STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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GOVERNOR

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June 15, 2004

Mr. Steve Lund
U.S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

Dear Mr. Lund:

SUBJECT: **Application for Section 404 and 401 permits for the Proposed Relocation of NC 16 from north of NC 73 to SR 1895 at existing NC 16 north of Chronicle.** Lincoln and Catawba Counties; Federal Aid No. F-24-1(34); State Project No. 8.1830501; TIP No. R-2206 B/C; $475.00 Debit work order 34383.1.5; WBS Element 34383.1.5.

This application addresses project R-2206 B/C and consists of the cover letter, ENG Form 4345, 8½ by 11 inch permit drawings, and half-size plan sheets.

Project Description

The North Carolina Department of Transportation (NCDOT) proposes to relocate 10.6 miles of NC 16 in Lincoln and Catawba Counties, North Carolina as a four-lane divided, limited access expressway (R-2206 B/C). The project will extend northward from just north of NC 73, beginning where the R-2206 A project ends, to NC 16 at SR 1895 north of Chronicle. Access will be provided at major crossroads via either at-grade intersections or interchanges. The R-2206 B/C alignment is situated on new location. Section B begins just north of NC 73 where the R-2206 A project ends. Heading north, the project will cross the CSX Railroad and Forney Creek using two two-lane bridges. Continuing northward, the project crosses at-grade with Optimist Club Road (SR 1380). Optimist Club Road will be shifted slightly to the north of the existing location. Further north, the project crosses at-grade with St. James Church Road (SR 1386). St. James Church Road will be shifted slightly to the south of the existing location. Section C begins northwest of the realigned intersection with St. James Church Road. The project turns toward the northwest where it passes under Forney Hill Road (SR 1373). The new bridge crossing will shift Forney Hill Road slightly to the south of the existing location. The project then crosses Killian Creek with two two-lane bridges. The project continues northwest where it passes under Mundy Road (SR 1349). The new bridge will shift Mundy Road slightly to the north. The project crosses into Catawba County where it interchanges with NC 150. Heading north, the project crosses East Maiden Road (SR 1855) with two

two-lane bridges. The project ends with an at-grade intersection with existing NC 16.

Purpose and Need

The project is proposed to improve access and travel time between the rapidly developing Lake Norman area and the Charlotte Metropolitan area, accommodate long-term local traffic demands, and increase capacity, while easing traffic congestion on existing NC 16. Relocating NC 16 will improve the overall mobility in this corridor. In addition, the project will fulfill a need identified in the thoroughfare plans of both Lincoln and Catawba Counties for a north-south arterial near their eastern boundaries. As the Charlotte Metropolitan area grows, those areas farther away from the central city become more attractive for residential development. Improved mobility in the NC 16 corridor will strengthen the link between the portion of the regional employee base residing near the study area and employment opportunities in Charlotte-Mecklenburg. This increased mobility and opportunity to live outside of the immediate Charlotte area will enhance the development potential and associated tax bases of Gaston, Lincoln, and Catawba Counties.

Summary of Impacts

WETLANDS
R-2206 B/C will permanently impact 4.00 acres of riverine and 2.21 acres of non-riverine jurisdictional wetlands (Table 1).

Table 1: Summary of Jurisdictional Wetland Impacts

Section	Riverine	Non-riverine	**Totals (ac)**
R-2206 B	3.31	0.21	**3.52**
R-2206 C	0.69	2.00	**2.66**
Totals	**4.00**	**2.21**	**6.21**

STREAMS
R-2206 B/C will permanently impact 13,320.8 linear feet of jurisdictional streams. The stream impacts, summarized in Table 2, will be to perennial and intermittent streams that are tributaries to Forney Creek [DWQ #11-119-2-3], Killian Creek [DWQ #11-119-2-(0.5)], and Jones Lake [DWQ #11-98-1].

Table 2: Summary of Jurisdictional Stream Impacts

Section	Stream Impact (ft)
R-2206 B	6,667.8
R-2206 C	6,653.0
TOTAL	**13,320.8**

SURFACE WATERS
In addition to impacts incurred through the installation of pipes, culverts, and other structures, the project will permanently impact 4.47 acres of surface waters due to the draining of a pond at sites 10B and 16C.

Summary of Mitigation

The project has been designed to avoid and minimize impacts to jurisdictional areas throughout the National Environmental Policy Act (NEPA) and design processes. Detailed descriptions of these actions are presented in the Mitigation Options section, pages 8-14, in this application. Compensatory mitigation for the remaining impacts consists of utilization of the Environmental Enhancement Program (EEP) for

the 6.21 acres of wetland impacts and 13,320.8 feet of stream impacts to satisfy the federal Clean Water Act compensatory mitigation requirements for NCDOT.

Project Breakdown and Construction Schedule

For construction purposes, NCDOT divided the R-2206 project into three sections, R-2206 A, R-2206 B, and R-2206 C. The three sections traverse through three North Carolina counties, Gaston, Lincoln and Catawba, and total 16.0 miles in length. R-2206 A, the first portion of the R-2206 project, was scheduled for construction beginning in July 2001 and is estimated to be completed in September 2004. Sections B and C are scheduled to begin construction in November 2004. Table 3 contains information concerning the construction schedule and the termini of each section.

Table 3: Construction Schedule for Relocation of NC 16 (TIP No. R-2206)

TIP No.	Section	Description	Length	Let Date
R-2206	A	NC 16 south of Lucia (Gaston Co.) to North of NC 73 South of Triangle (Lincoln Co.)	5.4 mi.	July 2001
	B	North of NC 73 South of Triangle (Lincoln Co.) to North of SR 1386 (Lincoln Co.)	4.8 mi.	October 2004
	C	North of SR 1386 (Lincoln Co.) to North of SR 1895 North of Chronicle (Catawba Co.)	5.8 mi.	October 2004

NEPA Document Status

A Draft Environmental Impact Statement (DEIS) for R-2206 was approved by the Federal Highway Administration (FHWA) on June 6, 1994. The DEIS explains the purpose and need for the project, provides a description of the project and characterizes the social, economic and environmental impacts of the project. After the DEIS was approved and circulated, a Corridor Public Hearing was held on the location on August 11, 1994. On May 8, 1997, the Final Environmental Impact Statement (FEIS) was approved by FHWA, the Record of Decision for the project was signed on September 4, 1997. Copies of the DEIS and FEIS have been provided to the regulatory agencies involved in the approval process. Additional copies will be provided upon request. This application applies to the B and C sections of R-2206 only. Section A of R-2206 is currently under construction.

This project is in compliance with 23 CFR Part 771.111(f) which lists the FHWA characteristics of independent utility of a project:

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;

(2) The project is usable and a reasonable expenditure even if no additional transportation improvements are made in the area; and

(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Resource Status

DELINEATIONS

In 1995 the wetlands along R-2206 A, B and C were delineated in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual.* This delineation included a 1,200-foot wide corridor along the preferred alternative. A representative selection of the wetlands was verified on March 17, 1995 with Steve Lund, USACE. Two additional verifications took place between on May 5 and May 10, 1995.

Subsequently, three additional wetlands were delineated. Location maps and USACE data sheets for these wetlands were sent to the USACE on May 30, 1995. Written approval was sent by the USACE on August 2, 1995. The USACE letter also identified several important wetlands (wetland 26, 39, 52, 71, 74, 75 and 112Z). The USACE strongly recommended that the proposed roadway be designed to avoid and minimize the impacts to these wetlands. The last five of these identified important wetlands are the only ones that pertain to the Sections B and C of the project. NCDOT has avoided impacts to four of the five important wetland sites. Wetland 71, now identified as part of Site 10B, will be impacted when the downstream impoundment is drained. More detailed information regarding these wetlands can be found in *Delineation and Assessment of the Wetlands within the Preferred Corridor for the Proposed Relocation of NC 16 – Part I* (January 1996).

NCDOT biologists visited the project on April 27 through April 29, 1999 to conduct stream determinations and verify the wetland boundaries on the plan sheets. They found several areas in which wetlands were called jurisdictional, but in fact were not. They also found new wetland areas that had not been previously identified. Re-delineation of the Sections B and C wetlands was conducted by NCDOT biologists on May 17 to 19, 1999. Mr. Steve Lund (USACE) and Mr. David Cox [North Carolina Wildlife Resources Commission (NCWRC)] met on September 21 and 22, 1999 with the NCDOT biologists to review stream determinations, wetland corrections, and to make comments. The stream determinations, new wetland lines, and wetland corrections were approved at this time.

Construction of R-2206 B/C will necessitate impacts to Waters of the United States, as defined under 33 CFR §328.3(a). Surface waters will be permanently impacted through stream relocations, filling of streams and ponds, and proposed enclosed channels. Permanent wetland impacts associated with R-2206 B/C include filling, excavating, clearing, and draining of wetlands. The NCDOT will perform all clearing activities using Method III Mechanized Clearing. Since Method III involves clearing and grubbing, all clearing impacts are considered permanent along this project.

WETLANDS

Construction of R-2206 B/C will impact two wetland community types: headwater forest system and emergent wetland. The headwater forest system, both riverine and non-riverine, is best characterized as Piedmont/Low Mountain Alluvial Forest (Schafale and Weakley, 1990). Common canopy trees found in these headwater wetlands included river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). The shrub layer included silky dogwood *(Cornus amomum)*, elderberry *(Sambucus canadensis*), Chinese privet (*Ligustrum sinense*), tag alder (*Alnus serrulata*), and American holly (*Ilex opaca*). The herb and vine layer ranged from sparse to dense depending on the thickness of the tree and shrub layers. Common plants included jewelweed (*Impatiens capensis*), Japanese honeysuckle (*Lonicera japonica*), sedge (*Carex sp.*), and Japanese grass (*Microstegium vimineum*).

The emergent wetlands, both riverine and non-riverine, are best characterized as Piedmont/Mountain Semipermanent Impoundment (Schafale and Weakley, 1990). These wetlands are dominated by herbaceous species and contain sparse to nonexistent tree and shrub layers. Common plants found in these wetlands included Japanese grass, sedges, rushes (*Juncus* sp.), mixed grasses (Poacea), jewelweed, and Japanese honeysuckle. The sporadic woody species, found primarily around the edges of the wetland, included red maple, tulip poplar, elderberry, black willow (*Salix nigra*), box elder (*Acer negundo*), and swamp rose (*Rosa palustris*).

These wetlands can also be classified under the U.S. Fish and Wildlife Service's *Classification of*

Wetlands and Deepwater Habitats (Cowardin et al., 1979). The wetlands in the project area are palustrine in nature, which is defined as non-tidal wetlands dominated by trees, shrubs, persistent emergents, and mosses and lichens. Eight of the eleven wetland sites are dominated by broad-leaved deciduous trees. One wetland is dominated by broad-leaved deciduous shrubs, and the remaining two wetlands are dominated by emergent herbaceous plants.

Table 4 lists the amount of wetland impacts under each wetland community type. R-2206 B/C impacts eleven (11) jurisdictional wetland sites (1B, 9B, 10B, 14B, 3C, 4C, 10C, 11C, 14C, 15C and 16C). As depicted on the enclosed permit drawings, the project will permanently impact 6.21 acres through filling, excavation, draining or clearing of jurisdictional wetlands along the B and C section of R-2206.

Table 4: Wetland Communities Impacted by R-2206 B/C

Site	Riverine		Non-riverine		Cowardin Classification*	**Totals (ac)**
	Headwater Forest (ac)	Emergent Marsh (ac)	Headwater Forest (ac)	Emergent Marsh (ac)		
1B	--	--	0.11	--	PFO1A	**0.11**
9B	0.19	--	--	--	PFO1A	**0.19**
10B	3.12	--	--	--	PSS1/PEM/PFO1C	**3.12**
14B	--	--	--	0.10	PEMA	**0.10**
3C	--	--	0.01	--	PFO1A	**0.01**
4C	--	--	0.01	--	PFO1A	**0.01**
10C	0.10	--	--	--	PFO1A	**0.10**
11C	--	--	0.12	--	PFO1A	**0.12**
14C	0.49	--	0.17	--	PFO1C	**0.66**
15C	--	--	1.69	--	PFO1E	**1.69**
16C	--	0.10	--	--	PEMC	**0.10**
Totals	**3.90**	**0.10**	**2.11**	**0.10**		**6.21**

(*) Notes: PFO1 – palustrine, forested, broad-leaved deciduous; PSS1 – palustrine, shrub-scrub, broad-leaved deciduous; PEM – palustrine, emergent; A – temporarily flooded; C – seasonally flooded; E – seasonally saturated

STREAMS

Table 5 lists the jurisdictional stream impacts of R-2206 B/C. The project will permanently impact 13,320.9 linear ft of jurisdictional stream channels.

Table 5: Jurisdictional Streams Impacted by R-2206 B/C

Site No.	Stream Type	NCDWQ* Stream Index No.	Existing Channel Impacted (ft.)
1B	perennial		377.6 ft.
2B	perennial	--	429.8 ft.
3B	perennial	--	678.5 ft.
4B	perennial	--	834.3 ft.
6B	intermittent	--	355.3 ft.
7B	perennial	--	299.2 ft.
8B	perennial	--	382.2 ft.
9B	perennial	--	531.8 ft.

Table 5 continued

11B	intermittent	--	563.3 ft.
12B	perennial	--	660.8 ft.
13B	perennial	--	1,345.8 ft.
14B	perennial	11-119-2-3	209.3 ft.
1C	perennial	--	220.1 ft.
	perennial	--	425.5 ft.
	Perennial	--	1,040.3 ft.
2C	perennial	--	447.8 ft.
	intermittent	--	464.9 ft.
3C	perennial	--	145.0 ft.
4C	intermittent	--	230.3 ft.
6C	intermittent	--	571.8 ft
7C	intermittent	--	230.0 ft.
8C	perennial	--	51.5 ft.
9C	perennial	--	335.0 ft.
	perennial	--	203.4 ft.
10C	perennial	--	303.5 ft.
14C	perennial	--	631.6 ft.
15C	perennial	--	917.0 ft.
16C	perennial	--	334.6 ft.
17C	perennial	--	56.1 ft.
	perennial	--	44.6 ft**
Totals			**13,320.9 ft**

* - NCDWQ – North Carolina Division of Water Quality.
**Denotes additional impacts for the detour that are temporary.

SURFACE WATERS

Table 6 lists the impacts to surface waters from the proposed construction of R-2206 B/C. The project will permanently impact 4.47 acres of surface waters.

Table 6: Impacts to Surface Waters from R-2206 B/C

Site	Area of Impact (ac)
10B	3.27 ac
16C	1.20 ac
TOTAL	**4.47 ac**

Protected Species

Plants and animals with Federal classification of Endangered (E) or Threatened (T) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of February 5, 2003 the United States Fish and Wildlife Service (USFWS) lists two federally protected species for Lincoln and Catawba Counties. Table 7 outlines these species.

Table 7: Federally Protected Species Listed in Lincoln and Catawba Counties**

COMMON NAME	*SCIENTIFIC NAME*	STATUS	COUNTY
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T	Lincoln/Catawba
Michaux's sumac	*Rhus michauxii*	E	Lincoln

• ***Endangered (E)*** *is defined as a taxon in danger of extinction throughout all or a significant portion of its range.*
• ***Threatened (T)*** *denotes a taxon likely to become endangered within the foreseeable future throughout all or a significant portion of its range.*
** *Obtained from the US Department of the Interior, Fish and Wildlife Service, Updated County Species List at www: nc-es.fws.gov (February 5, 2003)*

The NCDOT has investigated the potential effects of R-2206 on federally protected species. Several environmental documents provide biological conclusions for the federally protected species listed in Table 7. *A Report on The Biological Assessment/Surveys For Hexastylis naniflora and Rhus michauxii Within The Preferred Corridor For The Proposed Relocation of NC 16* (June 1995) provides a biological conclusion of No Effect for the Michaux's sumac and dwarf-flowered heartleaf. The USFWS sent a letter on February 15, 1996 concurring with NCDOT's biological conclusion of No Effect for the Michaux's sumac and the dwarf-flowered heartleaf. The FEIS dated May 8, 1997 provides information on Michaux's sumac and dwarf-flowered heartleaf, and a determination regarding potential impacts to the above-mentioned species (FEIS pages 3-34 to 3-37). Due to the span of time since the previous protected species surveys, a new survey will be conducted of appropriate habitats within the proposed project right-of-way during summer 2004 and spring 2005.

A review of the NC Natural Heritage Program (NCNHP) records on December 30, 2003 revealed that there were no known populations of federally protected species or federal species of concern (FSC) within 1.0 mi (1.6 km) of the proposed project area.

Cultural Resources

ARCHITECTURAL RESOURCES
A historic architectural survey for R-2206 identified 12 individual properties and one district that are either listed in or eligible for listing in the National Register of Historic Places (NRHP). There are no properties located in the Area of Potential Effect (APE) for the R-2206 B/C project. According to the FEIS documentation, the State Historic Preservation Officer (SHPO) concurred with these findings on April 28, 1994.

ARCHAEOLOGICAL RESOURCES
An archaeological survey was done between January 23 and June 22, 1996. The survey was done by using a 600-foot corridor around the Preferred Alternative's preliminary alignment. This survey located 49 archaeological sites, seven were assessed as eligible for the NRHP. Five sites were located within the proposed right-of-way (ROW) for the Preferred Alternative on R-2206 B/C. These sites are listed as 31LN148**, 31LN150**, 31LN152, 31LN154, and 31LN159. Sites 31LN152 and 31LN159 appear to be outside the ROW and information is being supplied to the SHPO for concurrence. For the remaining three sites, NCDOT is planning a recovery as soon as right-of-way is acquired. Another site which is listed as eligible, Site 31LN149**, is located outside the proposed right-of-way and will require no further work if it is not disturbed by construction activities. The Deputy North Carolina State Historic Preservation Officer concurred with these recommendations on October 2, 1996. It was determined during a site visit on April 17, 2001 that 31LN159 is outside of the proposed right-of-way and will not be impacted.

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 paragraphs describe and quantify impacts for utility relocations. 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, they 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.

There are no jurisdictional resource impacts (wetlands, streams, or surface waters) associated with proposed utility relocations connected to this project. NCDOT currently has no information concerning any non-project related utility upgrades within the project area.

FEMA Compliance

According to the NCDOT Hydraulics Unit there are no detailed study areas within the project limits. A description of the FEMA Zone A crossing involvement is located in the DEIS on page 4-18 and 4-19 and supports the "No FEMA Involvement" status for this project.

Mitigation Options

The Corps of Engineers has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the Waters of the United States. Mitigation of wetland and surface water impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating 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 are taken to minimize or mitigate impacts to wetlands.

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning and NEPA compliance stages; minimization measures were incorporated as part of the project design. The USACE concurred by letter dated August 9, 1996 that R-2206 B/C satisfies its concerns relevant to avoidance and minimization of wetland impacts. Regulatory agencies involved in the Section 404/NEPA Merger Project Team provided concurrence for Point No. 4A – Avoidance and Minimization for R-2206 B/C on September 8, 2003. The following is a list of the project's jurisdictional wetland and stream avoidance/minimization activities proposed or completed by NCDOT.

AVOIDANCE:

The following measures were or will be employed by NCDOT to avoid impacts to Waters of the United States during construction of this project:

- The Preferred Alternative impacts the least wetlands of all the alternatives studied in the EIS.
- All wetland areas not affected by the project will be protected from unnecessary encroachment.

No staging of construction equipment or storage of construction supplies will be allowed in wetlands or near surface waters.

- Impacts to Forney Creek, Killian Creek (twice), and Reed Creek (previously sites 5B, 5C, 12C and 13C, respectively), were avoided through use of bridges rather than culverts or pipes. Placement of construction equipment in the streams will be prohibited.

MINIMIZATION:

The following project-specific measures were or will be employed by NCDOT to minimize impacts to Waters of the United States during construction of this project:

- Fill slopes through wetlands and streams area at a 2:1 ratio.
- Best Management Practices will be strictly enforced for sediment and erosion control for the protection of surface waters and wetlands.
- It is the policy of the NCDOT to eliminate lateral ditching in wetlands as much as possible, thus preserving the hydrology of adjacent wetlands.
- NCDOT Hydraulics Unit has reduced the amount of rip-rap in all stretches of the relocated channel.
- All pipes or culverts will be buried 6 or 12 inches, depending on the size of the structure, to minimize impacts to aquatic life movement and habitat.

The following site-specific measures were employed by NCDOT to minimize impacts to Waters of the United States during construction of this project:

- Site 1B (Sta. -Y- 15+81 Lt to -L- 106+25 Rt.): Site 1B consists of a non-riverine, headwater forest wetland area and perennial stream. The wetland system rated 68 out of 100 on NCDWQ's Wetland Rating System and is thus considered high quality. During the design phase, NCDOT revised the fill height of the service road to minimize impacts to a high quality wetland site. NCDOT plans to use a 900 mm (36 in) reinforced concrete pipe (RCP) to carry the stream under the proposed road. No riprap will be placed in the stream channel at the downstream end of the RCP and it will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized on the west side of the service road, in the median of the mainline, and to the extent allowed by the topography east of the mainline for the treatment of highway drainage off of the service road and mainline to attenuate impacts to downstream water quality. A pre-formed scour hole was evaluated for structure 17, but it was eliminated due to steepness of topography.
- Site 2B (Sta. -L-114+65 Lt. to 115+27 Rt.): Site 2B consists of a perennial stream. NCDOT plans to use a 900 mm (36 in) RCP to carry the stream under the proposed road. No riprap will be placed in the stream channel at the downstream end of the RCP and the culvert will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized to the extent allowed by the topography east of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 3B (Sta. -L- 121+69 Rt. to 122+44 Rt. and -L- 123+67 Lt.): Site 3B consists of two perennial streams. NCDOT plans to use a 1650 mm (66 in) RCP to carry the UT to Killian Creek under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median and east of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality. To avoid impacts,

Killian Creek will be bridged. The bridge over Killian Creek will not contain weep-holes. Riprap will be utilized at the end of the northern roadside ditch where it drains into Killian Creek to stabilize the bank, thus preventing head-cutting and possible impacts to downstream water quality from sedimentation.

- Site 4B (Sta. -L- 132+03 Rt. to 133+12 Lt.): Site 4B consists of a perennial stream. NCDOT plans to use a single barrel 2.1 m x1.5 m (7 ft x 5 ft) reinforced concrete box culvert (RCBC) to carry the stream under the proposed road. No riprap will be placed in the stream channel at the downstream end of the RCBC and the culvert will be buried to minimize impacts to aquatic life movements and habitat.
- Site 6B (Sta. -L- 139+59 Rt. to 140+01 Lt.): Site 6B consists of an intermittent steam for which NCDOT plans to use a 1050 mm (42 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median and to the extent allowed by the topography east and west of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 7B (Sta. -L- 142+91 Lt. to 143+36 Rt.): Site 7B consists of a perennial stream for which NCDOT plans to use a 1050 mm (42 in) RCP to convey it under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median and to the east and west of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 8B (Sta. -L- 145+50 Rt. to 145+88 Lt.): Site 8B consists of a perennial stream for which NCDOT plans to use a 1050 mm (42 in) RCP to convey it under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales were evaluated at this location, but they were not determined to be feasible due to steepness of topography.
- Site 9B (Sta. -L 150+96 Rt. to 151+55 Lt.): Site 9B consists of a riverine, headwater forest wetland area and a perennial stream. NCDOT proposes to fill and/or clear a majority of the wetland and use a 1200 mm (48 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median and for the final 82 feet of the eastern roadside ditch for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 10B (Sta. -L- 156+75 Rt. to 160+37 Lt). This site consists of a man-made impoundment and associated riverine, headwater forest wetlands. NCDOT proposes to breach the dam and remove an associated sluice-gate, thus draining the pond and wetlands. A single barrel 2.7 m x 1.8 m (8 ft x 6 ft) RCBC will carry a portion of the currently impounded stream under the proposed road. Approximately 700 feet of the currently impounded stream will be restored utilizing natural channel design techniques. This restored stream will be utilized as mitigation for a future, but yet to be specified, project in the region.
- Site 11B (Sta. -L- 169+36 Lt. to 170+01 Rt.): Site 11 B consists of an intermittent tributary to Forney Creek. NCDOT plans to use a 1050 mm (42 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are

utilized in the median for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.

- Site 12B (Sta. -L- 172+55 Lt to 173+39 Rt.): Site 12B consists of a perennial stream. NCDOT plans to use a 750 mm (30 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality. Riprap will be utilized at the end of the southern roadside ditch where the ditch drains into the creek to stabilize the bank, thus preventing head-cutting and possible impacts to downstream water quality from sedimentation.
- Site 13B (Sta. -L- 177+58 Rt. to 179+39 Rt.): Site 13B consists of a perennial stream for which NCDOT plans to use a 1350 mm (54 in) RCP to convey the stream under the proposed road. The RCP will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median and to the north of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 14B (Sta. -Y9-REV 18+46 Rt. to 18+56 Lt.): Site 14 B consists of a non-riverine emergent wetland and Forney Creek, a perennial stream. NCDOT proposes to fill and/or clear approximately half of the wetland. They also propose to convey Forney Creek under the relocated Optimist Club Road (SR 1380) utilizing a double barrel 4.3 m x 3.0 m (14 ft x 10 ft) RCBC. The RCBC will be buried to minimize impacts to aquatic life movements and habitat. A 450 mm (18 in.) high concrete sill will be placed in the upstream end of the western barrel to maintain the integrity and flow rate of the stream.
- Site 1C (Sta. -L- 181+48 Rt. to 183+99 Rt.): Site 1C consists of three perennial streams. NCDOT plans to use a 750 mm (30 in) pipe and a 1200 mm (48 in) RCPs to convey the eastern two streams under the proposed road. The westernmost stream will be conveyed under the road within a single barrel 1.5 m x1.5 m (5 ft x 5 ft) RCBC. No riprap will be placed in the streams at the downstream end of the pipes and the culvert and they will be buried to minimize impacts to aquatic life movements and habitat. Approximately 164 feet of westernmost stream channel will be relocated utilizing natural channel design techniques to minimize the amount of aquatic life habitat impacts. The new stream will have 50 foot wooded buffers, part of which will extend along the 2:1 slope, that will be in permanent right-of-way. NCDOT will plant a grass seed mixture on the 2:1 slope and once the buffer stabilizes, NCDOT will replant with indigenous tree species for Lincoln County. Grass-swales are utilized in the median for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 2C (Sta. -L- 190+86 Lt. to 192+03 Rt.): Site 2C consists of a perennial and an intermittent stream. NCDOT plans to use a 1500 mm (72 in) and a 900 mm (36 in) RCPs to convey the streams under the proposed road. No riprap will be placed in the streams at the downstream end of the pipes and the pipes will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales will be utilized in the median and along the southern shoulder for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 3C (Sta. -L- 194+96 Lt. to 195+14 Lt.): Site 3C consists of a non-riverine, headwater forest wetland area and a perennial stream. The wetland will be filled and the stream will be captured with a springbox and conveyed under the road within a 600 mm (24 in) RCP. No riprap will be placed in the stream at the downstream end of the pipe and the pipe will be buried to minimize

impacts to aquatic life movements and habitat.

- Site 4C (Sta. -L- 196+71 Lt. to 197+40 Lt.): Site 4C consists of a non-riverine, headwater forest wetland area and an intermittent stream. The wetland will be filled and the stream will be conveyed under the road within a 600 mm (24 in) RCP. The pipe will be buried to minimize impacts to aquatic life movements and habitat.
- Site 6C (Sta. -L- 202+25 Rt. to 203+66 Rt.): Site 6C consists of an intermittent stream that will be relocated into an open riprapped channel along the eastern edge of the roadway. Flows from the median and the western roadside ditch will be discharged into the ephemeral channel at Sta. 201+45 Rt. for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality. To the extent feasible due to topography, grass-swales are also utilized south of the mainline to treat highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 7C (Sta. -L- 207+91 Rt. to 207+96 Rt.): Site 7C consists of a intermittent stream for which NCDOT plans to use a 750 mm (30 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream channel at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median, north and south of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 8C (Sta. -L- 208+89 Rt. to 209+04 Rt.): Site 8C consists of a spring and perennial stream. The stream will be captured with a springbox and conveyed out of the right-of-way within a 150 mm (6 in.) poly-vinyl chloride (PVC) pipe. No riprap will be placed in the stream channel at the downstream end of the pipe and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales are utilized in the median, north and south of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 9C (Sta. -L- 211+68 Lt. to 212+42 Lt.): Site 9C consists of two perennial streams. NCDOT plans to use a 1050 mm (42 in) and a 750 mm (30 in) RCP to convey the streams under the proposed road. No riprap will be placed in the stream at the downstream end of the pipe and the pipes will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales will be utilized in the median for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 10 C (Sta. -L- 217+75 lt. to 218+37 Rt.): Site 10C consists of a riverine, headwater forest wetland area and a perennial stream. NCDOT proposes to fill and/or clear a majority of the wetland and use a 750 mm (30 in) RCP to convey the stream under the proposed road. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales will be utilized in the median and along the northern shoulder for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 11C (Sta. -L- 221+11 Rt. to 221+37 Rt.): Site 11C consists of non-riverine, headwater forest wetland area. NCDOT proposes to fill and/or clear approximately half of the wetland. A pre-formed scour hole was evaluated but it was eliminated due to steepness of topography. Grass-swales are utilized in the median, east and west of the mainline for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Old Site 12C (Sta. -L- 223+03): Impacts were avoided to Killian Creek at this site through the use of a bridge. As previously noted, no construction equipment nor in-stream construction

techniques will be utilized at this site. The bridge over Killian Creek will not contain weep-holes. Riprap will be utilized at the end of two eastern roadside ditches where they drain into Killian Creek to stabilize the bank, thus preventing head-cutting and possible impacts to downstream water quality from sedimentation. Approximately 85 feet of the end of the northeastern ditch will be grass-swale to aid in slowing water flow and for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality

- Old Site 13C (Sta. -L- 256+91): Impacts were avoided to Reed Creek at this site through the use of a bridge. As previously noted, no construction equipment nor in-stream construction techniques will be utilized at this site. The bridge over Reed Creek will not contain weep-holes. Grass-swales will be utilized in the median, east and west of the mainline, south of the creek, for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality. A pre-formed scour hole will be placed at the discharge of this southern collection system to reduce flow rates and thus reduce erosive impacts to the stream. Riprap will be utilized at the end of the western roadside ditch where it drains into Reed Creek to stabilize the bank, thus preventing head-cutting and possible impacts to downstream water quality from sedimentation.
- Site 14C (Sta. -L- 262+64 Rt. to 264+38 Lt.): Site 14C consists of two headwater forest wetland areas, one non-riverine and the one riverine, and a perennial stream. NCDOT plans to fill both wetlands. The stream will be conveyed by a1050 mm (42 in) RCP under the proposed road. No riprap will be placed in the stream at the downstream end of the pipe and the pipe will be buried to minimize impacts to aquatic life movements and habitat. Grass-swales will be utilized in the median for the treatment of highway drainage off of the mainline to attenuate impacts to downstream water quality.
- Site 15C (Sta. 264+72 Rt. to -NBL- 11+54 Rt.): Site 15C consists of a long linear non-riverine, headwater forest wetland area surrounding a perennial stream. NCDOT plans excavation, fill and clearing in portions of the wetland. Included in the area of wetland impact at near Sta. -L- 265+60 Rt. is a remnant piece, that while not slated for fill, clearing or excavation is likely to be effected based on knowledge of standard construction impacts and techniques. NCDOT plans to use a 600 mm (24 in) RCP and open riprapped channels to relocate and convey the stream under the realigned Tower Road (SR 1895).
- Site 16C (Sta. -SBL- 269+29 Rt. to 271+02 Lt.): Site 16C consists of a riverine emergent headwater wetland, a perennial stream and a manmade impoundment. NCDOT proposes to breach the dam thus draining the pond. The wetland will be filled and the stream conveyed under the road within a 600 mm (24 in) RCP. No riprap will be placed in the stream at the downstream end of the RCP and the pipe will be buried to minimize impacts to aquatic life movements and habitat.
- Site 17C (Sta. -Y14- 20+08 Lt. to 20+25 Rt. and -Y14-DET- 20+26 Lt. to 20+31 Rt.): The site consists of a culverted perennial tributary to Killian Creek. NCDOT proposes to extend the existing single barrel 1.5 m x 1.5 m (5 ft x 5 ft) RCBC. To facilitate the extension, NCDOT also plans to construct a temporary detour with a 1400 mm (56 in) RCP. To allow for additional flood capacity at the site, an additional 1200 mm (48 in.) RCP will be located southwest of the existing culvert. Grass-swales will be utilized to the north and south of NC 150 for treatment of highway drainage to attenuate impacts to downstream water quality.

COMPENSATION:
The primary emphasis of the compensatory mitigation is to reestablish a condition that would have existed if the project were 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 construction of the project. These methods consist of creation of new wetlands from uplands, borrow pits, and other non-wetland areas; restoration of wetlands; and enhancement of existing wetlands. Where such options may not be available, or when existing wetlands and wetland-surface water complexes are considered to be important resources worthy of preservation, consideration is given to preservation as at least one component of a compensatory mitigation proposal.

FHWA Step Down Compliance

All compensatory mitigation must be in compliance with 23 CFR Part 777.9, "Mitigation of Impacts" that describes the actions that should be followed to qualify for Federal-aid highway funding. This process is known as the FHWA "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 enhancement, creation, and preservation.

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 Ecosystem Enhancement Program (EEP), will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for NCDOT projects that are listed in Exhibit 1 of the subject MOA during the EEP transition period, which ends on June 30, 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 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. The remaining, unavoidable impacts to 6.21 acres of jurisdictional wetlands and to 13,320.8 feet of jurisdictional streams in cataloging unit 03050101 of the Catawba River Basin will be offset by compensatory mitigation provided by the EEP program.

Compensation

WETLANDS
R-2206 B/C will permanently impact 4.00 acres of riverine and 2.21 acres of non-riverine jurisdictional wetlands. At a 2:1 ratio, the project requires 8.00 acres of riverine and 4.42 acres of non-riverine off-site compensatory wetland mitigation. NCDOT is currently coordinating with EEP regarding the wetland mitigation for the impacts associated with this project.

STREAMS

R-2206 B/C will permanently impact 13,320.8 linear feet of jurisdictional streams that comprise waters of the United States. At a 2:1 ratio, the project requires 6,641.6 linear feet of off-site compensatory stream mitigation. NCDOT is currently coordinating with EEP regarding the stream mitigation for the impacts associated with this project.

Environmental Agency Field Reviews and Concurrence Meeting

FIRST AGENCY FIELD REVIEW

Two environmental agency field reviews were conducted for R-2206 B and C. The first field review was held for the A, B, and C sections of R-2206 on September 21-22, 1999. Mr. Steve Lund, USACE, Asheville Regulatory Field Office, Mr. David Cox, NCWRC, Jared Gray, Tim Bassette, and Chris Murray of NCDOT Project Development & Environmental Analysis (PDEA) Branch attended this field review. NCDWQ declined to attend and deferred its comments to other environmental agencies.

Three key issues were raised during the first field review. The issues involved wetland delineations for the A, B and C sections, whether or not avoidance and minimization needed to be revisited because of new wetlands that had been delineated, corrections to the old wetland delineations, and stream determinations by NCDOT biologists. Stream determinations conducted during the field review concluded that 24 jurisdictional stream sites along the B and C sections would require compensatory mitigation. The agencies agreed that avoidance and minimization issues would not have to be revisited. The new wetlands were verified and the old wetlands that were to be removed were also verified. During the field review, the agencies also discussed the idea of baffles in the proposed box culverts and about reducing rip-rap around areas were new structures were being placed.

SECOND AGENCY FIELD REVIEW

The USFWS raised several issues during the second review. They requested baffles be placed in the culvert at Site 14B and that site 10B be studied as a possible mitigation site. Natural channel design is proposed at that site. They also requested shorter fill slopes and further avoidance and minimization.

Environmental Commitments

The NCDOT will follow numerous environmental commitments which are the result of agency comments for the DEIS and the FEIS for R-2206. The commitments are listed below.

- Any stream relocations will be coordinated with the U.S. Fish and Wildlife Service and the NC Wildlife Resource Commission.
- Potential hazardous waste sites will be assessed before right-of-way acquisition.

The NCDOT will also implement the following environmental commitments which are the result of agency comments for R-2206 B/C. The commitments are listed below.

- At the request of USACE, NCDOT will commit to installing the new stream using natural stream

design and divert water flow into the new channel before the fill slopes are built.

Regulatory Approvals

Application is hereby made for a Department of Army Individual Section 404 Permit as required for the above-described activities. We are also hereby requesting a 401 Water Quality Certification from the Division of Water Quality. 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 for debit work order number). We are providing seven copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their review.

If you have any questions, or need additional information, please contact Mr. Chris Underwood, Environmental Biologist, at (919) 715-1451.

Sincerely,

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

cc:

W/attachment

Mr. John Hennessy, Division of Water Quality (7 copies)
Ms. Marella Buncick, USFWS
Ms. Marla Chambers, NCWRC
Ms. Becky Fox, USEPA-Whitter, NC
Mr. Ronald Mikulak, USEPA – Atlanta, GA
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. M. L. Holder, P.E., Division Engineer
Ms. Trish Simon, DEO

W/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Mark Staley, Roadside Environmental
Mr. David Franklin, USACE, Wilmington
Ms. Beth Harmon, EEP
Mr. Derrick Weaver, P.E. PDEA

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires December 31, 2004

Public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: Rivers and Harbors Act, Section 10, 33 USC 403: Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research and Sanctuaries Act, 33 USC 1413, Section 103. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

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

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

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
North Carolina Department of Transportation
Project Development & Environmental Analysis
c/o Chris S. Underwood

8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)

6. APPLICANT'S ADDRESS
1548 Mail Service Center
Raleigh, NC 27699-1598

9. AGENT'S ADDRESS

7. APPLICANT'S PHONE NOs. W/AREA CODE
a. Residence
b. Business 919-715-1451

10. AGENT'S PHONE NOs. W/AREA CODE
a. Residence
b. Business

11. **STATEMENT OF AUTHORIZATION**

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

_____ APPLICANT'S SIGNATURE

_____ DATE

NAME, LOCATION, AND DESCRIPTION OR PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Relocation of 10.6 miles of NC 16, T.I.P. No. R-2206 B/C

13. NAME OF WATERBODY, IF KNOWN (if applicable)
Tributaries to Forney Creek, Killian Creek, and Jones Creek

14. PROJECT STREET ADDRESS (if applicable)

15. LOCATION OF PROJECT
Lincoln and Catawba COUNTY
NC STATE

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) **Section, Township, Range, Lat/Lon, and/or Accessors's Parcel Number, for example.**
Project will extend northward from north of NC 73 to NC 16 at SR 1895 north of NC 150.

17. DIRECTIONS TO THE SITE: From Charlotte, take NC 16 north to just north of the intersection of NC 73.

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

The nature of the project and information specific to construction activities, methods, and materials are provided in the attached permit application, roadway drawings, general drawing sheets, and typical section sheets.

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

The purpose and need for the project is provided in the attached cover letter. Construction of the proposed project is anticipated to commence in August 2004.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Construction activities will require that fill material be placed into jurisdictional waters. Temporary impacts to jurisdictional waters include temporary filling of a stream channel during construction of a temporary detour. Permanent impacts to jurisdictional waters include installation of riprap for erosion control associated with culverts and drainage swales, placement of fill within jurisdictional channels that will have culverts installed, placement of fill within jurisdictional wetlands that impacted by construction of the proposed roadway, and installation of scour control mechanisms at the inlets and/or outlets of existing channels.

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

Discharged material will consist of fill dirt and riprap, as described in the attached permit application letter and drawings.

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

The attached table summarizes the surface areas of jurisdictional waters to be filled. Filling, permanent and temporary, will be performed using mechanized equipment such as backhoes and bulldozers. No dredging is proposed. Additional information pertaining to jurisdictional impacts is provided in the attached permit application letter and drawings.

23. Is Any Portion of the Work Already Complete? Yes ___ No _X__ IF YES, DESCRIBE THE COMPLETED WORK

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

Information pertaining to adjoining properties owners is provided in the attached permit drawings.

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

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

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

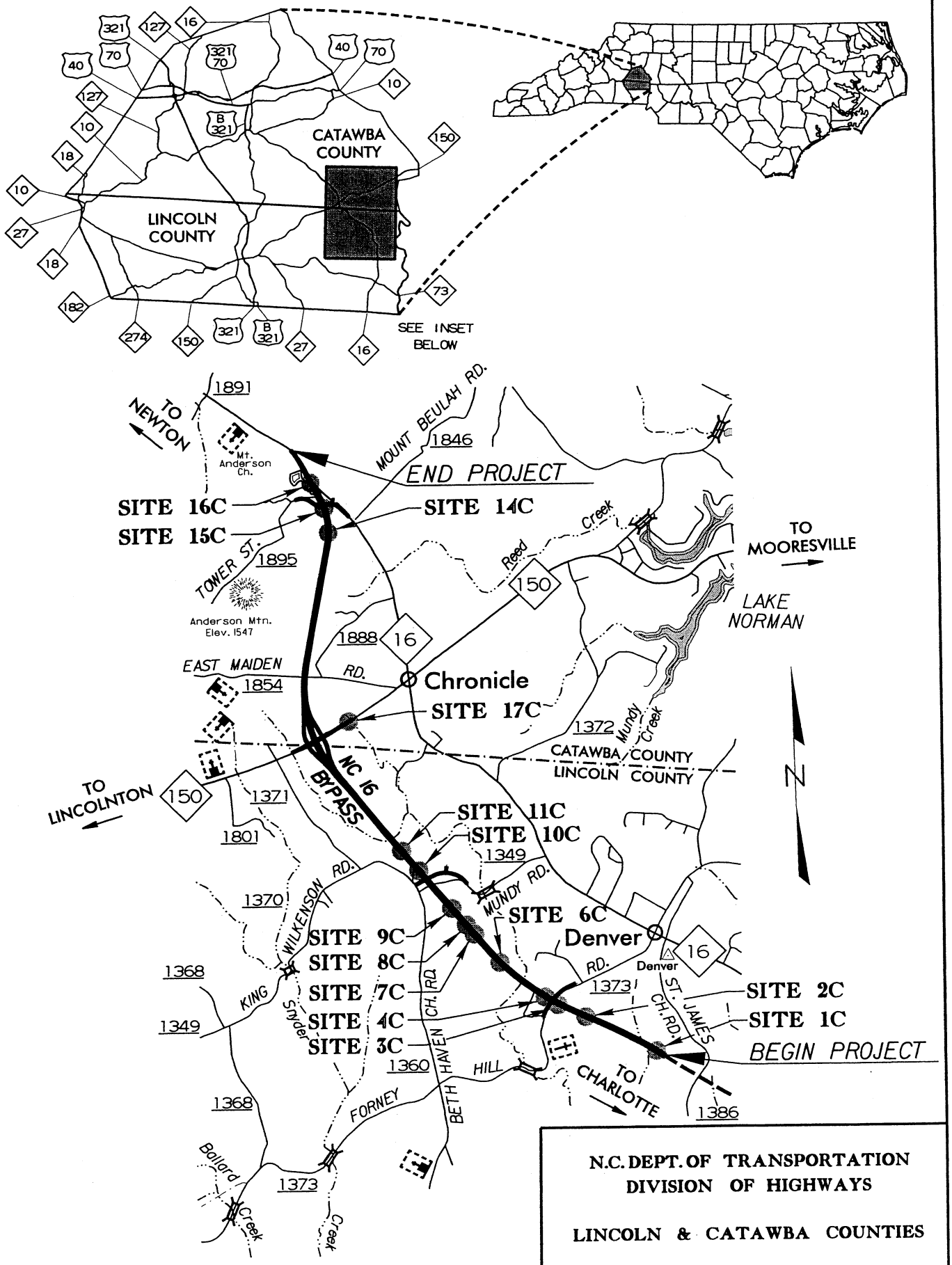
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
[signature]	6/15/04		

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

Item 22

Site	Fill in Wetlands (acres)	Excavation in Wetlands (acres)	Mechanized Clearing in Wetlands [Method III] (acres)	Fill in Surface Waters [Natural] (acres)	Fill in Surface Waters [Pond] (acres)	Existing Channel Impacted (feet)	Natural Stream Design (feet)
1B	0.100		0.010	0.027		337.62	
2B				0.025		429.79	
3B				0.104		678.48	
4B				0.136		834.32	
6B				0.027		355.31	
7B				0.022		299.21	
8B				0.030		382.22	
9B	0.173		0.020	0.040		531.82	
10B	3.116				3.267[1]		702.10
11B				0.042		563.32	
12B				0.052		660.76	
13B				0.101		1345.80	
14B	0.084		0.020	0.059		209.32	
1C				0.148		1686.02	164.04
2C				0.069		912.73	
3C	0.012			0.012		145.01	
4C	0.007			0.017		230.31	
6C				0.042		571.85	
7C				0.017		229.99	
8C				0.005		51.51	
9C				0.079		538.38	
10C	0.089		0.007	0.022		303.48	
11C	0.101		0.022				
14C	0.665			0.072		631.56	
15C	1.515	0.057	0.121	0.072		916.99	
16C	0.072	0.027	0.002	0.025	1.199	334.65	
17C					0.012[2]	100.72[3]	

1 = Denotes draining of pond
2 = 0.002 acres of impact will be for a detour and is temporary
3 = 44.62 feet will be for a detour and is temporary



SCALE
.5 0 1 KM

LOCATION MAP

NOTE: SITES 5C, 12C & 13C REMOVED DUE TO NO IMPACT

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 1 OF 35

1/16/04

LEGEND

---WLB---- WETLAND BOUNDARY

WLB WETLAND WLB

F F DENOTES FILL IN WETLAND

S S DENOTES SURFACE WATER IMPACT (NATURAL)

P P DENOTES SURFACE WATER IMPACT (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

/ 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

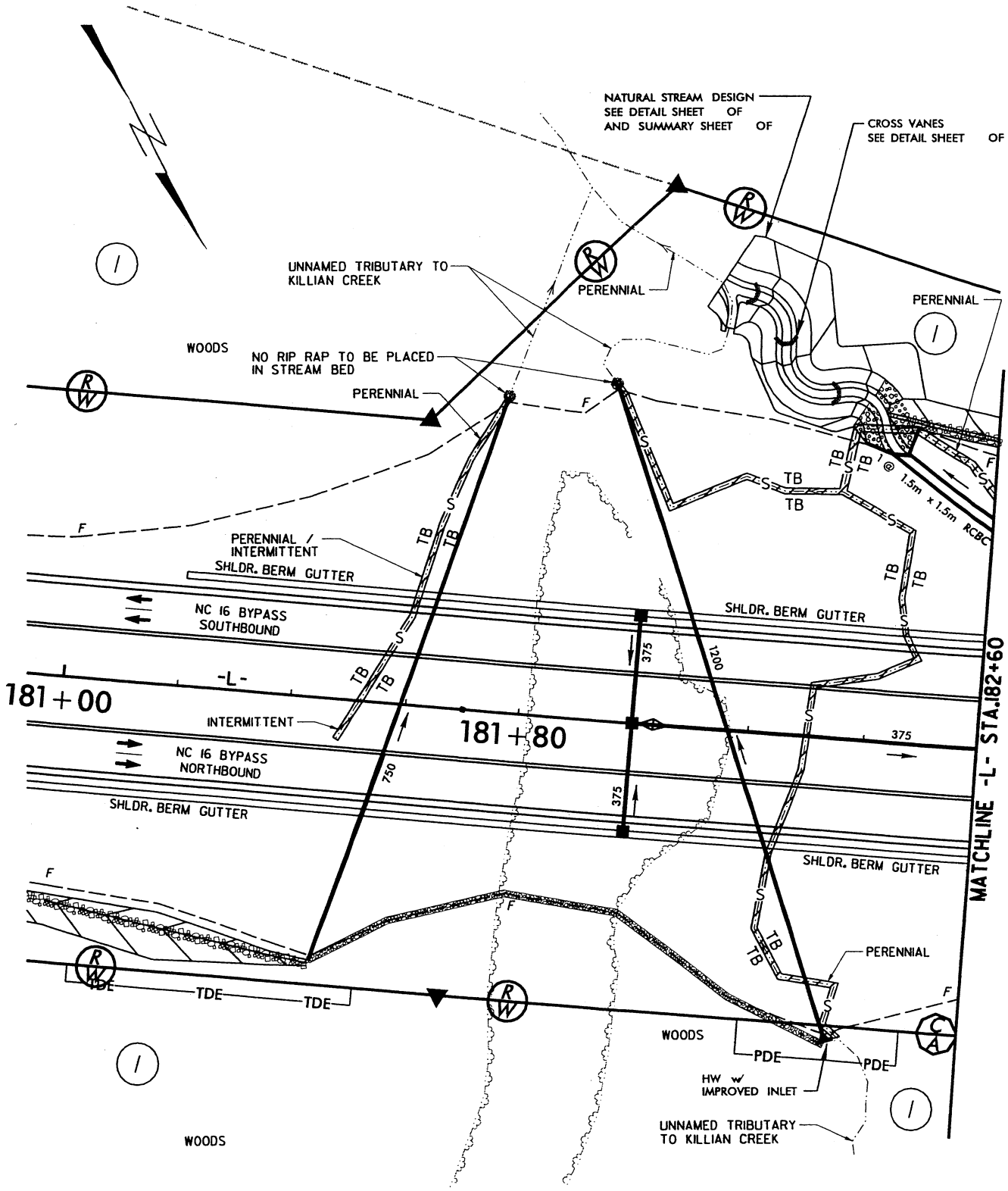
RIP RAP ENERGY DISSIPATOR BASIN

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 2 OF 35 **1/16/04**



PLAN VIEW
SITE 1C

10 0 20

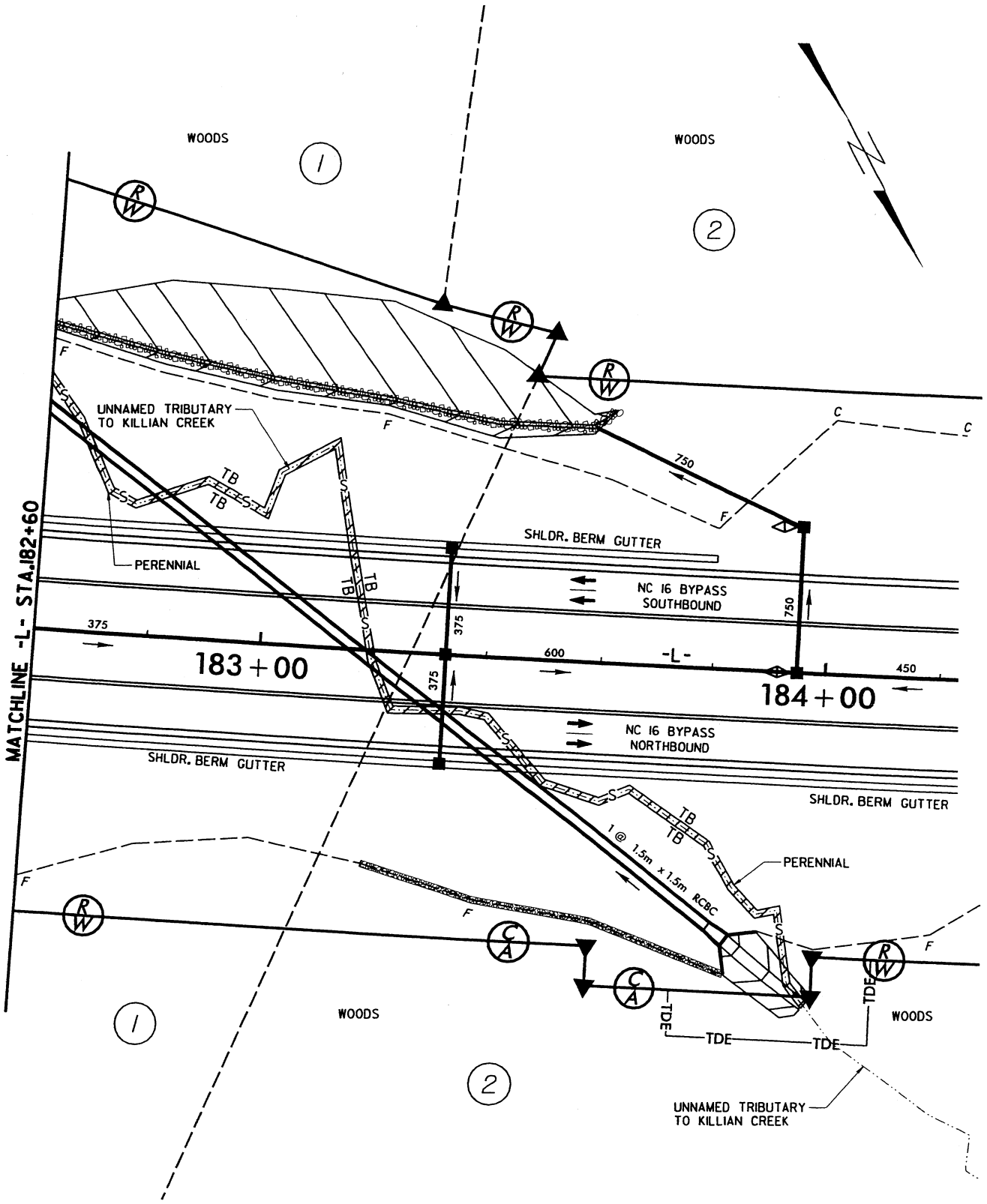
DENOTES SURFACE WATER IMPACT (NATURAL)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 3 OF 35 1/16/04



PLAN VIEW
SITE 1C

10 0 20

DENOTES SURFACE WATER IMPACT (NATURAL) S S

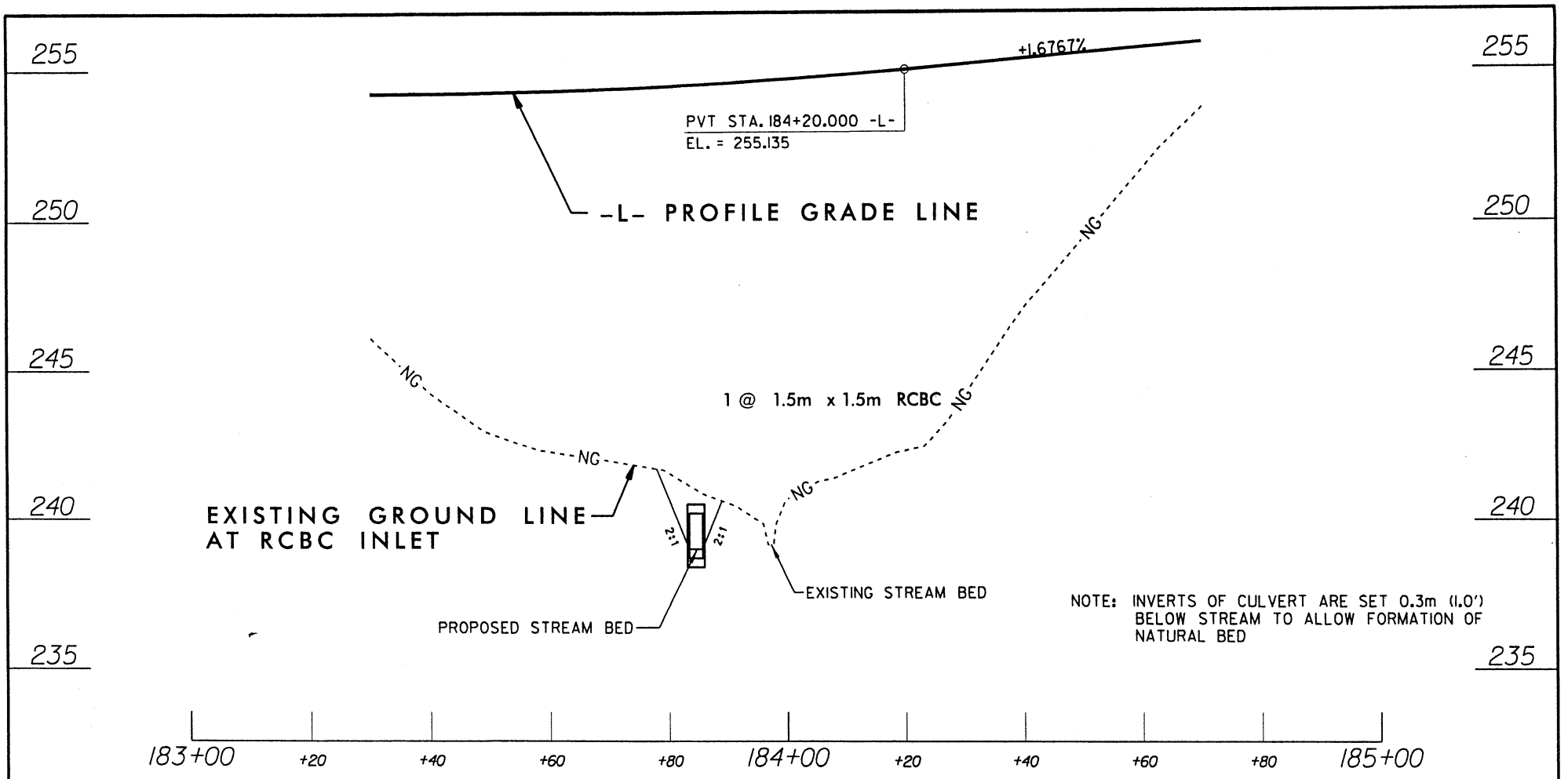
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 4 OF 35 **1/16/04**

REVISED 4/29/04



PROFILE
SITE 1C

5 0 10 HORIZONTAL SCALE

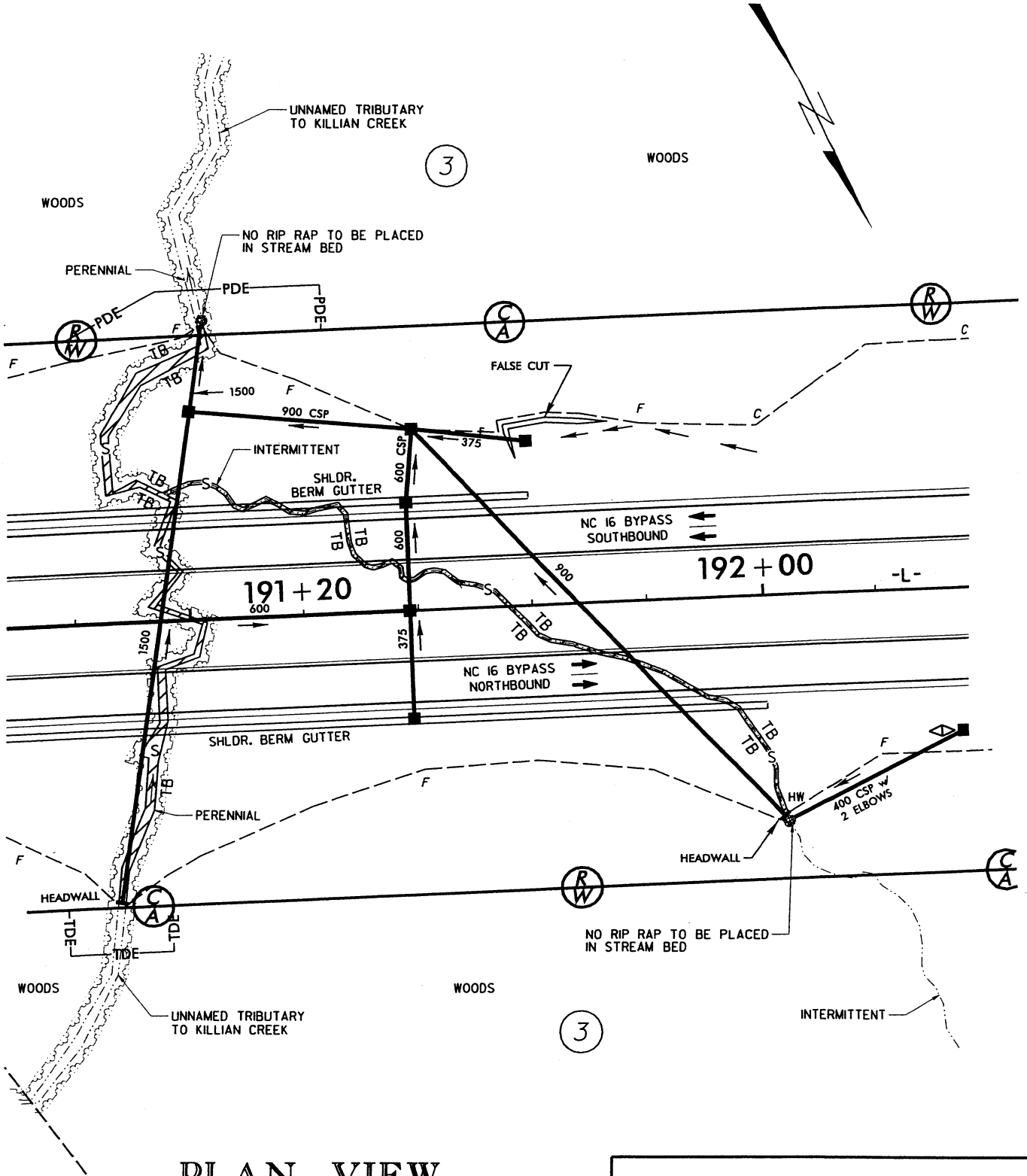
1 0 2 VERTICAL SCALE

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 5 **OF** 35 1/16/04



PLAN VIEW
SITE 2C

DENOTES SURFACE WATER IMPACT (NATURAL)

10 0 20

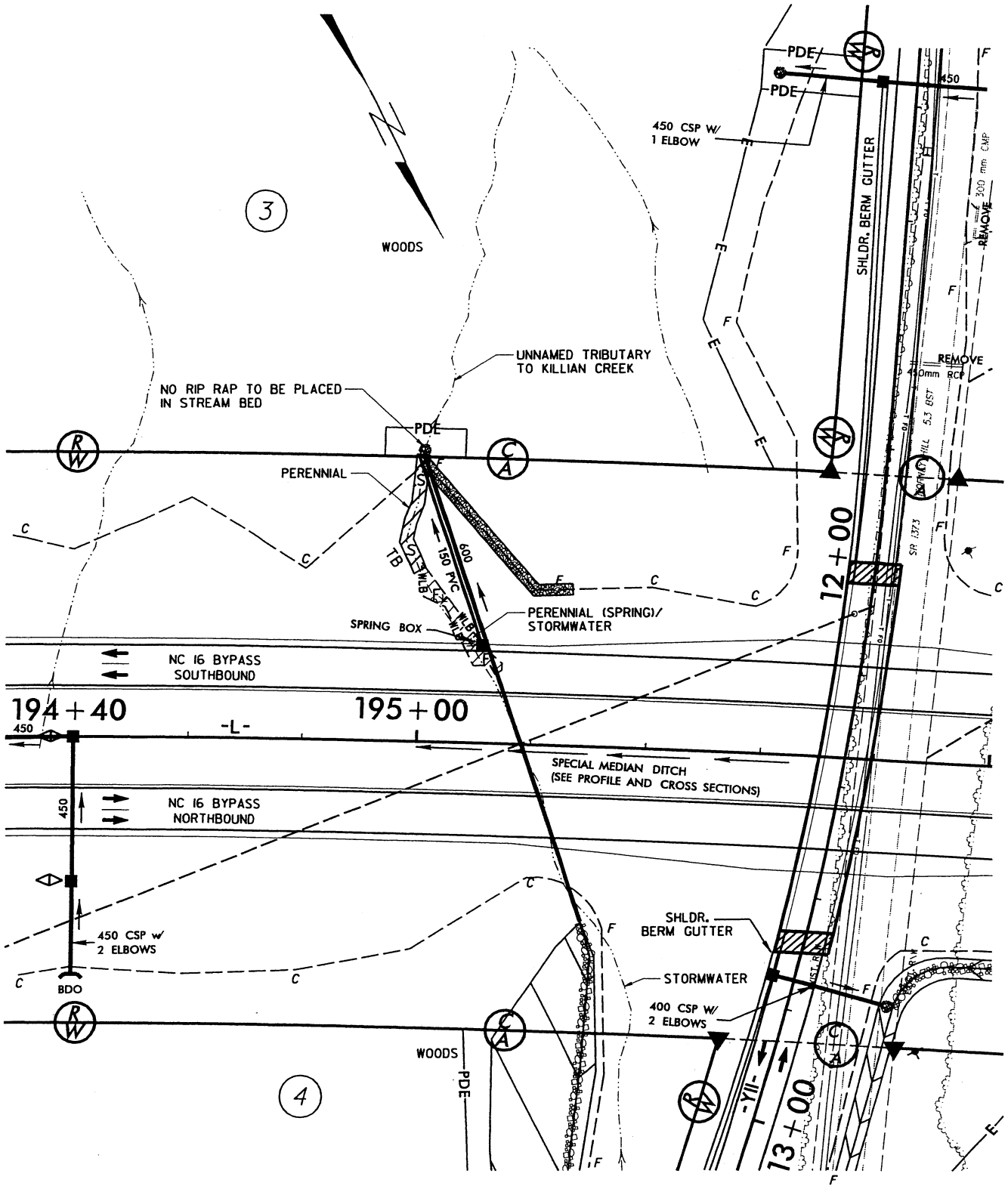
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 6 OF 35 **1/16/04**

REVISED 4/29/04



PLAN VIEW
SITE 3C

DENOTES SURFACE WATER IMPACT (NATURAL) — S S

DENOTES FILL IN WETLANDS — F F

10 0 20

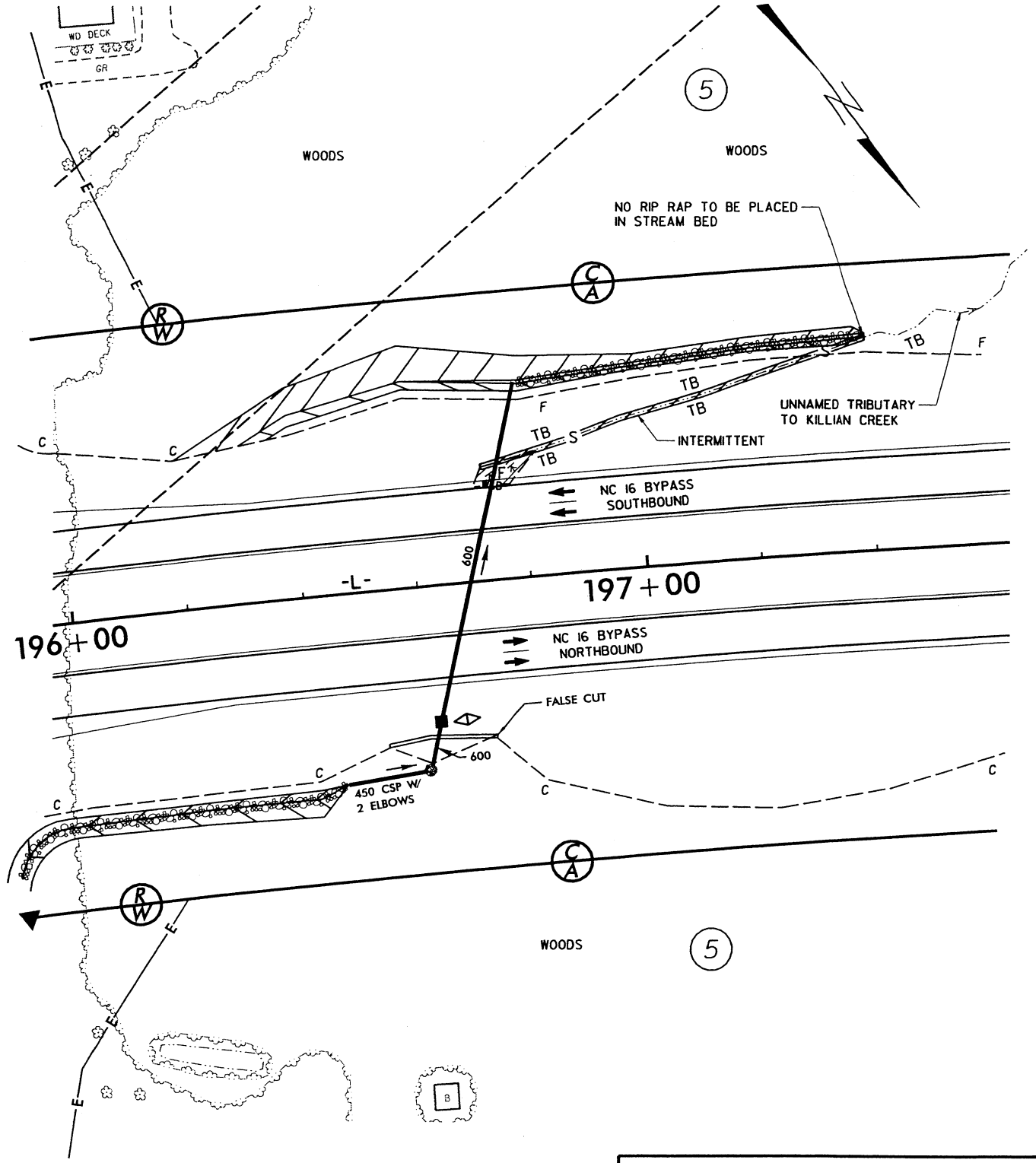
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 7 OF 35 **1/16/04**

REVISED 4/29/04



PLAN VIEW
SITE 4C

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

10 0 20

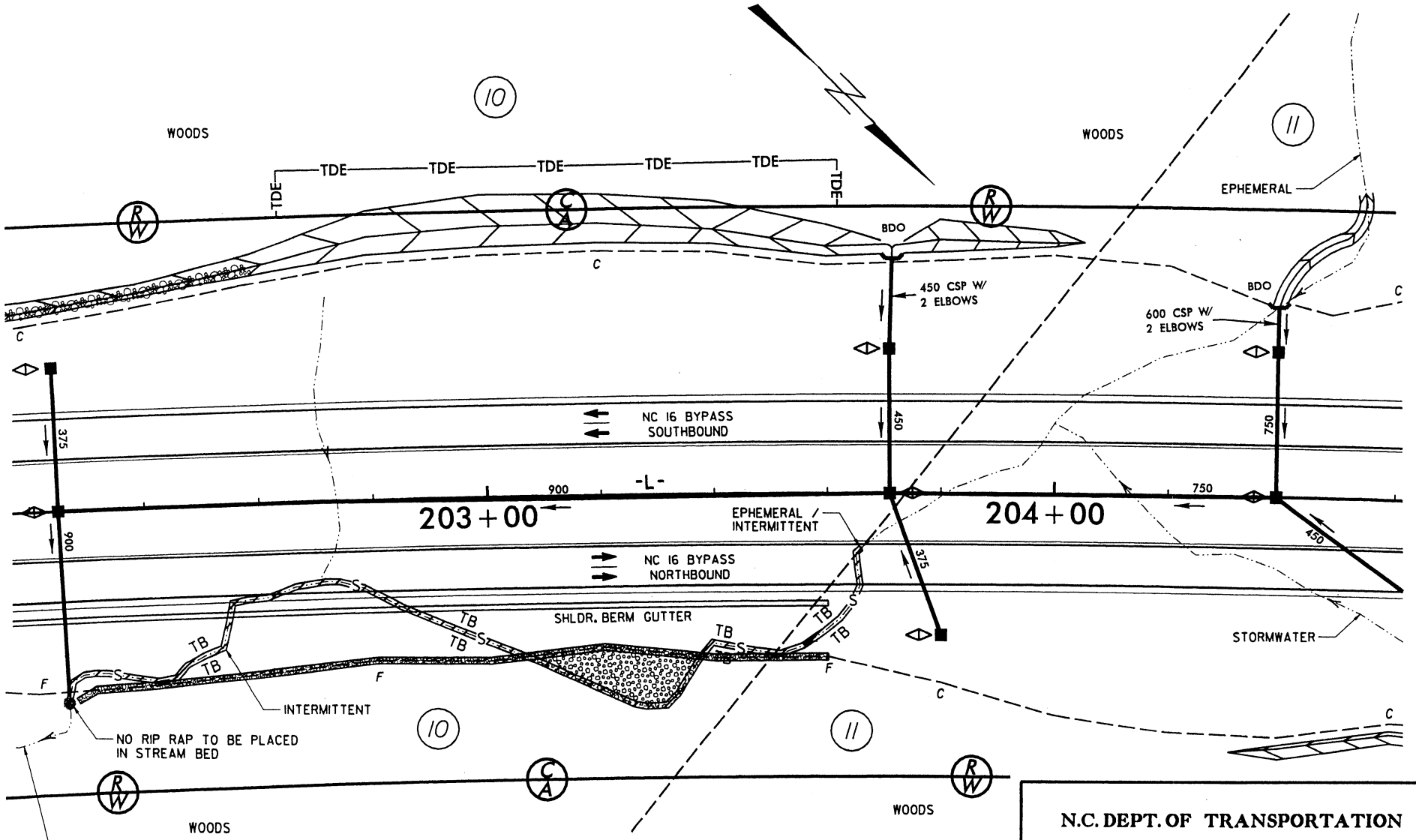
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 8 OF 35

1/16/04



PLAN VIEW
SITE 6C

10 0 20

DENOTES SURFACE WATER IMPACT (NATURAL) S S

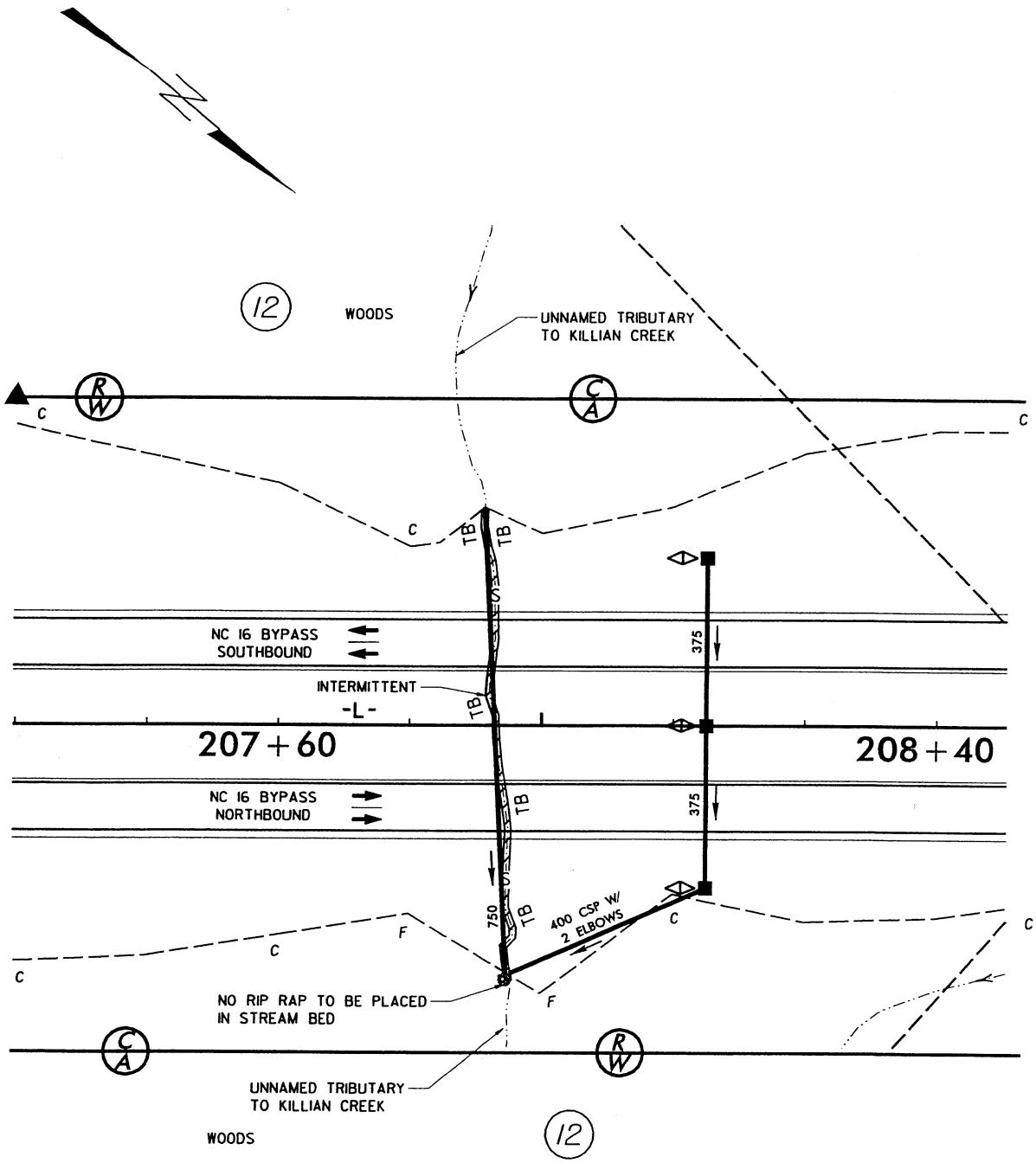
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 9 OF 35 1/16/04

REVISED 4/29/04



PLAN VIEW
SITE 7C

DENOTES SURFACE WATER
IMAPCT (NATURAL)

10 0 20

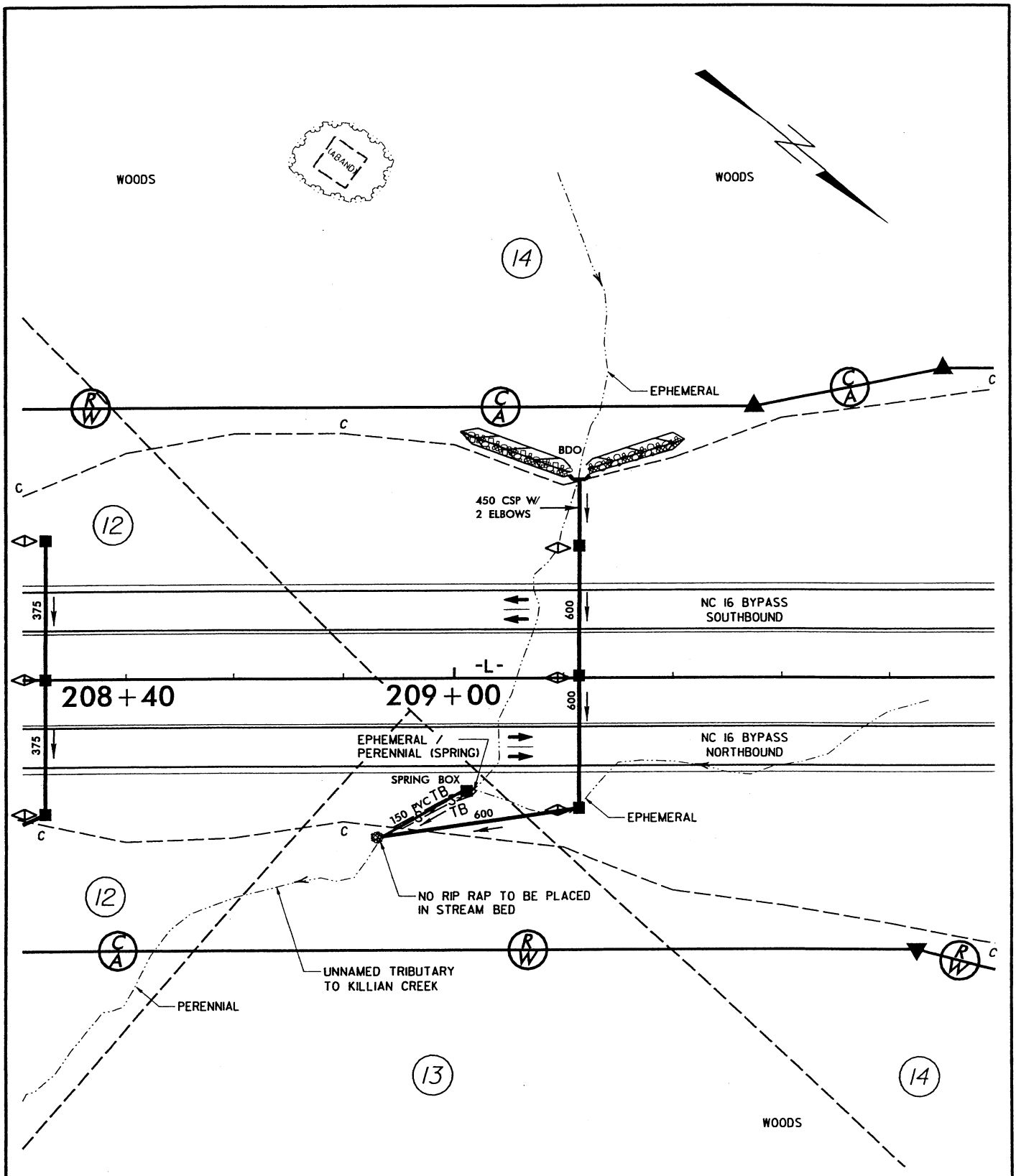
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 10 **OF** 35

