DEPARTMENT OF THE ARMY
Wilmington District, Corps of Engineers
Post Office Box 1890
Wilmington, North Carolina 28402-1890

Action ID No. 200431320 August 13, 2004

PUBLIC NOTICE

The **North Carolina Department of Transportation, ATTN: Dr. Gregory J. Thorpe, Director, Project Development and Environmental Analysis Branch, 1548 Mail Service Center, Raleigh, North Carolina 27699-1548** has applied for a Department of the Army (DA) permit **TO DISCHARGE DREDGED OR FILL MATERIAL INTO 6.21 ACRES OF WETLAND, 13,321 LINEAR FEET OF STREAM CHANNEL, AND 4.47 ACRES OF OPEN WATER POND IN AND ADJACENT TO THE WATERS OF FORNEY CREEK, KILLIAN CREEK, REED CREEK AND UNNAMED TRIBUTARIES TO FACILITATE THE RELOCATION OF 10.6 MILES OF NC HIGHWAY 16 FROM NC HIGHWAY 73 ON THE SOUTH TO SR 1895 (TOWER ROAD) AT EXISTING NC 16 ON THE NORTH, WEST OF DENVER, LINCOLN AND CATAWBA COUNTIES, NORTH CAROLINA (TIP NO. R-2206 B & C, STATE PROJECT NO. 8.1830501).**

The following description of the work is taken from data provided by the applicant and from observations made during an onsite visit by a representative of the Corps of Engineers. Plans submitted with the application show the proposed construction of a new, four-lane, median-divided roadway with limited access from NC Highway 73 at the terminus of R-2206 A in Lincoln County, to an intersection with existing NC 16 at SR 1895 (Tower Road) in Catawba County, a total distance of 10.6 miles. The proposed right-of-way width for the project is approximately 325 feet including a 60-foot wide median. The applicant has identified two sections of this project designated R-2206 B and R-2206 C. Section B is 4.8 miles in length and crosses Forney Creek and 12 unnamed tributaries. On-grade intersections would be constructed at SR 1380 (Optimist Club Road) and SR 1386 (St. James Church Road). A total of 3.52 acres of wetland and 6668 linear feet of stream channel would be impacted by pipe and culvert installations, channel relocation and lateral fill encroachment on Section B. Streams are mostly perennial and vary from 3 to 5 feet wide with substrates of silt, sand, gravel and cobble. Only Sites 6B and 11B have intermittent flow. Forney Creek would be spanned by dual bridges south of Optimist Club Road and would be conveyed under the same relocated road by a 110-foot long, double cell box culvert at Site 14B. A low-flow sill would be installed in the western cell of this box culvert. Impacts to tributary streams range from 299 feet at Site 7B where a 42-inch diameter pipe would be installed in a perennial stream to 1346 feet at Site 13B where a 54-inch pipe would convey the perennial stream under the proposed road. Four wetlands ranging in size from 0.10 to 3.12 acres would be crossed by Section B. These wetlands consist of headwater forest, scrub shrub and emergent marsh. The largest wetland impact (3.12 acres) would occur at Site 10B where two existing ponds measuring 3.27 acres would also be drained. Approximately 700 linear feet of the currently impounded stream channel at Site 10B would be restored utilizing natural stream channel design techniques.

Section C is 5.8 miles long and crosses Killian Creek, Reed Creek and thirteen unnamed tributaries. An interchange would be constructed at NC Highway 150 and an on-grade intersection would be constructed at SR 1895 (Tower Road) where the new roadway would merge back into existing NC Highway 16. Dual spanning bridges would be constructed over Killian Creek at two locations (north of SR 1373 and north of SR 1349) and over Reed Creek south of the Tower Road intersection. A total of 2.66 acres of wetland and 6653 linear feet of stream channel would be impacted by pipe and culvert installation, channel relocation and lateral fill encroachment. Streams are both intermittent and perennial, vary in width from 2 to 5 feet and have either a sandy substrate or a mixture of sand, gravel and cobble. Individual channel impacts range from 230 feet at Site 4C where a 24-inch diameter pipe would be installed on an intermittent channel to 1040 feet at Site 1C where a 5-foot by 5-foot, single-cell box culvert would be installed on a perennial channel. At the outlet of this culvert, 164 linear feet of channel would be relocated utilizing natural stream channel design techniques. The proposed road would impact seven wetlands ranging in size from 0.01 to 1.69 acres. Six of the wetlands consist of headwater forest. A 1.20-acre pond with a 0.10-acre fringing marsh would be filled at Site 16C.

