STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

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SECRETARY

July 18, 2003

U.S. Army Corps of Engineers
6508 Falls of the Neuse Road, Suite 120
Raleigh, North Carolina 27615

Attention: Mr. Eric C. Alsmeyer
NCDOT Coordinator

Dear Mr. Alsmeyer:

Subject: Modification to Individual Permit; Wake County; Northern Wake Expressway; State Project No. 8.U401711; TIP Nos. R-2000AA, R-2000AB, and R-2000AC; Action ID No. 199920387 (Original Action ID No. 199601917) $475.00 Debit work order 8.2401701, WBS Element 34365.1.1

The North Carolina Department of Transportation submitted an Individual Section 404 Permit Application to the U.S. Army Corps of Engineers for the subject project on March 29, 1996. On October 10, 1996, the Section 404 Permit was issued by the U.S. Army Corps of Engineers (Action ID No. 199601917), and on September 27, 1996, a Section 401 Water Quality Certification was issued by the N.C. Division of Water Quality (DWQ Project 960319). Section A of the Northern Wake Expressway (Interstate 540) includes R-2000AA, R-2000AB, and R-2000AC and will extend from Interstate 40 in Durham and Wake Counties south to NC 55 in Wake County. This project is located in the Piedmont Physiographic Province in Durham and Wake Counties in the Neuse River Basin Hydrological Cataloguing Unit 03020201 and in the Cape Fear River Basin Hydrological Cataloguing Unit 03030002. Work is scheduled to commence on Sections R-2000AA, R-2000AB, and R-2000AC of the Northern Wake Expressway in October 2003.

In compliance with Special Condition "m", we hereby request that the U.S. Army Corps of Engineers Section 404 Permit and the N.C. Division of Water Quality Section 401 Water Quality Certification be modified to reflect an increase of impacts to wetlands and surface waters from that described in our application dated March 29, 1996. The impacts are depicted on the attached revised permit drawings for Sections R-2000AA, R-2000AB, and R-2000AC.

Please note that the original application was submitted with preliminary plans for Sections R-2000AA, R-2000AB, and R-2000AC. The final plans are now available.

Summary of Impacts: Impacts jurisdictional under the federal Clean Water Act for Sections R-2000AA, R-2000AB, and R-2000AC consist of 1.98 acres of permanent wetland impacts to riverine

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bottomland hardwood forests (Cape Fear River Basin impacts total 1.94 acres and Neuse River Basin impacts total 0.04 acre). Approximately 12,263 linear feet of jurisdictional stream will be impacted by the proposed project (10,669 linear feet in the Cape Fear River Basin and 1,594 linear feet within the Neuse River Basin). Permanent impacts to ponds (fill and/or draining) total 4.95 acres. In addition, 0.05 acre of isolated wetland impacts fall under the North Carolina Isolated Wetland Regulations. There are no temporary wetland impacts.

Table 1: Summary of Jurisdictional Impacts

Section	Permanent Wetland* (ac)	Isolated Wetland (ac)	Temporary Wetland (ac)	Ponds (ac)	Stream Impacts (lf)
R-2000AA	0.90	0.05**	0	1.16	2,753
R-2000AB	1.08	0	0	3.79	8,333
R-2000AC	0	0.001**	0	0	1,177
TOTALS	**1.98**	**0.05**	**0**	**4.95**	**12,263**

*-- Includes fill, excavation, and mechanized clearing.
**--Isolated wetland occurs at Site 5 of Section R-2000AA and Site 1 of Section R-2000AC.

Summary of Mitigation: Sections R-2000AA, R-2000AB, and R-2000AC of the Northern Wake Expressway have been designed to avoid and minimize impacts to jurisdictional areas throughout the NEPA and design processes.

Compensatory mitigation for the impacts of Sections R-2000AA, R-2000AB, and R-2000AC consist of:

- 3.88 acres of wetland restoration at South Buffaloe Creek Mitigation Site (to account for impacts within the Cape Fear River Basin to 1.94 acres of riverine wetland);
- 0.08 acre of wetland restoration at Benson Grove Mitigation Site (to account for impacts within the Neuse River Basin to 0.04 acre of riverine wetland);
- 1,299 linear feet of on-site stream relocation using natural channel design techniques (Cape Fear River Basin);
- 10,547 linear feet will be debited from NCDENR - EEP (Cape Fear River Basin impacts to 8,953 linear feet of stream and Neuse River Basin impacts to 1,594 linear feet of stream); and
- Payment of $738,765.12 to the DWQ Buffer Program, in compliance with the North Carolina Neuse Buffer Regulations, for impacts to regulated riparian buffers.

The U.S. Army Corps of Engineers normally requires a 2:1 ratio for stream restoration. However, the payment of $738,765.12 to the DWQ Buffer Program for stream buffer restoration coupled with the proposed compensatory mitigation for streams at a ratio of 1:1 will result in the adequate restoration of stream ecosystems that provides an effective 2:1 stream mitigation ratio. The DWQ Buffer Program has committed to utilize buffer funds for the restoration of stream ecosystems that may be involved in the following:

1. The DWQ Buffer Program has stated that buffer restoration projects do not always involve stream restoration; however, stream restoration will occur on an unstable stream;
2. Only buffer restoration will occur on a stable stream; and
3. Buffer funds may be used to fund other projects focused on nutrient reduction.

Table 2: Summary of Wetland Mitigation (acres)

Section	Wetlands
	Restoration 2:1
R-2000AA	South Buffaloe Creek (1.80)
R-2000AB	South Buffaloe Creek (2.08) and Benson Grove (0.08)
R-2000AC	NA
TOTALS	**3.96**

Table 3: Summary of Stream Mitigation (linear feet)

Section	Streams		
	EEP 1:1	**Natural Channel Design 1:1**	**No Mitigation Required**
R-2000AA	2,753	0	0
R-2000AB	6,617	1,299	417*
R-2000AC	1,177	0	0
TOTALS	**10,547**	**1,299**	**417**

*The stream length does not require stream mitigation due to the location or the stream health according to Eric Alsmeyer of the U.S. Army Corps of Engineers. This stream length will require a buffer according to John Hennessey of the N.C. Division of Water Quality.

Table 4: Summary of Neuse Buffer Impacts and Mitigation. Units are given in square feet.

Section	Zone 1 Impacts *	Zone 2 Impacts *	Zone 1 Mitigation **	Zone 2 Mitigation **	Total	Costs ($)
R-2000AB	121,317	82,720	361,338	123,427	484,765	465,374.40
R-2000AC	71,516	46,822	214,548	70,234	284,782	273,390.72
TOTALS	**192,833**	**129,542**	**575,886**	**193,661**	**769,547**	**738,765.12**

*--Figures reflect the total buffer impacts for all sites within each zone.
--Figures reflect the total for sites requiring mitigation (mitigation is not required for sites with less than 0.33 acre or bridge sites) **after multiplying by ratios (3:1 for zone 1 and 1.5:1 for zone 2). Wetland impacts within the buffer area were subtracted from the total buffer impacts for each site. These impacts are already being mitigated for.

NEPA DOCUMENT STATUS

The N.C. Department of Transportation submitted an Individual Section 404 (of the Clean Water Act) Permit Application to the U.S. Army Corps of Engineers for the subject project on March 29, 1996. Additional information was submitted to the U.S. Army Corps of Engineers on April 24, 1996, at which time the application was declared to be complete. This permit application documented the status of the NEPA compliance. On April 25, 1996, a 30-day Public Notice was issued by the U.S. Army Corps of Engineers. Comments were received from the public, federal, and state agencies during the Public Notice period that ended May 24, 1996.

RESOURCE IMPACTS

The following section describes impact issues concerned with jurisdictional wetlands and streams associated with Sections R-2000AA, R-2000AB, and R-2000AC. Comparisons of proposed jurisdictional area impacts are made between the original permit application dated March 29, 1996 and the final design plans. Changes in jurisdictional area impacts are

summarized by site. Avoidance and minimization techniques are described in detail for each applicable site in the MITIGATION section of this application.

Delineations: Jurisdictional wetland and stream delineations and riparian buffer evaluations (only within the Neuse River Basin) for Sections R-2000AA and R-2000AB were conducted in April and May 2000 by EcoScience Corporation biologists. Eric Alsmeyer, of the U.S. Army Corps of Engineers Raleigh Regulatory Office, verified the delineations in the field on June 13, 2000. Jurisdictional area delineations of wetlands and streams and riparian buffer evaluations for Section R-2000AC were conducted from January 9 to 11, 2002 by EcoScience Corporation biologists. Eric Alsmeyer, of the U.S. Army Corps of Engineers, verified the delineations on February 5, 2002.

As previously mentioned, the project will result in 1.98 acres of permanent wetland impacts to riverine bottomland hardwood forests (Cape Fear River Basin impacts total 1.94 acres and Neuse River Basin impacts total 0.04 acre). Approximately 12,263 linear feet of jurisdictional stream will be impacted by the proposed project (10,669 linear feet in the Cape Fear River Basin and 1,594 linear feet within the Neuse River Basin). Permanent impacts to ponds (fill and/or draining) total 4.95 acres. In addition, 0.05 acre of isolated wetland impacts fall under the North Carolina Isolated Wetland Regulations. There are no temporary wetland impacts.

Wetland Impacts: The following paragraphs describe the increases in wetland impacts from the 1996 preliminary design to the 2003 final design. Details can be found in the 4C meeting minutes attached to this application for Sections R-2000AA, R-2000AB, and R-2000AC.

In Section R-2000AA, total wetland impacts have increased by 0.03 acre (see Table 5) from the original March 29, 1996 permit application. The original permit application was based on preliminary design plans and did not provide for impacts resulting from mechanized clearing which accounts for 0.03 acre of the current permanent wetland impacts. See Table 6 for changes in wetland impacts from the original permit application for each site in Section R-2000AA.

Explanations for Proposed Wetland Impact Increases (R-2000AA)

- **2003 Site 1:** Site 1 was not included in the 1996 wetland impacts; however, due to design changes the site has been added to the 2003 wetland impacts. Due to the level of service and design capacity for traffic, two loops were added to the diamond interchange. The loops were moved to the opposite corners of the interchange because the project limits were changed. When the final change occurred, the original ramp location needed to be moved creating additional impacts from the original permit application. The wetland impacts total 0.03 acre.
- **1996 Site 3 (2003 Site 4):** In 1996 wetland impacts totaled 0.48 acre, and in 2003 wetland impacts total 0.55 acre. The increase of 0.07 acre consists of 0.02 acre of mechanized clearing and 0.05 acre due to design changes.
- **2003 Site 5:** Site 5 was not included in the 1996 wetland impacts. The Y-line at this site was included in the original design; however, it was not delineated. Due to recent delineations, wetland impacts total 0.05 acre to isolated wetlands.

In Section R-2000AB, total wetland impacts have increased by 0.78 acre (see Table 5) from the original March 29, 1996 permit application. The original permit application was based on

preliminary design plans and did not provide for impacts resulting from mechanized clearing which accounts for an increase of 0.17 acre of permanent wetland impacts. Additional increases in permanent wetland impacts have resulted in an increase of 0.60 acre of fill and 0.01 acre of excavation. See Table 6 for changes in wetland impacts from the original permit application for each site in Section R-2000AB.

Explanations for Proposed Wetland Impact Increases (R-2000AB)

- **1996 Site 4 (2003 Site 1):** In 1996 wetland impacts totaled 0.01 acre, and in 2003 wetland impacts total 0.13 acre. The increase of 0.12 acre consists of 0.01 acre of mechanized clearing and 0.11 acre due to the design of the interchange. The 1996 design had the interchange ramps starting just east of Kit Creek, whereas the present design has the interchange ramps beginning about 2000 feet west of Kit Creek. The increase in wetland impacts is due to the increased footprint.
- **1996 Site 5 (2003 Site 2):** In 1996 wetland impacts totaled 0.01 acre, and in 2003 wetland impacts total 0.32 acre. The increase of 0.31 acre consists of 0.02 acre of mechanized clearing and 0.29 acre due to the design of the interchange. The 1996 design had the interchange ramps starting just east of Kit Creek, whereas the present design has the interchange ramps beginning about 2000 feet west of Kit Creek. The increase in wetland impacts is due to the increased footprint.
- **2003 Sites 3, 7, 8, and 10:** Sites 3, 7, 8, and 10 were not included in the 1996 wetland impacts; however, due to addition of these sites, wetland impacts total 0.32 acre, 0.12 acre, 0.13 acre, and 0.04 acre, respectively.
- **1996 Site 8 (2003 Site 3):** In 1996 wetland impacts totaled 0.26 acre, and in 2003 wetland impacts total 0.32 acre. The increase of 0.06 acre consists of impacts due to mechanized clearing.

In Section R-2000AC, total wetland impacts increased by 0.001 acre (see Table 5) from the original March 29, 1996 permit application. The increase in impacts resulted from fill within an isolated wetland. See Table 6 for changes in wetland impacts from the original permit application for each site in Section R-2000AC.

Explanations for Proposed Wetland Impact Increases (R-2000AC)

- **1996 Site 9 (2003 Site 1):** In 1996 there were no wetland impacts, and in 2003 wetland impacts total 0.001 acre. The increase of 0.001 acre consists of impacts to an isolated wetland.

Table 5: Wetland Impacts (acres)

Action	R-2000AA		R-2000AB		R-2000AC	
Date of Application	1996	2003	1996	2003	1996	2003
Fill	0.92	0.92*	0.30	0.90	0	0.001**
Excavation	0	0	0	0.01	0	0
Mechanized Clearing	NA	0.03	NA	0.17	NA	0
TOTALS	0.92	0.95*	0.30	1.08	0	0.001**

* -- Include impacts to 0.05 acre of isolated wetland at Site 5.

** -- Depicts impacts to an isolated wetland.

Table 6: Changes in Proposed Wetland Impacts for 1996 and 2003. Areas are given in acres. An increase in impact from 1996 to 2003 is depicted by a positive number in the "Change in Impact" column; while a decrease in impact from 1996 to 2003 is depicted by a negative number.

Section R-2000AA			Section R-2000AB			Section AC		
Site Number		Change in Impact	Site Number		Change in Impact	Site Number		Change in Impact
1996	2003		1996	2003		1996	2003	
NA	1	+0.03	4	1	+0.12	9	1	+0.001*
1	2	No change	5	2	+0.31			
2	3	**-0.12**	8	3	+0.06			
3	4	+0.07	NA	7	+0.12			
NA	5	+0.05	NA	8	+0.13			
			NA	10	+0.04			
			7	6	No change			
Total Change		**+0.03**	**Total Change**		**+0.78**	**Total Change**		**+0.001***

* -- Depicts impacts to an isolated wetland.

Stream Impacts:

R-2000AA: The total length of stream impacts in Section R-2000AA requiring mitigation is 2,753 linear feet. Table 7 presents the jurisdictional stream impacts and the associated mitigation needs for Section R-2000AA. Table 8 presents information for each of the streams impacted in Section R-2000AA.

R-2000AB: The total length of stream impacts in Section R-2000AB requiring mitigation is 6,617 linear feet. Table 7 presents the jurisdictional stream impacts and the associated mitigation needs for Section R-2000AB. Table 9 presents information for each of the streams impacted in Section R-2000AB. Within Sites 3 and 6, 1,299 linear feet of stream will be relocated using natural channel design techniques and mitigation credit will be received at a 1:1 ratio (see sheets 19, 20, 32, 32, and 45 to 59 of the Section R-2000AB permit drawings for design details and morphological tables).

- **Site 3:** In Site 3, 410 linear feet of stream, from Stations 11+90 to 13+39, (Sheets 19, 20, and 45 to 59) will be relocated using natural channel design techniques.
- **Site 6:** In Site 6, 889 linear feet of stream, from Station 10+39 to 12+76 (Sheet 32, 33, and 45 to 59) will be relocated using natural channel design techniques.

The proposed streams are designed according to "Natural Channel" design principles.
Note that impacts at Site 11 are non-jurisdictional.

R-2000AC: The total length of stream impacts in Section R-2000AC requiring mitigation is 1,177 linear feet. Table 7 presents the jurisdictional stream impacts and the associated mitigation needs for Section R-2000AC. Table 10 presents information for each of the streams impacted in Section R-2000AC.

Table 7: Stream Impacts (linear feet)

Action	Section AA		Section AB		Section AC	
Date of Application	**1996**	**2003**	**1996**	**2003**	**1996**	**2003**
Jurisdictional Streams	NA	2,753	NA	8,333	NA	1,177
Jurisdictional Streams Requiring Mitigation	NA	2,753	NA	7,916	NA	1,177
On-site Mitigation[1]	NA	0	NA	1,299	NA	0
Off-site Compensatory Mitigation	NA	2,753	NA	6,617	NA	1,177

1 -- Natural channel design and relocation of stream lengths.

Table 8: Section R-2000AA Stream Information

Site	Station No.	Structure	Stream	DWQ Index No.	Impact (linear feet)	Mitigation Required	HUC
1	20+90 to 22+55	--	UT to Kit Creek	16-41-1-17-2-(.7)	843	Yes	03030002
2	26+25 to 26+80	(2) 9' x 7' RCBC	UT to Kit Creek	16-41-1-17-2-(.7)	585	Yes	03030002
3	29+73 to 30+72	66" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	474	Yes	03030002
4	35+00 to 35+60	(2) 10' x 6' RCBC	UT to Kit Creek	16-41-1-17-2-(.7)	476	Yes	03030002
5	16+05 to 16+62	54" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	116	Yes	03030002
7	14+55	30" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	259	Yes	03030002
Total					**2,753**		

Table 9: Section R-2000AB Stream Information

Site	Station No.	Structure	Stream	DWQ Index No.	Impact (linear feet)	Mitigation Required	HUC
1	42+60/ 43+15	48" RCP/ 24" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	1,174	Yes	03030002
3	44+60 to 55+20	42" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	1,975	Yes	03030002
4	45+26/ 10+52	(2) 13' x 10' RCBC/ 60" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	1,128	Yes	03030002
5	49+67	24" RCP	UT to Kit Creek	16-41-1-17-2-(.7)	509	Yes	03030002
6	50+82/ 50+20 to 55+00/ 12+77/ 54+47	30" RCP/ 10' x 9' RCBC/ 8' x 7' RCBC	UT to Kit Creek	16-41-1-17-2-(.7)	3,130	Yes	03030002
9	5+20	36" RCP	UT to Stirrup Iron Creek	27-33-4-2	417	No	03020201
11	70+40	24" RCP	UT to Stirrup Iron Creek	27-33-4-2	Not Jurisdictional	No	03020201
Total					**7,916***		

*The total does not include stream lengths that do not require mitigation.

Table 10: Section R-2000AC Stream Information

Site	Station No.	Structure	Stream	DWQ Index No.	Impact (linear feet)	Mitigation Required	HUC
2	73+80 to 75+90	(2) 10' x 8' RCBC	UT to Stirrup Iron Creek	27-33-4-2	1,072	Yes	03020201
3	30+50	(3) 10' x 10' RCBC	Stirrup Iron Creek	27-33-4-2	105	Yes	03020201
Total					**1,177**		

PROTECTED SPECIES

Plants and animals with a Federal classification of Endangered or Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of February 11, 2003, the U.S. Fish and Wildlife Service lists three species for Durham County, North Carolina, and as of February 25, 2003, the U.S. Fish and Wildlife Service lists four species for Wake County, North Carolina (see Table 10).

Table 10: Federal Protected Species for Durham and Wake Counties

Scientific Name	Common Name	Status	County
Haliaeetus leucocephalus	bald eagle	Threatened*	Durham & Wake
Picoides borealis	red-cockaded woodpecker	Endangered	Wake
Alasmidonta heterodon	dwarf wedgemussel	Endangered	Wake
Echinacea laevigata	smooth coneflower	Endangered	Durham
Rhus michauxii	Michaux's sumac	Endangered	Durham & Wake

Endangered -- a species that is in danger of extinction throughout all or a significant portion of its range.
Threatened -- a species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
* -- a species proposed for delisting.

Surveys of suitable habitat were completed within Sections R-2000AA, R-2000AB, and R-2000AC of the Northern Wake Expressway by EcoScience biologists on June 4, 6, and 12, 2003. Biological conclusions of "May Affect, Not Likely to Adversely Affect" were concluded and documented for all species within Sections R-2000AA, R-2000AB, and R-2000AC, with the exception of the dwarf wedgemussel. A biological conclusion of "No Effect" was concluded and documented for the dwarf wedgemussel within Sections R-2000AA, R-2000AB, and R-2000AC.

Bald eagle: Marginal habitat for bald eagle exists within and adjacent to the study corridor near several bodies of water. No bald eagle or bald eagle nests were found during a search within the study corridor and 1 mile surrounding the study corridor. N.C. Natural Heritage Program records contain no known documentation of this species within 5 miles of the study corridor and the presence of bald eagle was discounted during the 1996 survey. Based on a N.C. Natural Heritage Program record search, professional judgment, and searches conducted for bald eagle nests within the study corridor as well as within 1 mile of the study corridor, this project may affect but is not likely to adversely affect bald eagle.

Red-cockaded woodpecker: Marginal foraging habitat and one cluster of pine trees providing marginal nesting habitat for red-cockaded woodpecker occurs within the study corridor. No additional nesting habitat was observed within 0.5 mile of potential foraging habitat, and no nesting/cavity trees occur within the cluster of potential nesting habitat. In addition, no red-cockaded woodpeckers were observed during field surveys. N.C. Natural Heritage Program records contain no known documentation of this species within 11 miles of the study corridor and the presence of red-cockaded woodpecker was discounted during the 1996 survey. Therefore, based on N.C. Natural Heritage Program records, professional judgment, and searches for foraging habitat, nesting habitat, and cavity trees, this project may affect but is not likely to adversely affect red-cockaded woodpecker.

Dwarf wedgemussel: No suitable habitat for the dwarf wedgemussel occurs within the study corridor. Streams within the study corridor are composed primarily of a silt/clay substrate. Siltation within the streams is high, clarity is poor, and flow is slow. In addition, streams within Wake County/Neuse River basin portion of the study corridor do no support suitable habitat for dwarf wedgemussels. These streams are intermittent, and therefore are unsuitable habitat for any mussel species. No mussels or relict shells were observed during field surveys. N.C. Natural Heritage Program Records indicate that the nearest known occurrence is approximately 19 miles southeast of the study corridor, in the Neuse River, and the presence of dwarf wedgemussel was

discounted during the 1996 survey. Based on the lack of suitable habitat, this project will have no effect on dwarf wedgemussel.

Michaux's sumac: Suitable habitat for Michaux's sumac occurs in numerous locations within the study corridor, and N.C. Natural Heritage Program records document the nearest known record of this species to occur approximately 5 miles east of the study corridor. However, systematic surveys within all areas of suitable habitat resulted in no findings of this species. Based on surveys conducted by EcoScience personnel, this project may affect but is not likely to adversely affect Michaux's sumac. Construction of the roadway project will open new areas which may provide additional suitable habitat for Michaux's sumac. Forest edges and roadside verges which are intermittently mowed will be created within the study corridor. Thus, highway construction may expand potential habitat for this plant.

Smooth coneflower: Suitable habitat for smooth coneflower occurs in numerous locations within the study corridor, and N.C. Natural Heritage Program records document the nearest known record of this species to occur approximately 14 miles north of the study corridor. However, systematic surveys within all areas of suitable habitat resulted in no findings of this species. Based on surveys conducted by EcoScience personnel, this project may affect but is not likely to adversely affect smooth coneflower. As with Michaux's sumac, roadway construction will likely open new areas favorable for the establishment and survival of smooth coneflower.

CULTURAL RESOURCES

The 1990 Memorandum of Agreement (MOA) was incorporated into the permit issued by the U.S. Army Corps of Engineers in 1996 for this project. In compliance with Special Condition "u" of that permit, the N.C. Department of Transportation will ensure compliance with the requirements set forth in Sections I and II of the MOA between the Federal Highway Administration, the N.C. Department of Transportation, and the N.C. State Historic Preservation Office.

Historic Buildings and Landscapes: Stipulations addressed in Section I of the 1990 MOA do not pertain to Sections R-2000AA, R-2000AB, and R-2000AC. Based on architectural surveys conducted in 1988, Sections R-2000AA, R-2000AB, and R-2000AC of the Northern Wake Expressway highway project will have no effect on historic properties. No further surveys are necessary.

Archaeological Properties: All actions addressed in Stipulation II of the 1990 MOA have been carried out in order to take into account the effect of the highway project on archaeological resources.

1. Intensive Archaeological Survey: Intensive archaeological surveys of the final alignment and right-of-way of the specified portions of the Northern Wake Expressway were completed in 1992 and 1994. The 1994 archaeological survey covers the area "from NC54 to the west side of Kit Creek" described in the in the 1990 Memorandum of Agreement. No additional archaeological investigations will be required.
2. Properties Identified: During the course of these surveys no archaeological sites identified through the archaeological surveys and/or testing program were recommended as eligible for the National Register. The N.C. State Historic Preservation Office has

concurred with these recommendations. Documentation of these findings will be provided prior to the project let date.

3. Data Recovery Plan: No data recovery investigations were required for the project; therefore, no data recovery plans were developed.

UTILITY IMPACTS

In addition to impacts from the construction of the road, impacts often result from the need to move existing utilities. These impacts to jurisdictional areas result from activities that "but for" the construction of the road would not have occurred. The following paragraph describes and quantifies the "but for" impacts. Occasionally, a utility company will decide to upgrade a line or construct a new line near the proposed highway right-of-way. The impacts from these activities would have occurred whether or not the road project was constructed. Therefore, these impacts do not fall under the "but for" scenario. In those cases, the utility company is responsible for obtaining any permits and the impacts are not addressed in the highway project application. However, if the information is available to us we will attempt to identify these "non-but for" actions so that you are kept informed about the actions that may occur near our right-of-way.

According to the N.C. Department of Transportation, no utility relocations will result in additional impacts to wetlands and/or buffer zones. One water line will pass through a wetland area within Section R-2000AB near the Davis Drive interchange; however, this area is already included as a wetland fill impact. In addition, one sewer line already exists within the same location; however, the sewer line will not be relocated.

FEMA COMPLIANCE

According to the N.C. Department of Transportation Hydraulics engineers, the N.C. Department of Transportation has achieved compliance with Federal Emergency Management Agency for Sections R-2000AA, R-2000AB, and R-2000AC. Section R-2000AA contains no stream reaches crossing detailed flood studies; therefore, no Federal Emergency Management Agency involvement is required.

Section R-2000AB impacts two streams (tributaries to Kit Creek) that are subject to Federal Emergency Management Agency compliance. The first tributary to Kit Creek has three box culverts within the project limits. They are located at Station 15+60 –YCFLY-, Station 45+26 – L-, and Station 13+40 –Y19REV-. The proposed culvert at Station 13+40 –Y19REV- (Davis Drive) is a 2 @ 13-feet x 11-feet box culvert which replaces the existing 2 @ 8-feet x 7-feet box culvert. This drops the 100-year water surface elevation at these three box culvert crossings. Thus, a "no rise" is achieved. The second tributary to Kit Creek has four box culverts within the project limits; however, only two box culverts occur within the detailed study reach of the stream. The 100-year water surface elevations along this reach will increase; however, the increase will be contained within NCDOT right-of-way. Therefore, no map revision will be required. The remaining two box culverts along this tributary are outside of the detailed study limits.

Section R-2000AC impacts two streams (Stirrup Creek and a tributary to Stirrup Creek). However, only the Stirrup Creek crossing is located in a Federal Emergency Management Agency detailed study. The crossing at Stirrup Creek calls for a 3 @ 10-feet x 10-feet RCBC

outlet extension. Upstream of the existing culvert is impounded. The outlet extension causes "no rise"; therefore, Federal Emergency Management Agency involvement will not be required.

MITIGATION

The U.S. Army Corps of Engineers has adopted, through the Council on Environmental Quality, 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 "waters of the United States." Mitigation of wetland and surface water impacts has been defined to include avoidance of impacts, minimization of impacts, rectification of impacts, reduction of impacts over time, and compensation for impacts (40 CFR 1508.20). Executive Order 11990 (Protection of Wetlands) and Department of Transportation Order 5660.1A (Preservation of the Nations Wetlands) emphasize protection of the functions and values provided by wetlands. These directives require that new construction in wetlands be avoided as much as possible and that all practicable measures be taken to minimize or mitigate impacts to wetlands.

As stated in the original permit application dated March 29, 1996, the Northern Wake Expressway has been designed by the N.C. Department of Transportation to incorporate all reasonable and practicable design features to avoid and minimize impacts to jurisdictional areas. Avoidance measures were taken during the NEPA and planning processes. Minimization measures were implemented during the design phase to include the examination of appropriate and practicable steps to reduce adverse impacts from the project.

Avoidance: All areas not affected by the project will be protected from unnecessary encroachment.

1. No staging of construction equipment or storage of construction supplies will be allowed in wetlands or near surface waters.
2. R-2000AB, Site 1: "In-line" Type A detention basins on intermittent/buffered streams were determined to be unnecessary and were removed from the design at Stations 43+50, 4+60, and 71+70.

Minimization: Minimization includes the examination of appropriate and practicable steps to reduce any adverse impacts. Minimization techniques were implemented as follows:

1. High Quality Waters Best Management Practices: N.C. Department of Transportation has committed that "construction related impacts associated with the proposed action will be minimized through the use of High Quality Waters erosion and sediment control measures. All practical measures have been taken to minimize environmental harm".
2. Slopes: Fill slopes in wetlands are at a 2:1 ratio where possible and feasible.
3. Ditching: N.C. Department of Transportation policy calls for the elimination of lateral ditching in wetlands as much as possible, thus preserving the hydrology of adjacent wetlands. Lateral ditching within wetlands does not occur within Sections R-2000AA, R-2000AB, and R-2000AC.
4. Median Width: The project was designed using a median 46 feet in width.
5. Grass Swale Treatment: Grass swales are being used everywhere possible even in areas that are not "buffered" streams.
6. R-2000AA, Site 3: Wetland impacts were reduced at this location from the original application.

7. R-2000AA, Site 7: Rock vanes have been added to the design and permit due to incision of the channel at this site.
8. R-2000AB, Site 7: A ditch was removed from the design plans within the wetland at Station 60+90.
9. R-2000AB, Site 9 (Buffer Site 1): The need to raise grate inlets inside the loop was eliminated due to adequate treatment provided from the grassed swales prior to entering inlets. Therefore, the ditches provide adequate treatment and the grate was lowered to ditch the elevation.
10. R-2000AC, Site 1: A cross vane/rock weir will be used at the culvert on this site.
11. R-2000AC: Ditches were tied into the tributary to Stirrup Iron Creek at minimum depth, and the stream bank will be protected by rip-rap.

Compensation: The primary emphasis of compensatory mitigation is to reestablish a condition similar to what would have existed if the project was not built. As previously stated, mitigation is limited to reasonable expenditures and practicable considerations related to highway operation. Mitigation is generally accomplished through a combination of methods designed to replace wetland functions and values lost as a result of project construction. These methods consist of creation of new wetlands from uplands, borrow pits, and other nonwetland areas; restoration of wetlands; and enhancement and preservation of existing wetlands.

Federal Highway Administration Step Down Compliance: All compensatory mitigation must be in compliance with 23 CFR Part 777.9 "Mitigation of Impacts" which describes the actions to follow to qualify for Federal-aid highway funding. This process is known as the Federal Highway Administration "Step Down" procedures:

1. Consideration must be given to mitigation within the right-of-way and should include the enhancement of existing wetlands and the creation of new wetlands in the highway median, borrow pit areas, interchange areas, and along the roadside.
2. Where mitigation within the right-of-way does not fully offset wetland losses, compensatory mitigation may be conducted outside the right-of-way including creation, restoration, enhancement, and preservation.

NCDENR/EEP COMMITMENT: Based upon the agreements stipulated in the "Memorandum of Agreement Among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U.S. Army Corps of Engineers, Wilmington District (MOA)", it is understood that the North Carolina Department of Environment and Natural Resources Ecological Enhancement Program (EEP), will assume responsibility for satisfying the Section 404 compensatory mitigation requirements for NCDOT projects that are listed in Exhibit 1 of the subject MOA during the Ecological Enhancement Program (EEP) transition period which ends on July 1, 2005.

Since the subject project is listed in Exhibit 1 the necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the same Ecoregion and the same 8-digit cataloguing unit. We have avoided and minimized the impacts to jurisdictional resources to the greatest extent possible as described above. The remaining impact to 10,547 feet of jurisdictional streams will be compensated for by mitigation provided by the EEP program.

WETLAND COMPENSATORY MITIGATION: In accordance with condition "k2" of the 1996 permit, mitigation at South Buffaloe Creek and Benson Grove has been implemented, constructed, and planted for Sections R-2000AA, R-2000AB, and R-2000AC. Mitigation plans for South Buffaloe Creek and Benson Grove were transmitted to the agencies under a separate cover from this application. Tables 11 and 12 present the mitigation available at South Buffaloe Creek and Benson Grove, and indicate the projects for which each type of mitigation was used.

Table 11: South Buffaloe Creek Mitigation Ledger

South Buffaloe Creek	Mitigation Plan		TIP Debit	TIP Debit	TIP Debit	TIP Debit	TIP Debit
Habitat	Acres at Start	Acres Remaining	U-2525A/ I-2402	I-2201F	I-2402D	I-2201E	R-2000AA/ AB
BLH Restoration	15.53	1.10	9.1	0.96	0.35	0.14	3.88
BLH Preservation	16.2	2.21	9.4	3.36	1.23	0	0
TOTAL	**31.73**	**3.31**	18.5	4.32	1.58	0.14	3.88

Table 12: Benson Grove Mitigation Ledger

Benson Grove	Mitigation Plan		TIP Debit	TIP Debit	TIP Debit
Habitat	Acres at Start	Acres Remaining	R-2547	R-2000F&G	R-2000AB
Swamp/BLH Restoration	30.49	0	8.6	21.81	0.08
BLH Preservation	50.50	0	0	50.50	0
TOTAL	**80.99**	**0**	8.6	72.31	0.08

South Buffaloe Creek Mitigation Site: South Buffaloe Creek is located in the South Buffaloe Creek floodplain within the Cape Fear River subbasin 03-06-02. This site comprises approximately 58 acres located in Guilford County west of the NC 6 interchange with Interstate 85 on the southeast side of Greensboro. Site construction involved the installation of a subsurface impervious wall to retard groundwater flow in support of swamp and bottomland hardwood forest communities. The South Buffaloe Creek Mitigation Site currently has 15.53 acres of restoration and 16.2 acres of preservation in the ground.

Benson Grove Mitigation Site: Benson Grove is located in the Black Creek floodplain within the Neuse River subbasin 03-04-04. This site comprises approximately 81.91 acres located just west of NC 50 on Zacks Mill Road (SR 1319) in Johnston County. Black Creek forms the southern property boundary. Benson Grove consists predominantly of riverine floodplain terrace. The U.S. Army Corps of Engineers conducted a review of the site and made a formal jurisdictional determination on November 10, 1999. Part of this jurisdictional determination included a review of information provided by the Natural Resources Conservation Service regarding "Prior Converted" agricultural areas. Benson Grove Mitigation Site currently has 30.49 acres of restoration and 50.50 acres of preservation in the ground.

Wetland Mitigation: Wetland impacts total 1.98 acres of riverine bottomland hardwood forests (1.94 acres of impact in the Cape Fear River Basin and 0.04 acre of impact in the Neuse River Basin). Approval is requested for compensatory mitigation provided by the N.C. Department of Transportation's South Buffaloe Creek Mitigation Site and Benson Grove Mitigation Site. We are aware that the N.C. Division of Water Quality requires a minimum of 1:1 restoration/creation mitigation. The following combination of compensatory mitigation is proposed.

1. 3.88 acres of wetland restoration at a ratio of 2:1 at South Buffaloe Creek and
2. 0.08 acres of wetland restoration at a ratio of 2:1 at Benson Grove.

Stream Mitigation: Stream impacts total 12,263 linear feet of impacts to first-, second-, and third-order perennial streams. The following combination of on-site stream relocation and compensatory mitigation is proposed.

1. Natural channel design and relocation of 1,299 linear feet of stream impacted within Section R-2000AB at a mitigation ratio of 1:1.
2. Compensatory mitigation will consist of a 1:1 debiting to the EEP for the remaining 10,547 linear feet of stream impacts.
3. In addition, 417 linear feet of stream within Site 9 of Section R-2000AB does not require stream mitigation according to Eric Alsmeyer of the U.S. Army Corps of Engineers.

Although the U.S. Army Corps of Engineers normally requires a 2:1 ratio for stream restoration, a payment of $738,765.12 will be submitted to the DWQ Program for stream buffer restoration and compensatory mitigation for streams will occur at a ratio of 1:1 resulting in the adequate restoration of stream ecosystems to result in an effective 2:1 stream mitigation ratio. The DWQ has committed to utilize buffer funds for the restoration of stream ecosystems that may be involved in the following:

1. The DWQ Program has stated that buffer restoration projects do not always involve stream restoration; however, stream restoration will occur on an unstable stream;
2. Only buffer restoration will occur on a stable stream; and
3. Buffer funds may be used to fund other projects focused on nutrient reduction.

INDIRECT AND CUMULATIVE IMPACTS (ICI)

No quantitative indirect and cumulative secondary impacts study is needed for Sections R-2000AA, R-2000AB, and R-2000AC as stated by John Hennessy of the N.C. Division of Water Quality on April 29, 2003 at the Interagency Hydraulic Design 4C Review Meeting for R-2000AA.

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Individual 404 Permit modification and a 401 Water Quality Certification from the N.C. Division of Water Quality as required for the activities described above. In compliance with Section 143-215.3D(e) of the NCAC, we will provide $475.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line). Seven copies of this application are provided to the N.C. Department of Environment and Natural Resources, Division of Water Quality, for their

review. We request that the DWQ issue an Authorization Certificate pursuant to 15A NCAC 2B .0233 for the proposed use (see attached Neuse Buffer Addendum).

If you have any questions or need any additional information please call Ms. Alice N. Gordon at (919) 715-1421.

Sincerely,

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

Mr. John Dorney, NCDWQ (7 copies)
Mr. Travis Wilson **(Div. 5)**, NCWRC
Ms. Kathy Matthews, USEPA
Mr. Gary Jordan **(Div. 5)** USFWS
Mr. John F. Sullivan III, P.E., FHWA
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Ms. Debbie Barbour, P.E., Highway Design
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. Jon Nance, P.E. **(Div. 5)** Division Engineer
Mr. Chris Murray **(Div. 5)** DEO
Mr. David Franklin, USACE, Wilmington (Cover Letter Only)
Mr. William D. Gilmore, P.E., EEP, Raleigh

NEUSE BUFFER ADDENDUM

The purpose of the Neuse Buffer Addendum is to provide the North Carolina Division of Water Quality (DWQ) with the necessary information to evaluate impacts of the project on Neuse Buffer areas. In addition, material is presented in this addendum to illustrate that the project has been designed to comply with the Riparian Buffer Mitigation Program (15A NCAC 2B .0242) and the Neuse River Basin Riparian Buffer Rules (15A NCAC 2B .0233). Therefore, we request that the DWQ issue an Authorization Certificate pursuant to 15A NCAC 2B .0233 for the proposed use.

The North Carolina Department of Transportation (NCDOT) proposes to construct a new controlled-access, six lane, divided highway constructed on a new location to be known as Sections R-2000AA, R-2000AB, and R-2000AC of the Northern Wake Expressway (I-540) in Wake County, North Carolina. These sections extend from a point west of NC 55 approximately 4.5 miles to the Interstate 40/I-540 interchange in Durham and Wake Counties. Portions of R-2000AB and all of R-2000AC occur within the Neuse River Basin, the remainder occurs within the Cape Fear River Basin.

Neuse Buffer Impacts: Due to the nature of this project, impacts to the riparian buffers of unnamed tributaries are unavoidable. Within Sections R-2000AB and R-2000AC, sites have been numbered and the buffer impacts for each were calculated. The calculations are presented in Tables A-1 and A-2 (see attached tables). The buffer impacts, necessary mitigation, and mitigation costs are summarized in the following unnumbered table.

Summary of Neuse Buffer Impacts and Mitigation (square feet)

Section	Zone 1 Impacts *	Zone 2 Impacts *	Zone 1 Mitigation **	Zone 2 Mitigation **	Total Mitigation	Costs ($) For Mitigation
R-2000AB	121,317	82,720	361,338	123,427	484,765	465,374.40
R-2000AC	71,516	46,822	214,548	70,234	284,782	273,390.72
TOTALS	**192,833**	**129,542**	**575,886**	**193,661**	**769,547**	**738,765.12**

*--Figures reflect the total buffer impacts for all sites within each zone.

--Figures reflect the total for sites requiring mitigation (mitigation is not required for sites with less than 0.33 acre or bridge sites) **after multiplying by ratios (3:1 for zone 1 and 1.5:1 for zone 2). Wetland impacts within the buffer area were subtracted from the total buffer impacts for each site. These impacts are already being mitigated for.

NCDOT's avoidance and minimization of impacts to streams and wetlands (discussed above in MITIGATION) by default represents avoidance and minimization of impacts to buffers. Drainage flowing in the general direction of the regulated buffers was handled so that the 50-foot buffer zone would not be directly impacted. The goal of the NCDOT was to design the project so that the effects of the drainage would not result in water quality impacts to waters of the Neuse River Basin as required by the Neuse River regulations. The NCDOT hydraulics unit closely coordinated the design and location of the structures to accomplish this goal with the DWQ. Non-erosive velocities were provided for at the outlet of all systems. Data showing these velocities are presented on the permit drawings. In addition, grassed swales, level spreaders, and preformed scour holes were utilized under circumstances that would not have otherwise permitted for non-erosive velocities entering into the buffer.

Potential sites requiring variance from the Neuse Buffer Rules were not identified for Sections R-2000AB and/or R-2000AC.

Tables A-1 through A-2 summarize the buffer impacts for all sites and the total acreage requiring buffer mitigation. Sites may qualify as "Allowable" uses that do not require buffer mitigation including bridge locations or buffer impacts of less than 150 linear feet and 0.33 acre. The wetland area within each buffer impact area was subtracted from the total buffer impact area according to the corresponding zones. The resulting impacts were then multiplied by the appropriate ratios for the zone (3:1 ratio for zone 1 and 1.5:1 ratio for zone 2). The on-site mitigation was then subtracted from the ratio total. Finally, the impacts for each zone were added together yielding 769,547 square feet of buffer impacts that require mitigation. Costs were calculated by multiplying the acreage of buffer impacts by $0.96 per square foot.

Table A-1: R-2000AB Neuse River Buffer Impact Mitigation Calculations Per Site (square feet)
Note: All Sites Require Mitigation.

Sites	1	2	3	Totals
Zone 1 Impacts	28,728	63,925	28,664	**121,317**
Zone 1 Wetlands	0	871	0	0
Zone 1 - Wetlands^	28,728	63,054	28,664	120,446
Mitigable Impacts (3:1 ratio)	86,184	189,162	85,992	361,338
On-site Mitigation	0	0	0	0
Remaining Area Requiring Mitigation	86,184	189,162	85,992	**361,338**
Zone 2 Impacts	18,266	43,755	20,699	**82,720**
Zone 2 Wetlands	0	436	0	0
Zone 2 - Wetlands^	18,266	43,319	20,699	82,284
Mitigable Impacts (1.5:1 ratio)	27,399	64,979	31,049	123,427
On-site Mitigation	0	0	0	0
Remaining Area Requiring Mitigation	27,399	64,979	31,049	**123,427**

^ -- Zone 1 buffer impacts minus wetland impacts in Zone 1.

Table A-2: R-2000AC Neuse River Buffer Impact Mitigation Calculations Per Site (square feet)
Note: All Sites Require Mitigation.

Sites	1a	1b	2	Totals
Zone 1 Impacts	31,345	28,621	11,550	**71,516**
Zone 1 Wetlands	0	0	0	0
Zone 1 - Wetlands^	31,345	28,621	11,550	71,516
Mitigable Impacts (3:1 ratio)	94,035	85,863	34,650	214,548
On-site Mitigation	0	0	0	0
Remaining Area Requiring Mitigation	94,035	85,863	34,650	**214,548**
Zone 2 Impacts	18,998	19,407	8,417	**46,822**
Zone 2 Wetlands	0	0	0	0
Zone 2 - Wetlands^	18,998	19,407	8,417	46,822
Mitigable Impacts (1.5:1 ratio)	28,497	29,111	12,626	70,234
On-site Mitigation	0	0	0	0
Remaining Area Requiring Mitigation	28,497	29,111	12,626	**70,234**

^ -- Zone 1 buffer impacts minus wetland impacts in Zone 1.

April 29, 2003

Subject: Draft Minutes Interagency Hydraulic Design 4C Review Meeting on April 24, 2003, for R-2000AA, Wake County.

Team Members:
Eric Alsmeyer – USACE (Present)
John Hennessy – NCDWQ (Present)
Travis Wilson – NCWRC (Present)
Heather Montague – NCDOT PDEA (Present)

Participants:
David Chang – NCDOT Hydraulics
Ray Lovingood – TranSytems Corp.
Doug Taylor – NCDOT Design Services
Marshall Clawson – NCDOT Hydraulics
Dan Duffield – NCDOT Hydraulics
Alice Gordon – NCDOT PDEA
Matt Cusack – EcoScience Corp.
David Harris – NCDOT Roadside Environmental
John Duggins – NCDOT Structure Design
Theo Beach – NCDOT Structure Design

This project consists of the proposed new location of I-540 (Western Wake Expressway) in Wake County.

1. Site 1 and 6 Interchange at I-540 and NC 55: Eric and John had concerns about addressing the impacts associated with the full interchange and it needs to be address in its entirety. The Hydraulics Unit will provide half size plan sheets (Mailed 4/28/03) to Travis, John, and Eric for them to review. The half size plan will show (Original design) full interchange showing all the impacts associated with the interchange. **Action Taken: Half size plans were mailed 4/28/03 and an additional meeting was held on May 15, 2003 to address outstanding issues and concerns about the interchange.**

2. Site 2 RCBC: John stated that the culvert needs to be designed for bankfull. Sills are provided. After knowing out the width and height, John commented that the culvert was "Good Enough"

   No action required

3. Site 3: Wetland boundary is now shown corrected and closed and ditch will be extended past the wetland. **No action required**

4. Site 4 RCBC: John stated that the culvert needs to be designed for bankfull. Sills are provided. Travis had a concern about rip rap show. Marshall stated that it would only be on the banks. Eric and John again asking about the sills, width and height, John commented that is seamed narrow, but was "Fine for now" **Action Taken: No rip rap will be place in the channel**

5. Site 5 Stream and Wetlands Locations: Eric Alsmeyer had concerns about if Y-15 was needed and justified. Doug Taylor explained that DOT was cutting off access and another access was required and that the location of the Y-15 was determined by holding a 1000' minimum spacing between Y-15 and the ramps of the interchange. Eric and John both had concerns about the streams and wetlands locations on Y-15, it appears that they might not have be properly identified. Alice Gordon and Matt Cusack will provide complete wetlands and jurisdiction stream identification. **Action Taken: Eco Science has completed wetlands and jurisdiction stream identification.**

Meeting Adjourned

Separate meeting held on 5-15-2003

Eric Alsmeyer – USACE (Present)
John Hennessy – NCDWQ (Present)
Travis Wilson – NCWRC (Present)

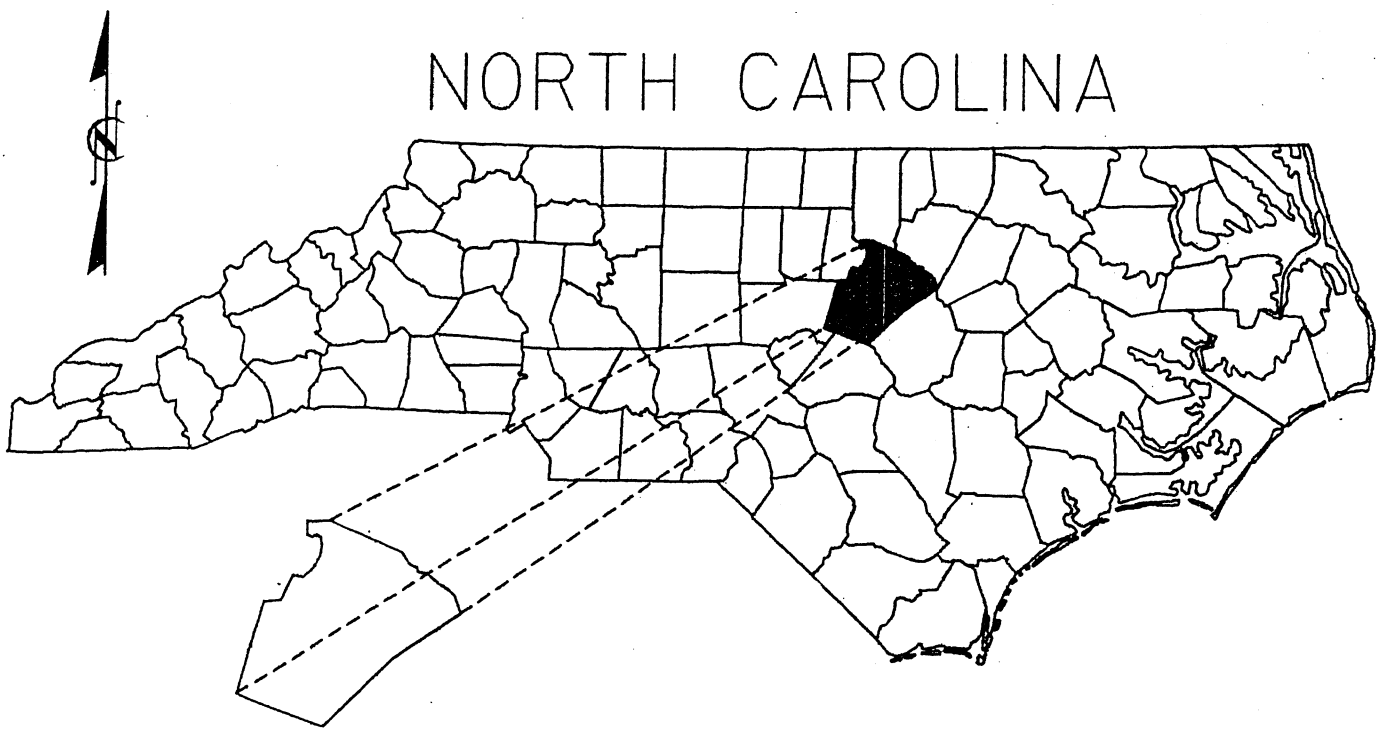
1. **Sites 1 and 6 (and future impacts on the other side of the interchange):** Eric and Travis are OK with the proposed alignment and interchange. **No action required**

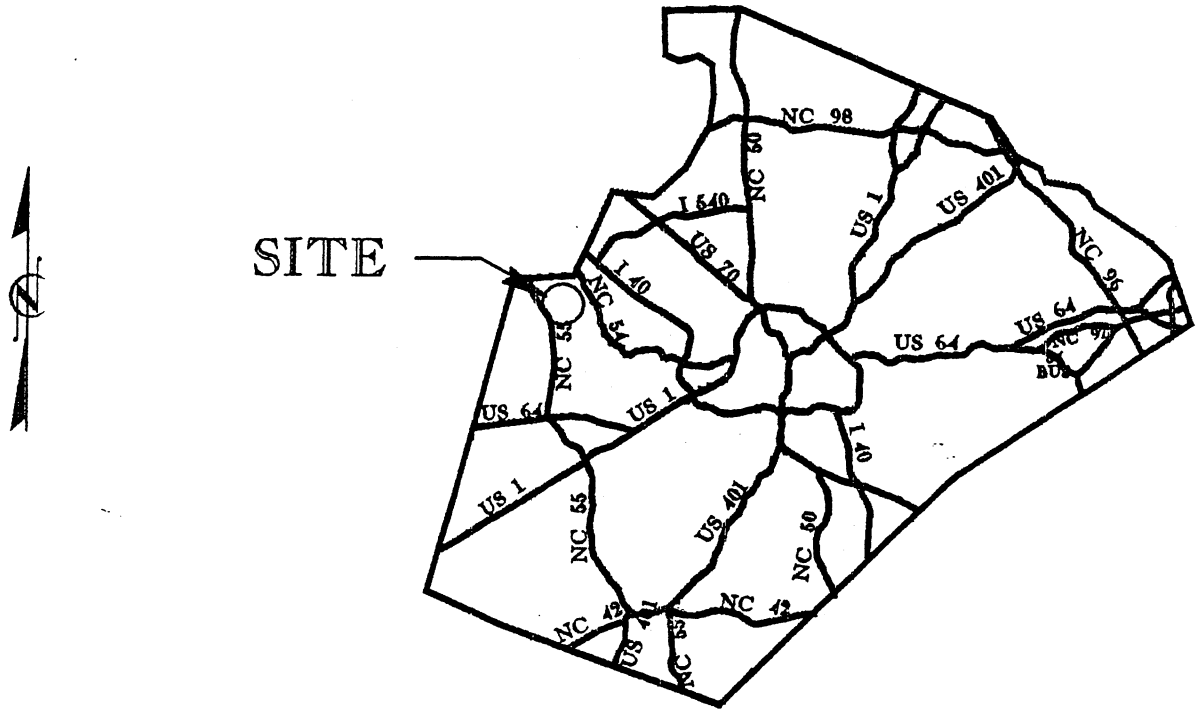
2. **Sites 1 and 6 (and future impacts on the other side of the interchange):** John wanted to know if the main line could be shifted to avoid impacts associated with interchange. Marshall presented the permit from 1996 for R-2000. Doug explained that the main line might still impact the stream however if the main line didn't the ramps would still impact the stream. John also stated since the permit for R-2000 from 1996 was approved it shows the main line and diamond interchange impacting the draw shown on the quad of the permit, that he was ok with the alignment as approved from 1996. **No action required**

3. **Site 5 and 7:** Eric did state that the he didn't have jurisdiction over the isolated wetland on Y15. John stated that those wetlands were his jurisdiction. Alice will address these wetlands in the permit application. **No action required**

4. **Site 5 and 7:** John stated that he wanted a rock vane at site 7, depending on if the channel is incised or not. **Action taken: From a field investigation from Eco Science, the channel is incised at Site 7. Rock Vanes has been added to the design and permit as requested**

Meeting Adjourned





VICINITY MAP

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

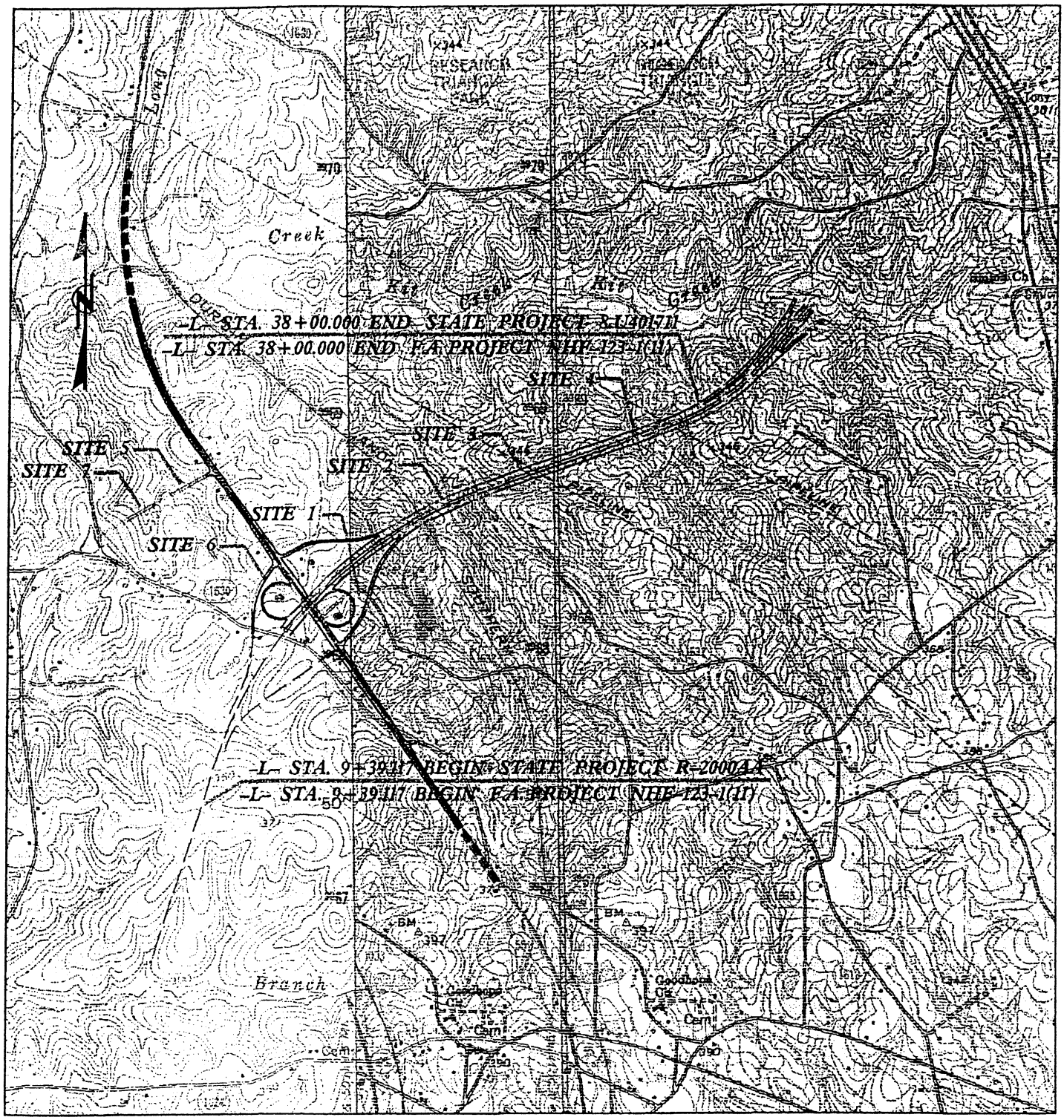
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 1 OF 19 DATE



SITE MAP

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

_____ COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 2 OF 19 DATE _____

LEGEND

WLB —— WETLAND BOUNDARY

WLB / WLB — WETLAND

F F — DENOTES FILL IN WETLAND

S S — DENOTES FILL IN SURFACE WATER

P P — DENOTES FILL IN SURFACE WATER (POND)

T T — DENOTES TEMPORARY FILL IN WETLAND

E E — DENOTES EXCAVATION IN WETLAND

TS TS — DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

COIR FIBER ROLLS

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

VANE

RIP RAP

RIP RAP ENERGY DISSIPATOR BASIN

BUFFER ZONE — BUFFER ZONE

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

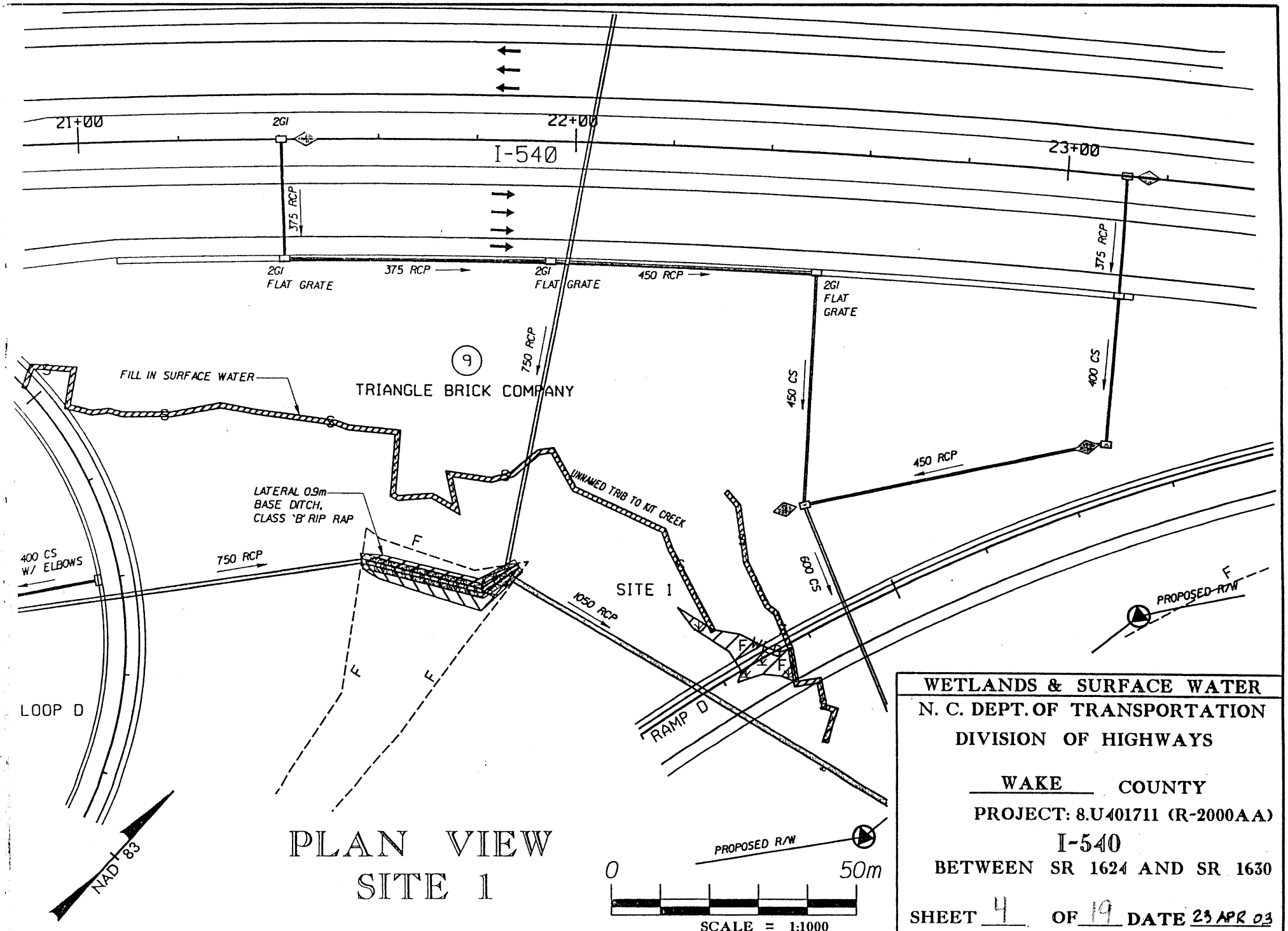
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 3 OF 19 DATE _____



PLAN VIEW
SITE 1

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

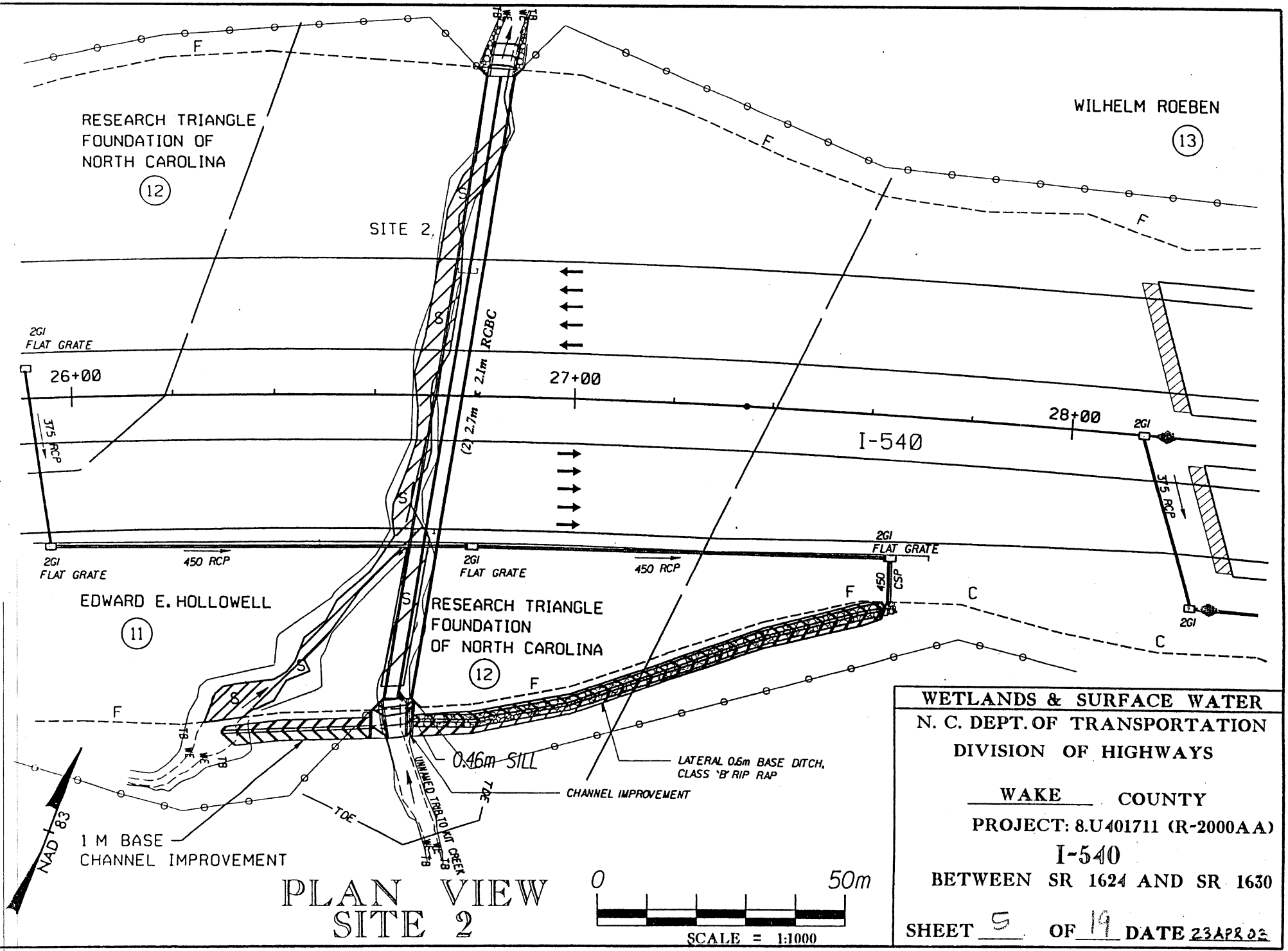
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 4 OF 19 DATE 23 APR 03



PLAN VIEW
SITE 2

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

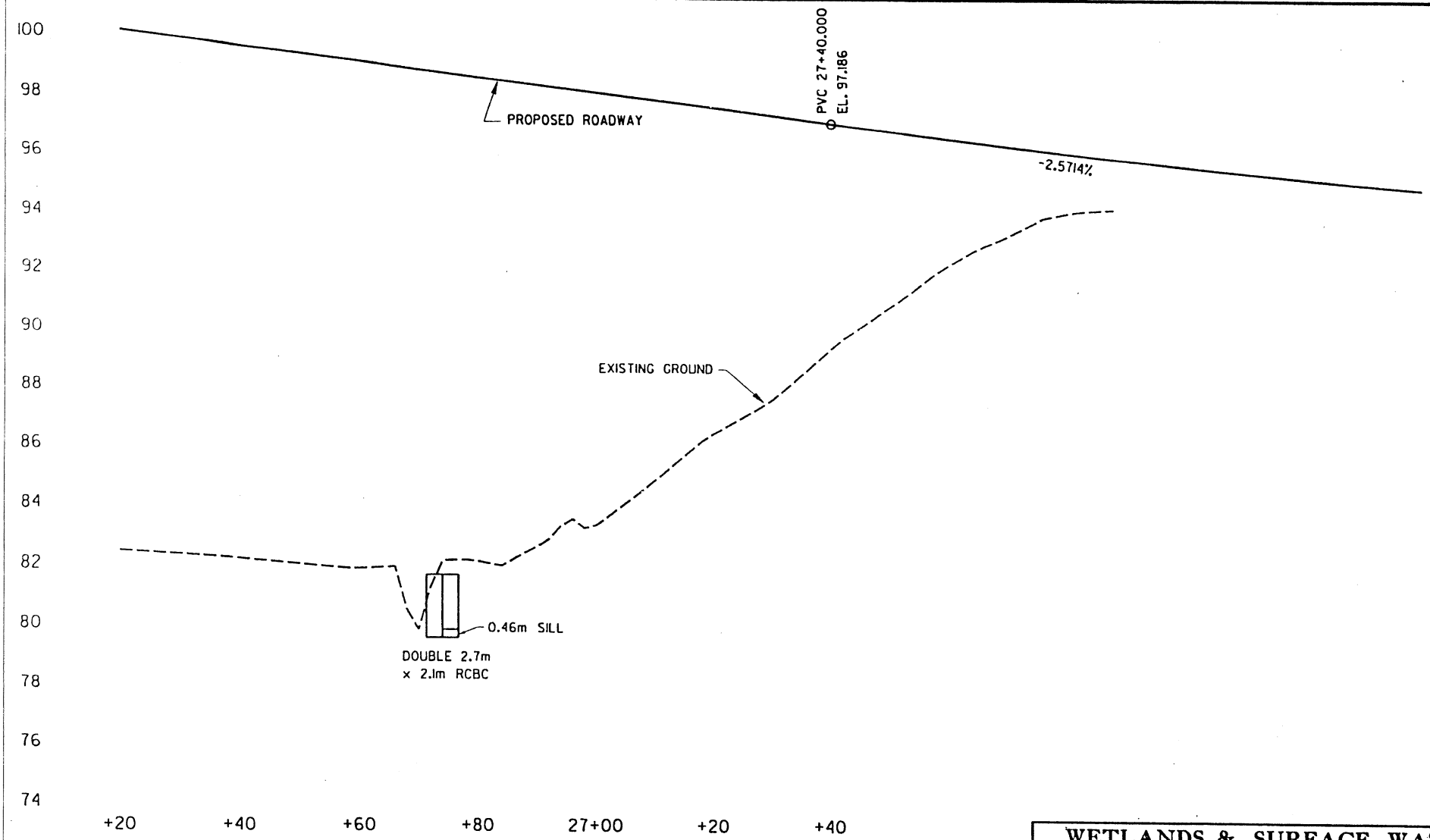
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 5 OF 19 DATE 23APR02



PROFILE
SITE 2

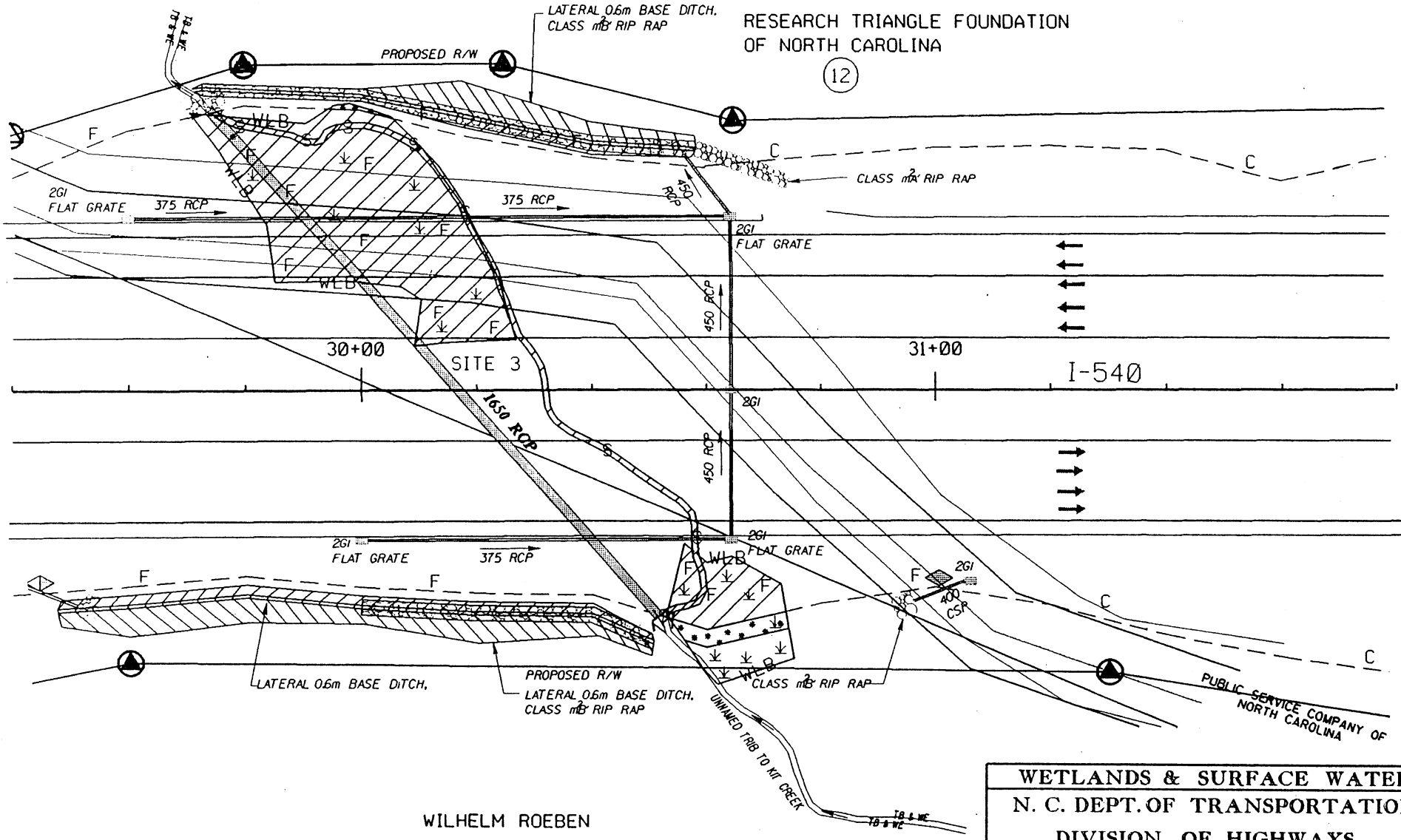
0 10m
VERTICAL

0 50m
HORIZONTAL

WETLANDS & SURFACE WATER
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.U401711 (R-2000AA)
I-540
BETWEEN SR 1624 AND SR 1630

SHEET 6 OF 19 DATE 23 APR 03



WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

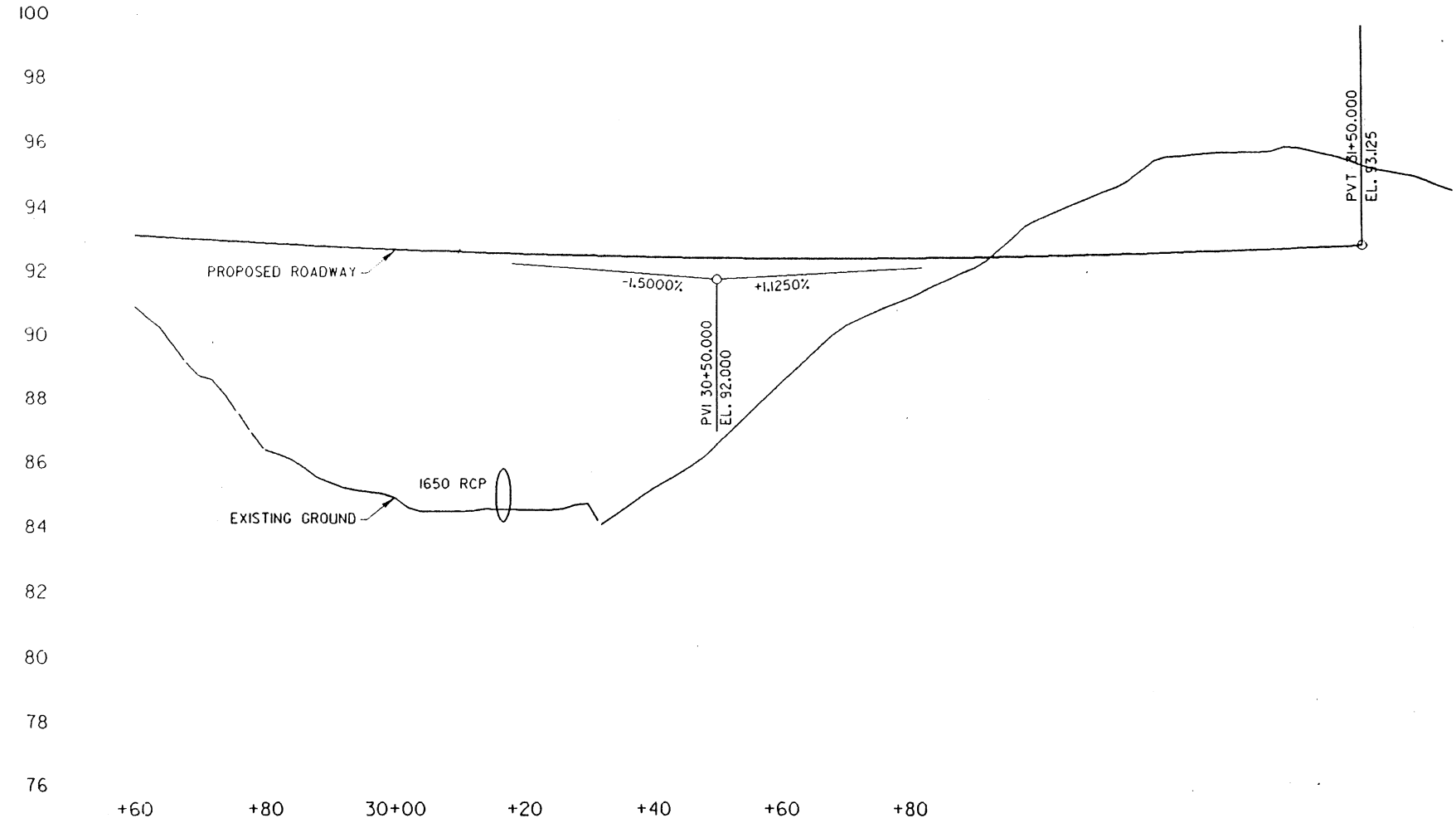
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

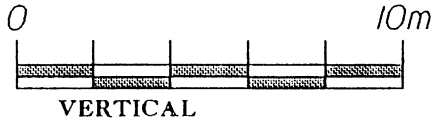
I-540

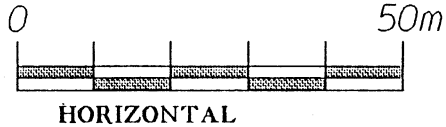
BETWEEN SR 1624 AND SR 1630

SHEET 7 OF 19 DATE



PROFILE
SITE 3





WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

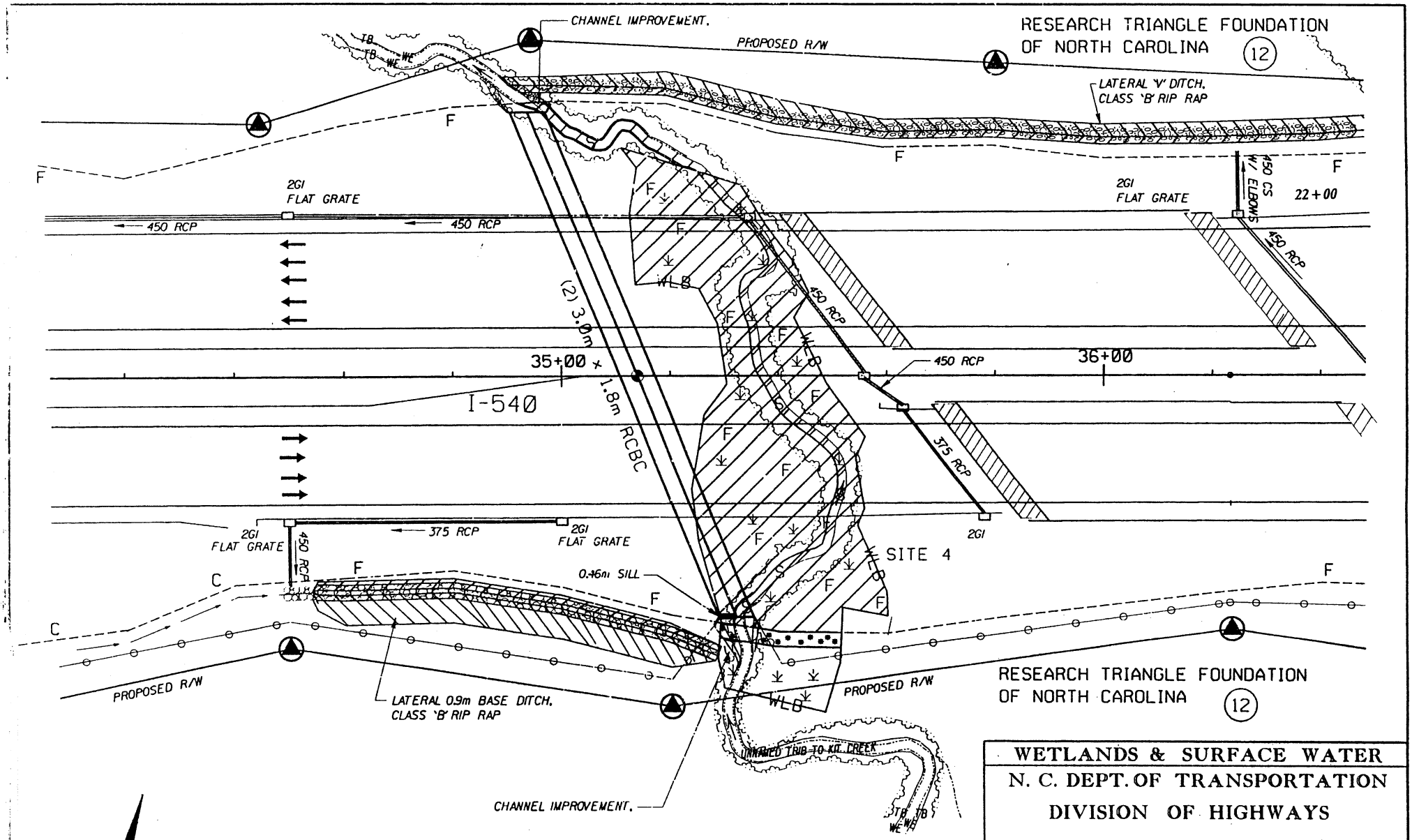
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 8 OF 19 DATE _____



PLAN VIEW
SITE 4

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

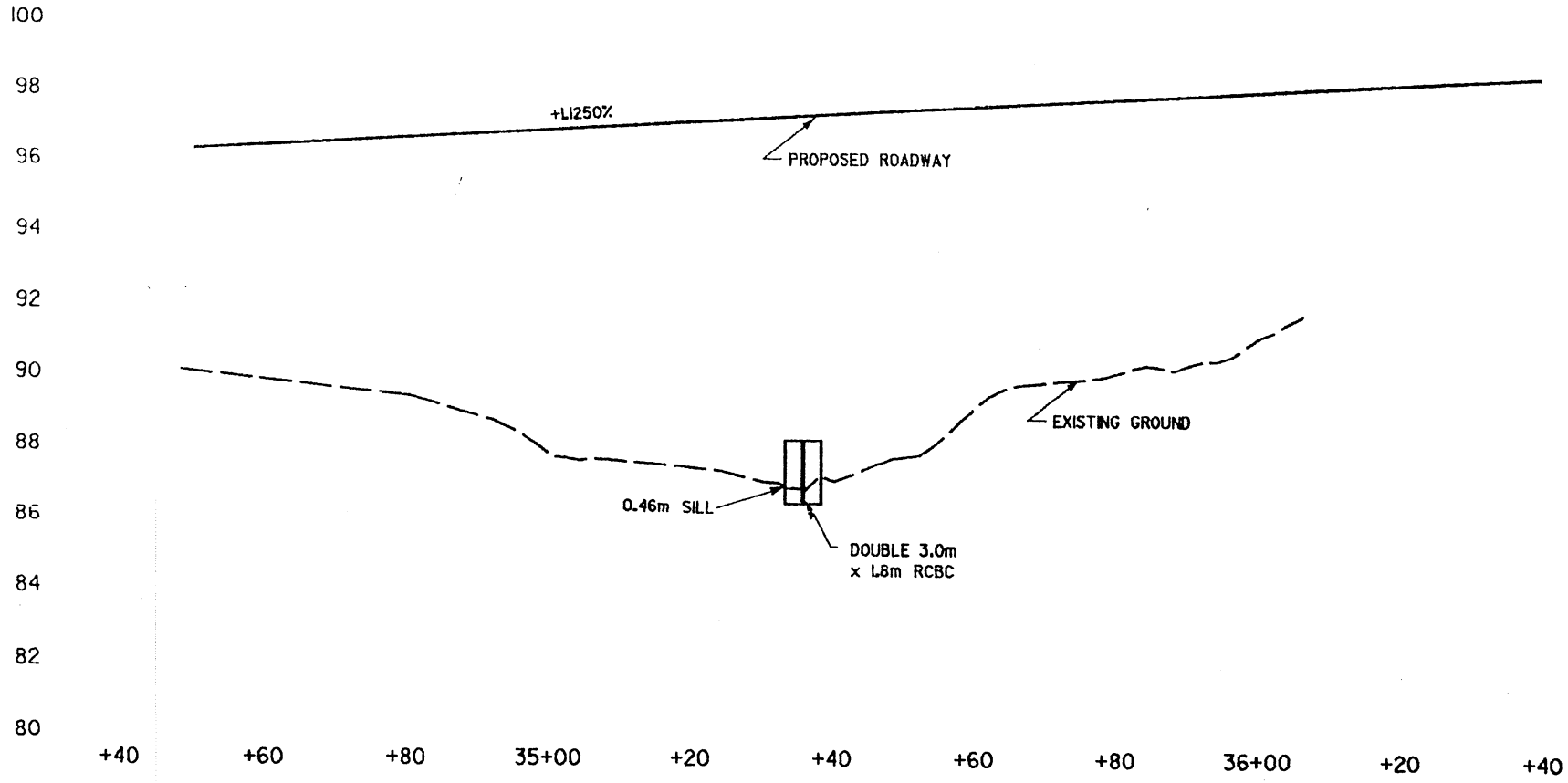
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

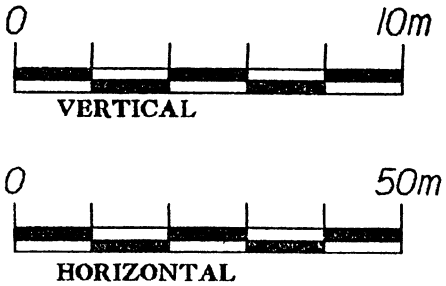
I-540

BETWEEN SR 1624 AND SR 1630

SHEET 9 OF 19 DATE



PROFILE
SITE 4



WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

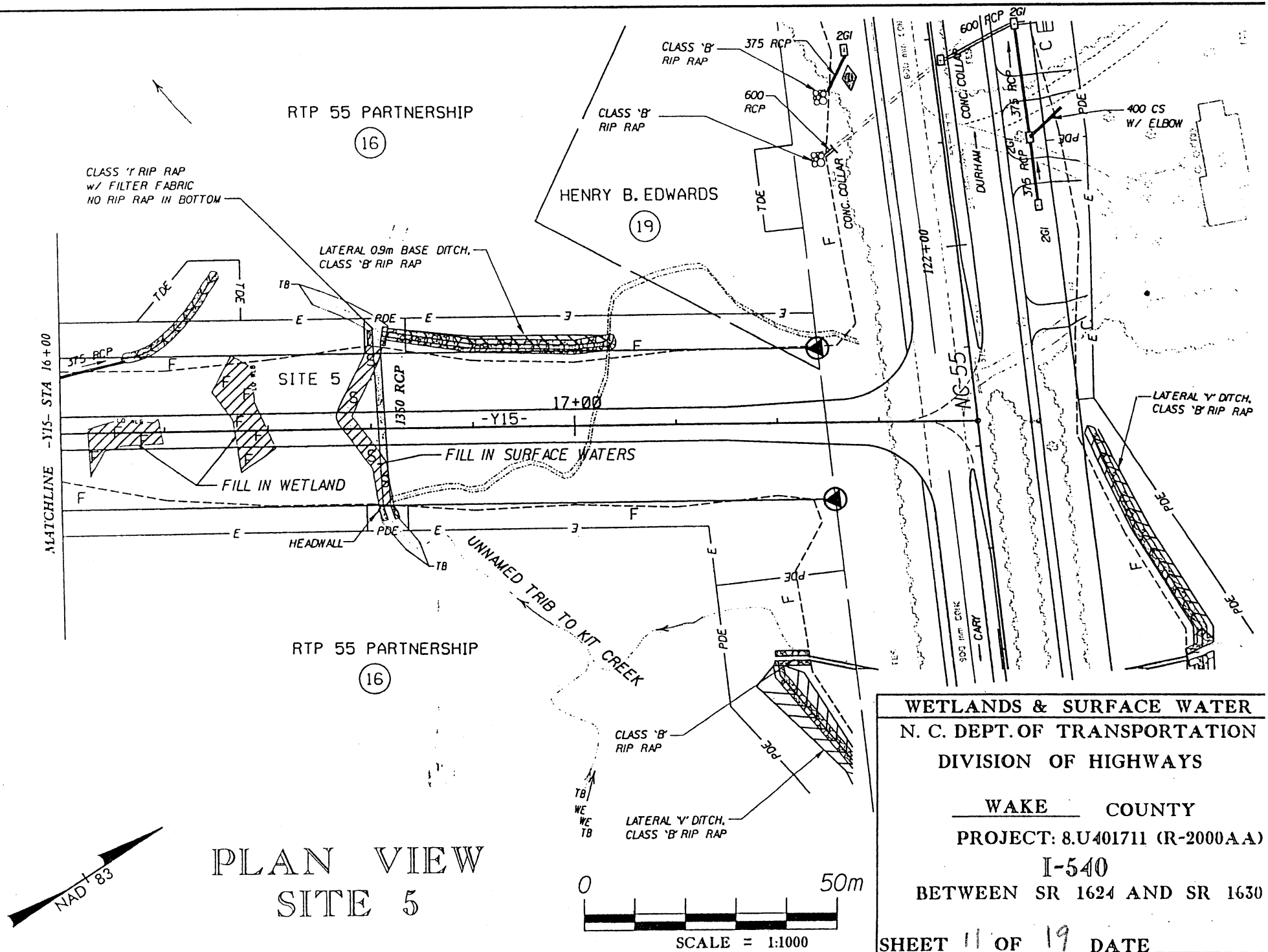
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 10 **OF** 19 **DATE** _____



PLAN VIEW
SITE 5

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

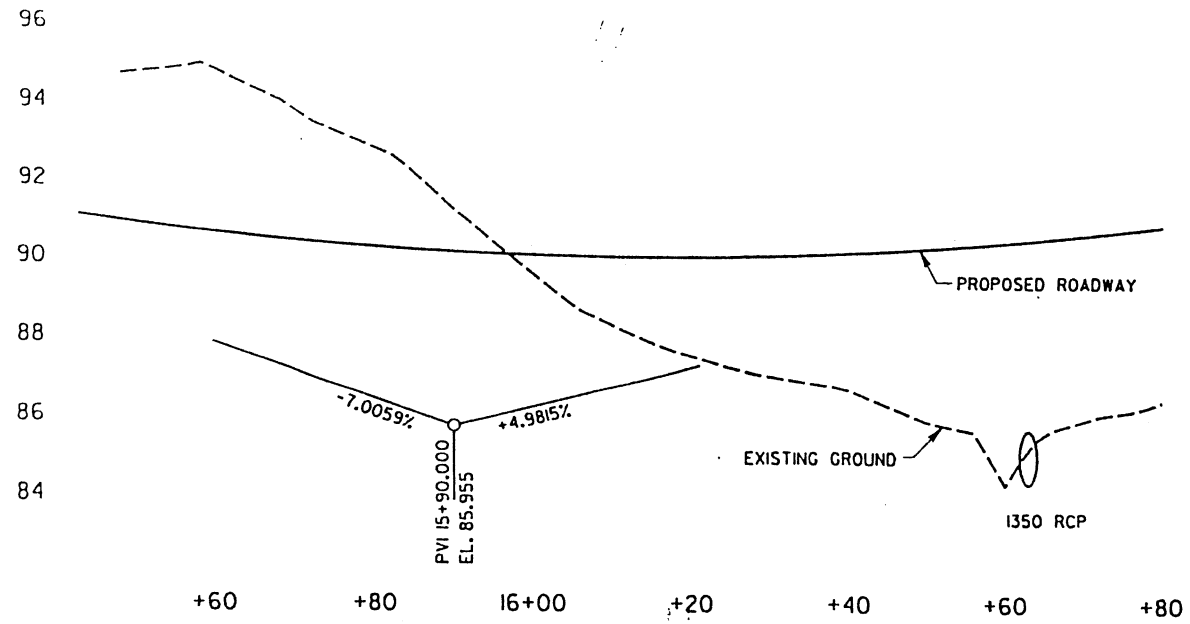
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

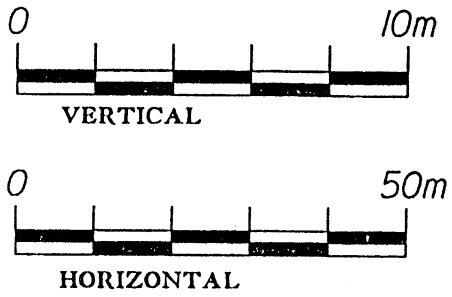
I-540

BETWEEN SR 1624 AND SR 1630

SHEET 11 OF 19 DATE _____



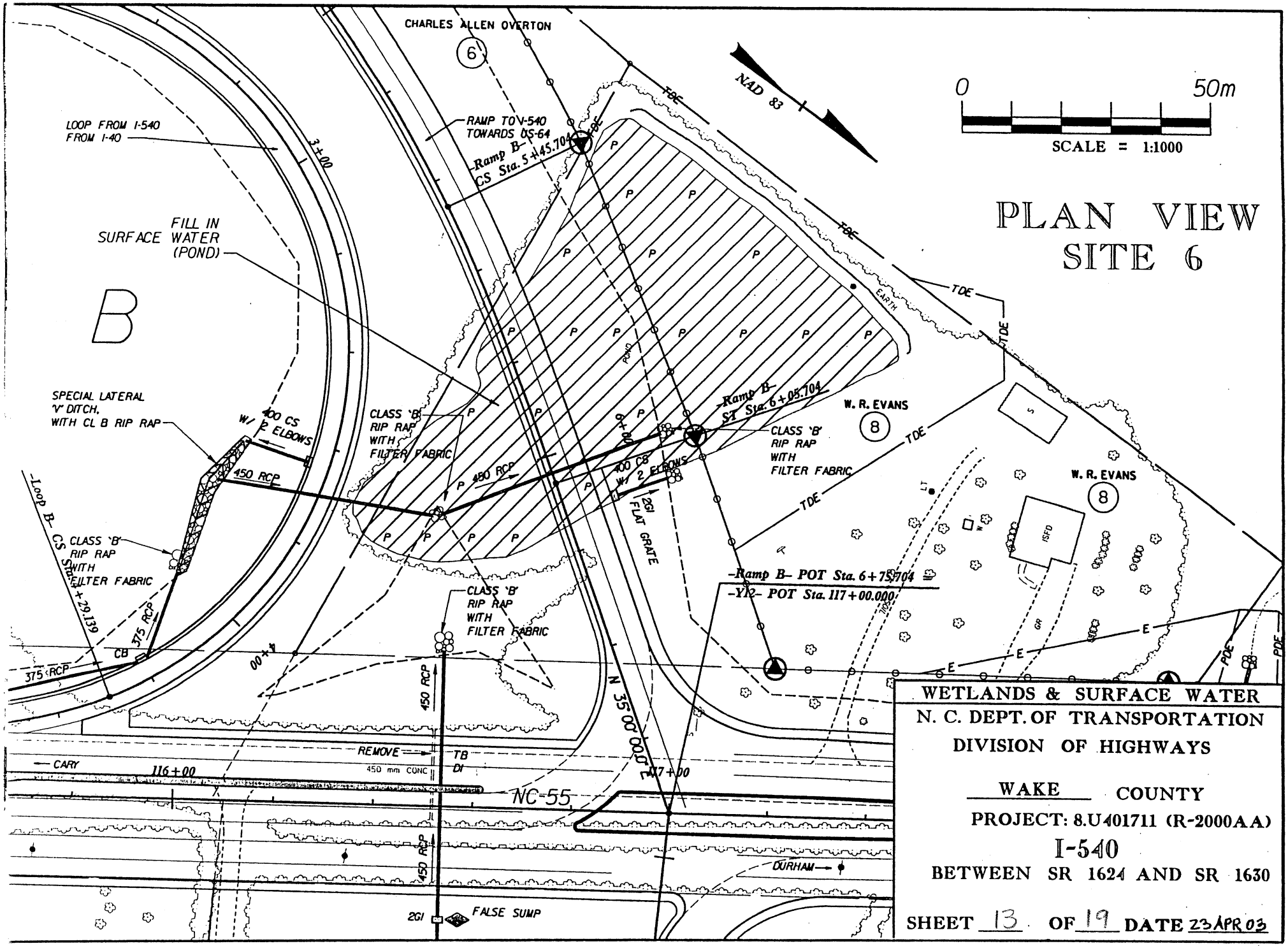
PROFILE
SITE 5



WETLANDS & SURFACE WATER
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.U401711 (R-2000AA)
I-540
BETWEEN SR 1624 AND SR 1630