1/16/04



PLAN VIEW
SITE 8C

10 0 20

DENOTES SURFACE WATER
IMAPCT (NATURAL)

S S

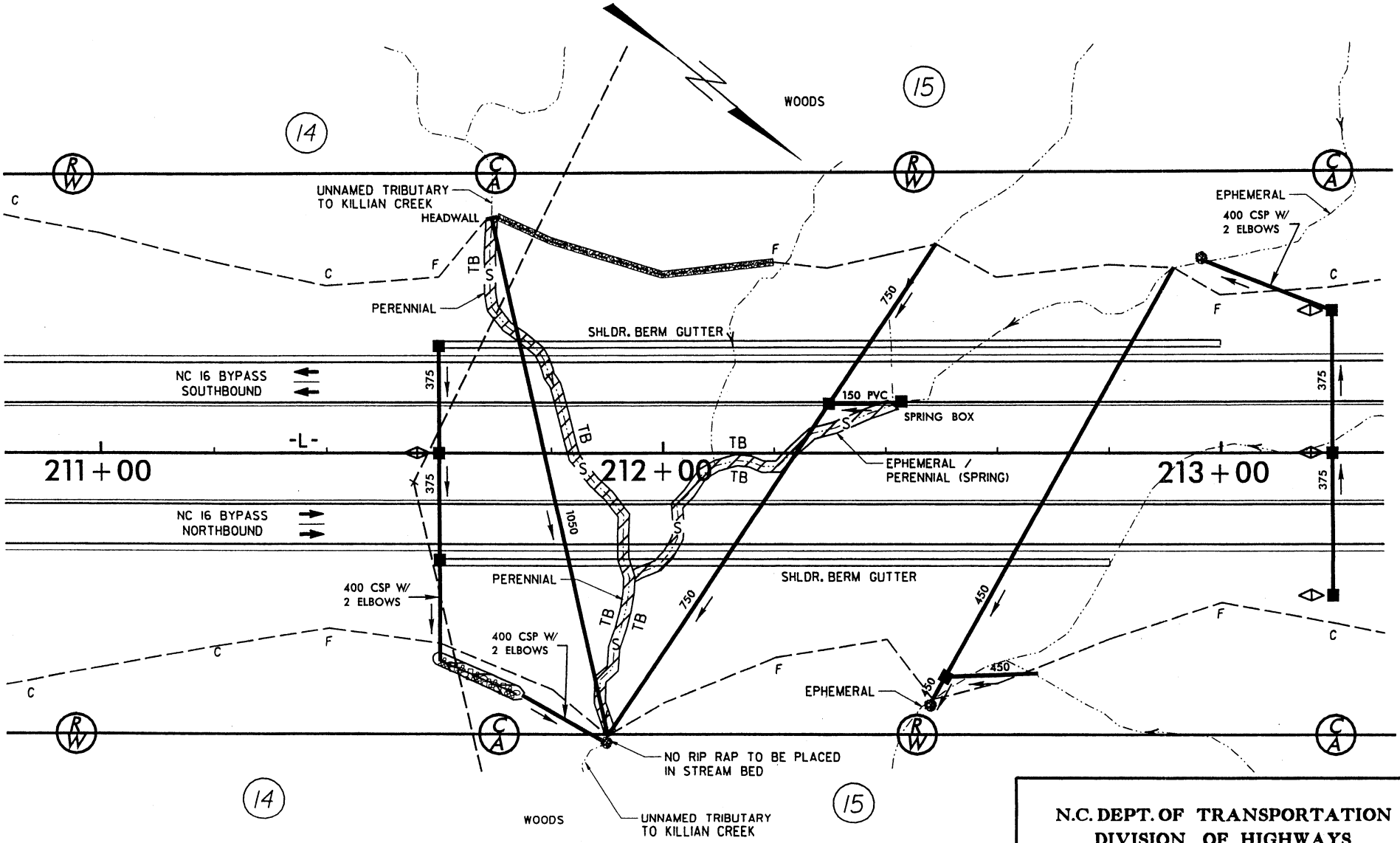
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 11 **OF** 35

1/16/04



PLAN VIEW
SITE 9C

10 0 20

DENOTES SURFACE WATER
IMAPCT (NATURAL)

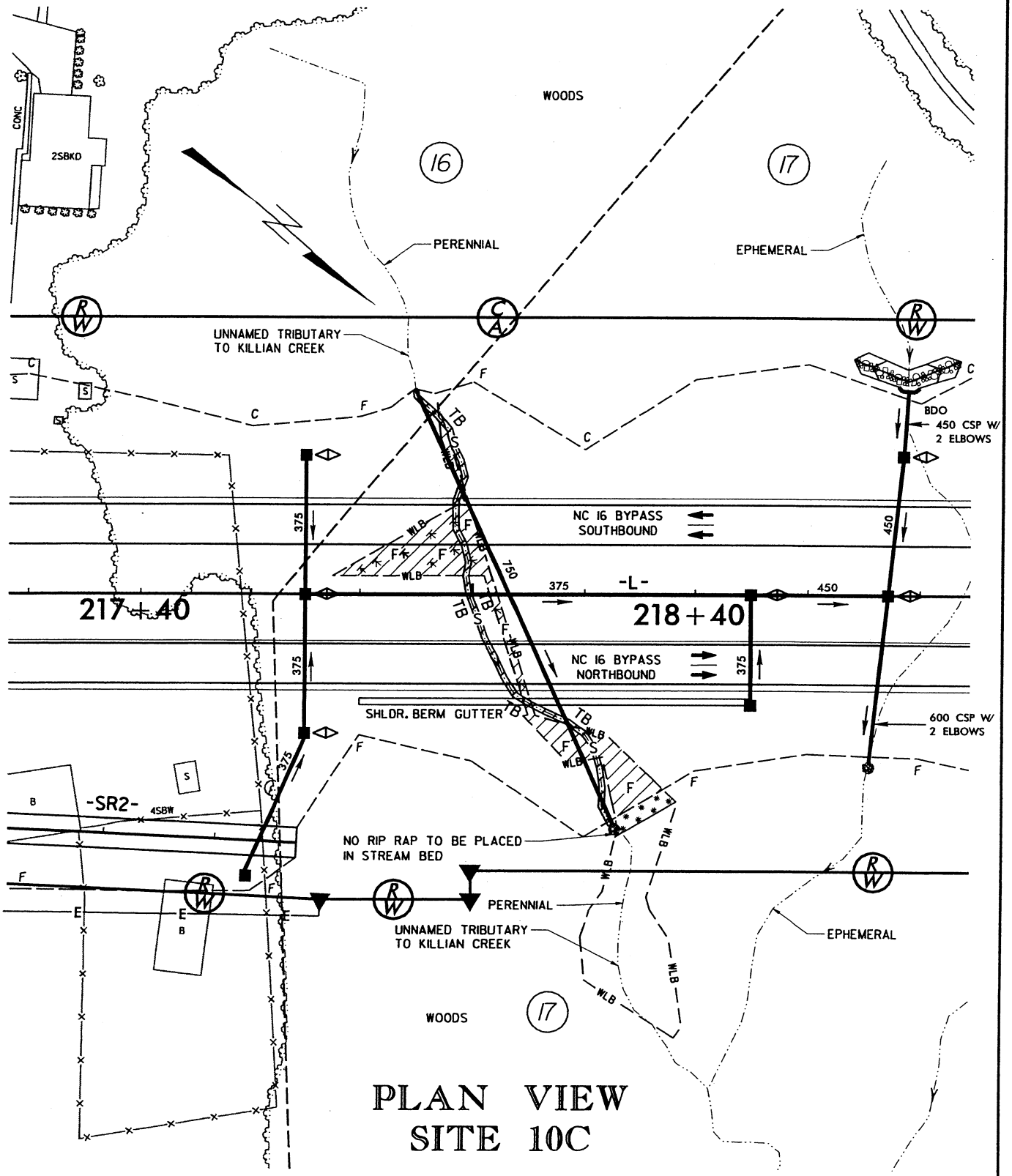
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 12 OF 35 1/16/04

REVISED 4/29/04



PLAN VIEW
SITE 10C

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

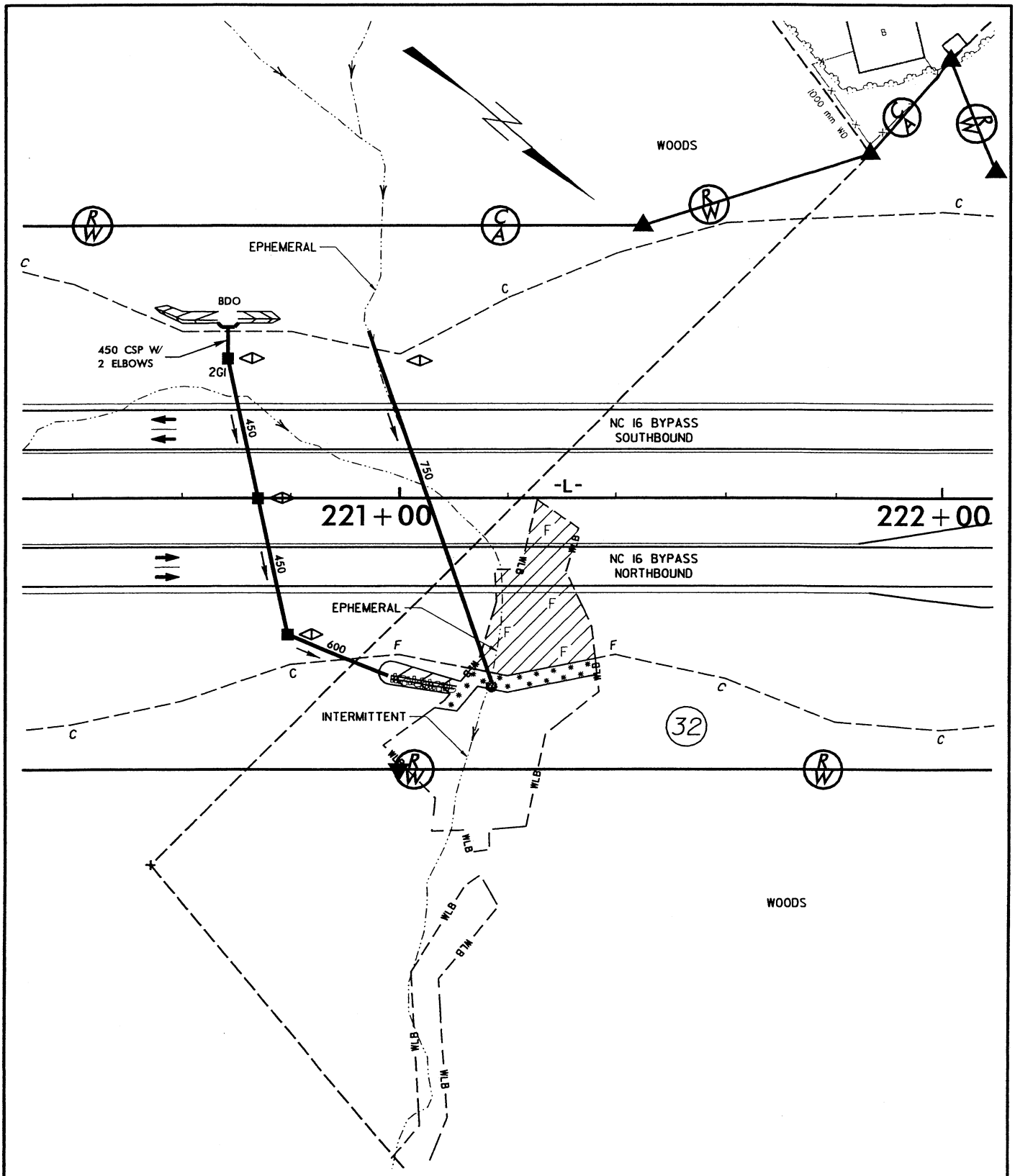
LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 13 **OF** 35

1/16/04

REVISED 4/29/04



PLAN VIEW
SITE 11C

10 0 20

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

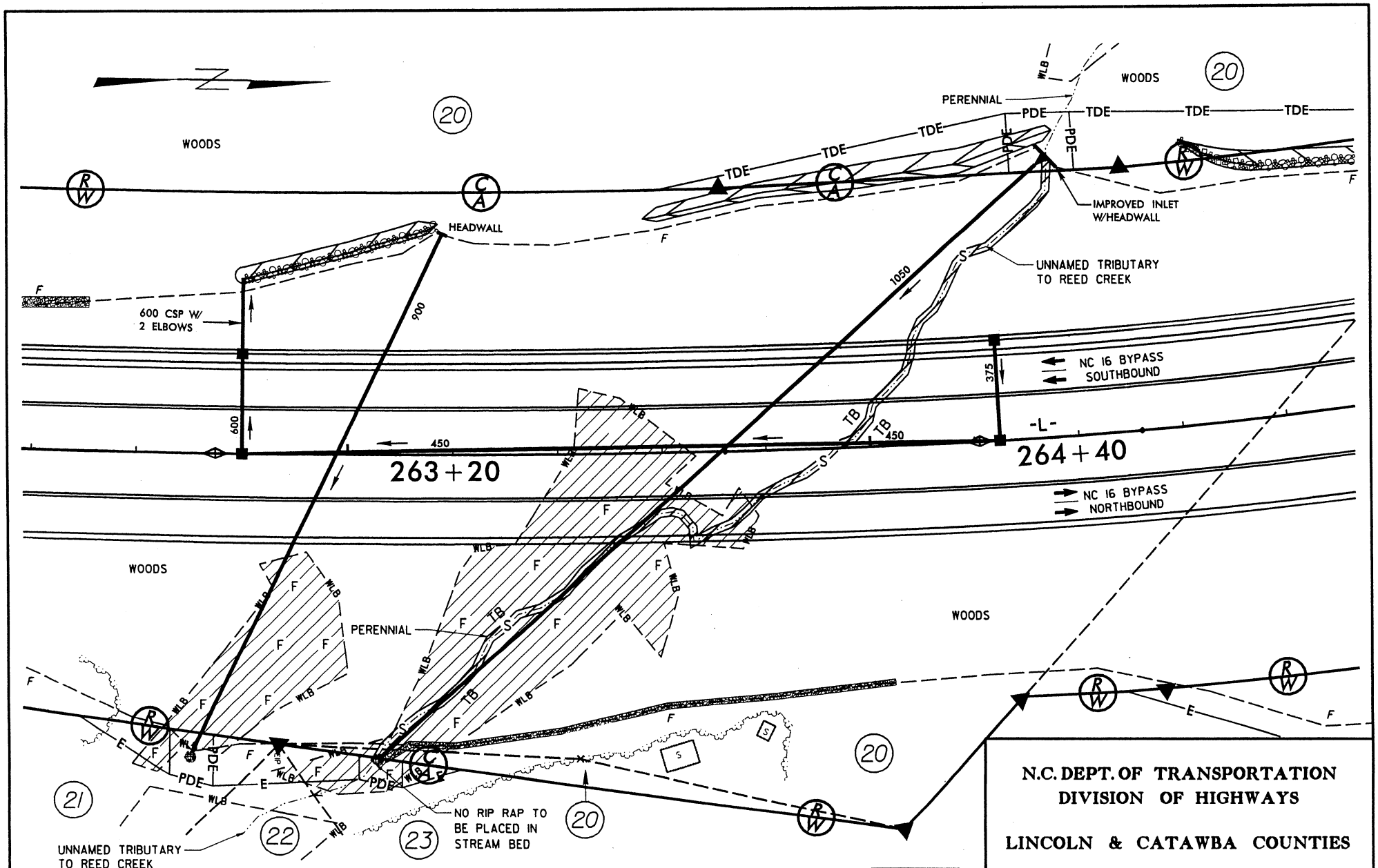
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 14 OF 35 **1/16/04**

REVISED 4/29/04



PLAN VIEW
SITE 14C

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

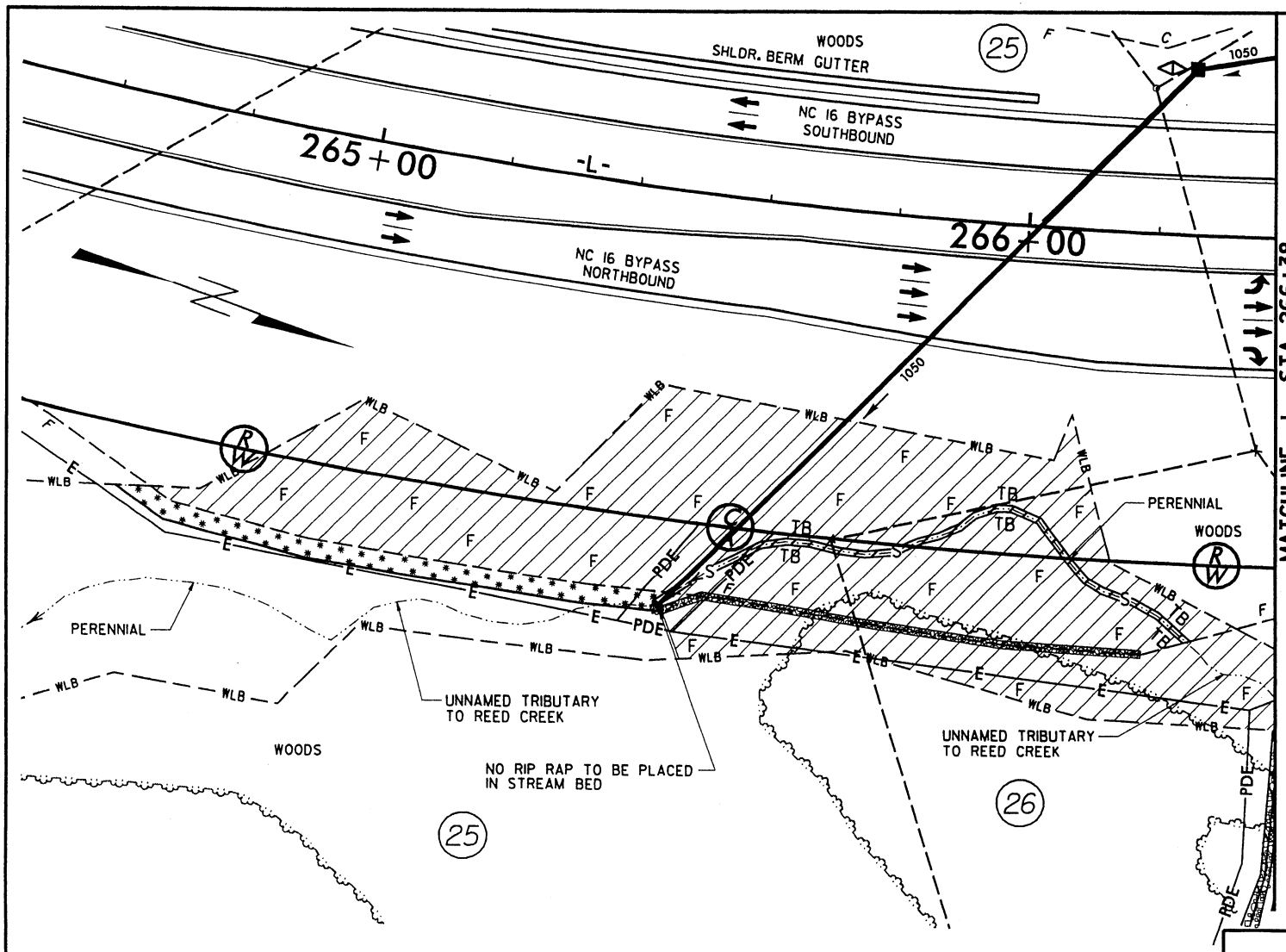
LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 15 OF 35

1/16/04

REVISED 4/29/04



PLAN VIEW
SITE 15C

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

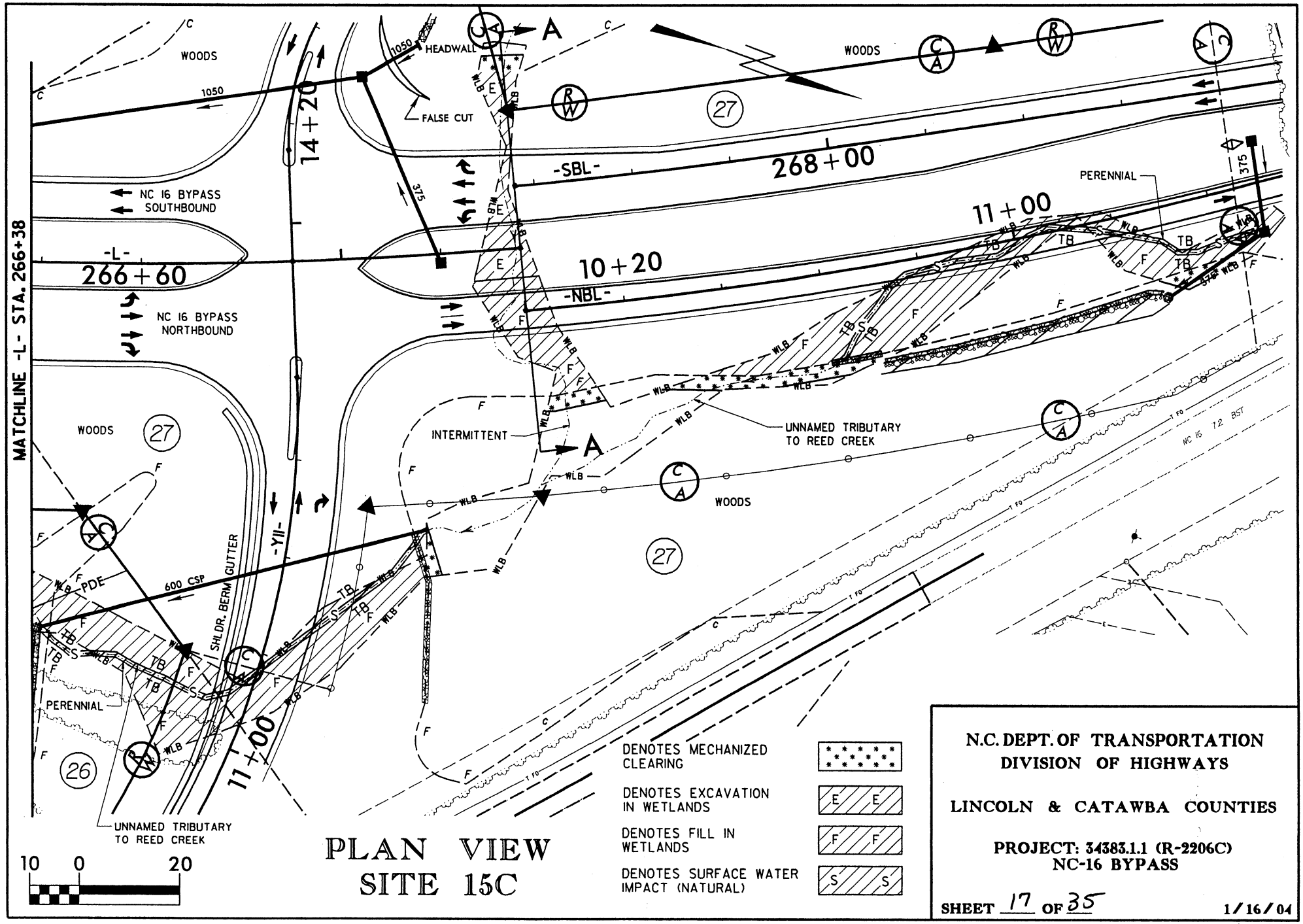
10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 16 OF 35 **1/16/04**



N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

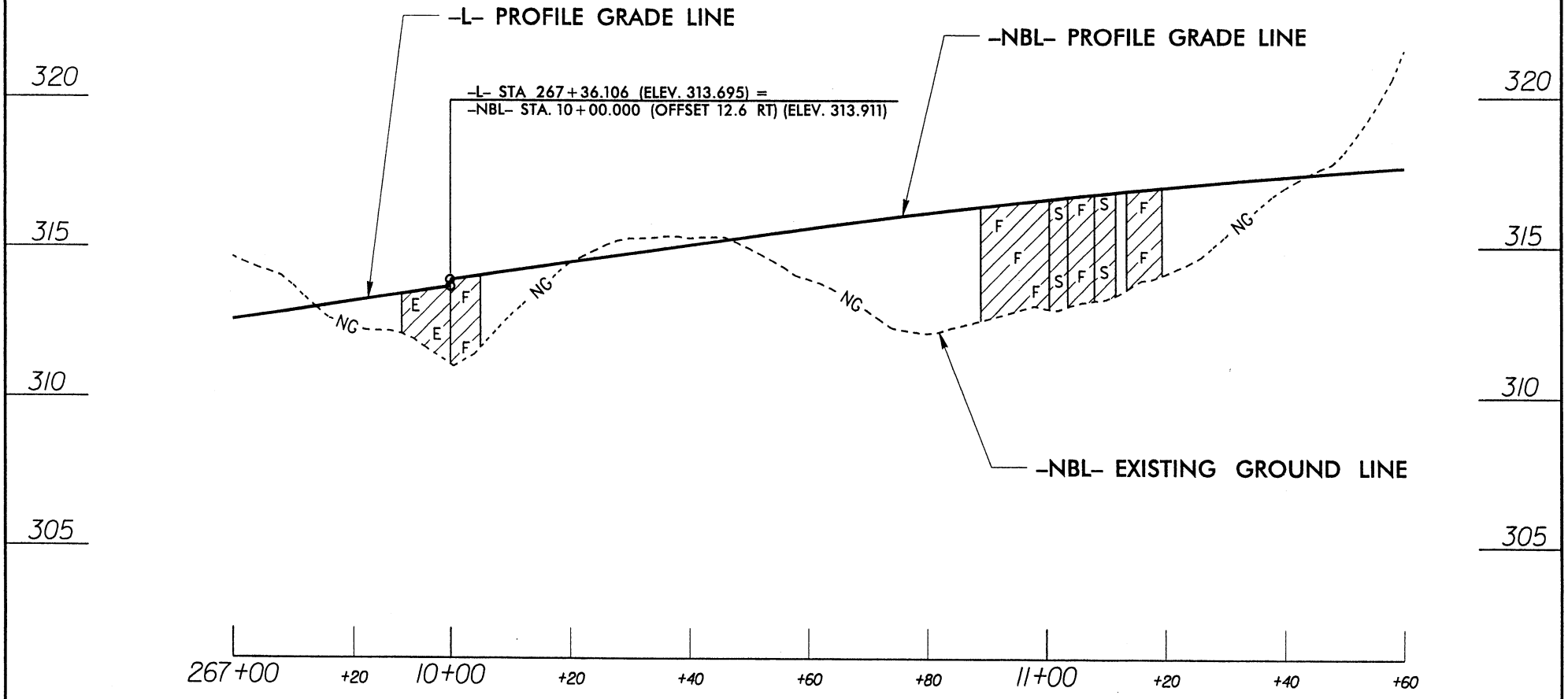
LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 17 OF 35

1/16/04

REVISED 4/29/04



PROFILE
SITE 15C

10 0 20 HORIZONTAL SCALE

2 0 4 VERTICAL SCALE

DENOTES EXCAVATION IN WETLANDS (E)

DENOTES FILL IN WETLANDS (F)

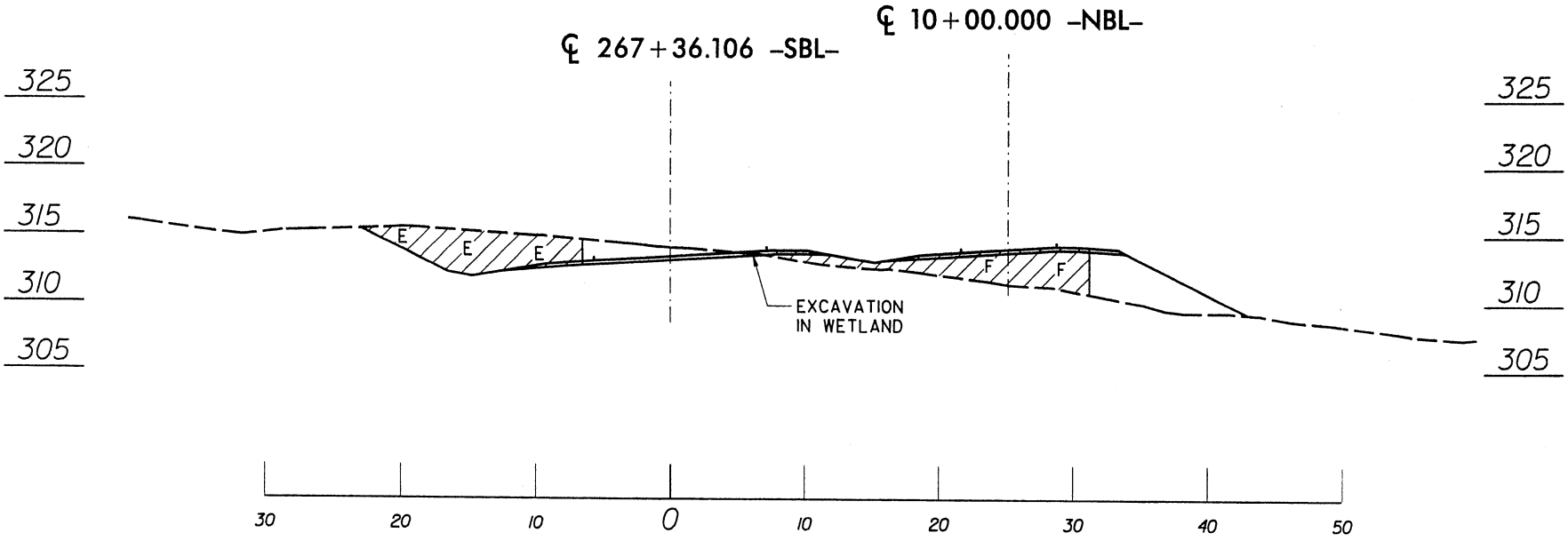
DENOTES SURFACE WATER IMPACT (NATURAL) (S)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 18 OF 35 1/16/04



SECTION A-A
SITE 15C

5 0 10
HORIZONTAL SCALE

1 0 2
VERTICAL SCALE

DENOTES FILL IN WETLANDS

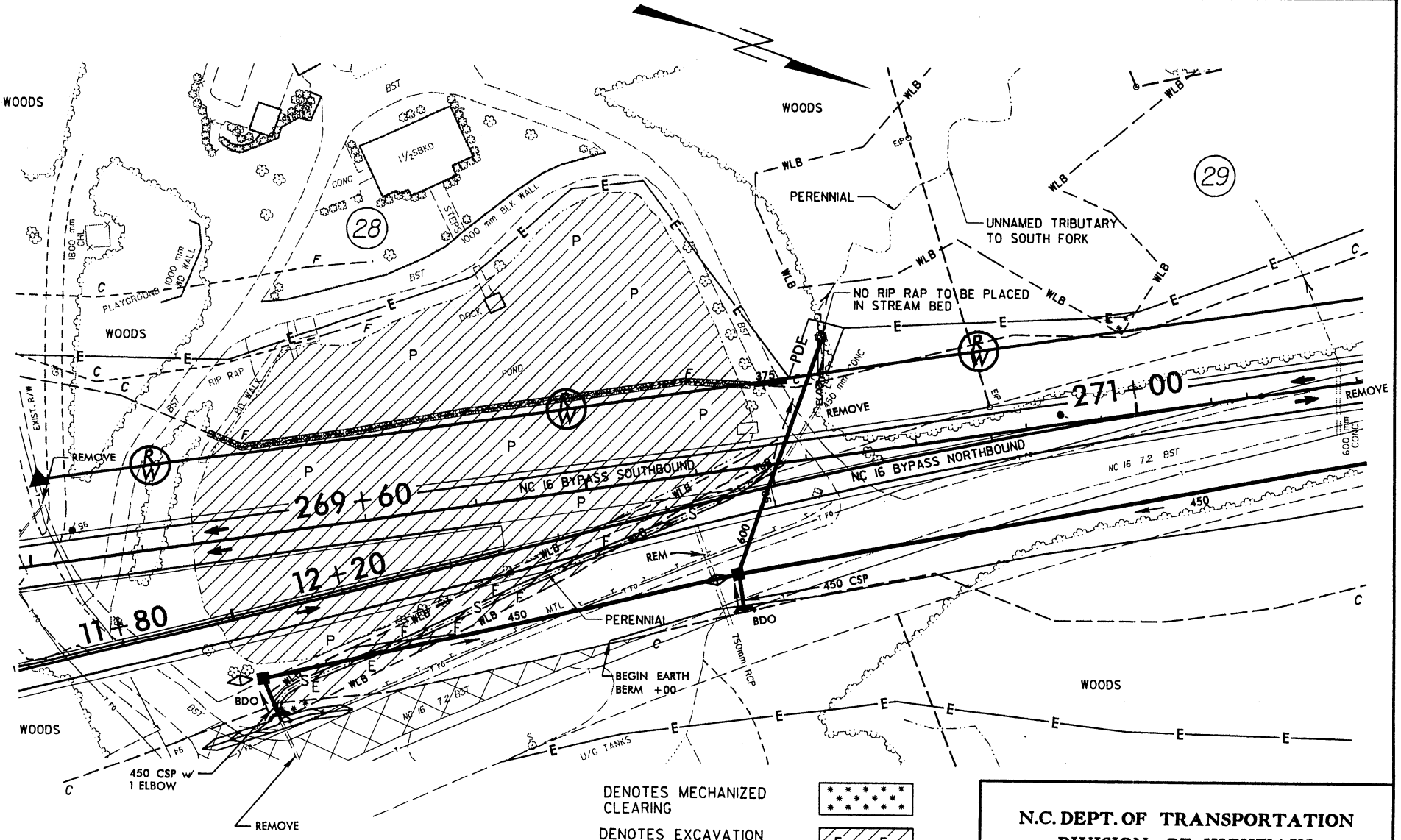
DENOTES EXCAVATION IN WETLANDS

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 19 OF 35 1/16/04



PLAN VIEW
SITE 16C

10 0 20

DENOTES MECHANIZED CLEARING

DENOTES EXCAVATION IN WETLANDS (E E)

DENOTES FILL IN WETLANDS (F F)

DENOTES SURFACE WATER IMPACT (NATURAL) (S S)

DENOTES SURFACE WATER IMPACT (POND) (P P)

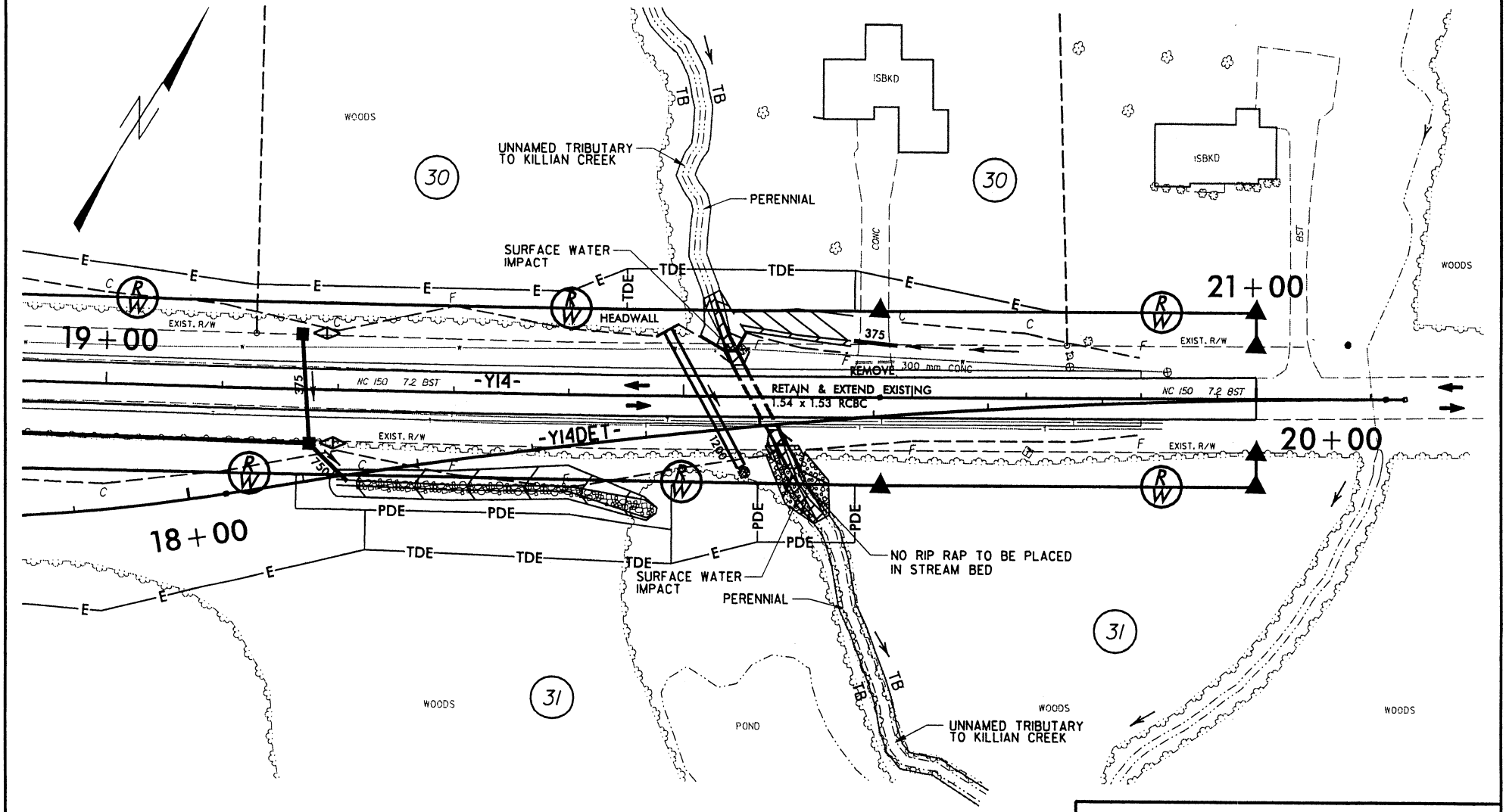
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 20 OF 35 1/16/04

REVISED 4/29/04



PLAN VIEW
SITE 17C

10 0 20

DENOTES SURFACE WATER IMPACT (NATURAL)

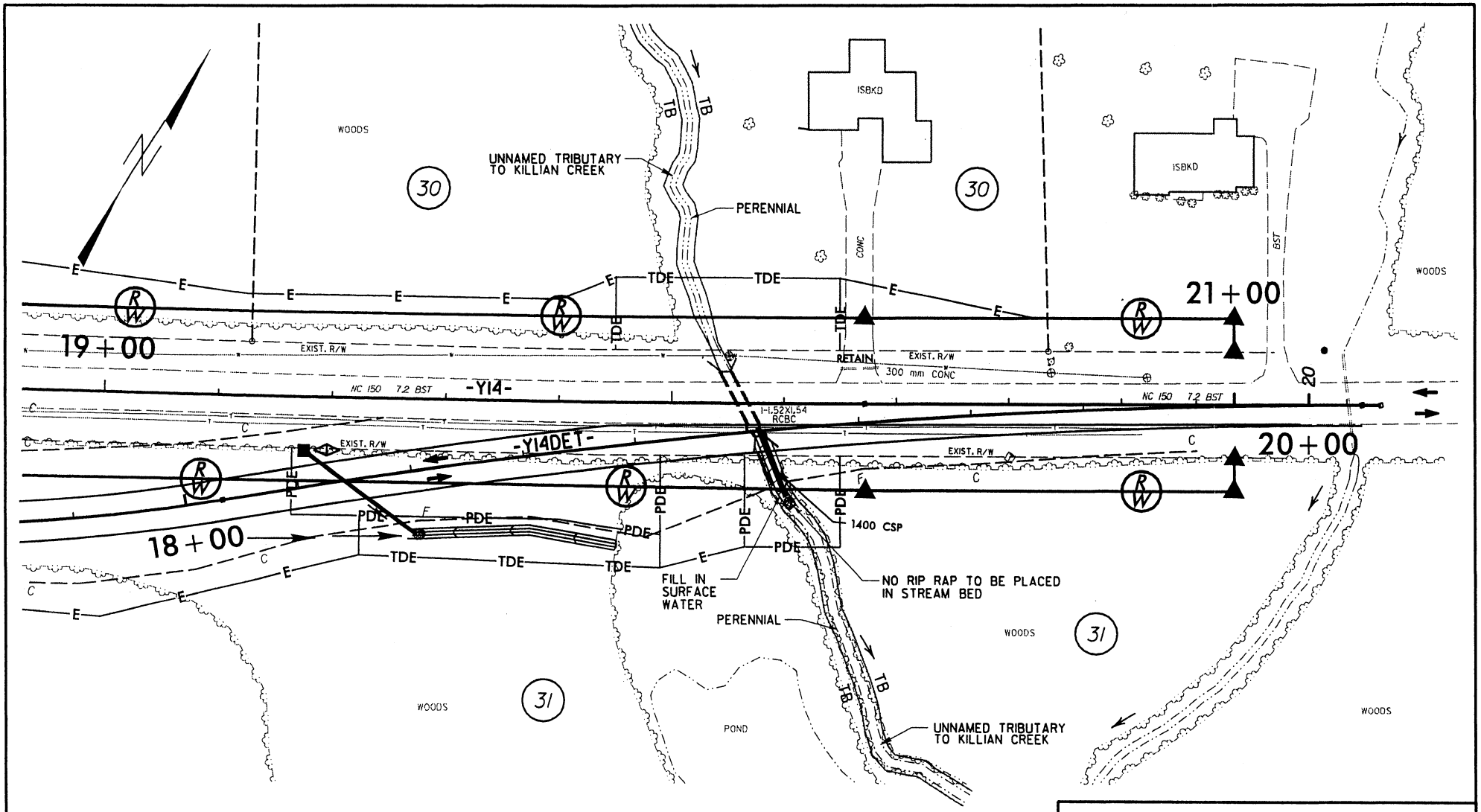
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 21 OF 35 **1/16/04**

REVISED 4/29/04



PLAN VIEW
SITE 17C

10 0 20

DENOTES SURFACE WATER IMPACT (NATURAL)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 22 OF 35 **1/16/04**

REVISED 4/29/04

IMPACT SUMMARY (ENGLISH)

Site No.	Station (From/To)	Structure Size	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1C	-L- 181+48 Rt to 181+74 Lt	750mm					0.017			220.1	
	-L- 182+23 Rt to 182+49 Lt	1200mm					0.032			425.5	
	-L- 181+92 Lt to 183+99 Rt	1 @ 1.5m x 1.5m RCBC					0.099			1040.3	164.0
2C	-L- 190+86 Lt to 191+05 Rt	1500mm					0.044			447.8	
	-L- 190+96 Lt to 192+03 Rt	900mm					0.025			464.9	
3C	-L- 194+96 Lt to 195+14 Lt	600mm	0.012				0.012			145.0	
4C	-L- 196+71 Lt to 197+40 Lt	600mm	0.007				0.017			230.3	
6C	-L- 202+25 Rt to 203+66 Rt	-					0.042			571.8	
7C	-L- 207+91 Rt to 207+96 Rt	750mm					0.017			230.0	
8C	-L- 208+89 Rt to 209+04 Rt	-					0.005			51.5	
9C	-L- 211+68 Lt to 211+95 Rt	1050mm					0.049			335.0	
	-L- 211+95 Rt to 212+42 Lt	750mm					0.030			203.4	
10C	-L- 217+75 Lt to 218+37 Rt	750mm	0.089			0.007	0.022			303.5	
11C	-L- 221+11 Rt to 221+37 Rt	-	0.101			0.022					
14C	-L- 262+64 Rt to 263+00 Rt	900mm	0.173								
	-L- 262+93 Rt to 264+38 Lt	1050mm	0.492				0.072			631.6	
	SHEET TOTAL		0.874	0.000	0.000	0.029	0.483	0.000	0.000	5300.7	164.0

NOTE: Sites 5C, 12C and 13C Removed Due To No Impact.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN / CATAWBA COUNTIES

PROJECT: 34383.1.1
NCDOT T.I.P. No: R-2206C

1/16/04

IMPACT SUMMARY (ENGLISH)

Site No.	Station (From/To)	Structure Size	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
15C	-L- 264+72 Rt to -NBL- 11+54 Rt	600mm	1.515		0.057	0.121	0.072			917.0	
16C	-SBL- 269+29 Rt to 271+02 Lt	-	0.072		0.027	0.002	0.025	1.198 [1]		334.6	
17C	-Y14- 20+08 Lt to 20+25 Rt	1 @ 1.54m x 1.53m RCBC					0.010			56.1	
	-Y14- DET 20+26 Lt to 20+31 Rt	1400mm					0.002 [2]			44.6 [2]	
		SHEET TOTAL	1.587	0.000	0.084	0.123	0.109	1.198	0.000	1352.3	0.0
		PROJECT TOTAL	2.461	0.000	0.084	0.152	0.592	1.198	0.000	6653.0	164.0

NOTE: [1] Denotes Draining Of Pond Impact.
[2] Denotes Additional Impacts For The Detour That Are Temporary.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN / CATAWBA COUNTIES

PROJECT: 34383.1.1
NCDOT T.I.P. No: R-2206C

SHEET 24 OF 35 1/16/04

Project No. 34383.1.1 (R-2206C)

Property Owner List

Property NO.	Name DB and Pg	Address
(1)	JOY L. BLANTON FLOYD LORETTA & DEANE L. SAIN DB 571 Pg 353	328 E. Congress St. Lincolnton, NC 28092
(2)	DENROCK COMPANY DB 800 Pg 110	P.O. Box 1006 ECP 12 Charlotte, NC 28201
(3)	JOHNNY L. ROLLINS DB 514 Pg 23	6740 Pleasant Oaks Circle Charlotte, NC 28216
(4)	HERBERT G. LEWIS DB 619 Pg 715	7035 Forney Hill Road Denver, NC 28037
(5)	HERBERT G. LEWIS DB 301 Pg 181	7035 Forney Hill Road Denver, NC 28037
(10)	KENNETH F. CARPENTER DB 896 Pg 355	386 Victory Grove Church Road Lincolnton, NC 28092
(11)	MURPHY A. CRONLAND DB 570 Pg 737	1200 Lithia Lane Lincolnton, NC 28092
(12)	MURPHY A. CRONLAND DB 491 Pg 516	1200 Lithia Lane Lincolnton, NC 28092
(13)	LEE B. KILLIAN DEED NOT FOUND	4153 NC 16 N Denver, NC 28037
(14)	FRANCES M. CROOKS DB 1402 Pg 872	5832 Mundy Road Denver, NC 28037

(continued)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

Project No. 34383.1.1 (R-2206C)

Property Owner List

Property NO.	Name DB and Pg	Address
(15)	R. M. THOMPSON, JR DB 1068 Pg 346	2946 Beth Haven Church Road Denver, NC 28037
(16)	JOEL B. BARKER DB 510 Pg 48	5511 Mundy Road Denver, NC 28037
(17)	ELLEN H. SHUFORD DB 336 Pg 671	200 Labans Lane Lincolnton, NC 28092
(32)	JANICE E. ROBINSON DB 504 Pg 47	4919 E. Maiden Road Maiden, NC 28650
(20)	CLIFF-BLAKE ASSOC. DB 1936 Pg 1335	P.O. Box 159 Cornelius, NC 28031
(21)	STEVE R. HOLBROOKS DB 1632 Pg 40	6861 Tommy Sherrill Road Sherrills Ford, NC 28673
(22)	JAMES E. BURGESS DB 1865 Pg 687	5386 Burgess Drive Maiden, NC 28650

(continued)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

Project No. 34383.1.1 (R-2206C)

Property Owner List

Property NO.	Name DB and Pg	Address
(23)	JAMES E. BURGESS DB 2002 Pg 1306	5386 Burgess Drive Maiden, NC 28650
(24)	RIGHT OF WAY UNABLE TO OBTAIN UNKNOWN	Not Available
(25)	TONY KAYE MOORE DB 2062 Pg 1721	4295 Mt. Beulah Road Maiden, NC 28650
(26)	AMOS BROWN DB 2204 Pg 1581	5480 Pembroke Drive Granite Falls, NC 28630
(27)	ANTHONY L. DRUM DB 986 Pg 165	Rt. 1 Box 177E Mt. Holly, NC 28120
(28)	EDDIE D. LAIL DEBRA S. LAIL DB 1397 Pg 816	5295 NC 16 S Maiden, NC 28650
(29)	GERALD D. GOODSON DB 2239 Pg 980	5151 NC 16 S Maiden, NC 28650
(30)	SCOTT GILLELAND & OLIVER L. OVERCASH HEIRS DB 2384 Pg 422	1219 Stowehill Lane Catawba, NC 28609
(31)	ROGER STEVE LEE DB 1218 Pg 786	1995 Captains Way Denver, NC 28037

NCDOT Project I.D. R-2206C

Lincoln / Catawba County, NC

NC 16 from North of SR 1386 in Lincoln County to

North of SR 1895 near Chronicle in Catawba County

NATURAL STREAM DESIGN

UNNAMED TRIBUTARY TO KILLIAN CREEK

Left of -L- Project Station 182+20

Prepared by: TranSite Consulting Engineers, Inc.

1300 Paddock Dr.

Raleigh, NC 27609

NATURAL STREAM DESIGN

UNNAMED TRIBUTARY TO KILLIAN CREEK

Left of -L- Project Station 182+20

The construction of NC 16 North of NC 73 to North of SR 1386 will require that a portion of an unnamed tributary of Killian Creek be relocated left of -L- Station 182+20. The proposed stream will be 50 meters (164 feet) in length starting at the outlet of the proposed 1 @ 1.5m x 1.5m (1 @ 5'x 5') RCBC and continue downstream intersecting the existing stream in a bend. The proposed stream relocation is designed according to "Natural Channel" design principles proposed by Dave Rosgen.

This tributary of Killian Creek drains 0.44 km^2 (0.18 mi^2) in Lincoln County and is located within the Piedmont Physiographic Region. Existing land use in the drainage basin is predominantly agriculture, low density residential and undeveloped. The Lincoln County Land Use Plan shows that the future land use is predominantly low density residential.

There is no hydraulic data available on this stream. Discharges were estimated using procedures outlined in USGS Water-Resources Report 96-4084, Estimation of Flood-Frequency Characteristics of Small Urban Watersheds in North Carolina.

EXISTING / REFERENCE STREAM

The existing stream was determined to be stable and undisturbed and was therefore used as the reference stream. A 100 meter section of the stream was surveyed in detail to determine it's morphological characteristics. Those characteristics include bankfull discharge, width, depth and area. This information was then compared to reference reach data provided by NCDOT for the Piedmont Region and found to be in general conformity to that of an E4 stream.

Pebble counts were conducted in the pool and riffle sections. Velocities, stream power and shear were obtained using the HEC-RAS computer model and compared to shear stresses predicted from the pebble count. The pebble count confirmed the channel hydraulics by qualifying the velocities that move bed form material. This material has been classified as a medium sand and gravel.

PROPOSED STREAM

The proposed stream is designed to have an E4 classification. The stream gradient is controlled upstream by the proposed 1 @ 1.5m x 1.5m (1 @ 5'x 5') RCBC left of -L- Sta. 182+44± and downstream by the tie to the existing stream left of -L- Sta. 182+10±. The RCBC will be buried a minimum of 0.3 meters both upstream and downstream to provide formation of a natural streambed through its entire length.

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that the channel banks will be planted with native trees and shrubs above bankful depth. In addition, cross vanes will be placed in the channel for grade control and coir fiber mat will be placed along the entire channel while rootwads will be placed along the outside of the channel bends. The channel bottom will match the characteristics of the existing channel.

SEDIMENT TRANSPORT ANALYSIS

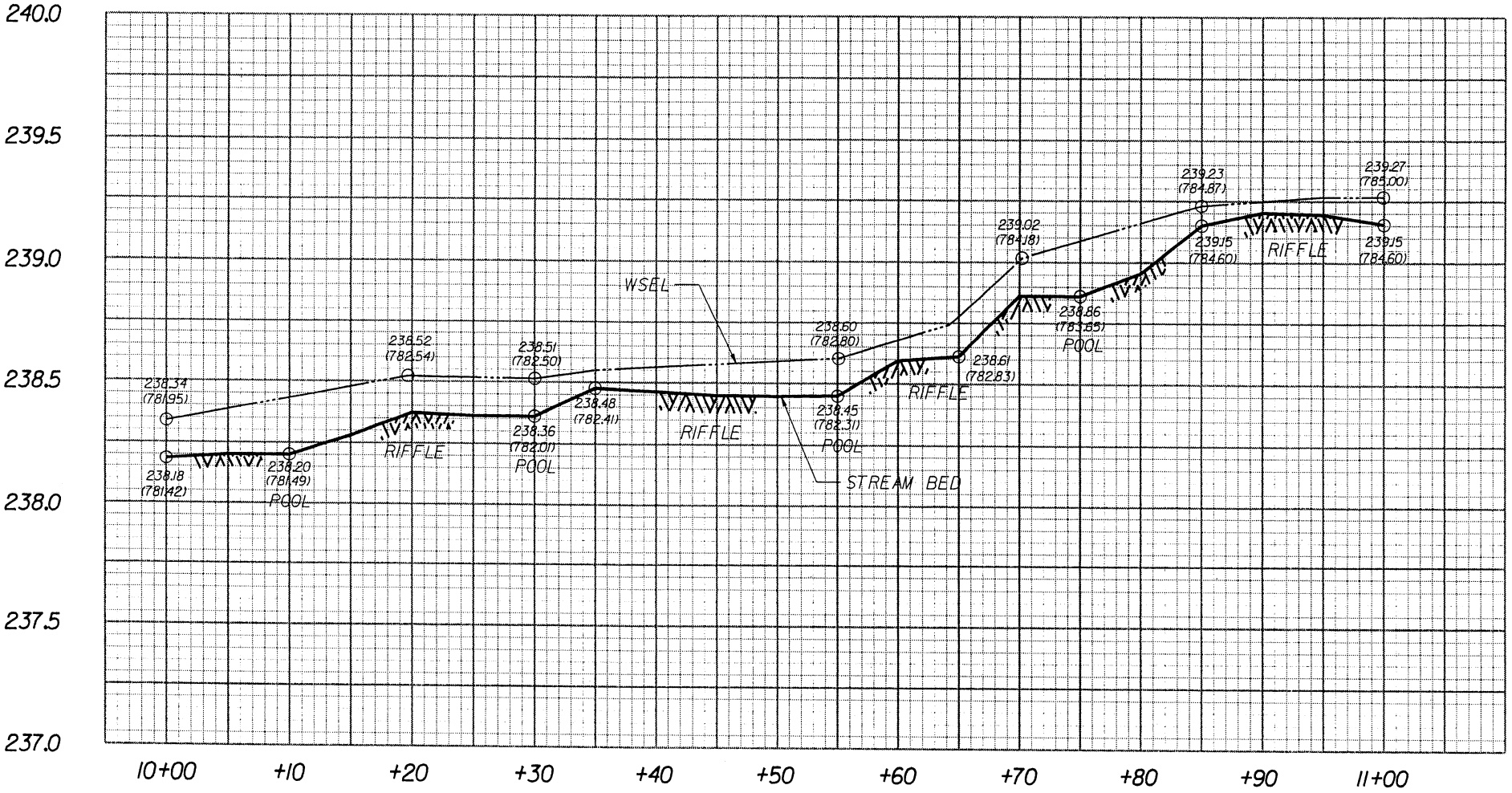
The proposed stream has a bankfull stream power of 2.47 lb/ft-s and a shear stress of 0.94 lb/ft^2 as compared to 3.89 lb/ft-s and 1.25 lb/ft^2 for the existing stream. While these values are less than those of the existing stream, they indicate that the proposed stream will transport the current sediment load without aggrading or degrading the streambed or banks. Additionally, 2-yr and 10-yr velocities and shear stresses were evaluated and found to be within acceptable limits.

Appendix B

Morphological Measurement Table
R-2206C, Lincoln / Catawba Cos.

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream Type	E4	E4	N/A	E4
2. Drainage Area (D.A.)	0.43 km^2 / 0.17 mi^2	0.43 km^2 / 0.17 mi^2	-	0.43 km^2 / 0.17 mi^2
3. Bankfull Width (W_{bkf})	2.33 m / 7.64 ft	3.50 m / 11.50 ft	-	2.33 m / 7.64 ft
4. Bankfull Mean Depth (d_{bkf})	0.45 m / 1.50 ft	0.36 m / 1.18 ft	-	0.45 m / 1.50 ft
5. Width/Depth Ratio (W_{bkf}/d_{bkf})	5.18	9.69	-	5.18
6. Bankfull Cross-Sectional Area (A_{bkf})	1.05 m^2 / 11.3 ft^2	1.24 m^2 / 13.35 ft^2	-	1.05 m^2 / 11.3 ft^2
7. Bankfull Mean Velocity (V_{bkf})	0.95 m/s / 3.12ft/s	0.80 m/s / 2.62 ft/s	-	0.95 m/s / 3.12ft/s
8. Bankfull Discharge (Q_{bkf})	1.00 m^3/s / 35.3 ft^3/s	1.00 m^3/s / 35.3 ft^3/s	-	1.00 m^3/s / 35.3 ft^3/s
9. Bankfull Max Depth (d_{mbkf})	0.63 m / 2.07 ft	0.50 m / 1.64 ft	-	0.63 m / 2.07 ft
10. Width of Floodprone Area (W_{fpa})	8.35 m / 27.39 ft (avg.)	8.5 m / 27.89 ft	-	8.35 m / 27.39 ft (avg.)
11. Entrenchment Ratio (W_{fpa}/W_{bkf})	3.58	2.43	-	3.58
12. Meander Length (L_m)	12-20 m / 39-66 ft	24.0 m / 78.74 ft	-	12-20 m / 39-66 ft
13. Ratio of Meander Length to Bankfull Width (L_m/W_{bkf})	5.1-8.6	6.86	-	5.1-8.6
14. Radius of Curvature (R_c)	3.5-7.0 m / 11.5-23.0 ft	6.50 m / 21.33 ft	-	3.5-7.0 m / 11.5-23.0 ft
15. Ratio of Radius of Curvature to Bankfull Width (R_c/W_{bkf})	1.5-3.0	1.86	-	1.5-3.0
16. Belt Width (W_{blt})	5.0-7.0 m / 16.4-23.0 ft	11.0 m / 36.1 ft	-	5.0-7.0 m / 16.4-23.0 ft
17. Meander Width Ratio (W_{blt}/W_{bkf})	2.1-3.0	3.14	-	2.1-3.0
18. Sinuosity (K) (stream length/valley length)	1.11	1.16	-	1.11
19. Valley Slope (VS)	1.11%	1.20%	-	1.11%
20. Average Slope (CS)	0.97%	1.14%	-	0.97%
21. Pool Slope	0.00%	0.00%	-	0.00%
22. Ratio of Pool Slope to Average Slope	0.00	0.00	-	0.00
23. Maximum Pool Depth (dp_{max})	0.65 m / 2.13 ft	0.85 m / 2.78 ft	-	0.65 m / 2.13 ft
24. Ratio of Pool Depth to Average Bankfull Depth (dp/d_{bkf})	1.44	2.36	-	1.44
25. Pool Width (W_p)	2.70 m / 8.86 ft	4.9 m / 16.07 ft	-	2.70 m / 8.86 ft
26. Ratio of Pool Width to Bankfull Width (W_p/W_{bkf})	1.16	1.40	-	1.16
27. Pool to Pool Spacing	20.0 m / 65.6 ft	14.0 m / 45.9 ft	-	20.0 m / 65.6 ft
28. Ratio of Pool to Pool Spacing to Bankfull Width	8.58	4.00	-	8.58
29. Ratio of Lowest Bnk Height to Bankfull Height (or Max Bankfull Depth) (Bh_{low}/d_{mbkf})	0.63	1.00	-	0.63

REFERENCE REACH PROFILE



NOTE: ELEVATIONS IN ( ) ARE IN FEET. ALL OTHER STATION AND ELEVATION DATA ARE IN METERS.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
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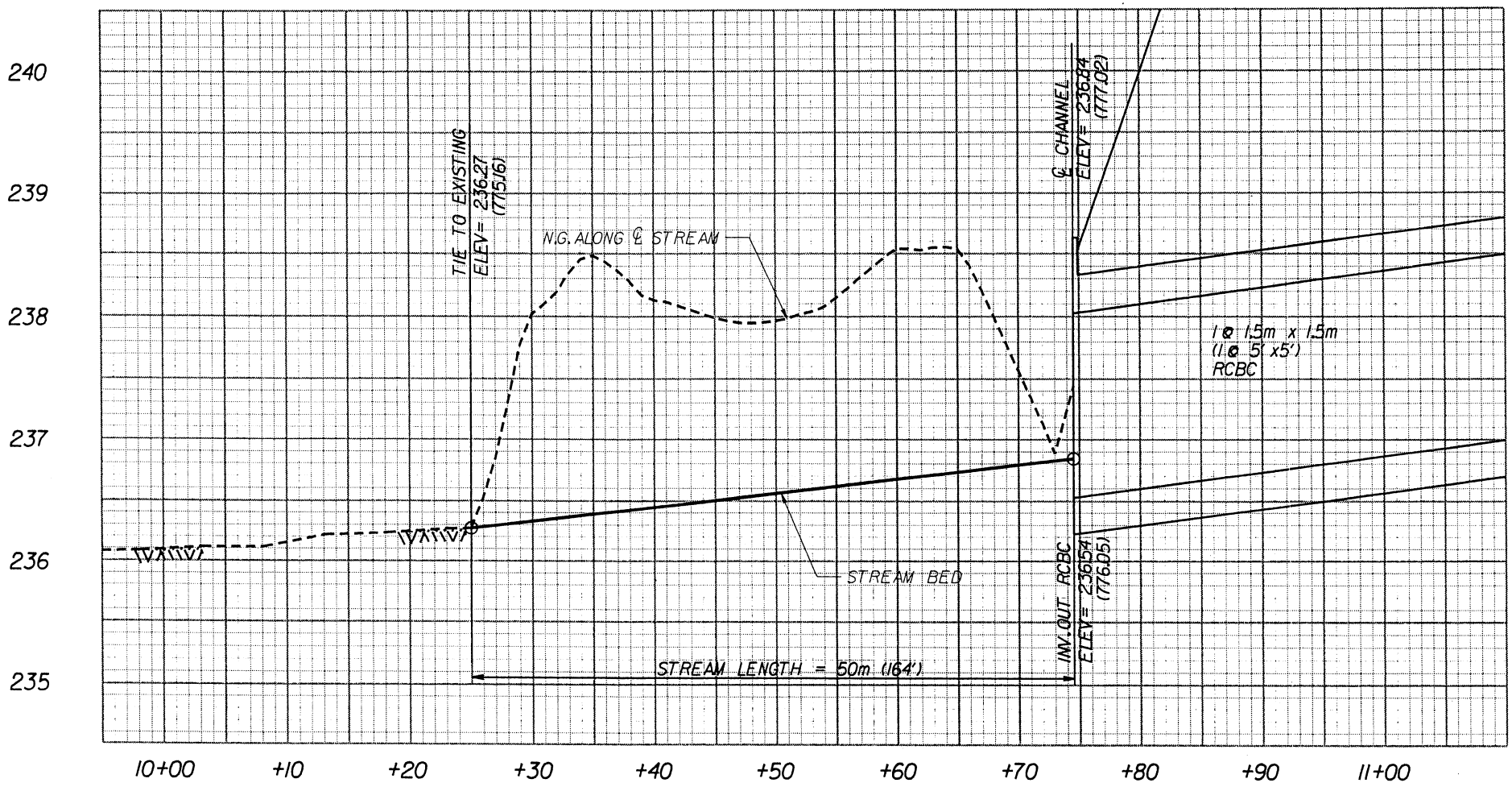
SHEET 32 OF 35 **10/10/03**

PROPOSED STREAM



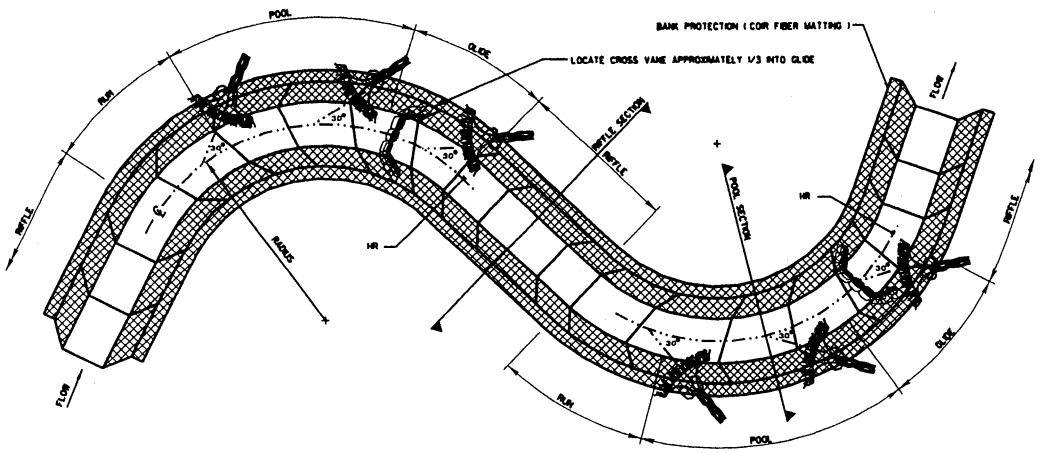
NOTE: ELEVATIONS IN ( ) ARE IN FEET.
ALL OTHER STATION AND ELEVATION
DATA ARE IN METERS.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

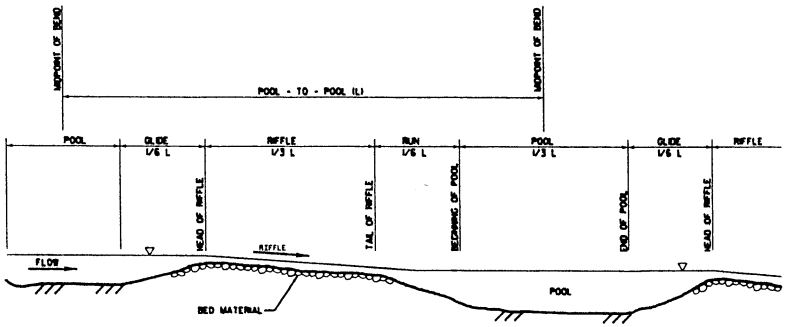
PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

SHEET 33 OF 35 **10/10/03**



TYPICAL PLAN

NOT TO SCALE



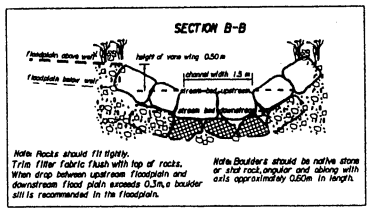
TYPICAL PROFILE

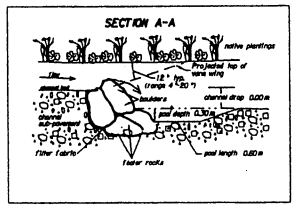
NOT TO SCALE

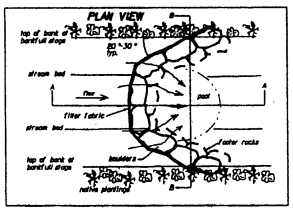
NOTES:

1. THE POOL TO POOL SPACING (L) SHALL BE MEASURED AS THE DISTANCE FROM THE MIDPOINT OF THE UPSTREAM BEND TO THE MIDPOINT OF THE DOWNSTREAM BEND.

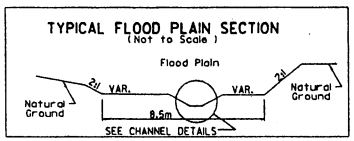
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS.

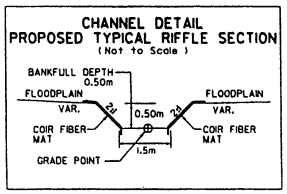


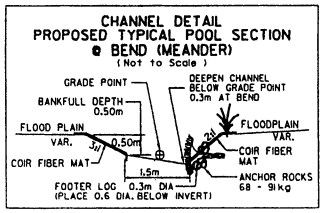




CROSS VANE ROCK WEIR DETAILS







NATURAL CHANNEL DESIGN TYPICALS

NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT WHICH SHALL CONSIST OF STAKING OUT THE CENTER OF EACH RADIUS, SCRIBING THE CENTER LINE OF THE CHANNEL FOR EACH BEND USING THE INDICATED RADIUS, AND SCRIBING CENTERLINE OF THE TANGENT SECTIONS BY CONNECTING SUCCESSIVE BENDS WITH STRAIGHT LINE. Ri= 6.5m+/- / 21.3 ft

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO AVOID CERTAIN OBSTACLES. APPROVAL BY THE ENGINEER OF THE STAKE-OUT ALIGNMENT SHALL BE REQUIRED PRIOR TO INITIATION OF THE CONSTRUCTION OF THE CHANNEL.

3. LOCATE ROCK VANES ACCORDING TO PLAN SHEET.

4. NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE.

5. ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE.

6. FOOTER LOG ANCHOR ROCK TO BE PLACED ON THE DOWNSTREAM END OF EACH FOOTER LOG SO THAT IT IS LEANING AGAINST THE LOG ON THE SIDE AWAY FROM THE CHANNEL.

7. WHEN BACKFILLING OVER AND AROUND FOOTER LOGS, ROOTWAD LOGS AND ANCHOR ROCKS FIRMLY SECURE ALL COMPONENTS INCLUDING JOINTS, CONNECTIONS AND GAPS.

8. PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH.

MORPHOLOGICAL MEASUREMENT TABLE

VARIABLES	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
1) STREAM TYPE	E4	E4	N/A	E4
2) DRAINAGE AREA	0.43 km² / 0.8 mi²	0.43 km² / 0.8 mi²	-	0.43 km² / 0.8 mi²
3) BANKFULL WIDTH	2.33 m / 7.64 ft	3.50 m / 6.50 ft	-	2.33 m / 7.64 ft
4) BANKFULL MEAN WIDTH	0.45 m / 1.50 ft	0.36 m / 1.18 ft	-	0.45 m / 1.50 ft
5) WIDTH / DEPTH RATIO	5.18	9.69	-	5.18
6) BANKFULL CROSS-SECTIONAL AREA	1.05 m² / 11.3 ft²	1.24 m² / 13.35 ft²	-	1.05 m² / 11.3 ft²
7) BANKFULL MEAN VELOCITY	0.95 m/s / 3.12 ft/s	0.80 m/s / 2.62 ft/s	-	0.95 m/s / 3.12 ft/s
8) BANKFULL DISCHARGE	1.00 m³/s / 35.3 ft³/s	1.00 m³/s / 35.3 ft³/s	-	1.00 m³/s / 35.3 ft³/s
9) BANKFULL MAX. DEPTH	0.63 m / 2.07 ft	0.50 m / 1.64 ft	-	0.63 m / 2.07 ft
10) WIDTH OF FLOODPRONE AREA	6.35 m / 21.39 ft (avg)	8.5 m / 27.89 ft	-	6.35 m / 21.39 ft (avg)
11) ENTRENCHMENT RATIO	3.56	2.43	-	3.56
12) MEANDER LENGTH	12-20 m / 39-66 ft	24.0 m / 78.74 ft	-	12-20 m / 39-66 ft
13) RATIO OF MEANDER LENGTH TO BANKFULL WIDTH	5.1-8.6	6.86	-	5.1-8.6
14) RADIUS OF CURVATURE	3.5-7.0 m / 11.5-23.0 ft	6.50 m / 21.33 ft	-	3.5-7.0 m / 11.5-23.0 ft
15) RATIO OF RADIUS OF CURVATURE TO BANKFULL WIDTH	1.5-3.0	1.86	-	1.5-3.0
16) BELT WIDTH	5.0-7.0 m / 16.4-23.0 ft	6.0 m / 20.1 ft	-	5.0-7.0 m / 16.4-23.0 ft
17) MEANDER WIDTH RATIO	2.1-3.0	3.14	-	2.1-3.0
18) SINUOSITY (STREAM LENGTH / VALLEY LENGTH)	1.2	1.16	-	1.2
19) VALLEY SLOPE	1.02%	1.70%	-	1.02%
20) AVERAGE SLOPE	0.97%	1.41%	-	0.97%
21) POOL SLOPE	0.00%	0.00%	-	0.00%
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.00	0.00	-	0.00
23) MAXIMUM POOL DEPTH	0.85 m / 2.13 ft	0.85 m / 2.78 ft	-	0.63 m / 2.13 ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	1.44	2.36	-	1.44
25) POOL WIDTH	2.70 m / 8.86 ft	4.9 m / 16.07 ft	-	2.70 m / 8.86 ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.16	1.40	-	1.16
27) POOL TO POOL SPACING	20.0 m / 65.6 ft	14.0 m / 45.9 ft	-	20.0 m / 65.6 ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	8.58	4.00	-	8.58
29) RATIO OF LOWEST BA HEIGHT TO BANKFUL MOT. MAX BANKFULL DEPTH	0.63	1.00	-	0.63

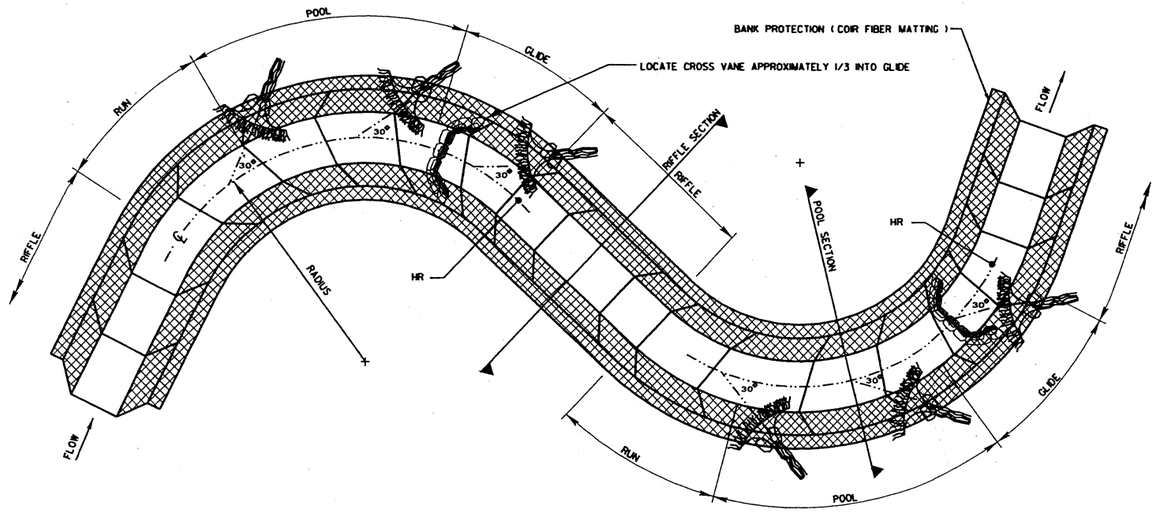
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

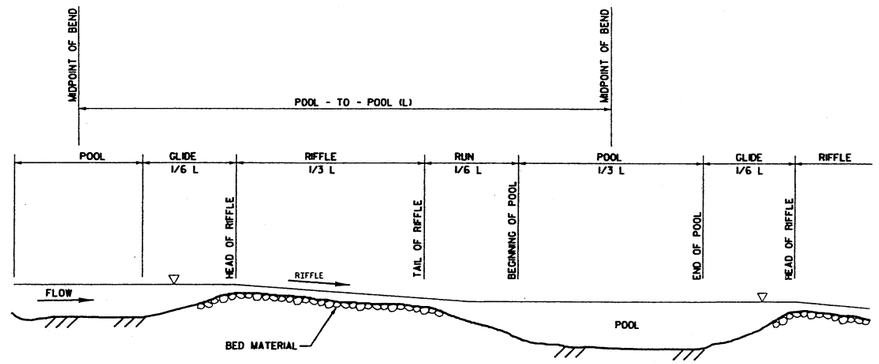
SHEET 34 OF 35

10/10/03



TYPICAL PLAN

NOT TO SCALE



TYPICAL PROFILE

NOT TO SCALE

NOTES:

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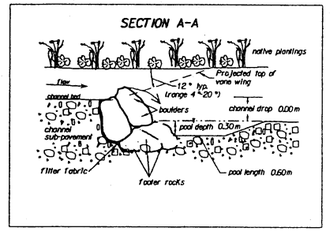
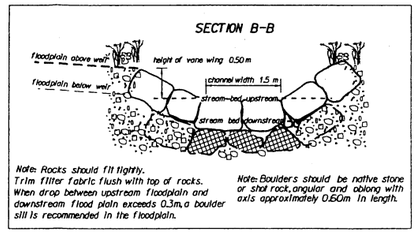
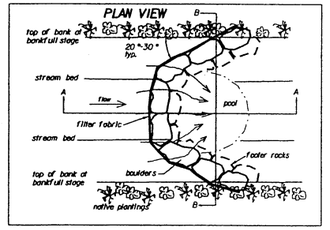
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS.



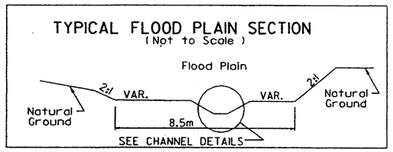


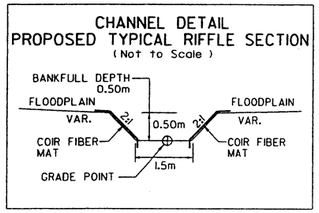
Note: Rocks should fit tightly. Trim filter fabric flush with top of rocks. When drop between upstream floodplain and downstream flood plain exceeds 0.3m, a boulder sill is recommended in the floodplain.

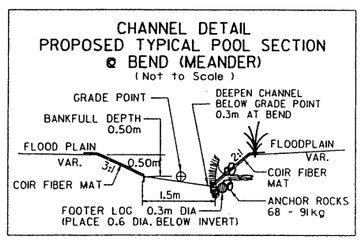
Note: Boulders should be native stone or shot rock, angular and oblong with axis approximately 0.80m in length.