The project as a whole would impact 6.21 acres of wetland, 2416 linear feet of intermittent stream channel, 10,905 linear feet of perennial stream channel and 4.47 acres of man-made pond. Approximately 700 linear feet of perennial channel on the B Section and 164 linear feet on the C Section would be relocated utilizing natural stream channel design. The applicant is proposing to mitigate for stream and wetland losses by utilizing the North Carolina Ecosystem Enhancement Program (EEP). Construction of the 5.4-mile long A Section of TIP R-2206 was authorized by Department of the Army permit on May 18, 2001 and is scheduled for completion in September of 2004. The Federal Highway Administration (FHWA) approved a Final Environmental Impact Statement (FEIS) for the proposed work on May 8, 1997. A Record of Decision (ROD) was signed by the FHWA on September 4, 1997. The purpose of the proposed work is to improve safety and traffic capacity of NC 16 and provide an improved transportation corridor between Charlotte and the Lake Norman area. Plans showing representative portions of the proposed work are included with this public notice. Full plans may be obtained from the applicant or viewed at the US Army Corps of Engineers, Asheville Regulatory Field Office, 151 Patton Avenue, Room 208, Asheville, North Carolina 28801-5006.

The State of North Carolina will review this public notice do determine the need for the applicant to obtain any required State authorization. No Department of the Army (DA) permit will be issued until the coordinated State viewpoint on the proposal has been received and reviewed by this agency, nor will a DA permit be issued until the North Carolina Department of Environment and Natural Resources (NCDENR) has determined the applicability of a Water Quality Certificate as required by PL 92-500.

This application is being considered pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344). Any person may request, in writing within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearing shall state, with particularity, the reasons for holding a public hearing.

The District Engineer has consulted the latest published version of the National Register of Historic Places for the presence or absence of registered properties, or properties listed as being eligible for inclusion therein, and this worksite is not registered property or property listed as being eligible for inclusion in the Register. Consultation of the National Register constitutes the extent of cultural resource investigations by the District Engineer, and he is otherwise unaware of the presence of such resources. Presently, unknown archeological, scientific, prehistorical, or historical data may be lost or destroyed by work under the requested permit.

The District Engineer, based on available information, is not aware that the proposed activity will affect species, or their critical habitat, designated as endangered or threatened pursuant to the Endangered Species Act of 1973.

The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluation of the probable impacts which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so the conditions under which it will be allowed to occur, are therefore determined by the outcome of the general balancing process. That decision should reflect the national concern for both protection and utilization of important resources. All factors which may be relevant to the proposal must be considered including the cumulative effects thereof. Among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards and flood plain values (in accordance with Executive Order 11988), land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. For activities involving the placement of dredged or fill materials in waters of the United States, a permit will be denied if the discharge that would be authorized by such permit would not comply with the Environmental Protection Agency's 404(b)(1) guidelines. Subject to the preceding sentence and any other applicable guidelines or criteria, a permit will be granted unless the District Engineer determines that it would be contrary to the public interest.

