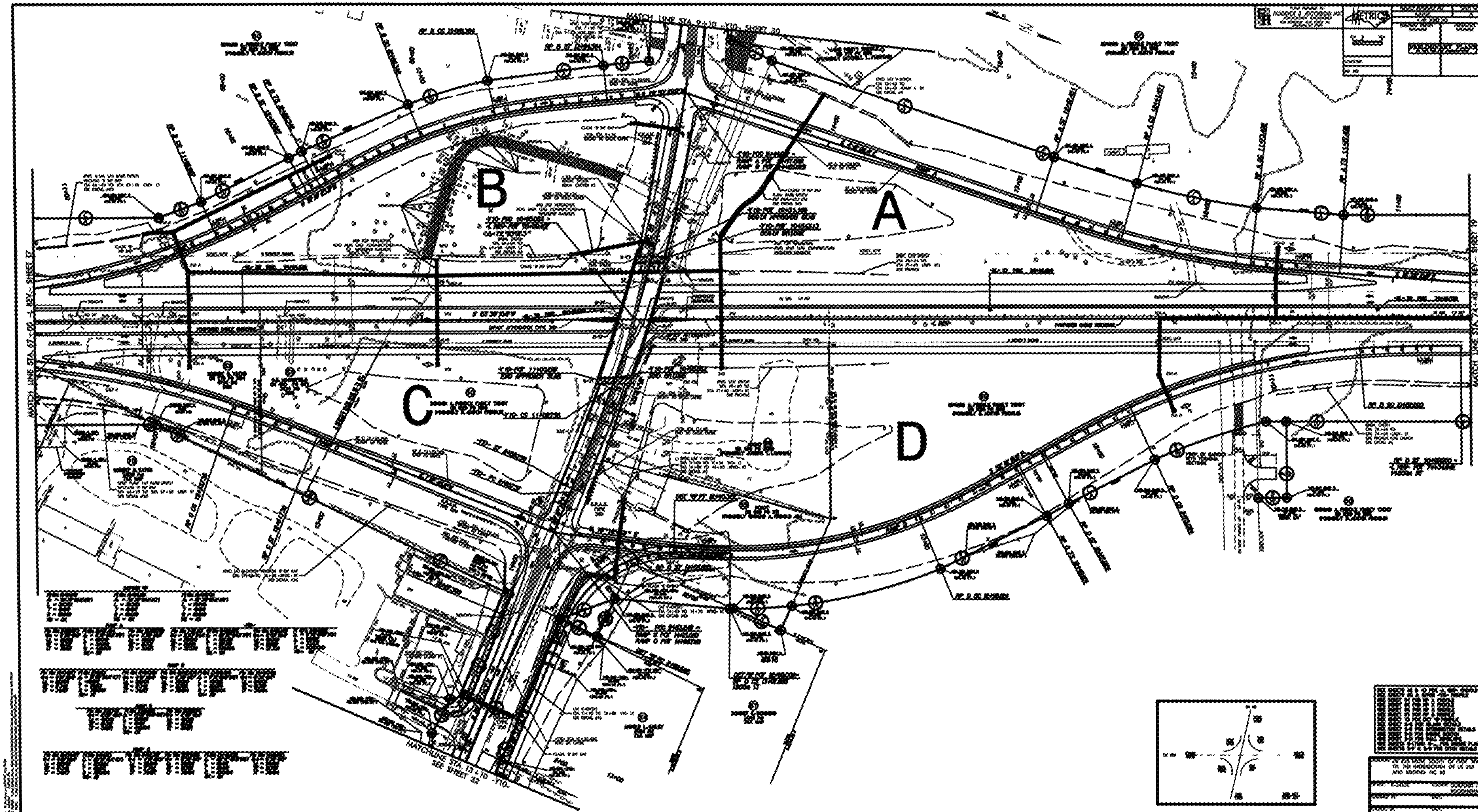
RAMP C

Pis Sta 11+11.743	PI Sta 11+81.683
Θs = 2° 59' 42.0"	Δ = 14° 09' 00.8" (RT)
Ls = 46.000	L = 108.666
ST = 15.337	T = 54.611
LT = 30.671	R = 440.000
	SE = .06

RAMP B

Pis Sta 10+34.677	PI Sta 11+11.013
Θs = 4° 15' 22.5"	Δ = 19° 08' 28.2" (LT)
Ls = 52.000	L = 116.927
ST = 17.342	T = 59.013
LT = 34.677	R = 350.000
	SE = .07

11/03/09 - PARCEL NO. 50 ADDED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL NO. 70 ADDED/REVISED TEMPORARY CONSTRUCTION EASEMENT



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METRIC

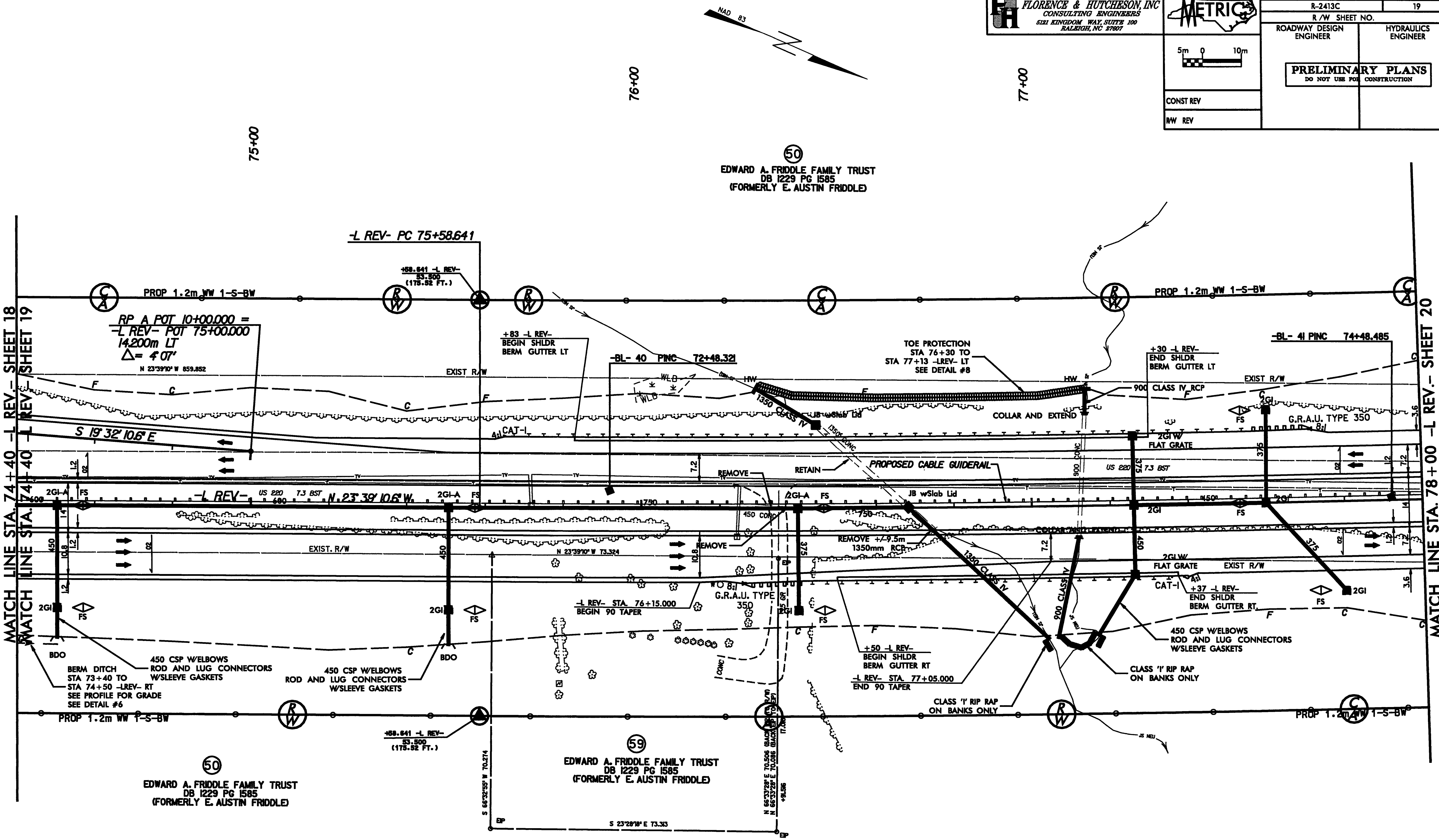
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L REV-
PI Sta 77+51.191
Δ = 3°09' 20.9 (LT)
L = 385.004
T = 192.550
R = 6,990.000
SE = NC

DET "C"	
PI Sta 10+56.714	PI Sta 11+75.573
Δ = 12°56' 33.1" (RT)	Δ = 14°16' 44.4" (LT)
L = 112.945	L = 124.608
T = 56.714	T = 62.628
R = 500.000	R = 500.000
SE = .06	SE = .06

SEE SHEET 43 FOR -L REV- PROFILE
SEE SHEET 54 FOR RP A PROFILE
SEE SHEETS 83 & 84 FOR XOVRI PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

PLANS PREPARED BY:
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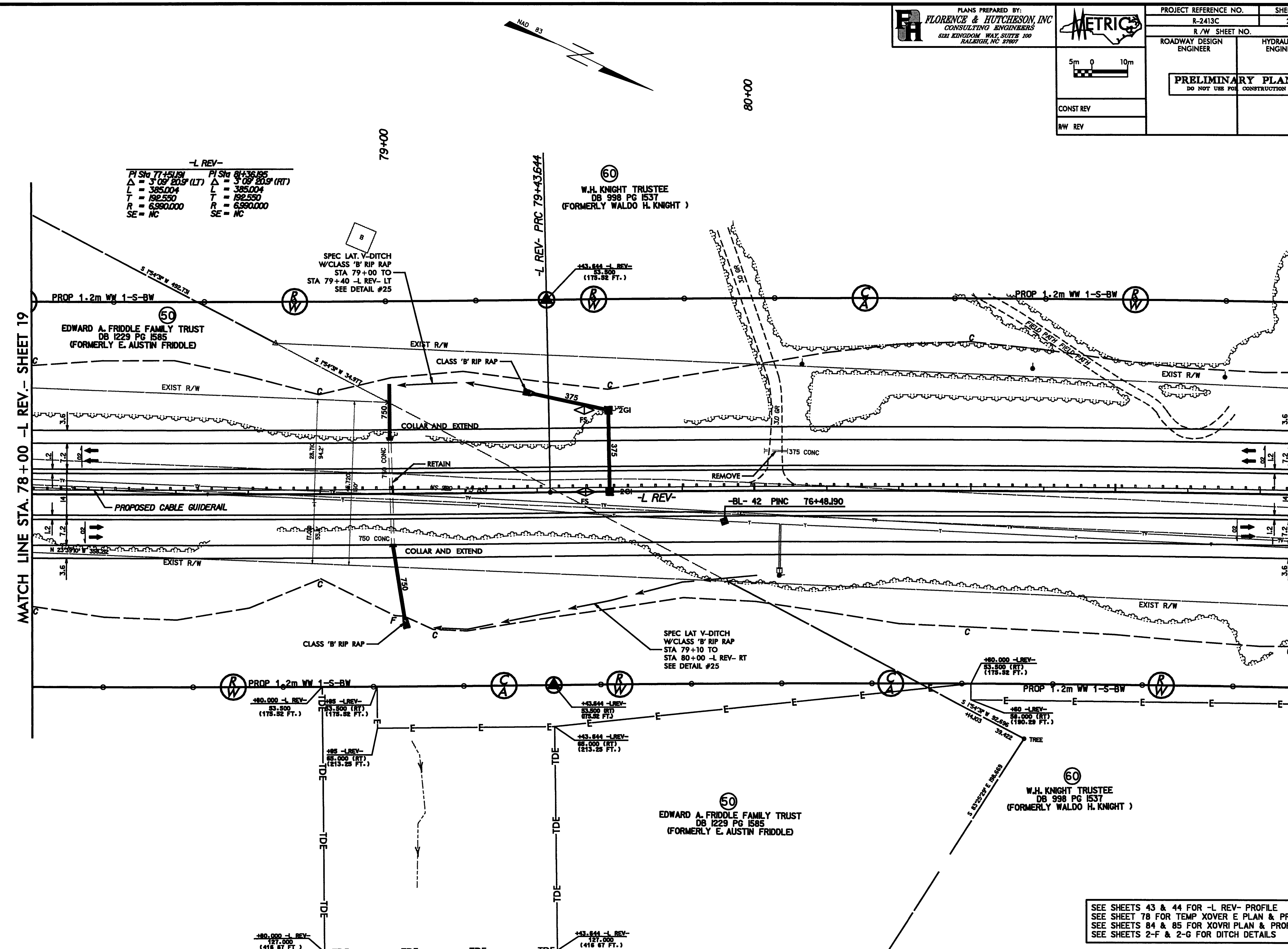
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

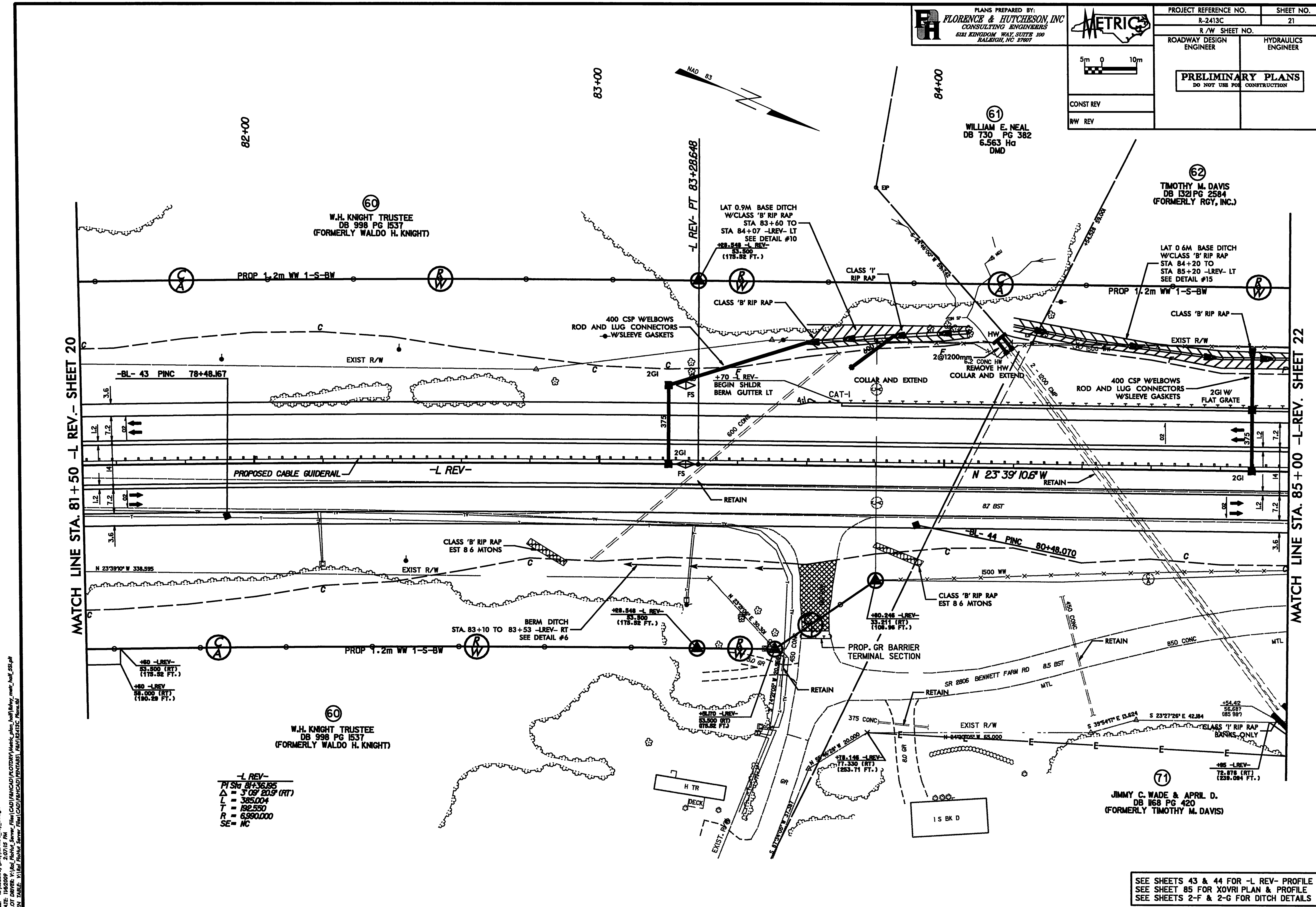
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV



SEE SHEETS 43 & 44 FOR -L REV- PROFILE
SEE SHEET 78 FOR TEMP XOVER E PLAN & PROFILE
SEE SHEETS 84 & 85 FOR XOVRI PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS



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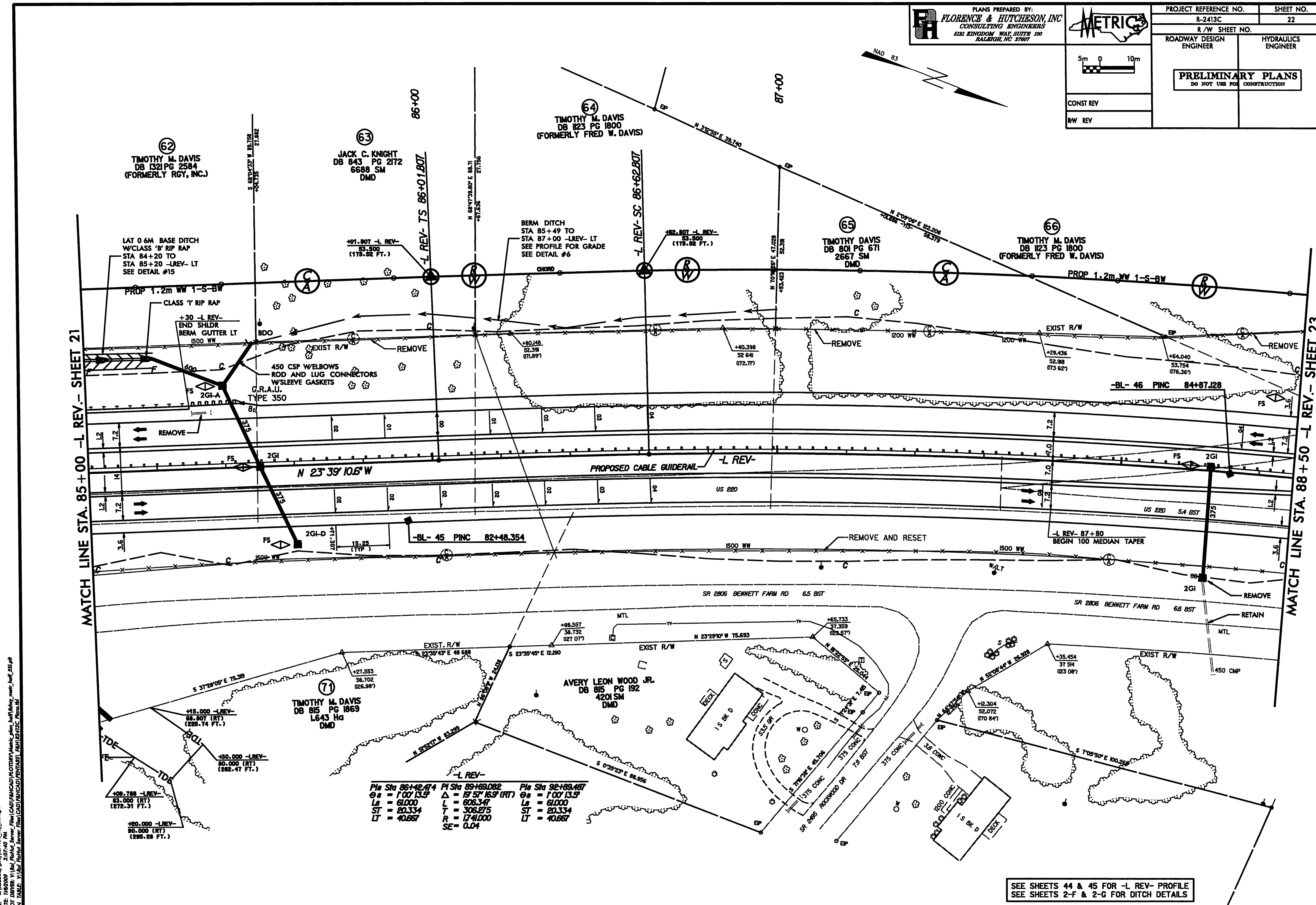
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
21
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
NAD 83
82+00
83+00
84+00
-L REV- PT 83+28.648
61
WILLIAM E. NEAL
DB 730 PG 382
6.563 Ha
DMD
62
TIMOTHY M. DAVIS
DB 1321 PG 2584
(FORMERLY RGY, INC.)
60
W.H. KNIGHT TRUSTEE
DB 998 PG 1537
(FORMERLY WALDO H. KNIGHT)
PROP 1.2m WW 1-S-BW
LAT 0.9M BASE DITCH
W/CLASS 'B' RIP RAP
STA 83+60 TO
STA 84+07 -LREV- LT
SEE DETAIL #10
CLASS 'I' RIP RAP
CLASS 'B' RIP RAP
400 CSP W/ELBOWS
ROD AND LUG CONNECTORS
W/SLEEVE GASKETS
LAT 0.6M BASE DITCH
W/CLASS 'B' RIP RAP
STA 84+20 TO
STA 85+20 -LREV- LT
SEE DETAIL #15
EXIST R/W
2GI
FS
+70 -L REV-
BEGIN SHLDR
BERM GUTTER LT
CAT-1
COLLAR AND EXTEND
2@1200mm
REMOVE HW
COLLAR AND EXTEND
2GI W/
FLAT GRATE
-BL- 43 PINC 78+48.167
MATCH LINE STA. 81+50 -L REV.- SHEET 20
MATCH LINE STA. 85+00 -L REV. SHEET 22
PROPOSED CABLE GUIDERAIL
-L REV-
N 23°39' 10.6" W
RETAIN
-BL- 44 PINC 80+48.070
CLASS 'B' RIP RAP
EST 8.6 MTONS
BERM DITCH
STA. 83+10 TO 83+53 -LREV- RT
SEE DETAIL #6
PROP. GR BARRIER
TERMINAL SECTION
SR 2806 BENNETT FARM RD
EXIST R/W
71
JIMMY C. WADE & APRIL D.
DB 1168 PG 420
(FORMERLY TIMOTHY M. DAVIS)
-L REV-
PI Sta 81+36.195
Δ = 3°09' 20.9" (RT)
L = 385.004
T = 192.550
R = 6,990.000
SE= NC
SEE SHEETS 43 & 44 FOR -L REV- PROFILE
SEE SHEET 85 FOR XOVRI PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS



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DATE: 11/6/2009 2:07:40 PM

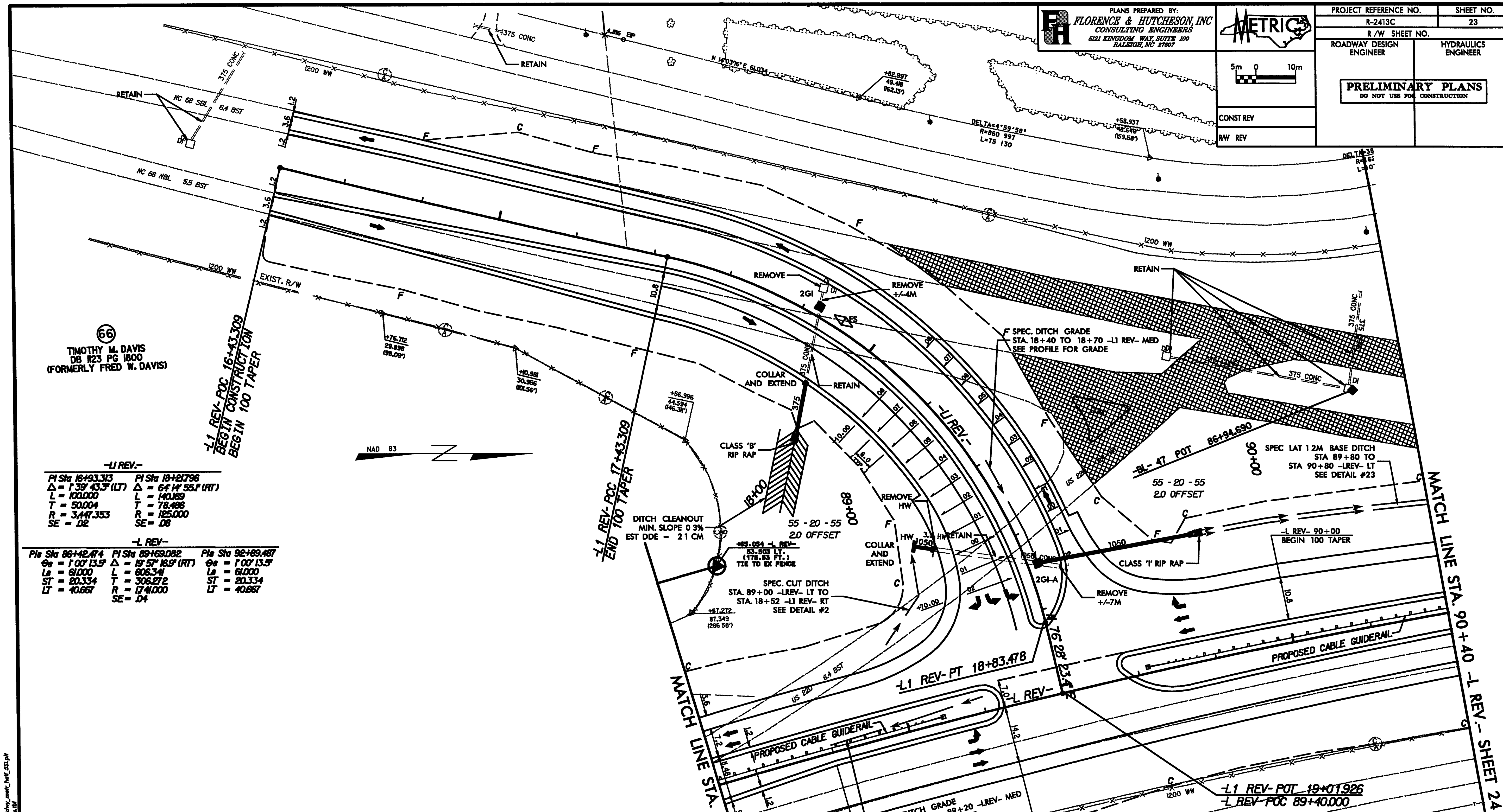
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV

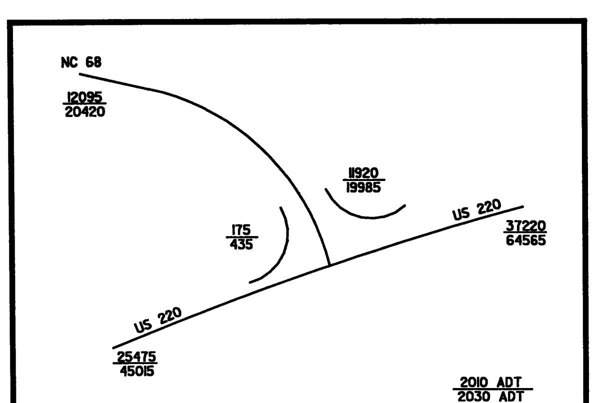


-L1 REV.-

PI Sta 16+93.313	PI Sta 18+21.796
Δ = 1° 39' 43.3" (LT)	Δ = 64° 14' 55.1" (RT)
L = 100.000	L = 140.169
T = 50.004	T = 78.486
R = 3,447.353	R = 125.000
SE = .02	SE = .08

-L REV-

PIs Sta 86+42.474	PI Sta 89+69.082	PIs Sta 92+89.487
Θs = 1° 00' 13.5"	Δ = 19° 57' 16.9" (RT)	Θs = 1° 00' 13.5"
Ls = 61.000	L = 606.341	Ls = 61.000
ST = 20.334	T = 306.272	ST = 20.334
LT = 40.667	R = 1,741.000	LT = 40.667
	SE = .04	



SEE SHEET 45 FOR -L REV- PROFILE
SEE SHEET 49 FOR -L1 REV- PROFILE
SEE SHEET 75 FOR TEMP XOVER B PLAN & PROFILE
SEE SHEET 80 FOR TEMP XOVER G PLAN & PROFILE
SEE SHEET 2-R FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: R:\Roadway\proj\R2413C_rdy_23.dgn
DATE: 11/6/2009 2:08:46 PM

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	24
R/W SHEET NO.	