CROSS VANE ROCK WEIR DETAILS







NATURAL CHANNEL DESIGN TYPICALS

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3) BANKFULL WIDTH	2.33 m / 7.64 ft	3.50 m / 8.50 ft	-	2.33 m / 7.64 ft
4) BANKFULL MEAN WIDTH	0.45 m / 1.50 ft	0.36 m / 1.18 ft	-	0.45 m / 1.50 ft
5) WIDTH / DEPTH RATIO	5.18	9.69	-	5.18
6) BANKFULL CROSS-SECTIONAL AREA	1.05 m² / 11.3 ft²	1.24 m² / 13.35 ft²	-	1.05 m² / 11.3 ft²
7) BANKFULL MEAN VELOCITY	0.95 m/s / 3.12 ft/s	0.80 m/s / 2.62 ft/s	-	0.95 m/s / 3.12 ft/s
8) BANKFULL DISCHARGE	1.00 m³/s / 35.3 ft³/s	1.00 m³/s / 35.3 ft³/s	-	1.00 m³/s / 35.3 ft³/s
9) BANKFULL MAX DEPTH	0.63 m / 2.07 ft	0.50 m / 1.64 ft	-	0.63 m / 2.07 ft
10) WIDTH OF FLOODPRONE AREA	8.35 m / 27.39 ft (avg)	8.5 m / 27.89 ft	-	8.35 m / 27.39 ft (avg)
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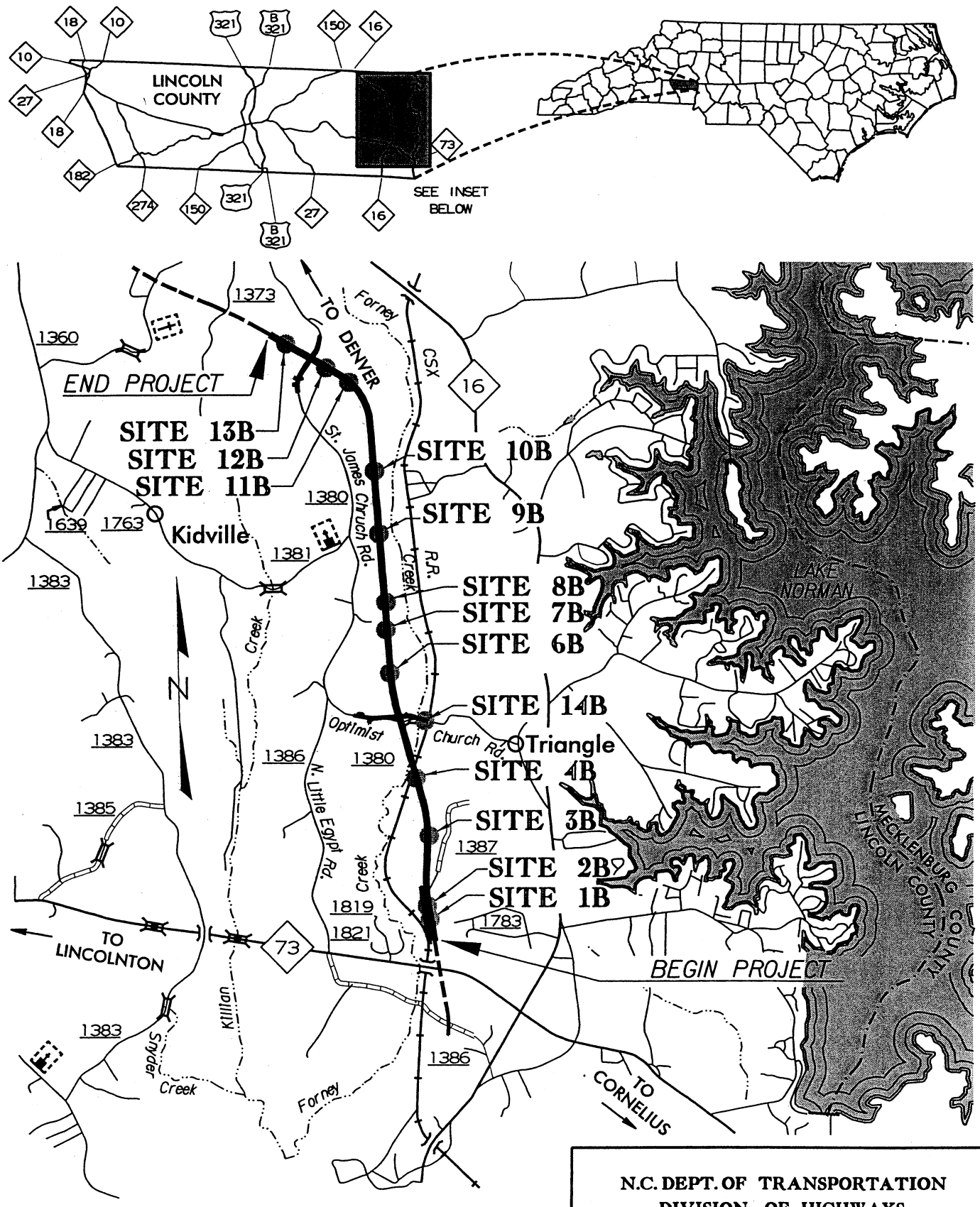
17) MEANDER WIDTH RATIO	2.1-3.0	3.14	-	2.1-3.0
18) SINUOSITY (STREAM LENGTH / VALLEY LENGTH	1.1	1.16	-	1.1
19) VALLEY SLOPE	1.1%	1.20%	-	1.1%
20) AVERAGE SLOPE	0.97%	1.14%	-	0.97%
21) POOL SLOPE	0.00%	0.00%	-	0.00%
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.00	0.00	-	0.00
23) MAXUMUM POOL DEPTH	0.65 m / 2.13 ft	0.85 m / 2.78 ft	-	0.65 m / 2.13 ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	1.44	2.36	-	1.44
25) POOL WIDTH	2.70 m / 8.86 ft	4.9 m / 16.07 ft	-	2.70 m / 8.86 ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.16	1.40	-	1.16
27) POOL TO POOL SPACING	20.0 m / 65.6 ft	14.0 m / 45.9 ft	-	20.0 m / 65.6 ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	8.58	4.00	-	8.58
29) RATIO OF LOWEST RA HEIGHT TO BANKFUL HGT.L. MAX BANKFULL DEPTH	0.63	1.00	-	0.63

METRIC
5 0 10

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	
R /W SHEET NO.	35 OF 35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	



LOCATION MAP

SCALE
.5 0 1 KM

NOTE: SITE 5B REMOVED DUE TO NO IMPACT

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 1 OF 35

1/16/04

LEGEND

---WLB---- WETLAND BOUNDARY

WLB WETLAND WLB

F F DENOTES FILL IN WETLAND

D D DENOTES DRAINED WETLAND

S S DENOTES SURFACE WATER IMPACT (NATURAL)

P P DENOTES SURFACE WATER IMPACT (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

/ 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

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 2 OF 35 **1/16/04**

Project No. 8.1830501 (R-2206B)

Property Owner List

Property NO.	Name DB and Pg	Address
1	ARLIE PARK, INC. DB 828 Pg 687, 688	P.O. Box 9 Lincolnton, NC 28093
2	CATAWBA SPRINGS LAND CO. DB 657 Pg 387, 396 DB 671 Pg 102-104	P.O. Box 9 Lincolnton, N.C. 28093
3	EAST LINCOLN LAND CO. INC. DB 711 Pg 505 TRACT 3,4,7	P.O. Box 9 Lincolnton, N.C. 28093
4	MICHAEL LANDIS BRYANT DB 895 Pg 588 TRACT 2	7036 Dorn Circle Charlotte, N.C. 28212
5	CSX Railroad	229 Nolichucky Avenue Erwin, Tenn. 37650
6	CATAWBA SPRINGS LAND CO. DB 657 Pg 387 TRACT 2 PARCEL 4	P.O. Box 9 Lincolnton, N.C. 28093
7	EAST LINCOLN LAND COMPANY DB 711 Pg 510 TRACT 2,6,11	P.O. Box 9 Lincolnton, N.C. 28093
8	HAYWOOD W. THOMPSON ROSA C. THOMPSON DB 344 Pg 331	2022 St. James Church Road Denver, N.C. 28037
9	CATAWBA SPRINGS HUNTING CLUB DB 653 Pg 493 DB 729 Pg 50 DB 699 Pg 592	P.O. Box 483 Denver, N.C. 28037

(continued)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

Project No. 8.1830501 (R-2206B)

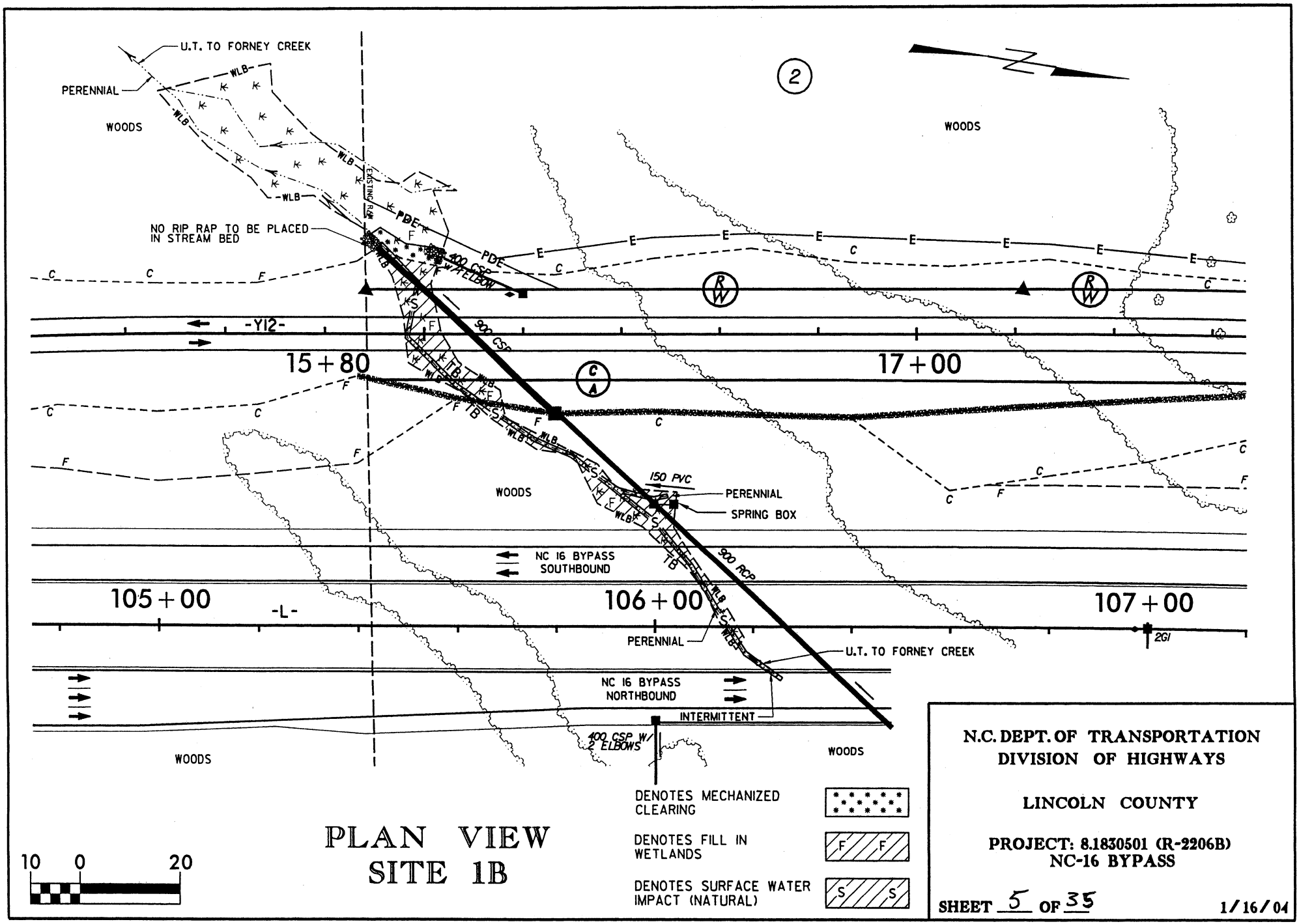
Property Owner List

Property NO.	Name DB and Pg	Address
(10)	WILLIAM SHIPP HEIRS DB 134 Pg 479	322 Auten Street Charlotte, N.C. 28208
(11)	DALLAS VANESS BARKER DB 707 Pg 556	2838 St. James Church Road Denver, N.C. 28037
(12)	CALLAWAY HOMES INC. DB 649 Pg 251	P.O. Box 448 3525 St James Church Road Denver NC 28037
(13)	JOY L. FLOYD, LORETTA BLANTON & DEANE L. SAIN DB 571 Pg 353	328 E. Congress St. Lincolnton, N.C. 28092
(14)	TERRY C. LOVE MELODY LAWING LOVE DB 611 Pg 637	7764 Optmist Club Road Denver, N.C. 28037

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS



PLAN VIEW
SITE 1B

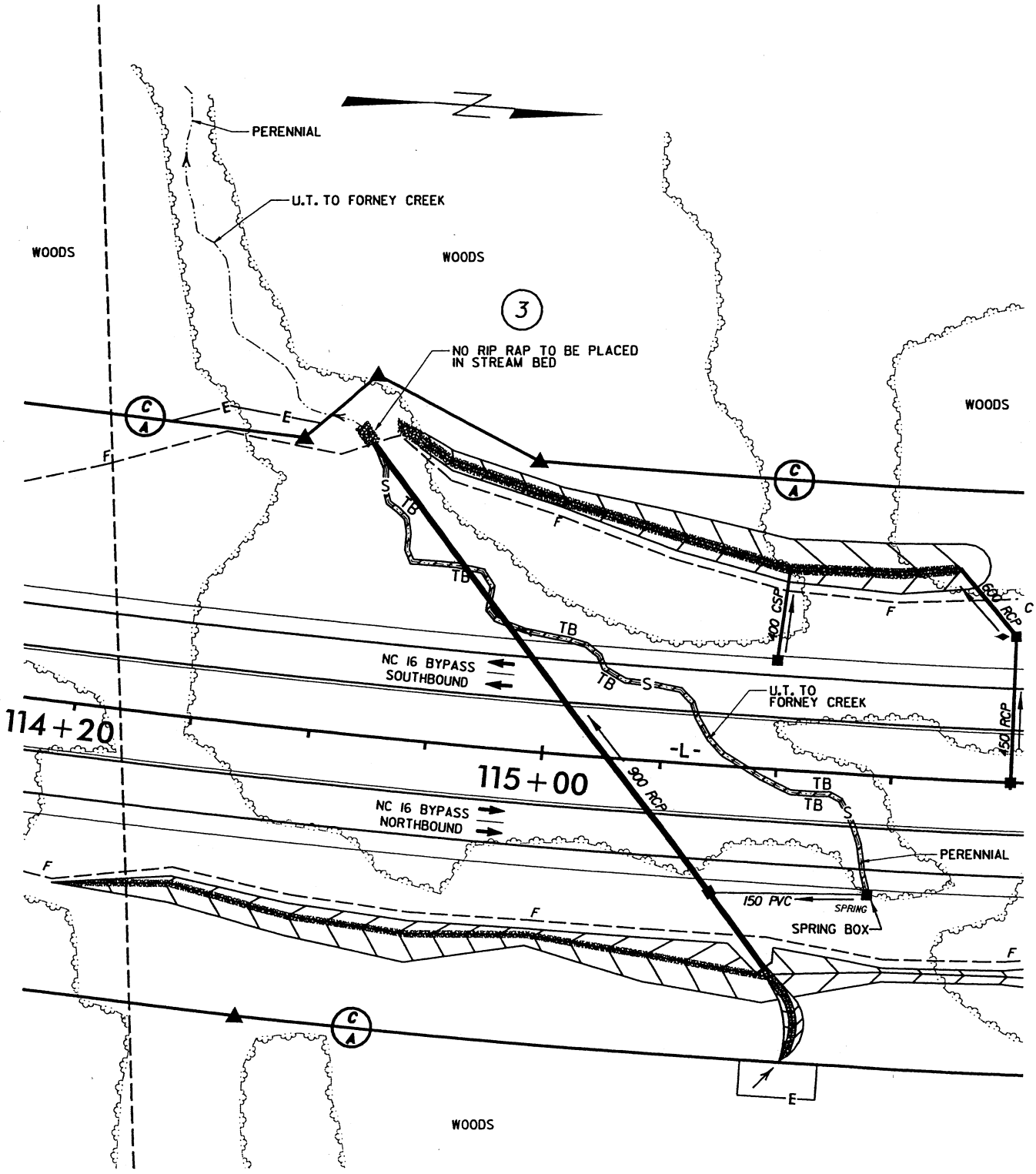
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 5 OF 35

1/16/04



PLAN VIEW
SITE 2B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

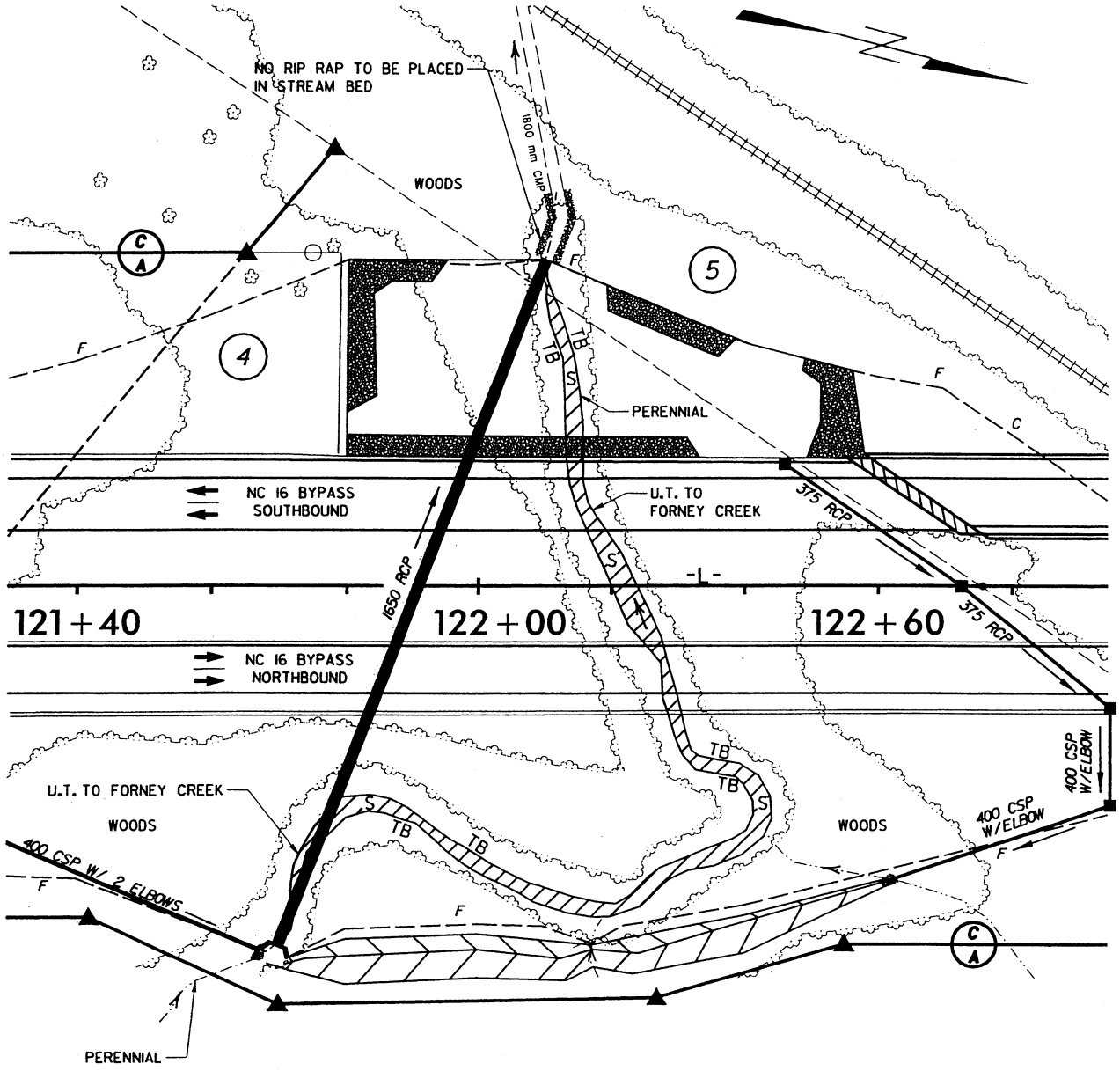
10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 6 **OF** 35 **1/16/04**



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PLAN VIEW
SITE 3B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

10 0 20

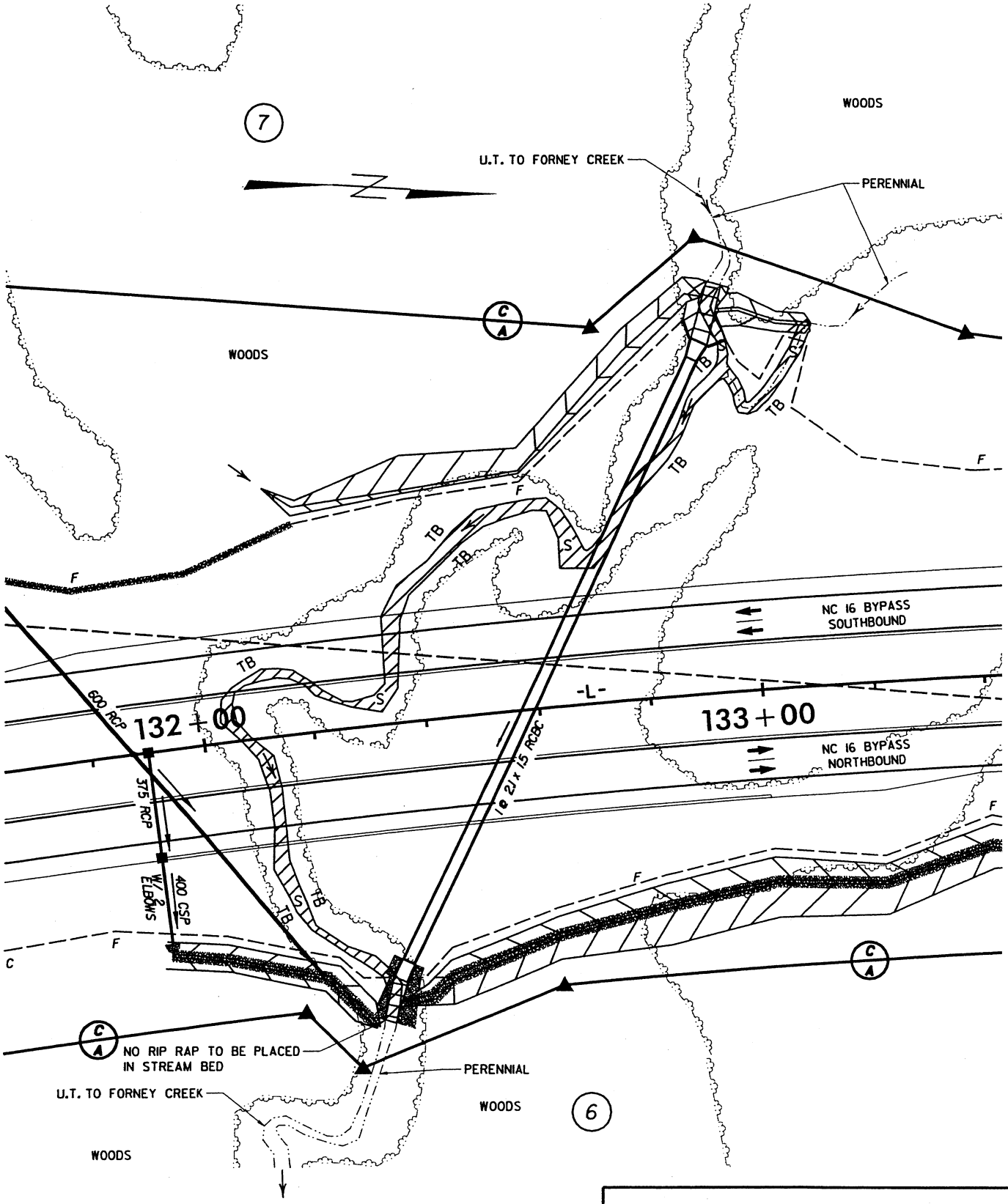
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 7 OF 35

1/16/04



PLAN VIEW
SITE 4B

10 0 20

DENOTES SURFACE WATER IMPACT (NATURAL) S S

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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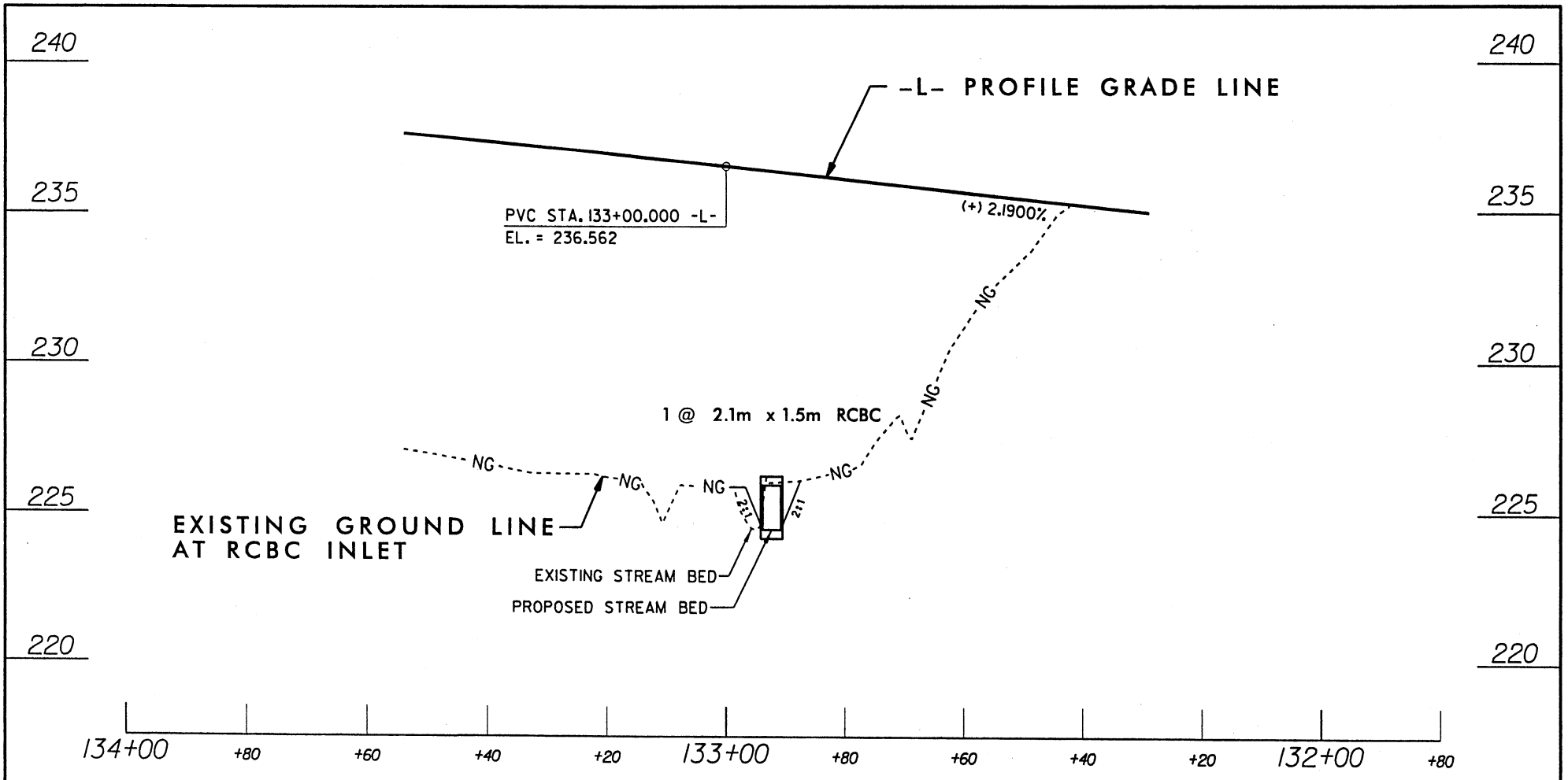
1/16/04



PROFILE
SITE 4B

5 0 10 HORIZONTAL SCALE

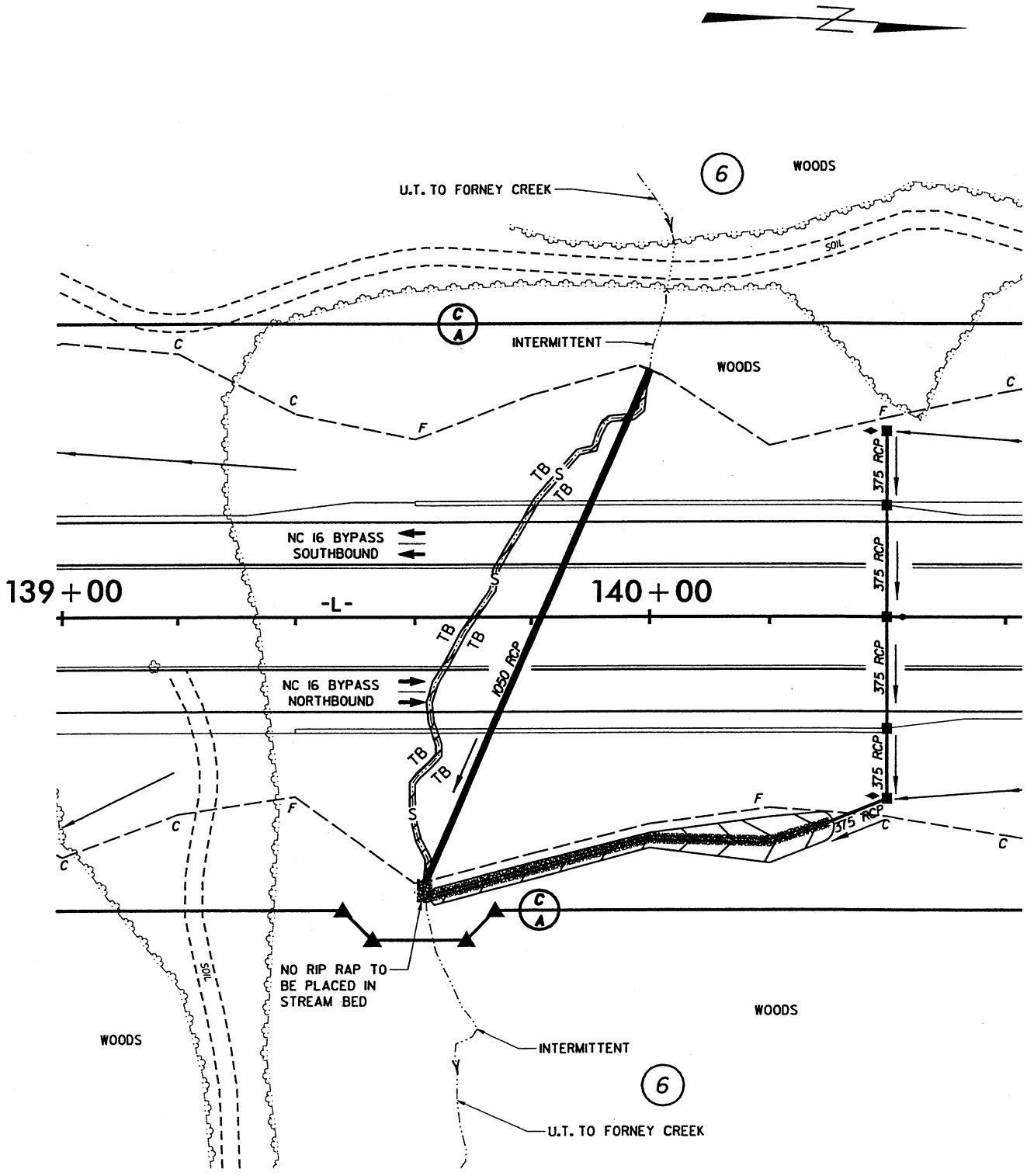
1 0 2 VERTICAL SCALE

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 9 OF 35 1/16/04



PLAN VIEW
SITE 6B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

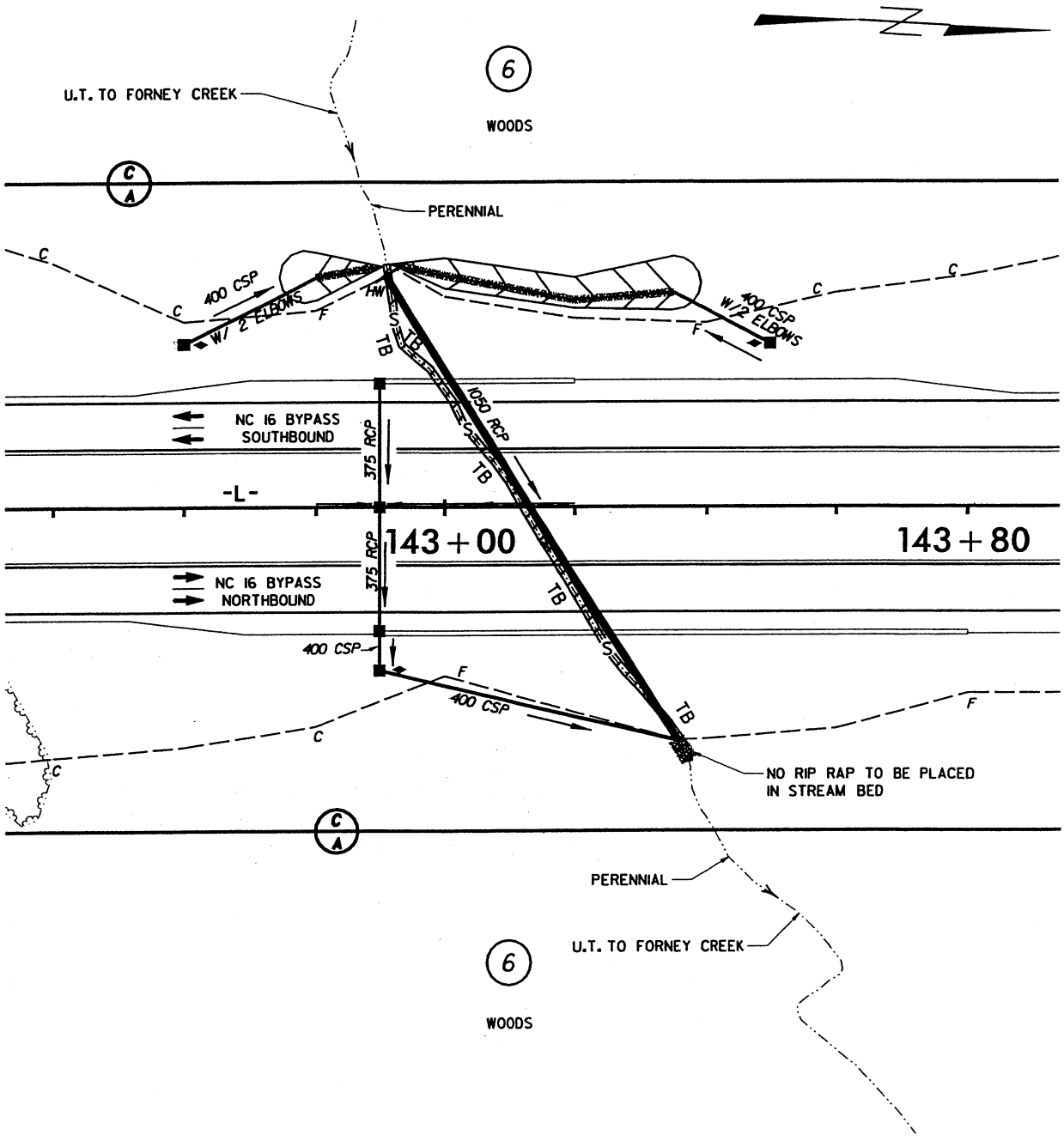
10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 10 OF 35 **1/16/04**



PLAN VIEW
SITE 7B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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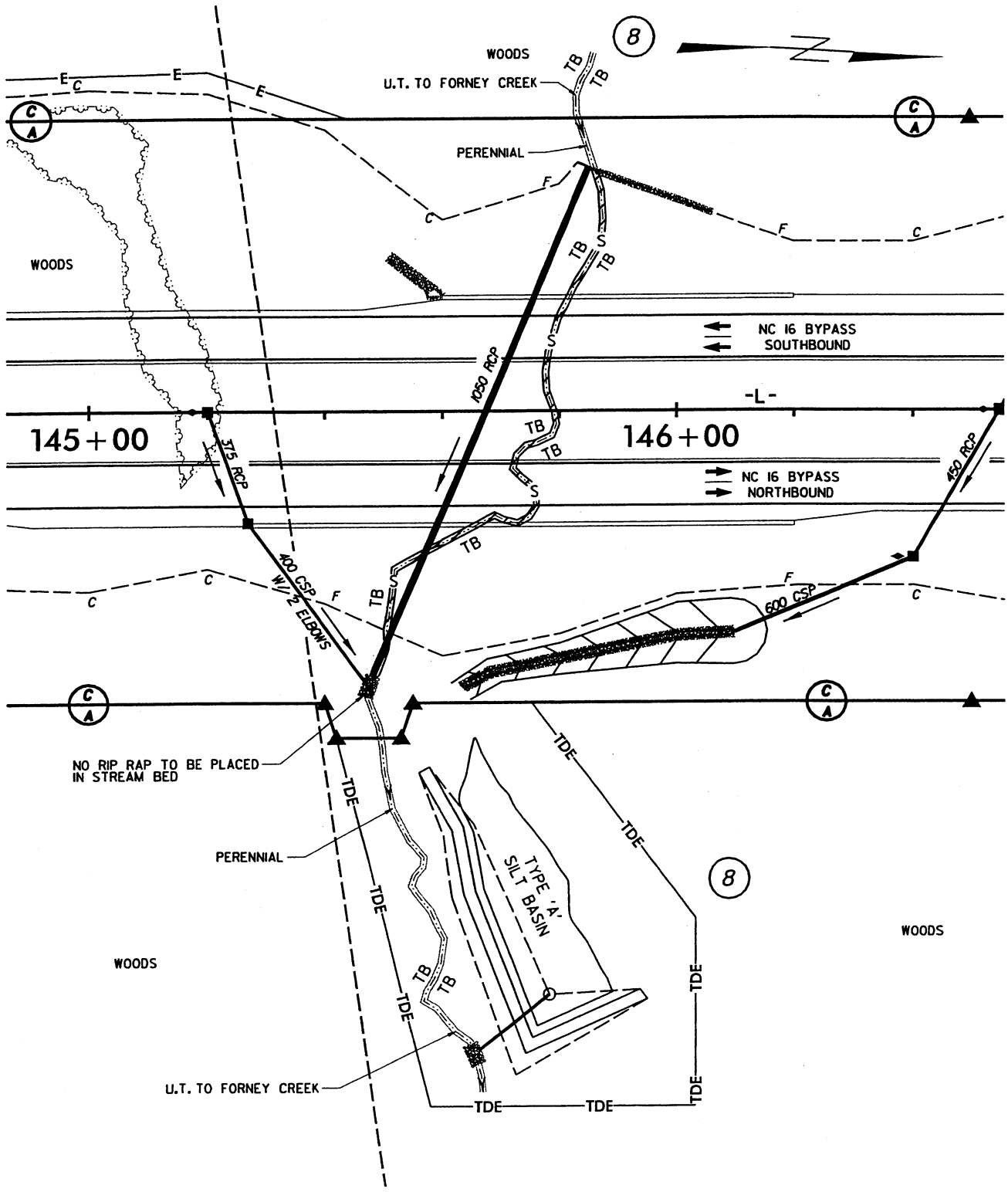
1/16/04



PLAN VIEW
SITE 8B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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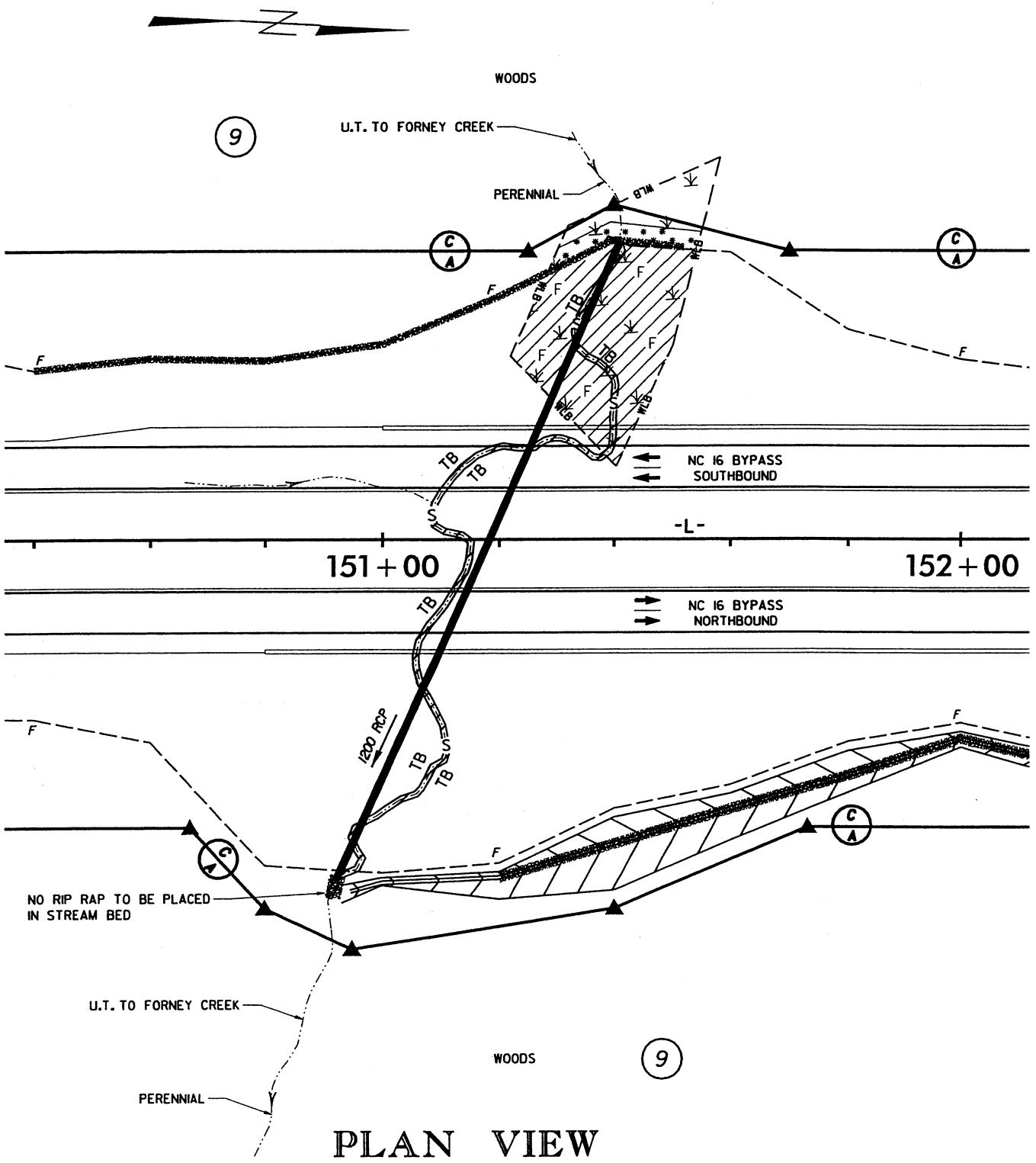
1/16/04



PLAN VIEW
SITE 9B

DENOTES FILL IN WETLANDS

DENOTES MECHANIZED CLEARING

DENOTES SURFACE WATER IMPACT (NATURAL)

10 0 20

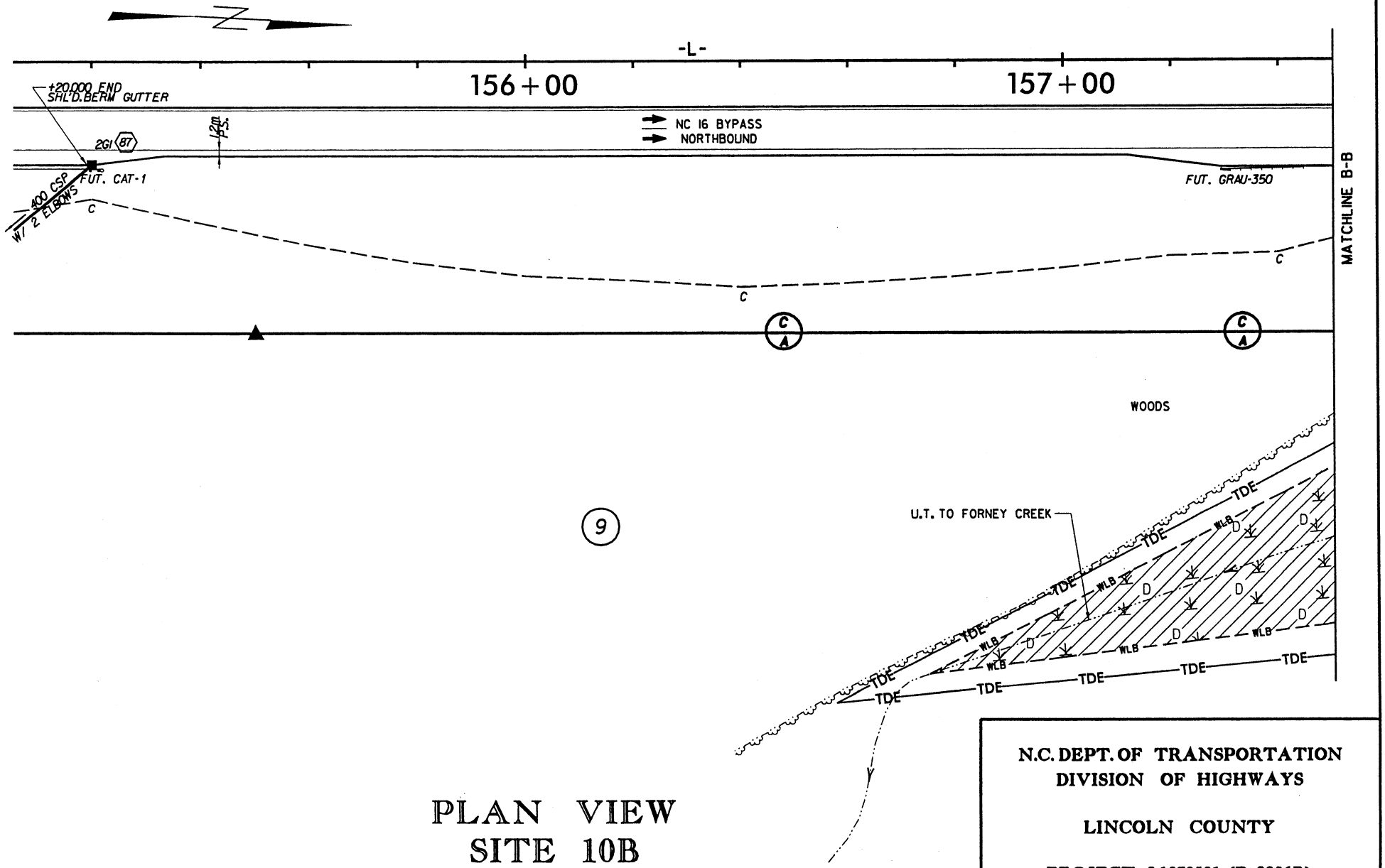
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 13 OF 35

1/16/04



PLAN VIEW
SITE 10B

10 0 20

DENOTES DRAINED WETLANDS

D D

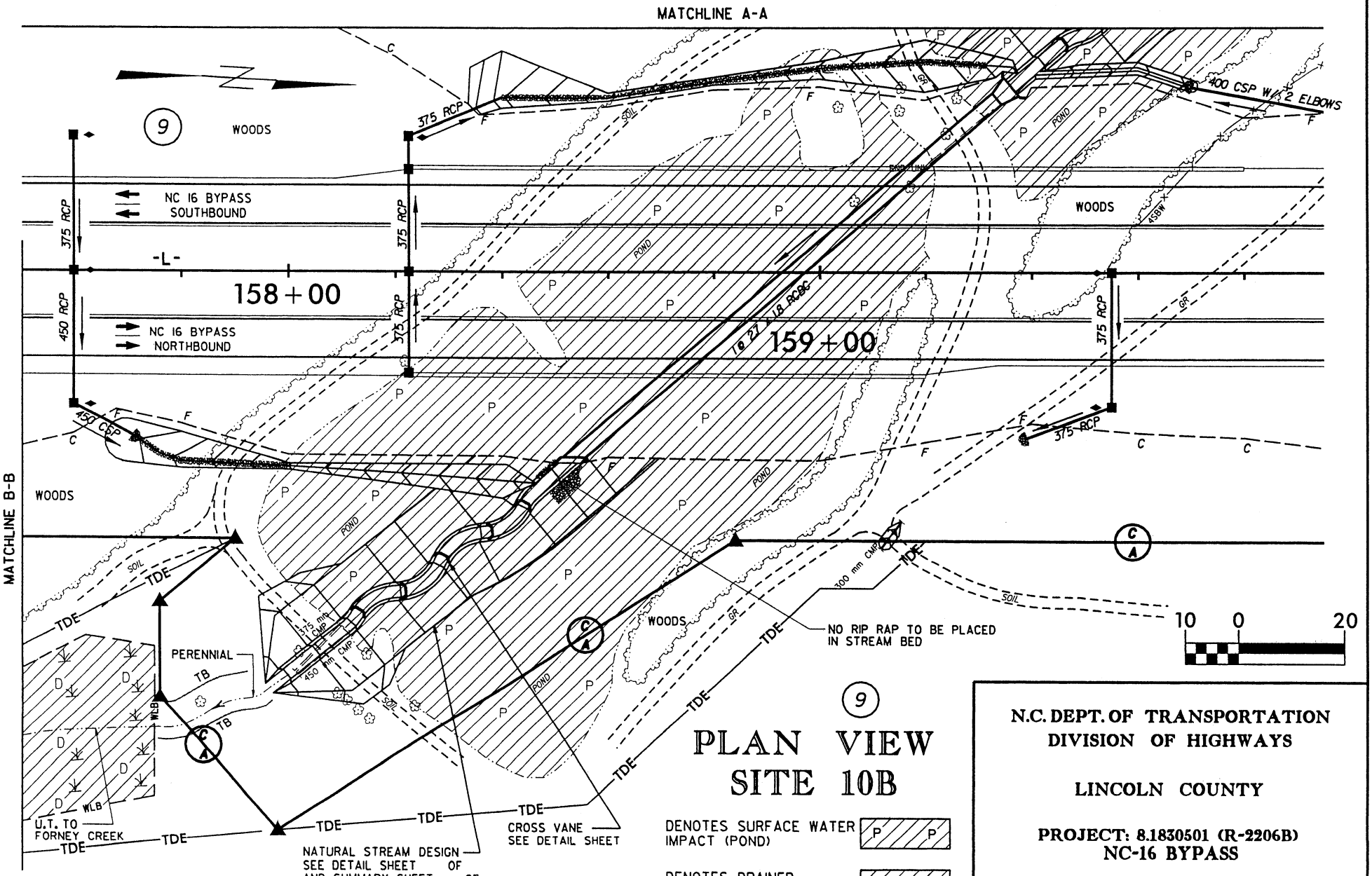
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 14 OF 35

1/16/04



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PLAN VIEW
SITE 10B

DENOTES SURFACE WATER IMPACT (POND) P P

DENOTES DRAINED WETLANDS D D

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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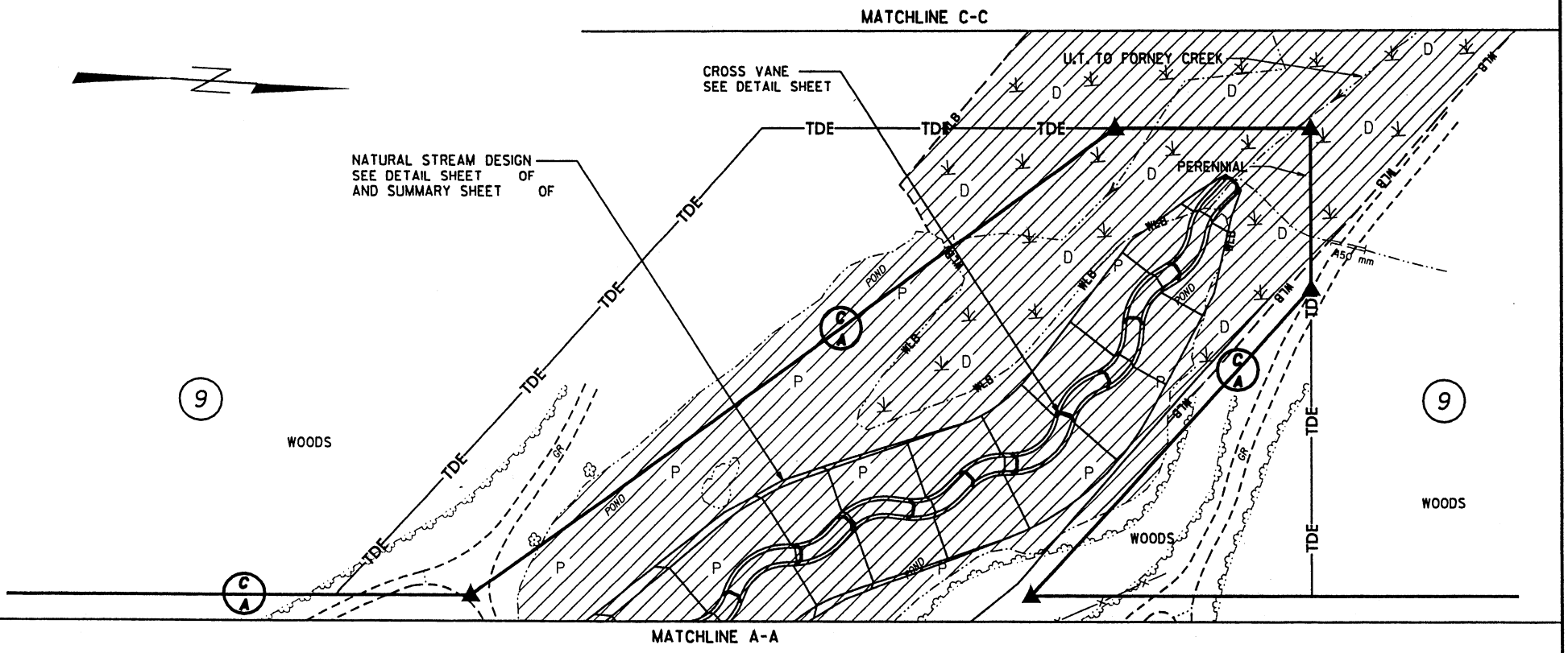
1/16/04



PLAN VIEW
SITE 10B

DENOTES SURFACE WATER IMPACT (POND) — P / P

DENOTES DRAINED WETLAND — D / D

10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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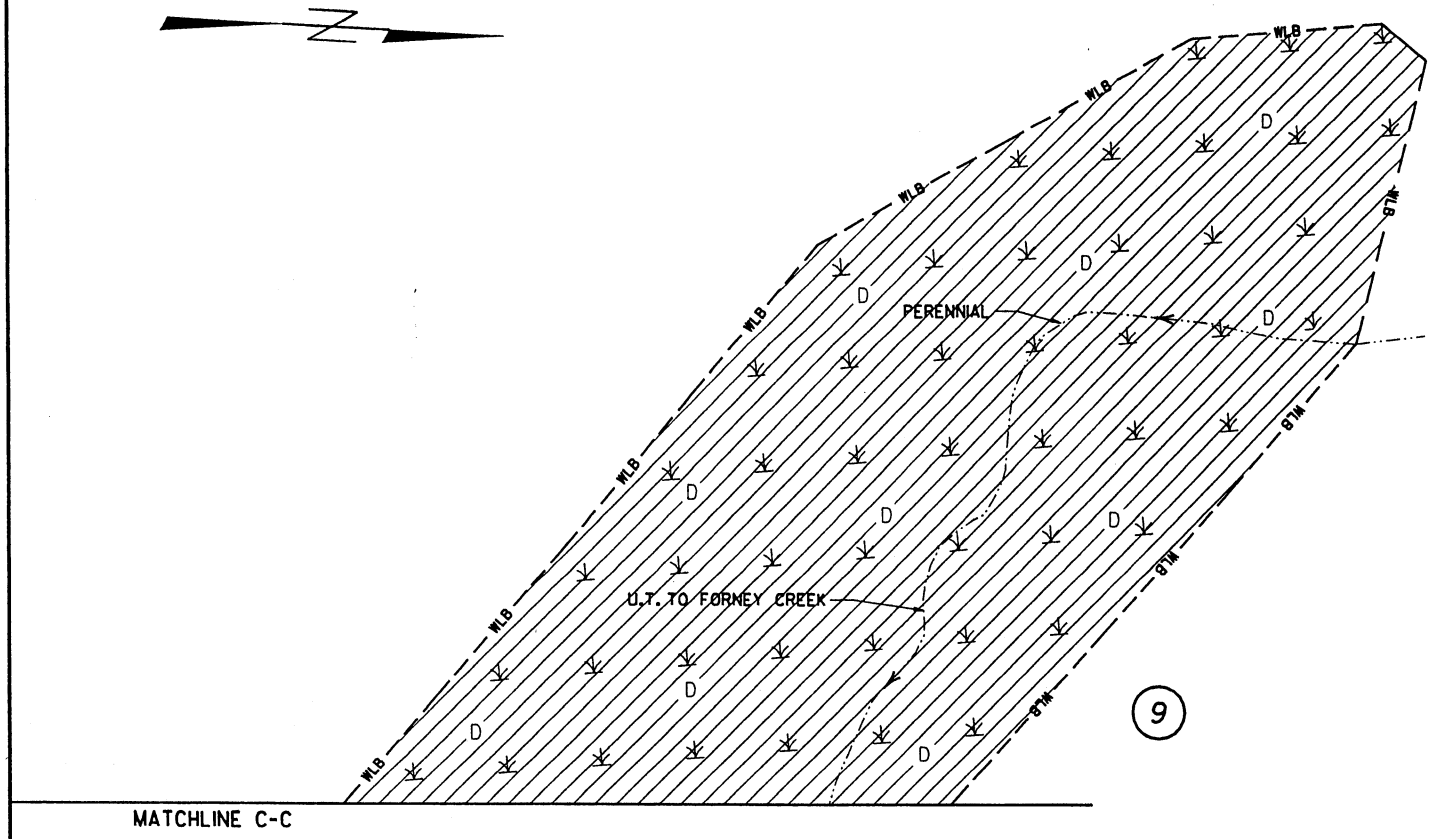


PLAN VIEW
SITE 10B

10 0 20

DENOTES DRAINED WETLAND

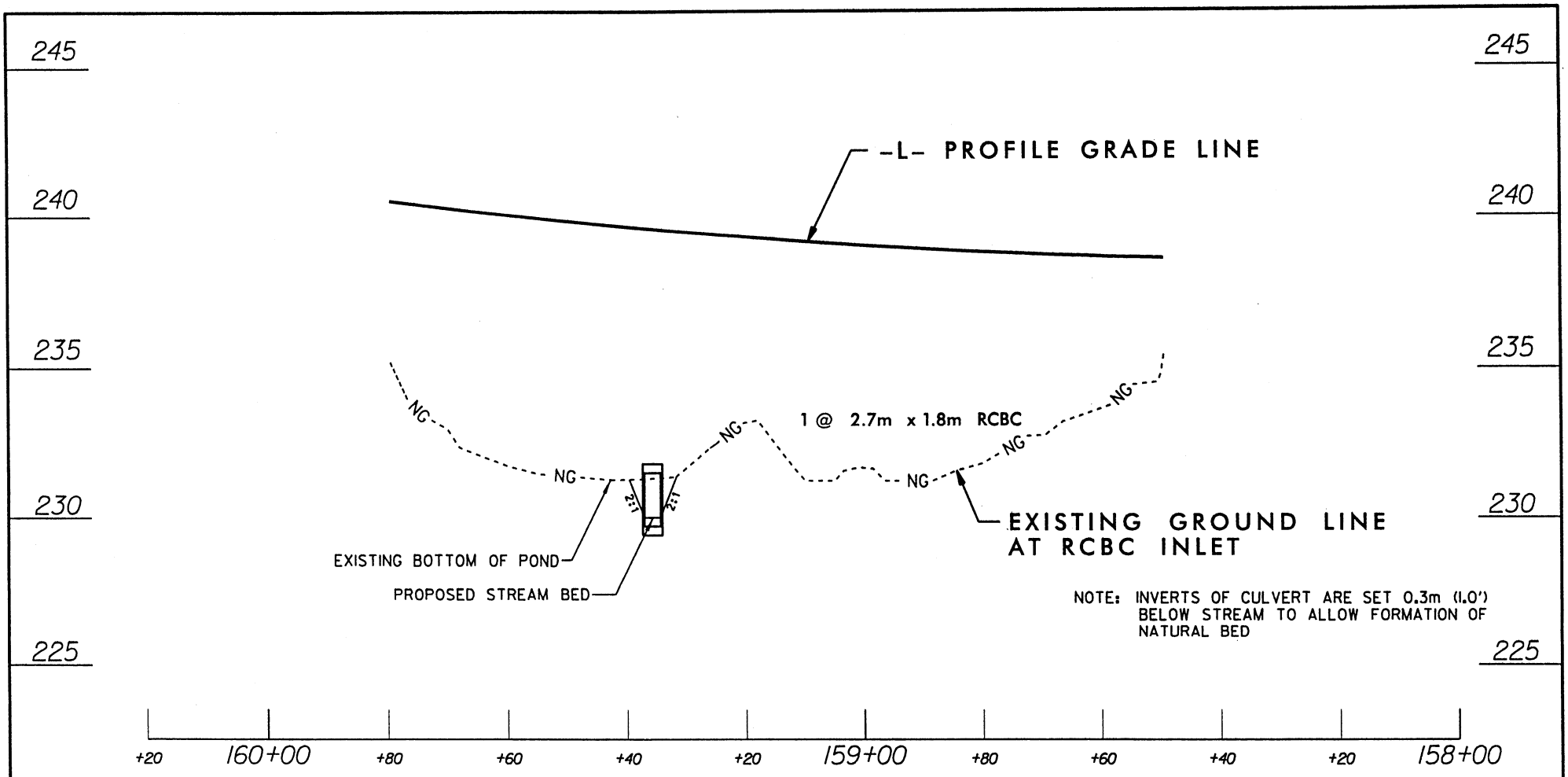
D D

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 17 OF 35 **1/16/04**



PROFILE
SITE 10B

5 0 10 HORIZONTAL SCALE

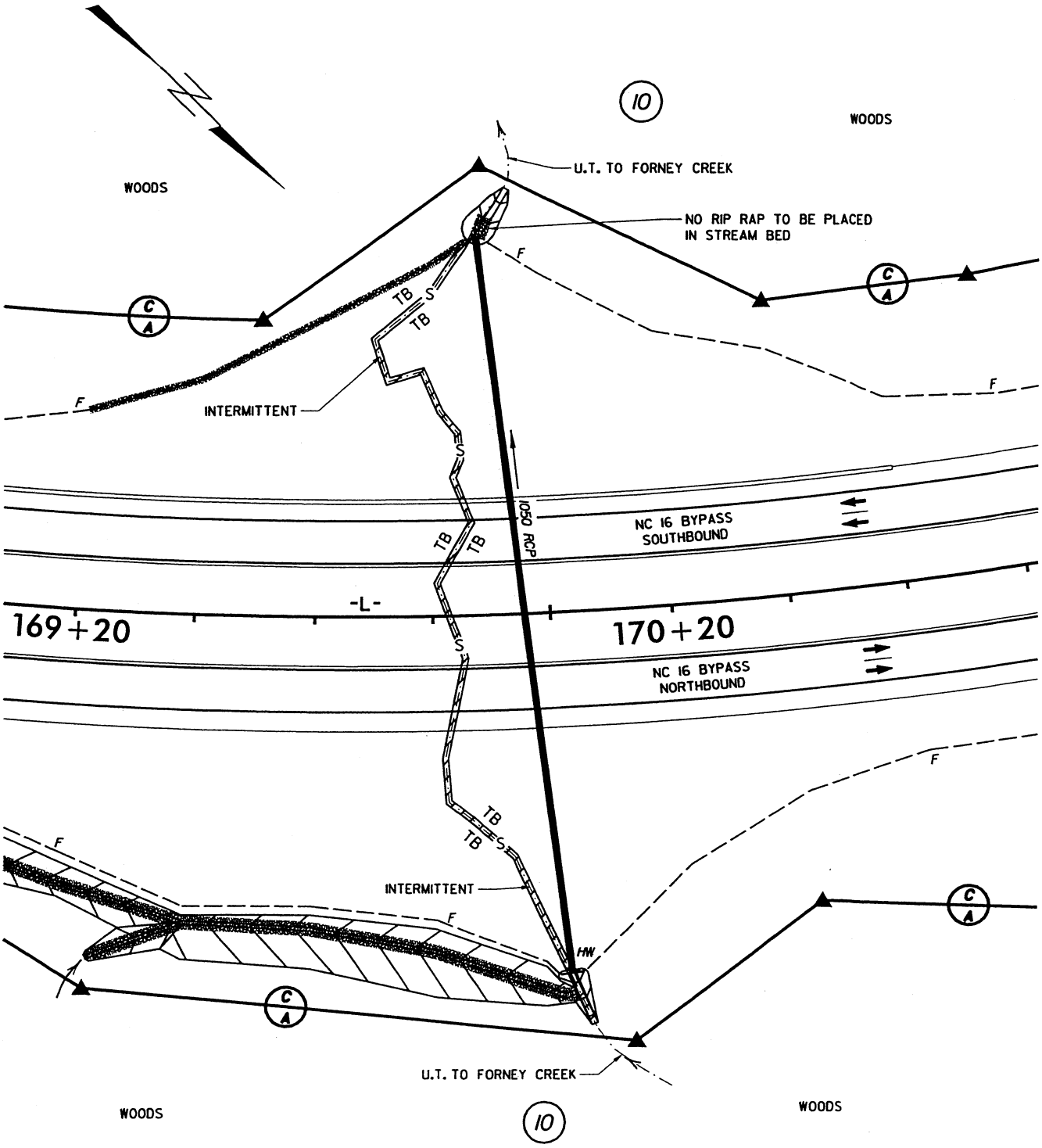
1 0 2 VERTICAL SCALE

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 18 **OF** 35 **1/16/04**



PLAN VIEW
SITE 11B

DENOTES SURFACE WATER IMPACT (NATURAL)

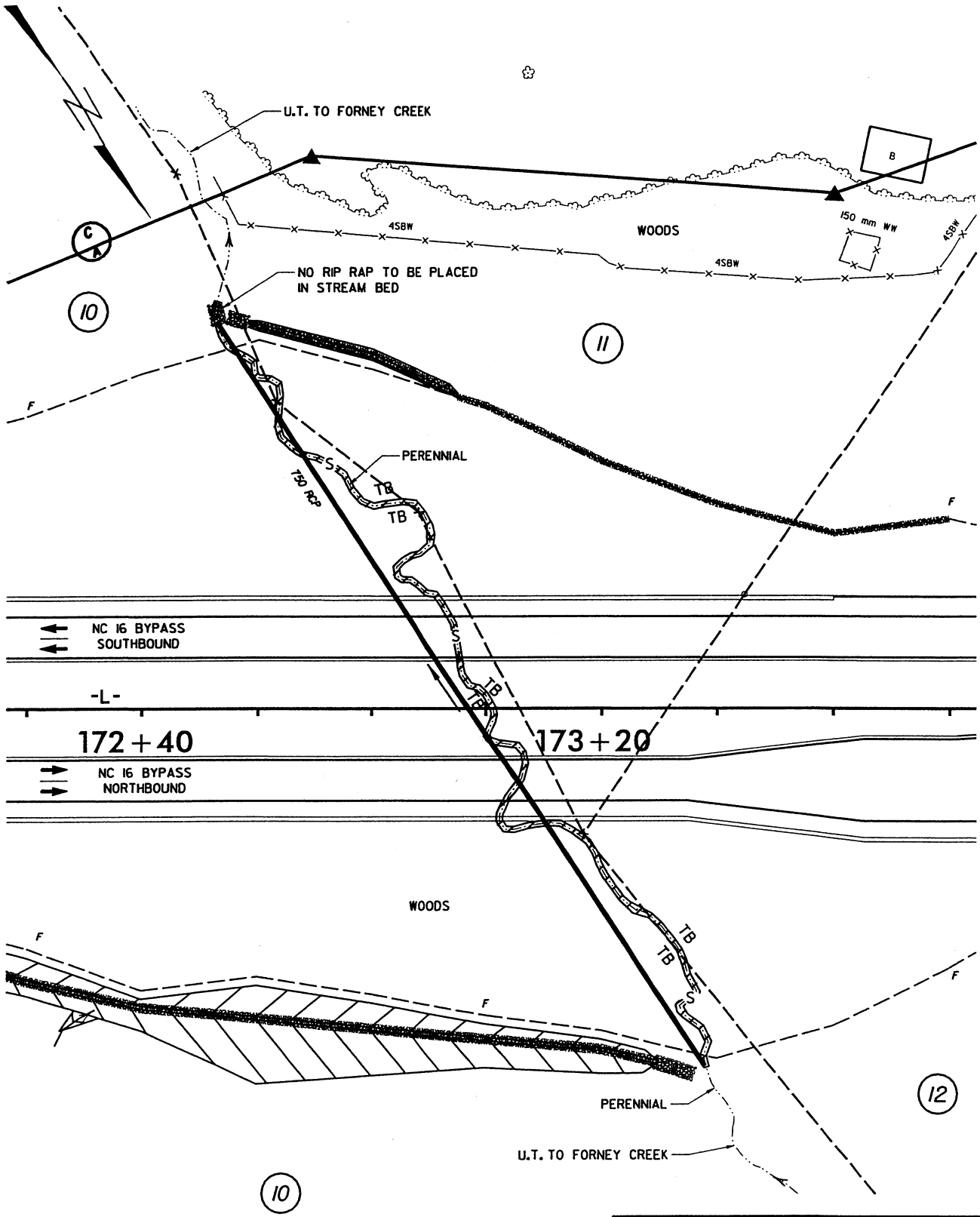
10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 19 OF 35 **1/16/04**



PLAN VIEW
SITE 12B

10 0 20

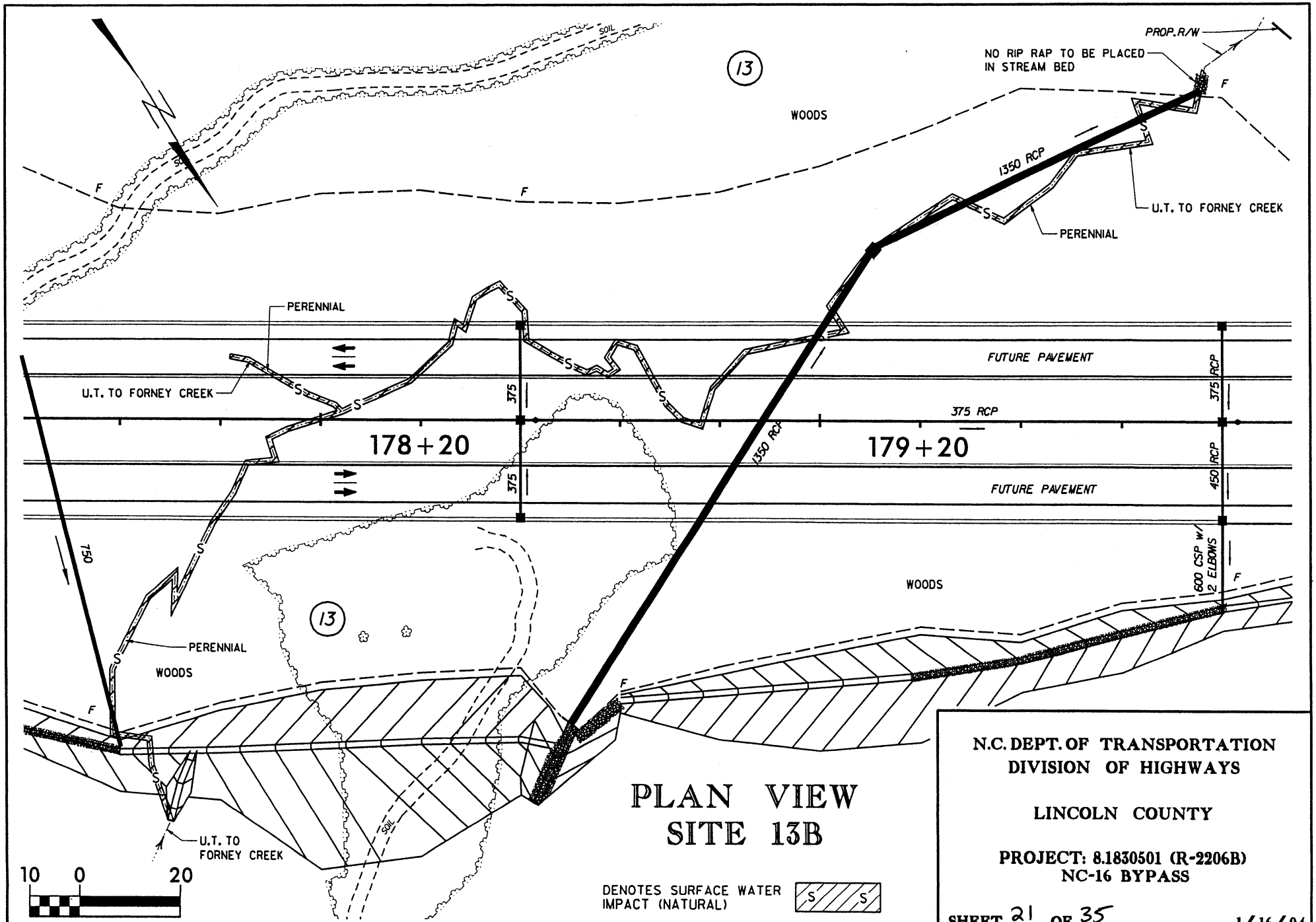
DENOTES SURFACE WATER IMPACT (NATURAL) S S

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 20 OF 35 **1/16/04**



PLAN VIEW
SITE 13B

DENOTES SURFACE WATER IMPACT (NATURAL) S S

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

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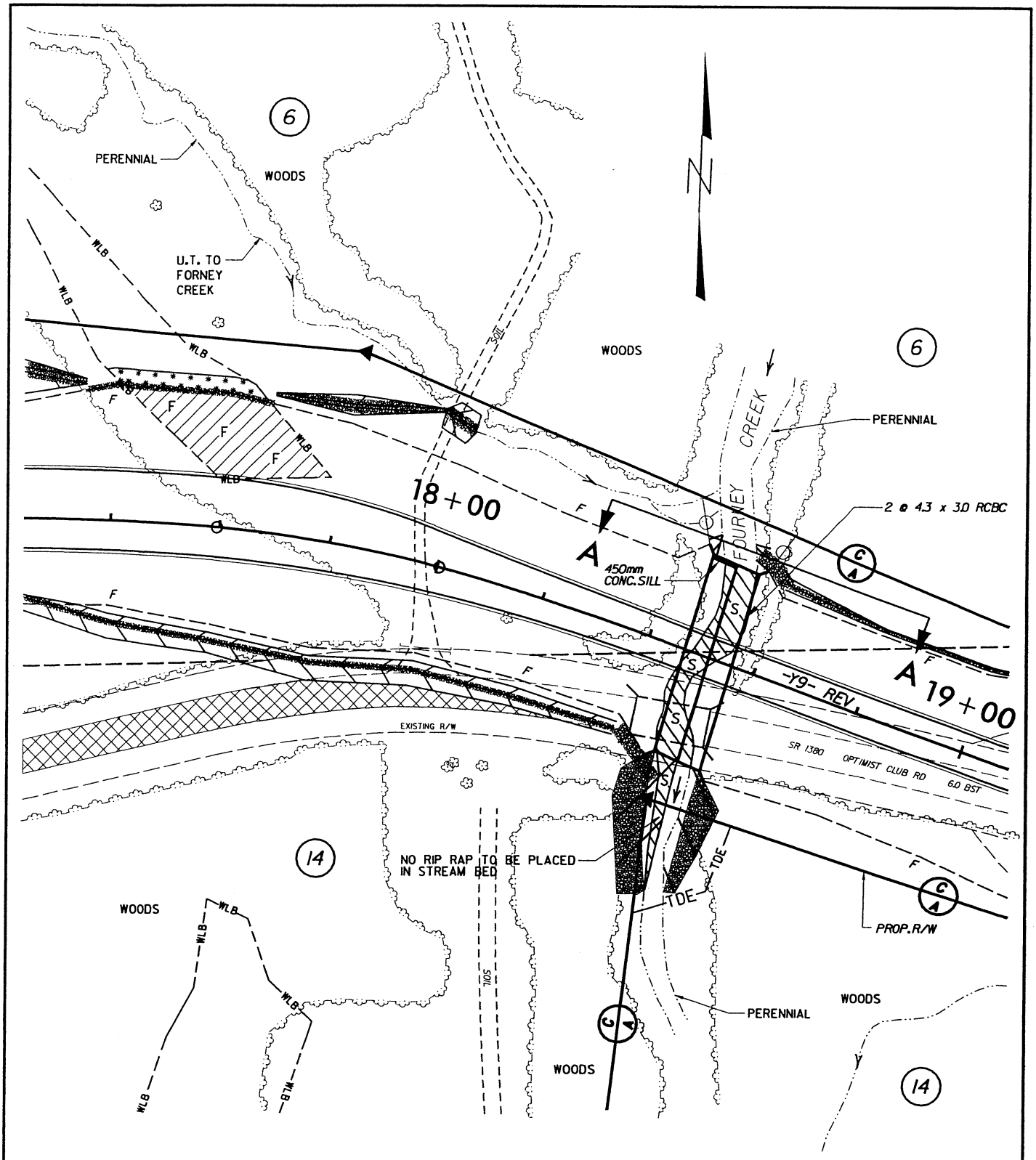
1/16/04



PLAN VIEW
SITE 14B

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

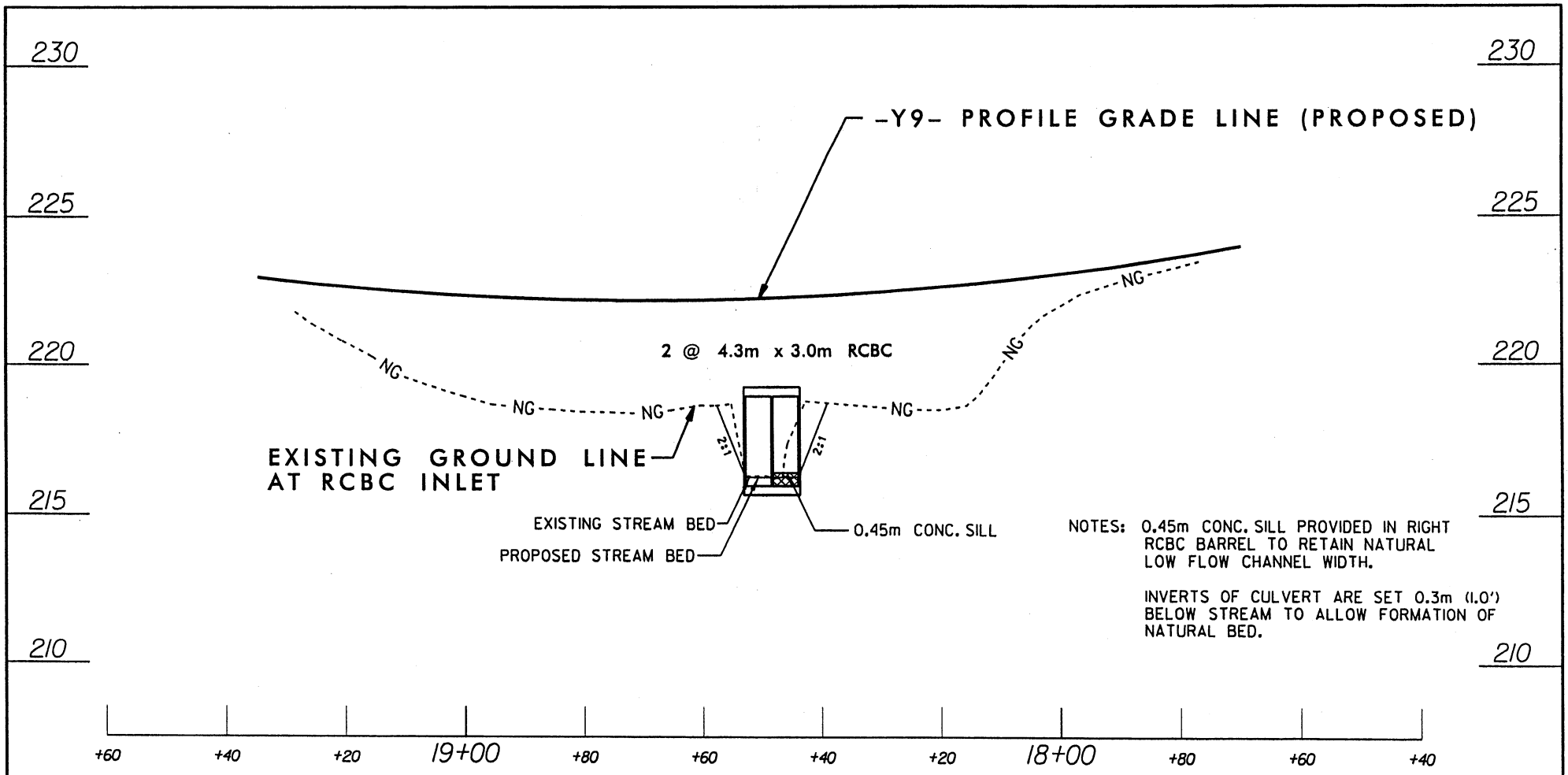
10 0 20

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 22 OF 35 **1/16/04**



PROFILE
SITE 14B

5 0 10
HORIZONTAL SCALE

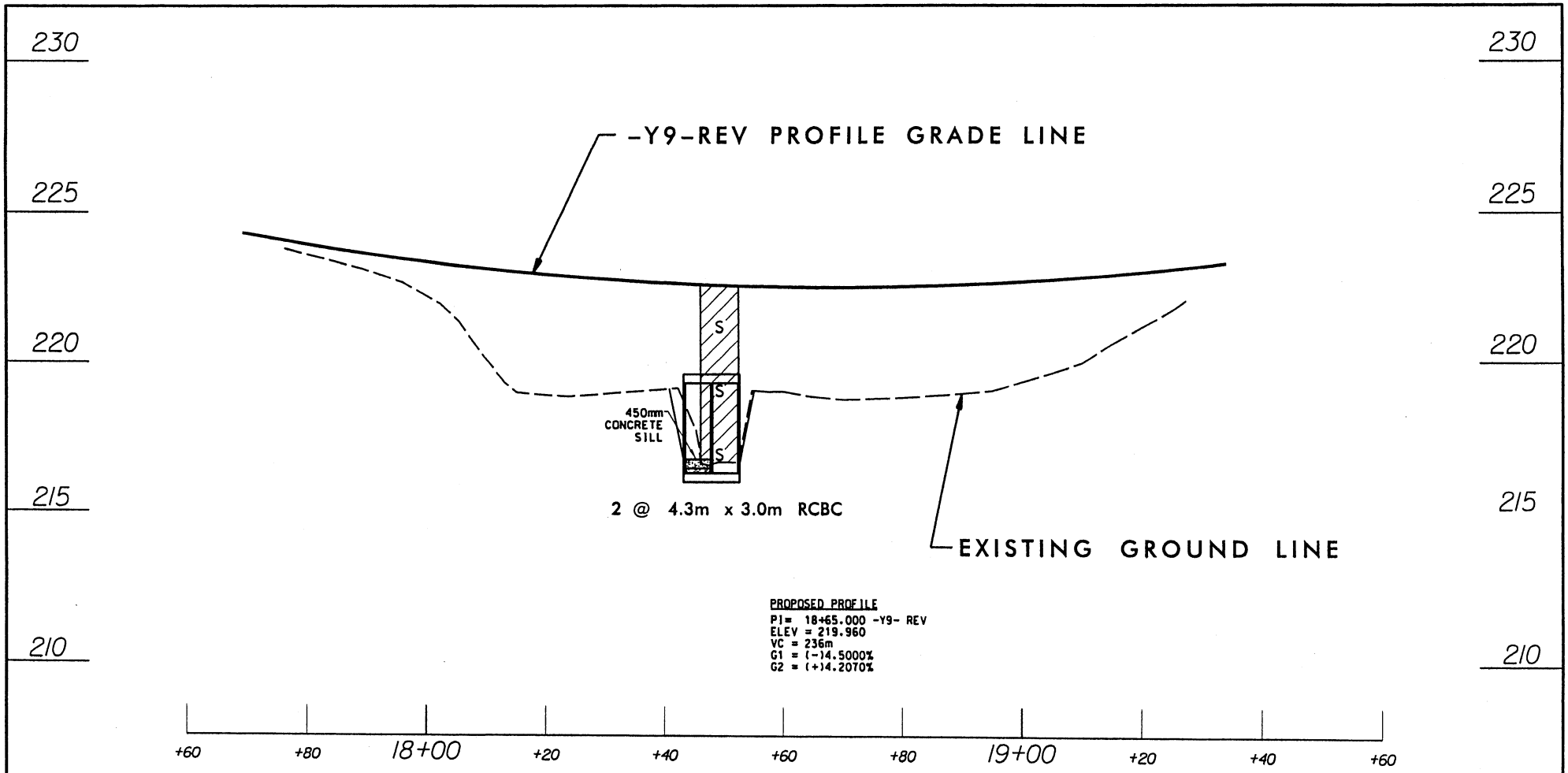
1 0 2
VERTICAL SCALE

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 23 OF 35 **1/16/04**



SECTION A-A
SITE 14B

5 0 10 HORIZONTAL SCALE

1 0 2 VERTICAL SCALE

DENOTES SURFACE WATER IMPACT (NATURAL) S S

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 24 OF 35

1/16/04

IMPACT SUMMARY (ENGLISH)

Site No.	Station (From/To)	Structure Size	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)
1B	-Y12- 15+81 Lt to 106+25 Rt	900mm	0.099			0.010	0.027			377.6	
2B	-L- 114+65 Lt to 115+27 Rt	900mm					0.025			429.8	
3B	-L- 121+69 Rt to 122+44 Rt	1650mm					0.104			678.5	
4B	-L- 132+03 Rt to 133+12 Lt	1 @ 2.1m x 1.5m RCBC					0.136			834.3	
6B	-L- 139+59 Rt to 140+01 Lt	1050mm					0.027			355.3	
7B	-L- 142+91 Lt to 143+36 Rt	1050mm					0.022			299.2	
8B	-L- 145+50 Rt to 145+88 Lt	1050mm					0.030			382.2	
9B	-L- 150+96 Rt to 151+55 Lt	1200mm	0.173			0.020	0.039			531.8	
10B	-L- 156+75 Rt to 157+75 Rt	1 @ 2.7m x 1.8m RCBC	3.116 [2]					3.267 [1]			459.3
	-L- 157+94 Rt to 160+37 Lt										242.8
11B	-L- 169+69 Lt to 170+01 Rt	1050mm					0.042			563.3	
12B	-L- 172+55 Lt to 173+39 Rt	750mm					0.052			660.7	
13B	-L- 177+58 Rt to 179+75 Lt	1350mm					0.101			1345.8	
14B	-Y9-REV 18+46 Rt to 18+56 Lt	2 @ 4.3m x 3.0m RCBC	0.084			0.020	0.059			209.3	
	PROJECT TOTALS		3.472	0.000	0.000	0.050	0.664	3.267	0.000	6667.8	702.1

NOTES:

Site 5B Removed Due To No Impact

[1] Denotes Draining Of Pond Impact.