SHEET 12 OF 19 DATE 23 Apr 03



WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

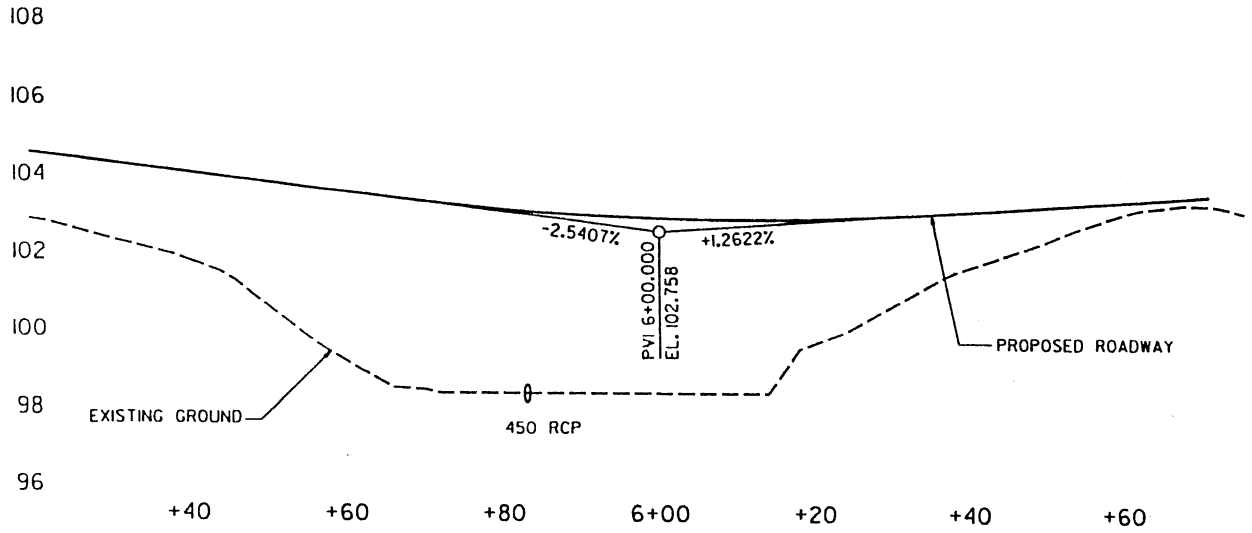
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

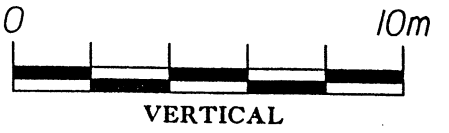
I-540

BETWEEN SR 1624 AND SR 1630

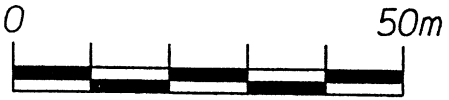
SHEET 13 OF 19 DATE 23 APR 03



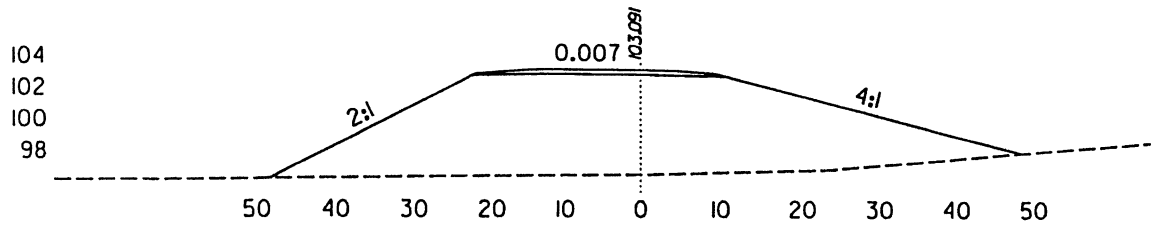
PROFILE
SITE 6



VERTICAL

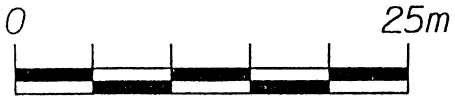


HORIZONTAL



6+00.000

CROSS SECTION
SITE 6



HORIZONTAL

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

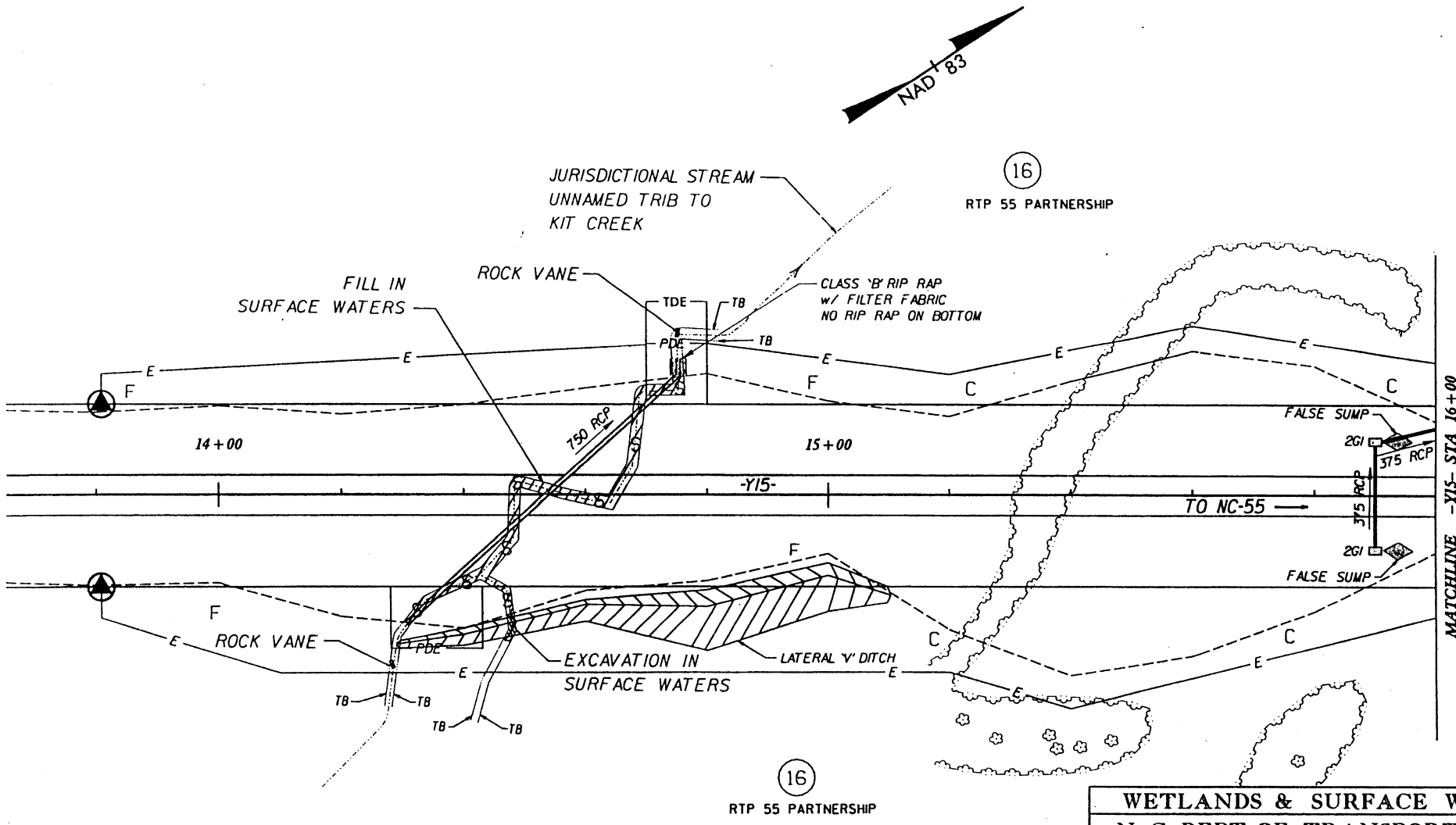
WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 14 **OF** 19 **DATE** 23 APR 03



PLAN VIEW
SITE 7

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

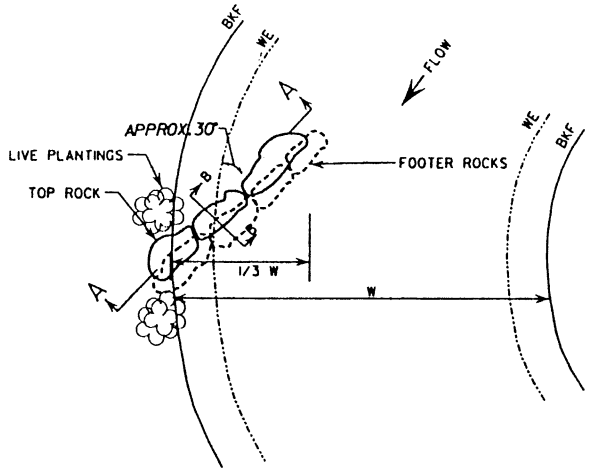
I-540

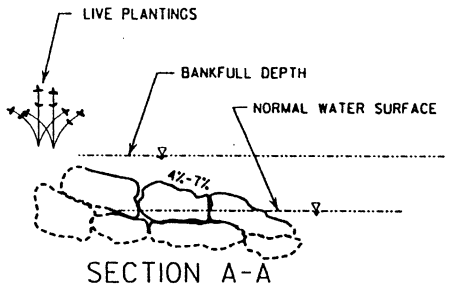
BETWEEN SR 1624 AND SR 1630

SHEET 15 OF 19 DATE _____

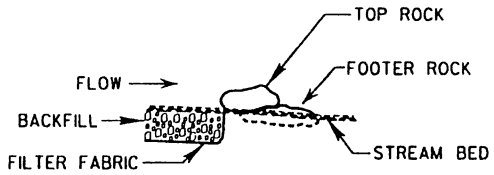
ROCK VANE

(NOT TO SCALE)





SECTION A-A



SECTION B-B

NOTE:
ROCKS SHOULD BE NATIVE
STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH
AXIS APPROXIMATELY 1.52m IN LENGTH

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 16 **OF** 19 **DATE** _____

WETLAND PERMIT IMPACT SUMMARY

Site No	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1	20+90 TO		0.011				0.026			257	
	22+55 -L-										
2	26+25 TO	(2) 2.7m x 2.1m RCBC					0.067			178	
	26+80 -L-										
3	29+73 TO	1650 RCP	0.122			0.007	0.014			144	
	30+72 -L-										
4	35+00 TO	(2) 3.0m x1.8m RCBC	0.217			0.006	0.023			145	
	35+60 -L-										
5	16+05 TO	1350 RCP	0.021				0.010			36	
	16+62 -Y15-										
6	5+71 TO	450 RCP						0.470			
	6+15 RAMP B										
7	14+55 -Y15-	750 RCP					0.014			79	
TOTALS:			0.371	0	0	0.013	0.155	0.470	0	839	0

WETLAND & SURFACE WATER

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT 8.U401711 (R-2000AA)
I-540
BETWEEN SR 1624 AND SR 1630

SHEET 17 OF 19 DATE

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To) (meters)	Structure Size / Type (English Units)	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (acres)	Temp. Fill In Wetlands (acres)	Excavation In Wetlands (acres)	Mechanized Clearing (Method III) (acres)	Fill In SW (Natural) (acres)	Fill In SW (Pond) (acres)	Temp. Fill In SW (acres)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1	20+90 TO		0.026				0.064			843	
	22+55 -L-										
2	26+25 TO	(2) 9' w x 7' h RCBC					0.164			585	
	26+80 -L-										
3	29+73 TO	66" RCP	0.302			0.016	0.036			474	
	30+72 -L-										
4	35+00 TO	(2) 10' w x 6' h RCBC	0.537			0.016	0.058			476	
	35+60 -L-										
5	16+05 TO	54" RCP	0.051				0.026			116	
	16+62 -Y15-										
6	5+71 TO	18" RCP						1.161			
	6+15 RAMP B										
7	14+55 -Y15-	30" RCP					0.035			259	
TOTALS:			0.917	0	0	0.032	0.383	1.161	0	2754	0

WETLAND & SURFACE WATER

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT 8.U401711 (R-2000AA)
I-540
BETWEEN SR 1624 AND SR 1630

SHEET 18 OF 19 DATE

PROPERTY OWNER

NAME AND ADDRESS

	OWNER'S NAME	ADDRESS
(9)	TRIANGLE BRICK CO.	APEX HWY DURHAM, N.C. 27713-9436
(11)	EDWARD E. HOLLOWELL	PO BOX 12136 RALEIGH, N.C. 27605-2136
(12)	RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA	PO BOX 12255 DURHAM, N.C. 27709-2255
(13)	WILHELM ROEBEN C/O TRIANGLE BRICK CO.	6523 APEX HWY DURHAM N.C. 27713
(16)	RTP 55 PARTNERSHIP	c/o JAMES KO 6208 BRAESMEADOW CR RALEIGH N.C. 27612-2804
(6)	CHARLES ALLEN OVERTON	PO BOX 1694 CLINTON, N.C. 28329-1694
(8)	W. R. EVANS	PO BOX 1694 CLINTON, N.C. 28329-1694

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.U401711 (R-2000AA)

I-540

BETWEEN SR 1624 AND SR 1630

SHEET 19 OF 19 DATE

Subject: Minutes from Interagency Hydraulic Design Review Meeting (1/24/02)
I-540 (Northern Wake Expressway) from Research Triangle East Limits to 0.966 km (0.60 miles) Southwest of I-40, Wake County

Team Members:
Marshall Clawson, NCDOT Hydraulics
Steve Bondor, Arcadis G & M (Hydraulics)
Pete Currie, Arcadis G & M (Hydraulics)
David Cox, NCWRC
John Hennessey, NCDWQ
Beth Barnes, NCDWQ
Eric Alsmeyer, USACE
Tom McCartney, USFW
Alice Gordon, NCDOT PD & EA
Galen Cail, NCDOT Hydraulics

The meeting began with the distribution of the Stormwater Management Plan and a review of the overall project layout. The basin boundaries for the Neuse and Cape Fear Rivers were then distinguished on quad maps. All stream classification and delineation is presumed complete. **Steve Bondor** proceeded to review each redline plan sheet and field agency comments and questions. The question/comments are summarized as follows:

1) **John, Eric, and David expressed concern over the "in-line" Type A basins on intermittent/buffered streams. Steve will investigate removing or relocating these basins.. Galen will consult with the Roadside Environmental Unit whether the basins are necessary.** The basins in question are located at the following locations:

Sta 43+50 –L- (Lt), 4+60 –RPA54- (Rt), 71+70 –L- (Rt)

Basins removed at these sites. Upstream of crossing Sta 4+60 –RPA54- is inside of –LPA54-, which will be used for detention.

2) **John pointed out that an "Inter Basin Trade-off" was proposed between Jordan Lake and the Neuse Basin** and there was concern that it may effect this project. **John will investigate and report at the next monthly meeting.**

3) **John and Eric mentioned that the natural stream relocation from Sta 12+00 to Sta 13+50 –YRPB- (Rt) may not qualify for mitigation credit but only minimization** due to the amount of box culverts and the overall stream impact

upstream. **They offered no comments concerning the natural stream relocation from Sta 10+40 to Sta 12+80 –YRPA- (Rt) and Sta 13+55 to Sta 14+70 –YRPC- (Rt).** Mitigation credits to be qualified by the **agencies.**

4) **Steve** and **Marshall** pointed out that the drainage structures in gore areas will be raised to promote detention/infiltration in the interchanges. **John encouraged placing outlets for systems where overland flow is available and where infiltration of stormwater can occur before it outlets to streams. Steve will investigate additional areas where treatment is available.**

5) **Eric mentioned the removal of the ditch in the wetland/buffer at Sta 60+90 – -L- (Rt).** May need additional wetland delineation coverage. **Steve will investigate the use of a preformed scour hole** outside of buffer. **Alice will investigate the need for additional wetland coverage.**

Additional coverage provided by Matt Cusack of Ecoscience. The ditch is removed and a preformed scour hole is proposed.

6) **John recommended treating stormwater inside of Loop A at the NC 54 interchange (–LPA54-)** instead of proposing basin/retention treatment at outlet. **Steve will investigate.**

Concur. Inside of loop used for detention..

7) **John wants to review the proposed basin from Sta 3+40 to Sta 5+20 –RPD54- (Lt).** It is proposed to retain a portion of the existing pond for retention. There were questions concerning the classification (stream or wetland) at the pond outlet The pond has Neuse River buffers. **Galen will provide half size plan views of the basin to John** for investigation. **John will review and report at the next monthly meeting.**

Subject: Draft Minutes from Interagency Hydraulic Design Review Meeting on October 17, 2002 for R-2000AB Wake County

Team Members:

Eric Alsmeyer-USACE	(present)
John Hennessy-NCDWQ	(present)
David Cox-NCWRC	(present)
Howard Hall-USFWS	(absent)
Chris Militscher-EPA	(absent)
Alice Gordon-PDEA	(present)

Participants:
Galen Cail, NCDOT Hydraulics
David Chang, NCDOT Hydraulics
Steve Bondor, Arcadis Engineers
Glenn Mumford, NCDOT Roadway Design
Anne Gamber, NCDOT Hydraulics

Galen opened the meeting with a brief review of the project location. It was noted the project had been through the 4B Hydraulic Design Review on January 24, 2002.

Additional impacts due to utilities were investigated. Only Site 3, Sheet 13 was effect (outlet of box culvert under Davis Drive). Plan view and impacts revised.

1) Site 1 and 2:
No specific comments other than location of the site on the project plans. It was brought up that Site 1 had been revised since the January review meeting where it was requested to remove the proposed detention basin from the stream.

2) Site3:
David Cox questioned the energy dissipater in the live stream at the outlet of the proposed 3.0mx3.0m RCBC Sta 11+90 –YRPB- (Lt). Steve and Galen replied that the dissipater was considered due to the high outlet velocities and the proximity of the bend from the outlet in the natural stream design. It was thought that it would be better to go ahead and use rip rap armor in the bed of a prescribed dissipater than to allow the stream to scour on it's own. There were concerns from John, Eric and David of the migration of scour downstream and if the rock cross vanes and dissipater would be sufficient to stop it. It was discussed that using a rock key at sufficient depth just downstream of the dissipater may inhibit migration and should be considered. John wanted to review calculations for the dissipater and will investigate the possible options for this area.

- *Dissipater data submitted with permit.*

John requested the natural stream design information include stream power calculations. He also questioned whether the reference stream had been approved. Steve stated this will be investigated.

- *Stream power data submitted with permit.*

- *Dave Penrose (DWQ) had previously observed and verbally approved the reference reach during a previous project. Confirmed with John Hennessey 11/4/02.*

John wanted impacts to streams for the entire interchange to be shown on permit drawings. This will be incorporated into the permit.

- *Additional drawing submitted with permit. Stream impacts will include entire project reach including ultimate interchange design.*

David, Eric and John wanted to know if sills had been considered along streams. Steve stated that sills had been considered but were not used at culverts effected by the backwater of the pond West of Davis Drive.\ or at other locations along this stream because the box culvert(s) fit the stream width.

3) Site 4:
Eric requested that a sill in culvert for low flow capacity be examined. This site will be reinvestigated for a sill considering the pond effects and stream width.

- *The application of sills at this site was reconsidered. The box, a 2 @ 4mx3m under proposed –YCFLY-, is the most upstream box from the lake along Davis Drive. The width of the normal water surface at the box is 5.5m to 6.0m wide with the top of bank width of approximately 9.5m to 10m. The normal lake pool elevation has backwater effects up to and including half of the box length. It was determined the minimal effects of having a sill under these conditions did not justify the additional cost and design time required to increase the box size to accommodate the sill.*

It was noted that the location of Site 4 was incorrectly shown on the vicinity map.

- *Site corrected on vicinity map.*

4) Site 5:
No specific comments other than location of the site on the project plans.

5) Site 6:
John requested the natural stream design information include stream power calculations. He also questioned whether the reference stream had been approved. Steve stated this will be investigated.

- *Stream power data submitted with permit.*
- *Dave Penrose (DWQ) had previously observed and verbally approved the reference reach during a previous project. Confirmed with John Hennessey 11/4/02.*

6) Site 7:
Eric wanted to know the limits of the wetland area and if they were complete. Alice agreed to redelineate the wetland to verify its boundary. Eric stated if the wetlands extend past project area consider as partial take. If wetlands extend within the proximity of the right of way show as total take. This will be incorporated into the permit.

Additional wetland delineation requested.....

7) Site 8:
No comments.

8) Site 9 (Buffer Site 1):
It was decided that the need to raise the grate inlets inside the loop could be eliminated if adequate treatment was provided from the grassed swales prior to entering the inlets.

Ditches provide adequate treatment. Grate will be lowered to ditch elevation.

Correct buffer limits to be shown with an arc at begin/end buffer.

Buffer outline corrected.

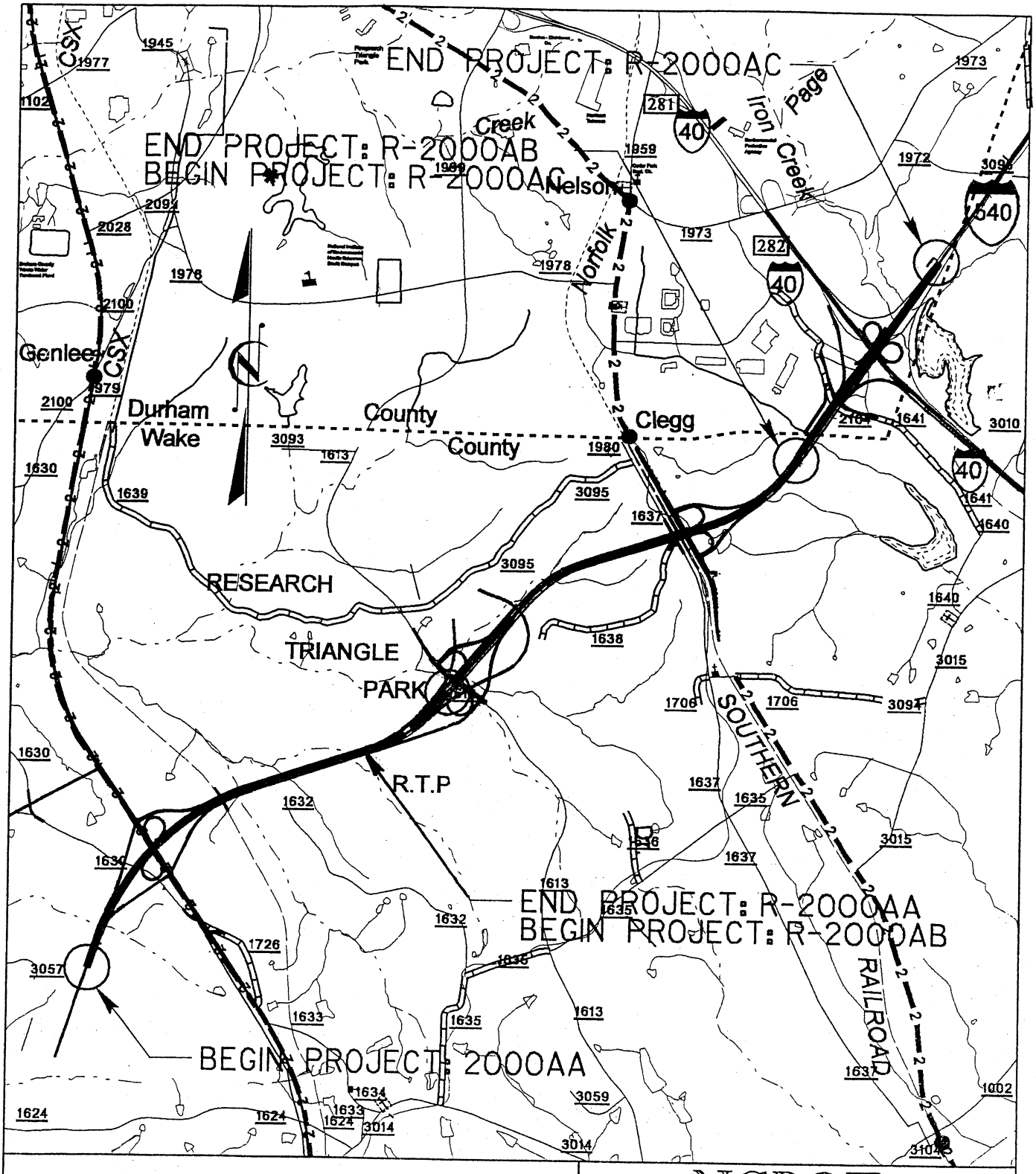
9) Site 10 (Buffer Site 2):
Alice Gordon stated that downstream of the pond was reevaluated and found not to be wetlands or a stream. Can eliminate as impacted on permitted. John Hennessy requested that a rock berm be used to diffuse flow at riser outlet.

Wetland eliminated. Class B outlet protection should be adequate since discharge outlets only when riser of upstream sediment basin is submerged.

10) Site 11 (Buffer Site 3):

Correct buffer limits to be shown with an arc at begin/end buffer.

Buffer outline corrected.



VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS

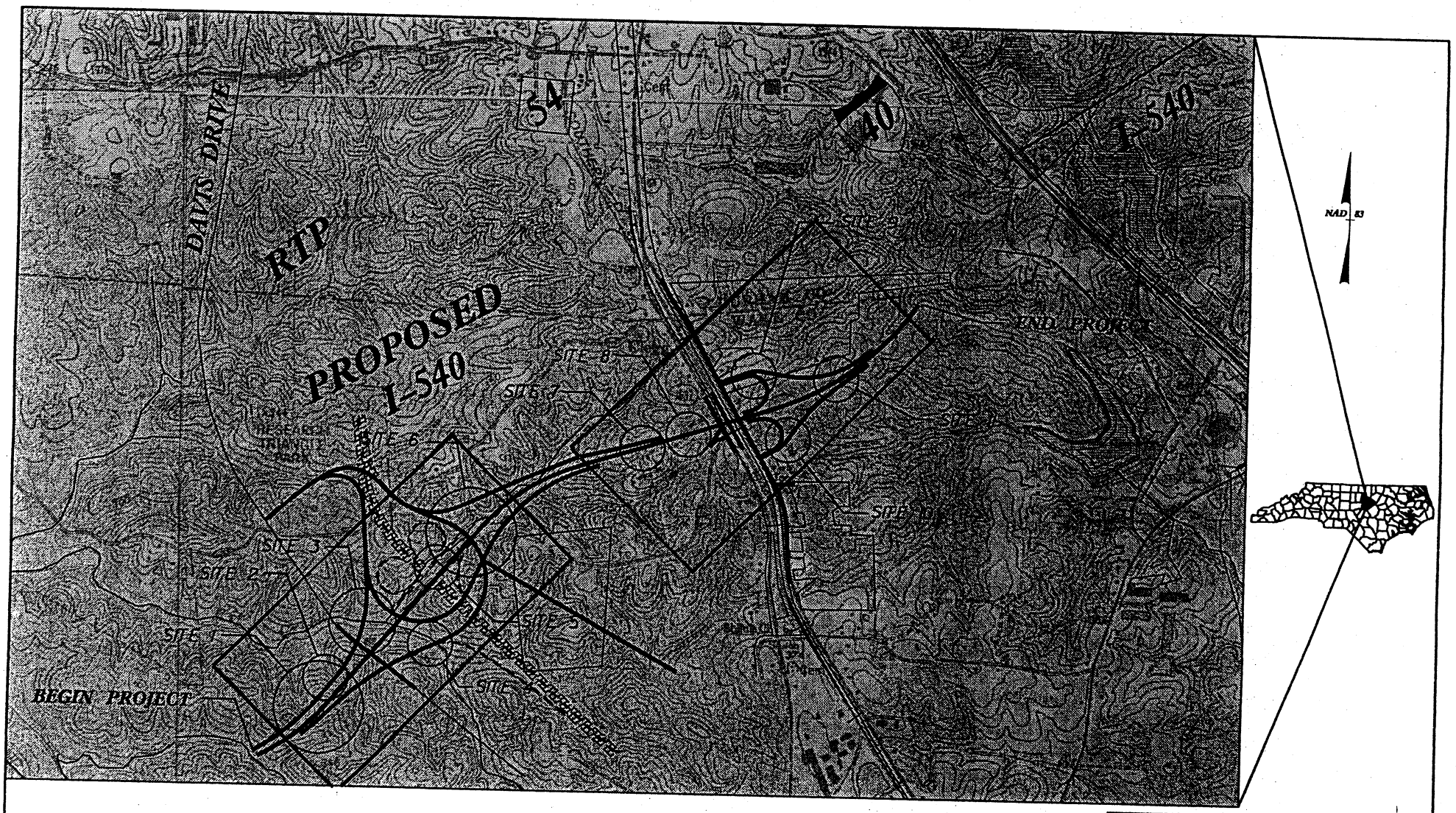
WAKE / DURHAM COUNTIES

PROJECT: R-2000

I-540 FROM NC 55 TO I-40

SHEET 1 OF 67

7/03



SITE MAP

250 0 500

METERS

SCALE

WETLAND

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 2 OF 67

7/03

SITE 3

FUTURE

SITE 6

SITE 2

-YRPB-

B

A

-YRPA-

-L-

-Y19REN-

DAVIS DRIVE

-YBFLY-

-YCFLY-

-Y19DET2-

SITE 1

SITE 4

SITE 5

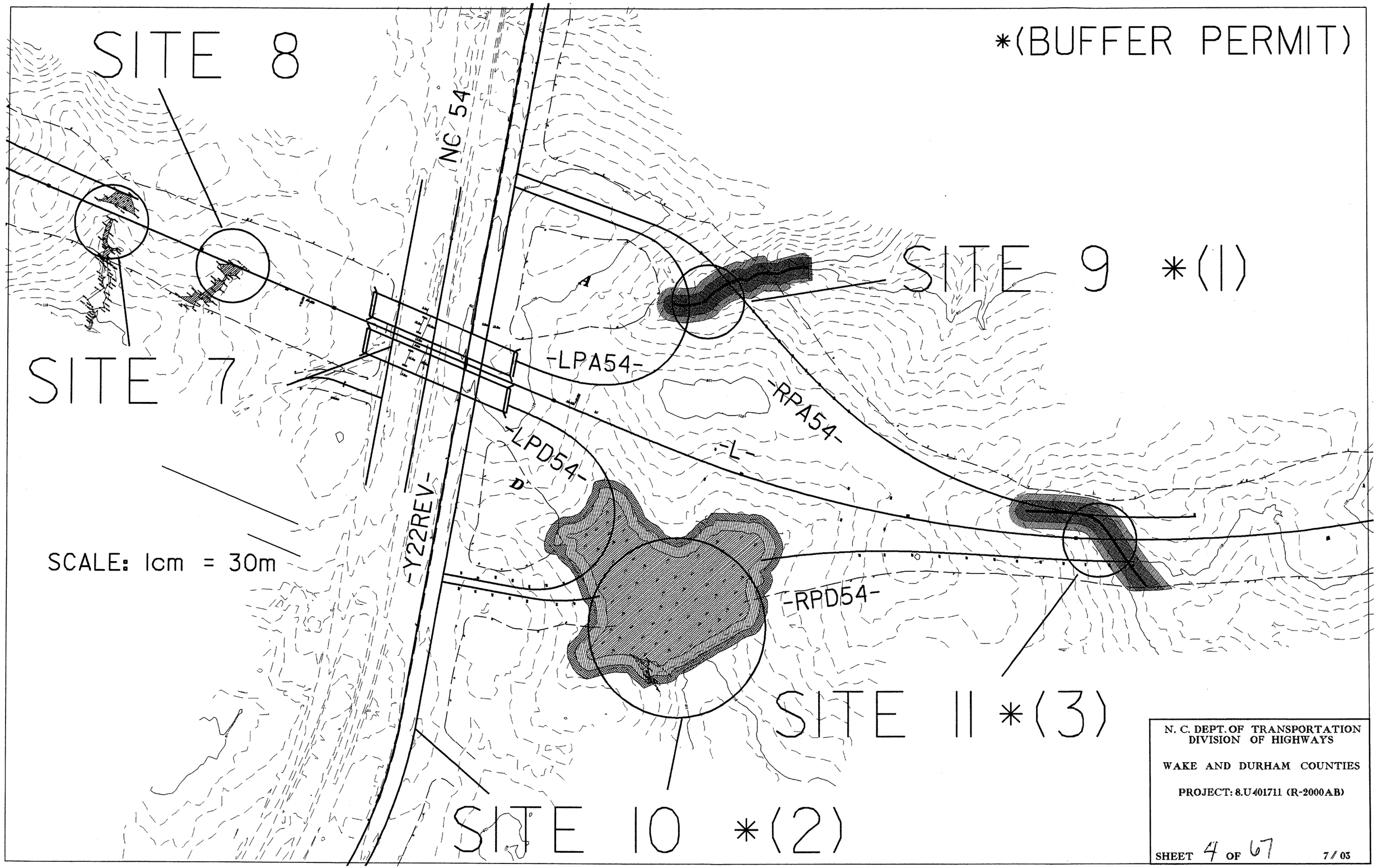
SCALE: 1cm = 30m

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 3 OF 67 7/03



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DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 4 OF 67 7/03

: SCALE: 1cm = 30m

CULVERT LAYOUTS AND STREAM RELOCATIONS FOR TRIBS TO KIT CREEK

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 5 OF 67 7/03

LEGEND

WLB WETLAND BOUNDARY

WETLAND

F F DENOTES FILL IN WETLAND

S S DENOTES FILL IN SURFACE WATER

P P DENOTES FILL IN SURFACE WATER (POND)

T T DENOTES TEMPORARY FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

TS TS DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

COIR FIBER ROLLS

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

VANE

RIP RAP

RIP RAP ENERGY DISSIPATOR BASIN

BUFFER ZONE BUFFER ZONE

N. C. DEPT. OF TRANSPORTATION
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WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 6 OF 67 7/03

STORMWATER MANAGEMENT PLAN

Project No. 8.U401711, TIP No. R-2000AB
Interim Design
Wake-Durham Counties

February 25, 2002
Revised November 1,2002

Hydraulics Project Engineer: Steven M. Bondor, P.E. (ARCADIS G&M of North Carolina, Inc.)
Galen Cail, P.E. (NCDOT Hydraulics Unit)

Roadway Description

The project consists of a portion of the Northern Wake Expressway (I-540) extending from west of Davis Drive to about 1 kilometer (km) west of Interstate 40 (I-40). The project is about 3.6 km in length and includes a new alignment consisting of a controlled access divided highway with two or more 3.6-meter (m) lanes in each direction, and interchanges at NC 54 and Davis Drive. The proposed typical section consists of a grass median with grass shoulders and ditches, and curb and gutter along the interchange loops. The proposed roadway crosses various streams and includes eight box culverts and three stream relocations. The proposed drainage system includes cross pipes, grate inlets and associated pipe systems in the median and side ditches, lateral ditches, and modified expressway gutter along high fill slopes.

Project Involvement

The entire project is located within an unincorporated area of Wake County. However, the project is not subject to Wake County Stormwater regulations, because state projects are specifically exempted by the regulations. The section of the project located east of NC54, from -L-Sta 64+40 to the end is located within the Neuse River Watershed, and is therefore subject to the North Carolina Department of Environment and Natural Resources (NCDENR) regulations for preservation of stream buffers. The remainder of the project, west of NC54, is located in the Cape Fear Watershed. Three streams within the Neuse River Watershed were identified as being subject to the stream buffer regulations by the NCDENR, based on the Wake County Natural Resource Conservation Service Soil Maps and the U. S. Geological Service Quad Map (Cary Quadrangle).

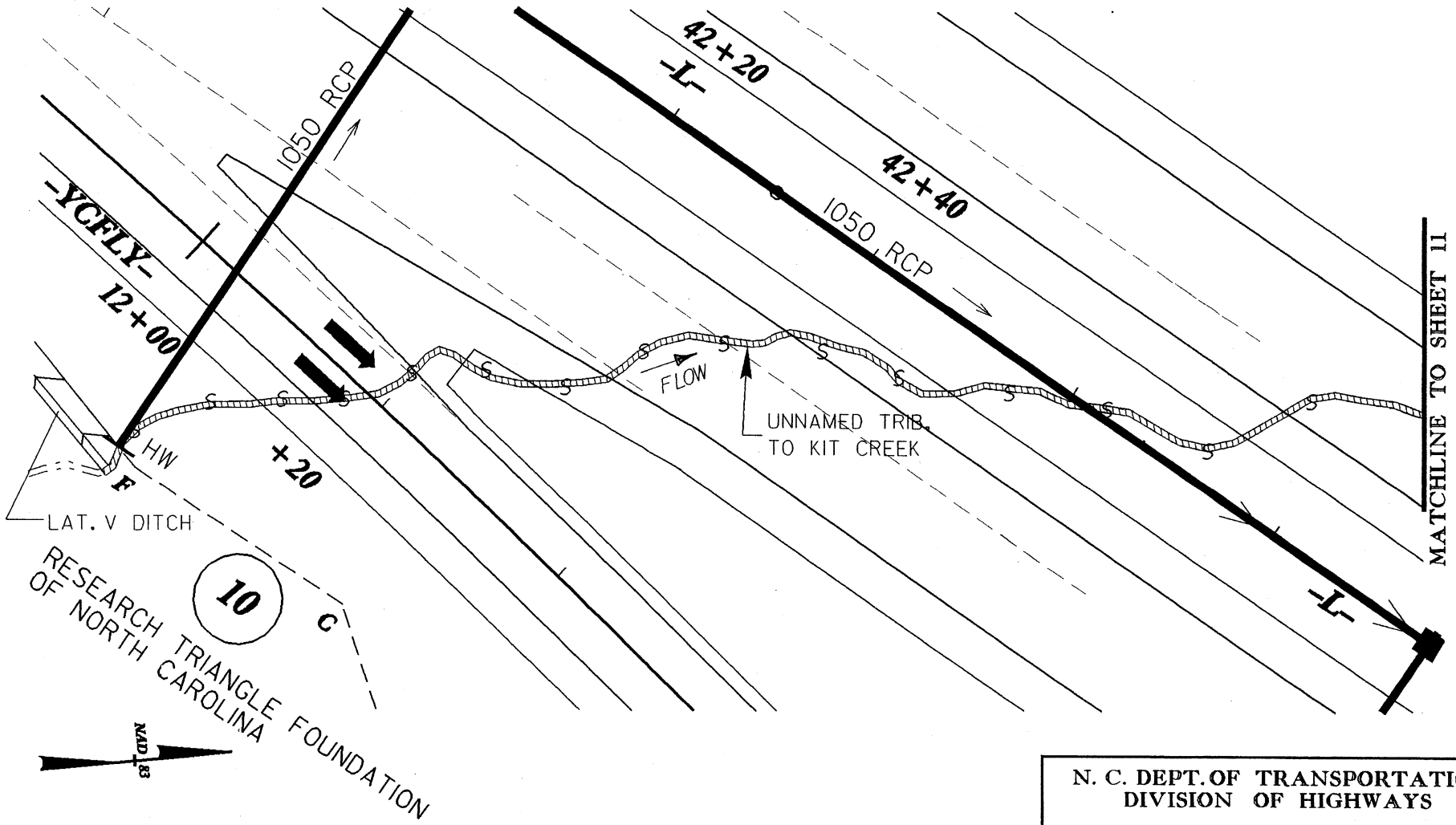
Best Management Practices and Major Structures

Best Management Practices (BMPs) utilized on the project are as follows: grass swales, wet detention ponds, detention in gore areas, level spreaders, natural channel design for stream relocations, and the submergence of box culverts below stream beds. The BMPs were designed based on the North Carolina Department of Environment and Natural Resources publication entitled, "Stormwater Management Guidance Manual." Stormwater detention in gore areas will be provided by open-throat catch basins elevated about 1 m above the low point.

The stream relocations are required due to the location of the proposed fill slopes over the existing streams, making the relocation of the streams unavoidable along these reaches. The design methods used are in accordance with those recommended in, "Applied River Morphology" (Rosgen, 1996).

BMP	Station	Plan Sheet
Grass Swales	-RPA54- 5+80 to 6+20 right	10
	-RPA54- 3+20 to 3+90 left	10
	-RPA54- 4+70 to 5+60 left	10
	-LPA54- 1+00 to 1+40 right	10
	-L- 67+07 to 67+60 median	10
	-L- 69+00 to 69+40 median	12
	-L- 70+40 to 70+80 median	12
Detention in Gore Areas	-L- 45+90 left	6
	-L- 47+00 left	6
	-L- 50+80 left	6
	-L- 51+80 left	6
	-Y- 26+40 left	6
	-Y- 26+70 right	6
	-L- 49+40 right	7
	-Y32+15 right	7
	-L- 66+40 left	10
	-L- 66+40 right	11
Level Spreader	-Y22REV- 13+50 left	21
	-L- 70+40 right	12
Stream Relocations	-YRPB- 11+90 to 13+39 right	6
	-YRPA- 10+39 to 12+76 right	8

BMP	Station	Plan Sheet
Box Culverts	-Y19REV- 13+40	5
	-L- 45+26	5
	-YCFLY- 15+60	5
	-YBFLY-15+67	6
	-Y- 27+97	6
	-YCFLY- 23+97	6
	-L- 54+80	8



PLAN VIEW
SITE 1

5 0 10
METERS

DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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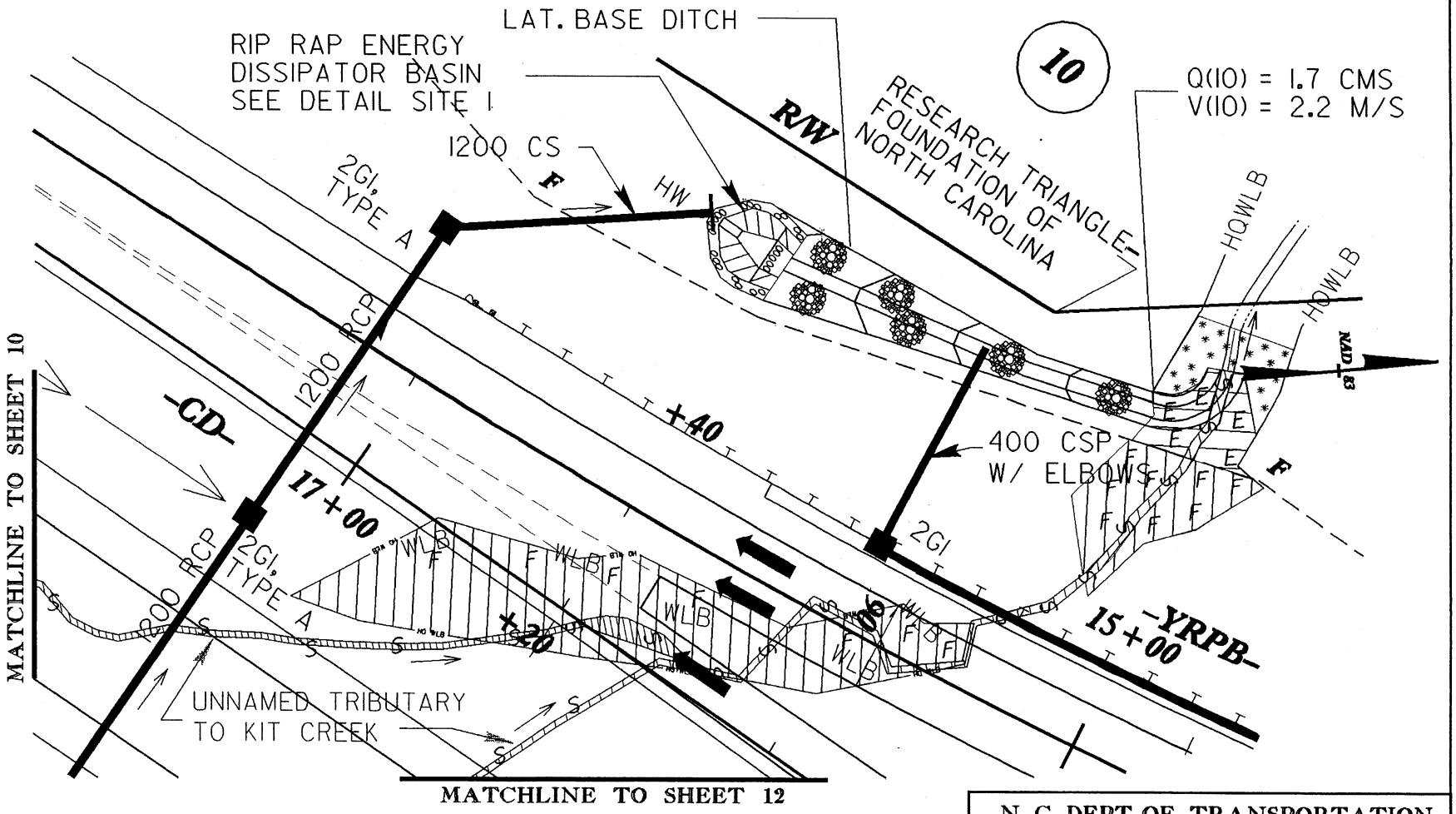

PLAN VIEW
SITE 1

5 0 10
SCALE
METERS

F F DENOTES FILL IN WETLANDS

S S DENOTES FILL IN SURFACE WATERS

E E DENOTES EXCAVATION IN WETLANDS

DENOTES MECHANIZED CLEARING

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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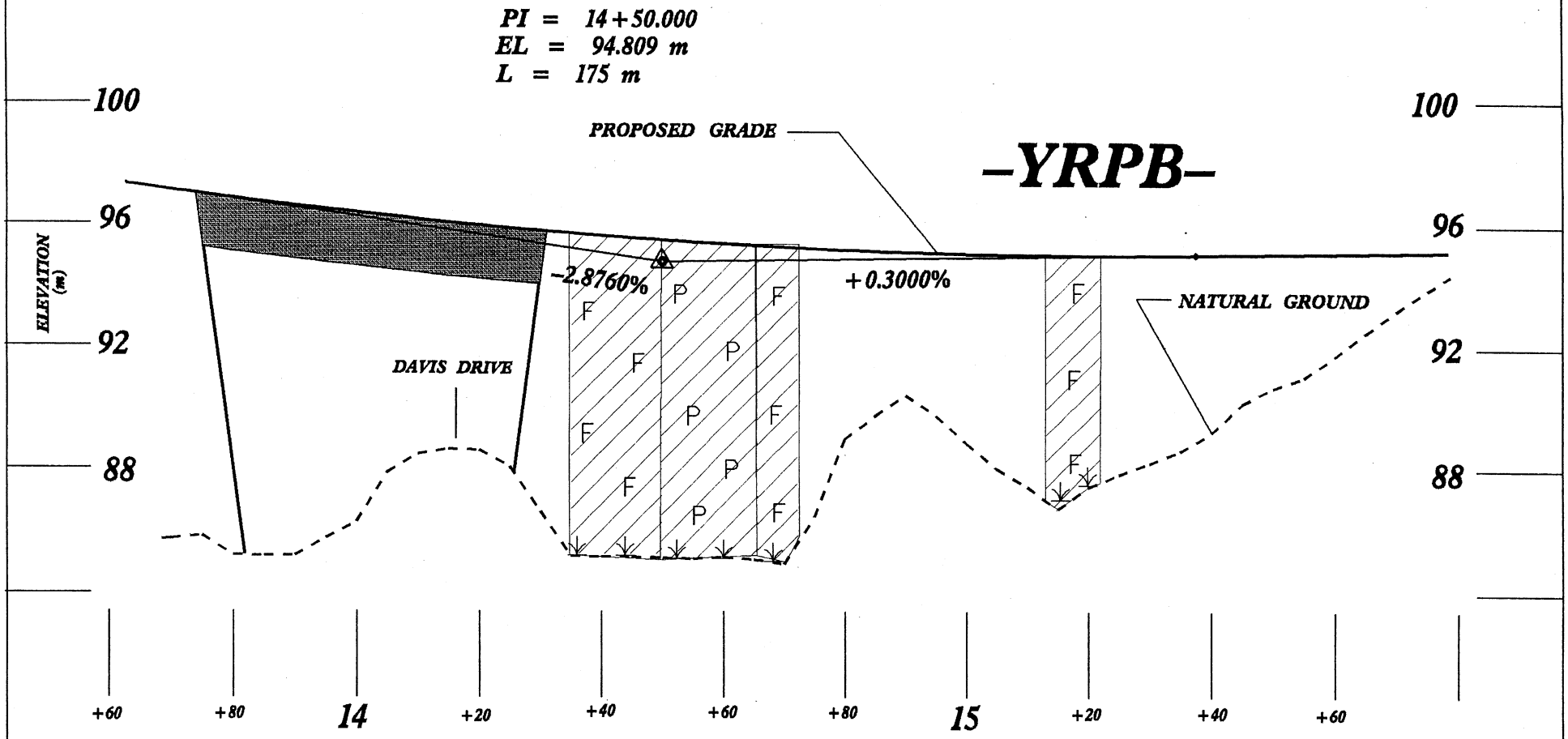
7/03



PROFILE
SITE 1 & 2

F F DENOTES FILL IN WETLAND

P P DENOTES FILL IN SURFACE WATER (POND)

NCDOT

DIVISION OF HIGHWAYS

WAKE & DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AB)

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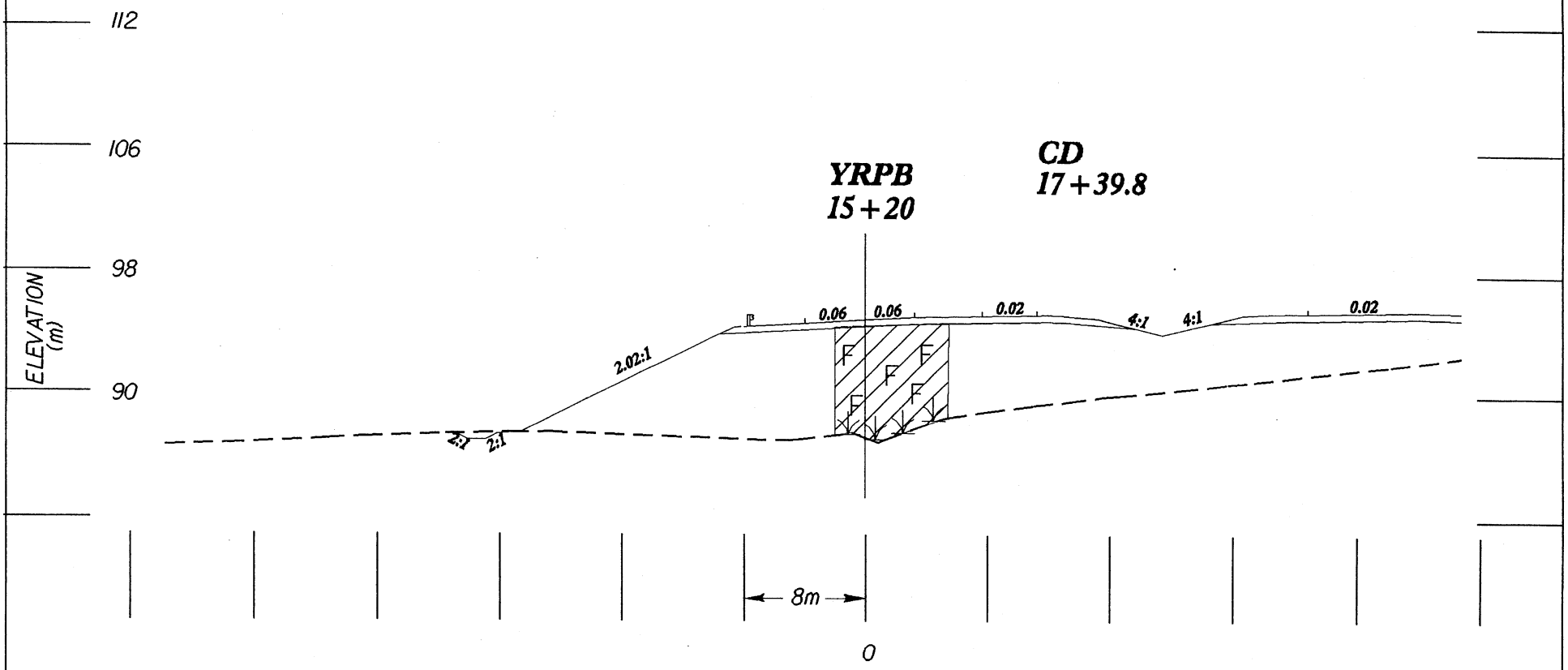

TYPICAL X-SECTION
SITE 1

F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY
PROJECT: 8.U401711 (R-2000AB)

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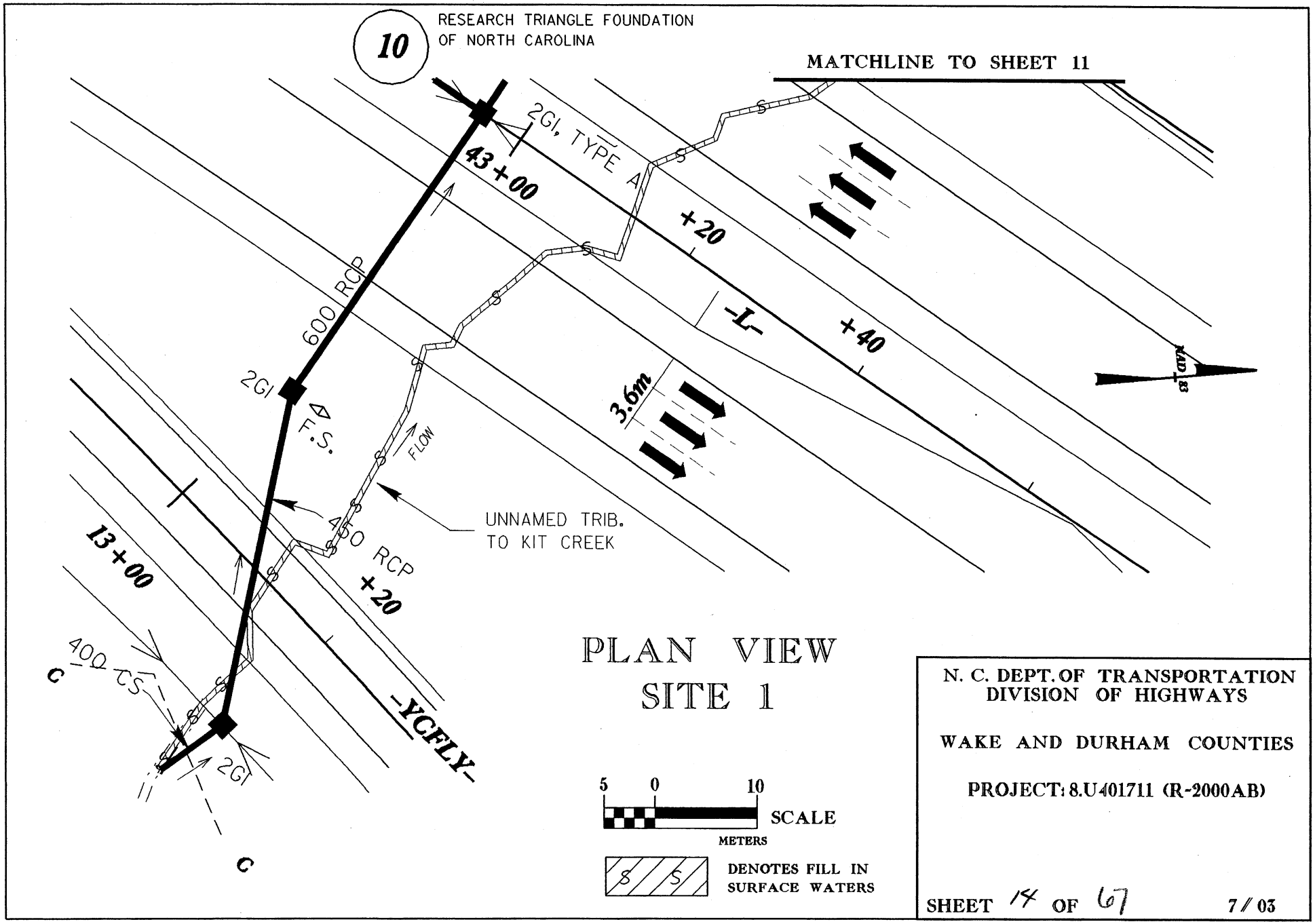

PLAN VIEW
SITE 1

5 0 10
SCALE
METERS

DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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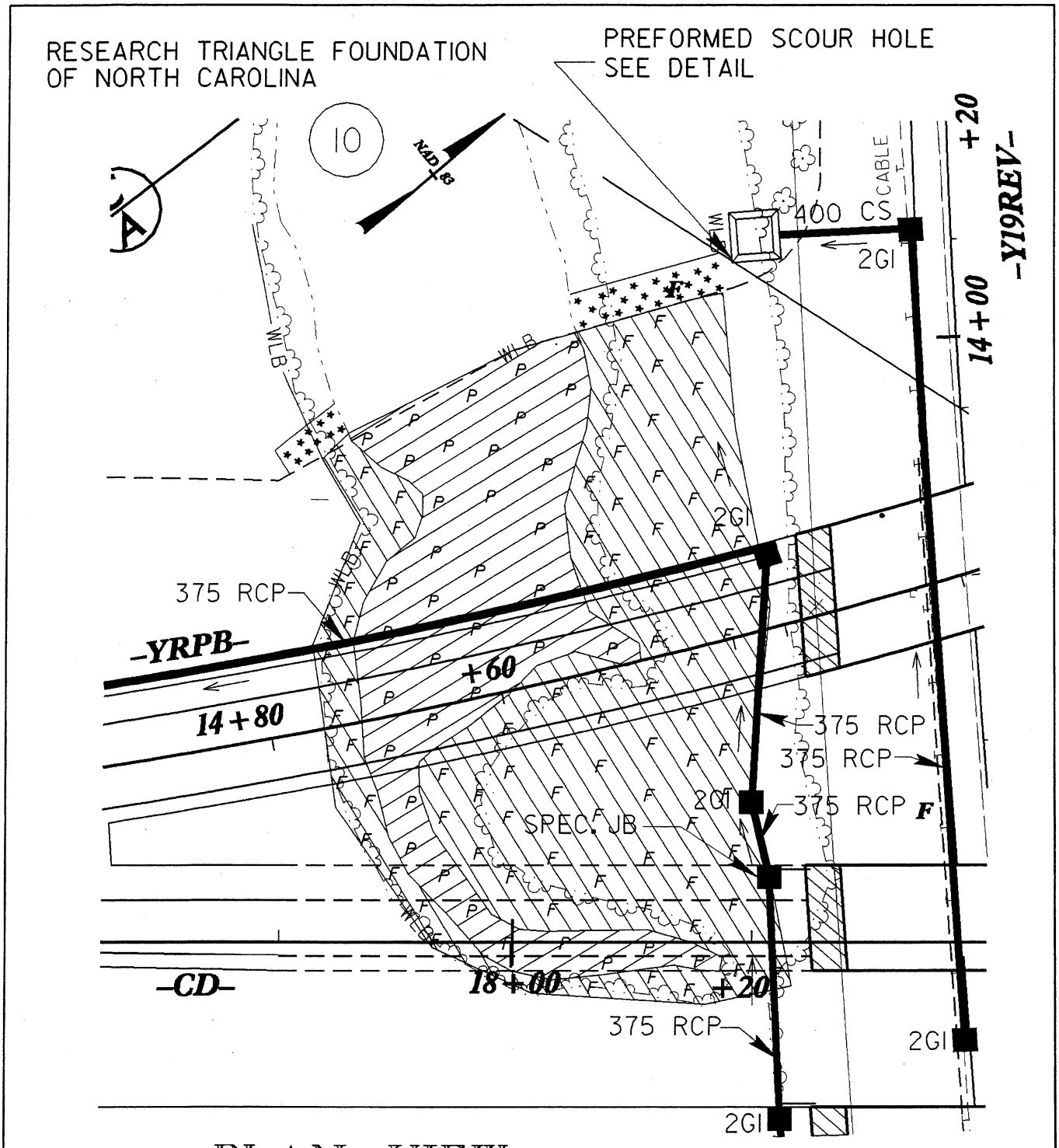

PLAN VIEW

SITE 2

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

DENOTES FILL IN POND

5 0 10

METERS

SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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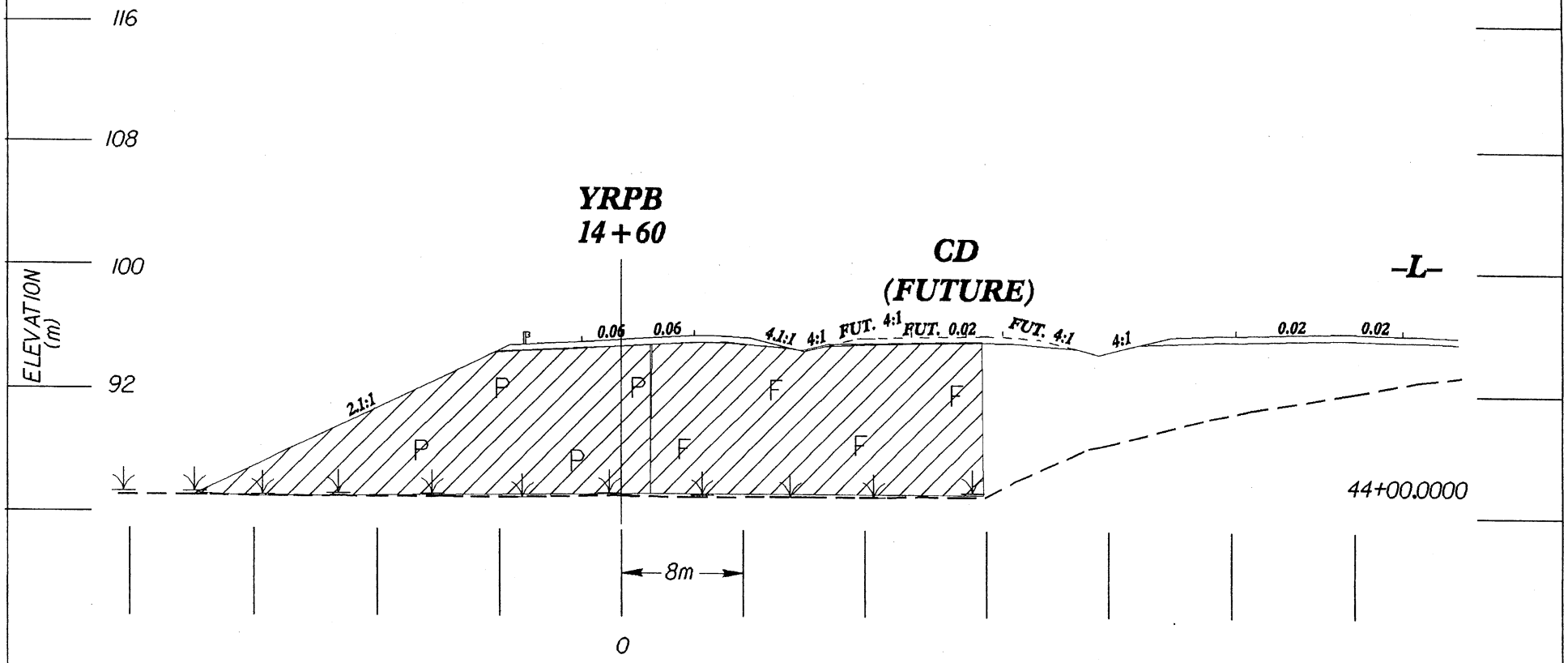
7/03



TYPICAL X-SECTION
SITE 2

F F DENOTES FILL IN WETLAND

P P DENOTES FILL IN SURFACE WATER (POND)

NCDOT

DIVISION OF HIGHWAYS

WAKE & DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AB)

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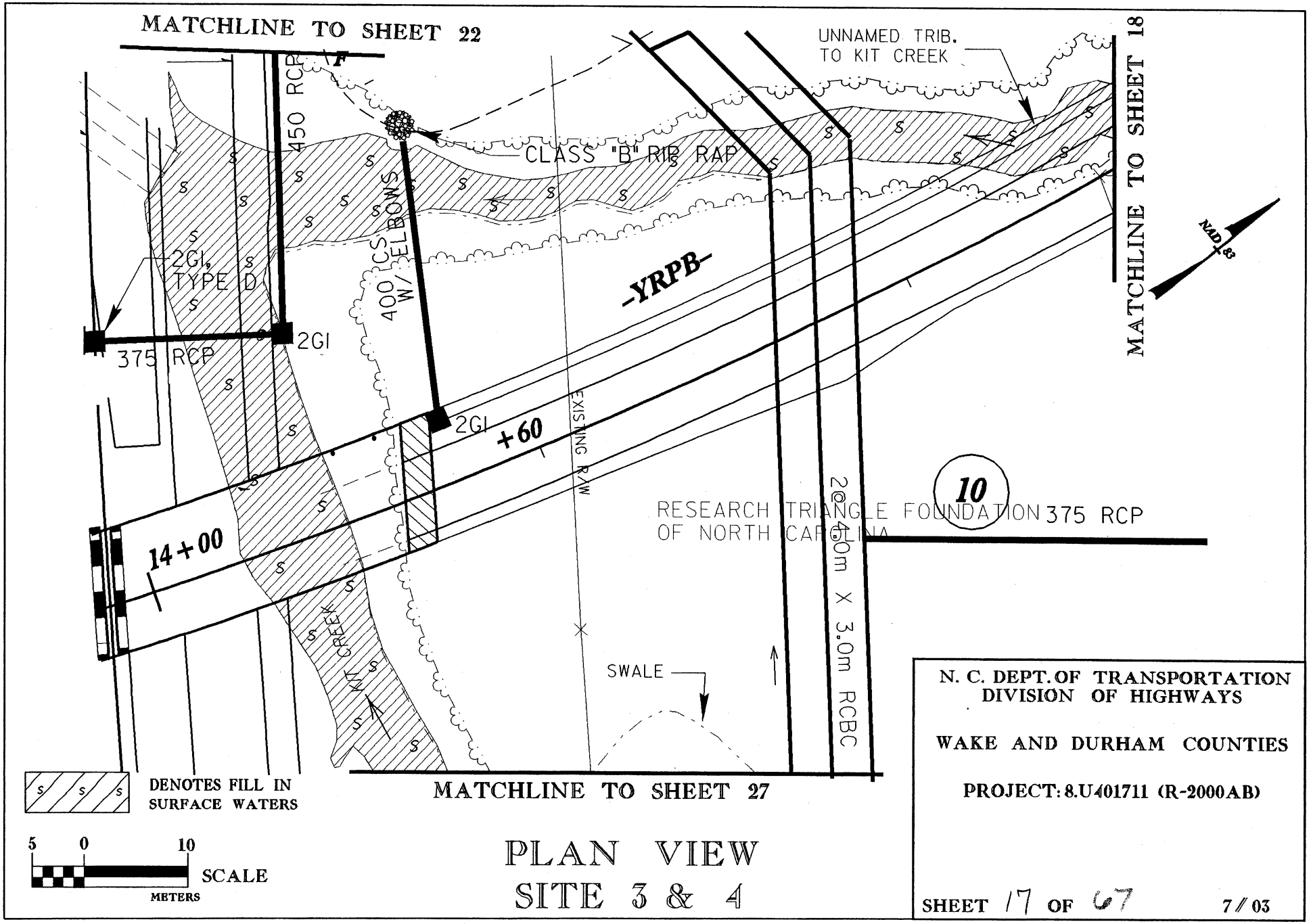

PLAN VIEW
SITE 3 & 4

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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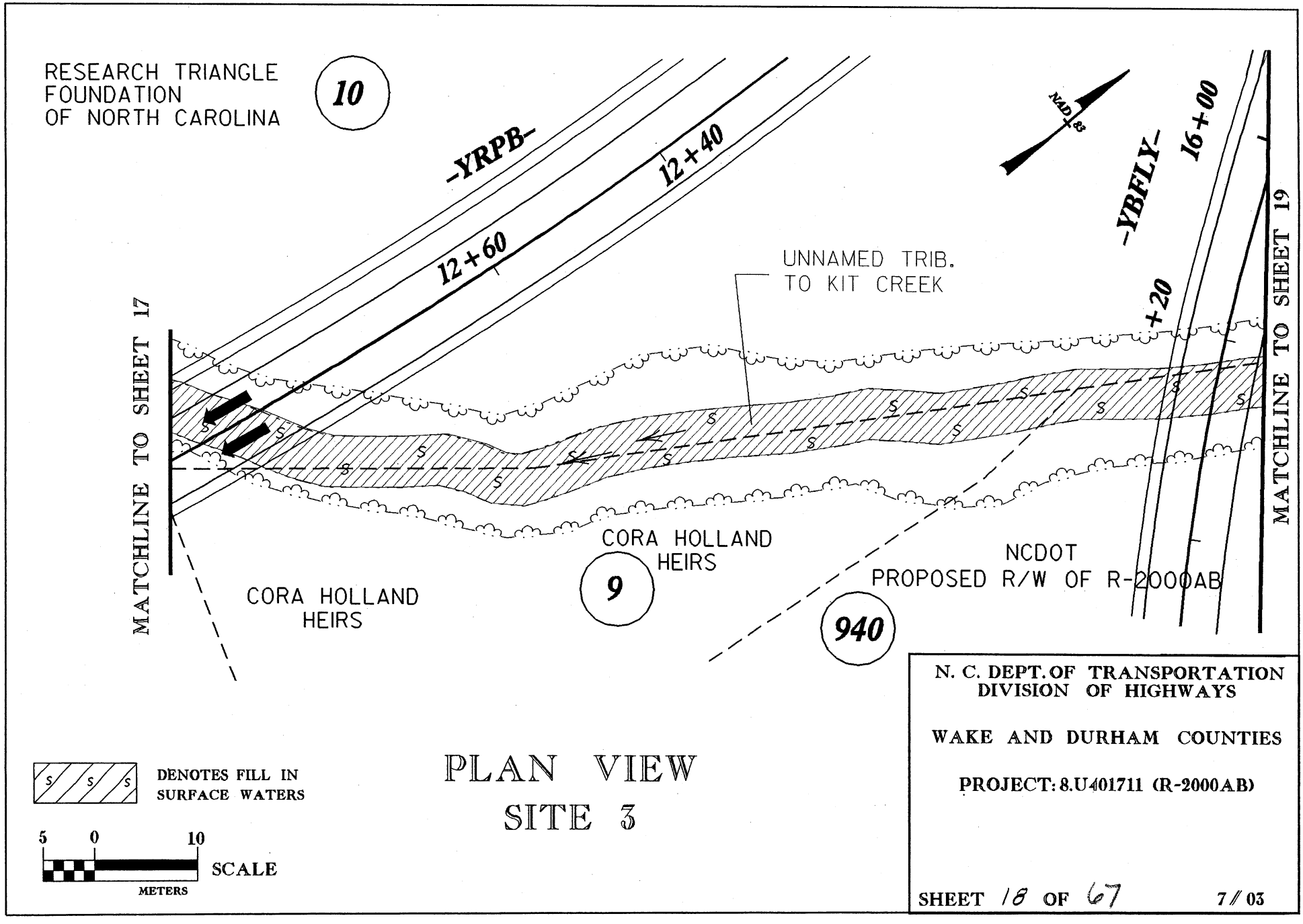

PLAN VIEW
SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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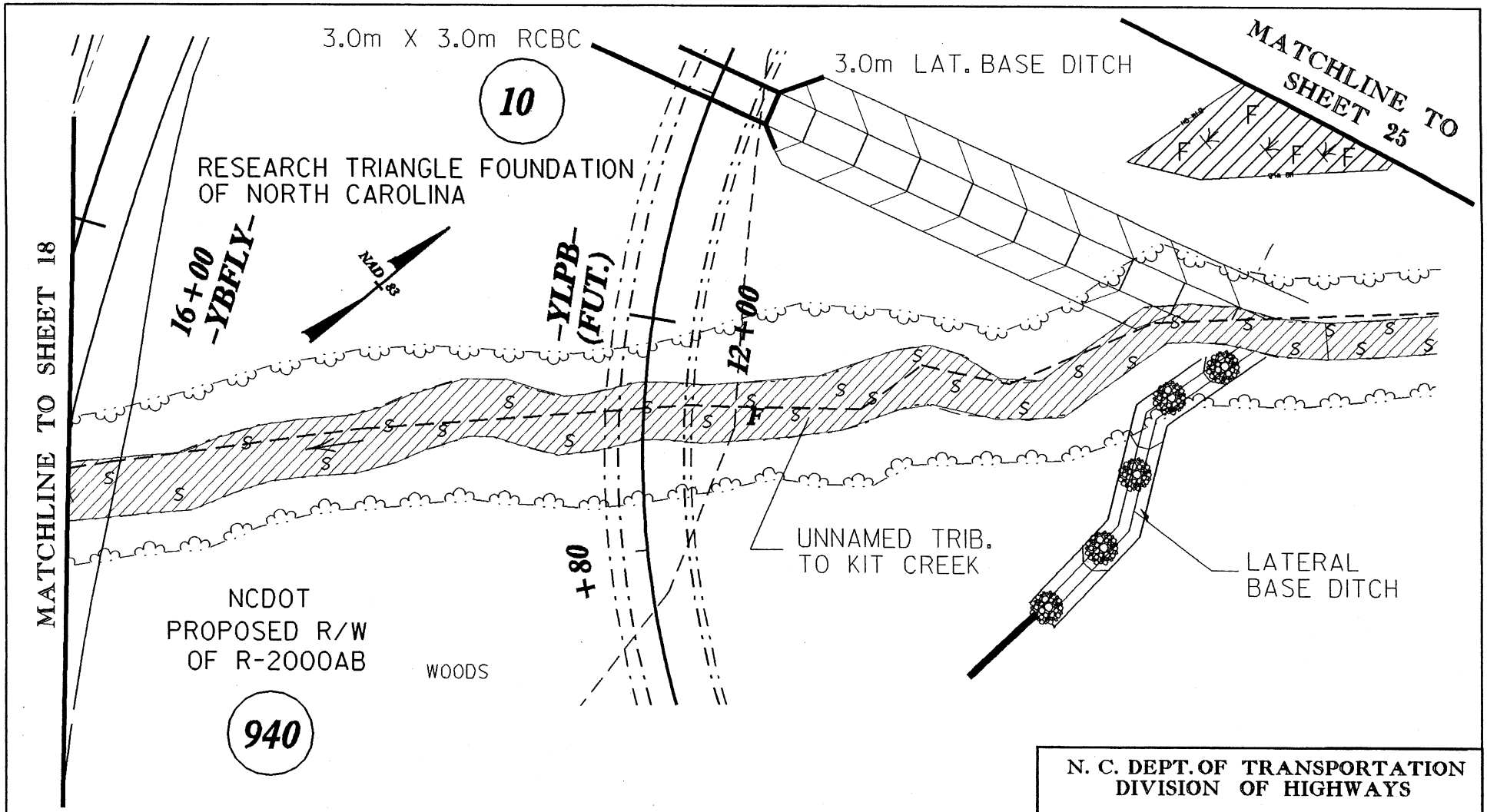

DENOTES FILL IN SURFACE WATERS

5 0 10
SCALE
METERS

PLAN VIEW
SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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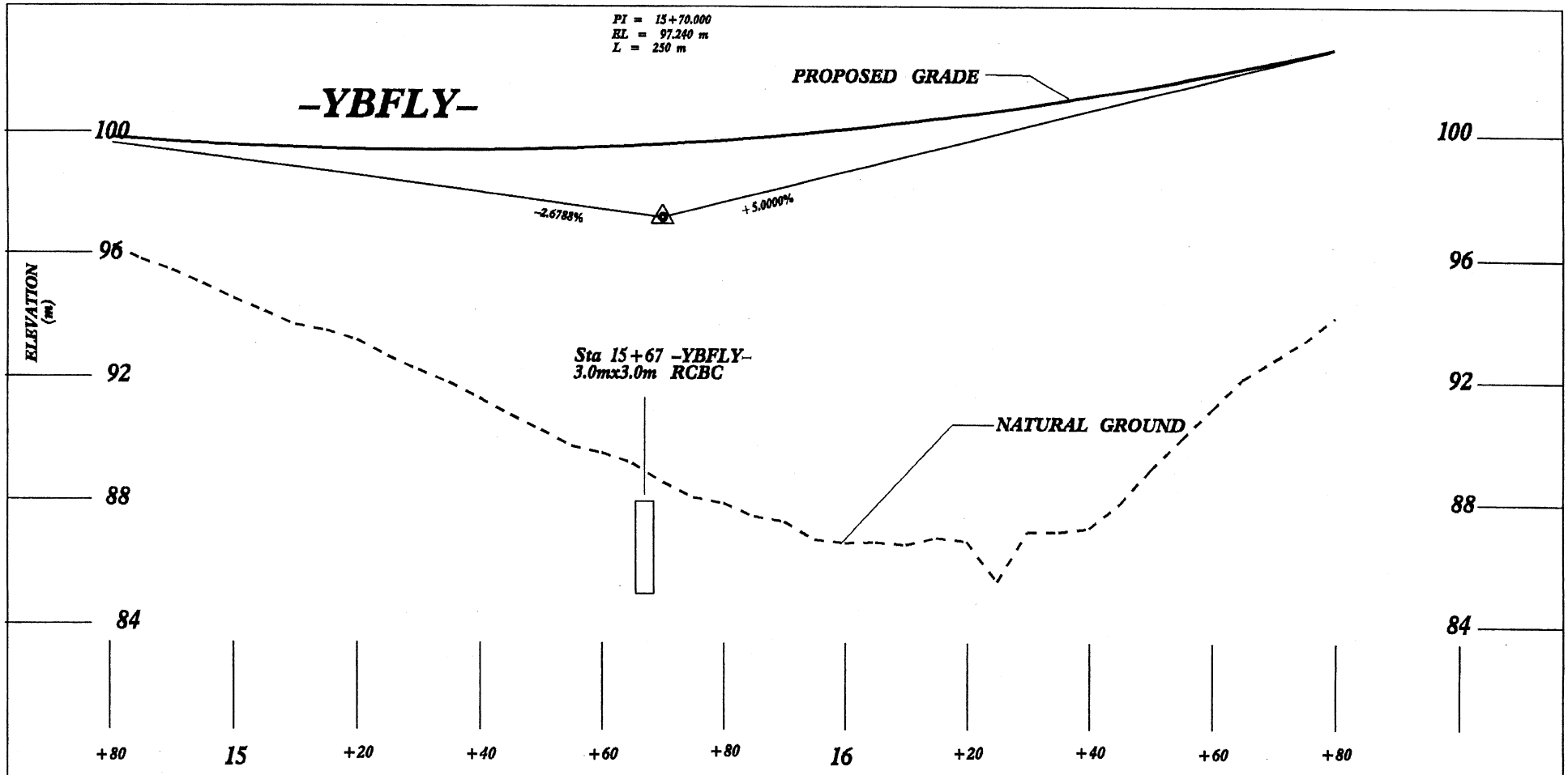

PROFILE
SITE 3

NCDOT
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY
PROJECT: 8.U401711 (R-2000AB)

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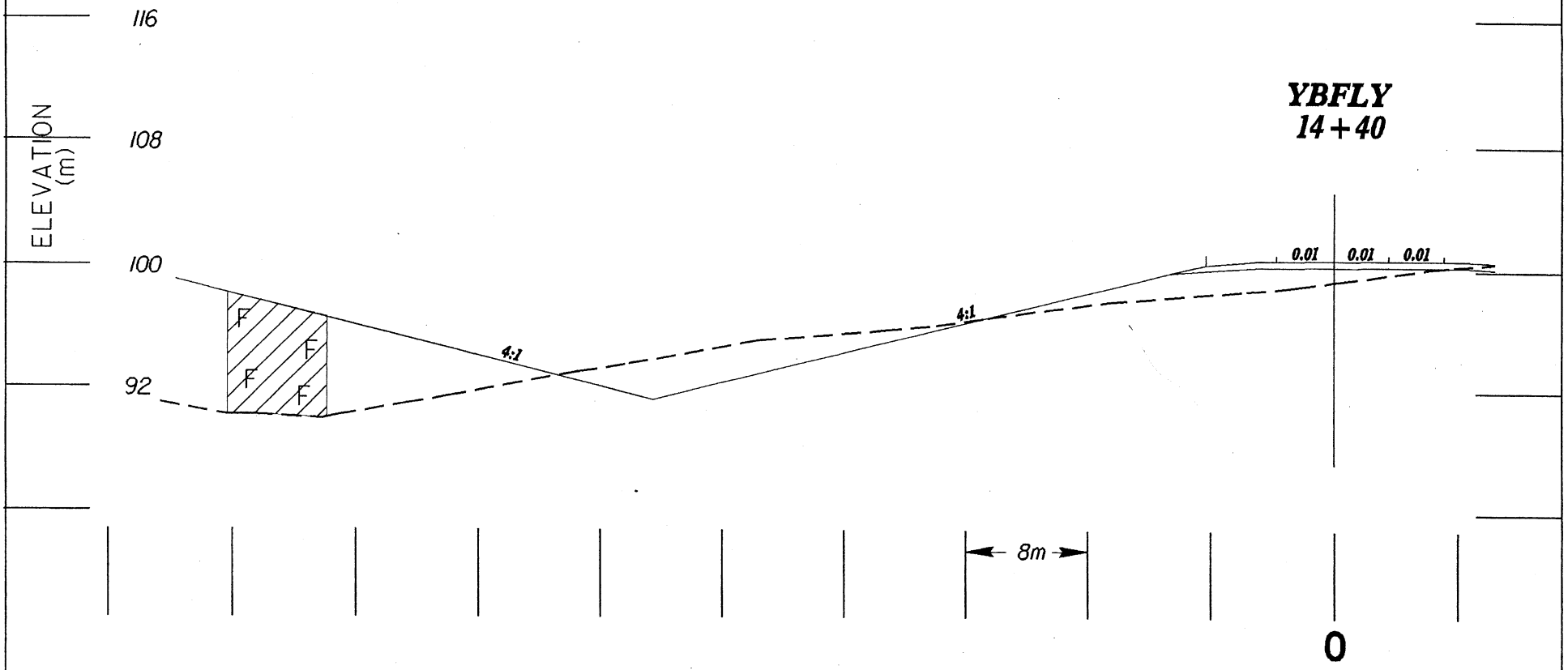
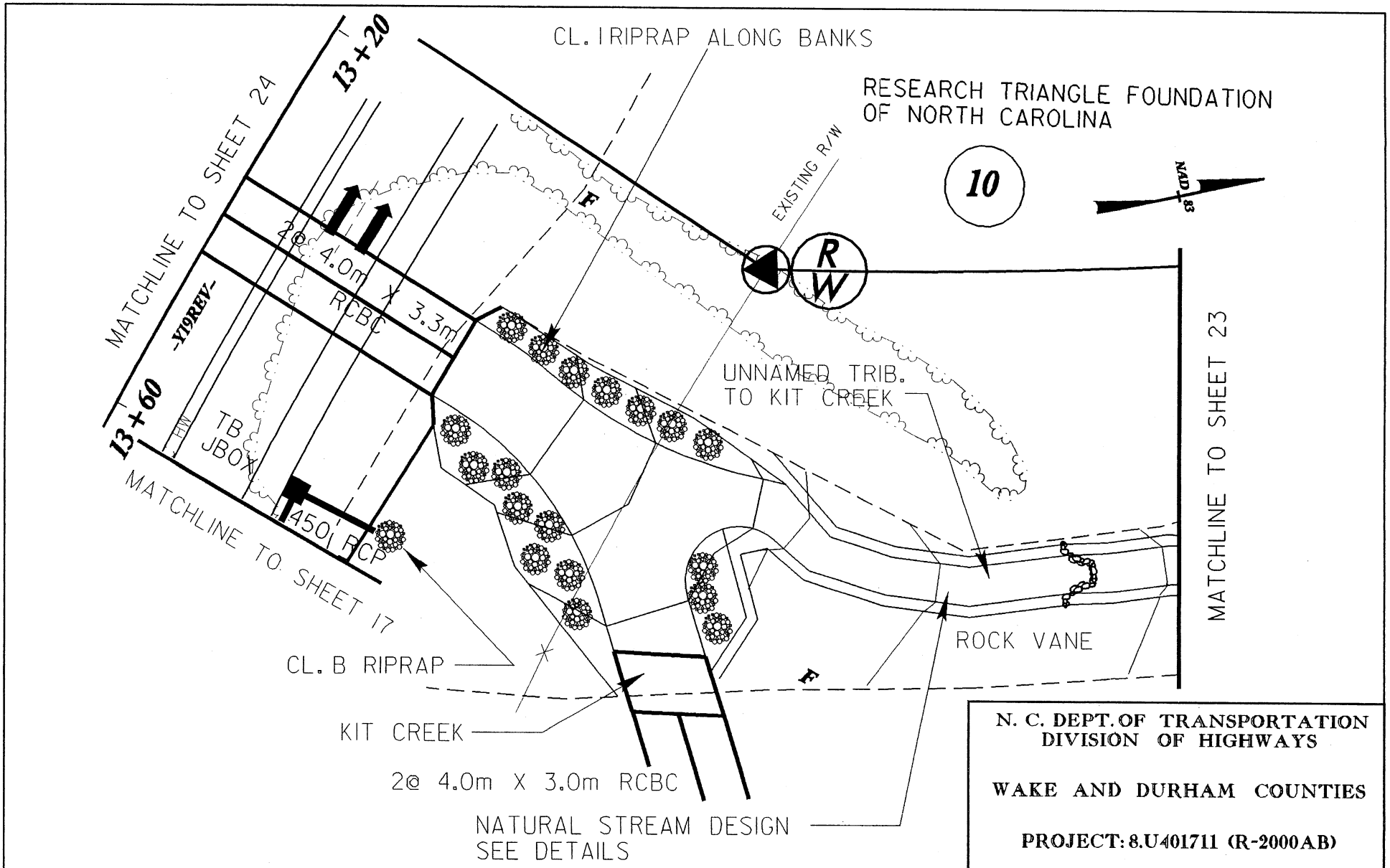


TYPICAL X-SECTION
SITE 3

F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY
PROJECT: 8.U401711 (R-2000AB)



PLAN VIEW
SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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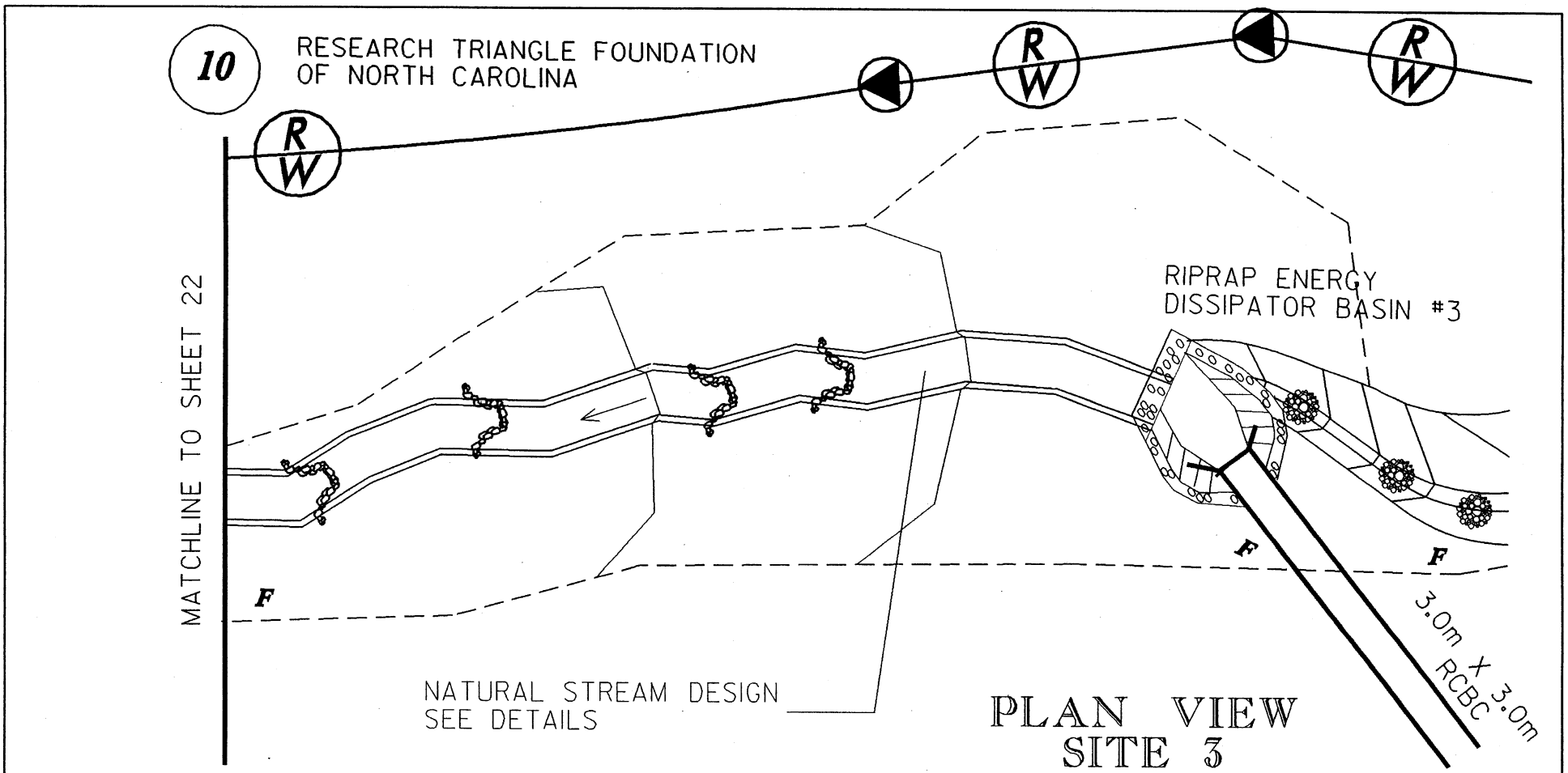
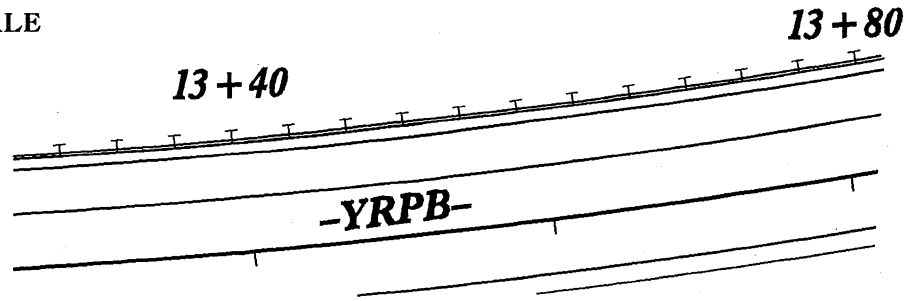


PLAN VIEW
SITE 3

5 0 10
SCALE
METERS



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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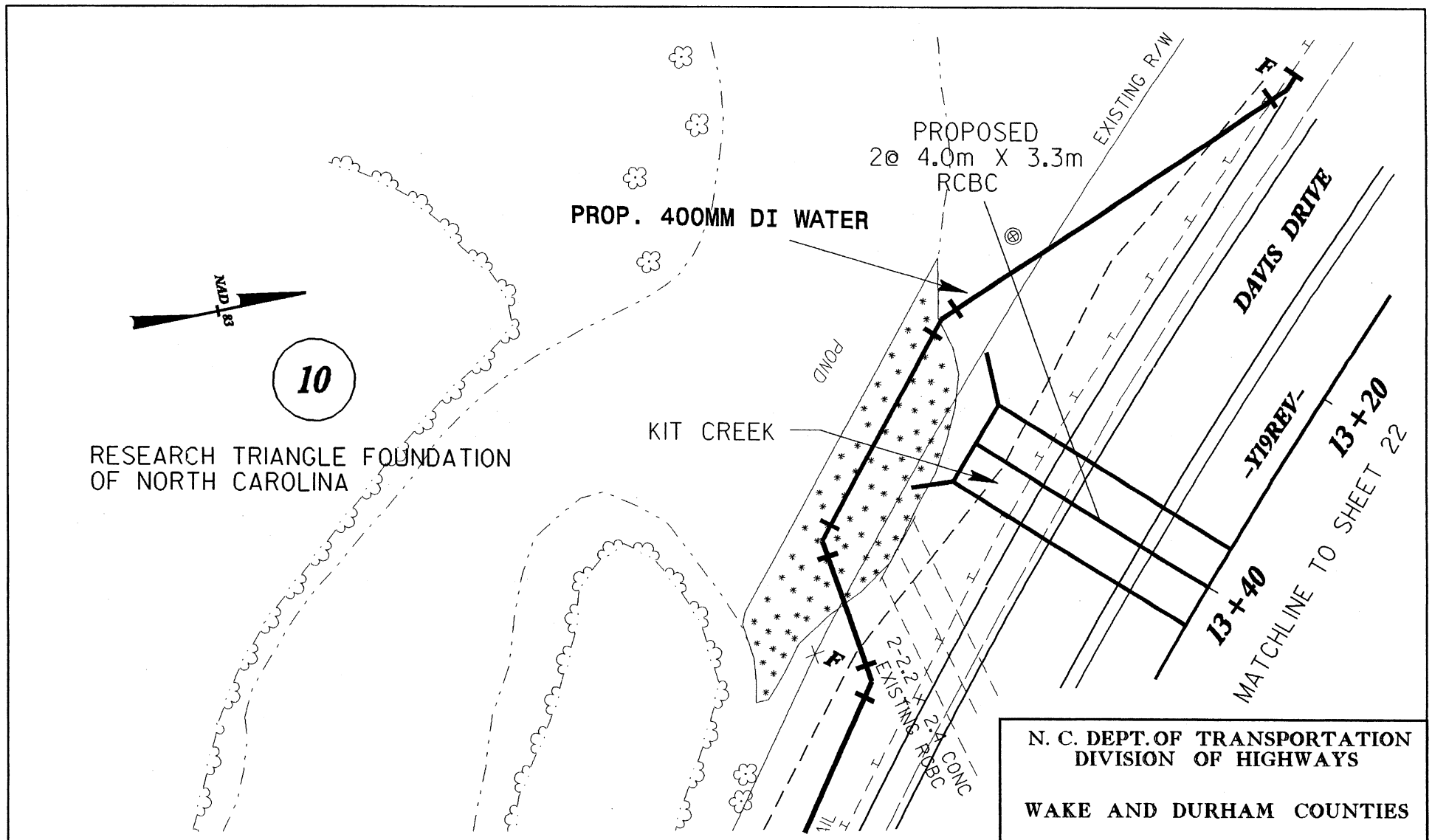