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

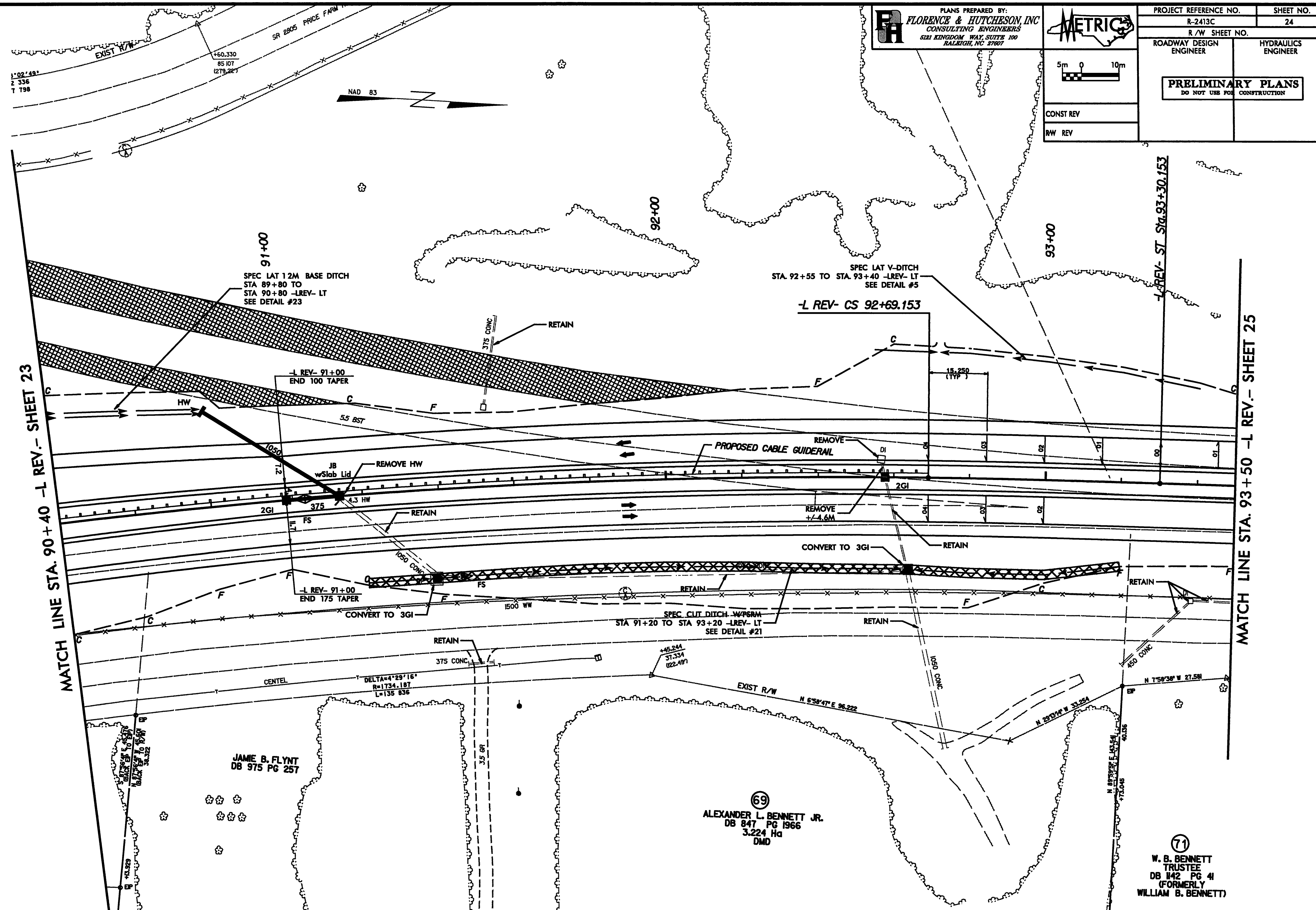
CONST REV

R/W REV

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L REV-

PIs Sta 86+42.474	PI Sta 89+69.082	PIs Sta 92+89.487
θs = 1° 00' 13.5"	Δ = 19° 57' 16.9" (RT)	θs = 1° 00' 13.5"
Ls = 61.000	L = 606.341	Ls = 61.000
ST = 20.334	T = 306.272	ST = 20.334
LT = 40.667	R = 1,741.000	LT = 40.667
	SE = .04	

SEE SHEET 45 FOR -L REV- PROFILE
SEE SHEET 75 FOR TEMP XOVER B PLAN & PROFILE
SEE SHEET 79 FOR TEMP XOVER F PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

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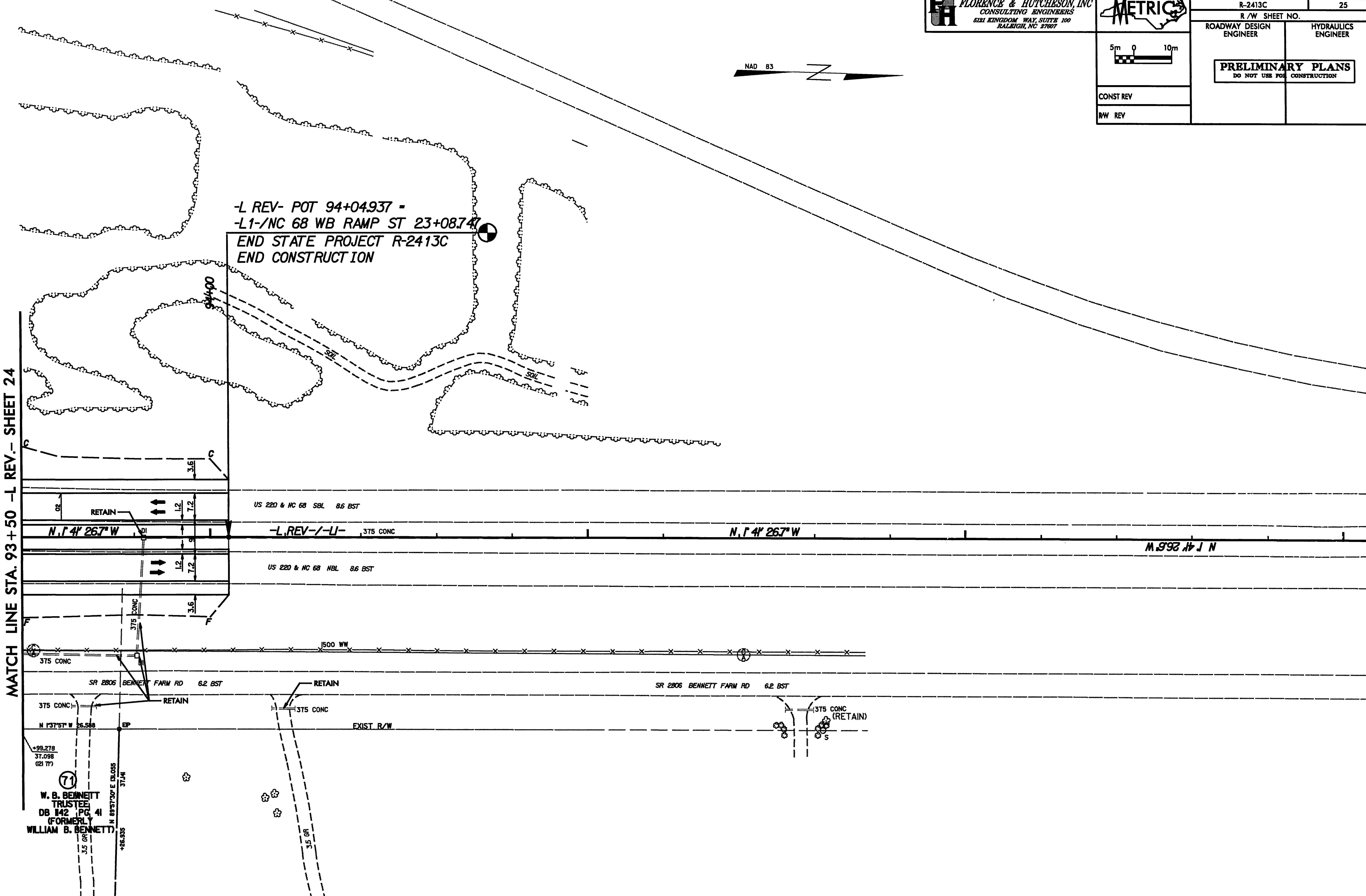
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	25
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV



-L REV-

PIs Sta 86+42.474	PI Sta 89+69.082	PIs Sta 92+89.487
θs = 1° 00' 13.5"	Δ = 19° 57' 16.9" (RT)	θs = 1° 00' 13.5"
Ls = 61.000	L = 606.341	Ls = 61.000
ST = 20.334	T = 306.272	ST = 20.334
LT = 40.667	R = 1,741.000	LT = 40.667
	SE = .04	

SEE SHEETS 45 & 46 FOR -L REV- PROFILE
SEE SHEET 76 FOR TEMP XOVER C PLAN & PROFILE
SEE SHEET 79 FOR TEMP XOVER F PLAN & PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: R:\Roadway\proj\R2413C_rdy_25.dgn
DATE: 11/6/2009 2:10:06 PM
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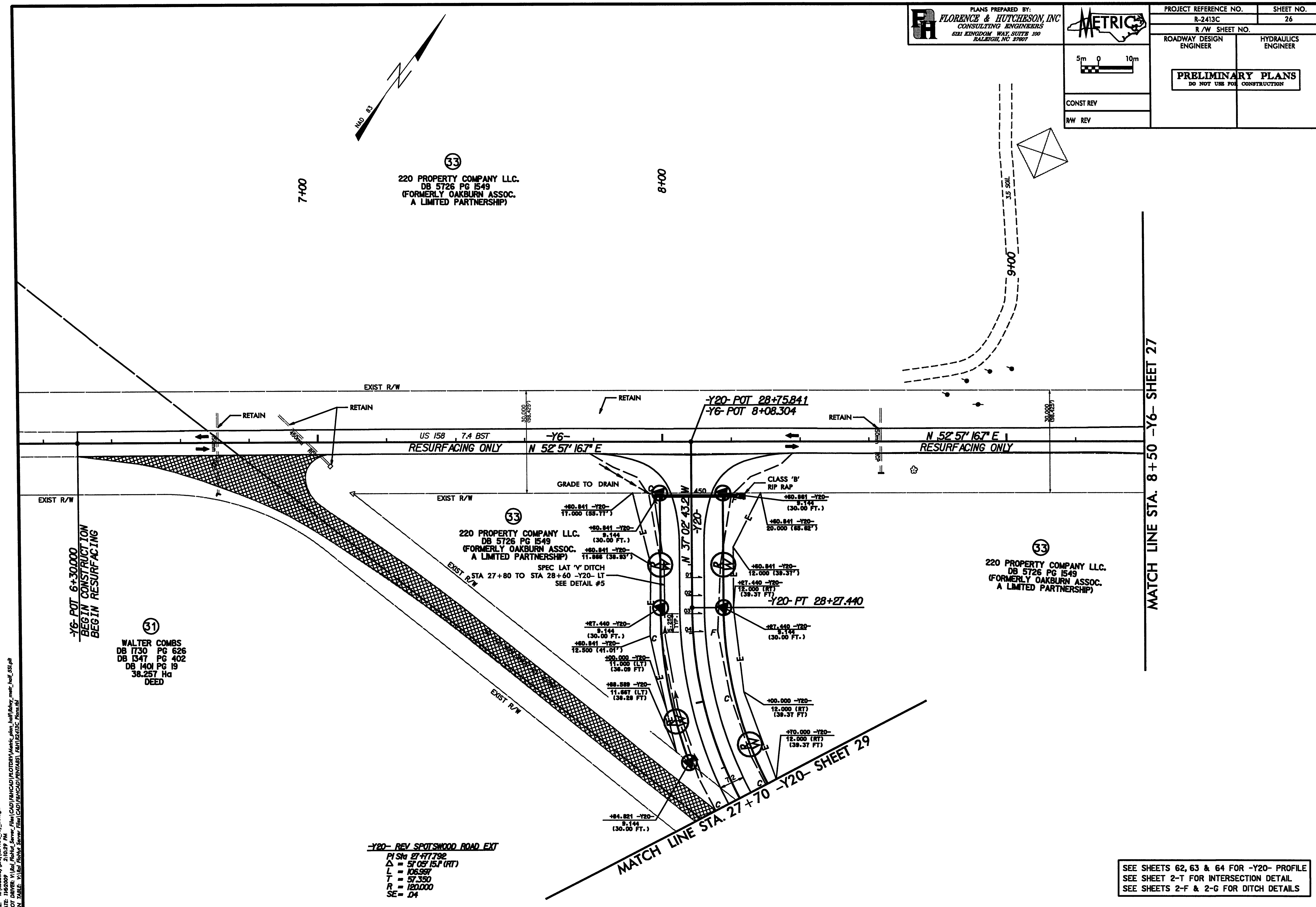
PEN TABLE: V:\Ral FloHut Server Files\CAD\F&HCAD\PENTABS\ F&H\R2413C Plans.tbl

11/03/09 - PARCEL 33 REVISED TEMPORARY CONSTRUCTION EASEMENT



110309 - PARCEL 33 REVISED PERMANENT DRAINAGE EASEMENT
REVISED TEMPORARY CONSTRUCTION EASEMENT

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
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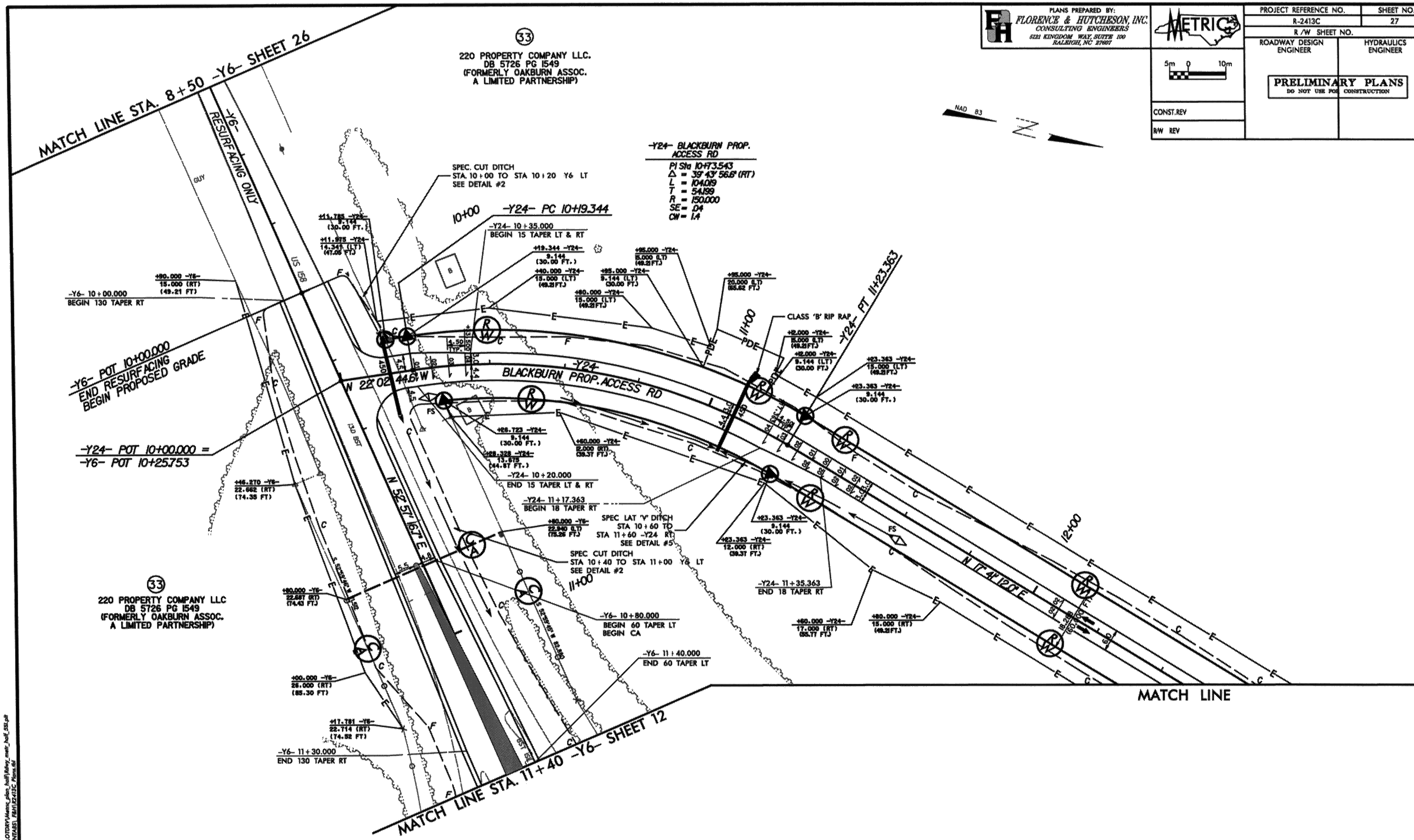
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV
R/W REV



SEE SHEETS 58 & 59 FOR -Y6- PROFILE
SEE SHEET 69 FOR -Y24- PROFILE
SEE SHEET 2-P FOR ISLAND DETAILS
SEE SHEET 2-T FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

PLANS PREPARED BY:
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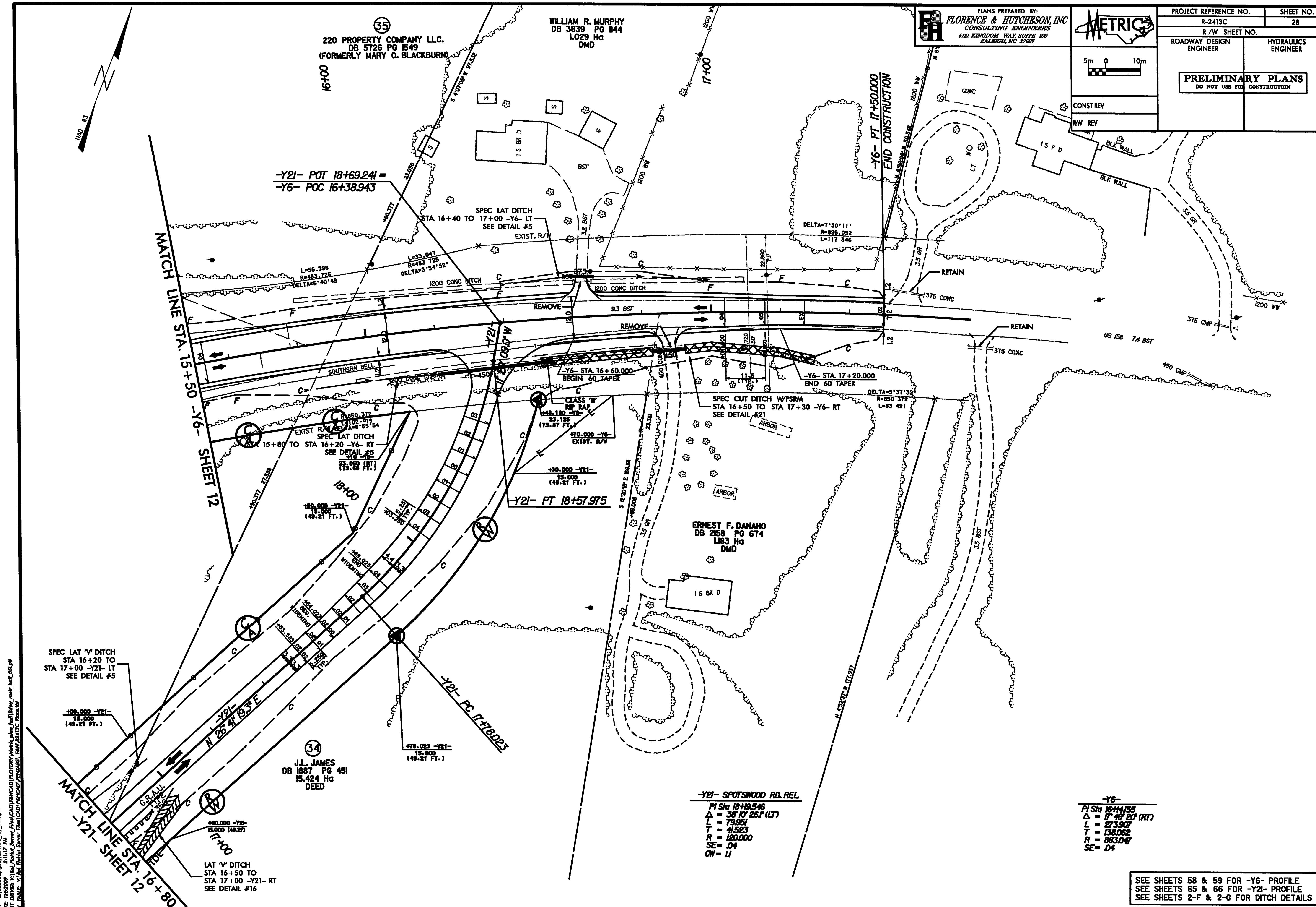
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV



-Y21- SPOTSWOOD RD. REL.

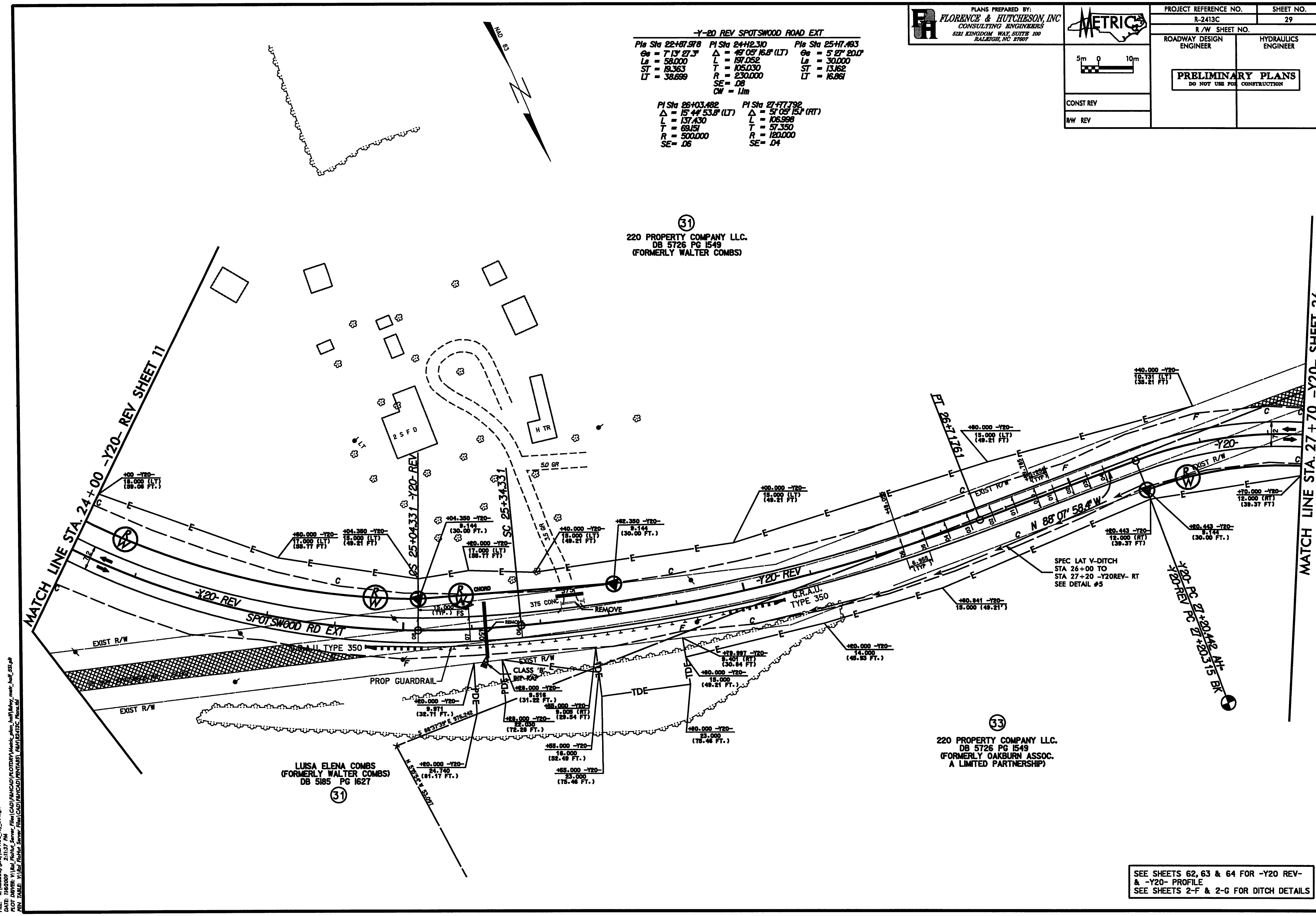
PI Sta 18+19.546
Δ = 38°10' 26.F (LT)
L = 79.951
T = 41.523
R = 120.000
SE = .04
CW = 1.1

-Y6-

PI Sta 16+41.55
Δ = 17°46' 20" (RT)
L = 273.907
T = 138.062
R = 883.047
SE = .04

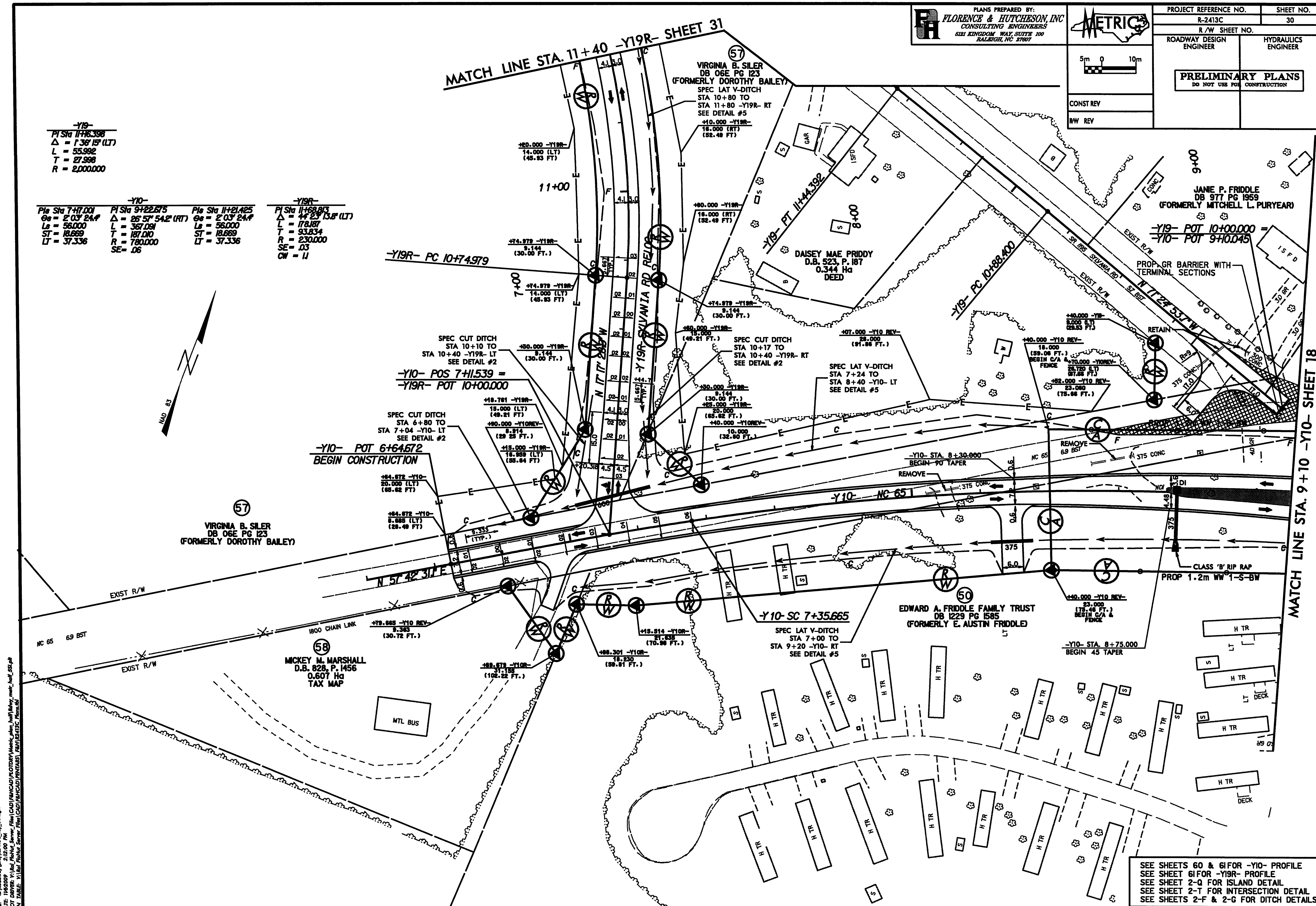
SEE SHEETS 58 & 59 FOR -Y6- PROFILE
SEE SHEETS 65 & 66 FOR -Y21- PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

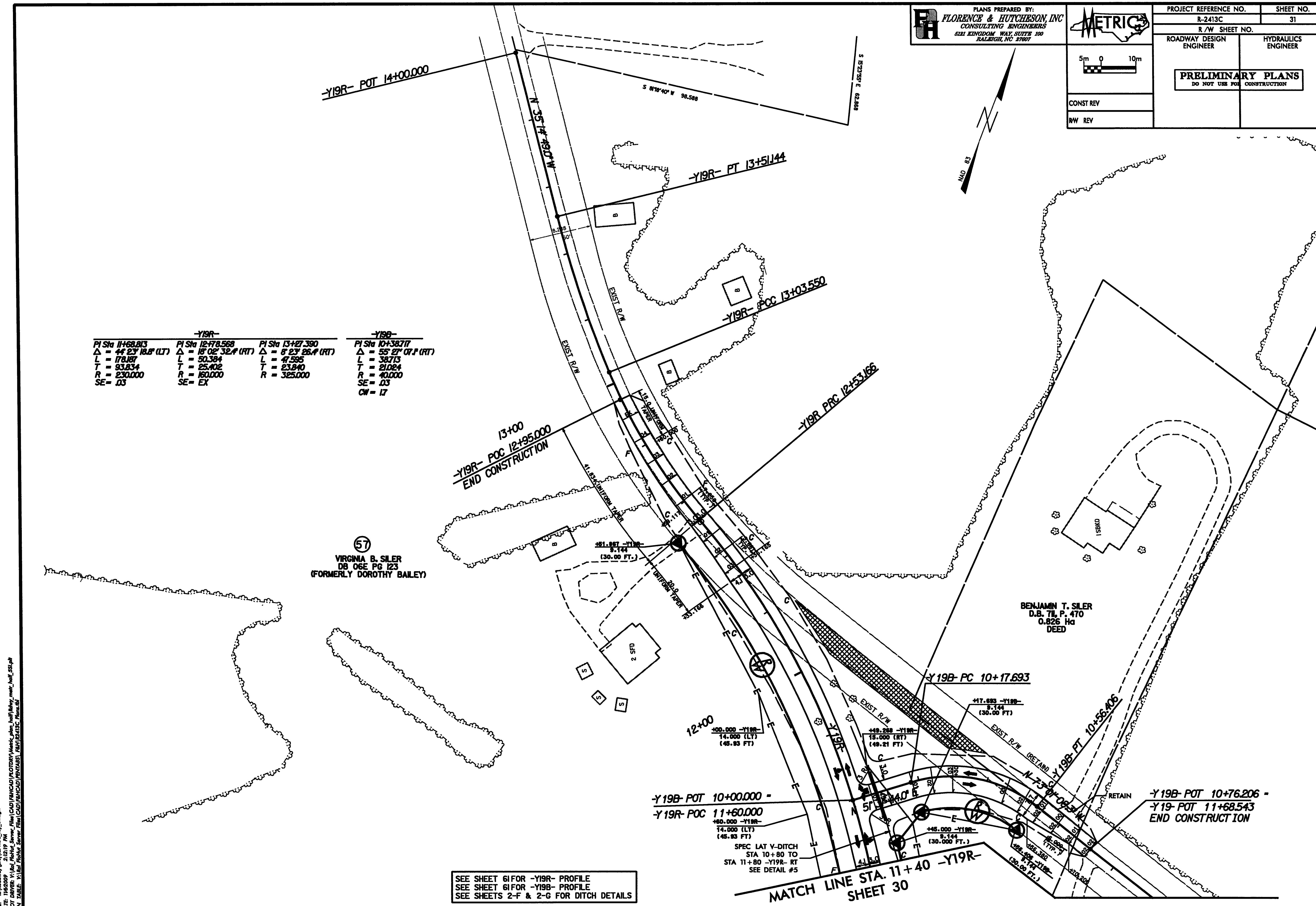
FILE: R:\Roadway\proj\R2413C_rdy_28.dgn
DATE: 1/9/2009
2:11:17 PM



11/03/09 - PARCEL 33 REVISED TEMPORARY CONSTRUCTION EASEMENT

FILE: R:\Roadway\proj\R2413C_rdy_29.dgn
DATE: 11/6/2009


PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
SHEET NO.
R-2413C
30
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
MATCH LINE STA. 11+40 -Y19R- SHEET 31
MATCH LINE STA. 9+10 -Y10- SHEET 18
-Y19-
PI Sta 11+16.398
Δ = 1° 36' 15" (LT)
L = 55.992
T = 27.998
R = 2,000.000
-Y10-
PIs Sta 7+17.001
Θs = 2° 03' 24.4"
Ls = 56.000
ST = 18.669
LT = 37.336
PI Sta 9+22.675
Δ = 26° 57' 54.2" (RT)
L = 367.091
T = 187.010
R = 780.000
SE = .06
PIs Sta 11+21.425
Θs = 2° 03' 24.4"
Ls = 56.000
ST = 18.669
LT = 37.336
-Y19R-
PI Sta 11+68.813
Δ = 44° 23' 13.8" (LT)
L = 178.187
T = 93.834
R = 230.000
SE = .03
CW = 11
-Y19R- PC 10+74.979
-Y10- POS 7+11.539 =
-Y19R- POT 10+00.000
-Y10- POT 6+64.672
BEGIN CONSTRUCTION
-Y10- SC 7+35.665
-Y19- PT 11+44.392
-Y19- PC 10+88.400
-Y19- POT 10+00.000 =
-Y10- POT 9+10.045
-Y19R- SYLVANIA RD RE100
-Y10- NC 65
N 57° 42' 31" E
N 11° 24' 53.7" W
SR 1155 SYLVANIA RD
57
VIRGINIA B. SILER
DB 06E PG 123
(FORMERLY DOROTHY BAILEY)
DAISEY MAE PRIDDY
D.B. 523, P. 187
0.344 Ha
DEED
JANIE P. FRIDDLE
DB 977 PG 1959
(FORMERLY MITCHELL L. PURYEAR)
50
EDWARD A. FRIDDLE FAMILY TRUST
DB 1229 PG 1585
(FORMERLY E. AUSTIN FRIDDLE)
58
MICKEY M. MARSHALL
D.B. 828, P. 1456
0.607 Ha
TAX MAP
SPEC LAT V-DITCH
STA 10+80 TO
STA 11+80 -Y19R- RT
SEE DETAIL #5
SPEC CUT DITCH
STA 10+10 TO
STA 10+40 -Y19R- LT
SEE DETAIL #2
SPEC CUT DITCH
STA 10+17 TO
STA 10+40 -Y19R- RT
SEE DETAIL #2
SPEC LAT V-DITCH
STA 7+24 TO
STA 8+40 -Y10- LT
SEE DETAIL #5
SPEC CUT DITCH
STA 6+80 TO
STA 7+04 -Y10- LT
SEE DETAIL #2
SPEC LAT V-DITCH
STA 7+00 TO
STA 9+20 -Y10- RT
SEE DETAIL #5
PROP. GR BARRIER WITH TERMINAL SECTIONS
-Y10- STA. 8+30.000
BEGIN 90 TAPER
-Y10- STA. 8+75.000
BEGIN 45 TAPER
CLASS 'B' RIP RAP
PROP 1.2m WW 1-S-BW
EXIST R/W
1800 CHAIN LINK
MTL BUS
NAD 83
SEE SHEETS 60 & 61 FOR -Y10- PROFILE
SEE SHEET 61 FOR -Y19R- PROFILE
SEE SHEET 2-Q FOR ISLAND DETAIL
SEE SHEET 2-T FOR INTERSECTION DETAIL
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS