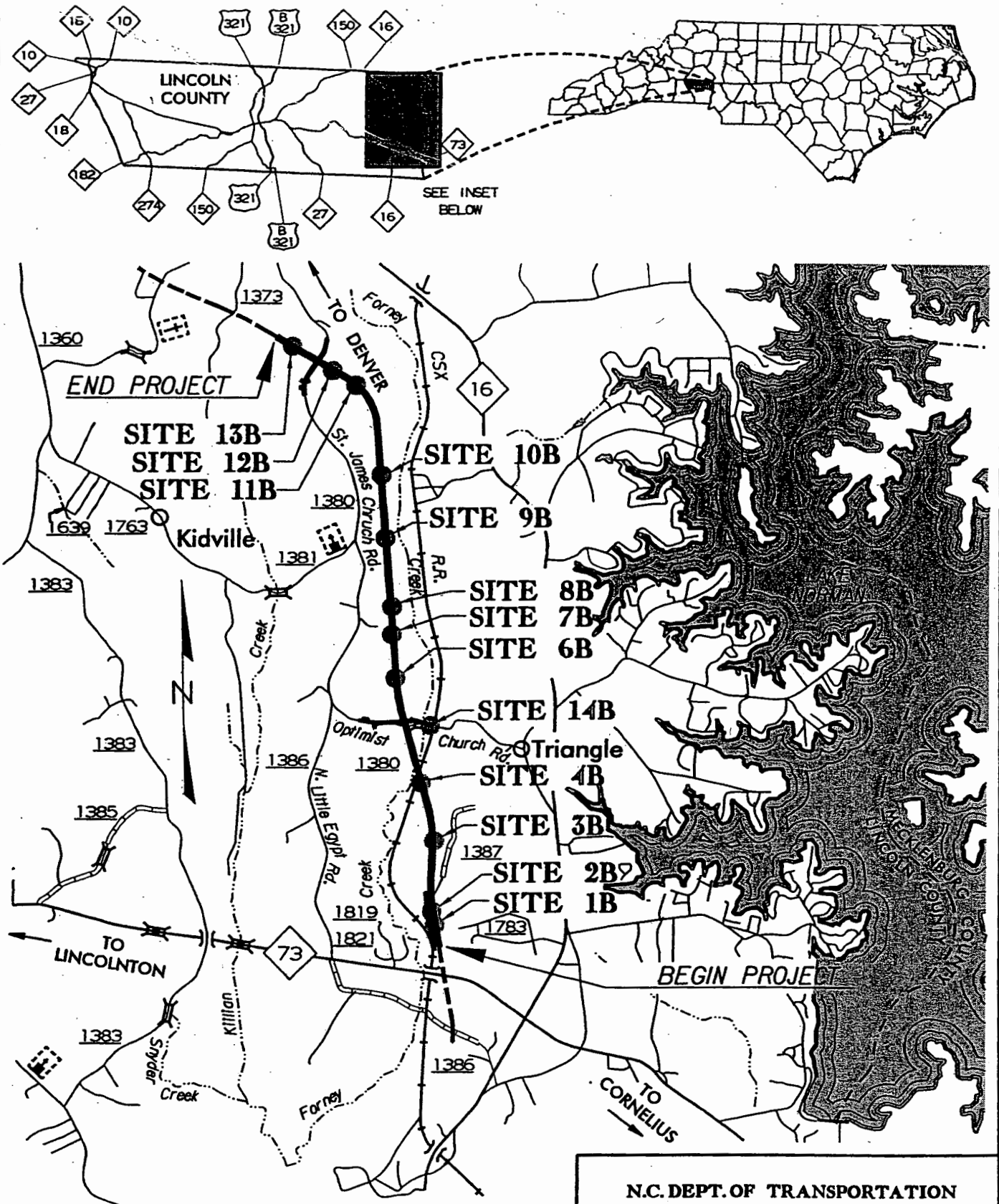
The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials; Indian Tribes and other interested parties in order to consider and evaluate the impacts, including secondary and cumulative impacts, of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Generally, the decision whether to issue this Department of the Army (DA) permit will not be made until the North Carolina Division of Water Quality (NCDWQ) issues, denies, or waives State certification required by Section 401 of the Clean Water Act. The NCDWQ considers whether or not the proposed activity will comply with Sections 301, 302, 306 and 307 of the Clean Water Act. The application and this public notice for the DA permit serves as application to the NCDWQ for certification.

Additional information regarding the Clean Water Act certification may be reviewed at the offices of the 401 Wetlands Certification Unit, North Carolina Division of Water Quality (NCDWQ), 2321 Crabtree Blvd., Raleigh, North Carolina 27604. Copies of such materials will be furnished to any person requesting copies upon payment of reproduction costs.

All persons desiring to make comments regarding the application for Clean Water Act certification should do so in writing delivered to the North Carolina Division of Water Quality Wetlands Section, 1621 Mail Service Center, Raleigh, North Carolina 27626-0621, on or before September 3, 2004, Attention: Mr. John Dorney.

Written comments pertinent to the proposed work, as outlined above, will be received in this office, Attention: Mr. Steven Lund, until 4:15 p.m., August 27, 2004, or telephone (828) 271-7980.