PLAN VIEW
SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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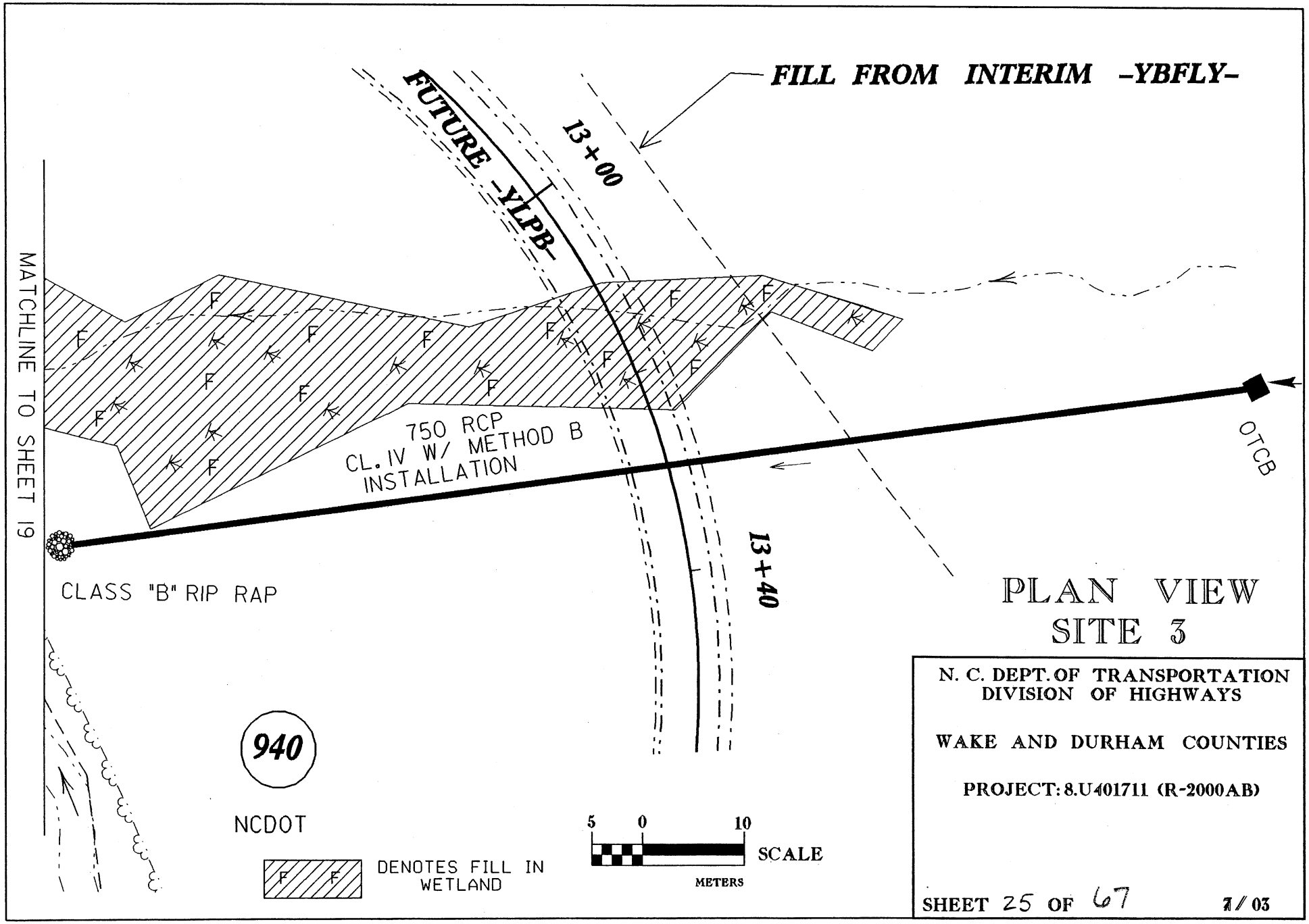


PLAN VIEW
SITE 3

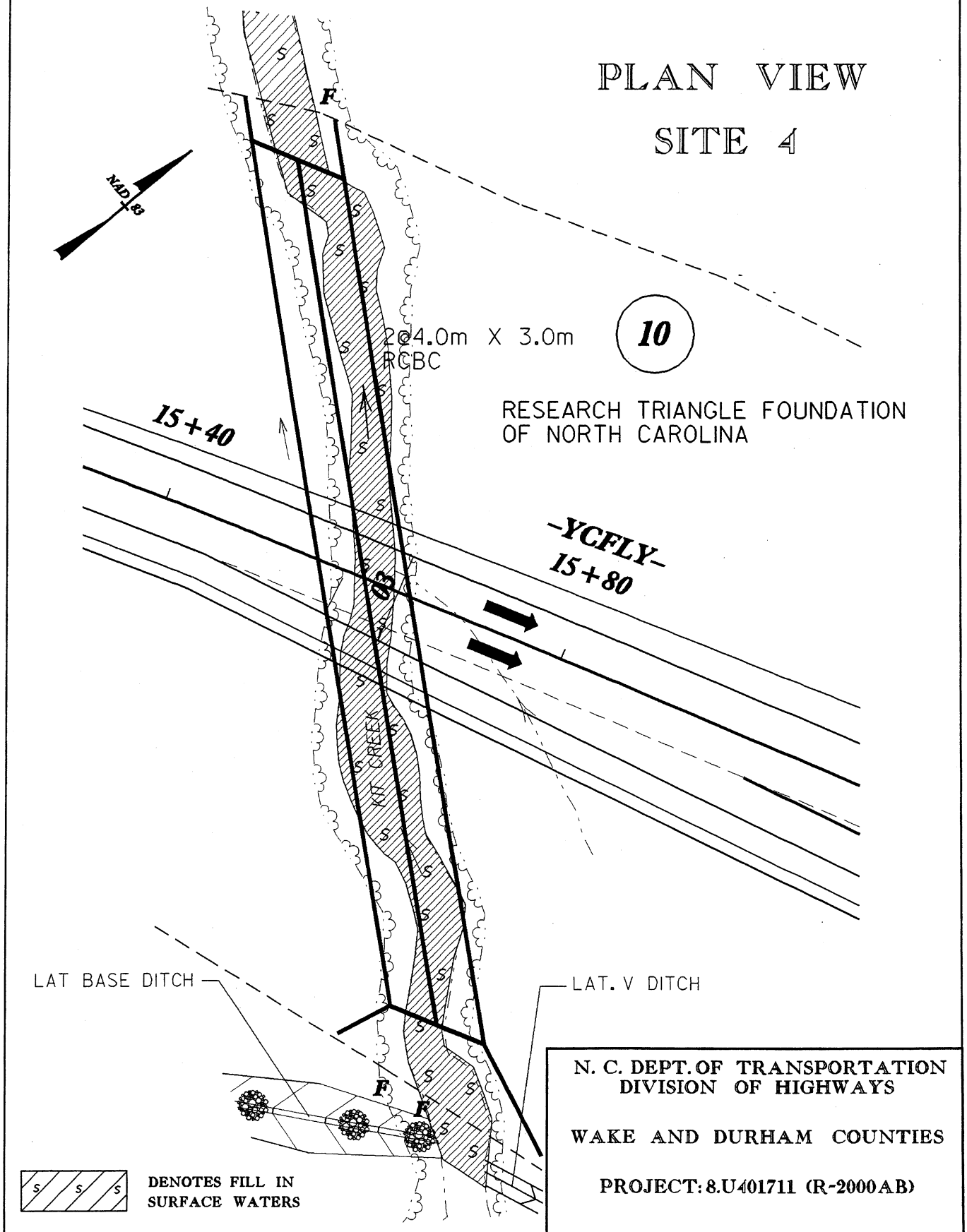
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 25 OF 67

7/03



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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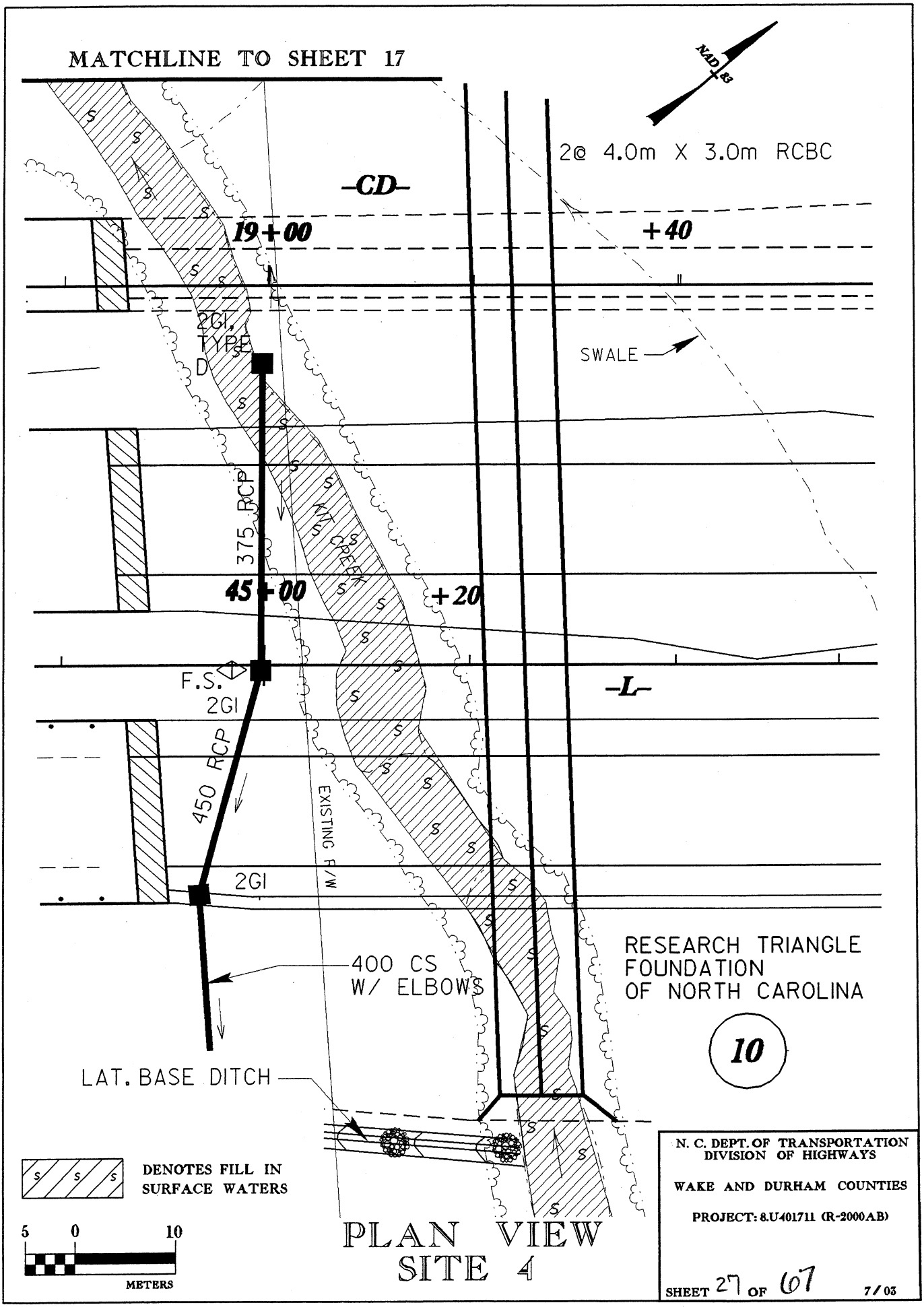
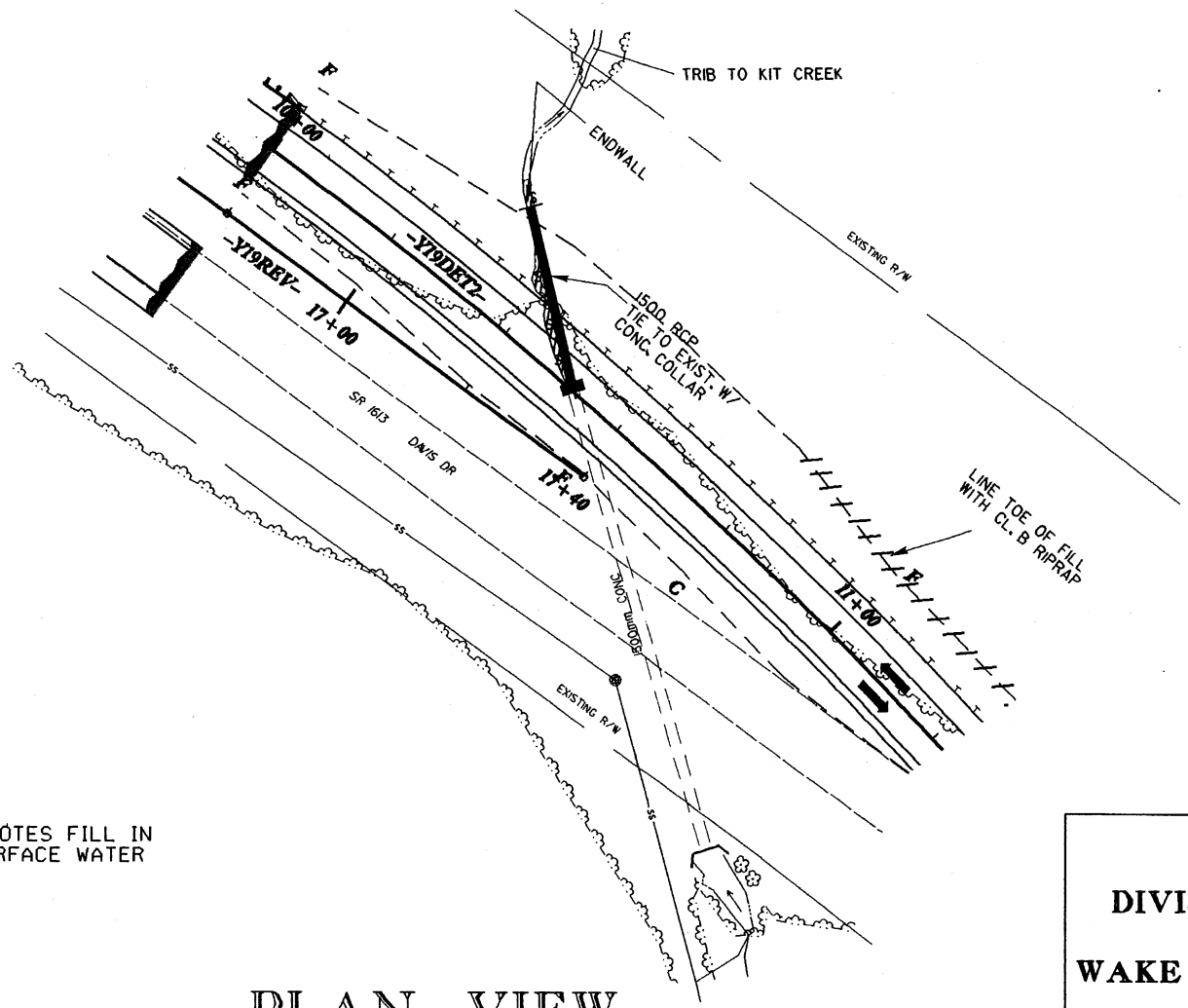
7/03


MATCHLINE TO SHEET 17
NAD 83
2@ 4.0m X 3.0m RCBC
-CD-
19+00
+40
2GI, TYPE D
SWALE
375 RCP
KIT CREEK
45+00
+20
F.S. 2GI
-L-
450 RCP
EXISTING R/W
2GI
400 CS W/ ELBOWS
RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
10
LAT. BASE DITCH
DENOTES FILL IN SURFACE WATERS
5 0 10
METERS
PLAN VIEW
SITE 4
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE AND DURHAM COUNTIES
PROJECT: 8.U401711 (R-2000AB)
SHEET 27 OF 67
7/03



DENOTES FILL IN SURFACE WATER

PLAN VIEW

SITE 4

10m 0 20m

SCALE

NCDOT

DIVISION OF HIGHWAYS

WAKE & DURHAM COUNTY

PROJECT: 8.U401711(R-2000AB)

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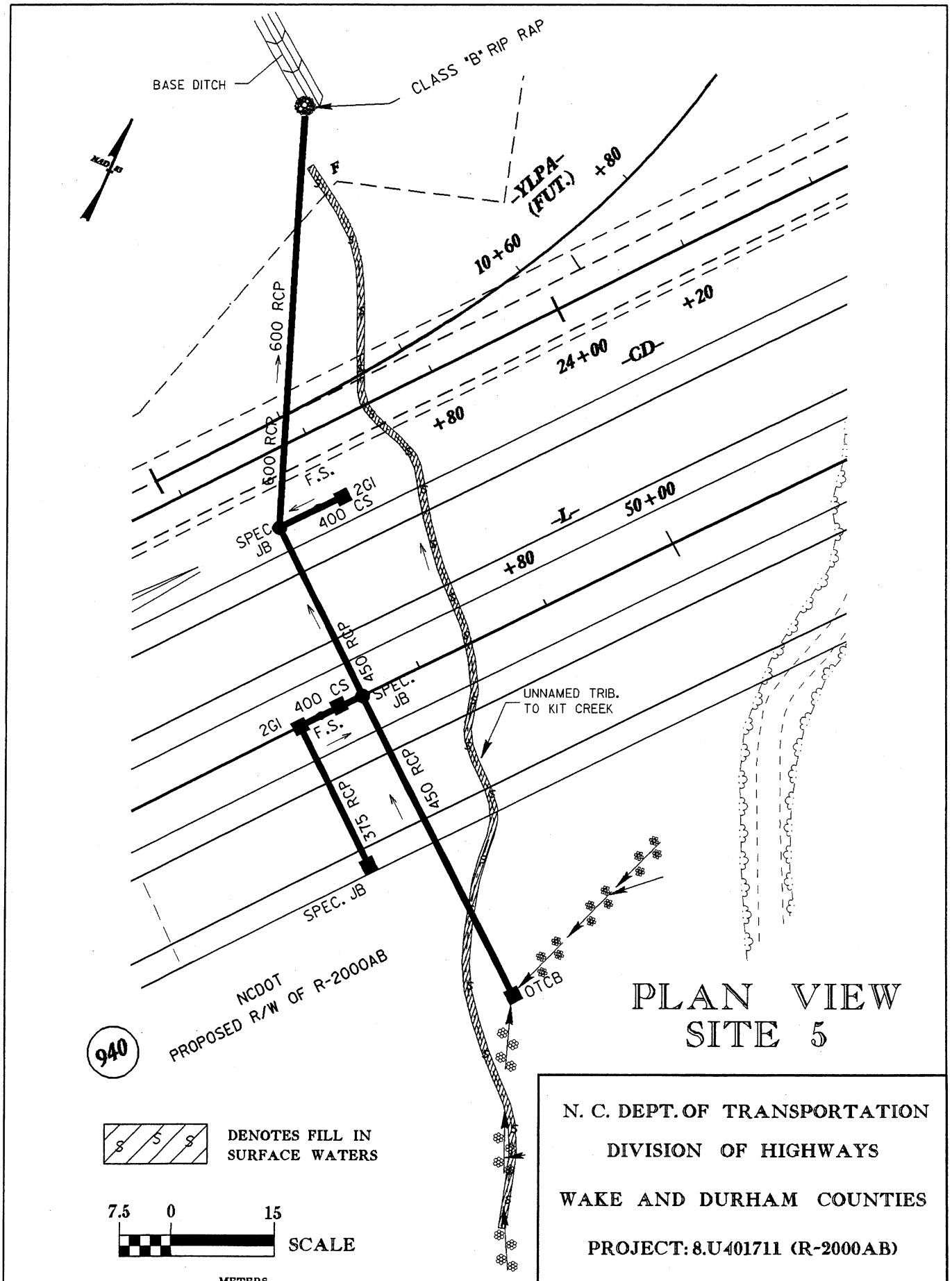

PLAN VIEW
SITE 5

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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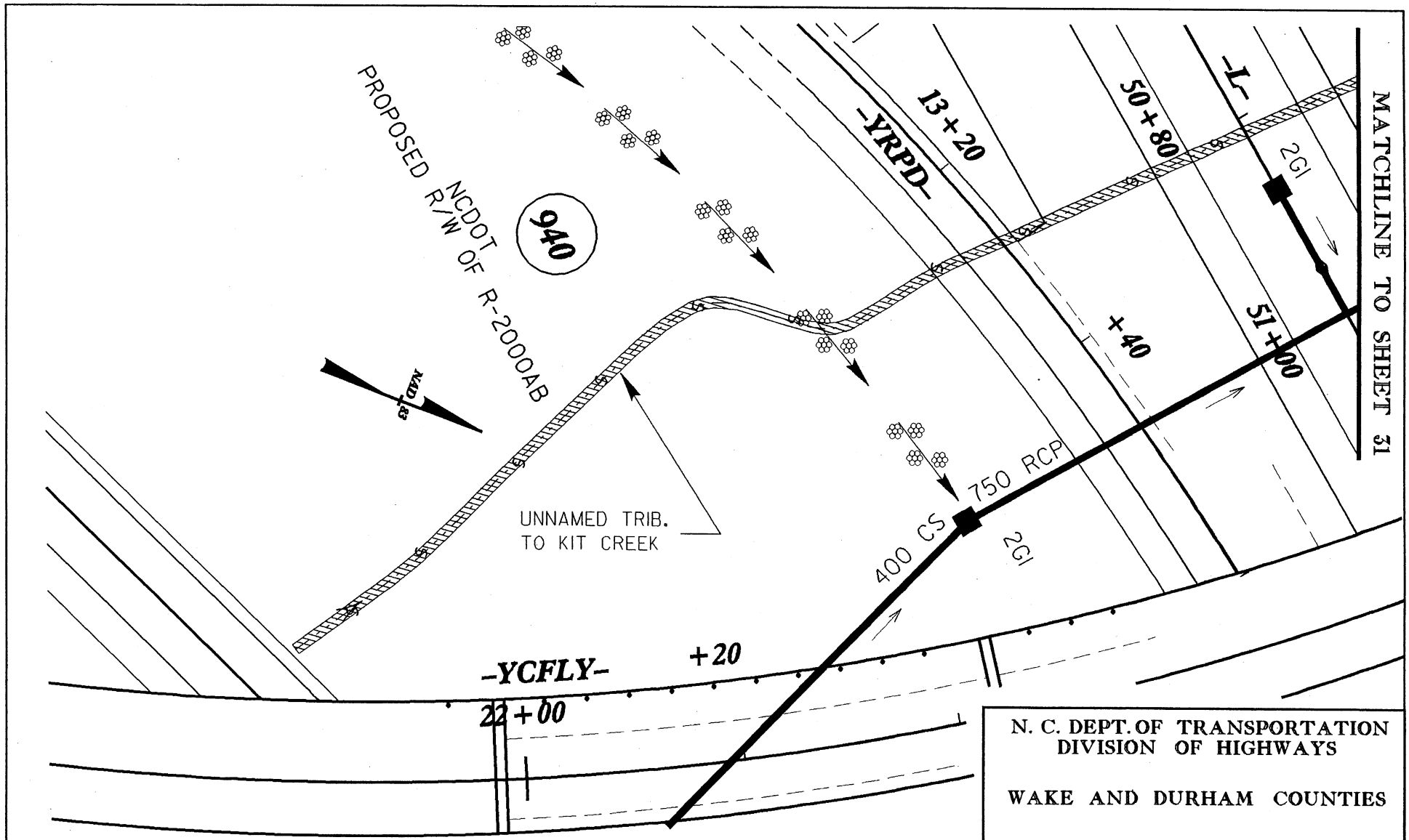

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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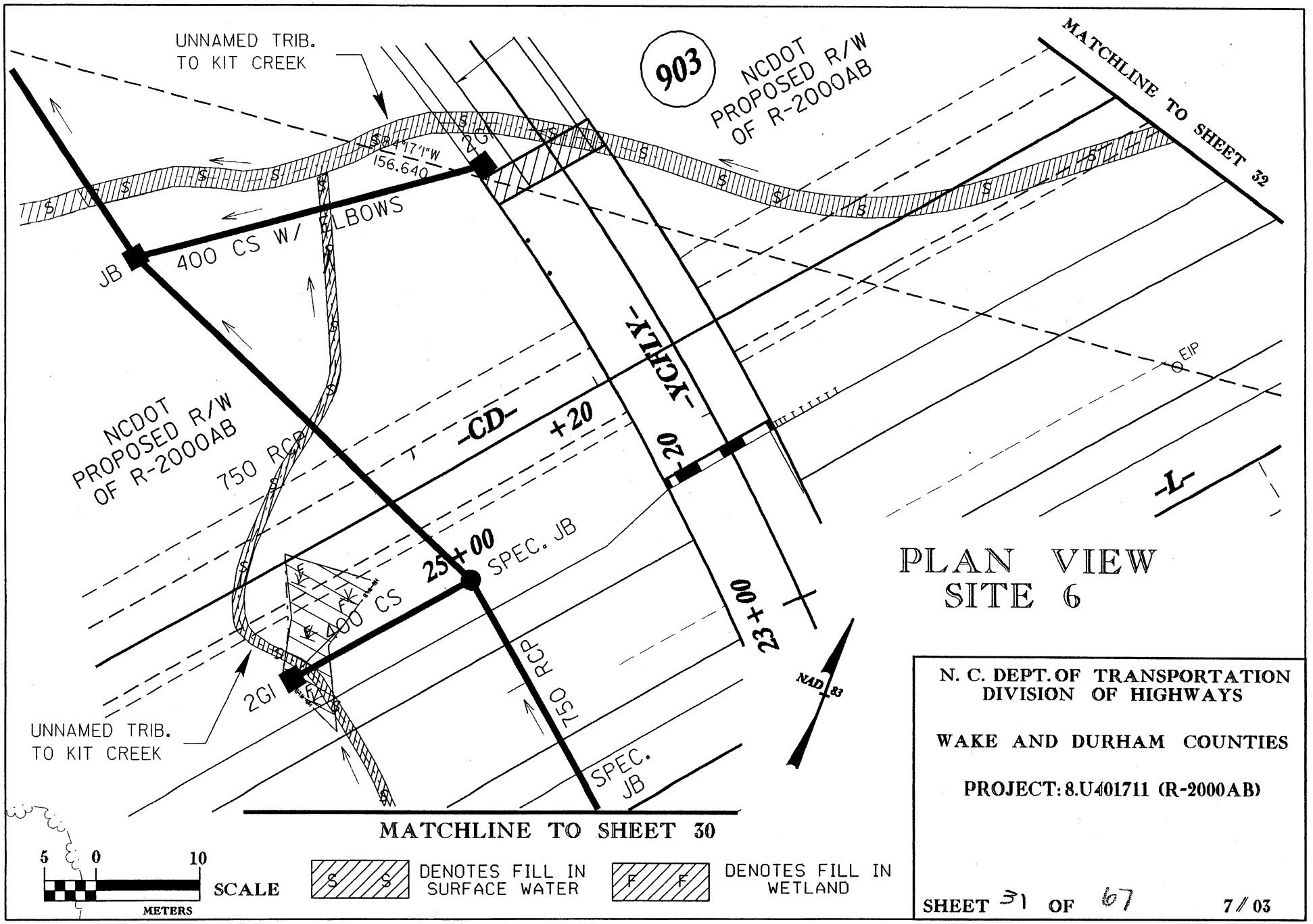

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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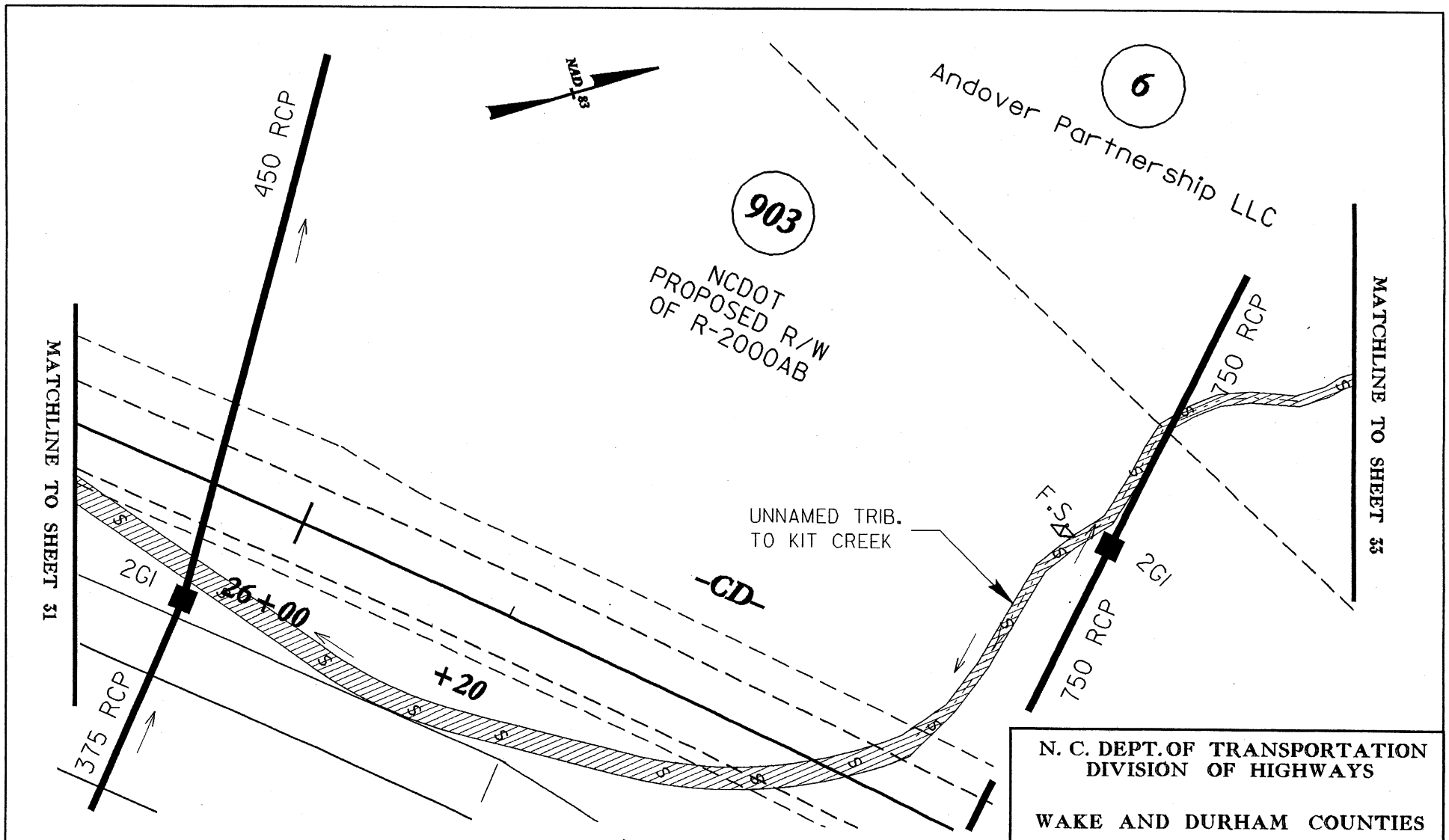

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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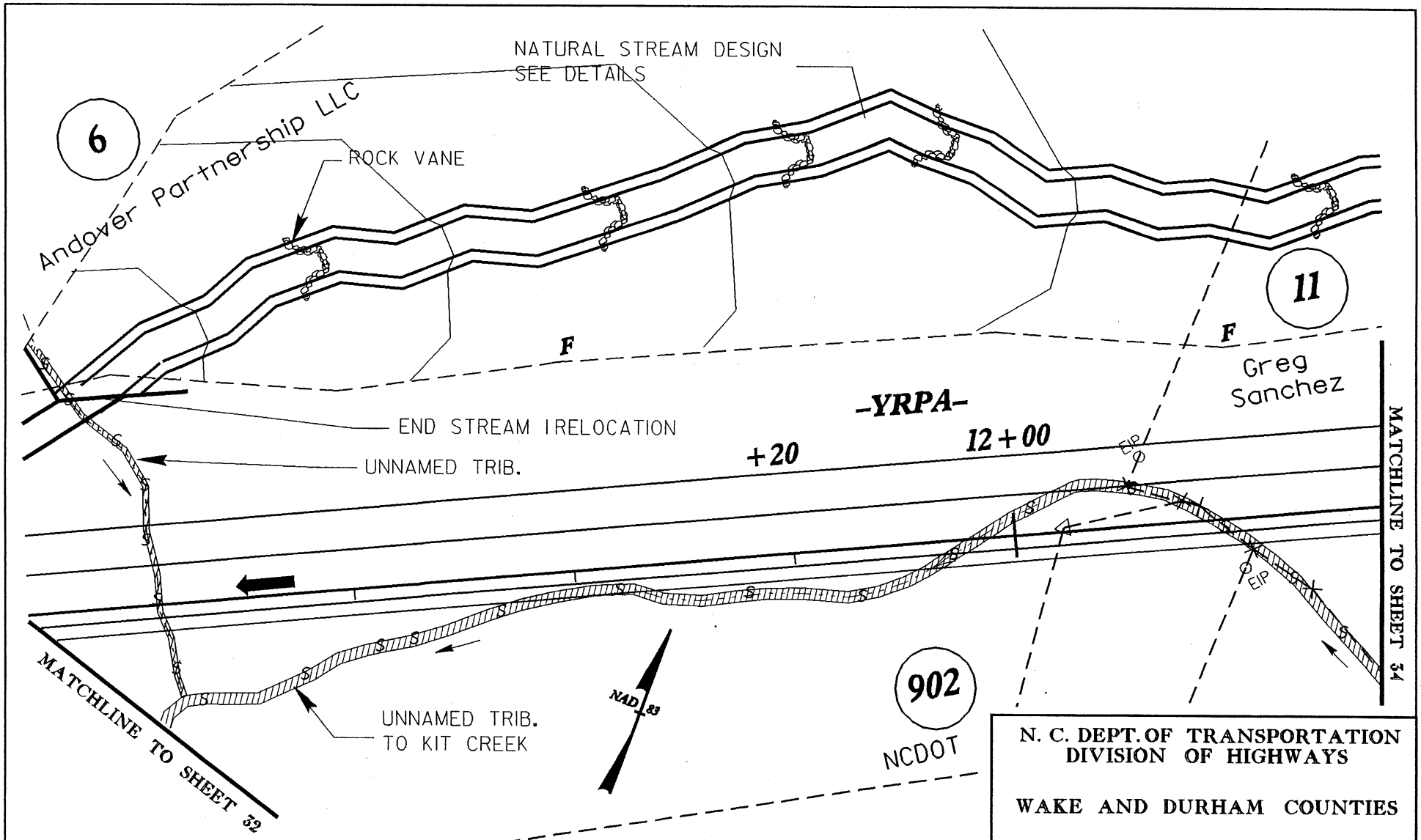

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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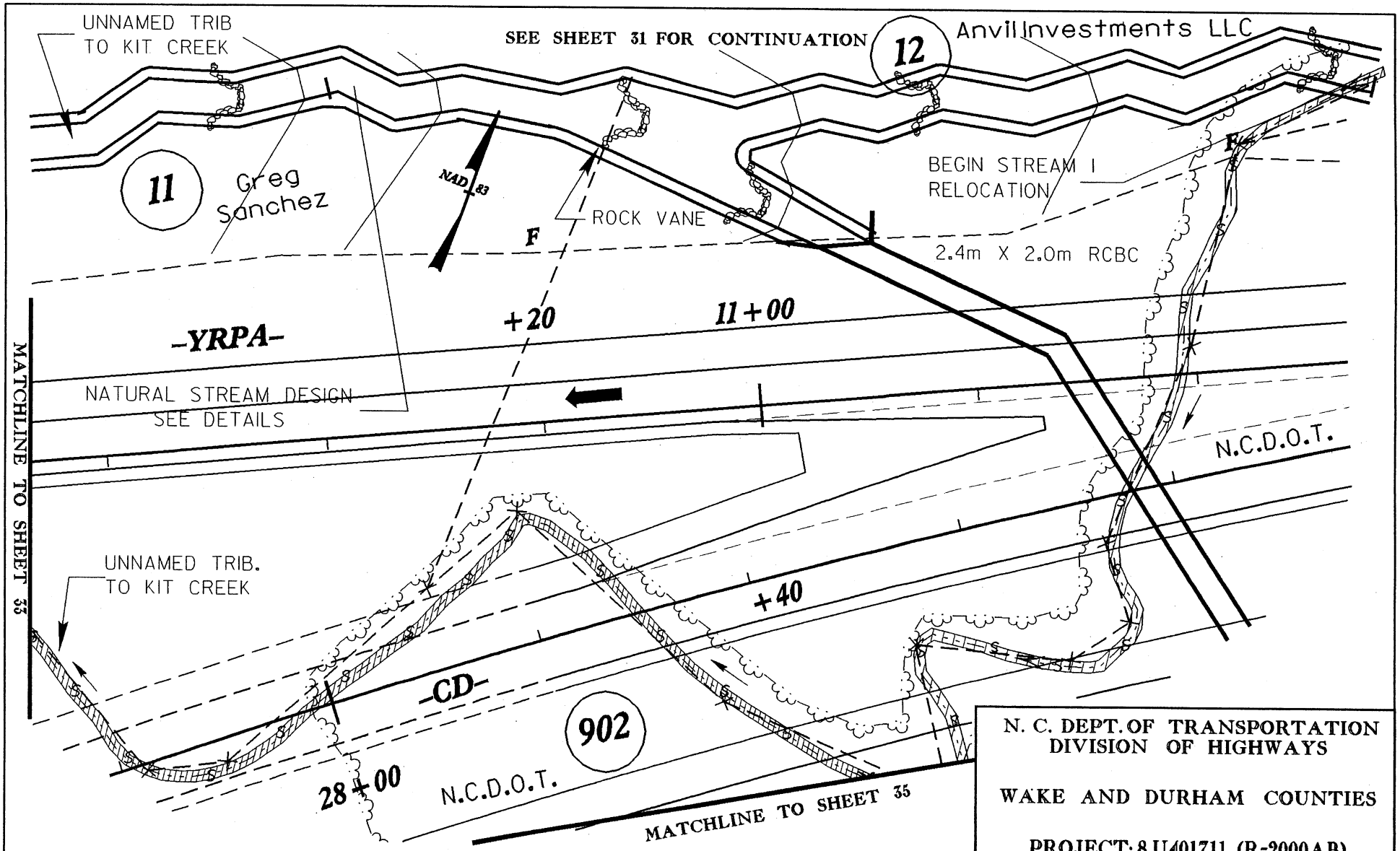

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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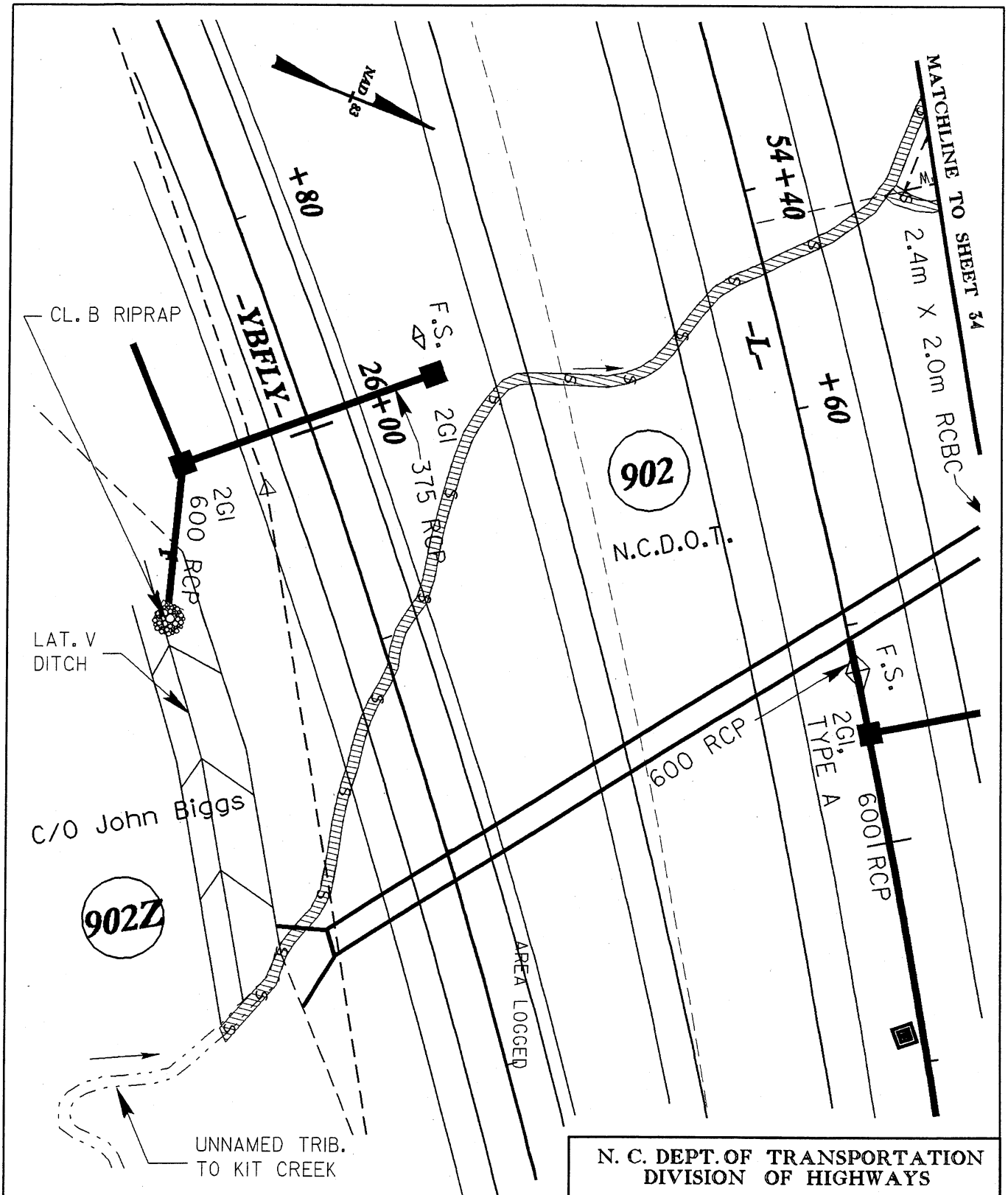


PLAN VIEW
SITE 6

SCALE
5 0 10
METERS

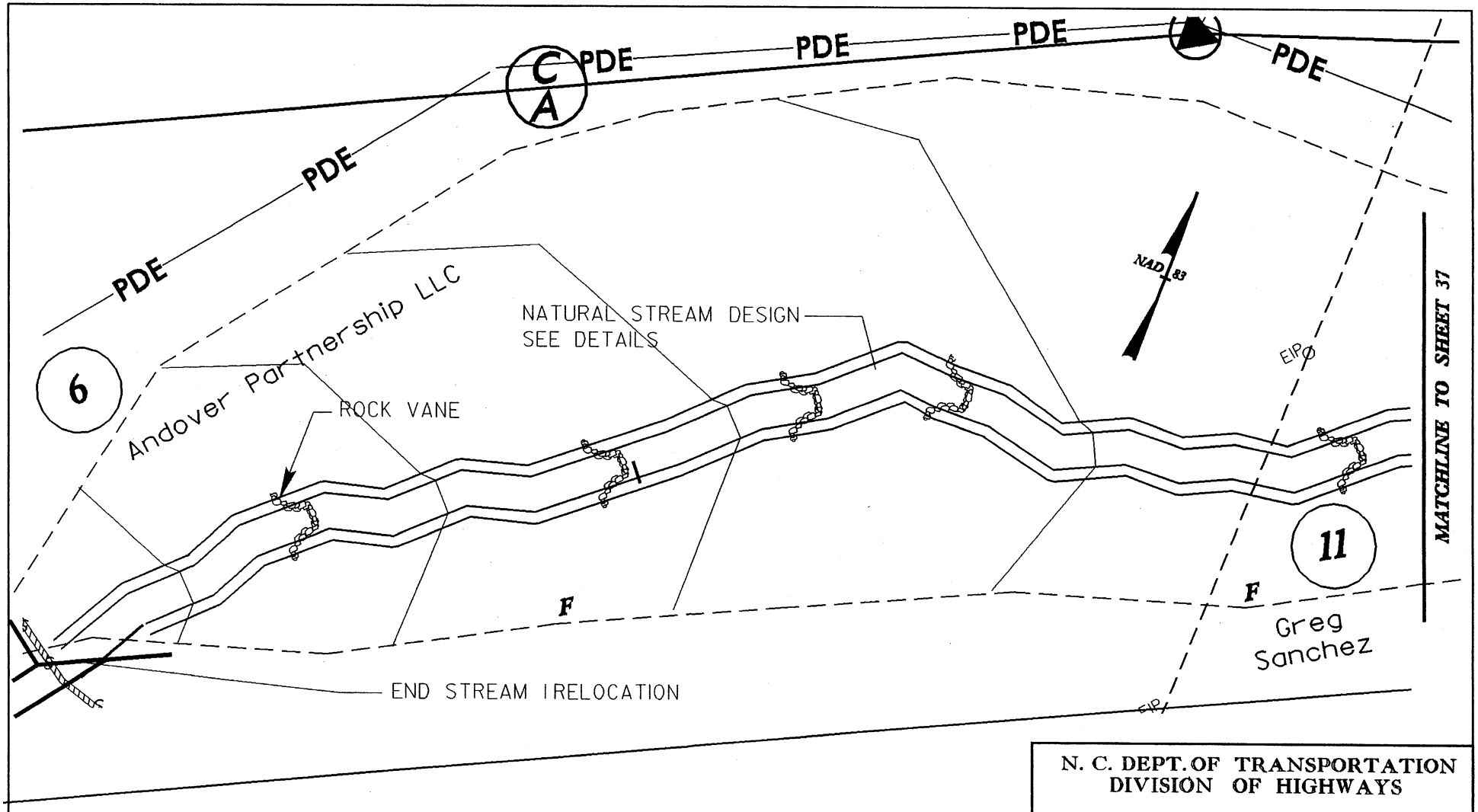
DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB) -

SHEET 35 OF 67 7/03



5 0 10
SCALE
METERS

PLAN VIEW
SITE 6

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

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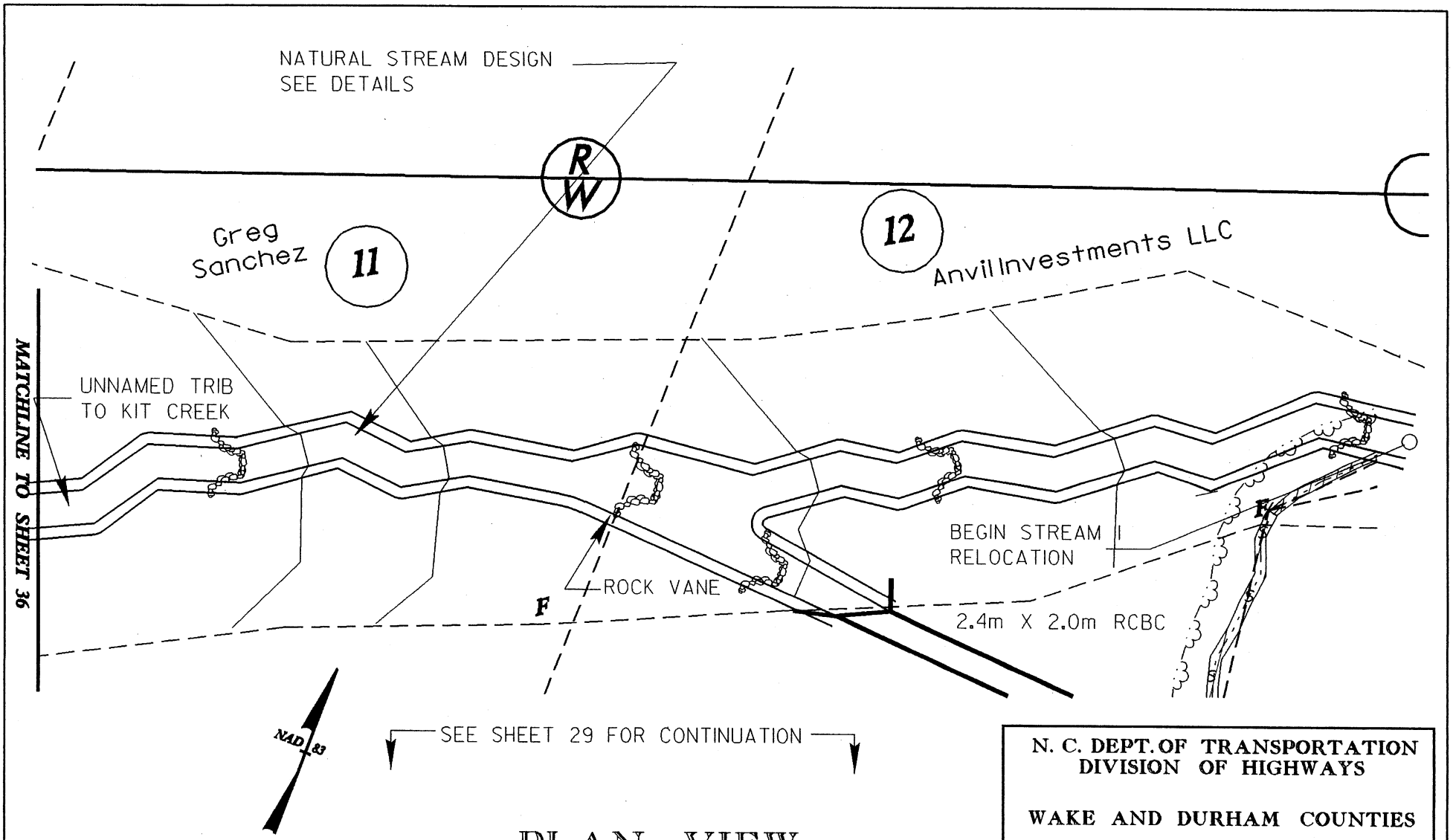


PLAN VIEW
SITE 6

5 0 10
SCALE
METERS

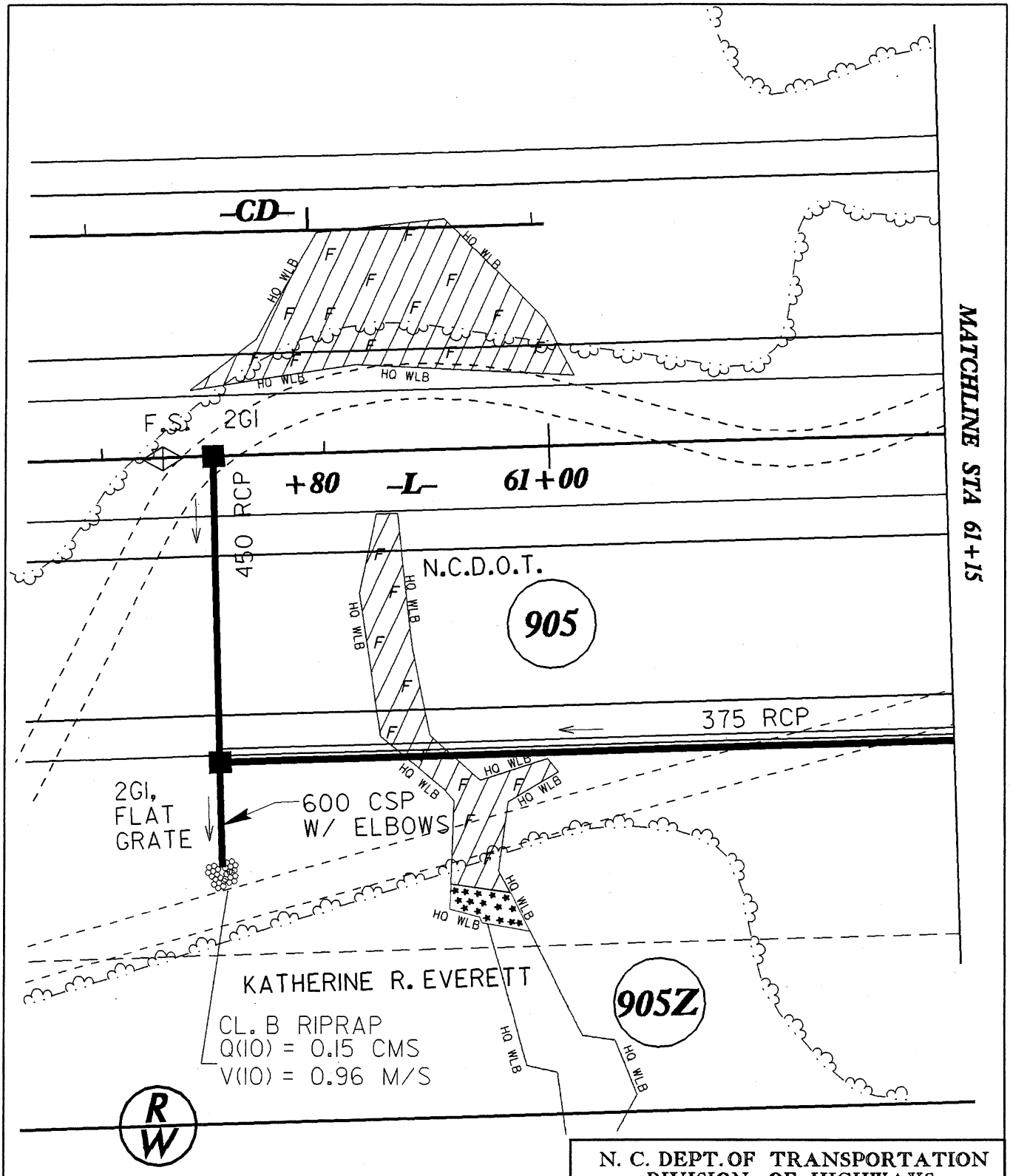
DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 37 **OF** 67 **7/03**



DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

5 0 10

SCALE

METERS

PLAN VIEW
SITE 7

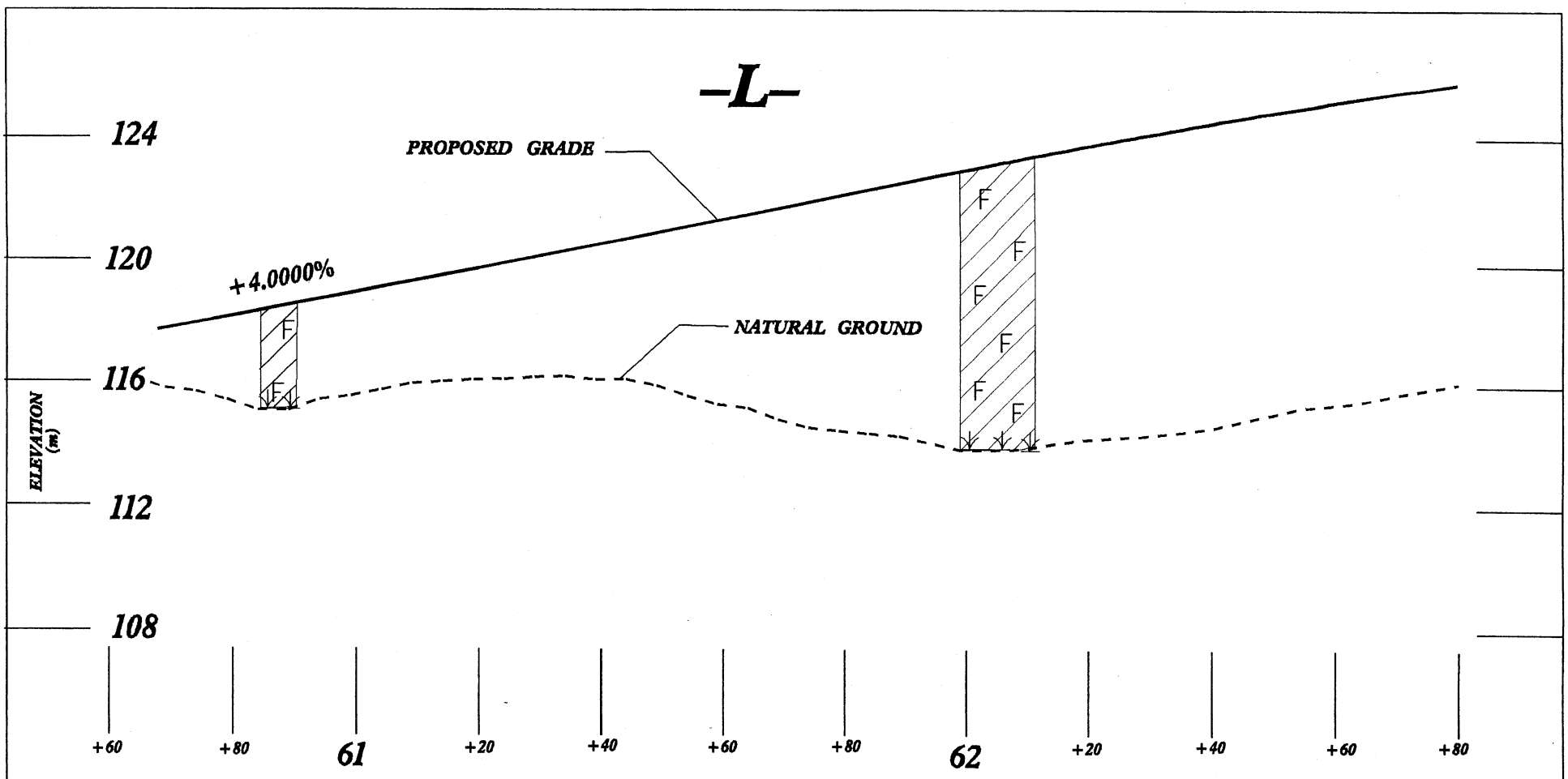
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 38 OF 67

7/03



PROFILE
SITE 7 & 8

F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY
PROJECT: 8.2U401711 (R-2000AB)

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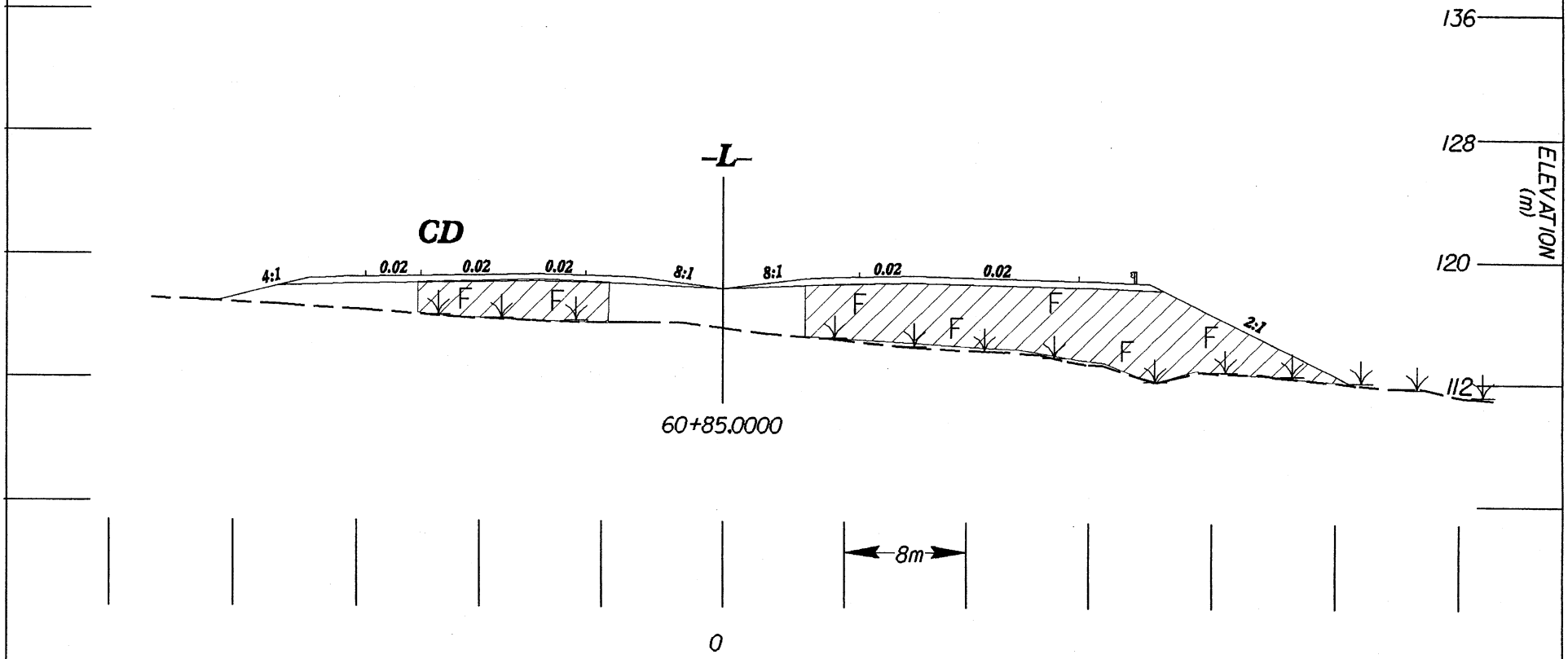

TYPICAL X-SECTION
SITE 7

F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
WAKE & DURHAM COUNTY
PROJECT: 8.U401711 (R-2000AB)

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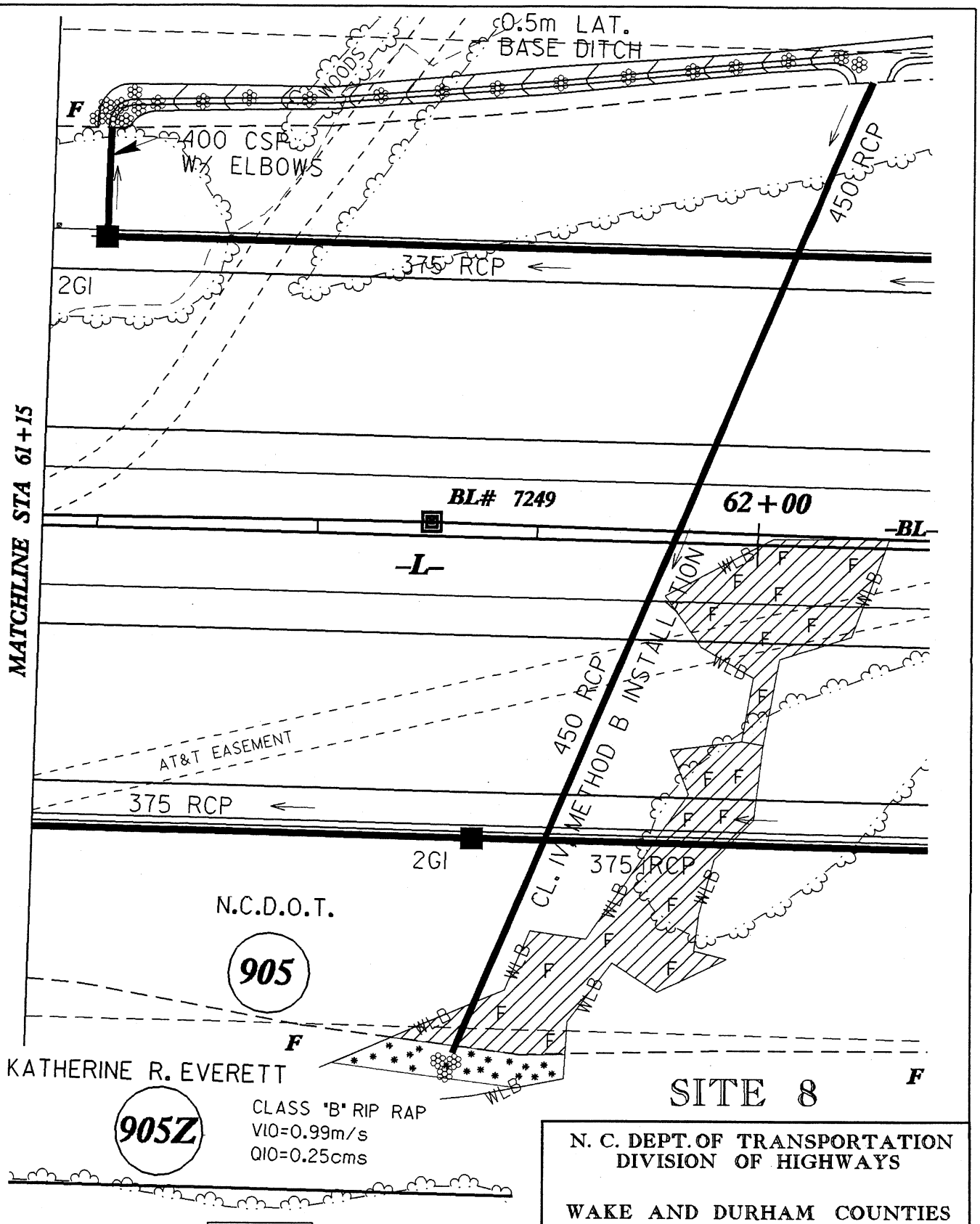
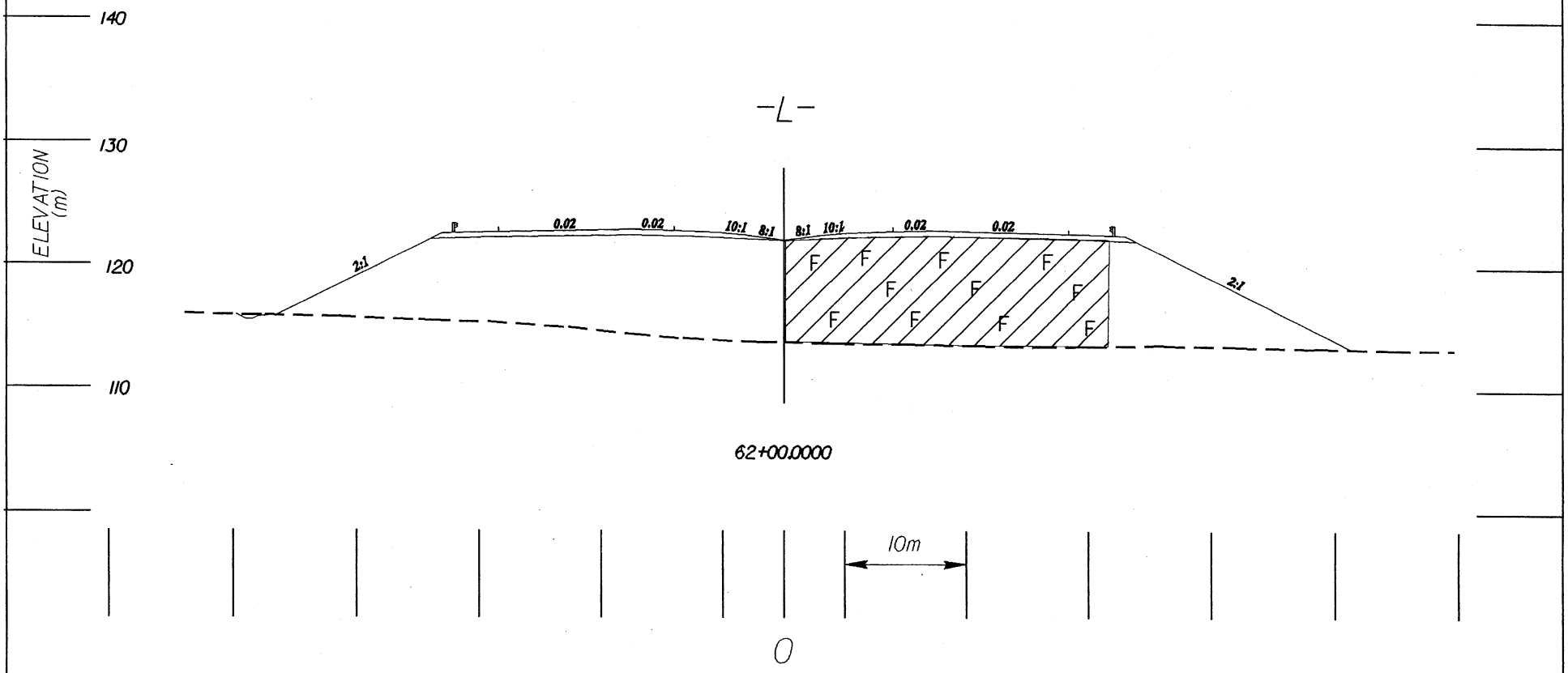


N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

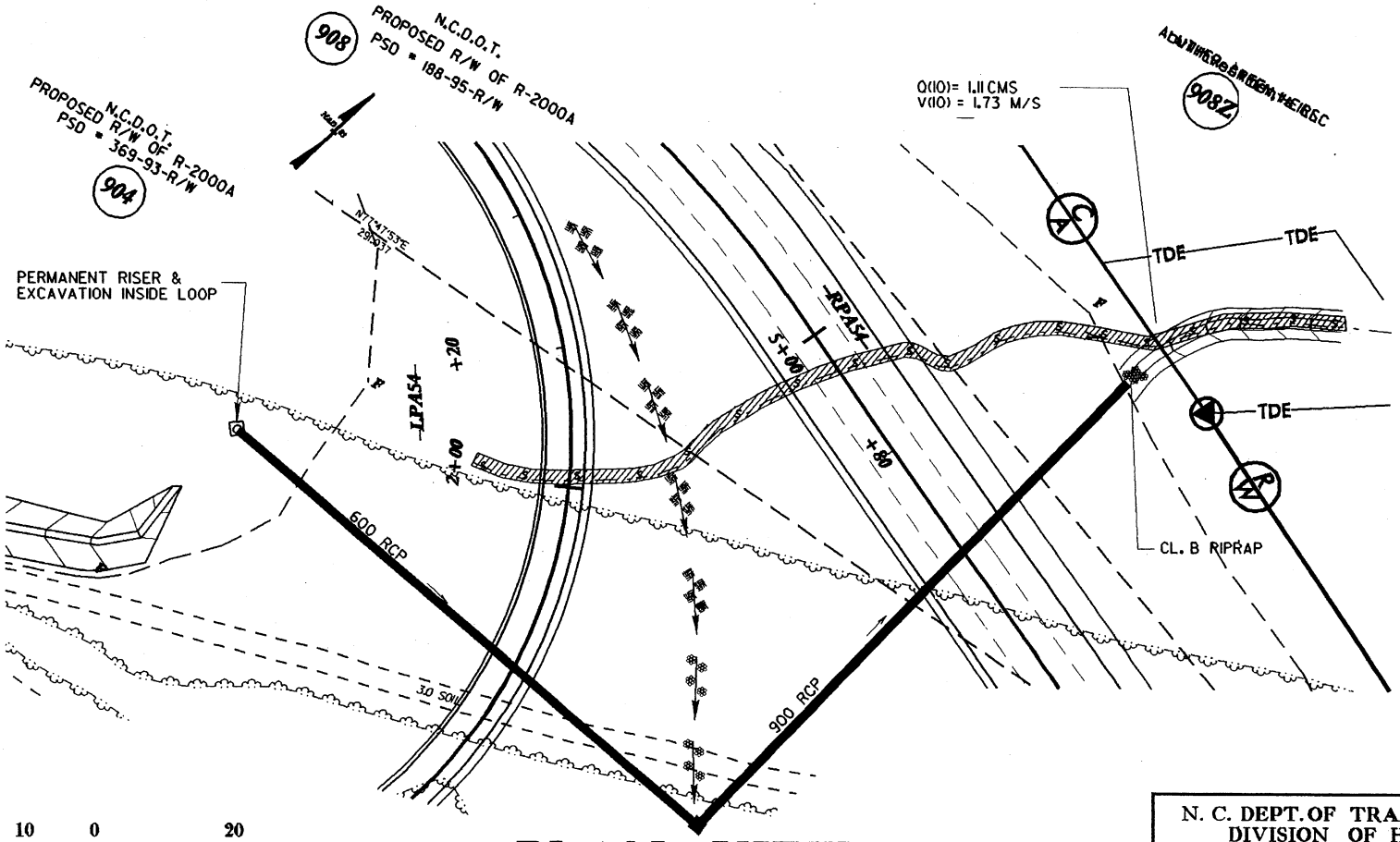
SHEET 41 OF 67 7/03



TYPICAL X-SECTION
SITE 8

F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY
PROJECT: 8.U401711 (R-2000AB)



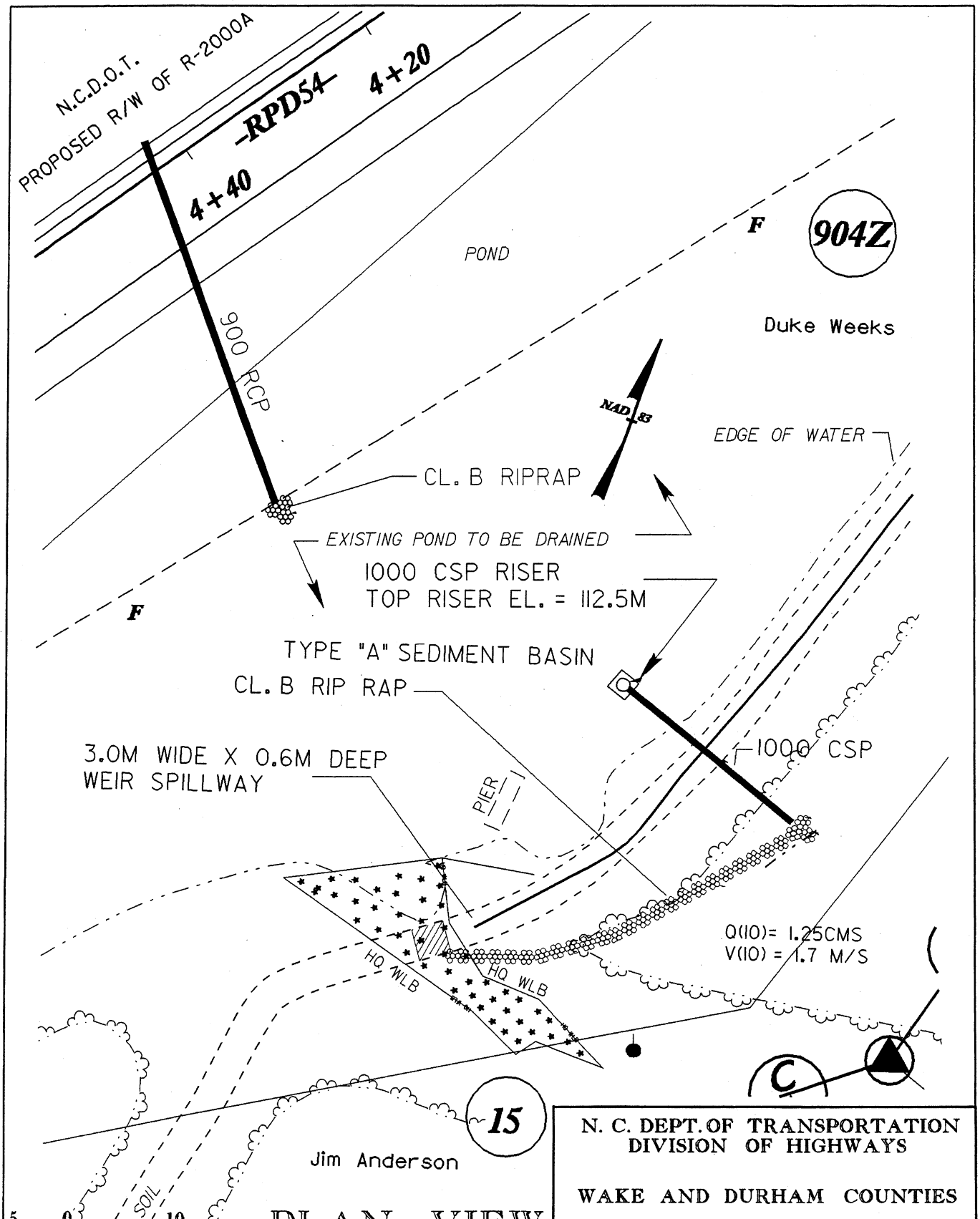
PLAN VIEW
SITE 9
STREAM IMPACTS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 43 OF 67 7/03



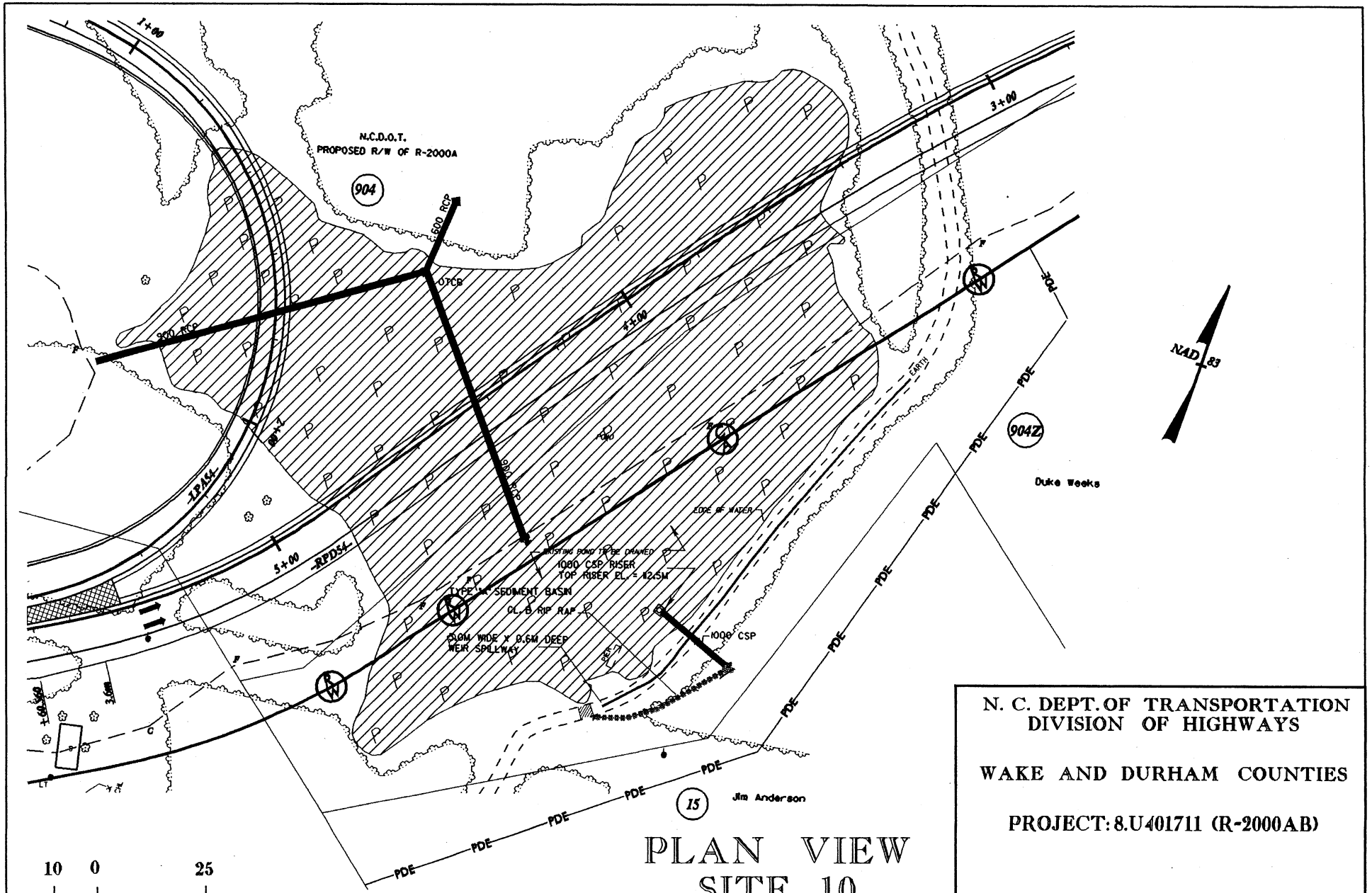
PLAN VIEW
SITE 10
WETLAND IMPACTS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 44 OF 67 7/03



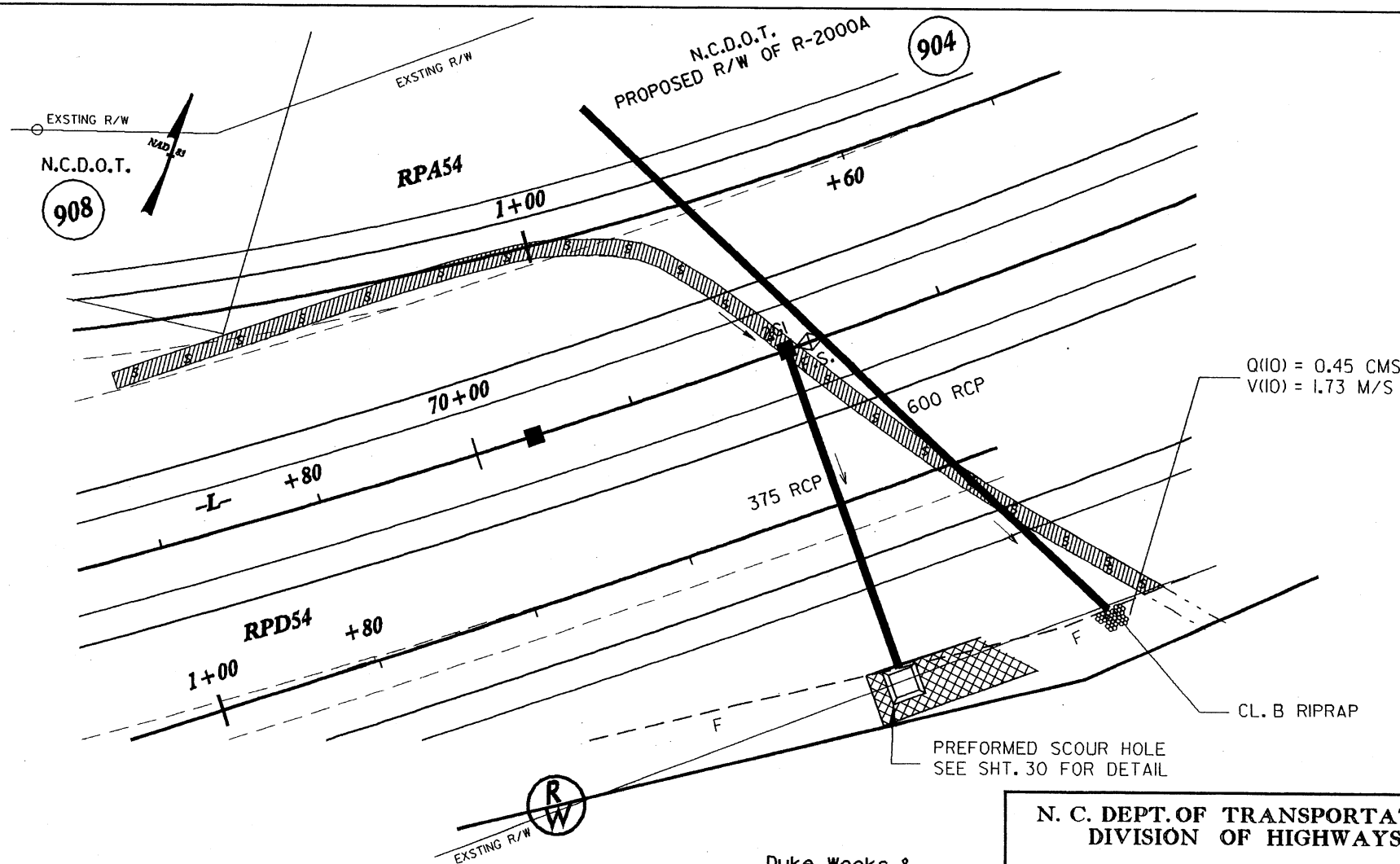
PLAN VIEW
SITE 10
POND IMPACTS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 45 OF 67 7/03



PLAN VIEW
SITE 11

Duke Weeks &
Anvil Investments LLC
904Z

S S S DENOTES FILL IN SURFACE WATERS

7.5 0 15
SCALE
METERS

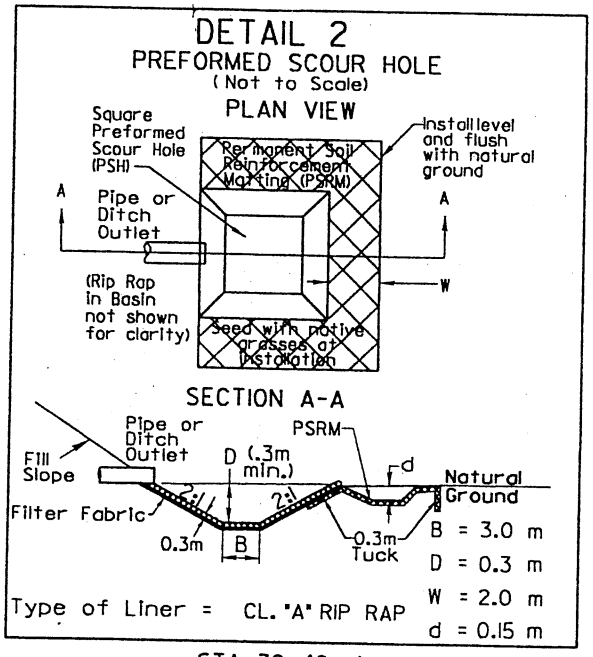
STREAM IMPACTS
ARE NOT JURISDICTIONAL

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

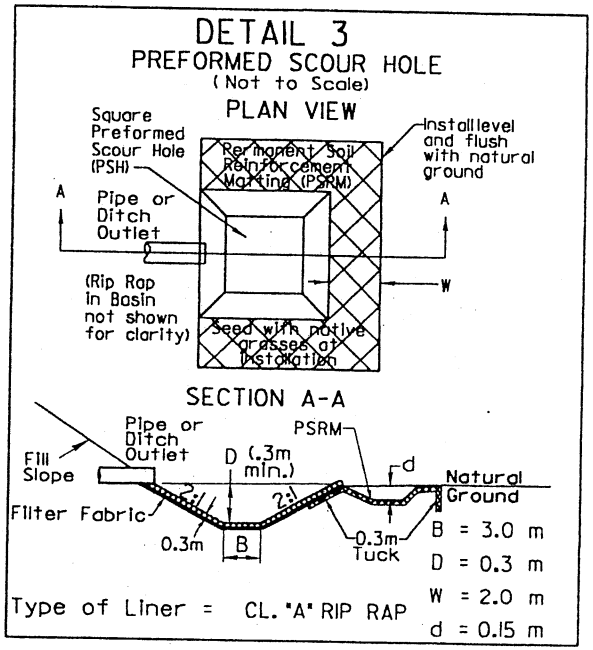
PROJECT: 8.U401711 (R-2000AB)

SHEET 46 OF 67 7/03



STA. 70+40 -L-

Do not install until vegetation is established in watershed



STA. 11+20 LT -Y19REV--

Do not install until vegetation is established in watershed

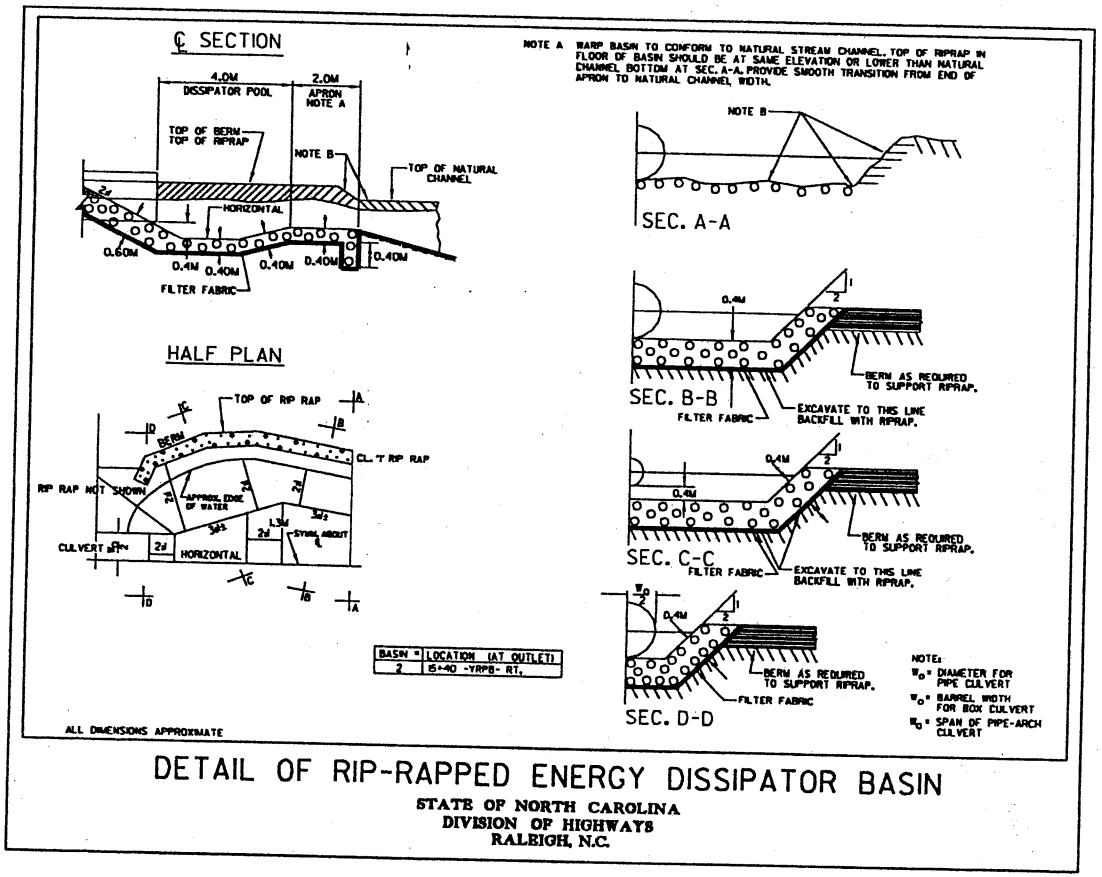
PREFORMED SCOUR HOLE DETAILS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 47 OF 61 7/03



DETAIL OF RIP-RAPPED ENERGY DISSIPATOR BASIN

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
RALEIGH, N.C.

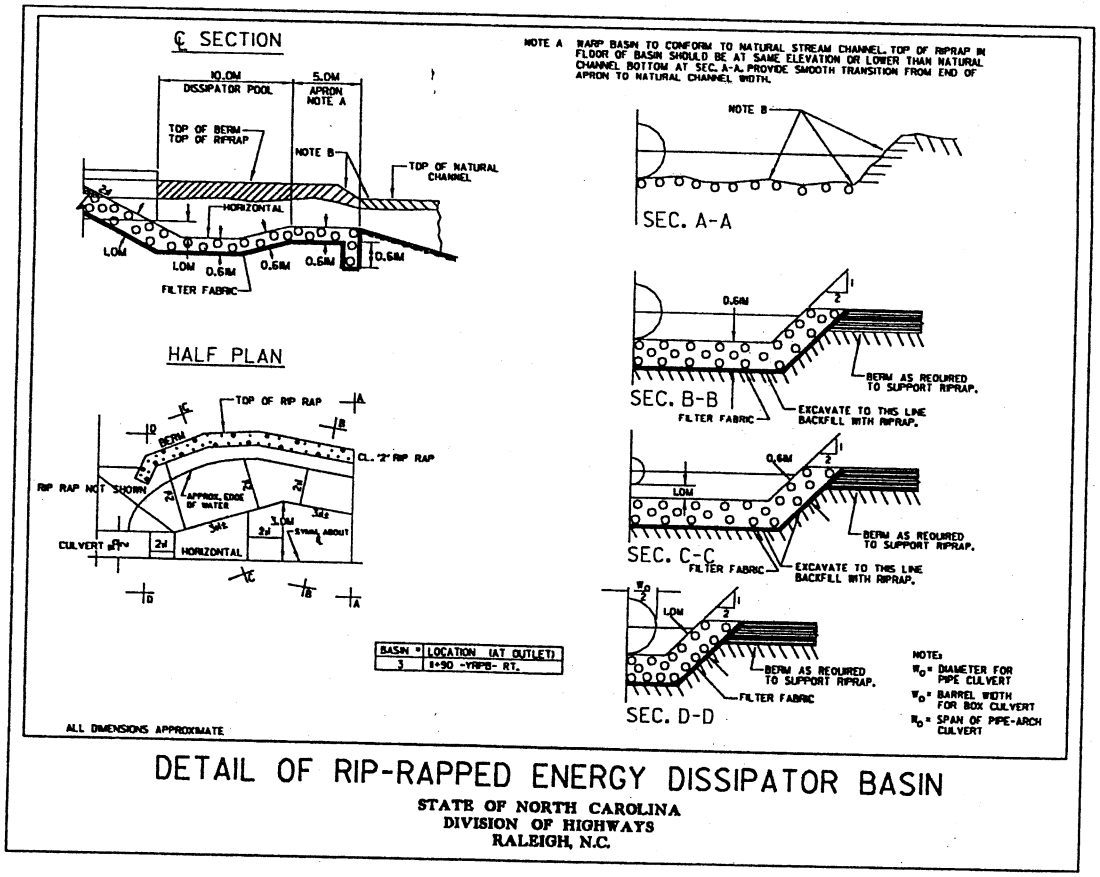
SITE 1

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 48 OF 67 7/03



DETAIL OF RIP-RAPPED ENERGY DISSIPATOR BASIN

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
RALEIGH, N.C.