-Y19R-

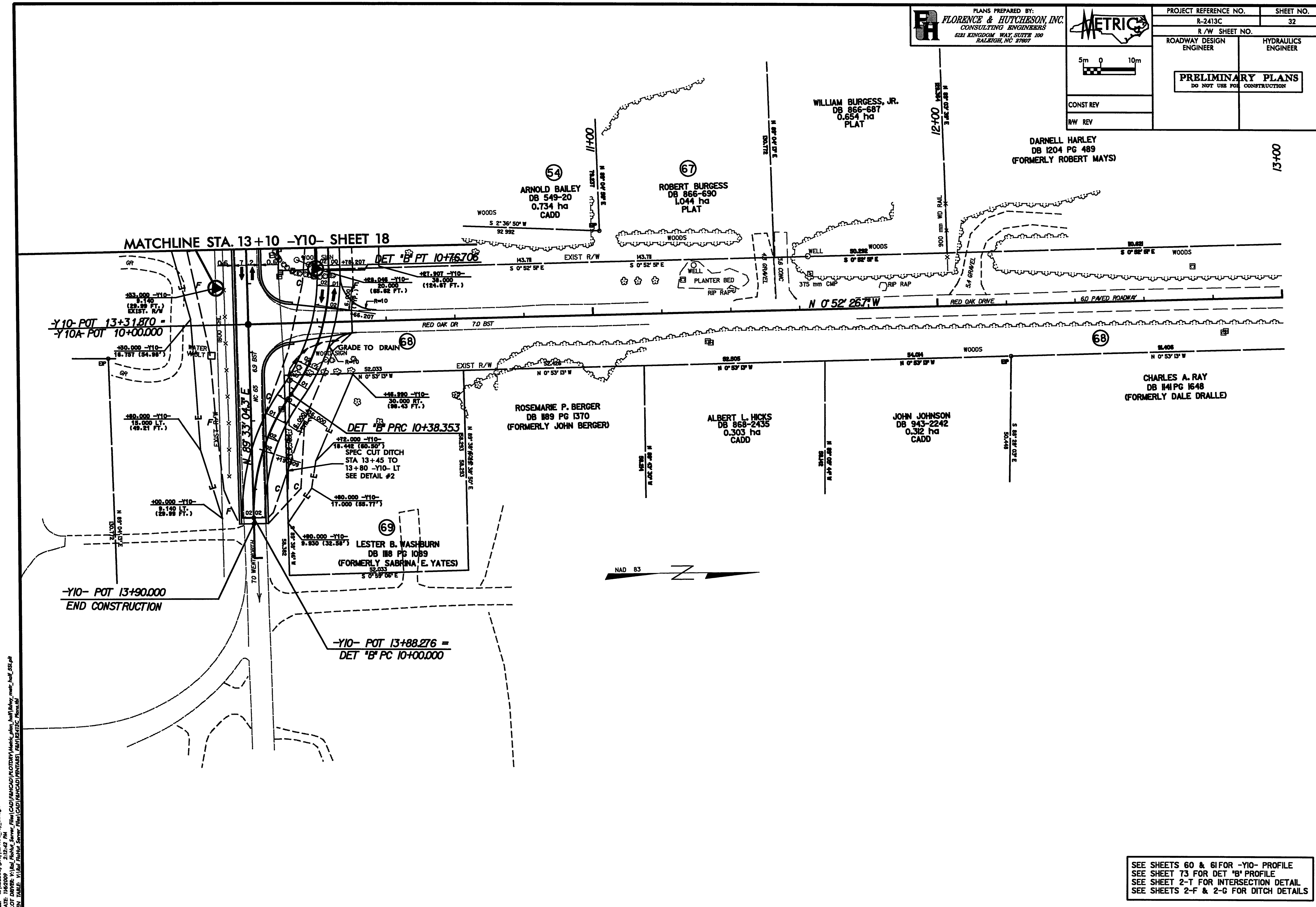
PI Sta 11+68.813	PI Sta 12+78.568	PI Sta 13+27.390
Δ = 44° 23' 18.8" (LT)	Δ = 18° 02' 32.4" (RT)	Δ = 8° 23' 26.4" (RT)
L = 178.187	L = 50.384	L = 47.595
T = 93.834	T = 25.402	T = 23.840
R = 230.000	R = 160.000	R = 325.000
SE = .03	SE = EX	

-Y19B-

PI Sta 10+38.717
Δ = 55° 27' 07.1" (RT)
L = 38.713
T = 21.024
R = 40.000
SE = .03
CW = 1.7

SEE SHEET 61 FOR -Y19R- PROFILE
SEE SHEET 61 FOR -Y19B- PROFILE
SEE SHEETS 2-F & 2-G FOR DITCH DETAILS

FILE: R:\Roadway\proj\R2413C_rdy_31.dgn
DATE: 11/6/2009 2:12:19 PM



11/03/09 - PARCEL 69 REVISED TEMPORARY CONSTRUCTION EASEMENT
11/03/09 - PARCEL 70 REVISED TEMPORARY CONSTRUCTION EASEMENT

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RALEIGH, NC 27607

METRIC

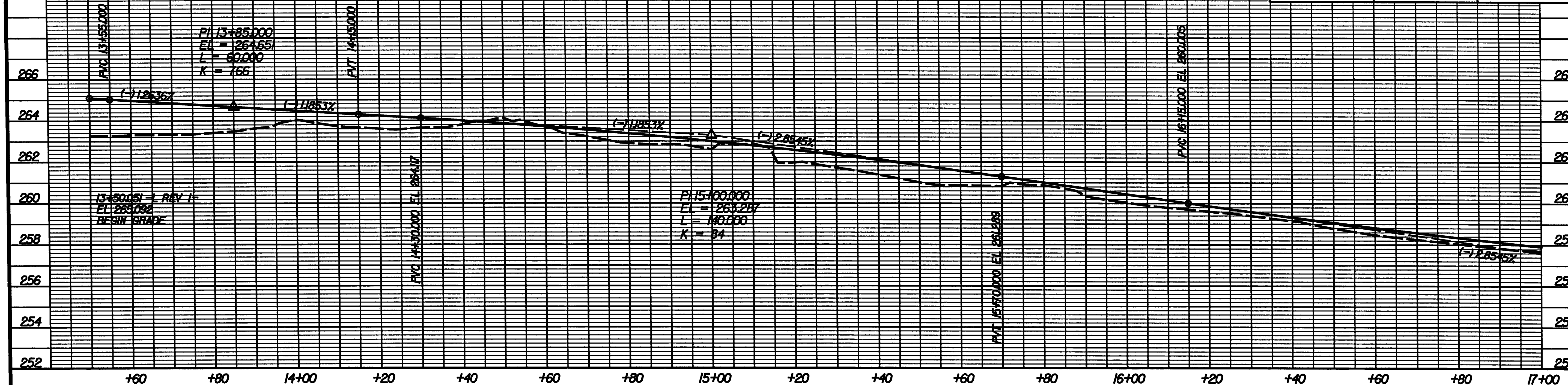
5m 0 10m

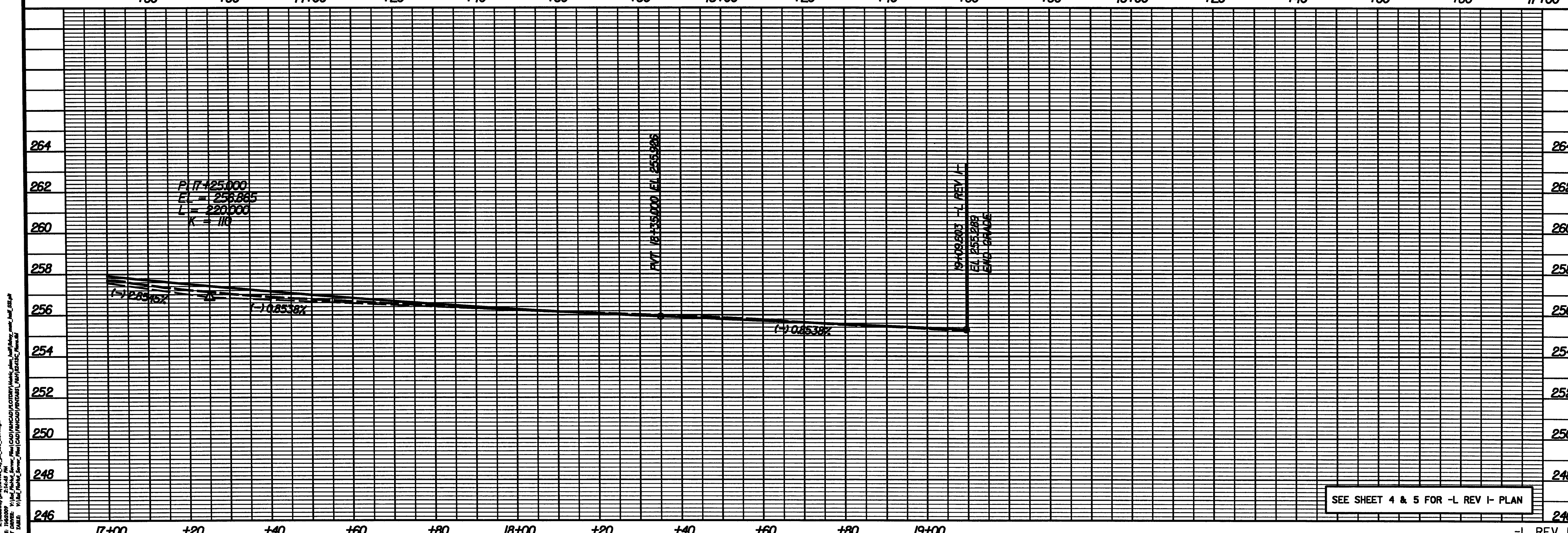
CONST REV

R/W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





-L REV I-

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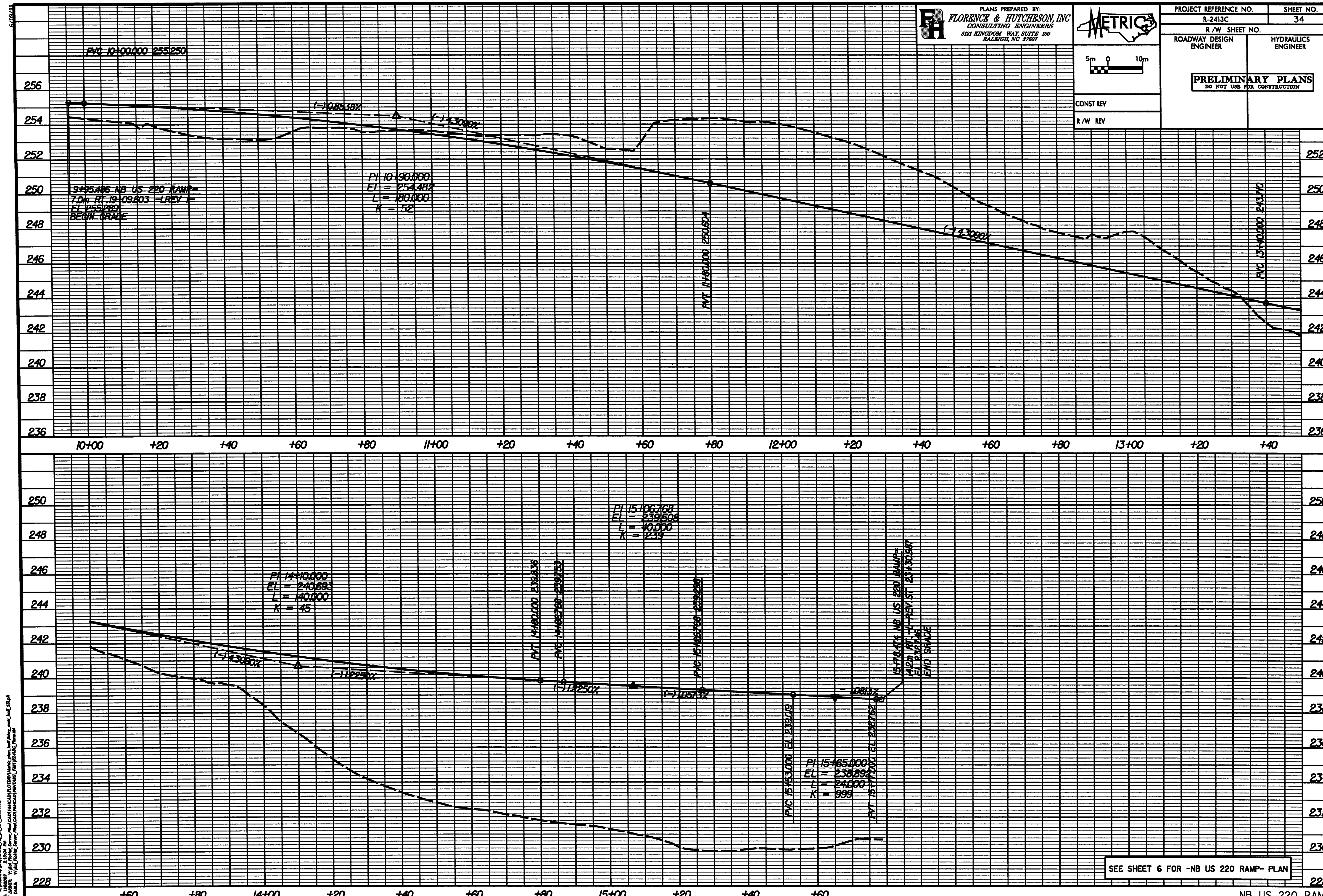
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

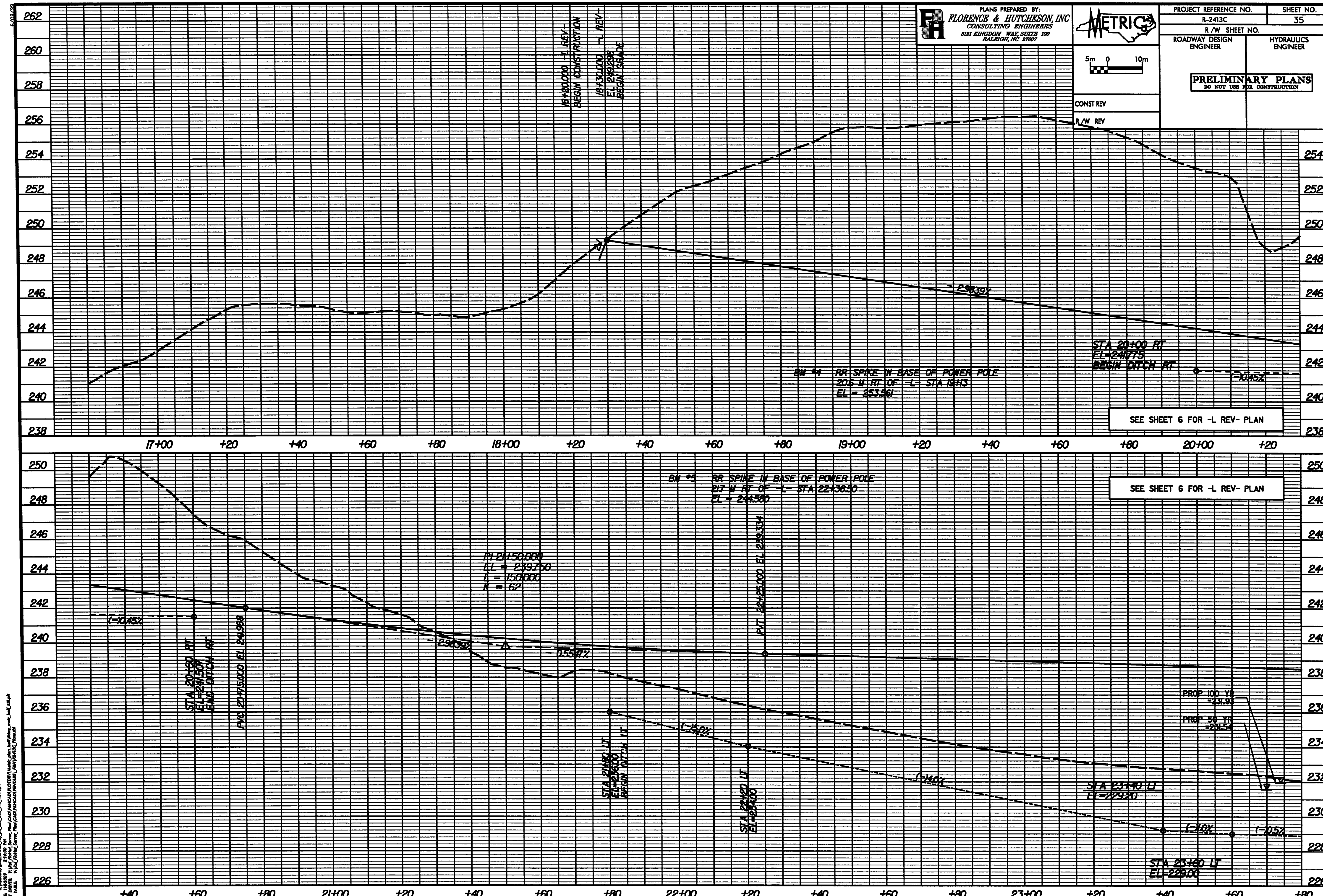
R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEET 6 FOR -NB US 220 RAMP- PLAN

NB US 220 RAMP


PLANS PREPARED BY:
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CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
5m 0 10m
CONST REV
R/W REV
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
35
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
18+20.000 -L REV-
BEGIN CONSTRUCTION
18+30.000 -L REV-
EL 249.298
BEGIN GRADE
-2.9839%
STA 20+00 RT
EL=241.775
BEGIN DITCH RT
(-1.0145%
BM #4 RR SPIKE IN BASE OF POWER POLE
20.6 M RT OF -L- STA 19+13
EL = 253.561
SEE SHEET 6 FOR -L REV- PLAN
17+00 +20 +40 +60 +80 18+00 +20 +40 +60 +80 19+00 +20 +40 +60 +80 20+00 +20
BM #5 RR SPIKE IN BASE OF POWER POLE
21.7 M RT OF -L- STA 22+36.50
EL = 244.580
SEE SHEET 6 FOR -L REV- PLAN
PI 21+50.000
EL = 239.750
L = 150.000
K = 62
PT 22+25.000 EL 239.334
PC 20+75.000 EL 241.988
STA 20+60 RT
EL=241.507
END DITCH RT
(-1.0145%
-2.9839%
0.5547%
(-1.50%
STA 21+80 LT
EL=236.000
BEGIN DITCH LT
STA 22+20 LT
EL=234.00
(-1.40%
PROP 100 YR =231.93
PROP 50 YR =231.54
STA 23+40 LT
EL=229.20
(-1.0%
(-0.5%
STA 23+60 LT
EL=229.00
262 260 258 256 254 252 250 248 246 244 242 240 238
250 248 246 244 242 240 238 236 234 232 230 228 226
+40 +60 +80 21+00 +20 +40 +60 +80 22+00 +20 +40 +60 +80 23+00 +20 +40 +60 +80
-L REV-

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METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

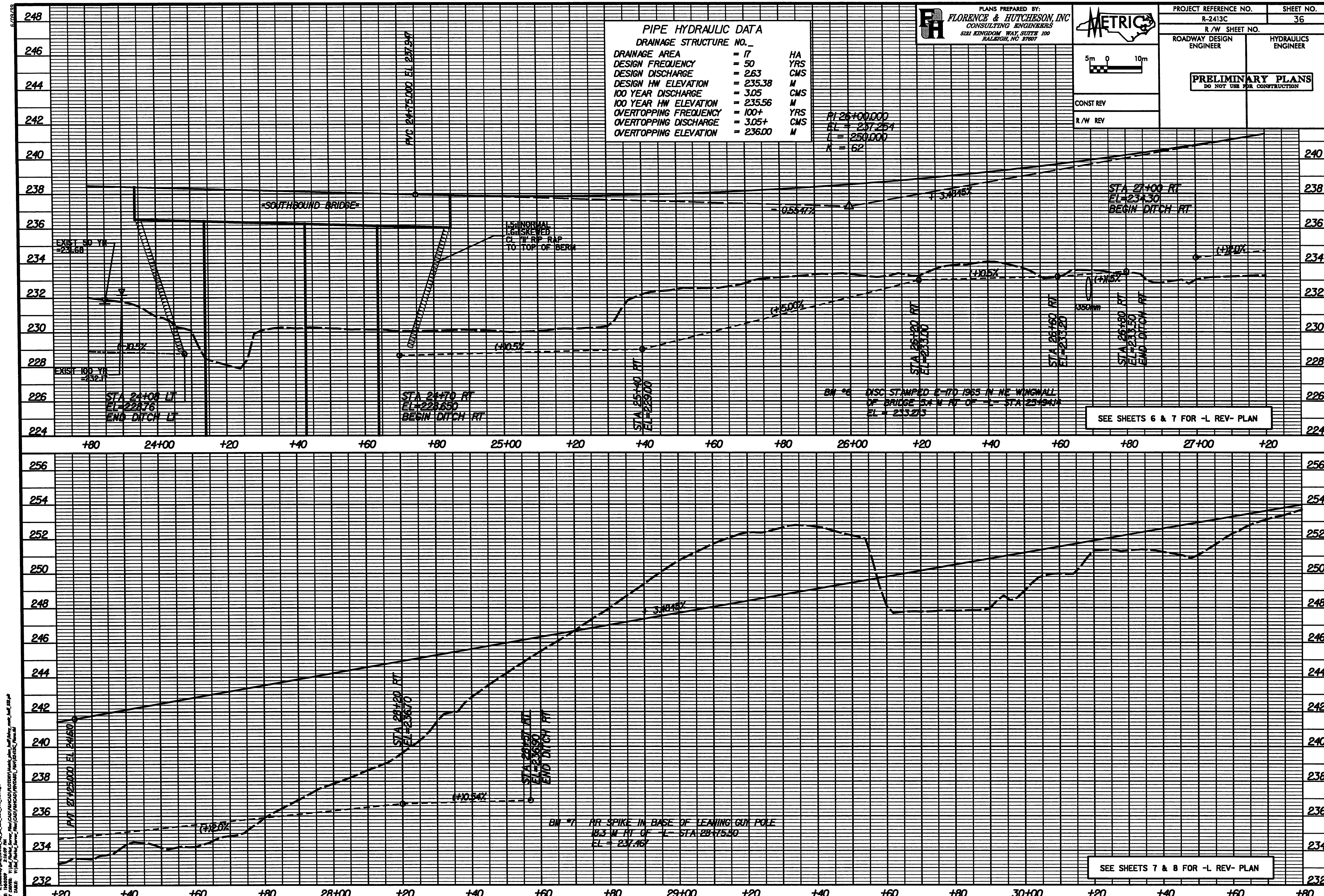
CONST REV

R/W REV

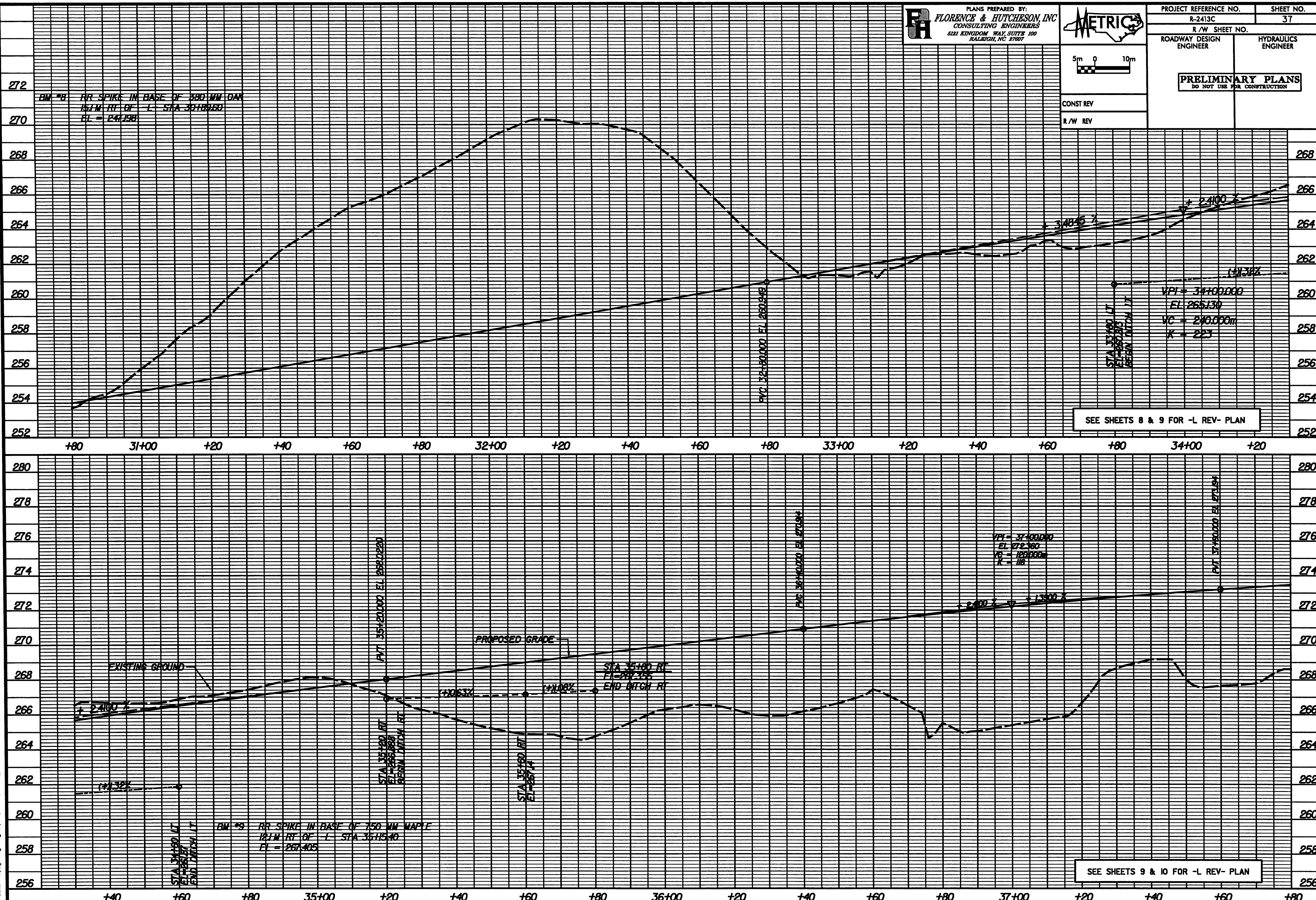
PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	=	17	HA
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	2.63	CMS
DESIGN HW ELEVATION	=	235.38	M
100 YEAR DISCHARGE	=	3.05	CMS
100 YEAR HW ELEVATION	=	235.56	M
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	3.05+	CMS
OVERTOPPING ELEVATION	=	236.00	M



-L REV-



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RALEIGH, NC 27607
METRIC
5m 0 10m
PROJECT REFERENCE NO.
SHEET NO.
R-2413C
37
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
BM #8 RR SPIKE IN BASE OF 380 MM OAK
15.1 M RT OF -L- STA 30+89.60
EL = 247.198
+ 3.4845 %
+ 2.4100 %
(+)1.32%
PVC 32+80.000 EL 260.546
STA 33+80 LT
BEGIN DITCH LT
VPI = 34+00.000
EL 265.130
VC = 240.000m
K = 223
SEE SHEETS 8 & 9 FOR -L REV- PLAN
+80 31+00 +20 +40 +60 +80 32+00 +20 +40 +60 +80 33+00 +20 +40 +60 +80 34+00 +20
252 254 256 258 260 262 264 266 268 270 272
VPI = 37+00.000
EL 272.360
VC = 120.000m
K = 118
PVT 35+20.000 EL 268.280
PVC 36+40.000 EL 270.94
PVT 37+60.000 EL 273.94
+ 2.4100 %
+ 1.3900 %
PROPOSED GRADE
EXISTING GROUND
STA 35+80 RT
END DITCH RT
(+)1.063%
(+)1.68%
(+)1.32%
STA 35+20 RT
BEGIN DITCH RT
STA 35+60 RT
STA 34+60 LT
END DITCH LT
BM #9 RR SPIKE IN BASE OF 750 MM MAPLE
12.1 M RT OF -L- STA 35+15.40
EL = 267.405
SEE SHEETS 9 & 10 FOR -L REV- PLAN
+40 +60 +80 35+00 +20 +40 +60 +80 36+00 +20 +40 +60 +80 37+00 +20 +40 +60 +80
256 258 260 262 264 266 268 270 272 274 276 278 280

-L REV-

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METRIC

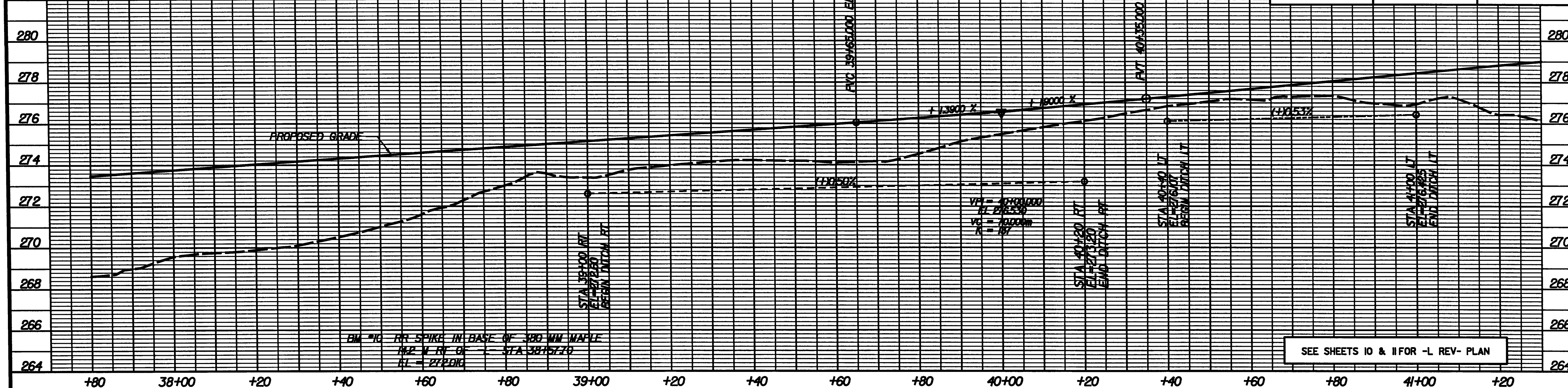
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

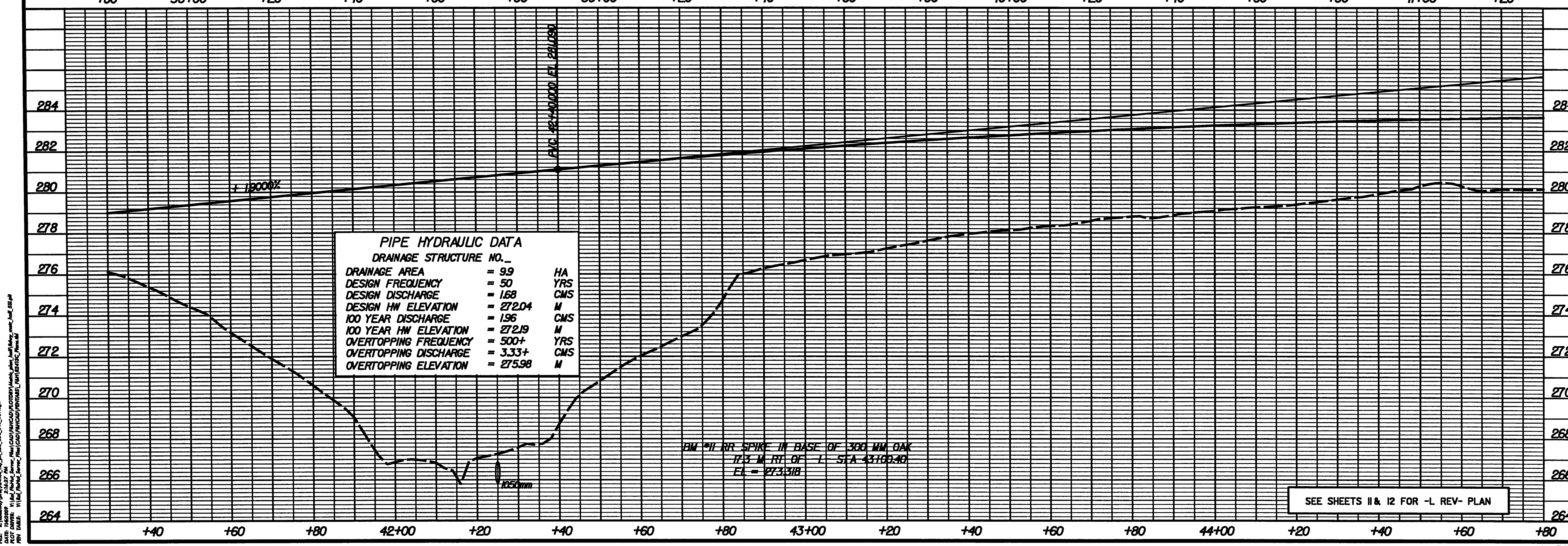
5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 9.9	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 1.68	CMS
DESIGN HW ELEVATION	= 272.04	M
100 YEAR DISCHARGE	= 1.96	CMS
100 YEAR HW ELEVATION	= 272.19	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 3.33+	CMS
OVERTOPPING ELEVATION	= 275.98	M