LOCATION MAP

SCALE

.5 0 1 KM

NOTE: SITE 5B REMOVED DUE TO NO IMPACT

PUBLIC NOTICE SHEET 1 OF 22

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 WLB WETLAND

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

X X X X 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
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PROJECT: 8.1830501 (R-2206B)
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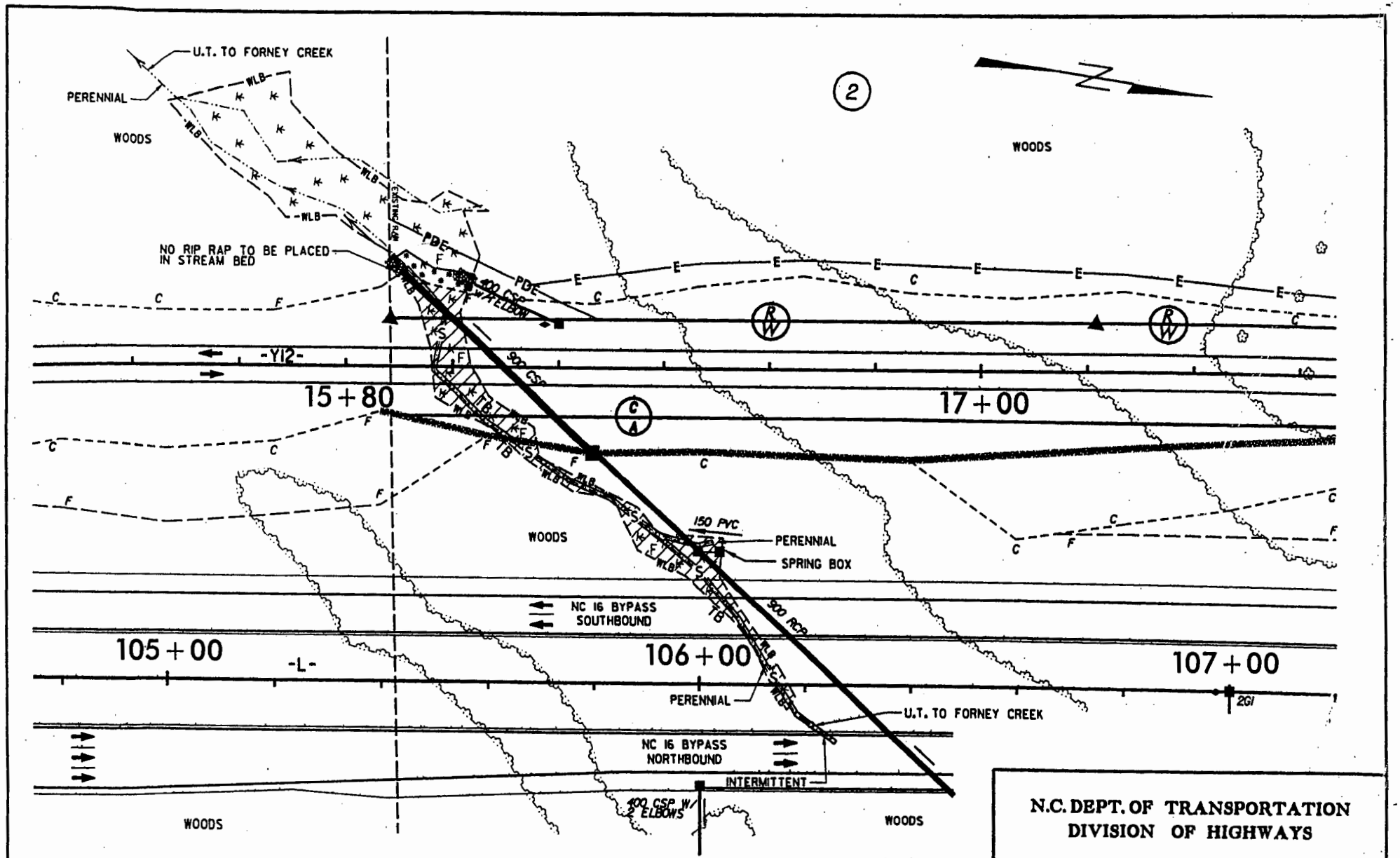