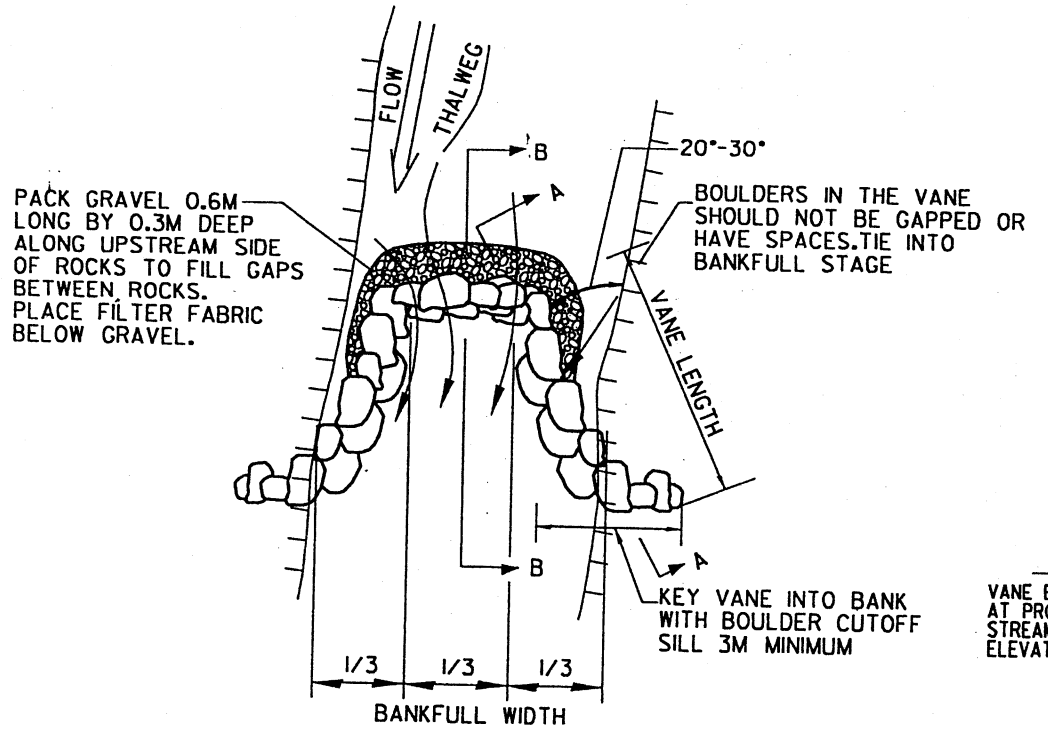
SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

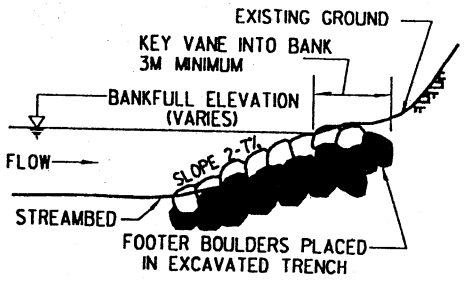
WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

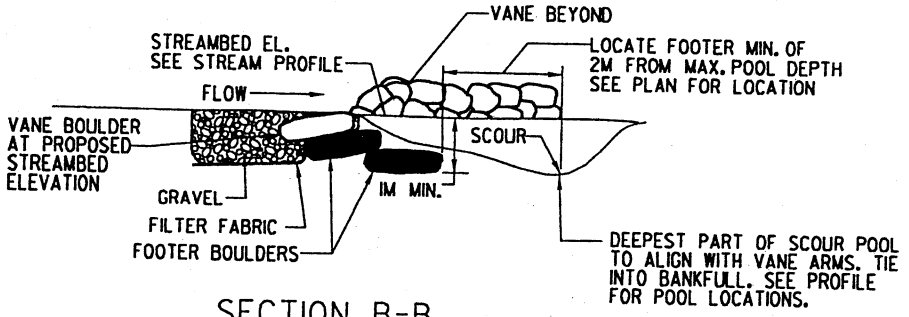
SHEET 49 **OF** 67



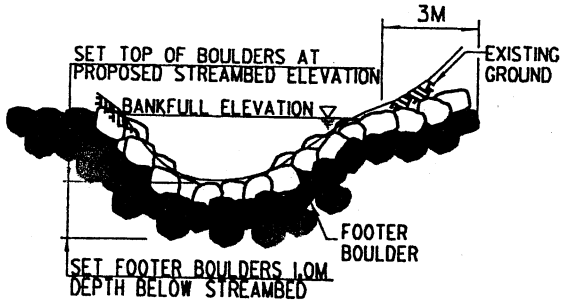
PLAN VIEW



SECTION A-A



SECTION B-B



CROSS SECTION VIEW

SITES 3 AND 6

ROCK CROSS VANE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

ARCADIS G & M of North Carolina, Inc.
2301 Rexwoods Drive
Suite 102
Raleigh
North Carolina 27607-3366
Tel 919 782 5511
Fax 919 782 5905

TELECOMMUNICATIONS & LAND RESOURCES

MEMORANDUM
Re: Natural Channel Design

Project 8.U401711 R-2000AB
Wake County, NC

From: Steven M. Bondor, PE
Project Engineer

September 17, 2002

Natural channel design methods were utilized in three locations within the project limits. At each location the existing stream is located below the proposed fill slope making the relocation of the stream unavoidable along these reaches. The design methods used are in accordance with those recommended in *"Applied River Morphology"* (Rosgen 1996).

Map data obtained to support the natural channel design consisted of review of topographic mapping prepared from the project surveys and the USGS Cary Quadrangle map. Stream pattern data including the sinuosity, meander wavelength, belt width, and bend radii was obtained from the project topographic mapping. Regional curves, prepared by the N.C. Stream Restoration Institute, depicting bankfull depth, bankfull cross sectional area, bankfull discharge, and bankfull width for stable streams, were also utilized to compare the channel dimensions observed in the field with those of other streams in the region.

Field surveys of the existing reach and reference reaches were conducted to obtain "Level II" stream parameters, as defined in *"Applied River Morphology"*. The following data was obtained: bankfull cross section, floodplain cross section, longitudinal stream profile, and an estimate of bed / bank material. Additional parameters were determined based on analysis of the field survey data: bankfull cross sectional area, riffle depth, pool depth, riffle slope, pool slope, water surface slope, width / depth ratio, and entrenchment ratio. The field survey data and a summary of the Level II stream parameters are enclosed.

-YRPA- Sta 10+39 to Sta 12+76 right
-YRPB- Sta 11+90 to Sta 13+39 right

Existing Condition

The watershed is mostly rural and wooded with a small amount of agricultural land use and a few isolated residential areas. The wooded areas were cleared in the past and were used previously for agriculture. The existing stream in the project area is an intermittent stream with no base flow and is severely incised with eroded banks and bank height ratios above 2.0. Sediment depositional features were observed along the project length as a result of the bank erosion. The lower 300 feet of the project reach is submerged by a lake constructed in 1995 by the Research Triangle Park Foundation. Backwater from the lake has reduced the stream velocity causing deposition of sediment in the channel. Analysis of the field survey data indicates that the upper reach along -YRPA- most closely resembles a G5 stream type while the lower

reach along -YRPB- most closely resembles an F5 stream type. Both of these stream types are entrenched, have low sinuosity, and are unstable with no active floodplain. The stream would most likely continue to incise to a base level and then widen and develop a floodplain at a lower elevation evolving to a type C or E stream.

Bed Material

The existing stream consists of a sand bed with nearly all particles 2mm or less in diameter. The proposed channel will likely also consist of sand since it is located in the same valley as the existing stream.

Reference Reach

A reference reach corresponding to the proposed B5 stream type was located and surveyed to obtain "Level II" stream parameters, as defined in *"Applied River Morphology"*. The stream was used as a reference reach for both of the proposed streams since they are both the same stream type. The stream is located in the Tar River watershed in Franklin County near Rolesville and is an unnamed tribuatry to Crooked Creek. The following data was obtained: bankfull cross section, floodplain cross section, longitudinal stream profile, and an estimate of bed / bank material. Additional dimensionless ratios parameters were determined based on analysis of the field survey data: bankfull cross sectional area, riffle depth, pool depth, riffle slope, pool slope, water surface slope, width / depth ratio, and entrenchment ratio. Dimensionless ratios were computed and summarized in the morphological data table. The ratios were used to compute the range of ratios for the dimension, pattern, and profile for the proposed channel.

Proposed Condition

The proposed roadway includes an interchange to be located directly above the existing stream channel. As a result the stream will be relocated along the fill slope of the roadway embankment out of the existing floodplain along the side of the valley. A stream type B is recommended for the relocated channel since the existing grade and the roadway embankment will form a narrow valley suitable for the B stream type. The channel dimension will include a larger width to depth ratio and a floodplain with a reduced bank height to minimize bank erosion. Development is expected in the watershed and will result in more frequent storm events. This will likely cause the bankfull channel to widen within the proposed floodplain. The proposed floodplain is of adequate width however to prevent the channel from becoming entrenched and will accommodate an increase in the meander belt width as the channel widens. Rock cross vanes will be utilized to maintain the channel grade. The proposed grades are fixed based on the elevations of box culverts at each end of the proposed reaches. The culvert grades were determined based on compliance with the Wake County flood insurance rate maps and FEMA regulations requiring that the project not cause an increase in the 100 year flood elevation. The proposed channel dimension, pattern, and profile are shown on the roadway plan sheets and were determined based on the reference reach data, the regional curve data, and the existing topographic features. Calculations and a morphological data are enclosed.

Sediment Transport

The existing stream channel is degrading upstream of the lake as evidenced by the degree of incision and bank erosion observed. Based on a comparison of the the bankfull shear stress between the existing and proposed channels, the proposed reach along YRPA will provide a slightly lower transport rate than the existing channel while the reach along YRPB will provide a slightly greater transport (This assumes the bed material will be identical in the location of the new channels). As a result, rock cross vanes will be utilized to maintain the channel grade on both relocation sites.

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH GAGE STATION AND REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

NCDOT Project : R-2000AB Wake County I - 540 Northern Wake Expressway
Restoration Site: -YRPA- Sta 10+39 rt to 12+76 rt
USGS Gage Station: No. 02082950 Little Fishing Creek near White Oak, NC
Reference Reach: Unnamed Tributary to Crooked Creek near Rolesville, NC

Variables	Existing Channel	Proposed Reach	Reference Reach	USGS Gage Station
1. Stream Type	G5	B5c	B5c	E
2. Drainage Area	0.38 sq mi	0.38 sq mi	0.49 sq mi	177 sq mi
3. Bankfull Width (Wbkf)	Mean: 10.5 ft Range:	Mean: 11.0 ft Range: 10 - 12 ft	Mean: 11.4 ft Range: 11.0 ft - 11.8 ft	Mean: 63.5 ft Range:
4. Bankfull Mean Depth (dbkf)	Mean: 1.3 ft Range:	Mean: 1.0 ft Range:	Mean: 1.1 ft Range: 0.9 ft - 1.2 ft	Mean: 7.6 ft Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 8.1 Range:	Mean: 10.75 Range:	Mean: 10.7 Range: 10.0 - 11.8	Mean: 8.0 Range:
6. Bankfull Cross-Sectional Area (Abkf)	Mean: 14 ft2 Range:	Mean: 11.3 ft2 Range:	Mean: 12.1 ft2 Range: 10.3 ft2 - 14.0 ft2	Mean: 485.4 ft2 Range:
7. Bankfull Mean Velocity (Vbkf)	Mean: 3.5 fps Range:	Mean: 4.0 fps Range:	Mean: 3.6 fps Range: 3.1 fps - 4.2 fps	Mean: Range:
8. Bankfull Discharge, (Qbkf)	Mean: 48 cfs Range:	Mean: 45 cfs Range:	Mean: 43.8 cfs Range: 37.1 cfs - 50.4 cfs	Mean: Range:
9. Maximum Bankfull Depth (dmax)	Mean: 1.5 ft Range:	Mean: 2.1 ft Range:	Mean: 2.1 ft Range: 1.9 ft - 2.4 ft	Mean: 8.5 ft Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 4.8 Range:	Mean: 1.0 Range: 1.0	Mean: 1.4 Range: 1.0 - 1.6	Mean: 1.1 Range:
11. Width of Flood Prone Area (Wfpa)	Mean: 16 ft Range:	Mean: 23 ft Range: 20 - 25 ft	Mean: 40.6 ft Range: 25.5 ft - 80.0 ft	Mean: >150 ft Range:
12. Entrenchment Ratio (Wfpa/Wbkf)	Mean: 1.5 Range:	Mean: 2.0 Range: 1.8 - 2.3	Mean: 2.3 Range: 2.2 - 2.4	Mean: 2.4 Range:
13. Meander Length (Lm)	Mean: 270 ft Range:	Mean: 45 ft Range: 33 - 59 ft	Mean: 46.0 ft Range: 21.0 ft - 88.0 ft	Mean: Range:
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: 25.7 Range:	Mean: 4.1 Range: 3 - 5.4	Mean: 4.0 Range: 1.8 - 7.7	Mean: Range:
15. Raduis of Curvature (Rc)	Mean: 50 ft Range:	Mean: 33 ft Range:	Mean: N/A Range:	Mean: Range:
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: 4.8 Range:	Mean: 3.0 Range: 2.9 - 3.2	Mean: N/A Range:	Mean: Range:
17. Belt Width (Wblt)	Mean: 105 ft Range:	Mean: 15.4 ft Range: 9.8 - 19.7 ft	Mean: 7.0 ft Range: 6.0 ft - 8.0 ft	Mean: Range:
18. Meander Width Ratio (Wblt/Wbkf)	Mean: 10 Range:	Mean: 1.4 Range: 0.9 - 1.8	Mean: 0.6 Range: 0.5 - 0.7	Mean: Range:
19. Sinuosity (Stream length/valley distance) (k)	Mean: 1.2 Range:	Mean: 1.05 Range:	Mean: 1.1 Range:	Mean: Range:
20. Valley Slope (ft/ft)	Mean: .012 Range:	Mean: .009 Range:	Mean: 0.017 ft/ft Range:	Mean: Range:
21. Average Water Surface Slope or Bankful Slope for Reach (Sbkf or Savg)=(Svalley/k)	Mean: .01 Range:	Mean: .008 Range:	Mean: 0.016 ft/ft Range:	Mean: Range:
22. Pool Slope (Spool)	Mean: N/A Range:	Mean: .009 ft/ft Range: .0025 - .03 ft/ft	Mean: 0.029 ft/ft Range: 0.0 ft/ft - 0.07 ft/ft	Mean: Range:

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH GAGE STATION AND REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

NCDOT Project : R-2000AB Wake County I - 540 Northern Wake Expressway
Restoration Site: -YRPA- Sta 10+39 rt to 12+76 rt
USGS Gage Station: No. 02082950 Little Fishing Creek near White Oak, NC
Reference Reach: Unnamed Tributary to Crooked Creek near Rolesville, NC

Variables	Existing Channel	Proposed Reach	Reference Reach	USGS Gage Station
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 1.1 Range: 0.3 - 3.8	Mean: 1.8 Range: 0.0 - 4.4	Mean: Range:
24. Maximum Pool Depth (dpool)	Mean: N/A Range:	Mean: 3.1 ft Range: 3 - 3.6 ft	Mean: 3.2 ft Range: 3.1 ft - 3.4 ft	Mean: Range:
25. Ratio of Maximum Pool Depth to Bankfull Mean Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 3.1 Range: 3 - 3.6	Mean: 3.0 Range: 2.9 - 3.2	Mean: Range:
26. Pool Width (Wpool)	Mean: N/A Range:	Mean: 11 Range:	Mean: 8.8 ft Range: 8.0 ft - 9.5 ft	Mean: Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.0 Range:	Mean: 0.8 Range: 0.7 - 0.8	Mean: Range:
28. Bankfull Cross-sectional Area at Pool (Apool)	Mean: N/A Range:	Mean: 15.1 Range:	Mean: 15.4 ft2 Range: 15.2 ft2 - 15.6 ft2	Mean: Range:
29. Ratio of Pool Area to Bankfull Area (Apool/Abkf)	Mean: N/A Range:	Mean: 1.3 Range:	Mean: 1.3 Range: 1.1 - 1.5	Mean: Range:
30. Pool to Pool Spacing (p-p)	Mean: N/A Range:	Mean: 43 ft Range: 30 - 66 ft	Mean: 42.0 ft Range: 22.0 ft - 69.0 ft	Mean: Range:
31. Ratio of Pool-to-Pool Spacing to Bankfull Width (p-p/Wbkf)	Mean: N/A Range:	Mean: 3.9 Range: 2.7 - 6	Mean: 3.7 Range: 1.9 -6.1	Mean: Range:
32. Pool Length (Lp)	Mean: N/A Range:	Mean: 10 ft Range:6.5 - 13 ft	Mean: 9.3 ft Range: 7.0 ft - 13.0 ft	Mean: Range:
33. Riffle Slope (Sriff)	Mean: N/A Range:	Mean: .011 ft/ft Range: .004 - .028 ft/ft	Mean: 0.04 ft/ft Range: 0.001 ft/ft - 0.14 ft/ft	Mean: Range:
34. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: N/A Range:	Mean: 1.4 Range: 0.5 - 3.5	Mean: 2.5 Range: 0.1 - 8.8	Mean: Range:
35. Maximum Riffle Depth (driff)	Mean: N/A Range:	Mean: 2.0 ft Range: 2.0 ft	Mean: 2.1 ft Range: 1.9 ft - 2.4 ft	Mean: Range:
36. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: N/A Range:	Mean: 2.0 Range: 2.0	Mean: 2.0 Range: 1.8 - 2.2	Mean: Range:
37. Run Slope (Srun)	Mean: N/A Range:	Mean: N/A Range:	Mean: 0.042 ft/ft Range: 0.034 ft/ft - 0.057 ft/ft	Mean: Range:
38. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.8 Range: 0.2 - 3.4	Mean: Range:
39. Maximum Run Depth (drun)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.1 ft Range: 1.7 ft - 2.4 ft	Mean: Range:
40. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.9 Range: 1.5 - 2.2	Mean: Range:
41. Slope of Glide (Sgl)	Mean: N/A Range:	Mean: N/A Range:	Mean: 0.019 ft/ft Range: 0.002 ft/ft - 0.034 ft/ft	Mean: Range:
42. Ratio of Glide Slope to Average Water Surface Slope (Sgl/Sws)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.1 Range: 0.1 - 2.1	Mean: Range:
43. Maximum Glide Depth (dgl)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.4 ft Range: 2.3 ft - 2.6 ft	Mean: Range:
44. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.3 Range: 2.1 - 2.4	Mean: Range:
Materials:				

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH GAGE STATION AND REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

NCDOT Project : R-2000AB Wake County I - 540 Northern Wake Expressway
Restoration Site: -YRPB- Sta 11+80 RT to 13+40 RT
USGS Gage Station: No. 02082950 Little Fishing Creek near White Oak, NC
Reference Reach: Unnamed Tributary to Crooked Creek near Rolesville, NC

Variables	Existing Channel	Proposed Reach	Reference Reach	USGS Gage Station
1. Stream Type	F5	B5c	B5c	E
2. Drainage Area	0.49 sq mi	0.49 sq mi	0.49 sq mi	177 sq mi
3. Bankfull Width (Wbkf)	Mean: 15 ft Range:	Mean: 12 ft Range:	Mean: 11.4 ft Range: 11.0 ft - 11.8 ft	Mean: 63.5 ft Range:
4. Bankfull Mean Depth (dbkf)	Mean: 0.8 ft Range:	Mean: 1.1 ft Range:	Mean: 1.1 ft Range: 0.9 ft - 1.2 ft	Mean: 7.6 ft Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 18 Range:	Mean: 10.8 Range:	Mean: 10.7 Range: 11.0 - 11.8	Mean: 8.0 Range:
6. Bankfull Cross-Sectional Area (Abkf)	Mean: 12.3 ft2 Range:	Mean: 13.2 ft2 Range:	Mean: 12.1 ft2 Range: 10.3 ft2 - 14.0 ft2	Mean: 485.4 ft2 Range:
7. Bankfull Mean Velocity (Vbkf)	Mean: 4.3 fps Range:	Mean: 4 fps Range:	Mean: 3.6 fps Range: 3.1 fps - 4.2 fps	Mean: Range:
8. Bankfull Discharge, cfs (Qbkf)	Mean: 53 cfs Range:	Mean: 53 cfs Range:	Mean: 43.8 cfs Range: 37.1 cfs - 50.4 cfs	Mean: Range:
9. Maximum Bankfull Depth (dmax)	Mean: 1.6 ft Range:	Mean: 2.2 ft Range:	Mean: 2.1 ft Range: 1.9 ft - 2.4 ft	Mean: 8.5 ft Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 2.2 Range:	Mean: 1.0 Range:	Mean: 1.4 Range: 1.0 - 1.6	Mean: 1.1 Range:
11. Width of Flood Prone Area (Wfpa)	Mean: 17 ft Range:	Mean: 27 ft Range: 25 - 30 ft	Mean: 40.6 ft Range: 25.5 ft - 80.0 ft	Mean: >150 ft Range:
12. Entrenchment Ratio (Wfpa/Wbkf)	Mean: 1.1 Range:	Mean: 2.3 Range: 2.1 - 2.5	Mean: 2.3 Range: 2.2 - 2.4	Mean: 2.4 Range:
13. Meander Length (Lm)	Mean: N/A Range:	Mean: 47 ft Range: 36 - 69 ft	Mean: 46.0 ft Range: 21.0 ft - 88.0 ft	Mean: Range:
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 3.9 Range: 3 - 5.8	Mean: 4.0 Range: 1.8 - 7.7	Mean: Range:
15. Raduis of Curvature (Rc)	Mean: N/A Range:	Mean: 30 ft Range:	Mean: N/A Range:	Mean: Range:
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: N/A Range:	Mean: Range:
17. Belt Width (Wblt)	Mean: N/A Range:	Mean: 8.5 ft Range: 8 - 15 ft	Mean: 7.0 ft Range: 6.0 ft - 8.0 ft	Mean: Range:
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 0.7 Range: 0.7 - 1.3	Mean: 0.6 Range: 0.5 - 0.7	Mean: Range:
19. Sinuosity (Stream length/valley distance) (k)	Mean: N/A Range:	Mean: 1.1 Range:	Mean: 1.1 Range:	Mean: Range:
20. Valley Slope (ft/ft)	Mean: N/A Range:	Mean: .012 Range:	Mean: 0.017 ft/ft Range:	Mean: Range:
21. Average Water Surface Slope or Bankful Slope for Reach (Sbkf or Savg)=(Svalley/k)	Mean: .004 Range:	Mean: .01 Range:	Mean: 0.016 ft/ft Range:	Mean: Range:
22. Pool Slope (Spool)	Mean: N/A Range:	Mean: .017 ft/ft Range: .01 - .025	Mean: 0.029 ft/ft Range: 0.0 ft/ft - 0.07 ft/ft	Mean: Range:

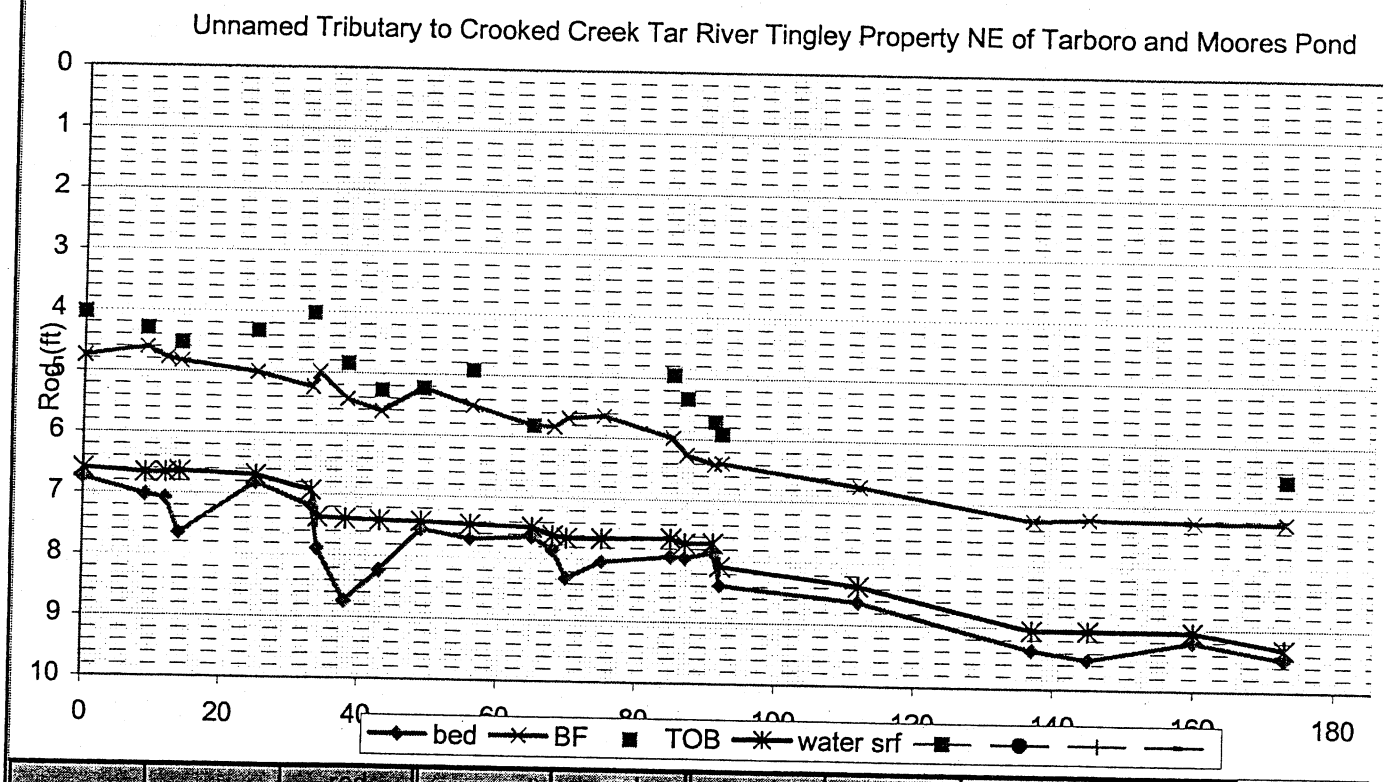
MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH GAGE STATION AND REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

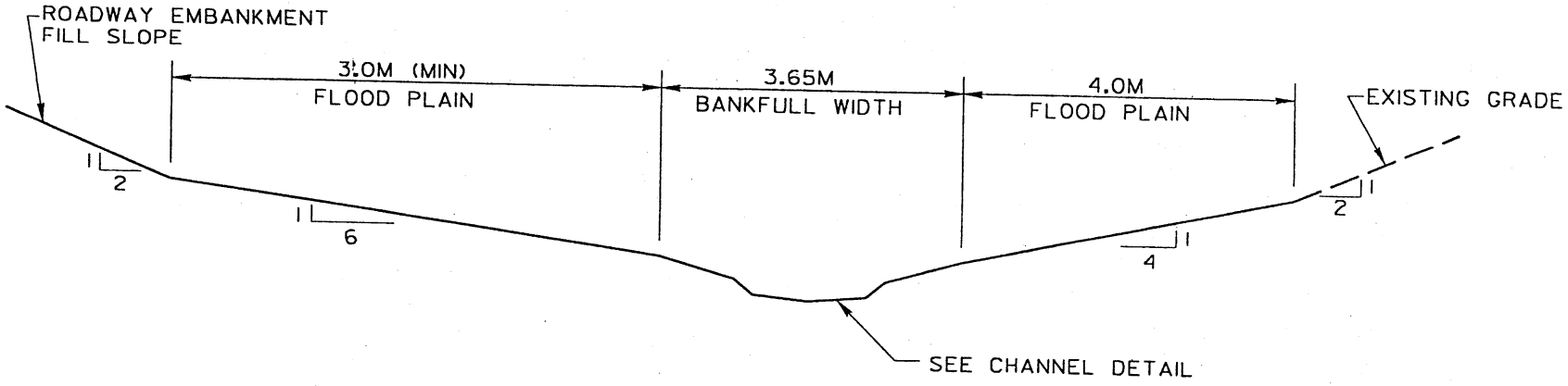
NCDOT Project : R-2000AB Wake County I - 540 Northern Wake Expressway
Restoration Site: -YRPB- Sta 11+80 RT to 13+40 RT
USGS Gage Station: No. 02082950 Little Fishing Creek near White Oak, NC
Reference Reach: Unnamed Tributary to Crooked Creek near Rolesville, NC

Variables	Existing Channel	Proposed Reach	Reference Reach	USGS Gage Station
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 1.7 Range:.01 - .025	Mean: 1.8 Range: 0.0 - 4.4	Mean: Range:
24. Maximum Pool Depth (dpool)	Mean: N/A Range:	Mean: 3.1 ft Range:·2.3 - 4.2 ft	Mean: 3.2 ft Range: 3.1 ft - 3.4 ft	Mean: Range:
25. Ratio of Maximum Pool Depth to Bankfull Mean Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.8 Range: 2.1 - 3.8	Mean: 3.0 Range: 2.9 - 3.2	Mean: Range:
26. Pool Width (Wpool)	Mean: N/A Range:	Mean: 12 Range:	Mean: 8.8 ft Range: 8.0 ft - 9.5 ft	Mean: Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.0 Range:	Mean: 0.8 Range: 0.7 - 0.8	Mean: Range:
28. Bankfull Cross-sectional Area at Pool (Apool)	Mean: N/A Range:	Mean: 16 Range:	Mean: 15.4 ft2 Range: 15.2 ft2 - 15.6 ft2	Mean: Range:
29. Ratio of Pool Area to Bankfull Area (Apool/Abkf)	Mean: N/A Range:	Mean: 1.2 Range:	Mean: 1.3 Range: 1.1 - 1.5	Mean: Range:
30. Pool to Pool Spacing (p-p)	Mean: N/A Range:	Mean: 47 ft Range: 26 - 75 ft	Mean: 42.0 ft Range: 22.0 ft - 69.0 ft	Mean: Range:
31. Ratio of Pool-to-Pool Spacing to Bankfull Width (p-p/Wbkf)	Mean: N/A Range:	Mean: 3.9 ft Range:2.2 - 6.3 ft	Mean: 3.7 Range: 1.9 -6.1	Mean: Range:
32. Pool Length (Lp)	Mean: N/A Range:	Mean: 9.0 ft Range: 6.5 - 13 ft	Mean: 9.3 ft Range: 7.0 ft - 13.0 ft	Mean: Range:
33. Riffle Slope (Sriff)	Mean: N/A Range:	Mean: .01 ft/ft Range:.002 - .027	Mean: 0.04 ft/ft Range: 0.001 ft/ft - 0.14 ft/ft	Mean: Range:
34. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: N/A Range:	Mean: 0.9 Range:0.2 - 2.7	Mean: 2.5 Range: 0.1 - 8.8	Mean: Range:
35. Maximum Riffle Depth (driff)	Mean: N/A Range:	Mean: 2.2 ft Range:2.2 ft	Mean: 2.1 ft Range: 1.9 ft - 2.4 ft	Mean: Range:
36. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: N/A Range:	Mean: 2.0 Range: 2.0	Mean: 2.0 Range: 1.8 - 2.2	Mean: Range:
37. Run Slope (Srun)	Mean: N/A Range:	Mean: N/A Range:	Mean: 0.042 ft/ft Range: 0.034 ft/ft - 0.057 ft/ft	Mean: Range:
38. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.8 Range: 0.2 - 3.4	Mean: Range:
39. Maximum Run Depth (drun)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.1 ft Range: 1.7 ft - 2.4 ft	Mean: Range:
40. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.9 Range: 1.5 - 2.2	Mean: Range:
41. Slope of Glide (Sgl)	Mean: N/A Range:	Mean: N/A Range:	Mean: 0.019 ft/ft Range: 0.002 ft/ft - 0.034 ft/ft	Mean: Range:
42. Ratio of Glide Slope to Average Water Surface Slope (Sgl/Sws)	Mean: N/A Range:	Mean: N/A Range:	Mean: 1.1 Range: 0.1 - 2.1	Mean: Range:
43. Maximum Glide Depth (dgl)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.4 ft Range: 2.3 ft - 2.6 ft	Mean: Range:
44. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: N/A Range:	Mean: 2.3 Range: 2.1 - 2.4	Mean: Range:

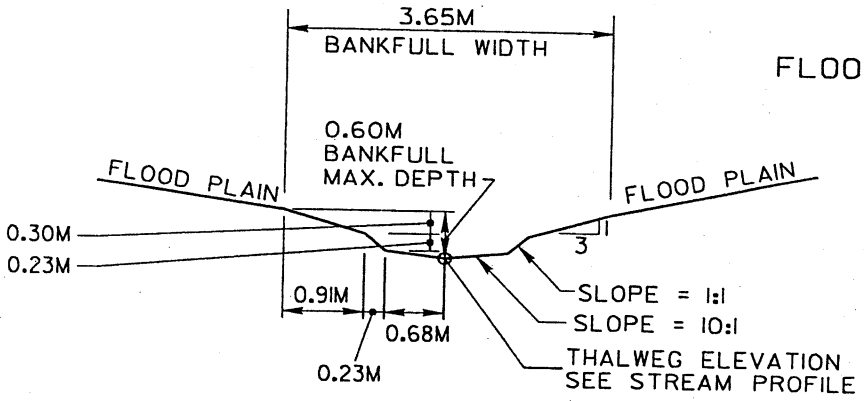
Profile Tool



notes	dist	rod bed	(measured) water d	rod water srf	rod BF	rod TOB		
RIF	0	6.75	0.15	6.6	4.75	4.03		
RUN	9	7.02	0.36	6.66	4.61	4.29		
POOL	12	7.08	0.42	6.66	4.78			
POOL MAX	14	7.65	1.01	6.64	4.83	4.53		
RIF	25	6.81	0.12	6.69	5	4.32		
STEP	33	7.19	0.26	6.93	5.24	4.02		
POOL	34	7.88	0.51	7.37	4.99			
MAX POOL	38	8.74	1.35	7.39	5.43	4.84		
GLIDE	43	8.23	0.82	7.41	5.62	5.27		
RIF	49	7.54	0.12	7.42	5.23	5.23		
RUN	56	7.69	0.24	7.45	5.5	4.92		
RIF	65	7.64	0.16	7.48	5.81	5.81		
POOL	68	7.84	0.23	7.61	5.88			
POOL MAX	70	8.31	0.66	7.65	5.68			
GLIDE	75	8.03	0.38	7.65	5.64			
RIF	85	7.93	0.3	7.63	5.98	4.95		
RUN	87	7.95	0.24	7.71	6.26	5.34		
STEP	91	7.85	0.15	7.7	6.41	5.71		
TEP BOTTO	92	8.39	0.31	8.08	6.39	5.91		
RIF	112	8.63	0.26	8.37	6.74			
POOL	137	9.37	0.32	9.05	7.26			
GLIDE	145	9.52	0.47	9.05	7.22			



FLOOD PLAIN SECTION RIFFLE
STREAM 2 -YRPB-



CHANNEL DETAIL RIFFLE
STREAM 2 -YRPB-

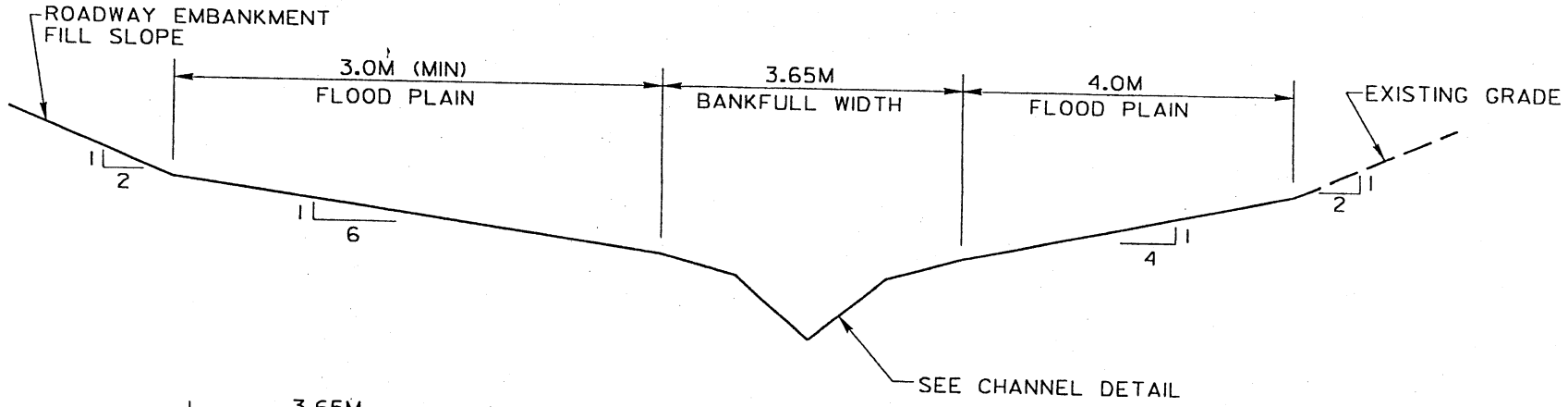
SITE 3
NATURAL CHANNEL DESIGN
TYPICAL SECTIONS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

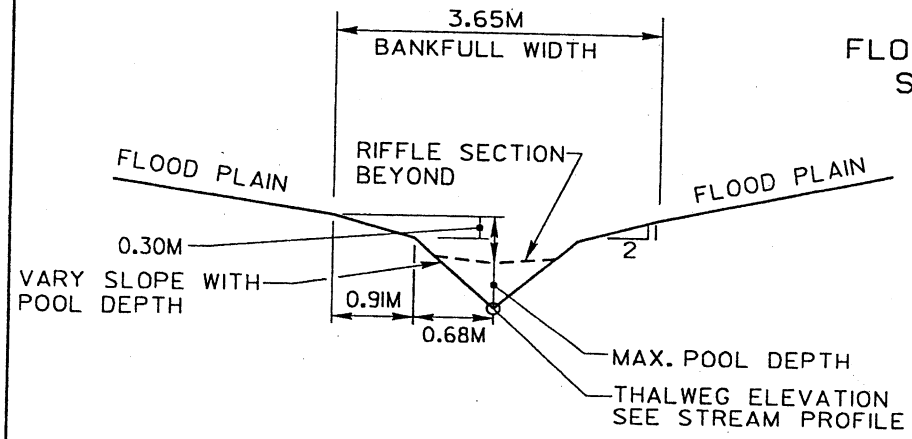
WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET ~~58~~ 67 OF 67 7/03



FLOOD PLAIN SECTION POOL
STREAM 2 -YRPB-



CHANNEL DETAIL POOL
STREAM 2 -YRPB-

SITE 3
NATURAL CHANNEL DESIGN
TYPICAL SECTIONS

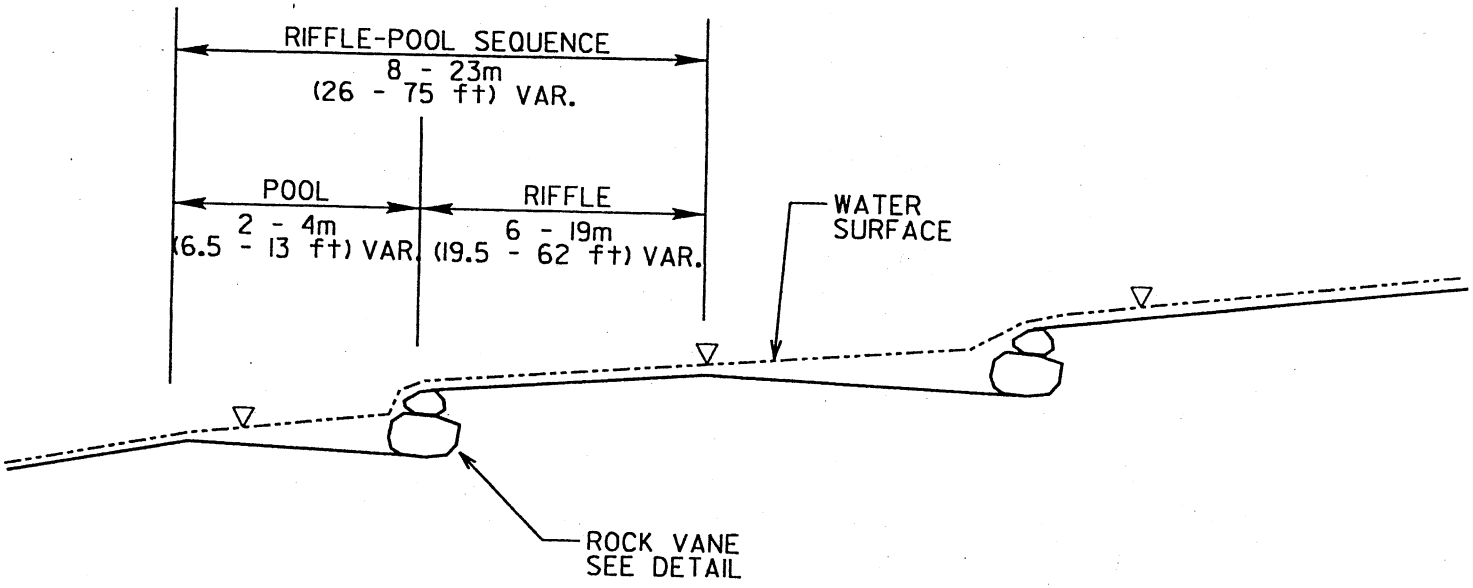
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 59 OF 67

9/03



RIFFLE-POOL SPACING
SITE 3, STREAM 2

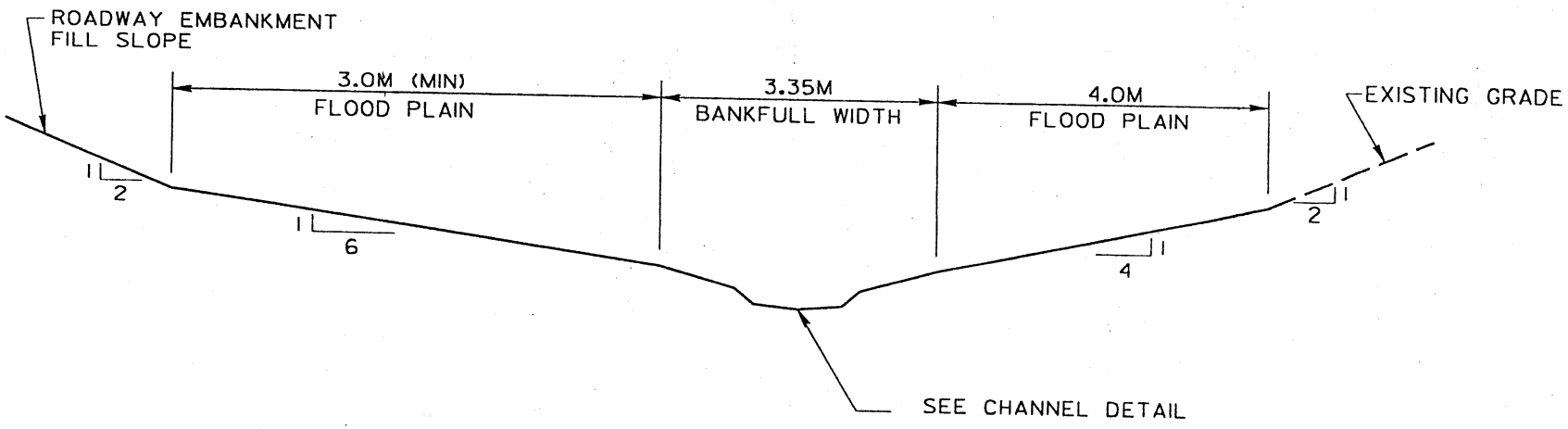
NOT TO SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

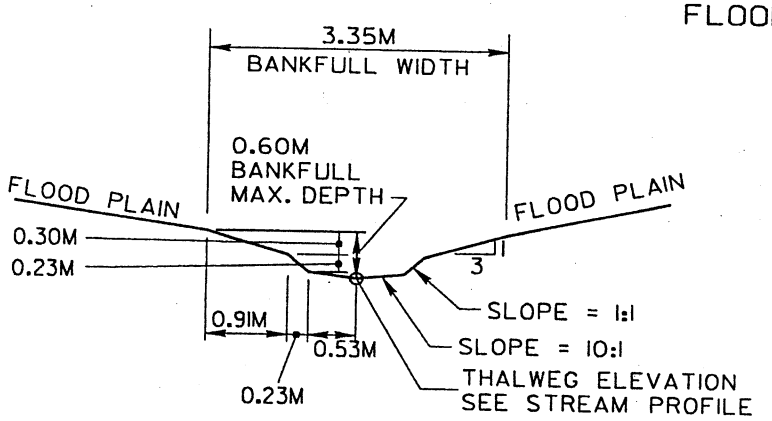
WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 60 OF 67 7/03



FLOOD PLAIN SECTION RIFFLE
STREAM 1 -YRPA-



CHANNEL DETAIL RIFFLE
STREAM 1 -YRPA-

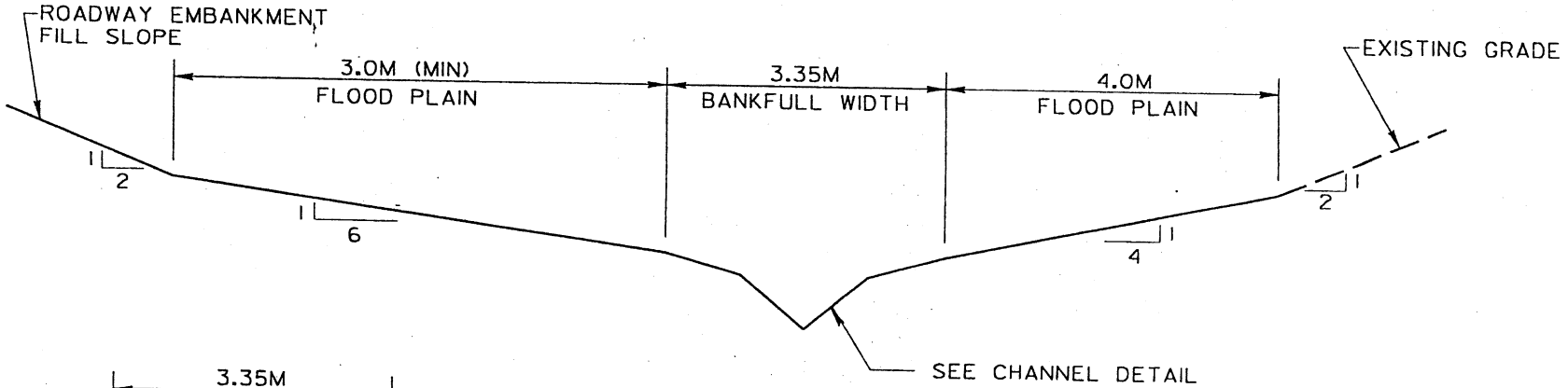
SITE 6
NATURAL CHANNEL DESIGN
TYPICAL SECTIONS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

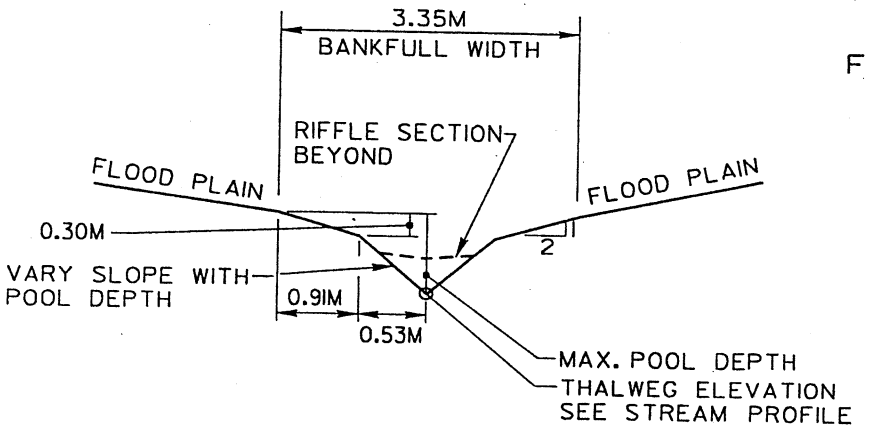
WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 6.1 OF 67 7/03



FLOOD PLAIN SECTION POOL
STREAM 1 -YRPA-



CHANNEL DETAIL POOL
STREAM 1 -YRPA-

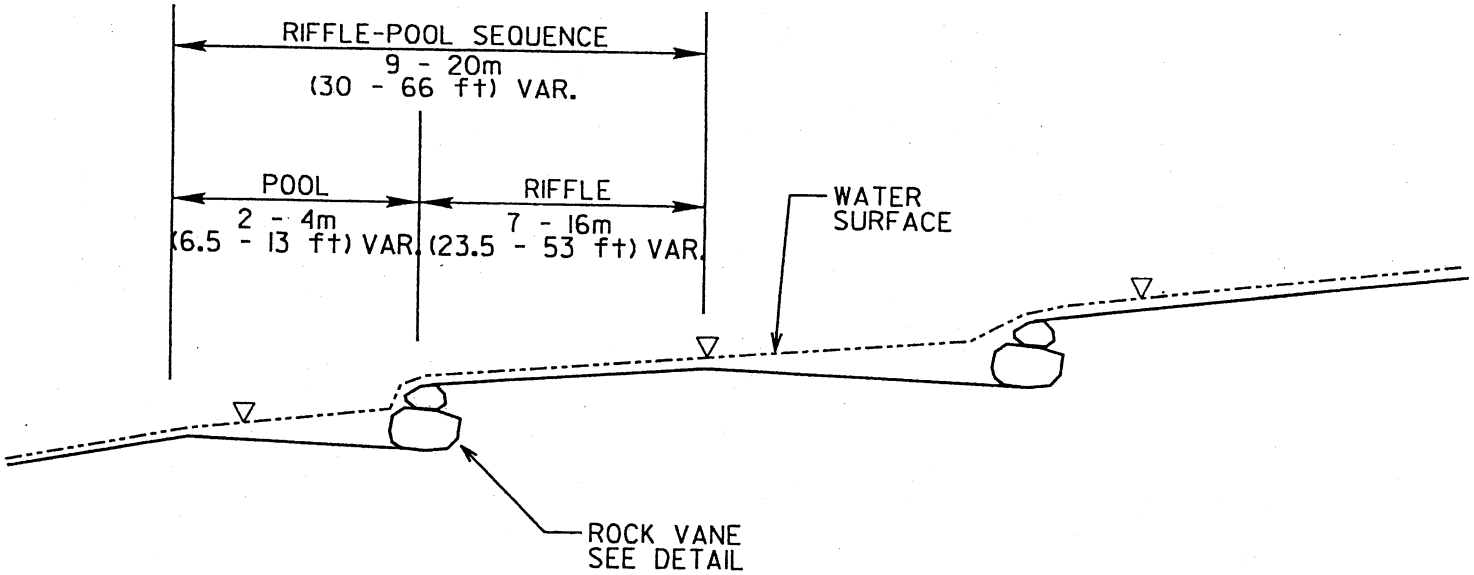
SITE 6
NATURAL CHANNEL DESIGN
TYPICAL SECTIONS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 62 OF 67 7/03



RIFFLE-POOL SPACING
SITE 6 , STREAM 1

NOT TO SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

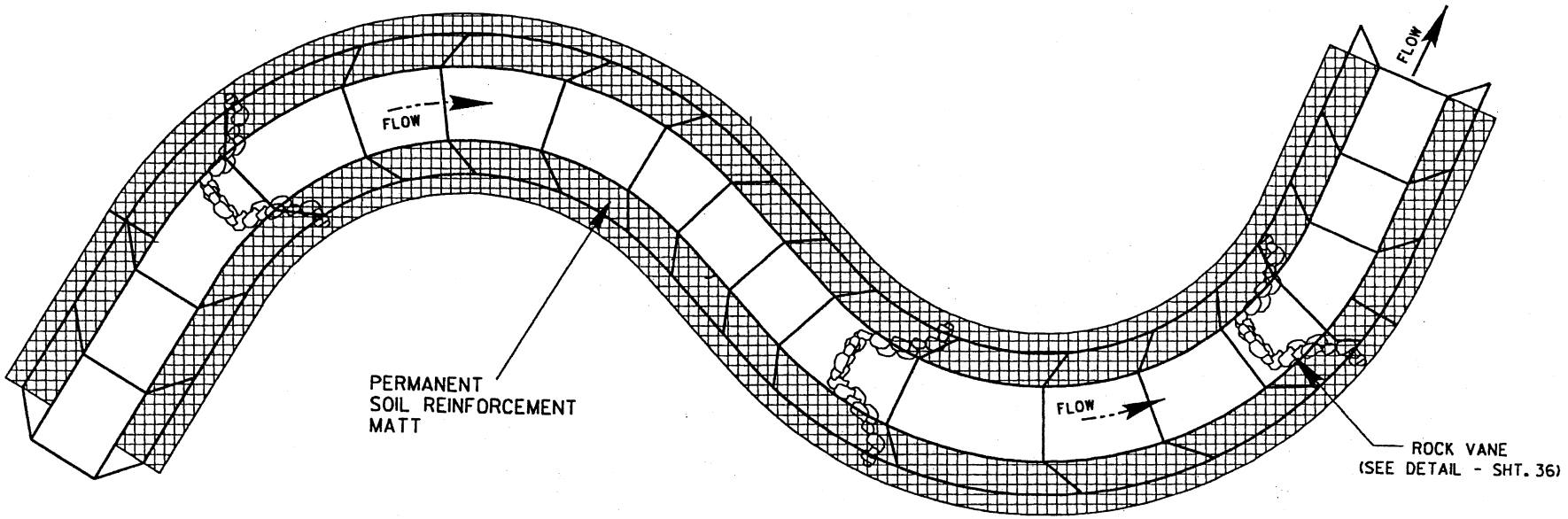
SHEET 63 OF 67 7/03 v.

CHANNEL PLAN VIEW TYPICAL

(Not to Scale)

NOTES:
SEE STREAM PROFILES FOR
RIFFLE AND POOL LOCATIONS

SEE PLANS FOR PATTERN



SITE 3 AND SITE 6
STREAM RESTORATION DETAILS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 64 OF 67

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	SURFACE WATER IMPACTS: Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1	-L- 42+60	48" RCP					0.04			761	
	-YRPB- 15+20		0.11		0.01	0.01					
	-L- 43+15	24" RCP					0.01			413	
2	-YRPB- 14+60	Existing Lake	0.30			0.02		0.16			
3	From -L- 44+60						0.58			1975	410
	To -L- 55+20 Lt	Extend 42" RCP									
	-YBFLY- 15+67	1 @ 10' x 10' RCBC	0.25								
	-YCFLY- 23+97	1 @ 10' x 9' RCBC									
	-Y19REV- 13+40	2 @ 13' x 11' RCBC				0.07					
4	-L- 45+26	2 @ 13' x 10' RCBC					0.46			1030	
	-YCFLY- 15+60	2 @ 13' x 10' RCBC									
	-Y19DET2- 10+52	60" RCP Ext.					0.01			98	
5	-L- 49+67	24" RCP					0.04			509	
6	-L- 50+82	30" RCP	0.02				0.05			607	
	From -L- 50+20	1 @ 10' x 9' RCBC					0.21			2060	889
	To -L- 55+00 Lt										
	-YRPA- 12+77						0.01			118	
	-L- 54+47	1 @ 8' x 7' RCBC					0.03			345	
7	-L- 60+85 Lt & Rt	24" RCP	0.11			0.01					
8	-L- 62+05	24" RCP	0.11			0.02					
9	-RPA54- 5+20 Lt	36" RCP					0.07	3.63		417	
10	-RPD54- 4+60 Lt	36" RCP				0.04					
	-RPD54- 4+43	36" RCP									
11	-L- 70+40	24" RCP					0.07				
TOTALS:			0.90	0.00	0.01	0.17	1.55	3.79	0.00	8333	1299

Form Revised 3/22/01

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT 8.U401711 (R-2000AB)
WAKE & DURHAM COUNTY

Jul-03

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1	-L- 42+60	1200mm RCP					0.014			232	
	-YRPB- 15+20		0.043		0.004	0.004					
	-L 43+15	600mm RCP					0.005			126	
2	-YRPB- 14+60	Existing Lake	0.122			0.007		0.065			
3	From -L- 44+60						0.233			602	125
	To -L- 50+20 Lt										
	-YBFLY- 15+67	1 - 3m x 3m RCBC	0.103								
	-YCFLY- 23+97	1 - 3m x 2.7m RCBC									
	-Y19REV- 13+40	2- 4m x 3.3m RCBC				0.028					
4	-L- 45+26	2 - 4m x 3m RCBC					0.185			314	
	-YCFLY- 15+60	2 - 4m x 3m RCBC									
	-Y19DET2- 10+52	1500 mm RCP Ext.					0.003			30	
5	-L- 49+67	600mm RCP					0.016			155	
6	-L- 50+82	750mm RCP	0.008				0.019			185	
	From -L- 50+20	1 - 3.0m x 2.7m RCBC					0.085			628	271
	To -L- 55+00 Lt										
	-YRPA- 12+77						0.002			36	
	-L- 54+47	1-2.4m x 2.0m RCBC					0.012			105	
7	-L- 60+85 LT & RT	600mm RCP	0.043			0.003					
8	-L- 62+05	600mm RCP	0.044			0.006					
9	-RPA54- 5+20 LT	900mm RCP					0.027			127	
10	-RPD54- 4+60 LT	900mm RCP				0.016					
	-RPD54- 4+43	900mm RCP						1.47			
11	-L- 70+40	600mm RCP					0.027				
TOTALS:			0.363	0	0.004	0.064	0.628	1.535	0	2540	396

Form Revised 3/22/01

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

Jul-03

PROPERTY OWNER

NAME AND ADDRESS

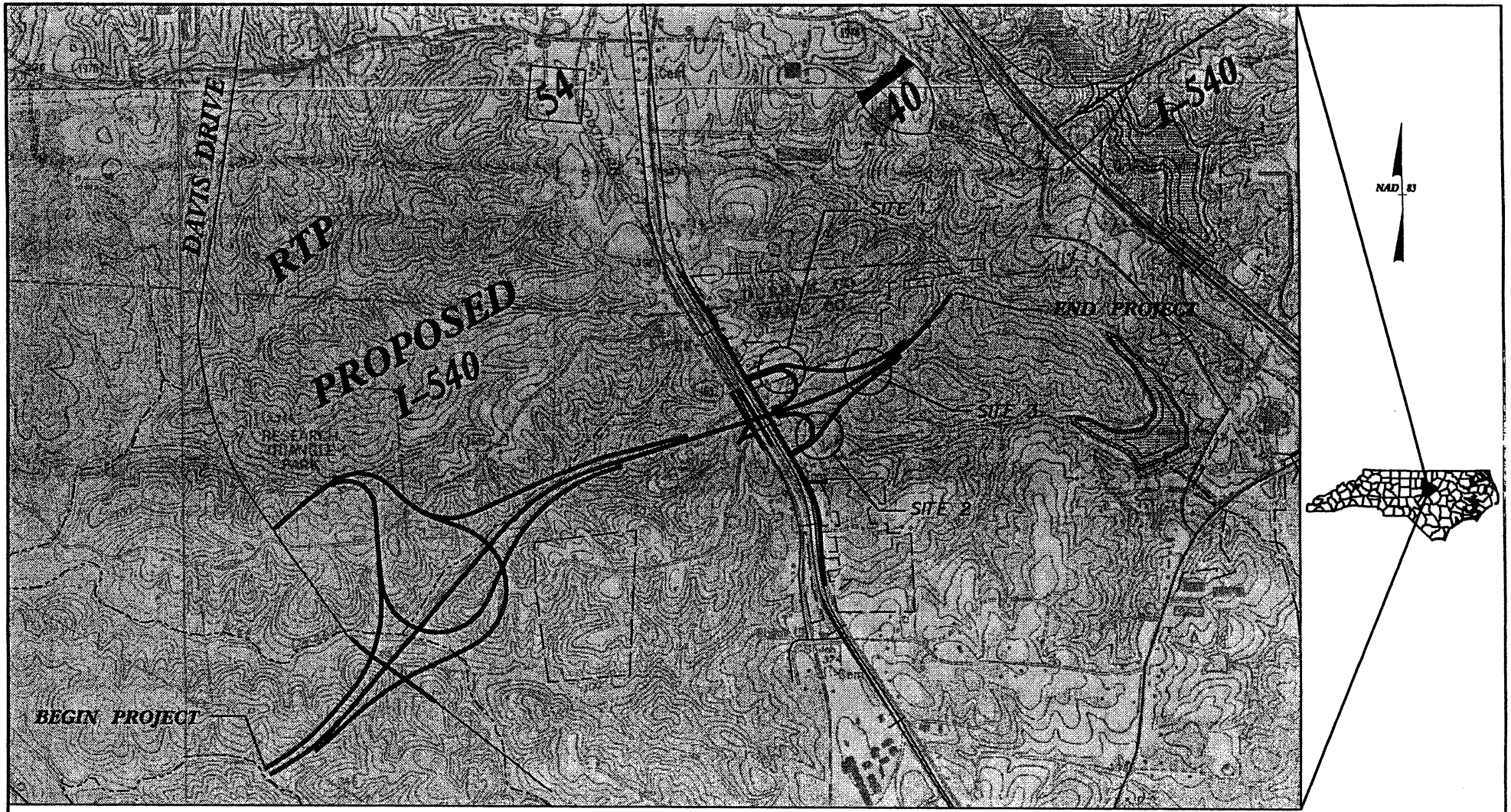
SITE	OWNER'S NAME	ADDRESS
10	Research Triangle Foundation of North Carolina	P.O. Box 12255 Durham, NC 27713-9436
9	Cora Holland Heirs	11006 Chapel Hill Road Morrisville, NC 27560
6	Andover Partnership LLC	5511 Capital Center Drive Suite 320 Raleigh, NC 27606
11	Greg Sanchez	310 Craven Street New Bern, NC 28560
12	Anvil Investments LLC	P.O. Box 3557 Cary, NC 27519
904Z (West of Project) 908Z	Anvil Investments LLC C/O Greg Brice	100 Weston Estates Cary, NC 27513
904Z (East of Project)	Duke Weeks C/O Jim Anderson	1800 Perimeter Drive Morrisville, NC 27560
905Z	Katherine R. Everett	P.O. Box 586 Durham, NC 27702
15	Jim Anderson	1800 Perimeter Drive Morrisville, NC 27560
902Z	C/O John Biggs Attorney	122 East Parrish Street Durham, NC 27701
902-905, 908, 940	N.C.D.O.T.	

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 67 OF 67 7/03



SITE MAP

BUFFER

250 0 500

SCALE

METERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 1 OF 12

BUFFER LEGEND

WLB WETLAND BOUNDARY

WETLAND

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

BZ RIPARIAN BUFFER ZONE

BZ1 RIPARIAN BUFFER ZONE 1
30 ft (9.2m)

BZ2 RIPARIAN BUFFER ZONE 2
20 ft (6.1m)

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE (PSH)

LEVEL SPREADER (LS)

GRASS SWALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE & DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AB)

STORMWATER MANAGEMENT PLAN

Project No. 8.U401711, TIP No. R-2000AB **February 25, 2002**
Wake-Durham Counties
Hydraulics Project Engineer: Steven M. Bondor, P.E. (ARCADIS G&M of North Carolina, Inc.)
Galen Cail, P.E. (NCDOT Hydraulics Unit)

Roadway Description

The project consists of a portion of the Northern Wake Expressway (I-540) extending from west of Davis Drive to about 1 kilometer (km) west of Interstate 40 (I-40). The project is about 3.6 km in length and includes a new alignment consisting of a controlled access divided highway with two or more 3.6-meter (m) lanes in each direction, and interchanges at NC 54 and Davis Drive. The proposed typical section consists of a grass median with grass shoulders and ditches, and curb and gutter along the interchange loops. The proposed roadway crosses various streams and includes eight box culverts and three stream relocations. The proposed drainage system includes cross pipes, grate inlets and associated pipe systems in the median and side ditches, lateral ditches, and modified expressway gutter along high fill slopes.

Project Involvement

The entire project is located within an unincorporated area of Wake County. However, the project is not subject to Wake County Stormwater regulations, because state projects are specifically exempted by the regulations. The section of the project located east of NC54, from -L-Sta 64+40 to the end is located within the Neuse River Watershed, and is therefore subject to the North Carolina Department of Environment and Natural Resources (NCDENR) regulations for preservation of stream buffers. The remainder of the project, west of NC54, is located in the Cape Fear Watershed. Three streams within the Neuse River Watershed were identified as being subject to the stream buffer regulations by the NCDENR, based on the Wake County Natural Resource Conservation Service Soil Maps and the U. S. Geological Service Quad Map (Cary Quadrangle).

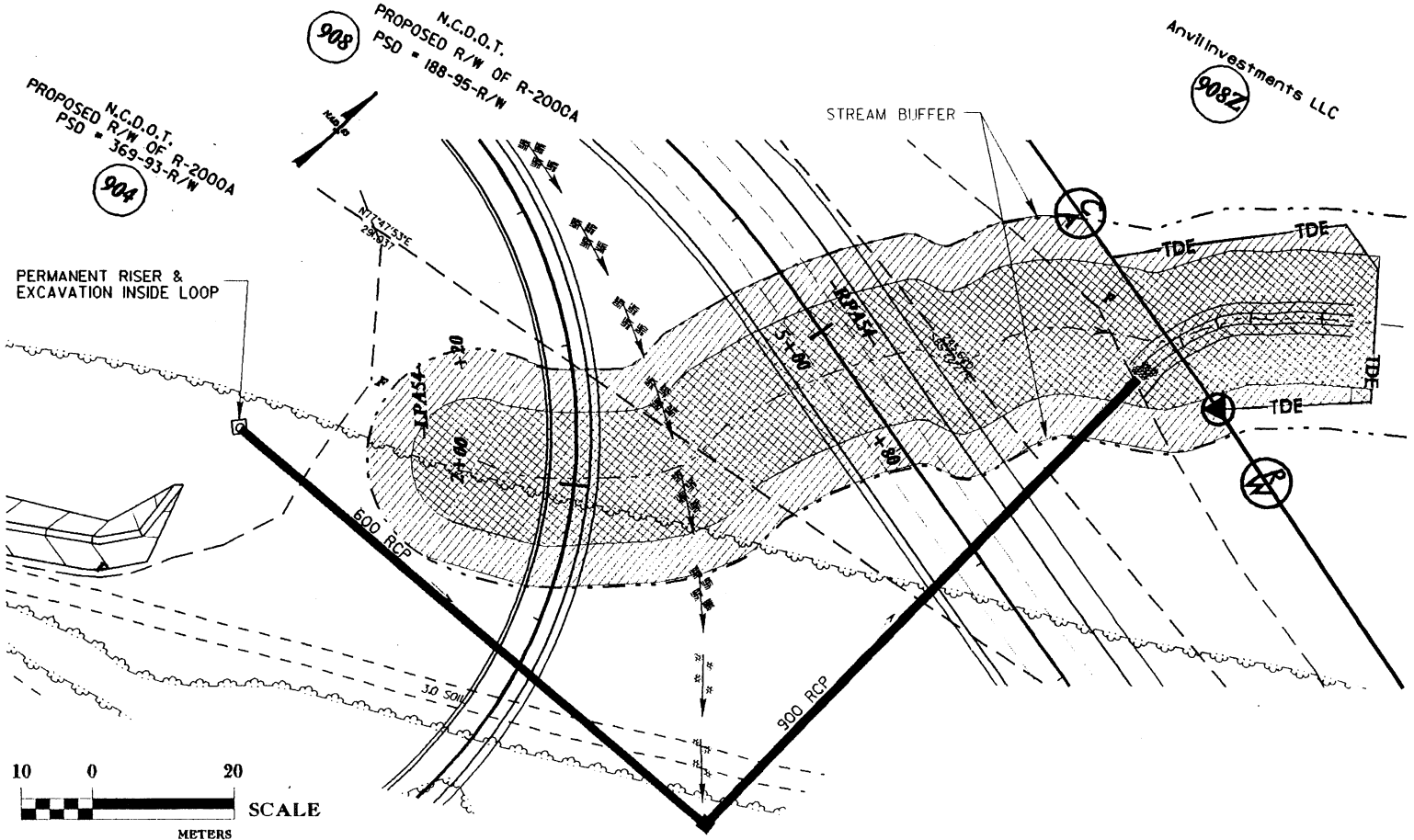
Best Management Practices and Major Structures

Best Management Practices (BMPs) utilized on the project are as follows: grass swales, wet detention ponds, detention in gore areas, level spreaders, natural channel design for stream relocations, and the submergence of box culverts below stream beds. The BMPs were designed based on the North Carolina Department of Environment and Natural Resources publication entitled, "Stormwater Management Guidance Manual." The wet detention pond was designed for water quality and flood control. The wet pond will be used as a riser basin during construction. Stormwater detention in gore areas will be provided by open-throat catch basins elevated about 1 m above the low point.

The stream relocations are required due to the location of the proposed fill slopes over the existing streams, making the relocation of the streams unavoidable along these reaches. The design methods used are in accordance with those recommended in, "Applied River Morphology" (Rosgen, 1996).

BMP	Station	Plan Sheet
Grass Swales	-RPA54- 5+80 to 6+20 right	10
	-L- 67+07 to 67+60 median	10
	-L- 69+00 to 69+40 median	12
	-L- 70+40 to 70+80 median	12
Wet Detention Pond	-LPA54- 2+10 left	10
Detention in Gore Areas	-L- 45+90 left	6
	-L- 47+00 left	6
	-L- 50+80 left	6
	-L- 51+80 left	6
	-Y- 26+40 left	6
	-Y- 26+70 right	6
	-L- 49+40 right	7
	-Y32+15 right	7
	-L- 66+40 left	10
	-L- 66+40 right	11
Level Spreader	-Y22REV- 13+50 left	21
	-L- 70+40 right	12
Stream Relocations	-YRPB- 11+90 to 13+39 right	6
	-YRPA- 10+39 to 12+76 right	8
	-YRPC- 13+40 to 14+80 right	18

BMP	Station	Plan Sheet
Box Culverts	-Y19REV- 13+40	5
	-L- 45+26	5
	-YCFLY- 15+60	5
	-YBFLY-15+67	6
	-Y- 27+97	6
	-YCFLY- 23+97	6
	-L- 54+80	8
	-Y- 37+15	18



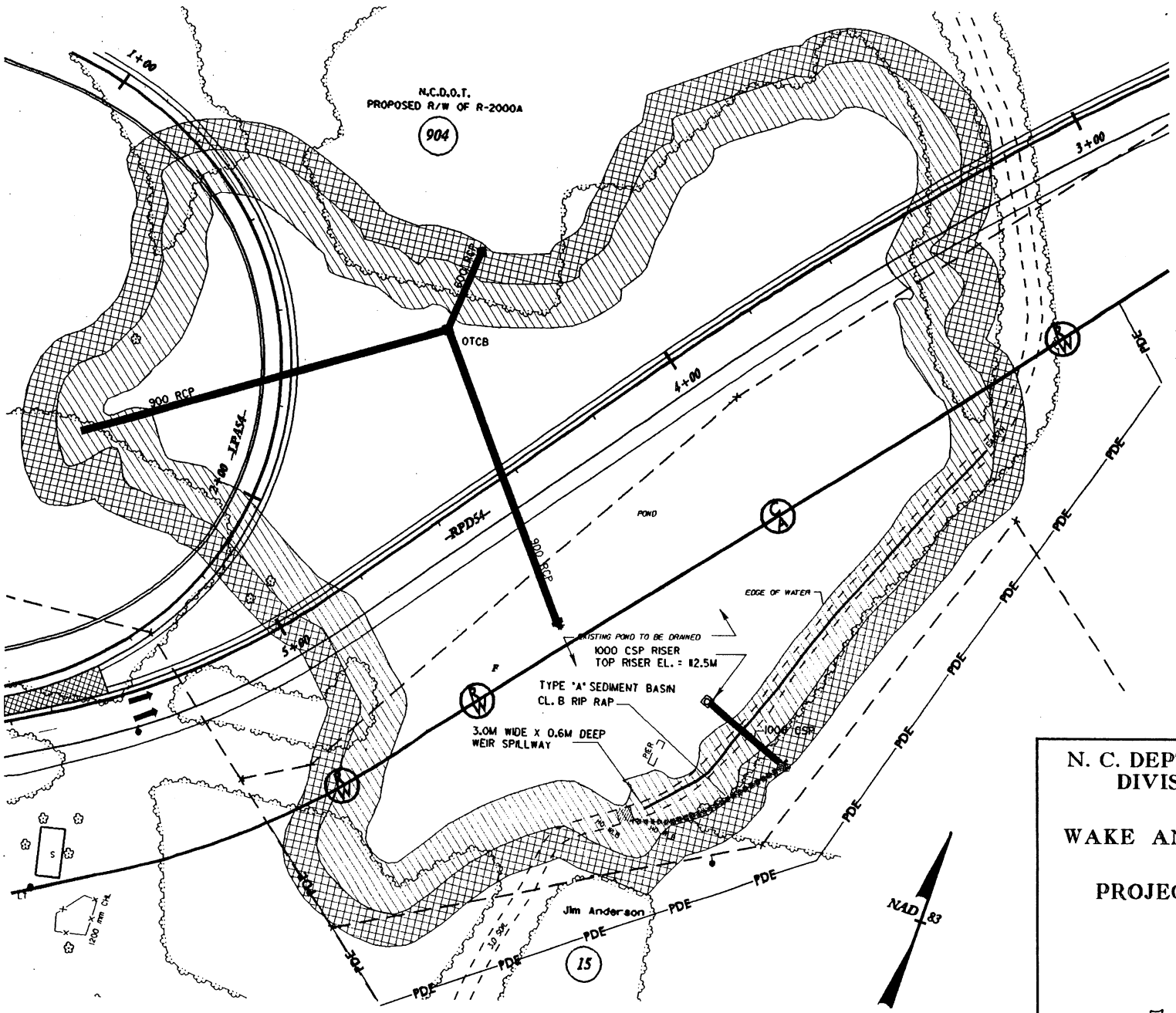
PLAN VIEW
SITE 1
BUFFER IMPACTS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 6 OF 12 4/03



DENOTES ZONE 1 POND BUFFER IMPACT

DENOTES ZONE 2 POND BUFFER IMPACT

10 0 25

SCALE

METERS

PLAN VIEW
SITE 2
BUFFER IMPACTS

904Z

Duke Weeks

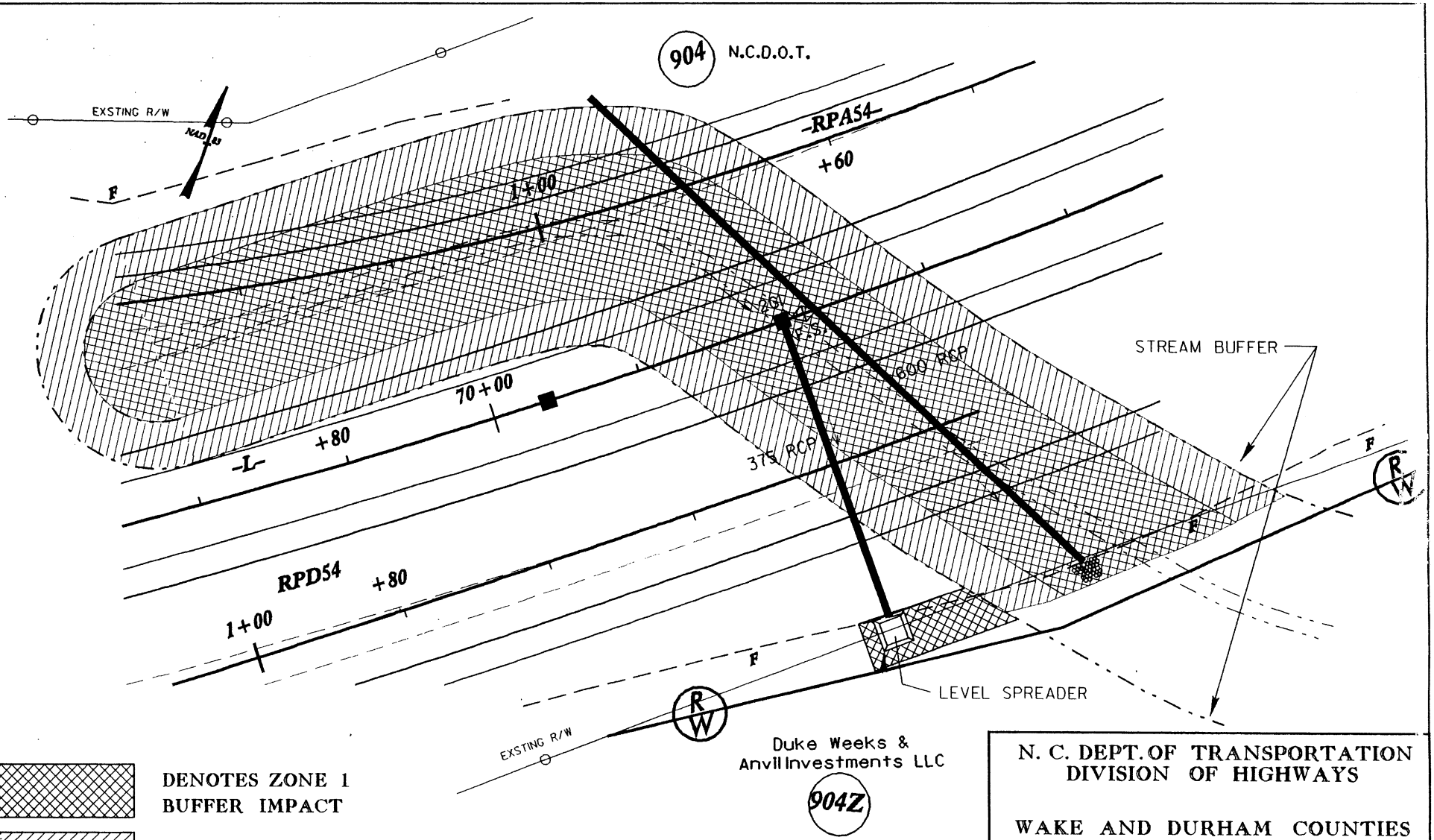
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 7 OF 12

4/03



DENOTES ZONE 1 BUFFER IMPACT

DENOTES ZONE 2 BUFFER IMPACT

7.5 0 15

SCALE

METERS

PLAN VIEW
SITE 3

BUFFER IMPACTS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

SHEET 8 OF 12

4/03

R-2000AB
Grass Ditch Treatment

11/4/02

Ditch station	Longitudinal slope	Sideslope	V10	Length of swale	Drainage Area	V2	Sideslope If steeper than 3:1, then reject	Nonerosive for 10-year storm
RPA54 5+80 to 6+20 right	2.5 - 3.1%	4 - 6:1	0.43 m/sec	40m	0.04 ha	0.41 m/sec	ok	ok
RPA54 3+20 to 3+90 left	0.80%	4:1	0.55 m/sec	70m	0.6 ha	0.51 m/sec	ok	PSRM used
RPA54 4+70 to 5+60 left	2.70%	4:1	0.86 m/sec	90m	0.6 ha	0.81 m/sec	ok	PSRM used
LPA54 1+00 to 1+40 right	10%	4:1	0.90 m/sec	40m	0.1 ha	0.85 m/sec	ok	PSRM used
L 67+07 to 67+60 median	2.1 - 2.9 %	6.5 - 8:1	0.51 m/sec	53m	0.15 ha	0.49 m/sec	ok	ok
L 69+00 to 69+40 median	4%	6.5 - 8:1	0.56 m/sec	40m	0.11 ha	0.54 m/sec	ok	ok
L 70+40 to 70+80 median	4%	6.5 - 8:1	0.56 m/sec	40m	0.11 ha	0.54 m/sec	ok	ok

9/12

BUFFER IMPACTS SUMMARY

			IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)
1	900mm RCP	-RPA54- 5+20 LT	X					2669.0	1697.0	4366.0		
		-RPA54- 4+55 RT.										
2	900mm RCP	-RPD54- 5+00 LT	X					5939.0	4065.0	10004.0		
		-RPD54- 3+60 LT										
3	600mm RCP	-L- 69+60 LT	X					2663.0	1923.0	4586.0		
		-L- 70+60 RT.										
TOTAL:					0.0	0.0	0.0	11271.0	7685.0	18956.0		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES
PROJECT: 8.U401711 (R-2000AB)

SHEET 10 OF 12

BUFFER IMPACTS SUMMARY

			IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	900mm RCP	-RPA54- 5+20 LT	X					28728.0	18266.0	46994.0		
		-RPA54- 4+55 RT.										
2	900mm RCP	-RPD54- 5+00 LT	X					63925.0	43755.0	107680.0		
		-RPD54- 3+60 LT										
3	600mm RCP	-L- 69+60 LT	X					28664.0	20699.0	49363.0		
		-L- 70+60 RT.										
TOTAL:					0.0	0.0	0.0	121317.0	82720.0	204037.0		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES
PROJECT: 8.U401711 (R-2000AB)

PROPERTY OWNER

NAME AND ADDRESS

SITE	OWNER'S NAME	ADDRESS
908Z	Anvil Investments, LLC C/O Greg Brice	100 Weston Estates Cary, NC 27513
904Z (West of Project)	Anvil Investments, LLC C/O Greg Brice	100 Weston Estates Cary, NC 27513
904Z (East of Project)	Duke Weeks C/O Jim Anderson	1800 Perimeter Drive Morrisville, NC 27560
15	Jim Anderson	1800 Perimeter Drive Morrisville, NC 27560
905	N.C.D.O.T.	

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE AND DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AB)

HYDRAULIIC DESIGN AND PERMIT REVIEW MEETING FOR R-2000AC, WAKE/DURHAM CO.

Prepared by Bill Elam
October 21, 2002

Contents:

I. Minutes of the Interagency "4C" Meeting on 10/17/02

II. Minutes of the DWQ Buffer Meeting on 5/14/02

III. Minutes of the Interagency "4B" Meeting on 4/18/02

IV. Agency Comments and Post Meeting Activities

V. Attachments: Stormwater Management Plan

I. Minutes of the Interagency "4C" Meeting on 10/17/02

Participants:

David Chang, NCDOT Hydraulics
Bill Elam, NCDOT Hydraulics
Max Price, NCDOT Hydraulics
Eric Alsmeyer, USACE
Alice Gordon, NCDOT PD&EA
David Cox, WRC
Howard Hall, USFWS (not present)
Chris Militscher-EPA (not present)
John Hennessy, NCDENR

The meeting began with a brief overview of the project. It was explained that this meeting was a final permit review for the Wetland and Stream Impact permit and the Buffer permit. Max Price proceeded to review each permit sheet.

1. Site 1. A cross vane will be used at the culvert.
2. Hydraulics notified the agencies that we were confirming the stream topography to ensure correct stream impacts.
3. John Hennessy said that he would have to review the use of grass swales as treatment for the buffer impacts. Max Price review with John Hennessy why level spreaders and detention basins would not work based on topography, slope, or drainage area.
4. John Hennessy and Alice Gordon requested that we put a title block on the Grass Swale data sheet.

II. Minutes of the DWQ Buffer Meeting on 5/14/02

Participants:

David Chang, NCDOT Hydraulics
Bill Elam, NCDOT Hydraulics
Max Price, NCDOT Hydraulics
John Hennessy, NCDENR

The meeting began with a brief overview of the project. It was explained that this meeting was a plan review focused on the streams with buffers. Max Price proceeded to review each redline plan sheet.

1. Grass Swales used as the Stream Buffer BMP. Max Price explained to John Hennessy on a site by site basis why grass swales were used instead of level spreaders or detention ponds. John did not express any major concerns or problems with the design.

III. Minutes of the Interagency "4B" Meeting on 4/18/02

Participants:

Eric Alsmeyer, USACE
Alice Gordon, NCDOT PD&EA
Bill Elam, NCDOT Hydraulics
Howard Hall, USFWS
John Hennessy, NCDWQ
Max Price, NCDOT Hydraulics
Dave Henderson, NCDOT Hydraulics
David Cox, NCWRC

The meeting began with a brief overview of the project. It was explained that this meeting was a thirty- percent plan review. The history of the project was discussed. Max Price proceeded to review each redline plan sheet. The Neuse River Buffers are a major issue with this project.

1. Stream Mitigation 74+00 to 75+60 –L. There is an intermittent channel that will be under fill to the left of the –L- line. Eric Alsmeyer stated that stream mitigation was not required, but the stream would be counted as an impact.
2. Tributary to Stirrup Iron Creek. Ditches will be tied in to stream channel at a minimum depth and the stream bank will be protected with rip rap. David Cox and Eric Alsmeyer were concerned that the ditches would be tied into stream bed.
3. Pocket Wetland on Ramp C. Max Price showed where 0.01 ha (0.025 Ac) of wetland were being impacted at Station 13+55 Ramp C.
4. Grass Swales as Treatment. Grass swales are being used everywhere possible even if it is not a "buffered" stream.

IV. Post Meeting Activities

As noted in the Interagency "4C" meeting, the stream topography at Tributary to Stirrup Iron Creek was rechecked. The alignment of the culvert was adjusted slightly to align better with the stream. The ditches were tied into the stream channel at minimum depth and the stream bank will be protected with rip rap. The ditches changed slightly due to the adjustments in the topography around the stream.

V. Attachments: Stormwater Management Plan

ROADWAY DESCRIPTION:
The R-2000AC project is a leg of the I-540 project in Wake and Durham County. The length of the project is 1.707km (1.06 mi.). There is new stream crossing on Tributary to Stirrup Iron Creek and one box culvert extenuation on Stirrup Iron Creek on the project.

ENVIRONMENTAL DESCRIPTION:
Stirrup Iron Creek and the Tributary to Stirrup Iron Creek are in the Neuse River Basin. The stream classification for Stirrup Iron Creek and Tributary to Stirrup Iron Creek is Class C – NSW (aquatic life, secondary recreation, and nutrient sensitive waters). There are several small – unnamed streams that appear on the soils map. There are a total of three permitted sites on the project, with impacts totaling 359 m (1178 ft.) of stream, 0.0005 ha (.0012 ac.) of wetlands, and 1.14 ha (2.82 ac.) of Neuse River Riparian Buffers.

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES:
Best Management Practices (BMP's) utilized on this project consist of Grassed Swales and pre-formed scour holes.

The following summarizes the locations of each BMP:

Grassed Swales
Station 74+00 to 74+50 –L- Right
Station 74+00 to 74+50 –L- Median
Station 74+00 to 74+50 –L- Left
Station 74+50 to 76+10 –L- Median
Station 75+20 to 75+40 –L- Right
Station 75+80 to 76+80 –L- Left
Station 74+00 to 74+50 –L- Right
Station 76+10 to 77+00 –L- Median
Station 13+00 to 14+00 –Y1- Right
Station 76+00 to 77+00 –L- Left
Station 77+00 to 78+00 –L- Median
Station 77+00 to 78+00 –L- Left
Station 13+75 to 14+55–CD- Left
Station 12+00 to 13+00 –Y1- Right
Station 78+00 to 79+20 –L- Right
Station 78+00 to 79+60 –L- Median
Station 78+00 to 79+60 –L- Left
Station 14+80 to 15+80–CD- Left
Station 11+40 to 12+00 –Y1- Right
Station 11+00 to 11+40 –Y1- Right
Station 79+20 to 79+60 –L- Right
Station 79+60 to 80+60 –L- Median

Station 79+60 to 80+60 –L- Left
Station 79+60 to 80+00 –L- Right
Station 14+60 to 15+40 –Ramp C- Right
Station 25+60 to 26+80 –Y3- Right
Station 26+80 to 27+50 –Y3- Right
Station 27+50 to 27+80 –Y3- Right
Station 27+80 to 29+40 –Y3- Right
Station 30+80 to 31+80 –Y3- Right

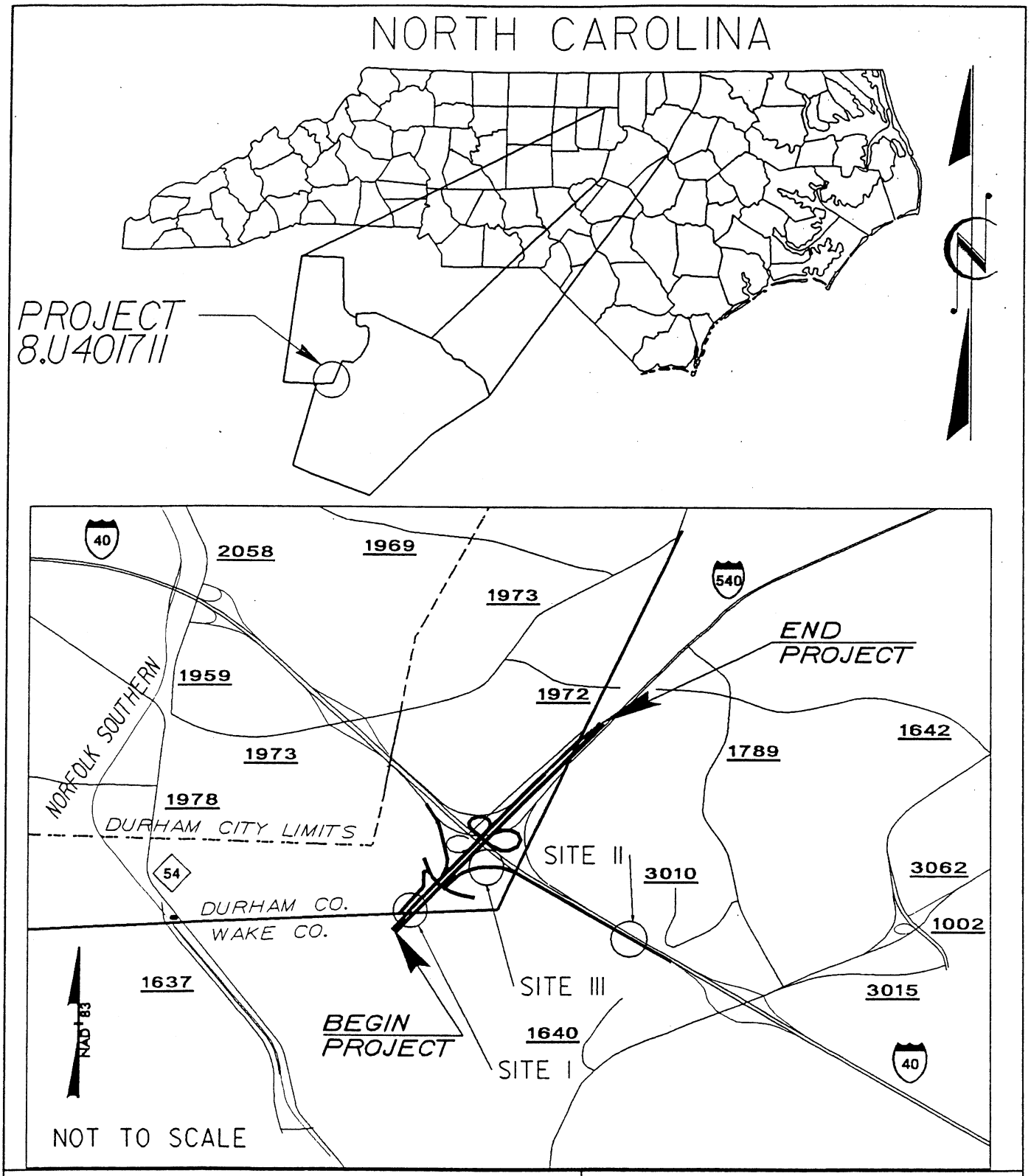
Preformed Scour Holes

Station 76+12 –L- Right
Station 13+44 –Ramp B- Right
Station 82+10 –L- Right
Station 13+60 –Ramp C- Right
Station 34+15 –Y3- Right

Major Structures

Station 75+75.4 –L- (Tributary to Stirrup Iron Creek) New 2 @ 3.0m x 2.4m (10 ft. x 8 ft.) reinforced concrete box culvert is to be constructed. The culvert will be buried one foot.

Station 30+21 –Y3- (Stirrup Iron Creek) Existing 3 @ 3.0m x 3.0m (10 ft. x 10 ft.) reinforced concrete box culvert will be extended.