[2] Denotes Draining Of Wetland Impact.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501
NCDOT T.I.P. No: R-2206B

1/16/2004

NCDOT Project I.D. R-2206B

Lincoln / Catawba County, NC

NC 16 Bypass from North of NC 73 to North of

SR 1386 (St. James Church Road)

NATURAL STREAM DESIGN

UNNAMED TRIBUTARY TO FORNEY CREEK

Right of -L- Project Station 158+40

Left of -L- Project Station 159+60

Prepared by: TranSite Consulting Engineers, Inc.

1300 Paddock Dr.

Raleigh, NC 27609

NATURAL STREAM DESIGN

UNNAMED TRIBUTARY TO FORNEY CREEK

Right of -L- Project Station 158+40

Left of -L- Project Station 159+60

The construction of NC 16 North of NC 73 to North of SR 1386 will require that a portion of an unnamed tributary to Forney Creek be relocated right of -L- Station 158+40 and left of -L- Station 159+60. The total length of stream to be relocated will be 214 meters (702') starting left of -L- Station 160+35± and continue 140 meters (459') downstream to the inlet of the proposed 1 @ 2.7m x 1.8m (1 @ 9'x 6') RCBC. The stream will begin again at the outlet of the proposed RCBC and continue downstream an additional 74 meters (243') intersecting the existing stream on the downstream side of an existing soil road. The proposed stream relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

This tributary of Forney Creek drains 1.00 km^2 (0.39 mi^2) in Lincoln County and is located within the Piedmont Physiographic Region. Existing land use in the drainage basin is predominantly agriculture, low density residential and undeveloped. The Lincoln County Land Use Plan shows that the future land use is predominantly low density residential.

There is no hydraulic data available on this stream. Discharges were estimated using procedures outlined in USGS Water-Resources Report 96-4084, Estimation of Flood-Frequency Characteristics of Small Urban Watersheds in North Carolina.

EXISTING CHANNEL

The existing conditions at the proposed stream relocation sites are two ponds in series totaling 1.32 hectares (3.26 acres) of surface area. The ponds will be drained prior to construction and the proposed streams constructed through the natural bottoms.

REFERENCE STREAM

A 30 meter section of stream upstream of the existing ponds was surveyed in detail to determine it's morphological characteristics. Those characteristics include bankfull discharge, width, depth and area. The reach begins approximately 140 meters upstream of the upstream pond and was chosen to be used as the reference reach because it is stable and undisturbed.

The reference streambed was found to be fine to medium sand. Therefore, a pebble count was not feasible. Velocities, stream power and shear were obtained using the HEC-RAS computer model. Based on the field survey data gathered, this stream reach was classified as an C5 stream.

PROPOSED STREAM

The proposed stream will be excavated in the natural bottoms of the drained ponds and is designed to have a C5 classification. The upstream stream gradient is controlled by the tie to the existing stream 115 meters (377') left of -L- Sta. 160+35± and the invert in of the proposed 1 @ 2.7m x 1.8m (1 @ 9'x 6') RCBC. The downstream gradient is controlled by the invert out of the proposed RCBC and the tie to the existing stream 80 meters (262') right of -L- Sta. 157+95±. The RCBC will be buried a minimum of 0.3 meters (1.0') upstream and downstream to provide formation of a natural streambed through its entire length.

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that the channel banks will be planted with native trees and shrubs above bankful depth. In addition, cross vanes will be placed in the channel for grade control and coir fiber mat will be placed along the entire channel while rootwads will be placed along the outside of the channel bends. The channel bottom will match the characteristics of the existing channel.

SEDIMENT TRANSPORT ANALYSIS

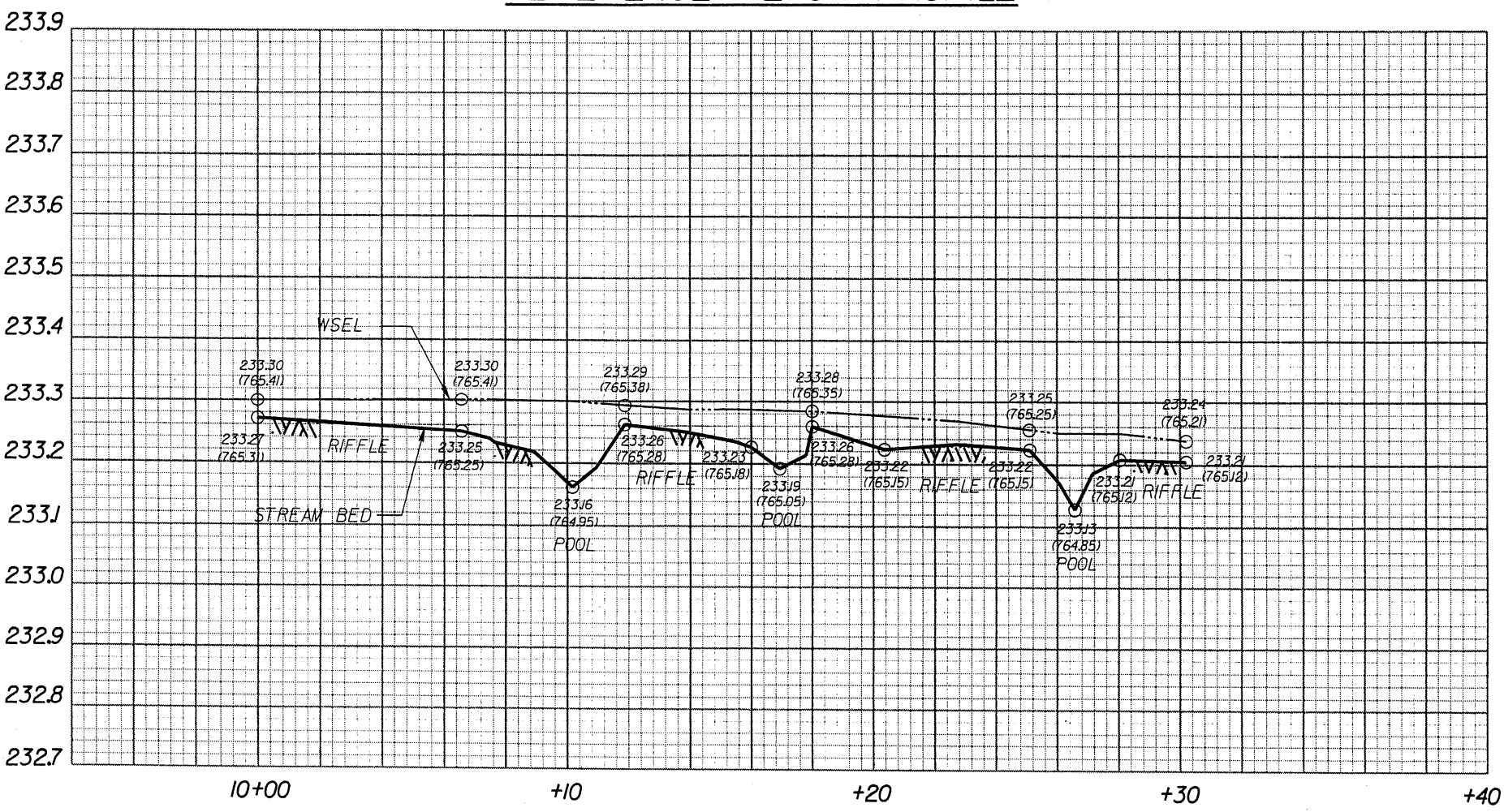
The proposed stream has a bankfull stream power of 0.78 lb/ft-s and a shear stress of 0.30 lb/ft^2 as compared to 0.83 lb/ft-s and 0.31 lb/ft^2 for the existing stream. These values indicate that the proposed stream will transport the current sediment load without aggrading or degrading the streambed or banks. Additionally, 2-yr and 10-yr velocities and shear stresses were evaluated and found to be within acceptable limits.

Appendix B

Morphological Measurement Table
R-2206B, Lincoln County

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream Type	N/A - (2) Ponds	C5	N/A	C5
2. Drainage Area (D.A.)	1.00 km^2 / 0.39 mi^2	1.00 km^2 / 0.39 mi^2	-	1.00 km^2 / 0.39 mi^2
3. Bankfull Width (W_{bkf})	N/A	4.11 m / 13.5 ft	-	4.45 m / 14.6 ft
4. Bankfull Mean Depth (d_{bkf})	-	0.35 m / 1.14 ft	-	0.32 m / 1.04 ft
5. Width/Depth Ratio (W_{bkf}/d_{bkf})	-	11.84	-	14.00
6. Bankfull Cross-Sectional Area (A_{bkf})	-	1.43 m^2 / 15.34 ft^2	-	1.41 m^2 / 15.2 ft^2
7. Bankfull Mean Velocity (V_{bkf})	-	0.80 m/s / 2.61 ft/s	-	0.80 m/s / 2.64 ft/s
8. Bankfull Discharge (Q_{bkf})	-	1.13 m^3/s / 40.0 ft^3/s	-	1.13 m^3/s / 40.0 ft^3/s
9. Bankfull Max Depth (d_{mbkf})	-	0.45 m / 1.50 ft	-	0.52 m / 1.69 ft
10. Width of Floodprone Area (W_{fpa})	-	21.7 m / 71.3 ft	-	54.9 m / 180 ft
11. Entrenchment Ratio (W_{fpa}/W_{bkf})	-	5.28	-	12.33
12. Meander Length (L_m)	-	20 m / 41 ft	-	20-26 m / 41-85 ft
13. Ratio of Meander Length to Bankfull Width (L_m/W_{bkf})	-	3.04	-	2.80 - 5.82
14. Radius of Curvature (R_c)	-	9.0 m / 29.5 ft	-	9.0-12.0 m/29.5-39.4 ft
15. Ratio of Radius of Curvature to Bankfull Width (R_c/W_{bkf})	-	2.19	-	2.02 - 2.70
16. Belt Width (W_{blt})	-	6.5 m / 21.3 ft	-	6.0 m / 19.7 ft
17. Meander Width Ratio (W_{blt}/W_{bkf})	-	1.58	-	1.35
18. Sinuosity (K) (stream length/valley length)	-	1.05	-	1.06
19. Valley Slope (VS)	-	1.87%	-	0.20%
20. Average Slope (CS)	-	1.73%	-	0.23%
21. Pool Slope	-	0.00%	-	0.00%
22. Ratio of Pool Slope to Average Slope	-	0.00	-	0.00
23. Maximum Pool Depth (dp_{max})	-	0.45 m / 1.48 ft	-	0.54 m / 1.77 ft
24. Ratio of Pool Depth to Average Bankfull Depth (dp/d_{bkf})	-	1.30	-	1.70
25. Pool Width (W_p)	-	4.25 m / 13.94 ft	-	4.50 m / 14.76 ft
26. Ratio of Pool Width to Bankfull Width (W_p/W_{bkf})	-	1.03	-	1.01
27. Pool to Pool Spacing	-	8.0 m / 26.2 ft	-	4.0-8.0 m / 13.1-26.2 ft
28. Ratio of Pool to Pool Spacing to Bankfull Width	-	1.94	-	0.90 - 1.79
29. Ratio of Lowest Bnk Height to Bankfull Height (or Max Bankfull Depth) (Bh_{low}/d_{mbkf})	-	1.00	-	0.86

REFERENCE REACH PROFILE



NOTE: ELEVATIONS IN ( ) ARE IN FEET. ALL OTHER STATION AND ELEVATION DATA ARE IN METERS.

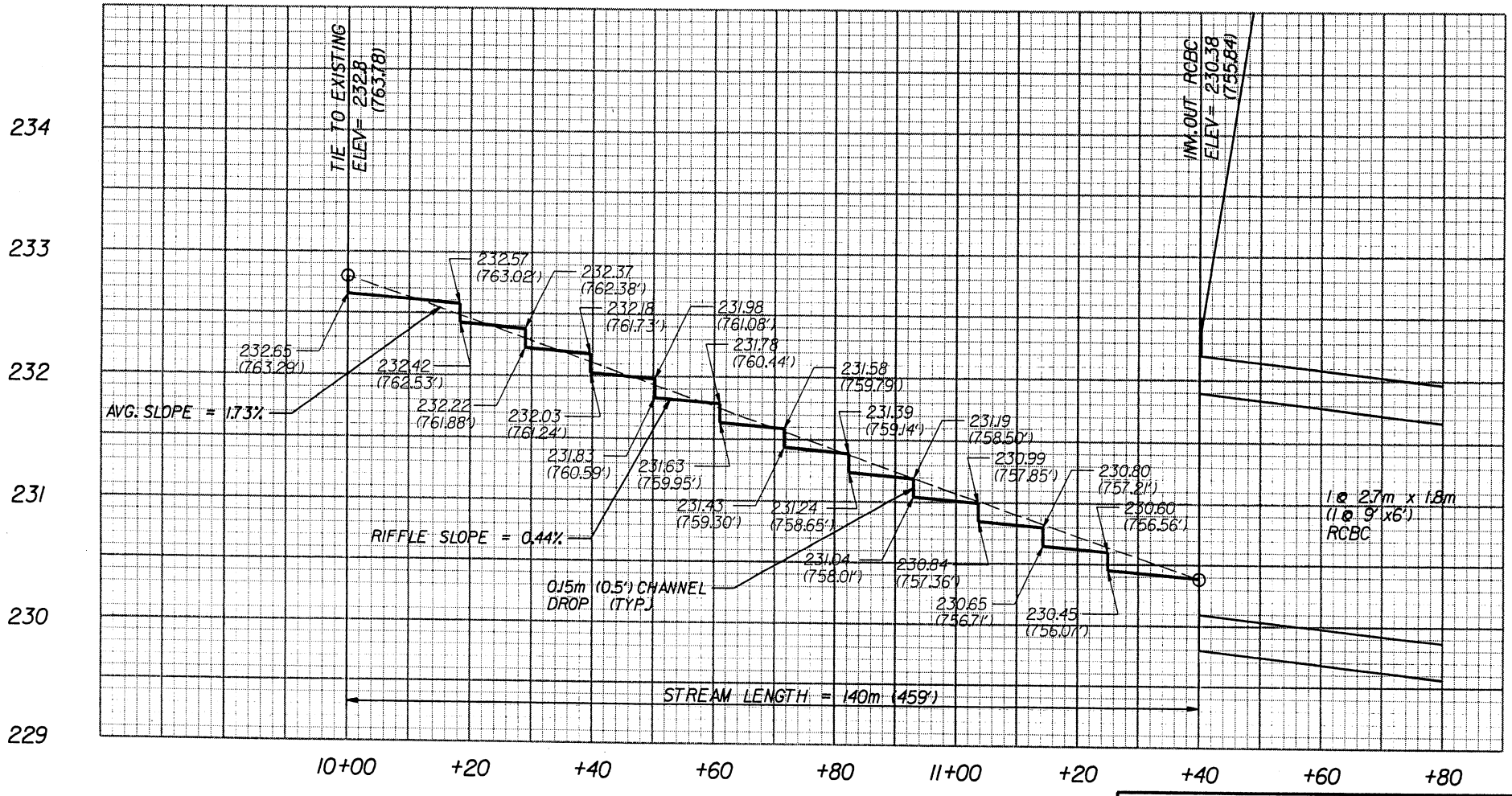
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 31 OF 35 **10/10/03**

PROPOSED THALWEG PROFILE



NOTE: ELEVATIONS IN ( ) ARE IN FEET.
ALL OTHER STATION AND ELEVATION
DATA ARE IN METERS.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

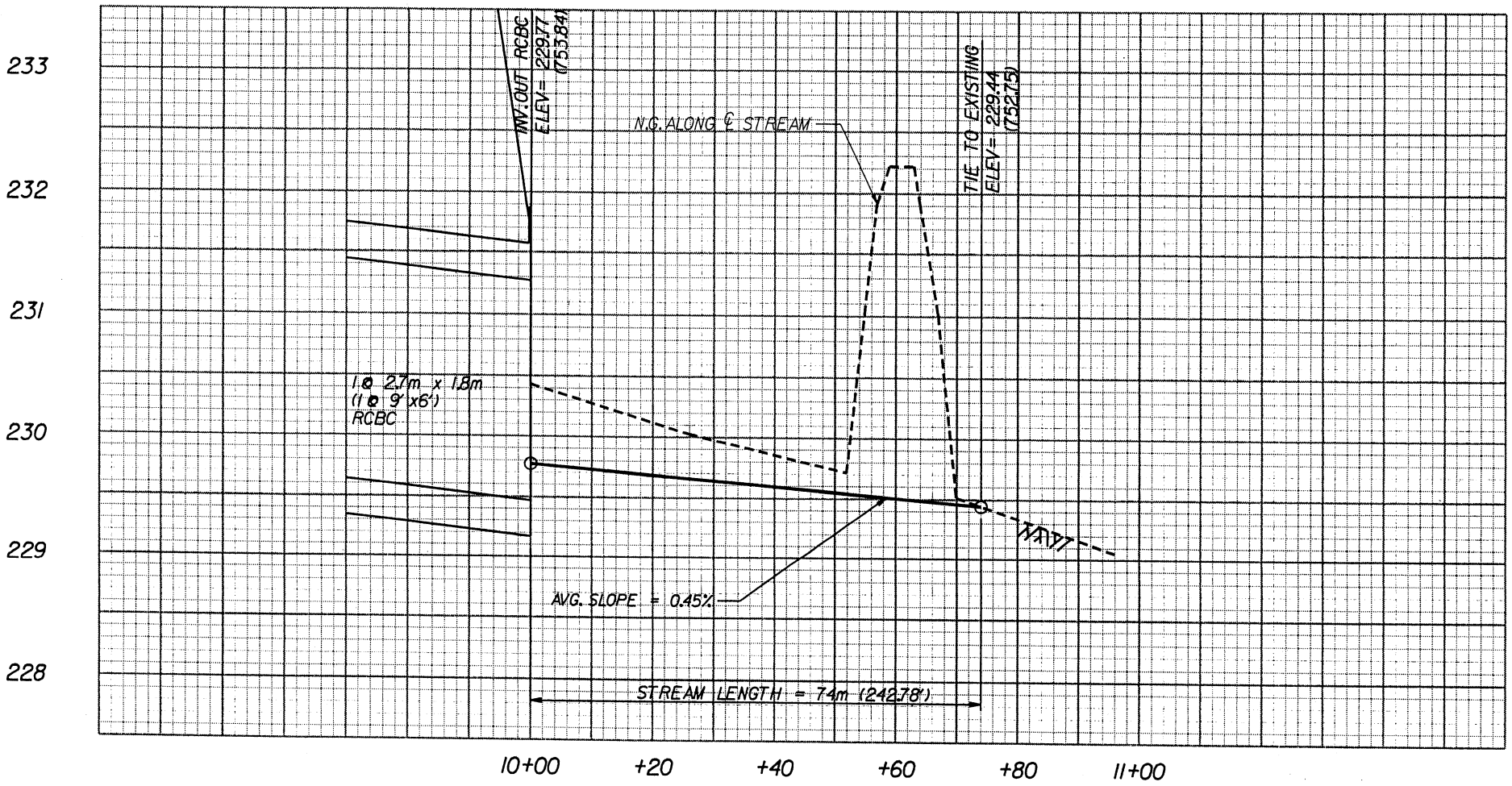
LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 32 OF 35

10/10/03

PROPOSED THALWEG PROFILE



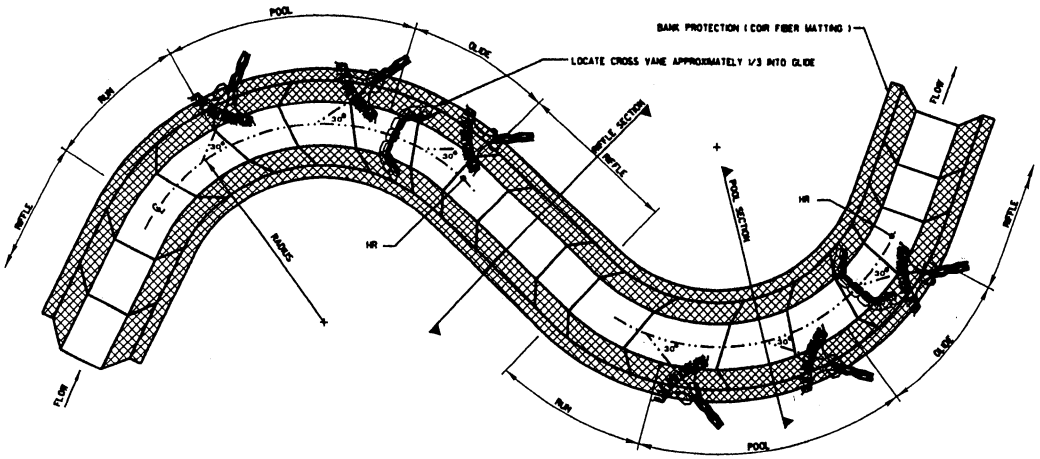
NOTE: ELEVATIONS IN ( ) ARE IN FEET.
ALL OTHER STATION AND ELEVATION
DATA ARE IN METERS.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

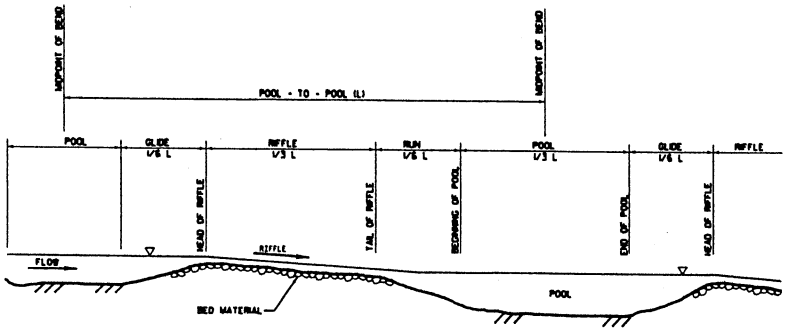
PROJECT: 8.1830501 (R-2206B)
NC-16 BYPASS

SHEET 33 OF 35 **10/10/03**



TYPICAL PLAN

NOT TO SCALE



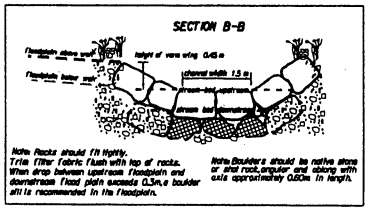
TYPICAL PROFILE

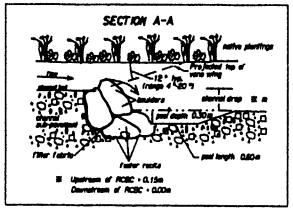
NOT TO SCALE

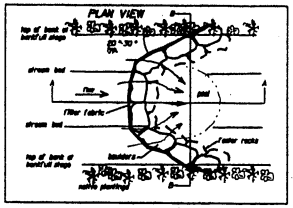
NOTES:

1. THE POOL TO POOL SPACING (L) SHALL BE MEASURED AS THE DISTANCE FROM THE MIDPOINT OF THE UPSTREAM BEND TO THE MIDPOINT OF THE DOWNSTREAM BEND.

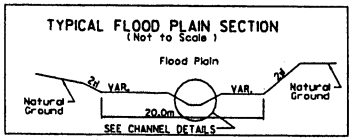
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS.

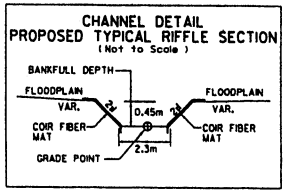


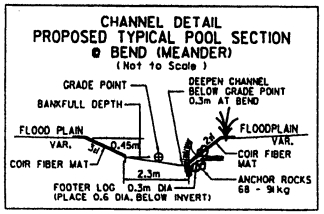




CROSS VANE ROCK WEIR DETAILS







NATURAL CHANNEL DESIGN TYPICALS

NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT WHICH SHALL CONSIST OF STAKING OUT THE CENTER OF EACH RADIUS, SCRIBING THE CENTER LINE OF THE CHANNEL FOR EACH BEND USING THE INDICATED RADIUS, AND SCRIBING CENTERLINE OF THE TANGENT SECTIONS BY CONNECTING SUCCESSIVE BENDS WITH STRAIGHT LINE. Ri= 9.0m+/- / 29.5 ft

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO AVOID CERTAIN OBSTACLES. APPROVAL BY THE ENGINEER OF THE STAKE-OUT ALIGNMENT SHALL BE REQUIRED PRIOR TO INITIATION OF THE CONSTRUCTION OF THE CHANNEL.

3. LOCATE ROCK VANES ACCORDING TO PLAN SHEET.

4. NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE.

5. ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE.

6. FOOTER LOG ANCHOR ROCK TO BE PLACED ON THE DOWNSTREAM END OF EACH FOOTER LOG SO THAT IT IS LEANING AGAINST THE LOG ON THE SIDE AWAY FROM THE CHANNEL.

7. WHEN BACKFILLING OVER AND AROUND FOOTER LOGS, ROOTWAD LOGS AND ANCHOR ROCKS FIRMLY SECURE ALL COMPONENTS INCLUDING JOINTS, CONNECTIONS AND GAPS.

8. PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH.

MORPHOLOGICAL MEASUREMENT TABLE

VARIABLES	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
1) STREAM TYPE	N/A - (2) Ponds	C5	N/A	C5
2) DRAINAGE AREA	1.00 km²/ 0.39 mi²	1.00 km²/ 0.39 mi²	-	1.00 km²/ 0.39 mi²
3) BANKFULL WIDTH	N/A	4.5m / 13.5 ft	-	4.45 m / 14.5 ft
4) BANKFULL MEAN WIDTH	-	0.35 m / 1.04 ft	-	0.32 m / 1.04 ft
5) WIDTH/ DEPTH RATIO	-	8.84	-	14.0
6) BANKFULL CROSS-SECTIONAL AREA	-	1.43 m²/ 8.34 ft²	-	1.45m²/ 8.2 ft²
7) BANKFULL MEAN VELOCITY	-	0.80 m/s / 2.64 ft/s	-	0.80 m/s / 2.64 ft/s
8) BANKFULL DISCHARGE	-	1.13 m³/s / 40.0 ft³/s	-	1.13 m³/s / 40.0 ft³/s
9) BANKFULL MAX.DEPTH	-	0.48 m / 1.56 ft	-	0.52 m / 1.68 ft
10) WIDTH OF FLOODPRONE AREA	-	21.7 m / 71.3 ft	-	54.0 m / 180 ft
11) ENTRENCHMENT RATIO	-	5.28	-	12.33
12) MEANDER LENGTH	-	20 m / 66 ft	-	20-26 m / 66-85 ft
13) RATIO OF MEANDER LENGTH TO BANKFULL WIDTH	-	3.04	-	2.80-3.82
14) RADIUS OF CURVATURE	-	9.0 m / 29.5 ft	-	8.0-12.0 m / 26.2-39.4 ft
15) RATIO OF RADIUS OF CURVATURE TO BANKFULL WIDTH	-	2.8	-	2.00-2.70
16) BELT WIDTH	-	6.5 m / 21.3 ft	-	8.0 m / 26.7 ft
17) MEANDER WIDTH RATIO	-	1.38	-	1.38
18) SINUOSITY (STREAM LENGTH/ VALLEY LENGTH)	-	1.05	-	1.05
19) VALLEY SLOPE	-	1.47%	-	0.20%
20) AVERAGE SLOPE	-	1.73%	-	0.23%
21) POOL SLOPE	-	0.00%	-	0.00%
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	-	0.00	-	0.00
23) MAXIMUM POOL DEPTH	-	0.48 m / 1.48 ft	-	0.54 m / 1.77 ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	-	1.30	-	1.70
25) POOL WIDTH	-	4.25 m / 13.94 ft	-	4.5 m / 14.76 ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	-	1.03	-	1.0
27) POOL TO POOL SPACING	-	8.0 m / 26.2 ft	-	4.0-8.0 m / 13.1-26.2 ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	-	1.94	-	0.80-1.70
29) RATIO OF LOWEST BAR HEIGHT TO BANKFUL HGT.@ MAX BANKFULL DEPTH	-	1.00	-	0.86

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

PROJECT: 34383.1.1 (R-2206C)
NC-16 BYPASS

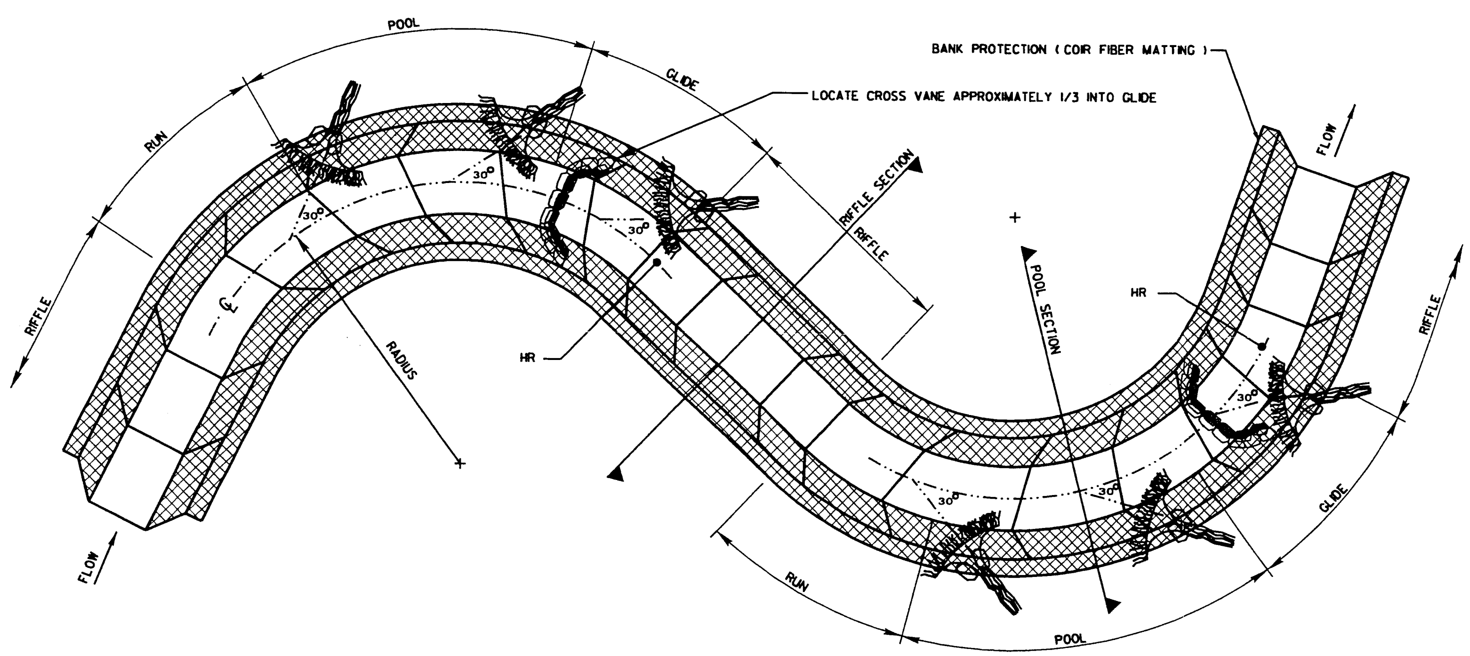
SHEET 34 OF 35

10/10/03

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	2
R/W SHEET NO. 35 of 35	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

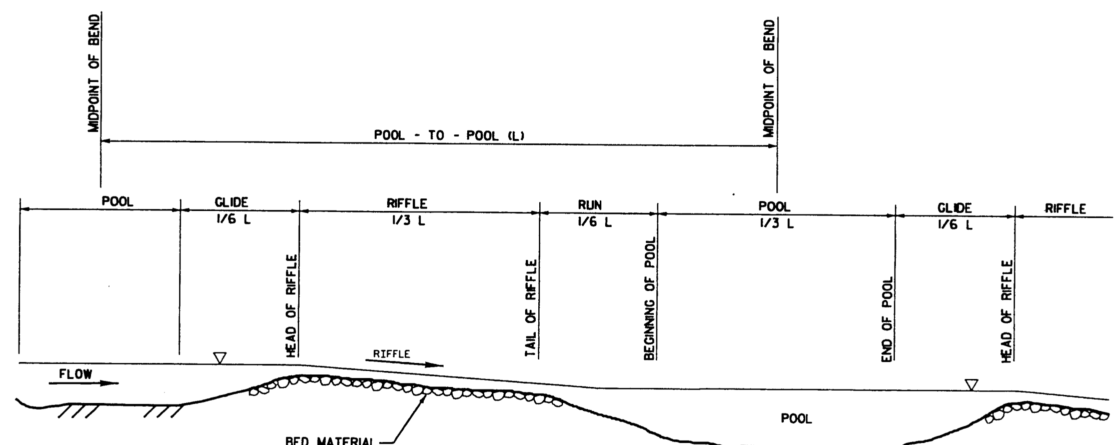
CONST. REV.

R/W REV.



TYPICAL PLAN

NOT TO SCALE



TYPICAL PROFILE

NOT TO SCALE

NOTES:

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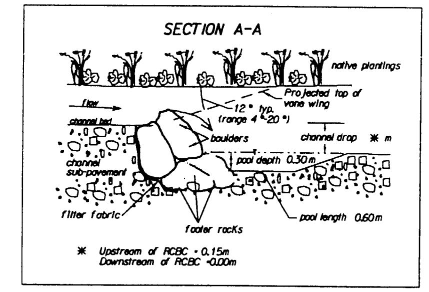
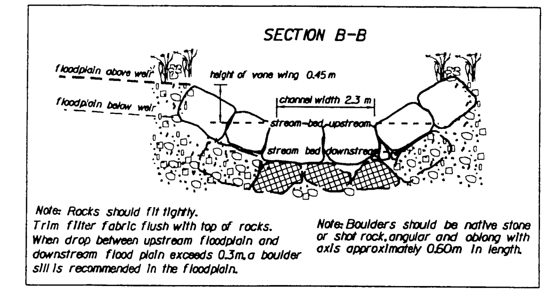
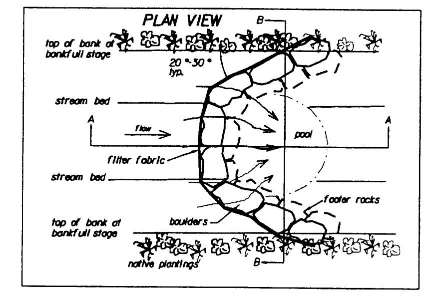
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS.







CROSS VANE ROCK WEIR DETAILS

NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT WHICH SHALL CONSIST OF STAKING OUT THE CENTER OF EACH RADIUS, SCRIBING THE CENTER LINE OF THE CHANNEL FOR EACH BEND USING THE INDICATED RADIUS, AND SCRIBING CENTERLINE OF THE TANGENT SECTIONS BY CONNECTING SUCCESSIVE BENDS WITH STRAIGHT LINE. Rl= 9.0m+/- / 29.5 ft

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO AVOID CERTAIN OBSTACLES. APPROVAL BY THE ENGINEER OF THE STAKE-OUT ALIGNMENT SHALL BE REQUIRED PROIR TO INITIATION OF THE CONSTRUCTION OF THE CHANNEL.

3. LOCATE ROCK VANES ACCORDING TO PLAN SHEET.

4. NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE.

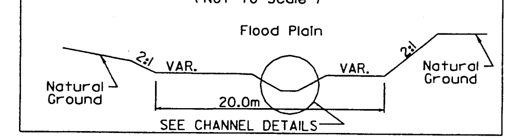
5. ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE.

6. FOOTER LOG ANCHOR ROCK TO BE PLACED ON THE DOWNSTREAM END OF EACH FOOTER LOG SO THAT IT IS LEANING AGAINST THE LOG ON THE SIDE AWAY FROM THE CHANNEL.

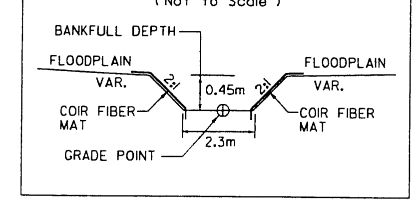
7. WHEN BACKFILLING OVER AND AROUND FOOTER LOGS, ROOTWAD LOGS AND ANCHOR ROCKS FIRMLY SECURE ALL COMPONENTS INCLUDING JOINTS, CONNECTIONS AND GAPS.

8. PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH.

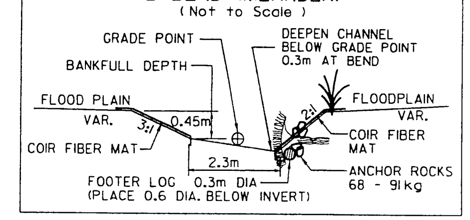
TYPICAL FLOOD PLAIN SECTION
(Not to Scale)



CHANNEL DETAIL
PROPOSED TYPICAL RIFFLE SECTION
(Not to Scale)



CHANNEL DETAIL
PROPOSED TYPICAL POOL SECTION
@ BEND (MEANDER)
(Not to Scale)



NATURAL CHANNEL DESIGN TYPICALS

MORPHOLOGICAL MEASUREMENT TABLE

VARIABLES	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
1) STREAM TYPE	N/A - (2) Ponds	C5	N/A	C5
2) DRAINAGE AREA	1.00 km^2 / 0.39 mi^2	1.00 km^2 / 0.39 mi^2	-	1.00 km^2 / 0.39 mi^2
3) BANKFULL WIDTH	N/A	4.11m / 13.5 ft	-	4.45 m / 14.6 ft
4) BANKFULL MEAN WIDTH	-	0.35 m / 1.14 ft	-	0.32 m / 1.04 ft
5) WIDTH / DEPTH RATIO	-	11.84	-	14.0
6) BANKFULL CROSS-SECTIONAL AREA	-	1.43 m^2 / 15.34 ft^2	-	1.41 m^2 / 15.2 ft^2
7) BANKFULL MEAN VELOCITY	-	0.80 m/s / 2.61 ft/s	-	0.80 m/s / 2.64 ft/s
8) BANKFULL DISCHARGE	-	1.13 m^3/s / 40.0 ft^3/s	-	1.13 m^3/s / 40.0 ft^3/s
9) BANKFULL MAX. DEPTH	-	0.45 m / 1.50 ft	-	0.52 m / 1.69 ft
10) WIDTH OF FLOODPRONE AREA	-	21.7 m / 71.3 ft	-	54.9 m / 180 ft
11) ENTRENCHMENT RATIO	-	5.28	-	12.33
12) MEANDER LENGTH	-	20 m / 41 ft	-	20-26 m / 41-85 ft
13) RATIO OF MEANDER LENGTH TO BANKFULL WIDTH	-	3.04	-	2.80-5.82
14) RADIUS OF CURVATURE	-	9.0 m / 29.5 ft	-	9.0-12.0 m / 29.5-39.4 ft
15) RATIO OF RADIUS OF CURVATURE TO BANKFULL WIDTH	-	2.19	-	2.02-2.70
16) BELT WIDTH	-	6.5 m / 21.3 ft	-	6.0 m / 19.7 ft
17) MEANDER WIDTH RATIO	-	1.58	-	1.35
18) SINUOSITY (STREAM LENGTH / VALLEY LENGTH	-	1.05	-	1.06
19) VALLEY SLOPE	-	1.87%	-	0.20%
20) AVERAGE SLOPE	-	1.73%	-	0.23%
21) POOL SLOPE	-	0.00%	-	0.00%
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	-	0.00	-	0.00
23) MAXUMUM POOL DEPTH	-	0.45 m / 1.48 ft	-	0.54 m / 1.77 ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	-	1.30	-	1.70
25) POOL WIDTH	-	4.25 m / 13.94 ft	-	4.5 m / 14.76 ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	-	1.03	-	1.01
27) POOL TO POOL SPACING	-	8.0 m / 26.2 ft	-	4.0-8.0 m / 13.1-26.2 ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	-	1.94	-	0.90-1.79
29) RATIO OF LOWEST Bak HEIGHT TO BANKFUL HGT. (or MAX BANKFULL DEPTH)	-	1.00	-	0.86

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 11/19/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 11B

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer feces 100 yards from channel
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-weak
		x	Stable Streambanks	-banks eroding
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-course sand, little bit of loam; different than bank
			Riparian Canopy Present (SP =/> 50% closure)	
x			Undercut Banks/Instream Habitat Structure	-has undercut banks
		x	Flow In Channel	-drought conditions
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
		x	Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	-weak
x			Wrack Material or Drift Lines	-weak
		x	Hydrophytic Vegetation in/adjacent to channel	-facutative to upland species; dogwood, holly, black cherry

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 14 acres

Determination:

____ Perennial Channel (stop) ____ Important Channel:_____LF

__x__ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/02/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 1C 182+30

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
x			Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	**Algae on rocks.**
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	**Feces at streambed.**
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	**It's O.K.**
		x	Stable Streambanks	**Undercut banks along stream bend.**
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	**Rock, course sand, silt, and gravel.**
x			Riparian Canopy Present (SP =/> 50% closure)	**Ironwood, beech, red maple.**
x			Undercut Banks/Instream Habitat Structure	**Undercut banks, lots of rocks**
x			Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	
x			Hydrophytic Vegetation in/adjacent to channel	**Some false nettle and clearweed , and ironwood**

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 70 acres

Determination:

____ Perennial Channel (stop)

__x_ Intermittent Channel (proceed)

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

____ Important Channel:_____LF

____ Unimportant Channel:_____LF

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/02/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 1C 183+00

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
x			Fish/Shellfish/Crustaceans Present	**-crayfish**
	x		Benthic Macro Invertebrates	**-stonefly, mayfly, caddisfly**
x			Amphibians Present/Breeding	**-small pickerel frogs readily visible**
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	**-deer, raccoon tracks**
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
x			Stable Streambanks	**-slight erosion**
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	**-cobble, gravel, sand, inriffles,over silt**
	x		Riparian Canopy Present (SP =/> 50% closure)	**-ironwood, red maple, tulip poplar**
x			Undercut Banks/Instream Habitat Structure	
	x		Flow In Channel	**- 2 - 3 ft, b + b, water ~ 3 in. deep, flowing**
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
	x		Adjacent Floodplain Present	
		x	Wrack Material or Drift Lines	
x			Hydrophytic Vegetation in/adjacent to channel	**-Microstegium, Boehmeria**

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~190 acres

Determination:

_x__	Perennial Channel (stop)	__x_	Important Channel:_____LF
____	Intermittent Channel (proceed)	____	Unimportant Channel:_____LF
____	Ephemeral Channel (no jd)		
____	Ditch Through Upland (no jd)		

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 1C 181+50

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
		x	Riffle/Pool Structure	
		x	Stable Streambanks	**Eroding**
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	**Cobble, gravel , sand , and silt; bank is loam**
	x		Riparian Canopy Present (SP =/> 50% closure)	**Maple, sourwood, ironwood, and tulip poplar**
		x	Undercut Banks/Instream Habitat Structure	
		x	Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	**Minimal seeps**
		x	Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	**Minimal flow patterns**
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** < 50 acres

Determination:

____	Perennial Channel	(stop)	____ Important Channel:_____LF
____	Intermittent Channel	(proceed)	__x__ Unimportant Channel:_____LF
__x__	Ephemeral Channel	(no jd)	
____	Ditch Through Upland	(no jd)	

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/01/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 2C 191+00

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	-fish in pools; crayfish holes
x			Benthic Macro Invertebrates	
x			Amphibians Present/Breeding	-frog
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
x			Stable Streambanks	-liverworts on banks
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-sand
	x		Riparian Canopy Present (SP =/> 50% closure)	-ironwood, white oak, red maple, beech, sourwood, and dogwood
	x		Undercut Banks/Instream Habitat Structure	-lots of undercut banks
	x		Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	
		x	Wrack Material or Drift Lines	

x			Hydrophytic Vegetation in/adjacent to channel	-Microstegium and ironwood

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 60 acres

Determination:

_x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/01/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 2C 191+40

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
x			Fish/Shellfish/Crustaceans Present	-fish present in pool; cray fish holes
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	-on rocks and some iron oxidizing bacteria tracks
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
x			Stable Streambanks	
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-downstream: silt sand , and cobble; upstream: silt, sand, and gravel
			Riparian Canopy Present (SP =/> 50% closure)	
x			Undercut Banks/Instream Habitat Structure	-some undercut banks
x			Flow In Channel	-rained about a week ago; very dry late summer, early fall
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
		x	Adjacent Floodplain Present	-too steep

x			Wrack Material or Drift Lines	
x			Hydrophytic Vegetation in/adjacent to channel	-Microstegium

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~15 acres

Determination:

_x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 11/19/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 3C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
x			Fish/Shellfish/Crustaceans Present	-crayfish
x			Benthic Macro Invertebrates	-either midge or caddisfly
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
		x	Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-weak
x			Stable Streambanks	
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-fine sand, weakly different than surrounding terrain
x			Riparian Canopy Present (SP =/> 50% closure)	-red, white, turkey oak; red maple, dogwood
			Undercut Banks/Instream Habitat Structure	
x			Flow In Channel	-weak
	x		Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	-it is the wetland
x			Wrack Material or Drift Lines	-weak

	x		Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 9 acres

Determination:

_x__ Perennial Channel (stop) _x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 4C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
		x	Riffle/Pool Structure	
x			Stable Streambanks	
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-weak channel
	x		Riparian Canopy Present (SP =/> 50% closure)	-tulip poplar, sweetgum, maple, and holly
x			Undercut Banks/Instream Habitat Structure	-weak structure
		x	Flow In Channel	
	x		Wetlands Adjacent To/Contig. With Channel (Discontinue)	- headwater wetland
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	- headwater wetland
		x	Adjacent Floodplain Present	
		x	Wrack Material or Drift Lines	
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 2 acres

Determination:

____	Perennial Channel	(stop)	___ Important Channel:_____LF
____	Intermittent Channel	(proceed)	__x__ Unimportant Channel:_____LF
__x__	Ephemeral Channel	(no jd)	
____	Ditch Through Upland	(no jd)	

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/02/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 6C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	-some algae
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer tracks
		x	Federally Protected Species Present (Discontinue)	
		x	Riffle/Pool Structure	
		x	Stable Streambanks	-some of sides collapsing
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-sand; different than bank
x			Riparian Canopy Present (SP =/> 50% closure)	-white oak, American hazelnut, sweetgum, red maple, beech
x			Undercut Banks/Instream Habitat Structure	-some undercut banks
		x	Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
		x	Seeps/Groundwater Discharge (June through Sept.)	
		x	Adjacent Floodplain Present	
	x		Wrack Material or Drift Lines	-lots of wrack lines
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 20 acres

Determination:

____	Perennial Channel	(stop)	____	Important Channel:_____LF
__x_	Intermittent Channel	(proceed)	__x__	Unimportant Channel:_____LF
____	Ephemeral Channel	(no jd)		
____	Ditch Through Upland	(no jd)		

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 11/19/03

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 7C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
x			Fish/Shellfish/Crustaceans Present	-one crayfish hole
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
	x		Wildlife Channel Use (i.e. tracks, feces, shells, others)	-den holes (probably groundhogs)
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-weak
			Stable Streambanks	
			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	
x			Riparian Canopy Present (SP =/> 50% closure)	-American holly, flowering dogwood, tulip poplar
x			Undercut Banks/Instream Habitat Structure	
		x	Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
		x	Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	-weak
x			Wrack Material or Drift Lines	-weak for wrack line
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** < 1 acre

Determination:

____ Perennial Channel (stop) ____ Important Channel:_____LF

____ Intermittent Channel (proceed) __x__ Unimportant Channel:_____LF

_x__ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/02/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) main channel (Site 9C 211+90)

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-iron oxiding
		x	Federally Protected Species Present (Discontinue)	
		x	Riffle/Pool Structure	
		x	Stable Streambanks	-incized, steeply channelized
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-sand only
x			Riparian Canopy Present (SP =/> 50% closure)	-beech, dogwood, ironwood, red maple
x			Undercut Banks/Instream Habitat Structure	
x			Flow In Channel	-minimal
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	-saturated bottom
x			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 20 acres

Determination:

____ Perennial Channel (stop)

_x__ Intermittent Channel (proceed)

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

____ Important Channel:_____LF

____ Unimportant Channel:_____LF

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/02/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 9C 212+00

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
x			Benthic Macro Invertebrates	
x			Amphibians Present/Breeding	-heard frog nearby
x			Algae And/Or Fungus (water quality function)	-algae on rocks
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer, raccoon tracks
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-very week
x			Stable Streambanks	-a little bank erosion
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-course sand, gravel; bank is loam
		x	Riparian Canopy Present (SP =/> 50% closure)	-beech, sweet gum, tulip poplar
x			Undercut Banks/Instream Habitat Structure	-very undercut banks
x			Flow In Channel	-kind of weak
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	
		x	Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	- a little bit of wrack mat
		x	Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 20 acres

Determination:

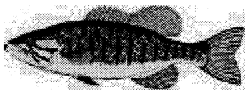
__x__	Perennial Channel (stop)	__x__	Important Channel:_____LF
____	Intermittent Channel (proceed)	____	Unimportant Channel:_____LF
____	Ephemeral Channel (no jd)		
____	Ditch Through Upland (no jd)		

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98



INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 11/19/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 11C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer sign
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-weak
x			Stable Streambanks	
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-sand, clay
x			Riparian Canopy Present (SP =/> 50% closure)	
x			Undercut Banks/Instream Habitat Structure	-weak
		x	Flow In Channel	
			Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	-weak
x			Wrack Material or Drift Lines	-really weak
x			Hydrophytic Vegetation in/adjacent to channel	-tag alder, Juncus

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **Y / (N)** **Approx. Drainage Area:** ~ 7 acres

Determination:

____	Perennial Channel	(stop)	____ Important Channel:_____LF
____	Intermittent Channel	(proceed)	__x__ Unimportant Channel:_____LF
__x__	Ephemeral Channel	(no jd)	
____	Ditch Through Upland	(no jd)	

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 12C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	-lots of fish; dead crayfish
x			Benthic Macro Invertebrates	-weak
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer, raccoon tracks
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
		x	Stable Streambanks	-incised; banks falling in
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-sand, silt, rock
	x		Riparian Canopy Present (SP =/> 50% closure)	-red maple, sweet gum, river birch
	x		Undercut Banks/Instream Habitat Structure	-rocks, undercut banks
	x		Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	
		x	Seeps/Groundwater Discharge (June through Sept.)	
	x		Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	-along riffle areas
	x		Hydrophytic Vegetation in/adjacent to channel	-microstegium, false nettle, river birch, jewel weed

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 500 acres

Determination:

__x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

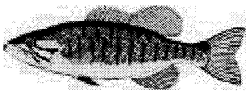
____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98



INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 13 C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Catawba Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
x			Fish/Shellfish/Crustaceans Present	-crayfish, snails
			Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
x			Algae And/Or Fungus (water quality function)	-algae on rocks
	x		Wildlife Channel Use (i.e. tracks, feces, shells, others)	-deer and raccoon tracks, black snake
		x	Federally Protected Species Present (Discontinue)	
	x		Riffle/Pool Structure	-small falls and pools
x			Stable Streambanks	-not likely in future due to recent logging
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-gravel, sand, and cobble; loamy banks
		x	Riparian Canopy Present (SP =/> 50% closure)	- recent logging; ~50 ft buffer
	x		Undercut Banks/Instream Habitat Structure	
	x		Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	-good fow after a dry September
x			Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	
	x		Wrack Material or Drift Lines	
x			Hydrophytic Vegetation in/adjacent to channel	

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 160 acres

Determination:

__x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 14C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Lincoln Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	-crayfish holes and snails
	x		Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-raccoon tracks
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-very weak
		x	Stable Streambanks	-lots of silt in stream bed; incised; very undercut banks
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-coarse sand, gravel, silt; upland is sandy loam
x			Riparian Canopy Present (SP =/> 50% closure)	-sweet gum, Americam holly, dogwood, and red maple
			Undercut Banks/Instream Habitat Structure	
x			Flow In Channel	
	x		Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	
	x		Seeps/Groundwater Discharge (June through Sept.)	-from adjoining wetlands
x			Adjacent Floodplain Present	-incised, but relic floodplain present
x			Wrack Material or Drift Lines	
	x		Hydrophytic Vegetation in/adjacent to channel	-cinnamon fern; wetland adjoins channel

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 16 acres

Determination:

__x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 11/20/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 15C 267+35

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Catawba Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
		x	Algae And/Or Fungus (water quality function)	
		x	Wildlife Channel Use (i.e. tracks, feces, shells, others)	
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
x			Stable Streambanks	
x			Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-weakly different than surrounding terrain; sand, clay , loam
x			Riparian Canopy Present (SP =/> 50% closure)	-white oak, southern red oak, sweet gum, and red maple
x			Undercut Banks/Instream Habitat Structure	- has some undercut banks
		x	Flow In Channel	- never seen flow in three visits since 1999
x			Wetlands Adjacent To/Contig. With Channel (Discontinue)	
		x	Persistent Pools/Saturated Bottom(June through Sept.)	
		x	Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	-weak
x			Wrack Material or Drift Lines	-has wrack material
x			Hydrophytic Vegetation in/adjacent to channel	-giant cane

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 4 acres

Determination:

____ Perennial Channel (stop) ____ Important Channel:_____LF

__x__ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 15C 268+60

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Catawba Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	-snails and crayfish
	x		Benthic Macro Invertebrates	
	x		Amphibians Present/Breeding	-looks like salamanders
x			Algae And/Or Fungus (water quality function)	-mushrooms
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-raccoon
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	
x			Stable Streambanks	
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-silt, sand, rock, and gravel
	x		Riparian Canopy Present (SP =/> 50% closure)	-red maple, ironwood, tulip poplar, holly, green ash, white oak, and rock chestnut oak
	x		Undercut Banks/Instream Habitat Structure	-no undercut banks; lots of rocks and downed logs in stream
	x		Flow In Channel	
	x		Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	
	x		Seeps/Groundwater Discharge (June through Sept.)	-from wetland
x			Adjacent Floodplain Present	
	x		Wrack Material or Drift Lines	

	x		Hydrophytic Vegetation in/adjacent to channel	-wetland adjoining stream; ironwood , Carex sp., royal and sensitive fern

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 19 acres

Determination:

__x__ Perennial Channel (stop) __x__ Important Channel:_____LF

____ Intermittent Channel (proceed) ____ Unimportant Channel:_____LF

____ Ephemeral Channel (no jd)

____ Ditch Through Upland (no jd)

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 16C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Catawba Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
		x	Fish/Shellfish/Crustaceans Present	
		x	Benthic Macro Invertebrates	
		x	Amphibians Present/Breeding	
	x		Algae And/Or Fungus (water quality function)	-lots of algae; non-point source pollution problem
x			Wildlife Channel Use (i.e. tracks, feces, shells, others)	-frog
		x	Federally Protected Species Present (Discontinue)	
		x	Riffle/Pool Structure	
		x	Stable Streambanks	-modified stream by DOT
		x	Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-clay, coarse sand, gravel; same as pond bank
		x	Riparian Canopy Present (SP =/> 50% closure)	-non-existant
		x	Undercut Banks/Instream Habitat Structure	
x			Flow In Channel	
x			Wetlands Adjacent To/Contig. With Channel (Discontinue)	
x			Persistent Pools/Saturated Bottom(June through Sept.)	
x			Seeps/Groundwater Discharge (June through Sept.)	-from wetland
		x	Adjacent Floodplain Present	
x			Wrack Material or Drift Lines	-wrack material
x			Hydrophytic Vegetation in/adjacent to channel	-from wetland

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 1.5 acres

Determination:

_x_	Perennial Channel (stop)	_x_	Important Channel:_____LF
____	Intermittent Channel (proceed)	____	Unimportant Channel:_____LF
____	Ephemeral Channel (no jd)		
____	Ditch Through Upland (no jd)		

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

INTERMITTENT CHANNEL EVALUATION FORM

ACTION ID NC16 Bypass T.I.P. Project No. R-2206C **APPLICANT NAME** NCDOT **DATE** 10/03/01

PROPOSED CHANNEL WORK (i.e., culvert, relocation, etc.) Site 17 C

WATERBODY/RIVER BASIN Catawba **COUNTY/CITY** Catawba Co.

RECENT WEATHER CONDITIONS Drought

P	SP	NP	Observation	Comments or Description
	x		Fish/Shellfish/Crustaceans Present	-crayfish, fish
x			Benthic Macro Invertebrates	-weak, few
		x	Amphibians Present/Breeding	
	x		Algae And/Or Fungus (water quality function)	-heavy algae
		x	Wildlife Channel Use (i.e. tracks, feces, shells, others)	-residential/pasture lands
		x	Federally Protected Species Present (Discontinue)	
x			Riffle/Pool Structure	-weak, channel straightened
x			Stable Streambanks	
	x		Channel Substrate(i.e. gravel, cobble, rock, coarse sand)	-coarse sand, gravel, bedrock
		x	Riparian Canopy Present (SP =/> 50% closure)	-residential lawn/pasture
x			Undercut Banks/Instream Habitat Structure	
	x		Flow In Channel	
		x	Wetlands Adjacent To/Contig. With Channel (Discontinue)	
	x		Persistent Pools/Saturated Bottom(June through Sept.)	
	x		Seeps/Groundwater Discharge (June through Sept.)	
x			Adjacent Floodplain Present	
	x		Wrack Material or Drift Lines	-drift material accumulation
	x		Hydrophytic Vegetation in/adjacent to channel	-microstegium, *Carex* sp., *Polygonum* sp.

Important To Domestic Water Supply? **Y / (N)**

Does Channel Appear On A Quad Or Soils Map? **(Y) / N** **Approx. Drainage Area:** ~ 180 acres

Determination:

_x_	Perennial Channel (stop)	_x_	Important Channel:_____LF
____	Intermittent Channel (proceed)	____	Unimportant Channel:_____LF
____	Ephemeral Channel (no jd)		
____	Ditch Through Upland (no jd)		

Project MGR. Initials _____

Evaluator's Signature : _____

(if other than C.O.E. project manager)

P=Present SP=Stongly Present NP=Not Present 11/4/98

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 11B* Nearest Named Stream: *Killian Creek* Latitude: 35°30'46.88"N Signature:

Date: *11/19/01* USGS QUAD: *Denver* Longitude: 81°01'9.19"W

Location/Directions: Take NC16 south to Egypt Road. Go south for 1.2 miles. 0.4 miles east is the location of the site.

PLEASE NOTE: ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used****

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	0	1	2	**(3)**
4) Is The Channel Sinuous?	**(0)**	1	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	(0)	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	1	(2)	3
9) Is A Continuous Bed & Bank Present?	0	1	2	**(3)**

*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*

10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present? ***Yes***=3 ***No***= **(0)**

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **12**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **5**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	**(1)**	1.5
2) Is There A Grade Control Point In Channel?	0	.5	(1)	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1. 5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	**(0)**	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5

6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)? ***Yes=1.5*** ***No***= **(0)**

SECONDARY HYDROLOGY INDICATOR POINTS: **.5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1.5)**
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	.5	0	**(0)**

SECONDARY BIOLOGY INDICATOR POINTS: **1. 5**

TOTAL POINTS *(Primary + Secondary)*= **22.5** *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *1C-181+50* Nearest Named Stream: *Killian Creek* Latitude: 35°31'9.02"N Signature:

Date: *10/02/01* USGS QUAD: *Denver* Longitude: 81°01'54.13"W

Location/Directions: Take NC16 south to Egypt Road. Go south for 0.6 miles. 0.4 miles west is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	**(0)**	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	**(0)**	1	2	3
5) Is There An Active (Or Relic) Floodplain Present?	**(0)**	1	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	**(1)**	2	3
8) Is There A Bankfull Bench Present?	**(0)**	1	2	3
9) Is A Continuous Bed & Bank Present?	**(0)**	1	2	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **3**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	2	**(1)**	0
2) Are Rooted Plants Present In Streambed?	3	2	**(1)**	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **2**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	**(.5)**	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	0	**(.5)**	1	1.5
3) Are Wrack Lines Present?	0	**(.5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	**(0)**	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=*1.5*		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(.5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **.5**

TOTAL POINTS** (Primary + Secondary)=* **10.5** ***If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *1C-182+30* Nearest Named Stream: *Killian Creek* Latitude: 35°31'8.65"N Signature:

Date: *10/02/01* USGS QUAD: *Denver* Longitude: 81°01'54.13"W

Location/Directions: Take NC16 south to Egypt Road. Go south for 0.6 miles. 0.4 miles west is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used* *

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	**(2)**	3
5) Is There An Active (Or Relic) Floodplain Present?	0	1	**(2)**	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	**(1)**	2	3
8) Is There A Bankfull Bench Present?	0	1	2	**(3)**
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	1	2	**(3)**
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***=0	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **15**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **5**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	(0)	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1. 5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(. 5)**	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	**(1)**	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	**(1)**	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=*1.5*		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **4. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	0	.5	1	**(1.5)**
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	0	.5	**(1)**	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
	2	1	**(.7 5)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3.25**

TOTAL POINTS ***(Primary + Secondary)***= **31.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *1C-183+00* Nearest Named Stream: *Killian Creek* Latitude: 35°31'2.94"N Signature:

Date: *10/02/01* USGS QUAD: *Denver* Longitude: 81°01'51.66"W

Location/Directions: Take NC16 south to Egypt Road. Go south for 0.6 miles. 0.4 miles west is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	2	**(3)**
3) Are Natural Levees Present?	0	**(1)**	2	3
4) Is The Channel Sinuous?	0	1	2	**(3)**
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	**(1)**	2	3
8) Is There A Bankfull Bench Present?	0	1	**(2)**	3
9) Is A Continuous Bed & Bank Present?	0	1	2	**(3)**
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: 16

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: 1

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	0	**(1)**	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: 6

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	**(. 5)**	1	1.5
2) Is There A Grade Control Point In Channel?	0	**(. 5)**	1	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: 2.5

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(.5)**	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes= (1.5)***		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: 7

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	**(.5)**	1	1.5
2) Are Amphibians Present?	0	.5	**(1)**	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1.5)**
5) Are Macrobenthos Present?	0	.5	1	**(1.5)**
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	**(1)**	1.5
7) Is Filamentous Algae Present?	0	**(.5)**	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: 6.75

TOTAL POINTS ***(Primary + Secondary)***= 39.25 ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 2C-191+00* Nearest Named Stream: *Killian Creek* Latitude: 35°31'21.70"N Signature:

Date: *10/01/01* USGS QUAD: *Denver* Longitude: 81°02'.91"W

Location/Directions: Take NC16 south to Denver Road. Go southwest for 0.6 miles. 0.3 miles south is the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	0	**(1)**	2	3
4) Is The Channel Sinuous?	0	1	2	**(3)**
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	1	**(2)**	3
9) Is A Continuous Bed & Bank Present?	0	1	2	**(3)**
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes*= (3)**		***No*=0**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: 17

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: 1

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	2	**(1)**	0
3) Is Periphyton Present?	0	1	**(2)**	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: 6

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	**(.5)**	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: 3.5

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	**(. 5)**	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(. 5)**	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1. 5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes*=1.5**		***No*= (0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: _____

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	.5	1	(1.5)
2) Are Amphibians Present?	0	.5	1	(1.5)
3) Are AquaticTurtles Present?	0	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	(1.5)
5) Are Macrobenthos Present?	0	.5	1	(1.5)
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	(.5)	1	1.5
7) Is Filamentous Algae Present?	(0)	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	(1)	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: 7. 5

***TOTAL POINTS** (Primary + Secondary)*= 40 *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 2C-191+40* Nearest Named Stream: *Killian Creek* Latitude: 35°31'20.83"N Signature:

Date: *10/01/01* USGS QUAD: *Denver* Longitude: 81°02'24.24"W

Location/Directions: Take NC16 south to Denver Road. Go southwest on Denver Road for 0.6 miles. 0.3 miles south is the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	2	**(3)**
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	2	**(3)**

*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*

10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present? ***Yes***=3 ***No***= **(0)**

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **11**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	**(2)**	3

PRIMARY HYDROLOGY INDICATOR POINTS: **2**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	**(2)**	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	0	1	**(2)**	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **6**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	**(1)**	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **4**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	**(. 5)**	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(. 5)**	1	1.5
3) Are Wrack Lines Present?	0	.5	1	**(1.5)**
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**

6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)? ***Yes= (1.5)*** ***No***=0

SECONDARY HYDROLOGY INDICATOR POINTS: **5. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	.5	**(1)**	1.5
2) Are Amphibians Present?	0	**(. 5)**	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	**(1)**	1.5
5) Are Macrobenthos Present?	0	**(. 5)**	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	**(1)**	1.5
7) Is Filamentous Algae Present?	0	**(. 5)**	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **5**

TOTAL POINTS ***(Primary + Secondary)*** **= 31.5** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 3C* Nearest Named Stream: *Killian Creek* Latitude: 35°31'29.78"N Signature:

Date: *10/01/01* USGS QUAD: *Denver* Longitude: 81°02'35.74"W

Location/Directions: Take NC16 south to Denver Road. The site is located 1 mile south down Denver road.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	**(1)**	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	**(1)**	2	3
5) Is There An Active (Or Relic) Floodplain Present?	**(0)**	1	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	**(0)**	1	2	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= (0)	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **4**

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Groundwater Flow/Discharge Present?	0	1	2	**(3)**

PRIMARY HYDROLOGY INDICATOR POINTS: **3**

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **5**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Head Cut Present In Channel?	0	.5	(1)	1.5
2) Is There A Grade Control Point In Channel?	0	.5	(1)	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	(1.5)

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3. 5**

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	**(. 5)**	0
2) Is Sediment On Plants (Or Debris) Present?	0	.5	(1)	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1. 5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	**(1)**	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes= (1.5)***		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: **6. 5**

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	(0)	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1. 5)**
5) Are Macrobenthos Present?	0	.5	**(1)**	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	**(. 5)**	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3.75**

TOTAL POINTS ***(Primary + Secondary)*** **= 26.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 4C* Nearest Named Stream: *Killian Creek* Latitude: 35°31'28.78"N Signature:

Date: 10/03/01 USGS QUAD: *Denver* Longitude: 81°02'39.37"W

Location/Directions: Take NC16 south to Denver Road. Go south for 1 mile. 500 feet west is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	**(0)**	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	**(1)**	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	**(1)**	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	**(0)**	1	2	3
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	**(1)**	2	3
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **4**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	**(2)**	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **4**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	1	**(1.5)**
2) Is There A Grade Control Point In Channel?	0	.5	**(1)**	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	**(. 5)**	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes= (1.5)***		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: **2. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
	2	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **. 5**

TOTAL POINTS ***(Primary + Secondary)*** **= 15.5** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 6C* Nearest Named Stream: *Killian Creek* Latitude: 35°31'41.58N Signature:

Date: *10/02/01* USGS QUAD: *Denver* Longitude: 81°03'6.75"W

Location/Directions: Take NC16 south and take a right onto Pumpkin Center Road. Go for 0.6 miles to Killian Creek. 0.5 miles south is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	**(0)**	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	2	**(3)**
5) Is There An Active (Or Relic) Floodplain Present?	0	1	**(2)**	3
6) Is The Channel Braided?	0	**(1)**	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	**(2)**	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= ***(0)***	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **11**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	**(2)**	1	0
2) Are Rooted Plants Present In Streambed?	3	2	**(1)**	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **3**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	1	**(1.5)**
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **4. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	(0)
2) Is Sediment On Plants (Or Debris) Present?	0	(. 5)	1	1.5
3) Are Wrack Lines Present?	0	.5	(1)	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	(0)	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	(0)	.5	1	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=*1.5*		***No***= (0)	

SECONDARY HYDROLOGY INDICATOR POINTS: **1. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	(0)	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	0	**(. 5)**	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **1**

TOTAL POINTS ***(Primary + Secondary)*** **= 21** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 7C* Nearest Named Stream: *Killian Creek* Latitude: 35°31'48.17"N Signature:

Date: *11/19/01* USGS QUAD: *Denver* Longitude: 81°02'12.80"W

Location/Directions: Take NC16 south and take a right onto Pumpkin Center Road. Go for 0.6 miles and the site is located 0.4 miles south.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	**(0)**	1	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	**(2)**	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	**(2)**	3

*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*

10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present? ***Yes***=3 ***No***= **(0)**

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **7**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	**(2)**	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **4**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	1	**(1.5)**
2) Is There A Grade Control Point In Channel?	0	.5	**(1)**	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **4**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	**(0)**	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5

6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)? ***Yes***=*1.5* ***No***= **(0)**

SECONDARY HYDROLOGY INDICATOR POINTS: **. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	**(. 5)**	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **1**

TOTAL POINTS ***(Primary + Secondary)*** **= 16.5** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 9C-211+90* Nearest Named Stream: *Killian Creek* Latitude: 35°31'1.58"N Signature:

Date: 10/02/01 USGS QUAD: *Denver* Longitude: 81°03'26.87"W

Location/Directions: Head south on NC16 and turn right onto Pumpkin Center Road. Turn left onto Tuckers Campground Road and go 0.2 miles. The location of the site is 0.2 miles east.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	**(0)**	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	**(2)**	3
5) Is There An Active (Or Relic) Floodplain Present?	**(0)**	1	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	**(1)**	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	**(2)**	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **8**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	**(1)**	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	**(3)**	2	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **6**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	**(1)**	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **2**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	**(. 5)**	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(. 5)**	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	**(1)**	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	**(1)**	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=1.5		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **3. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	**(1)**	1.5
5) Are Macrobenthos Present?	0	**(. 5)**	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	1	**(1.5)**
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **2. 5**

TOTAL POINTS ***(Primary + Secondary)*** **= 23** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 9C-212+00* Nearest Named Stream: *Killian Creek* Latitude:35°31'1.58"N Signature:

Date: *10/02/01* USGS QUAD: *Denver* Longitude: 81°03'26.87"W

Location/Directions: Head south on NC16 and turn right onto Pumpkin Center Road. Turn left onto Tuckers Campground Road and go 0.2 miles. The location of the site is 0.2 miles east.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	**(2)**	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	**(2)**	3
5) Is There An Active (Or Relic) Floodplain Present?	**(0)**	1	2	3
6) Is The Channel Braided?	(0)	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	1	**(2)**	3
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	1	2	**(3)**
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **10**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	2	**(3)**

PRIMARY HYDROLOGY INDICATOR POINTS: **3**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	**(3)**	2	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **6**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	1	**(1.5)**
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **4. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	**(1)**	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	**(1)**	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=*1.5*		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **2. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	0	.5	**(1)**	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	0	.5	**(1)**	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	0	.5	**(1)**	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
	2	1	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3**

TOTAL POINTS ***(Primary + Secondary)*** **= 29** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 11C* Nearest Named Stream: *Killian Creek* Latitude: 35°32'23.91"N Signature:

Date: *11/19/01* USGS QUAD: *Denver* Longitude: 81°03'50.69"W

Location/Directions: Take NC16 south to Pumpkin Center Road. Go west for 1.1 miles. 0.2 miles north is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	**(1)**	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	1	**(2)**	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	0	**(1)**	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	**(1)**	2	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **8**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	(2)	1	0
2) Are Rooted Plants Present In Streambed?	3	(2)	1	0
3) Is Periphyton Present?	(0)	1	2	3
4) Are Bivalves Present?	(0)	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **4**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	1	**(1. 5)**
2) Is There A Grade Control Point In Channel?	0	**(. 5)**	1	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1. 5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3.5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	**(. 5)**	1	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	**(0)**	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes=1.5***		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **. 5**

TOTAL POINTS *(Primary + Secondary)*= **16.5** *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Lincoln* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 12C* Nearest Named Stream: *Killian Creek* Latitude: 35°32'28.39"N Signature:

Date: *10/03/01* USGS QUAD: *Denver* Longitude: 81°03'56.89"W

Location/Directions: Take NC16 south to Pumpkin Center Road. Turn right on Mount Vernon Church Road and go 0.3 miles. 0.4 miles east is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	2	**(3)**
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	**(1)**	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	1	2	**(3)**
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	1	2	**(3)**
8) Is There A Bankfull Bench Present?	0	1	2	**(3)**
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	1	2	**(3)**
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes*= (3)**		***No*=0**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **21**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	**(3)**	2	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **6**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **3**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	**(1.5)**	1	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(.5)**	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes*=1.5**		***No*= (0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **6**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	.5	1	**(1.5)**
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	**(1)**	1.5
5) Are Macrobenthos Present?	0	**(.5)**	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
	2	1	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3**

TOTAL POINTS (*Primary + Secondary*)= **39** *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Catawba* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 14C* Nearest Named Stream: *Reed Creek* Latitude: 35°34'27.21"N Signature:

Date: *10/03/01* USGS QUAD: *Denver* Longitude: 81°04'26.38"W

Location/Directions: Take NC16 south to Mt. Beulah Road. 0.2 miles west is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	2	**(3)**
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	**(1)**	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	1	**(2)**	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	1	2	**(3)**
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	1	2	**(3)**
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **14**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	**(2)**	3

PRIMARY HYDROLOGY INDICATOR POINTS: **2**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	0	1	**(2)**	3

PRIMARY BIOLOGY INDICATOR POINTS: **7**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	**(0)**	.5	1	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **1**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	.5	**(1)**	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes= (1.5)***		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: **6. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1.5)**
5) Are Macrobenthos Present?	0	.5	1	**(1.5)**
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
	2	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3.75**

TOTAL POINTS ***(Primary + Secondary)*** **= 34.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Catawba* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 15C-267+35* Nearest Named Stream: *Reed Creek* Latitude: 35°34'42.87"N Signature:

Date: *11/20/01* USGS QUAD: *Denver* Longitude: 81°04'31.52W

Location/Directions: Take NC16 south to the first road past Jones Lake on the right. 0.1 miles south of that intersection is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	**(1)**	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	0	**(1)**	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	2	**(3)**
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **9**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	**(0)**	1	2	3

PRIMARY HYDROLOGY INDICATOR POINTS: **0**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	3	**(2)**	1	0
2) Are Rooted Plants Present In Streambed?	3	**(2)**	1	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **4**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **2. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	1	.5	**(0)**
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	**(0)**	.5	1	1.5
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	**(0)**	.5	1	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***=*1.5*		***No***= **(0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **1**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	**(0)**	.5	1	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	.75	**(. 5)**	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **. 5**

TOTAL POINTS ***(Primary + Secondary)*** **= 17.0** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Catawba* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 15C-268+60* Nearest Named Stream: *Reed Creek* Latitude: 35°34'39.27"N Signature:

Date: *10/03/01* USGS QUAD: *Denver* Longitude: 81°04"33.04"W

Location/Directions: Take NC16 south to the first road past Jones Lake on the right. 0.1 miles south of that intersection is the location of the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	1	**(2)**	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	2	**(3)**
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	**(0)**	1	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	1	2	**(3)**
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	**(0)**	1	2	3
8) Is There A Bankfull Bench Present?	0	1	**(2)**	3
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*	0	1	2	**(3)**
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **13**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	2	**(3)**

PRIMARY HYDROLOGY INDICATOR POINTS: **3**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	2	**(1)**	0
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	0	1	2	**(3)**

PRIMARY BIOLOGY INDICATOR POINTS: **7**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	0	.5	**(1)**	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	**(1.5)**

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **4**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	**(0)**	.5	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes***= **(1. 5)**		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: **6. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	0	.5	1	**(1.5)**
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1.5)**
5) Are Macrobenthos Present?	0	.5	1	**(1.5)**
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	**(1)**	1.5
7) Is Filamentous Algae Present?	**(0)**	.5	1	1.5

8) Are Wetland Plants In Streambed? *(* **NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
	2	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **6.25**

TOTAL POINTS ***(Primary + Secondary)*** **= 39.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Catawba* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 16C* Nearest Named Stream: *Reed Creek* Latitude: 35°34'48.76"N Signature:

Date: *10/03/01* USGS QUAD: *Denver* Longitude: 81°04'39.18"W

Location/Directions: Take NC16 south to Jones Lake. About 250 feet east of the lake is the site.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	**(0)**	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	**(0)**	1	2	3
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	**(0)**	1	2	3
5) Is There An Active (Or Relic) Floodplain Present?	**(0)**	1	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	1	**(2)**	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	**(0)**	1	2	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes***=3		***No***= **(0)**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **3**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	2	**(3)**

PRIMARY HYDROLOGY INDICATOR POINTS: **3**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	2	1	**(0)**
3) Is Periphyton Present?	**(0)**	1	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **3**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	1	**(1.5)**
3) Does Topography Indicate A Natural Drainage Way?	**(0)**	.5	1	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **1. 5**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	.5	1	**(1.5)**
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes= (1.5)***		***No***=0	

SECONDARY HYDROLOGY INDICATOR POINTS: **8**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	**(0)**	.5	1	1.5
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	**(0)**	.5	1	1.5
5) Are Macrobenthos Present?	**(0)**	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	1	**(1.5)**
7) Is Filamentous Algae Present?	0	.5	1	**(1.5)**

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **3.75**

TOTAL POINTS **(*Primary + Secondary*)= 22.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

NCDWQ Stream Classification Form

Project Name: *NC16 Bypass* River Basin: *Catawba* County: *Catawba* Evaluator: *Jay Bassette*

DWQ Project Number: *Site 17C* Nearest Named Stream: *Killian Creek* Latitude: 35°33'14.69"N Signature:

Date: *10/03/01* USGS QUAD: *Denver* Longitude: 81°04'17.51"W

Location/Directions: Take NC16 south to NC150. Turn right and the location of the site is about 0.5 miles down on the right.