PLAN VIEW
SITE 1B

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N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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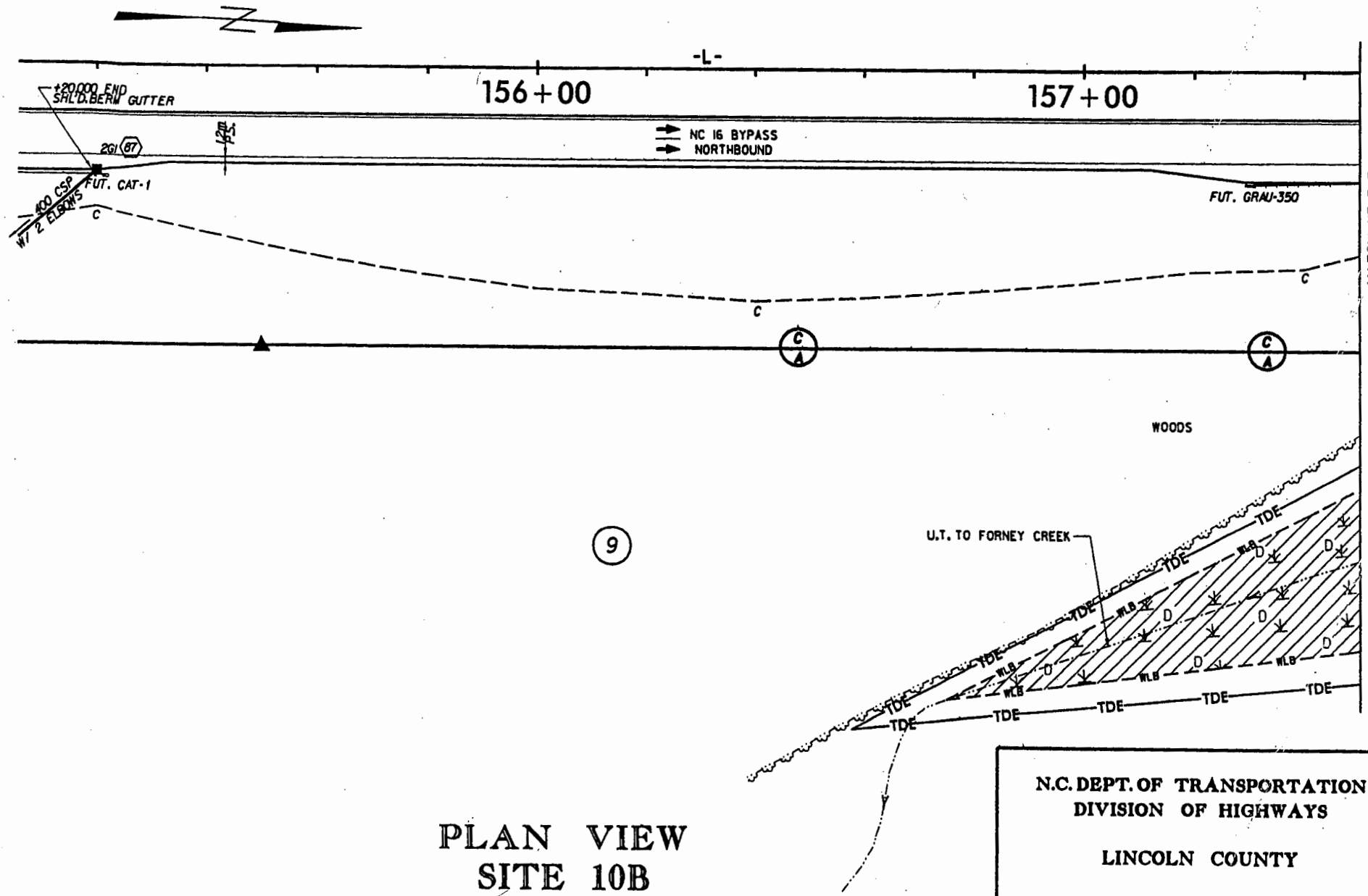

PLAN VIEW
SITE 10B

10 0 20

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DENOTES DRAINED WETLANDS

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
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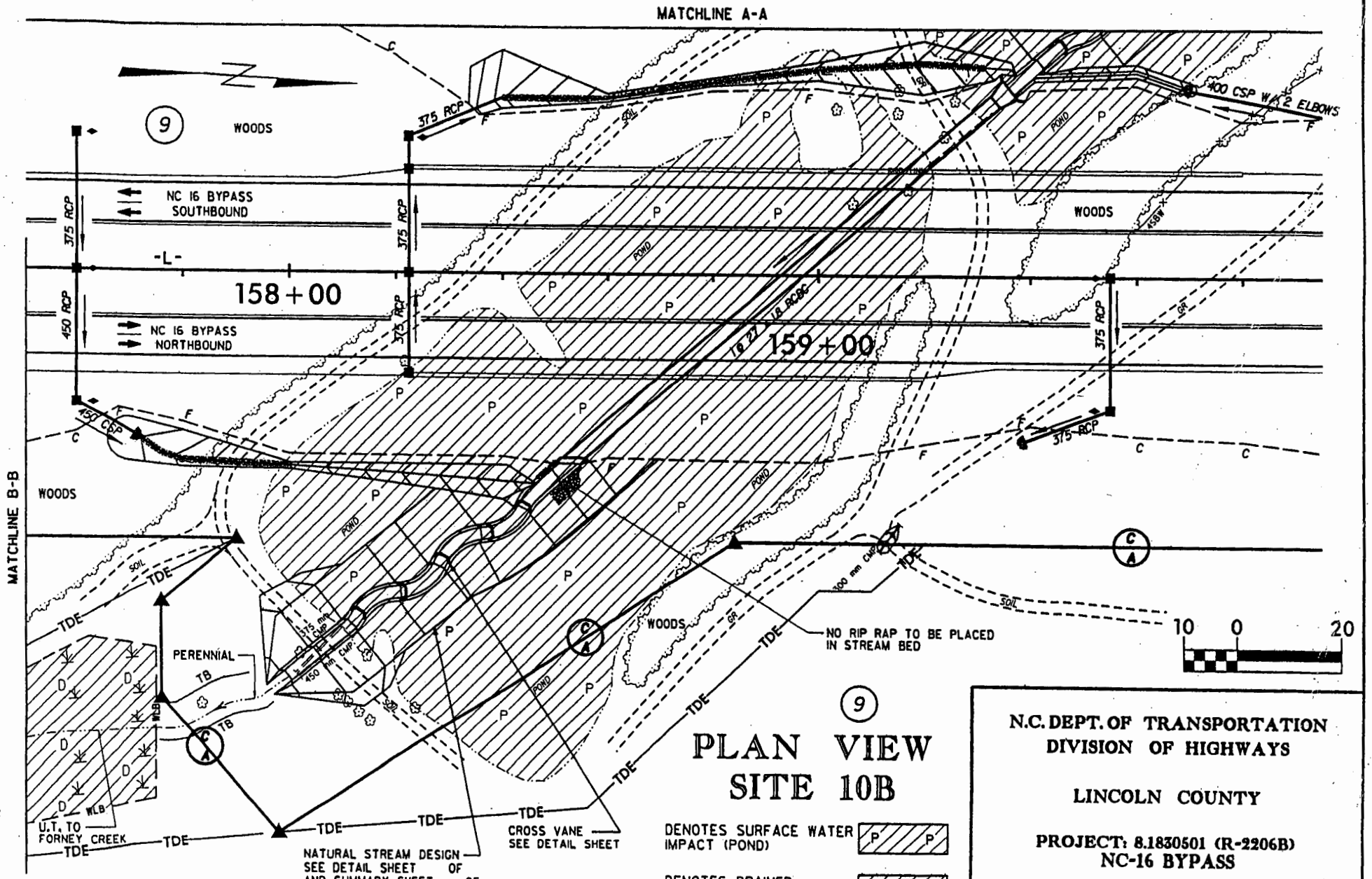