VICINITY MAPS

WETLAND AND STREAM IMPACTS

DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 1 OF 9 11 / 26 / 02

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

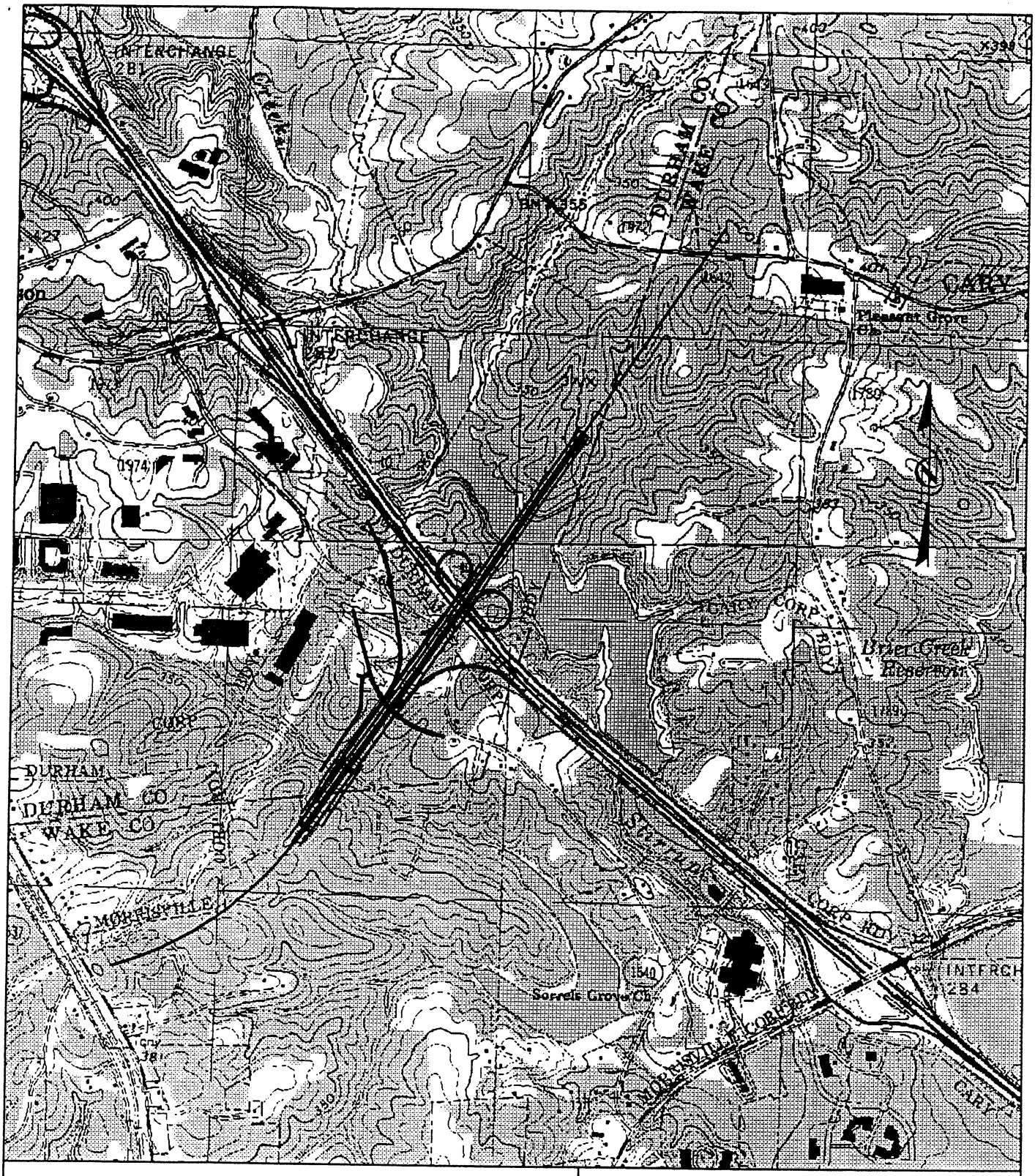
DITCH / GRASS SWALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY) FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM NORTHEAST OF I-40

11 / 26 / 02



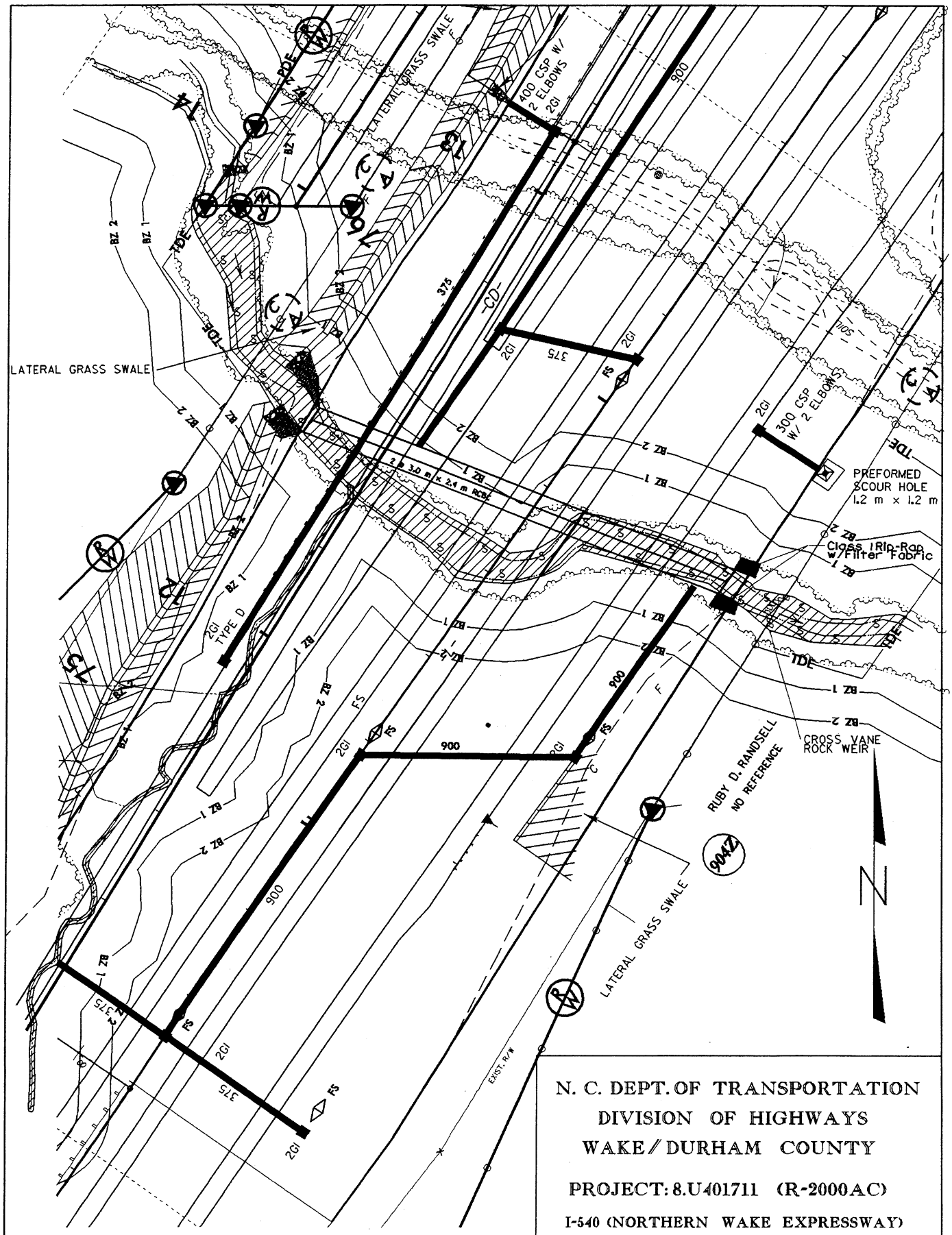
LOCATION MAPS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO
0.7 KM NORTHEAST OF I-40

SHEET 3 OF 9 11 / 26 / 02



PLAN VIEW

DENOTES FILL IN SURFACE WATER

10m 0 20m SCALE

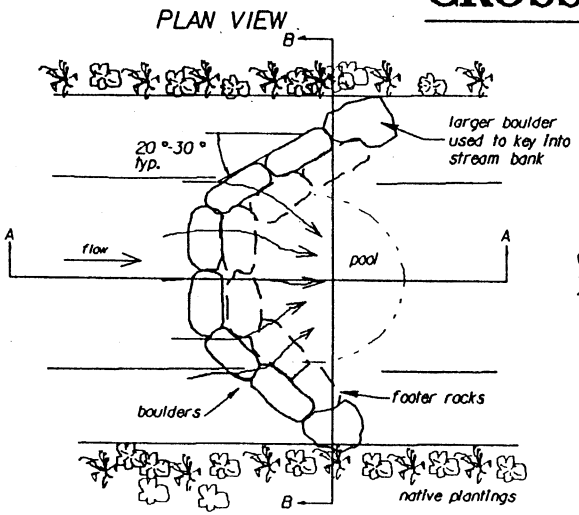
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

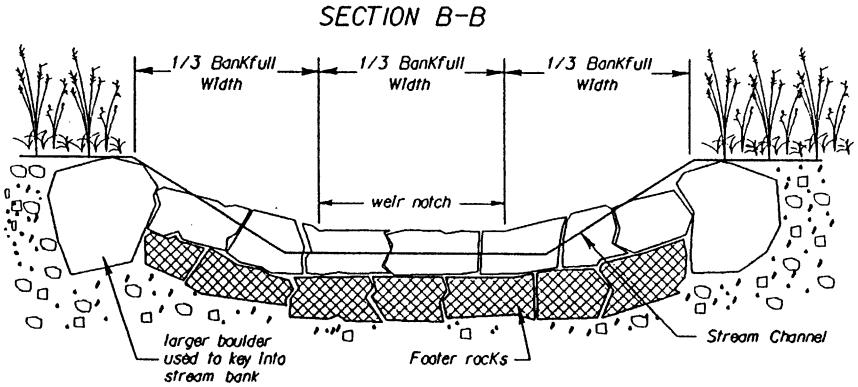
PROJECT: 8.U401711 (R-2000AC)

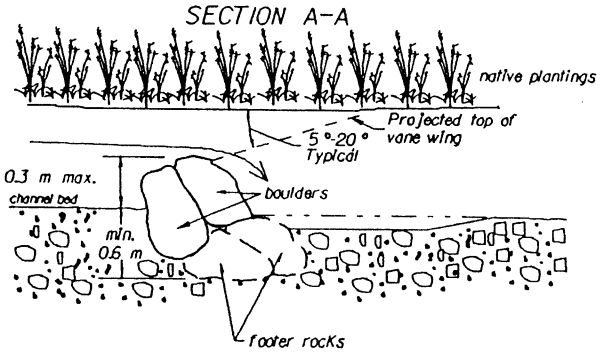
I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 4 OF 9 7/9/03

CROSS VANE ROCK WEIR DETAIL







NOTE: Boulders should be native quarried rock or locally shot rock, angular and oblong with approximate dimensions of 1.2m x 0.9m x 0.6m and weighing approximately (4000 lbs)

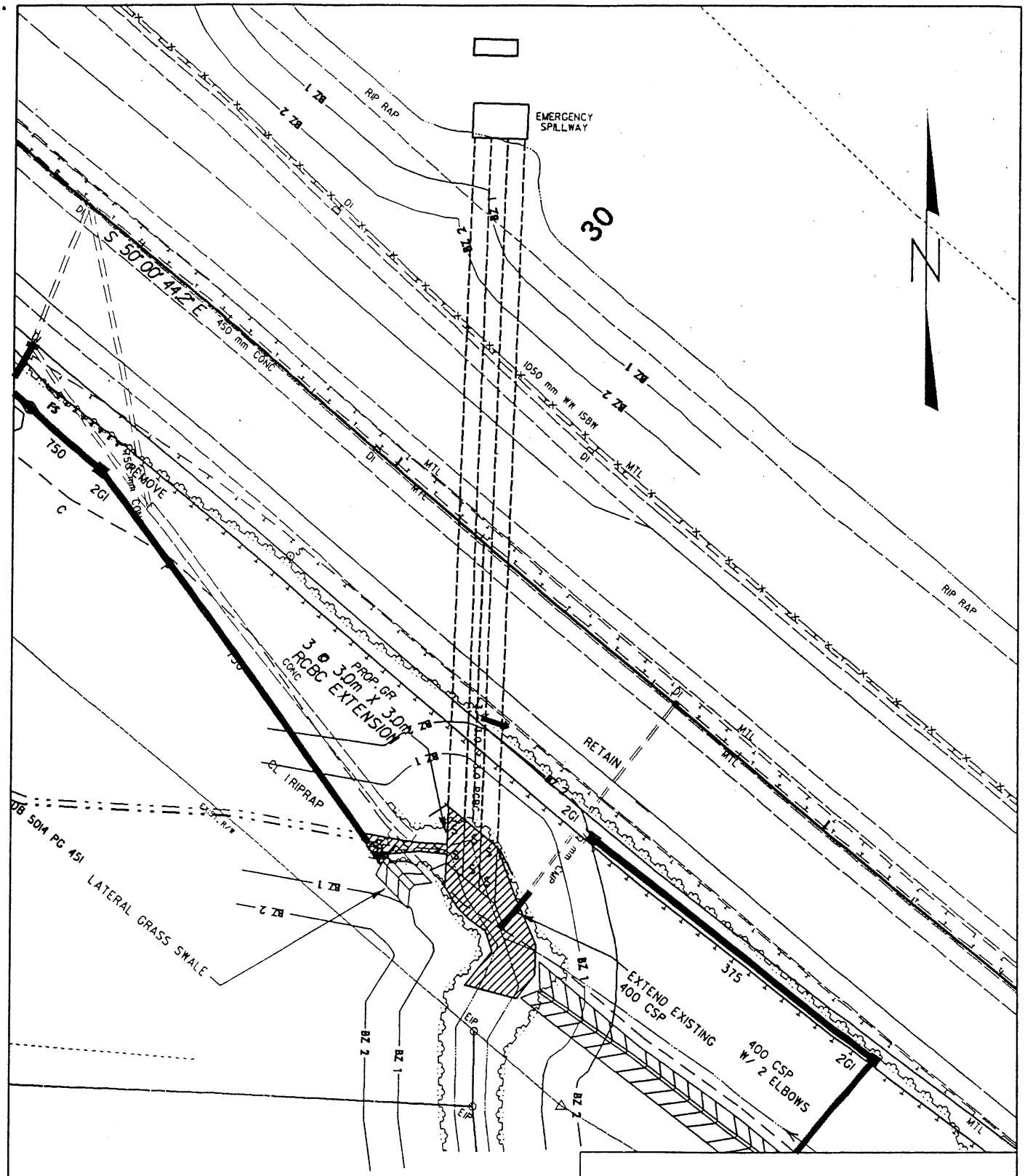
Larger boulders should have approximate dimensions of 1.2m x 1.2m x 0.9m

Note: Rocks should fit tightly with minimal spaces

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY) FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM NORTHEAST OF I-40



PLAN VIEW

DENOTES FILL IN SURFACE WATER

10m 0 20m SCALE

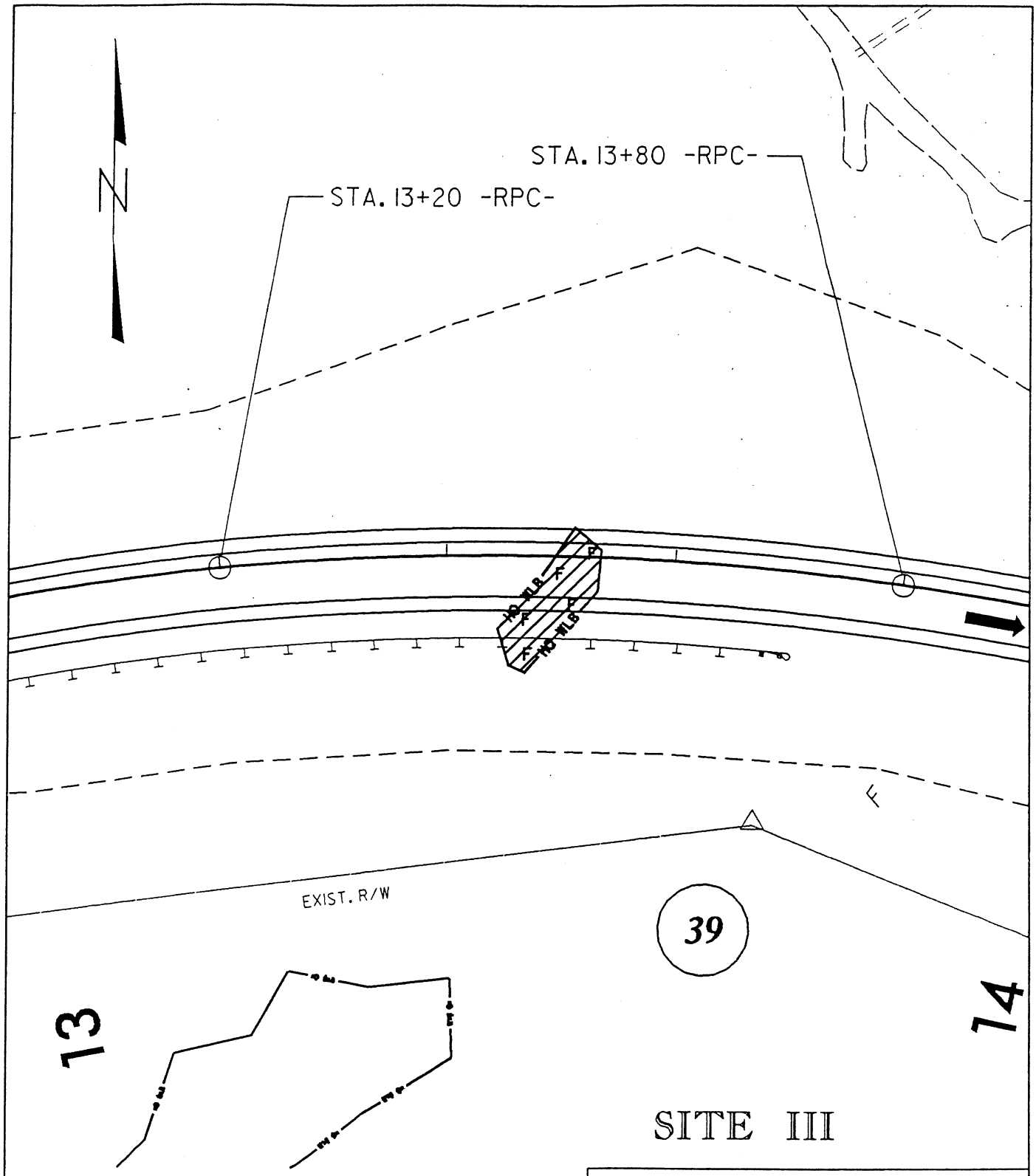
SITE II

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

 11 / 26 / 02



SITE III

DENOTES FILL IN WETLAND

5m 0 10m

SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 7 OF 9 11 / 26 / 02

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
	Ruby D. Randsell	303 Broad St. Fuquay-Varina, NC 27526
	Concourse Development,I,L.L.C.	1400 Commonwealth Dr. Suite 250 Wilmington, NC 28403
	CSM RealEstate Partners	300 W. Millbrook Road Suite B Raleigh, NC 27609
	Investors Of The Triangle	Post Offfice Box 1551 Durham, NC 27702-1551

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

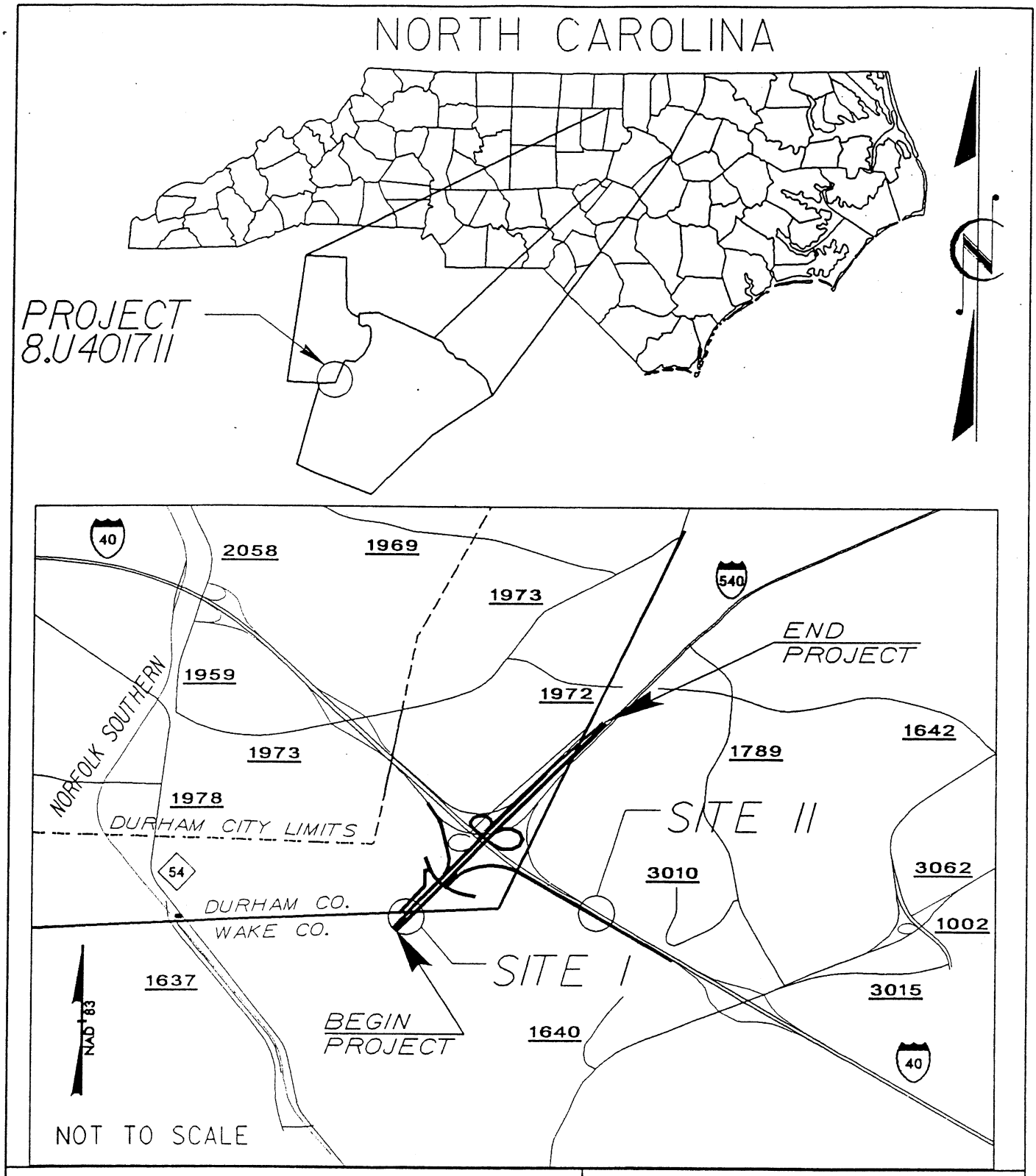
I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1	13+44 -RPC- TO	NA	0.0005								
	13+54 -RPC-										
2	73+80 -L- TO	2@ 3.0m x 2.4m RCBC					0.122			176	
	75+90 -L-										
	73+80 -L- TO	TRIBUTARY					0.015			151	
	75+90 -L-										
3	30+50 -Y3- RT.	3@ 3.0m x3.0m RCBC					0.032			32	
		EXTENSION									
TOTALS:			0.0005	0	0	0	0.169	0	0	359	0

NCDOT

DIVISION OF HIGHWAYS
WAKE/DURHAM COUNTY
PROJECT 8.U401711 (R-2000AC)
I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9KM SOUTHWEST OF I-40 TO
0.7KM NORTHEAST OF I-40



NEUSE RIVER BUFFER

VICINITY MAPS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 1 OF 14 11 / 26 / 02

BUFFER LEGEND

WLB — WETLAND BOUNDARY

WLB / WLB — WETLAND

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

—BZ— RIPARIAN BUFFER ZONE

—BZ1— RIPARIAN BUFFER ZONE 1
30 ft (9.2m)

—BZ2— RIPARIAN BUFFER ZONE 2
20 ft (6.1m)

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

—TDE— TEMP. DRAINAGE EASEMENT

—PDE— PERMANENT DRAINAGE EASEMENT

— EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

— EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE (PSH)

LEVEL SPREADER (LS)

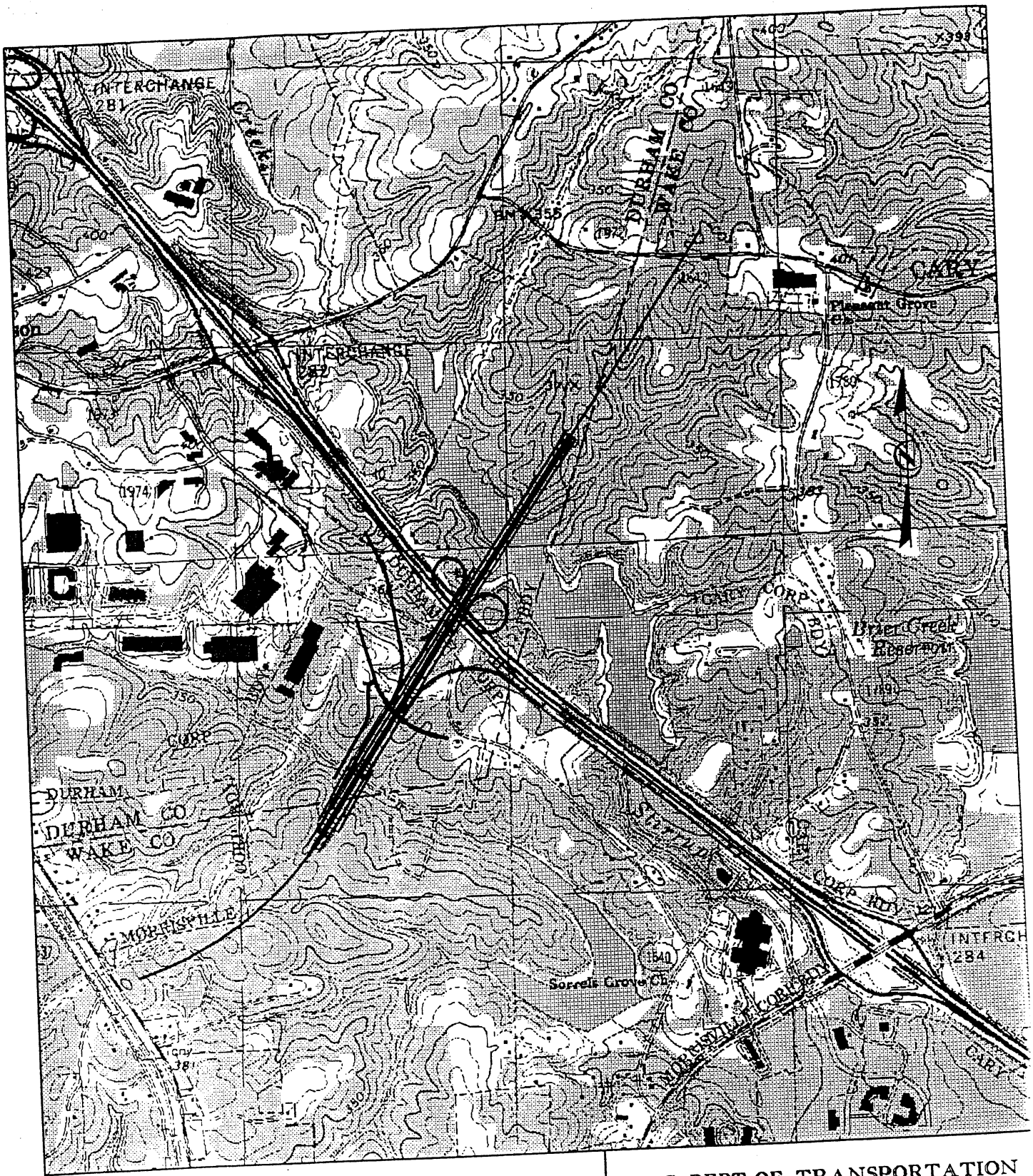
GRASS SWALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 2 OF 14 11/26/02



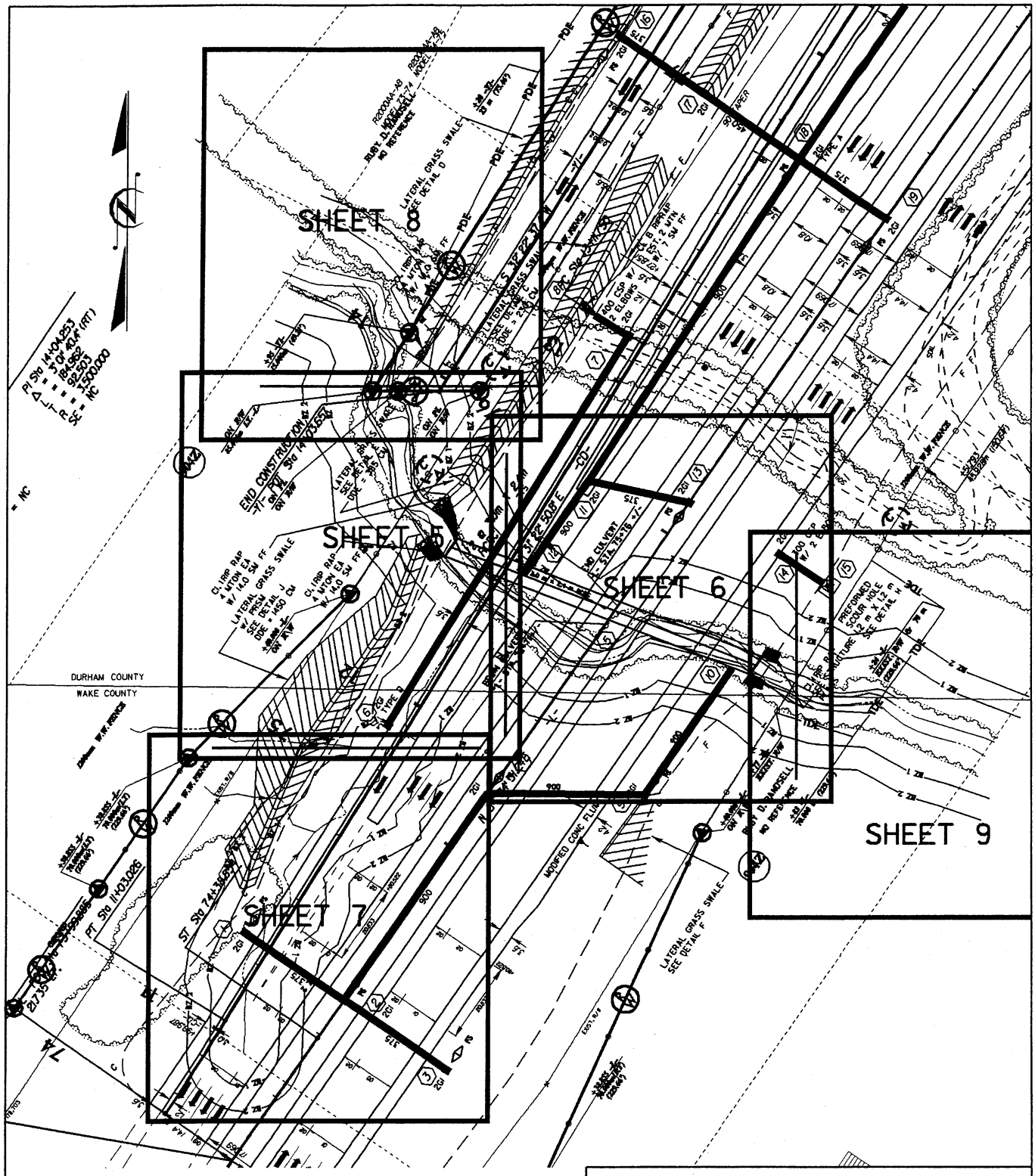
LOCATION MAPS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTIES

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO
0.7 KM NORTHEAST OF I-40

SHEET 3 OF 14 11 / 26 / 02



PLAN VIEW

SHEET LAYOUT

15m 0 30m

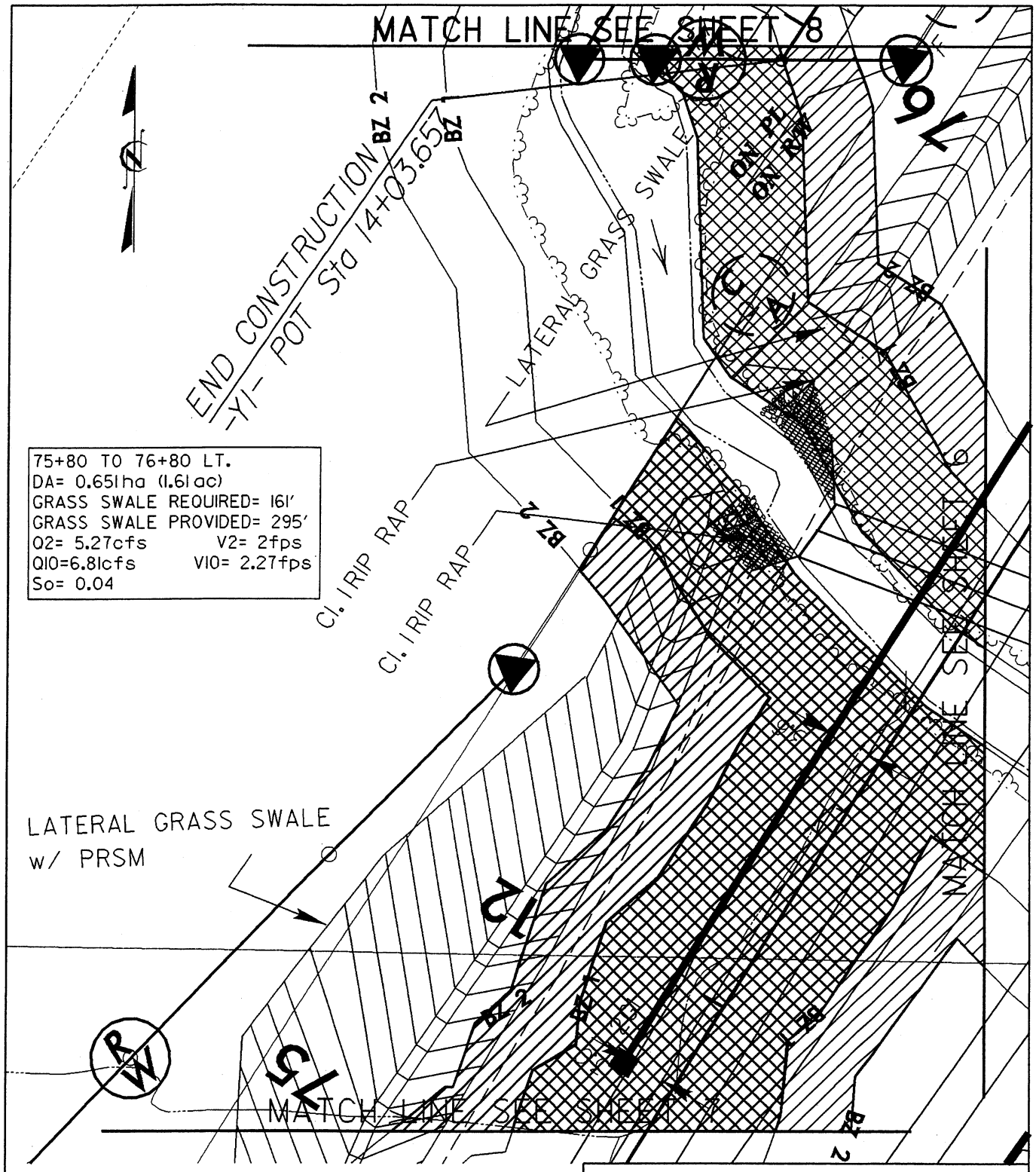
HORIZONTAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 4 OF 14 7 / 10 / 03



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
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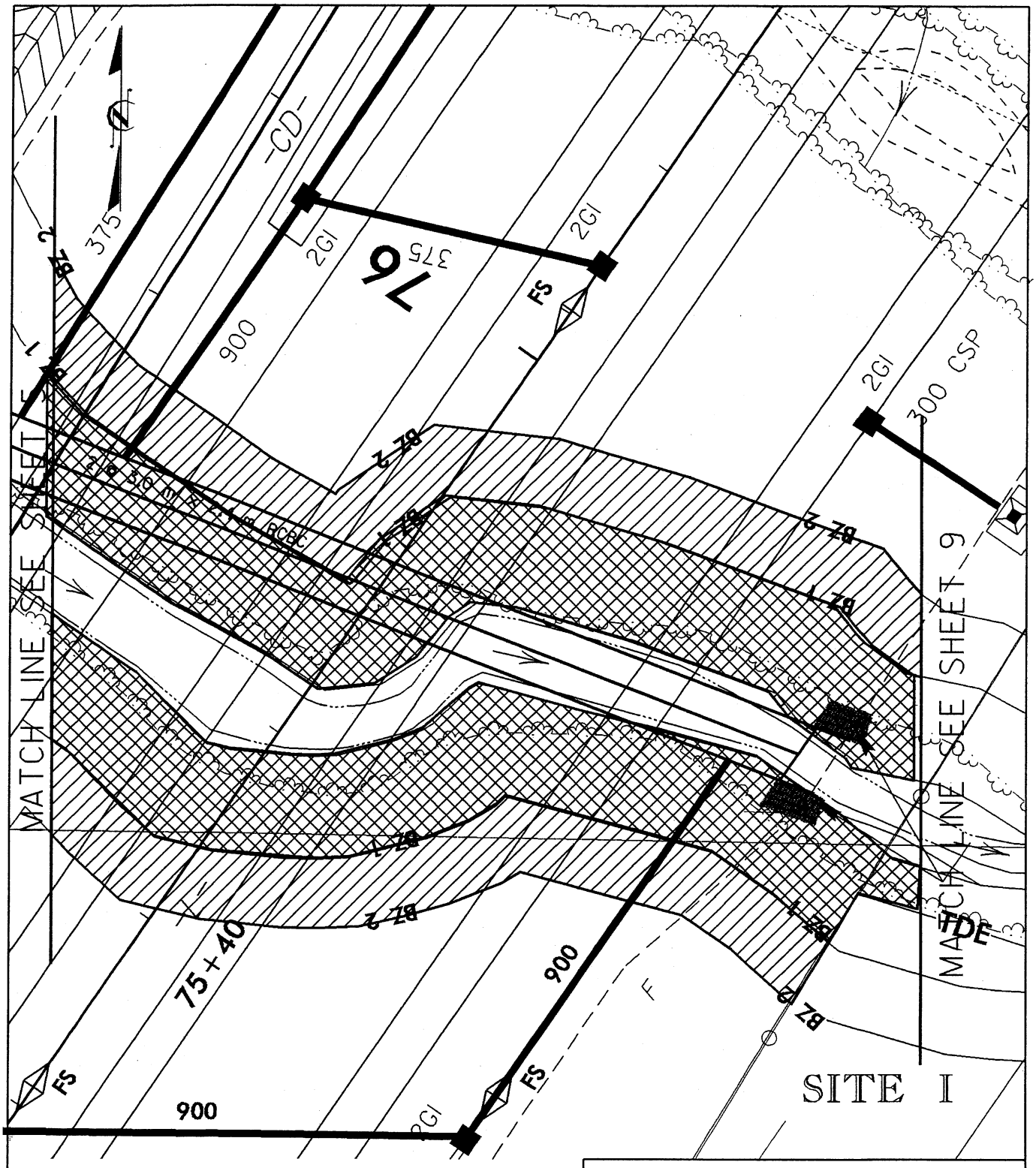
SHEET 5 OF 14 7 / 10 / 03



PLAN VIEW

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

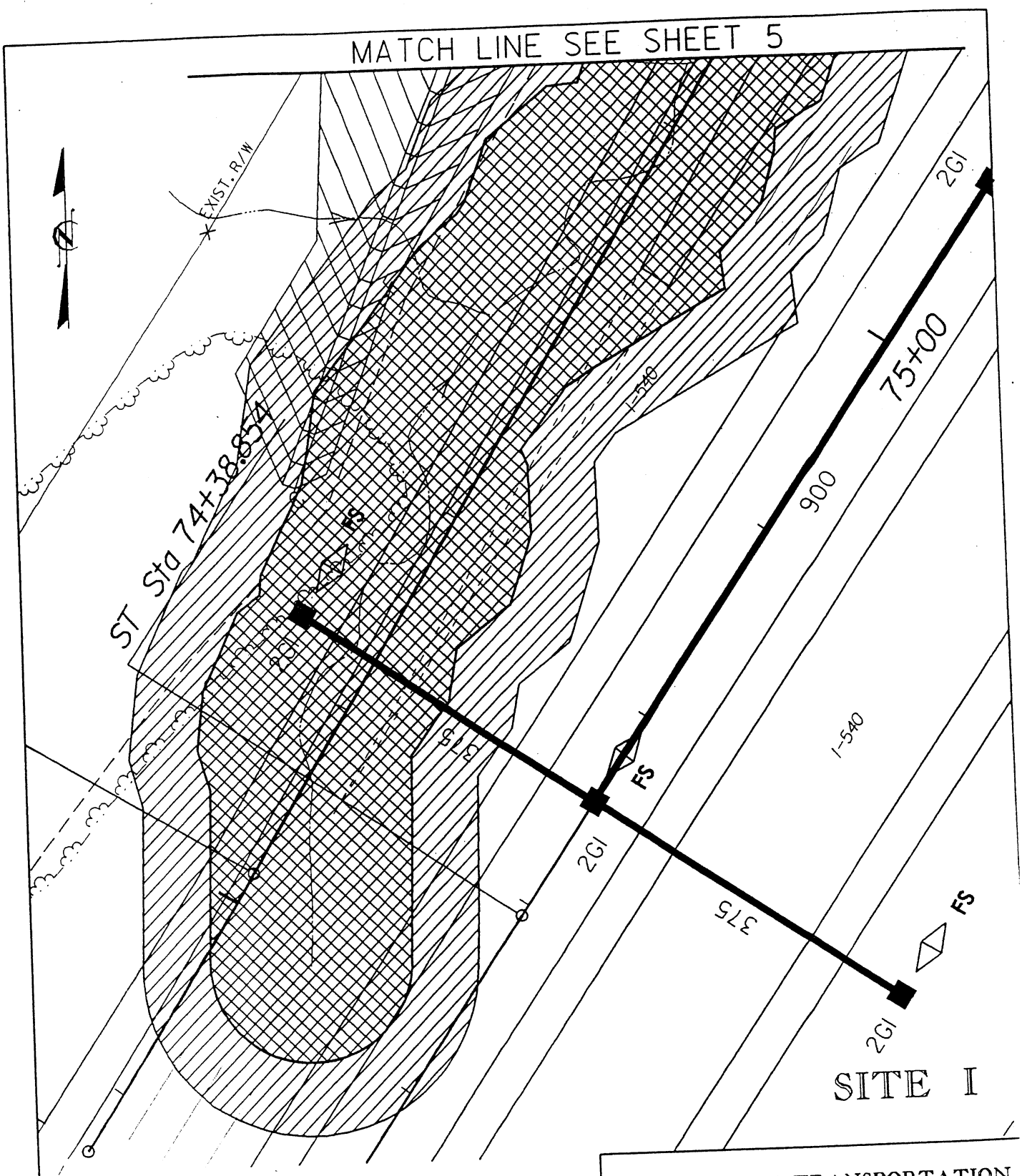
5m 0 10m SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 6 OF 14 7 / 10 / 03



MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

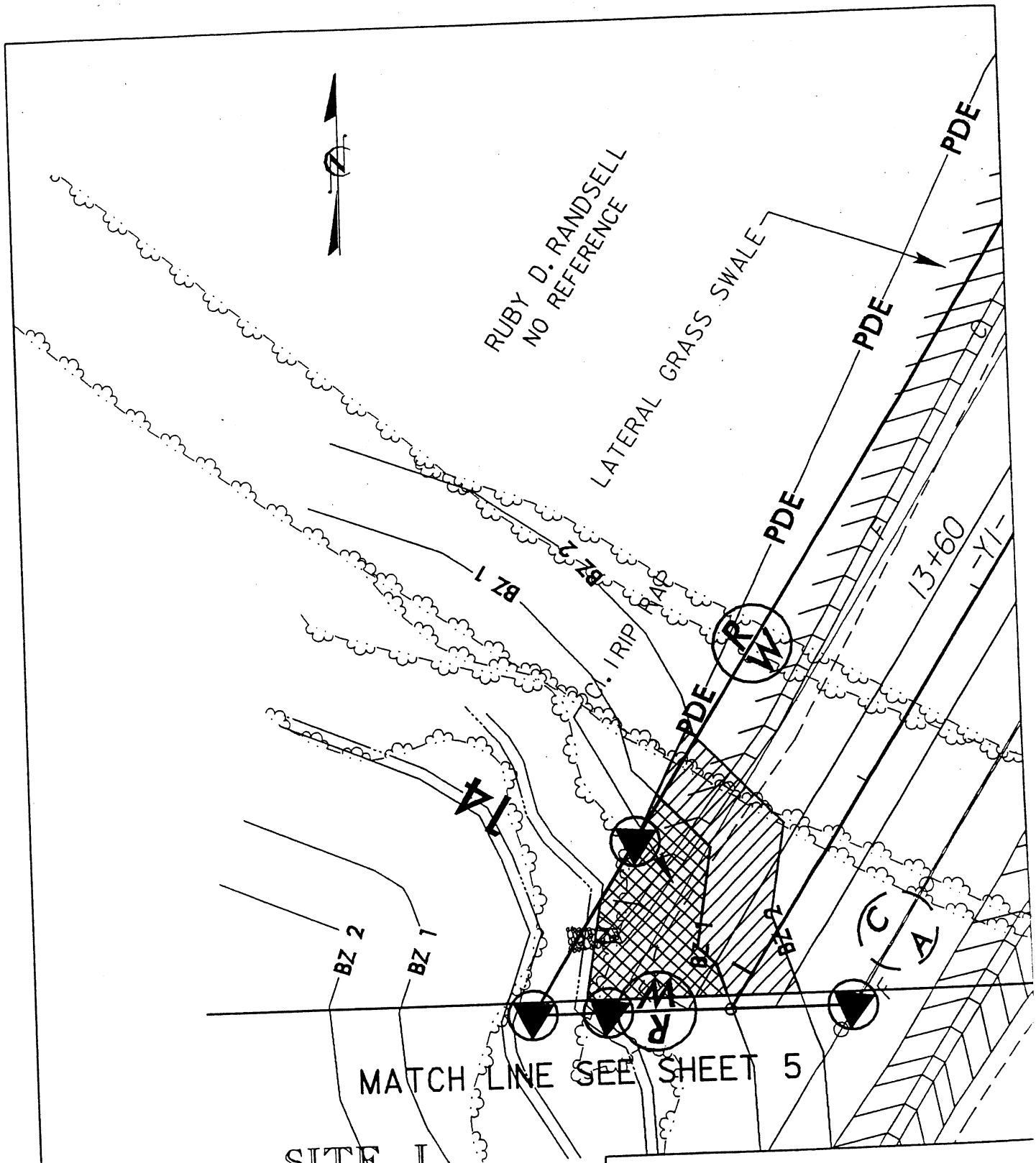
5m 0 10m SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 7 OF 14 11 / 26 / 02



SITE I
PLAN VIEW

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

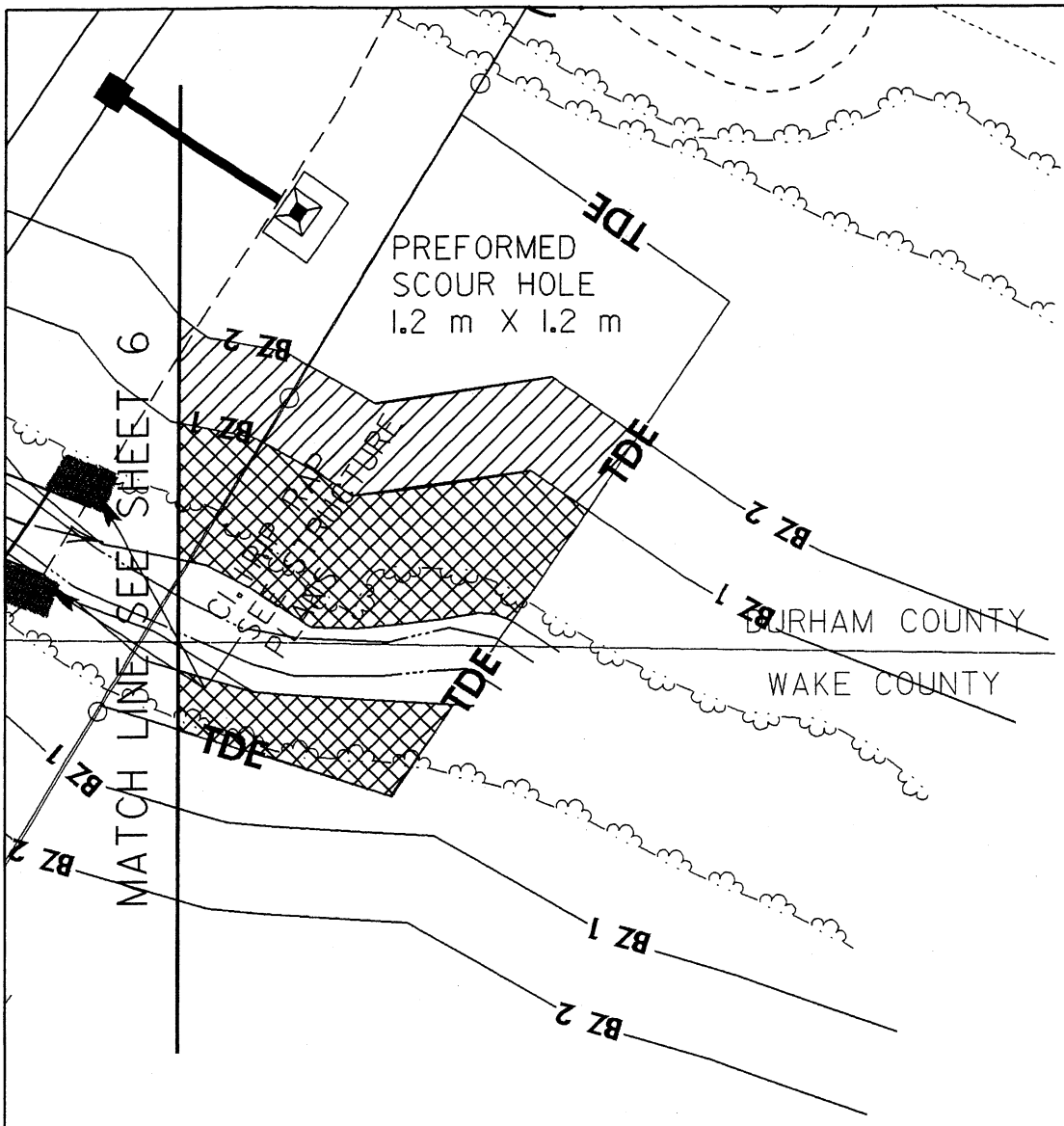
5m 0 10m SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 8 OF 14 11 / 26 / 02



SITE I
PLAN VIEW

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

5m 0 10m

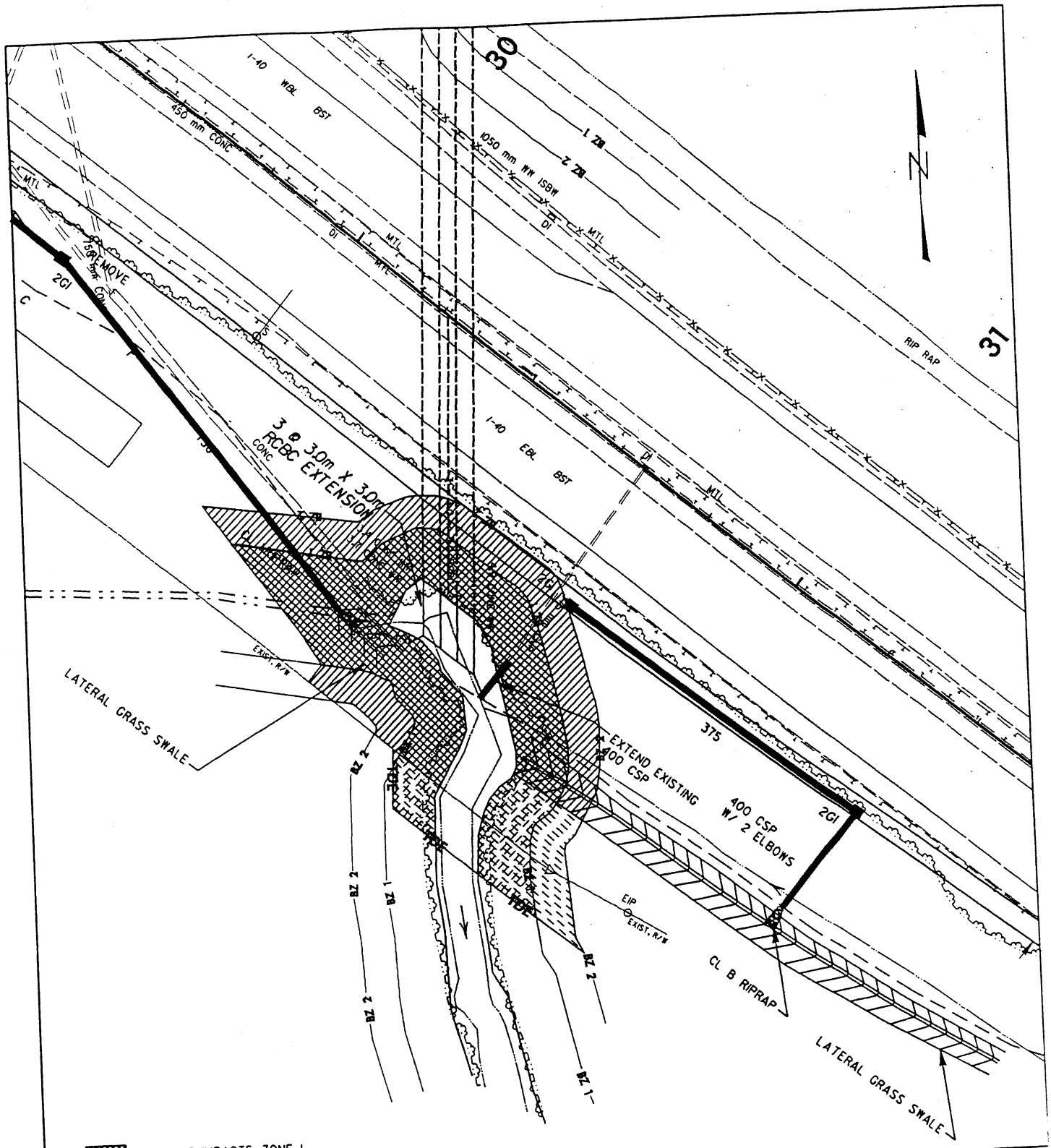
SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 9 OF 14 7/10/03



MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

SITE II
PLAN VIEW

SCALE= 1: 1000

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

SHEET 10 OF 14 11 / 26 / 02

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
	Ruby D. Randsell	303 Broad St. Fuquay-Varina, NC 27526
	Concourse Development,I,L.L.C.	1400 Commonwealth Dr. Suite 250 Wilmington, NC 28403
	CSM RealEstate Partners	300 W. Millbrook Road Suite B Raleigh, NC 27609
	Investors Of The Triangle	Post Offfice Box 1551 Durham, NC 27702-1551

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE / DURHAM COUNTY

PROJECT: 8.U401711 (R-2000AC)

I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM
NORTHEAST OF I-40

BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)
1	2@3.0x2.4 RCBC	-L- Sta 75+71+/-	X					2912.0	1765.0	4677.0		
1		-L- Sta 74+10+/- -L-Sta 75+49+/-		X				2659.0	1803.0	4462.0		
2	3@3.0x3.0 RCBC EXT.	-Y3- Sta 30+21+/-	X		271.9	143.4	415.3	1073.0	782.0	1855.0		
TOTAL:					271.9	143.4	415.3	6644.0	4350.0	10994.0		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.U401711 (R-2000AC)
I-540 (NORTH WAKE EXPRESSWAY) FROM
0.9 KM SOUTHWEST OF I-40 TO0.7 KM
NORTHEAST OF I-40

11/26/

SITE 1 - SHEET 4

			TREATED D.A.		
STRUCTURE	STATION	TYPE	HECTARES	ACRES	GRASSED SWALE
3	(-L-) 74+50 R	2GI	0.7	1.73	197'
2	(-L-) 74+50 M	2GI	0.34	0.84	197'
1	(-L-) 74+50 L	2GI	0.33	0.82	197'
DITCH	75+80 TO 76+80 -L-	SWALE	0.65	1.61	295'
DITCH	14+00 TO 14+80 Y1-	SWALE	0.1	0.24	213'
13	(-L-) 76+10 M	2GI	0.218	0.54	295'
11	(-L-) 76+00L	2GI	0.21	0.52	328'
14	(-L-) 76+12 R	2GI	0.18	0.44	PSH
4	(-L-) 75+17 M	2GI	0.38	0.93	515'
9	(-L-) 75+40 R	2GI	0.23	0.57	70'

SITE 1 - SHEET 5

			TREATED D.A.		
STRUCTURE	STATION	TYPE	HECTARES	ACRES	GRASSED SWALE
32	(-L-) 79+60 L	2GI	0.484	1.20	262'
33	(-L-) 79+60 M	2GI	0.42	1.04	197'
34	(-L-) 79+60 R	2GI	0.28	0.69	120'
26	(-L-) 78+00 R	2GI	0.3	0.74	295'
25	(-L-) 78+00 M	2GI	0.242	0.60	262'
24	(-L-) 78+00 L	2GI	0.52	1.28	328'
23	(-CD-) 14+75 L	2GI	0.9	2.22	656'
22	(-Y1-) 12+00 R	2GI	0.36	0.89	197'
19	(-L-) 77+00 M	2GI	0.242	0.60	328'
18	(-L-) 77+00 L	2GI	0.21	0.52	328'
17	(-CD-) 13+73 L	2GI	0.5	1.23	295'
16	(-Y1-) 13+00 R	2GI	0.63	1.56	328'
27	(-Y1-) 11+40 R	2GI	0.4	0.99	197'

SEE HALF SIZE PLAN SHEETS FOR STRUCTURE NUMBERS

NCDOT

DIVISION OF HIGHWAYS
WAKE/DURHAM COUNTY
PROJECT 8.U401711 (R-2000AC)
I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9KM SOUTHWEST OF I-40 TO
0.7KM NORTHEAST OF I-40

SITE 2 - SHEET 11

			TREATED D.A.		
STRUCTURE	STATION	TYPE	HECTARES	ACRES	GRASSED SWALE
60	(-Y3-) 25+63 R	BDO	0.89	2.20	OVERLAND FLOW
59	(-Y3-) 25+63 R	2GI	0.275	0.68	197'
62	(-Y3-) 26+80 R	BDO	1.1	2.72	OVERLAND FLOW
61	(-Y3-) 26+80 R	2GI	0.41	1.01	262'
64	(-Y3-) 27+53 R	BDO	1.1	2.72	OVERLAND FLOW
63	(-Y3-) 27+53 R	2GI	0.24	0.59	262'

SITE 2 - SHEET 12

			TREATED D.A.		
STRUCTURE	STATION	TYPE	HECTARES	ACRES	GRASSED SWALE
65	(-Y3-) 29+40 R	2GI	0.82	2.03	689'
67	(-Y3-) 29+60 R	2GI	0.05	0.12	60'
DTICH	Y3-) 30+80 TO 31+80 R	SWALE	0.7	1.73	230'

SEE HALF SIZE PLAN SHEETS FOR STRUCTURE NUMBERS

NCDOT

DIVISION OF HIGHWAYS
WAKE/DURHAM COUNTY
PROJECT 8.U401711 (R-2000AC)
I-540 (NORTHERN WAKE EXPRESSWAY)
FROM 0.9KM SOUTHWEST OF I-40 TO
0.7KM NORTHEAST OF I-40

HYDRAULIIC DESIGN AND PERMIT REVIEW MEETING FOR R-2000AC, WAKE/DURHAM CO.

Prepared by Bill Elam
October 21, 2002

Contents:

I. Minutes of the Interagency "4C" Meeting on 10/17/02

II. Minutes of the DWQ Buffer Meeting on 5/14/02

III. Minutes of the Interagency "4B" Meeting on 4/18/02

IV. Agency Comments and Post Meeting Activities

V. Attachments: Stormwater Management Plan

I. Minutes of the Interagency "4C" Meeting on 10/17/02

Participants:

David Chang, NCDOT Hydraulics
Bill Elam, NCDOT Hydraulics
Max Price, NCDOT Hydraulics
Eric Alsmeyer, USACE
Alice Gordon, NCDOT PD&EA
David Cox, WRC
Howard Hall, USFWS (not present)
Chris Militscher-EPA (not present)
John Hennessy, NCDENR

The meeting began with a brief overview of the project. It was explained that this meeting was a final permit review for the Wetland and Stream Impact permit and the Buffer permit. Max Price proceeded to review each permit sheet.

1. Site 1. A cross vane will be used at the culvert.
2. Hydraulics notified the agencies that we were confirming the stream topography to ensure correct stream impacts.
3. John Hennessy said that he would have to review the use of grass swales as treatment for the buffer impacts. Max Price review with John Hennessy why level spreaders and detention basins would not work based on topography, slope, or drainage area.
4. John Hennessy and Alice Gordon requested that we put a title block on the Grass Swale data sheet.

II. Minutes of the DWQ Buffer Meeting on 5/14/02

Participants:

David Chang, NCDOT Hydraulics
Bill Elam, NCDOT Hydraulics
Max Price, NCDOT Hydraulics
John Hennessy, NCDENR

The meeting began with a brief overview of the project. It was explained that this meeting was a plan review focused on the streams with buffers. Max Price proceeded to review each redline plan sheet.

1. Grass Swales used as the Stream Buffer BMP. Max Price explained to John Hennessy on a site by site basis why grass swales were used instead of level spreaders or detention ponds. John did not express any major concerns or problems with the design.

III. Minutes of the Interagency "4B" Meeting on 4/18/02

Participants:

Eric Alsmeyer, USACE
Alice Gordon, NCDOT PD&EA
Bill Elam, NCDOT Hydraulics
Howard Hall, USFWS
John Hennessy, NCDWQ
Max Price, NCDOT Hydraulics
Dave Henderson, NCDOT Hydraulics
David Cox, NCWRC

The meeting began with a brief overview of the project. It was explained that this meeting was a thirty- percent plan review. The history of the project was discussed. Max Price proceeded to review each redline plan sheet. The Neuse River Buffers are a major issue with this project.

1. Stream Mitigation 74+00 to 75+60 –L. There is an intermittent channel that will be under fill to the left of the –L- line. Eric Alsmeyer stated that stream mitigation was not required, but the stream would be counted as an impact.
2. Tributary to Stirrup Iron Creek. Ditches will be tied in to stream channel at a minimum depth and the stream bank will be protected with rip rap. David Cox and Eric Alsmeyer were concerned that the ditches would be tied into stream bed.
3. Pocket Wetland on Ramp C. Max Price showed where 0.01 ha (0.025 Ac) of wetland were being impacted at Station 13+55 Ramp C.
4. Grass Swales as Treatment. Grass swales are being used everywhere possible even if it is not a "buffered" stream.

IV. Post Meeting Activities

As noted in the Interagency "4C" meeting, the stream topography at Tributary to Stirrup Iron Creek was rechecked. The alignment of the culvert was adjusted slightly to align better with the stream. The ditches were tied into the stream channel at minimum depth and the stream bank will be protected with rip rap. The ditches changed slightly due to the adjustments in the topography around the stream.

V. Attachments: Stormwater Management Plan

ROADWAY DESCRIPTION:
The R-2000AC project is a leg of the I-540 project in Wake and Durham County. The length of the project is 1.707km (1.06 mi.). There is new stream crossing on Tributary to Stirrup Iron Creek and one box culvert extenuation on Stirrup Iron Creek on the project.

ENVIRONMENTAL DESCRIPTION:
Stirrup Iron Creek and the Tributary to Stirrup Iron Creek are in the Neuse River Basin. The stream classification for Stirrup Iron Creek and Tributary to Stirrup Iron Creek is Class C – NSW (aquatic life, secondary recreation, and nutrient sensitive waters). There are several small – unnamed streams that appear on the soils map. There are a total of three permitted sites on the project, with impacts totaling 359 m (1178 ft.) of stream, 0.0005 ha (.0012 ac.) of wetlands, and 1.14 ha (2.82 ac.) of Neuse River Riparian Buffers.

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES:
Best Management Practices (BMP's) utilized on this project consist of Grassed Swales and pre-formed scour holes.

The following summarizes the locations of each BMP:

Grassed Swales
Station 74+00 to 74+50 –L- Right
Station 74+00 to 74+50 –L- Median
Station 74+00 to 74+50 –L- Left
Station 74+50 to 76+10 –L- Median
Station 75+20 to 75+40 –L- Right
Station 75+80 to 76+80 –L- Left
Station 74+00 to 74+50 –L- Right
Station 76+10 to 77+00 –L- Median
Station 13+00 to 14+00 –Y1- Right
Station 76+00 to 77+00 –L- Left
Station 77+00 to 78+00 –L- Median
Station 77+00 to 78+00 –L- Left
Station 13+75 to 14+55–CD- Left
Station 12+00 to 13+00 –Y1- Right
Station 78+00 to 79+20 –L- Right
Station 78+00 to 79+60 –L- Median
Station 78+00 to 79+60 –L- Left
Station 14+80 to 15+80–CD- Left
Station 11+40 to 12+00 –Y1- Right
Station 11+00 to 11+40 –Y1- Right
Station 79+20 to 79+60 –L- Right
Station 79+60 to 80+60 –L- Median
Station 79+60 to 80+60 –L- Left
Station 79+60 to 80+00 –L- Right
Station 14+60 to 15+40 –Ramp C- Right
Station 25+60 to 26+80 –Y3- Right

Station 26+80 to 27+50 –Y3- Right
Station 27+50 to 27+80 –Y3- Right
Station 27+80 to 29+40 –Y3- Right
Station 30+80 to 31+80 –Y3- Right

Preformed Scour Holes

Station 76+12 –L- Right
Station 13+44 –Ramp B- Right
Station 82+10 –L- Right
Station 13+60 –Ramp C- Right
Station 34+15 –Y3- Right

Major Structures

Station 75+75.4 –L- (Tributary to Stirrup Iron Creek) New 2 @ 3.0m x 2.4m (10 ft. x 8 ft.) reinforced concrete box culvert is to be constructed. The culvert will be buried one foot.

Station 30+21 –Y3- (Stirrup Iron Creek) Existing 3 @ 3.0m x 3.0m (10 ft. x 10 ft.) reinforced concrete box culvert will be extended.

6/24/99

R-2000AA

PROJECT: 8.U401711

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2000AA	1	

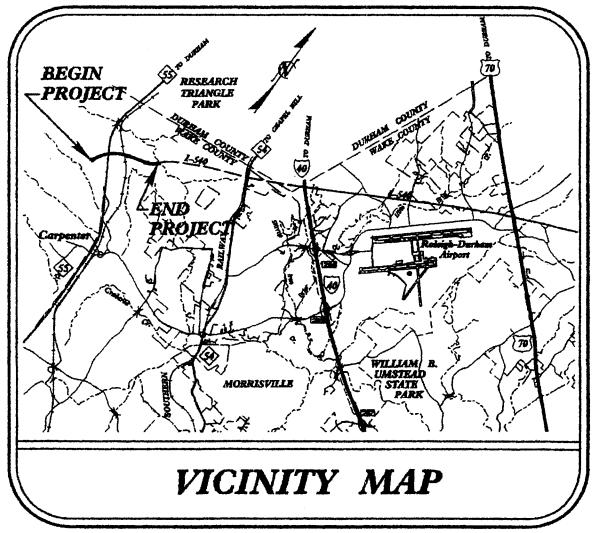
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
8.U401711	NHF-123-1(11)	P.E.
6.408006B		R/W

METRIC

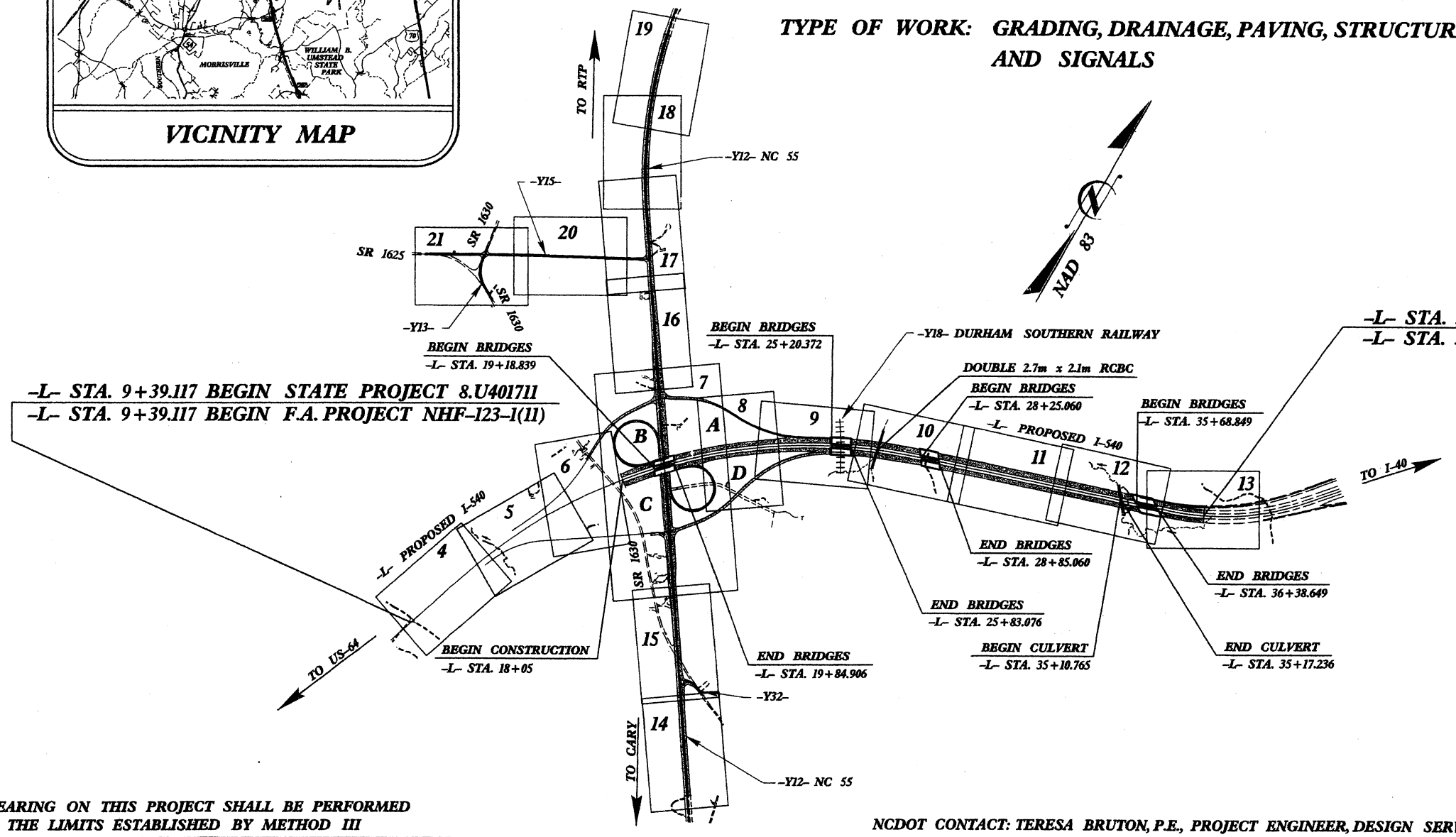
ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE SHOWN

LOCATION: *I-540 (NORTHERN WAKE EXPRESSWAY) FROM NC 55 WEST OF MORRISVILLE TO RESEARCH TRIANGLE PARK EAST LIMITS*

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



VICINITY MAP



NAD 83

-L- STA. 9+39.117 BEGIN STATE PROJECT 8.U401711
-L- STA. 9+39.117 BEGIN F.A. PROJECT NHF-123-1(11)

-L- STA. 38+00.000 END STATE PROJECT 8.U401711
-L- STA. 38+00.000 END F.A. PROJECT NHF-123-1(11)

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

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

NCDOT CONTACT: TERESA BRUTON, P.E., PROJECT ENGINEER, DESIGN SERVICES

GRAPHIC SCALES

5 0 10
PLANS

5 0 10
PROFILE (HORIZONTAL)

1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT 2002	=	40,200
ADT 2025	=	64,800
DHV	=	60 %
D	=	9 %
T	=	19 % *
V	=	110 km/h

* TTST 14% DUAL 5%

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT NHF-123-1(11) =	*2.596 km*
LENGTH STRUCTURES F.A. PROJECT NHF-123-1(11) =	*0.265 km*
TOTAL LENGTH STATE PROJECT 8.U401711 =	*2.861 km*

Prepared for N. C. Department of Transportation by:
TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:
OCTOBER 21, 2003

BRIAN A. WILES, P.E.
PROJECT ENGINEER

J. TOM DIFFEE, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

g:\vr99\01200\cadvr2000aa.tsh
06/17/2003
11:45:42 AM

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	1-A

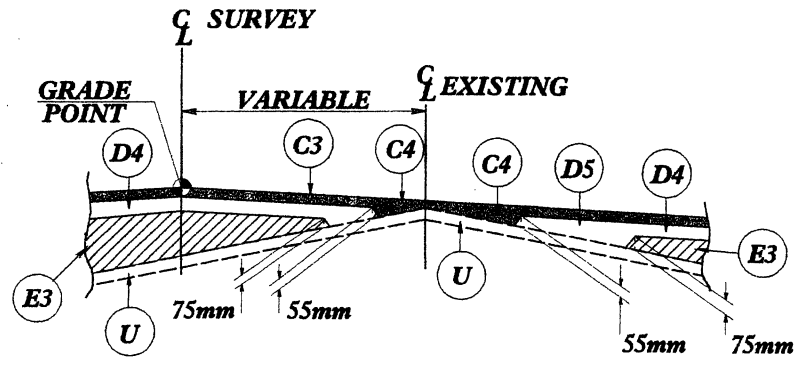
PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8825

PAVEMENT SCHEDULE

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT (WITH DOWELS)	E1	PROPOSED APPROX. 75 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 184 kg. PER SQ. METER.
C1	PROPOSED APPROX. 30 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 96 kg. PER SQ. METER.	E2	PROPOSED APPROX. 200 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 245 kg. PER SQ. METER IN EACH OF TWO LAYERS.
C2	PROPOSED APPROX. 60 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 72 kg. PER SQ. METER IN EACH OF TWO LAYERS.	E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 75 mm IN DEPTH OR GREATER THAN 150 mm IN DEPTH.
C3	PROPOSED APPROX. 80 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, AT AN AVERAGE RATE OF 96 kg. PER SQ. METER IN EACH OF TWO LAYERS.	J1	PROPOSED 200 mm AGGREGATE BASE COURSE.
C4	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, AT AN AVERAGE RATE OF 2.40 kg. PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT TO EXCEED 40 mm IN DEPTH.	K	SUBGRADE STABILIZATION.
D1	PROPOSED APPROX. 55 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 135 kg. PER SQ. METER.	R1	PROPOSED 750 mm CONCRETE CURB AND GUTTER.
D2	PROPOSED APPROX. 80 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 196 kg. PER SQ. METER.	R2	PROPOSED 450 mm CONCRETE CURB AND GUTTER.
D3	PROPOSED APPROX. 120 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 196 kg. PER SQ. METER.	T	EARTH MATERIAL
D4	PROPOSED APPROX. 100 mm ASPH. CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 245 kg. PER SQ. METER.	U	EXISTING PAVEMENT
D5	PROPOSED VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg. PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 55 mm OR GREATER THAN 110 mm IN DEPTH.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

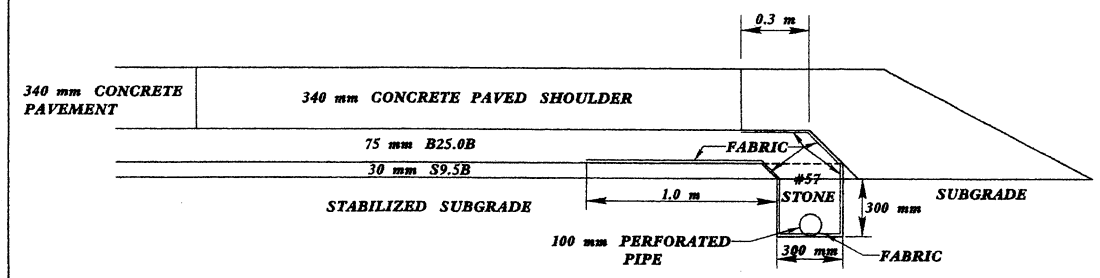


Detail Showing Method of Wedging

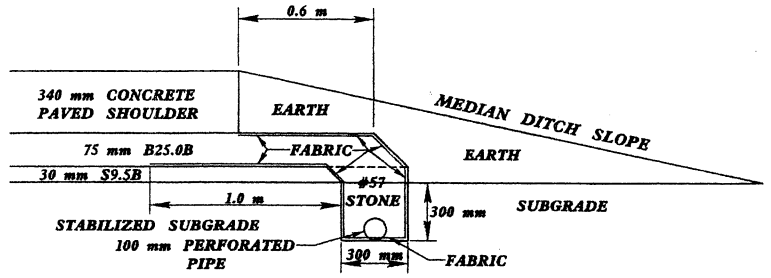
PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

SHOULDER DRAIN DETAILS

SEE SHEET NO. 3- FOR SUMMARY OF SHOULDER DRAINS



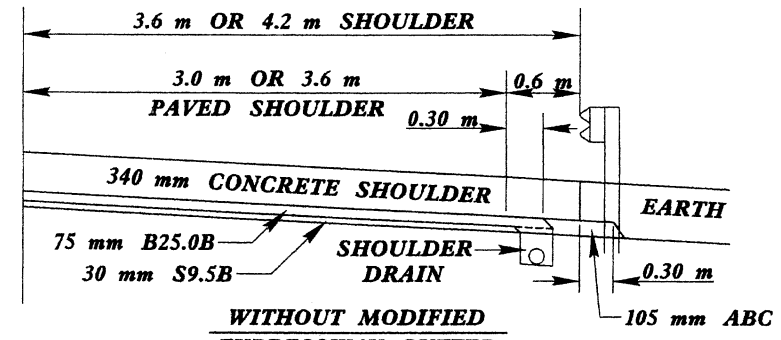
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
ON OUTSIDE SHOULDERS LINE -L-



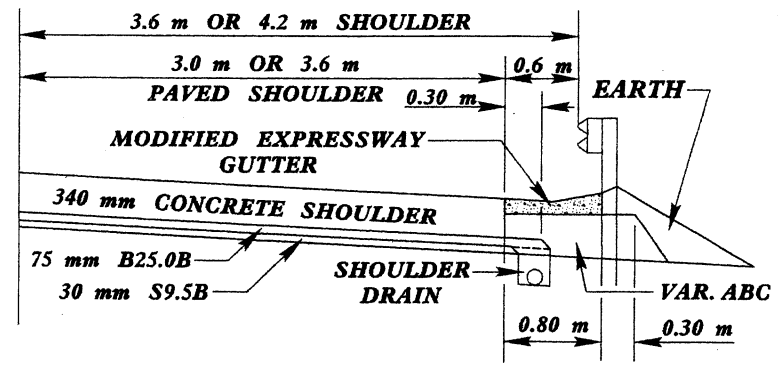
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
ON MEDIAN SHOULDERS LINE -L-

DETAILS OF CONCRETE SHOULDERS AT GUARDRAIL LOCATIONS

USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
(SEE STD. 862.01 FOR GUARDRAIL PLACEMENT)



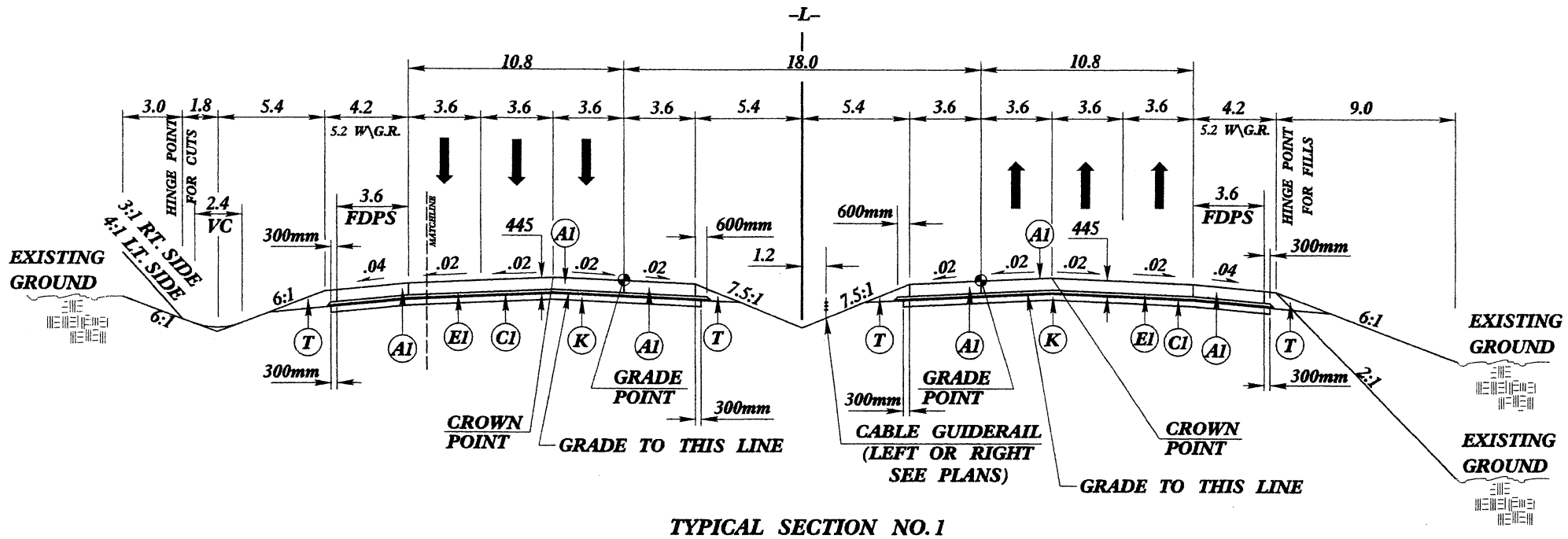
WITHOUT MODIFIED EXPRESSWAY GUTTER



WITH MODIFIED EXPRESSWAY GUTTER

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

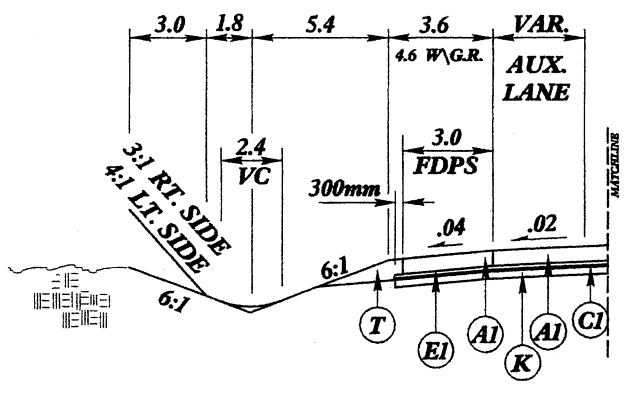
TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125



TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1 AS FOLLOWS

-L- STA. 18+05.000 TO STA. 19+18.839 (BEGIN BRIDGE)
-L- STA. 19+84.906 (END BRIDGE) TO STA. 25+20.372 (BEGIN BRIDGE)
-L- STA. 25+83.076 (END BRIDGE) TO STA. 28+25.060 (BEGIN BRIDGE)
-L- STA. 28+85.060 (END BRIDGE) TO STA. 35+68.849 (BEGIN BRIDGE)
-L- STA. 36+38.649 (END BRIDGE) TO STA. 38+00.000



TYPICAL SECTION NO. 1-A

-L- STA. 19+84.906 (LT) TO STA. 38+00.000 (LT)
-L- STA. 16+90.000 (RT) TO STA. 19+96.407 (RT)
-L- STA. 25+79.140 (RT) TO STA. 38+00.000 (RT)

NOTE: USE PARTIAL SECTION 1-A IN AUXILIARY LANE AREAS. NOTE THE CHANGE IN SHOULDER AND PAVED SHOULDER WIDTH.