-L REV-

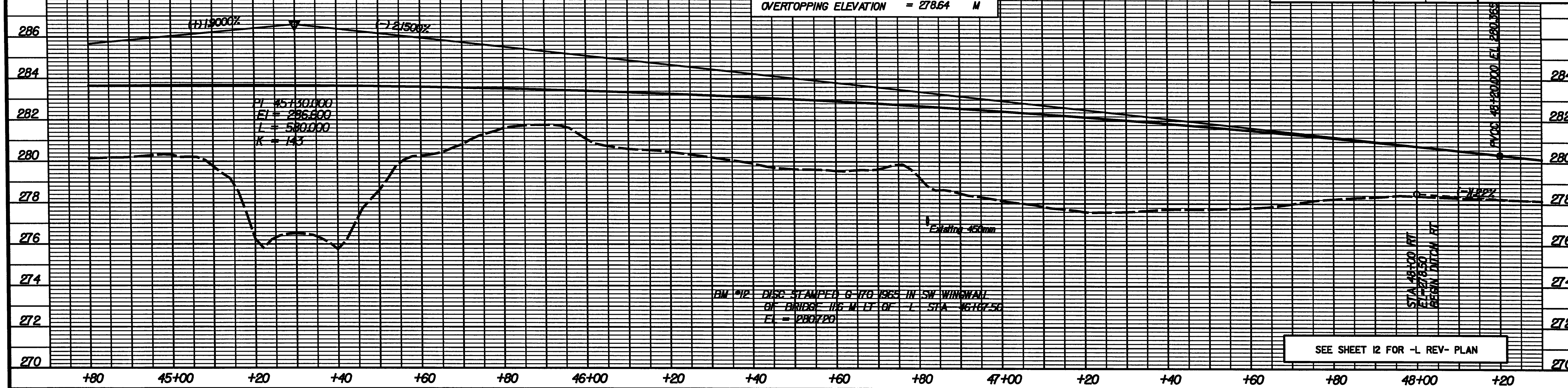
PLANS PREPARED BY: FLORENCE & HUTCHESON, INC CONSULTING ENGINEERS 5121 KINGDOM WAY, SUITE 100 RALEIGH, NC 27607	METRIC	PROJECT REFERENCE NO.	SHEET NO.
		R-2413C	39
		R/W SHEET NO.	
	5m 0 10m	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	CONST REV		
	R/W REV		

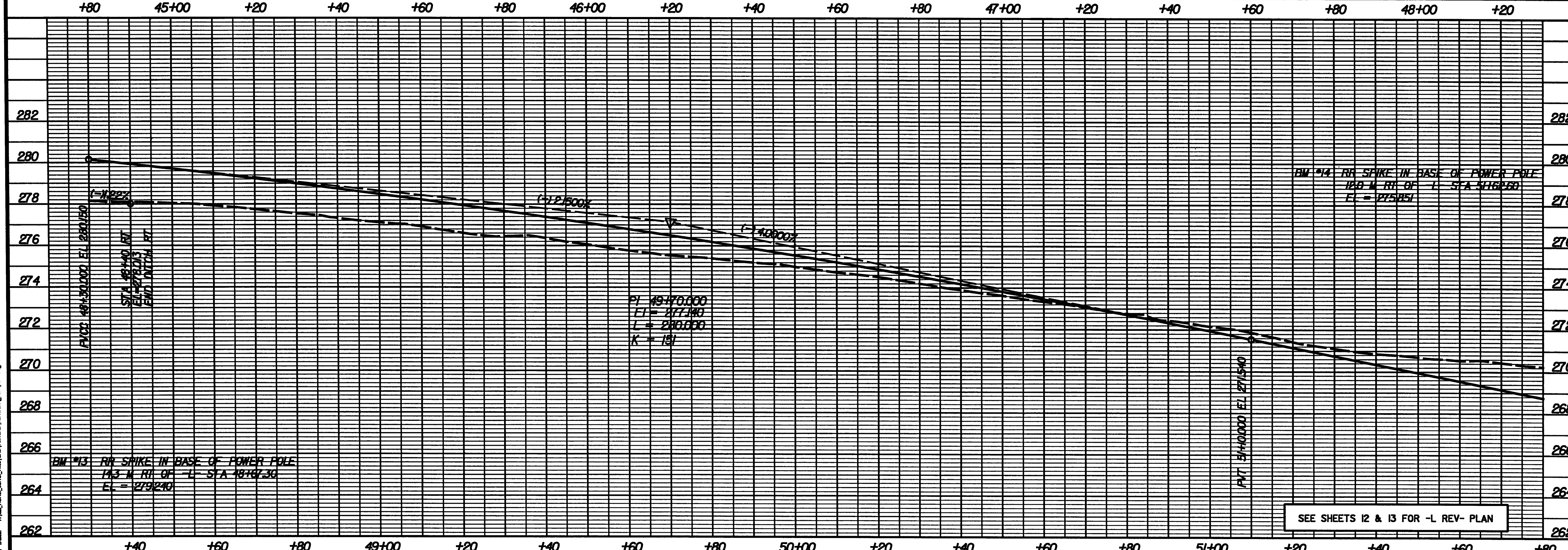
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.85	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.19	CMS
DESIGN HW ELEVATION	= 278.53	M
100 YEAR DISCHARGE	= 0.20	CMS
100 YEAR HW ELEVATION	= 278.55	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.21+	CMS
OVERTOPPING ELEVATION	= 278.64	M





-L REV-

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RALEIGH, NC 27607

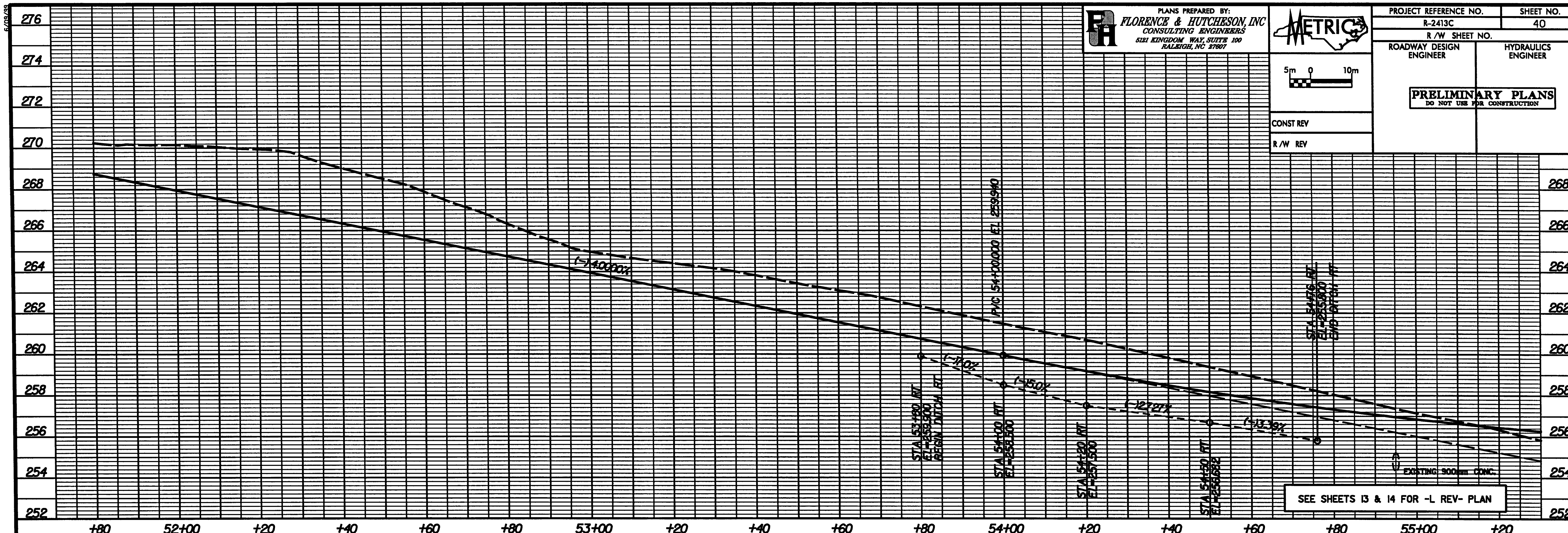
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	40
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV



BM #15 RR SPIKE IN BASE OF 610 MM OAK
13.0 M RT OF -L- STA 56+63.60
EL = 256.945

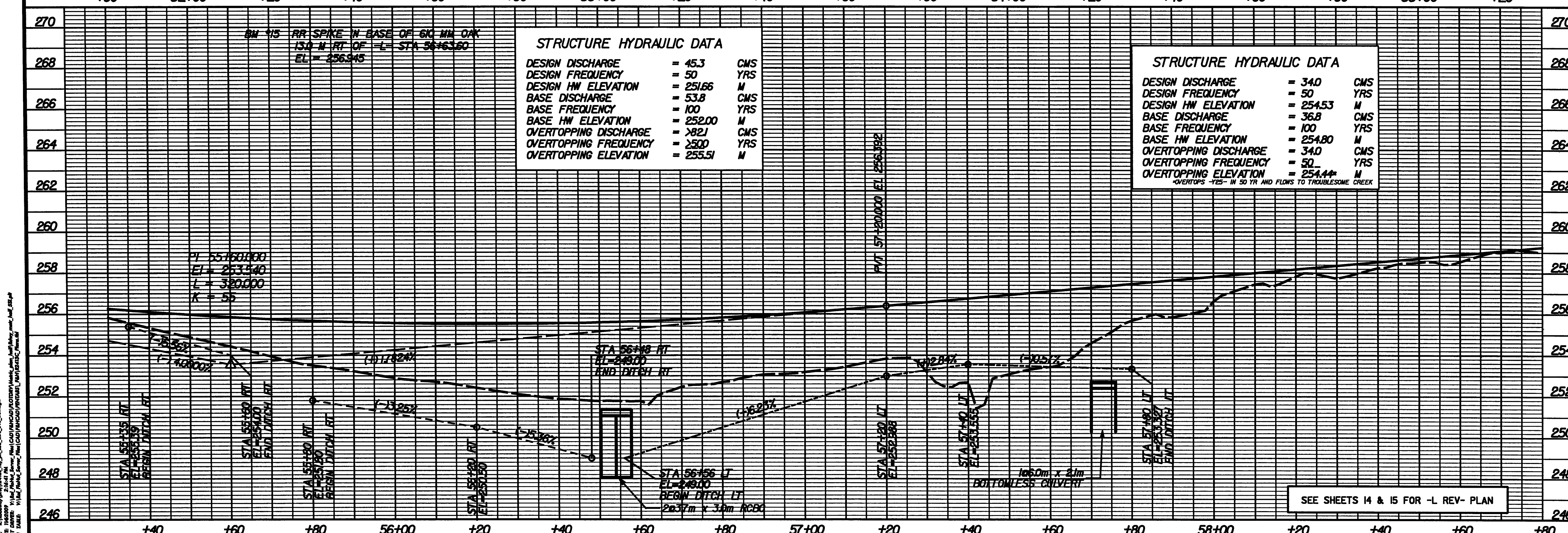
STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 45.3	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 251.66	M
BASE DISCHARGE	= 53.8	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 252.00	M
OVERTOPPING DISCHARGE	= >82.1	CMS
OVERTOPPING FREQUENCY	= ≥500	YRS
OVERTOPPING ELEVATION	= 255.51	M

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 34.0	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 254.53	M
BASE DISCHARGE	= 36.8	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 254.80	M
OVERTOPPING DISCHARGE	= 34.0	CMS
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING ELEVATION	= 254.44*	M

*OVERTOPS -Y25- IN 50 YR AND FLOWS TO TROUBLESOME CREEK



-L REV-

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	41
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANS PREPARED BY:
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RALEIGH, NC 27607

METRIC

CONST REV

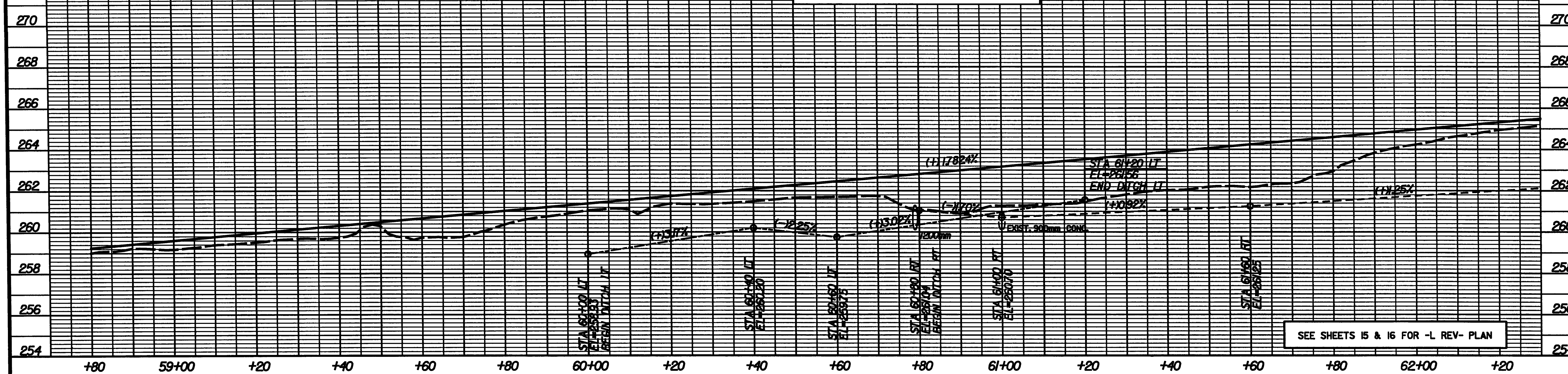
R/W REV

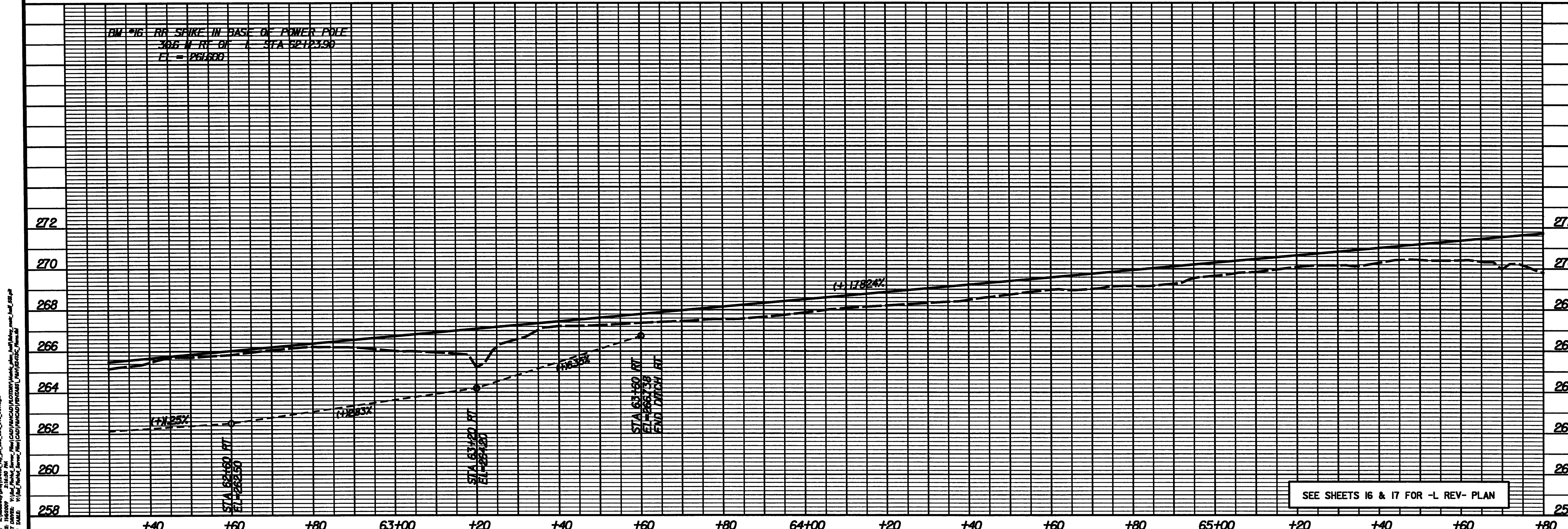
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 14.9	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 2.41	CMS
DESIGN HW ELEVATION	= 261.84	M
100 YEAR DISCHARGE	= 2.80	CMS
100 YEAR HW ELEVATION	= 262.06	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 2.80+	CMS
OVERTOPPING ELEVATION	= 262.40	M





PROJECT REFERENCE NO.	SHEET NO.
R-2413C	42
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLANS PREPARED BY:
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CONSULTING ENGINEERS
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RALEIGH, NC 27607

METRIC

5m 0 10m

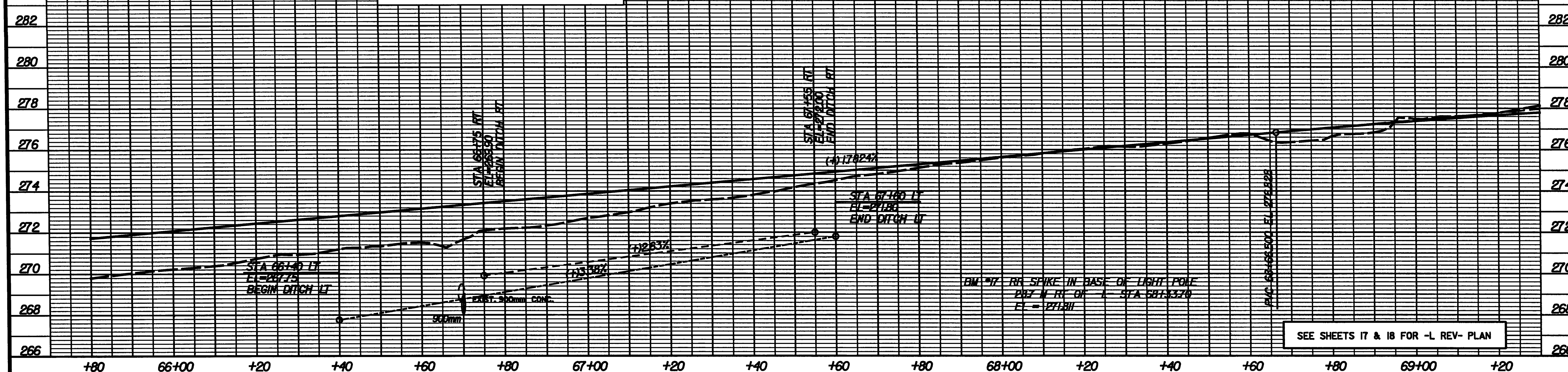
CONST REV

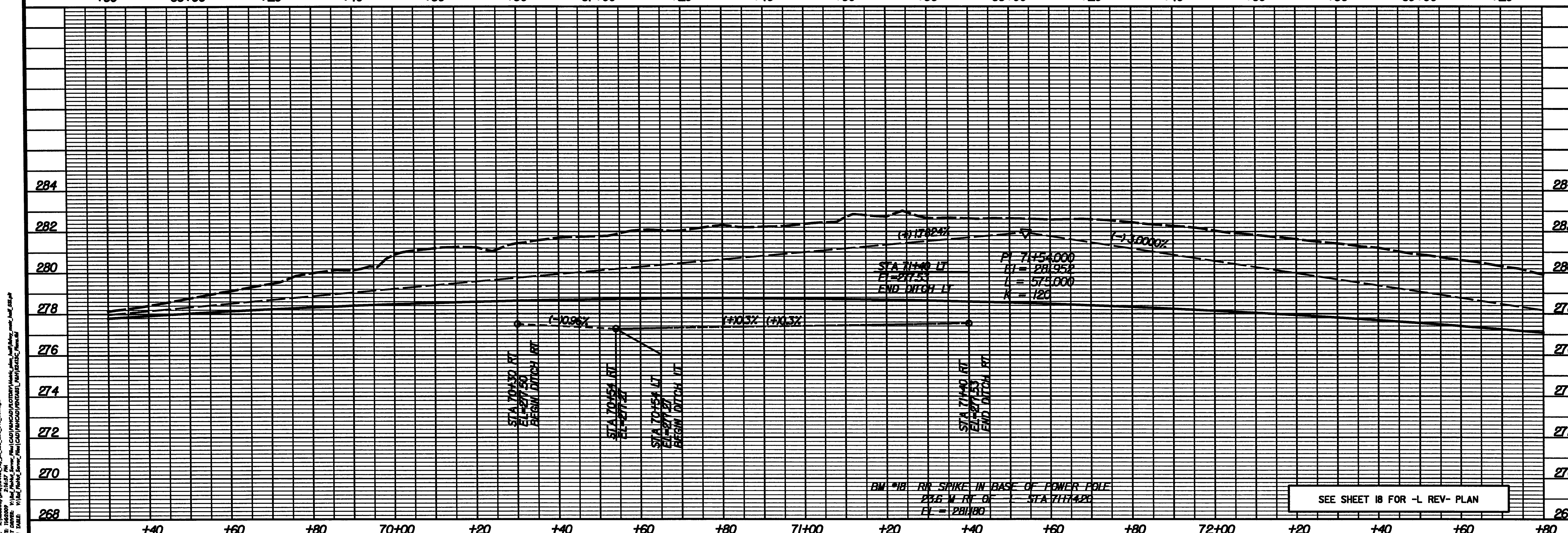
R/W REV

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 7.2	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 1.26	CMS
DESIGN HW ELEVATION	= 270.77	M
100 YEAR DISCHARGE	= 1.46	CMS
100 YEAR HW ELEVATION	= 270.94	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 1.46+	CMS
OVERTOPPING ELEVATION	= 272.0	M





-L REV-

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METRIC

5m 0 10m

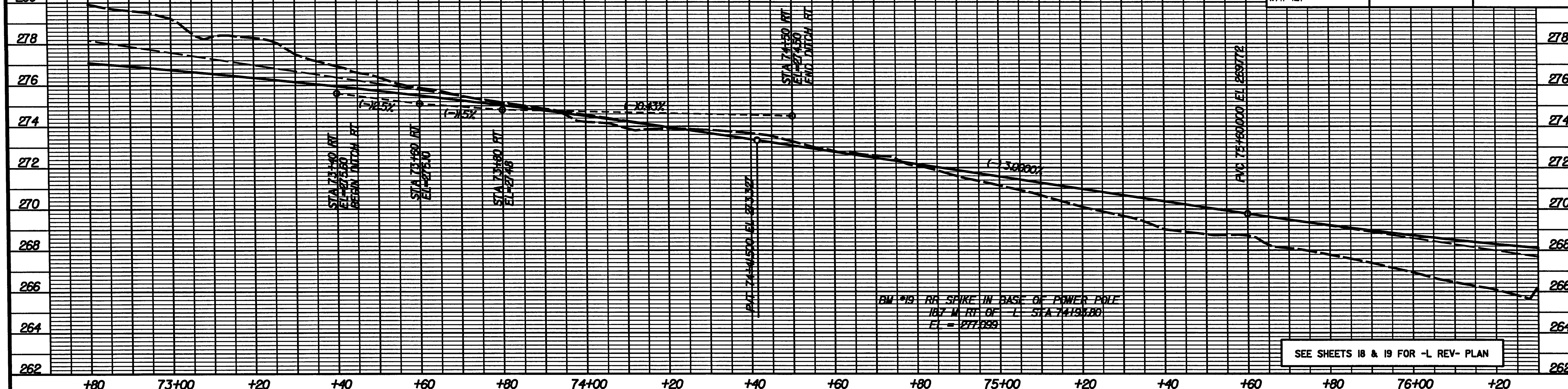
CONST REV

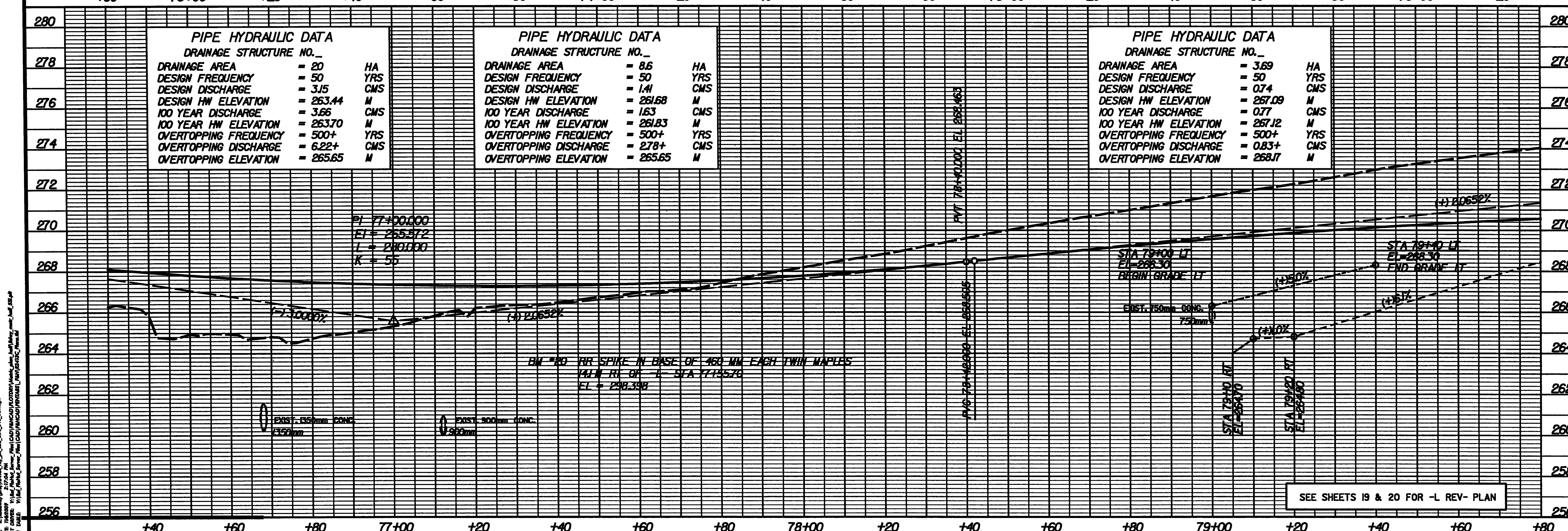
R/W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	43
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 20	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 3.15	CMS
DESIGN HW ELEVATION	= 263.44	M
100 YEAR DISCHARGE	= 3.66	CMS
100 YEAR HW ELEVATION	= 263.70	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 6.22+	CMS
OVERTOPPING ELEVATION	= 265.65	M

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 8.6	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 1.41	CMS
DESIGN HW ELEVATION	= 261.68	M
100 YEAR DISCHARGE	= 1.63	CMS
100 YEAR HW ELEVATION	= 261.83	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 2.78+	CMS
OVERTOPPING ELEVATION	= 265.65	M

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 3.69	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.74	CMS
DESIGN HW ELEVATION	= 267.09	M
100 YEAR DISCHARGE	= 0.77	CMS
100 YEAR HW ELEVATION	= 267.12	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.83+	CMS
OVERTOPPING ELEVATION	= 268.17	M

-L REV-

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METRIC

5m 0 10m

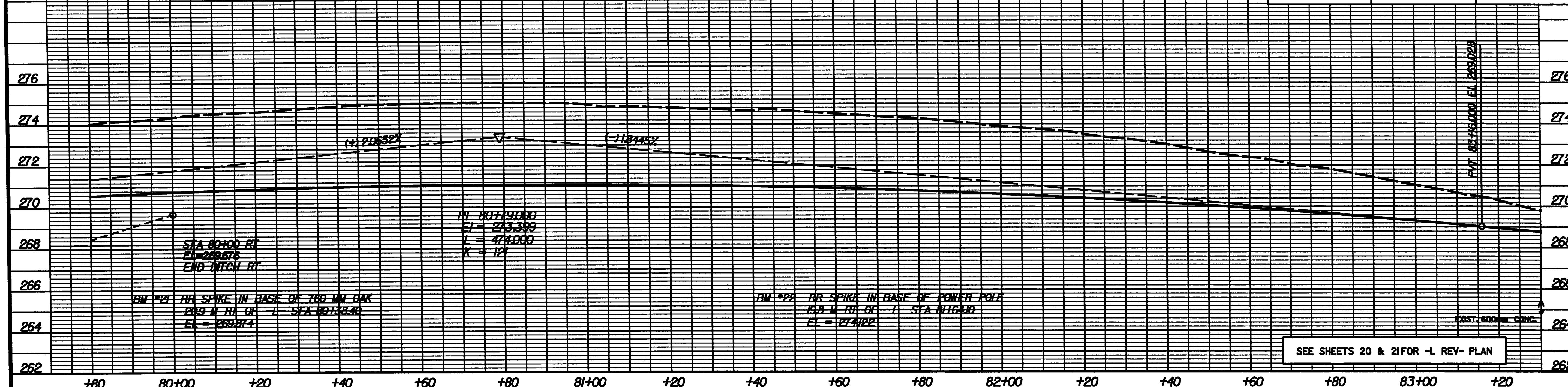
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	44
R/W SHEET NO.	