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgement of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Riffle-Pool Sequence?	0	**(1)**	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	1	2	**(3)**
3) Are Natural Levees Present?	**(0)**	1	2	3
4) Is The Channel Sinuous?	**(0)**	1	2	3
5) Is There An Active (Or Relic) Floodplain Present?	0	**(1)**	2	3
6) Is The Channel Braided?	**(0)**	1	2	3
7) Are Recent Alluvial Deposits Present?	0	**(1)**	2	3
8) Is There A Bankfull Bench Present?	0	**(1)**	2	3
9) Is A Continuous Bed & Bank Present?	0	1	**(2)**	3
*(*NOTE: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map ***And/Or*** In Field) Present?	***Yes*= (3)**		***No*=0**	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: **12**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	**(2)**	3

PRIMARY HYDROLOGY INDICATOR POINTS: **2**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fibrous Roots Present In Streambed?	**(3)**	2	1	0
2) Are Rooted Plants Present In Streambed?	3	2	**(1)**	0
3) Is Periphyton Present?	0	**(1)**	2	3
4) Are Bivalves Present?	**(0)**	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: **5**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	Absent	Weak	Moderate	Strong
1) Is There A Head Cut Present In Channel?	**(0)**	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	**(1)**	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	**(1)**	1.5

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: **2**

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaflitter Present In Streambed?	1.5	**(1)**	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	**(. 5)**	1	1.5
3) Are Wrack Lines Present?	0	.5	**(1)**	1.5
4) Is Water In Channel ***And*** >48 Hrs. Since Last ***Known*** Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	1	**(1.5)**
5) Is There Water In Channel During Dry Conditions ***Or*** In Growing Season)?	0	.5	1	**(1.5)**
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	***Yes*=1.5**		***No*= (0)**	

SECONDARY HYDROLOGY INDICATOR POINTS: **5. 5**

III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	.5	1	**(1.5)**
2) Are Amphibians Present?	**(0)**	.5	1	1.5
3) Are AquaticTurtles Present?	**(0)**	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	**(1.5)**
5) Are Macrobenthos Present?	0	**(. 5)**	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	**(. 5)**	1	1.5
7) Is Filamentous Algae Present?	0	.5	**(1)**	1.5

8) Are Wetland Plants In Streambed?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	*2*	1	**(.75)**	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: **5.75**

TOTAL POINTS ***(Primary + Secondary)*** **= 32.25** ***(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)***

R–2206B

PROJECT: 8.1830501

VICINITY MAP

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

LINCOLN COUNTY

LOCATION: NC 16 BYPASS FROM NORTH OF NC 73 TO NORTH OF SR 1386 (ST. JAMES CHURCH ROAD)

TYPE OF WORK: GRADING, DRAINAGE, STRUCTURES, AND 'Y' LINE PAVING

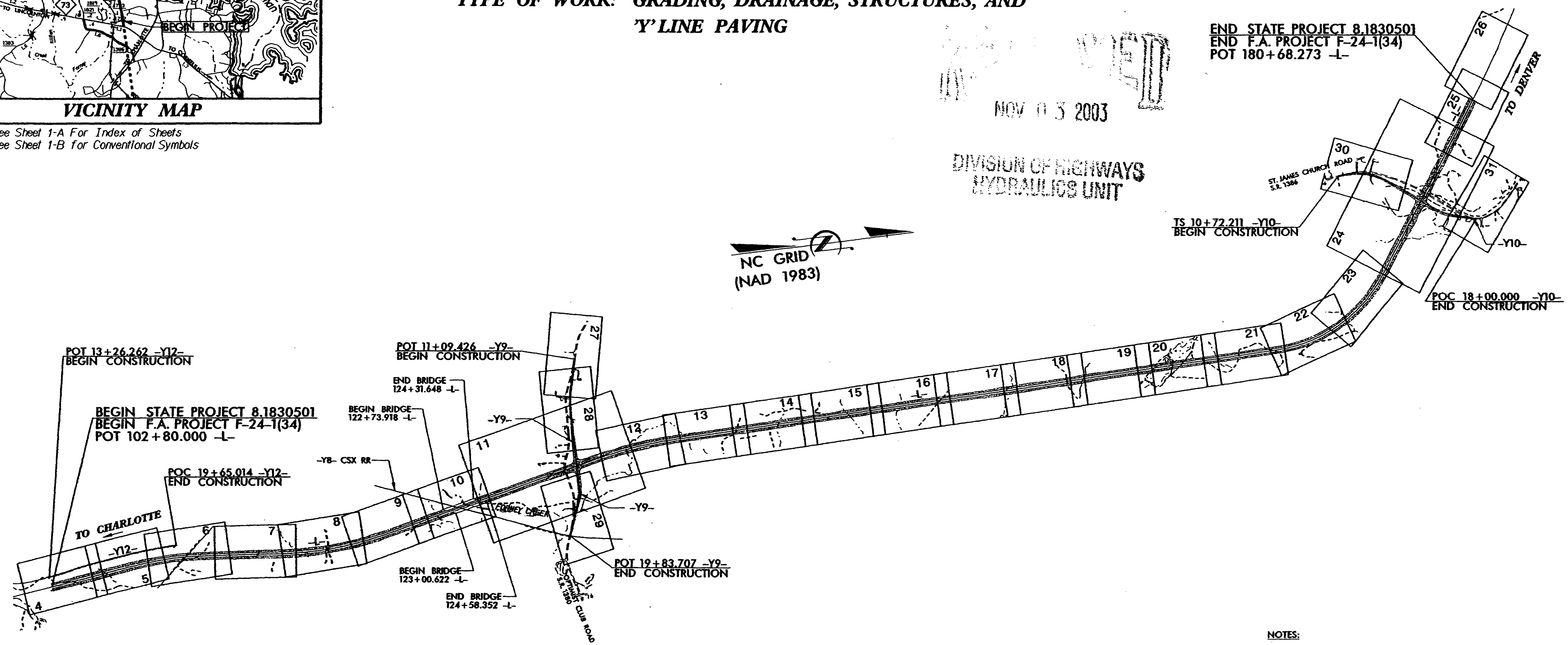
METRIC

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–2206B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
8.1830501	F–24–1(34)	P.E.
8.1830504	STP–16 (16)	R.O.W., UTIL.
8.1830504	STP–16 (16)	CONSTRUCTION

NOV 05 2003
DIVISION OF HIGHWAYS
HYDRAULICS UNIT



NOTES:

1. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERSECTIONS AS SHOWN ON THE PLANS.

NCDOT CONTACT: MR. S. D. BLEVINS, 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 2003	= 12,050
ADT 2023	= 20,400
DHV	= 10 %
D	= 62 %
T	= 12 % *
V	= 100 km/h

* (TTST 7% + DUAL 5%)

PROJECT LENGTH

LENGTH OF ROADWAY F.A. PROJECT F-24-1(34) =	7.630 Km
LENGTH OF STRUCTURE F.A. PROJECT F-24-1(34) =	0.158 Km
TOTAL LENGTH STATE PROJECT 8.1830501 =	7.788 Km

Prepared in the Office of:
WILBUR SMITH ASSOCIATES
P.O.BOX 2478 RALEIGH, NC 27602-2478
for
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: OCTOBER 29, 1999

LETTING DATE: NOVEMBER 20, 2001

DAVID L. WILVER, P.E.
PROJECT ENGINEER

MERRICK A. DUGAL, III, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14168 ENGINEER DOUGLAS B.

8/6/01

ROADWAY DESIGN

NORTH CAROLINA PROFESSIONAL SEAL 19026 ENGINEER DAVID L. WILVER

NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A. DUGAL III

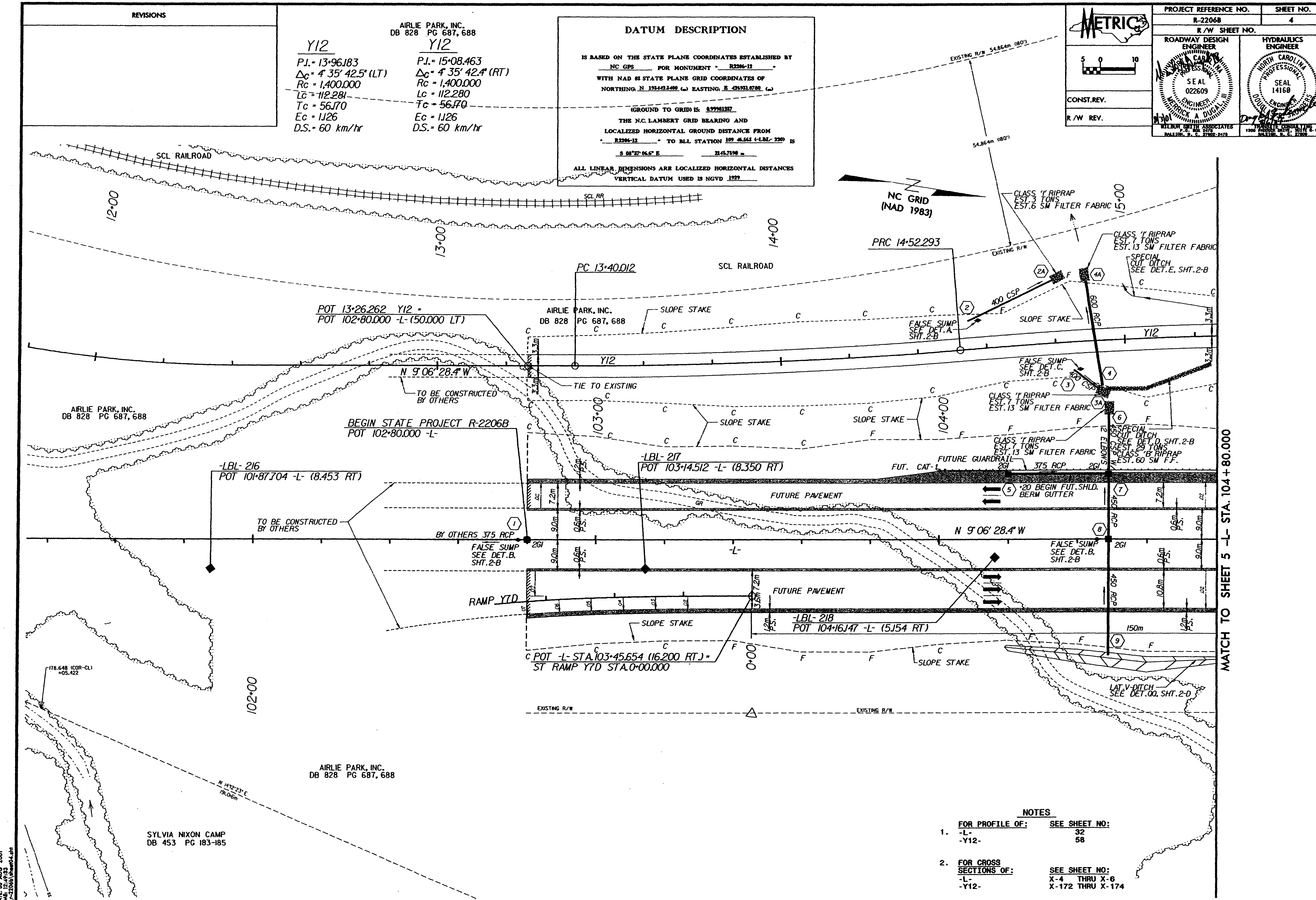
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

DATE: 03 AUG 2001
TIME: 09:32:24
r:\r-2206b\sheet01.shl


REVISIONS
AIRLIE PARK, INC.
DB 828 PG 687, 688
Y12
P.I. = 13+96.183
Δc = 4° 35' 42.5" (LT)
Rc = 1,400.000
Lc = 112.281
Tc = 56.170
Ec = 1.126
D.S. = 60 km/hr
Y12
P.I. = 15+08.463
Δc = 4° 35' 42.4" (RT)
Rc = 1,400.000
Lc = 112.280
Tc = 56.170
Ec = 1.126
D.S. = 60 km/hr
DATUM DESCRIPTION
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NC GPS FOR MONUMENT "R2206-12"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: N 193442.3400 (m) EASTING: E 426931.0780 (m)
(GROUND TO GRID) IS: 0.99981237
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2206-12" TO BLL STATION 109 46.563 (-LBL- 220) IS
S 08°37'06.6" E 2145.7590 m
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 1929
METRIC
PROJECT REFERENCE NO. R-2206B
SHEET NO. 4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST. REV.
R/W REV.
SEAL 022609
SEAL 14160
WILBUR SMITH ASSOCIATES
SCL RAILROAD
SCL RR
NC GRID (NAD 1983)
EXISTING R/W 54.864m (180')
CLASS 'I' RIPRAP EST. 3 TONS EST. 6 SM FILTER FABRIC
CLASS 'I' RIPRAP EST. 7 TONS EST. 13 SM FILTER FABRIC
SPECIAL CUT DITCH SEE DET. E. SHT. 2-B
PRC 14+52.293
PC 13+40.012
POT 13+26.262 Y12 = POT 102+80.000 -L- (50.000 LT)
SLOPE STAKE
400 CSP
600 RCP
FALSE SUMP SEE DET. A. SHT. 2-B
FALSE SUMP SEE DET. C. SHT. 2-B
300 CSP
N 9°06'28.4" W
TO BE CONSTRUCTED BY OTHERS
TIE TO EXISTING
AIRLIE PARK, INC. DB 828 PG 687, 688
BEGIN STATE PROJECT R-2206B
POT 102+80.000 -L-
-LBL- 216
POT 101+87.704 -L- (8.453 RT)
-LBL- 217
POT 103+14.512 -L- (8.350 RT)
SPECIAL CUT DITCH SEE DET. D. SHT. 2-B
EST. 25 TONS CLASS 'B' RIPRAP EST. 60 SM F.F.
FUTURE GUARDRAIL
FUT. CAT-1
375 RCP
2GI
FUTURE PAVEMENT
+20 BEGIN FUT. SHLD. BERM GUTTER
450 RCP
BY OTHERS 375 RCP
FALSE SUMP SEE DET. B. SHT. 2-B
-L-
RAMP Y7D
-LBL- 218
POT 104+16.147 -L- (5.154 RT)
150m
POT -L- STA. 103+45.654 (16.200 RT.) = ST RAMP Y7D STA. 0+00.000
LAT. V-DITCH SEE DET. 00. SHT. 2-D
EXISTING R/W
MATCH TO SHEET 5 -L- STA. 104+80.000
178.648 (COR-CL) +05.422
N 14°12'23" E 18.06m
AIRLIE PARK, INC. DB 828 PG 687, 688
SYLVIA NIXON CAMP DB 453 PG 183-185
NOTES
1. FOR PROFILE OF: -L- SEE SHEET NO: 32; -Y12- SEE SHEET NO: 58
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-4 THRU X-6; -Y12- SEE SHEET NO: X-172 THRU X-174
DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	5
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL — 8/31/10

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER JOHN R. D'ORAZIO, JR. — 8/31/10

WILBUR SMITH ASSOCIATES, P.O. Box 2479, RALEIGH, N. C. 27602-2479

PARSONS CONSULTING, 1616 Capital Blvd., Suite R-110, RALEIGH, N. C. 27609

METRIC 5 0 10

CONST.REV.

R/W REV.

Y12
P.I. = 15+08.463
Δc = 4° 35' 42.4" (RT)
Rc = 1,400.000
Lc = 112.280
Tc = 56.170
Ec = 1.126
D.S. = 60 km/hr

DITCH ℄ 2m 2% SHOULDER 4% 2% 2.5m ORIGINAL GROUND

PROPOSED BERM DETAIL

USE ON: -Y12- STA. 17+88.672 TO STA. 19+65.014

-L-
P.I. = 108+71.570
Ts = 235.839
Δ1 = 12° 44' 13.8" (RT)
Δc = 10° 05' 06.7" (RT)
Rc = 1,750.000
Lc = 308.035
Tc = 154.416
θs = 1° 19' 33.6"
Ls = 81.000
L.T. = 54.002
S.T. = 27.001
S.E. = 0.03
D.S. = 100 km/hr

Y12
P.I. = 18+48.370
Δc = 8° 01' 02.9" (RT)
Rc = 1,809.000
Lc = 253.136
Tc = 126.775
Ec = 4.437
D.S. = 60 km/hr

NC GRID (NAD 1983)

MATCH TO SHEET 4 -L- STA. 104+80.000

MATCH TO SHEET 6 -L- STA. 108+10.000

BEGIN ROW PROJECT R-2206B
-L- STA. 105+42.653

DAVID CLARK SR. HEIRS

DB 828 PG 687, 688
AIRLIE PARK, INC.

PT 15+64.573

CLASS 'I' RIPRAP EST. 24 TONS EST. 42 SM FILTER FABRIC

SLOPE STAKE

+88.306 Y12 9.000 (LT) (29.53')

+88.075 Y12 27.511 (LT) (90.26')

+41.085 125.493 (LT) (411.72')

EXISTING R/W

+27.583 Y12 9.000 (LT) (29.53')

CLASS 'B' RIPRAP EST. 1 TON EST. 4 SM FILTER FABRIC

FALSE SUMP SEE DET. A SHT. 2-B

+46.380 Y12 19.621 (LT) (64.37')

+13.973 Y12 15.377 (LT) (50.45')

+66.918 Y12 20.413 (LT) (66.97')

400 CSP W/ 2 ELBOWS

PROP. R/W

N 9° 06' 28.4" W

BEGIN FENCE

SLOPE STAKE

FUTURE GUARDRAIL

TOE PROTECTION SEE DET. V SHT. 2-C EST. 26 TONS CLASS 'B' RIPRAP EST. 54 SM F.F.

-LBL- 219
POT 105+47.319 -L- (2.324 RT)

OTCB

900 ROP CLASS N METHOD 'B' INSTALLATION

SPEC. CUT DITCH SEE DET. D SHT. 2-B EST. 180 TONS CLASS 'B' RIPRAP EST. 373 SM F.F.

SPRING BOX 150 PVC (SDR 80) *20 END FUT. SHLD. BERM GUTTER

*00 BEGIN FUT. SHLD. BERM GUTTER

FUT. GRAU-350

90m SLOPE STAKE

LATERAL 'V' DITCH SEE DET. QQ SHT. 2-D

BEGIN TAPER -95.654

END TAPER -85.654

+43.277 50.000 (RT) (164.04')

EXISTING R/W

AIRLIE PARK, INC. DB 828 PG 687, 688

BEGIN FENCE

PROPOSED W.W. FENCE

LAT. 'V' DITCH SEE DET. MM SHT. 2-D EST. 43 TONS CL 'B' RIP RAP EST 135 SM F.F.

PROP. R/W

+35.731 50.000 (RT) (164.04')

DAVID CLARK SR. HEIRS

+60.000 60.000 (RT) (196.85')

CLASS 'I' RIPRAP EST. 3 TONS EST. 6 SM FILTER FABRIC

+80 END FUT. SHLD. FUT. CAT-1 BERM GUTTER

FALSE SUMP SEE DET. C SHT. 2-B

400 CSP W/ 2 ELBOWS

-LBL- 220
POC 107+35.000 -L- (3.912 RT)

+76.484 50.231 (RT) (164.80') CHORD

+16.731 50.000 (RT) (164.04')

PROPOSED W.W. FENCE

PROP. R/W

TRANSITION STONE EST. 8 TONS CLASS 'B' RIPRAP EST. 15 SM F.F.

SPEC. CUT DITCH SEE DET. D SHT. 2-B EST. 20 TONS CLASS 'B' RIPRAP EST. 41 SM F.F.

+30.000 Y12 11.250 (LT) (36.91')

SLOPE STAKE

PROP. R/W

+21.596 Y12 9.000 (LT) (29.53')

+27.225 Y12 18.162 (LT) (59.59')

PC 17+21.596

SC 107+16.731

TS 106+35.731

27m (TYP.)

GRADE TO DRAIN

PROP. BERM

SLOPE STAKE

FUTURE GUARDRAIL GRAU-350

FUTURE PAVEMENT

FALSE SUMP SEE DET. B SHT. 2-B

-L-

2GI

SLOPE STAKE

PROPOSED W.W. FENCE

PROP. R/W

105+00 106+00 107+00 108+00 16+00 17+00 18+00

NOTES

	FOR PROFILE OF:	SEE SHEET NO:
1.	-L-	32, 33
	-Y12-	58, 59

2. FOR CROSS SECTIONS OF:	SEE SHEET NO:
-L-	X-6 THRU X-12
-Y12-	X-174 THRU X-178

DATE: 03 AUG 2001
TIME: 12:49:38
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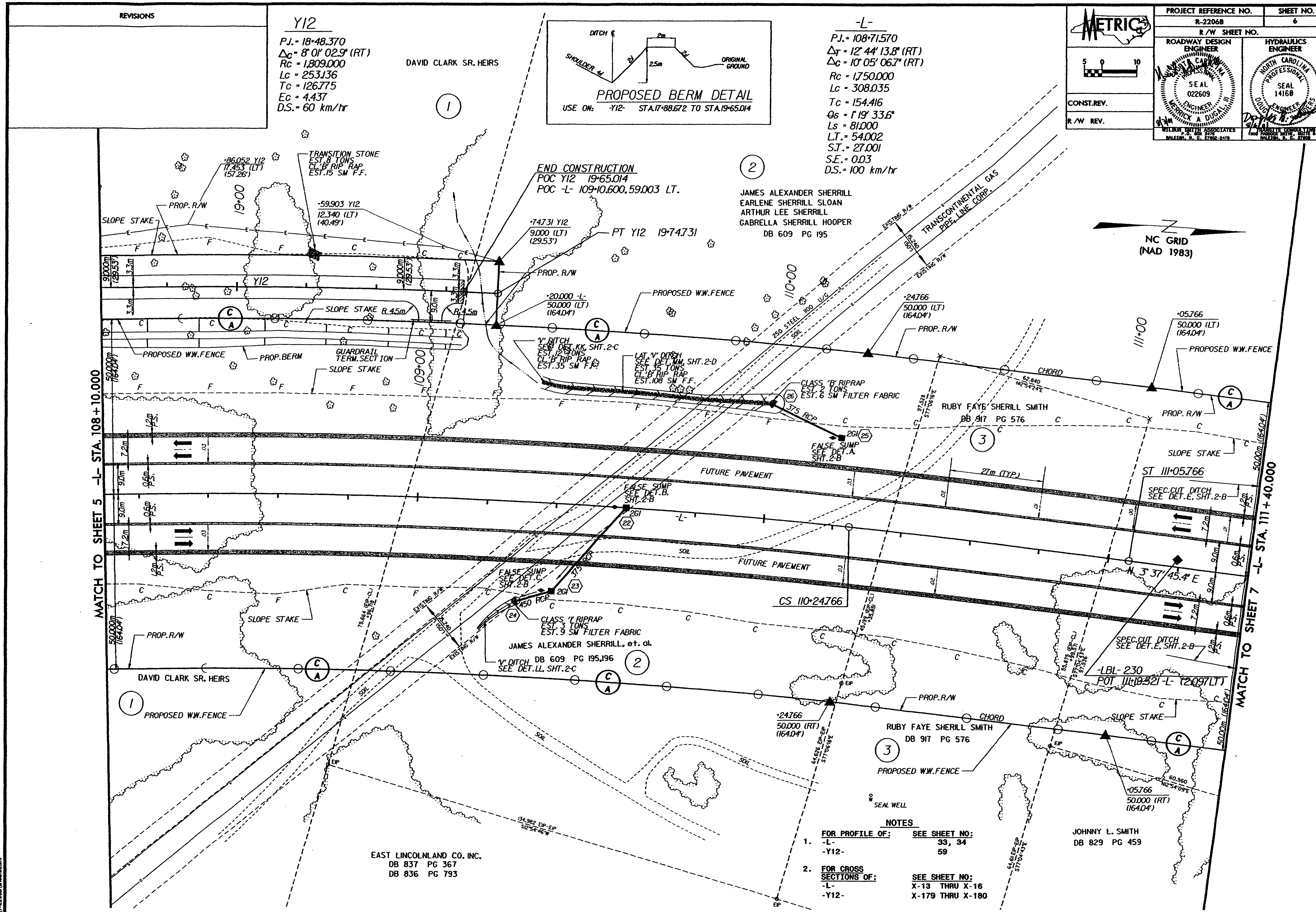
REVISIONS
Y12
P.I. = 18+48.370
Δc = 8° 01' 02.9" (RT)
Rc = 1,809.000
Lc = 253.136
Tc = 126.775
Ec = 4.437
D.S. = 60 km/hr
PROPOSED BERM DETAIL
USE ON: -Y12- STA.17+88.672 TO STA.19+65.014
DITCH ℄
SHOULDER 4:1
2:1
2.5m
2m
ORIGINAL GROUND
-L-
P.I. = 108+71.570
ΔT = 12° 44' 13.8" (RT)
Δc = 10° 05' 06.7" (RT)
Rc = 1,750.000
Lc = 308.035
Tc = 154.416
θs = 1° 19' 33.6"
Ls = 81.000
L.T. = 54.002
S.T. = 27.001
S.E. = 0.03
D.S. = 100 km/hr
METRIC
PROJECT REFERENCE NO. R-2206B
SHEET NO. 6
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
SEAL 022609
SEAL 14168
WILBUR SMITH ASSOCIATES
CONST.REV.
R/W REV.
DAVID CLARK SR. HEIRS
END CONSTRUCTION
POC Y12 19+65.014
POC -L- 109+10.600, 59.003 LT.
PT Y12 19+74.731
JAMES ALEXANDER SHERRILL
EARLENE SHERRILL SLOAN
ARTHUR LEE SHERRILL
GABRELLA SHERRILL HOOPER
DB 609 PG 195
TRANSCONTINENTAL GAS PIPE LINE CORP.
NC GRID (NAD 1983)
TRANSITION STONE EST. 8 TONS CL'B' RIP RAP EST. 15 SM F.F.
PROP. R/W
SLOPE STAKE
PROPOSED W.W. FENCE
PROP. BERM
GUARDRAIL TERM. SECTION
'V' DITCH SEE DET. KK, SHT. 2-C EST. 12 TONS CL'B' RIP RAP EST. 35 SM F.F.
LAT. 'V' DITCH SEE DET. MM, SHT. 2-D EST. 35 TONS CL'B' RIP RAP EST. 108 SM F.F.
CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC
RUBY FAYE SHERILL SMITH
DB 917 PG 576
FALSE SUMP SEE DET. A, SHT. 2-B
FALSE SUMP SEE DET. B, SHT. 2-B
FALSE SUMP SEE DET. C, SHT. 2-B
FUTURE PAVEMENT
27m (TYP.)
ST 111+05.766
SPEC. CUT DITCH SEE DET. E, SHT. 2-B
N 3° 37' 45.4" E
CS 110+24.766
CLASS 'I' RIPRAP EST. 3 TONS EST. 9 SM FILTER FABRIC
JAMES ALEXANDER SHERRILL, et. al.
'V' DITCH DB 609 PG 195,196 SEE DET. LL, SHT. 2-C
-LBL- 230
POT 111+18.521 -L- (2.097 LT)
MATCH TO SHEET 5 -L- STA. 108+10.000
MATCH TO SHEET 7 -L- STA. 111+40.000
PROPOSED W.W. FENCE
EAST LINCOLNLAND CO. INC.
DB 837 PG 367
DB 836 PG 793
SEAL WELL
JOHNNY L. SMITH
DB 829 PG 459
NOTES
1. FOR PROFILE OF: SEE SHEET NO:
-L- 33, 34
-Y12- 59
2. FOR CROSS SECTIONS OF: SEE SHEET NO:
-L- X-13 THRU X-16
-Y12- X-179 THRU X-180
DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	7
R/W SHEET NO.	

METRIC

5 0 10

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL III	NORTH CAROLINA PROFESSIONAL SEAL 14168 ENGINEER DOUGLAS B. TANNER, JR.
WILBUR SMITH ASSOCIATES P.O. BOX 2978 RALEIGH, N. C. 27602-2478	TRANSITE CONSULTING 1800 PASSIM DRIVE, SUITE B-10 RALEIGH, N. C. 27609

CONST.REV.

R/W REV.

NOTES

1. FOR PROFILE OF: -L- SEE SHEET NO: 34, 35
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-16 THRU X-22

-L-
P.I. = 116+92.856
Δt = 18° 10' 40.9" (LT)
Δc = 15° 31' 33.8" (LT)
Rc = 1,750.000
Lc = 474.217
Tc = 238.570
θs = 1° 19' 33.6"
Ls = 81.000
L.T. = 54.002
S.T. = 27.001
S.E. = 0.03
D.S. = 100 km/hr

NC GRID (NAD 1983)

VENTOSA, LLC.
DB 1184 PG 657
"FIRST TRACT"

JAMES ALEXANDER SHERRILL
EARLENE SHERRILL SLOAN
ARTHUR LEE SHERRILL
GABRELLA SHERRILL HOOPER
DB 609 PG 195

TYPE 'A' BASIN
450 CSP BARREL
450 CSP RISER
MIN S.A. = 259 sm
MIN STORAGE = 297 cm
T.O.D. ELEV. = 225.770
PMS ELEV = 225.300
EMS ELEV. = 225.600

CLASS 'B' RIPRAP
EST. 3 TONS
EST. 9 SM F.F.

CLASS 'I' RIPRAP
EST. 10 TONS
EST. 19 SM FILTER FABRIC

112+00
113+00
114+00

PROPOSED W.W. FENCE
SLOPE STAKE
PROP. R/W
CHORD

-LBL- 231
POT 112+27.636 -L- (0.874 RT)

-LBL- 232
POS 114+22.983 -L- (0.500 RT)
TS 113+72.371

*00.000 BEGIN FUT. SHL'D. BERM GUTTER
*60.000 BEGIN FUT. SHL'D. BERM GUTTER
*60.000 END FUT. SHL'D. BERM GUTTER

FUT. CAT-1
FUT. GUARDRAIL
FUTURE PAVEMENT
SPEC. CUT DITCH SEE DET. E, SHT. 2-B
GRAU-350 SPEC. CUT DITCH SEE DET. E, SHT. 12-B
FALSE SUMP SEE DET. A SHT. 2-B
FALSE SUMP SEE DET. C. SHT. 2-B
FALSE SUMP SEE DET. B. SHT. 2-B
400 CSP W/ 2 ELBOWS
750 CLASS IV RCP
375 RCP
LAT. 'V' DITCH SEE DET. 00, SHT. 2-D
LAT. 'V' DITCH SEE DET. MM, SHT. 2-D
EST. 17 TONS CL. 'B' RIP RAP EST. 54 SM F.F.
EST. 36 TONS CL. 'B' RIP RAP EST. 114 SM F.F.
EST. 11 TONS CL. 'B' RIP RAP EST. 52 SM F.F.

N 3° 37' 45.4" E

MATCH TO SHEET 6 -L- STA. 111+40.000
MATCH TO SHEET 8 -L- STA. 114+50.000

JAKE HUBERT SMITH
MARY S. SMITH
DB 444 PG 661

SARAH K. SHERRILL
DB 786 PG 740

ROBERT SMITH
RUBY FAYE SMITH
DB 375 PG 367

RUBY SMITH
DB 786 PG 746

DARRELL ABERNATHY, Sr.
D.B. 1087 PG. 150

VENTOSA, LLC.

DATE: 10 AUG 2001
TIME: 11:19:12
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REVISIONS

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2206B	8
CONST.REV.	R/W SHEET NO.	
R/W REV.	ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGLI III — WILBUR SMITH ASSOCIATES P.O. BOX 25116 RALEIGH, N.C. 27602-5479	HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER LOUIS D. GRAVELY — PARSONS BRINCKERHOFF 1500 SUNDAY DRIVE, SUITE B-10 RALEIGH, N.C. 27607

-L-
P.I.= 116+92.856
Δr= 18° 10' 40.9" (LT)
Δc= 15° 31' 33.8" (LT)
Rc = 1,750.000
Lc = 474.217
Tc = 238.570
θs = 1° 19' 33.6"
Ls = 81.000
L.T.= 54.002
S.T.= 27.001
S.E.= 0.03
D.S.= 100 km/hr

EAST LINCOLN LAND CO. INC
DB 711PG 505
TRACT 3, 4, 7
5

NC GRID
(NAD 1983)

MICHAEL LANDIS BRYANT
DB 895 PG 588
TRACT 2
6

MATCH TO SHEET 7 -L- STA. 114+50.000

MATCH TO SHEET 9 -L- STA. 118+00.000

115+00 116+00 117+00 118+00

+56.000 52.734 (LT) (173.01') — CLASS 'I' RIPRAP EST. 14 TONS EST. 25 SM FILTER FABRIC

RIPRAP AT EMBANKMENT SEE DET. AA SHT. 2-C EST. 10 TONS CL 'I' RIP.

+65.000 62.000 (LT) (203.41')

+95.000 50.000 (LT) (164.04')

0.6m LAT. BASE DITCH SEE DET. F SHT. 2-B EST. 85 TONS CL 'B' RIP RAP EST. 230 SM F.F.

PROPOSED W.W. FENCE

PROP. R/W

+41.000 50.000 (LT) (164.04')

+80.000 55.000 (LT) (180.45')

+00.000 50.000 (LT) (164.04')

+60.000 54.000 (LT) (177.17')

+87.000 50.000 (LT) (164.04')

PROPOSED W.W. FENCE

PROP. R/W

SLOPE STAKE

+53.371 50.000 (LT) (164.04')

SC 114+53.371

W. METHOD 'B' INSTALLATION

SLOPE STAKE

CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC

FUT. GUARDRAIL

+40.000 END FUT. SHL'D. BERM GUTTER

900 CSP

900 RCP

FUT. GRAU-350

FALSE SUMP SEE DET. A SHT. 2-B

FUTURE PAVEMENT

-LBL 234
POC 117+70.840 -L- (11.424 LT)

CLASS V

3GI TYPE A

SPRING BOX

FUTURE PAVEMENT

-L-

FUT. GUARDRAIL

SLOPE STAKE

JB

150 PVC (SDR 80)

SPRING

BEGIN FENCE TIE TO HEADWALL

FUT. CAT-1

FALSE SUMP 2GI SEE DET. C SHT. 2-B

400 CSP

-LBL 233
POC 116+82.417 -L- (7.649 LT)

FUT. GRAU-350

FUT. GUARDRAIL

SPEC. CUT DITCH SEE DET. DD SHT. 2-C

SLOPE STAKE

+53.371 50.000 (RT) (164.04')

LAT. 'V' DITCH SEE DET. NN SHT. 2-D EST. 75 TONS CL 'B' RIP RAP EST. 224 SM F.F.

END FENCE TIE TO HEADWALL

0.9m BASE DITCH SEE DET. S SHT. 2-B EST. 24 TONS CL 'B' RIP RAP EST. 48 SM F.F.

LAT. 'V' DITCH SEE DET. OO SHT. 2-D

CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC

PROP. R/W

PROPOSED W.W. FENCE

TOE

+37.000 50.000 & 56.000 (RT) (164.04' & 183.73')

+50.000 50.000 & 56.000 (RT) (164.04' & 183.73')

+00.000 50.000 (RT) (164.04')

PROP. R/W

PROPOSED W.W. FENCE

EAST LINCOLN LAND CO. INC
DB 711PG 505
TRACT 3, 4, 7
5

MICHAEL LANDIS BRYANT
DB 895 PG 588
TRACT 2
6

NOTES

	FOR PROFILE OF:	SEE SHEET NO:
1.	-L-	35, 36

	FOR CROSS SECTIONS OF:	SEE SHEET NO:
2.	-L-	X-23 THRU X-29

DATE: 03 AUG 2001
TIME: 07:46:56
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REVISIONS

-L-
P.I. = 116+92.856
Δ_T = 18° 10' 40.9" (LT)
Δ_c = 15° 31' 33.8" (LT)
Rc = 1,750.000
Lc = 474.217
Tc = 238.570
~~Os = 1° 19' 33.6"~~
Ls = 81.000
L.T. = 54.002
S.T. = 27.001
S.E. = 0.03
D.S. = 100 km/hr

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	9
R /W SHEET NO.	

METRIC 5 0 10

CONST.REV.

R /W REV.

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAN, III
WILBUR SMITH ASSOCIATES
P. O. BOX 2576
RALEIGH, N. C. 27602-2576

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS P. SAUNDERS
9/4/01
PARSONS TRANSITEK CONSULTING
1900 PADGETT DRIVE, SUITE B-10
RALEIGH, N. C. 27608

EAST LINCOLN LAND COMPANY
DB 711PG 505
(5) TRACT 3, 4, 7

EXISTING R/W

NC GRID (NAD 1983)

(6) MICHAEL LANDIS BRYANT
DB 895 PG 588
TRACT 2

118+00
119+00
120+00
121+00

PROP.R/W
SLOPE STAKE
PROPOSED W.W.FENCE
0.6m BASE DITCH SEE DET.W, SHT.-2-C
S07°15'29"W 181.59'
-36.000 50.108 & 56.108 (LT) (164.40' & 184.08')
-49.000 50.201' & 56.207 (LT) (164.72' & 184.41')
-27.588 50.000 (LT) (164.04')
-08.588 50.000 (LT) (164.04')
TDE
LAT. 'V' DITCH SEE DET.00, SHT.2-D
CHORD
CLASS 'I' RIPRAP EST. 10 TONS EST. 19 SM FILTER FABRIC
CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC
ST 120+08.588
PROPOSED W.W.FENCE
FUT. GUARDRAIL
SLOPE STAKE
FALSE SUMP SEE DET.A SHT.-2-B
-15.000 BEGIN FUT SHL'D.BERM GUTTER
FUT. GUARDRAIL
FUT. CAT-1
400 CSP W/ 2 ELBOWS
-80.000 END FUT SHL'D.BERM GUTTER
FUTURE PAVEMENT
-L-
N 14° 32' 55.5" W
43.695 508.0 -L- 6.590
750 RCP CLASS IV
FALSE SUMP SEE DET.B, SHT.-2-B
FUTURE PAVEMENT
27m (TYP.)
-LBL 235
POT 120+57.732 -L- (8.478 LT)
FUT. GRAU-350
FUT. GUARDRAIL
FALSE SUMP SEE DET.C SHT.-2-B
SPEC.CUT DITCH SEE DET.DD, SHT.-2-C
400 CSP W/ 2 ELBOWS
SLOPE STAKE
LAT. 'V' DITCH SEE DET.00, SHT.-2-D
FUT. GUARDRAIL
LAT. 'V' DITCH SEE DET.00, SHT.-2-D EST. 17 TONS CL'B' RIP RAP EST.35 SM F.F.
LAT. 'V' DITCH SEE DET.00, SHT.-2-D EST. 49 TONS CL'B' RIP RAP EST.130 SM F.F.
CS 119+27.588
PROP.R/W
PROPOSED W.W.FENCE
-27.588 50.000 (RT) (164.04')
-08.588 50.000 (RT) (164.04')
PROPOSED W.W.FENCE
PROP.R/W
(6) MICHAEL LANDIS BRYANT
DB 895 PG 588
TRACT 2

MATCH TO SHEET 8 -L- STA. 118+00.000
MATCH TO SHEET 10 -L- STA. 121+30.000

NOTES

	FOR PROFILE OF:	SEE SHEET NO:
1.	-L-	36, 37

	FOR CROSS SECTIONS OF:	SEE SHEET NO:
2.	-L-	X-29 THRU X-34

DATE: 02 AUG 2001
TIME: 15:40:46
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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	10
R/W SHEET NO.	

METRIC

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER

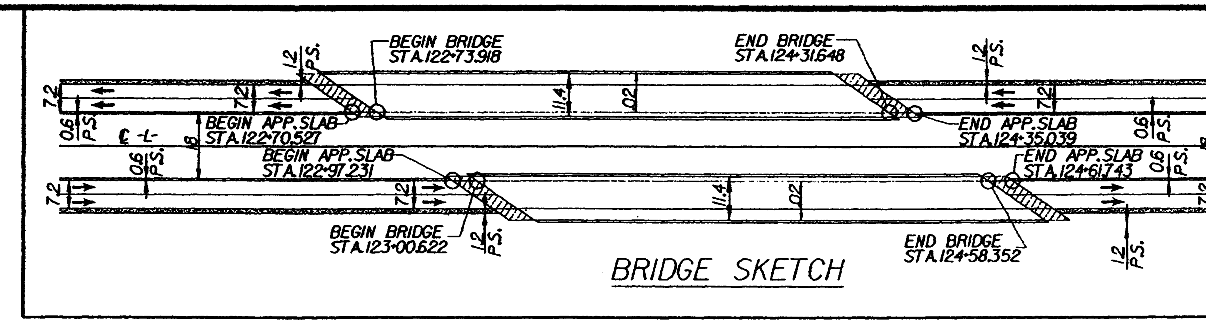
HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL III

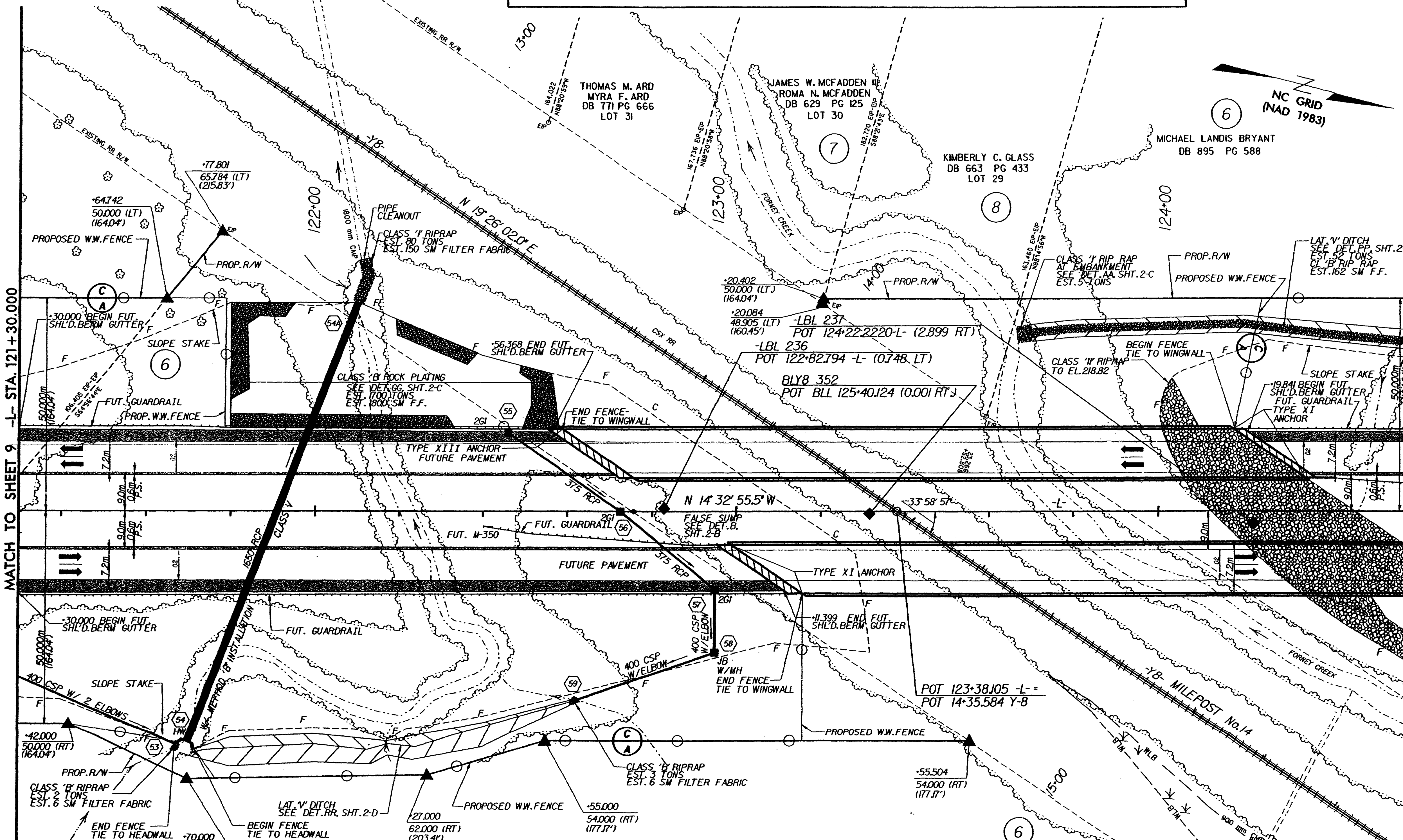
NORTH CAROLINA PROFESSIONAL SEAL 14168 ENGINEER DOUGLAS R. SAUNDERS

WILBUR SMITH ASSOCIATES P.O. BOX 2478 RALEIGH, N. C. 27602-2478

TRANSITE CONSULTING 1900 PARADOX DRIVE, SUITE 8-10 RALEIGH, N. C. 27609



EAST LINCOLN LAND COMPANY
DB 711 PG 505
TRACT 3, 4, 7



MICHAEL LANDIS BRYANT
DB 895 PG 588
TRACT 2

NOTES

1. FOR PROFILE OF: -L- SEE SHEET NO: 37, 38
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-34 THRU X-37
3. FOR STRUCTURE PLANS SEE SHEET NO: S-1 THRU S-86

DATE: 03 AUG 2001

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	11
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 022609, MERRICK A. DUGAL, III — WILBUR SMITH ASSOCIATES, P.O. BOX 2479, RALEIGH, N.C. 27602-2479

HYDRAULICS ENGINEER — SEAL 14160, DOUGLAS B. SAUNDERS — TRANSITE CONSULTING, 1300 PADDOCK DRIVE, SUITE B-10, RALEIGH, N.C. 27609

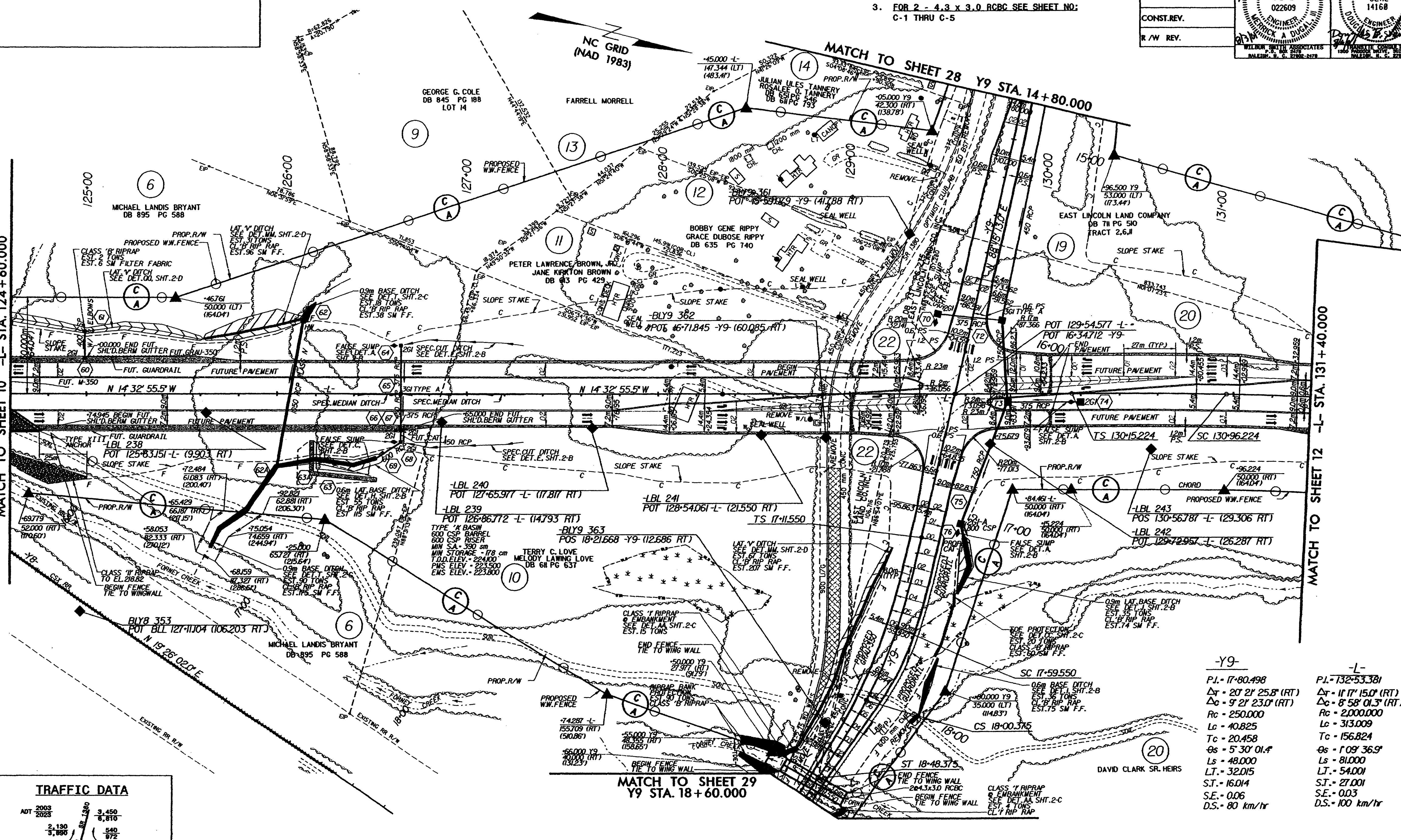
CONST. REV.

R/W REV.

REVISIONS

NOTES

1. FOR PROFILE OF: -L- SEE SHEET NO: 38 THRU 40; Y9 SEE SHEET NO: 56 THRU 57
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-38 THRU X-51; Y9 SEE SHEET NO: X-153 THRU X-161
3. FOR 2 - 4.3 x 3.0 RCBC SEE SHEET NO: C-1 THRU C-5



METRIC
NC GRID (NAD 1983)
MATCH TO SHEET 28 Y9 STA. 14+80.000
MATCH TO SHEET 29 Y9 STA. 18+60.000
MATCH TO SHEET 10 -L- STA. 124+60.000
MATCH TO SHEET 12 -L- STA. 131+40.000
GEORGE G. COLE DB 845 PG 188 LOT 14
FARRELL MORRELL
MICHAEL LANDIS BRYANT DB 895 PG 588
JULIAN ULES TANNERY ROSALEE O. TANNERY
BOBBY GENE RIPPY GRACE DUBOSE RIPPY DB 635 PG 740
PETER LAWRENCE BROWN, JR. JANE KIRKTON BROWN
EAST LINCOLN LAND COMPANY DB 711 PG 510 TRACT 2,6,11
TERRY C. LOVE MELODY LAWING LOVE DB 611 PG 637
DAVID CLARK SR. HEIRS
N 14°32' 55.5" W
N 19°26' 02.0" E
FORNEY CREEK
CSX RR
PROPOSED W.W. FENCE
PROP. R/W
FUTURE PAVEMENT
SPEC. MEDIAN DITCH
-LBL 238 POT 125+63.151 -L- (9.903 RT)
-LBL 239 POT 126+86.712 -L- (14.793 RT)
-LBL 240 POT 127+65.977 -L- (17.817 RT)
-LBL 241 POT 128+54.061 -L- (21.550 RT)
-LBL 242 POT 129+72.957 -L- (26.287 RT)
-LBL 243 POS 130+56.787 -L- (29.306 RT)
BLY8 353 POT BLL 127+11.104 (106.203 RT)
-BLY9 362 POT 16+71.845 -Y9- (60.085 RT)
-BLY9 363 POS 18+21.668 -Y9- (12.686 RT)
POT 129+54.577 -L- POT 16+34.712 -Y9-
TS 130+15.224
SC 130+96.224
TS 17+11.550
SC 17+59.550
CS 18+00.375
ST 18+48.375

TRAFFIC DATA

ADT 2003 / 2023

3,450	6,810
2,130	3,980
540	972
12,050	20,400
11,210	18,490
850	1,510
1,480	2,590
3,220	6,020

-L- NC16; Y9 SR 1360

-Y9-	-L-
P.I. = 17+80.498	P.I. = 132+53.381
Δ_T = 20° 21' 25.8" (RT)	Δ_T = 11° 17' 15.0" (RT)
Δ_c = 9° 21' 23.0" (RT)	Δ_c = 8° 58' 01.3" (RT)
Rc = 250.000	Rc = 2,000.000
Lc = 40.825	Lc = 313.009
Tc = 20.458	Tc = 156.824
θs = 5° 30' 01.4"	θs = 1° 09' 36.9"
Ls = 48.000	Ls = 81.000
L.T. = 32.015	L.T. = 54.001
S.T. = 16.014	S.T. = 27.001
S.E. = 0.06	S.E. = 0.03
D.S. = 80 km/hr	D.S. = 100 km/hr

DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	12
R/W SHEET NO.	

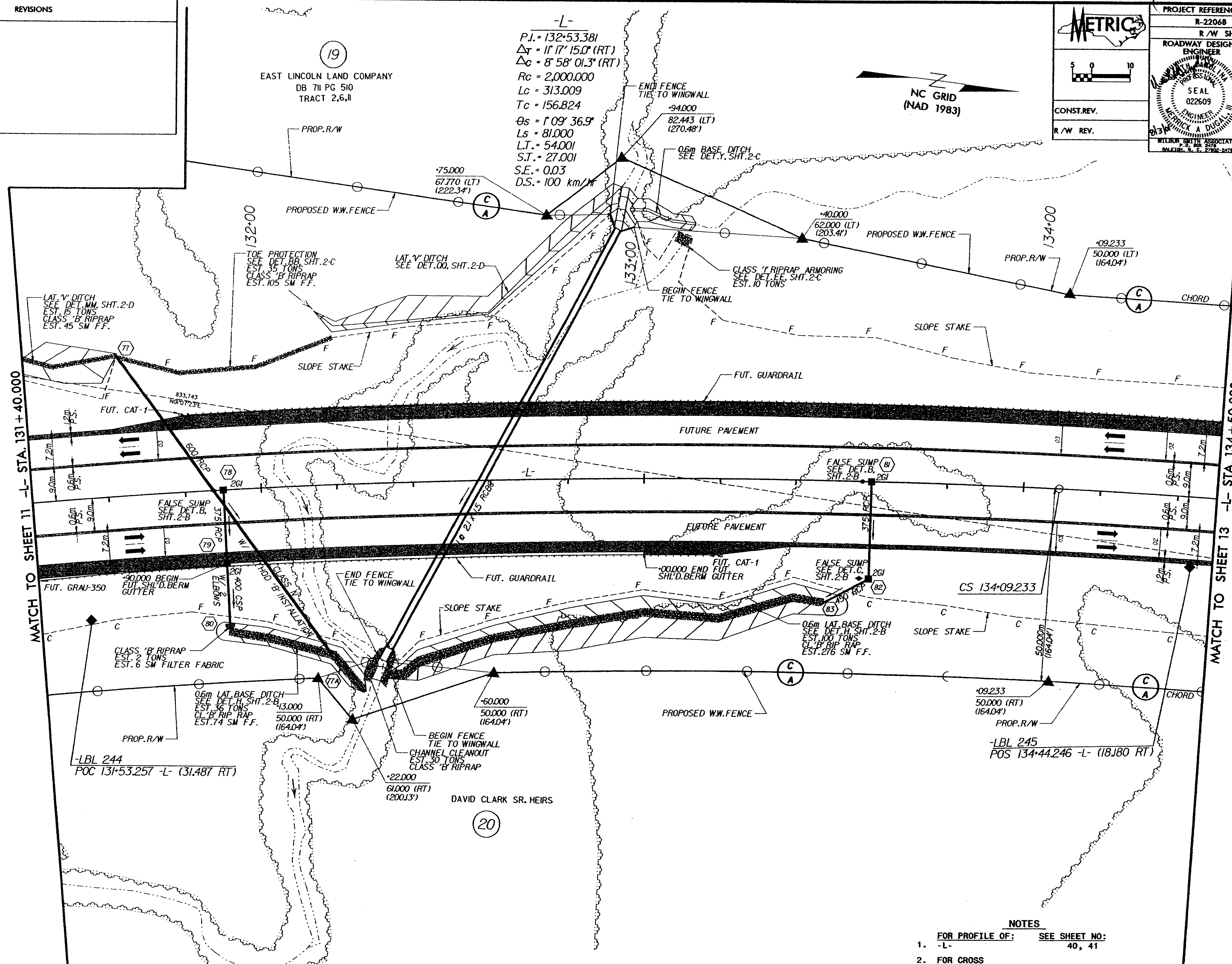
METRIC

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER — SEAL 022609 — MERRICK A DUGAL III — WILBUR SMITH ASSOCIATES, P.O. BOX 2478, RALEIGH, N.C. 27602-2478

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14168 — DOUGLAS R. SAUNDERS — 3 TRANSIT CONSULTING, 1300 PADDOCK DRIVE, SUITE E-10, RALEIGH, N.C. 27609



NOTES

1.	FOR PROFILE OF: -L-	SEE SHEET NO: 40, 41
2.	FOR CROSS SECTIONS OF: -L-	SEE SHEET NO: X-51 THRU X-56
3.	2.1 x 1.5 RCBC SEE SHEET NO: C-6 THRU C-11	

DATE: 03 AUG 2001
TIME: 14:22:02

REVISIONS

-L-
P.I. = 132+53.381
Δ_T = 11° 17' 15.0" (RT)
Δ_C = 8° 58' 01.3" (RT)
Rc = 2,000.000
Lc = 313.009
Tc = 156.824
θ_s = 1° 09' 36.9"
Ls = 81.000
L.T. = 54.001
S.T. = 27.001
S.E. = 0.03
D.S. = 100 km/hr

NC GRID (NAD 1983)

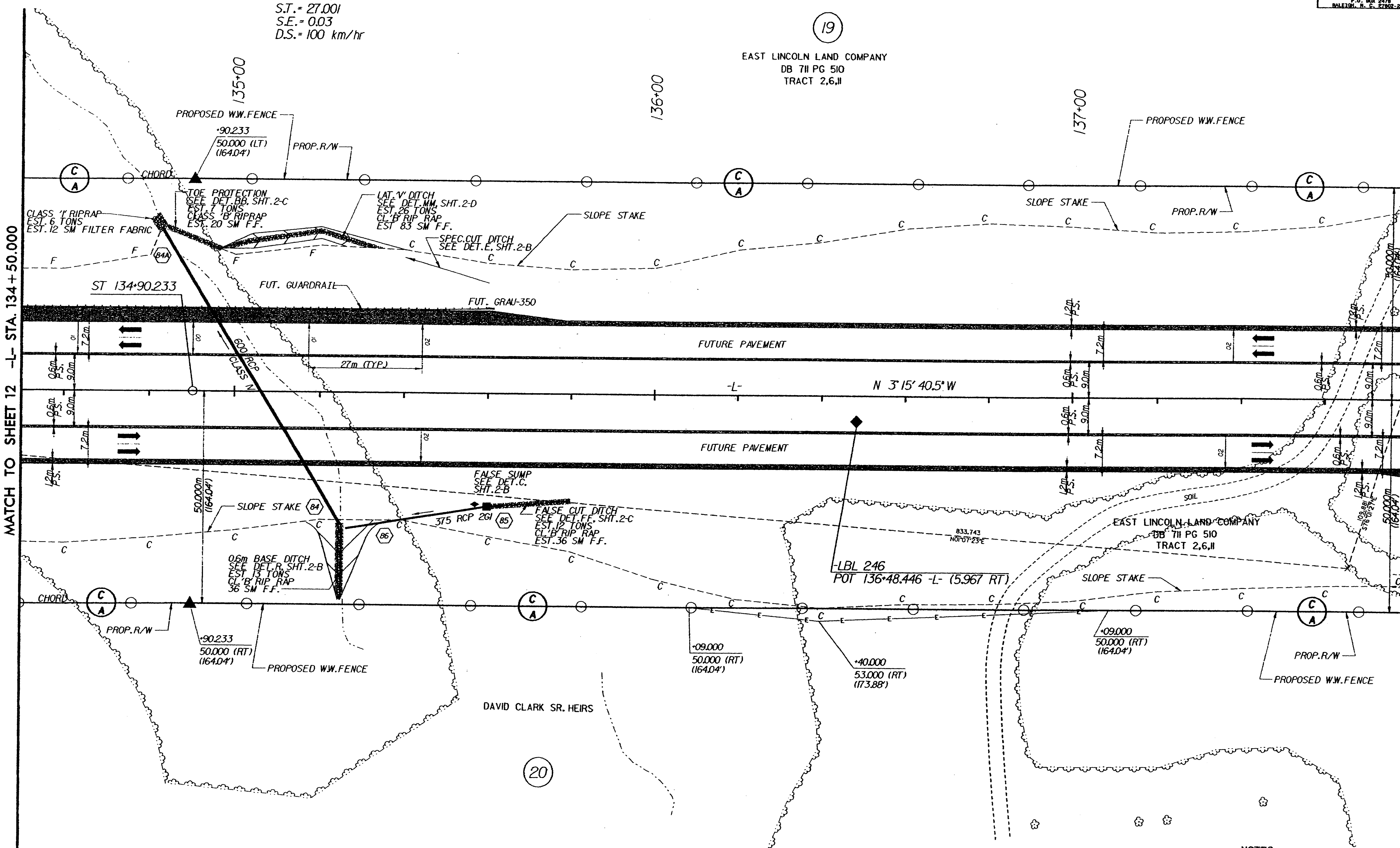
PROJECT REFERENCE NO.	SHEET NO.
R-2206B	13
R/W SHEET NO.	

METRIC

CONST. REV.
R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER — MERRICK A. DUGAL, III
WILBUR SMITH ASSOCIATES, P.O. BOX 2478, RALEIGH, N.C. 27602-2478

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER — DOUGLAS SAUNDERS
TRANSITE CONSULTING, 1900 PADDOCK DRIVE, SUITE B-10, RALEIGH, N.C. 27606



MATCH TO SHEET 12 -L- STA. 134+50.000
MATCH TO SHEET 14 -L- STA. 137+80.000
19
EAST LINCOLN LAND COMPANY
DB 711 PG 510
TRACT 2,6,11
135+00
136+00
137+00
PROPOSED W.W. FENCE
+90.233
50.000 (LT)
(164.04')
PROP. R/W
CHORD
TOE PROTECTION
SEE DET. BB, SHT. 2-C
EST. 7 TONS
CLASS 'B' RIPRAP
EST. 20 SM F.F.
LAT. 'V' DITCH
SEE DET. MM, SHT. 2-D
EST. 26 TONS
CL. 'B' RIP RAP
EST. 83 SM F.F.
CLASS 'I' RIPRAP
EST. 6 TONS
EST. 12 SM FILTER FABRIC
SPEC. CUT DITCH
SEE DET. E, SHT. 2-B
SLOPE STAKE
ST 134+90.233
FUT. GUARDRAIL
FUT. GRAU-350
FUTURE PAVEMENT
27m (TYP.)
-L-
N 3° 15' 40.5" W
600 RCP CLASS V
FALSE SUMP
SEE DET. C, SHT. 2-B
FALSE CUT DITCH
SEE DET. FF, SHT. 2-C
EST. 12 TONS
CL. 'B' RIP RAP
EST. 36 SM F.F.
375 RCP 2GI
0.6m BASE DITCH
SEE DET. R, SHT. 2-B
EST. 13 TONS
CL. 'B' RIP RAP
36 SM F.F.
-LBL 246
POT 136+48.446 -L- (5.967 RT)
EAST LINCOLN LAND COMPANY
DB 711 PG 510
TRACT 2,6,11
+90.233
50.000 (RT)
(164.04')
PROPOSED W.W. FENCE
+09.000
50.000 (RT)
(164.04')
+40.000
53.000 (RT)
(173.88')
DAVID CLARK SR. HEIRS
20

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 41
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-57 THRU X-62

DATE: 03 AUG 2001

REVISIONS

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2206B	14
	R /W SHEET NO.	
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R /W REV.	SEAL 022609 ENGINEER MURDOCK A DUCAN, III WILBUR SMITH ASSOCIATES P.O. BOX 24170 RALEIGH, N. C. 27626-2478	SEAL 14168 ENGINEER DOUGLAS B. SAUNDERS PARSONS BRINCKERHOFF 7000 PARAGON PLACE, SUITE 6-10 RALEIGH, N. C. 27626

NC GRID (NAD 1983)

20

DAVID CLARK SR. HEIRS

MATCH TO SHEET 13 -L- STA. 137+80.000

-L- STA. 141+20.000 MATCH TO SHEET 15

138+00 139+00 140+00 141+00

+00.000 50.000 (LT) (164.04') PROP.R/W

PROPOSED W.W.FENCE

STD. BERM DITCH PAVED DITCH

SLOPE STAKE

-LBL 247 POT 137+86.63 -L- (1.638 RT)

BDO 400 CSP W/ ELBOW

SPEC.CUT DITCH SEE DET.E, SHT.2-B

-LBL 248 POT 139+20.010 -L- (0.604LT)

END FENCE TIE TO HEADWALL

BEGIN FENCE TIE TO HEADWALL

+06.000 50.000 (LT) (164.04')

FALSE SUMP SEE DET.A, F SHT.2-B

PROP.R/W

SLOPE STAKE

SPEC.CUT DITCH SEE DET.E, SHT.2-B

+60.000 BEGIN FUT. SHL'D.BERM GUTTER

FUT. CAT-1

FUT. GUARDRAIL

FUT. GRAU-350

FUTURE PAVEMENT

+40.000 END FUT. SHL'D.BERM GUTTER

450 RCP W/ 2 ELBOWS

1050 RCP W/ METHOD N 3°15'40.5"W CLASS 'B' INSTALLATION

375 RCP

FALSE SUMP SEE DET.B, SHT.2-B

FALSE SUMP SEE DET.C, SHT.2-B

LAT.'V' DITCH SEE DET.QQ, SHT.2-D

CLASS 'I' RIPRAP EST. 4 TONS EST. 9 SM FILTER FABRIC

0.6m LAT.BASE DITCH SEE DET.P, SHT.2-B EST.61 TONS CL.'B' RIP RAP EST.126 SM F.F.

+00.000 50.000 (RT) (164.04')

LAT.'V' DITCH SEE DET.MM, SHT.2-D EST.18 TONS CL.'B' RIP RAP EST.54 SM F.F.

+48.000 50.000 (RT) (164.04')

+53.000 55.000 (RT) (180.45')

CLASS 'I' RIPRAP (180.45') EST. 18 TONS EST. 33 SM FILTER FABRIC

+74.000 50.000 (RT) (164.04')

+69.000 55.000 (RT) (180.45')

PROPOSED W.W.FENCE

PROP.R/W

DAVID CLARK SR. HEIRS

20

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 41, 42
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-62 THRU X-67

DATE: 03 AUG 2001
TIME: 12:50:22
FILE: 2206\sheet14.dgn

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	15
R/W SHEET NO.	

METRIC

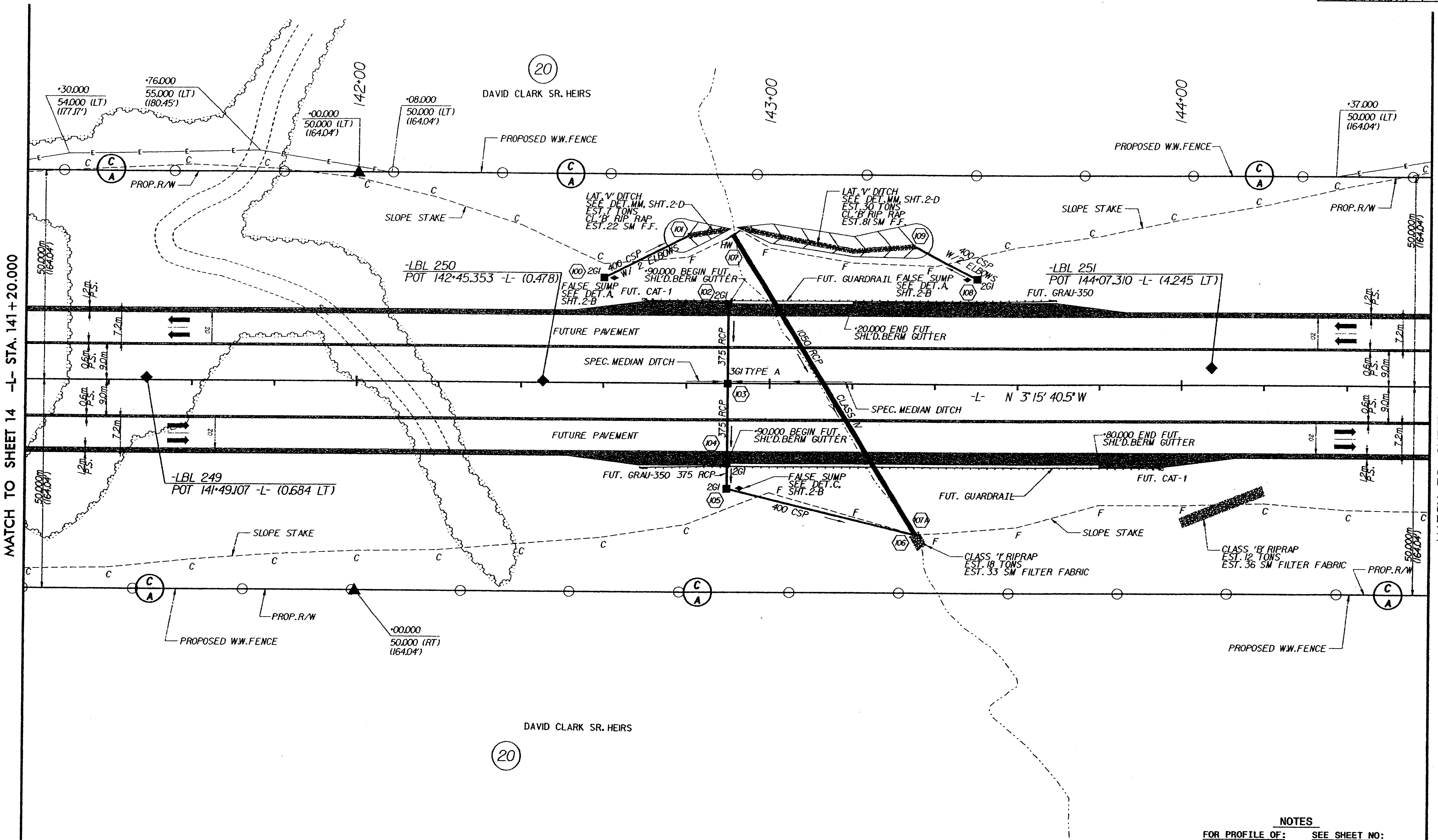
CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER — SEAL 022609 — MERRICK A. DUCAL III — WILBUR SMITH ASSOCIATES

HYDRAULICS ENGINEER — SEAL 14160 — TRANSITE CONSULTING

NC GRID (NAD 1983)



DAVID CLARK SR. HEIRS
20
142+00
143+00
144+00
PROPOSED W.W.FENCE
PROP.R/W
SLOPE STAKE
LAT. 'V' DITCH SEE DET. MM, SHT. 2-D EST. 7 TONS CL.'B' RIP RAP EST. 22 SM F.F.
LAT. 'V' DITCH SEE DET. MM, SHT. 2-D EST. 30 TONS CL.'B' RIP RAP EST. 81 SM F.F.
-LBL 250 POT 142+45.353 -L- (0.478)
-LBL 251 POT 144+07.310 -L- (4.245 LT)
-LBL 249 POT 141+49.107 -L- (0.684 LT)
FALSE SUMP SEE DET. A SHT. 2-B
FUT. CAT-1
FUT. GUARDRAIL
FUT. GRAU-350
FUTURE PAVEMENT
SPEC. MEDIAN DITCH
3GI TYPE A
1050 RCP
375 RCP
400 CSP
-L- N 3°15' 40.5" W
+90.000 BEGIN FUT. SHL'D. BERM GUTTER
+20.000 END FUT. SHL'D. BERM GUTTER
+80.000 END FUT. SHL'D. BERM GUTTER
CLASS 'I' RIPRAP EST. 18 TONS EST. 33 SM FILTER FABRIC
CLASS 'B' RIPRAP EST. 12 TONS EST. 36 SM FILTER FABRIC
MATCH TO SHEET 14 -L- STA. 141+20.000
MATCH TO SHEET 16 -L- STA. 144+60.000

NOTES

		SEE SHEET NO:
1.	FOR PROFILE OF: -L-	42, 43
2.	FOR CROSS SECTIONS OF: -L-	X-67 THRU X-73

DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	16
R/W SHEET NO.	

METRIC

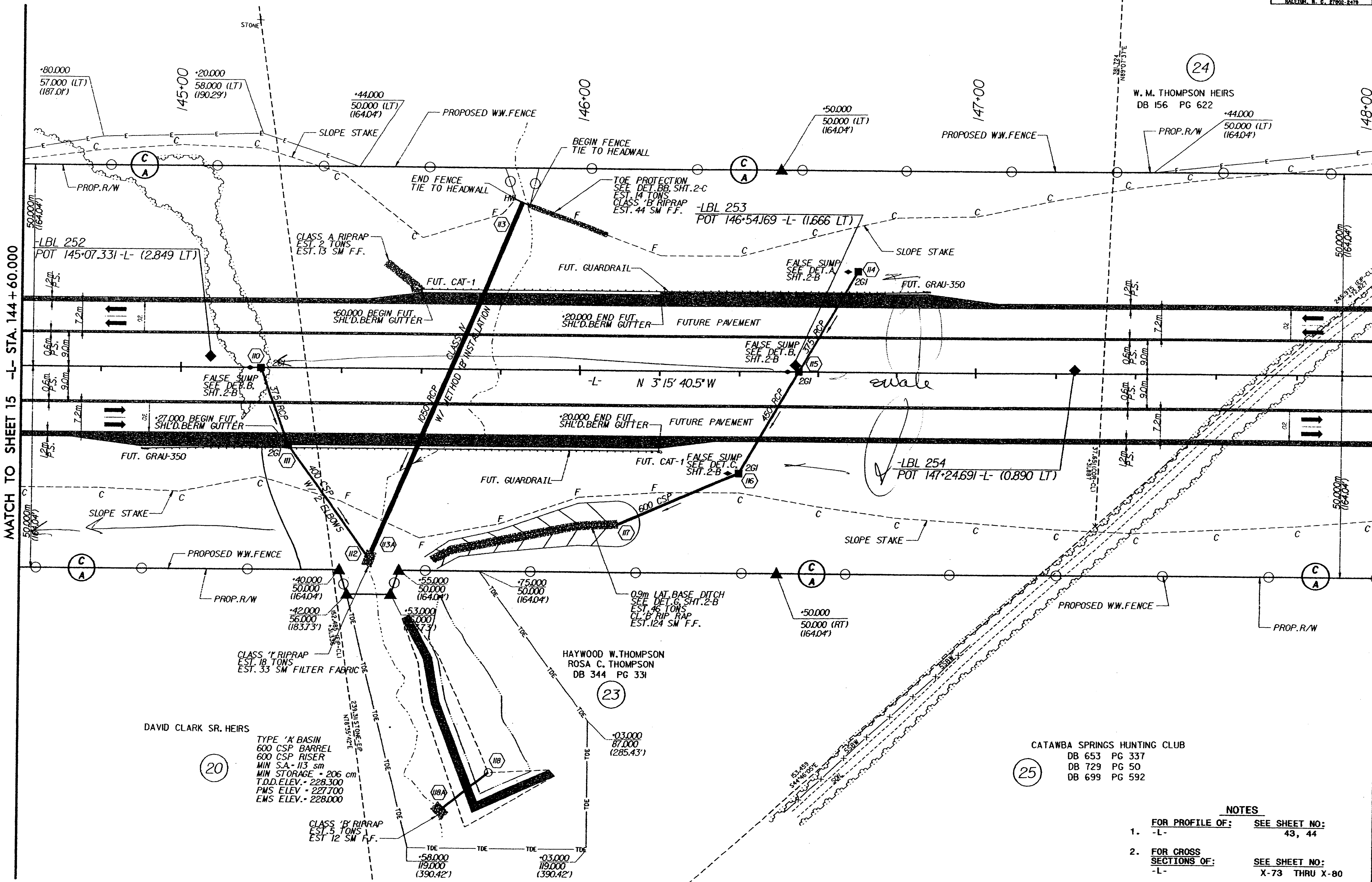
CONST. REV.