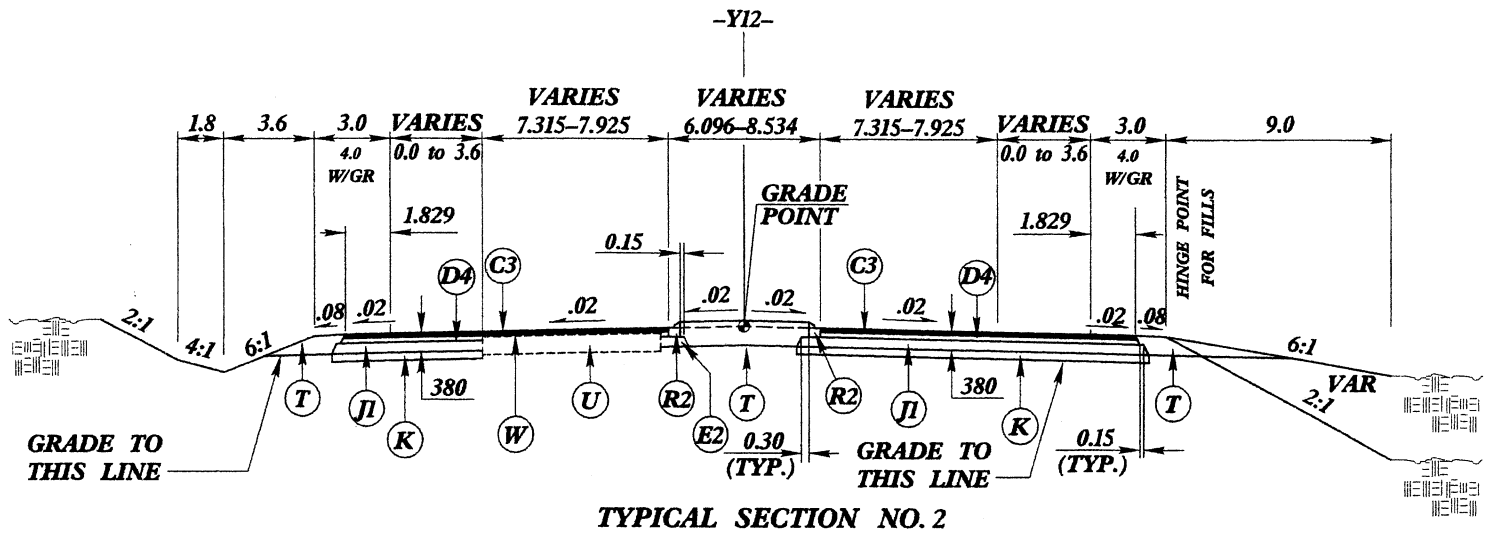
PAVEMENT SCHEDULE

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT.	E1	PROPOSED APPROX. 75 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0B.
C1	PROPOSED APPROX. 30 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B.	E2	PROPOSED APPROX. 200 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C2	PROPOSED APPROX. 60 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, IN EACH OF TWO LAYERS.	E3	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C3	PROPOSED APPROX. 80 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, IN EACH OF TWO LAYERS.	J1	PROPOSED 200 mm AGGREGATE BASE COURSE.
C4	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C.	K	SUBGRADE STABILIZATION.
D1	PROPOSED APPROX. 55 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R1	PROPOSED 750 mm CONCRETE CURB AND GUTTER.
D2	PROPOSED APPROX. 80 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R2	PROPOSED 450 mm CONCRETE CURB AND GUTTER.
D3	PROPOSED APPROX. 120 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	T	EARTH MATERIAL
D4	PROPOSED APPROX. 100 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	U	EXISTING PAVEMENT
D5	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

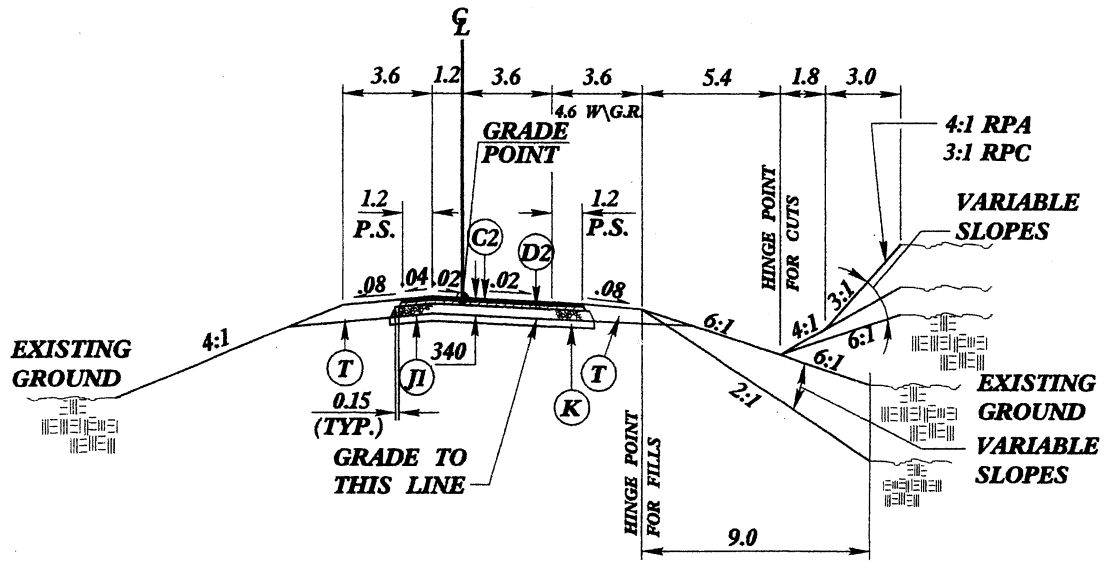
TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2 AS FOLLOWS

-Y12- STA. 103+70.268 TO STA. 129+23.439



TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3 AS FOLLOWS

-RPA- STA. 1+73.228 TO STA. 5+93.024

-RPC- STA. 5+80.000 TO STA. 6+25.581

PAVEMENT SCHEDULE

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT.	E1	PROPOSED APPROX. 75 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0B.
C1	PROPOSED APPROX. 30 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B.	E2	PROPOSED APPROX. 200 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C2	PROPOSED APPROX. 60 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, IN EACH OF TWO LAYERS.	E3	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C3	PROPOSED APPROX. 80 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, IN EACH OF TWO LAYERS.	J1	PROPOSED 200 mm AGGREGATE BASE COURSE.
C4	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C.	K	SUBGRADE STABILIZATION.
D1	PROPOSED APPROX. 55 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R1	PROPOSED 750 mm CONCRETE CURB AND GUTTER.
D2	PROPOSED APPROX. 80 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R2	PROPOSED 450 mm CONCRETE CURB AND GUTTER.
D3	PROPOSED APPROX. 120 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	T	EARTH MATERIAL
D4	PROPOSED APPROX. 100 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	U	EXISTING PAVEMENT
D5	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

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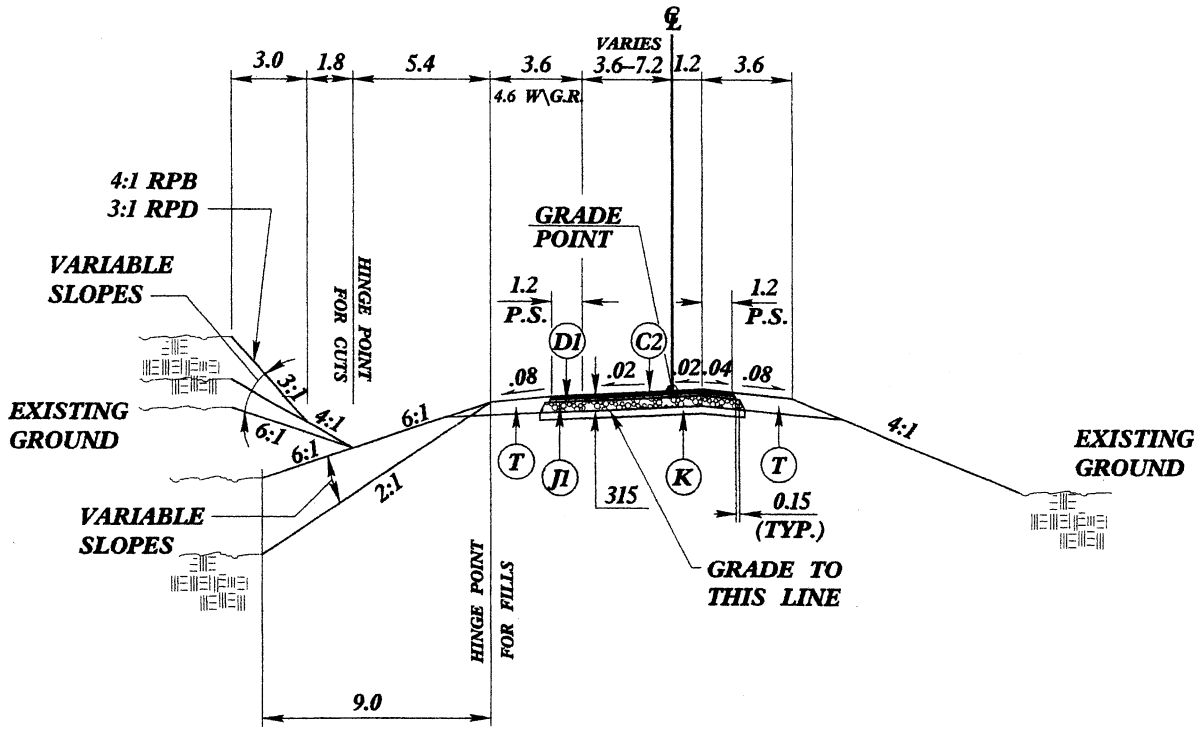
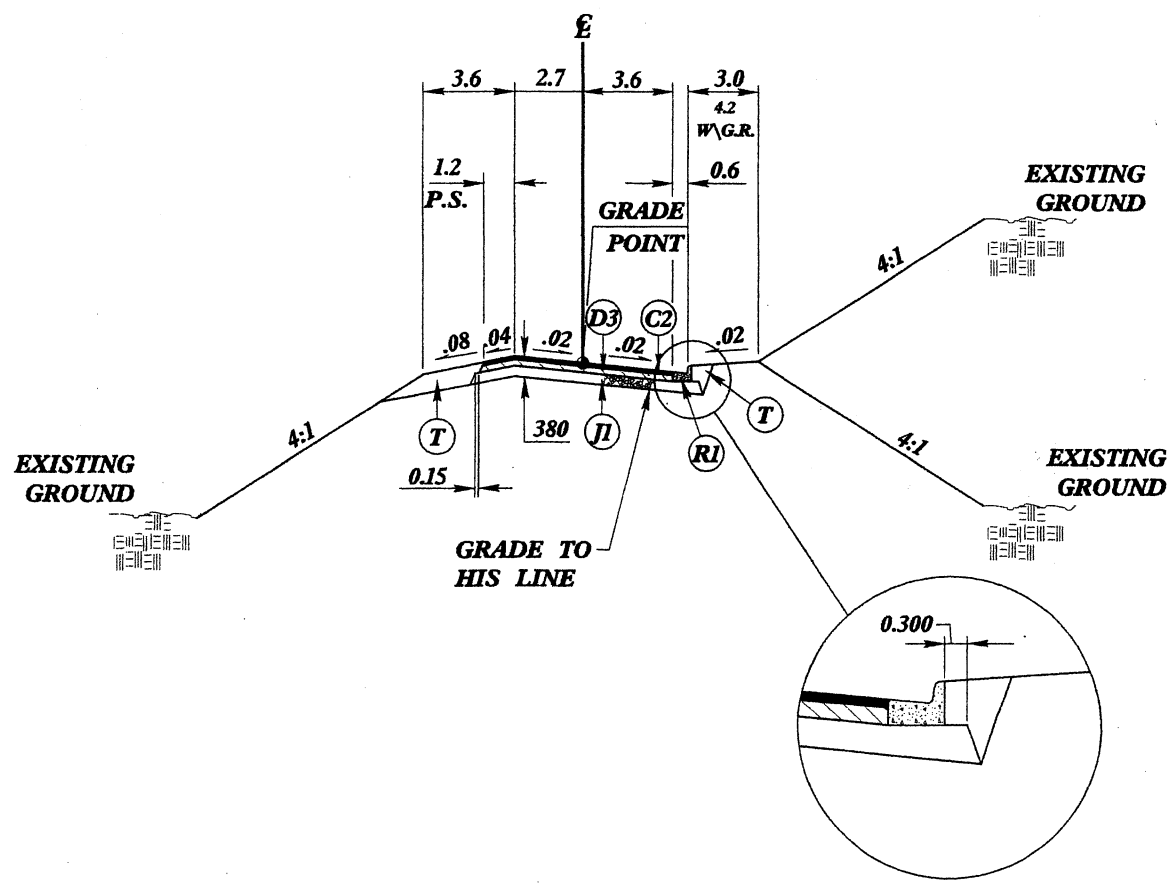
PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125



TYPICAL SECTION NO. 4



TYPICAL SECTION NO. 5

USE TYPICAL SECTION NO. 4 AS FOLLOWS

–RPD– STA. 1+32.774 TO STA. 6+53.577
–RPB– STA. 3+50.000 TO STA. 6+05.704 (GRADING ONLY)
–RPB– STA. 6+05.704 TO STA. 6+62.667

PAVEMENT SCHEDULE

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT.	E1	PROPOSED APPROX. 75 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0B.
C1	PROPOSED APPROX. 30 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B.	E2	PROPOSED APPROX. 200 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C2	PROPOSED APPROX. 60 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, IN EACH OF TWO LAYERS.	E3	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C3	PROPOSED APPROX. 80 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, IN EACH OF TWO LAYERS.	J1	PROPOSED 200 mm AGGREGATE BASE COURSE.
C4	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C.	K	SUBGRADE STABILIZATION.
D1	PROPOSED APPROX. 55 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R1	PROPOSED 750 mm CONCRETE CURB AND GUTTER.
D2	PROPOSED APPROX. 80 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R2	PROPOSED 450 mm CONCRETE CURB AND GUTTER.
D3	PROPOSED APPROX. 120 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	T	EARTH MATERIAL
D4	PROPOSED APPROX. 100 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	U	EXISTING PAVEMENT
D5	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

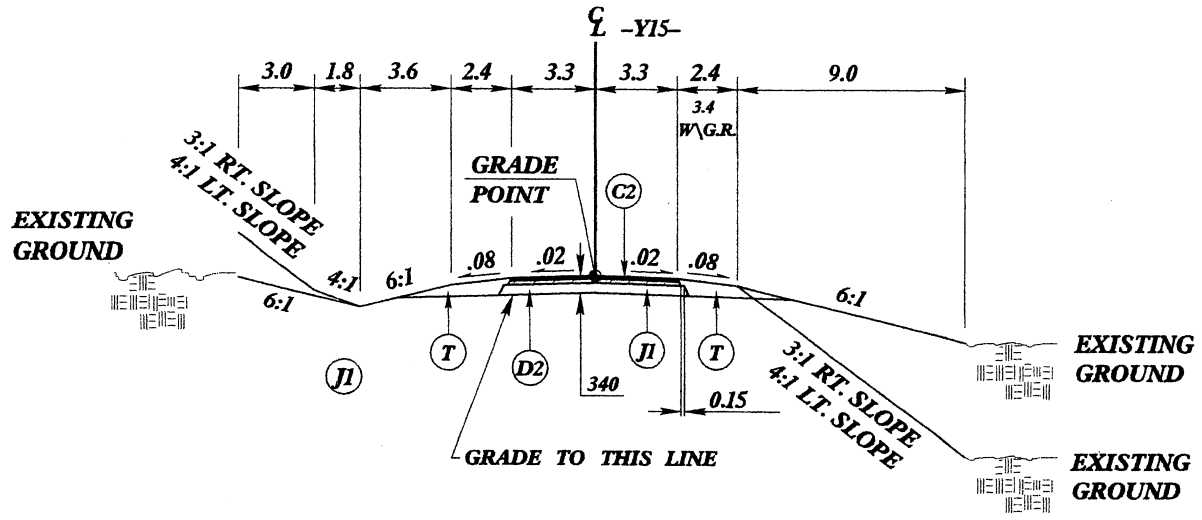
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

USE TYPICAL SECTION NO. 5 AS FOLLOWS

–LPB– STA. 1+24.773 TO STA. 4+26.486
–LPD– STA. 0+74.447 TO STA. 3+63.036 (GRADING ONLY)

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2000AA	2-E
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER	

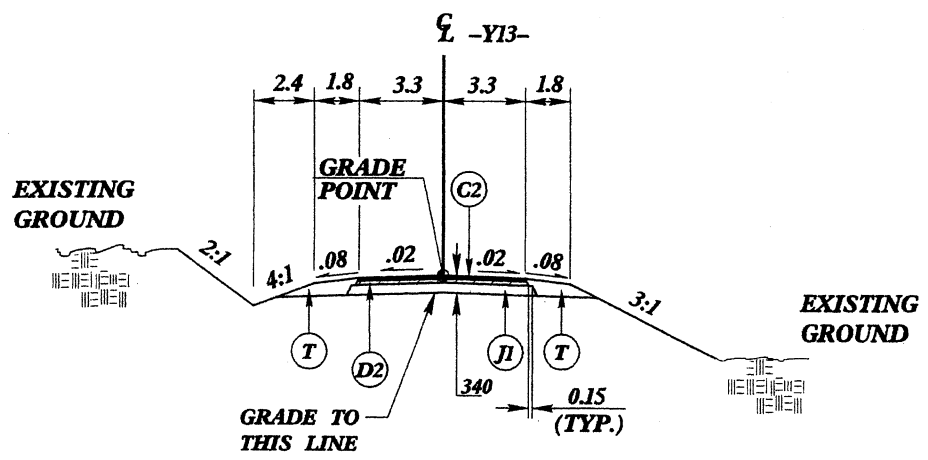
TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125



TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 6 AS FOLLOWS

-Y15- 10+40.000 TO 17+68.947



TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7 AS FOLLOWS

-Y13- 10+20.000 TO 12+00.000

PAVEMENT SCHEDULE

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT.	E1	PROPOSED APPROX. 75 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0B.
C1	PROPOSED APPROX. 30 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B.	E2	PROPOSED APPROX. 200 mm ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C2	PROPOSED APPROX. 60 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, IN EACH OF TWO LAYERS.	E3	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C.
C3	PROPOSED APPROX. 80 mm ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C, IN EACH OF TWO LAYERS.	J1	PROPOSED 200 mm AGGREGATE BASE COURSE.
C4	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S12.5C.	K	SUBGRADE STABILIZATION.
D1	PROPOSED APPROX. 55 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R1	PROPOSED 750 mm CONCRETE CURB AND GUTTER.
D2	PROPOSED APPROX. 80 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	R2	PROPOSED 450 mm CONCRETE CURB AND GUTTER.
D3	PROPOSED APPROX. 120 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B.	T	EARTH MATERIAL
D4	PROPOSED APPROX. 100 mm ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	U	EXISTING PAVEMENT
D5	PROPOSED VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

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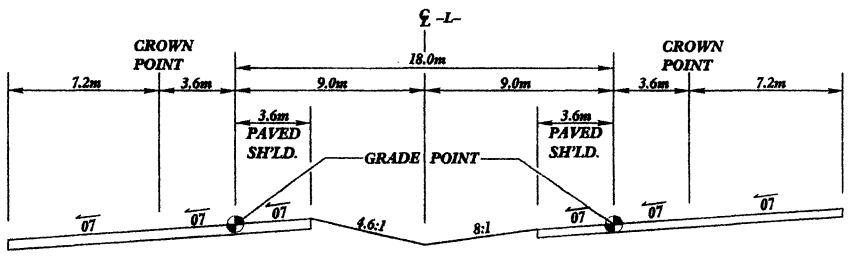
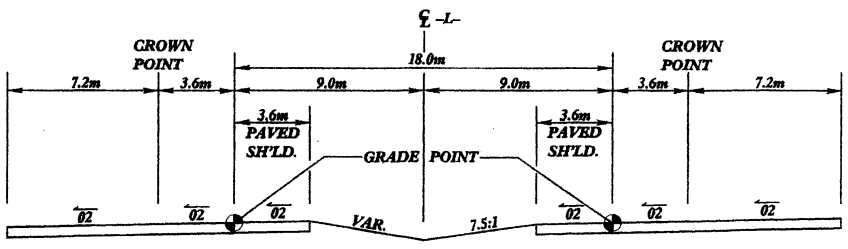
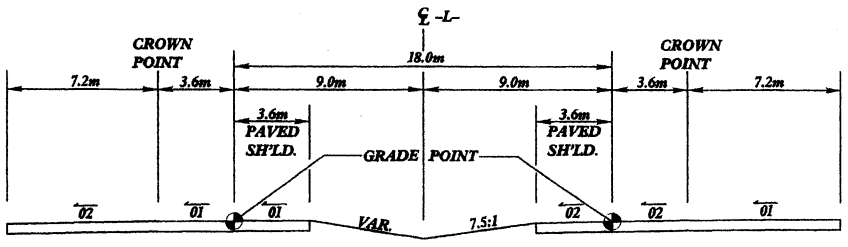
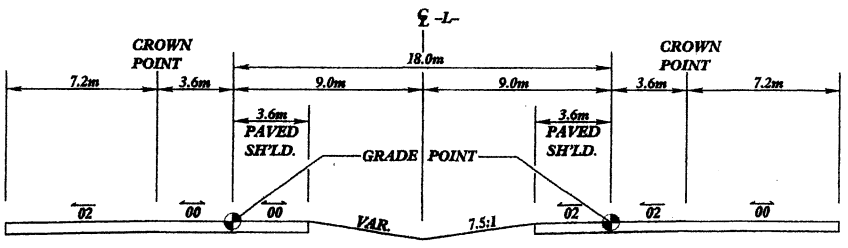
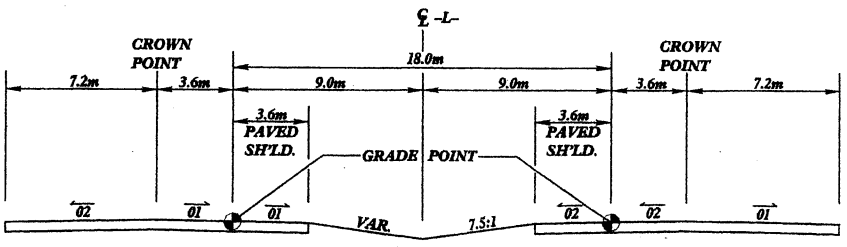
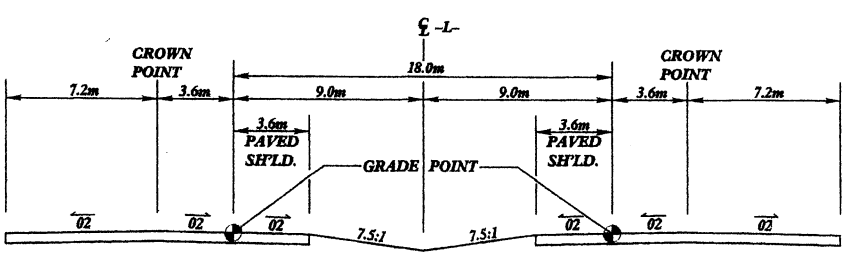












DETAIL OF SUPERELEVATION TREATMENT

METRIC

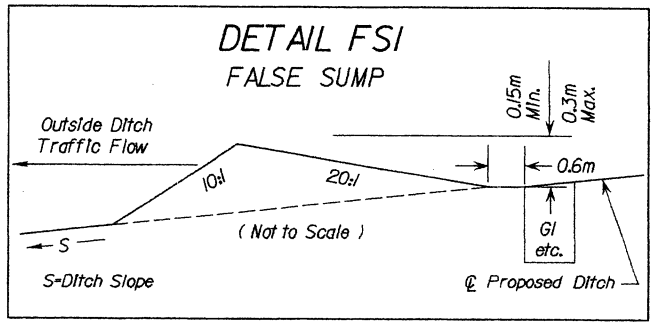
ROADWAY DESIGN ENGINEER	PROJECT REFERENCE NO. R-2000AA
PAVEMENT DESIGN ENGINEER	SHEET NO. 2-F

METRIC

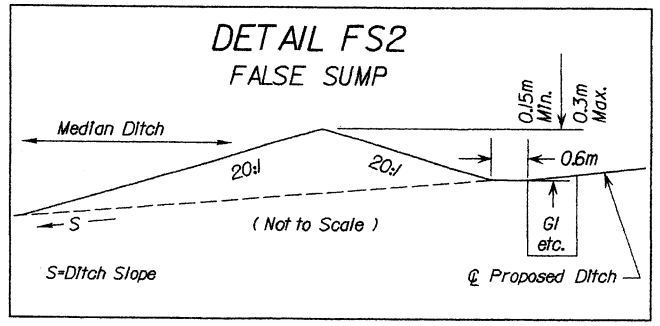
PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-G
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

BAAN SYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

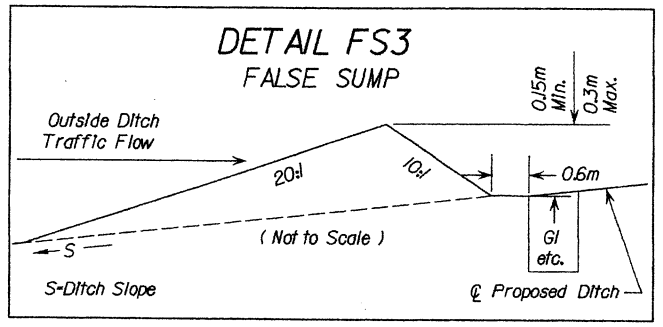
DETAIL FS1
FALSE SUMP



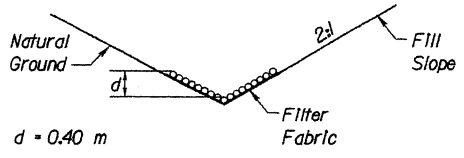
DETAIL FS2
FALSE SUMP



DETAIL FS3
FALSE SUMP



DETAIL 1
TOE PROTECTION
(Not to Scale)

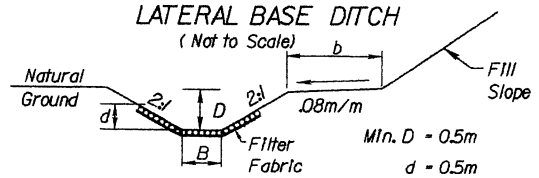


d = 0.40 m

Type of Liner = CLASS 'B' RIP RAP

-L- STA. 22+15 to 22+40 LT
-Y12- STA. 118+00 to 118+40 RT

DETAIL 2
LATERAL BASE DITCH
(Not to Scale)



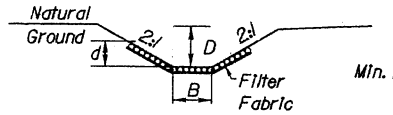
Min. D = 0.5m
d = 0.5m
B = See Below
b = 1.5m

*When B Is< 1.8 m

Type of Liner = CLASS 'B' RIP RAP

	B
-L- STA. 18+40 to 19+00 RT	0.6m
-L- STA. 20+90 to 22+15 LT	0.6m
-L- STA. 21+56 to 21+90 RT	0.9m
-L- STA. 26+68 to 27+66 RT	0.6m
-L- STA. 30+00 to 30+50 RT	0.6m
-L- STA. 29+73 to 30+60 LT	0.6m
-L- STA. 34+50 to 35+28 RT	0.9m
-L- STA. 37+20 to 38+00 RT	1.0m
RAMP D STA. 3+20 to 4+65 LT	0.6m
-Y15- STA. 16+62 to 17+07 LT	0.9m

DETAIL 3
BASE DITCH
(Not to Scale)



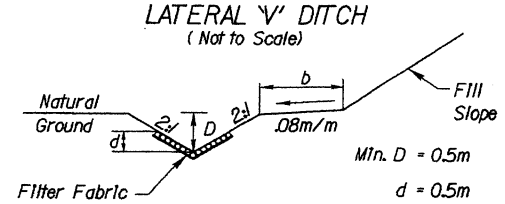
Min. D = 0.5m
d = 0.5m
B = See Below

*When B Is< 1.8 m

Type of Liner = CLASS 'B' RIP RAP

	B
-L- STA. 19+65 to 20+70 RT	0.9m
LOOP D STA. 2+86 RT	0.6m

DETAIL 4
LATERAL 'V' DITCH
(Not to Scale)

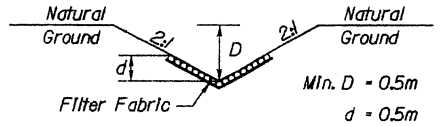


Min. D = 0.5m
d = 0.5m
b = 1.5m

Type of Liner = CLASS 'B' RIP RAP

-L- STA. 34+95 to 36+80 LT
-Y12- STA. 108+51 to 108+98 RT
-Y12- STA. 117+70 to 118+00 RT
-Y12- STA. 119+40 to 119+64 LT
-Y12- STA. 120+60 to 121+15 RT
-Y12- STA. 120+70 to 121+22 LT
-Y12- STA. 121+16 to 121+60 RT
-Y12- STA. 123+70 to 124+22 RT
-Y12- STA. 124+24 to 124+65 RT

DETAIL 5
TAIL 'V' DITCH
(Not to Scale)

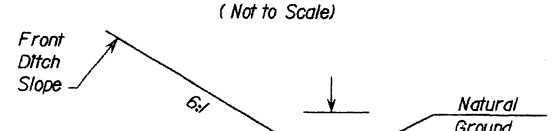


Min. D = 0.5m
d = 0.5m

Type of Liner = CLASS 'B' RIP RAP

-Y12- STA. 166+55 LT
-Y15- STA. 16+12 to 16+31 LT

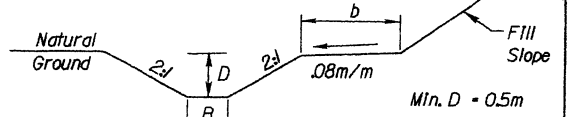
DETAIL 6
SPECIAL CUT DITCH
(Not to Scale)



Min. D= .5m

-Y15- STA. 10+20 to 10+80 RT

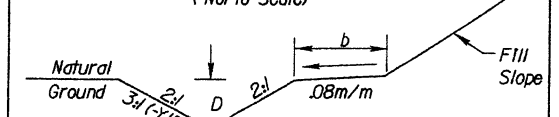
DETAIL 7
LATERAL BASE DITCH
(Not to Scale)



Min. D = 0.5m
B = 0.6m
b = 1.5m

-L- STA. 29+48 to 30+00 RT

DETAIL 8
LATERAL 'V' DITCH
(Not to Scale)



Min. D = 0.5 m
b = 1.5 m

-Y12- STA. 108+35 to 108+51 RT
-Y15- STA. 14+29 to 15+10 RT

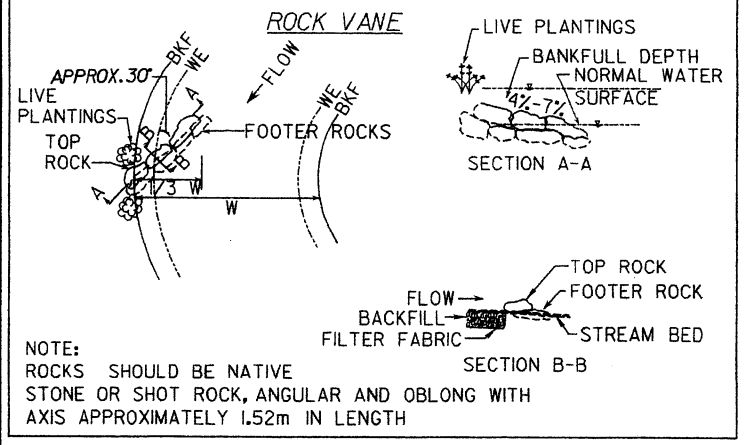
q:\r-d99\0200\cad\r-2000aadtch.typ
06/17/2003
kcline

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2000AA	2-H
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

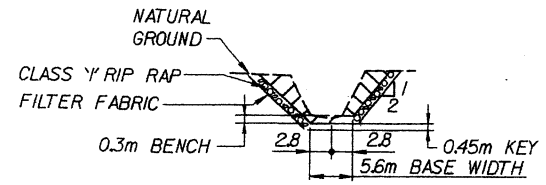
DETAIL 9

ROCK VANE



NOTE:
ROCKS SHOULD BE NATIVE STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH AXIS APPROXIMATELY 1.52m IN LENGTH

DETAIL 10

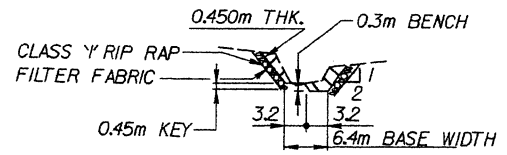


CHANNEL INLET DETAIL

CHANNEL IMPROVEMENTS

-L- STA. 26+74

DETAIL 11



CHANNEL INLET DETAIL

CHANNEL IMPROVEMENTS

-L- STA. 35+30

DETAIL 12

SPECIAL LATERAL 'V' DITCH

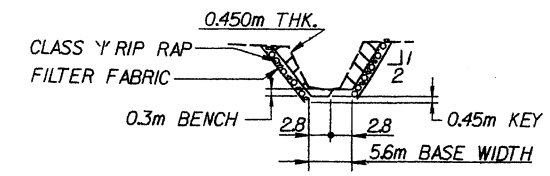
(Not to Scale)

Min. D = 0.3m

d = 0.3m

Type of Liner = CLASS 'B' RIP RAP

DETAIL 13

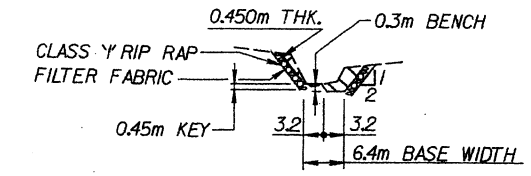


CHANNEL OUTLET DETAIL

CHANNEL IMPROVEMENTS

-L- STA. 26+74

DETAIL 14

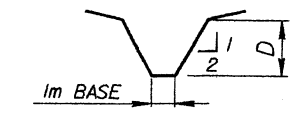


CHANNEL OUTLET DETAIL

CHANNEL IMPROVEMENTS

-L- STA. 35+00

DETAIL 15



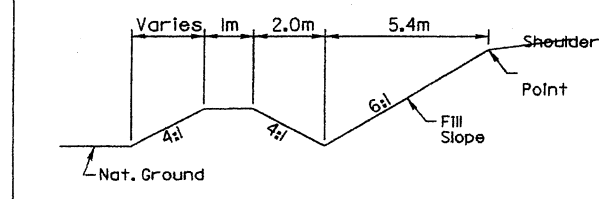
CHANNEL IMPROVEMENTS

	D
-L- STA. 26+20 to 26+60 RT	2.1m
-L- STA. 37+70 TO 38+05 RT	0.8m

DETAIL 16

FALSE CUT

(Not to Scale)

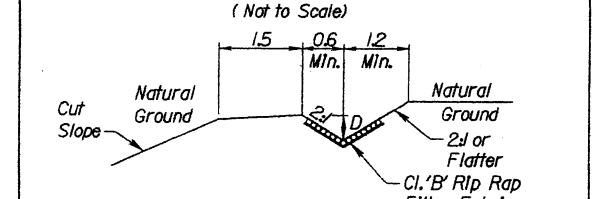


-RAMP A- STA 4+70 to 4+90 RT

DETAIL 17

SPECIAL BERM DITCH W/ CLASS "B" RIP RAP & IMPERMEABLE FABRIC

(Not to Scale)



Min. D = 0.3m

-Y12- STA. 118+40 to 118+90 RT
-Y12- STA. 119+00 to 120+00 RT
-Y12- STA. 122+44 to 123+70 RT
-Y12- STA. 124+65 to 125+00 RT

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-I
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R /W REV.	

METRIC

5 0 10

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

-L-

PIs Sta 11+93.790	PI Sta 20+34.565	PIs Sta 27+76.379
Θs = 2° 02' 46.6"	Δ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

NAD 83

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239

EDWARD E. HOLLOWELL DB 3206 PG 53

WILHELM ROEBEN DB 5085 PG 345

PUBLIC SERVICE COMPANY OF NORTH CAROLINA MB 1997 PG 1350,1354

PROPOSED R/W

TDE

PUE

-L- CS Sta. 27+34.708

-L- POS Sta. 28+55.867

-Y4- POC Sta. 9+02.525

-L- ST Sta. 28+59.708

N 77° 36' 14.8" E

FOR PLAN SEE SHEET NO. 10

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06/20/2003
08:58:58 AM

REVISIONS

METRIC	5 0 10
CONST. REV.	
R /W REV.	

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	2-J
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

-YRPB-
PI Sta 21+81.431
Θs = 4° 05' 33.2"
Ls = 125.000
LT = 83.3556
ST = 41.6869

PI Sta 19+63.646
Δ = 23° 23' 33.1" (RT)
L = 357.242
T = 181.1444
R = 875.0000
SE = 05

NAD 83

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239

12

BEGIN CULVERT
-L- POT Sta. 35+10.763

END CULVERT
-L- POT Sta. 35+17.236

-YRPB- ST Sta. 22+64.744 =
-L- POT Sta. 35+76.173
(23.400m LT)

END BRIDGE
-L- POS Sta. 36+38.649
-L- POT Sta. 36+01.949 =
-YB- POT Sta. 16+88.722

-L- CTS Sta. 36+23.274
250mm CMCP TRANS. LINE

-YRPB- CS Sta. 21+39.744

PROPOSED R/W

TDE

34+00 35+00 36+00 37+00 22+00

N 71° 36' 14.8" E

89.75 89.5

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239

BEGIN BRIDGE
-L- POT Sta. 35+68.849

FOR PLAN SEE SHEET NO. 12

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06/17/2003
11:54:16 AM

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	3-N

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

PARCEL NO.	SHEET NO.	PROPERTY OWNERS NAME
1	4, 5	GEORGE C. PENDERGRAFT
2	5	STERLING ALLEN WEED
3	5, 6, 7, 15	HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
4	6, 7	FRANK MOORE
5	6	GEORGE C. PENDERGRAFT
6	6, 7	CHARLES ALLEN OVERTON
7	7	HERBERT JUNIOR FUTRELL
8	7, 16	W. R. EVANS
9	7, 8, 9, 15	TRIANGLE BRICK COMPANY
10	7	GERALD A. DEMARRAIS
11	7, 8, 9, 10, 16	EDWARD E. HOLLOWELL
12	9, 10, 11, 12, 13	RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
13	10, 11	WILHELM ROEBEN
14	15	PHYLLIS W. CLAYTON
15	16	JAMES HIGH, III
16	16, 17, 18, 19, 20, 21	RTP 55 PARTNERSHIP
17	17, 18	ERNEST W. DIXON
18	17	HENRY B. EDWARDS
19	17	HENRY B. EDWARDS

PARCEL NO.	SHEET NO.	PROPERTY OWNERS NAME
20	21	BERNARD F. McLEOD, JR.
21	21	HIGHLAND DEVELOPMENT
22	16, 17, 19	ROBERT ERNEST SEAGROVES
23	18	RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
24	7, 15	ROEBEN INVESTMENT, LLC
25	6	DANEIL Z. PARKER
26	6	JERRY LEE KNOTT

6/01/99

REVISIONS

THIS SHEET FOR RIGHT-OF-WAY ACQUISTION ONLY

NAD 83

-L-

PIs Sta 11+93.790	PI Sta 20+34.565	PIs Sta 27+76.379
Θs = 2° 02' 46.6"	Δ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

METRIC

5 0 10

CONST. REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	4
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

-L- STA. 9+39.117 BEGIN STATE PROJECT R-2000AA
-L- STA. 9+39.117 BEGIN F.A. PROJECT NHF-123-1(11)

-BL- *7107 POT Sta. 11+00.585
-L- Sta. 9+43.364 (1.8695 m RT)

PANTHER CREEK ASSOCIATES
DB 3889 PG 96
DB 4167 PG 444
DB 4167 PG 448

+39.117
60.000
(196.85')

C A

PROPOSED R/W

-BL- *7108 POT Sta. 12+82.707
-L- Sta. 10+96.394 (17.592 m RT)

1
GEORGE C. PENDERGRAFT
DB 1132 PG 313

+10.451
50.000
(164.04')

C A

-BL- *7116 POT Sta. 13+59.910
-L- Sta. 11+73.661 (3.573 m RT)

+35.451
42.000
(137.80')

-BL- *7118 POT Sta. 14+21.746
-L- Sta. 12+35.251 (1.549 m RT)

PROPOSED R/W

MATCH LINE - SHEET NO. 5 - STA 12+60

3.0 SOIL

S81°58'08"E 51.859

+56.763

EP-EP 322.000
S81°58'08"E

C-EP 192.635
46.382

10+00 -L- 11+00 12+00 -L-

N 18° 25' 30.9" E

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD * 016-95-RW
PAR * 901

3.0 SOIL

C A

PROPOSED R/W

+72.067
52.000
(170.60')

PANTHER CREEK ASSOCIATES
DB 3889 PG 96
DB 4167 PG 444
DB 4167 PG 448

1
GEORGE C. PENDERGRAFT
DB 1132 PG 313

-L- TS Sta. 11+10.451

+10.451
53.000
(173.88')

PROPOSED R/W

+35.451
51.000
(167.32')

-L- SC Sta. 12+35.451

C A

-Ramp C- CS Sta. 0+00.000 =
-L- POC Sta. 12+53.721 (19.800m RT)

FOR -L- PROFILE SEE SHEET NO. 22

FOR -RAMP C- PROFILE SEE SHEET NO. 39

FOR RAMP CURVE DATA
INFOMATION SEE SHEET NO. 7-A

DATUM DESCRIPTION

NCDOT FOR MONUMENT * R2000-26 *
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING 232215.5660 (m) EASTING 621861.3190 (m)

(GROUND TO GRID) IS 0.9999154
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
* R2000-26 * TO -L- STATION 9+39.117 IS
S 48°50'04.17" W 3297.264 m

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 1929

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06/17/2003
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REVISIONS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	5
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R /W REV.

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

NAD 83

GEORGE C. PENDERGRAFT
DB 1132 PG 313
(1)

STERLING ALLEN WEED
DB 5666 PG 684
PB 1985 PG 1964
(2)

GEORGE C. PENDERGRAFT
DB 1132 PG 313
(1)

HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
DB 4017 PG 764
(3)

GEORGE C. PENDERGRAFT
DB 1132 PG 313
(1)

HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
DB 4017 PG 764
(3)

-BL- • 1120 POT Sta. 1+60.713 (3.5863 m RT)
-L- Sta. 12+74.365

-BL- • 7122 POT Sta. 17+06.558 (1.6464 m RT)
-L- Sta. 15+19.783 (1.6464 m RT)

-BL- • 7121 POT Sta. 15+86.589
-L- Sta. 13+99.872 (1.5025 m RT)

-Ramp B- CS Sta. 0+00.000 = -L- POC Sta. 13+97.343 (19.800m LT)

-Ramp B- SRS Sta. 0+50.000

-Ramp B- SC Sta. 1+20.000

-Ramp B- -RAMP B- STA 2+00

-Ramp C- SC Sta. 0+70.000

-Ramp C- CS Sta. 1+72.567

-Ramp C- ST Sta. 2+42.567

-Ramp C- - RAMP C - STA 3+40

PROPOSED R/W

TDE

EIP

EIP-EIP 610.152

EIP-CL 520.025

N 55° 44' 42.5" E

N 38° 31' E

N 45° 38' 59" E 58.857

N 24° 22' 28" E 60.981

N 45° 38' 44" E 114.327

N 65° 36' 45" W 70.344

HQ WLB

CONC

11/2 SLOGD

+80.000 90.000 (295.28')

+00.000 92.500 (303.48')

+04.000 69.000 (226.38')

+80.000 69.000 (226.38')

+97.343 -L- 57.800 (189.63')

+20.000 35.000 (114.83')

+80.000 33.000 (108.27')

+95.000 43.550 (142.88')

+45.000 41.526 (136.24')

+02.000 60.000 (196.85')

+73.000 67.000 (219.82')

+72.567 32.000 (104.99')

+42.567 30.000 (98.43')

+20.000 35.000 (114.83')

+80.572

Eip No. 6.339

EIP No. 7.834

11+00

12+00

13+00

14+00

15+00

16+00

1+00

2+00

3+00

-L-

MATCH LINE - SHEET NO. 4 - STA 12+60

MATCH LINE - SHEET NO. 6 - STA 16+00

THIS SHEET FOR RIGHT-OF-WAY ACQUISTION ONLY

Pls Sta 11+93.790	Pl Sta 20+34.565	Pls Sta 27+76.379
Θs = 2° 02' 46.6"	Δ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

FOR -L- PROFILE SEE SHEET NO. 23

FOR -RAMP B- PROFILE SEE SHEET NO. 38

FOR -RAMP C- PROFILE SEE SHEET NO. 39

FOR RAMP CURVE DATA INFORMATION SEE SHEET NO. 7-A

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	6
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R /W REV.

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

NAD 83

-L-

PIs Sta 11+93.790	PI Sta 20+34.565	PIs Sta 27+76.379
Θs = 2° 02' 46.6"	Δ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

MATCH LINE - SHEET NO. 5 - STA 16+00

-RAMP C- STA 3+40

-RAMP B- STA 2+00

-RAMP B- CS Sta. 3+02.422

-RAMP B- ST Sta. 3+72.422

-RAMP B- VS Sta. 3+92.422

-RAMP B- STA 4+30 SEE INSET SHEET NO. 7

-RAMP C- STA 4+50

MATCHLINE - SHEET NO. 7 - STA 17+60

BEGIN WW FENCE

BEGIN CONSTRUCTION RAMP B STA 3+50

PROPOSED R/W

PROPOSED R/W

HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
DB 4017 PG 764

FRANK MOORE
DB 5299 PG 140
PB 1986 PG 481

FORMERLY FRANK MOORE
N.C.D.O.T.
PROPOSED R/W OF R2000A
PSD # 235-95-RW
PAR 901

GEORGE C. PENDERGRAFT
DB 918 PG 545
DB 1132 PG 313

DANIEL Z. PARKER
DB 5389 PG 281

JERRY LEE KNOTT
DB 1854 PG 08

CHARLES ALLEN OVERTON
DB 1940 PG 01

9.144 ACCESS EASEMENT 130.00'

GUARDRAIL BARRICADE

GRADE TO DRAIN

REMOVE

N 55° 44' 42.5" E

N 51° 31' 4" E

150m TAPER

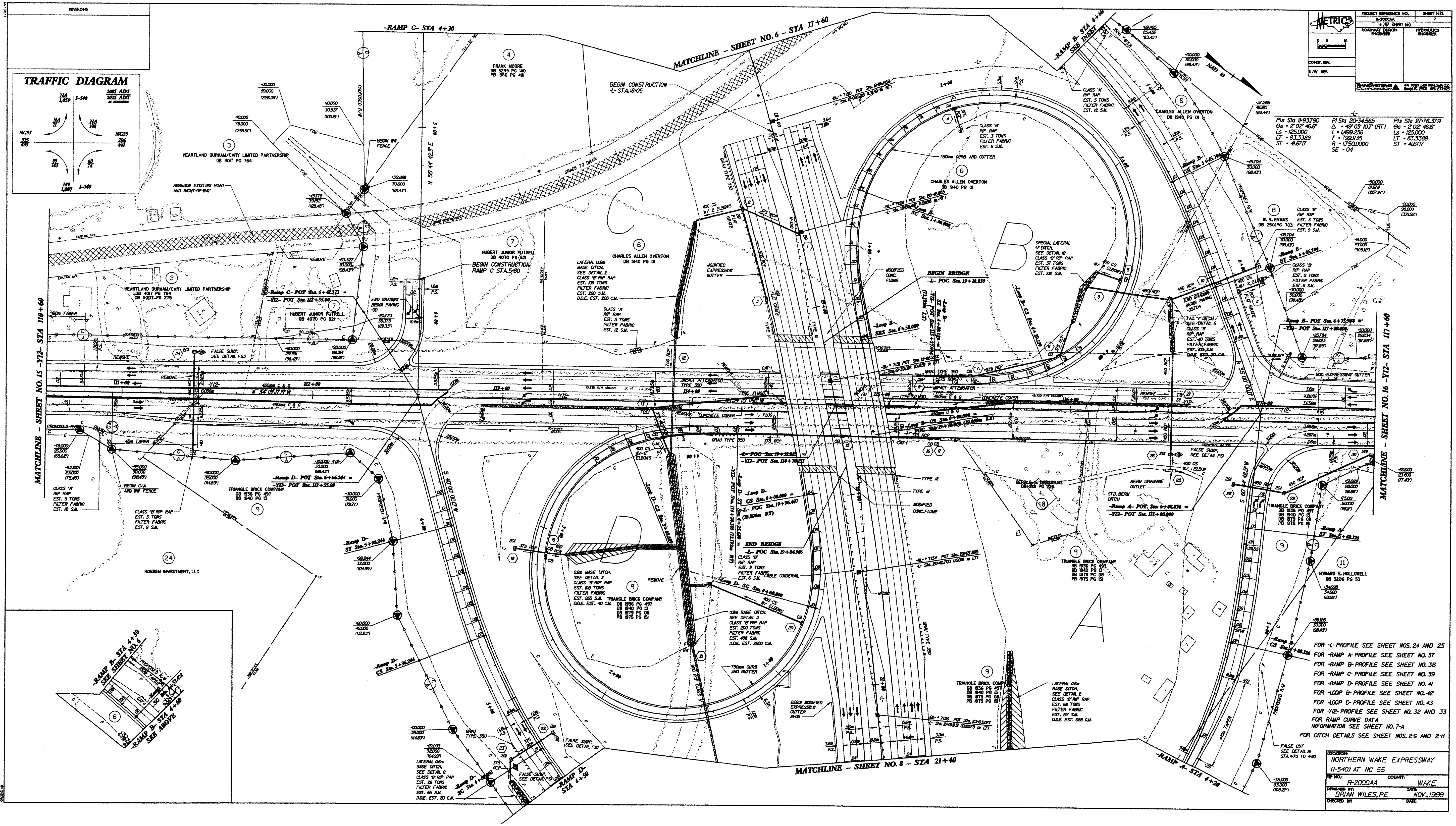
FOR -L- PROFILE SEE SHEET NO. 24

FOR -RAMP B- PROFILE SEE SHEET NO. 38

FOR -RAMP C- PROFILE SEE SHEET NO. 39

FOR RAMP CURVE DATA INFORMATION SEE SHEET NO. 7-A

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H



FOR -L- PROFILE SEE SHEET NOS. 24 AND 25
FOR -RAMP A- PROFILE SEE SHEET NO. 37
FOR -RAMP B- PROFILE SEE SHEET NO. 38
FOR -RAMP C- PROFILE SEE SHEET NO. 39
FOR -RAMP D- PROFILE SEE SHEET NO. 41
FOR -LOOP B- PROFILE SEE SHEET NO. 42
FOR -LOOP D- PROFILE SEE SHEET NO. 43
FOR -Y12- PROFILE SEE SHEET NO. 32 AND 33
FOR RAMP CURVE DATA
INFORMATION SEE SHEET NO. 7-A
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.
R/W REV.

LOCATION:
NORTHERN WAKE EXPRESSWAY
(I-540) AT NC 55

TIP NO.: R-2000AA COUNTY: WAKE
DESIGNED BY: BRIAN WILES, PE DATE: NOV.,1999
CHECKED BY: DATE:

REVISIONS

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	7-A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

Ramey Kemp & Associates
5121 Kingdom Way, Suite 100
Raleigh, NC 27607 (919) 233-8091

-L-
Pt Sta 11+93.790
θs = 2° 02' 46.6"
Ls = 125.000
LT = 83.3389
ST = 41.6717

Pt Sta 20+34.565
Δ = 49° 05' 10.7" (RT)
L = 1,499.256
T = 799.1135
R = 1,750.0000
SE = 04

Pt Sta 27+76.379
θs = 2° 02' 46.6"
Ls = 125.000
LT = 83.3389
ST = 41.6717

-Loop B-
Pt Sta 0+16.667
θs = 0° 48' 33.7"
Ls = 50.000
R = 1,769.8000
LT = 33.3337
ST = 16.6670

Pt Sta 1+04.150
θs = 30° 33' 27.5"
Ls = 80.000
LT = 54.8052
ST = 27.4109

Pt Sta 2+96.394
Δ = 228° 31' 32.8" (RT)
L = 299.140
T = 166.3940
R = 75.0000
SE = 10

Pt Sta 4+49.449
θs = 22° 55' 05.9"
Ls = 60.000
LT = 40.3405
ST = 20.3099

-Ramp B-
Pt Sta 0+16.667
θs = 0° 48' 33.7"
Ls = 50.000
R = 1,769.8000
LT = 33.3337
ST = 16.6670

Pt Sta 0+96.875
θs = 3° 25' 40.6"
Ls = 70.000
LT = 46.6754
ST = 23.3413

Pt Sta 2+11.957
Δ = 17° 51' 59.9" (LT)
L = 182.422
T = 91.9571
R = 585.0000
SE = 06

Pt Sta 3+25.763
θs = 3° 25' 40.6"
Ls = 70.000
LT = 46.6754
ST = 23.3413

-Ramp B-
Pt Sta 4+32.448
θs = 6° 29' 10.7"
Ls = 60.000
LT = 40.0269
ST = 20.0244

Pt Sta 4+99.550
Δ = 20° 10' 07.7" (RT)
L = 93.282
T = 47.1289
R = 265.0000
SE = 07

Pt Sta 5+65.728
θs = 6° 29' 10.7"
Ls = 60.000
LT = 40.0269
ST = 20.0244

-Ramp A-
Pt Sta 0+23.334
θs = 1° 01' 50.5"
Ls = 70.000
R = 1,773.4000
LT = 46.6676
ST = 23.3342

Pt Sta 1+16.885
θs = 5° 00' 48.2"
Ls = 70.000
LT = 46.6854
ST = 23.3504

Pt Sta 2+06.223
Δ = 18° 48' 03.7" (RT)
L = 131.256
T = 66.2232
R = 400.0000
SE = 08

Pt Sta 2+94.606
θs = 5° 00' 48.2"
Ls = 70.000
LT = 46.6854
ST = 23.3504

-Ramp A-
Pt Sta 3+91.283
θs = 6° 29' 10.7"
Ls = 60.000
LT = 40.0269
ST = 20.0244

Pt Sta 4+49.963
Δ = 16° 37' 12.5" (LT)
L = 116.870
T = 58.7069
R = 265.0000
SE = 07

Pt Sta 5+08.150
θs = 6° 29' 10.7"
Ls = 60.000
LT = 40.0269
ST = 20.0244

-Y1B-
Pt Sta 10+54.901
Δ = 5° 06' 24.0" (RT)
L = 109.529
T = 54.800
R = 1,228.9009

-Y12- POT Sta. 117+60.000 =
-Ramp A- POT Sta. 6+08.876 =
-Ramp B- POT Sta. 6+75.744

-Ramp B- CS Sta. 5+63.744
-Ramp B- ST Sta. 6+65.284
N 35° 00' 00.0" E
6+00
5+00
4+00
3+00
2+00
1+00
0+00
S 67° 44' 42.5" W
-Ramp A- ST Sta. 1+16.885
-Ramp A- CS Sta. 1+68.224
-Ramp A- SC Sta. 2+23.556
-Ramp A- TS Sta. 2+73.556
-Ramp A- ST Sta. 3+43.556
-Ramp A- CS Sta. 3+91.283
N 89° 53' 42.5" W
-Ramp A- SC Sta. 4+49.963
-Ramp A- CS Sta. 4+89.963
-Ramp B- SC Sta. 4+99.550
-Ramp B- TS Sta. 5+49.550
-Ramp B- ST Sta. 5+99.550
-Ramp B- CS Sta. 6+13.728
-L- POC Sta. 6+80.000 (19.808m LT)
-Ramp B- CS Sta. 0+43.321
-Ramp B- SC Sta. 0+93.321
-Ramp B- TS Sta. 1+43.321
-Ramp B- ST Sta. 1+93.321
-Ramp B- CS Sta. 2+04.321
-L- POC Sta. 21+57.19 (19.808m RT)
-Ramp B- SC Sta. 2+54.321
-Ramp B- TS Sta. 3+04.321
-Ramp B- ST Sta. 3+54.321
-Ramp B- CS Sta. 3+68.321
-L- POC Sta. 6+80.000 (19.808m LT)
-Ramp B- CS Sta. 4+49.449
-Ramp B- SC Sta. 4+99.449
-Ramp B- TS Sta. 5+49.449
-Ramp B- ST Sta. 5+99.449
-Ramp B- CS Sta. 6+13.728
-L- POC Sta. 6+80.000 (19.808m LT)
-Loop B- CS Sta. 4+29.139
-Loop B- ST Sta. 4+29.139
-Y12- POT Sta. 113+27.924 (12.192m LT)
-Loop B- SC Sta. 3+79.139
-Loop B- TS Sta. 3+79.139
-Loop B- CS Sta. 3+29.139
-L- POC Sta. 6+80.000 (19.808m LT)
-L- POC Sta. 19+51.883 =
-Y12- POT Sta. 114+76.137
-Loop D- CS Sta. 6+80.000 =
-L- POC Sta. 19+96.497 (19.808m RT)
-Loop D- ST Sta. 4+35.489 = -Y12- POT Sta. 114+36.361 (12.192m RT)
-Loop D- SC Sta. 4+85.489
-Loop D- TS Sta. 4+85.489
-Loop D- CS Sta. 3+65.489
-Ramp C- CS Sta. 1+72.567
-Ramp C- ST Sta. 2+82.567
-Ramp C- SC Sta. 2+32.567
-Ramp C- TS Sta. 2+32.567
-Ramp C- ST Sta. 1+82.567
-Ramp C- CS Sta. 1+68.567
-L- POC Sta. 21+57.19 (19.808m LT)
N 55° 44' 42.5" E
-Y12- POT Sta. 122+55.099 =
-Ramp C- POT Sta. 6+43.373 =
-Ramp D- POT Sta. 6+66.244
S 40° 00' 00.0" W
-Ramp D- ST Sta. 5+96.244
-Ramp D- CS Sta. 5+46.244
-Ramp D- SC Sta. 4+96.244
-Ramp D- TS Sta. 4+46.244
-Ramp D- ST Sta. 3+96.244
-Ramp D- CS Sta. 3+82.244
N 34° 00' 00.0" W
S 15° 42' 57.2" W
-Ramp D- SC Sta. 4+39.893
-Ramp D- TS Sta. 4+89.893
-Ramp D- ST Sta. 5+39.893
-Ramp D- CS Sta. 5+53.893
-Ramp D- SC Sta. 6+39.999
-Ramp D- CS Sta. 6+53.999
S 29° 42' 29.4" E
-L- POC Sta. 34+45.588 (19.808m RT)
-L- POC Sta. 35+33.407 (19.808m LT)
-L- POC Sta. 25+51.402 =
-Y1B- POC Sta. 18+92.536
-Y1B- PC Sta. 19+88.899
-Y1B- PT Sta. 11+88.530
-Y1B- POT Sta. 11+81.531
-L- CS Sta. 27+34.198

-Ramp C-
Pt Sta 0+43.321
θs = 1° 51' 24.6"
Ls = 70.000
LT = 43.3806
ST = 26.7808
Ri = 1,730.2000
R2 = 295.0000

Pt Sta 1+21.806
Δ = 19° 55' 15.0" (RT)
L = 102.567
T = 51.8063
R = 295.0000
SE = 09

Pt Sta 1+95.931
θs = 6° 41' 52.1"
Ls = 70.000
LT = 46.7011
ST = 23.3641

-Loop D-
Pt Sta 0+39.555
θs = 23° 54' 42.4"
Ls = 60.000
LT = 39.5547
ST = 21.1824
Ri = 1,730.2000
R2 = 75.0000

Pt Sta 2+08.702
Δ = 233° 31' 46.2" (RT)
L = 305.6894
T = -140.7020
R = 75.0000
SE = 10

Pt Sta 3+85.999
θs = 22° 55' 05.9"
Ls = 60.000
LT = 40.3405
ST = 20.3099

-Ramp D-
Pt Sta 0+42.318
θs = 6° 01' 20.7"
Ls = 70.000
LT = 42.3177
ST = 27.7448
Ri = 1,730.2000
R2 = 400.0000

Pt Sta 2+04.274
Δ = 37° 06' 44.3" (LT)
L = 259.083
T = 134.2741
R = 400.0000
SE = 08

Pt Sta 3+52.443
θs = 5° 00' 48.2"
Ls = 70.000
LT = 46.6854
ST = 23.3504

-Ramp D-
Pt Sta 4+49.114
θs = 5° 43' 46.5"
Ls = 60.000
LT = 40.0210
ST = 20.0159

Pt Sta 5+02.809
Δ = 12° 49' 29.8" (RT)
L = 67.151
T = 33.7185
R = 300.0000
SE = 07

Pt Sta 5+56.263
θs = 5° 43' 46.5"
Ls = 60.000
LT = 40.0210
ST = 20.0159

LOCATION:
NORTHERN WAKE EXPRESSWAY
(I-540) AT NC 55

TIP NO.	COUNTY
R-2000AA	WAKE
DESIGNED BY: BRIAN WILES, PE	DATE: NOV. 1999
CHECKED BY:	DATE

REVISIONS

METRIC

10 0 20

CONST. REV.

R/W REV.

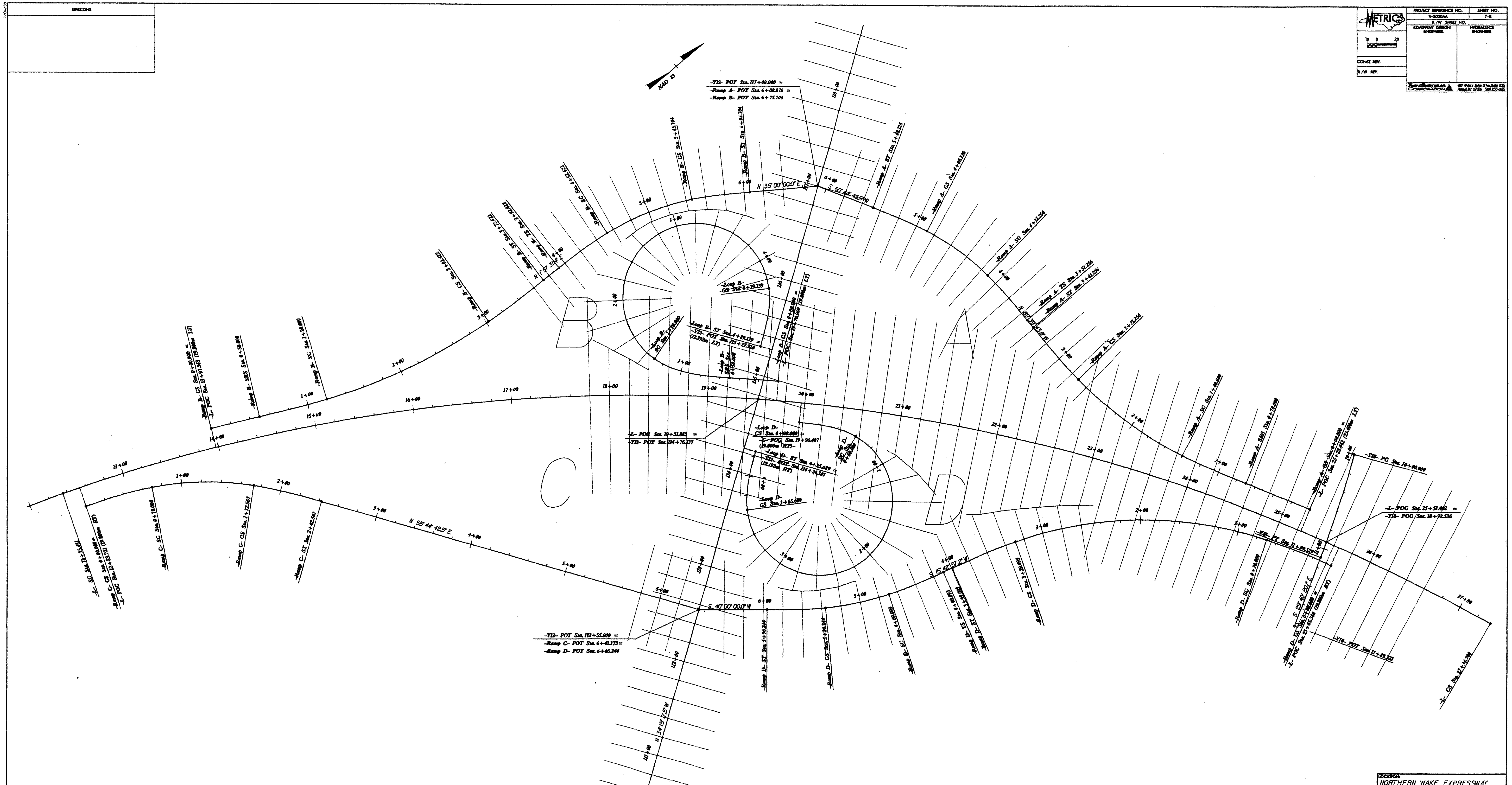
PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	7-B

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

TranSystems Corporation
487 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8025



LOCATION:
NORTHERN WAKE EXPRESSWAY
(I-540) AT NC 55

TIP NO.: R-2000AA
COUNTY: WAKE

DESIGNED BY: BRIAN WILES, PE
DATE: NOV., 1999

CHECKED BY:
DATE:

REVISIONS

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2000AA	8
	R /W SHEET NO.	
CONST. REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R /W REV.		

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

NAD 83

MATCHLINE - SHEET NO. 7 - STA 21+40

-RAMP D- STA 4+50

-Ramp D- TS Sta. 4+09.093

PROPOSED R/W +09.093 34.000 (111.55')

-Ramp D- ST Sta. 3+99.093

-Ramp D- CS Sta. 3+29.093

+40.000 45.000 (147.64')

+15.000 57.000 (187.01')

S 15° 42' 57" W

END MODIFIED EXPRESSWAY GUTTER -04

REMOVE

400 CS W/ 2 ELBOWS

2GI FLAT GRATE

1050 RCP CLASS IV W/ METHOD "B" INSTALLATION

900 RCP CLASS IV

LATERAL 0.9m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 65 TONS FILTER FABRIC EST. 158 S.M. D.D.E. EST. 280 C.M.

MODIFIED EXPRESSWAY GUTTER

LATERAL 0.6m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 228 TONS FILTER FABRIC EST. 565 S.M. D.D.E. EST. 1167 C.M.

LEACH FIELD

8" SAN. SEWER

SEPTIC TANK

NON-UTILITIES ONLY

CLASS 'Y' RIP RAP EST. 18 TONS FILTER FABRIC EST. 33 S.M.

TRIANGLE BRICK COMPANY
DB 1936 PG 497
DB 1940 PG 13
DB 1879 PG 08
PB 1975 PG 151

FALSE SUMP, SEE DETAIL FS3

450 CS W/ 2 ELBOWS

600 CS ROD, LUG & GASKET CONNECTIONS

450 RCP

375 RCP

FALSE SUMP, SEE DETAIL FS2

-BL- • 7137 POT Sta. 23+57.022
-L- Sta. 21+69.894 (0.1959 m LT)

-BL- • 7138 POT Sta. 24+14.054
-L- Sta. 22+26.935 (0.3572 m RT)

CABLE GUIDERAIL

TOE PROTECTION, SEE DETAIL 1 CLASS 'B' RIP RAP EST. 37 TONS FILTER FABRIC EST. 94 S.M.

-BL- • 7139 POT Sta. 21+68.319
-L- Sta. 22+79.195 (0.9235 m RT)

750 RCP CLASS IV W/ METHOD "B" INSTALLATION

LATERAL 0.6m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 132 TONS FILTER FABRIC EST. 326 S.M. D.D.E. EST. 1806 C.M.

-RAMP A- STA 4+20

-Ramp A- SC Sta. 4+11.256

N 89° 39' 43.6" W

+55.54

+80.000 37.000 (121.39')

-Ramp A- TS Sta. 3+51.256

-Ramp A- ST Sta. 3+41.256

+41.256 30.000 (98.43')

EP-CL 462.805

EP-BP 465.105

CHORD PROPOSED R/W

EDWARD E. HOLLOWELL
DB 3206 PG 53

-Ramp A- CS Sta. 2+71.256

+71.256 30.000 (98.43')

-RAMP D- STA 2+60

-RAMP A- STA 2+25

MATCH LINE
SHEET NO. 9 - STA 23+00

-L-

PIs Sta 11+93.790	PI Sta 20+34.565	PIs Sta 27+76.379
Θs = 2° 02' 46.6"	△ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

FOR -L- PROFILE SEE SHEET NOS. 25 AND 26
FOR -RAMP A- PROFILE SEE SHEET NO. 37
FOR -RAMP D- PROFILE SEE SHEET NOS. 40 AND 41
FOR RAMP CURVE DATA INFORMATION SEE SHEET NO. 7-A
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

6/10/03

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R/W REV.

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

-L-
PI Sta 11+93.790
Θs = 2° 02' 46.6"
Ls = 125.000
LT = 83.3389
ST = 41.6717

-L-
PI Sta 20+34.565
Δ = 49° 05' 10.7" (RT)
L = 1,499.256
T = 799.1135
R = 1,750.0000
SE = 04

-L-
PIs Sta 27+76.379
Θs = 2° 02' 46.6"
Ls = 125.000
LT = 83.3389
ST = 41.6717

-Y18-
PI Sta 10+54.801
Δ = 5° 06' 24.0" (RT)
L = 109.529
T = 54.8010
R = 1,228.9009

NAD 83

-BL- 7140 POT Sta. 25+45.167
-L- Sta. 23+58.003 (0.8063 m RT)

-BL- 7142 POT Sta. 26+33.618
-L- Sta. 24+46.423 (0.990 m RT)

-BL- 7144 POT Sta. 26+86.784
-L- Sta. 24+99.745 (4.321 m RT)

-BL- 7145 POT Sta. 27+38.881
-L- Sta. 25+51.258 (0.776 m RT)

-Ramp A- SC Sta. 1+40.000

-Ramp A- SRS Sta. 0+70.000

-Ramp A- CS Sta. 2+00.000 = -L- POC Sta. 25+27.442 (23.400m LT)

-Y18- PC Sta. 10+00.000

-L- POC Sta. 25+20.372
BEGIN BRIDGE

-L- POC Sta. 25+51.408 = -Y18- POC Sta. 10+92.536
END BRIDGE

-L- POC Sta. 25+83.076

-Y18- PT Sta. 11+09.529

-Ramp D- SC Sta. 0+70.000

-Ramp D- CS Sta. 0+00.000 = -L- POC Sta. 25+65.380 (19.880m RT)

-Y18- POT Sta. 11+83.321

-RAMP A- STA 2+25

-RAMP D- STA 2+60

MATCH LINE - SHEET NO. 8 - STA 23+00

MATCH LINE - SHEET NO. 10 - STA 26+20

11
EDWARD E. HOLLOWELL
DB 3206 PG 53

12
RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
DB 1670 PG 239

9
TRIANGLE BRICK COMPANY
DB 1936 PG 497
DB 1940 PG 13
DB 1879 PG 08
PB 1975 PG 151

PROPOSED R/W
SEE CROSS SECTIONS
CHORD
CAT-I
CABLE GUIDERAIL
FALSE SUMP, SEE DETAIL FS2
FALSE SUMP, SEE DETAIL FS1
END EXPRESSWAY GUTTER *15
MODIFIED EXPRESSWAY GUTTER
CLASS 'B' RIP RAP, EST. 5 TONS FILTER FABRIC EST. 12 S.M.
FALSE SUMP, SEE DETAIL FS2
TYPE III
2GI FLAT GRATE
400 CS W/2 ELBOWS
375 RCP
450 RCP
BEGIN C/A
END C/A
EXISTING R/W
SOUTHERN RAILWAY
RR SPUR LINE

*40.000
30.000
(98.43')

*70.000
30.000
(98.43')

*35.000
30.000
(98.43')

*00.000
40.000
(131.23')

*30.843
63.400
(208.01')

*60.645 -L-
62.000
(203.41')

*20.000
72.000
(236.22')

*80.000
30.000
(98.43')

*55.000
30.000
(98.43')

*70.000
41.000
(134.51')

*33.815
40.000
(131.23')

*26.078
44.000
(144.36')

*71.410 -L-
68.000
(223.10')

*20.000
83.000
(272.31')

FOR -L- PROFILE SEE SHEET NO. 26
FOR -RAMP A- PROFILE SEE SHEET NO. 37
FOR -RAMP D- PROFILE SEE SHEET NO. 40
FOR RAMP CURVE DATA INFORMATION SEE SHEET NO. 7-A
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	10
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R /W REV.

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

-L-

PIs Sta 11+93.790	PI Sta 20+34.565	PIs Sta 27+76.379
Θs = 2° 02' 46.6"	Δ = 49° 05' 10.7" (RT)	Θs = 2° 02' 46.6"
Ls = 125.000	L = 1,499.256	Ls = 125.000
LT = 83.3389	T = 799.1135	LT = 83.3389
ST = 41.6717	R = 1,750.0000	ST = 41.6717
	SE = 04	

FUTURE LOUIS STEPHENS ROAD

TS Sta. 10+21.560

ST Sta. 10+03.079

N 5° 05' 06.2" W

10+00

NAD 83

+60.000 91.000 (298.56')

+85.000 91.000 (298.56')

END BRIDGE

-L- POT Sta. 28+85.060

BEGIN BRIDGE

-L- POS Sta. 28+25.060

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239

EDWARD E. HOLLOWELL DB 3206 PG 53

WILHELM ROEBEN DB 5085 PG 345

PUBLIC SERVICE COMPANY OF NORTH CAROLINA DB 6667 PG 463 MB 1997 PG 1350, 1354

+81.500 98.000 (321.52')

+97.000 96.000 (314.96')

+90.000 77.000 (252.62')

+76.000 75.764 (248.57')

+20.000 72.000 (236.22')

+10.000 68.610 (225.10')

+60.000 49.000 (160.76')

+10.000 47.419 (155.57')

+37.929 60.039 (196.98')

+95.732 60.792 (199.45')

+40.000 45.000 (147.64')

+85.000 45.981 (150.86')

-BL- • 7147 POT Sta. 28+51.843 -L- Sta. 26+64.255 (1.0548 m RT)

-BL- • 7148 POT Sta. 29+24.158 -L- Sta. 27+36.511 (0.5867 m RT)

-BL- • 7149 POT Sta. 29+68.337 -L- Sta. 27+80.675 (0.5004 m RT)

-BL- • 7150 POT Sta. 30+46.152 -L- Sta. 28+58.489 (0.4719 m RT)

-BL- • 7152 POT Sta. 31+23.795 -L- Sta. 29+36.122 (0.3687 m RT)

CHANNEL IMPROVEMENT, SEE DETAIL 13 CLASS 'Y' RIP RAP EST. 32 TONS FILTER FABRIC EST. 42 S.M. D.D.E. EST. 90 C.M.

CHANNEL IMPROVEMENT, SEE DETAIL 15 D.D.E. EST. 86 C.M.

CHANNEL IMPROVEMENT, SEE DETAIL 10 CLASS 'I' RIP RAP EST. 32 TONS FILTER FABRIC EST. 42 S.M. D.D.E. EST. 83 C.M.

LATERAL 0.6m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 172 TONS FILTER FABRIC EST. 426 S.M. D.D.E. EST. 342 C.M.

LATERAL 0.6m BASE DITCH, SEE DETAIL 7 D.D.E. EST. 66 C.M.

CLASS 'B' RIP RAP EST. 2 TONS FILTER FABRIC EST. 6 S.M.

CLASS 'B' RIP RAP EST. 3 TONS FILTER FABRIC EST. 9 S.M.

MODIFIED EXPRESSWAY GUTTER

END EXPRESSWAY GUTTER 1:3

TYPE III

MOD. EXPRESSWAY GUTTER

CABLE GUIDERAIL

M-350

FALSE SUMP, SEE DETAIL FS2

FALSE SUMP, SEE DETAIL FS1

FLAT GRATE

2GI FLAT GRATE

450 RCP

375 RCP

400 CS W/ 2 ELBOWS

450 CS W/ 2 ELBOWS

90m TAPER

DOUBLE 2.7m x 2.1m RCBC W/ 0.3m SILL

PROPOSED R/W

TDE

F

C

A

-L- CS Sta. 27+34.708

-L- ST Sta. 28+59.708

SC Sta. 8+45.673

TS Sta. 8+01.782

-L- POS Sta. 28+55.867 = -YA- POC Sta. 9+02.525

N 71° 36' 14.8" E

MATCH LINE - SHEET NO. 9 - STA 26+20

MATCH LINE - SHEET NO. 11 - STA 29+60

FOR -L- PROFILE SEE SHEET NO. 27

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

FOR GRADING UNDER STRUCTURE SEE SHEET NO. 2-I

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REVISIONS

RISER BASIN	
SPILLWAY ELEV.= 89.30	31+84 (LEFT)
SPILLWAY WIDTH = 1.6m	600mm BARREL
TOP RISER ELEV.= 89.0	DA= 2.48 ha
INVERT BARREL = 87.8	DENUDED= 2.26 ha
RISER PIPE = 600mm	

SEE STANDARD DETAIL 1630.01

METRIC

5 0 10

CONST. REV.
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	11
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8825

NAD 83

CLASS 'I' RIP RAP
EST. 44 TONS
FILTER FABRIC
EST. 75 S.M.

LATERAL 0.6m BASE DITCH,
SEE DETAIL 2
CLASS 'B' RIP RAP
EST. 153 TONS
FILTER FABRIC
EST. 378 S.M.
D.D.E. EST. 410 C.M.

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

CLASS 'A' RIP RAP
EST. 10 TONS
FILTER FABRIC
EST. 25 S.M.

CLASS 'B' RIP RAP
EST. 5 TONS
FILTER FABRIC
EST. 12 S.M.

CLASS 'A'
RIP RAP
EST. 5 TONS
FILTER FABRIC
EST. 12 S.M.

600mm RISER

MODIFIED EXPRESSWAY GUTTER

END MODIFIED EXPRESSWAY GUTTER

GRAU TYPE 350

HEADWALL

PROPOSED R/W

PUE

TDE

FALSE SUMP
SEE DETAIL FS2

FALSE SUMP
SEE DETAIL FS3

CABLE GUIDERAIL

N 71° 36' 14.8" E

CLASS 'N'

13
WILHELM ROEBEN
DB 5085 PG 345

PUBLIC SERVICE COMPANY OF
NORTH CAROLINA
DB 6667 PG 463
MB 1997 PG 1350-1354

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

MATCH LINE - SHEET NO. 10 - STA 29+60

MATCH LINE - SHEET NO. 12 - STA 33+00

FOR -L- PROFILE SEE SHEET NO. 28
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

METRIC 5 0 10

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

NAD 83

FUTURE SITE 27 ACCESS ROAD

-YRPB-
PIs Sta 21+81.431
Θs = 4° 05' 33.2"
Ls = 125.000
LT = 83.3556
ST = 41.6869

PI Sta 19+63.646
Δ = 23° 23' 33.1" (RT)
L = 357.242
T = 181.444
R = 875.0000
SE = 05

CHANNEL IMPROVEMENT, SEE DETAIL 14
CLASS 'I' RIP RAP
EST. 32 TONS
FILTER FABRIC
EST. 48 S.M.
D.D.E. EST. 20 C.M.

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239 (12)

-YB- 18+00

+78.00 70.000 (229.66')
+95.00 62.000 (203.41')
+07.00 80.000 (262.47')
+78.00 56.900 (186.68')
+15.00 60.929 (199.90')
TDE

END BRIDGE
-L- POS Sta. 36+38.649
-L- POT Sta. 36+01.949 =
-YB- POT Sta. 16+88.722

-YRPB- ST Sta. 22+64.744 = -L- POT Sta. 35+76.173 (23.400m LT)

-BL- • 7168 POT Sta. 37+51.91 -L- Sta. 35+63.59 (0.1679 m LT)

-L- TS Sta. 36+23.274

LATERAL 'V' DITCH, SEE DETAIL 4
+60.000 34.000 (111.55') CLASS 'B' RIP RAP
EST. 212 TONS
FILTER FABRIC
EST. 543 S.M.
D.D.E. EST. 428 C.M.

+00.000 50.000 (164.04')
PROPOSED R/W
C A

BEGIN EXPRESSWAY MODIFIED GUTTER +68

CLASS 'B' RIP RAP
EST. 3 TONS
FILTER FABRIC
EST. 9 S.M.

BEGIN CULVERT
-L- POT Sta. 35+10.765

+45.000 47.000 (154.20')

-BL- • 7165 POT Sta. 36+12.850 -L- Sta. 34+25.178 (0.0451 m LT)

END CULVERT
-L- POT Sta. 35+17.236

RC Slope A 70.516

450 CS W/ 2 ELBOWS
66 2GI FLAT GRATE
67 2GI FLAT GRATE
68 2GI FLAT GRATE
74 2GI FLAT GRATE
70 2GI FLAT GRATE
65 2GI FALSE SUMP SEE DETAIL FS2
72 2GI FLAT GRATE

450 RCP
375 RCP
600mm CMP.
TYPE III
C F
G.I.m. OH
HO MLB

18.0m 14.4m 3.6m P.S. 3.0m P.S. .02 .01 .00

-L- 34+00 35+00 30+00 22+

N 71° 36' 14.8" E
M-350
CABLE GUIDERAIL
BEGIN MODIFIED EXPRESSWAY GUTTER +44
+68.571 +86.423 +04.286
GRAU TYPE 350

STD. BERM DITCH

+30.000 75.000 (246.06')
+50.000 50.000 (164.04')
+20.000 61.000 (200.13')
+26.00 60.186 (197.46')
+32.00 75.000 (246.06')
+54.00 72.000 (236.22')
+51.922 56.672 (185.93')
+00.000 50.000 (164.04')
+23.274 47.000 (154.20')
+25.000 70.000 (229.66')

LATERAL 0.9m BASE DITCH, SEE DETAIL 2
CLASS 'B' RIP RAP
EST. 137 TONS
FILTER FABRIC
EST. 339 S.M.
D.D.E. EST. 726 C.M.

CHANNEL IMPROVEMENT, SEE DETAIL 11
CLASS 'I' RIP RAP
EST. 25 TONS
FILTER FABRIC
EST. 40 S.M.
D.D.E. EST. 20 C.M.

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA DB 1670 PG 239 (12)

BEGIN BRIDGE
-L- POT Sta. 35+68.849

MATCH LINE - SHEET NO. 11 - STA 33+00

MATCH LINE - SHEET NO. 13 - STA 36+40

-YB- N 56° 29' 36" E

FOR -L- PROFILE SEE SHEET NO. 29
FOR -YRPB- PROFILE SEE SHEET NO. 44
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H
FOR GRADING UNDER STRUCTURE SEE SHEET NO. 2-J

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

METRIC 5 0 10

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

-YRPB-

PIs Sta 21+81.431	PI Sta 19+63.646
Θs = 4° 05' 33.2"	Δ = 23° 23' 33.1" (RT)
Ls = 125.000	L = 357.242
LT = 83.3556	T = 181.1444
ST = 41.6869	R = 875.0000
	SE = 05

-L-

PIs Sta 37+06.630	PI Sta 39+29.419	PIs Sta 41+47.203
Θs = 4° 05' 33.2"	Δ = 23° 23' 33.1" (LT)	Θs = 4° 05' 33.2"
Ls = 125.000	L = 357.242	Ls = 125.000
LT = 83.3556	T = 181.1444	LT = 83.3556
ST = 41.6869	R = 875.0000	ST = 41.6869
	SE = 07	

NAD 83

-L- STA. 38+00.000 END STATE PROJECT R-2000AA

-L- STA. 38+00.000 END F.A. PROJECT NHF-123-1(11)

MATCH LINE - SHEET NO. 12 - STA 36+40

LATERAL 'V' DITCH
SEE DETAIL 4
CLASS 'B' RIP RAP
EST. 59 TONS
FILTER FABRIC
EST. 150 S.M.
D.D.E. EST. 74 C.M.

+60.000
27.000
(88.58')

PROPOSED R/W

-BL- • 7174 POT Sta. 38+74.217
-L- Sta. 38+86.547 (0.5600 m LT)

-YRPB- CS Sta. 21+39.744

END EXPRESSWAY GUTTER +10

-L- SC Sta. 31+48.274

+90.000
65.000
(213.25')

TIE PROPOSED WW FENCE
TO WW FENCE BY R-2000AB

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

375 RCP

MOD. EXPRESSWAY GUTTER

GRAU TYPE 350

2GI (78) 2GI (79)

21+00

TYPE III
FALSE SUMP,
SEE DETAIL FS2

450 RCP

2GI (75)

450 RCP

W-350

37+00

(76) (77)

2GI 375 RCP 2GI

-L-

02 3.6m P.S. 16.5

03 +82.857

04 +00.714

05 +16.571

06 +36.429

07 +54.286

3.6m P.S. 10.8m

18.0m

14.4m

38+00

CABLE GUIDERAIL

39+00

-L-

TYPE III

-YB-

16+00

TDE

+85.000
56.947
(186.83')

+75.000
68.000
(223.10')

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

PROPOSED R/W

+48.274
70.000
(229.66')

350mm CMP TRANSLINE

TIE TO PROPOSED
GUARDRAIL
BY R-2000AB

TIE PROPOSED WW FENCE
TO WW FENCE BY R-2000AB

LATERAL 1.0m BASE DITCH,
SEE DETAIL 2
CLASS 'B' RIP RAP
EST. 156 TONS
FILTER FABRIC
EST. 380 S.M.
D.D.E. EST. 370 C.M.

-BL- • 7174 POT Sta. 39+95.237
-L- Sta. 38+07.618 (17.823 m RT)

-BL- • 7177 POT Sta. 40+84.597
-L- Sta. 38+97.189 (17.643 m RT)

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

19+00

20+00

12
RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA
DB 1670 PG 239

FOR -L- PROFILE SEE SHEET NO. 30

FOR -YRPB- PROFILE SEE SHEET NO. 44

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

6/10/03

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R/W REV.

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BEGIN CONSTRUCTION
-Y12- STA. 103+70.268

NAD 83

RAEFORD L. SEARS
AND WIFE,
DORIS N. SEARS
DB 4493 PG 104
MB 1971 PG 438

SADIE M. NUTT
DB 3732 PG 917

RUSSELL W. TARLETON, JR.
AND WIFE, DIANNE N. TARLETON

MILDRED NUTT
DB 2046 PG 576
MB 1971 PG 438

VINCENT I. STRUBLE
DB 4005 PG 144
MB 1971 PG 438

JOHN W. PETTY
DB 3242 PG 690
PB 1986 PG 61

ISBK&FD

EXISTING R/W

TDE

PDE

E

F

2GI

375 RCP

300 mm CONC

450 CS

450mm CURB & GUTTER

NC 55 25' BST

RET AIN

1.829m P.S.

7.315m

6.096m

0.02

104+00

105+00

106+00

107

-Y12-

+89.753
35.316

+75.668
36.272

+85.714
36.272

+50.417
17.496

+15.668
19.258

0.652 EIP TO R/W
148.86 EIP TO BACK CORNER
N89°39'54"W

N83°31'54"W
142.32 EIP TO BACK CORNER
0.204 EIP TO R/W

1.094 R/W
0.704 R/W

EIP

S34°14'51"E
206.666

N65°34'35"W
58.849

SR 1726 PETTY FARM RD

S 66°

SR

2SFD

B

S

FOR -Y12- PROFILE SEE SHEET NO. 31

MATCHLINE - SHEET NO. 15 -Y12- STA 107+00

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MATCHLINE – SHEET NO. 7 –Y12– STA 110+00

MATCHLINE – SHEET NO. 14 –Y12– STA 107+00

FOR –Y12– PROFILE SEE SHEET NOS. 31 AND 32
FOR DITCH DETAILS SHEET NOS. 2-G AND 2-H

TRIANGLE BRICK COMPANY
DB 1936 PG 497
DB 1940 PG 13

ROBBEN INVESTMENT, LLC

PHYLLIS W. CLAYTON
DB 1598 PG 191

JOHN W. PETTY
DB 3287 PG 690
PB 1986 PG 61

HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
DB 4017 PG 764
DB 5007 PG 275

HEARTLAND DURHAM/CARY LIMITED PARTNERSHIP
DB 3909 PG 661
MB 1959 PG 286

–Y12– POT Sta. 107+59.462 =
–Y32– POT Sta. 3+04.801

–Y12– POT Sta. 4+05.204

–Y12– POT Sta. 3+80.000

–Y12– POT Sta. 3+17.554

ABANDON EXISTING ROAD AND RIGHT-OF-WAY

NAD 83

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	15
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

R/W REV.
CONST. REV.

5 0 10

TRANSYSTEMS CORPORATION
491 Waters Edge Dr.Ste. 235
Holly,NC 27606 (919) 233-8125

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	16
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R /W REV.

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NAD 83

8 W. R. EVANS DB 2501 PG 703

15 JAMES HIGH, III DDB 2384 PG 517

16 RTP 55 PARTNERSHIP DB 3875 PG 300

22 ROBERT ERNEST SEAGROVES DB 3875 PG 311

MATCHLINE - SHEET NO. 7 -Y12- STA 117+60

MATCHLINE - SHEET NO. 17 -Y12- STA 120+80

CLASS 'B' RIP RAP EST. 5 TONS FILTER FABRIC EST. 12 S.M.

CLASS 'B' RIP RAP EST. 2 TONS FILTER FABRIC EST. 6 S.M.

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 35 TONS FILTER FABRIC EST. 90 S.M. D.D.E. EST. 40 C.M.

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 15 TONS FILTER FABRIC EST. 67 S.M. D.D.E. EST. 15 C.M.

END EXPRESSWAY GUTTER -70

END C/A AND WW FENCE

COLLAR

45m TAPER

40m TAPER

REMOVE FES

REMOVE

FALSE SUMP, SEE DETAIL FS1

FALSE SUMP, SEE DETAIL FS3

MANHOLE COVER

PROPOSED R/W

EXISTING R/W

TOE PROTECTION SEE DETAIL 1 CLASS 'B' RIP RAP EST. 41 TONS FILTER FABRIC EST. 114 S.M.

STANDARD RCP TAPERED INLET 1200 X 600 WITH SPECIAL END WALL SEE SPECIAL DETAIL SHEET 2-

11 EDWARD E. HOLLOWELL DB 3206 PG 53

SPECIAL BERM DITCH SEE DETAIL 17 CLASS 'B' RIP RAP EST. 51 TONS FILTER FABRIC EST. 142 S.M.

SPECIAL BERM DITCH SEE DETAIL 17 CLASS 'B' RIP RAP EST. 62 TONS FILTER FABRIC EST. 170 S.M.

SPECIAL BERM DITCH SEE DETAIL 17 CLASS 'B' RIP RAP EST. 40 TONS FILTER FABRIC EST. 108 S.M.

BERM DRAIN OUTLET

16 RTP 55 PARTNERSHIP DB 3875 PG 300

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 29 TONS FILTER FABRIC EST. 75 S.M. D.D.E. EST. 40 C.M.

FOR -Y12- PROFILE SEE SHEET NO. 33

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	17
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R /W REV.	

METRIC

5 0 10

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

NAD 83

-Y12-

PIs Sta 123+30.614	PI Sta 129+50.945	PIs Sta 135+19.692
Θs = 1° 22' 38.3"	Δ = 41° 08' 53.8" (RT)	Θs = 1° 22' 38.3"
Ls = 76.200	L = 1,138.278	Ls = 76.200
LT = 50.8016	T = 594.9323	LT = 50.8016
ST = 25.4014	R = 1,584.9632	ST = 25.4014
	SE = 025	

MATCHLINE - SHEET NO. 20 -Y15- STA 16+80

MATCHLINE - SHEET NO. 16 -Y12- STA 120+80

MATCHLINE - SHEET NO. 18 -Y12- STA 123+80

-Y12- TS Sta. 122+79.813

-Y12- SC Sta. 123+56.013

-Y12- POT Sta. 121+65.00

-Y15- POT Sta. 17+79.365

LATERAL 'Y' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 61 TONS FILTER FABRIC EST. 157 S.M. D.D.E. EST. 240 C.M.

ROBERT ERNEST SEAGROVES DB 3875 PG 311

RTP 55 PARTNERSHIP DB 3875 PG 300

CLASS 'B' RIP RAP EST. 10 TONS FILTER FABRIC EST. 24 S.M.

LATERAL 0.9m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 51 TONS FILTER FABRIC EST. 125 S.M. D.D.E. EST. 110 C.M.

HENRY B. EDWARDS DB 2409 PG 321

CLASS 'B' RIP RAP EST. 5 TONS FILTER FABRIC EST. 12 S.M.

CLASS 'B' RIP RAP EST. 2 TONS FILTER FABRIC EST. 6 S.M.

REMOVE FES

JB W/ MH COVER

RETAIN

900 RCP

900 mm CONC

375 mm CONC

REMOVE

121+00 N 34° 15' 17.5" W

122+00

123+00

40m TAPER

450mm C & G

375 RCP

600 RCP

600 CS W/1 ELBOW

400 CS W/ 1 ELBOW

FALSE SUMP, SEE DETAIL FS1

FALSE SUMP, SEE DETAIL FS3

COLLAR

CHORD

PROPOSED R/W

EXISTING R/W

GRAU TYPE 350

BERM DRAIN OUTLET

GRADE TO DRAIN

HENRY B. EDWARDS DB 1647 PG 304

ERNEST W. DIXON DB 5176 PG 691

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 50 TONS FILTER FABRIC EST. 130 S.M. D.D.E. EST. 132 C.M.

RTP 55 PARTNERSHIP DB 3875 PG 300

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 65 TONS FILTER FABRIC EST. 165 S.M. D.D.E. EST. 115 C.M.

ERNEST W. DIXON DB 5176 PG 691

STANDARD RCP TAPERED INLET 1500 X 900 WITH SPECIAL END WALL SEE SPECIAL DETAIL SEE SHEET 2-

SPECIAL BERM DITCH SEE DETAIL 17 CLASS 'B' RIP RAP EST. 129 TONS FILTER FABRIC EST. 360 S.M.

LATERAL 'V' DITCH, SEE DETAIL 4 CLASS 'B' RIP RAP EST. 15 TONS FILTER FABRIC EST. 37 S.M. D.D.E. EST. 24 C.M.

ISFD

WOODS

GR

CONC

WD RAIL

FOR -Y12- PROFILE SEE SHEET NOS. 33 AND 34

FOR -Y15- PROFILE SEE SHEET NO. 36

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	18
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R /W REV.	

METRIC

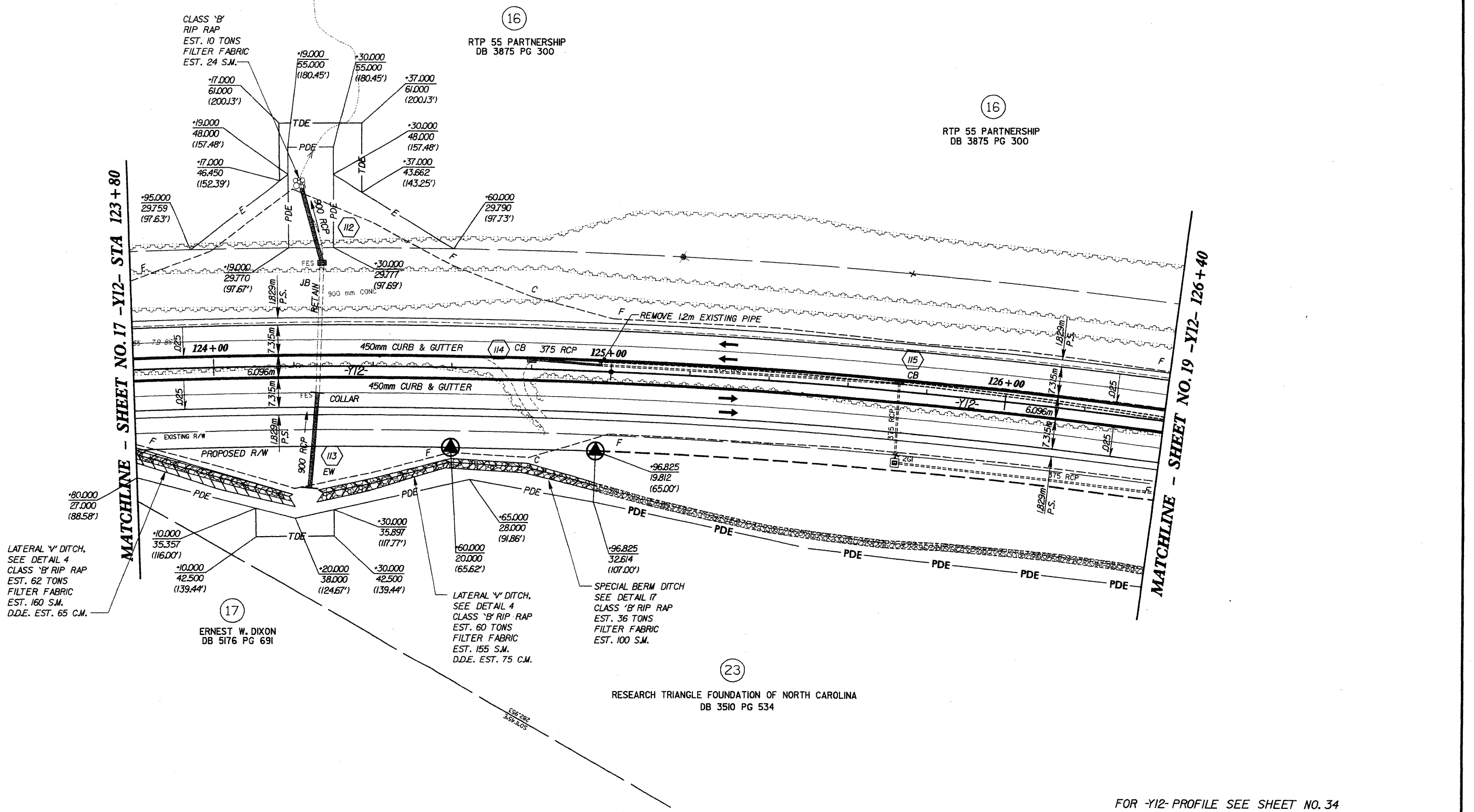
5 0 10

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

NAD 83

-Y12-

PIs Sta 123+30.614	PI Sta 129+50.945	PIs Sta 135+19.692
Θs = 1° 22' 38.3"	Δ = 41° 08' 53.8" (RT)	Θs = 1° 22' 38.3"
Ls = 76.200	L = 1,138.278	Ls = 76.200
LT = 50.8016	T = 594.9323	LT = 50.8016
ST = 25.4014	R = 1,584.9632	ST = 25.4014
	SE = 025	



FOR -Y12- PROFILE SEE SHEET NO. 34
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	19
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC
5 0 10

CONST. REV.

R /W REV.

TRANSYSTEMS CORPORATION
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NAD 83

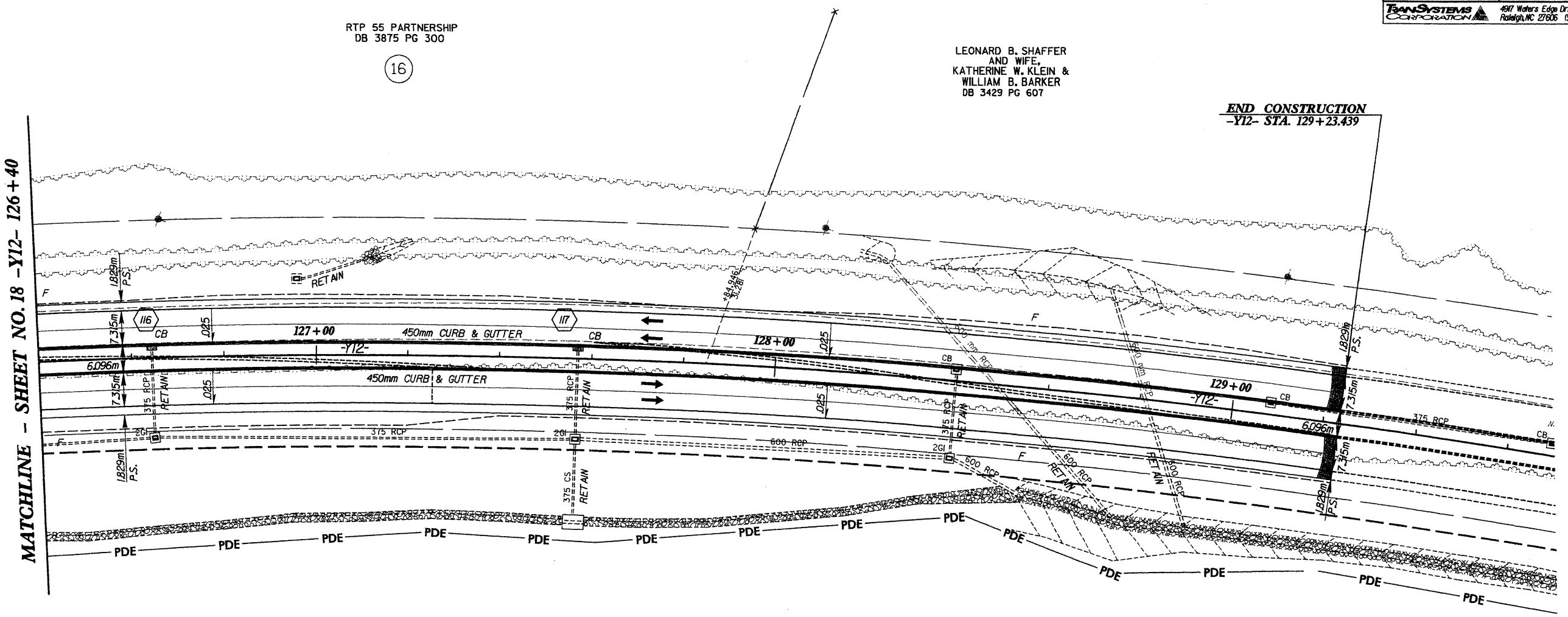
-Y12-

PIs Sta 123+30.614	PI Sta 129+50.945	PIs Sta 135+19.692
Θs = 1° 22' 38.3"	Δ = 41° 08' 53.8" (RT)	Θs = 1° 22' 38.3"
Ls = 76.200	L = 1,138.278	Ls = 76.200
LT = 50.8016	T = 594.9323	LT = 50.8016
ST = 25.4014	R = 1,584.9632	ST = 25.4014
	SE = 025	

RTP 55 PARTNERSHIP
DB 3875 PG 300
(16)

LEONARD B. SHAFFER
AND WIFE,
KATHERINE W. KLEIN &
WILLIAM B. BARKER
DB 3429 PG 607

END CONSTRUCTION
-Y12- STA. 129+23.439



RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
DB 3510 PG 534
(23)

FOR -Y12- PROFILE SEE SHEET NO. 34

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	20
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST. REV.

R /W REV.

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
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NAD 83

MATCHLINE - SHEET NO. 21 -Y15- STA 13+60

-Y15- PT Sta. 13+80.859

MATCHLINE - SHEET NO. 17 -Y15- STA 16+80

PROPOSED R/W

GRAU TYPE 350

14+00

15+00

16+00

N 61° 37' 02.1" E

750 RCP

375 RCP

356 RCP

6.6m

02.02

PDE

TDE

FALSE SUMP, SEE DETAIL FS2

HEADWALL

16

RTP 55 PARTNERSHIP
DB 3875 PG 300

118

119 2GI

120 2GI

121

+80.859 20.000 (65.62') | +80.859 15.000 (49.21')

+80.000 15.000, 25.000 & 30.000 (49.21', 82.02' & 98.42')

+70.000 15.000, 25.000 & 30.000 (49.21', 82.02' & 98.42')

ROCK VANE SEE DETAIL 9

CLASS 'B' RIP RAP EST. 8 TONS NO RIP RAP ON BOTTOM FILTER FABRIC EST. 18 S.M.

+20.000 20.000 (65.62')

+80.000 28.000 (91.86')

+00.000 22.000 (72.18')

TAIL 'V' DITCH, SEE DETAIL 5 CLASS 'B' RIP RAP EST. 38 TONS FILTER FABRIC EST. 97 S.M. D.D.E. EST. 20 C.M.

+15.000 22.000 (72.18')

CLASS 'I' RIP RAP EST. 30 TONS NO RIP RAP IN BOTTOM FILTER FABRIC EST. 52 S.M.

+35.000 22.000 & 34.000 (72.18' & 111.55')

+25.000 34.000 (111.55')

LATERAL 0.9m BASE DITCH, SEE DETAIL 2 CLASS 'B' RIP RAP EST. 34 TONS FILTER FABRIC EST. 84 S.M. D.D.E. EST. 25 C.M.

+67.000 15.000 & 22.000 (49.21' & 72.18')

+59.000 15.000 & 22.000 (49.21' & 72.18')

+80.859 15.000 (49.21')

+80.859 20.000 (65.62')

+10.000 29.000 (95.14')

+28.000 15.00 & 25.000 (49.21' & 82.02')

+43.000 15.00 & 25.000 (49.21' & 82.02')

LATERAL 'V' DITCH SEE DETAIL 8 D.D.E. EST. 754 C.M.

ROCK VANE SEE DETAIL 9

+20.000 29.000 (95.14')

+40.000 35.000 (114.83')

+00.000 20.000 (65.62')

+59.000 15.000 & 20.000 (49.21' & 65.62')

+67.000 15.000 & 20.000 (49.21' & 65.62')

CLASS 'I' RIP RAP EST. 30 TONS NO RIP RAP IN BOTTOM FILTER FABRIC EST. 52 S.M.

-Y15-
PI Sta 13+39.269
Δ = 1° 21' 42.2" (RT)
L = 83.184
T = 41.5938
R = 3,500.0000
SE = N/C

FOR -Y15- PROFILE SEE SHEET NO. 35

FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AA	21
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R /W REV.	