PLAN VIEW
SITE 10B

DENOTES SURFACE WATER IMPACT (POND) — P

DENOTES DRAINED WETLANDS — D

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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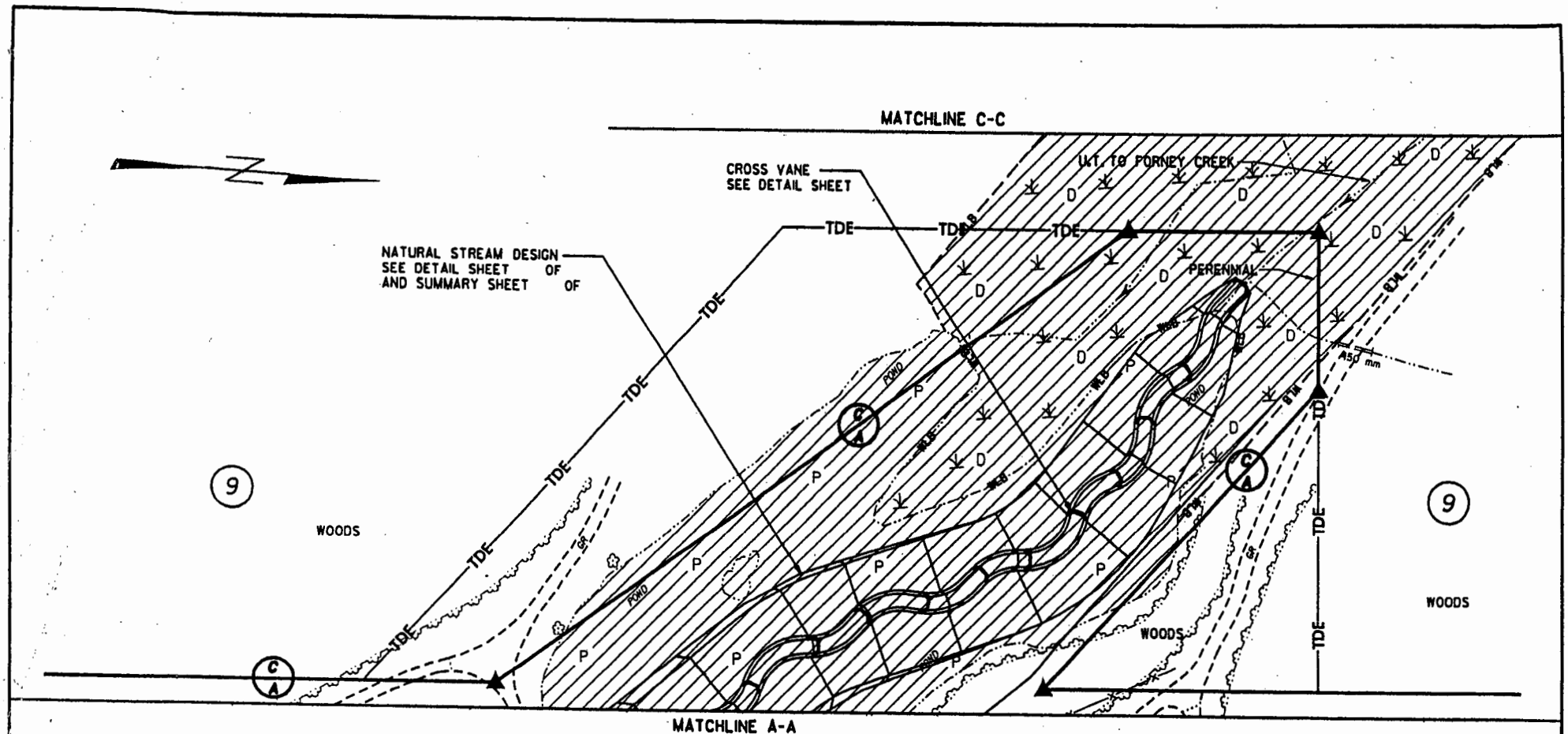