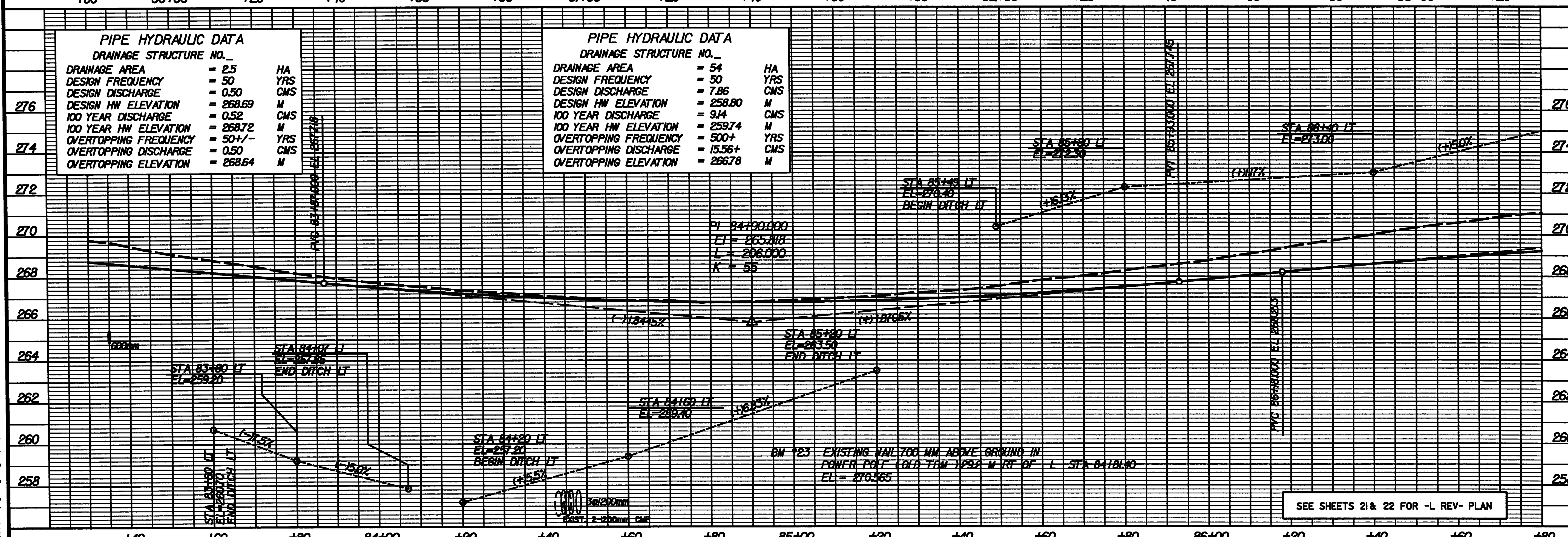
CONST REV

R/W REV

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 2.5	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.50	CMS
DESIGN HW ELEVATION	= 268.69	M
100 YEAR DISCHARGE	= 0.52	CMS
100 YEAR HW ELEVATION	= 268.72	M
OVERTOPPING FREQUENCY	= 50+/-	YRS
OVERTOPPING DISCHARGE	= 0.50	CMS
OVERTOPPING ELEVATION	= 268.64	M

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 54	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 7.86	CMS
DESIGN HW ELEVATION	= 258.80	M
100 YEAR DISCHARGE	= 9.14	CMS
100 YEAR HW ELEVATION	= 259.74	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 15.56+	CMS
OVERTOPPING ELEVATION	= 266.78	M

-L REV-

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CONSULTING ENGINEERS
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RALEIGH, NC 27607

METRIC

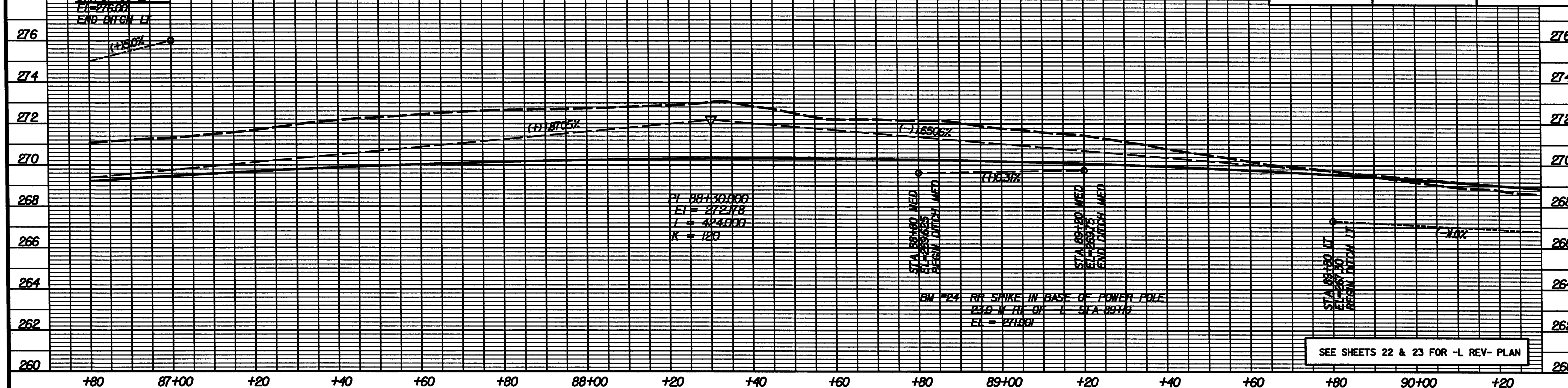
5m 0 10m

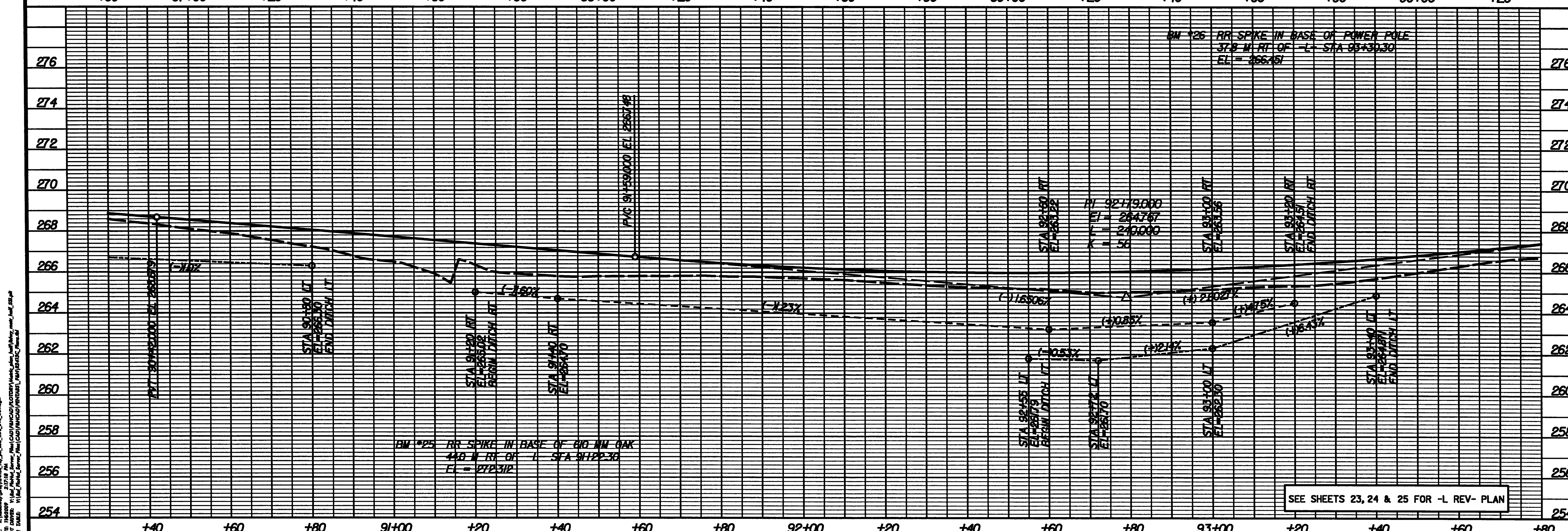
CONST REV

R/W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	45
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





-L REV-

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

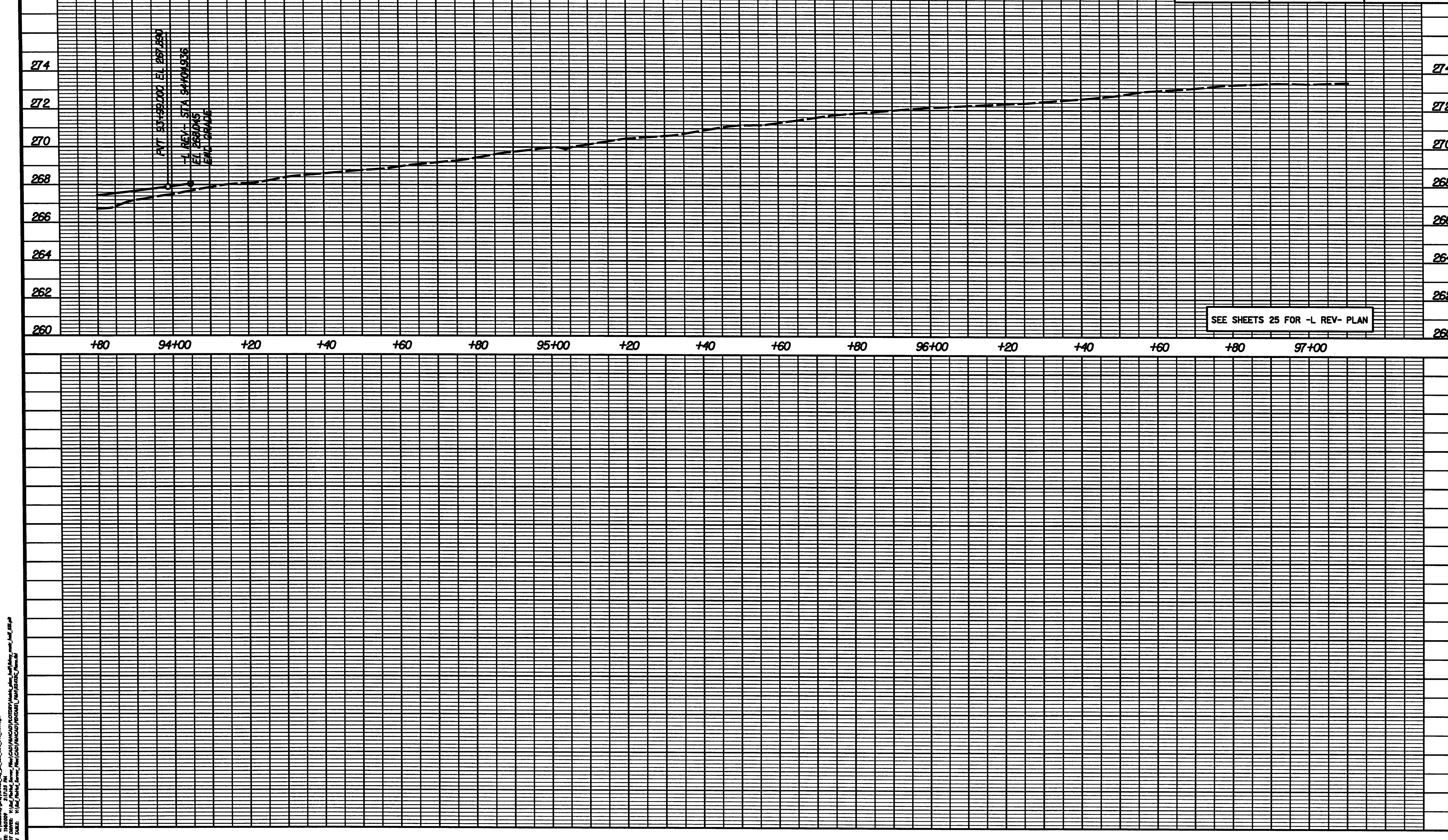
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L REV-

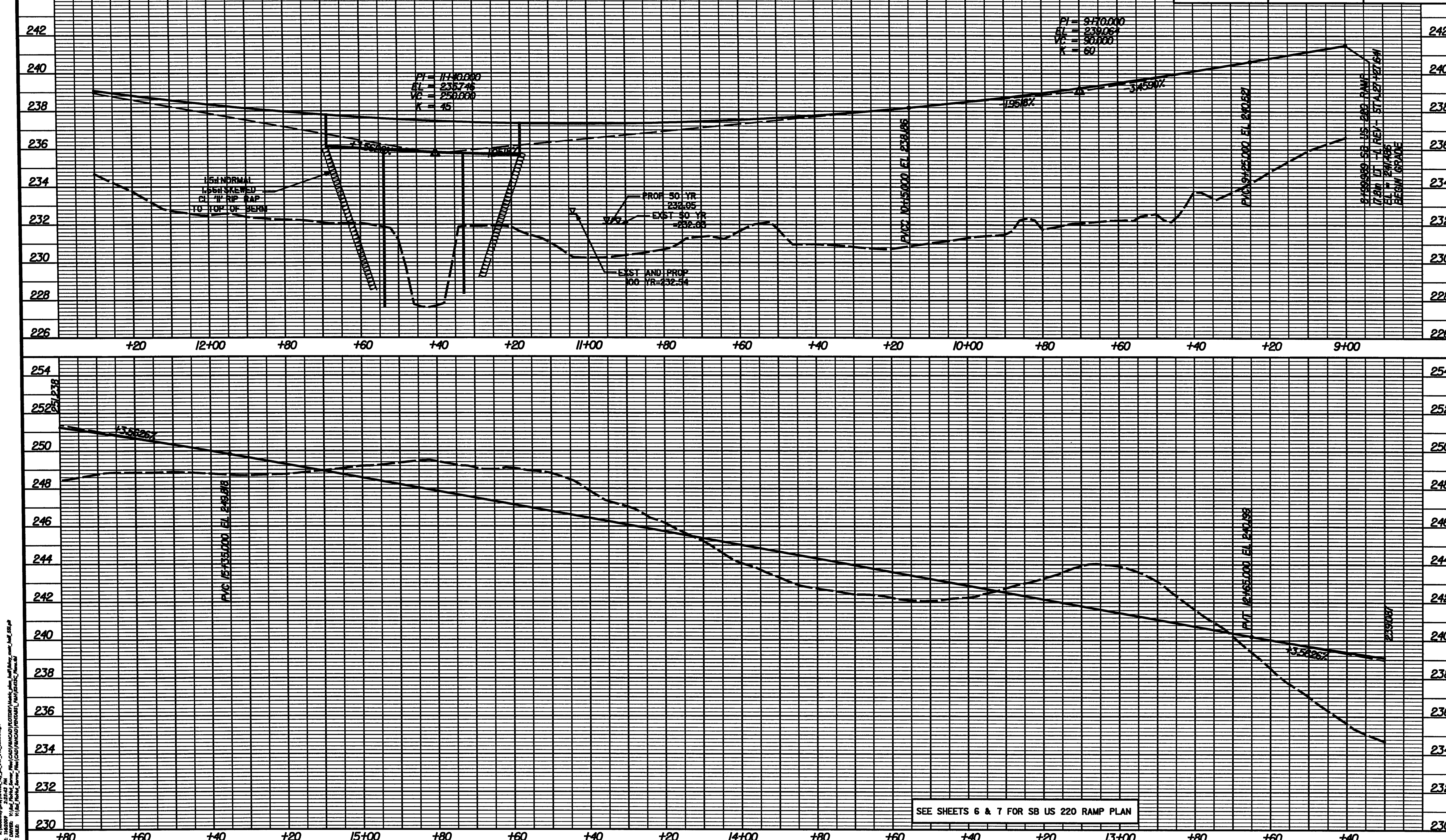
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	47
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV
R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SB US 220 RAMP

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

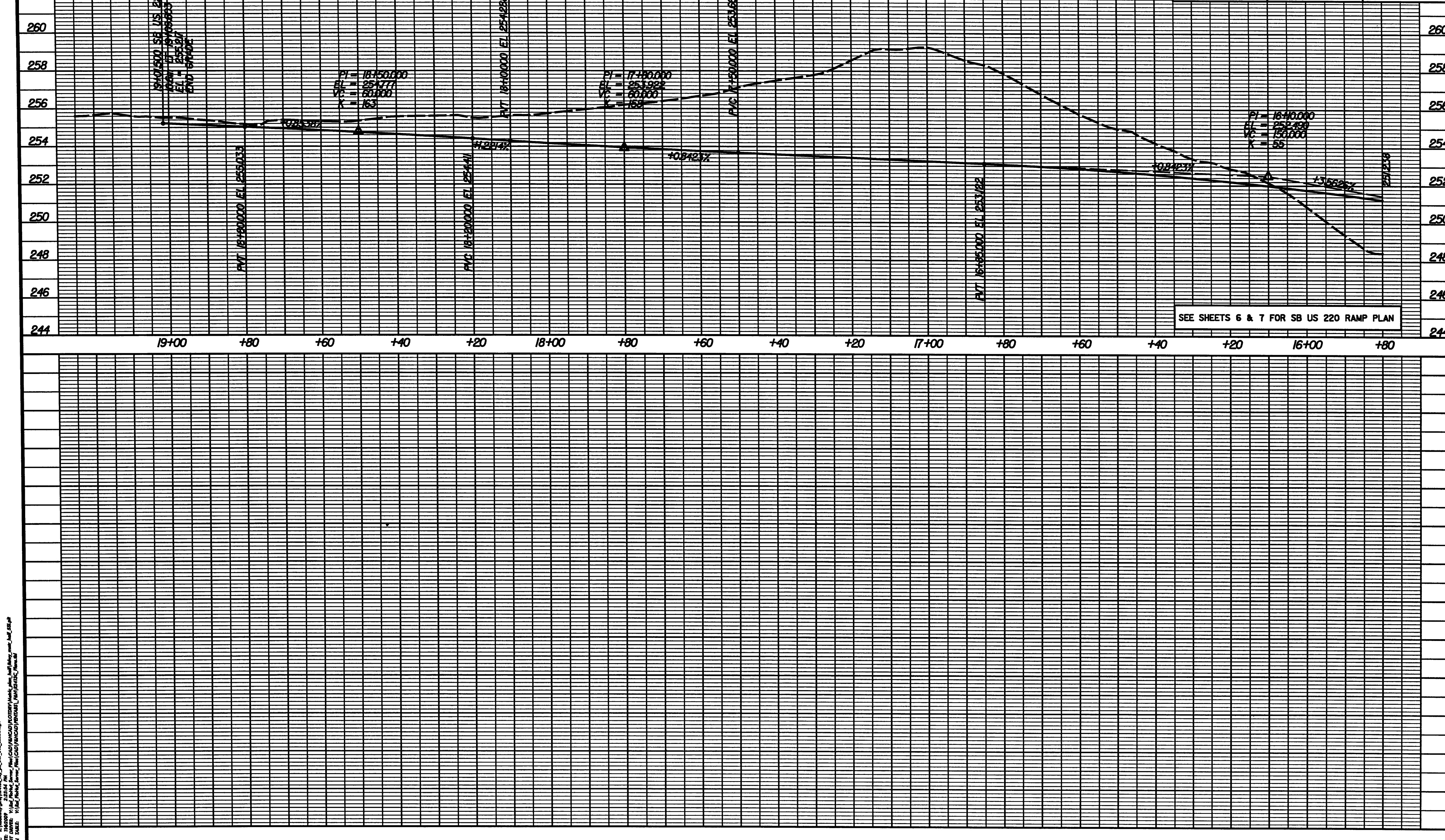
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	48
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV



SB US 220 RAMP

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

CONST REV

R /W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	49
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER

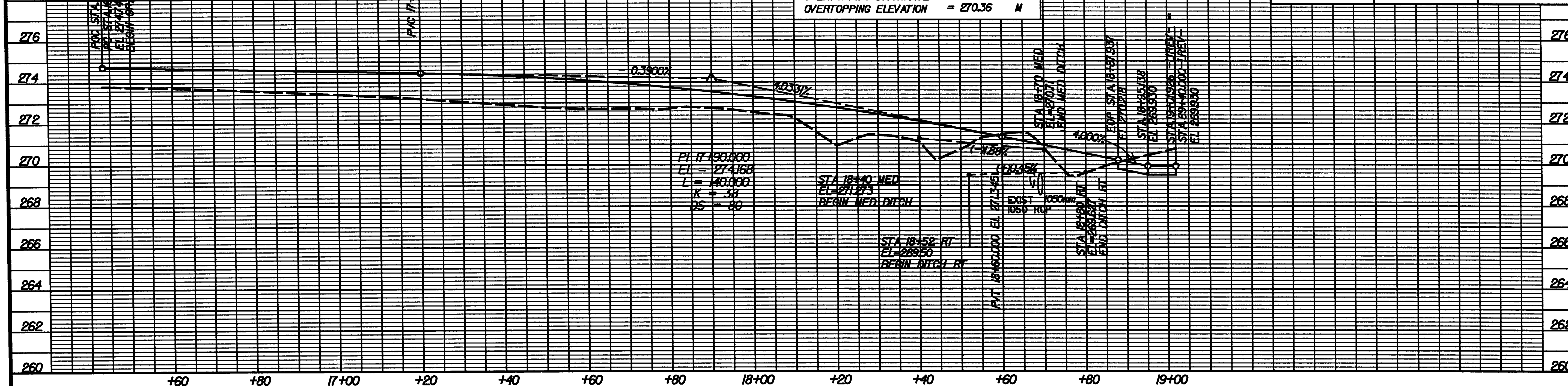
HYDRAULICS ENGINEER

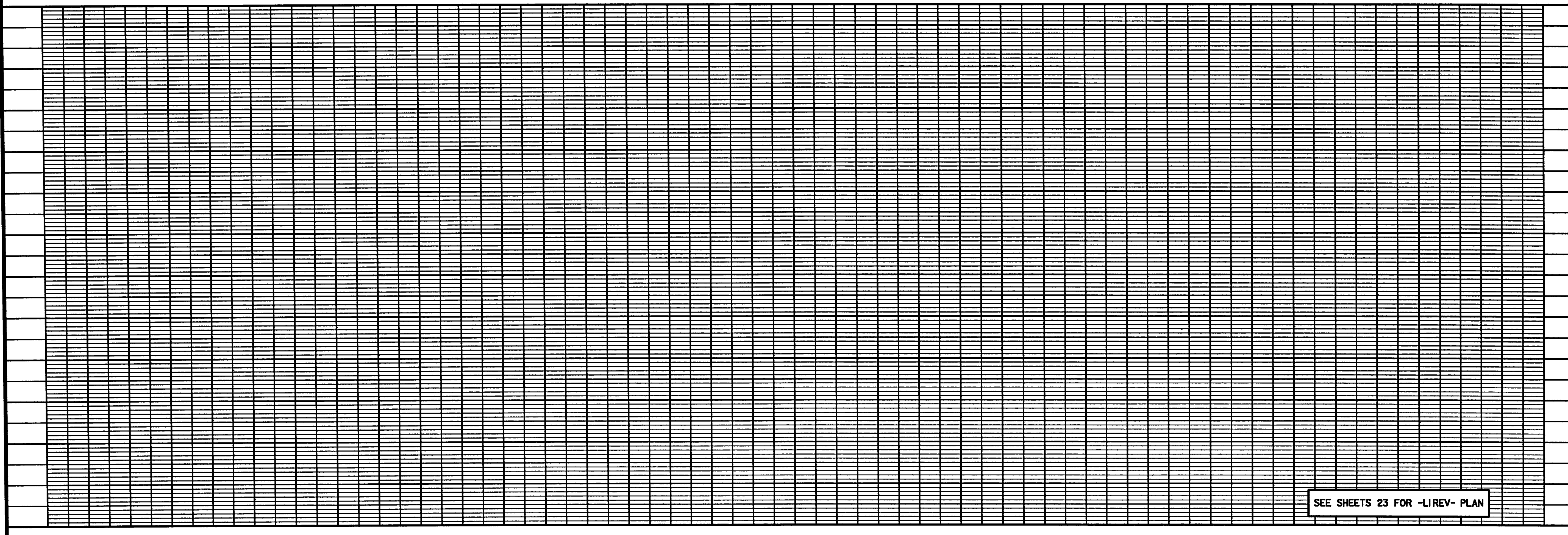
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 5.2	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 1.0	CMS
DESIGN HW ELEVATION	= 270.22	M
100 YEAR DISCHARGE	= 1.16	CMS
100 YEAR HW ELEVATION	= 270.30	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 1.98+	CMS
OVERTOPPING ELEVATION	= 270.36	M





SEE SHEETS 23 FOR -LIREV- PLAN

-LIREV-

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	50
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

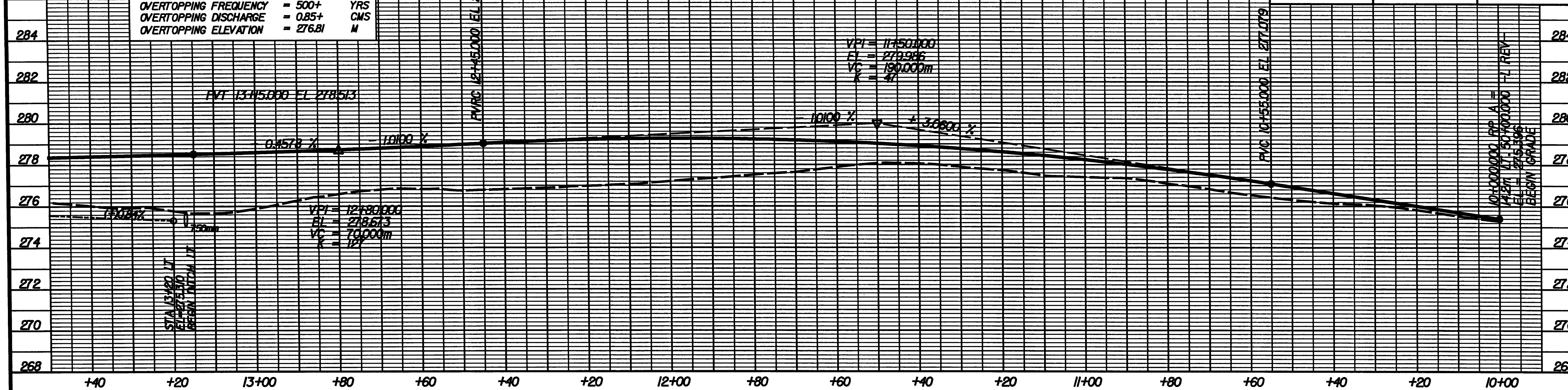
CONST REV

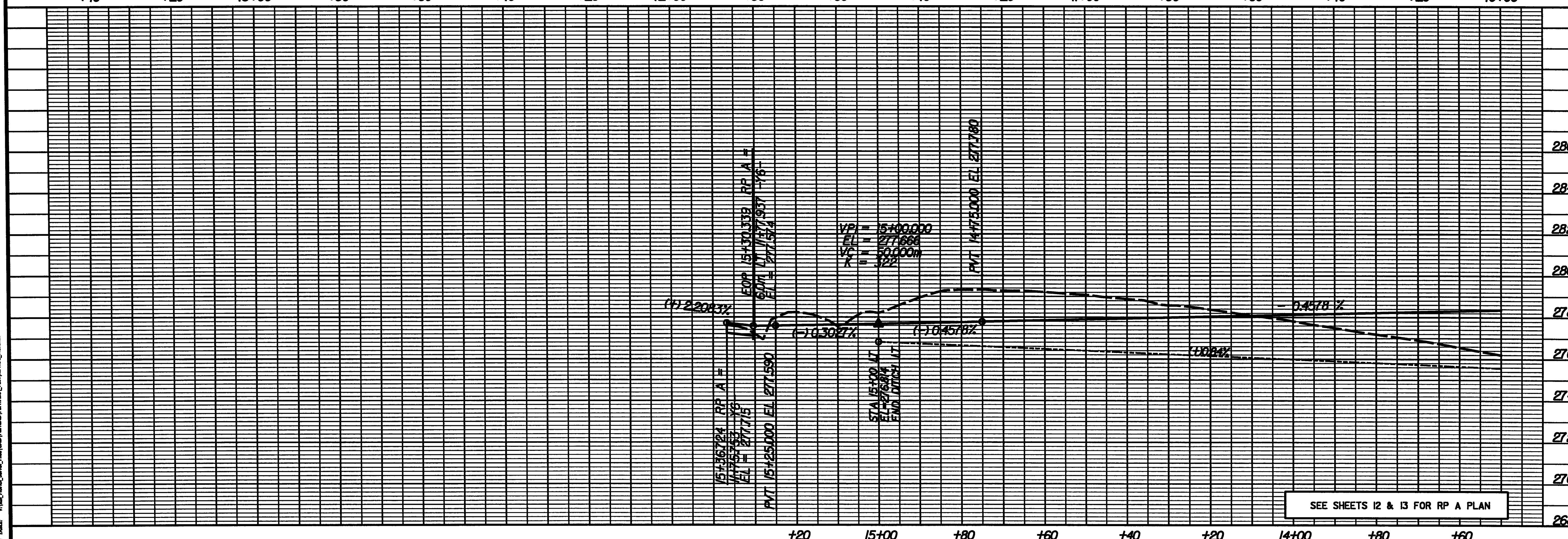
R /W REV

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 3.21	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.75	CMS
DESIGN HW ELEVATION	= 276.07	M
100 YEAR DISCHARGE	= 0.79	CMS
100 YEAR HW ELEVATION	= 276.10	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.85+	CMS
OVERTOPPING ELEVATION	= 276.81	M





SEE SHEETS 12 & 13 FOR RP A PLAN

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	51
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

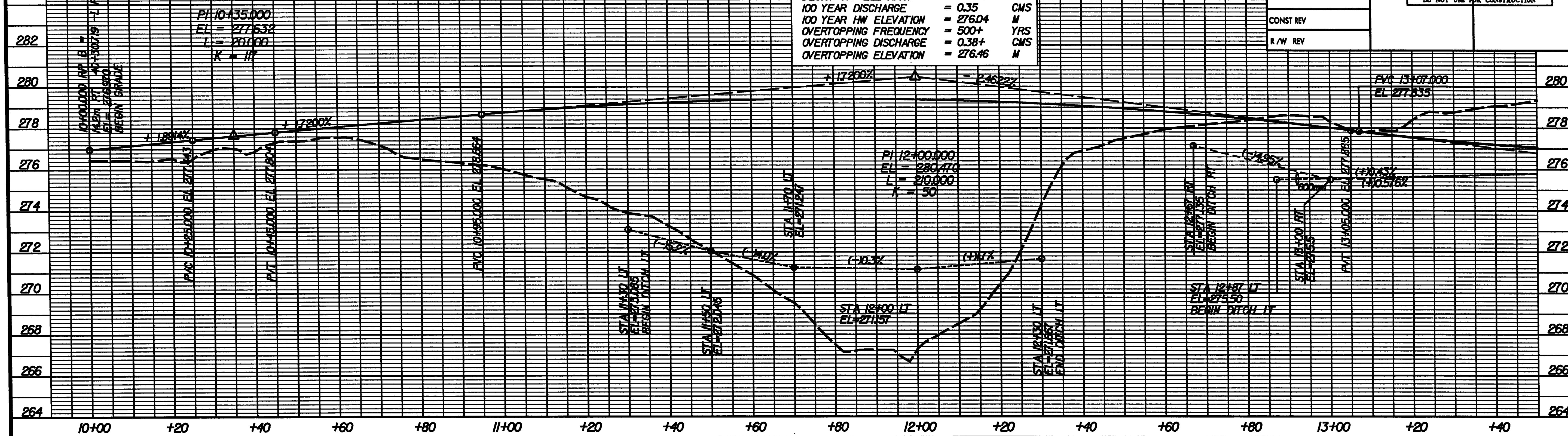
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

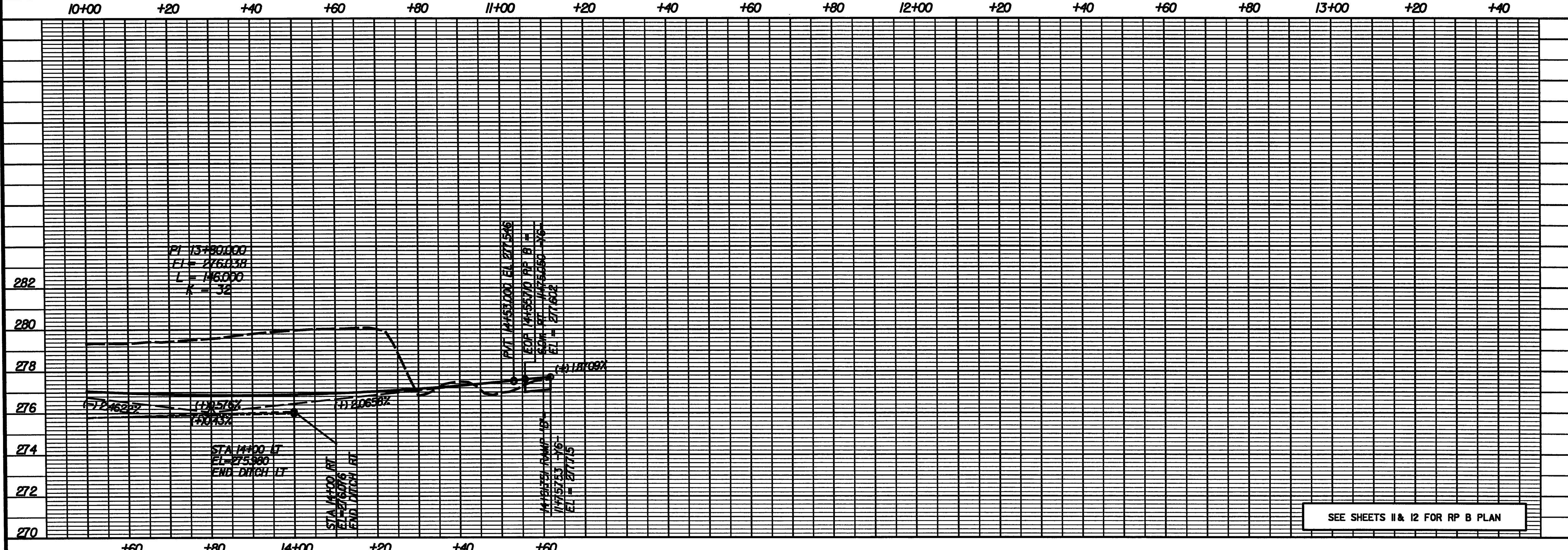
CONST REV
R/W REV

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 1.44	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.34	CMS
DESIGN HW ELEVATION	= 276.01	M
100 YEAR DISCHARGE	= 0.35	CMS
100 YEAR HW ELEVATION	= 276.04	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.38+	CMS
OVERTOPPING ELEVATION	= 276.46	M





SEE SHEETS 11 & 12 FOR RP B PLAN

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	52
R/W SHEET NO.	