R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A. DUGAL III

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS SAUNDERS

WILBUR SMITH ASSOCIATES, P.O. BOX 2479, RALEIGH, N.C. 27602-2479



NC GRID (NAD 1983)
HAYWOOD W. THOMPSON
ROSA C. THOMPSON
DB 344 PG 331
W. M. THOMPSON HEIRS
DB 156 PG 622
DAVID CLARK SR. HEIRS
CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592
MATCH TO SHEET 15 -L- STA. 144+60.000
MATCH TO SHEET 17 -L- STA. 148+00.000
145+00
146+00
147+00
148+00
-L-
N 3°15' 40.5" W
PROPOSED W.W. FENCE
PROP. R/W
SLOPE STAKE
BEGIN FENCE TIE TO HEADWALL
END FENCE TIE TO HEADWALL
TOE PROTECTION SEE DET. BB, SHT. 2-C EST. 14 TONS CLASS 'B' RIPRAP EST. 44 SM F.F.
-LBL 252 POT 145+07.331 -L- (2.849 LT)
-LBL 253 POT 146+54.169 -L- (1.666 LT)
-LBL 254 POT 147+24.691 -L- (0.890 LT)
CLASS A RIPRAP EST. 2 TONS EST. 13 SM F.F.
FUT. CAT-1
FUT. GUARDRAIL
FUT. GRAU-350
FUTURE PAVEMENT
+60.000 BEGIN FUT. SHL'D. BERM GUTTER
+20.000 END FUT. SHL'D. BERM GUTTER
+27.000 BEGIN FUT. SHL'D. BERM GUTTER
FALSE SUMP SEE DET. A SHT. 2-B
FALSE SUMP SEE DET. B SHT. 2-B
FALSE SUMP SEE DET. C SHT. 2-B
1050 RCP CLASS IV W/ METHOD 'B' INSTALLATION
375 RCP
450 RCP
400 CSP W/ 2 ELBOWS
600 CSP
0.9m LAT. BASE DITCH SEE DET. G, SHT. 2-B EST. 46 TONS CL. 'B' RIP RAP EST. 124 SM F.F.
CLASS 'I' RIPRAP EST. 18 TONS EST. 33 SM FILTER FABRIC
TYPE 'A' BASIN 600 CSP BARREL 600 CSP RISER MIN S.A. - 113 sm MIN STORAGE - 206 cm T.O.D. ELEV. - 228.300 PWS ELEV. - 227.700 EMS ELEV. - 228.000
CLASS 'B' RIPRAP EST. 5 TONS EST. 12 SM F.F.
+80.000 57.000 (LT) (187.01')
+20.000 58.000 (LT) (190.29')
+44.000 50.000 (LT) (164.04')
+50.000 50.000 (LT) (164.04')
+40.000 50.000 (164.04')
+42.000 56.000 (183.73')
+55.000 50.000 (164.04')
+53.000
+75.000 50.000 (164.04')
+50.000 50.000 (RT) (164.04')
+03.000 87.000 (285.43')
+58.000 119.000 (390.42')
+03.000 119.000 (390.42')
50.000m (164.04')
swale

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 43, 44
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-73 THRU X-80

DATE: 03 AUG 2001 TIME: 12:50:42 r:\r-2206b\sheet16.sht

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	17
R/W SHEET NO.	

METRIC

5 0 10

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUCAT, III

WILBUR SMITH ASSOCIATES P.O. BOX 2479 RALEIGH, N. C. 27602-2479

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS B. SANDERS

TRANSITE CONSULTING 1900 PRESTON BLVD. SUITE B-10 PLANO, TX. 75093

24
W. M. THOMPSON HEIRS
DB 156 PG 622

25
CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592

NC GRID (NAD 1983)

302.739
S 44°46'05"E

MATCH TO SHEET 16 -L- STA. 148+00.000

149+00

150+00

151+00

MATCH TO SHEET 18 -L- STA. 151+30.000

•20.000
58.000 (LT)
(190.29')

•60.000
59.000 (LT)
(193.57')

•34.000
50.000 (LT)
(164.04')

•25.000
50.000 (LT)
(164.04')

•67.000
50.000 (RT)
(164.04')

•80.000
64.000 (RT)
(209.97')

•95.000
71.000 (RT)

50.000m (164.04')

SLOPE STAKE

PROP.R/W

PROPOSED W.W.FENCE

TOE PROTECTION SEE DET.BB, SHT.2-C EST.55 TONS CLASS 'B' RIPRAP EST.171 SM F.F.

-LBL 255
POT 148+36.712 -L- (0.486 LT)

-LBL 256
POT 149+27.740 -L- (0.391 LT)

-LBL 257
POT 150+19.255 -L- (1.455 LT)

-LBL 258
POT 151+27.844 -L- (1.041 LT)

FALSE SUMP SEE DET.A SHT.2-B

FALSE SUMP SEE DET.B. SHT.2-B

FALSE SUMP SEE DET.C. SHT.2-B

2GI

375 RCP

FUTURE PAVEMENT

FUT. CAT-1

FUT. GUARDRAIL

FUT. GRAU-350

•00.000 BEGIN FUT. SHL'D. BERM GUTTER

•80.000 BEGIN FUT. SHL'D. BERM GUTTER

-L-

N 3°15'40.5" W

400 CSP

CLASS 'B' RIPRAP
EST. 4 TONS
EST. 12 SM FILTER FABRIC

CLASS 'I' RIPRAP
EST. 24 TONS
EST. 42 SM FILTER FABRIC

1200 RCP CLASS IV W/ METHOD 'B' INSTALLATION

0.6m LAT. BASE DITCH SEE DET.L SHT.2-B

0.6m LAT. BASE DITCH SEE DET.F SHT.2-B
EST.6 TONS
CL.'B' RIP RAP
EST.18 SM F.F.

450 mm CONC

SOIL

CATAWBA SPRINGS HUNTING CLUB
25 DB 653 PG 337
DB 729 PG 50
DB 699 PG 592

NOTES

	FOR PROFILE OF:	SEE SHEET NO:
1.	-L-	44, 45

	FOR CROSS SECTIONS OF:	SEE SHEET NO:
2.	-L-	X-80 THRU X-88

DATE: 03 AUG 2001
TIME: 12:50:47
n:\r-2206b\sheet17.dgn

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	18
R/W SHEET NO.	

METRIC

CONST.REV.

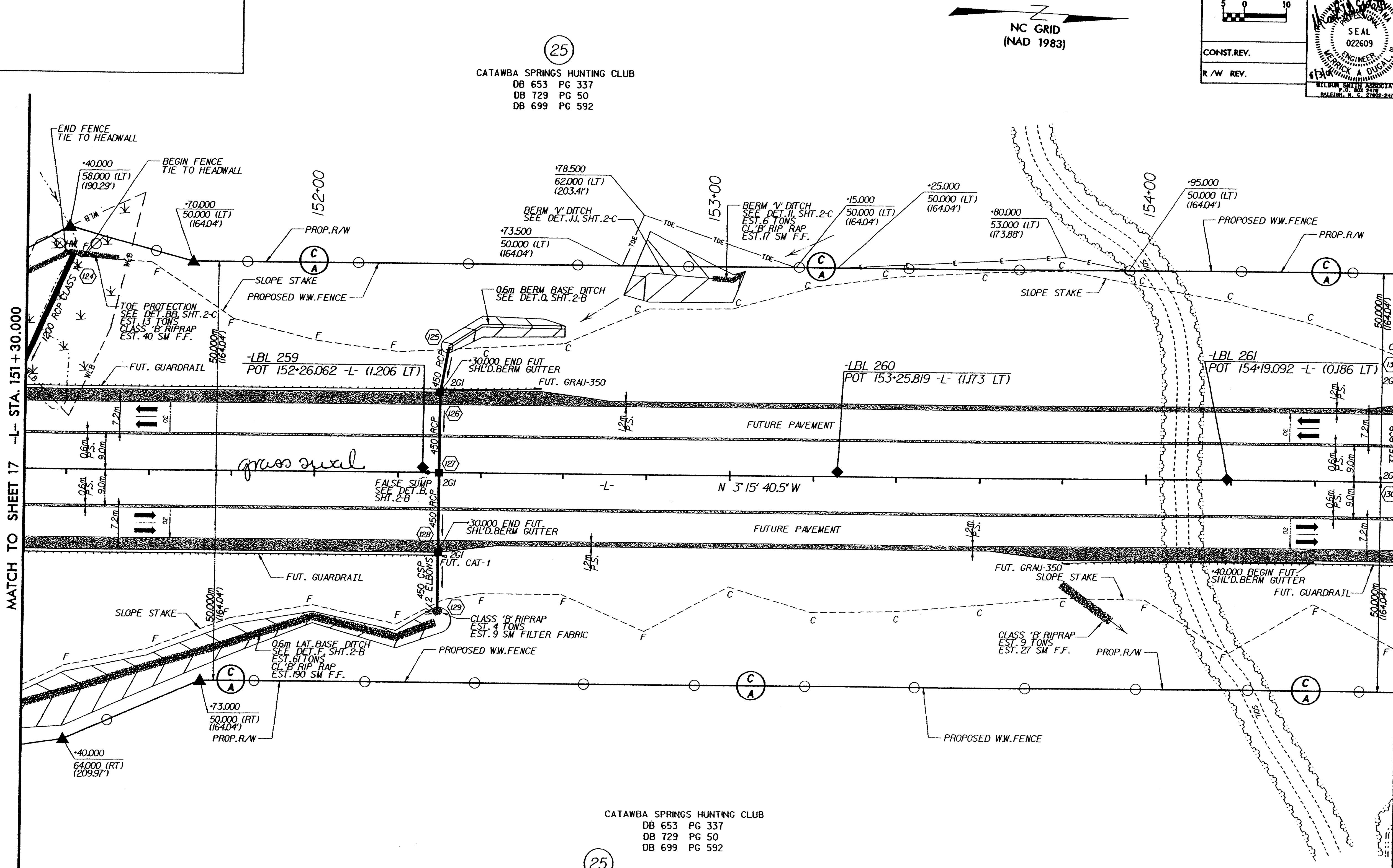
R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A. DUCAL III

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS

WILBUR SMITH ASSOCIATES P.O. BOX 2478 RALEIGH, N.C. 27602-2478

TRANSITE CONSULTING RALEIGH, N.C.



NOTES

1.	FOR PROFILE OF: -L-	SEE SHEET NO: 45, 46
2.	FOR CROSS SECTIONS OF: -L-	SEE SHEET NO: X-89 THRU X-95

DATE: 03 AUG 2001 TIME: 12:50:53

REVISIONS

METRIC

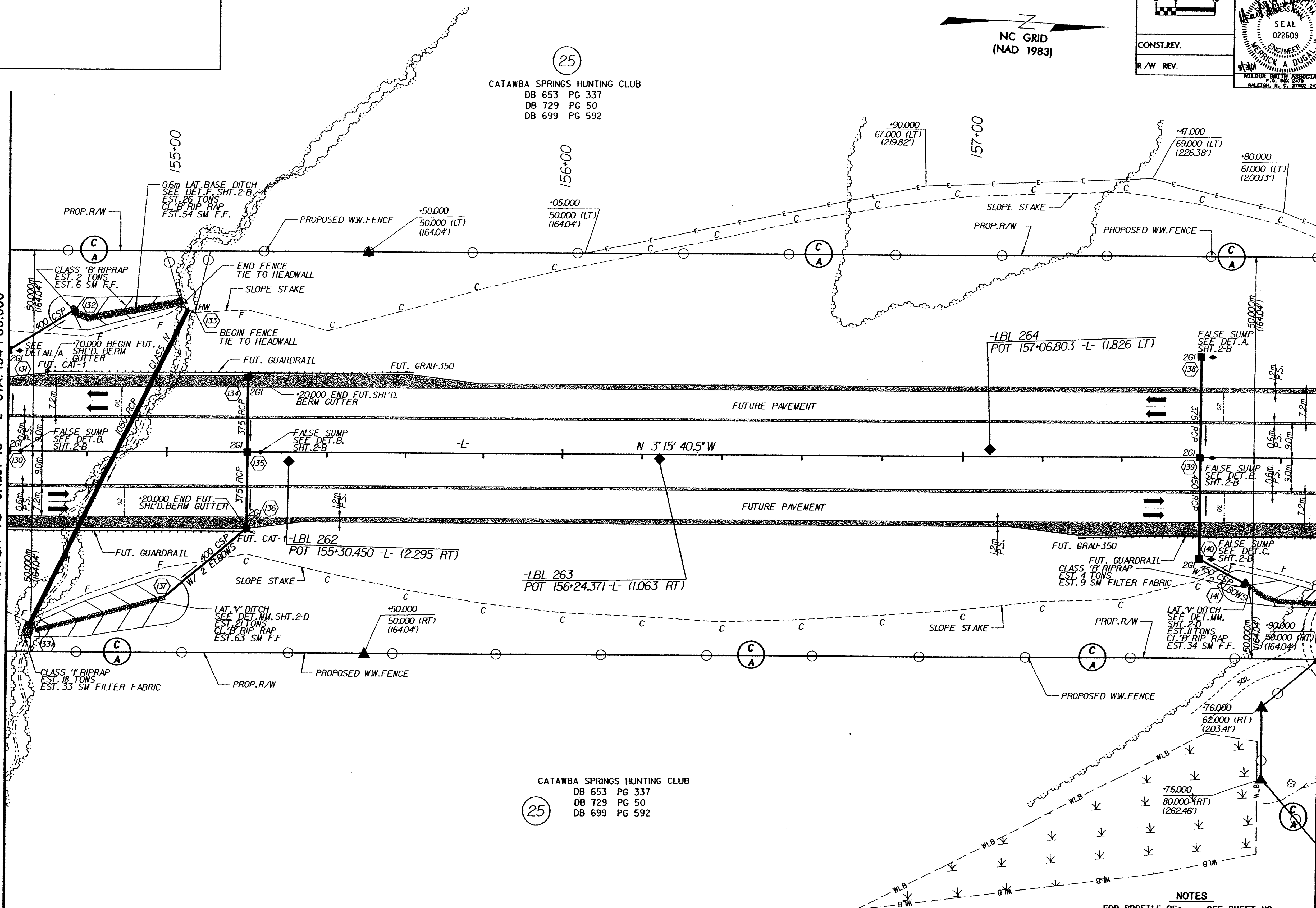
PROJECT REFERENCE NO.	SHEET NO.
R-2206B	19
R/W SHEET NO.	

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A. DUGAL, III — WILBUR SMITH ASSOCIATES, P.O. BOX 2478, RALEIGH, N. C. 27602-2478

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS ... SAUNDERS — TRANSITE CONSULTING, 1300 PADDOCK DRIVE, SUITE S-10, RALEIGH, N. C. 27609



NC GRID
(NAD 1983)
CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592
155+00
156+00
157+00
MATCH TO SHEET 18 -L- STA. 154+60.000
MATCH TO SHEET 20 -L- STA. 157+90.000
0.6m LAT. BASE DITCH SEE DET. F SHT. 2-B EST. 26 TONS CL 'B' RIP RAP EST. 54 SM F.F.
PROP. R/W
PROPOSED W.W. FENCE
+50.000 50.000 (LT) (164.04')
-05.000 50.000 (LT) (164.04')
+90.000 67.000 (LT) (219.82')
+47.000 69.000 (LT) (226.38')
+80.000 61.000 (LT) (200.13')
SLOPE STAKE
CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM F.F.
END FENCE TIE TO HEADWALL
BEGIN FENCE TIE TO HEADWALL
400 CSP
SEE DETAIL A
-70.000 BEGIN FUT. SHL'D. BERM GUTTER
FUT. CAT-1
FUT. GUARDRAIL
FUT. GRAU-350
+20.000 END FUT. SHL'D. BERM GUTTER
FALSE SUMP SEE DET. B. SHT. 2-B
-LBL 264 POT 157+06.803 -L- (1.826 LT)
FALSE SUMP SEE DET. A. SHT. 2-B
FUTURE PAVEMENT
-L-
N 3°15' 40.5" W
FALSE SUMP SEE DET. B. SHT. 2-B
375 RCP
1050 RCP
450 RCP
-LBL 262 POT 155+30.450 -L- (2.295 RT)
-LBL 263 POT 156+24.371 -L- (1.063 RT)
400 CSP W/ 2 ELBOWS
FALSE SUMP SEE DET. C. SHT. 2-B
CLASS 'B' RIPRAP EST. 4 TONS EST. 9 SM FILTER FABRIC
LAT. 'V' DITCH SEE DET. MM. SHT. 2-D EST. 27 TONS CL 'B' RIP RAP EST. 63 SM F.F.
LAT. 'V' DITCH SEE DET. MM. SHT. 2-D EST. 11 TONS CL 'B' RIP RAP EST. 34 SM F.F.
+50.000 50.000 (RT) (164.04')
+90.000 50.000 (RT) (164.04')
CLASS 'I' RIPRAP EST. 18 TONS EST. 33 SM FILTER FABRIC
+76.000 62.000 (RT) (203.41')
+76.000 80.000 (RT) (262.46')
50.000m (164.04')
WLB

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 46, 47
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-95 THRU X-101

DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	20
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL III

9/10/01

CONST.REV.

R/W REV.

WILBUR SMITH ASSOCIATES
P.O. BOX 2479
RALEIGH, N.C. 27602-2478

TRANSITEC ENGINEERING
1300 MASSACHUSETTS AVENUE, SUITE 8-10
RALEIGH, N.C. 27609

NC GRID (NAD 1983)

CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592

MATCH TO SHEET 19 -L- STA. 157+90.000

MATCH TO SHEET 21 -L- STA. 161+20.000

-LBL 265
POT 158+19.382 -L- (3.229 LT)

-LBL 266
POT 159+69.223 -L- (0.654 LT)

-LBL 267
POT 160+99.973 -L- (0.017 LT)

PROPOSED W.W.FENCE

PROP.R/W

LAT. 'V' DITCH SEE DET.MM, SHT.2-D EST. 5 TONS CL 'B' RIP RAP EST.177 SM F.F.

EST. 47 TONS CL 'B' RIP RAP EST.50 SM F.F.

CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC

10m CHANNEL SEE DET.HH, SHT.2-C

BOULDER (TYPICAL) SEE SHT.2-D

REMOVE AND GRADE TO DRAIN

400 CSP W/ 2 ELBOWS

375 RCP

2.7 x 1.8 RCBC

FUT. GUARDRAIL

FUT. CAT-1

FUTURE PAVEMENT

FALSE SUMP SEE DET.A SHT.2-B FUT. CAT-1

FALSE SUMP SEE DET.B SHT.2-B

FALSE SUMP SEE DET.C SHT.2-B FUT. GRAU-350

SLOPE STAKE

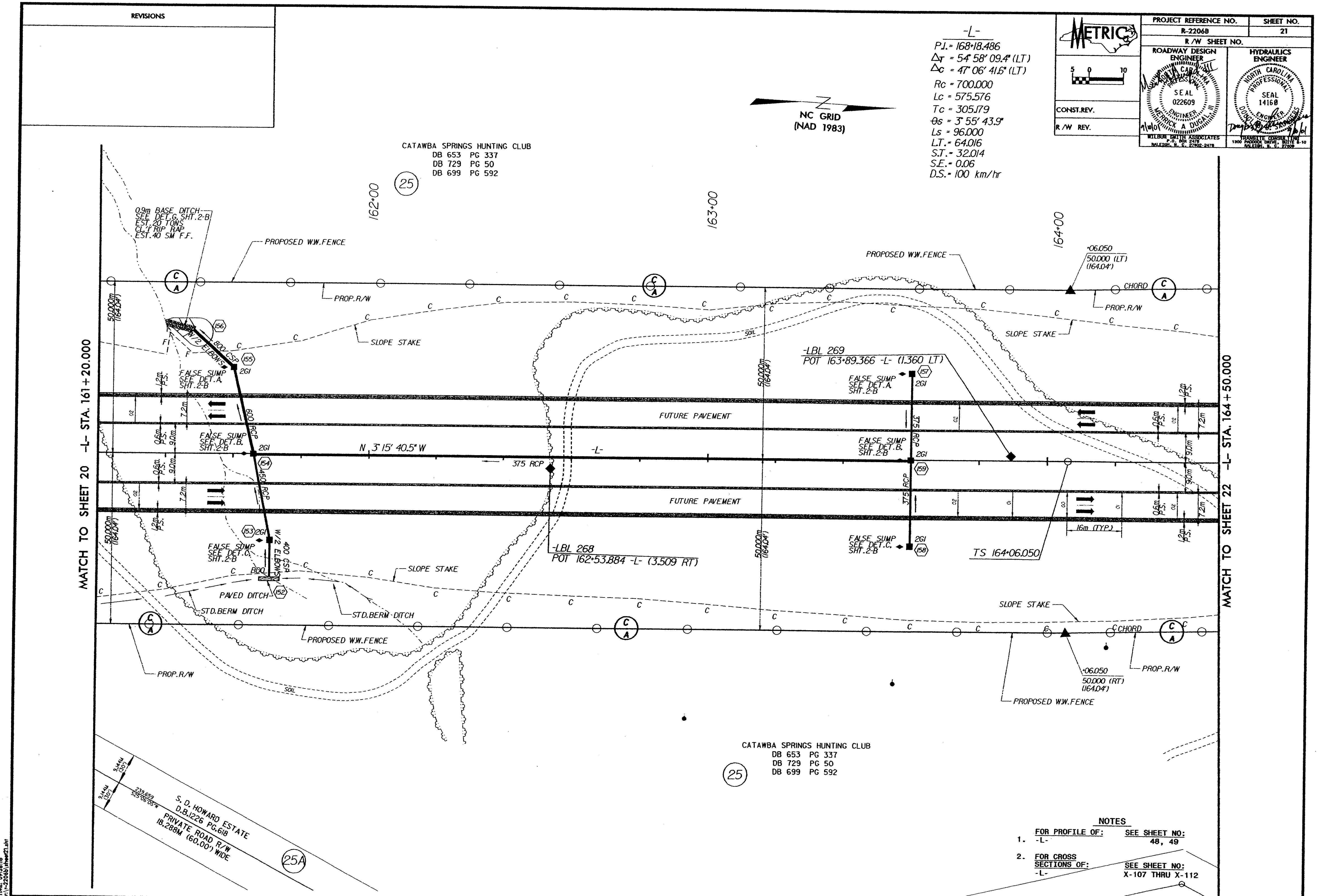
POND

S.D. HOWARD ESTATE D.B.1226 PG.618 PRIVATE ROAD R/W (18.288M (60.00') WIDE

N 3°15'40.5" W

NOTES	
FOR PROFILE OF:	SEE SHEET NO:
1. -L-	47, 48
2. FOR CROSS SECTIONS OF: -L-	SEE SHEET NO: X-102 THRU X-107
2. FOR 2.7 x 1.8 RCBC SEE SHEET NO:	C-12 THRU C-17

DATE: 04 SEP 2001
TIME: 09:37:04
n:\r-2206b\sheet20.shl


REVISIONS
METRIC
PROJECT REFERENCE NO.
R-2206B
SHEET NO.
21
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
WILBUR SMITH ASSOCIATES
TRANBITE CONSULTING
NC GRID (NAD 1983)
-L-
P.I. = 168+18.486
ΔT = 54° 58' 09.4" (LT)
Δc = 47° 06' 41.6" (LT)
Rc = 700.000
Lc = 575.576
Tc = 305.179
θs = 3° 55' 43.9"
Ls = 96.000
L.T. = 64.016
S.T. = 32.014
S.E. = 0.06
D.S. = 100 km/hr
CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592
25
162+00
163+00
164+00
0.9m BASE DITCH
SEE DET.G. SHT.2-B
EST. 20 TONS
CL.1 RIP RAP
EST. 40 SM F.F.
PROPOSED W.W. FENCE
PROP. R/W
SLOPE STAKE
CHORD
+06.050
50.000 (LT)
(164.04')
-LBL 269
POT 163+89.366 -L- (1.360 LT)
FALSE SUMP
SEE DET.A
SHT.2-B
FALSE SUMP
SEE DET.B.
SHT.2-B
FALSE SUMP
SEE DET.C.
SHT.2-B
FUTURE PAVEMENT
N 3° 15' 40.5" W
-L-
375 RCP
600 RCP
450 RCP
800 CSP
W/2 ELBOWS
400 CSP
2GI
-LBL 268
POT 162+53.884 -L- (3.509 RT)
TS 164+06.050
16m (TYP.)
PAVED DITCH
STD. BERM DITCH
SOIL
MATCH TO SHEET 20 -L- STA. 161+20.000
MATCH TO SHEET 22 -L- STA. 164+50.000
+06.050
50.000 (RT)
(164.04')
S. D. HOWARD ESTATE
D.B.1226 PG.618
PRIVATE ROAD R/W
18.288M (60.00') WIDE
25A
NOTES
1. FOR PROFILE OF: -L- SEE SHEET NO: 48, 49
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-107 THRU X-112
DATE: 06 SEP 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	22
R/W SHEET NO.	

METRIC

ROADWAY DESIGN ENGINEER — SEAL 022609 — MERRICK A. DUGAL, III

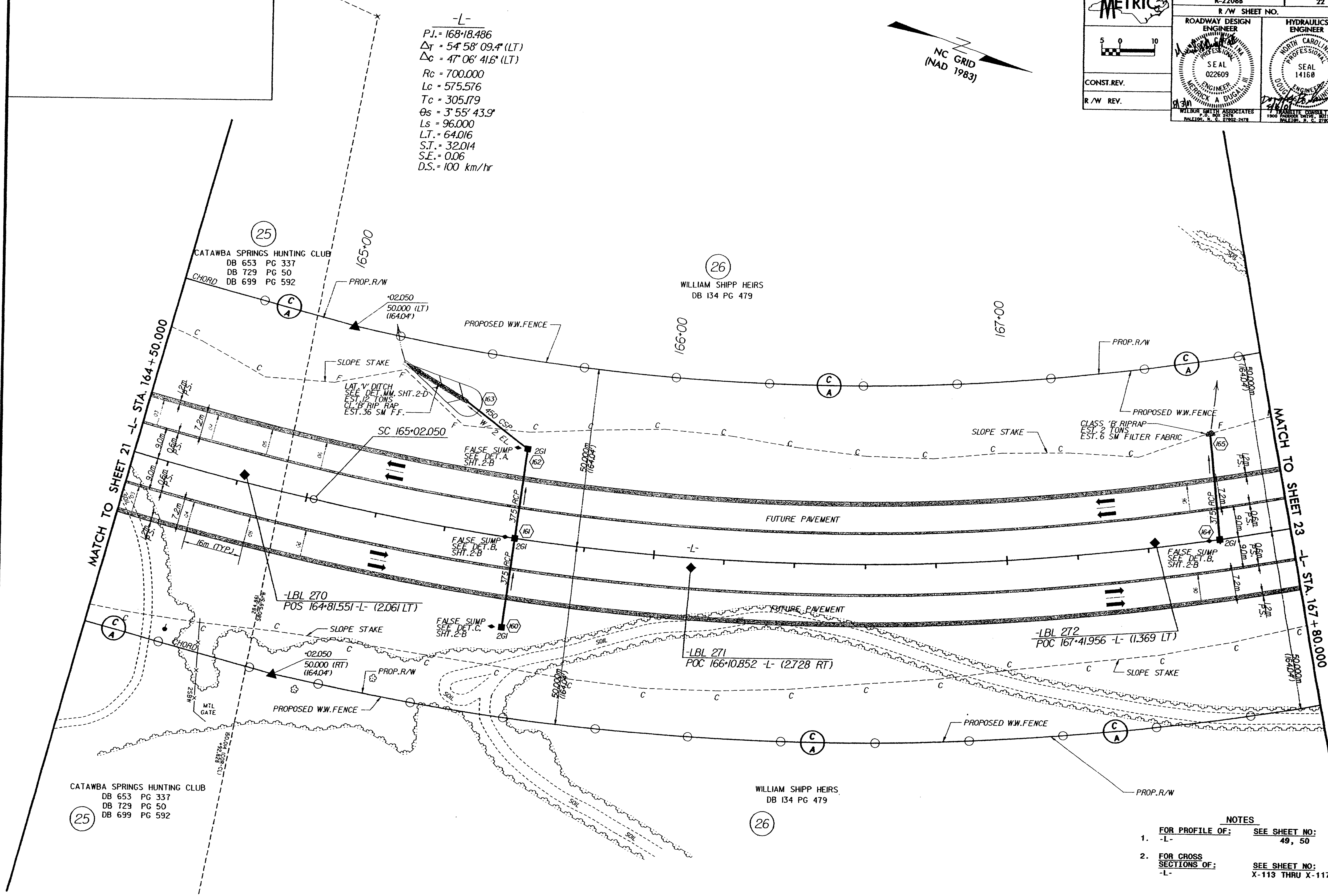
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14160 — DOUGLAS SAUNDERS

CONST. REV.

R/W REV.

WILBUR SMITH ASSOCIATES, P.O. BOX 2476, RALEIGH, N.C. 27602-2476

TRANSITE CONSULTING, 1300 PADDOCK DRIVE, SUITE 6-10, RALEIGH, N.C. 27609



-L-
P.I. = 168+18.486
Δ_T = 54° 58' 09.4" (LT)
Δ_C = 47° 06' 41.6" (LT)
Rc = 700.000
Lc = 575.576
Tc = 305.179
θ_s = 3° 55' 43.9"
Ls = 96.000
L.T. = 64.016
S.T. = 32.014
S.E. = 0.06
D.S. = 100 km/hr
NC GRID (NAD 1983)
CATAWBA SPRINGS HUNTING CLUB
DB 653 PG 337
DB 729 PG 50
DB 699 PG 592
WILLIAM SHIPP HEIRS
DB 134 PG 479
MATCH TO SHEET 21 -L- STA. 164+50.000
MATCH TO SHEET 23 -L- STA. 167+80.000
165+00
166+00
167+00
PROP. R/W
PROPOSED W.W. FENCE
SLOPE STAKE
+02.050
50.000 (LT)
(164.04')
50.000 (RT)
LAT. 'V' DITCH
SEE DET. MM, SHT. 2-D
EST. 12 TONS
CL. 'B' RIP RAP
EST. 36 SM F.F.
450 CSP
W/ 2 EL
SC 165+02.050
FALSE SUMP
SEE DET. A.
SHT. 2-B
SEE DET. B.
SEE DET. C.
2GI
375 RCP
FUTURE PAVEMENT
16m (TYP.)
-LBL 270
POS 164+81.551 -L- (2.061 LT)
-LBL 271
POC 166+10.852 -L- (2.728 RT)
-LBL 272
POC 167+41.956 -L- (1.369 LT)
CLASS 'B' RIPRAP
EST. 2 TONS
EST. 6 SM FILTER FABRIC
CHORD
MTL GATE
SOIL

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 49, 50
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-113 THRU X-117

DATE: 03 AUG 2001

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	23
R/W SHEET NO.	

METRIC

CONST. REV.

R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL III

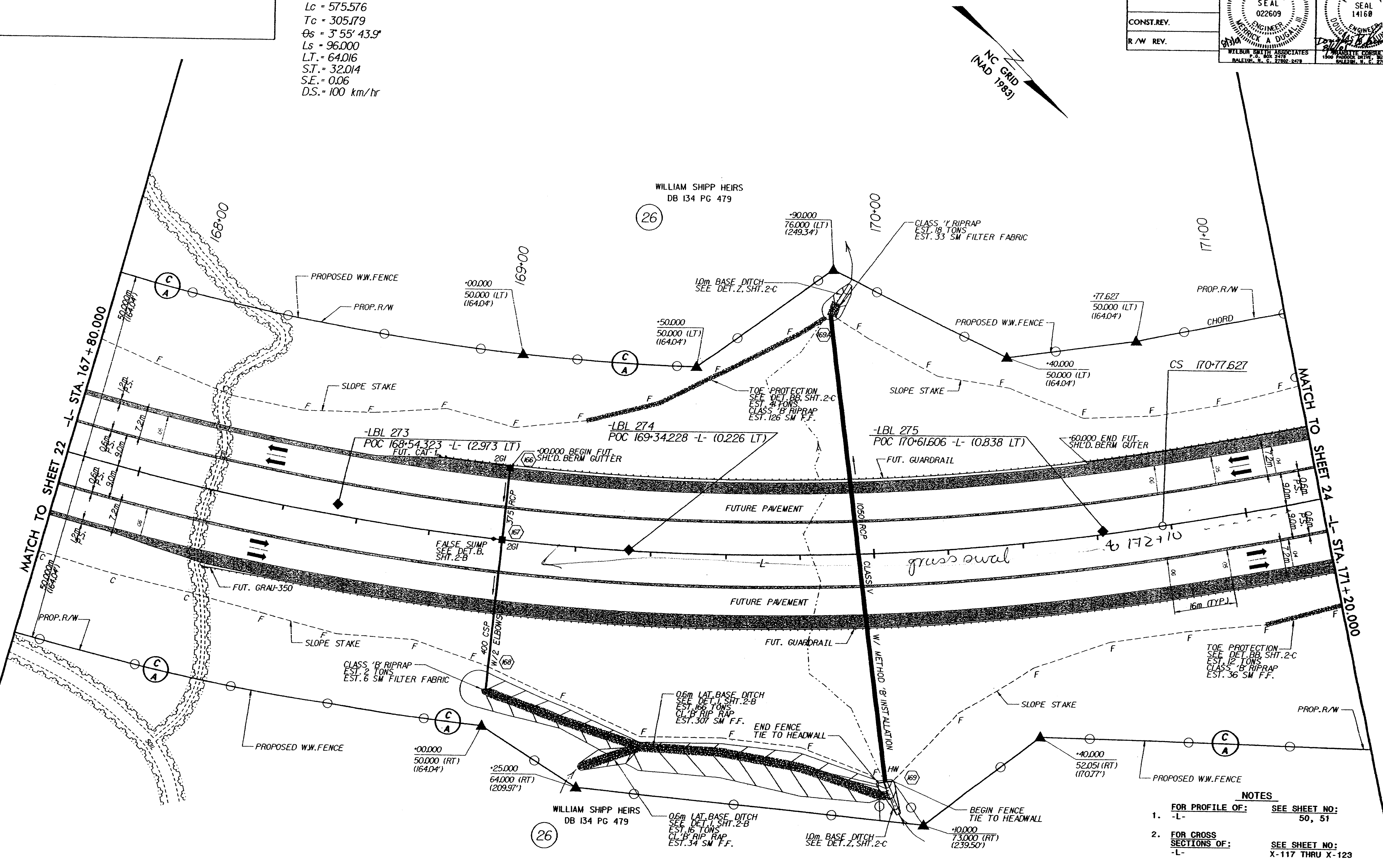
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS F. SAUNDERS

WILBUR SMITH ASSOCIATES P.O. BOX 2479 RALEIGH, N.C. 27602-2479

STANTEC CONSULTING 1300 PADDOCK DRIVE, SUITE G-10 RALEIGH, N.C. 27609

-L-

PI = 168+18.486
Δ_T = 54° 58' 09.4" (LT)
Δ_C = 47° 06' 41.6" (LT)
Rc = 700.000
Lc = 575.576
Tc = 305.179
θ_S = 3° 55' 43.9"
Ls = 96.000
L.T. = 64.016
S.T. = 32.014
S.E. = 0.06
D.S. = 100 km/hr



NC GRID (NAD 1983)
WILLIAM SHIPP HEIRS
DB 134 PG 479
26
MATCH TO SHEET 22 -L- STA. 167+80.000
MATCH TO SHEET 24 -L- STA. 171+20.000
168+00
169+00
170+00
171+00
PROPOSED W.W. FENCE
PROP. R/W
SLOPE STAKE
+00.000 50.000 (LT) (164.04')
+50.000 50.000 (LT) (164.04')
+90.000 76.000 (LT) (249.34')
1.0m BASE DITCH SEE DET. Z, SHT. 2-C
CLASS 'I' RIPRAP EST. 18 TONS EST. 33 SM FILTER FABRIC
TOE PROTECTION SEE DET. BB, SHT. 2-C EST. 41 TONS CLASS 'B' RIPRAP EST. 126 SM F.F.
+77.627 50.000 (LT) (164.04')
+40.000 50.000 (LT) (164.04')
CHORD
CS 170+77.627
-LBL 273 POC 168+54.323 -L- (2.973 LT)
-LBL 274 POC 169+34.228 -L- (0.226 LT)
-LBL 275 POC 170+61.606 -L- (0.838 LT)
FUT. CAT-1
+00.000 BEGIN FUT. SHL'D. BERM GUTTER
+60.000 END FUT. SHL'D. BERM GUTTER
FUT. GUARDRAIL
FUTURE PAVEMENT
375 RCP
1050 RCP
CLASS V
W/ METHOD 'B' INSTALLATION
FALSE SUMP SEE DET. B, SHT. 2-B
2GI
FUT. GRAU-350
400 CSP W/2 ELBOWS
16m (TYP.)
CLASS 'B' RIPRAP EST. 2 TONS EST. 6 SM FILTER FABRIC
0.6m LAT. BASE DITCH SEE DET. I, SHT. 2-B EST. 166 TONS CL.'B' RIP RAP EST. 307 SM F.F.
END FENCE TIE TO HEADWALL
HW
BEGIN FENCE TIE TO HEADWALL
0.6m LAT. BASE DITCH SEE DET. I, SHT. 2-B EST. 16 TONS CL.'B' RIP RAP EST. 34 SM F.F.
1.0m BASE DITCH SEE DET. Z, SHT. 2-C
+00.000 50.000 (RT) (164.04')
+25.000 64.000 (RT) (209.97')
+10.000 73.000 (RT) (239.50')
+40.000 52.051 (RT) (170.77')
TOE PROTECTION SEE DET. BB, SHT. 2-C EST. 12 TONS CLASS 'B' RIPRAP EST. 36 SM F.F.
grass swal
℄ 172+10

NOTES

1. FOR PROFILE OF: -L- — SEE SHEET NO: 50, 51
2. FOR CROSS SECTIONS OF: -L- — SEE SHEET NO: X-117 THRU X-123

DATE: 03 AUG 2001
TIME: 12:51:21
r:\r2206b\sheet23.shx

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	25
R/W SHEET NO.	

METRIC

CONST.REV.

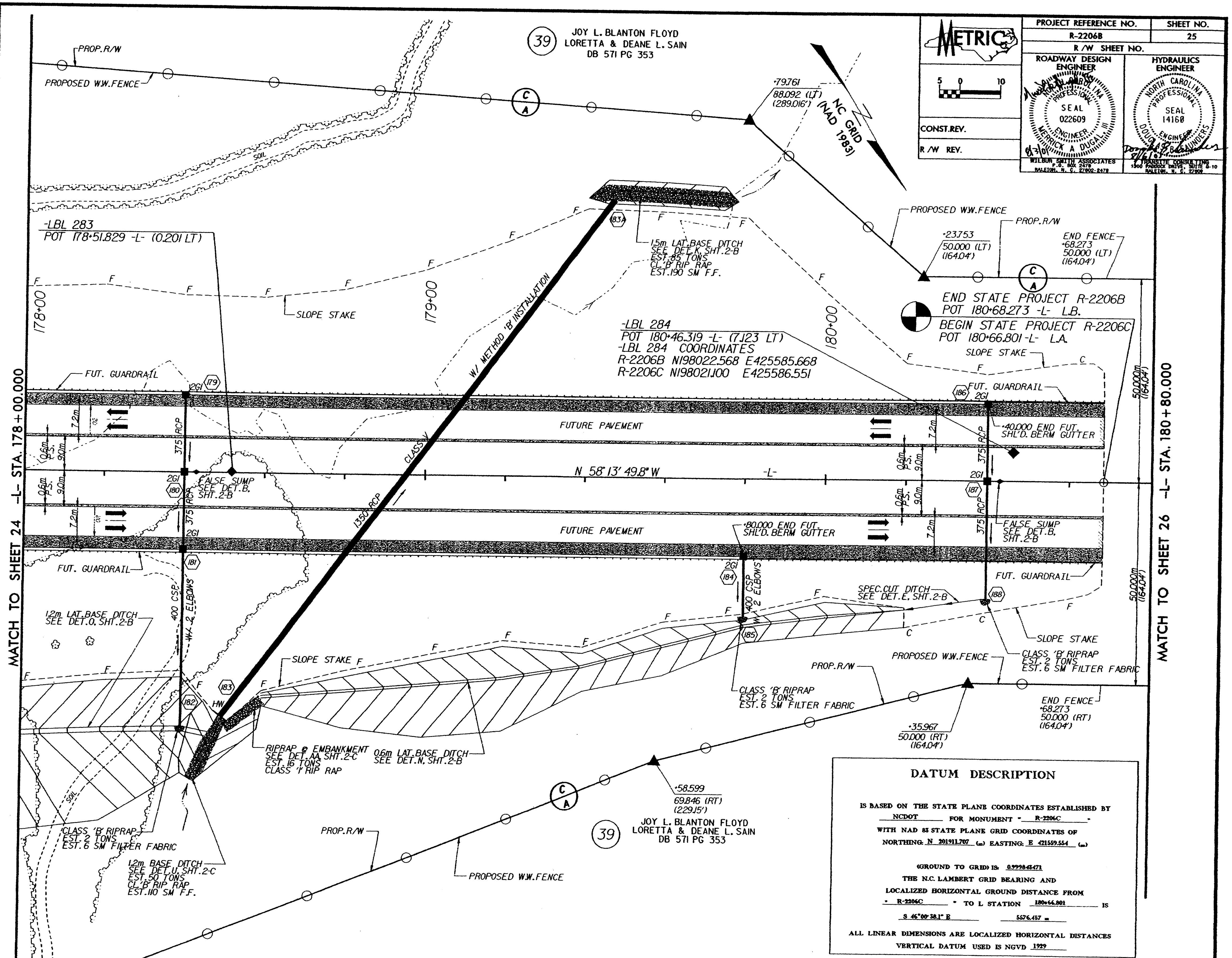
R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A DUGAL, III — 8/3/01

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS B. SAUNDERS — 8/6/01

WILBUR SMITH ASSOCIATES
P.O. BOX 2478
RALEIGH, N. C. 27602-2478

TRANSITE CONSULTING
1300 PADDOCK DRIVE, SUITE G-10
RALEIGH, N. C. 27609



DATUM DESCRIPTION

IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R-2206C" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: N 201911.707 (m) EASTING: E 421559.554 (m)

(GROUND TO GRID) IS: 0.99984347I
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R-2206C" TO L STATION 180+66.801 IS S 46°00'38.1" E 5576.457 m

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

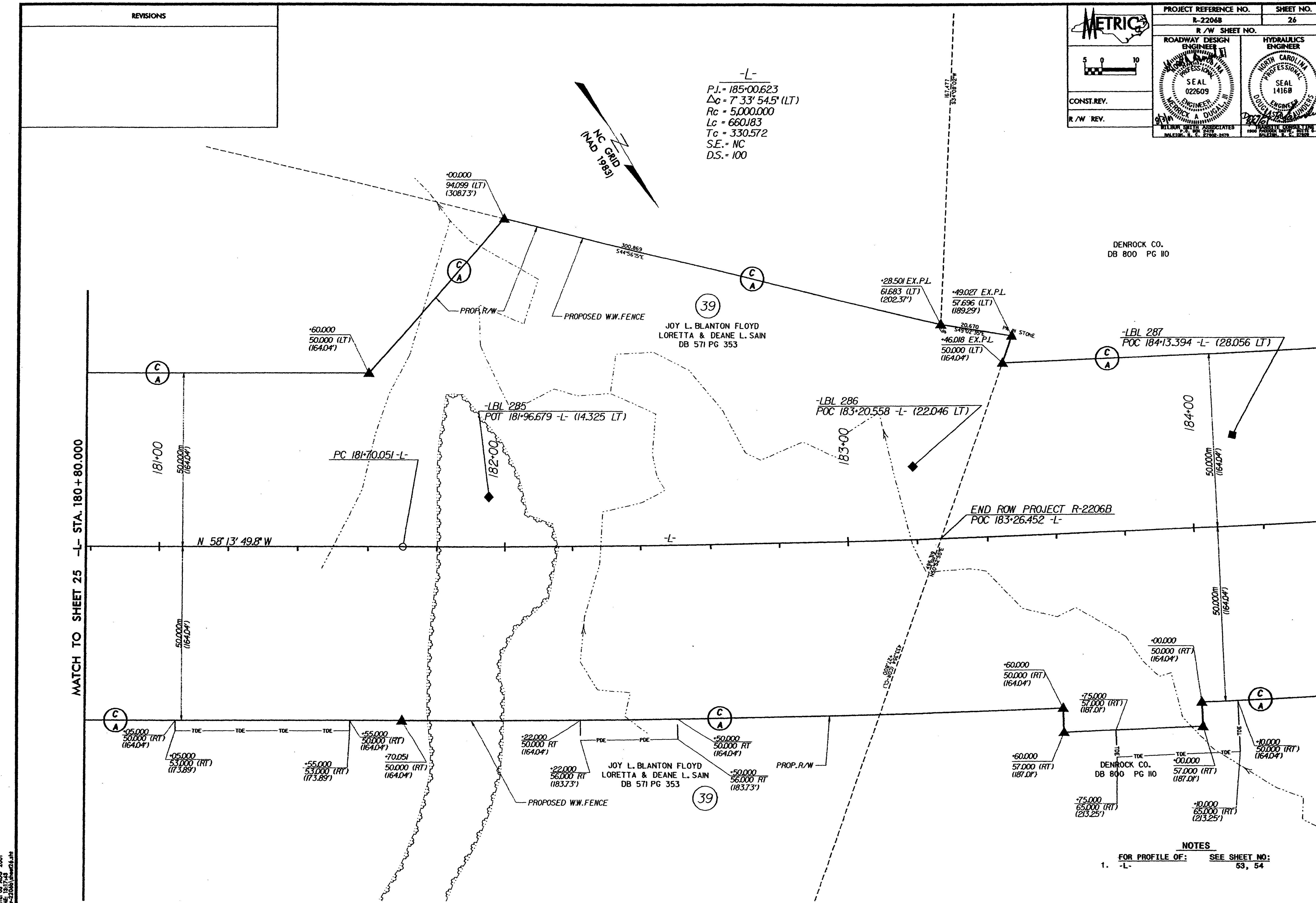
NOTES

1. FOR PROFILE OF: -L- SEE SHEET NO: 53
2. FOR CROSS SECTIONS OF: -L- SEE SHEET NO: X-140 THRU X-146

COORDINATE EQUALITY

R-2206B -L- STA 180+68.273
N 198040.1832 E 4255707535 =
R-2206C -L- STA 180+66.801
N 198038.7150 E 4255716370

DATE: 03 AUG 2001



REVISIONS
METRIC
PROJECT REFERENCE NO.
R-2206B
SHEET NO.
26
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST. REV.
R/W REV.
-L-
P.I. = 185+00.623
Δc = 7° 33' 54.5" (LT)
Rc = 5,000.000
Lc = 660.183
Tc = 330.572
S.E. = NC
D.S. = 100
NC GRID (NAD 1983)
DENROCK CO.
DB 800 PG 110
JOY L. BLANTON FLOYD
LORETTA & DEANE L. SAIN
DB 571 PG 353
39
PROP. R/W
PROPOSED W.W. FENCE
-LBL 285
POT 181+96.679 -L- (14.325 LT)
-LBL 286
POC 183+20.558 -L- (22.046 LT)
-LBL 287
POC 184+13.394 -L- (28.056 LT)
PC 181+70.051 -L-
END ROW PROJECT R-2206B
POC 183+26.452 -L-
N 58° 13' 49.8" W
181+00
182+00
183+00
184+00
MATCH TO SHEET 25 -L- STA. 180+80.000
+28.501 EX. P.L.
61.683 (LT)
(202.37')
+49.027 EX. P.L.
57.696 (LT)
(189.29')
+46.018 EX. P.L.
50.000 (LT)
(164.04')
+00.000
94.099 (LT)
(308.73')
+60.000
50.000 (LT)
(164.04')
50.000m
(164.04')
TDE
PDE
+05.000
50.000 (RT)
(164.04')
+05.000
53.000 (RT)
(173.89')
+55.000
50.000 (RT)
(164.04')
+55.000
53.000 (RT)
(173.89')
+70.051
50.000 (RT)
(164.04')
+22.000
50.000 RT
(164.04')
+22.000
56.000 RT
(183.73')
+50.000
50.000 RT
(164.04')
+50.000
56.000 RT
(183.73')
+60.000
50.000 (RT)
(164.04')
+60.000
57.000 (RT)
(187.01')
+75.000
57.000 (RT)
(187.01')
+75.000
65.000 (RT)
(213.25')
+00.000
50.000 (RT)
(164.04')
+00.000
57.000 (RT)
(187.01')
+10.000
50.000 (RT)
(164.04')
+10.000
65.000 (RT)
(213.25')
PIN STONE
NOTES
FOR PROFILE OF: SEE SHEET NO:
1. -L- 53, 54
DATE: 08 AUG 2001

PROJECT REFERENCE NO.	SHEET NO.
R-2206B	31
R/W SHEET NO.	

METRIC

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022609 ENGINEER MERRICK A. DUGAL III

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 14160 ENGINEER DOUGLAS B. SAUNDERS

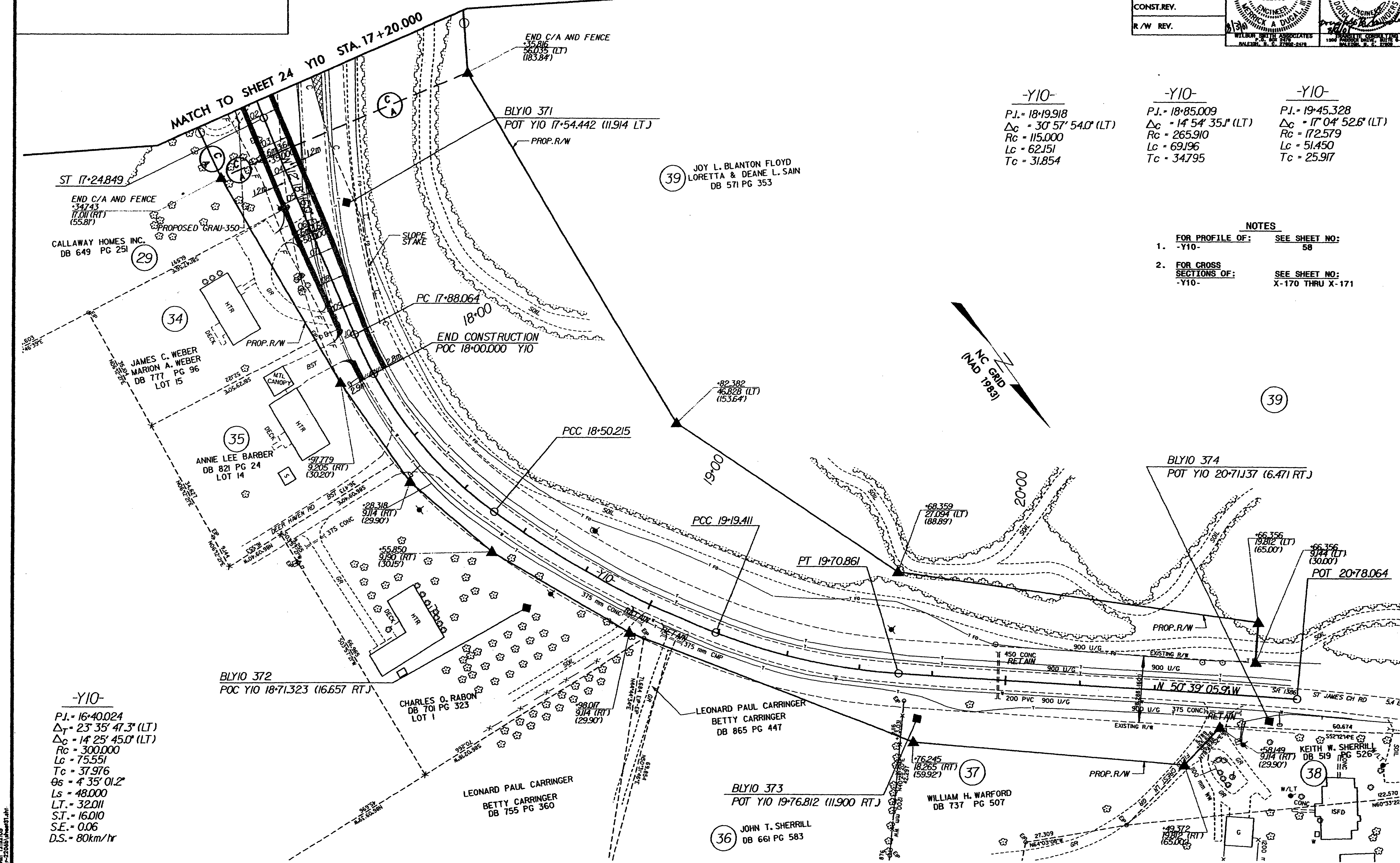
WILBUR SMITH ASSOCIATES P.O. BOX 2478 RALEIGH, N. C. 27602-2478

TRANSITE CONSULTING 1300 PADDOCK DRIVE, SUITE 5-10 RALEIGH, N. C. 27609

REVISIONS

CONST. REV.

R/W REV.



MATCH TO SHEET 24 Y10 STA. 17+20.000
ST 17+24.849
END C/A AND FENCE +34.743 17.011 (RT) (55.81')
PROPOSED GRAU-350
CALLAWAY HOMES INC. DB 649 PG 251
29
END C/A AND FENCE +35.816 56.035 (LT) (183.84')
BLY10 371
POT Y10 17+54.442 (11.914 LT.)
PROP. R/W
JOY L. BLANTON FLOYD LORETTA & DEANE L. SAIN DB 571 PG 353
39
SLOPE STAKE
PC 17+88.064
18+00
END CONSTRUCTION
POC 18+00.000 Y10
34
JAMES C. WEBER MARION A. WEBER DB 777 PG 96 LOT 15
MTL CANOPY
35
ANNIE LEE BARBER DB 821 PG 24 LOT 14
+97.779 9.205 (RT) (30.20')
DEER HAVEN RD
+28.318 9.114 (RT) (29.90')
PCC 18+50.215
+82.382 46.828 (LT) (153.64')
NC GRID (NAD 1983)
19+00
20+00
+55.850 9.190 (RT) (30.15')
-Y10-
375 mm CONC
375 mm CMP
PCC 19+19.411
PT 19+70.861
+68.359 27.094 (LT) (88.89')
BLY10 374
POT Y10 20+71.137 (6.471 RT.)
+66.356 19.812 (LT) (65.00')
+66.356 9.144 (LT) (30.00')
POT 20+78.064
PROP. R/W
EXISTING R/W
900 U/G
450 CONC RETAIN
200 PVC
N 50° 39' 05.9" W
ST JAMES CH RD
BLY10 372
POC Y10 18+71.323 (16.657 RT.)
CHARLES O. RABON DB 701 PG 323 LOT 1
+98.017 9.114 (RT) (29.90')
LEONARD PAUL CARRINGER BETTY CARRINGER DB 865 PG 447
+76.245 18.265 (RT) (59.92')
37
WILLIAM H. WARFORD DB 737 PG 507
BLY10 373
POT Y10 19+76.812 (11.900 RT.)
LEONARD PAUL CARRINGER BETTY CARRINGER DB 755 PG 360
36
JOHN T. SHERRILL DB 661 PG 583
+58.149 9.114 (RT) (29.90')
KEITH W. SHERRILL DB 519 PG 526
38
ISFD
+49.372 19.812 (RT) (65.00')

-Y10-
P.I. = 16+40.024
Δ_T = 23° 35' 47.3" (LT)
Δ_C = 14° 25' 45.0" (LT)
Rc = 300.000
Lc = 75.551
Tc = 37.976
θs = 4° 35' 01.2"
Ls = 48.000
L.T. = 32.011
S.T. = 16.010
S.E. = 0.06
D.S. = 80km/hr

-Y10-
P.I. = 18+19.918
Δ_C = 30° 57' 54.0" (LT)
Rc = 115.000
Lc = 62.151
Tc = 31.854

-Y10-
P.I. = 18+85.009
Δ_C = 14° 54' 35.1" (LT)
Rc = 265.910
Lc = 69.196
Tc = 34.795

-Y10-
P.I. = 19+45.328
Δ_C = 17° 04' 52.6" (LT)
Rc = 172.579
Lc = 51.450
Tc = 25.917

NOTES

1. FOR PROFILE OF: -Y10- — SEE SHEET NO: 58
2. FOR CROSS SECTIONS OF: -Y10- — SEE SHEET NO: X-170 THRU X-171

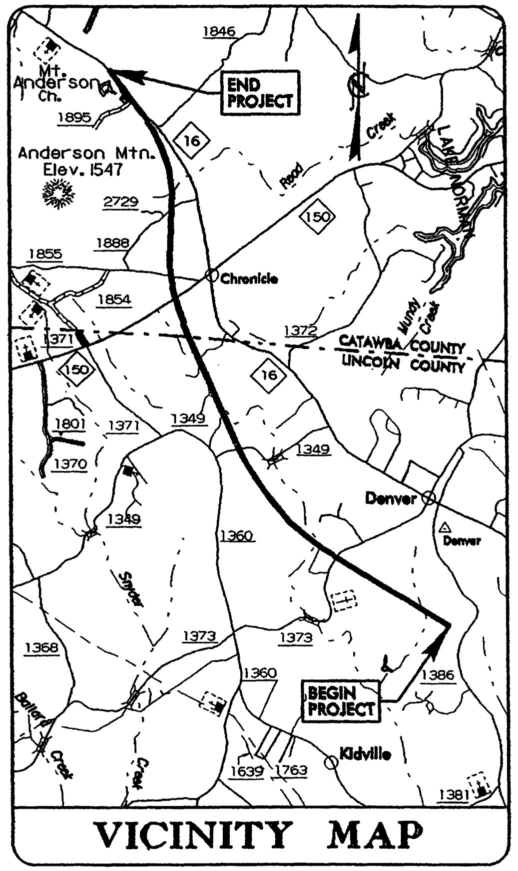
DATE: 02 AUG 2001

9/09/99

TIP PROJECT: R-2206C

CONTRACT:

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



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2206C	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34383.1.1	STP-F-24-1(34)	P.E.
34383.2.1	STP-16(12)	R/W

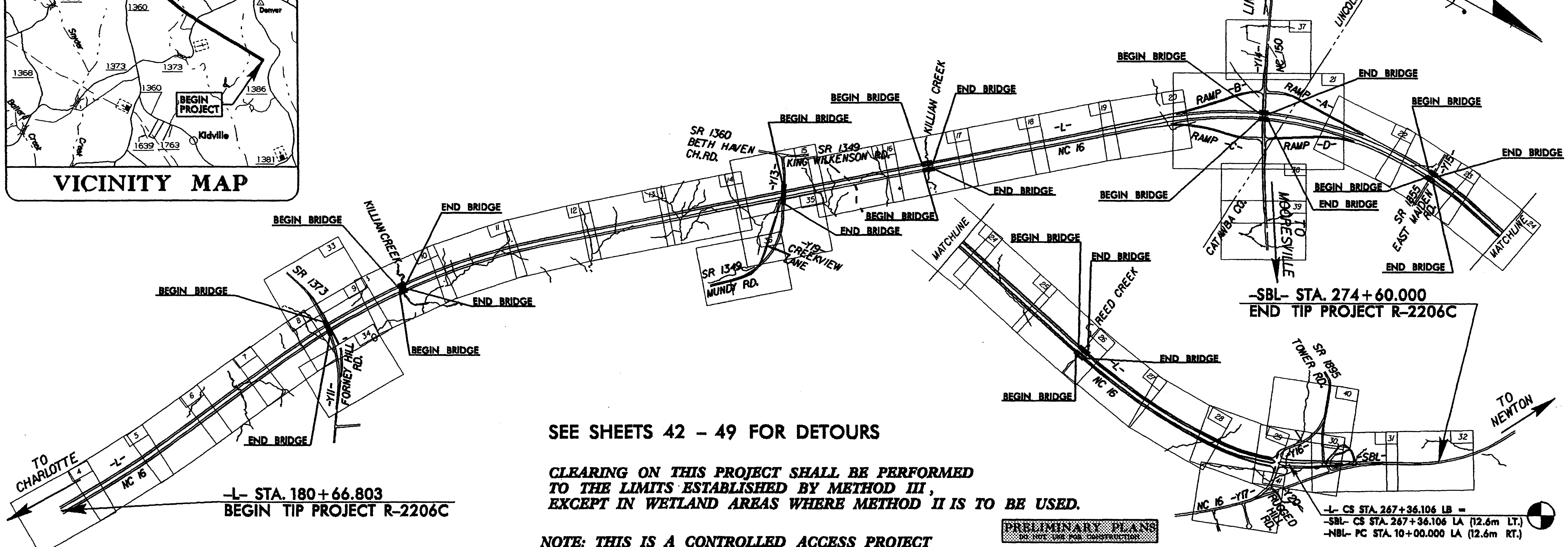
METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN

LINCOLN & CATAWBA COUNTIES

***LOCATION:** NC 16 FROM NORTH OF SR 1386 IN LINCOLN CO. TO NORTH OF SR 1895 NEAR CHRONICLE IN CATAWBA CO.*

***TYPE OF WORK:** GRADING, DRAINAGE, STRUCTURES, AND -Y- LINE PAVING*



SEE SHEETS 42 - 49 FOR DETOURS

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III, EXCEPT IN WETLAND AREAS WHERE METHOD II IS TO BE USED.

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

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

5 0 10 — PLANS

5 0 10 — PROFILE (HORIZONTAL)

1 0 2 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 6,150
ADT 2025 = 11,800
DHV = 11%
D = 58%
T = 13% *
V = 100 km/h
*(DUALS = 6% & TTST = 7%)
FUNC CLASS = ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2206C =
LENGTH STRUCTURES TIP PROJECT R-2206C =
TOTAL LENGTH OF TIP PROJECT R-2206C = 9.392 km

Prepared in the Office of:

DIVISION OF HIGHWAYS

1000 Birch Ridge Dr., Raleigh, NC 27610

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 20, 2002

LETTING DATE:
AUGUST 17, 2004

RONALD D. ALLEN PE
PROJECT ENGINEER

JEANIE TYSON
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*

04-NOV-2003 10:03

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2206C	4
CONST.REV.	R/W SHEET NO.	
R/W REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

PROJECT R-2206B

COORDINATE EQUALITY
R-2206B -L- STA. 180+68.273
N 198040.1829 E 425570.7538 =
R-2206C -L- STA. 180+66.801
N 198038.7150 E 425571.6370

NAD 83

-L- STA.180+68.273 LB
END PROJECT R-2206B
END CONST.
-L- STA.180+66.801 LA
BEGIN PROJECT R-2206C
BEGIN CONST.

-BL- 284 ON PROJECT R-2206B: N = 198,022.568
E = 425,585.568
-BL- 284 ON PROJECT R-2206C: N = 198,021.100
E = 425,586.551

-BL- 284

JOY L. BLANTON FLOYD
LORETTA & DEANE L. SAIN
DB 571 PG 353

CONNECT TO FENCE ON R-2206B

+66.801
50.000m
(164.04ft)

CONNECT TO GUARDRAIL ON R-2206B

BEG. FUTURE SHLDR. BERM GUTTER
180+60

BEG. FUTURE SHLDR. BERM GUTTER
181+20

-L- PC STA.181+70.051

+60.000
50.000m
(164.04ft)

+00.000
94.099m (308.73ft)
(EXIST. PROP. LINE)

PROPOSED NATURAL STREAM DESIGN
SEE SHEET 2

CLASS 'I' RIP RAP
EST. 30 MTONS
FILTER FABRIC
EST. 52 SM.

CLASS 'I' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 18.4 SM.

0.6m LAT. BASE DITCH
W/CL 'I' RIP RAP
EST. 145 MTONS
FILTER FABRIC
EST. 228 SM
EST. DDE = ?
(SEE DETAIL ?)

300.869
S 44°56'15" E

PROPOSED W. W. FENCE

-BL- 285
-L- STA 181+95.275
14.261 (LT)

1 @ 1.5m x 1.5m RCBC

1.2m P.S.

FUTURE GUARDRAIL

2GI

N 60° 58' 20.7" W

N 58° 13' 49.8" W

N 62° 21' 59.4" W

FUTURE PAVEMENT

FALSE SUMP (SEE SHEET ?)

0.6m P.S.

7.2m

0.2

18.0m

375

180

181

182

183

-L-

FUTURE GUARDRAIL

750 CL IV METHOD 'B' INSTALL

1200 CL IV METHOD 'B' INSTALL

CONNECT TO FENCE ON R-2206B

+66.801
50.000m
(164.04ft)

TDE

+05.000
50.000m (164.04ft) &
53.000m (173.89ft)

+55.000
50.000m (164.04ft) &
53.000m (173.89ft)

+70.051
50.000m
(164.04ft)

PDE

+22.000
50.000m (164.04ft) &
56.000m (183.73ft)

+50.000
50.000m (164.04ft) &
56.000m (183.73ft)

LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 45 MTONS
FILTER FABRIC
EST. 93 SM
EST. DDE = ?
(SEE DETAIL ?)

TOE PROTECTION
W/CL 'B' RIP RAP
EST. 81 MTONS
FILTER FABRIC
EST. 168 SM
(SEE DETAIL ?).

PROPOSED W. W. FENCE

HEADWALL W/ IMPROVED INLET

JOY L. BLANTON FLOYD
LORETTA & DEANE L. SAIN
DB 571 PG 353

-L-
PI Sta 185+00.623
Δ = 7° 33' 54.5" (LT)
L = 660.183
T = 330.572
R = 5,000.000
e = NC

MATCHLINE SEE SHEET 5
-L- STA. 183+00.000

SEE SHEET 50 FOR -L- PROFILE

DATUM DESCRIPTION

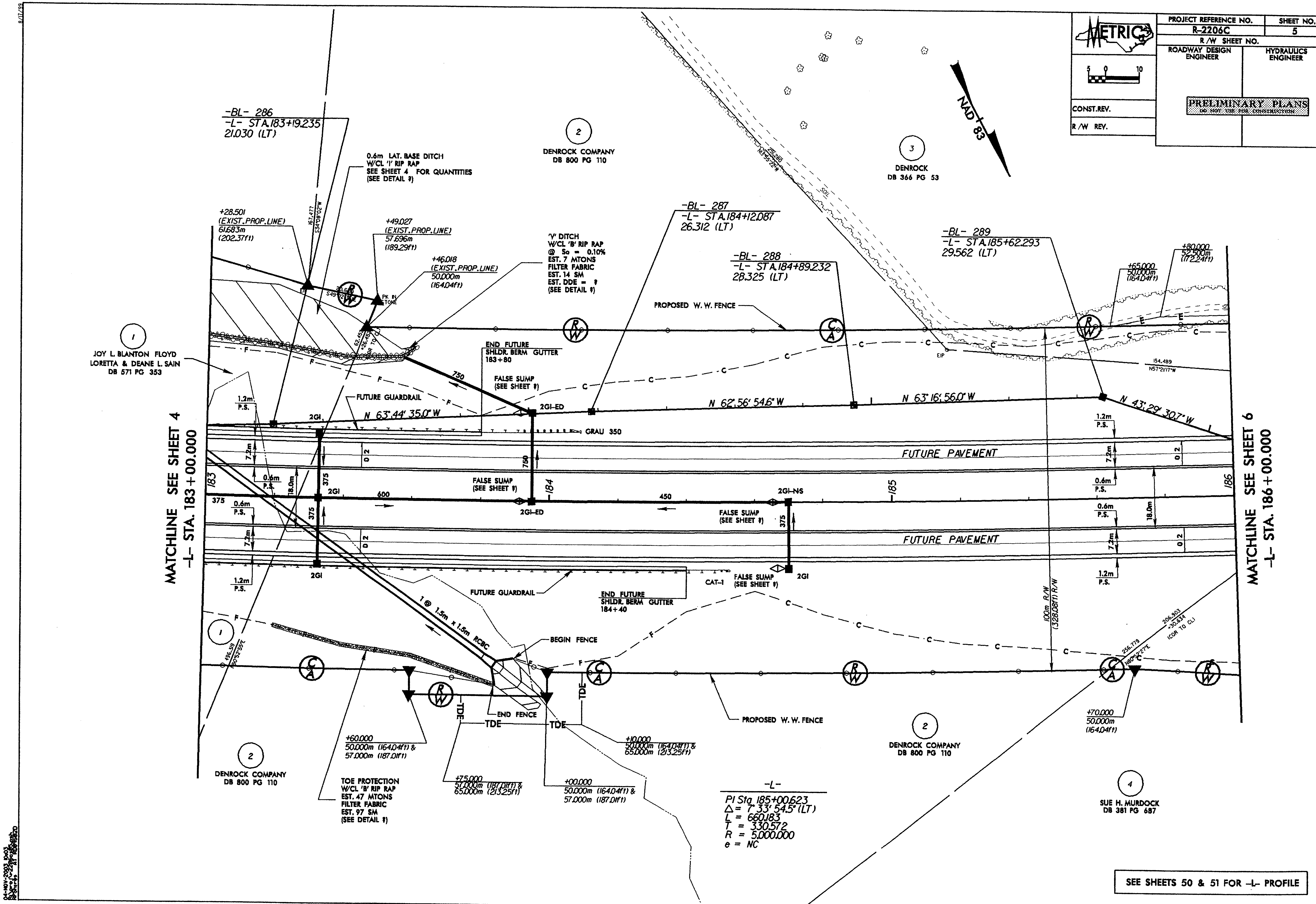
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R-2206C" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 201911.707(m.) EASTING: 721659.464(m.)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9996457I

THE N.C. LAMBERT GRID BEARING LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R-2206C" TO -L- STATION 180+66.801 IS
S 45 00 38.1 E 6,576.457m.

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES

VERTICAL DATUM USED IS NGVD 29

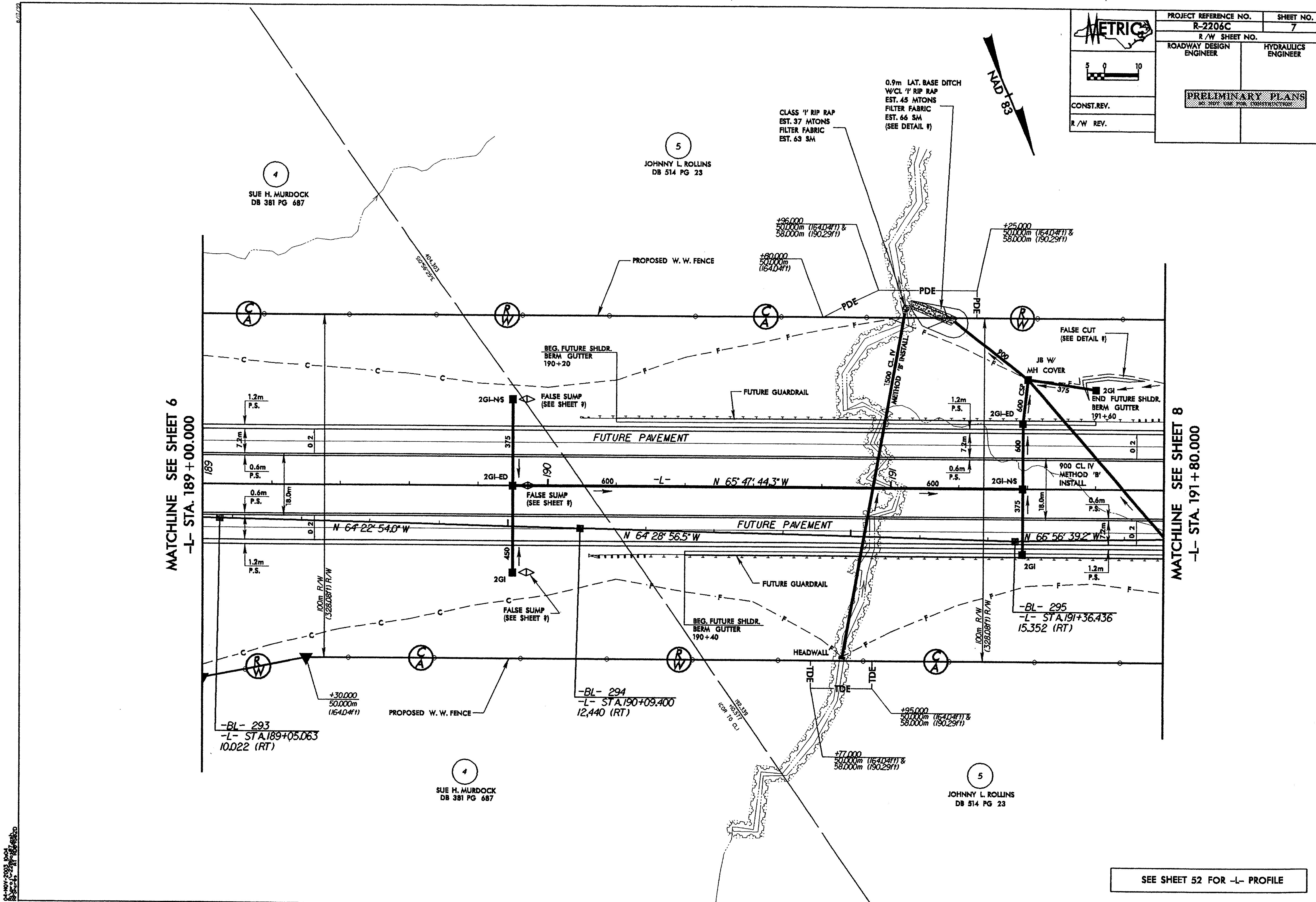


PROJECT REFERENCE NO.
R-2206C
SHEET NO.
5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
METRIC
CONST.REV.
R/W REV.
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
-BL- 286
-L- STA.183+19.235
21.030 (LT)
2
DENROCK COMPANY
DB 800 PG 110
3
DENROCK
DB 366 PG 53
0.6m LAT. BASE DITCH
W/CL 'I' RIP RAP
SEE SHEET 4 FOR QUANTITIES
(SEE DETAIL #)
+28.501
(EXIST.PROP.LINE)
61.683m
(202.37ft)
+49.027
(EXIST.PROP.LINE)
57.696m
(189.29ft)
+46.018
(EXIST.PROP.LINE)
50.000m
(164.04ft)
'V' DITCH
W/CL 'B' RIP RAP
@ So = 0.10%
EST. 7 MTONS
FILTER FABRIC
EST. 14 SM
EST. DDE = #
(SEE DETAIL #)
-BL- 287
-L- STA.184+12.087
26.312 (LT)
-BL- 288
-L- STA.184+89.232
28.325 (LT)
-BL- 289
-L- STA.185+62.293
29.562 (LT)
+80.000
52.500m
(172.24ft)
+65.000
50.000m
(164.04ft)
PROPOSED W. W. FENCE
1
JOY L. BLANTON FLOYD
LORETTA & DEANE L. SAIN
DB 571 PG 353
END FUTURE
SHLDR. BERM GUTTER
183+80
FALSE SUMP
(SEE SHEET #)
FUTURE GUARDRAIL
N 63°44' 35.0" W
N 62°56' 54.6" W
N 63°16' 56.0" W
N 43°29' 30.7" W
2GI-ED
GRAU 350
FUTURE PAVEMENT
MATCHLINE SEE SHEET 4
-L- STA. 183+00.000
MATCHLINE SEE SHEET 6
-L- STA. 186+00.000
2GI
2GI-NS
2GI-ED
600
450
375
750
18.0m
7.2m
1.2m
P.S.
0.6m
183
184
185
186
FALSE SUMP
(SEE SHEET #)
CAT-1
FUTURE GUARDRAIL
END FUTURE
SHLDR. BERM GUTTER
184+40
1 @ 1.5m x 1.5m RCBC
BEGIN FENCE
END FENCE
100m R/W
(328.08ft) R/W
TDE
+60.000
50.000m (164.04ft) &
57.000m (187.01ft)
TOE PROTECTION
W/CL 'B' RIP RAP
EST. 47 MTONS
FILTER FABRIC
EST. 97 SM
(SEE DETAIL #)
+75.000
57.000m (187.01ft) &
65.000m (213.25ft)
+10.000
50.000m (164.04ft) &
65.000m (213.25ft)
+00.000
50.000m (164.04ft) &
57.000m (187.01ft)
PROPOSED W. W. FENCE
+70.000
50.000m
(164.04ft)
2
DENROCK COMPANY
DB 800 PG 110
4
SUE H. MURDOCK
DB 381 PG 687
-L-
PI Sta 185+00.623
Δ = 7°33' 54.5" (LT)
L = 660.183
T = 330.572
R = 5,000.000
e = NC
SEE SHEETS 50 & 51 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.
R/W REV.



METRIC
NAD 83
0.9m LAT. BASE DITCH
W/CL 'I' RIP RAP
EST. 45 MTONS
FILTER FABRIC
EST. 66 SM
(SEE DETAIL #)
CLASS 'I' RIP RAP
EST. 37 MTONS
FILTER FABRIC
EST. 63 SM
JOHNNY L. ROLLINS
DB 514 PG 23
SUE H. MURDOCK
DB 381 PG 687
PROPOSED W. W. FENCE
BEG. FUTURE SHLDR. BERM GUTTER 190+20
FUTURE GUARDRAIL
FALSE SUMP (SEE SHEET #)
FUTURE PAVEMENT
N 65° 47' 44.3" W
N 64° 22' 54.0" W
N 64° 28' 56.5" W
N 66° 56' 39.2" W
FALSE CUT (SEE DETAIL #)
JB W/ MH COVER
END FUTURE SHLDR. BERM GUTTER 191+60
900 CL. IV METHOD 'B' INSTALL
1500 CL. IV METHOD 'B' INSTALL
HEADWALL
MATCHLINE SEE SHEET 6
-L- STA. 189+00.000
MATCHLINE SEE SHEET 8
-L- STA. 191+80.000
-BL- 293
-L- STA.189+05.063
10.022 (RT)
-BL- 294
-L- STA.190+09.400
12.440 (RT)
-BL- 295
-L- STA.191+36.436
15.352 (RT)
100m R/W (328.08ft) R/W
SEE SHEET 52 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	8
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

NAD 83

-L-
PI Sta 199+75.908
Δ = 25° 54' 22.0" (RT)
L = 1,356.440
T = 690.016
R = 3,000.000
e = 0.02
RO = 35m

5
JOHNNY L. ROLLINS
DB 514 PG 23

+85.893
50.000m
(164.04ft)

PROPOSED W. W. FENCE

CLASS 'I' RIP RAP
EST. 3.6 MTONS
FILTER FABRIC
EST. 8.4 SM

5
JOHNNY L. ROLLINS
DB 514 PG 23

SPECIAL LAT. 'V' DITCH
SEE DITCH GRADE
(SEE DETAIL 9)

-L- PC STA.192+85.893

FALSE CUT
(SEE DETAIL 9)

100m R/W
(328.08ft R/W)

FALSE SUMP
(SEE SHEET 9)

2GI-N/S

1.2m P.S.

+27.560

17.5m TYP.

FUTURE PAVEMENT

7.2m

0.6m P.S.