METRIC

5 0 10

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

MATCHLINE - SHEET NO. 20 -Y15- STA 13+60

-Y15- POT Sta. 10+00.000

BEGIN CONSTRUCTION
-Y15- STA. 10+20.000

-Y13- POT STA. 11+67.717 =
-Y15- POT STA. 12+23.870

END CONSTRUCTION
-Y15- STA. 12+00.000

NAD 83

20

BERNARD F. McLEOD, JR.
DB 6318 PG 465
DB 350 PG 494
DB 393 PG 184
DB 518 PG 51
DB 657 PG 568

PROPOSED R/W
EXISTING R/W
SR 1625 ALSTON AVE 6.0 BST
18.288 R/W (60.00')
6.6m
10+00
11+00
12+00
375
122
123
124
125
126
-Y15- N 60° 15' 19.9" E
N 8° 14' 55.1" W
-Y13-
-Y13- PT Sta. 11+48.620
-Y13- PC Sta. 10+59.339
-Y15- PC Sta. 12+97.675
-Y13- POT Sta. 10+00.000
N 59° 24' 10.3" W
REMOVE
SPECIAL CUT DITCH. SEE DETAIL 6
RETAIN
CLASS 'B' RIP RAP EST. 3 TONS FILTER FABRIC EST. 9 S.M.
COLLAR
450 RCP
10m R.
20m R.
PDE
EIP
CONC
SR 1630 ALSTON AVE
60 BST

+00.000 15.000 (49.21') | +00.000 9.144 (30.00')
+40.000 15.000 (49.21') | +60.000 20.000 (65.62')
+14.675 20.000 (65.62') | -10.000 15.000 (49.21')
+00.000 9.144 (30.00') | +58.371 9.144 (30.00')
+77.109 10.396 (34.11') | +80.000 17.000 (55.77')
+04.766 17.000 (55.77') | +98.570 15.000 (49.21')
+20.101 23.391 (76.74') | +41.784 36.498 (119.75')
+12.200 45.945 (150.74') | +01.020 29.143 (95.61')
+83.431 15.827 (51.93') | +80.000 14.315 (46.97')
+60.559 10.000 (32.81') | +60.000 20.000 (65.62')
+54.000 9.638 & 20.000 (31.62' & 65.62')
+24.800 10.149 (33.30')
+00.000 9.144 (30.00') | +77.000 25.000 (82.02') | +85.000 25.000 (82.02')
+47.522 20.000 (65.62') | +97.675 15.000 (49.21') | +20.000 18.000 (59.06')
+50.000 15.000 (49.21') | +77.000 15.000 (49.21') | +85.000 15.000 (49.21') 13+00
+35.000 15.000 (49.21') | +97.675 15.000 (49.21')
+30.876 20.000 (65.62') | +40.000 10.00 (32.81')
+20.000 15.000 (49.21') | +80.000 10.000 (32.81')
+59.339 8.417 & 10.000 (27.61' & 32.81') | +47.189
+97.675 20.000 (65.62') | +20.000 23.000 (75.46')

HIGHLAND DEVELOPMENT (21)

HIGHLAND DEVELOPMENT (21)

HIGHLAND DEVELOPMENT (21)

RTP 55 PARTNERSHIP
DB 3875 PG 300

DONNIE RAY SEAGROVES
DB 3875 PG 313
PB 1987 PG 1910

-Y13-
PI Sta 11+07.202
Δ = 51° 09' 15.3" (RT)
L = 89.281
T = 47.8629
R = 100.0000
SE = 06

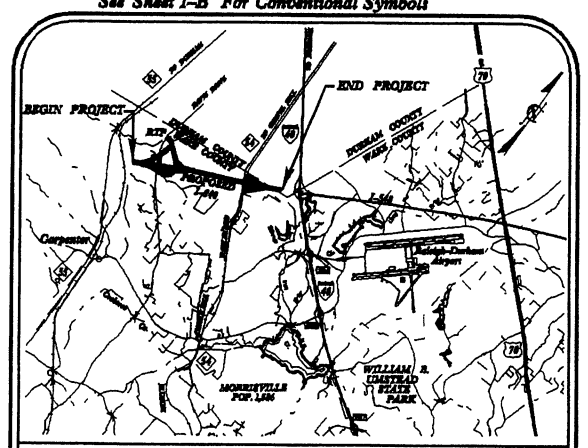
-Y15-
PI Sta 13+39.269
Δ = 1° 21' 42.2" (RT)
L = 83.184
T = 41.5938
R = 3,500.0000
SE = N/C

FOR -Y15- PROFILE SEE SHEET NO. 35
FOR -Y13- PROFILE SEE SHEET NO. 36
FOR DITCH DETAILS SEE SHEET NOS. 2-G AND 2-H

TIP PROJECT: R-2000AB

CONTRACT: C200798

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE-DURHAM COUNTIES

LOCATION: I-540 (NORTHERN WAKE EXPRESSWAY) FROM RESEARCH TRIANGLE PARK EAST LIMITS TO 0.966 km SOUTHWEST OF I-40

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

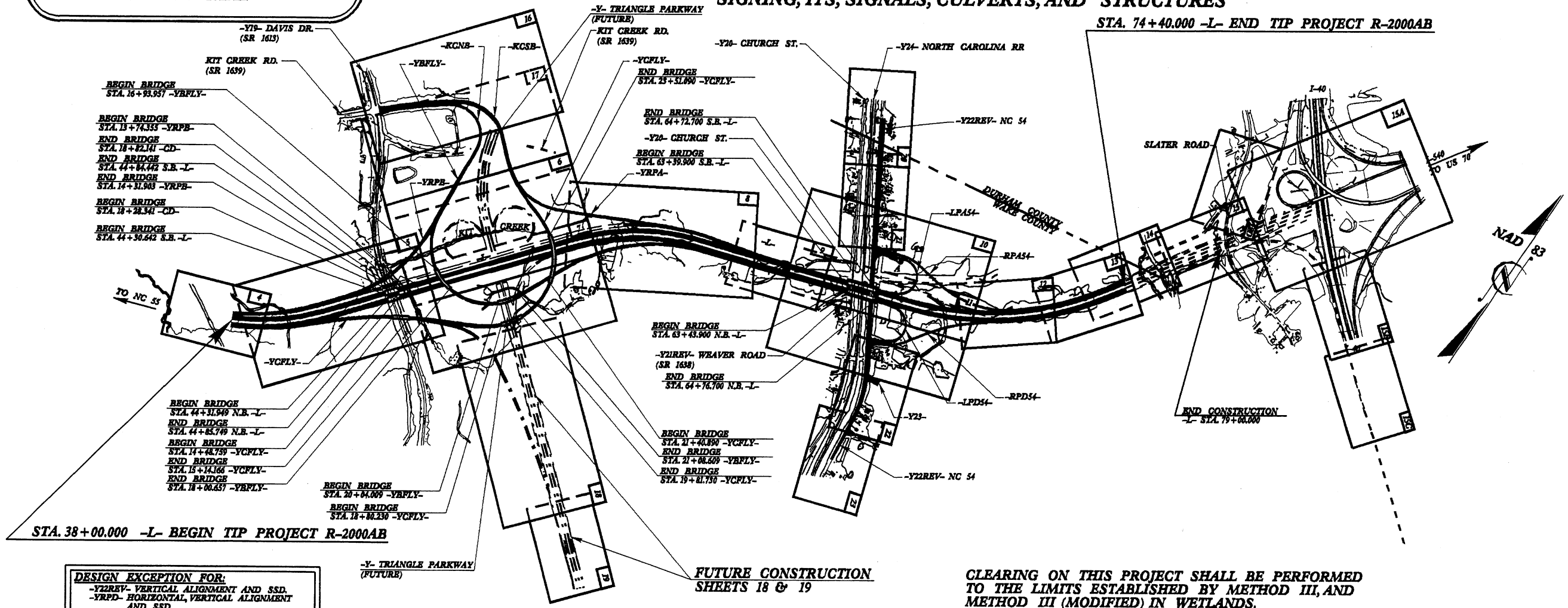
METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2000AB	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34365.1.5	N.A.	P.E.
34365.2.5	N.A.	R/W, UTIL.
34365.2.6	N.A.	R/W
34365.2.7	NHF-STP-123-3(8)	R/W
34365.3.43	NHF-540(3)	CONST.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DESIGN EXCEPTION FOR:
-Y22REV- VERTICAL ALIGNMENT AND SSD.
-YRPD- HORIZONTAL, VERTICAL ALIGNMENT AND SSD.
-YBFLY- AND -YCFLY- SSD ON BRIDGES AND SUPERELEVATION.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III, AND METHOD III (MODIFIED) IN WETLANDS.
THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

GRAPHIC SCALES

PLANS 5 0 10

PROFILE (HORIZONTAL) 5 0 10

PROFILE (VERTICAL) 1 0 2

DESIGN DATA

ADT 2005	=	31,700
ADT 2025	=	106,300
DHV	=	9 %
D	=	60 %
T	=	18 % *
V	=	110 km/h

* TTST 12% DUAL 6 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2000AB = km
LENGTH STRUCTURES TIP PROJECT R-2000AB = km
TOTAL LENGTH OF TIP PROJECT R-2000AB = 3.640 km

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

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MAY 31, 2002

LETTING DATE: JULY 15, 2003

GLENN W. MUMFORD, P.E.
PROJECT ENGINEER

ANTHONY A. HOUSER, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

FP_TIP_2003_07.55
Revised: 11/13/2003 by: J.T. Burchfield

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJ. REFERENCE NO.	SHEET NO.
R-2000AB	1 - B

*S.U.E = SUBSURFACE UTILITY ENGINEER

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut — C
- Prop. Slope Stakes Fill — F
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp — WCR
- Curb Cut For Future Wheelchair Ramp — CCFR
- Exist. Guardrail
- Prop. Guardrail
- Exist. Cable Guiderail
- Prop. Cable Guiderail
- Equality Symbol
- Pavement Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
- Exist. Control of Access Line — CA
- Prop. Control of Access Line — CA
- Exist. Easement Line — E
- Prop. Temp. Construction Easement Line — E
- Prop. Temp. Drainage Easement Line — TDE
- Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

- Stream or Body of Water
- River Basin Buffer — BZ
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Shoreline
- Falls, Rapids
- Prop Lateral, Tail, Head Ditches — FLOW

STRUCTURES

MAJOR

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

MINOR

- Head & End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Boxes — CB
- Paved Ditch Gutter

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- Cable TV Pedestal — C
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole
- Telephone Booth
- Water Manhole
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole
- Power Transformer
- Sanitary Sewer Manhole
- Storm Sewer Manhole — S
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS

- Recorded Water Line — W
- Designated Water Line (S.U.E.*) — W
- Sanitary Sewer — SS
- Recorded Sanitary Sewer Force Main — FSS
- Designated Sanitary Sewer Force Main(S.U.E.*) — FSS
- Recorded Gas Line — G
- Designated Gas Line (S.U.E.*) — G
- Storm Sewer — S
- Recorded Power Line — P
- Designated Power Line (S.U.E.*) — P
- Recorded Telephone Cable — T
- Designated Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Unknown Utility (S.U.E.*) — ?UTL
- Recorded Television Cable — TV
- Designated Television Cable (S.U.E.*) — TV
- Recorded Fiber Optics Cable — FO
- Designated Fiber Optics Cable (S.U.E.*) — FO
- Exist. Water Meter
- U/G Test Hole (S.U.E.*)
- Abandoned According to U/G Record — ATTUR
- End of Information — E.O.I.

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol — PL
- Exist. Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Property Number — 123
- Parcel Number — 6
- Fence Line — WW & ISBW
- Existing Wetland Boundaries — WLB
- Proposed Wetland Boundaries — WLB
- Existing Endangered Animal Boundaries — EAB
- Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate
- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery
- Dam
- Sign — S
- Well — W
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol — R/W
- Guard Post — GP
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

VEGETATION

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

RAILROADS

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

revised 2/25/97

19-JUN-2003 07:55
P:\proj\Vinyl_Plotter\mab.tsh
FSMorin AT R1006S020

CONST.REV.	
R /W REV.	

METRIC

5 0 10

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	4
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-
Pls Sta 37+06.630 Pl Sta 39+29.419
Θs = 4° 05' 33.2" Δ = 23° 23' 33.1" (LT)
Ls = 125.000 L = 357.242
LT = 83.356 T = 181.144
ST = 41.687 R = 875.000
SE = 0.07

-YRPB-
Pls Sta 21+81.431 Pl Sta 19+63.646
Θs = 4° 05' 33.2" Δ = 23° 23' 33.1" (RT)
Ls = 125.000 L = 357.242
LT = 83.356 T = 181.144
ST = 41.687 R = 875.000
SE = 0.05
RO = SEE PLANS

NAD 83

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA

10

BEGIN PROJECT R-2000AB
STA. 38+00.000 -L-

PCSta. 24+65.715 SITE 27
ACCESS ROAD

STSta. 22+64.744 -YRPB-
POTSta. 35+76.172 -L-
23.4m LT.

250mm CWLP TRANS. LINE

TSSta. 36+23.274 -L-

+82.062 -YRPB-

CSSta. 21+39.744 -YRPB-

BEGIN PROPOSED WW FENCE +94.412 -YRPB- 43.000m(RT) 141.08'

+94.412 -YRPB- 65.000m(RT) 213.26'

CHORD

WORK TO BE DONE BY OTHERS

END CONSTRUCTION
STA 20+44.345 -YRPB-
-YRPB- 20+16.524
END -YRPB- PAVEMENT
BEG. -L- PAVEMENT

+53.357 -YRPB-

POTSta. 36+01.946 -L-
POTSta. 23+83.921 SITE 27

+29.225 -YRPB-

20+00 21+00 22+00 36+00 37+00

N 71° 36' 14" E

N 56° 29' 36" W

3m 3.6m 3.6m 10.8m 18.0m 14.4m 3.6m

7.2m 1.2m 3.6m 3.6m 10.8m 14.4m 3.6m

01 02 03 04 05 06 07 00

CABLE GUIDERAIL

BEGIN GUIDERAIL
STA. 38+00.000 -L-

BEGIN GUARDRAIL
STA. 38+00.000 -L-

CAT-1 8:1 81.915

MATCH LINE TO SHEET 5 STA 38+90.000 -L-

10
RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA

POTSta. 23+00.000 SITE 27
ACCESS ROAD

SCSta. 37+48.274 -L-

250mm CWLP TRANS. LINE

STA. 37+80 -L- TO
STA. 38+60 -L- RT.
1.0m LAT. BASE DITCH
W/ 180 MTONS CL. 'B' RIP RAP &
444.64 SM FF LINER
SEE SHEET 2-O, DETAIL 1

STA. 38+40 -L- TO
STA. 39+20 -L- MED.
SPECIAL GRADE DITCH
NO DETAIL (PER HYDRO)

BL# 7174
STA 39+95.237 -BL-=
STA 38+07.701 -L-
1.760 LT.

BEGIN PROPOSED WW FENCE +48.274 -L-
55.000m(RT), 70.000m(RT)
180.45', 229.66'

TRAFFIC DIAGRAM

-YRPB- & -RPB-

I-440 I-440

DATUM DESCRIPTION

NCGS FOR MONUMENT " R2000-26 "
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING 233215.5660 (m) EASTING 621861.3190 (m)

(GROUND TO GRID) IS 0.9999164
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
" R2000-26 " TO -L- STATION 38+00.000 IS
S 34° 13' 10.9450" E 624.9890 m

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 1929

NOTES:
1) SEE SHEET 24 FOR -L- PROFILE
2) SEE SHEET 44 FOR -YRPB- PROFILE
3) SEE SHEET 2-O FOR DITCH DETAILS

9-18-2003 09:09
R:\Projects\2000ab\Roadway\2000ab_sht4.dgn
jeffreyh

REVISIONS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
B-3990AB	7
R.W. SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS	

CONSTRUCTION R/W SURVEY

MATCH LINE TO SHEET 6 STA 39+00.000 -L-

MATCH LINE TO SHEET 7 STA 45+00.000 -L-

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA

TRAFFIC DIAGRAM

-RCSB- ⊕ -RCNB-

1-440 WEST

1-440 EAST

NOTES:

1) SEE SHEET 14 ⊕ 15 FOR -L- PROFILE
2) SEE SHEET 43 ⊕ 44 FOR -YSEPA- PROFILE
3) SEE SHEET 42 ⊕ 43 FOR -YCPLY- PROFILE
4) SEE SHEET 38 FOR -YSERVY- PROFILE
5) SEE SHEET 37 FOR -CD- PROFILE
6) SEE SHEET 2-N FOR BRIDGE SKETCH DETAILS
7) SEE SHEET 1-L FOR SHEAR POINT DIAGRAM
8) SEE SHEET 2-O FOR DITCH DETAILS
9) SEE SHEET C- THRU C- FOR CULVERT PLANS
10) SEE SHEET S- THRU S- FOR STRUCTURE PLANS
11) SEE SHEET 1-Q FOR SHOULDER BERM GUTTER STATIONING
12) SEE SHEET 2-Q FOR STREAM 1 DETAILS ⊕ SHEET 45 FOR STREAM 2 PROFILE

LOCATION:

TIP NO.: COUNTY:

DESIGNED BY: DATE:

CHECKED BY: DATE:

REVISIONS

PROJECT REFERENCE NO. | SHEET NO.
R-2633B | 6
R.W. SHEET NO.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
TRANSPORTATION BUILDING
RALEIGH

METRIC

CONSTRUCTION PLANS

CONTRACT:
R/W SEC:

-Y8PA-
PVI Sta 47+00.00 (PT)
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PB-
PVI Sta 47+00.00 (PT)
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PC-
PVI Sta 47+00.00 (PT)
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8PZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8QZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8RZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8ST-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8SZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8TZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8US-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8UZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VV-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VW-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VX-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VY-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8VZ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WA-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WB-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WC-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WD-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WE-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WF-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WG-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WH-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WI-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WJ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WK-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WL-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WM-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WN-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WO-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WP-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WQ-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WR-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WS-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WT-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt = 65.000
Rt = 100.00
Rt = 65.000
SE = 0.05

-Y8WU-
PVI Sta 47+00.00
PVI Elev 1,147.500
Lt = 100.00
Lt =

REVISIONS

PROJECT REFERENCE NO. R-2000(A)B
SHEET NO. 7
F.A. PROJ. NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
CONSTRUCTION
R/W SHEET NO.

MATCH LINE TO SHEET 6

MATCH LINE TO SHEET 5 STA 45+00.000 -L-

MATCH LINE TO SHEET 8 STA 24+20.000 -YRFLY-

MATCH LINE TO SHEET 8 STA 32+68.000 -YRFLY-

FUTURE GUARDRAIL

GRADING ONLY

CABLE GUARDRAIL

BEGIN GUARDRAIL STA. 44+53.347

END GUARDRAIL STA. 46+73.194

BEGIN GUARDRAIL STA. 31+14.739

END GUARDRAIL STA. 31+34.253

TYPE XI MOD. ATTENUATOR

FUT. TYPE XI MOD. ATTENUATOR

FUT. PIER

END BRIDGE STA. 33+38.500 -YRFLY-

END APPROACH SLAB STA. 33+41.500 -YRFLY-

BEGIN APPROACH SLAB STA. 31+37.333 -YRFLY-

END APPROACH SLAB STA. 31+58.500 -YRFLY-

BEGIN BRIDGE STA. 31+60.000 -YRFLY-

END BRIDGE STA. 31+81.500 -YRFLY-

HELEN MILLS MASON

PLACE 0.6m DIA. DECK DRAINS AT THE FOLLOWING LOCATIONS

-YRFLY-

31+37 LT	31+56 LT
31+43 LT	31+62 LT
31+49 LT	31+68 LT
31+50 LT	31+74 LT
31+56 LT	31+80 LT
31+62 LT	31+86 LT
31+68 LT	31+92 LT
31+74 LT	31+98 LT
31+80 LT	32+04 LT
31+86 LT	32+10 LT
31+92 LT	32+16 LT
31+98 LT	32+22 LT
32+04 LT	32+28 LT
32+10 LT	32+34 LT
32+16 LT	32+40 LT
32+22 LT	32+46 LT
32+28 LT	32+52 LT
32+34 LT	32+58 LT
32+40 LT	33+01 LT
32+46 LT	33+07 LT
32+52 LT	33+13 LT
32+58 LT	33+19 LT
33+01 LT	33+25 LT
33+07 LT	33+31 LT
33+13 LT	33+37 LT
33+19 LT	33+43 LT
33+25 LT	33+49 LT
33+31 LT	33+55 LT
33+37 LT	34+01 LT
33+43 LT	34+07 LT
33+49 LT	34+13 LT
33+55 LT	34+19 LT
34+01 LT	34+25 LT
34+07 LT	34+31 LT
34+13 LT	34+37 LT
34+19 LT	34+43 LT
34+25 LT	34+49 LT
34+31 LT	34+55 LT
34+37 LT	35+01 LT
34+43 LT	35+07 LT
34+49 LT	35+13 LT
34+55 LT	35+19 LT
35+01 LT	35+25 LT
35+07 LT	35+31 LT
35+13 LT	35+37 LT
35+19 LT	35+43 LT
35+25 LT	35+49 LT
35+31 LT	35+55 LT
35+37 LT	36+01 LT
35+43 LT	36+07 LT
35+49 LT	36+13 LT
35+55 LT	36+19 LT
36+01 LT	36+25 LT
36+07 LT	36+31 LT
36+13 LT	36+37 LT
36+19 LT	36+43 LT
36+25 LT	36+49 LT
36+31 LT	36+55 LT
36+37 LT	37+01 LT
36+43 LT	37+07 LT
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37+01 LT	37+25 LT
37+07 LT	37+31 LT
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37+37 LT	38+01 LT
37+43 LT	38+07 LT
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37+55 LT	38+19 LT
38+01 LT	38+25 LT
38+07 LT	38+31 LT
38+13 LT	38+37 LT
38+19 LT	38+43 LT
38+25 LT	38+49 LT
38+31 LT	38+55 LT
38+37 LT	39+01 LT
38+43 LT	39+07 LT
38+49 LT	39+13 LT
38+55 LT	39+19 LT
39+01 LT	39+25 LT
39+07 LT	39+31 LT
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39+19 LT	39+43 LT
39+25 LT	39+49 LT
39+31 LT	39+55 LT
39+37 LT	40+01 LT
39+43 LT	40+07 LT
39+49 LT	40+13 LT
39+55 LT	40+19 LT
40+01 LT	40+25 LT
40+07 LT	40+31 LT
40+13 LT	40+37 LT
40+19 LT	40+43 LT
40+25 LT	40+49 LT
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40+37 LT	41+01 LT
40+43 LT	41+07 LT
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41+07 LT	41+31 LT
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41+25 LT	41+49 LT
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41+43 LT	42+07 LT
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41+55 LT	42+19 LT
42+01 LT	42+25 LT
42+07 LT	42+31 LT
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42+31 LT	42+55 LT
42+37 LT	43+01 LT
42+43 LT	43+07 LT
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42+55 LT	43+19 LT
43+01 LT	43+25 LT
43+07 LT	43+31 LT
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43+31 LT	43+55 LT
43+37 LT	44+01 LT
43+43 LT	44+07 LT
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44+37 LT	45+01 LT
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45+07 LT	45+31 LT
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47+55 LT	48+19 LT
48+01 LT	48+25 LT
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48+31 LT	48+55 LT
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65+19 LT	65+43 LT
65+25 LT	65+49 LT
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65+37 LT	66+01 LT
65+43 LT	66+07 LT
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66+19 LT	66+43 LT
66+25 LT	66+49 LT
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67+43 LT	68+07 LT
67+49 LT	68+13 LT
67+55 LT	68+19 LT
68+01 LT	68+25 LT
68+07 LT	68+31 LT
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68+37 LT	69+01 LT
68+43 LT	69+07 LT
68+49 LT	69+13 LT
68+55 LT	69+19 LT
69+01 LT	69+25 LT
69+07 LT	69+31 LT
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69+19 LT	69+43 LT
69+25 LT	69+49 LT
69+31 LT	69+55 LT
69+37 LT	70+01 LT
69+43 LT	70+07 LT
69+49 LT	70+13 LT
69+55 LT	70+19 LT
70+01 LT	70+25 LT
70+07 LT	70+31 LT
70+13 LT	70+37 LT
70+19 LT	70+43 LT
70+25 LT	70+49 LT
70+31 LT	70+55 LT
70+37 LT	71+01 LT
70+43 LT	71+07 LT
70+49 LT	71+13 LT
70+55 LT	71+19 LT
71+01 LT	71+25 LT
71+07 LT	71+31 LT
71+13 LT	71+37 LT
71+19 LT	71+43 LT
71+25 LT	71+49 LT
71+31 LT	71+55 LT
71+37 LT	72+01 LT
71+43 LT	72+07 LT
71+49 LT	72+13 LT
71+55 LT	72+19 LT
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72+07 LT	72+31 LT
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72+43 LT	73+07 LT
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73+01 LT	73+25 LT
73+07 LT	73+31 LT
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73+31 LT	73+55 LT
73+37 LT	74+01 LT
73+43 LT	74+07 LT
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73+55 LT	74+19 LT
74+01 LT	74+25 LT
74+07 LT	74+31 LT
74+13 LT	74+37 LT
74+19 LT	74+43 LT
74+25 LT	74+49 LT
74+31 LT	74+55 LT
74+37 LT	75+01 LT
74+43 LT	75+07 LT
74+49 LT	75+13 LT
74+55 LT	75+19 LT
75+01 LT	75+25 LT
75+07 LT	75+31 LT
75+13 LT	75+37 LT
75+19 LT	75+43 LT
75+25 LT	75+49 LT
75+31 LT	75+55 LT
75+37 LT	76+01 LT
75+43 LT	76+07 LT
75+49 LT	76+13 LT
75+55 LT	76+19 LT
76+01 LT	76+25 LT
76+07 LT	76+31 LT
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76+25 LT	76+49 LT
76+31 LT	76+55 LT
76+37 LT	77+01 LT
76+43 LT	77+07 LT
76+49 LT	77+13 LT
76+55 LT	77+19 LT
77+01 LT	77+25 LT
77+07 LT	77+31 LT
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77+19 LT	77+43 LT
77+25 LT	77+49 LT
77+31 LT	77+55 LT
77+37 LT	78+01 LT
77+43 LT	78+07 LT
77+49 LT	78+13 LT
77+55 LT	78+19 LT
78+01 LT	78+25 LT
78+07 LT	78+31 LT
78+13 LT	78+37 LT
78+19 LT	78+43 LT
78+25 LT	78+49 LT
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REVISIONS
REVISED NOTE REGARDING ROAD CLOSURE PROPERTY NAME CHANGED ON SHEET 12.

PROJECT REFERENCE NO.	SHEET NO.
AC-0000(XX)	7
U.S. ROUTE NO.	
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.DIV.	
R/W DIV.	

PRELIMINARY PLANS
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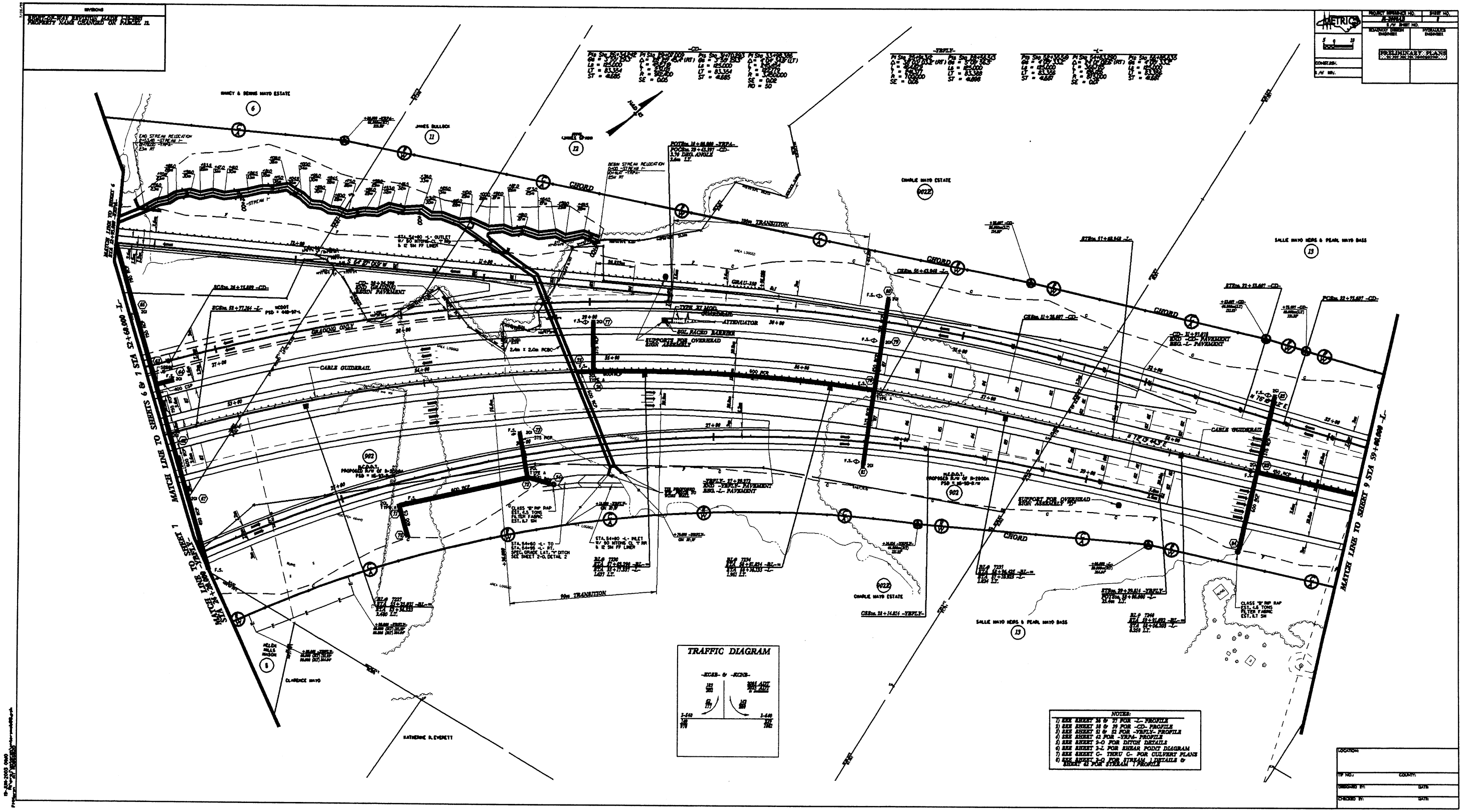
NANCY & DENNIS MAYO ESTATE
6
JAMES BULLOCK
11
LINDA L. BOND
12
CHARLIE MAYO ESTATE
9012
SALLIE MAYO HORS & PEARL MAYO BASS
13
CLARENCE MAYO
5
KATHERINE R. EVERETT
MATCH LINE TO SHEET 1 STA 52+64.99 -L-
MATCH LINE TO SHEET 9 STA 59+90.99 -L-
CHORD
TRANSITION
CABLE GUIDERAIL
TYPE 31 MOD. OVERHEAD ATTENUATOR
SGL. FACED BARRIER
SUPPORT FOR OVERHEAD SIGN ASSEMBLY
CLASS "B" RIP RAP
EST. 1.5 TONS
FILTER FABRIC
EST. 0.7 SY
CLASS "B" RIP RAP
EST. 2.5 TONS
FILTER FABRIC
EST. 0.7 SY
STA. 54+90 -L- TO STA. 54+95 -L- RT.
SPEC'L GRADE LAY'N DITCH
SEE SHEET 2-D, DETAIL 2
STA. 54+90 -L- MILES W/ NO STONE CL. 7" RR & 12 SM FF LINER
STA. 57+40 -L- OUTLET W/ NO STONE CL. 7" RR & 12 SM FF LINER
END STREAM RELOCATION STA 57+40 -STREAM 1- BEGIN STREAM -STREAM 1- ELEV 91
BEGIN STREAM RELOCATION STA 54+90 -STREAM 1- END STREAM -STREAM 1- ELEV 91
PROPOSED R/W @ 9+20.00A PSR = 60-99-0.7B
PROPOSED R/W @ 9+20.00A PSR = 60-99-0.7B
SEE SHEET 2-C FOR STREAM 1 PROFILE
SEE SHEET 2-D FOR DITCH DETAILS
SEE SHEET 2-E FOR REMAIN POINT DIAGRAM
SEE SHEET 2-F FOR STREAM 1 PROFILE
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PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRAFFIC DIAGRAM

-KCSB- & -KCNB-

2005 ADT
2025 ADT
X SIGNALIZED

183 / 202			142 / 280
62 / 177			

I-540: 142 / 978 — I-540: 229 / 1081

-CD-
PI Sta 33+98.386
Δ = 4° 04' 34.9" (LT)
L = 245.454
T = 122.779
R = 3,450.000
SE = 0.02
RO = 50

NAD 83

S 75° 56' W EP-EIP 495.857
DP-COR 280.591

13
SALLIE MAYO HEIRS & PEARL MAYO BASS

+40.000 -CD-
40.000m(LT)
131.23'

905Z
KATHERINE R. EVERETT

CHORD

SUPPORT FOR OVERHEAD SIGN ASSEMBLY "F"

PTSta. 35+21.061 -CD-
POTSta. 61+00.000 -L-
19.8m LT.

+00.000 -L-
55.000m(LT)
180.45'

STA. 61+38.563 -L- LT.
BEGIN EXPRESSWAY GTR

STA. 61+40 -L- TO
STA. 62+09 -L- LT.
0.5m LAT. BASE DITCH
W/ 86 MTONS CL 'B' RIP R
& 229.45 SM FF LINER
SEE SHEET 2-0, DETAIL 8

CLASS 'B' RIP RAP
EST. 1.8 TONS
FILTER FABRIC
EST. 5.9 SM

MATCH LINE TO SHEET 8 STA 59+00.000 -L-

MATCH LINE TO SHEET 10 & 11 STA 62+00.000 -L-

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD # 189-94-RW
905

38L230
N71°15'44"E

F.S. 86 2GI

34+00

35+00

+33.669

95

400 CSP
W/ ELBOWS

CAT-I

8:1

2GI

375 RCP

96

3.6m

CABLE GUIDERAIL

60+00

61+00

F.S. 85

450 RCP

N 72° 13' 44.3" E

F.S. 90

2GI

450 RCP

98

80.772 (265') CP&L TRANSMISSION LINE EASEMENT
DB 2288 - PG 549

CAROLINA POWER AND LIGHT CO.

93

CL. IN METHOD B INSTALLATION

375 RCP

GRAU-350

8:1

+48.607

2GI

600 CSP
W/ ELBOWS

F.S. 87

CAROLINA POWER AND LIGHT CO.

88

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD # 189-94-RW
905

13
SALLIE MAYO HEIRS & PEARL MAYO BASS

EXIST. R/W

386.853
N72°13'44"E

+35.000

90m TAPER

CAROLINA POWER AND LIGHT CO.

+00.000 -L-
50.000m(RT)
164.04'

BL# 7249
STA 63+55.932 -BL-=
STA 61+70.434 -L-
1.302 RT.

+80.000 -L-
55.000m(RT)
180.45'

BL# 7245
STA 61+36.828 -BL-=
STA 59+51.338 -L-
0.120 RT.

CLASS 'B' RIP RAP
EST. 2.7 TONS
FILTER FABRIC
EST. 9.2 SM

BL# 7247
STA 62+06.324 -BL-=
STA 60+20.833 -L-
0.177 LT.

STA. 60+68.559 -L- RT.
BEGIN EXPRESSWAY GTR

KATHERINE R. EVERETT
905Z

CLASS 'B' RIP RAP
EST. 1.8 TONS
FILTER FABRIC
EST. 5.9 SM

KATHERINE R. EVERETT
905Z

R5 SOIL

EP-TOR 10.670

NOTES:

1) SEE SHEET 27 & 28 FOR -L- PROFILE
2) SEE SHEET 39 FOR -CD- PROFILE
3) SEE SHEET 2-O FOR DITCH DETAILS

R-2000AB 08/
R:\C-2\Un
Project: RT R2000AB

REVISIONS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROJECT: R-2633 BYPASS, MARSHALL FORK CREEK TO SR 1449 (OLD NC 10)
PROJECT: R-2633 BYPASS, MARSHALL FORK CREEK TO SR 1449 (OLD NC 10)

-L-

PI Sta. 10+00.000	PI Sta. 19+00.000	PI Sta. 27+00.000
D = 5°00'00"	D = 3°00'00" (LT)	D = 3°00'00"
Tangent = 500.00	L = 1000.00	Tangent = 500.00
Curve = 1000.00	Tangent = 500.00	Curve = 1000.00
External = 62.83	Curve = 1000.00	External = 62.83
Chord = 1000.00	External = 62.83	Chord = 1000.00
SE = 0.06	Chord = 1000.00	SE = 0.06
RC = 1833.33	SE = 0.06	RC = 1833.33
	RC = 1833.33	

-RPAS4-

PI Sta. 11+00.000	PI Sta. 14+00.000	PI Sta. 17+00.000	PI Sta. 21+00.000
D = 3°00'00" (RT)	D = 3°00'00" (LT)	D = 3°00'00" (RT)	D = 3°00'00" (LT)
L = 600.00	L = 600.00	L = 600.00	L = 600.00
Tangent = 300.00	Tangent = 300.00	Tangent = 300.00	Tangent = 300.00
Curve = 600.00	Curve = 600.00	Curve = 600.00	Curve = 600.00
External = 22.50	External = 22.50	External = 22.50	External = 22.50
Chord = 600.00	Chord = 600.00	Chord = 600.00	Chord = 600.00
SE = 0.04	SE = 0.04	SE = 0.04	SE = 0.04
RC = SEE PLANS	RC = SEE PLANS	RC = SEE PLANS	RC = SEE PLANS
A_s = 360.000			

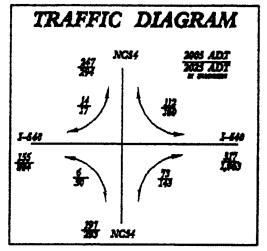
-LPAS4-

PI Sta. 11+00.000	PI Sta. 14+00.000	PI Sta. 17+00.000
D = 3°00'00" (RT)	D = 3°00'00" (LT)	D = 3°00'00" (RT)
L = 600.00	L = 600.00	L = 600.00
Tangent = 300.00	Tangent = 300.00	Tangent = 300.00
Curve = 600.00	Curve = 600.00	Curve = 600.00
External = 22.50	External = 22.50	External = 22.50
Chord = 600.00	Chord = 600.00	Chord = 600.00
SE = 0.04	SE = 0.04	SE = 0.04
RC = SEE PLANS	RC = SEE PLANS	RC = SEE PLANS

NOTES:

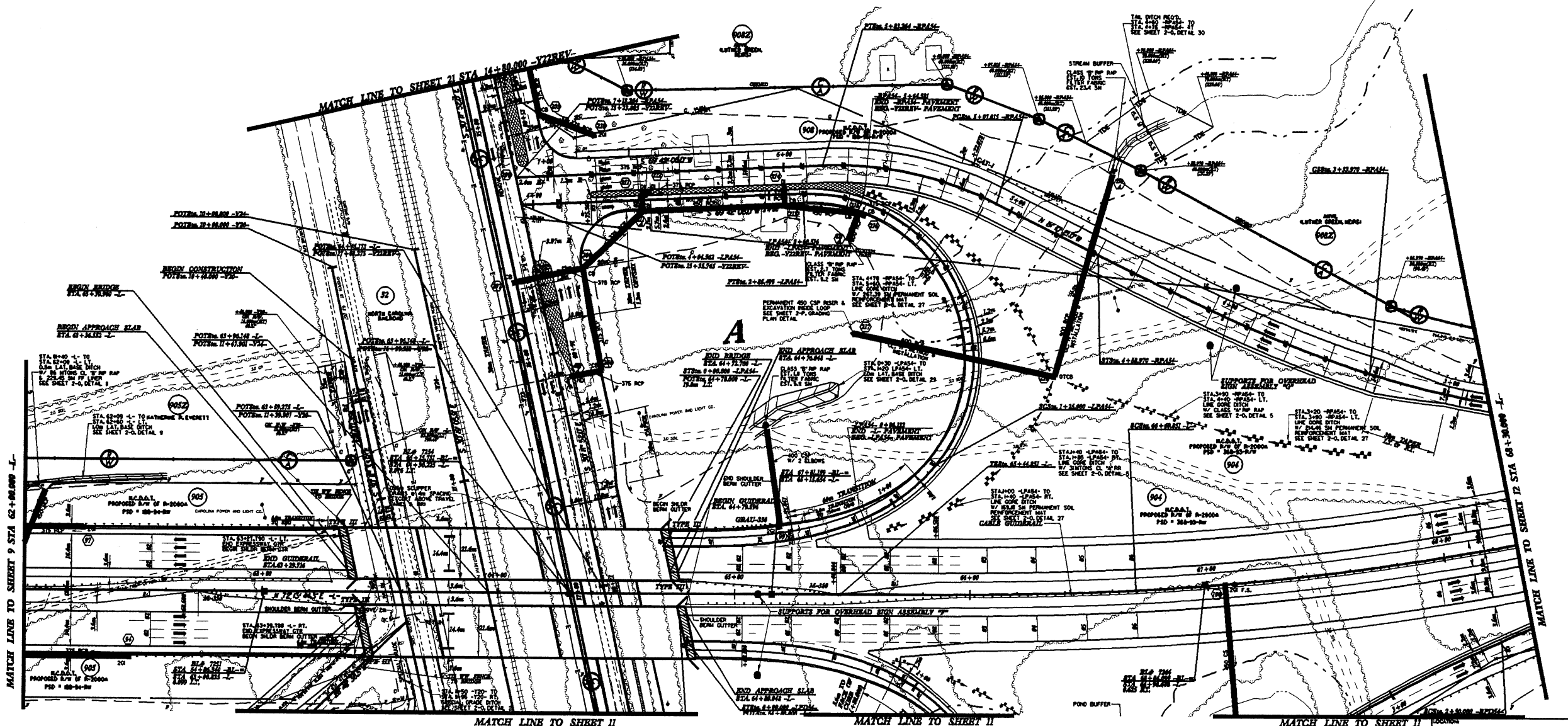
1) SEE SHEET 27 & 28 FOR -L- PROFILE
2) SEE SHEET 32 FOR -Y22REV- PROFILE
3) SEE SHEET 57 FOR -LPAS4- PROFILE
4) SEE SHEET 58 FOR -RPAS4- PROFILE
5) SEE SHEET 59 FOR -LPDS4- PROFILE
6) SEE SHEET 59 FOR -RPDS4- PROFILE
7) 150mm MONOLITHIC ISLAND
8) SEE SHEET 2-N FOR BRIDGE SKETCH DETAILS
9) SEE SHEET 2-M FOR SHEAR POINT DIAGRAM
10) SEE SHEET 2-O FOR DITCH DETAILS
11) SEE SHEET S- THRU S- FOR STRUCTURE PLANS
12) SEE SHEET 3-Q FOR SHOULDER BERM GUTTER STATIONING

TRAFFIC DIAGRAM



METRIC

PROJECT REFERENCE NO. R-2633 B
R/W SHEET NO.
SHEET NO. 19
ROADWAY DESIGN Engineer
HYDRAULICS Engineer
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST.ENG.
R/W ENG.



TIP NO.:	COUNTY:
DESIGNED BY:	DATE:
CHECKED BY:	DATE:

REVISIONS

PROJECT REFERENCE NO. R-2000UB
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONSTR.ENGR.
R/W ENGR.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

MATCH LINE TO SHEET 9 STA 62+16.000 -L-

MATCH LINE TO SHEET 10

MATCH LINE TO SHEET 10

MATCH LINE TO SHEET 12 STA 69+30.000 -L-

MATCH LINE TO SHEET 12 STA 19+40.000 -Y22REV-

NORTH CAROLINA POWER AND LIGHT CO.

KATHERINE R. EVERETT

WEEKS REALTY LIMITED PARTNERSHIP

INVESTORS OF THE TRIANGLE

SEDIMENT BASIN TABLE

BASIN	APPROX. STA.	D	Q2	Q10	Q25	Q50	Q100	SURFACE DISTURBING AREA	VOLUME
		m	cms	cms	cms	cms	cms	ha	m³

NOTES:
1) SEE SHEET 27 & 28 FOR -L- PROFILE
2) SEE SHEET 31 FOR -Y21REV- PROFILE
3) SEE SHEET 32 FOR -Y22REV- PROFILE
4) SEE SHEET 57 FOR -LPA54- PROFILE
5) SEE SHEET 59 FOR -LPD54- PROFILE
6) SEE SHEET 59 & 60 FOR -RPD54- PROFILE
7) 150mm MONOLITHIC ISLAND
8) SEE SHEET 2-N FOR BRIDGE SKETCH DETAILS
9) SEE SHEET 2-M FOR SHEAR POINT DIAGRAM
10) SEE SHEET 2-O FOR DITCH DETAILS
11) SEE SHEET S- THRU S- FOR STRUCTURE PLANS
12) SEE SHEET 3-Q FOR SHOULDER BERM GUTTER STATIONING

TRAFFIC DIAGRAM

NC54 — 2005 ADT 3065 ADT (2025) — 3-SU — 3-SU — NC54

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY: DATE:
CHECKED BY: DATE:

REVISIONS
RIGHT-OF-WAY REVISION MADE 4-1-2003 PROPERTY NAME CHANGED ON PARCEL 904Z AND 908Z

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	12
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R /W REV.

NAD 83

ANVIL
(LUTHER GREEN, HEIRS)
908Z

-RPD54-

Pls Sta 0+41.678
Es = 3°01' 20.8"
Ls = 125.000
LT = 83.345
ST = 41.678
R, = 1184.800

Pls Sta 2+08.368
Es = 5°06' 56.5"
Ls = 125.000
LT = 83.368
ST = 41.698

Pl Sta 3+00.947
Δ = 8°19' 31.9" (LT)
L = 101.715
T = 50.947
R = 700.000
SE = 0.05
INC = SEE PLANS

Pls Sta 3+93.414
Es = 5°06' 56.5"
Ls = 125.000
LT = 83.368
ST = 41.698

Pl Sta 5+20.548
Δ = 25°16' 09.9" (RT)
L = 66.155
T = 33.624
R = 150.000
SE = 04
RO = SEE PLANS

-RPA54-

Pls Sta 0+72.855
Es = 12°12' 09.4"
Ls = 125.000
LT = 72.855
ST = 62.597
Δ1 = 3°07' 47.9"
Δ2 = 9°04' 21.5"
RI = 1141.600
R2 = 395.000

-RPA54- 1+96.009
END -L- PAVEMENT
BEG. -RPA54- PAVEMENT

Pl Sta 2+31.992
Δ = 30°18' 42.F (RT)
L = 208.970
T = 106.992
R = 395.000
SE = 0.07

Pls Sta 3+75.737
Es = 9°03' 56.8"
Ls = 125.000
LT = 83.443
ST = 41.766

Pl Sta 5+45.982
Δ = 29°07' 31.0" (LT)
L = 76.250
T = 38.968
R = 150.000
SE = 0.04
RO = SEE PLANS

SCSta. 1+25.000 -RPA54-

+25.000 -RPA54-
30.000m(RT)
(98.43')

STA. 69+60 -L- TO
STA 70+25 -L- LT.
LAT. "V" DITCH
W/ 75 MTONS CL 'B' RR
& 240.02 SM FF LINER
SEE SHEET 2-O,
DETAIL 6

ANVIL
(INVESTORS OF THE TRIANGLE)
904Z

STA. 70+25 -L- TO
STA. 70+35 -L- LT.
LAT. "V" DITCH
SEE SHEET 2-O,
DETAIL 2

POCSta 71+15.318
CSSta. 0+00.000 -RPA54-
19.80m LT.

+15.318 -L-
30.000m(LT)
(164.04')

USE STD. 850.10
BERM DRAIN OUTLET

STA. 71+40 -L- TO
STA. 71+58 -L- LT.
SPECIAL GRADE
BERM DITCH

MATCH LINE TO SHEET 10 & 11 STA 68+30.000 -L-

MATCH LINE TO SHEET 13 STA 71+60.000

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD # 369-93-R/W
904

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD # 188-95-R/W
908

EXSTNG R/W

CHORD

CLASS "B" RIP RAP
EST. 1.8 TONS
FILTER FABRIC
EST. 5.9 SM

375 RCP

400 CSP

450 RCP

600 RCP

STREAM BUFFER

SOIL

SUPPORTS FOR OVERHEAD
SIGN ASSEMBLY "H"

CABLE GUIDERAIL

F.S.

-RPD54- 2+01.873
END -L- PAVEMENT
BEG. -RPD54- PAVEMENT

BL# 7266
STA 70+38.743 -BL-=
STA 68+53.573 -L-
1.462 RT.

INVESTORS OF THE TRIANGLE
904Z

+25.000 -RPD54
40.000m(LT)
131.23'

SRSSta. 1+25.000 -RPD54-

BL# 7268
STA 71+92.300 -BL-=
STA 70+07.330 -L-
0.025 LT.

LEVEL SPREADER
96 SM OF PERMANENT SOIL
REINFORCEMENT MATTING
SEE SHEET 2-P, DETAIL 2
6 MTONS CL "A" RR
20 SM FF

+60.000 -L-
60.000m(RT)
(196.85')

POCSta 70+60.000 -L-
CSSta 0+00.000 -RPD54-
19.80m RT.

CLASS "B" RIP RAP
EST. 2.7 TONS
FILTER FABRIC
EST. 9.2 SM

CLASS "B" RIP RAP
EST. 2.7 TONS
FILTER FABRIC
EST. 8.4 SM

STA. 71+55 -L-
TAIL DITCH CLEAN OUT
10m @ 0.3%
W/ 11 MTONS CL 'B' RR
& 28.25 SM FF
SEE SHEET 2-O, DETAIL 15

-L-

Pls Sta 66+28.197
Es = 3°04' 25.7"
Ls = 125.0
LT = 83.3459
ST = 41.6781

Pl Sta 70+00.311
Δ = 31°40' 21.7" (LT)
L = 644.0034
T = 330.4600
R = 1165.0000
SE = 06
INC = 20.833

Pls Sta 73+55.533
Es = 3°04' 25.7"
Ls = 125.0
LT = 83.3459
ST = 41.6781

NOTES:

1) SEE SHEET 28 & 29 FOR -L- PROFILE
2) SEE SHEET 58 FOR -RPA54- PROFILE
3) SEE SHEET 59 FOR -RPD54- PROFILE
4) SEE SHEET 2-M FOR SHEAR POINT DIAGRAM
5) SEE SHEET 2-O FOR DITCH DETAILS

R-2AB-2003 08-30
P:\proj\unit\projects\r-2ab12.dgn
Fisher-N AT R2005820

REVISIONS
RIGHT-OF-WAY REVISION MADE 4-1-2003
PROPERTY NAME CHANGED ON PARCEL 904Z

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2000AB	13
	R /W SHEET NO.	
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R /W REV.	PRELIMINARY PLANS NOT APPROVED FOR CONSTRUCTION	

NAD 83

-L-
PIs Sta 66+28.197 Θs = 3°04'25.7" Ls = 125.0 LT = 83.3459 ST = 41.6781
PI Sta 70+00.311 Δ = 31°40'21.7" (LT) L = 644.0034 T = 330.4600 R = 1,165.0000 SE = 06 INC = 20.833
PIs Sta 73+55.533 Θs = 3°04'25.7" Ls = 125.0 LT = 83.3459 ST = 41.6781

STA. 73+80 -L- TO STA. 74+60 -L- LT. STD. BERM DITCH W/ 138 MTONS CL 'B' RR & 348.83 SM FF LINER SEE SHEET 2-0, DETAIL 16

ANVIL (INVESTORS OF THE TRIANGLE)

904Z

PCSta. 10+24.325 -CD2-

POTSta. 10+00.000 -CD2- = POSSta. 73+59.839 -L- (21.735 LT)

USE STD. 850.10 BERM DRAIN OUTLET

CSSta. 73+13.855 -L-

STA. 71+58 -L- TO STA. 71+80 -L- LT. SPECIAL GRADE BERM DITCH

STA. 72+80 -L- TO STA. 73+40 -L- LT. STD. BERM DITCH

STA. 73+40 -L- TO STA. 73+55 -L- LT. STD. BERM DITCH

+20.000 -L- 70.000m(LT) (229.66')

+13.855 -L- 70.000m(LT) (229.66')

CHORD

EXISTING R/W

N40°13'47"E 144.863

N37°19'58"W 168.703

70m UNIFORM TAPER

904

N.C.D.O.T. PROPOSED R/W OF R-2000A PSD # 369-93-R/W

72.589 m TRANSITION

400 CS

2GI

F.S.

N 35°12'47.0" E

MATCH LINE TO SHEET 12 STA 71+60.000 -L-

MATCH LINE TO SHEET 14 STA 74+10.000 -L-

CABLE GUIDERAIL

72+00

73+00

74+00

450 RCP

600 RCP

375 RCP

2GL TYPE A

CAT-1

8:1

SUPPORTS FOR OVERHEAD SIGN ASSEMBLY "I"

90m TAPER

S34°50'59"W 157.508

S37°19'58"W 167.075

INVESTORS OF THE TRIANGLE

904Z

BL# 7271 = STA 74+15.602 -BL- = STA 72+29.818 -L- 9.819 LT.

+13.855 -L- 60.000m(RT) (196.85')

STREAM BUFFER

NOTES:
1) SEE SHEET 29 FOR -L- PROFILE
2) SEE SHEET 2-O FOR DITCH DETAILS

REVISIONS
RIGHT-OF-WAY REVISION MADE 4-1-2003 PROPERTY NAME CHANGED ON PARCEL 904Z

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2000AB	14
	R /W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST.REV.		
R /W REV.		

END PROJECT R-2000AB
POT Sta 74+40.000 -L-

NAD 83

DURHAM COUNTY
WAKE COUNTY

-L-
PI Sta 74+56.040
Δ = 0° 22' 03.4" (LT)
L = 32.079
T = 16.040
R = 5,000.000
SE = NC
RO = 0

PI Sta 74+88.119
Δ = 0° 22' 03.4" (RT)
L = 32.079
T = 16.040
R = 5,000.000
SE = NC
RO = 0

-CD2-
PI Sta 10+46.725
D = 3° 39' 56.2" (LT)
L = 44.784
T = 22.400
R = 700.000

COORDINATE EQUALITY
POTSta. 10+79.722 -CD2- LB=
N 234,786.921 E 624,355.542
POTSta. 11+14.089 -CD- LA=
N 234,786.857 E 624,355.748

STA. 74+60 -L- TO
STA. 74+83 -L- LT.
1.0m LAT. BASE DITCH
W/ 54 MTONS CL 'B' RR
AND 130.22 SM FF LINER
SEE SHEET 2-0, DETAIL 17

PTSta. 10+69.109 -CD2-
END WW FENCE
+40.000 -L-

+38.855 -L-
70.000m(LT)
(229.66')

+80.000 -L-
70.000m(LT)
(229.66')
PLACE BY OTHERS

CLASS "B" RIP RAP
EST. 4.5 TONS
FILTER FABRIC
EST. 11.7 SM

EXISTING R/W
EXIST. R/W

72.589 m
TRANSITION

600 RCP
375 RCP
2GI
F.S.
TYPE A

END GUIDERAIL
STA. 74+40.000 -L-

FUTURE LANES

FUTURE CONSTRUCTION LIMITS

N 31° 33' 28.3" E

COORDINATE EQUALITY
PCSta. 74+40.000 -L- LB=
N 234,773.763 E 624,374.752
PCSta. 74+40.000 -L- LA
N 234,773.699 E 624,374.958

STSta. 74+38.855 -L-

END GRADING
POCSta 74+60.000 -L-

PRCSta. 74+72.079 -L-

PTSta 75+04.159 -L- BK =
PTSta 75+04.221 -L- AH

(TO BE DONE BY OTHERS)

N.C.D.O.T.
PROPOSED R/W OF R-2000A
PSD # 369-93-RW

ANVIL
(INVESTORS OF THE TRIANGLE)
DB 5605 PG 216
DB 3490 PG 163

904Z

ON PL
83.476m (280.433')
NO MONUMENT
PLACE BY OTHERS

+72.000 -L-
83.476m (280.433')

END CONSTRUCTION
-Y1- POT Sta 14+03.657
+64.000 -L-
ON R/W

+40.000 -L-
ON R\W
PLACE BY OTHERS

+95 -Y1-
15.000m (49.21')
PLACE BY OTHERS
ON PL
ON R/W
PLACE BY OTHERS

RUBY D. RANSDELL
NO REFERENCE
0202

+20 -Y1-
23 m (75.46')

PDE
TDE
EXIST. R/W
FUTURE CONSTRUCTION LIMITS
FUTURE ROAD
14+00
75+00
76+00

+40.000 -L-
ON R/W,
PLACE BY OTHERS

S31°06'12"W
184.42'
+77 -L-
EXIST. R/W

INVESTORS OF THE TRIANGLE
904Z
+24 -L-
EXIST. R/W & 70 m
(229.66')

+83 -L-
70.000 m (229.66')

24.629/
S34°25'11"W
+51.793/
45.928m (150.64')

MATCH LINE TO SHEET 15 STA 74+10.000 -L-

MATCH LINE TO SHEET 15 STA 76+80.000 -L-

NOTES:
1) THIS SHEET WILL BE USED FOR THE ACQUISITION OF ADDITIONAL RIGHT OF WAY FOR PROJECT R-2000AC

RIGHT OF WAY REVISION MADE 5-22-03 PER TRACY PARROTT'S REQUEST AT R-2000AC FFI. A NEW ROW MONUMENT WAS ADDED ON -Y1- AT STATION 10+29.622 ON EXISTING ROW LINE AND ROW LINE WAS EXTENDED BACK TO THE MONUMENT AT 11+59.510 -Y1-.

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Fletcher AT RD65620

8/17/99

MATCH LINE TO SHEET 14 STA 76+80.000 -L-

FUTURE CONSTRUCTION LIMITS

FUTURE CONSTRUCTION LIMITS N.C.D.O.T. PROPOSED R/W OF R-2000A PSD # 235-92-L

FUTURE CONSTRUCTION LIMITS

PDE PDE PDE PDE PDE PDE

PT Sta 11+72.948 -Y1-

+62 -Y1- 18.259 m (59.90') PROP. R/W

+72.948 -Y1- 15 m (49.21') PLACE BY OTHERS

+19.510 -Y1- PL PLACE BY OTHERS

FC Sta 11+22.683 -Y1-

STSta 16+70.204 -RPB-

+40 -RPB- 30 m (98.43')

+94 -RPB- 30 m (98.43')

CSSta 16+10.204 -RPB-

SCSta 11+42.030 -RPC-

STSta 10+82.030 -RPC-

0202

RUBY RANSDELL DB 932 PG 509

N.C.D.O.T. DB 1119 PG 149

13+00 12+00 11+00 14+00 15+00 16+00 77+00 78+00 79+00 80+00

FUTURE LANES

FUTURE ROAD

SLATER RD 75 BST

SOIL

MTL

CONC

EXIST. R/W

+45 -L- EXIST. R/W PLACE BY OTHERS

+66 -L- EXIST. R/W PLACE BY OTHERS

+05.852 48.574m (159.37') END FENCE

+34.84 72.283m (237.15') END FENCE

-L- +64.307 64.02m (209.99') BEGIN FENCE

50.000m (164.00') BEGIN FENCE

RICHARD R. JONES DB 2960 PG 418 DB 2809 PG 97 DB 1129 PG 391 MB 135 PG 64 MB 134 PG 186

39

NAD 83

METRIC

5 0 10

CONST. REV.

R/W REV.

PROJECT REFERENCE NO. R-2000AB

SHEET NO. 15

R/W SHEET NO.

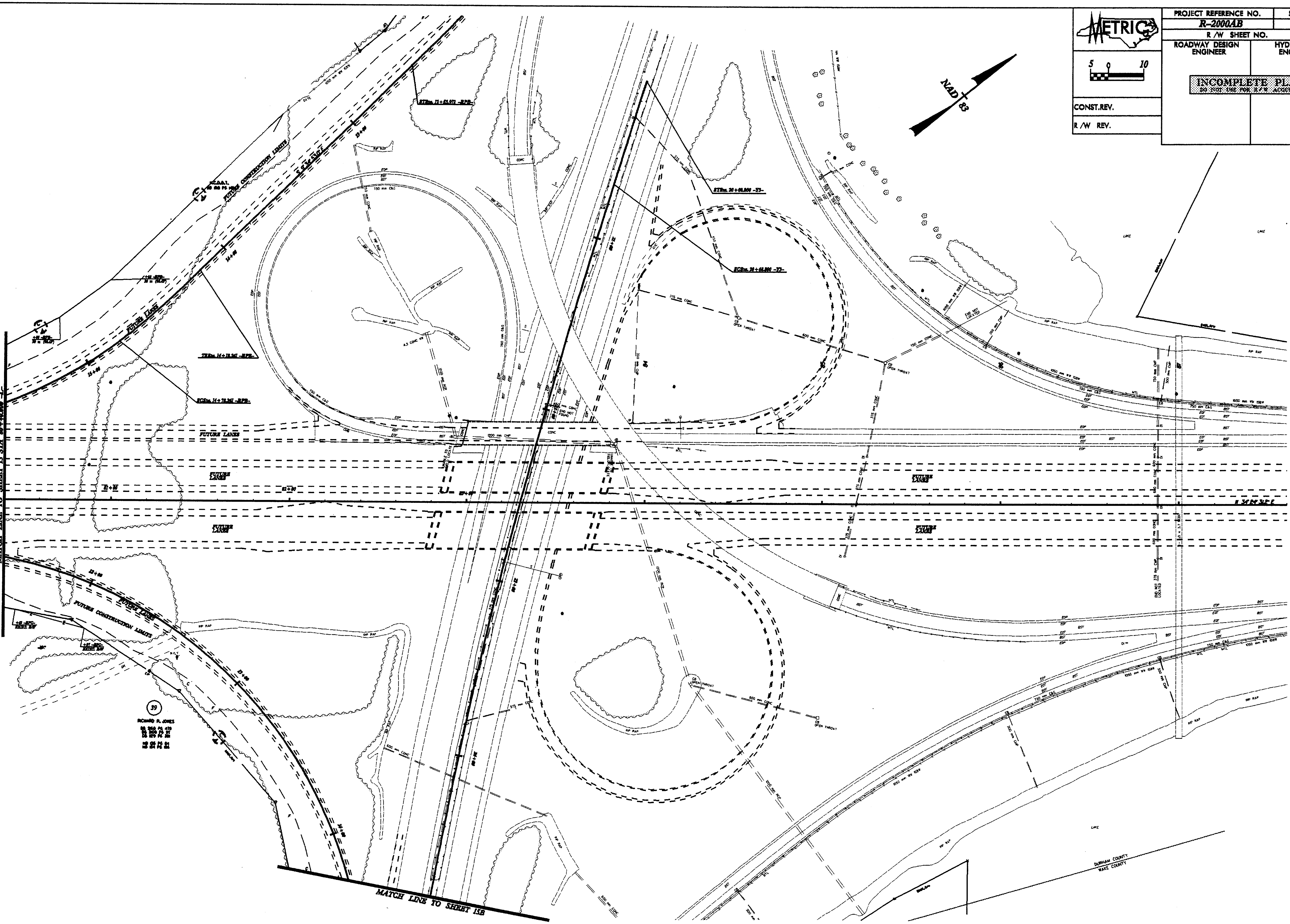
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS NOT FOR CONSTRUCTION

MATCH LINE TO SHEET 15A STA 80+40.000 -L-

8/17/99



PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	15A

R /W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

METRIC

5 0 10

CONST.REV.

R /W REV.

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Fletcher AT RD065820

8/17/99

MATCH LINE TO SHEET 15A

25+00

15+00

450 mm CMP

450 mm CONC

150 mm CONC

DURHAM COUNTY
WAKE COUNTY

1050 mm WW ISBW

300 mm CMP

RIP RAP

150 mm C&G

MTL

39
RICHARD R. JONES
DB 2160 PG 478
DB 2909 PG 97
DB 1129 PG 391
MB 135 PG 64
MB 134 PG 186

39

CSSta. 15+02.503 -RPC-

E/P

20.62d
N88°22'19"W

E/P

S01°49'40"W
5.90T

STSta. 15+62.503 -RPC-

FUTURE CONSTRUCTION LIMITS

FUTURE LANES

26+00

I-40 EBL BST

EOT

BST

EOP

600 mm CONC

450 mm CONC

27+00

I-40 WBL BST

END NOT LOCATED

28+00

750 mm CONC

CSSta. 27+68.891 -Y3-

STSta. 28+28.891 -Y3-

CSM REAL ESTATE PARTNERS
DB 5014 PG 451
MB 1991 PG 805

NAD 83

EAST. R/R

MATCH LINE TO SHEET 15C

METRIC

5 0 10

PROJECT REFERENCE NO.
R-2000AB

SHEET NO.
15B

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

CONST. REV.

R/W REV.

8/17/93

RIGHT-OF-WAY REVISION MADE 1-10-2003. PERMANENT DRAINAGE EASEMENT CHANGED TO TEMPORARY DRAINAGE EASEMENT ON PARCEL 41.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	15C
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

CONST.REV.

R /W REV.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83

MATCH LINE TO SHEET 15B

LAKE

LAKE

EMERGENCY SPILLWAY

RIP RAP

RIP RAP

EOP
BST
EOT
BST
EOT
BST
EOT
I-40 WBL BST
EOT
BST DI
EOT
I-40 EBL BST
EOT
BST
EOP

MTL 1050 mm WW ISBW
DI
1050 mm WW ISBW
MTL
DI
1050 mm WW ISBW
S

29+00
30+00
31+00

750 mm CONC
DI
450 mm CONC
DI
MTL
MTL
DI
MTL
MTL
DI
MTL
MTL
750 mm CONC
CONC
F
C
C
13.4 CONC HW
3.7 CONC WW
5.0L x 3.0 RCBC
4.9 CONC WW
375 mm CMP
F
EIP
EXIST. R/W
EIP
EIP
S 27°55'54" W
500.00'
EIP
EIP
+75.961 -Y3-
EXIST. R/W
+83 -Y3-
PL
41
+50 -Y3-
EXIST. R/W
TDE
+50 -Y3-
75 ms (246.06')
TDE
TDE
TDE
83.00'
S05°41'42"E

CSM REAL ESTATE PARTNERS
DB 5014 PG 451
MB 1991 PG 805

40

CONCOURSE DEVELOPMENT, I, L.L.C.
DB 8310 PG 2529
DB 8231 PG 1217
MB 1986 PG 354

RIGHT OF WAY REVISION MADE 5-22-03 PER TRACY PARROTT'S REQUEST AT R-2000AC FFI. A NEW ROW MONUMENT WAS ADDED ON -Y1- AT STATION 10+29.622 ON EXISTING ROW LINE AND ROW LINE WAS EXTENDED BACK TO THE MONUMENT AT 11+59.510 -Y1-.

8/17/99

POTSta. 10+00.000 -Y2-

80.772 (265') CAROLINA POWER & LIGHT TRANSMISSION LINE EASEMENT

80.772

U/C

GR

RIP RAP

RIP RAP

17.2 CONC HW

N/F 1.53ac

C

C

C

900 mm CONC

S 15°52'16" E

F

FUTURE CONSTRUCTION LIMITS

11+00

FUTURE LANES

12+00

450 mm CONC

NCDOT

TSSta. 12+03.232 -Y2-

NAD 83

PETULA ASSOCIATES, LTD.
DB 2069 PG 767
PARCEL 3

Under Construction

+77 -Y2-
EXIST. R/W

ON R\W -Y2-
ON PL
PLACE BY
OTHERS

+00 -Y2-
32 m (104.99')

ON R\W -Y2-
32m (104.99')

PDE

N/F 1.53ac

ARGUS ROAD
(UNDEVELOPED)

42

W.288

NATIONS BANK
NO REFERENCE

43

18.288
S81°43'15"E

ON PL
ON PL
PLACE BY
OTHERS

ON R\W -Y2-
28 m (91.86')

ON R\W -Y2-
ON PL
PLACE BY
OTHERS

+73.000 -Y2-
ON R\W

44

PC Sta 10+19.914 -Y1-

FLORIA MAE McGHEE GLENN
& RUTH McGHEE HOOKER
DB 2223 PG 853

64.008
S08°12'55"W

EIP

PT Sta 10+38.884 -Y1-

51.607
S81°43'15"E

EIP

+29.622 -Y2-
ON R\W

FUTURE CONSTRUCTION LIMITS

FUTURE LANES

FUTURE CONSTRUCTION LIMITS

SCSta. 12+63.232 -Y2-

NCDOT
DB 1719 PG 149

MATCH LINE TO SHEET 15

METRIC

5 0 10

CONST.REV.

R/W REV.

PROJECT REFERENCE NO. R-2000AB | SHEET NO. 15D

R/W SHEET NO.

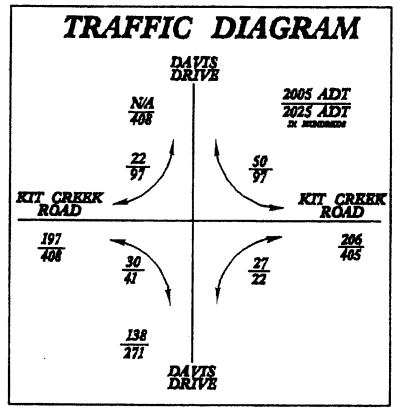
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
NO SIGNATURE REQUIRED

REVISIONS

TRAFFIC DIAGRAM

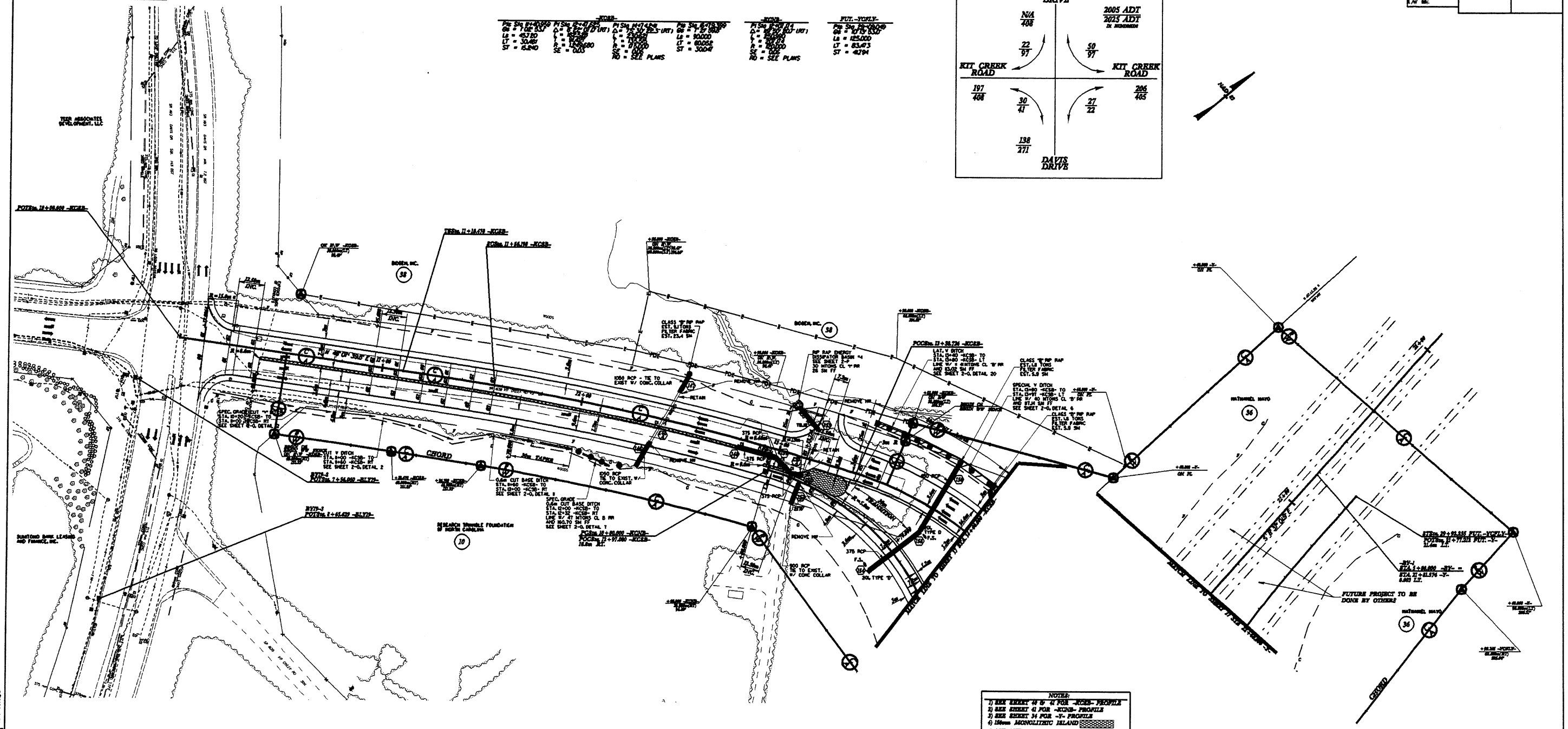


PROJECT REFERENCE NO.	SHEET NO.
0.1800128	1
R.W. SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS

CONST.SW.

R/W SW.



LOCATION:	
TIP NO.:	COUNTY:
DESIGNED BY:	DATE:
CHECKED BY:	DATE:

REVISIONS

TRAFFIC DIAGRAM

KIT CREEK CONNECTORS

183 / 202	2065 ADT / 2623 ADT K DIRECTION
62 / 177	142 / 288
I-540	I-540
149 / 978	229 / 1082

NOTES:
1) SEE SHEET 14 FOR -L- PROFILE
2) SEE SHEET 19 FOR -YRPLY- PROFILE
3) SEE SHEET 16 FOR -YCPLY- PROFILE
4) PAVEMENT REMOVAL
5) SEE SHEET 3-L FOR ERROR POINT DIAGRAM
6) SEE SHEET 3-D FOR DITCH DETAILS

METRIC

PROJECT REFERENCE NO. B-5301U
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

CONSTR.
R/W REV.

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA

RELOCATE DITCH
GROUND ELV.=56.4±
STA.=9+ -YRPLY- TO
STA.=9+ -YRPLY- RT
SEE SHEET 3-D, DETAIL #1

PROPOSED CUL-DE-SAC

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA

-L-
PI Sta. 8+09.00
D = 8°09'00" RT
Lc = 125.000
LT = 63.323
ST = 40.72

-YCPLY-
PI Sta. 14+63.53
Δ = 90°57'59" (RT)
D = 57.296
R = 100.000
Lc = 158.675
SE = 0.08

-YRPLY-
PI Sta. 8+00.00
D = 8°13'00"
Lc = 125.000
LT = 63.473
ST = 40.94

STA. 12+68 -YRPLY- TO
STA. 13+40 -YRPLY- PT
DETAIL CHART V DITCH
SEE SHEET 3-D, DETAIL 2

STA. 13+40 -YRPLY- TO
STA. 13+80 -YRPLY- PT
LATERAL DITCH
SEE SHEET 3-D, DETAIL 2

STA. 12+68 -YRPLY- TO
STA. 13+80 -YRPLY- LT.
LINE CURB DITCH
W/ CLASS "B" RIP RAP
SEE SHEET 3-D, DETAIL 2

POT2Sta. 11+69.594 -YCPLY-
POT3Sta. 11+71.493 -YRPLY-

375 RCP

PROPOSED 6'x7' CB (-Y3000A-)
FES # 000-00-0/0

CLASS "B" RIP RAP
SIT: 6.1 TONS
FILTER FABRIC
EST: 17.2 SY

ROAD GRADING
POC STA 34+68.899 -Y-
STA. 34+40 -Y- TO
STA. 35+85 -YCPLY- LT.
LINE CURB DITCH
W/ 183 STONE CL"A" RR
SEE SHEET 3-D, DETAIL 3

PROPOSED 6'x7' CB (-Y2000A-)
FES # 000-00-0/0

APPROX EXCAVATION
FOR FUTURE FULL
QUADRANT GRADING

CLASS "B" RIP RAP
SIT: 6.6 TONS
FILTER FABRIC
EST: 6.7 SY

STA. 35+85 -YCPLY- TO
STA. 36+15 -YCPLY- LT.
LINE CURB DITCH
W/ 7.5 FT. RR PERMANENT SOIL
REINFORCEMENT MAT
SEE SHEET 3-D, DETAIL 27

600 RCP

MATCH LINE TO SHEET 10 STA. 34+68.899 -Y-

MATCH LINE TO SHEET 10 STA. 34+68.899 -Y-

MATCH LINE TO SHEET 12 STA. 24+68.899 -Y-

FUTURE PROJECT TO BE DONE BY OTHERS
-Y-2
POT4Sta. 24+39.04 -RTY- =
POT5Sta. 24+39.04 -Y-
4.00 RT.

CRSta. 24+67.855 FUT. -YCPLY-

BEGIN GRADING
POCSta. 23+88.899 -Y-

-YCPLY-
PI Sta. 21+17.00
Δ = 90°00'00" (RT)
D = 57.296
R = 100.000
L = 157.080
T = 100.000
SE = 0.08
RO = SEE PLANS

-YCRSP-
PI Sta. 21+47.00
Δ = 90°00'00" (RT)
D = 57.296
R = 100.000
L = 157.080
T = 100.000
SE = 0.08
RO = SEE PLANS

-YCRSP-
PI Sta. 8+70.00
Δ = 90°00'00"
D = 57.296
R = 100.000
L = 157.080
T = 100.000
SE = 0.08
RO = SEE PLANS

PROPOSED CUL-DE-SAC

TSSta. 24+78.347 -YCRSP-

PCSta. 21+69.347 -YCRSP- =
POCSta. 24+68.899 -YCPLY-

STA. 24+30 -YCPLY- TO
STA. 24+40 -YCPLY- RT
DITCH

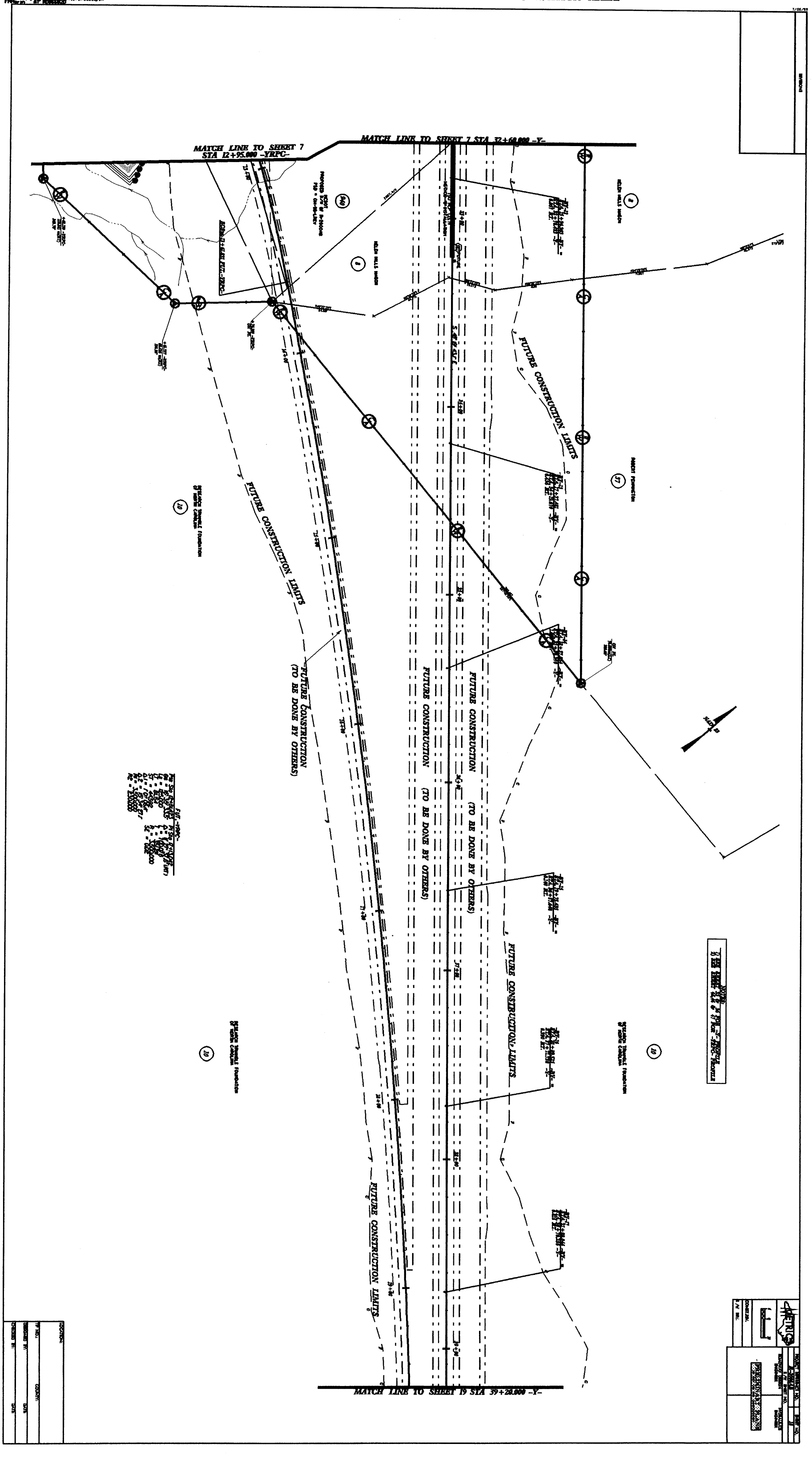
USE STD. 840.00
METAL DRAIN OUTLET

STA. 24+30 -YCPLY-
TO STA. 24+40 -YCPLY-
RT SPECIAL CHART V
DITCH SEE SHEET 3-D
DETAIL 2

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY: DATE:
CHECKED BY: DATE:

RIGHT-OF-WAY REVISION 12-04-2002 -
REDUCED THE RIGHT-OF-WAY TAKE ON PARCEL 10, ADJUSTED MONUMENTS ON PARCEL 10 TO AVOID THE CREEK

RIGHT-OF-WAY REVISION JUNE 20, 2003
ADJUSTED RIGHT-OF-WAY ON PARCEL 10 TO ACCOMODATE RTP PRESERVATION AREA.



8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	19
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

CONST.REV.

R /W REV.

FUT. -YRPC-
PI Sta 17+13.042
Δ = 11° 27' 37.6" (RT)
L = 700.078
T = 351.211
R = 3,500.000

FUT. -Y-
PIs Sta 42+13.060
θs = 4° 05' 33.2"
Ls = 125.000
LT = 83.356
ST = 41.687

PI Sta 44+47.642
Δ = 24° 52' 10.1" (RT)
L = 379.797
T = 192.937
R = 875.000

NAD 83

NOTES:
1) SEE SHEET 36 FOR -Y- PROFILE
2) SEE SHEET 47 FOR -YRPC- PROFILE

TSSta. 41+29.705 FUT. -Y-

SCSta. 42+54.705 FUT. -Y-

RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA

FUTURE CONSTRUCTION (TO BE DONE BY OTHERS)

40+00 S 48° 19' 43.1" E 41+00 42+00

FUTURE CONSTRUCTION (TO BE DONE BY OTHERS)

20+00

MATCH LINE TO SHEET 18 STA 39+20.000 -Y-

MATCH LINE TO SHEET 19A STA 42+60.000 -Y-

RESEARCH TRIANGLE FOUNDATION
OF NORTH CAROLINA

-BY-18
STA. 22+86.585 -BY- =
STA. 39+68.793 -Y-
0.103 LT.

POTSta. 40+30.000 FUT. -Y-
PTSta. 20+61.909 FUT. -YRPC-
17.8m RT.

REVISIONS

6/10/22

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

METRIC 5 0 10

CONST.REV.

R/W REV.

-Y22REV-
PI Sta 10+75.762
Δ = 3° 36' 58.3" (LT)
L = 151.474
T = 75.762
R = 2,400.000
SE = NC

PI Sta 12+27.237
Δ = 3° 36' 58.3" (RT)
L = 151.474
T = 75.762
R = 2,400.000
SE = NC

NAD 83

BEGIN CONSTRUCTION
PCSta. 10+00.000 -Y22REV-
PCSta. 10+00.087 -Y22- (5.043 RT.)

16
ANVIL
(HELEN GREEN DUNNIGAN, HEIRS)

PRCSta. 11+51.474 -Y22REV-

360m MEDIAN TRANSITION

+00.000 -Y22REV-
ON R/W,
15.000m(LT)(49.21')

POTSta. 10+00.000 -Y22-

+51.474 -Y22REV-
25.000m(LT) (82.02')

STA. 10+20 -Y22REV- TO
STA. 11+35 -Y22REV- LT.
SPECIAL GRADE DITCH
SEE SHEET 2-O, DETAIL 28

TIE TO EXISTING DITCH

17
CHESTER B. McCRIMMON

CHORD

EXISTING R/W

11+00 -Y22REV-

11+00 -Y22-

TIE TO EXISTING DITCH
+00.000 -Y22REV-
ON R/W,
10.000m(LT)(32.81')

PDE
HOLD EXISTING EOP

4,622
+78.600

SOUTHERN RR

WHEEL STOP CONTROL

80.960 R/W
(200.00')

+40.000 -Y22REV-
ON R/W,
16.000m(RT) (52.49')

STA. 10+60 -Y22REV- TO
STA. 11+80 -Y22REV- RT.
SPECIAL GRADE DITCH
SEE SHEET 2-O, DETAIL 28

+00.000 -Y22REV-
18.000m(RT) (59.06')

NORTH CAROLINA RAILROAD

32

DURHAM COUNTY
WAKE COUNTY

MATCH LINE TO SHEET 21 STA 11+60.000 -Y22REV

CHURCH ST 6.5 BST

450 mm CONC

600 mm CONC

300 mm CONC

150 BST CURB

BST

CREEK RD 10.0 GR

2-CONC COLS

ISFD

NOTES:
1) SEE SHEET 31 FOR -Y22REV- PROFILE
2) PAINT STRIPING
3) SEE SHEET 2-O FOR DITCH DETAILS

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FPMorgan
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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.

R/W REV.

-Y22REV-
PI Sta 10+75.762
Δ = 3° 36' 58.3" (LT)
L = 151.474
T = 75.762
R = 2,400.000
SE = NC

PI Sta 12+27.237
Δ = 3° 36' 58.3" (RT)
L = 151.474
T = 75.762
R = 2,400.000
SE = NC

NAD 83

PERMANENT SOIL REINFORCEMENT MATTING 75 SM

LEVEL SPREADER RIP RAP BASIN 15mX6m. SEE SHEET 2-P DETAIL I

6 MTONS CL "A" RR

20 SM FF

360m MEDIAN TRANSITION

+00.000 -Y22REV- 25.000m(LT) (82.02') BEGIN CONTROL OF ACCESS BEGIN WW FENCE

PTSta. 13+02.949 -Y22REV-

+02.949 -Y22REV- 25.000m(LT) (82.02')

+40.000 -Y22REV- 25.000m(LT) (82.02') 55.000m(LT) (180.45')

+70.000 -Y22REV- 25.000m(LT) (82.02') 55.000m(LT) (180.45')

+75.000 -Y22REV- 25.000m(LT) (82.02')

BEGIN C&G +60.000

CLASS "B" RIP RAP EST. 6.4 TONS
FILTER FABRIC EST. 18.4 SM

STREAM BUFFER

CHESTER B. McCRIMMON

ANVIL (MADGE P. GREEN)

ANVIL (JOHNNIE B. McCRIMMON)

ANVIL (JAMES A. WILFONG) (MARIA HERRERA)

ANVIL (JESSIE L. CHAVIS)

CHARLIE E. GREEN

17 18 19 20 21 22

R=3.97m

2CI TYPE D CB

375 RCP

900 RCP

450 mm CONC

600 mm CONC

400mm DI

REMOVE

VAR. R/W

WV VAULT

ISBLKD

ISFD

WOODS

WD DECK

POOL

HTR

BLK S

BLK G

12+00 13+00 14+00

S 30° 17' 52.0" E

MATCH LINE TO SHEET 20 STA 11+60.000 -Y22REV

MATCH LINE TO SHEET 10 STA 14+80.000 -Y22REV-

60.960m R/W (200.00')

+00.000 -Y22REV- ON R/W, 18.000m(RT) (59.06')

+90.000 -Y22REV- ON R/W, 18.000m(RT) (59.06')

30m TAPER

3J CONC HW

0.6 x 1.5 CONC

NORTH CAROLINA RAILROAD

32

L9 CONC HW

CHURCH ST 6.5 BST

STA. 10+60 -Y22REV- TO STA. 11+80 -Y22REV- RT. SPECIAL GRADE DITCH SEE SHEET 2-O, DETAIL 28

+00.000 -Y22REV- ON R/W, 18.000m(RT) (59.06') BEGIN CONTROL OF ACCESS NO C/A FENCE

BEGIN CURB & GUTTER STA 13+60.000 -Y22REV-

NOTES:

1) SEE SHEET 31 & 32 FOR -Y22REV- PROFILE
2) PAINT STRIPING
3) 150mm MONOLITHIC ISLAND
4) DESIGN EXCEPTION FOR -Y22REV- VERTICAL AND SSD AT STA. 13+80.000
5) SEE SHEET 2-O FOR DITCH DETAILS

19-JAN-2003 08:42
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Preferences

REVISIONS

NOTES:

1) SEE SHEET 32 & 33 FOR -Y22REV- PROFILE
2) SEE SHEET 33 FOR -Y23- PROFILE
3) PAINT STRIPING
4) 150mm MONOLITHIC ISLAND
5) SEE SHEET 2-O FOR DITCH DETAILS

METRIC

5 0 10

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

-Y22-

PI Sta 21+13.558
Δ = 23° 52' 30.0" (RT)
L = 181.263
T = 91.966
R = 435.000

PI Sta 24+32.396
Δ = 2° 04' 30.0" (LT)
L = 28.981
T = 13.492
R = 745.000

PI Sta 24+82.966
Δ = 5° 01' 31.6" (LT)
L = 74.415
T = 37.081
R = 845.000

-Y22REV-

PI Sta 21+29.839
Δ = 27° 02' 38.1" (RT)
L = 212.402
T = 108.218
R = 450.000
SE = 04
RO = 70.000

PI Sta 24+28.935
Δ = 7° 18' 34.5" (LT)
L = 107.164
T = 53.655
R = 840.000
SE = 03
RO = 50.000
INC = SEE PLANS

NAD 83

WEEKS REALTY LIMITED PARTNERSHIP (15)

WEEKS REALTY LIMITED PARTNERSHIP (15)

WEEKS REALTY LIMITED PARTNERSHIP (15)

WEEKS REALTY LIMITED PARTNERSHIP (15)

EVERETT PROPERTIES LMTD PARTNERSHIP (9072)

N.C.D.O.T. PSD # 124-95-R/W (907)

ON PL
12.000m(LT) -RPD54-
(269.03')

POTSta. 10+88.601 -Y23-
END CONSTRUCTION
POTSta. 10+60.000 -Y23-

+60.000 -Y23-
ON R/W (NO MON.)
20.000m(LT) (65.62')
END CONTROL OF ACCESS
END W.W. FENCE

PROP. 1.5m SIDEWALK

POTSta. 10+00.000 -Y23-
POCSta. 20+31.241 -Y22REV-

VACILIOS CHIOTAKIS (14)

+00.000 -Y22REV-
30.000m(LT) (98.43')

+55.000 -Y22REV-
30.000m(LT) (98.43')

+40.000 -Y23-
20.000m(LT)
(65.62')

+60.000 -Y23-
ON R/W (NO MON.)
20.000m(RT) (65.62')
BEGIN CONTROL OF ACCESS
BEGIN W.W. FENCE

+90.000 -Y22REV-
30.000m(LT) (98.43')

382.445m MEDIAN TRANSITION

END C&G +00.000

ABEL WHITLEY (23)

WALTER C. GREEN (24)

SYLVESTER CURRIE (25)

JAMES DARNELL HOLLAND (26)

+34.024 -Y22REV-
30.000m(LT) (98.43')
END CONTROL OF ACCESS
END W.W. FENCE

PTSta. 22+34.024 -Y22REV-

50m TRANSITION LT

MATCH LINE TO SHEET 11 STA 19+40.000 -Y22REV-

MATCH LINE TO SHEET 23 STA 22+40.000 -Y22REV-

VACILIOS CHIOTAKIS

375 RCP REMOVE

450 RCP

20+00

21+00

22+00

-Y22REV-

CONCRETE COLLAR

RETAIN

PLACE 10 TONS CLASS "A" RIP RAP

NORTH CAROLINA RAILROAD (32)

END CURB & GUTTER
STA 21+00.000 -Y22REV-

+21.622 -Y22REV-
ON R/W

+44.055

+87.157

CLASS "B" RIP RAP
EST. 2.7 TONS
FILTER FABRIC
EST. 8.4 SM

CLASS "B" RIP RAP
EST. 1.8 TONS
FILTER FABRIC
EST. 5.9 SM

+34.024 -Y22REV-
ON R/W
END CONTROL OF ACCESS
NO C/A FENCE

STA. 22+00 -Y22REV- TO
STA. 24+80 -Y22REV- RT.
SPECIAL GRADE DITCH
SEE SHEET 2-O, DETAIL 28

3.1 CONC HW
750 mm CONC

NORTH CAROLINA RAILROAD
SOUTHERN RR

PCSta. 20+21.622 -Y22REV-

~~PCSta. 20+21.592 -Y22-~~

+40.000 -Y22REV-
ON R/W

~~PTSta. 22+02.855 -Y22-~~

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AB	23
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R /W REV.

-Y22-

PI Sta 21+13.558
Δ = 23° 52' 30.0" (RT)
L = 181.263
T = 91.966
R = 435.000

PI Sta 24+32.396
Δ = 2° 04' 30.0" (LT)
L = 26.981
T = 13.492
R = 745.000

PI Sta 24+82.966
Δ = 5° 01' 31.5" (LT)
L = 74.415
T = 37.081
R = 845.000

-Y22REV-

PI Sta 21+29.839
Δ = 27° 02' 38.1" (RT)
L = 212.402
T = 108.218
R = 450.000
SE = 04
RO = 70.000

PI Sta 24+28.935
Δ = 7° 18' 34.5" (LT)
L = 107.164
T = 53.655
R = 840.000
SE = 03
RO = 50.000
INC = SEE PLANS

EVERETT PROPERTIES LMTD PARTNERSHIP

907Z

NAD 83

POND

POND

S10°40'40"E 21.121

26

JAMES DARNELL HOLLAND

60m TRANS. LT.

S6°13'33"E 60.960

PCSta. 23+75.281 -Y22REV-

382.445m MEDIAN TRANSITION

ALEX WEAVER, HEIRS

27

S6°25'1"E 30.480

28

LEROY WEAVER

S6°25'22"E 30.480

29

LINA WEAVER ADKINS

PTSta. 24+82.445 -Y22REV-
POCSta. 24+76.349 -Y22-
4.884 m RT.