PLAN VIEW
SITE 10B

DENOTES SURFACE WATER IMPACT (POND) P P

DENOTES DRAINED WETLAND D D

10 0 20

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DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
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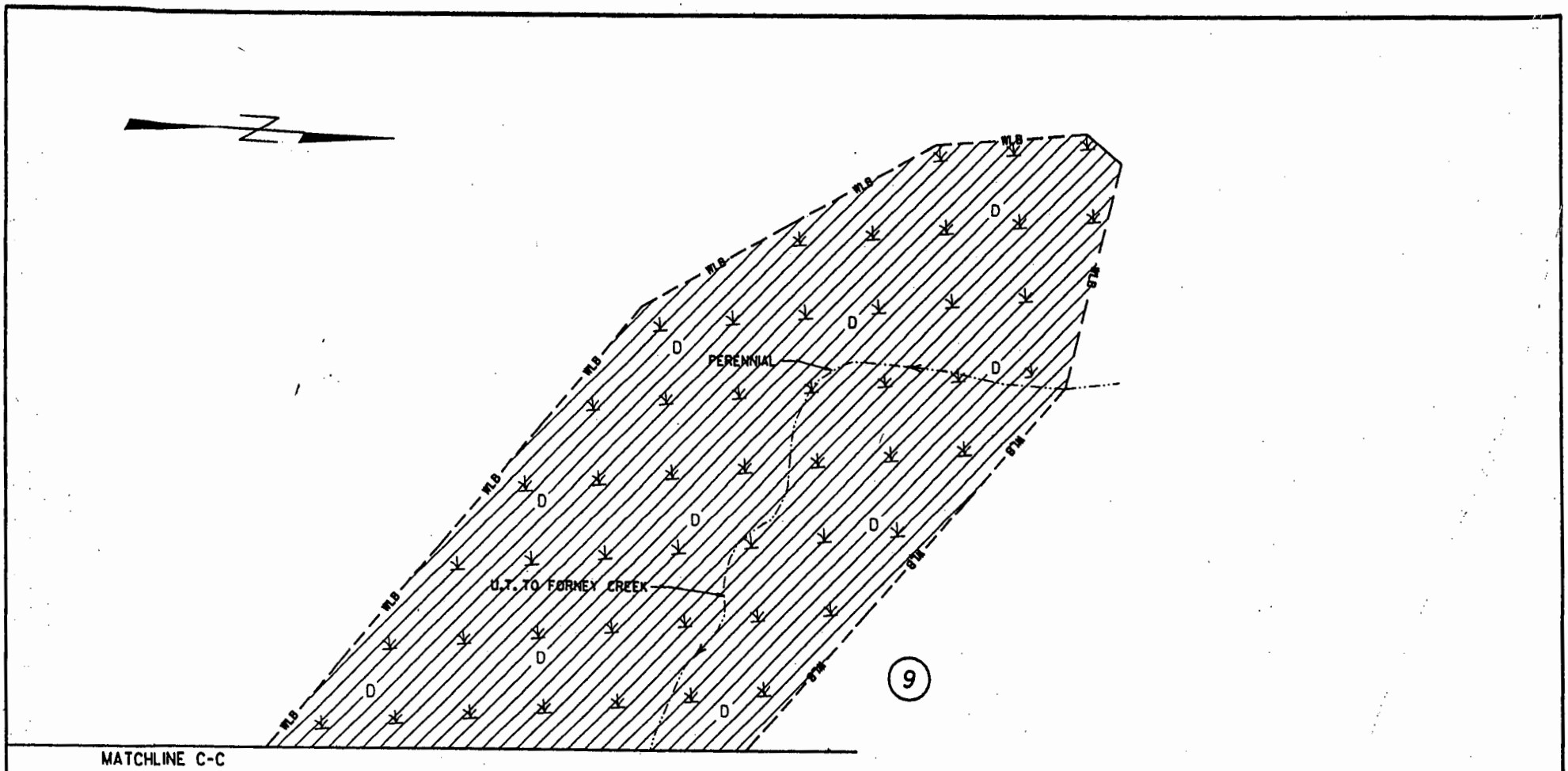