10.8m

450

N 65° 41' 44.3" W

-L-

N 66° 56' 39.2" W

N 62° 04' 26.9" W

N 61° 48' 49.1" W

N 58° 01' 21.5" W

FALSE SUMP
(SEE SHEET 9)

2GI

FUTURE GUARDRAIL

900 CL. IV
METHOD 'B'
INSTALL.

HEADWALL

400 CSP w/
2 ELBOWS

-BL- 298
-L- STA.194+17.472
23.611 (RT)

203.752
S84°42'11"E

450 CSP w/
2 ELBOWS

BDO

-BL- 296
-L- STA.192+25.350
13.570 (RT)

+85.893
50.000m
(164.04ft)

-BL- 297
-L- STA.193+12.034
19.084 (RT)

BERM 'V' DITCH
EST. DDE = ?
(SEE DETAIL 9)

CLASS 'B' RIP RAP
EST. 2.7 MTONS
FILTER FABRIC
EST. 5.9 SM

BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 20 MTONS
FILTER FABRIC
EST. 60 SM
EST. DDE = ?
(SEE DETAIL 9)

282.410
N87°05'44"W

6
HERBERT G. LEWIS
DB 619 PG 715

PROPOSED W. W. FENCE

END FUTURE SHLDR.
BERM GUTTER
192+00

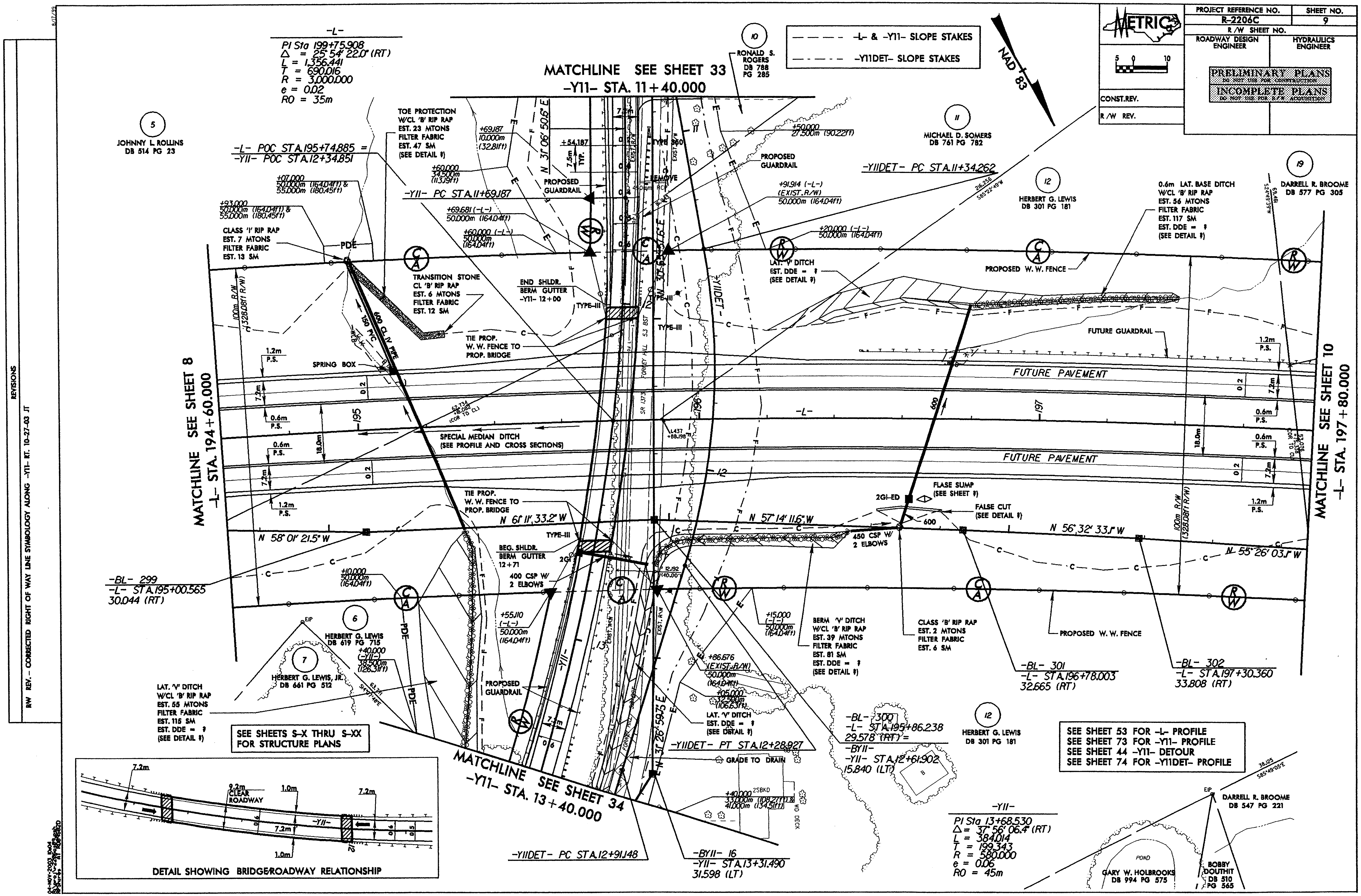
5
JOHNNY L. ROLLINS
DB 514 PG 23

13
THOMPSON MEM. EVAN. METH. CHURCH
DEED NOT FOUND

MATCHLINE SEE SHEET 7
-L- STA. 191+80.000

MATCHLINE SEE SHEET 9
-L- STA. 194+60.000

SEE SHEETS 52 & 53 FOR -L- PROFILE



METRIC
PROJECT REFERENCE NO. R-2206C
SHEET NO. 9
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
CONST. REV.
R/W REV.
NAD 83
REVISIONS
RW REV. - CORRECTED RIGHT OF WAY LINE SYMBOLOGY ALONG -Y11- RT. 10-27-03 JT
-L- & -Y11- SLOPE STAKES
-Y11DET- SLOPE STAKES
MATCHLINE SEE SHEET 33 -Y11- STA. 11+40.000
MATCHLINE SEE SHEET 34 -Y11- STA. 13+40.000
MATCHLINE SEE SHEET 8 -L- STA. 194+60.000
MATCHLINE SEE SHEET 10 -L- STA. 197+80.000
-L-
PI Sta 199+75.908
Δ = 25° 54' 22.0" (RT)
L = 1,356.441
T = 690.016
R = 3,000.000
e = 0.02
RO = 35m
-Y11-
PI Sta 13+68.530
Δ = 37° 56' 06.4" (RT)
L = 384.014
T = 199.343
R = 580.000
e = 0.06
RO = 45m
JOHNNY L. ROLLINS DB 514 PG 23
RONALD S. ROGERS DB 788 PG 285
MICHAEL D. SOMERS DB 761 PG 782
HERBERT G. LEWIS DB 301 PG 181
DARRELL R. BROOME DB 577 PG 305
HERBERT G. LEWIS DB 619 PG 715
HERBERT G. LEWIS, JR. DB 661 PG 512
GARY W. HOLBROOKS DB 994 PG 575
BOBBY DOUTHIT DB 510 PG 565
DARRELL R. BROOME DB 547 PG 221
-L- POC STA.195+74.885 = -Y11- POC STA.12+34.851
-Y11- PC STA.11+69.187
-Y11DET- PC STA.11+34.262
-Y11DET- PT STA.12+28.927
-Y11DET- PC STA.12+91.148
-BL- 299 -L- STA.195+00.565 30.044 (RT)
-BL- 300 -L- STA.195+86.238 29.578 (RT) = -BY11- -Y11- STA.12+61.902 15.840 (LT)
-BL- 301 -L- STA.196+78.003 32.665 (RT)
-BL- 302 -L- STA.197+30.360 33.808 (RT)
-BY11- 16 -Y11- STA.13+31.490 31.598 (LT)
TOE PROTECTION W/CL 'B' RIP RAP EST. 23 MTONS FILTER FABRIC EST. 47 SM (SEE DETAIL #)
CLASS 'I' RIP RAP EST. 7 MTONS FILTER FABRIC EST. 13 SM
TRANSITION STONE CL 'B' RIP RAP EST. 6 MTONS FILTER FABRIC EST. 12 SM
0.6m LAT. BASE DITCH W/CL 'B' RIP RAP EST. 56 MTONS FILTER FABRIC EST. 117 SM EST. DDE = # (SEE DETAIL #)
LAT. 'V' DITCH EST. DDE = # (SEE DETAIL #)
LAT. 'V' DITCH W/CL 'B' RIP RAP EST. 55 MTONS FILTER FABRIC EST. 115 SM EST. DDE = # (SEE DETAIL #)
BERM 'V' DITCH W/CL 'B' RIP RAP EST. 39 MTONS FILTER FABRIC EST. 81 SM EST. DDE = # (SEE DETAIL #)
CLASS 'B' RIP RAP EST. 2 MTONS FILTER FABRIC EST. 6 SM
PROPOSED GUARDRAIL
FUTURE GUARDRAIL
PROPOSED W. W. FENCE
TIE PROP. W. W. FENCE TO PROP. BRIDGE
END SHLDR. BERM GUTTER -Y11- 12+00
BEG. SHLDR. BERM GUTTER 12+71
SPECIAL MEDIAN DITCH (SEE PROFILE AND CROSS SECTIONS)
FUTURE PAVEMENT
SPRING BOX
600 CL IV PIPE
400 CSP W/ 2 ELBOWS
450 CSP W/ 2 ELBOWS
FLASE SUMP (SEE SHEET #)
FALSE CUT (SEE DETAIL #)
GRADE TO DRAIN
N 58° 01' 21.5" W
N 61° 11' 33.2" W
N 57° 14' 11.6" W
N 56° 32' 33.5" W
N 55° 26' 03.5" W
N 31° 06' 50.6" E
N 31° 26' 59.5" E
SEE SHEETS S-X THRU S-XX FOR STRUCTURE PLANS
SEE SHEET 53 FOR -L- PROFILE
SEE SHEET 73 FOR -Y11- PROFILE
SEE SHEET 44 -Y11- DETOUR
SEE SHEET 74 FOR -Y11DET- PROFILE
DETAIL SHOWING BRIDGE/ROADWAY RELATIONSHIP

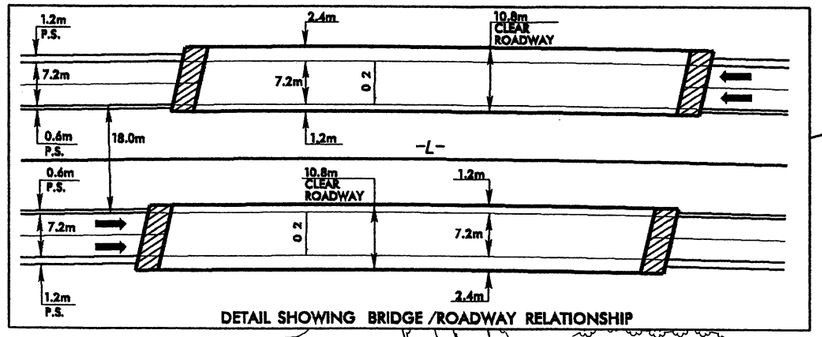
PROJECT REFERENCE NO.	SHEET NO.
R-2206C	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS (NOT FOR CONSTRUCTION)	
CONST. REV.	
R/W REV.	

METRIC 5 0 10

REVISIONS

R/W REV. - EXISTING TOPO UPDATED ON PARCEL 21. TIED PROPOSED W.W. FENCES TO ENDS OF PROPOSED BRIDGES. 10-27-03 JT

8/17/99



DETAIL SHOWING BRIDGE /ROADWAY RELATIONSHIP

SEE SHEETS S-X THRU S-XX FOR STRUCTURE PLANS

-L-
PI Sta 199+75.908
Δ = 25° 54' 22.0" (RT)
L = 1,356.441
T = 690.016
R = 3,000.000
e = 0.02
RO = 35m

NAD 83

21 VICKI L. HINNANT DB 834 PG 302

24 KENNETH F. CARPENTER DB 896 PG 355

19 DARRELL R. BROOME DB 577 PG 305

22 WALTER W. STITT DB 978 PG 322

20 RUBY S. CALDWELL DB 770 PG 83

DARRELL R. BROOME DB 547 PG 221

23 DANIEL T. MADUX DB 533 PG 456

25 DANIEL T. MADUX DB 563 PG 41

GRAVEL 'T' TURNAROUND TO BE PLACED AS DIRECTED BY THE ENGINEER.

PROPOSED W. W. FENCE

PROPOSED GUARDRAIL BARRIER

TOE PROTECTION W/CL 'B' RIP RAP EST. 26 MTONS FILTER FABRIC EST. 54 SM (SEE DETAIL 9)

BERM 'V' DITCH W/CL 'B' RIP RAP EST. 46 MTONS FILTER FABRIC EST. 94 SM EST. DDE = 9 (SEE DETAIL 9)

100m R/W (328.08ft R/W)

END PROP. W.W. FENCE

FUTURE GUARDRAIL

TYPE-III

KILLIAN CREEK

BEGIN PROP. W.W. FENCE

FUTURE PAVEMENT

CONCRETE FLUME

FALSE SUMP (SEE SHEET9)

GRADE TO DRAIN

450 CSP W/ 2 ELBOWS

400 CSP W/ 2 ELBOWS

600 CSP w2 ELBOWS

BEG. FUTURE SHLDR. BERM GUTTER 198+30

END FUTURE SHLDR. BERM GUTTER 199+09

BEG. FUTURE SHLDR. BERM GUTTER 199+91

N 53° 50' 09.2" W

N 53° 24' 16.5" W

N 54° 25' 44.3" W

N 50° 28' 09.7" W

CLASS 'I' RIP RAP @ EMBANKMENT EST. 7 MTONS FILTER FABRIC EST. 15 SM (SEE DETAIL 9)

0.6m LAT. BASE DITCH W/CL 'B' RIP RAP EST. 91 MTONS FILTER FABRIC EST. 190 SM EST. DDE = 9 (SEE DETAIL 9)

-BL- 303
-L- STA. 198+01.080
35.269 (RT)

-BL- 304
-L- STA. 198+83.266
37.162 (RT)

-BL- 305
-L- STA. 199+60.247
37.489 (RT)

-BL- 306
-L- STA. 200+31.963
34.771 (RT)

+32.296 (PROP. LINE) 50.000m (164.04ft)

+57.694 (PROP. LINE) 50.000m (164.04ft)

+50.084 (PROP. LINE) 54.447m (178.63ft)

+49.044 (PROP. LINE) 50.000m (164.04ft)

+13.488 (PROP. LINE) 74.834m (242.24ft)

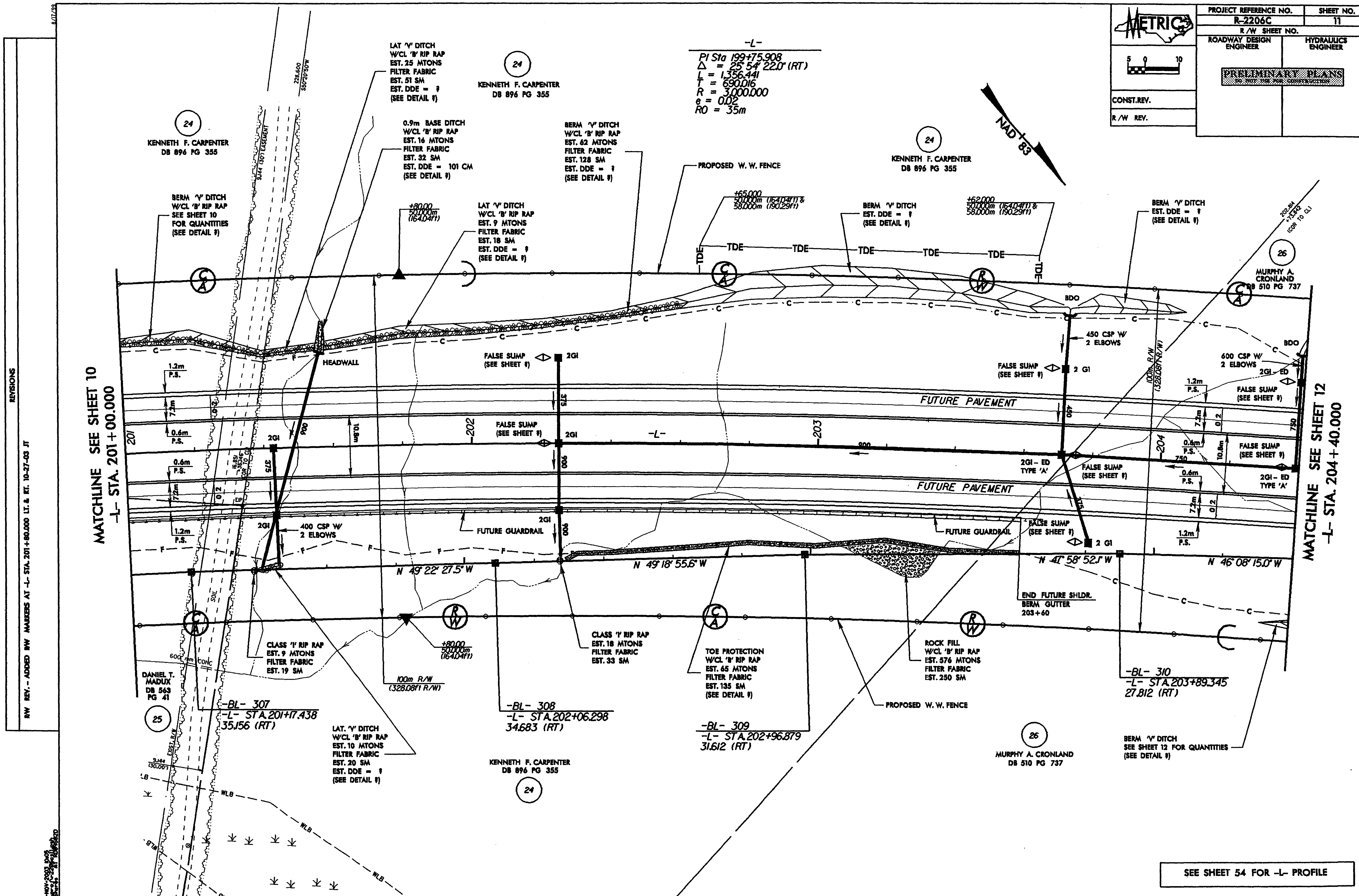
+14.346 (PROP. LINE) 50.000m (164.04ft)

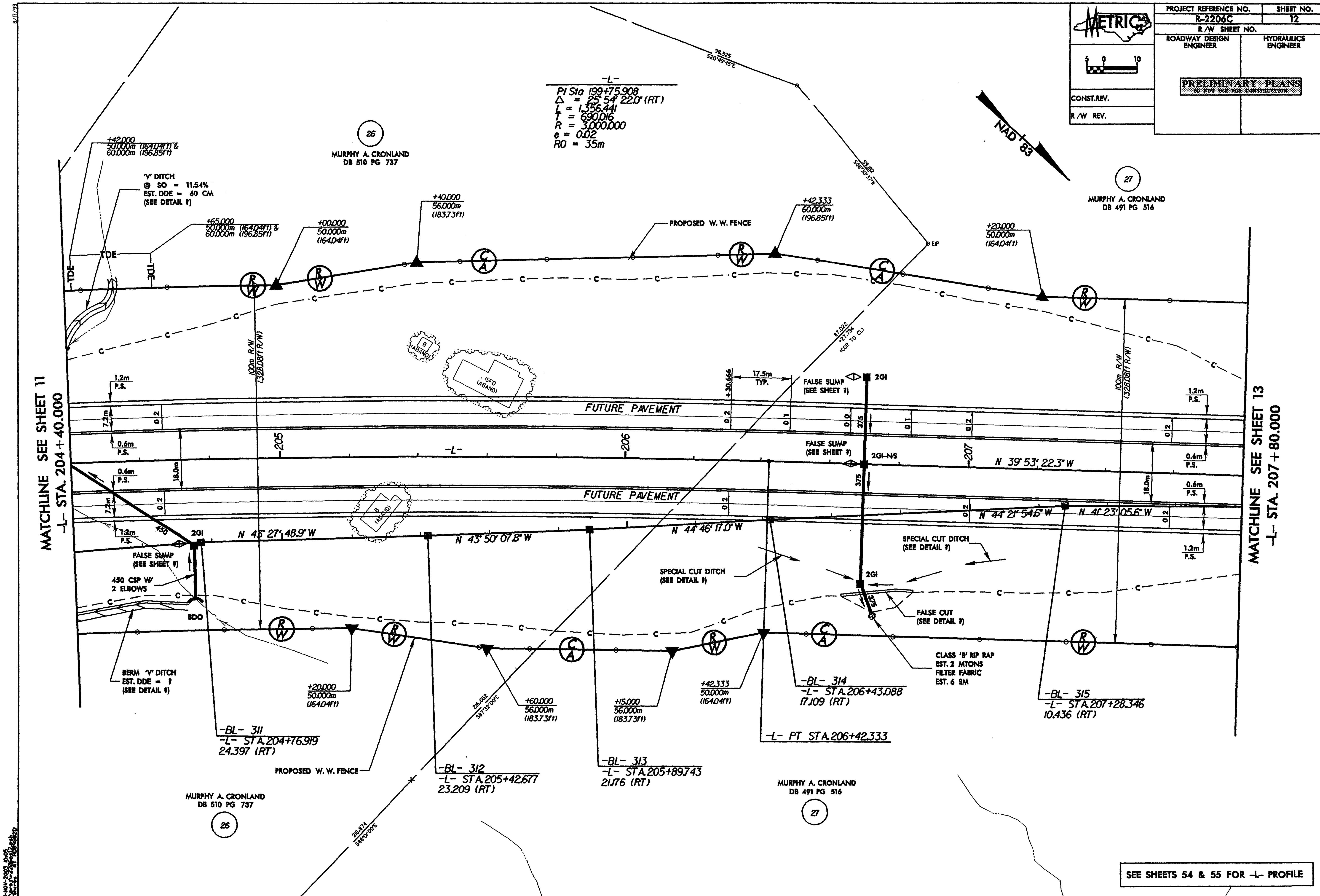
MATCHLINE SEE SHEET 9 -L- STA. 197+80.000

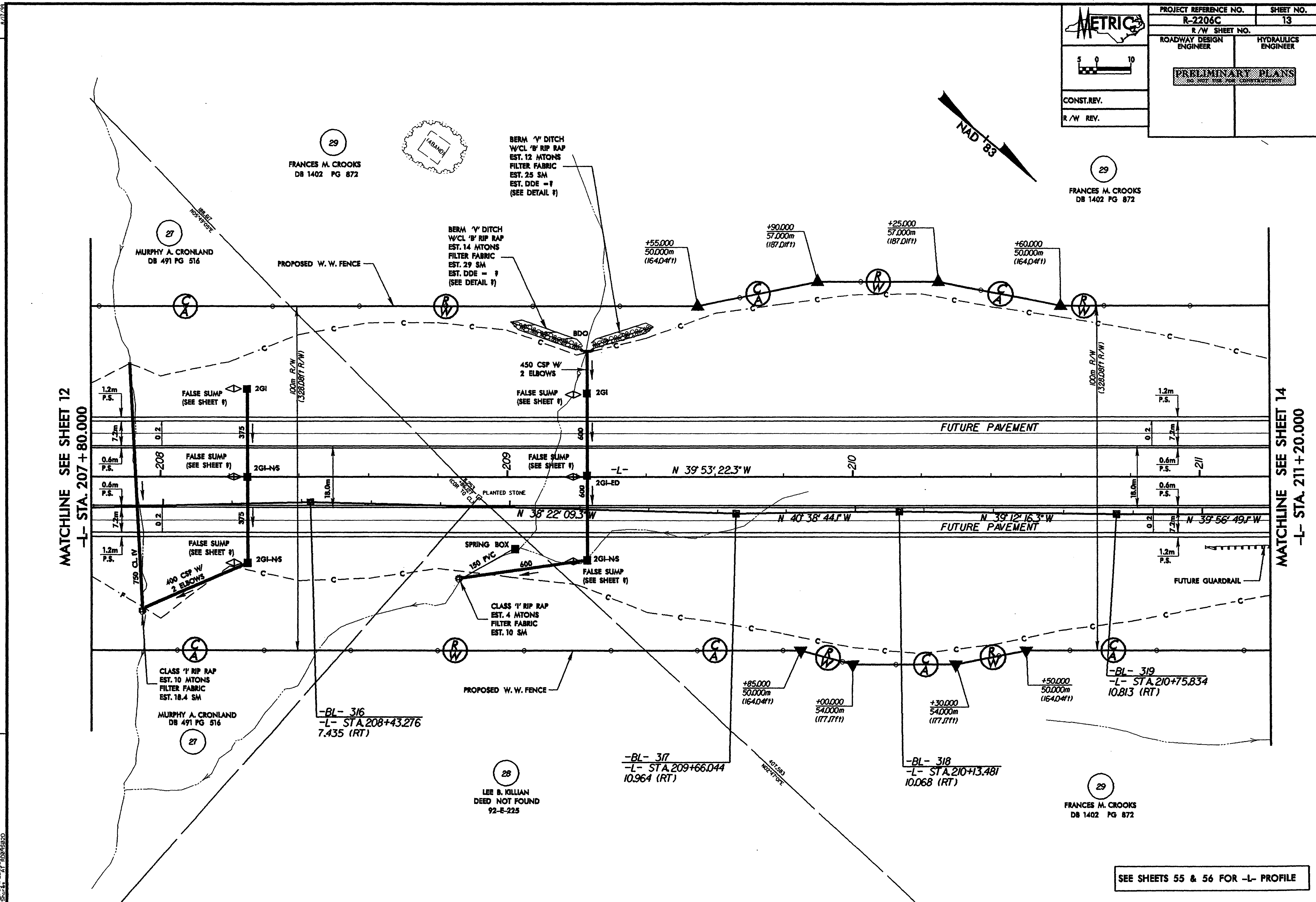
MATCHLINE SEE SHEET 11 -L- STA. 201+00.000

SEE SHEETS 53 & 54 FOR -L- PROFILE

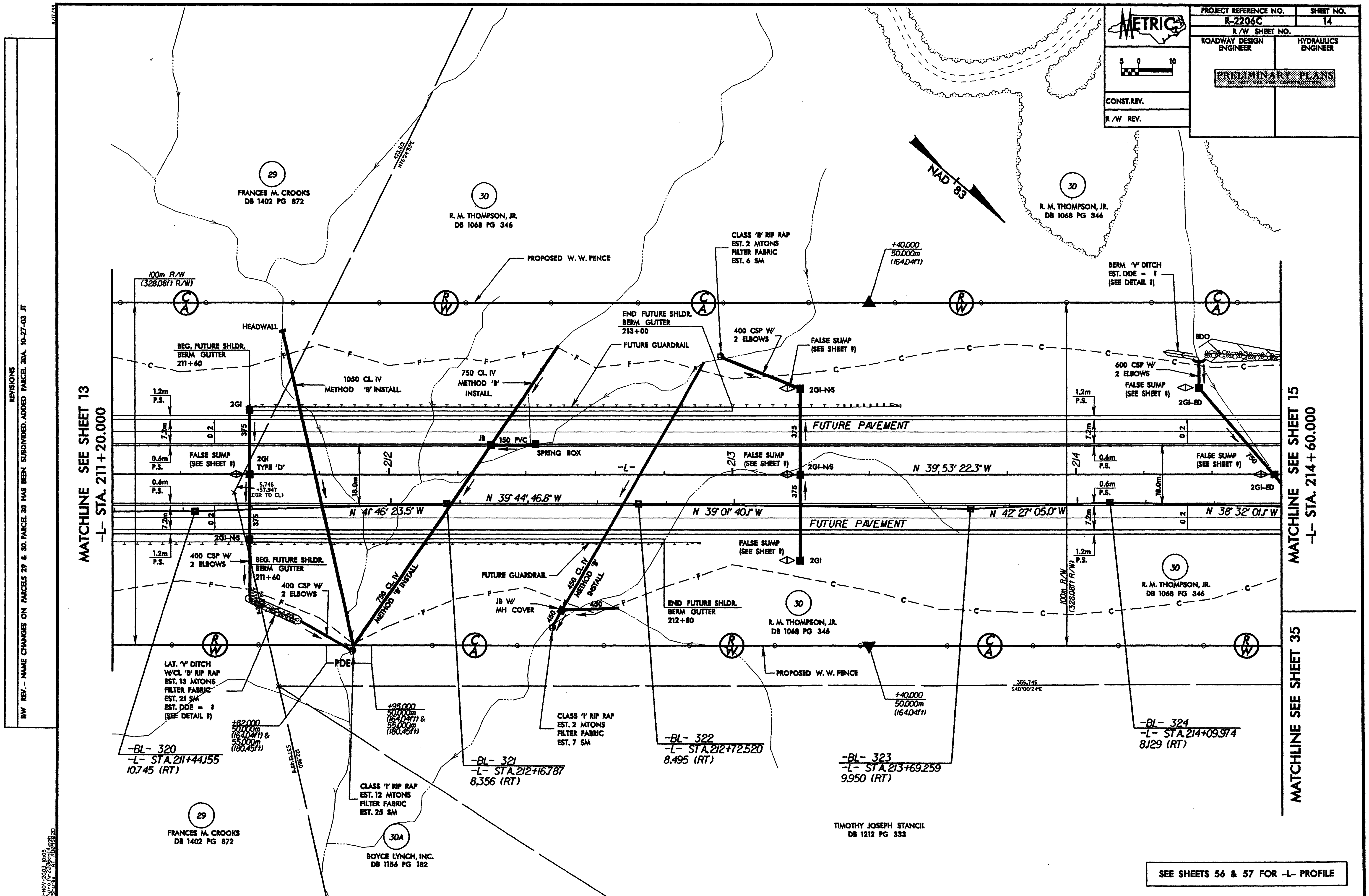
01-NOV-2003 9:04


METRIC
PROJECT REFERENCE NO. R-2206C
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
CONST. REV.
R/W REV.
REVISIONS
R/W REV. - ADDED R/W MARKERS AT -L- STA. 201+80.000 LT. & RT. 10-27-03 JT
-L-
PI Sta 199+75.908
Δ = 25° 54' 22.0" (RT)
L = 1,356.441
T = 690.016
R = 3,000.000
e = 0.02
RO = 35m
NAD 83
KENNETH F. CARPENTER DB 896 PG 355
MURPHY A. CRONLAND DB 510 PG 737
DANIEL T. MADUX DB 563 PG 41
LAT 'V' DITCH W/CL 'B' RIP RAP EST. 25 MTONS FILTER FABRIC EST. 51 SM EST. DDE = ? (SEE DETAIL ?)
0.9m BASE DITCH W/CL 'B' RIP RAP EST. 16 MTONS FILTER FABRIC EST. 32 SM EST. DDE = 101 CM (SEE DETAIL ?)
BERM 'V' DITCH W/CL 'B' RIP RAP EST. 62 MTONS FILTER FABRIC EST. 128 SM EST. DDE = ? (SEE DETAIL ?)
PROPOSED W. W. FENCE
BERM 'V' DITCH W/CL 'B' RIP RAP SEE SHEET 10 FOR QUANTITIES (SEE DETAIL ?)
LAT 'V' DITCH W/CL 'B' RIP RAP EST. 9 MTONS FILTER FABRIC EST. 18 SM EST. DDE = ? (SEE DETAIL ?)
+80.00 50.000m (164.04ft)
+65.000 50.000m (164.04ft) & 58.000m (190.29ft)
+62.000 50.000m (164.04ft) & 58.000m (190.29ft)
BERM 'V' DITCH EST. DDE = ? (SEE DETAIL ?)
TDE
BDO
450 CSP W/ 2 ELBOWS
600 CSP W/ 2 ELBOWS
HEADWALL
FALSE SUMP (SEE SHEET ?)
2GI
2GI - ED TYPE 'A'
FUTURE PAVEMENT
FUTURE GUARDRAIL
-L-
201
202
203
204
900
750
450
375
1.2m P.S.
0.6m P.S.
7.2m
10.8m
MATCHLINE SEE SHEET 10 -L- STA. 201+00.000
MATCHLINE SEE SHEET 12 -L- STA. 204+40.000
400 CSP W/ 2 ELBOWS
N 49° 22' 27.5" W
N 49° 18' 55.6" W
N 41° 58' 52.1" W
N 46° 08' 15.0" W
END FUTURE SHLDR. BERM GUTTER 203+60
CLASS 'I' RIP RAP EST. 9 MTONS FILTER FABRIC EST. 19 SM
CLASS 'I' RIP RAP EST. 18 MTONS FILTER FABRIC EST. 33 SM
TOE PROTECTION W/CL 'B' RIP RAP EST. 65 MTONS FILTER FABRIC EST. 135 SM (SEE DETAIL ?)
ROCK FILL W/CL 'B' RIP RAP EST. 576 MTONS FILTER FABRIC EST. 250 SM
100m R/W (328.08ft R/W)
-BL- 307 -L- STA. 201+17.438 35.156 (RT)
-BL- 308 -L- STA. 202+06.298 34.683 (RT)
-BL- 309 -L- STA. 202+96.879 31.612 (RT)
-BL- 310 -L- STA. 203+89.345 27.812 (RT)
LAT. 'V' DITCH W/CL 'B' RIP RAP EST. 10 MTONS FILTER FABRIC EST. 20 SM EST. DDE = ? (SEE DETAIL ?)
BERM 'V' DITCH SEE SHEET 12 FOR QUANTITIES (SEE DETAIL ?)
600 mm CONC
SJ44 (30ft) EASEMENT
WLB
SEE SHEET 54 FOR -L- PROFILE


PROJECT REFERENCE NO. R-2206C
SHEET NO. 12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
METRIC
CONST.REV.
R/W REV.
PRELIMINARY PLANS
NAD 83
-L-
PI Sta 199+75.908
Δ = 25° 54' 22.0" (RT)
L = 1,356.441
T = 690.016
R = 3,000.000
e = 0.02
RO = 35m
MURPHY A. CRONLAND
DB 510 PG 737
MURPHY A. CRONLAND
DB 491 PG 516
'V' DITCH
@ SO = 11.54%
EST. DDE = 60 CM
(SEE DETAIL #)
PROPOSED W. W. FENCE
FUTURE PAVEMENT
N 39° 53' 22.3" W
N 43° 27' 48.9" W
N 43° 50' 07.8" W
N 44° 46' 17.0" W
N 44° 21' 54.6" W
N 41° 23' 05.6" W
FALSE SUMP (SEE SHEET #)
450 CSP W/ 2 ELBOWS
SPECIAL CUT DITCH (SEE DETAIL #)
FALSE CUT (SEE DETAIL #)
CLASS 'B' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 6 SM
BERM 'V' DITCH
EST. DDE = #
(SEE DETAIL #)
-BL- 311
-L- STA 204+76.919
24.397 (RT)
-BL- 312
-L- STA 205+42.677
23.209 (RT)
-BL- 313
-L- STA 205+89.743
21.176 (RT)
-BL- 314
-L- STA 206+43.088
17.109 (RT)
-BL- 315
-L- STA 207+28.346
10.436 (RT)
-L- PT STA 206+42.333
MATCHLINE SEE SHEET 11
-L- STA. 204+40.000
MATCHLINE SEE SHEET 13
-L- STA. 207+80.000
100m R/W (328.08ft R/W)
SEE SHEETS 54 & 55 FOR -L- PROFILE



METRIC
PROJECT REFERENCE NO.
R-2206C
SHEET NO.
13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST.REV.
R/W REV.
NAD 83
REVISIONS
R/W REV. - NAME CHANGES ON PARCELS 28 & 29. 10-27-03 JT
MATCHLINE SEE SHEET 12
-L- STA. 207+80.000
MATCHLINE SEE SHEET 14
-L- STA. 211+20.000
FRANCES M. CROOKS
DB 1402 PG 872
MURPHY A. CRONLAND
DB 491 PG 516
LEE B. KILLIAN
DEED NOT FOUND
92-E-225
BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 12 MTONS
FILTER FABRIC
EST. 25 SM
EST. DDE = ?
(SEE DETAIL ?)
BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 14 MTONS
FILTER FABRIC
EST. 29 SM
EST. DDE = ?
(SEE DETAIL ?)
PROPOSED W. W. FENCE
450 CSP W/
2 ELBOWS
FALSE SUMP
(SEE SHEET ?)
FUTURE PAVEMENT
N 39° 53' 22.3" W
N 38° 22' 09.3" W
N 40° 38' 44.1" W
N 39° 12' 16.3" W
N 39° 56' 49.1" W
PLANTED STONE
SPRING BOX
150 PVC
400 CSP W/
2 ELBOWS
750 CL IV
CLASS 'I' RIP RAP
EST. 4 MTONS
FILTER FABRIC
EST. 10 SM
CLASS 'I' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 18.4 SM
FUTURE GUARDRAIL
100m R/W
(328.08ft R/W)
-BL- 316
-L- STA 208+43.276
7.435 (RT)
-BL- 317
-L- STA 209+66.044
10.964 (RT)
-BL- 318
-L- STA 210+13.481
10.068 (RT)
-BL- 319
-L- STA 210+75.834
10.813 (RT)
+55.000
50.000m
(164.04ft)
+90.000
57.000m
(187.01ft)
+25.000
57.000m
(187.01ft)
+60.000
50.000m
(164.04ft)
+85.000
50.000m
(164.04ft)
+00.000
54.000m
(177.17ft)
+30.000
54.000m
(177.17ft)
+50.000
50.000m
(164.04ft)
SEE SHEETS 55 & 56 FOR -L- PROFILE



PROJECT REFERENCE NO.
R-2206C
SHEET NO.
14
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
METRIC
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST.REV.
R/W REV.
REVISIONS
RW REV. - NAME CHANGES ON PARCELS 29 & 30. PARCEL 30 HAS BEEN SUBDIVIDED. ADDED PARCEL 30A. 10-27-03 JT
NAD 83
MATCHLINE SEE SHEET 13
-L- STA. 211+20.000
MATCHLINE SEE SHEET 15
-L- STA. 214+60.000
MATCHLINE SEE SHEET 35
29
FRANCES M. CROOKS
DB 1402 PG 872
30
R. M. THOMPSON, JR.
DB 1068 PG 346
30A
BOYCE LYNCH, INC.
DB 1156 PG 182
TIMOTHY JOSEPH STANCIL
DB 1212 PG 333
100m R/W
(328.08ft R/W)
PROPOSED W. W. FENCE
CLASS 'B' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 6 SM
+40.000
50.000m
(164.04ft)
BERM 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)
HEADWALL
BEG. FUTURE SHLDR. BERM GUTTER
211+60
1050 CL. IV
METHOD 'B' INSTALL
750 CL. IV
METHOD 'B'
INSTALL
END FUTURE SHLDR. BERM GUTTER
213+00
FUTURE GUARDRAIL
400 CSP W/
2 ELBOWS
FALSE SUMP
(SEE SHEET ?)
600 CSP W/
2 ELBOWS
BDO
2GI
2GI-N/S
2GI-ED
2GI TYPE 'D'
JB
150 PVC
SPRING BOX
FUTURE PAVEMENT
-L-
N 39° 53' 22.3" W
N 39° 44' 46.8" W
N 41° 46' 23.5" W
N 39° 01' 40.1" W
N 42° 27' 05.0" W
N 38° 32' 01.1" W
5.746
+57.947
(COR TO CL)
1.2m P.S.
0.6m P.S.
7.2m
18.0m
375
750 CL. IV
METHOD 'B' INSTALL
450 CL. IV
METHOD 'B'
INSTALL
JB W/
MH COVER
END FUTURE SHLDR.
BERM GUTTER
212+80
LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 13 MTONS
FILTER FABRIC
EST. 21 SM
EST. DDE = ?
(SEE DETAIL ?)
PDE
+82.000
50.000m
(164.04ft) &
55.000m
(180.45ft)
+95.000
50.000m
(164.04ft) &
55.000m
(180.45ft)
CLASS 'I' RIP RAP
EST. 12 MTONS
FILTER FABRIC
EST. 25 SM
CLASS 'I' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 7 SM
-BL- 320
-L- STA. 211+44.155
10.745 (RT)
-BL- 321
-L- STA. 212+16.787
8.356 (RT)
-BL- 322
-L- STA. 212+72.520
8.495 (RT)
-BL- 323
-L- STA. 213+69.259
9.950 (RT)
-BL- 324
-L- STA. 214+09.974
8.129 (RT)
SEE SHEETS 56 & 57 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS NOT FOR CONSTRUCTION	
CONST.REV.	
R/W REV.	

REVISIONS

8/1/03 R/W REV. - NAME CHANGE ON PARCEL 30, ADDED SERVICE ROAD -SR2- TO ACCESS SHUFORD PROPERTY, ADJUSTED C/A FENCE, R/W AND EASEMENTS ACCORDINGLY. 10-27-03 JT

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DETAIL SHOWING BRIDGE /ROADWAY RELATIONSHIP

SEE SHEETS S-X THRU S-XX FOR STRUCTURE PLANS

-L- & -Y11- SLOPE STAKES

-Y11DET- SLOPE STAKES

NAD 83

SR 1360 BETH HAVEN CH BST

SR 1360 KING WILKINSON RD BST

-Y13- POT STA.10+00.000 =
-Y13DET- POT STA.10+00.000

-BY13- 380
-Y13- STA.10+03.035
15.433 (RT)

N 39° 54' 17.5" E

N 56° 46' 18.8" E

-Y13DET- PC STA.10+15.946

+20.000
8.518m (27.95ft)
(EXIST. R/W) &
14.500m (47.57ft)

-Y13- POT STA.10+20.000
BEGIN CONST.

+27.000
9.805m (31.51ft)
(EXIST. R/W)

-Y13- PC STA.10+57.146

-Y13DET- PT STA.10+72.246

-Y13-
PI Sta 10+87.019
Δ = 6° 50' 18.0" (RT)
L = 59.676
T = 29.873
R = 500.000
e = 0.04
RO = 30m

CLASS 'B' RIP RAP
EST. 3 MTONS
FILTER FABRIC
EST. 9 SM

PROPOSED GUARDRAIL

LAT. 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)

-Y13DET- PC STA.11+09.371

-Y13- PT STA.11+16.822

-BY13- 5
-Y13- STA.10+68.957
4.728 (LT)

FALSE SUMP (SEE SHEET ?)

N 62° 50' 51.6" E

+44.646

+86.822

+81.636
(-L-)
50.000m
(164.04ft)

+87.000
(-)
50.000m
(164.04ft)

-BY13- 19
-Y13- STA.11+34.411
3.293 (LT)

750 CL. IV
METHOD 'B'
INSTALL.

-Y13DET- PT STA.11+44.785

+62.650
(-L-)
50.000m
(164.04ft)

+36.000
(-)
50.000m
(164.04ft)

+00.000
50.000m (164.04ft) &
54.000m (177.17ft)

+42.000
50.000m (164.04ft) &
54.000m (177.17ft)

BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 107 MTONS
FILTER FABRIC
EST. 222 SM
EST DDE = ?
(SEE DETAIL ?)

BERM 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)

PROPOSED W. W. FENCE

TDE TDE TDE

-L- POT STA.216+60.508 =
-Y13- POT STA.11+68.541

-BL- 329
-L- STA.217+77.035
5.643 (RT)

-BL- 328
-L- STA.217+24.962
5.845 (RT)

TIE PROP. W.W. FENCE TO PROP. BRIDGE

FUTURE PAVEMENT

N 39° 53' 22.3" W

N 40° 06' 43.7" W

N 41° 48' 09.6" W

N 21° 23' 40.5" W

N 58° 29' 04.7" W

BEG. SHLDR. BERM GUTTER 12+05

BEG. SHLDR. BERM GUTTER 12+03

FUTURE GUARDRAIL

GRAU-350

-SR2- N 31° 11' 21.0" W

BEG. FUTURE SHLDR. BERM GUTTER 217+80

FALSE SUMP (SEE SHEET ?)

400 CSP W/ 2 ELBOWS

R. M. THOMPSON, JR. DB 1068 PG 346

WILLIAM C. LACKEY, JR. DB 927 PG 356

JOEL B. BARKER DB 510 PG 48

ELLEN H. SHUFORD DB 336 PG 671

MATCHLINE SEE SHEET 14
-L- STA. 214+60.000

MATCHLINE SEE SHEET 16
-L- STA. 218+00.000

MATCHLINE SEE SHEET 35

MATCHLINE SEE SHEET 35
-Y13- STA. 12+20.000

-BL- 325
-L- STA.214+76.692
9.708 (RT)

-BL- 326
-L- STA.215+39.869
7.597 (RT)

-Y13DET- PC STA.12+14.243

-BL- 327
-L- STA.216+30.071
37.770 (RT)

-BY13-
-Y13- STA.12+12.378
20.779 (RT)

+58.789
(-L-)
50.000m
(164.04ft)

CLASS 'B' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 6 SM

LAT 'V' DITCH
SEE SHEET 35
FOR QUANTITIES
(SEE DETAIL ?)

+73.000
(-SR2)
10.000m
(32.81ft)

+96.204 (-SR2-)
10.000m (32.81ft)

-SR2- PT Sta.10+96.204

-SR2- POT Sta.11+55.000

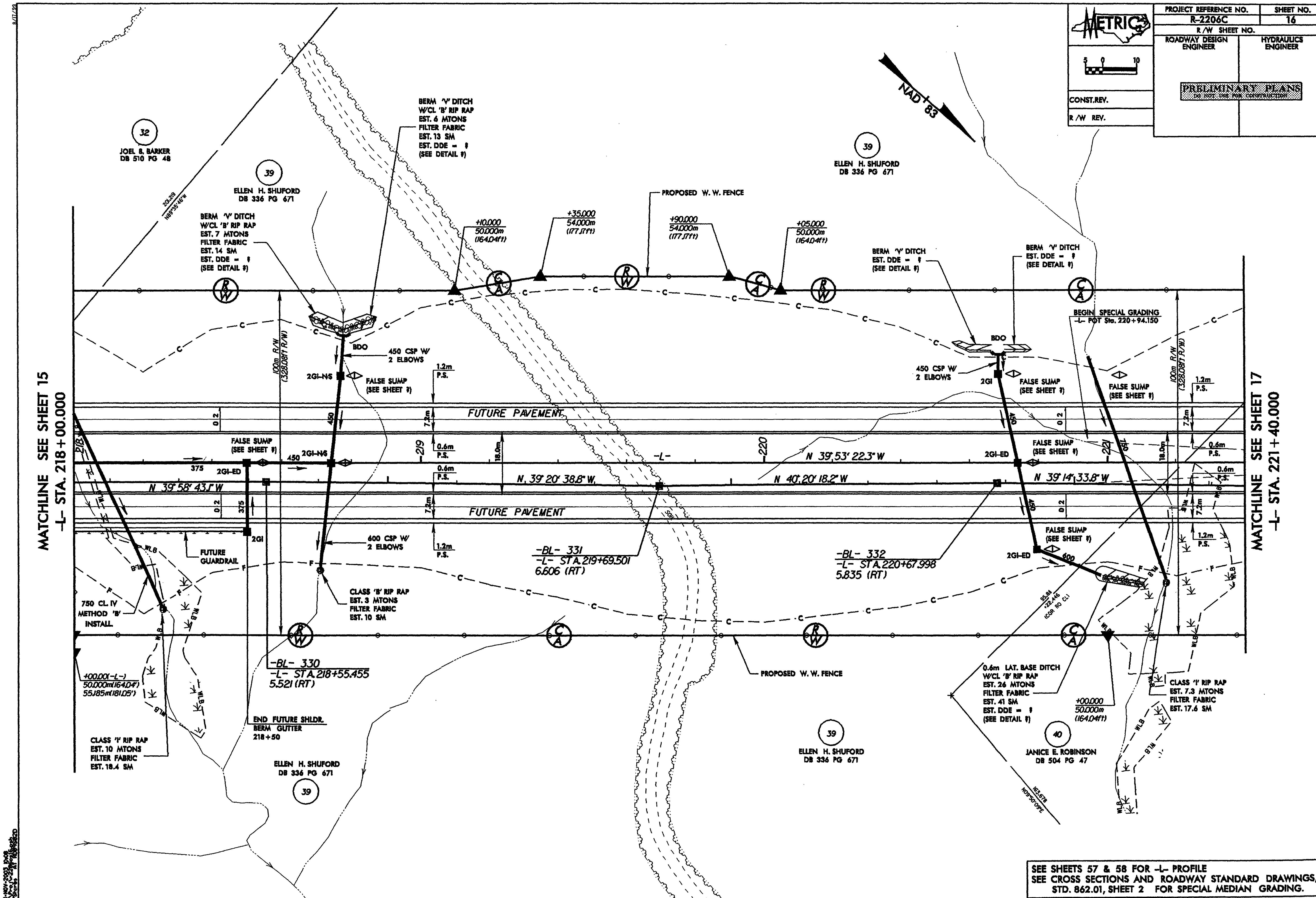
END CONST.

+60.000 (-SR2-)
10.000m (32.81ft),
13.000m (42.65ft)

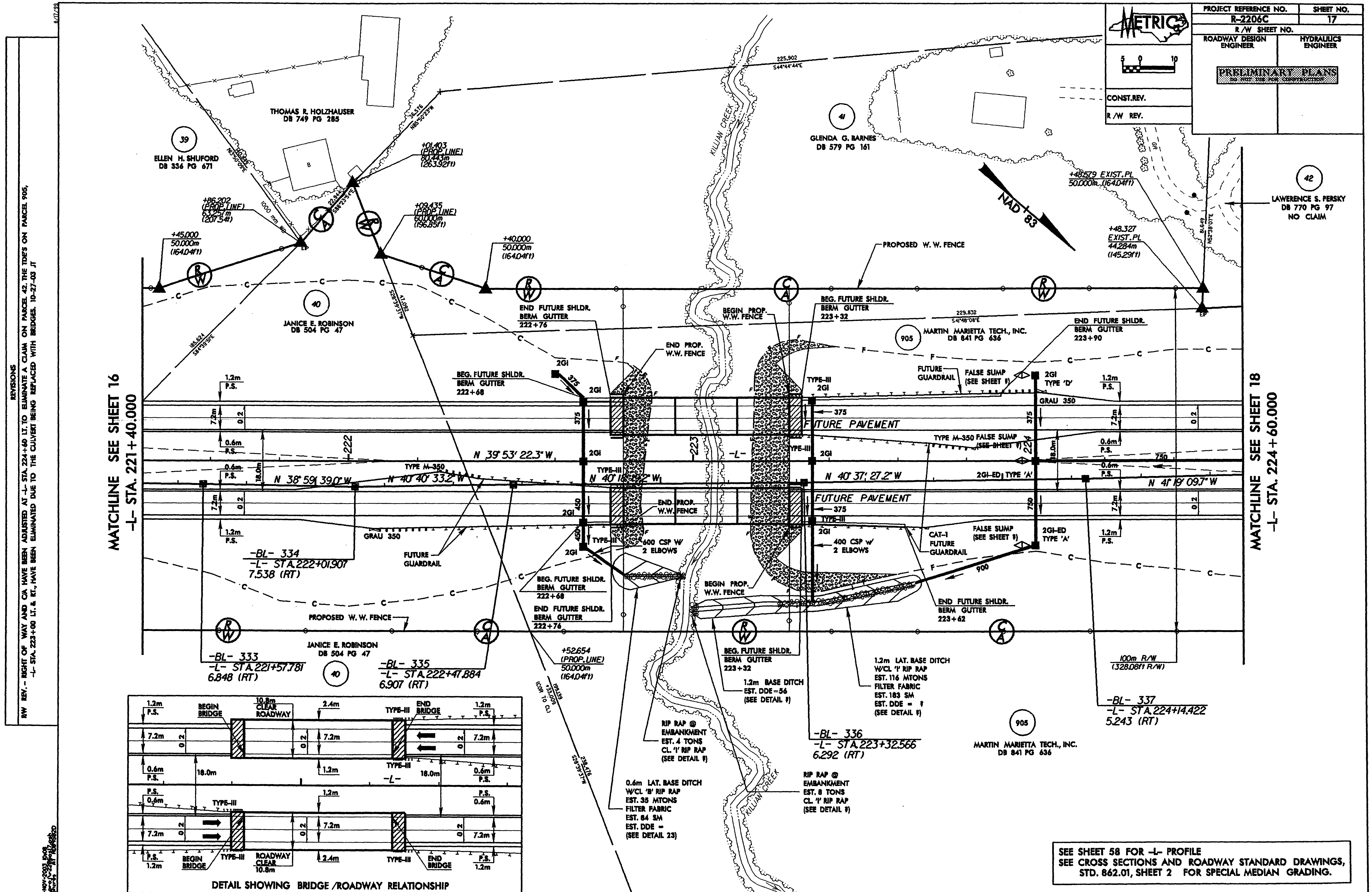
-SR2- POT Sta.11+60.00

SEE SHEET 57 FOR -L- PROFILE
SEE SHEETS 74 FOR -Y13- PROFILE
SEE SHEES 45 FOR -Y13DET-
SEE SHEET 75 FOR -Y13DET- PROFILE

NOTE: END SHLDR. BERM GUTTER -Y13- STA. 12+08



METRIC
PROJECT REFERENCE NO.
R-2206C
SHEET NO.
16
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST.REV.
R/W REV.
NAD 83
32
JOEL B. BARKER
DB 510 PG 48
39
ELLEN H. SHUFORD
DB 336 PG 671
40
JANICE E. ROBINSON
DB 504 PG 47
BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 6 MTONS
FILTER FABRIC
EST. 13 SM
EST. DDE = #
(SEE DETAIL #)
BERM 'V' DITCH
W/CL 'B' RIP RAP
EST. 7 MTONS
FILTER FABRIC
EST. 14 SM
EST. DDE = #
(SEE DETAIL #)
BERM 'V' DITCH
EST. DDE = #
(SEE DETAIL #)
PROPOSED W. W. FENCE
+10.000
50.000m
(164.04ft)
+35.000
54.000m
(177.17ft)
+90.000
54.000m
(177.17ft)
+05.000
50.000m
(164.04ft)
BDO
450 CSP W/
2 ELBOWS
2GI-N/S
FALSE SUMP
(SEE SHEET #)
1.2m
P.S.
0.6m
P.S.
100m R/W
(328.08ft R/W)
FUTURE PAVEMENT
18.0m
7.2m
2GI-ED
2GI
-L-
N 39° 58' 43.1" W
N 39° 20' 38.8" W
N 40° 20' 18.2" W
N 39° 53' 22.3" W
N 39° 14' 33.8" W
BEGIN SPECIAL GRADING
-L- POT Sta. 220+94.150
MATCHLINE SEE SHEET 15
-L- STA. 218+00.000
MATCHLINE SEE SHEET 17
-L- STA. 221+40.000
FUTURE GUARDRAIL
600 CSP W/
2 ELBOWS
CLASS 'B' RIP RAP
EST. 3 MTONS
FILTER FABRIC
EST. 10 SM
-BL- 331
-L- STA. 219+69.501
6.606 (RT)
-BL- 332
-L- STA. 220+67.998
5.835 (RT)
-BL- 330
-L- STA. 218+55.455
5.521 (RT)
750 CL. IV
METHOD 'B'
INSTALL
+00.00(-L-)
50.000m(164.04')
55.185m(181.05')
CLASS 'I' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 18.4 SM
END FUTURE SHLDR.
BERM GUTTER
218+50
0.6m LAT. BASE DITCH
W/CL 'B' RIP RAP
EST. 26 MTONS
FILTER FABRIC
EST. 41 SM
EST. DDE = #
(SEE DETAIL #)
+00.000
50.000m
(164.04ft)
CLASS 'I' RIP RAP
EST. 7.3 MTONS
FILTER FABRIC
EST. 17.6 SM
SEE SHEETS 57 & 58 FOR -L- PROFILE
SEE CROSS SECTIONS AND ROADWAY STANDARD DRAWINGS,
STD. 862.01, SHEET 2 FOR SPECIAL MEDIAN GRADING.


PROJECT REFERENCE NO. R-2206C
SHEET NO. 17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
METRIC
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST. REV.
R/W REV.
REVISIONS
RW REV. - RIGHT OF WAY AND C/A HAVE BEEN ADJUSTED AT -L- STA. 224+60 LT. TO ELIMINATE A CLAIM ON PARCEL 42. THE TDE'S ON PARCEL 905, -L- STA. 223+00 LT. & RT., HAVE BEEN ELIMINATED DUE TO THE CULVERT BEING REPLACED WITH BRIDGES. 10-27-03 JT
THOMAS R. HOLZHAUSER
DB 749 PG 285
ELLEN H. SHUFORD
DB 336 PG 671
GLENDA G. BARNES
DB 579 PG 161
LAWERENCE S. PERSKY
DB 770 PG 97
NO CLAIM
JANICE E. ROBINSON
DB 504 PG 47
MARTIN MARIETTA TECH., INC.
DB 841 PG 636
KILLIAN CREEK
NAD 83
PROPOSED W. W. FENCE
MATCHLINE SEE SHEET 16
-L- STA. 221+40.000
MATCHLINE SEE SHEET 18
-L- STA. 224+60.000
N 39° 53' 22.3" W
N 38° 59' 39.0" W
N 40° 40' 33.2" W
N 40° 37' 27.2" W
N 41° 19' 09.7" W
FUTURE PAVEMENT
-BL- 333
-L- STA. 221+57.781
6.848 (RT)
-BL- 334
-L- STA. 222+01.907
7.538 (RT)
-BL- 335
-L- STA. 222+47.884
6.907 (RT)
-BL- 336
-L- STA. 223+32.566
6.292 (RT)
-BL- 337
-L- STA. 224+14.422
5.243 (RT)
100m R/W
(328.08ft R/W)
BEG. FUTURE SHLDR. BERM GUTTER 222+68
END FUTURE SHLDR. BERM GUTTER 222+76
BEG. FUTURE SHLDR. BERM GUTTER 223+32
END FUTURE SHLDR. BERM GUTTER 223+62
END FUTURE SHLDR. BERM GUTTER 223+90
BEGIN PROP. W.W. FENCE
END PROP. W.W. FENCE
FUTURE GUARDRAIL
FALSE SUMP (SEE SHEET 9)
TYPE M-350
GRAU 350
600 CSP W/ 2 ELBOWS
400 CSP W/ 2 ELBOWS
1.2m LAT. BASE DITCH W/CL 'I' RIP RAP EST. 116 MTONS FILTER FABRIC EST. 183 SM EST. DDE = (SEE DETAIL 9)
1.2m BASE DITCH EST. DDE=56 (SEE DETAIL 9)
RIP RAP @ EMBANKMENT EST. 4 TONS CL. 'I' RIP RAP (SEE DETAIL 9)
RIP RAP @ EMBANKMENT EST. 8 TONS CL. 'I' RIP RAP (SEE DETAIL 9)
0.6m LAT. BASE DITCH W/CL 'B' RIP RAP EST. 35 MTONS FILTER FABRIC EST. 84 SM EST. DDE = (SEE DETAIL 23)
DETAIL SHOWING BRIDGE / ROADWAY RELATIONSHIP
BEGIN BRIDGE
END BRIDGE
10.8m CLEAR ROADWAY
TYPE-III
SEE SHEET 58 FOR -L- PROFILE
SEE CROSS SECTIONS AND ROADWAY STANDARD DRAWINGS, STD. 862.01, SHEET 2 FOR SPECIAL MEDIAN GRADING.

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

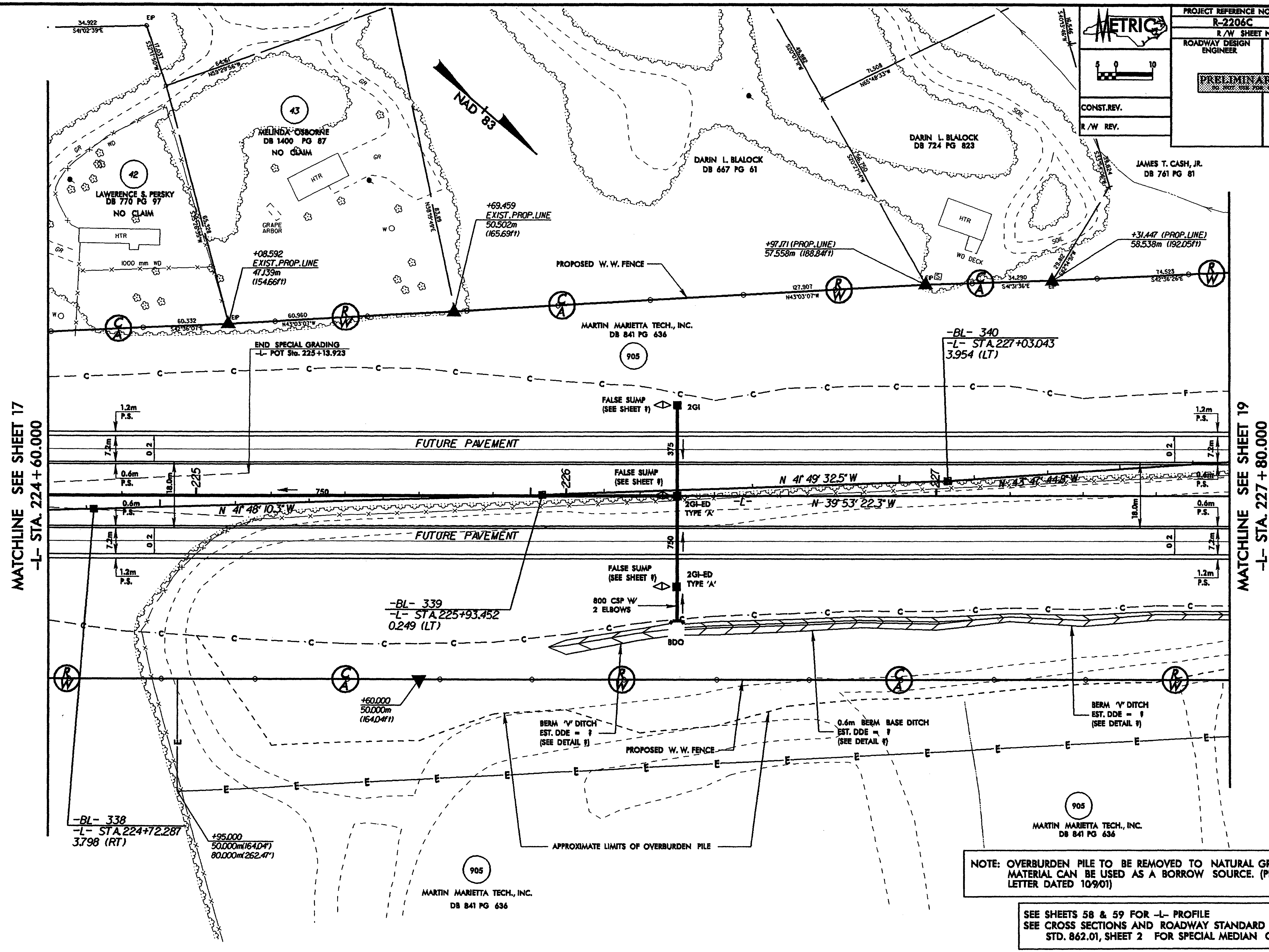
PRELIMINARY PLANS

CONST. REV.

R/W REV.

REVISIONS

RW REV. - RIGHT OF WAY AND C/A HAVE BEEN ADJUSTED AT -L- STA. 225+00 LT. TO ELIMINATE CLAIMS ON PARCELS 42 AND 43. NAME CHANGE ON PARCEL 43. TCE HAS BEEN ADDED TO AND ADJUSTED ON PARCEL 905 RIGHT OF -L- DUE TO OVERBURDEN PILES. 10-27-03 JT



MATCHLINE SEE SHEET 17
-L- STA. 224+60.000
MATCHLINE SEE SHEET 19
-L- STA. 227+80.000
NAD 83
42
LAWERENCE S. PERSKY
DB 770 PG 97
NO CLAIM
43
MELINDA OSBORNE
DB 1400 PG 87
NO CLAIM
DARIN L. BLALOCK
DB 667 PG 61
DARIN L. BLALOCK
DB 724 PG 823
JAMES T. CASH, JR.
DB 761 PG 81
MARTIN MARIETTA TECH., INC.
DB 841 PG 636
905
+08.592
EXIST. PROP. LINE
47.139m
(154.66ft)
+69.459
EXIST. PROP. LINE
50.502m
(165.69ft)
+97.171 (PROP. LINE)
57.558m (188.84ft)
+31.447 (PROP. LINE)
58.538m (192.05ft)
PROPOSED W. W. FENCE
END SPECIAL GRADING
-L- POT Sta. 225+13.923
-BL- 340
-L- STA. 227+03.043
3.954 (LT)
-BL- 339
-L- STA. 225+93.452
0.249 (LT)
-BL- 338
-L- STA. 224+72.287
3.798 (RT)
FUTURE PAVEMENT
FALSE SUMP
(SEE SHEET #)
2GI
2GI-ED
TYPE 'A'
800 CSP W
2 ELBOWS
BDO
N 41° 49' 32.5" W
N 41° 48' 10.3" W
N 39° 53' 22.3" W
+60.000
50.000m
(164.04ft)
+95.000
50.000m (164.04')
80.000m (262.47')
BERM 'V' DITCH
EST. DDE = #
(SEE DETAIL #)
0.6m BERM BASE DITCH
EST. DDE = #
(SEE DETAIL #)
APPROXIMATE LIMITS OF OVERBURDEN PILE
HTR
GRAPE ARBOR
1000 mm WD
WD DECK

NOTE: OVERBURDEN PILE TO BE REMOVED TO NATURAL GROUND. MATERIAL CAN BE USED AS A BORROW SOURCE. (PER GEOTECH LETTER DATED 10/9/01)

SEE SHEETS 58 & 59 FOR -L- PROFILE
SEE CROSS SECTIONS AND ROADWAY STANDARD DRAWINGS, STD. 862.01, SHEET 2 FOR SPECIAL MEDIAN GRADING.

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2206C	19
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	PRELIMINARY PLANS	
R/W REV.	NOT FOR CONSTRUCTION	

REVISIONS

8/17/05

R/W REV. - NAME CHANGE ON PARCEL 44, TCE ADDED TO AND ADJUSTED ON PARCEL 905 RIGHT OF -L- DUE TO OVERBURDEN PILES, 10-27-03 JT

MATCHLINE SEE SHEET 18
-L- STA. 227+80.000

MATCHLINE SEE SHEET 20
-L- STA. 231+00.000

NAD 83

SOIL

EXIST. R/W

JAMES T. CASH, JR.
DB 761 PG 81

JAMES T. CASH, JR.
DB 761 PG 81

+05.887 (PROP. LINE)
62.071m (203.65ft)

+54.176 (PROP. LINE)
63.283m (207.62ft)

PROPOSED W. W. FENCE

1.2m BASE DITCH
@ So = 0.5%
EST. DDE = 52 CM
(SEE DETAIL 1)

-BL- 342
-L- STA. 229+11.022
15.969 (LT)

+34.679 (PROP. LINE)
66.221m (217.26ft)

HELEN L. TURBYFILL & DARRIS L. TURBYFILL
DB 663 PG 362

-BL- 343
-L- STA. 229+87.437
22.825 (LT)

90m UNIFORM TAPER

+35.822 (PROP. LINE)
50.000m (164.04ft)

PROPOSED W. W. FENCE

-BL- 344
-L- STA. 230+96.106
28.824 (LT)

905 MARTIN MARIETTA TECH., INC.
DB 841 PG 636

CLASS 'B' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 18 SM

-BL- 341
-L- STA. 228+03.043
10.901 (LT)

FALSE SUMP
(SEE SHEET 1)

2GI-ED

2GI

2GI-NS

N 42° 37' 48" W

N 39° 53' 22.3" W

N 45° 00' 57.0" W

N 43° 02' 57.1" W

FUTURE PAVEMENT

800 CSP W/
2 ELBOWS

BDO

PROPOSED
W. W. FENCE

BERM 'V' DITCH
SEE SHEET 18 FOR QUANTITIES
(SEE DETAIL 1)

+75.000
60.000m (196.85')

APPROXIMATE LIMITS OF OVERBURDEN PILE

+40.000
105.000m (344.49')

+60.000
50.000m
(164.04ft)

+00.000
57.000m
(187.01ft)

+40.000
57.000m
(187.01ft)

+80.764
50.000m
(164.04ft)

+45.000
110.000m (360.89')

NOTE: OVERBURDEN PILE TO BE REMOVED TO NATURAL GROUND. MATERIAL CAN BE USED AS A BORROW SOURCE. (PER GEOTECH LETTER DATED 10/9/01)

SEE SHEET 59 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

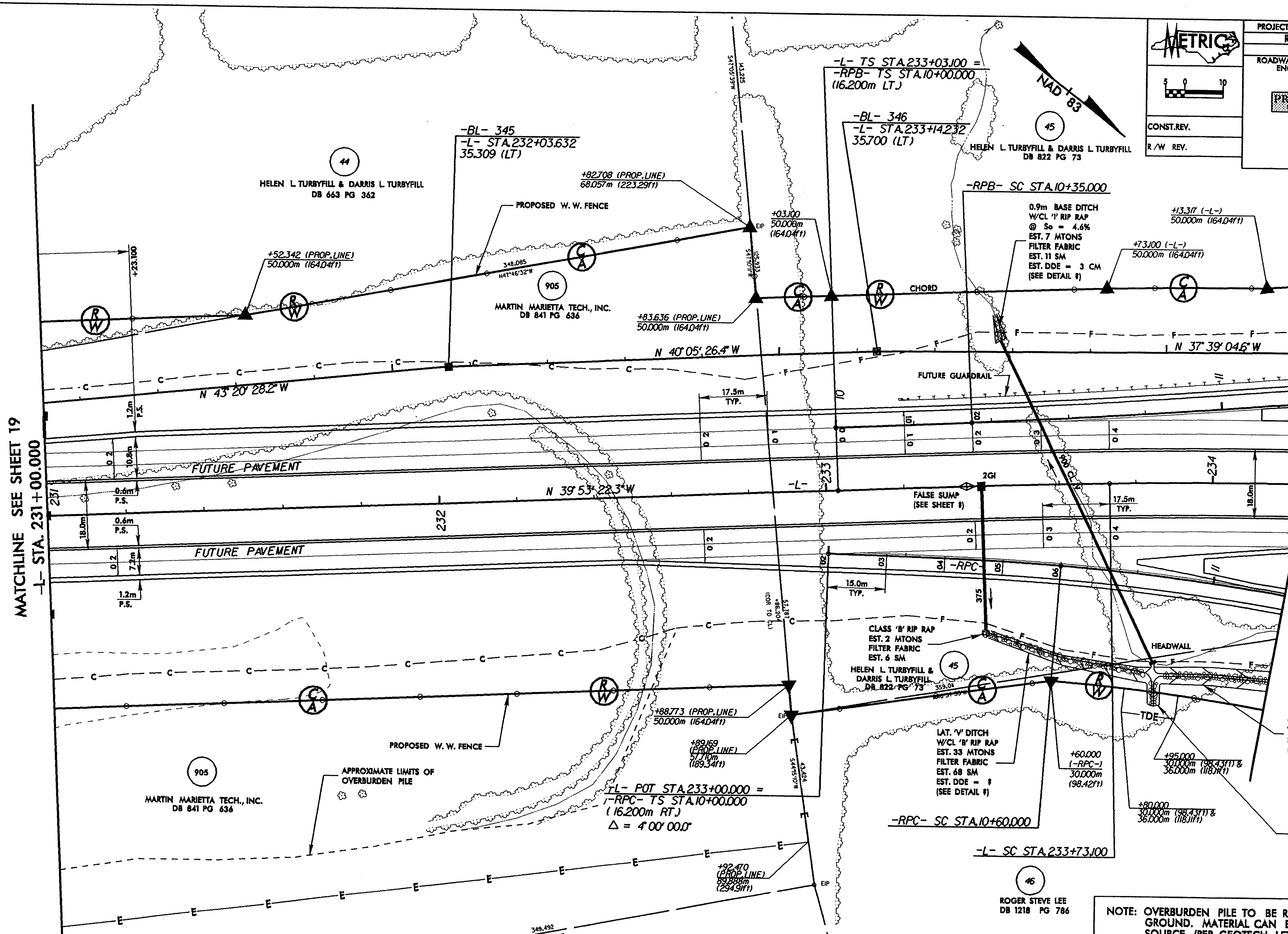
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.

R/W REV.

REVISIONS

R/W REV. - NAME CHANGE ON PARCELS 44, 45, & 46. TCE ADDED TO AND ADJUSTED ON PARCEL 905 RIGHT OF -L- DUE TO OVERBURDEN PILES. 10-27-03 JT



NAD 83
MATCHLINE SEE SHEET 19
-L- STA. 231+00.000
MATCHLINE SEE SHEET 21
-L- STA. 234+20.000
-BL- 345
-L- STA. 232+03.632
35.309 (LT)
-L- TS STA. 233+03.100 =
-RPB- TS STA. 10+00.000
(16.200m LT.)
-BL- 346
-L- STA. 233+14.232
35.700 (LT)
44
HELEN L. TURBYFILL & DARRIS L. TURBYFILL
DB 663 PG 362
45
HELEN L. TURBYFILL & DARRIS L. TURBYFILL
DB 822 PG 73
905
MARTIN MARIETTA TECH., INC.
DB 841 PG 636
46
ROGER STEVE LEE
DB 1218 PG 786
PROPOSED W. W. FENCE
+82.708 (PROP. LINE)
68.057m (223.29ft)
+52.342 (PROP. LINE)
50.000m (164.04ft)
+83.636 (PROP. LINE)
50.000m (164.04ft)
+03.100
50.000m
(164.04ft)
-RPB- SC STA. 10+35.000
0.9m BASE DITCH
W/CL 'I' RIP RAP
@ So = 4.6%
EST. 7 MTONS
FILTER FABRIC
EST. 11 SM
EST. DDE = 3 CM
(SEE DETAIL #)
+13.317 (-L-)
50.000m (164.04ft)
+73.100 (-L-)
50.000m (164.04ft)
CHORD
N 40° 05' 26.4" W
N 37° 39' 04.6" W
N 43° 20' 28.2" W
N 39° 53' 22.3" W
FUTURE GUARDRAIL
FUTURE PAVEMENT
17.5m TYP.
15.0m TYP.
-L-
232
233
234
FALSE SUMP
(SEE SHEET #)
2GI
-RPC-
375
CLASS 'B' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 6 SM
HEADWALL
0.6m LAT. BASE DITCH
W/CL 'B' RIP RAP
SEE SHEET 21 FOR QUANTITIES
(SEE DETAIL #)
+88.773 (PROP. LINE)
50.000m (164.04ft)
+89.169
(PROP. LINE)
57.710m
(189.34ft)
-L- POT STA. 233+00.000 =
-RPC- TS STA. 10+00.000
(16.200m RT.)
Δ = 4° 00' 00.0"
LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 33 MTONS
FILTER FABRIC
EST. 68 SM
EST. DDE = #
(SEE DETAIL #)
+60.000
(-RPC-)
30.000m
(98.42ft)
+95.000
30.000m (98.43ft) &
36.000m (118.11ft)
+80.000
30.000m (98.43ft) &
36.000m (118.11ft)
TDE
-RPC- SC STA. 10+60.000
-L- SC STA. 233+73.100
0.9m BASE DITCH
W/CL 'B' RIP RAP
@ So = 0.5%
EST. 8 MTONS
FILTER FABRIC
EST. 16 SM
EST. DDE = 11 CM
(SEE DETAIL #)
PROPOSED W. W. FENCE
APPROXIMATE LIMITS OF
OVERBURDEN PILE
+92.470
(PROP. LINE)
EIP
349.492
N47°53'50"W

NOTE: OVERBURDEN PILE TO BE REMOVED TO NATURAL GROUND. MATERIAL CAN BE USED AS A BORROW SOURCE. (PER GEOTECH LETTER DATED 10/9/01)

-L-

PIs Sta 233+49.768	PI Sta 241+32.719	PIs Sta 248+14.847
Θs = 1° 15' 12.0"	Δ = 50° 47' 35.4" (RT)	Θs = 1° 15' 12.0"
Ls = 70.000	L = 1,418.413	Ls = 70.000
LT = 46.668	T = 759.619	LT = 46.668
ST = 23.334	R = 1,600.000	ST = 23.334
	e = 0.04	

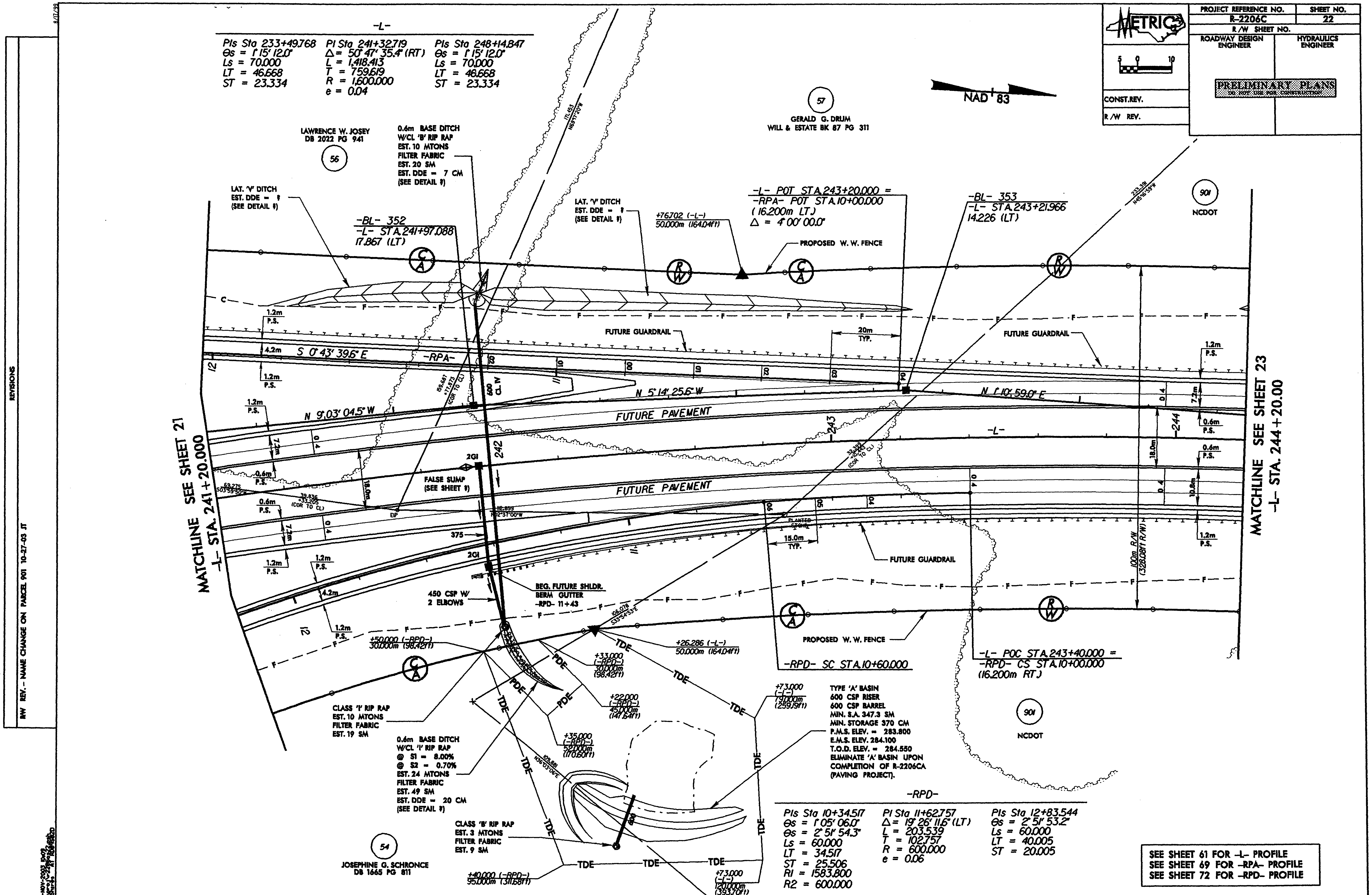
-RPB-

PIs Sta 10+23.333	PI Sta 11+84.898
Θs = 0° 24' 03.9"	Δ = 6° 51' 45.3" (LT)
Ls = 35.000	L = 299.437
LT = 23.333	T = 149.898
ST = 11.667	R = 2,500.000
	e = 0.02

-RPC-

PIs Sta 10+40.005	PI Sta 11+53.032	PIs Sta 12+64.599
Θs = 2° 51' 53.2"	Δ = 17° 37' 38.9" (RT)	Θs = 2° 51' 53.2"
Ls = 60.000	L = 184.594	Ls = 60.000
LT = 40.005	T = 93.032	LT = 40.005
ST = 20.005	R = 600.000	ST = 20.005
	e = 0.06	

SEE SHEET 59 FOR -L- PROFILE
SEE SHEET 70 FOR -RPB- PROFILE
SEE SHEET 71 FOR -RPC- PROFILE



METRIC
PROJECT REFERENCE NO. R-2206C
SHEET NO. 22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST.REV.
R/W REV.
NAD 83
-L-
PIs Sta 233+49.768
Θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334
PI Sta 241+32.719
Δ= 50° 47' 35.4" (RT)
L = 1,418.413
T = 759.619
R = 1,600.000
e = 0.04
PIs Sta 248+14.847
Θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334
LAWRENCE W. JOSEY
DB 2022 PG 941
56
GERALD G. DRUM
WILL & ESTATE BK 87 PG 311
57
0.6m BASE DITCH
W/CL 'B' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 20 SM
EST. DDE = 7 CM
(SEE DETAIL 9)
LAT. 'V' DITCH
EST. DDE = 9
(SEE DETAIL 9)
-BL- 352
-L- STA. 241+97.088
17.867 (LT)
-L- POT STA. 243+20.000 =
-RPA- POT STA. 10+00.000
(16.200m LT)
Δ = 4° 00' 00.0"
+76.702 (-L-)
50.000m (164.04ft)
PROPOSED W. W. FENCE
-BL- 353
-L- STA. 243+21.966
14.226 (LT)
901
NCDOT
FUTURE GUARDRAIL
S 0° 43' 39.6" E
-RPA-
N 5° 14' 25.6" W
N 1° 10' 59.0" E
N 9° 03' 04.5" W
FUTURE PAVEMENT
-L-
FALSE SUMP
(SEE SHEET 9)
2GI
375
BEG. FUTURE SHLDR. BERM GUTTER
-RPD- 11+43
450 CSP W/
2 ELBOWS
MATCHLINE SEE SHEET 21
-L- STA. 241+20.000
MATCHLINE SEE SHEET 23
-L- STA. 244+20.00
100m R/W
(328.08ft R/W)
+50.000 (-RPD-)
30.000m (98.42ft)
+26.286 (-L-)
50.000m (164.04ft)
+33.000 (-RPD-)
30.000m (98.42ft)
-RPD- SC STA. 10+60.000
-L- POC STA. 243+40.000 =
-RPD- CS STA. 10+00.000
(16.200m RT)
+22.000 (-RPD-)
45.000m (147.64ft)
+35.000 (-RPD-)
52.000m (170.60ft)
+73.000 (-L-)
79.000m (259.19ft)
CLASS 'I' RIP RAP
EST. 10 MTONS
FILTER FABRIC
EST. 19 SM
0.6m BASE DITCH
W/CL 'I' RIP RAP
@ S1 = 8.00%
@ S2 = 0.70%
EST. 24 MTONS
FILTER FABRIC
EST. 49 SM
EST. DDE = 20 CM
(SEE DETAIL 9)
TYPE 'A' BASIN
600 CSP RISER
600 CSP BARREL
MIN. S.A. 347.3 SM
MIN. STORAGE 370 CM
P.M.S. ELEV. = 283.800
E.M.S. ELEV. 284.100
T.O.D. ELEV. = 284.550
ELIMINATE 'A' BASIN UPON COMPLETION OF R-2206CA (PAVING PROJECT).
CLASS 'B' RIP RAP
EST. 3 MTONS
FILTER FABRIC
EST. 9 SM
54
JOSEPHINE G. SCHRONCE
DB 1665 PG 811
+40.000 (-RPD-)
95.000m (311.68ft)
+73.000 (-L-)
120.000m (393.70ft)
-RPD-
PIs Sta 10+34.517
Θs = 1° 05' 06.0"
Θs = 2° 51' 54.3"
Ls = 60.000
LT = 34.517
ST = 25.506
R1 = 1583.800
R2 = 600.000
PI Sta 11+62.757
Δ= 19° 26' 11.6" (LT)
L = 203.539
T = 102.757
R = 600.000
e = 0.06
PIs Sta 12+83.544
Θs = 2° 51' 53.2"
Ls = 60.000
LT = 40.005
ST = 20.005
SEE SHEET 61 FOR -L- PROFILE
SEE SHEET 69 FOR -RPA- PROFILE
SEE SHEET 72 FOR -RPD- PROFILE
REVISIONS
RW REV. - NAME CHANGE ON PARCEL 901 10-27-03 JT

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

CONST. REV.