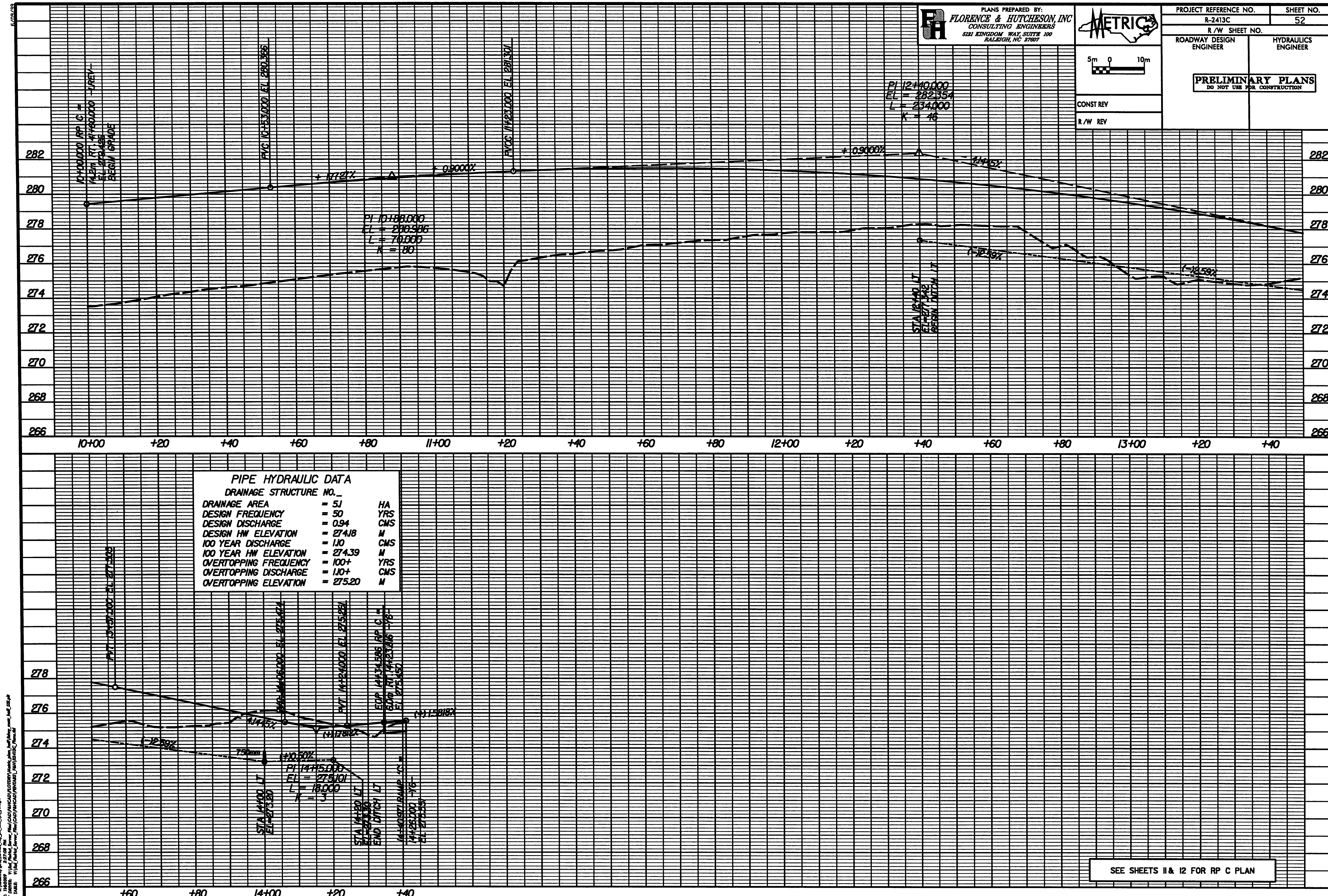
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 5.1	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.94	CMS
DESIGN HW ELEVATION	= 274.18	M
100 YEAR DISCHARGE	= 1.10	CMS
100 YEAR HW ELEVATION	= 274.39	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 1.10+	CMS
OVERTOPPING ELEVATION	= 275.20	M

SEE SHEETS 11 & 12 FOR RP C PLAN

RAMP C - US 158

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

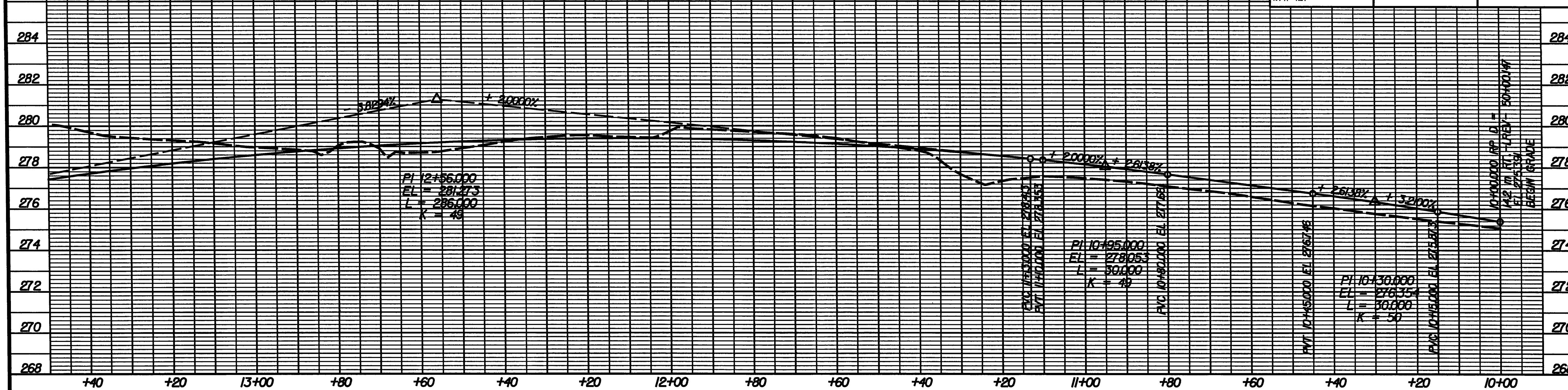
5m 0 10m

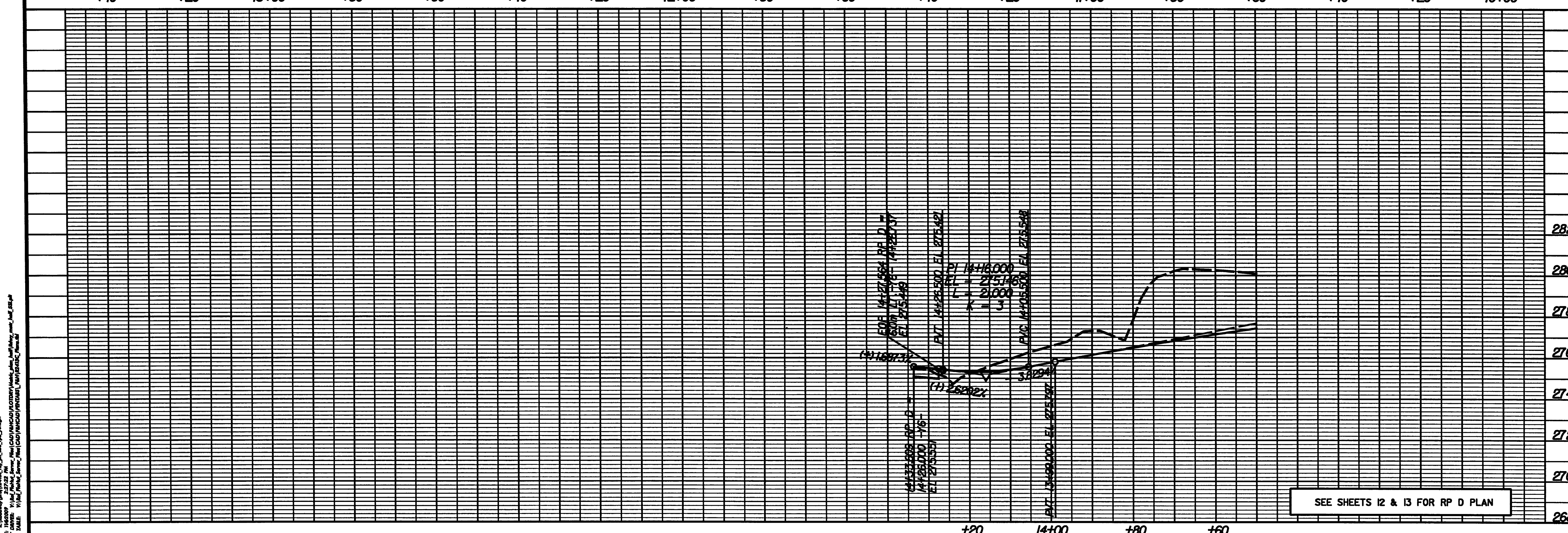
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	53
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV





SEE SHEETS 12 & 13 FOR RP D PLAN

RAMP D - US 158

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	54
R/W SHEET NO.	

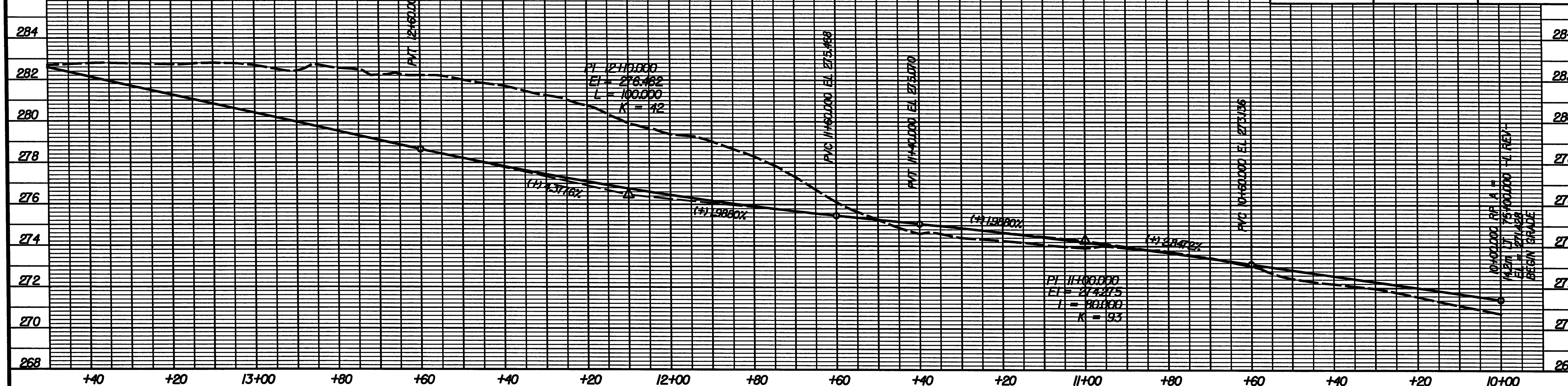
ROADWAY DESIGN ENGINEER

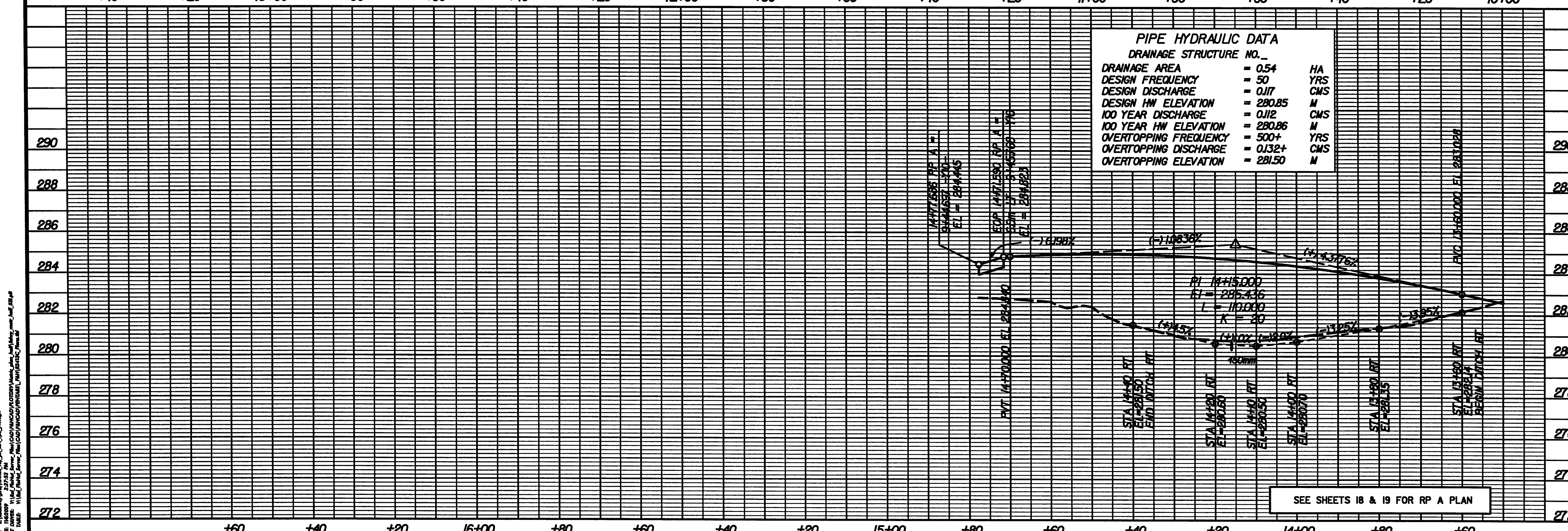
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.54	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.117	CMS
DESIGN HW ELEVATION	= 280.85	M
100 YEAR DISCHARGE	= 0.112	CMS
100 YEAR HW ELEVATION	= 280.86	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.132+	CMS
OVERTOPPING ELEVATION	= 281.50	M

SEE SHEETS 18 & 19 FOR RP A PLAN

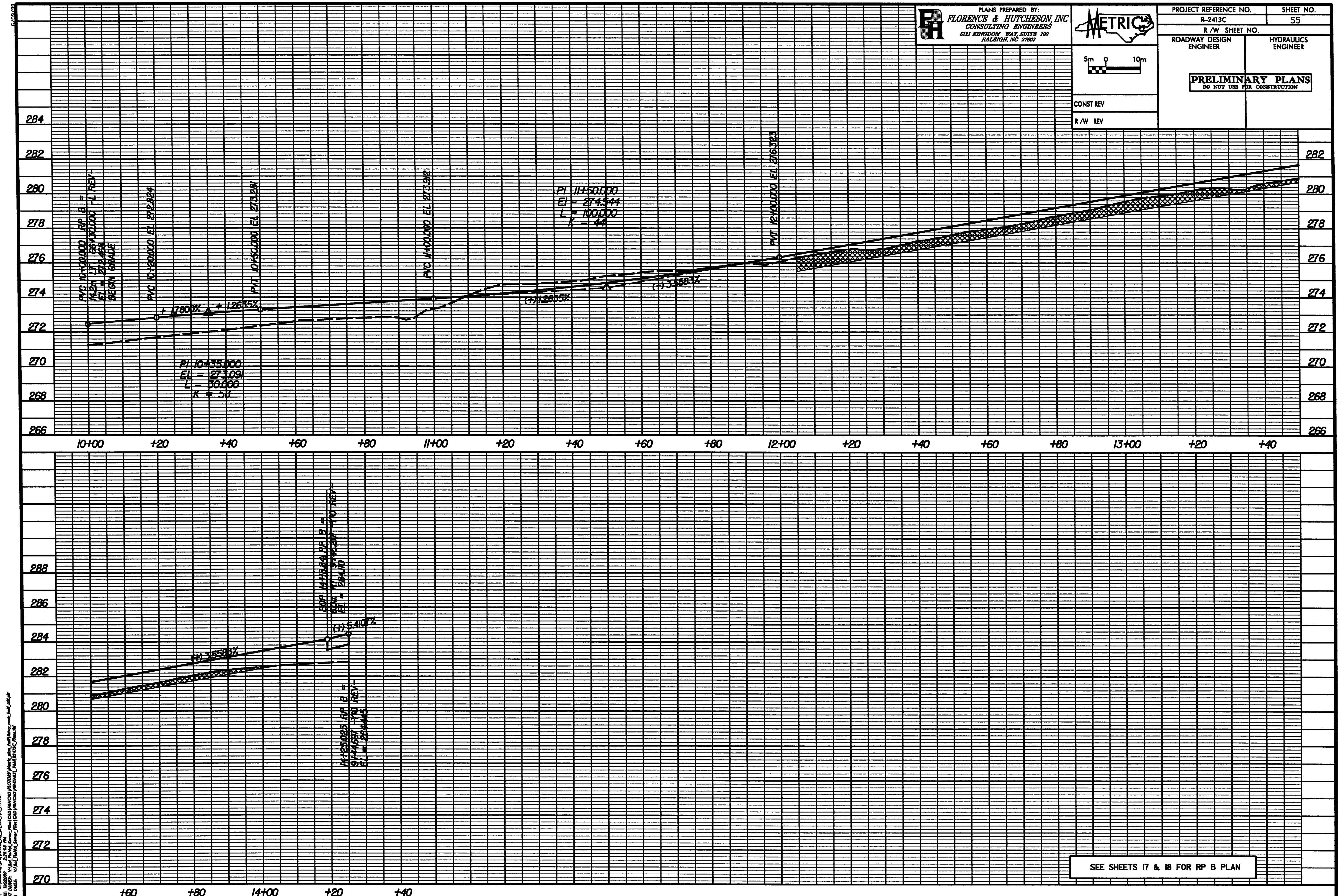
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	55
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV
R/W REV



RAMP B - NC 65

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

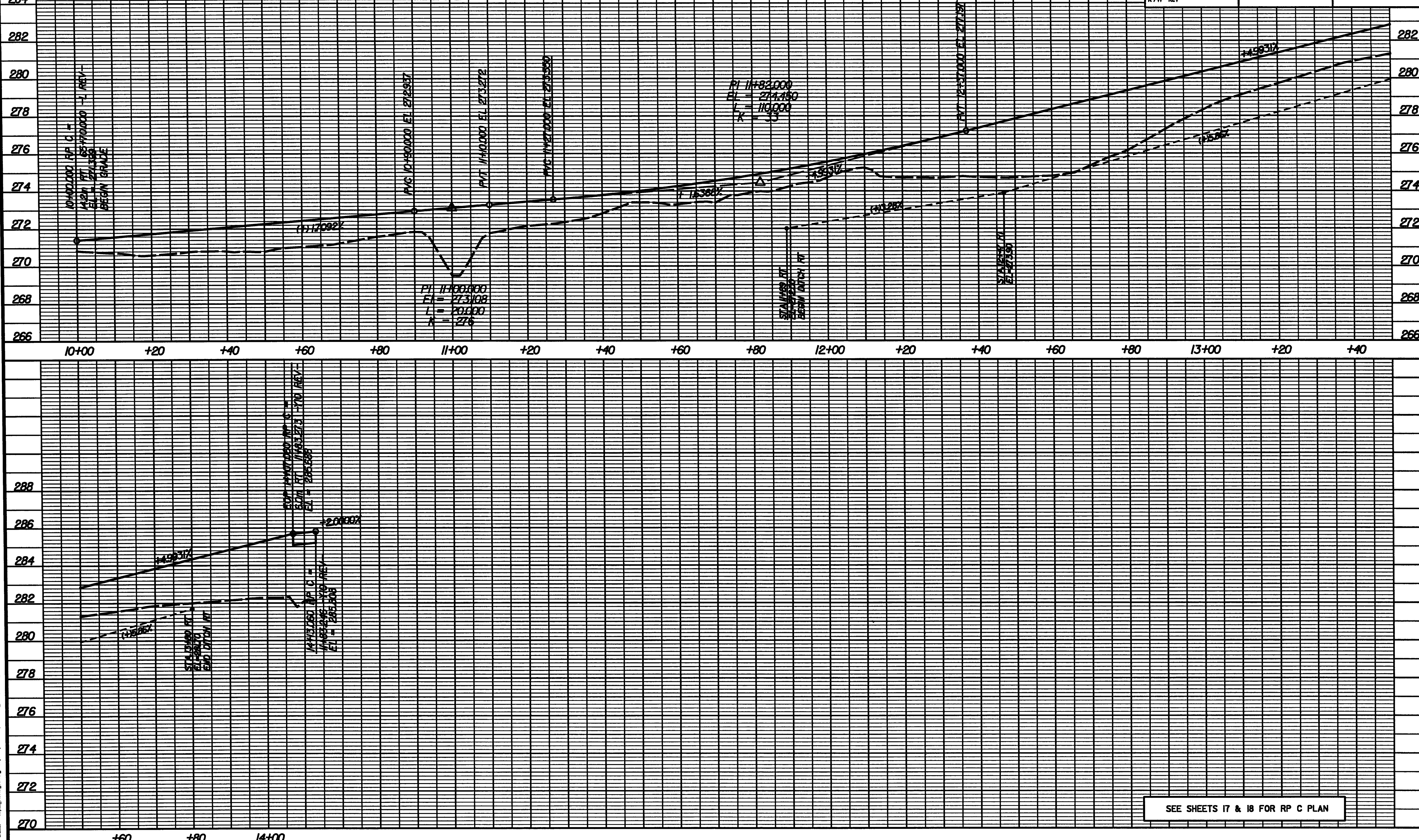
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	56
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV



SEE SHEETS 17 & 18 FOR RP C PLAN

RAMP C - NC 65

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

CONST REV

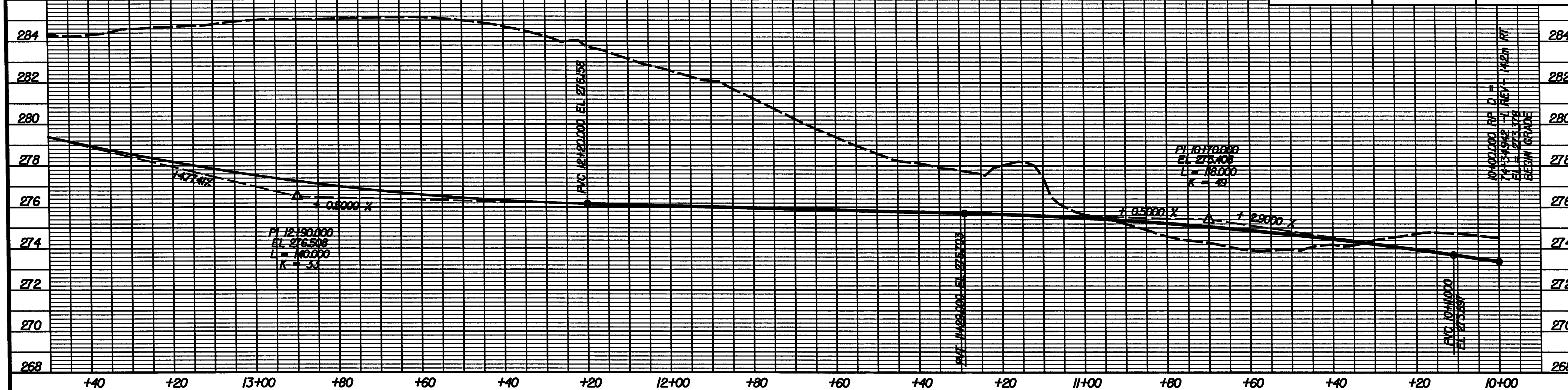
R /W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	57
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

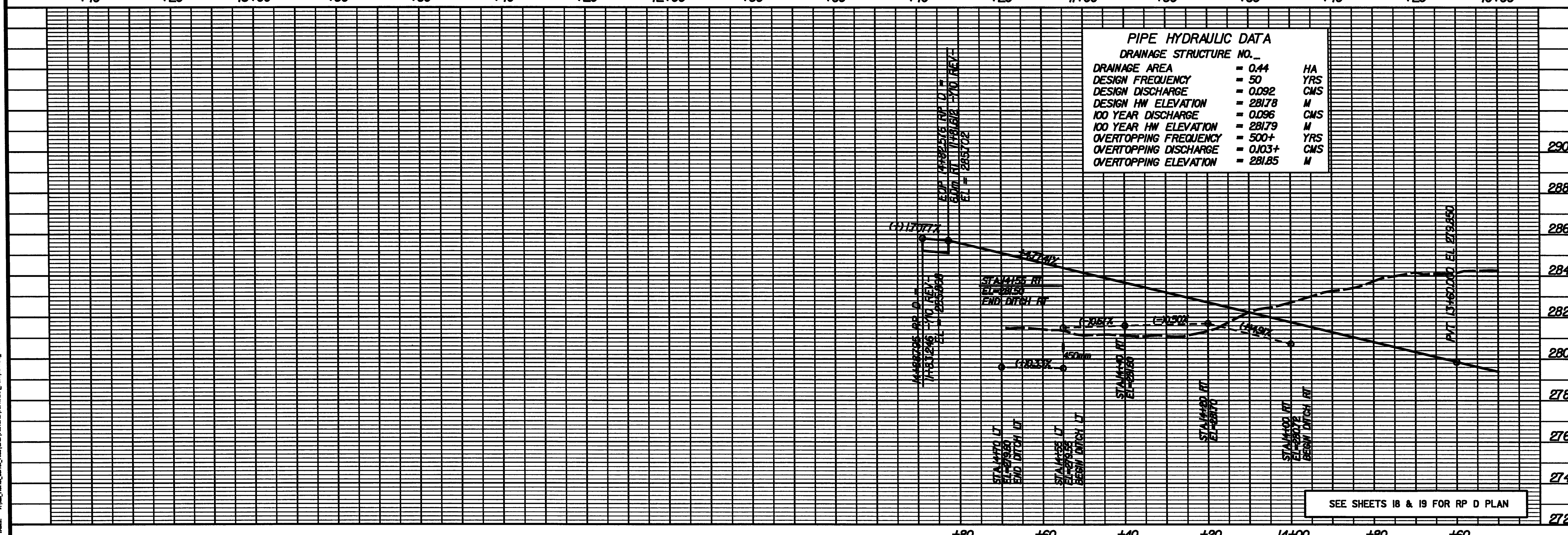
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

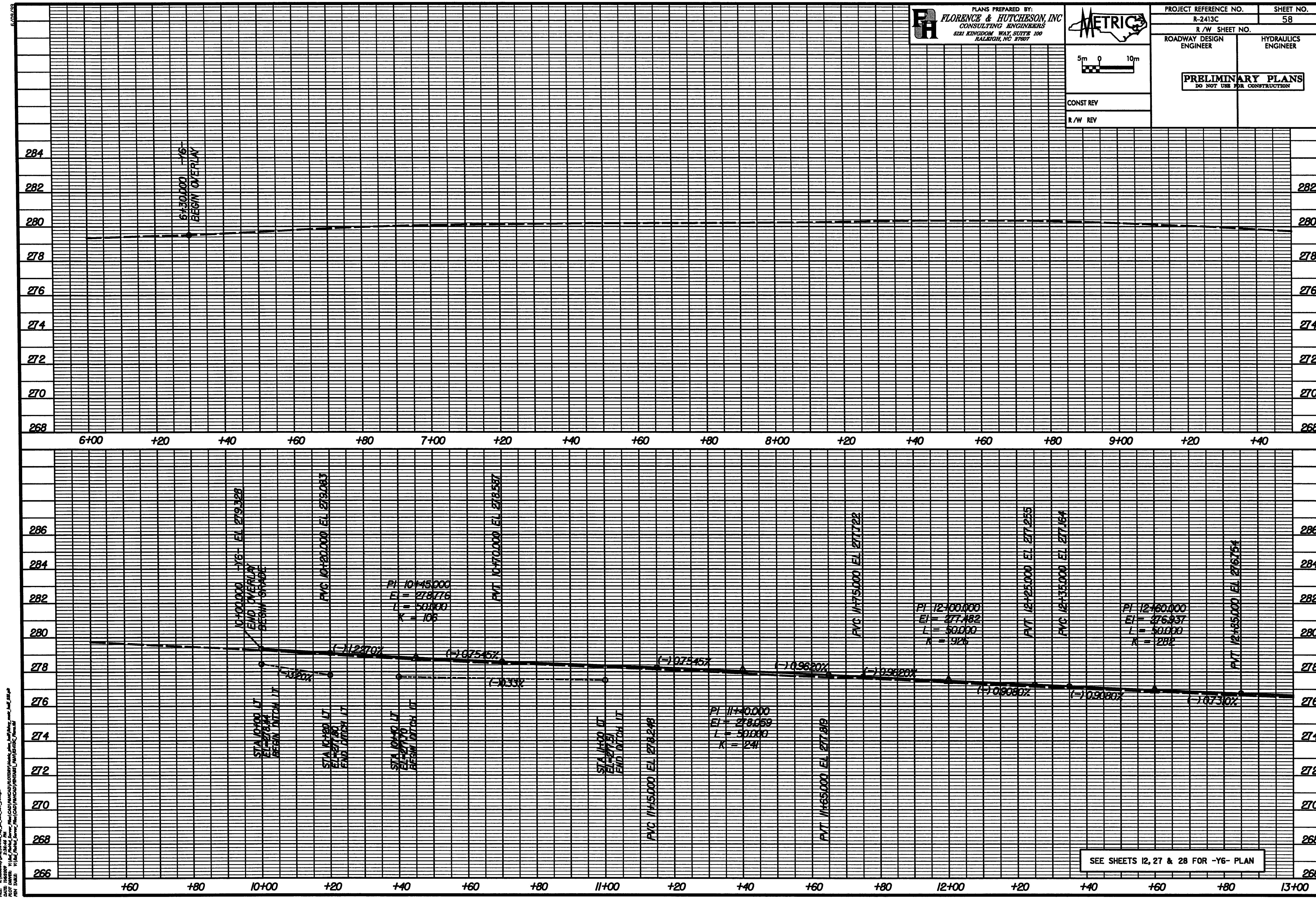
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.44	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.092	CMS
DESIGN HW ELEVATION	= 281.78	M
100 YEAR DISCHARGE	= 0.096	CMS
100 YEAR HW ELEVATION	= 281.79	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.103+	CMS
OVERTOPPING ELEVATION	= 281.85	M

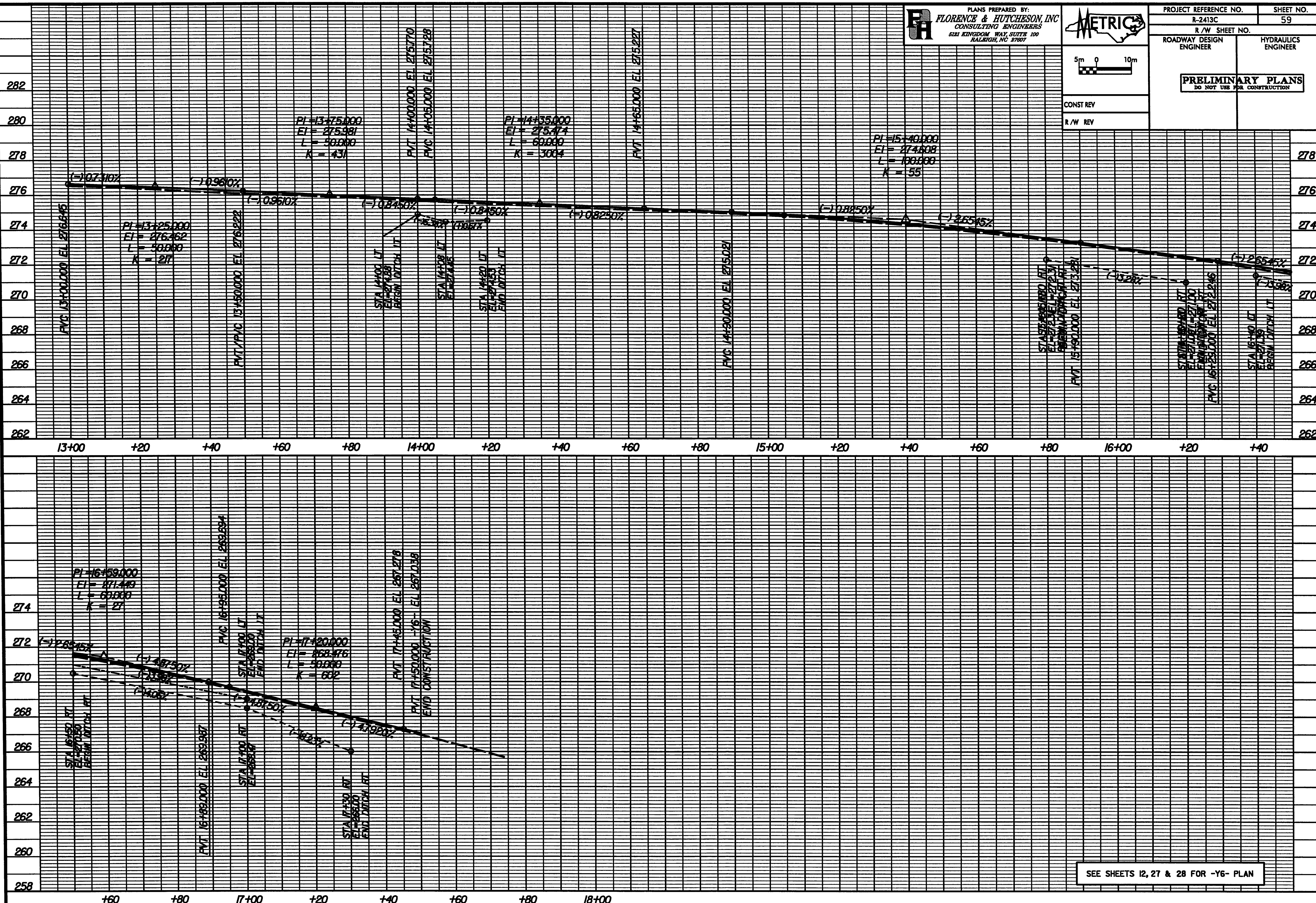


SEE SHEETS 18 & 19 FOR RP D PLAN

RAMP D - NC 65



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
R-2413C
SHEET NO.
58
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
5m 0 10m
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST REV
R/W REV
6+30.000 -Y6-
BEGIN OVERLAY
10+00.000 -Y6- EL 279.328
END OVERLAY
BEGIN GRADE
PVC 10+20.000 EL 279.083
PI 10+45.000
EL = 278.776
L = 50.000
K = 106
PVT 10+70.000 EL 278.587
(-)1.2270%
(-)0.7545%
(-)1.320%
(-)1.033%
(-)0.7545%
(-)0.9620%
(-)0.9620%
STA 10+00 LT
EL=278.14
BEGIN DITCH LT
STA 10+20 LT
EL=277.88
END DITCH LT
STA 10+40 LT
EL=277.76
BEGIN DITCH LT
STA 11+00 LT
EL=277.51
END DITCH LT
PVC 11+15.000 EL 278.248
PI 11+40.000
EL = 278.059
L = 50.000
K = 241
PVT 11+65.000 EL 277.819
PVC 11+75.000 EL 277.722
PI 12+00.000
EL = 277.482
L = 50.000
K = 926
PVT 12+25.000 EL 277.255
PVC 12+35.000 EL 277.164
(-)0.9080%
(-)0.9080%
PI 12+60.000
EL = 276.937
L = 50.000
K = 282
PVT 12+85.000 EL 276.754
(-)0.7310%
SEE SHEETS 12, 27 & 28 FOR -Y6- PLAN



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
METRIC
PROJECT REFERENCE NO.
SHEET NO.
R-2413C
59
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
5m 0 10m
CONST REV
R/W REV
PI =13+75.000
El = 275.981
L = 50.000
K = 431
PVT 14+00.000 EL 275.770
PVC 14+05.000 EL 275.728
PI =14+35.000
El = 275.474
L = 60.000
K = 3004
PVT 14+65.000 EL 275.227
PI =15+40.000
El = 274.808
L = 100.000
K = 55
(-) 0.7310%
(-) 0.9610%
(-) 0.9610%
(-) 0.8450%
(-) 0.8450%
(-) 0.8250%
(-) 0.8250%
(+) 2.6545%
(-) 2.6545%
(-) 1.328%
PVC 13+00.000 EL 276.545
PI =13+25.000
El = 276.462
L = 50.000
K = 217
PVT/PVC 13+50.000 EL 276.222
STA 14+00 LT
BEGIN DITCH LT
END DITCH LT
PVC 14+90.000 EL 275.021
PVT 15+90.000 EL 273.281
PVC 16+29.000 EL 272.246
STA 16+40 LT
BEGIN DITCH LT
282 280 278 276 274 272 270 268 266 264 262
13+00 +20 +40 +60 +80 14+00 +20 +40 +60 +80 15+00 +20 +40 +60 +80 16+00 +20 +40
PI =16+59.000
El = 271.449
L = 60.000
K = 27
(-) 2.6545%
(-) 4.8750%
(-) 4.8750%
(-) 4.3920%
PVC 16+95.000 EL 269.694
PI =17+20.000
El = 268.476
L = 50.000
K = 602
PVT 17+45.000 EL 267.278
PVT 17+50.000 -Y6- EL 267.038
END CONSTRUCTION
STA 16+50 RT
BEGIN DITCH RT
PVT 16+89.000 EL 269.987
STA 17+00 RT
STA 17+30 RT
END DITCH RT
274 272 270 268 266 264 262 260 258
+60 +80 17+00 +20 +40 +60 +80 18+00
SEE SHEETS 12, 27 & 28 FOR -Y6- PLAN

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	60
R/W SHEET NO.	