S6°43'40"E 30.480

30

WILLIAM J. BARBEE

S8°46'45"E 30.480

S10°48'5"E 27.400

LEAVY BARBEE

JAMES B. GREEN, HEIRS

31

MATCH LINE TO SHEET 22, STA. 22+40.000 -Y22REV-

N84°45'37"E 60.960

S84°41'37"W 60.960

S84°41'37"W 60.960

S84°41'36"W 60.960

S85°02'20"W 60.960

S85°03'42"W 60.960

+91.948

+75.281 -Y22REV-
17.000m(LT)(55.77')

+82.445 -Y22REV-
ON R/W
17.000m(LT)(55.77')

+82.445 -Y22REV-
ON R/W
15.000m(RT)(49.21')

+40.000 -Y22REV-
20.000m(RT)(65.62')

PGSta. 24+18.904 -Y22-

PGCSta. 24+45.885 -Y22-

PTSta. 25+20.000 -Y22-

STA. 23+20 -Y22REV- TO
STA. 24+00 -Y22REV- LT.
SPECIAL GRADE DITCH
SEE SHEET 2-0, DETAIL 28

ISFD

262

263

264

265

266

267

268

375

450

WOODS

REMOVE

EXISTING R/W

VAR. R/W

COMBO CURB & GUTTER

23+00

24+00

25+00

+57.357

+92.357

+49.111

+32.085

+14.242

S 6°25'22.0" E

S12°44'39"E 30.467

S12°44'39"E 30.467

450 mm CONC

TIE TO EXIST. ROADWAY DITCHES

60.960 R/W (200.00')

NORTH CAROLINA RAILROAD

32

SOUTHERN RR

WHEEL STOP CONTROL

WHEEL STOP CONTROL

STA. 22+00 -Y22REV- TO
STA. 24+80 -Y22REV- RT.
SPECIAL GRADE DITCH
SEE SHEET 2-0, DETAIL 28

450 mm CONC

450 mm CONC

SOIL

NOTES:

1) SEE SHEET 30 FOR -Y22REV PROFILE
2) PAINT STRIPING
3) SEE SHEET 2-0 FOR DITCH DETAILS

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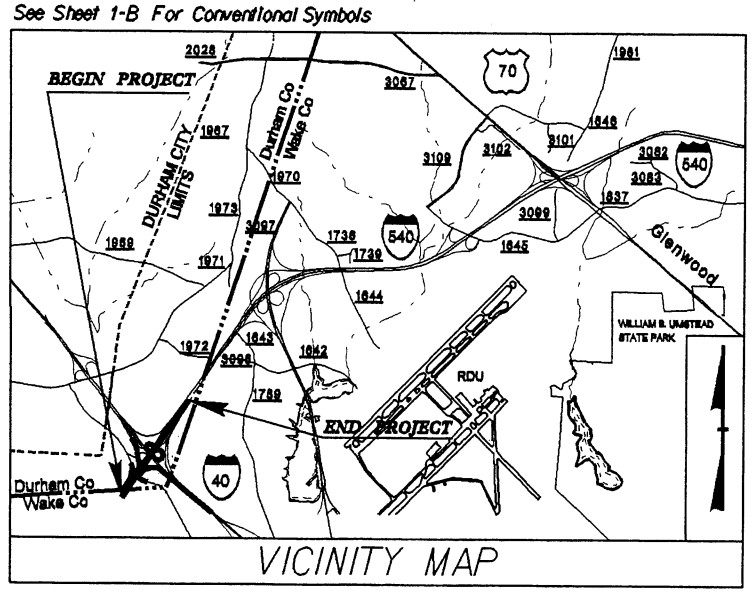
09/09/9

TIP PROJECT: R-2000AC

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE / DURHAM COUNTIES

METRIC

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

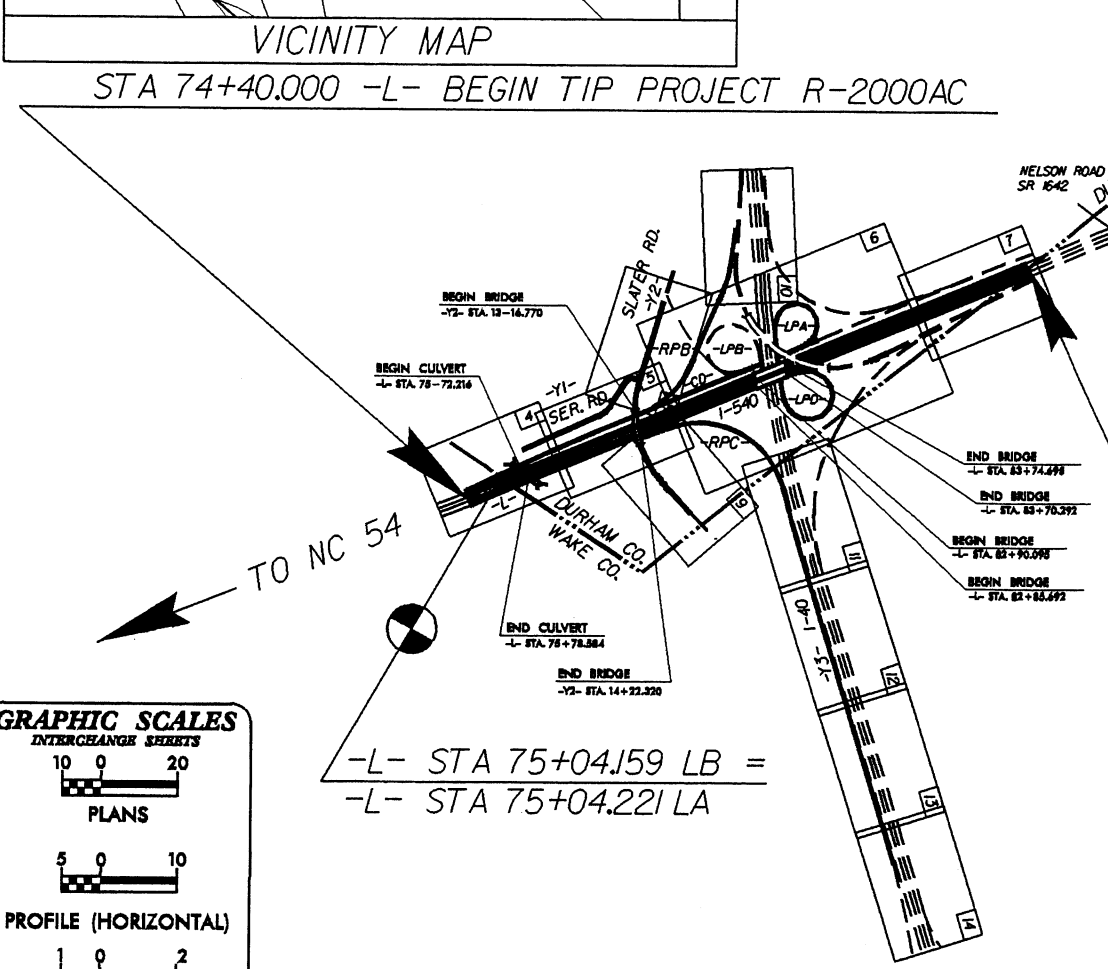
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2000AC	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34365.1.2	NHF-123-1(11)	PE
34365.3.3	NHF-540(5)	CONST.

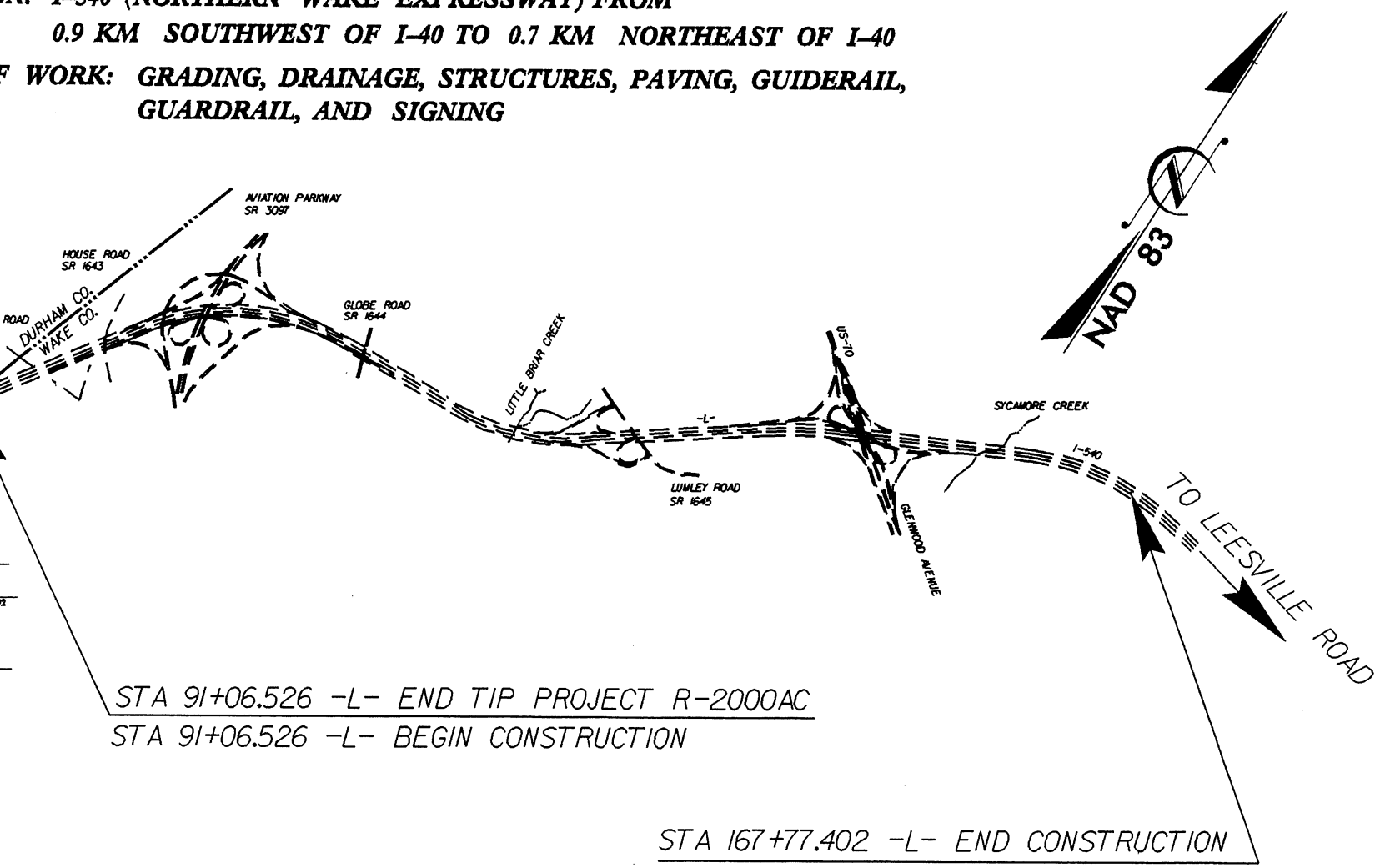
LOCATION: *I-540 (NORTHERN WAKE EXPRESSWAY) FROM 0.9 KM SOUTHWEST OF I-40 TO 0.7 KM NORTHEAST OF I-40*

TYPE OF WORK: *GRADING, DRAINAGE, STRUCTURES, PAVING, GUIDERAIL, GUARDRAIL, AND SIGNING*

STA 74+40.000 -L- BEGIN TIP PROJECT R-2000AC



-L- STA 75+04.159 LB =
-L- STA 75+04.221 LA



STA 91+06.526 -L- END TIP PROJECT R-2000AC
STA 91+06.526 -L- BEGIN CONSTRUCTION

STA 167+77.402 -L- END CONSTRUCTION

GRAPHIC SCALES
INTERCHANGE SHEETS
10 0 20 PLANS
5 0 10 PROFILE (HORIZONTAL)
1 0 2 PROFILE (VERTICAL)

THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

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

DESIGN DATA

ADT 2005	=	59,400
ADT 2025	=	157,200
DHV	=	9 %
D	=	60 %
T	=	18 % *
V	=	110 km/h

* (TTST 12% + DUAL 6%)

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2000AC	=	1.575 km
LENGTH STRUCTURES TIP PROJECT R-2000AC	=	0.091 km
TOTAL LENGTH TIP PROJECT R-2000AC	=	1.666 km

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

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: N/A

LETTING DATE: DECEMBER 16, 2003

BRENDA MOORE, P.E.
PROJECT ENGINEER

THAD F. DUNCAN, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

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

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED
DIVISION ADMINISTRATOR DATE

09-JUN-2003 14:28
bpsmith
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AT R0025801E

5/1/92

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJ. REFERENCE NO.	SHEET NO.
R-2000AC	1 - B

*S.U.E = SUBSURFACE UTILITY ENGINEER

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut — C
- Prop. Slope Stakes Fill — F
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp — WCR
- Curb Cut For Future Wheelchair Ramp — CCFR
- Exist. Guardrail
- Prop. Guardrail
- Exist. Cable Guiderail
- Prop. Cable Guiderail
- Equality Symbol
- Pavement Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/w Marker
- Exist. Control of Access Line — CA
- Prop. Control of Access Line — CA
- Exist. Easement Line — E
- Prop. Temp. Construction Easement Line — E
- Prop. Temp. Drainage Easement Line — TDE
- Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

- Stream or Body of Water
- River Basin Buffer — BZ
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Shoreline
- Falls, Rapids
- Prop Lateral, Tail, Head Ditches — FLOW

STRUCTURES

MAJOR

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

MINOR

- Head & End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Boxes — CB
- Paved Ditch Gutter

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- Cable TV Pedestal — C
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole — P
- Telephone Booth
- Water Manhole — W
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole — T
- Power Transformer
- Sanitary Sewer Manhole
- Storm Sewer Manhole — S
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS

- Recorded Water Line — W
- Designated Water Line (S.U.E.*) — W
- Sanitary Sewer — SS
- Recorded Sanitary Sewer Force Main — FSS
- Designated Sanitary Sewer Force Main(S.U.E.*) — FSS
- Recorded Gas Line — G
- Designated Gas Line (S.U.E.*) — G
- Storm Sewer — S
- Recorded Power Line — P
- Designated Power Line (S.U.E.*) — P
- Recorded Telephone Cable — T
- Designated Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Unknown Utility (S.U.E.*) — ?UTL
- Recorded Television Cable — TV
- Designated Television Cable (S.U.E.*) — TV
- Recorded Fiber Optics Cable — FO
- Designated Fiber Optics Cable (S.U.E.*) — FO
- Exist. Water Meter
- U/G Test Hole (S.U.E.*)
- Abandoned According to U/G Record — ATTUR
- End of Information — E.O.I.

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol — PL
- Exist. Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Property Number — 123
- Parcel Number — 6
- Fence Line — WW & ISBW
- Existing Wetland Boundaries — WLB
- Proposed Wetland Boundaries — WLB
- Existing Endangered Animal Boundaries — EAB
- Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate
- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery
- Dam
- Sign — S
- Well — W
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol — R/W
- Guard Post — GP
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

VEGETATION

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

RAILROADS

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

revised 2/25/97

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PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

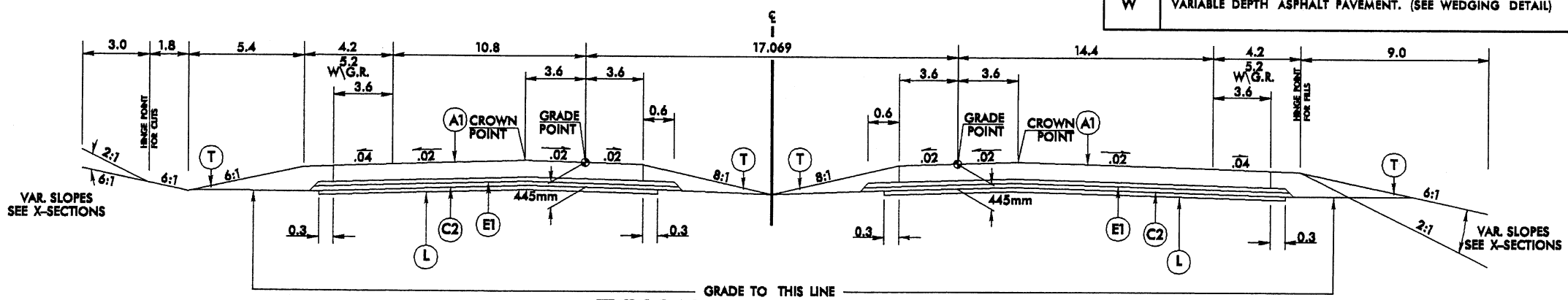
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE

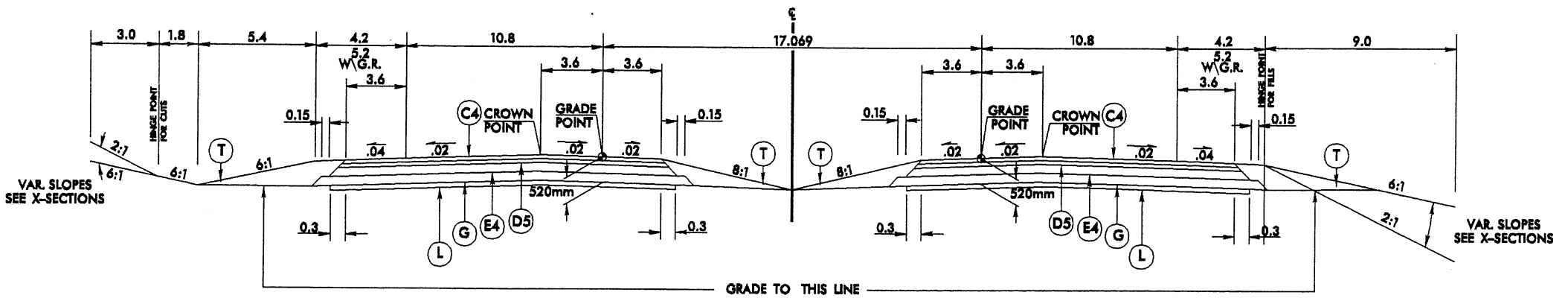
(FINAL PAVEMENT DESIGN)

A1	340 mm PORTLAND CEMENT CONCRETE PAVEMENT.	D4	PROP. APPROX. 110 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 269.50 kg PER SQ. METER.	E7	PROP. APPROX. 400 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 326.67 kg PER SQ. METER IN EACH OF THREE LAYERS.
C1	PROP. APPROX. 60 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5A, AT AN AVERAGE RATE OF 72 kg PER SQ. METER IN EACH OF TWO LAYERS.	D5	PROP. APPROX. 80 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 196 kg PER SQ. METER.	E8	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 75 mm IN DEPTH OR GREATER THAN 140 mm IN DEPTH.
C2	PROP. APPROX. 30 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 72 kg PER SQ. METER.	D6	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 55 mm OR GREATER THAN 110 mm IN DEPTH.	E9	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 75 mm IN DEPTH OR GREATER THAN 140 mm IN DEPTH.
C3	PROP. APPROX. 70 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 84 kg PER SQ. METER IN EACH OF TWO LAYERS.	D7	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 55 mm OR GREATER THAN 110 mm IN DEPTH.	G	PROP. 200 mm CEMENT TREATED AGGREGATE BASE COURSE.
C4	PROP. APPROX. 70 mm ASPHALT CONC. SURFACE COURSE, TYPE S12.5D, AT AN AVERAGE RATE OF 84 kg PER SQ. METER IN EACH OF TWO LAYERS.	D8	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 55 mm OR GREATER THAN 110 mm IN DEPTH.	J1	200 mm AGGREGATE BASE COURSE.
C5	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5A, AT AN AVERAGE RATE OF 2.4 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 30 mm IN DEPTH OR GREATER THAN 40 mm IN DEPTH.	E1	PROP. APPROX. 75 mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 183.75 kg PER SQ. METER.	J2	250 mm AGGREGATE BASE COURSE.
C6	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 2.4 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 30 mm IN DEPTH OR GREATER THAN 40 mm IN DEPTH.	E2	PROP. APPROX. 90 mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 220.5 kg PER SQ. METER.	L	SUBGRADE TO BE STABILIZED WITH 110 TO 220 kg PER SQ. METER OF CEMENT/LIME STABILIZER AGGREGATE MIXED WITH THE TOP 75 mm OF SUBGRADE SOIL AT LOCATIONS DIRECTED BY THE ENGINEER.
C7	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S12.5D, AT AN AVERAGE RATE OF 2.4 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 35 mm IN DEPTH OR GREATER THAN 60 mm IN DEPTH.	E3	PROP. APPROX. 80mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 196 kg PER SQ. METER.	P	PRIME COAT AT THE RATE OF 1.6 L PER SQ. METER.
D1	PROP. APPROX. 60 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 147 kg PER SQ. METER.	E4	PROP. APPROX. 170 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 208.25 kg PER SQ. METER IN EACH OF TWO LAYERS.	R1	750 mm CONCRETE CURB AND GUTTER.
D2	PROP. APPROX. 70 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 171.50 kg PER SQ. METER.	E5	PROP. APPROX. 210 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 257.25 kg PER SQ. METER IN EACH OF TWO LAYERS.	T	EARTH MATERIAL.
D3	PROP. APPROX. 80 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 196 kg PER SQ. METER.	E6	PROP. APPROX. 280 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 343.0 kg PER SQ. METER IN EACH OF TWO LAYERS.	U	EXISTING PAVEMENT.
				W	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2

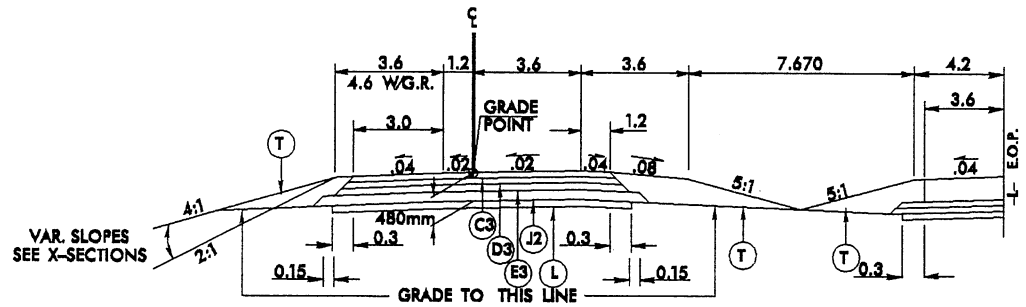
USE TYPICAL NO. 1

-L- STA. 74+40.000 TO 75+04.159 LB =
-L- STA. 75+04.221 LA TO 82+85.692 (BEGIN BRIDGE)

USE TYPICAL NO. 2

-L- STA. 83+70.292 (END BRIDGE) TO 91+06.526

A1	340mm CONCRETE.
C1	60mm S9.5A.
C2	30mm S9.5B.
C3	70mm S9.5C.
C4	70mm S12.5D.
C5	VAR. S9.5A.
C6	VAR. S9.5C.
C7	VAR. S12.5D.
D1	60m I19.0B.
D2	70mm I19.0C.
D3	80mm I19.0C.
D4	110mm I19.0C.
D5	80mm I19.0D.
D6	VAR. I19.0B.
D7	VAR. I19.0C.
D8	VAR. I19.0D.
E1	75mm B25.0B.
E2	90mm B25.0B.
E3	80mm B25.0C.
E4	170mm B25.0C.
E5	210mm B25.0C.
E6	280mm B25.0C.
E7	400mm B25.0C.
E8	VAR. B25.0B.
E9	VAR. B25.0C.
G	200mm CTABC.
J1	200mm ABC.
J2	250mm ABC.
L	SUBGRADE STABILIZER.
P	PRIME COAT.
R1	750mm C & G.
T	EARTH MATERIAL.
U	EXIST. PAVEMENT.
W	WEDGING.



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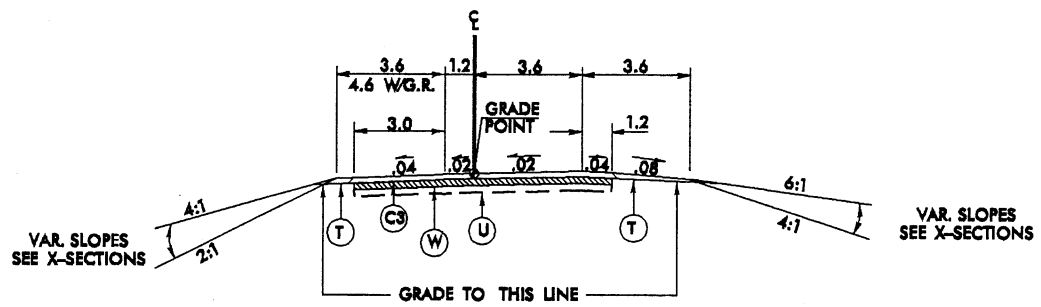
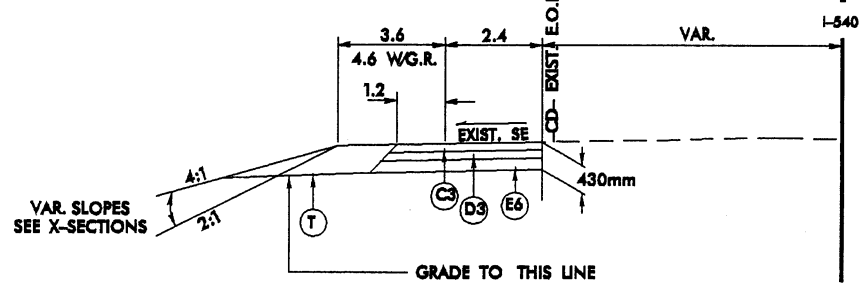
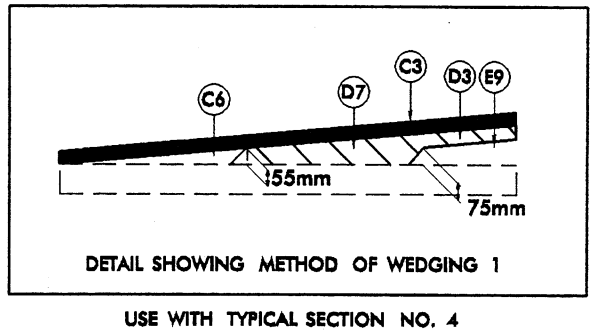


TYPICAL SECTION NO. 4

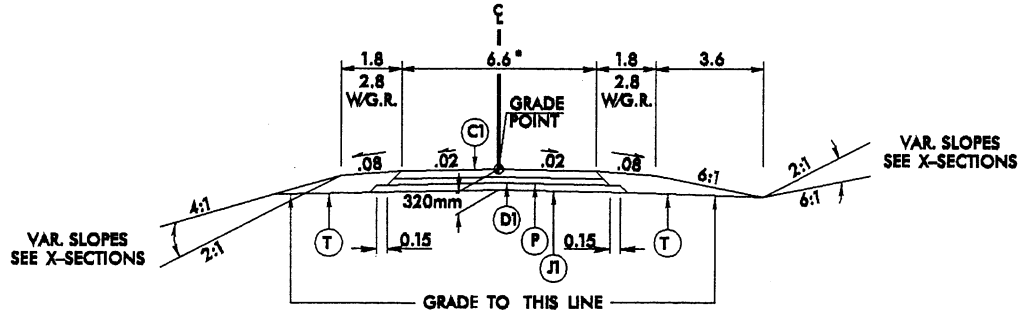


TYPICAL SECTION NO. 4–A



DETAIL SHOWING METHOD OF WEDGING 1

USE WITH TYPICAL SECTION NO. 4



TYPICAL SECTION NO. 5

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

USE TYPICAL NO. 3

USE –L– PAVEMENT DESIGN –CD– STA. 11+14.089 TO 12+70.302 (SEE TYPICAL SECTION NO. 1)
–CD– STA. 12+70.302 TO 19+55.000

USE TYPICAL NO. 4

–CD– STA. 19+55.000 TO 19+73.289 (BEGIN EXIST. BRIDGE)
–CD– STA. 20+55.978 (END EXIST. BRIDGE) TO 21+60.000

USE TYPICAL NO. 4–A

–CD– STA. 25+75.374 TO 32+14.283

USE TYPICAL NO. 5

*–Y1– STA. 10+18.076 TO 10+48.884 TRANSITION FROM 8.6 LANE WIDTH TO 6.6 LANE WIDTH
–Y1– STA. 10+48.884 TO 13+98.063

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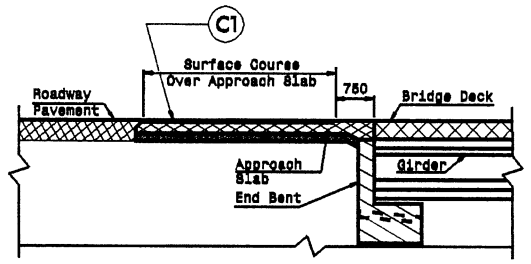
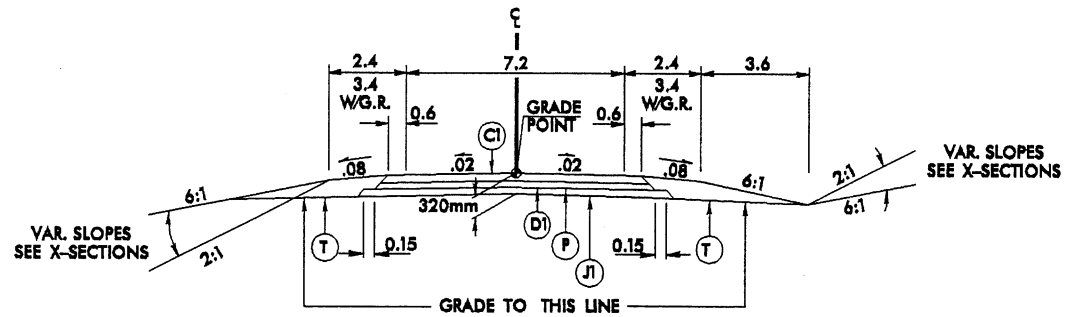
A1	340mm CONCRETE.
C1	60mm S9.5A.
C2	30mm S9.5B.
C3	70mm S9.5C.
C4	70mm S12.5D.
C5	VAR. S9.5A.
C6	VAR. S9.5C.
C7	VAR. S12.5D.
D1	60m I19.0B.
D2	70mm I19.0C.
D3	80mm I19.0C.
D4	110mm I19.0C.
D5	80mm I19.0D.
D6	VAR. I19.0B.
D7	VAR. I19.0C.
D8	VAR. I19.0D.
E1	75mm B25.0B.
E2	90mm B25.0B.
E3	80mm B25.0C.
E4	170mm B25.0C.
E5	210mm B25.0C.
E6	280mm B25.0C.
E7	400mm B25.0C.
E8	VAR. B25.0B.
E9	VAR. B25.0C.
G	200mm CTABC.
J1	200mm ABC.
J2	250mm ABC.
L	SUBGRADE STABILIZER.
P	PRIME COAT.
R1	750mm C & G.
T	EARTH MATERIAL.
U	EXIST. PAVEMENT.
W	WEDGING.



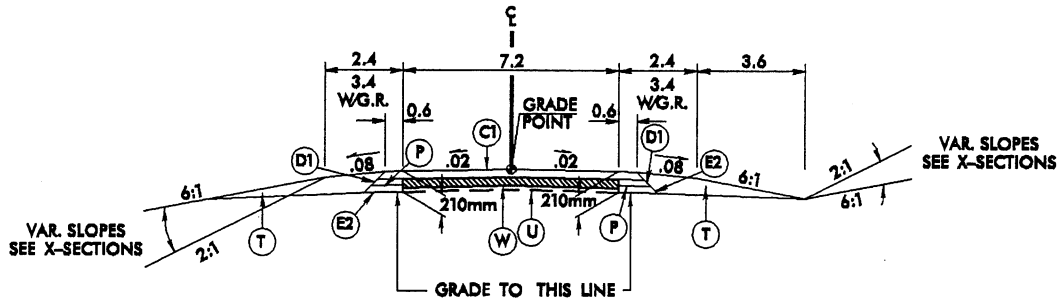
Detail of Asphalt Wearing Surface on Approach Slab
USE WITH TYPICAL NO. 6



TYPICAL SECTION NO. 6

USE TYPICAL NO. 6

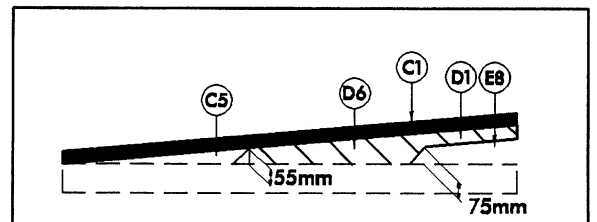
–Y2– STA. 10+95.000 TO 13+16.770 (BEGIN BRIDGE)
–Y2– STA. 14+22.320 (END BRIDGE) TO 15+50.000



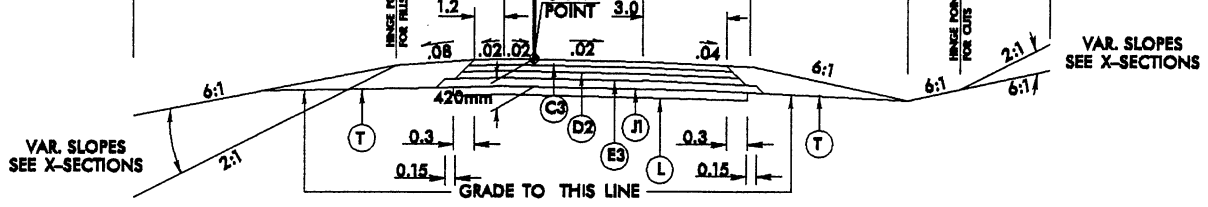
TYPICAL SECTION NO. 7

USE TYPICAL NO. 7

–Y2– STA. 10+00.000 TO 10+95.000
–Y2– STA. 15+50.000 TO 15+95.000



DETAIL SHOWING METHOD OF WEDGING 2
USE WITH TYPICAL SECTION NO. 7

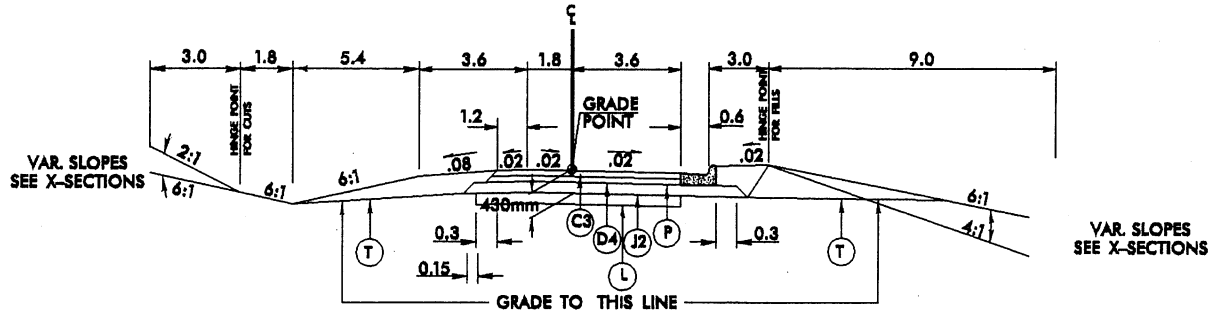


TYPICAL SECTION NO. 8

USE TYPICAL NO. 8

–RPB– STA. 10+44.794 TO 15+71.293
USE –CD– PAVEMENT DESIGN –RPB– STA. 15+71.293
TO STA. 16+70.204 (SEE TYPICAL SECTION NO. 3)

USE –L– PAVEMENT DESIGN –RPC– STA. 10+00.000
TO 11+56.074 (SEE TYPICAL SECTION NO. 1)
–RPC– STA. 11+56.074 TO 14+72.554
USE –Y3– PAVEMENT DESIGN –RPC– 14+72.554
TO 15+62.503 (SEE TYPICAL SECTION NO. 12)



TYPICAL SECTION NO. 9

USE TYPICAL NO. 9

USE –Y3– PAVEMENT DESIGN –LPA– STA. 10+00.000
TO STA. 10+78.141 (SEE TYPICAL SECTION NO. 11)
–LPA– STA. 10+78.141 TO 12+85.937
USE –CD– PAVEMENT DESIGN –LPA– STA. 12+85.937
TO 13+56.049 (SEE TYPICAL SECTION NO.4)
USE –L– PAVEMENT DESIGN –LPD– STA. 10+00.000
TO STA. 10+77.611 (SEE TYPICAL SECTION NO. 2)
–LPD– STA. 10+77.611 TO 13+68.778
USE –Y3– PAVEMENT DESIGN –LPD– STA. 13+68.778
TO STA. 14+37.003 (SEE TYPICAL SECTION NO. 11)

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6/6/03

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slcauley
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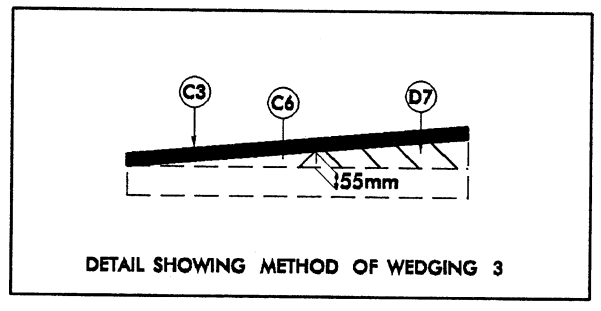
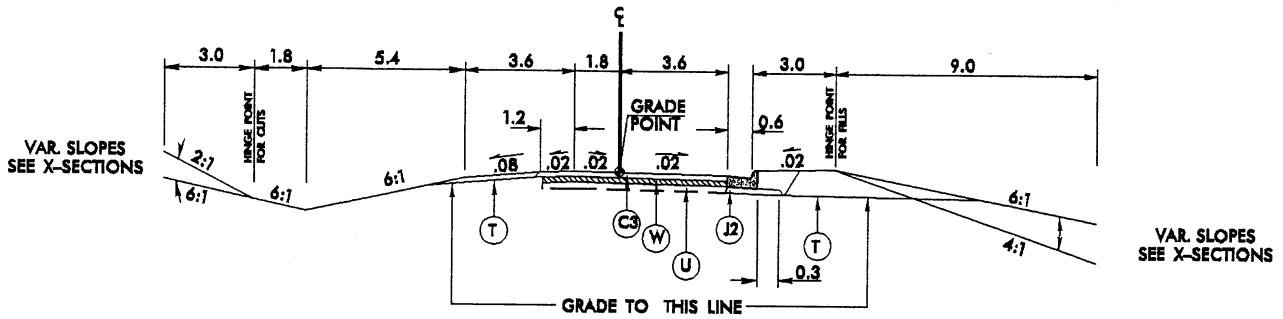
A1	340mm CONCRETE.
C1	60mm S9.5A.
C2	30mm S9.5B.
C3	70mm S9.5C.
C4	70mm S12.5D.
C5	VAR. S9.5A.
C6	VAR. S9.5C.
C7	VAR. S12.5D.
D1	60m I19.0B.
D2	70mm I19.0C.
D3	80mm I19.0C.
D4	110mm I19.0C.
D5	80mm I19.0D.
D6	VAR. I19.0B.
D7	VAR. I19.0C.
D8	VAR. I19.0D.
E1	75mm B25.0B.
E2	90mm B25.0B.
E3	80mm B25.0C.
E4	170mm B25.0C.
E5	210mm B25.0C.
E6	280mm B25.0C.
E7	400mm B25.0C.
E8	VAR. B25.0B.
E9	VAR. B25.0C.
G	200mm CTABC.
J1	200mm ABC.
J2	250mm ABC.
L	SUBGRADE STABILIZER.
P	PRIME COAT.
R1	750mm C & G.
T	EARTH MATERIAL.
U	EXIST. PAVEMENT.
W	WEDGING.

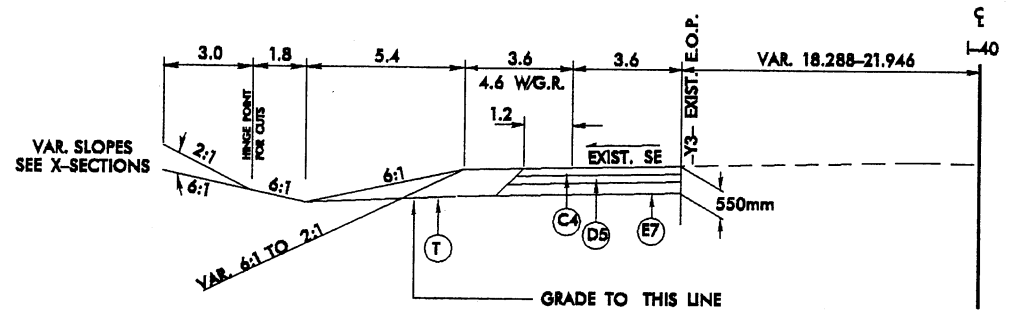


DETAIL SHOWING METHOD OF WEDGING 3

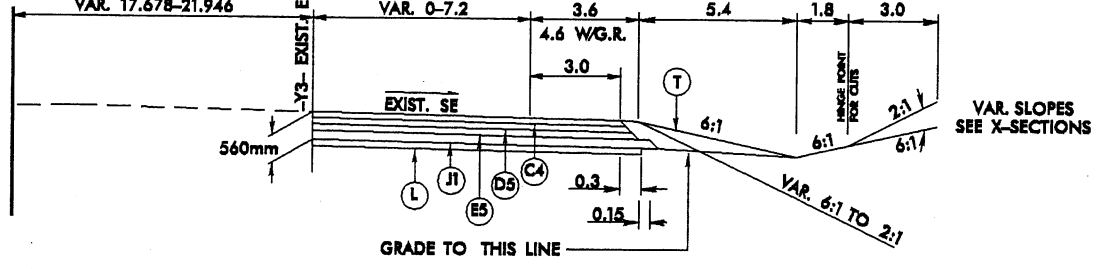
USE WITH TYPICAL SECTION NO. 10



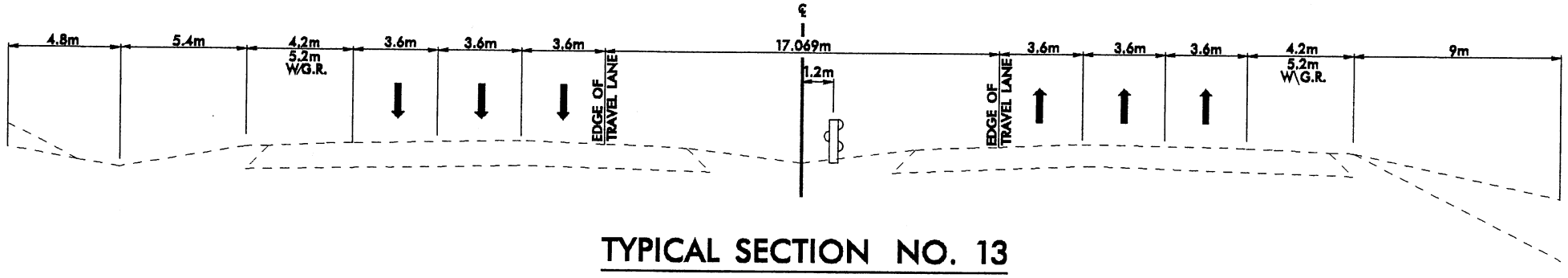
TYPICAL SECTION NO. 10



TYPICAL SECTION NO. 11



TYPICAL SECTION NO. 12



TYPICAL SECTION NO. 13

USE TYPICAL NO. 10

USE –CD– PAVEMENT DESIGN –LPB– STA. 10+00.000 TO 10+75.186 (SEE TYPICAL SECTION NO. 3)
–LPB– STA. 10+75.186 TO 11+00.000

USE TYPICAL NO. 11

–Y3– STA. 20+49.957 TO 23+51.836 LT.

USE TYPICAL NO. 12

–Y3– STA. 24+49.333 TO 36+58.608 RT.

USE TYPICAL NO. 13

–L– STA. 74+40.000 TO 167+77.402

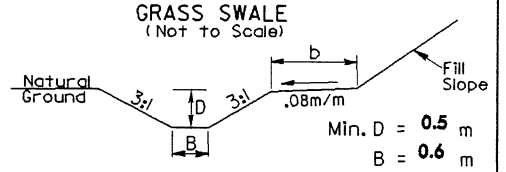
6/6/99

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DRAINAGE DITCH DETAILS

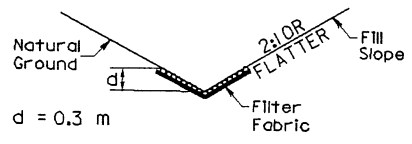
DETAIL A
GRASS SWALE
(Not to Scale)



Min. D = 0.5 m
B = 0.6 m
b = 1.6 m

-RPB- STA 12+90 RT TO -RPB- STA 13+20 RT
-RPB- STA 14+00 RT TO -RPB- STA 15+00 RT
-Y3- STA 30+80 RT TO -Y3- STA 31+80 RT

DETAIL B
TOE PROTECTION
(Not to Scale)

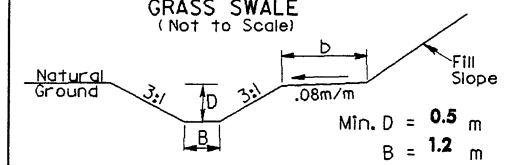


d = 0.3 m

Type of Liner = MATTING

-Y3- STA 29+80 RT TO -Y3- STA 30+50 RT

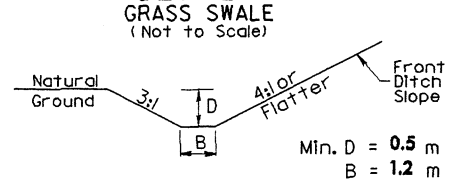
DETAIL C
GRASS SWALE
(Not to Scale)



Min. D = 0.5 m
B = 1.2 m
b = 1.6 m

-L- STA 74+60 LT TO -L- STA 75+60 LT
-L- STA 76+40 LT TO -L- STA 76+80 LT
-L- STA 77+00 LT TO -L- STA 77+80 LT
-L- STA 78+00 LT TO -L- STA 79+00 LT
-RPB- STA 15+40 RT TO -RPB- STA 15+93 RT
-Y1- STA 11+00 RT TO -Y1- STA 11+40 RT
-Y3- STA 30+44 RT TO -Y3- STA 30+51 RT

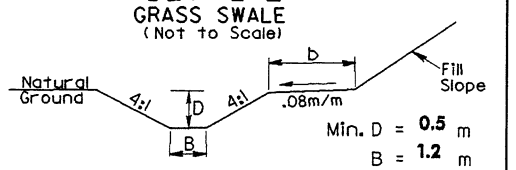
DETAIL D
GRASS SWALE
(Not to Scale)



Min. D = 0.5 m
B = 1.2 m

-Y1- STA 11+40 RT TO -Y1- STA 13+95 RT

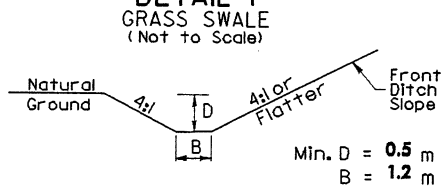
DETAIL E
GRASS SWALE
(Not to Scale)



Min. D = 0.5 m
B = 1.2 m
b = 1.6 m

-L- STA 75+80 LT TO -L- STA 76+40 LT

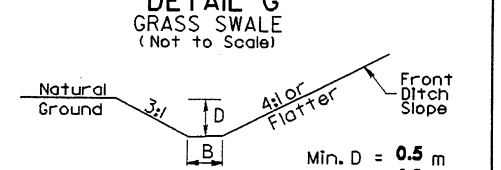
DETAIL F
GRASS SWALE
(Not to Scale)



Min. D = 0.5 m
B = 1.2 m

-L- STA 75+20 RT TO -L- STA 75+40 RT
-Y2- STA 10+60 RT TO -Y2- STA 11+60 RT
-RPC- STA 12+20 LT TO -RPC- STA 12+60 LT
-RPC- STA 11+60 RT TO -RPC- STA 12+80 RT

DETAIL G
GRASS SWALE
(Not to Scale)

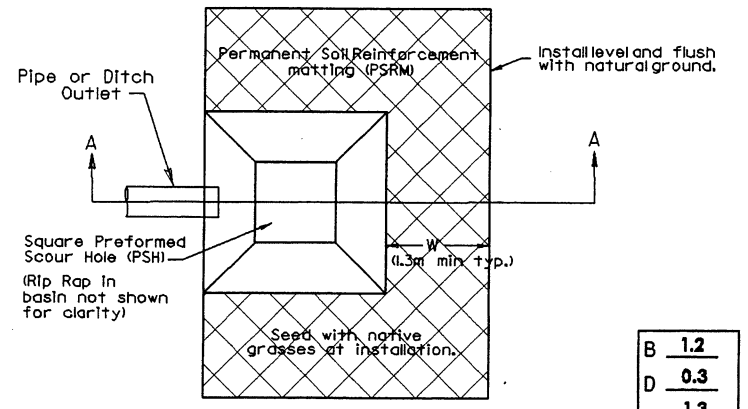


Min. D = 0.5 m
B = 1.2 m

-RPC- STA 14+60 RT TO -RPC- STA 15+40 RT

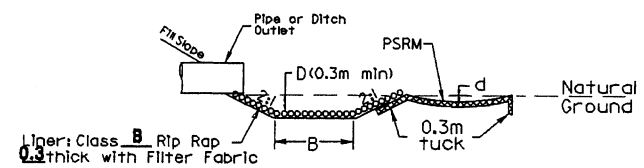
DETAIL H
PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON

PLAN VIEW



B	1.2
D	0.3
W	1.3
d	0.15

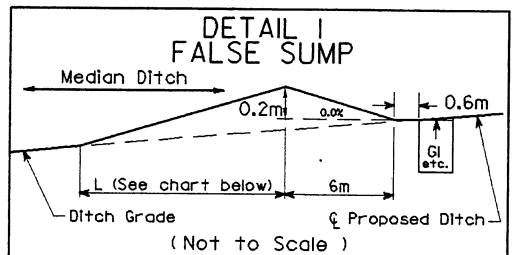
SECTION A-A



10/10/01

-L- STA 76+12 RT
-L- STA 82+07 RT
-RPB- STA 13+55 RT
-RPC- STA 13+67 RT
-Y3- STA 34+15 RT

DETAIL I
FALSE SUMP



(Not to Scale)

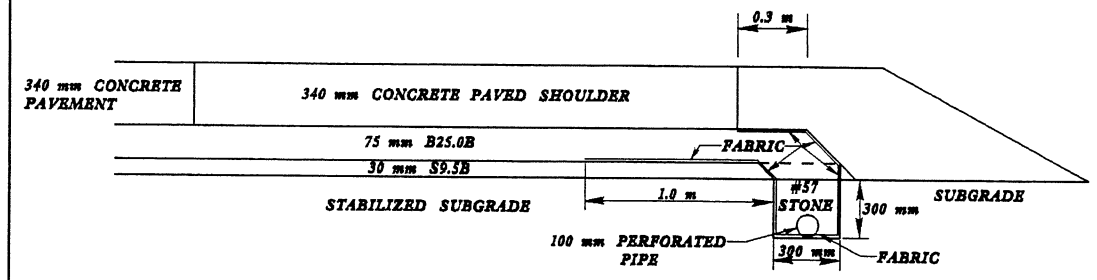
Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	6m	Over 4.0% To 6.0%	12.2m
Over 2.0% To 4.0%	9.1m	Over 6.0%	15.2m

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2000AC	2-E
	R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	

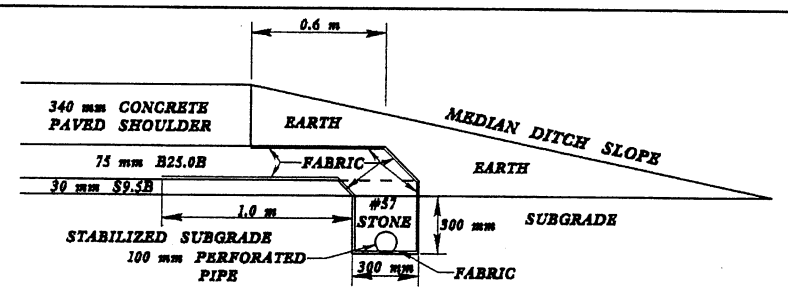
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SHOULDER DRAIN DETAILS

(SEE SHEET NO. 3-E FOR SUMMARY OF SHOULDER DRAINS)



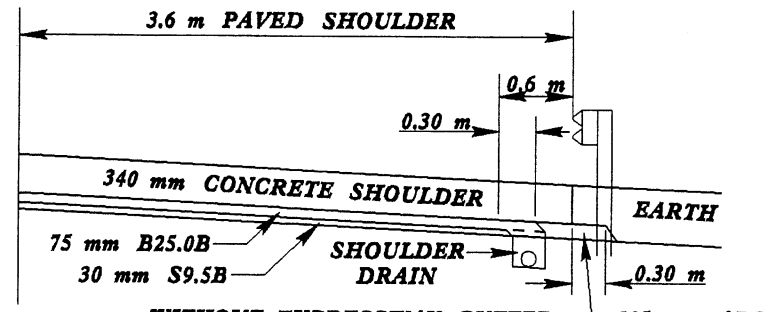
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
ON OUTSIDE SHOULDERS LINE -L-



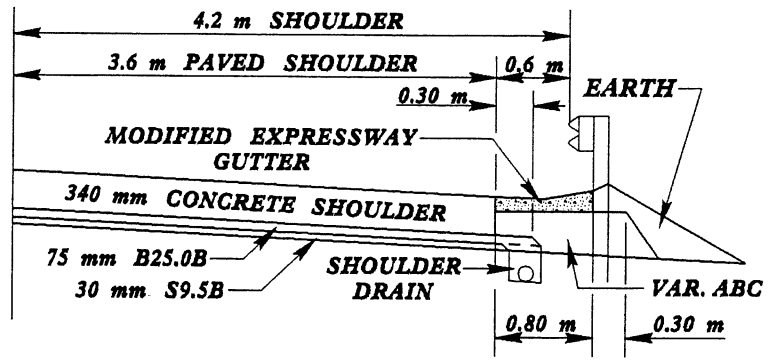
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
ON MEDIAN SHOULDERS LINE -L-

DETAILS OF CONCRETE SHOULDERS AT GUARDRAIL LOCATIONS

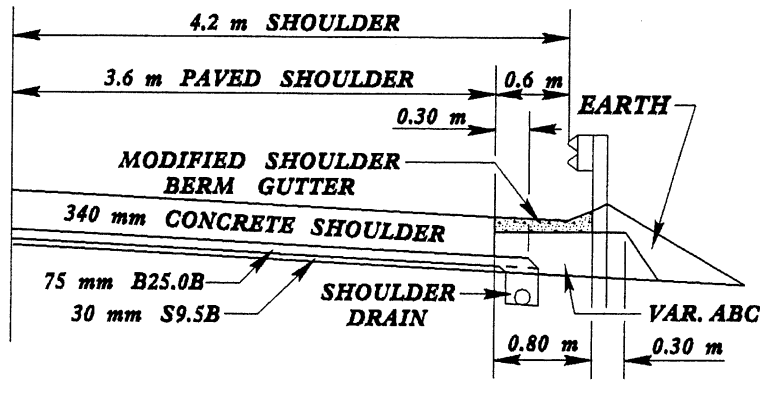
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1
(SEE STD. 862.01 FOR GUARDRAIL PLACEMENT)



WITHOUT EXPRESSWAY GUTTER
OR SHOULDER BERM GUTTER



WITH EXPRESSWAY GUTTER



WITH SHOULDER BERM GUTTER

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-F
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

10 0 20

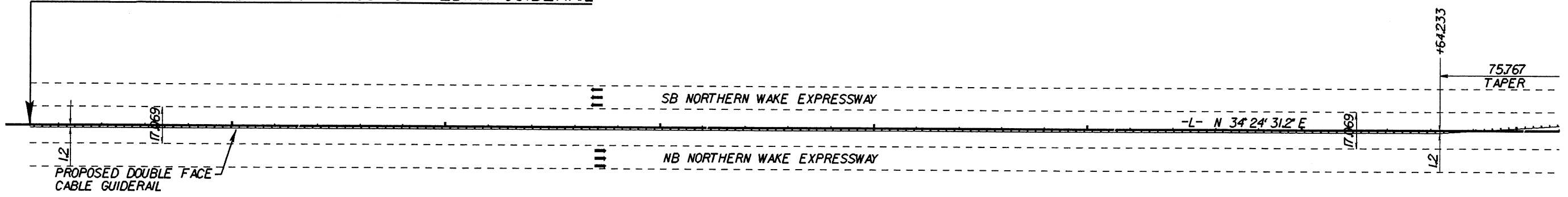
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

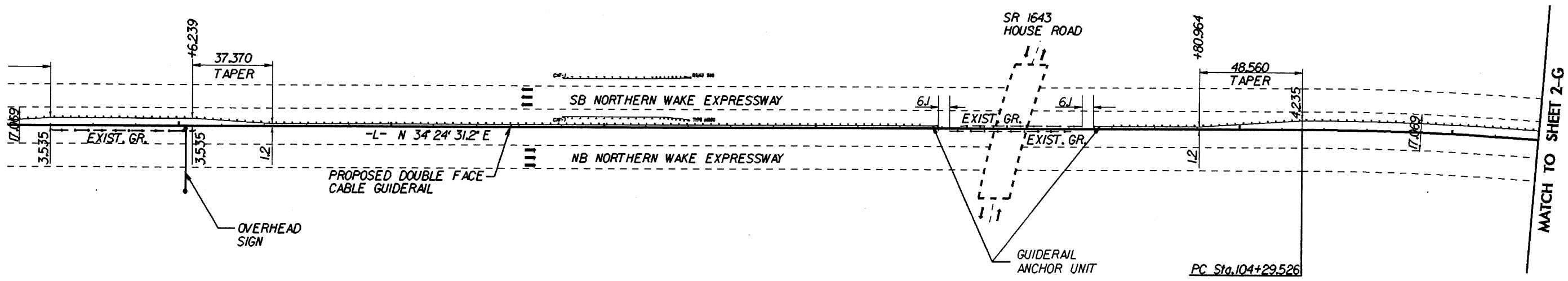
R/W REV.

92 93 94 95 96 97 98 98+20

STA. 91+06.526 -L- BEGIN CONSTRUCTION MEDIAN GUIDERAIL



98+20 99 100 101 102 103 104 105 105+40



-L-
PI Sta 111+56.882
Δ = 55° 00' 28.8" (RT)
L = 1,341.219
T = 727.356
R = 1,397.000

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

8/11/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-G
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

10 0 20

CONST.REV.

R/W REV.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

105+00

106

107

108

109

110

111

112

112+60

AVIATION PARKWAY

RAMP

61

EXIST. GR.

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

4.23%

-17.08%

17.08%

-4.23%

PROPOSED DOUBLE FACE CABLE GUIDERAIL

GUIDERAIL ANCHOR UNIT

GUIDERAIL ANCHOR UNIT

MATCH TO SHEET 2-F

MATCH TO SHEET 2-H

-L-
PI Sta 111+56.882
Δ = 55° 00' 28.8" (RT)
L = 1,341.219
T = 727.356
R = 1,397.000

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-H
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

10 0 20

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R/W REV.

REVISIONS

8/17/99

-L-

PI Sta 111+56.882
Δ = 55° 00' 28.8" (RT)
L = 1,341.219
T = 727.356
R = 1,397.000

PI Sta 129+14.784
Δ = 34° 19' 05.0" (LT)
L = 836.751
T = 431.349
R = 1,397.000

112+60 113 114 115 116 117 118 119 GLOBE ROAD 119+80

+48.691 61.372 TAPER +29.980 20.320 TAPER

OVERHEAD SIGN

EXIST. GR.

-L- N 89° 25' 00.0" E

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

4.235 3:1 3:1 1:2 6.1 17.069 1:2

PT Sta. 117+70.745

GUIDERAIL ANCHOR UNIT

PROPOSED DOUBLE FACE CABLE GUIDERAIL

MATCH TO SHEET 2-G

119+80 120 121 122 123 124 125 126 127+00

PC Sta. 124+83.435

48.560 TAPER

GUIDERAIL ANCHOR UNIT

MATCH TO SHEET 2-I

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-I
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

10 0 20

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R/W REV.

127+00

128

129

130

131

132

133

134

134+20

LITTLE BRIAR CREEK

MATCH TO SHEET 2-H

17.069

42.35

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

PROPOSED DOUBLE FACE CABLE GUIDERAIL

SIGN SUPPORT

6.1

EXIST. GR.

EXIST. GR.

6.1

GUIDERAIL ANCHOR UNIT

PT Sta.133+20.86

48.553
TAPER

-L- N 55° 05' 55.0" E

12

MATCH TO SHEET 2-J

-L-

PI Sta 129+14.784
Δ = 34° 19' 05.0" (LT)
L = 836.751
T = 431.349
R = 1,397.000

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-J
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

10 0 20

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R/W REV.

134+20

135

136

137

Lumley Road

138

139

140

141

141+40

MATCH TO SHEET 2-I

MATCH TO SHEET 2-K

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

PROPOSED DOUBLE FACE CABLE GUIDERAIL

GUIDERAIL ANCHOR UNIT

EXIST. GR.

EXIST. GR.

-L- N 55° 05' 55.0" E

6J

6J

12

12

17.69

17.69

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

02-JAN-2003 8:22
N:\STIP\R-2000AC\Design\Roadway\R2000AC_2J.dgn

8/17/99

REVISIONS

METRIC

10 0 20

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-K
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

141+40 142 143 144 145 146 147 148 148+60

+2.018

48.553
TAPER

4.235

17.069

-L- N 55°05'55.0" E

12'

PROPOSED DOUBLE FACE
CABLE GUIDERAIL

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

4.235

V.A.R.

EXIST. GR.

MATCH TO SHEET 2-J

MATCH TO SHEET 2-L

PC Sta.143+50.576

PT Sta.148+58.612

-L-
PI Sta 146+05.043
Δ = 8° 20' 00.0" (RT)
L = 508.036
T = 254.467
R = 3,493.000

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	2-L
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

10 0 20

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.

R/W REV.

REVISIONS

9/17/99

US 70

148+60

149

150

151

152

153

154

155

155+80

+63.576

MATCH TO SHEET 2-K

46.048
TAPER

14.235

VAR.

12

6.1

6.1

EXIST. GR.

-L- N 63° 25' 55.0" E

SB NORTHERN WAKE EXPRESSWAY

NB NORTHERN WAKE EXPRESSWAY

26.330

12

MATCH TO SHEET 2-M

EXIST. GR.

PROPOSED DOUBLE FACE
CABLE GUIDERAIL

GUIDERAIL
ANCHOR UNIT

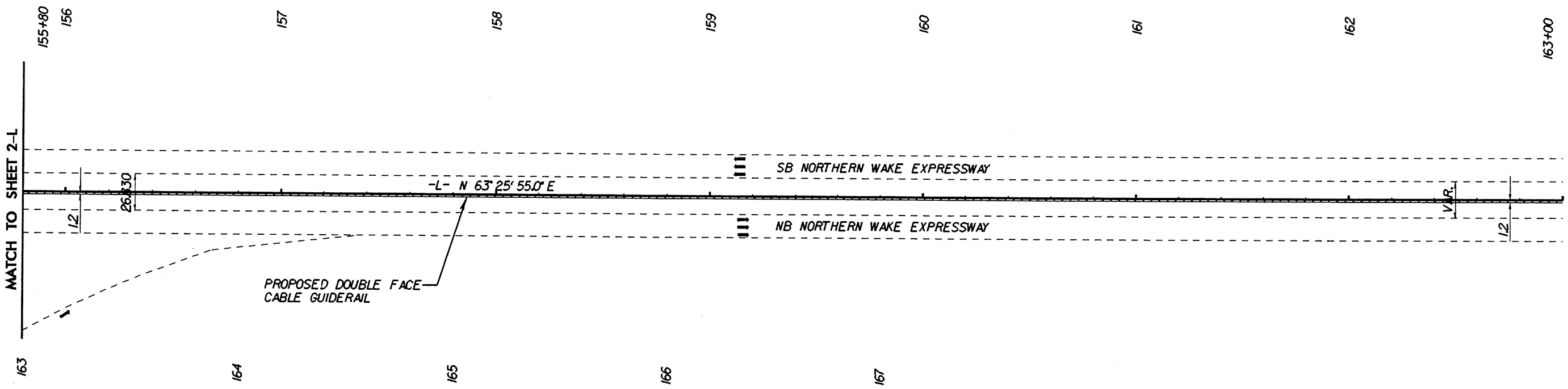
US 70

NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

METRIC	PROJECT REFERENCE NO.	SHEET NO.
10 0 20	R-2000AC	2-M
	R/W SHEET NO.	
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV.	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

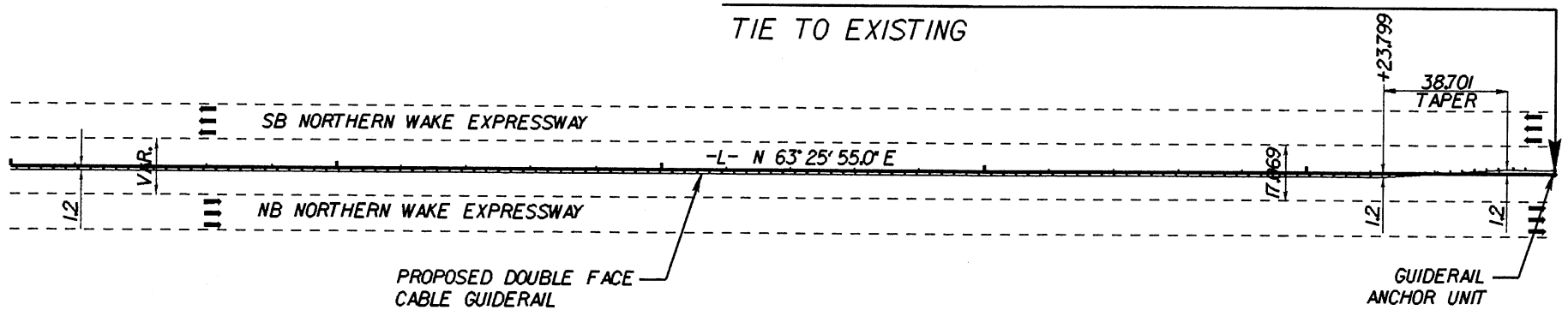
REVISIONS

8/17/99



STA. 167+77.402 -L- END CONSTRUCTION MEDIAN GUIDERAIL

TIE TO EXISTING



NOTE: ALL EXISTING GUARDRAIL SHALL REMAIN

8/17/99

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "KITTY"
WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 233929783(m) EASTING: 619139768(m)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999920026
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "KITTY" TO -L- STATION 74+40.000 IS
5302.774(m) N 80° 50' 33.579" E
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

-L-	
PI Sta 74+56.040	PI Sta 74+88.119
Δ = 0° 22' 03.4" (LT)	Δ = 0° 22' 03.4" (RT)
L = 32.079	L = 32.079
T = 16.040	T = 16.040
R = 5,000.000	R = 5,000.000
SE = NC	SE = NC

-CD-	
PI Sta 10+88.515	PI Sta 14+04.253
Δ = 3° 19' 35.8" (LT)	Δ = 3° 01' 40.4" (RT)
L = 29.030	L = 184.962
T = 14.519	T = 92.503
R = 500.000	R = 3,500.000
SE = NC	SE = NC

METRIC 5 0 10

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

CONST.REV.
R/W REV.

DURHAM COUNTY
WAKE COUNTY

NAD 83

STA 74+40.000 -L- BEGIN STATE PROJECT R-2000AC

-L- PT Sta 75+04.159 LB =
-L- PT Sta 75+04.221 LA
-L- PRC Sta 74+72.079
-L- PC Sta 74+40.000
-CD- POT Sta 11+14.089
23.284 LT.

BEGIN WW FENCE
+40.000 -L-
70.206 LT.
TIE TO FENCE BY OTHERS

INVESTORS OF THE TRIANGLE
DB 5605 PG 216
DB 3490 PG 763

RUBY D. RANDSELL
NO REFERENCE

END PAVEMENT
-Y1- POT Sta 13+98.063
END CONSTRUCTION
-Y1- POT Sta 14+03.657

ON PL
85.476m (280.433')
NO MONUMENT

+80.000 -L-
70.000m(LT)
(229.66')

+72.000 -L-
85.476m (280.433')

+64.000 -L-
ON R/W

+40.000 -L-
ON R/W

+95 -Y1-
15.000m (49.21')

+20 -Y1-
23 m (75.46')

LATERAL GRASS SWALE
SEE DETAIL C
DDE = 1450 CM

LATERAL GRASS SWALE
SEE DETAIL E
DDE = 385 CM

LATERAL GRASS SWALE
SEE DETAIL C
DDE = 230 CM

LATERAL GRASS SWALE
SEE DETAIL D

Cl. IRIP RAP
4 MTON EA
W/ 14.0 SM FF

S 32° 22' 37.4" W -Y1-

PC Sta 13+11.750

N 31° 22' 50.8" E -CD-

BEGIN CULVERT
-L- STA. 75+72.216

END CULVERT
-L- STA. 75+78.584

N 34° 25' 11.0" E

N 34° 24' 31.2" E

N 34° 24' 18.9" E

N 34° 24' 45.1" E

N 34° 24' 33.0" E

N34°10'27"E
178.703

S37°19'58"W
187.075

FUTURE CONSTRUCTION
I-540 14.4 BST
3.0 BST
3.6 BST

BEG. EXPRESSWAY GUTTER
-L- STA 75+15

BEG. EXPRESSWAY GUTTER
-L- STA 75+10

PROP. CABLE GUIDERAIL

TIE TO EXIST. CABLE GUIDERAIL

MODIFIED CONC FLUME

40 TAPER

BL-7276 PINC 3+44.945
-L- STA. 74+21.585
0.194 RT

BL-7279 PINC 4+18.046
-L- STA. 74+94.686
0.183 RT

BL-7281 PINC 4+98.617
-L- STA. 75+75.257
0.199 RT

BEGIN WW FENCE
+40.000 -L-
69.581 RT.
TIE TO FENCE BY OTHERS

RUBY D. RANDSELL
NO REFERENCE

400 CSP W/
2 ELBOWS
2GI

CL B RIPRAP
EST. 2 MTN
W/ 7 SM FF

300 CSP
W/ 2 ELBOWS

PREFORMED
SCOUR HOLE
1.2 m X 1.2 m
SEE DETAIL H

Cl. IRIP RAP
SEE STRUCTURE
PLANS

1200mm W.W. FENCE

+51.793'
45.928m (150.64')

+24 -L-
EXIST. R/W @ 70 m
(229.66')

+83 -L-
70.000 m (229.66')

+77 -L-
EXIST. R/W

LATERAL GRASS SWALE
SEE DETAIL F

FOR -L- PROFILE SEE SHEET 15
FOR -CD- PROFILE SEE SHEET 18
FOR -Y1- PROFILE SEE SHEET 20
FOR CULVERT SEE SHEETS C1 - C10

MATCH LINE TO SHEET 5

76+80

09-JUN-2003 8:35

8/17/99

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

CONST.REV.

R/W REV.

NAD 83

SKETCH SHOWING PAVEMENT IN RELATIONSHIP TO STRUCTURE (NTS)

MATCH LINE TO SHEET 8

MATCH LINE TO SHEET 4

MATCH LINE TO SHEET 6

MATCH LINE TO SHEET 9

LATERAL GRASS SWALE SEE DETAIL C DDE = 135

RUBY D. RANDSELL NO REFERENCE

+62 -Y1- 18.259 m (59.90') PROP. R/W

+72.948 -Y1- 15 m (49.21')

+19.510 -Y1- PL

S 0° 22' 37.0" W

NCDOT DB 1719 PG 149

11.302 S87°14'41"E

020Z

PT Sta 11+72.948

LATERAL GRASS SWALE SEE DETAIL D

PDE

S 32° 22' 37.4" W -Y1-

LATERAL GRASS SWALE SEE DETAIL C DDE = 490 CM

1200mm W.W. FENCE

LATERAL GRASS SWALE SEE DETAIL C DDE = 380 CM

PC Sta 11+22.683

RPB- PT Sta 16+70.204

-CD- POT Sta 15+97.850 0.000 OFFSET

ON PL 72.283m (237.15') -L-Y2- STA. 13+09.379 7.587 RT

BY-22

-L- +34.184 67.40lm (221.06') END FENCE

300 CSP W/ 2 ELBOWS

CL B RIPRAP EST. 2.0 MTN W/ 6.0 SM FF

PROP. GR

GRAU 350

-L- +44.307 64.021m (209.99') BEGIN FENCE

+40 -RPB- 30 m (98.43')

LATERAL GRASS SWALE SEE DETAIL C DDE = 110 CM

CL B RIPRAP EST. 2.0 MTN W/ 4.0 SM FF

+96 -RPB- 30 m (98.43')

CS Sta 16+10.204

END-SHLD. BERM GUTTER -RPB- STA 15+76

BEG. APP. SLAB -Y2- STA 13+11.885

BEG. BRIDGE -Y2- STA 13+16.770

300 CSP W/ 2 ELBOWS

CAT-1

-RPB-

90 TAPER

300 CSP W/ 2 ELBOWS

CL B RIPRAP EST. 2.0 MTN W/ 4.0 SM FF

PT Sta 14+96.713

180 FULL

END EXPRESSWAY GUTTER -L- STA 78+40

N 34° 24' 31.2" E -CD-

2GI TYPE A

BL-7285 -L- STA. 78+70.777 0.207 RT

-L- STA. 79+09.755 0.198 RT

-Y2- STA. 13+80.854 6.608 RT

600 mm CONC

REMOVE

POT -CD- Sta 16+01.680

POC -Y2- Sta 13+39.392

PROP. CABLE GUIDERAIL

N 34° 24' 31.2" E -L-

TYPE M350

POT -L- Sta 79+16.544

POC -Y2- Sta 13+79.303

N 36° 42' 31.2" E -RPC-

PROP. GR CAT-1

BL-7283 -L- STA. 77+01.536 0.208 RT

END EXPRESSWAY GUTTER -L- STA 77+20

1200mm W.W. FENCE

-RPC- POT Sta 10+00.000

-L- POT Sta 78+92.000 22.935 RT.

EXIST. R/W +45 -L- -RPB- EXIST. R/W

END BRIDGE -Y2- STA 14+22.320

+05.852 49.574m (159.32') END FENCE

+66 -L- EXIST. R/W

BY-6 -Y2- STA. 14+58.766 6.305 RT

300 CSP W/ 2 ELBOWS

TS Sta 10+82.030

SC Sta 11+42.030

+16.443 50.000m (164.00') BEGIN FENCE

END APP. SLAB -Y2- STA 14+27.195

RICHARD R. JONES
DB 2160 PG 478
DB 2109 PG 97
DB 1129 PG 391
MB 135 PG 64
MB 134 PG 186

39

RUBY D. RANDSELL
NO REFERENCE

020Z

-CD-

PI Sta 14+00.986
Δ = 3° 01' 40.4" (RT)
L = 184.962
T = 92.503
R = 3,500.000
SE = NC
RO = 0

-YI-

PI Sta 11+48.490
Δ = 32° 00' 00.4" (RT)
L = 50.266
T = 25.807
R = 90.000
SE = 08
RO = 50

-Y2-

PI Sta 13+99.155
Δ = 48° 44' 54.4" (LT)
L = 255.246
T = 135.923
R = 300.000
SE = 06
RO = 60

PI Sta 15+45.808
Δ = 30° 14' 20.6" (RT)
L = 131.943
T = 67.547
R = 250.000
SE = 08
RO = 60

PIs Sta 16+30.232
Θs = 6° 52' 31.8"
Ls = 60.000
LT = 40.030
ST = 20.027

-RPC-

PIs Sta 11+22.061
Θs = 6° 52' 31.8"
Ls = 60.000
LT = 40.030
ST = 20.027

PI Sta 13+61.716
Δ = 82° 36' 51.1" (RT)
L = 360.472
T = 219.685
R = 250.000
SE = 08
RO = 60

** CURVE WIDENING

*** PAVE TO EDGE OF GUARDRAIL

SBG DENOTES SHOULDER BERM GUTTER.

FOR -L- PROFILE SEE SHEET 15
FOR -CD- PROFILE SEE SHEET 18
FOR -YI- PROFILE SEE SHEET 20
FOR -Y2- PROFILE SEE SHEET 21
FOR -RPB- PROFILE SEE SHEET 22
FOR -RPC- PROFILE SEE SHEET 23
FOR STRUCTURE SEE SHEETS SX-SX

08-JUN-2003 RCS
N:\Survey\Cadd\Projects\2000ac\Sheets\2000ac_sht5.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

10 0 20

CONST.REV.

R/W REV.

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

NAD 83

MATCH LINE TO SHEET 10

MATCH LINE TO SHEET 5

MATCH LINE TO SHEET 7

MATCH LINE TO SHEET 11

-RPB-
Pt Sta 12+13.986
Rt = 41.54 36.6'
Ls = 60.000
Lt = 40.05
ST = 20.04

Pt Sta 14+58.292
Rt = 6 52' 34.8"
Ls = 60.000
Lt = 40.030
ST = 20.027

Pt Sta 15+45.808
Δ = 39 14' 20.6" (RT)
L = 134.943
T = 67.547
R = 250.000
SE = 08
RD = 60

-T3-
Pt Sta 20+48.800
Rt = 0 29' 28.0"
Ls = 60.000
Lt = 40.000
ST = 20.000

Pt Sta 34+20.067
Δ = 8 29' 38.3" (LT)
L = 700.08
T = 350.59
R = 3,500.000

-RPC-
Pt Sta 13+61.76
Δ = 62° 39' 54" (RT)
L = 360.47
T = 199.85
R = 250.000
SE = 08
RD = 60

-LPB-
Pt Sta 10+61.889
Rt = 42 58' 18.6"
Ls = 90.000
Lt = 61.868
ST = 31.706

Pt Sta 15+66.403
Δ = 168 00' 52.3" (RT)
L = 576.403
R = 60.000
SE = 08
RD = 90

Pt Sta 42+97.755
Rt = 42 58' 18.6"
Ls = 90.000
Lt = 61.868
ST = 31.706

-LPD-
Pt Sta 10+61.358
Rt = 36° 49' 56.6"
Ls = 60.000
Lt = 61.358
ST = 31.233

Pt Sta 13+48.000
Δ = 282 51' 35.3" (RT)
L = 257.003
T = 258.000
R = 70.000
SE = 08
RD = 90

Pt Sta 13+78.656
Rt = 36° 49' 56.6"
Ls = 90.000
Lt = 61.358
ST = 31.233

-LPB-
Pt Sta 10+51.609
Rt = 34 08' 20.4"
Ls = 75.209
Lt = 54.608
ST = 28.137

Pt Sta 15+27.456
Δ = 69° 39' 39.2" (RT)
L = 248.49
T = 154.258
R = 70.104
SE = 08
RD = 76.2

SKETCH SHOWING PAVEMENT IN RELATIONSHIP TO STRUCTURE (NTS)

I-540 & I-40

FOR -L- PROFILE SEE SHEET 16
FOR -CD- PROFILE SEE SHEETS 18 & 19
FOR -RPB- PROFILE SEE SHEET 22
FOR -RPC- PROFILE SEE SHEET 23
FOR -LPA- PROFILE SEE SHEET 24
FOR -LPD- PROFILE SEE SHEET 25
FOR STRUCTURES SEE SHEETS S1-Sx

SBB DENOTES SHOULDER BERM GUTTER.

DURHAM COUNTY
WAKE COUNTY

08-JAN-2003 RCS
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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

CONST.REV.

R/W REV.

METRIC

5 0 10

NAD 83

-CD-
PI Sta 27+33.197
Δ = 2° 16' 18.3" (RT)
L = 138.773
T = 69.396
R = 3,500.00

87+60

88

89

90

91

26

STA 91+06.526 -L- END STATE PROJECT R-2000AC

PC Sta 26+63.802

MATCH LINE TO SHEET 6

RIP RAP

300 mm CMP

1050 mm WW ISBW

MTL

750 mm C&G

CB

S

TYPE M350

PROP. GR

REM. GR

NTL

RETAIN

375 mm CONC

DI

40 TAPER

PROP. CABLE GUIDERAIL

-L- N 34° 24' 31.2" E

450 mm CONC

600 mm CONC

U/C

BL-7293
-L- STA. 87+60.943
0.183 RT

BL-7294
-L- STA. 90+97.705
0.446 RT

END NOT LOCATED

LAKE

DURHAM COUNTY
WAKE COUNTY

FOR -L- PROFILE SEE SHEET 17

09-JAN-2003 8:27

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

CONST.REV.

R/W REV.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83

-Y2-
PI Sta 13+99.155
Δ = 48° 44' 54.4" (LT)
L = 255.246
T = 135.923
R = 300.000
SE = 06
RO = 60

PIs Sta 12+43.252
θs = 5° 43' 46.5"
Ls = 60.000
LT = 40.021
ST = 20.019

-Y1-
PI Sta 10+30.904
Δ = 72° 27' 28.0" (LT)
L = 18.969
T = 10.990
R = 15.000
SE = 06
RO = 32 & 24

*** PAVE TO EDGE OF GUARDRAIL

BEGIN CONSTRUCTION
-Y2- POT Sta 10+00.000

STA 10+80 -Y2- LT
TIE TO EXISTING SLOPE

-Y2- TS Sta 12+03.232

CL B RIPRAP
EST. 2.0 MTN
W/ 4.0 SM FF

EXTEND EXISTING
450 mm

-Y2- POS Sta 12+36.033
-Y1- POT Sta 10+00.000

SC Sta 12+63.232

41 TAPER

06 *** 39.38

10 11 12

NCDOT

RETAIN

RIP RAP

300 mm CONC

450 mm CONC

COLLAR

SLATER RD 7.2 BST

-Y2- S 15° 52' 11.6" E

BY-3
-Y2- STA. 10+33.635
5.558 RT

BY-4
-Y2- STA. 11+89.967
5.620 RT

GRAU 350 PROP. GR

PC Sta 10+19.914

-Y1- S 72° 50' 05.0" W

TOE PROTECTION
SEE DETAIL B

+73.000 -Y2-
ON R\W

ON R\W -Y2-
ON PL

ON R\W -Y2-
28 m (91.86')

+77 -Y2-
EXIST. R/W

ON R\W -Y2-
ON PL

+00 -Y2-
32 m (104.99')

PDE

NATIONS BANK
NO REFERENCE

ARGUS ROAD
(UNDEVELOPED)

PETULA ASSOCIATES, LTD.
DB 2069 PG 767
PARCEL 3

LATERAL GRASS SWALE
SEE DETAIL F

ON R\W -Y2-
32m (104.99')

ON PL
ON PL

FLORIA MAE McGHEE GLENN
& RUTH McGHEE HOOKER
DB 2223 PG 853

S 0° 22' 37.0" W

PROP. GR

GRAU 350

+29.622 -Y1-
ON R/W

-Y1- PT Sta 10+38.884

NCDOT
DB 1719 PG 149

80.772 (265') CAROLINA POWER & LIGHT
TRANSMISSION LINE EASEMENT

MATCH LINE TO SHEET 5

FOR -Y1- PROFILE SEE SHEET 20
FOR -Y2- PROFILE SEE SHEET 21

08-JAN-2003 M27
N:\ENG\PROJECTS\2000AC\ROADWAY\PLANS\SHEETS\2000AC_SHEET_08.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

CONST.REV.

R/W REV.

5 0 10

*** PAVE TO EDGE OF GUARDRAIL

-Y2-

PI Sta 13+99.155	PIs Sta 15+38.497
Δ = 48° 44' 54.4" (LT)	Θs = 5° 43' 46.5"
L = 255.246	Ls = 60.000
T = 135.923	LT = 40.021
R = 300.000	ST = 20.019
SE = 06	
RO = 60	

NAD 83

RICHARD R. JONES
DB 2160 PG 478
DB 2109 PG 97
DB 1129 PG 391

MB 135 PG 64
MB 134 PG 186

GEORGE A. GLAUBIGER
DB 1911 PG 146

EIP
EXIST. R/W
16.364 N76°40'02"E
S05°53'50"W 150.00'
S05°43'27"E 149.811'
EIP S76°07'11"W 13.710
EXIST. R/W
18.288

MATCH LINE TO SHEET 5

PROP. GR
REM. GR
MTL
600 mm CONC
CS Sta 15+18.478
F GRAU 350
MTL +54.800
27 TAPER
ST Sta 15+78.478
PROP. GR
REM. GR
F GRAU 350
375 mm CONC
RETAIN
RETAIN

END CONSTRUCTION
-Y2- POT Sta 15+95.000

POT Sta 16+68.478

-Y2- S 76° 04' 39.0" E

SLATER RD. L 7.7 POT

BY-7
-Y2- STA. 16+14.334
5.556 RT

HTR
W/L
GR

RICHARD R. JONES
DB 2160 PG 478
DB 2109 PG 97
DB 1129 PG 391

MB 135 PG 64
MB 134 PG 186

RICHARD JONES
DB 1129 PG 391
MB 135 PG 64

JESSE MARSH AND WIFE,
RUBY MARSH
DB 974 PG 570
MB 89 PG 74

RUBY D. RANDSELL
NO REFERENCE

ARTHUR G. CULLATI,
RECIL T. SMITH & WIVES
DB 1529 PG 726
MB 96 PG 16

S07°46'58"W 141.580'
N06°44'51"E 131.805'

2SFD

FOR -Y2- PROFILE SEE SHEET 21

09-JAN-2003 8:27

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

CONST.REV.

R/W REV.

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

NAD 83

-RPB-

PIs Sta 11+42.357
Θs = 4° 54' 39.8"
Ls = 60.000
LT = 40.015
ST = 20.014

PI Sta 11+78.168
Δ = 5° 10' 40.3" (RT)
L = 311.630
T = 155.826
R = 350.000
SE = 07
RO = 60

PIs Sta 12+13.986
Θs = 4° 54' 39.8"
Ls = 60.000
LT = 40.015
ST = 20.014

MATCH LINE TO SHEET 6

EXIST. R/W

1050 mm WW ISBW EXIST. R/W

GATE

1050 mm WW ISBW

RIP RAP

17

18

19

MTL

I-40 WBL BST

EXISTING CONCRETE MEDIAN BARRIER

15" CONC END NOT LOCATED

21.946

18.288

-Y3- S 37° 34' 09.9" E

RETAIN

I-40 EBL BST

900 mm CONC

750 mm CONC

BEGIN CONSTRUCTION
-RPB- POT Sta 10+00.000
-Y3- POT Sta 18+00.960
52.691 RT.

BLI-918 PINC 45+60.994
-Y3- STA. 19+22.075
20.471 RT

TS Sta 11+02.342

SC Sta 11+62.342

EOP

BST

-RPB- S 24° 34' 53.0" E

CS Sta 11+93.972

2.7 CONC HW

1050 mm WW ISBW

1 FO

PETULA ASSOCIATES, LTD.
DB 2069 PG 767
PARCEL 1

N.F. RANSDELL HEIRS
DB 281 PG 675
MB 37 PG 160

N43.6660
N76°02'50"E

80.772

80.772 (265') CAROLINA POWER & LIGHT
TRANSMISSION LINE EASEMENT

1050 mm WW ISBW EXIST. R/W

FOR -RPB- PROFILE SEE SHEET 22

8/17/99

09-JAN-2003 8:27

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

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

CONST.REV.

R/W REV.

NAD 83

-Y3-

PI Sta 24+20.017
Δ = 11° 27' 38.3" (LT)
L = 700.091
T = 351.217
R = 3,500.000

PIs Sta 27+88.891
Θs = 0° 29' 28.0"
Ls = 60.000
LT = 40.000
ST = 20.000

-RPC-

PI Sta 13+61.716
Δ = 82° 36' 51.1" (RT)
L = 360.472
T = 219.685
R = 250.000
SE = 08
RO = 60

PIs Sta 15+22.530
Θs = 6° 52' 31.8"
Ls = 60.000
LT = 40.030
ST = 20.027

MATCH LINE TO SHEET 6

MATCH LINE TO SHEET 12

CS Sta 27+68.891

ST Sta 28+28.891

EXIST. R/W

MARK COUNTY

1050 mm WW 1SBW

700 mm CMP

RIP RAP

750 mm CMC

300 mm CMP

1050 mm WW 1SBW

MTL

BST

25 26 27 28

450 mm CONC

EXISTING CONCRETE MEDIAN BARRIER

RETAIN

BLI-953
-Y3- STA. 25+25.250
23.162 RT

450 mm CMP

PLUG

-RPC-

-Y3-

21.946

21.336

18.288

11.678

END NOT LOCATED

600 mm CONC

750 mm CONC

I-40 WBL BST

I-40 EBL BST

S 50° 00' 44.2" E

2GI FS

59 60 61 62 63 64

450

90 TAPER

600

400 CSP BDO W/ ELBOW

400 CSP W/ ELBOW

BDO

-RPC- ST Sta 15+62.503
-Y3- POC Sta 26+10.370
21.946 RT.

CS Sta 15+02.503

STANDARD BERM DITCH
-Y3- STA 25+20 RT TO -Y3- STA 28+40 RT

LATERAL GRASS SWALE
SEE DETAIL G

1200mm W.W. FENCE

RICHARD R. JONES
DB 2160 PG 478
DB 2109 PG 97
DB 1129 PG 391
MB 135 PG 64
MB 134 PG 186

39

CSM REAL ESTATE PARTNERS
DB 5014 PG 451
MB 1991 PG 805

S 07° 59' 40" E 106.15'
N 88° 32' 19" W 20.62'

FOR -RPC- PROFILE SEE SHEET 23

02-JAN-2003 8:27
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PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

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

CONST.REV.

R/W REV.

NAD 83

MATCH LINE TO SHEET 11

MATCH LINE TO SHEET 13

LAKE

LAKE

EMERGENCY SPILLWAY

RIP RAP

RIP RAP

29

30

31

32

MTL 1050 mm WW ISBW

DI

1050 mm WW ISBW

MTL

1050 mm WW ISBW

DI

750 mm CONC

DI

-Y3-

S 50°00'44.2" E

450 mm CONC

DI

MTL

DI

MTL

END EXISTING CONCRETE MEDIAN BARRIER

BEG. EXPRESSWAY GUTTER
-Y3- STA 29+70

750 mm CONC

REMOVE DI

66

REM. GR

MTL

GRAU 350

FS

REMOVE

RETAIN

11.678

7.2

11.678

36

11.678

36

2GI

MTL

BLI-956
-Y3- STA. 28+51.541
20.334 RT

600

2GI

65

750

67

2GI

PROP. GR
3 @ 3.0m X 3.0m
RCBC EXTENSION

3.0 RCBC

X9 CONC WW

CONC

13.4 CONC HW
3.7 CONC WW

750 mm CMP

70

36

+81.650

375

2GI

90 TAPER

71

36

400 CSP
W/ 2 ELBOWS

72

69

EXTEND EXISTING
400 CSP

COLLAR AND
EXTEND 750

750

TOE PROTECTION MATTING
-Y3- STA 29+80 RT TO -Y3- STA 30+50 RT
SEE DETAIL B

CL I RIPRAP
EST. 10.0 MTN
W/ 19.0 SM FF

68

CL B RIPRAP
EST. 2.0 MTN
W/ 7.0 SM FF

1200mm W.W. FENCE

EXIST. R/W

EIP

+50 -Y3-
EXIST. R/W

41

LATERAL GRASS SWALE
SEE DETAIL A
DDE = 450 CM

+50 -Y3-
75 m (246.06')

TDE

TDE

TDE

TDE

+75.961 -Y3-
EXIST. R/W

+83 -Y3-
PL

13.472
S00°41'55"W

83.092
S05°41'42"E

CSM REAL ESTATE PARTNERS
DB 5014 PG 451
MB 1991 PG 805

40

LATERAL GRASS SWALE
SEE DETAIL C
DDE = 25 CM

CONCOURSE DEVELOPMENT I, L.L.C.
DB 8310 PG 2529
DB 8231 PG 1217
MB 1986 PG 354

FOR CULVERT SEE SHEETS CX-CX

BZ 1

BZ 2

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09-JUN-2003 8:29
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8/17/99

MATCH LINE TO SHEET 12

32

33

34

35

MATCH LINE TO SHEET 14

BLI-957
-Y3- STA. 32+69.323
22.377 RT
1200mm W.W. FENCE

+90.47
517.30m (N539721)
END FENCE TIE
TO EXIST. FENCE

EXIST. R/W

1050 mm WW ISBW

375 mm CONC

3.6

3.6

17.678

-Y3- S 50° 00' 44.2" E

MTL

DI

450 mm CONC

300 CSP
W/2 ELBOWS

PROP. GR

REM. GR

2GI

375 mm CMP

1050 mm WW ISBW

PREFORMED
SCOUR HOLE
1.2 m x 1.2 m
SEE DETAIL H

CONCOURSE DEVELOPMENT, I, L.L.C.
DB 8330 PG 2529
DB 8231 PG 1217
MB 1986 PG 354

TIE TO EXIST. SLOPE

1850 mm CMP

87.1

EIP

750 mm C&G

BST

HIGHWOODS REALTY LTD. PARTNERSHIP
DB 6668 PG 449
MB 1994 PG 141

NAD 83

METRIC

5 0 10

CONST. REV.

R/W REV.

PROJECT REFERENCE NO. R-2000AC

SHEET NO. 13

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
R-2000AC	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

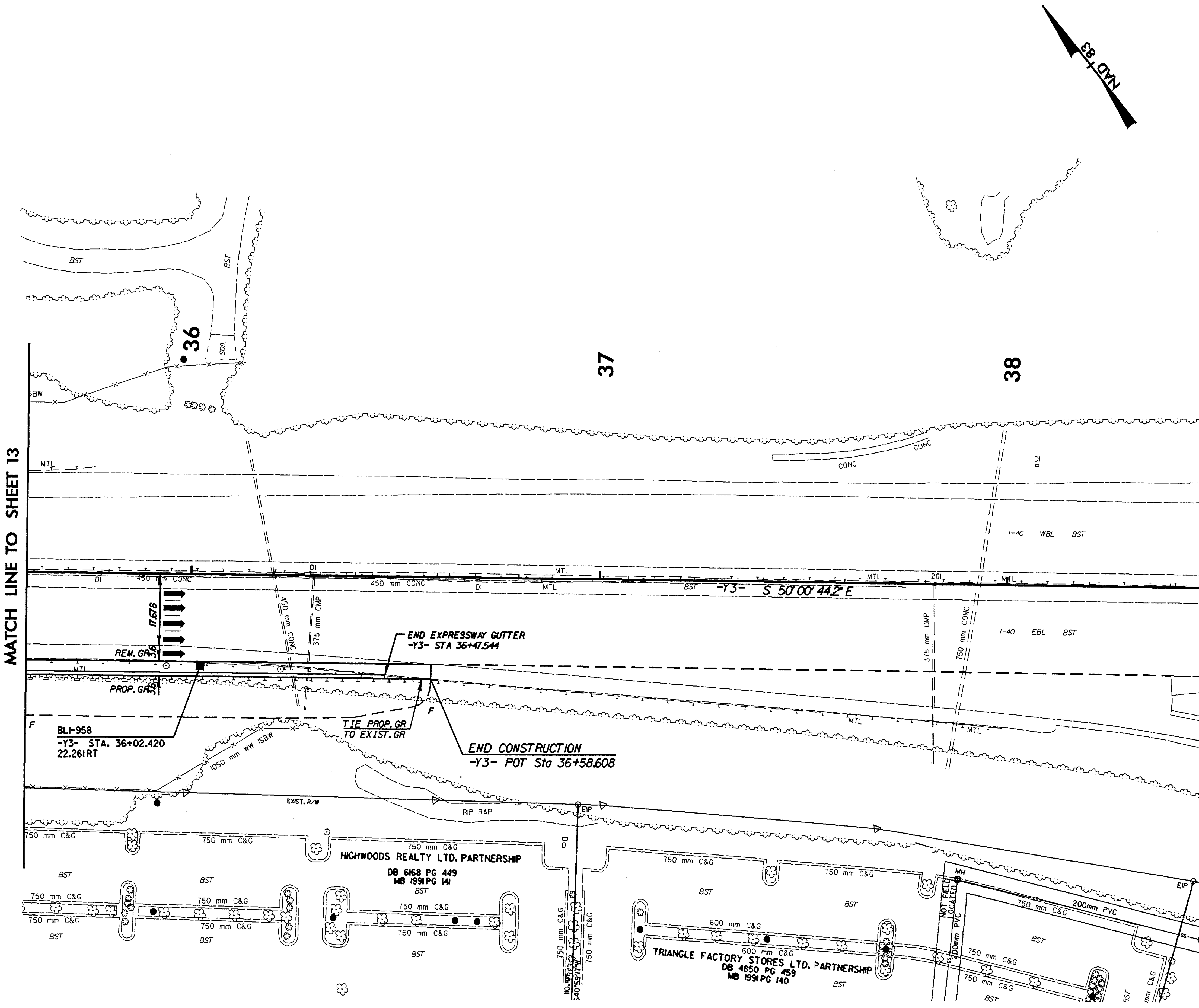
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

METRIC

5 0 10

CONST.REV.

R/W REV.



8/17/99

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