R/W REV.

PRELIMINARY PLANS
NO RIGHT-OF-WAY OR CONSTRUCTION

REVISIONS
R/W REV. - NAME CHANGE ON PARCEL 61, 10-27-03 JT
R/W REV. - NAME CHANGE ON PARCEL 901 ADDED "SEAL WELL" NOTE ON P

-Y15- POT STA 10+00.000

-BY15- 384 POT STA 5+00.000

-SRI-
PI Sta 11+08.607
Δ = 3° 57' 08.2" (RT)
L = 103.470
T = 51.756
R = 1,500.000
e = NC

NAD 83

-Y15- POT STA 10+75.000 =
-SRI- POT STA 10+00.000

-L-
PIs Sta 233+49.768
θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334

PI Sta 241+32.719
Δ = 50° 47' 35.4" (RT)
L = 1,418.413
T = 759.619
R = 1,600.000
e = 0.04

PIs Sta 248+14.847
θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334

-L- POC STA 245+91.502
-Y15- POT STA 11+17.440

-SRI- PC STA 10+56.852

-BL- 355
-L- STA 245+18.564
4.291 (LT)

-BL- 354
-L- STA 244+59.079
6.059 (LT)

-BL- 356
-L- STA 245+99.887
3.308 (LT) =
-BY15-
-Y15- STA 11+14.486
8.525 (LT)

MATCHLINE -L- STA 244+20.000
SEE SHEET 22

MATCHLINE -L- STA 247+40.000
SEE SHEET 24

RALPH W. BEAL
DB 976 PG 191

HERMAN L. HICKS
DB 1106 PG 50

JACK L. MORING
DB 599 PG 73

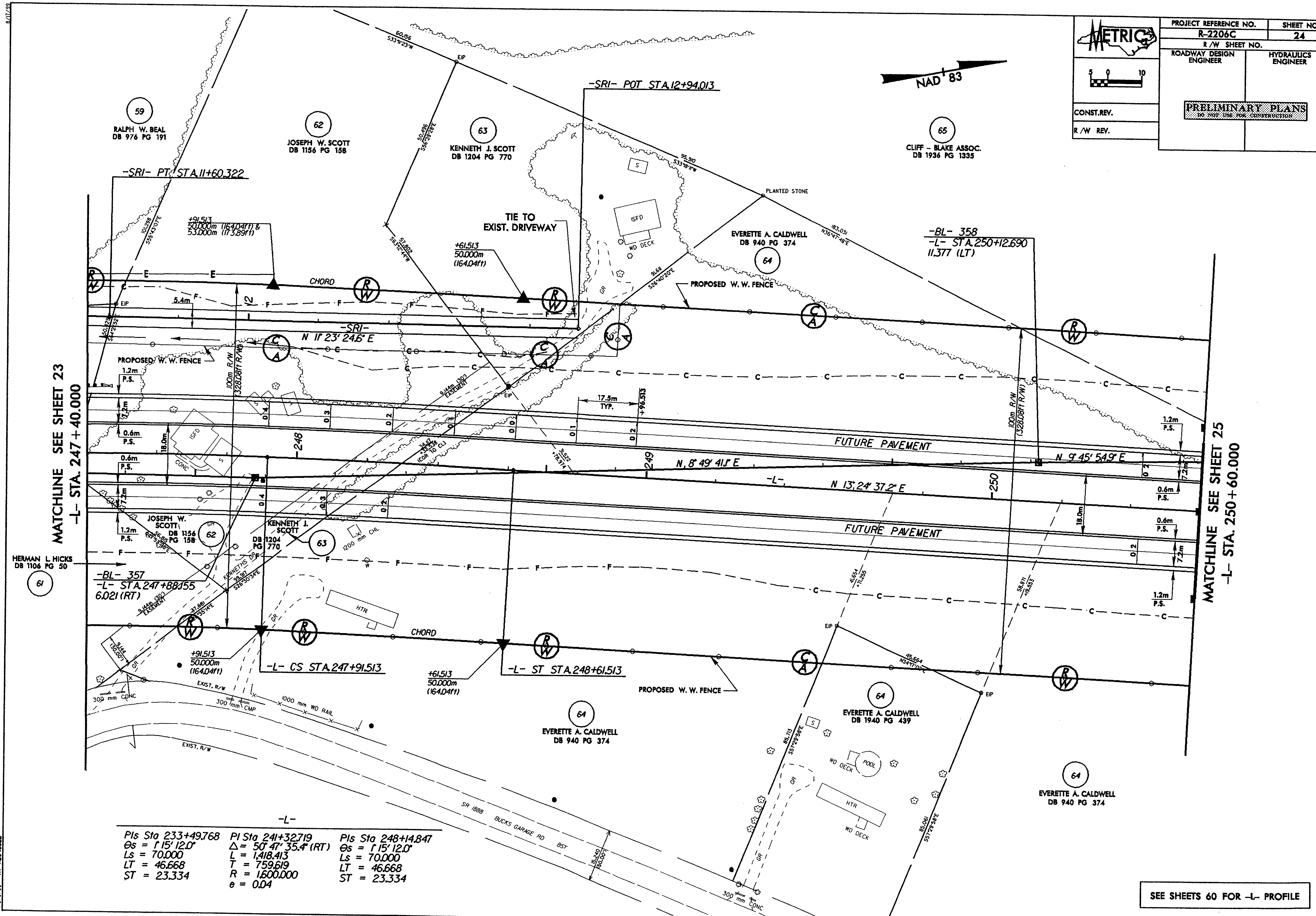
FRED L. DRUM
DB 1665 PG 813

NCDOT

DETAIL SHOWING BRIDGE /ROADWAY RELATIONSHIP

SEE SHEETS S-X THRU S-XX FOR STRUCTURE PLANS

SEE SHEET 60 FOR -L- PROFILE



METRIC
PROJECT REFERENCE NO. R-2206C
SHEET NO. 24
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
59
RALPH W. BEAL
DB 976 PG 191
62
JOSEPH W. SCOTT
DB 1156 PG 158
63
KENNETH J. SCOTT
DB 1204 PG 770
65
CLIFF - BLAKE ASSOC.
DB 1936 PG 1335
64
EVERETTE A. CALDWELL
DB 940 PG 374
-SRI- POT STA.12+94.013
-SRI- PT STA.11+60.322
TIE TO EXIST. DRIVEWAY
+91.513
50.000m (164.04ft) &
53.000m (173.89ft)
+61.513
50.000m
(164.04ft)
-BL- 358
-L- STA.250+12.690
11.377 (LT)
PLANTED STONE
PROPOSED W. W. FENCE
CHORD
-SRI-
N 11° 23' 24.6" E
MATCHLINE SEE SHEET 23
-L- STA. 247+40.000
MATCHLINE SEE SHEET 25
-L- STA. 250+60.000
FUTURE PAVEMENT
N 8° 49' 41.5" E
N 13° 24' 37.2" E
N 9° 45' 54.9" E
-L-
17.5m TYP.
100m R/W (328.08ft R/W)
HERMAN L. HICKS
DB 1106 PG 50
61
-BL- 357
-L- STA.247+88.155
6.021 (RT)
-L- CS STA.247+91.513
-L- ST STA.248+61.513
PROPOSED W. W. FENCE
EVERETTE A. CALDWELL
DB 1940 PG 439
EXIST. R/W
SR 1888 BUCKS GARAGE RD BST
1000 mm WD RAIL
300 mm CMP
300 mm CONC
HTR
WD DECK
POOL
ISFD
SEE SHEETS 60 FOR -L- PROFILE
-L-
PIs Sta 233+49.768
θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334
PI Sta 241+32.719
Δ = 50° 47' 35.4" (RT)
L = 1,418.413
T = 759.619
R = 1,600.000
e = 0.04
PIs Sta 248+14.847
θs = 1° 15' 12.0"
Ls = 70.000
LT = 46.668
ST = 23.334

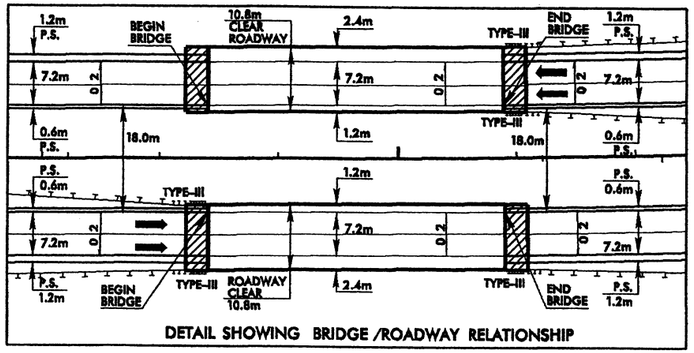
REVISIONS
RW REV. - THE TDE AND PDE ON PARCELS 65 & 68, -L- STA. 257+00 LT. & RT., HAVE BEEN ELIMINATED DUE TO THE CULVERT BEING REPLACED WITH BRIDGES, 10-27-03

8/21/03

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	26
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

PRELIMINARY PLANS
INCOMPLETE PLANS
NOT FOR CONSTRUCTION



DETAIL SHOWING BRIDGE /ROADWAY RELATIONSHIP

NAD 83

REED CREEK

65 CLIFF - BLAKE ASSOC. DB 1936 PG 1335

-BL- 365
-L- STA 257+33.908
47.089 (LT)

CL 'I' RIP RAP @ EMBANKMENT
EST. 4 MTONS
FILTER FABRIC
EST. 9 SM
(SEE DETAIL #)

LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 85 MTONS
FILTER FABRIC
EST. 176 SM
EST. DDE - #
(SEE DETAIL #)

+67.989
50.000m
(164.04ft)

-BL- 363
-L- STA 255+77.189
39.125 (LT)

-BL- 364
-L- STA 256+51.4915
42.040 (LT)

CHORD

N 9° 33' 32.4" E

N 11° 09' 49.7" E

N 9° 50' 10.6" E

N 10° 24' 02.6" E

BERM 'V' DITCH
SEE SHEET 25 FOR QUANTITIES
(SEE DETAIL #)

65 CLIFF - BLAKE ASSOC. DB 1936 PG 1335

-BL- 362
-L- STA 254+79.471
33.022 (LT)

PROPOSED W. W. FENCE

MATCHLINE SEE SHEET 25
-L- STA. 254+00.000

MATCHLINE SEE SHEET 27
-L- STA. 257+40.000

END PROP. W.W. FENCE

BEGIN PROP. W.W. FENCE

BEG. FUTURE SHLDR. BERM GUTTER 257+21

FUTURE GUARDRAIL

FALSE SUMP (SEE SHEET #)

FUTURE PAVEMENT

N 13° 24' 37.2" E -L-

TYPE M-350

GTD TYPE-III

GRAD 350

FUTURE GUARDRAIL

400 CSP W/ 2 ELBOWS

BEGIN SPECIAL GRADING
-L- POT Sta. 254+78.429

END FUTURE SHLDR. BERM GUTTER 254+40

CLASS 'B' RIP RAP
EST. 2 MTONS
FILTER FABRIC
EST. 6 SM

CLIFF - BLAKE ASSOC. DB 1936 PG 1335

-L- TS STA. 256+67.989

CLASS 'B' RIP RAP
EST. 0.9 MTONS
FILTER FABRIC
EST. 4.2 SM

+23.967
(PROP. LINE)
59.218m
(194.35ft)

KEVIN L. VARNADORE
DB 2051 PG 843

SILVER WAVE PROPERTIES
DB 1741 PG 749

+49.755
(PROP. LINE)
65.418m
(214.63ft)

R. HOLBROOKS
DB 1632 PG 40
68

PREFORMED SCOUR HOLE
B=1.5m W=1.5m
D=0.6m d=0.15m

+07.989
50.000m
(164.04ft)

-L- SC STA. 257+07.989

TREE FARM

-L-

PIs Sta 256+94.656	PI Sta 260+42.049
θs = 0° 27' 30.1"	Δ = 15° 13' 19.3" (LT)
Ls = 40.000	L = 664.186
LT = 26.667	T = 334.060
ST = 13.333	R = 2,500.000
	e = 0.02

(SEE PLANS FOR SUPER LOCATION)

SEE CROSS SECTIONS AND ROADWAY STANDARD DRAWINGS, STD. 862.01, SHEET 2 FOR SPECIAL MEDIAN GRADING.
SEE SHEETS 62 & 63 FOR -L- PROFILE

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	R-2206C	27
	R/W SHEET NO.	
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV.	PRELIMINARY PLANS NOT FOR CONSTRUCTION	

NAD 83

65 CLIFF – BLAKE ASSOC. DB 1936 PG 1335

-BL- 366
-L- STA. 258+04.638
45.837 (LT)

-BL- 367
-L- STA. 259+02.843
44.701 (LT)

-BL- 368
-L- STA. 260+33.162
36.393 (LT)

LAT. 'V' DITCH W/CL 'B' RIP RAP SEE SHEET 26 FOR QUANTITIES (SEE DETAIL 1)

BERM 'V' DITCH EST. DDE = ? (SEE DETAIL 1)

PROPOSED W. W. FENCE

BERM 'V' DITCH EST. DDE = ? (SEE DETAIL 1)

LAT. 'V' DITCH EST. DDE = ? (SEE DETAIL 1)

BERM 'V' DITCH EST. DDE = ? (SEE DETAIL 1)

N 12° 34' 51.3" E

N 10° 11' 11.4" E

N 10° 41' 59.0" E

FUTURE GUARDRAIL

FUTURE GUARDRAIL

END FUTURE SHLDR. BERM GUTTER 257+75

END SPECIAL GRADING -L- POC Sta. 259+07.253

FALSE SUMP (SEE SHEET 1)

FALSE CUT (SEE DETAIL 1)

GRAU 350

2GI

375 TYPE M-350

FUTURE PAVEMENT

0.6m P.S.

1.2m P.S.

20.0m TYP.

CAT-1

FUTURE GUARDRAIL

CLIFF – BLAKE ASSOC. DB 1936 PG 1335 65

END FUTURE SHLDR. BERM GUTTER 257+50

SOIL

FUTURE GUARDRAIL

100m R/W (328.08ft R/W)

PROPOSED W. W. FENCE

TREE FARM

68 R. HOLBROOKS DB 1632 PG 40

0.6m LAT. BASE DITCH W/CL 'B' RIP RAP EST. ? MTONS FILTER FABRIC EST. ? SM EST. DDE = ? (SEE DETAIL 1)

+60.000 200.000m (1640.4ft) & 57.000m (187.0ft)

PDE

0.6m BASE DITCH W/CL 'B' RIP RAP @ So = 7.5% EST. 14 MTONS FILTER FABRIC EST. 26 SM EST. DDE = 53 CM (SEE DETAIL 1)

+70.000 200.000m (1640.4ft) & 57.000m (187.0ft)

100m R/W (328.08ft R/W)

MATCHLINE SEE SHEET 26 -L- STA. 257+40.000

MATCHLINE SEE SHEET 28 -L- STA. 260+60.000

-L-

Pls Sta 256+94.656
θs = 0° 27' 30.1"
Ls = 40.000
LT = 26.667
ST = 13.333

Pl Sta 260+42.049
Δ = 15° 13' 19.3" (LT)
L = 664.186
T = 334.060
R = 2,500.000
e = 0.02

SEE CROSS SECTIONS AND ROADWAY STANDARD DRAWINGS, STD. 862.01, SHEET 2 FOR SPECIAL MEDIAN GRADING.
SEE SHEET 63 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

R/W REV. - PARCEL 70 (UNKNOWN) DELETED, RIGHT OF WAY AND C/A ADJUSTED TO RUN ALONG PARCEL 71 PROPERTY LINE, EASEMENTS ADJUSTED ACCORDINGLY, 10-27-03 JT

8/07/03

04-NOV-2003 09:26
C:\projects\2206c\roadway\sheets\2206c_sht28.dgn
dgn: 2206c_sht28.dgn

NAD 83

MATCHLINE -L- STA. 260+60.000 SEE SHEET 27

MATCHLINE -L- STA. 263+60.000 SEE SHEET 29

65 CLIFF - BLAKE ASSOC. DB 1936 PG 1335

-BL- 369
-L- STA. 261+06.301
28.261 (LT)

-BL- 370
-L- STA. 262+46.480
12.862 (LT)

-BL- 371
-L- STA. 263+47.620
2.983 (LT)

BERM 'V' DITCH
SEE SHEET 27 FOR QUANTITIES
(SEE DETAIL 9)

+80.000
50.000m
(164.04ft)

BERM 'V' DITCH
EST. DDE = 9
(SEE DETAIL 9)

PROPOSED W. W. FENCE

LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 11 MTONS
FILTER FABRIC
EST. 23 SM
EST. DDE = 9
(SEE DETAIL 9)

CLASS 'B' RIP RAP
EST. 3 MTONS
FILTER FABRIC
EST. 9 SM

TOE PROTECTION
W/CL 'B' RIP RAP
EST. 29 MTONS
FILTER FABRIC
EST. 61 SM
(SEE DETAIL 9)

LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 24 MTONS
FILTER FABRIC
EST. 50 SM
EST. DDE = 9
(SEE DETAIL 9)

BEG. FUTURE SHLDR.
BERM GUTTER
261+90

N 10° 36' 10.3" E

N 8° 43' 06.6" E

N 5° 02' 50.8" E

FUTURE PAVEMENT

1.2m P.S.

0.6m P.S.

7.2m

0.2

261

18.0m

400 CSP w/ 2 ELBOWS

2GI-ED

FALSE SUMP (SEE SHEET 9)

275

262

2GI

600 CL. IV METHOD 'B' INSTALL.

600 CSP W/ 2 ELBOWS

2GI

263

600

450

2GI-NS

HEADWALL

FUTURE GUARDRAIL

-L-

Pls Sta 256+94.656
θs = 0° 27' 30.0"
Ls = 40.000
LT = 26.667
ST = 13.333

PI Sta 260+42.049
Δ = 15° 13' 19.3" (LT)
L = 664.186
T = 334.060
R = 2,500.000
e = 0.02

100m R/W
(328.08ft R/W)

PROPOSED W. W. FENCE

68 R. HOLBROOKS DB 1632 PG 40

CLIFF - BLAKE ASSOC. DB 1936 PG 1335

SOIL

CLASS 'I' RIP RAP
EST. 4 MTONS
FILTER FABRIC
EST. 10 SM

0.6m BASE DITCH
@ So = 7.00%
EST. DDE = .4 CM
(SEE DETAIL 9)

+00.000
50.000m (164.04ft) &
59.000m (193.57ft)

+05.000
59.000m (164.04ft) &
59.000m (193.57ft)

TDE

TDE

+38.654
(EXIST. PROP. LINE)
50.000m (164.04ft)

+50.000
57.304m (188.32ft)
(EXIST. PROP. LINE)

+67.000
53.159m (175.06ft)
(EXIST. PROP. LINE) &
62.000m (203.41ft)

CLASS 'I' RIP RAP
EST. 9 MTONS
FILTER FABRIC
EST. 19 SM

900 CL. IV METHOD 'B' INSTALL.

+87.101
(EXIST. PROP. LINE)
55.946m (183.55ft)

+02.000
57.930m (190.06ft) &
62.500m (205.05ft)

+75.000
54.368m (178.37ft)
(EXIST. PROP. LINE) &
64.000m (209.97ft)

CLASS 'I' RIP RAP
EST. 15 MTONS
FILTER FABRIC
EST. 32 SM

1050 CL. IV METHOD 'B' INSTALL.

+20.000
60.483m (198.34ft)

+10.000
59.034m (193.68ft) &
64.000m (209.97ft)

TOE PROTECTION
W/CL 'B' RIP RAP
SEE SHEET 29 FOR QUANTITIES
(SEE DETAIL 9)

69 JAMES E. BURGESS DB 1865 PG 687

71 JAMES E. BURGESS, JR. DB 2002 PG 1306

POOL

WD RAIL

SEE SHEETS 63 & 64 FOR -L- PROFILE

MATCHLINE SEE SHEET 40

NOTE: SEE SHEET 29 FOR INTERSECTION TRAFFIC DIAGRAM

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS

CONST.REV.

R/W REV.

NAD 83

REVISIONS

RW REV. - PARCEL 78 HAS BEEN SUBDIVIDED, ADDED PARCEL 78B. EXISTING RIGHT OF WAY ALONG EXISTING NC 16 REDUCED FROM 30.480m (100') TO 24.384m (80'). 10-27-05 JT

-L-

PIs Sta 264+18.607
Θs = 0° 54' 59.9"
Θs = 2° 37' 09.5"
Ls = 80.000
LT = 46.432
ST = 33.592

PI Sta 265+95.400
Δ = 18° 35' 31.4" (LT)
L = 283.931
T = 143.224
R = 875.000
e = 0.06

-Y16-

PI Sta 11+48.636
Δ = 52° 54' 12.1" (RT)
L = 161.584
T = 87.068
R = 175.000
e = 0.08
RO = 55m

PI Sta 13+63.234
Δ = 55° 11' 49.2" (LT)
L = 48.168
T = 26.138
R = 50.000
e = 0.02

-SBL-

PIs Sta 267+69.450
Θs = 3° 19' 18.8"
Ls = 100.000
LT = 66.678
ST = 33.344

-NBL-

PI Sta 10+71.600
Δ = 9° 13' 25.5" (LT)
L = 142.890
T = 71.600
R = 887.600
e = 0.06

-Y17-

PI Sta 11+37.112
Δ = 65° 56' 55.1" (RT)
L = 201.429
T = 113.535
R = 175.000
e = 0.08
RO = 60m

-Y16- PT STA.12+23.152

-Y16- PC STA.13+37.097

-BL- 373
-L- STA.266+86.772
5.128 (LT)

-Y16- PT STA.13+85.265

-L- POC STA.266+90.268 =
-Y16- POT STA.14+07.660
-Y17- POT STA.10+00.000

-BL- 374
-SBL- STA.267+89.175
2.580 (RT)

-SBL- POT STA.268+60.000
END -SBL- & -NBL- GRADING

-SBL- ST STA.268+36.106

-L- CS STA.267+36.106 LB =
-SBL- CS STA.267+36.106 LA
(12.600m LT)
-NBL- PC STA.10+00.000 LA
(12.600m RT.

-Y17- PC STA.10+23.577

-Y17- POC STA.10+60.000
END GRADING

-Y20- POT STA.11+74.365

-Y20- POT STA.11+60.000
END CONST.

-NBL- PT STA.11+42.890

-BY16- 102
-Y16- STA.11+89.390
62.667 (LT)

-BL- 375
-SBL- STA.268+96.414
8.908 (RT)=
-BY16-
-Y16- STA.12+16.010
140.523 (LT)

-BL- 101
-NBL- STA.11+74.778
24.155 (RT) =
-BY17-
-Y17- STA.10+09.326
224.235 (LT)

-LDET- PC STA.10+50.803

-LDET- POT STA.10+00.000

1.2m BASE DITCH W/CL 'B' RIP RAP @ So = 0.12% EST. 30 MTONS FILTER FABRIC EST. 46 SM EST. DDE = 10 CM (SEE DETAIL 9)

SPECIAL CUT DITCH W/CL 'B' RIP RAP EST. 24 MTONS FILTER FABRIC EST. 49 SM SEE DITCH GRADE (SEE DETAIL 9)

SPECIAL CUT DITCH W/CL '1' RIP RAP EST. 64 MTONS FILTER FABRIC EST. 101 SM SEE DITCH GRADE (SEE DETAIL 9)

1.2m SPECIAL CUT BASE DITCH W/CL '1' RIP RAP EST. 246 MTONS FILTER FABRIC EST. 386 SM SEE DITCH GRADE (SEE DETAIL 9)

TOE PROTECTION W/CL 'B' RIP RAP EST. 39 MTONS FILTER FABRIC EST. 80 SM (SEE DETAIL 9)

TOE PROTECTION W/CL '1' RIP RAP EST. 9 MTONS FILTER FABRIC EST. 14 SM (SEE DETAIL 9)

LAT. 'V' DITCH W/CL 'B' RIP RAP EST. 39 MTONS FILTER FABRIC EST. 81 SM EST. DDE = (SEE DETAIL 9)

CLASS 'B' RIP RAP EST. 2 MTONS FILTER FABRIC EST. 6 SM

BERM 'V' DITCH EST. DDE = 9 (SEE DETAIL 9)

450 CSP W/ 2 ELBOWS

600 CSP

CLIFF - BLAKE ASSOC. DB 1936 PG 1335 (65)

ANTHONY L DRUM DB 968 PG 165 (74)

EDDIE D. LAIL & DEBRA S. LAIL DB 1397 PG 816 (77)

CMH HOMES, INC. DB 1819 PG 1456 (73)

DAVID CARL LYNN DB 1945 PG 507 (78B)

GILBERT H. CALDWELL, SR. DB 1987 PG 1278 (78)

MATCHLINE SEE SHEET 29 -L- STA. 266+40.000

MATCHLINE SEE SHEET 41 -Y17- STA. 10+80.000

MATCHLINE SEE SHEET 31 -SBL- STA. 269+40.000

SEE SHEET 65 FOR -L- PROFILE
SEE SHEET 65 FOR -SBL- PROFILE
SEE SHEET 67 FOR -NBL- PROFILE
SEE SHEETS 79 & 80 FOR -Y16- PROFILE
SEE SHEET 80 FOR -Y17- PROFILE
SEE SHEETS 42 & 43 FOR -L- DETOUR
SEE SHEET 68 FOR -LDET- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

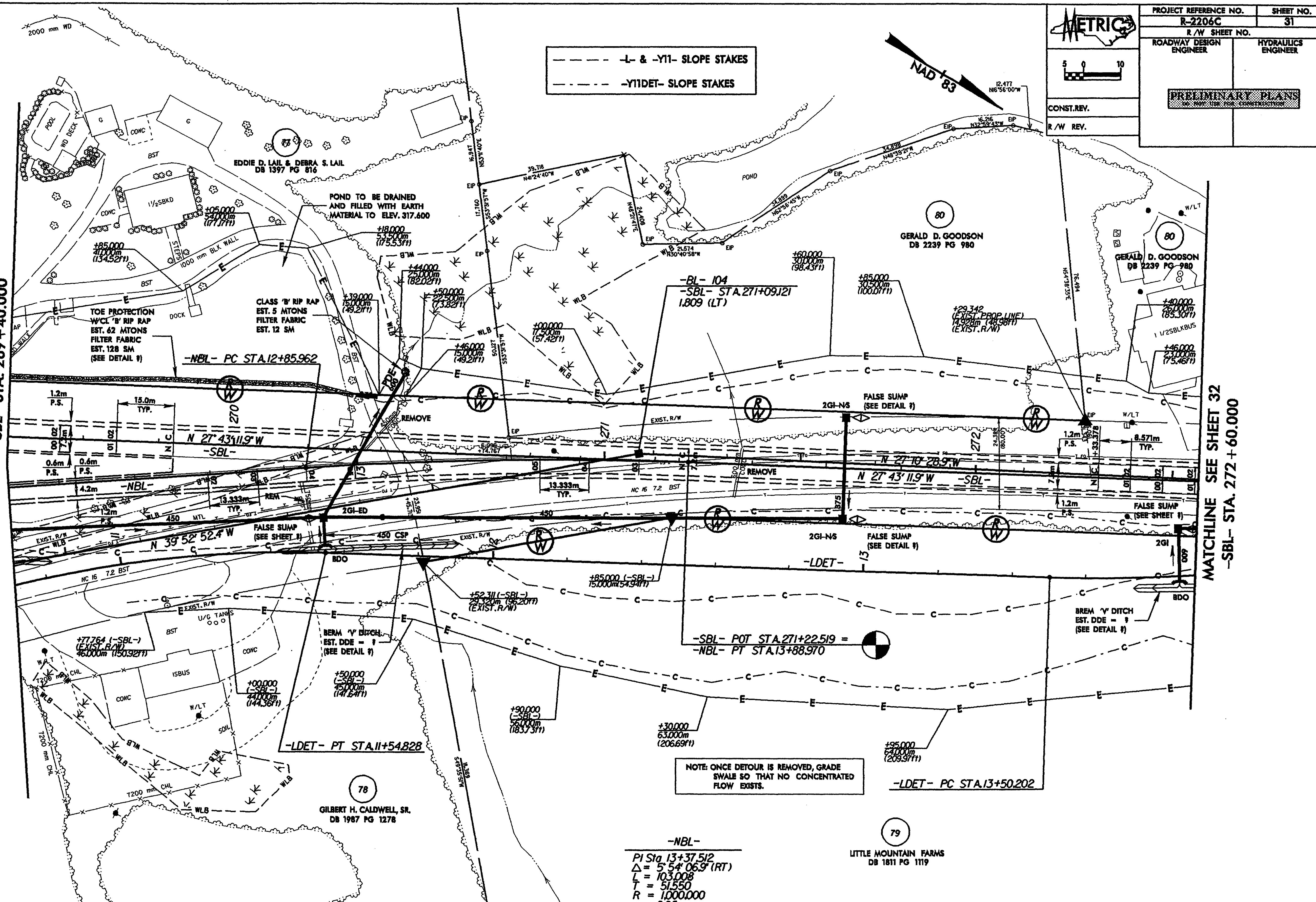
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.

R/W REV.

REVISIONS

RW REV. – NAME CHANGE ON PARCEL 80. EXISTING RIGHT OF WAY ALONG EXISTING NC 16 REDUCED FROM 30.480m (100') TO 24.384m (80'). PROPOSED RIGHT OF WAY ADDED ALONG -SBL- RT. 10-27-03 JT



-L- & -Y11- SLOPE STAKES
-Y11DET- SLOPE STAKES
NAD 83
MATCHLINE SEE SHEET 30
-SBL- STA. 269+40.000
MATCHLINE SEE SHEET 32
-SBL- STA. 272+60.000
EDDIE D. LAIL & DEBRA S. LAIL
DB 1397 PG 816
POND TO BE DRAINED AND FILLED WITH EARTH MATERIAL TO ELEV. 317.600
GERALD D. GOODSON
DB 2239 PG 980
TOE PROTECTION
W/CL 'B' RIP RAP
EST. 62 MTONS
FILTER FABRIC
EST. 128 SM
(SEE DETAIL ?)
CLASS 'B' RIP RAP
EST. 5 MTONS
FILTER FABRIC
EST. 12 SM
-NBL- PC STA.12+85.962
-BL- 104
-SBL- STA.271+09.121
1.809 (LT)
N 27° 43' 11.9" W
N 27° 10' 28.9" W
N 39° 52' 52.4" W
FALSE SUMP (SEE DETAIL ?)
REMOVE
-LDET-
-SBL- POT STA.271+22.519 =
-NBL- PT STA.13+88.970
BERM 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)
BREM 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)
-LDET- PT STA.11+54.828
-LDET- PC STA.13+50.202
NOTE: ONCE DETOUR IS REMOVED, GRADE SWALE SO THAT NO CONCENTRATED FLOW EXISTS.
GILBERT H. CALDWELL, SR.
DB 1987 PG 1278
LITTLE MOUNTAIN FARMS
DB 1811 PG 1119
-NBL-
PI Sta 13+37.512
Δ = 5° 54' 06.9" (RT)
L = 103.008
T = 51.550
R = 1,000.000
e = 0.05
RO = 40m

SEE SHEETS 65 & 66 FOR -SBL- PROFILE
SEE SHEET 67 FOR -NBL- PROFILE
SEE SHEETS 42 & 43 FOR -L DETOUR
SEE SHEET 68 FOR -LDET- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

REVISIONS

8/17/99

8W REV. - NAME CHANGE ON PARCEL 80, EXISTING RIGHT OF WAY ALONG EXISTING -SBL- RT. 10-27-03 JT
TO 24.384m (80'), PROPOSED RIGHT OF WAY ADDED ALONG -SBL- RT. 10-27-03 JT

NAD 83

-L- & -Y11- SLOPE STAKES

-Y11DET- SLOPE STAKES

MATCHLINE SEE SHEET 31
-SBL- STA. 272+60.000

-SBL- PC STA. 272+90.521

-SBL- POT STA. 275+53.163

-SBL- PT STA. 275+45.614

-LDET- POT STA. 15+87.759 =
-SBL- POC STA. 274+54.914

-LDET- PT STA. 14+46.346

-BL- 10
-SBL- STA. 274+19.571
12.901 (RT)

-BL- 106 POT STA. 278+44.552

-SBL- STA. 274+60.000
END PROJECT R-2206C
END CONST.

-SBL-
PI Sta 274+19.419
Δ = 20° 11' 58.6" (LT)
L = 255.093
T = 128.897
R = 720.000
e = 0.07
RO = 60m

SEE SHEET 66 FOR -L- PROFILE
SEE SHEETS 42 & 43 FOR -L DETOUR
SEE SHEET 68 FOR -LDET- PROFILE

GERALD D. GOODSON
DB 2239 PG 980

GARRETT L. GOODSON
DB 1443 PG 909

EUGENE N. CALDWELL
DB 748 PG 552

TROY L. CALDWELL
DB 992 PG 378

CLAYTON S. KIRBY
DB 1231 PG 686

R. D. HUFFMAN
DB 1231 PG 687

LITTLE MOUNTAIN FARMS
DB 1811 PG 1119

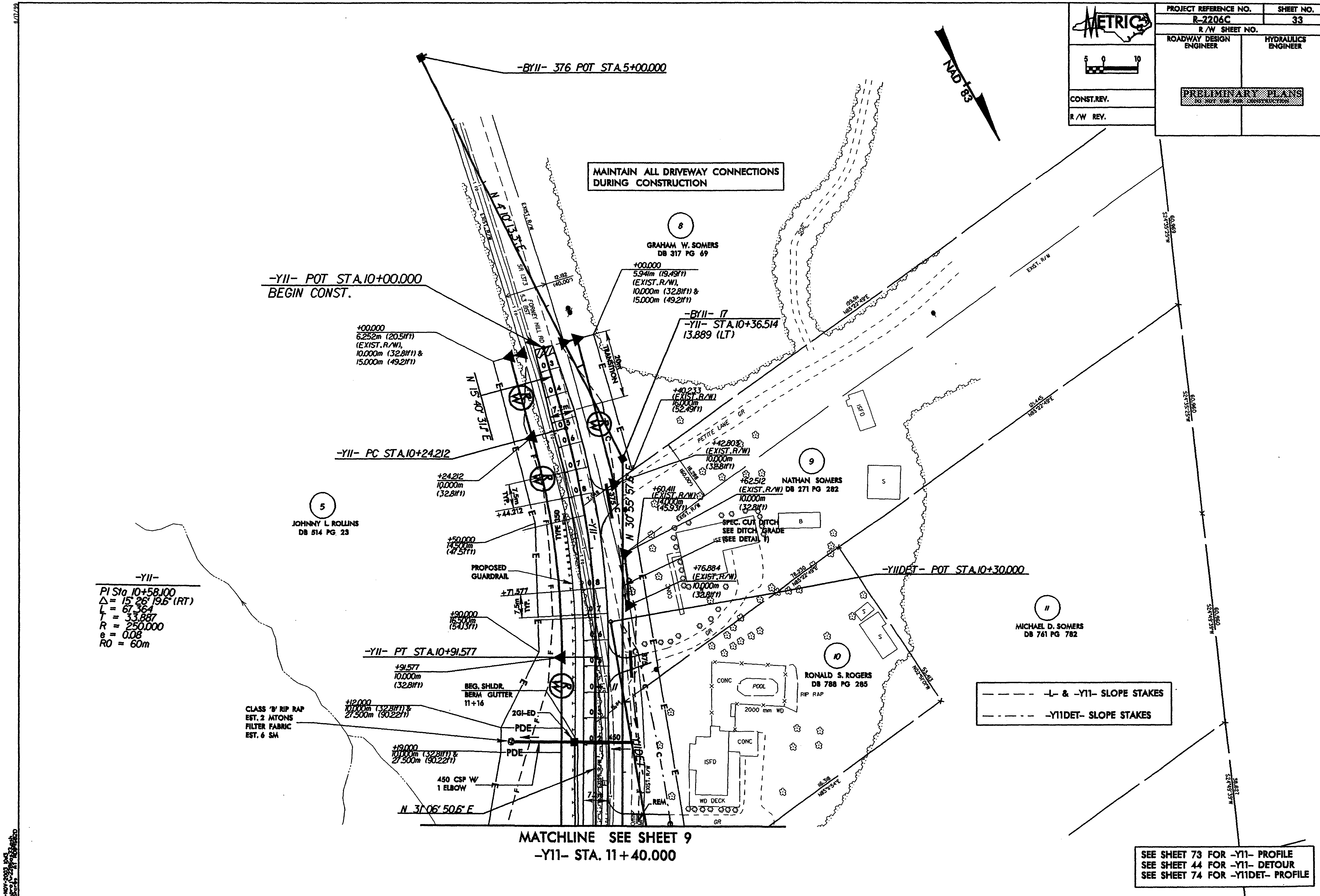
0.6m BASE DITCH
W/CL 'B' RIP RAP
@ So = 10.0%
EST. 10 MTONS
FILTER FABRIC
EST. 20 SM
EST. DDE = .4 CM
(SEE DETAIL 8)

+80.000 25.000m (85.30ft)
+76.348 20.000m (65.62ft)
+73.000 15.337m (50.32ft)
+68.000 26.000m (85.30ft)
+63.436 20.000m (65.62ft)
+60.000 15.394m (50.51ft) (EXIST. R/W)
+40.000 18.000m (59.06ft)
+90.521 15.000m (49.21ft)
+00.000 30.000m (164.042ft)
+33.000 37.000m (121.39ft)
+71.000 23.000m (75.459ft)
+40.000 21.000m (68.90ft)
+60.000 15.000m (49.21ft)
+00.000 9.958m (30.37ft) (EXIST. R/W) 15.000m (49.21ft)
+60.000 15.243m (49.62ft) (EXIST. R/W) & 18.500m (60.70ft)

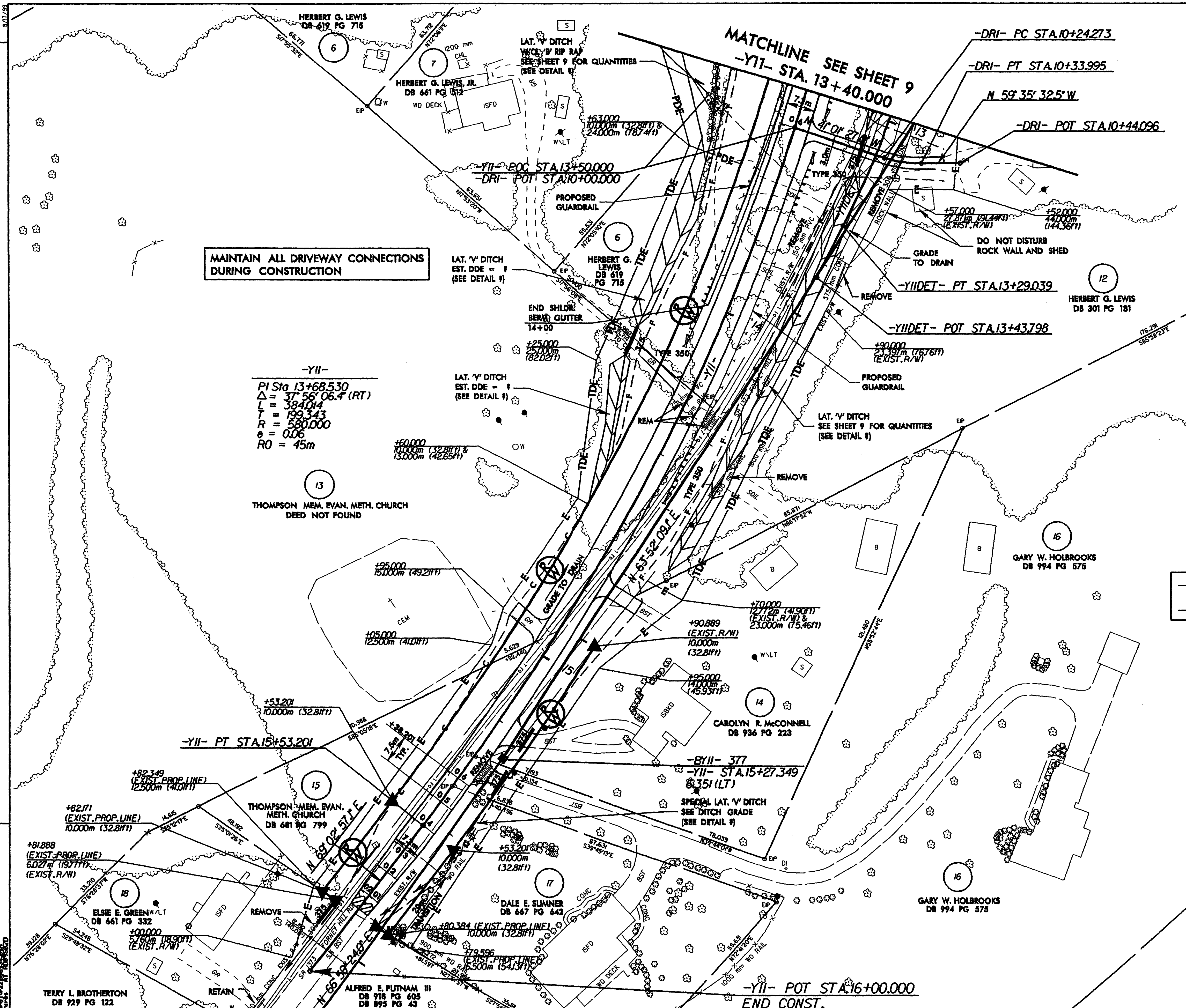
-SBL- N 48° 01' 10.5" W
-SBL- N 41° 09' 07.4" W
N 62° 45' 38.4" W
N 27° 10' 28.9" W

60.960 S35°58'34"E
62.766 N56°04'32"W
60.657 N35°51'54"W
S25°25'50"E 122.762
S55°44'42"W 56.534
S55°44'42"W 62.489
S55°07'14"W 121.320
S55°07'14"W 50.611

2GI-ED
REMOVE DI
REMOVE 300 mm CONC
REMOVE 450 mm CONC
1.2m P.S.
PLUG
RETAIN
450 mm CONC
1200 mm CHL
4.6 CONC WW
2.1 x 2.1 CONC
EXIST. R/W
PRIVATE R/W
POND
CONC WALL
W/LT
BST
NC 16 7.2 BST
1/2 SBK&FD
ISBKD
ISFD
POOL CONC
G W/APT
WD RAIL
GR
EIP



METRIC
PROJECT REFERENCE NO. R-2206C
SHEET NO. 33
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
CONST. REV.
R/W REV.
NAD 83
-BY11- 376 POT STA. 5+00.000
MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION
GRAHAM W. SOMERS DB 317 PG 69
-Y11- POT STA. 10+00.000 BEGIN CONST.
-BY11- 17 -Y11- STA. 10+36.514 13.889 (LT)
-Y11- PC STA. 10+24.212
NATHAN SOMERS DB 271 PG 282
JOHNNY L. ROLLINS DB 514 PG 23
-Y11DET- POT STA. 10+30.000
MICHAEL D. SOMERS DB 761 PG 782
-Y11- PI Sta 10+58.100 Δ = 15° 26' 19.6" (RT) L = 67.364 T = 33.887 R = 250.000 e = 0.08 RO = 60m
-Y11- PT STA. 10+91.577
RONALD S. ROGERS DB 788 PG 285
PROPOSED GUARDRAIL
CLASS 'B' RIP RAP EST. 2 MTONS FILTER FABRIC EST. 6 SM
BEG. SHLDR. BERM GUTTER 11+16
450 CSP W 1 ELBOW
N 31° 06' 50.6" E
-L- & -Y11- SLOPE STAKES
-Y11DET- SLOPE STAKES
MATCHLINE SEE SHEET 9
-Y11- STA. 11+40.000
SEE SHEET 73 FOR -Y11- PROFILE
SEE SHEET 44 FOR -Y11- DETOUR
SEE SHEET 74 FOR -Y11DET- PROFILE



PROJECT REFERENCE NO.	SHEET NO.
R-2206C	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

CONST. REV.

R/W REV.

REVISIONS

RW REV. - CORRECTED RIGHT OF WAY LINE SYMBOLOGY ALONG -Y11- RT. 10-27-03 JT

- - - - -L- & -Y11- SLOPE STAKES
- · - · - -Y11DET- SLOPE STAKES

SEE SHEET 73 FOR -Y11- PROFILE
SEE SHEET 44 FOR -Y11- DETOUR
SEE SHEET 74 FOR -Y11DET- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

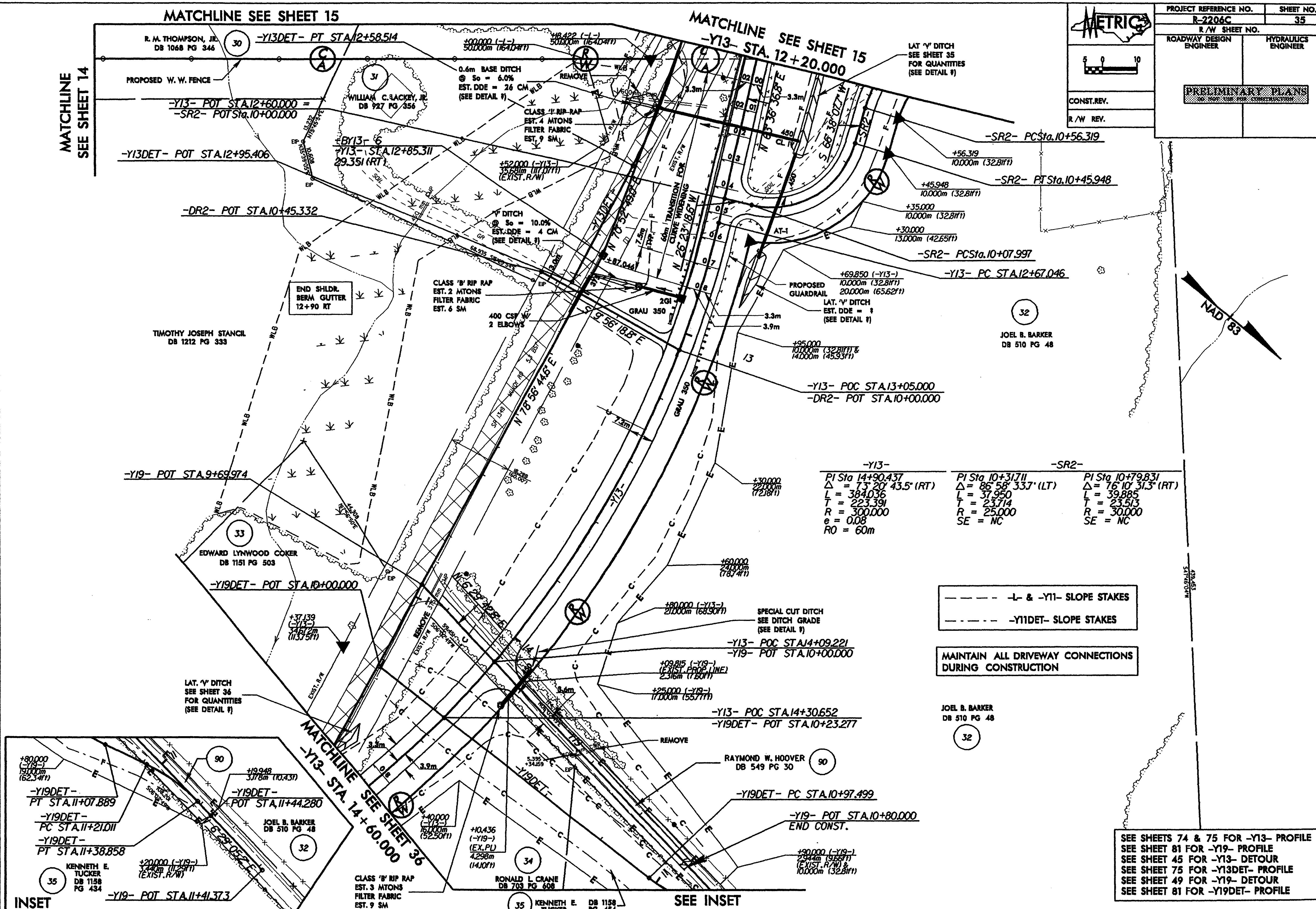
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.

R/W REV.

REVISIONS

RW REV. - NAME CHANGE ON PARCEL 35. PARCEL 30 HAS BEEN SUBDIVIDED. ADDED SERVICE ROAD -SR2- TO ACCESS SHUFORD PROPERTY. ADJUSTED RIGHT OF WAY AND EASEMENTS ACCORDINGLY. 10-27-03



MATCHLINE SEE SHEET 15
MATCHLINE SEE SHEET 14
MATCHLINE SEE SHEET 15 -Y13- STA. 12+20.000
MATCHLINE SEE SHEET 36 -Y13- STA. 14+60.000
R. M. THOMPSON, JR. DB 1068 PG 346
WILLIAM C. SACKEY, JR. DB 927 PG 356
TIMOTHY JOSEPH STANCIL DB 1212 PG 333
EDWARD LYNWOOD COKER DB 1151 PG 503
JOEL B. BARKER DB 510 PG 48
RAYMOND W. HOOVER DB 549 PG 30
RONALD L. CRANE DB 703 PG 608
KENNETH E. TUCKER DB 1158 PG 454
-Y13DET- PT STA.12+58.514
-Y13- POT STA.12+60.000 = -SR2- POT Sta.10+00.000
-Y13DET- POT STA.12+95.406
-DR2- POT STA.10+45.332
-Y19- POT STA.9+69.974
-Y19DET- POT STA.10+00.000
-SR2- PC Sta.10+56.319
-SR2- PT Sta.10+45.948
-SR2- PC Sta.10+07.997
-Y13- PC STA.12+67.046
-Y13- POC STA.13+05.000
-DR2- POT STA.10+00.000
-Y13- POC STA.14+09.221
-Y19- POT STA.10+00.000
-Y13- POC STA.14+30.652
-Y19DET- POT STA.10+23.277
-Y19DET- PC STA.10+97.499
-Y19- POT STA.10+80.000 END CONST.
PROPOSED W. W. FENCE
0.6m BASE DITCH @ So = 6.0% EST. DDE = 26 CM (SEE DETAIL 9)
CLASS 'I' RIP-RAP EST. 4 MTONS FILTER FABRIC EST. 9 SM
'V' DITCH @ So = 10.0% EST. DDE = 4 CM (SEE DETAIL 9)
CLASS 'B' RIP RAP EST. 2 MTONS FILTER FABRIC EST. 6 SM
400 CSP W/ 2 ELBOWS
END SHLDR. BERM GUTTER 12+90 RT
LAT 'V' DITCH SEE SHEET 35 FOR QUANTITIES (SEE DETAIL 9)
PROPOSED GUARDRAIL
LAT. 'V' DITCH EST. DDE = 9 (SEE DETAIL 9)
SPECIAL CUT DITCH SEE DITCH GRADE (SEE DETAIL 9)
LAT. 'V' DITCH SEE SHEET 36 FOR QUANTITIES (SEE DETAIL 9)
CLASS 'B' RIP RAP EST. 3 MTONS FILTER FABRIC EST. 9 SM
REMOVE
GRAU 350
NAD 83
INSET
SEE INSET
-Y19DET- PT STA.11+07.889
-Y19DET- PC STA.11+21.011
-Y19DET- PT STA.11+38.858
-Y19DET- POT STA.11+44.280
-Y19- POT STA.11+41.373

-Y13-	-SR2-	-SR2-
PI Sta 14+90.437	PI Sta 10+31.711	PI Sta 10+79.831
Δ = 73° 20' 43.5" (RT)	Δ = 86° 58' 33.7" (LT)	Δ = 76° 10' 31.3" (RT)
L = 384.036	L = 37.950	L = 39.885
T = 223.391	T = 23.714	T = 23.513
R = 300.000	R = 25.000	R = 30.000
e = 0.08	SE = NC	SE = NC
RO = 60m		

— — — — -L- & -Y11- SLOPE STAKES

— · — · — -Y11DET- SLOPE STAKES

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

SEE SHEETS 74 & 75 FOR -Y13- PROFILE
SEE SHEET 81 FOR -Y19- PROFILE
SEE SHEET 45 FOR -Y13- DETOUR
SEE SHEET 75 FOR -Y13DET- PROFILE
SEE SHEET 49 FOR -Y19- DETOUR
SEE SHEET 81 FOR -Y19DET- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

REVISIONS

8/17/98

R/W REV. - ADDED STATION AND OFFSET TO EASEMENT BREAK AT -Y13- STA. 15+20.000 LT. PARCEL 30 HAS BEEN SUBDIVIDED. ADDED PARCEL 30A. NAME CHANGES ON PARCELS 33 & 37. 10-27-03 JT

NAD 83

MATCHLINE SEE SHEET 35
-Y13- STA. 14+60.000

TIMOTHY JOSEPH STANCIL
DB 1212 PG 333

30A
BOYCE LYNCH, INC.
DB 1156 PG 182

JOEL B. BARKER
DB 603 PG 485

33
EDWARD LYNWOOD COKER
DB 1151 PG 503

34
RONALD L. CRANE
DB 703 PG 608

36
KENNETH L. MUNDY
DB 703 PG 595

37
BRIAN GREGORY WALKER &
TRACIE RENEE WALKER
DB 1237 PG 646

38
KENNETH C. HARRISON
DB 853 PG 352

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

-BY13- 18
-Y13- STA.14+85.138
4.487 (RT)

-Y13- POT STA.17+40.561

-Y13- POT STA.17+20.000
END CONST.

-BY13- 382 POT STA.12+72.764

-Y13- PT STA.16+51.081

-BY13- 381
-Y13- STA.16+22.375
5.150 (LT)

S 39° 10' 20.7" E

S 43° 02' 39.7" W

S 65° 34' 28.7" E

-Y13-
PI Sta 14+90.437
Δ = 73° 20' 43.5" (RT)
L = 384.036
T = 223.391
R = 300.000
e = 0.08
RO = 60m

LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 34 MTONS
FILTER FABRIC
EST. 71 SM
EST. DDE = ?
(SEE DETAIL I)

CLASS 'I' RIP RAP
EST. 7 MTONS
FILTER FABRIC
EST. 13 SM

LAT. 'V' DITCH
EST. DDE = ?
(SEE DETAIL I)

SPECIAL CUT DITCH
SEE DITCH GRADE
(SEE DETAIL I)

REMOVE

GRADE TO DRAIN

SR 1349 MUNDY RD 5.3 BST

EXIST. R/W

SEE SHEET 75 FOR -Y13- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	37
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS NOT FOR CONSTRUCTION

REVISIONS

RW REV. - EXISTING RIGHT OF WAY ALONG -Y14- (NC 150) REDUCED FROM 30.480m (100') TO 18.288m (60'), ADDED PROPOSED RIGHT OF WAY ALONG -Y14- LT. & RT. ADJUSTED EASEMENTS ACCORDINGLY, PARCEL 52 HAS BEEN SUBDIVIDED, ADDED PARCELS 51A & 52A, ADDED SERVICE ROAD -SR2- AT -Y14- STA 13+50 LT. ADJUSTED C/A, RIGHT OF WAY AND EASEMENTS ACCORDINGLY. EXISTING TOPO UPDATED ON PARCEL 52A. 10-27-03

-Y14- POC STA.11+50.000
BEGIN CONST.

-BY14- 131
-Y14- STA.11+50.943
5.387 (LT)

NAD 83

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

-Y14- SLOPE STAKES

-Y14DET- SLOPE STAKES

-Y14DET-

PI Sta 10+87.298
Δ = 8° 19' 18.2" (RT)
L = 174.290
T = 87.298
R = 1,200.000

PI Sta 12+10.850
Δ = 12° 50' 12.5" (LT)
L = 72.814
T = 36.560
R = 325.000

-Y14-

PI Sta 15+40.904
Δ = 10° 07' 29.0" (LT)
L = 989.574
T = 496.078
R = 5,600.000
e = NC

-SR3-

PI Sta 10+24.888
Δ = 89° 47' 43.8" (RT)
L = 31.345
T = 19.929
R = 20.000
SE = RC

-SR3A-

PI Sta 10+24.969
Δ = 26° 58' 49.9" (RT)
L = 14.127
T = 7.197
R = 30.000
SE = RC

DAVID L CURTIS
DB 724 PG 401

RACHEL A. M. CURTIS
DB 724 PG 398

DARRELL V. BEAL
DB 724 PG 844

KIM BEAL
DB 1496 PG 592

DARIS LEE TURBYFILL
DB 822 PG 73

MELVIN POOLE
DB 913 PG 13

DARRELL V. BEAL
DB 1035 PG 624

ROSIA OVERCASH
DB 793 PG 40

STANLEY OVERCASH
DB 223A PG 1817

EASEMENT
PLAT 50-37

CLASS 'I' RIP RAP
EST. 6 MTONS
FILTER FABRIC
EST. 14 SM

DRAINAGE SYSTEM TO BE CONSTRUCTED AS PART OF -Y14- DETOUR

REMOVE 24m OF EXIST. 600mm

RETAIN 19.2m OF EXIST. 600mm

SPECAIL CUT DITCH
SEE DITCH GRADE
(SEE DETAIL 9)

REMOVE SYSTEM

-Y14DET- PRC STA.11+74.290

-BY14- 2L
-Y14- STA.13+39.577
7.708 (LT)

-SR3- POT Sta.10+00.000
-Y14- POC Sta.13+50.000

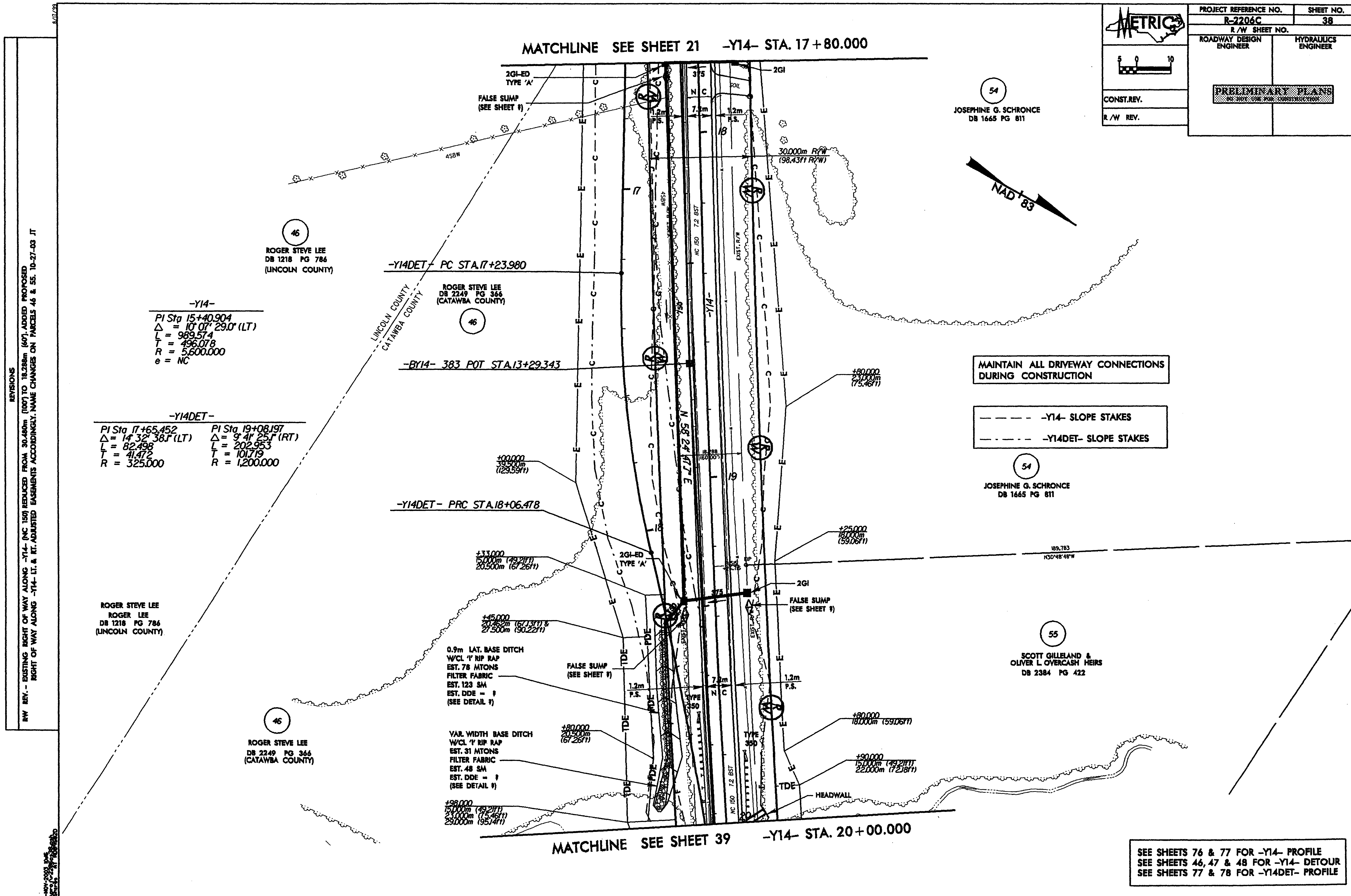
-Y14DET- PT STA.12+47.104

-SR3- PC Sta.10+04.959

-SR3- PT Sta.10+36.303

MATCHLINE SEE SHEET 21
-Y14- STA. 13+80.000

SEE SHEET 76 FOR -Y14- PROFILE
SEE SHEETS 46, 47 & 48 FOR -Y14- DETOUR
SEE SHEETS 77 & 78 FOR -Y14DET- PROFILE


PROJECT REFERENCE NO.
R-2206C
SHEET NO.
38
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
METRIC
CONST. REV.
R/W REV.
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
REVISIONS
RW REV. - EXISTING RIGHT OF WAY ALONG -Y14- (NC 150) REDUCED FROM 30.480m (100') TO 18.288m (60'). ADDED PROPOSED RIGHT OF WAY ALONG -Y14- LT. & RT. ADJUSTED EASEMENTS ACCORDINGLY. NAME CHANGES ON PARCELS 46 & 55. 10-27-03 JT
MATCHLINE SEE SHEET 21 -Y14- STA. 17+80.000
MATCHLINE SEE SHEET 39 -Y14- STA. 20+00.000
2GI-ED TYPE 'A'
FALSE SUMP (SEE SHEET #)
2GI
30.000m R/W (98.43ft R/W)
JOSEPHINE G. SCHRONCE DB 1665 PG 811
NAD 83
ROGER STEVE LEE DB 1218 PG 786 (LINCOLN COUNTY)
ROGER STEVE LEE DB 2249 PG 366 (CATAWBA COUNTY)
LINCOLN COUNTY
CATAWBA COUNTY
-Y14DET- PC STA.17+23.980
-BY14- 383 POT STA.13+29.343
-Y14DET- PRC STA.18+06.478
-Y14-
PI Sta 15+40.904
Δ = 10° 07' 29.0" (LT)
L = 989.574
T = 496.078
R = 5,600.000
e = NC
-Y14DET-
PI Sta 17+65.452
Δ = 14° 32' 38.1" (LT)
L = 82.498
T = 41.472
R = 325.000
PI Sta 19+08.197
Δ = 9° 41' 25.1" (RT)
L = 202.953
T = 101.719
R = 1,200.000
MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION
-Y14- SLOPE STAKES
-Y14DET- SLOPE STAKES
+80.000 23.000m (75.46ft)
+00.000 39.500m (129.59ft)
+25.000 18.000m (59.06ft)
+33.000 15.000m (49.21ft) 20.500m (67.26ft)
+45.000 20.462m (67.13ft) & 27.500m (90.22ft)
0.9m LAT. BASE DITCH W/CL 'I' RIP RAP EST. 78 MTONS FILTER FABRIC EST. 123 SM EST. DDE = # (SEE DETAIL #)
VAR. WIDTH BASE DITCH W/CL 'I' RIP RAP EST. 31 MTONS FILTER FABRIC EST. 48 SM EST. DDE = # (SEE DETAIL #)
+80.000 20.500m (67.26ft)
+98.000 15.000m (49.21ft) 23.000m (75.46ft) 29.000m (95.14ft)
+80.000 18.000m (59.06ft)
+90.000 15.000m (49.21ft) 22.000m (72.18ft)
HEADWALL
TYPE 350
1.2m P.S.
7.2m
NC 150 7.2 BST
N 58° 24' 41.7" E
ROGER STEVE LEE ROGER LEE DB 1218 PG 786 (LINCOLN COUNTY)
SCOTT GILLELAND & OLIVER L. OVERCASH HEIRS DB 2384 PG 422
SEE SHEETS 76 & 77 FOR -Y14- PROFILE
SEE SHEETS 46, 47 & 48 FOR -Y14- DETOUR
SEE SHEETS 77 & 78 FOR -Y14DET- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	39
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5 0 10

CONST.REV.

R /W REV.

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

NAD 83

REVISIONS

8/27/03

RW REV. - EXISTING RIGHT OF WAY ALONG -Y14- (NC 150) REDUCED FROM 30.480m (100') TO 18.288m (60'). ADDED PROPOSED RIGHT OF WAY ALONG -Y14- LT. & RT. ADJUSTED EASEMENTS ACCORDINGLY. NAME CHANGES ON PARCELS 46 & 55. 10-27-03 JT

MATCHLINE SEE SHEET 38

-Y14- STA. 20+00.000

-Y14-
PI Sta 15+40.904
△ = 10° 07' 29.0" (LT)
L = 989.574
T = 496.078
R = 5,600.000
e = NC

-Y14DET-
PI Sta 19+08.197
△ = 9° 41' 25.1" (RT)
L = 202.953
T = 101.719
R = 1,200.000

CLASS 'I' RIP RAP
EST. 16 MTONS
FILTER FABRIC
EST. 31 SM

+13.000
15.000m (49.21ft)
25.000m (82.02ft)

+30.000
15.000m (49.21ft)
25.000m (82.02ft)

+34.399
15.000m (49.21ft)

POND

46
ROGER STEVE LEE
DB 2249 PG 366
(CATAWBA COUNTY)

RETAIN & EXTEND EXISTING
1.54 x 1.53 RCBC

LAT. 'V' DITCH
EST. DDE = ?
(SEE DETAIL ?)

+30.000
15.000m (49.21ft)
22.000m (72.18ft)

TYPE 350

+34.399
15.000m (49.21ft)

5
55
SCOTT GILLELAND &
OLIVER L. OVERCASH HEIRS
DB 2384 PG 422

ISBKD

-Y14- PT STA.20+34.399

REMOVE

SPECIAL CUT DITCH
SEE DITCH GRADE
(SEE DETAIL ?)

N 58° 50' 52.9" E

88.655
N33°31'00"W

+65.000
15.000m (49.21ft)

-Y14- POT STA.21+00.000
END CONST.

+00.000
9.140m (29.99ft)
(EXIST. R/W)
15.000m (49.21ft)

N 58° 24' 41.7" E

-BY14- 100 POT STA.15+71.122

-Y14DET- PT STA.20+09.431

-Y14- POT STA.21+26.070 =
-Y14DET- POT STA.21+35.347

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

— — — — -Y14- SLOPE STAKES

— — — — -Y14DET- SLOPE STAKES

SEE SHEETS 77 FOR -Y14- PROFILE
SEE SHEETS 46, 47 & 48 FOR -Y14- DETOUR
SEE SHEETS 77 & 78 FOR -Y14DET- PROFILE

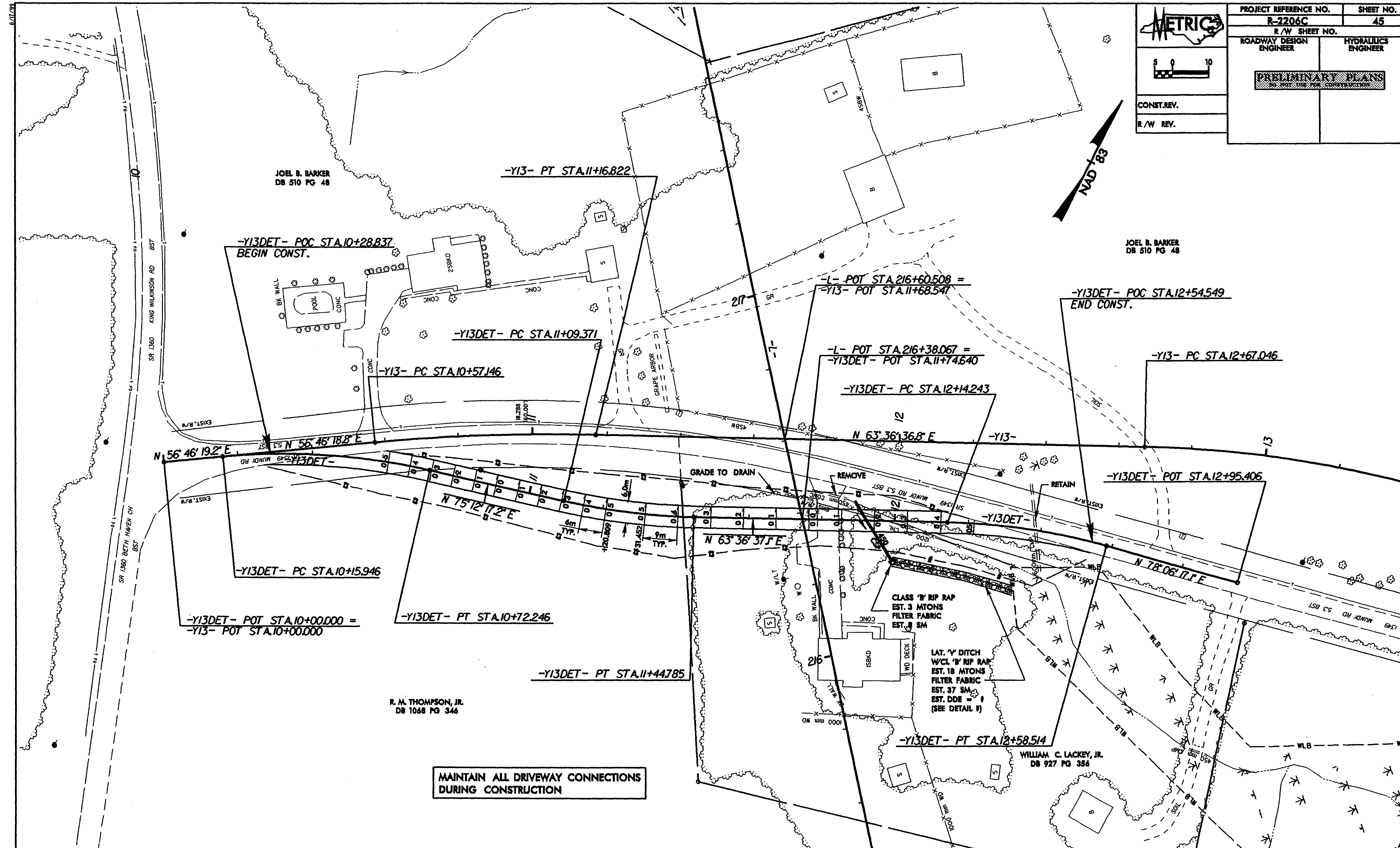
04-NOV-2003 RMT

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	45
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.
R/W REV.



NAD 83
JOEL B. BARKER
DB 510 PG 48
-Y13- PT STA.11+16.822
-Y13DET- POC STA.10+28.837
BEGIN CONST.
-Y13DET- PC STA.11+09.371
-Y13- PC STA.10+57.146
-L- POT STA.216+60.508 =
-Y13- POT STA.11+68.547
-L- POT STA.216+38.067 =
-Y13DET- POT STA.11+74.640
-Y13DET- PC STA.12+14.243
-Y13DET- POC STA.12+54.549
END CONST.
-Y13- PC STA.12+67.046
-Y13DET- POT STA.12+95.406
N 56° 46' 19.2" E
N 56° 46' 18.8" E
N 63° 36' 36.8" E
N 75° 12' 17.2" E
N 63° 36' 37.1" E
N 78° 06' 17.1" E
-Y13DET-
-Y13-
-L-
GRADE TO DRAIN
REMOVE
RETAIN
SR 1360 KING WILKINSON RD BST
SR 1360 BETH HAVEN CH BST
SR 1349 MUNDY RD 5.3 BST
GRAPE ARBOR
POOL
BK WALL
2SBKD
1SBKD
WD DECK
CONC
EXIST. R/W
6m TYP.
9m TYP.
-Y13DET- PC STA.10+15.946
-Y13DET- POT STA.10+00.000 =
-Y13- POT STA.10+00.000
-Y13DET- PT STA.10+72.246
-Y13DET- PT STA.11+44.785
-Y13DET- PT STA.12+58.514
CLASS 'B' RIP RAP
EST. 3 MTONS
FILTER FABRIC
EST. 8 SM
LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 18 MTONS
FILTER FABRIC
EST. 37 SM
EST. DDE = #
(SEE DETAIL #)
R. M. THOMPSON, JR.
DB 1068 PG 346
WILLIAM C. LACKEY, JR.
DB 927 PG 356
1000 mm WD
-Y19- POT

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

-Y13DET-

PI Sta 10+44.341	PI Sta 11+27.139	PI Sta 12+36.497
Δ = 18° 25' 58.0" (RT)	Δ = 11° 35' 40.1" (LT)	Δ = 14° 29' 40.0" (RT)
L = 56.300	L = 35.413	L = 44.271
T = 28.395	T = 17.767	T = 22.254
R = 175.000	R = 175.000	R = 175.000
e = 0.05	e = 0.05	e = 0.05
RO = 40m	RO = 40m	RO = 40m

SEE SHEET 75 FOR -Y13DET- PROFILE
SEE SHEETS 15, 35 & 36 FOR -Y13-
SEE SHEETS 74 & 75 FOR -Y13- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	48
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS NOT FOR BID OR CONSTRUCTION	
CONST.REV.	
R/W REV.	

METRIC

5 0 10

NAD '83

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

SCOTT GILLELAND & OLIVER L OVERCASH HEIRS DB 2384 PG 422

JOSEPHINE G. SCHRONCE DB 1665 PG 811

-Y14- PT STA.20+34.400

-Y14- POT STA.21+26.070

-Y14DET- POC STA.20+09.431
END CONST.

MATCHLINE SEE SHEET 47
-Y14DET STA. 17+20.000

FALSE SUMP (SEE DETAIL 1)

-Y14-

-Y14DET-

RETAIN 300 mm CONC

1-1.54 X 1.53 RCBC

1400 CSP

CL 'B' RIP RAP
EST. 8 MTONS
FILTER FABRIC
EST. 21 SM

LAT. BASE DITCH (SEE DETAIL 1)

SPECIAL CUT DITCH (SEE DETAIL 1)

-Y14DET- PC STA.17+23.980

-Y14DET- PRC STA.18+06.478

ROGER STEVE LEE DB 2249 PG 366 (CATAWBA COUNTY)

POND

ROGER STEVE LEE DB 1218 PG 786 (LINCOLN COUNTY)

-Y14DET-

PI Sta 17+65.452	PI Sta 19+08.197
Δ = 14° 32' 38.1" (LT)	Δ = 9° 41' 25.1" (RT)
L = 82.498	L = 202.953
T = 41.472	T = 101.719
R = 325.000	R = 1,200.000
e = 0.06	e = RC
RO = 36m	RO = 12m

SEE SHEETS 77 & 78 FOR -Y14DET- PROFILE
SEE SHEETS 21, 37, 38 & 39 FOR -Y14-
SEE SHEETS 76 & 77 FOR -Y14- PROFILE

6/17/99

04-NOV-2003 JMS

PROJECT REFERENCE NO.	SHEET NO.
R-2206C	49
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5 0 10

CONST.REV.

R/W REV.

PRELIMINARY PLANS

NAD 83

TIMOTHY JOSEPH STANCIL
DB 1212 PG 333

JOEL B. BARKER
DB 510 PG 48

RAYMOND W. HOOVER
DB 549 PG 30

EDWARD LYNWOOD COKER
DB 1151 PG 1503

RONALD L. CRANE
DB 703 PG 608

KENNETH E. TUCKER
DB 1158 PG 454

SR 1349 MUNDY RD

-Y19- POT STA.9+69.974

-Y13- POC STA.14+09.221
-Y19- POT STA.10+00.000

-Y19DET- PT STA.11+38.858

-Y19DET- POT STA.11+44.280
-Y19- POT STA.11+20.000

-Y19DET- PC STA.11+21.011

-Y19- POT STA.11+41.373

N 6° 29' 05.2" E

N 6° 29' 42.8" E

N 2° 03' 34.5" W

N 13° 51' 59.0" W

-Y19DET- POT STA.10+00.000
BEGIN CONST.

-Y19DET- POT STA.11+40.000
END CONST.

-Y19DET- PT STA.11+07.889

-Y13- POC STA.14+30.652
-Y19DET- POT STA.10+23.277

-Y19DET- PC STA.10+97.499

-Y19DET-

PI Sta 11+02.713	PI Sta 11+30.031
Δ = 11° 54' 24.5" (LT)	Δ = 20° 27' 04.3" (RT)
L = 10.391	L = 17.847
T = 5.214	T = 9.019
R = 50.000	R = 50.000
e = NC	e = NC

MAINTAIN ALL DRIVEWAY CONNECTIONS DURING CONSTRUCTION

SEE SHEET 81 FOR -Y19DET- PROFILE
SEE SHEET 35 FOR -Y19-
SEE SHEET 81 FOR -Y19- PROFILE
SEE SHEET 35 FOR -Y13-
SEE SHEETS 74 & 75 FOR -Y13- PROFILE