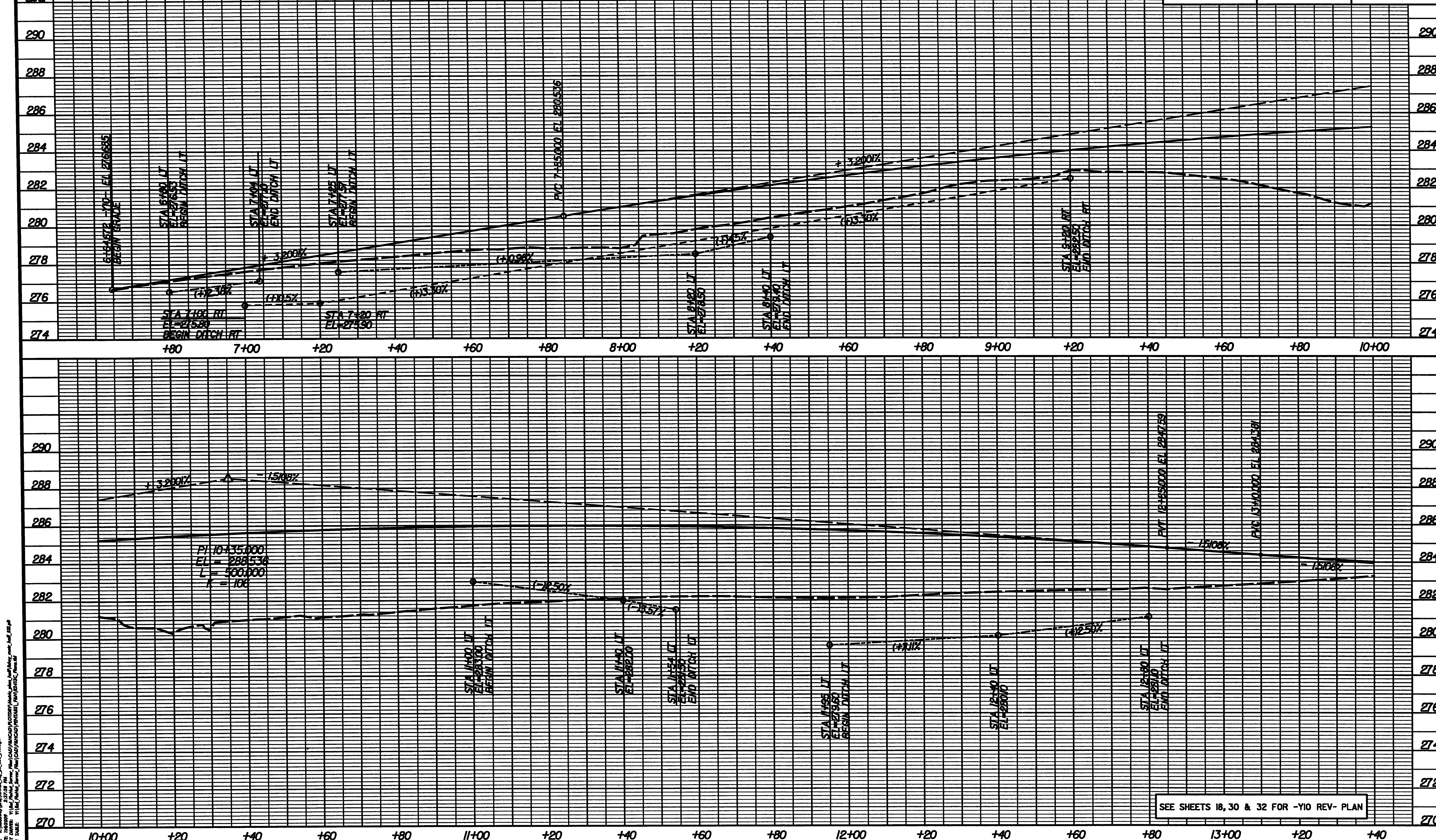
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-Y10 REV- NC 65 & -Y10- NC 65

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	61
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5m 0 10m

CONST REV

R/W REV

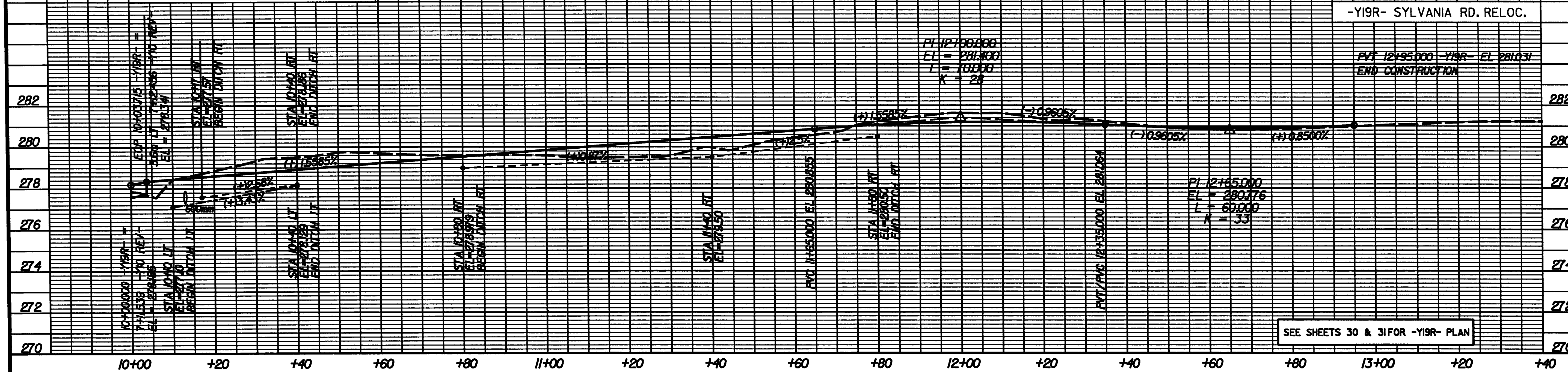
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 2.43	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.46	CMS
DESIGN HW ELEVATION	= 278.25	M
100 YEAR DISCHARGE	= 0.51	CMS
100 YEAR HW ELEVATION	= 278.33	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.54+	CMS
OVERTOPPING ELEVATION	= 278.56	M

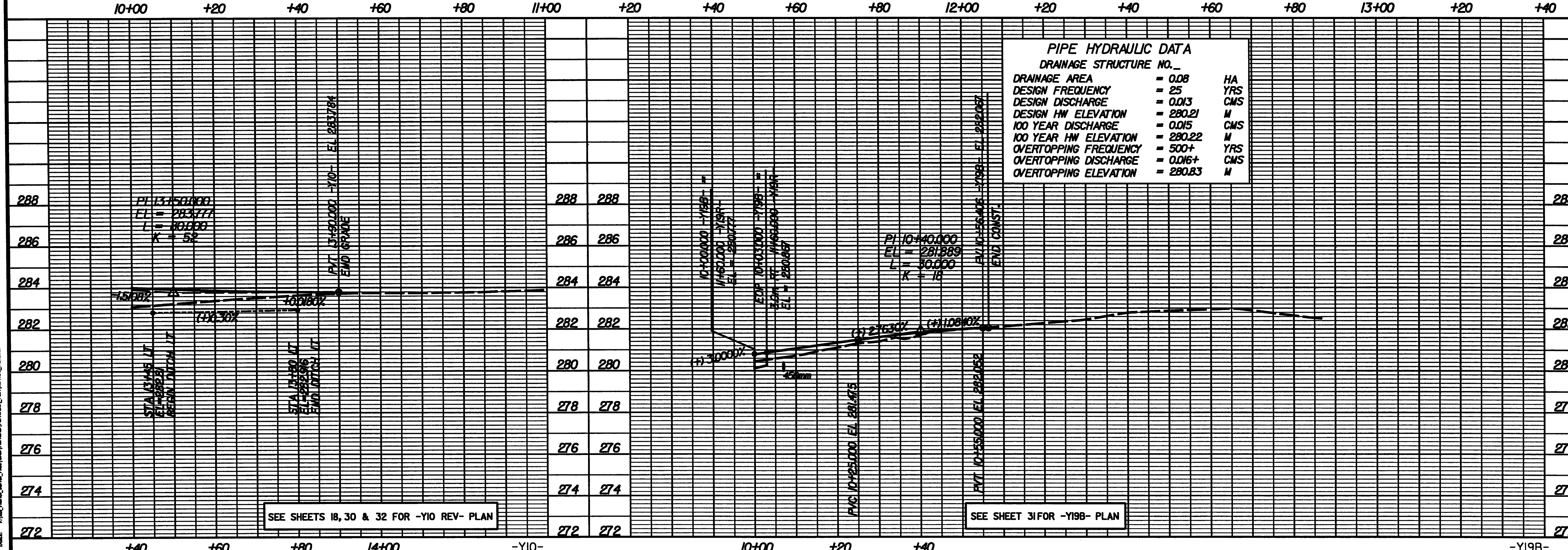
-Y19R- SYLVANIA RD. RELOC.



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.08	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.013	CMS
DESIGN HW ELEVATION	= 280.21	M
100 YEAR DISCHARGE	= 0.015	CMS
100 YEAR HW ELEVATION	= 280.22	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.016+	CMS
OVERTOPPING ELEVATION	= 280.83	M



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

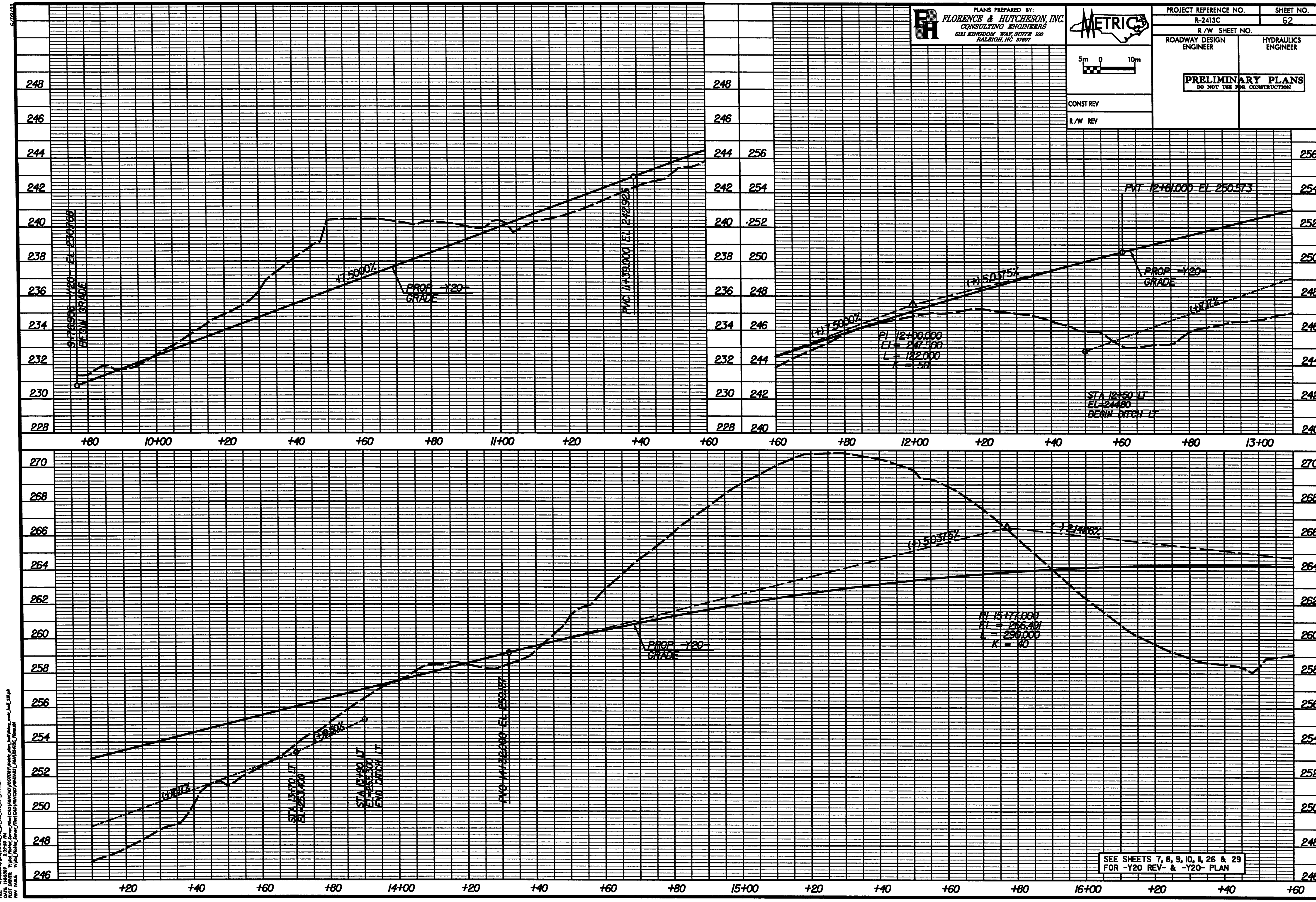
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	62
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

R /W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

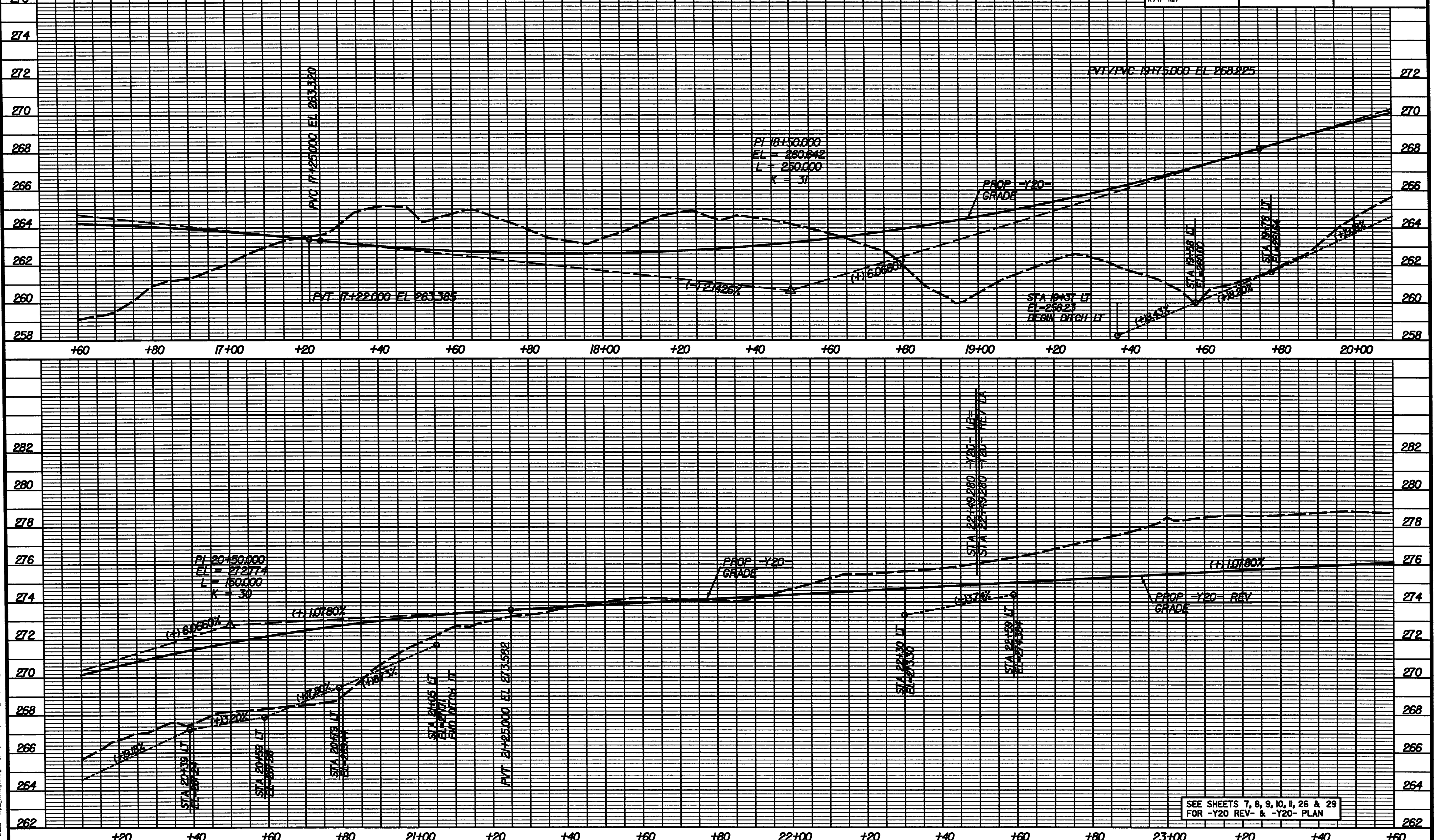
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	63
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R/W REV



SEE SHEETS 7, 8, 9, 10, 11, 26 & 29
FOR -Y20 REV- & -Y20- PLAN

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	64
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

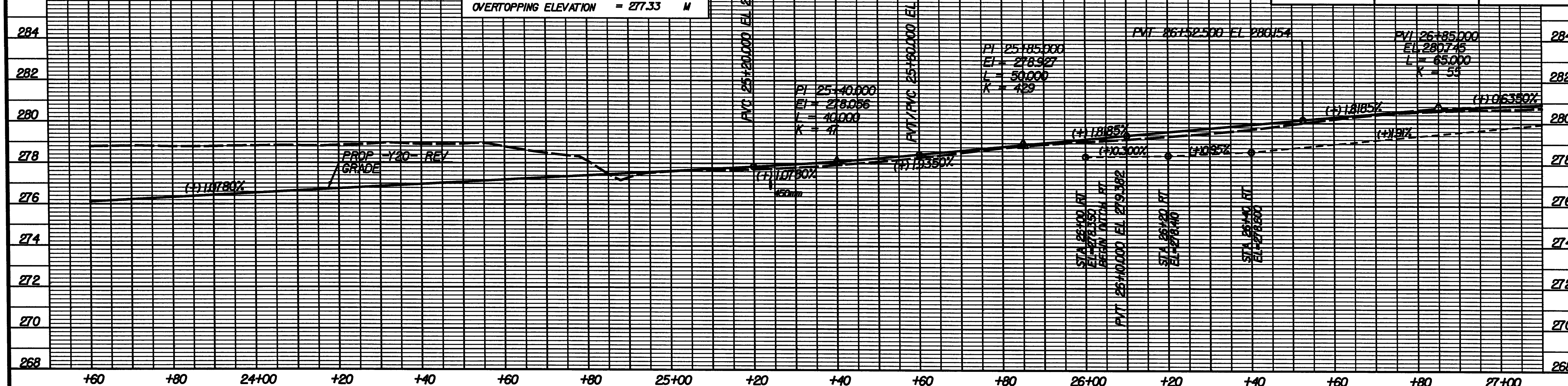
CONST REV

R/W REV

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

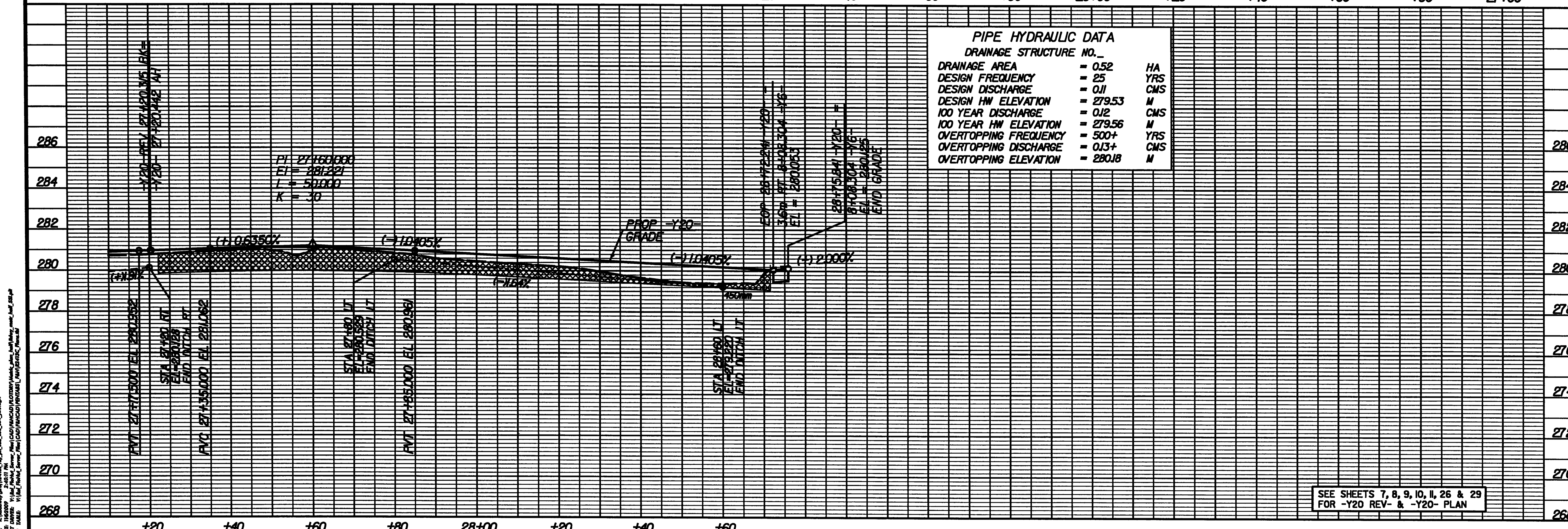
DRAINAGE AREA	= 0.68	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.14	CMS
DESIGN HW ELEVATION	= 277.29	M
100 YEAR DISCHARGE	= 0.16	CMS
100 YEAR HW ELEVATION	= 277.33	M
OVERTOPPING FREQUENCY	= 100	YRS
OVERTOPPING DISCHARGE	= 0.17	CMS
OVERTOPPING ELEVATION	= 277.33	M



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.52	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.11	CMS
DESIGN HW ELEVATION	= 279.53	M
100 YEAR DISCHARGE	= 0.12	CMS
100 YEAR HW ELEVATION	= 279.56	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.13+	CMS
OVERTOPPING ELEVATION	= 280.18	M



SEE SHEETS 7, 8, 9, 10, 11, 26 & 29
FOR -Y20 REV- & -Y20- PLAN

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607

METRIC

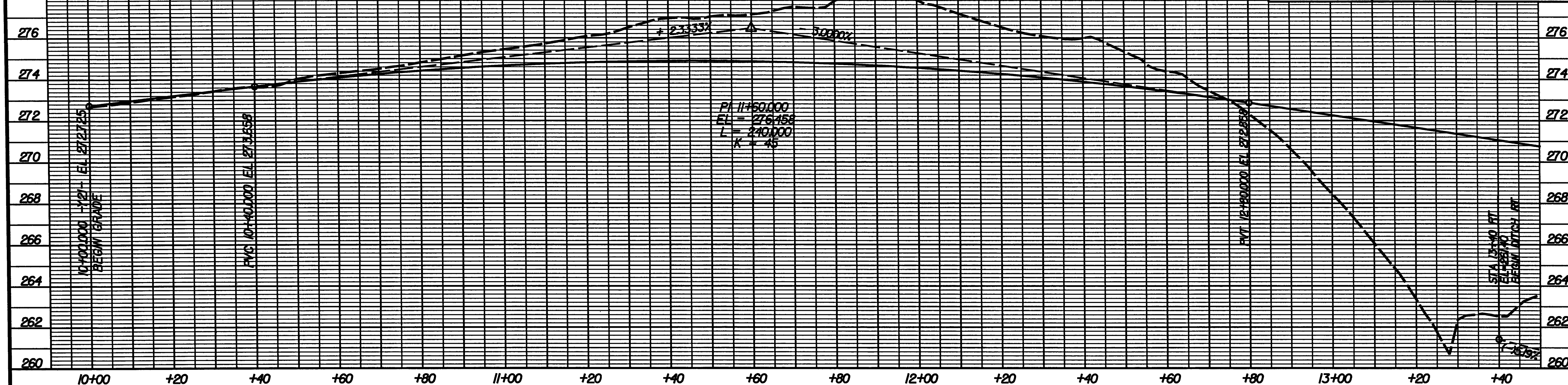
5m 0 10m

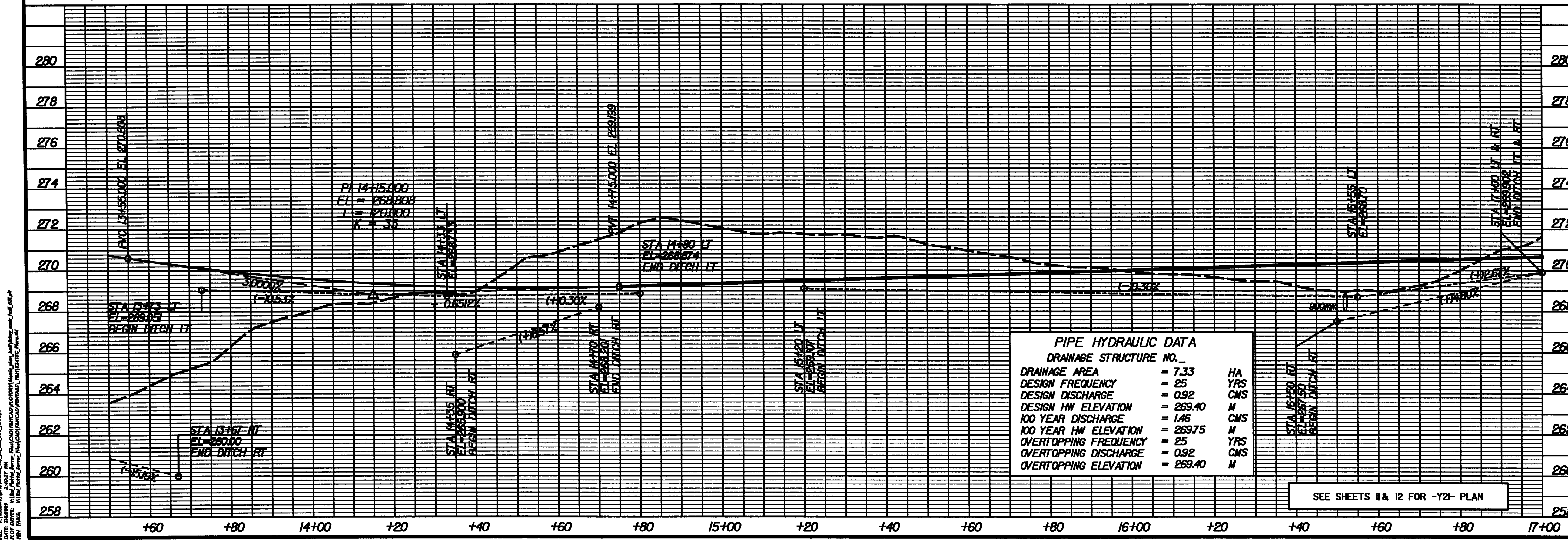
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	65
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST REV

R /W REV





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 7.33	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.92	CMS
DESIGN HW ELEVATION	= 269.40	M
100 YEAR DISCHARGE	= 1.46	CMS
100 YEAR HW ELEVATION	= 269.75	M
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 0.92	CMS
OVERTOPPING ELEVATION	= 269.40	M

SEE SHEETS 11 & 12 FOR -Y21- PLAN

PLANS PREPARED BY:
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METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	66
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

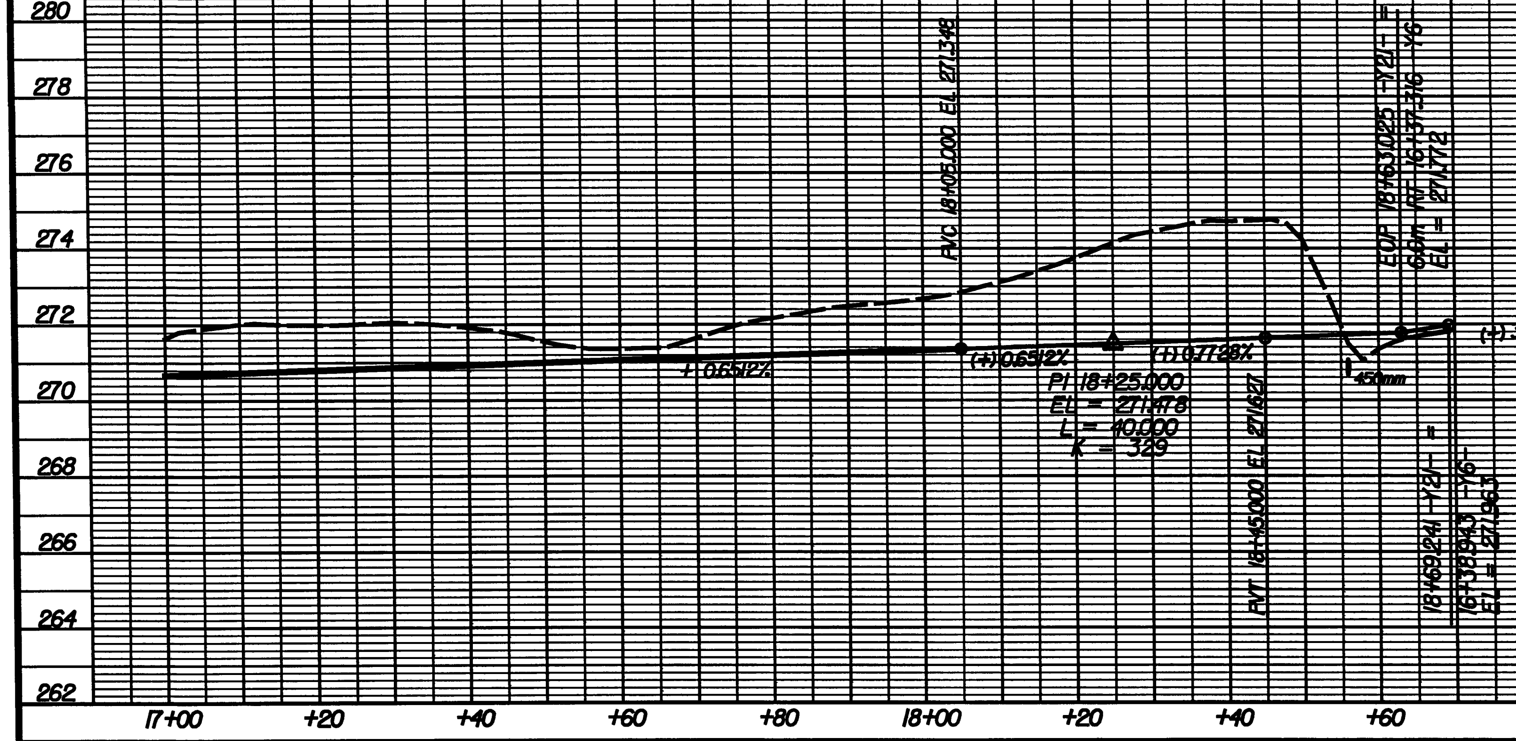
R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.56	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.13	CMS
DESIGN HW ELEVATION	= 271.32	M
100 YEAR DISCHARGE	= 0.14	CMS
100 YEAR HW ELEVATION	= 271.33	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.15+	CMS
OVERTOPPING ELEVATION	= 271.91	M



SEE SHEETS 11 & 12 FOR -Y21- PLAN

278
276
274
272
270
268
266
264
262

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	67
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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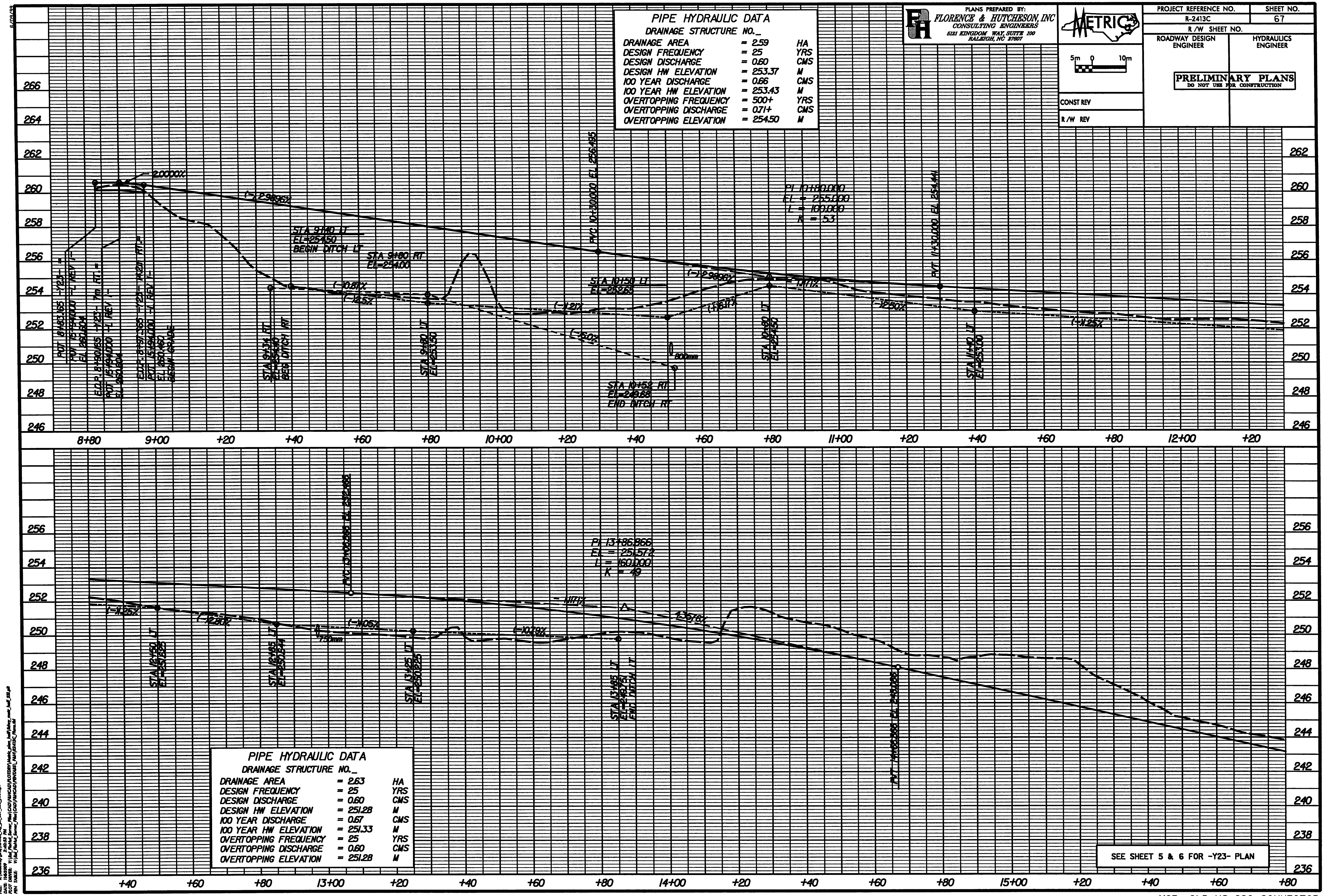
CONST REV

R/W REV



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 2.59	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.60	CMS
DESIGN HW ELEVATION	= 253.37	M
100 YEAR DISCHARGE	= 0.66	CMS
100 YEAR HW ELEVATION	= 253.43	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.71+	CMS
OVERTOPPING ELEVATION	= 254.50	M

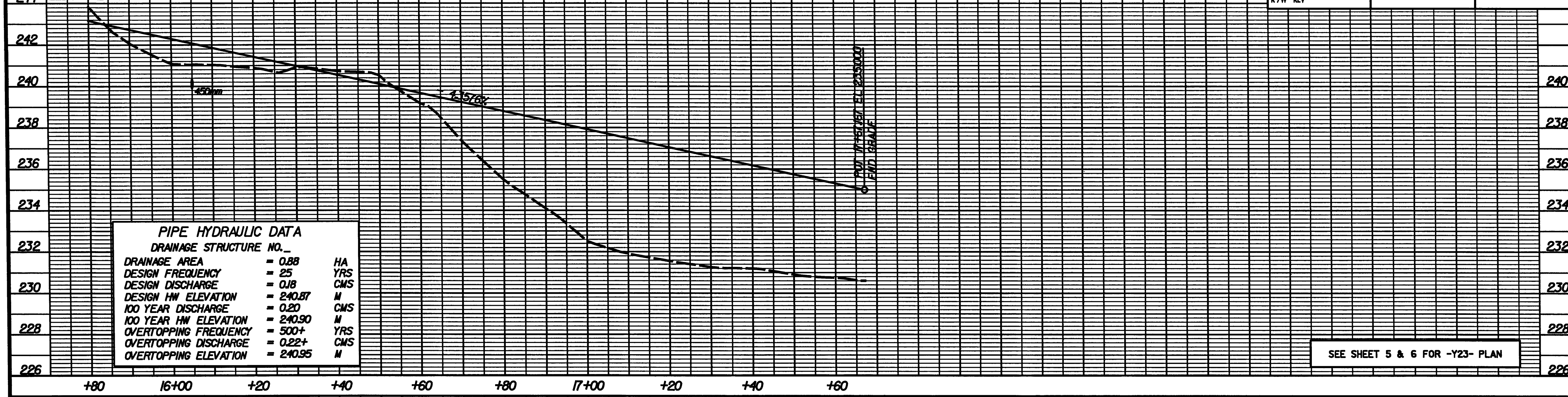
PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 2.63	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.60	CMS
DESIGN HW ELEVATION	= 251.28	M
100 YEAR DISCHARGE	= 0.67	CMS
100 YEAR HW ELEVATION	= 251.33	M
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 0.60	CMS
OVERTOPPING ELEVATION	= 251.28	M

-Y23- OLD US 220 CONNECTOR

PLANS PREPARED BY:		PROJECT REFERENCE NO.	SHEET NO.
FLORENCE & HUTCHESON, INC CONSULTING ENGINEERS 5121 KINGDOM WAY, SUITE 100 RALEIGH, NC 27607	METRIC	R-2413C	68
		R /W SHEET NO.	
	5m 0 10m	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	CONST REV	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
	R /W REV		



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.88	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.18	CMS
DESIGN HW ELEVATION	= 240.87	M
100 YEAR DISCHARGE	= 0.20	CMS
100 YEAR HW ELEVATION	= 240.90	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.22+	CMS
OVERTOPPING ELEVATION	= 240.95	M

SEE SHEET 5 & 6 FOR -Y23- PLAN

-Y23- OLD US 220 CONNECTOR

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	69
R/W SHEET NO.	

PLANS PREPARED BY:
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METRIC

5m 0 10m

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
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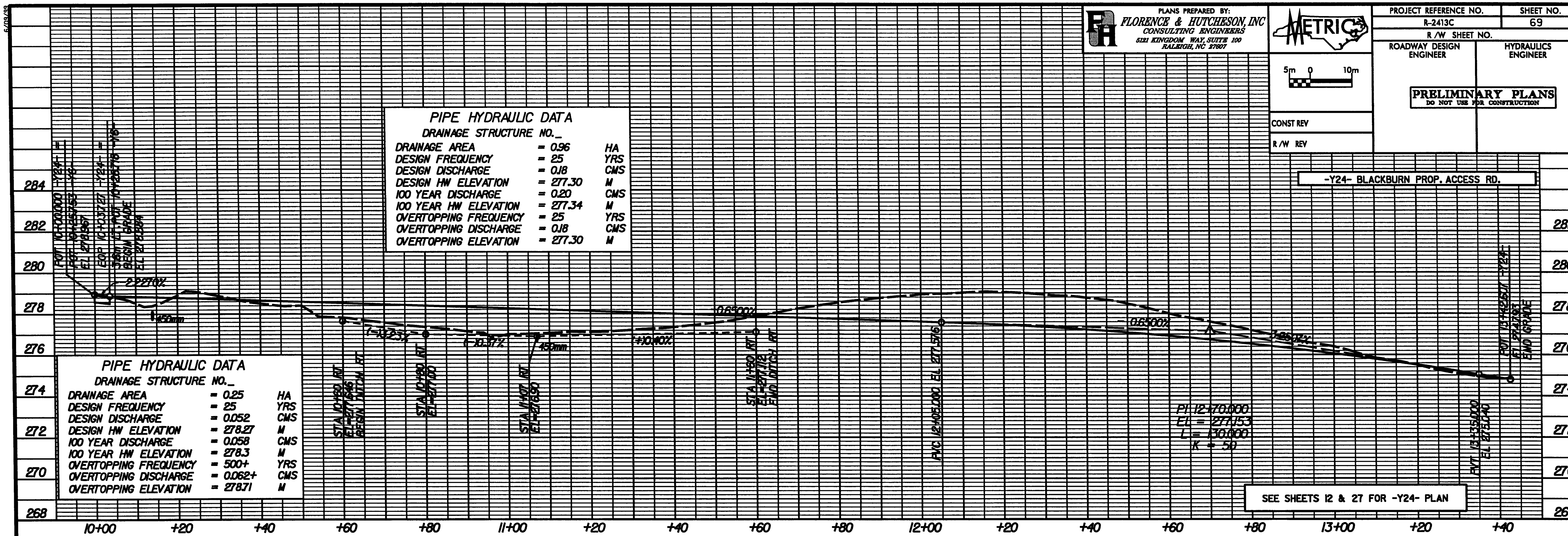
CONST REV

R/W REV

-Y24- BLACKBURN PROP. ACCESS RD.



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

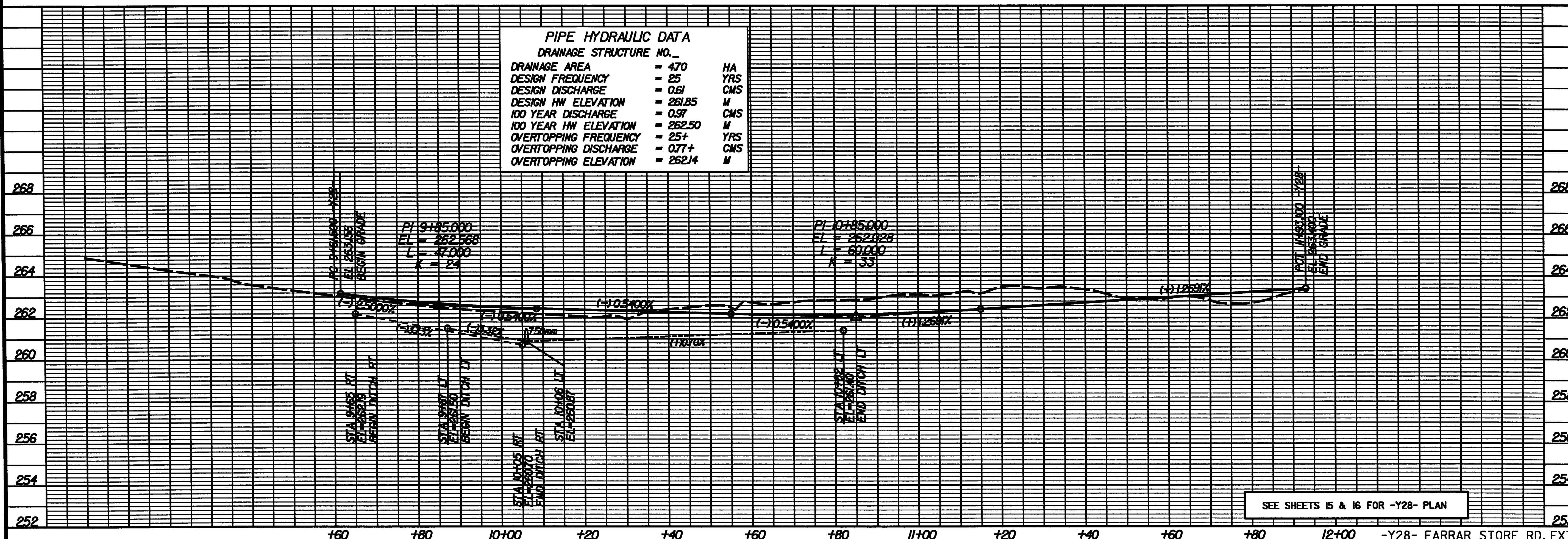
DRAINAGE AREA	= 0.96	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.18	CMS
DESIGN HW ELEVATION	= 277.30	M
100 YEAR DISCHARGE	= 0.20	CMS
100 YEAR HW ELEVATION	= 277.34	M
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 0.18	CMS
OVERTOPPING ELEVATION	= 277.30	M

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.25	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.052	CMS
DESIGN HW ELEVATION	= 278.27	M
100 YEAR DISCHARGE	= 0.058	CMS
100 YEAR HW ELEVATION	= 278.3	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.062+	CMS
OVERTOPPING ELEVATION	= 278.71	M

SEE SHEETS 12 & 27 FOR -Y24- PLAN



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 4.70	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.61	CMS
DESIGN HW ELEVATION	= 261.85	M
100 YEAR DISCHARGE	= 0.97	CMS
100 YEAR HW ELEVATION	= 262.50	M
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 0.77+	CMS
OVERTOPPING ELEVATION	= 262.14	M

SEE SHEETS 15 & 16 FOR -Y28- PLAN

-Y28- FARRAR STORE RD. EXT.

PLANS PREPARED BY:
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METRIC

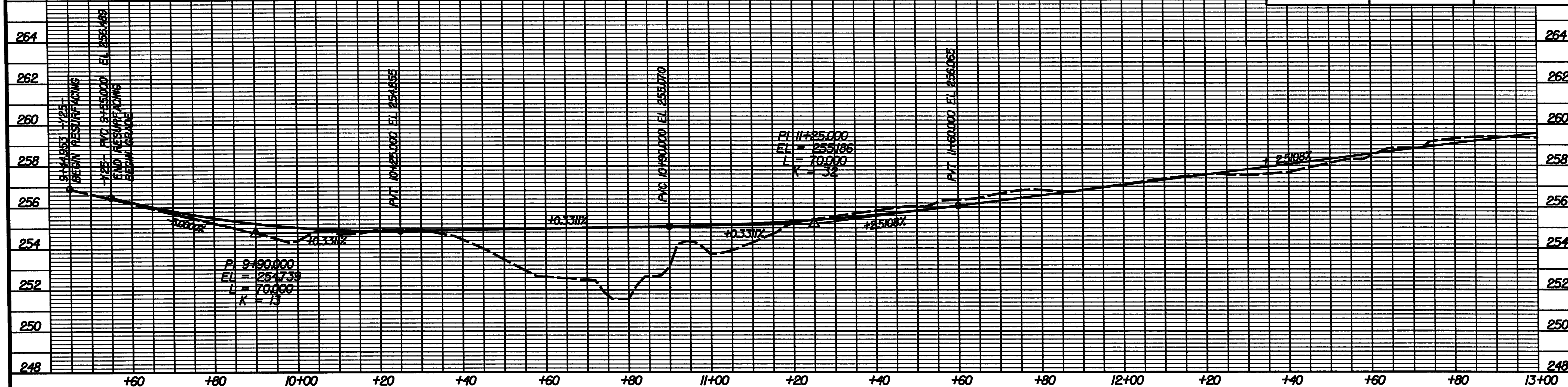
5m 0 10m

CONST REV

R/W REV

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	70
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

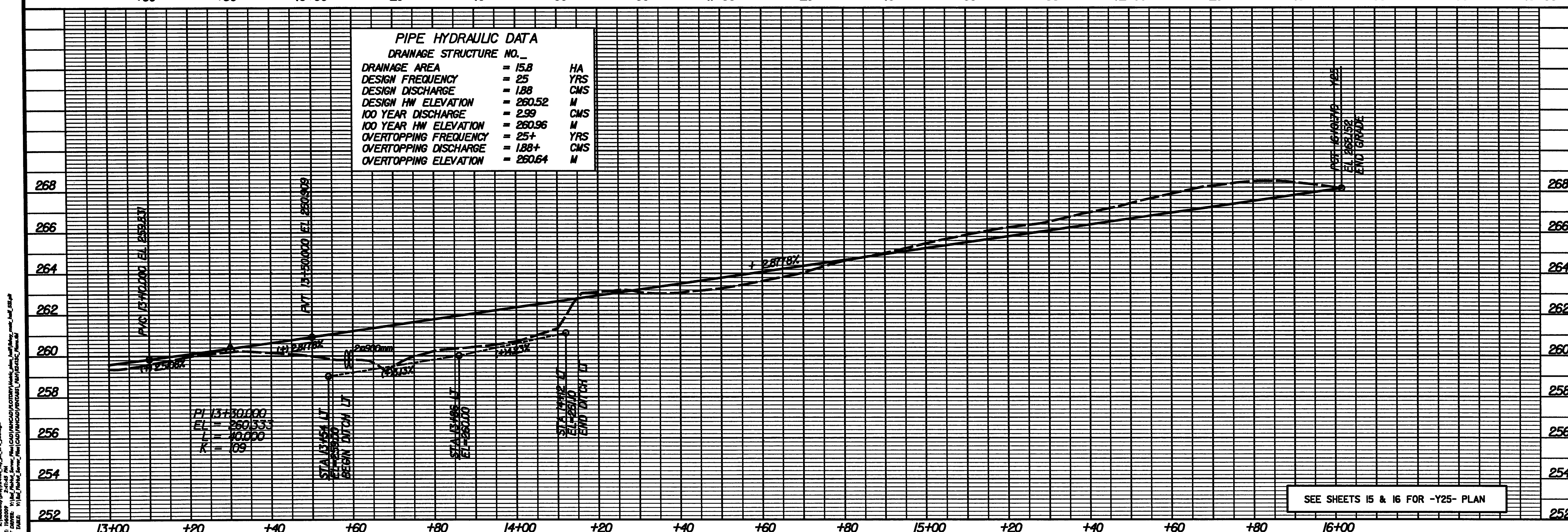
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 15.8	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 1.88	CMS
DESIGN HW ELEVATION	= 260.52	M
100 YEAR DISCHARGE	= 2.99	CMS
100 YEAR HW ELEVATION	= 260.96	M
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 1.88+	CMS
OVERTOPPING ELEVATION	= 260.64	M



-Y25- FRIDDLE PROPERTY ACCESS RD.

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METRIC

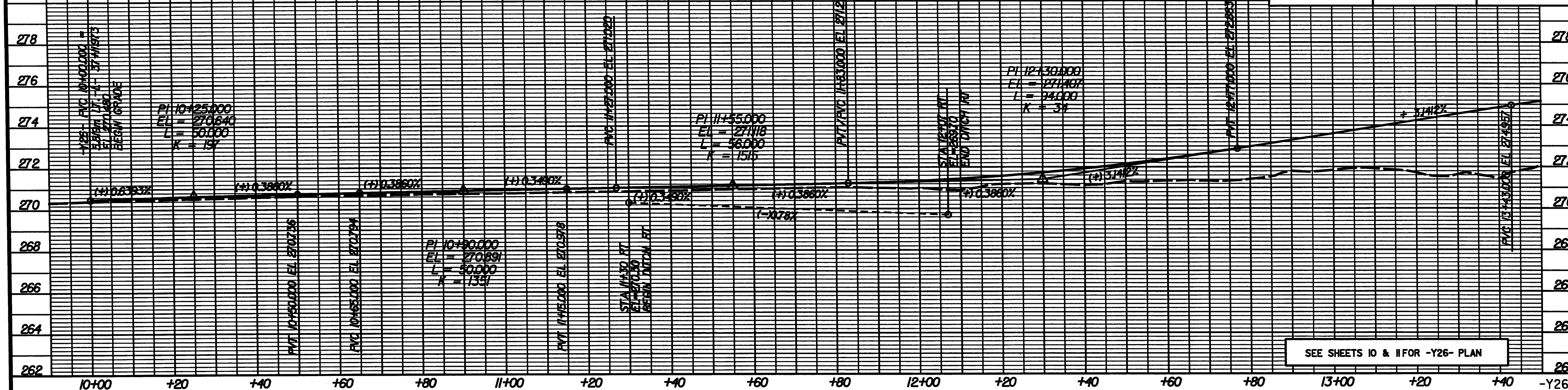
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	71
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

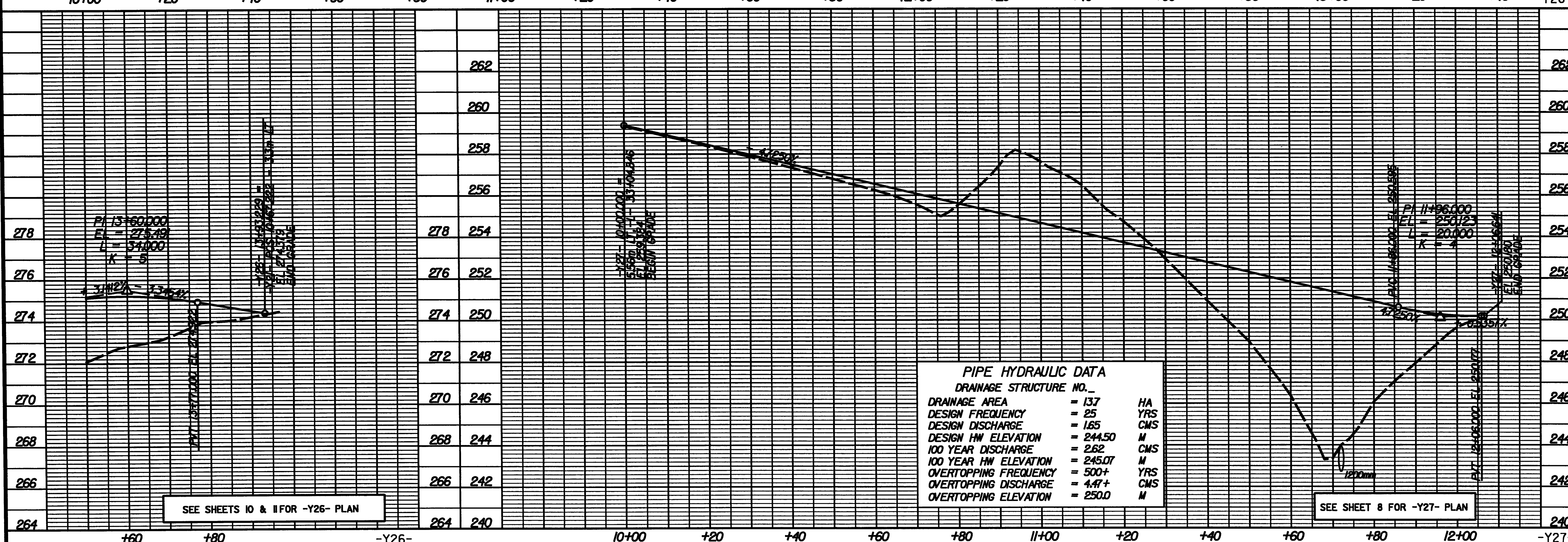
5m 0 10m

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 137	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 1.65	CMS
DESIGN HW ELEVATION	= 244.50	M
100 YEAR DISCHARGE	= 2.62	CMS
100 YEAR HW ELEVATION	= 245.07	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 4.47+	CMS
OVERTOPPING ELEVATION	= 250.0	M

PLANS PREPARED BY:
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METRIC

5m 0 10m

CONST REV

R /W REV

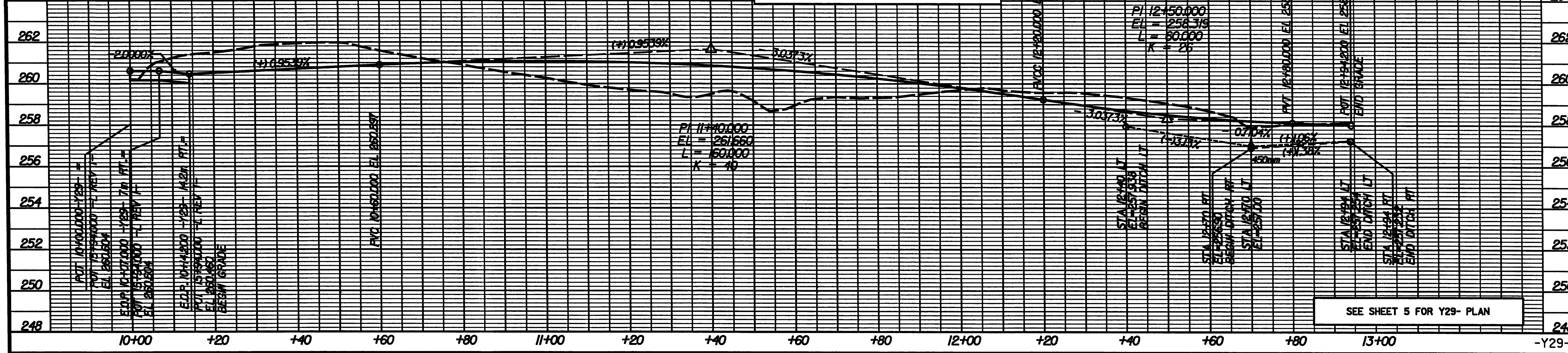
PROJECT REFERENCE NO.	SHEET NO.
R-2413C	72
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 0.18	HA
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 0.04	CMS
DESIGN HW ELEVATION	= 257.15	M
100 YEAR DISCHARGE	= 0.04	CMS
100 YEAR HW ELEVATION	= 257.15	M
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 0.04+	CMS
OVERTOPPING ELEVATION	= 257.2	M



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RALEIGH, NC 27607

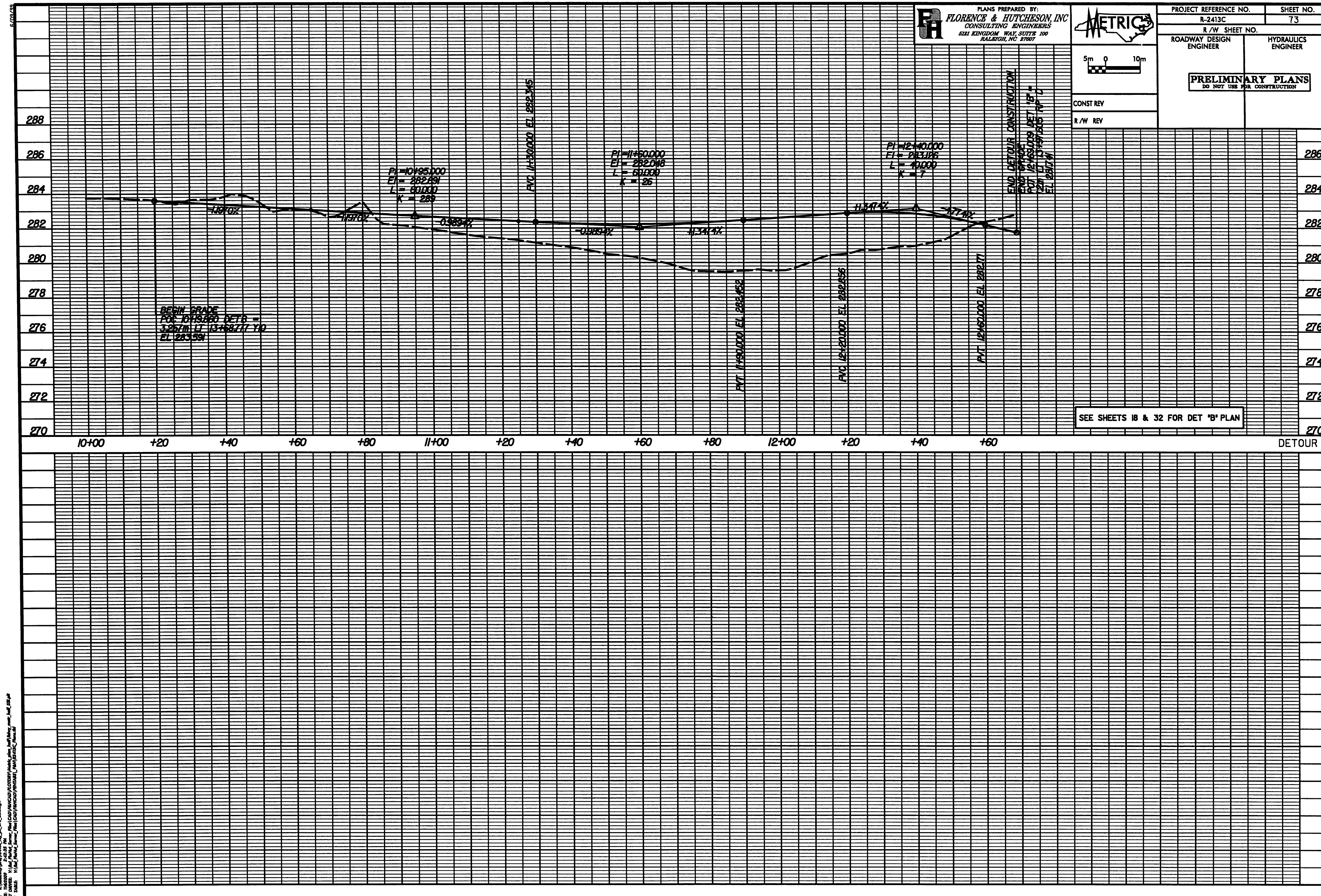
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413C	73
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST REV

R/W REV

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



UTILITIES PERMIT PLAN SHEET