PLAN VIEW
SITE 10B

10 0 20

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DENOTES DRAINED WETLAND

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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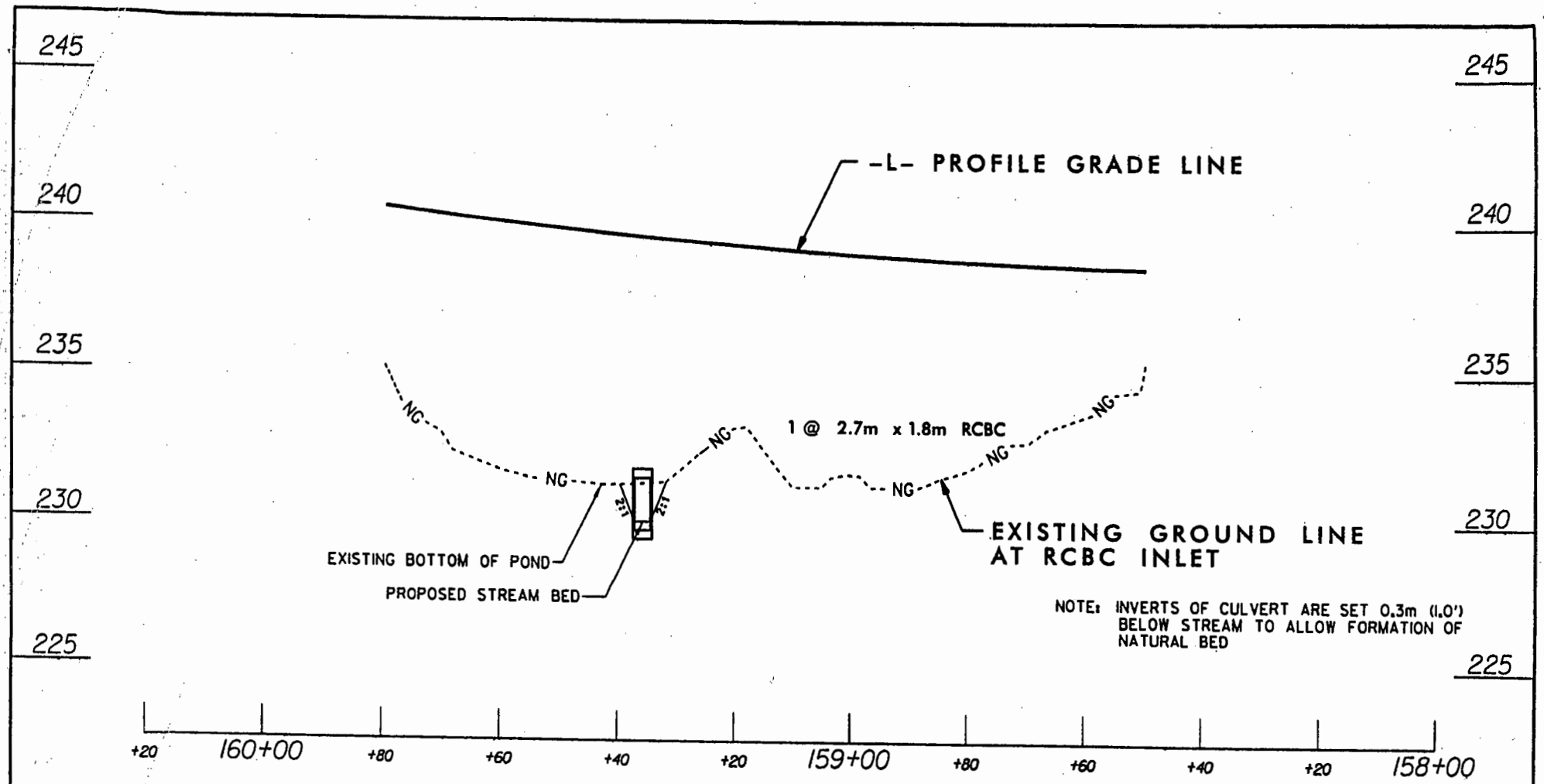

PROFILE
SITE 10B

5 0 10 HORIZONTAL SCALE

1 0 2 VERTICAL SCALE

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N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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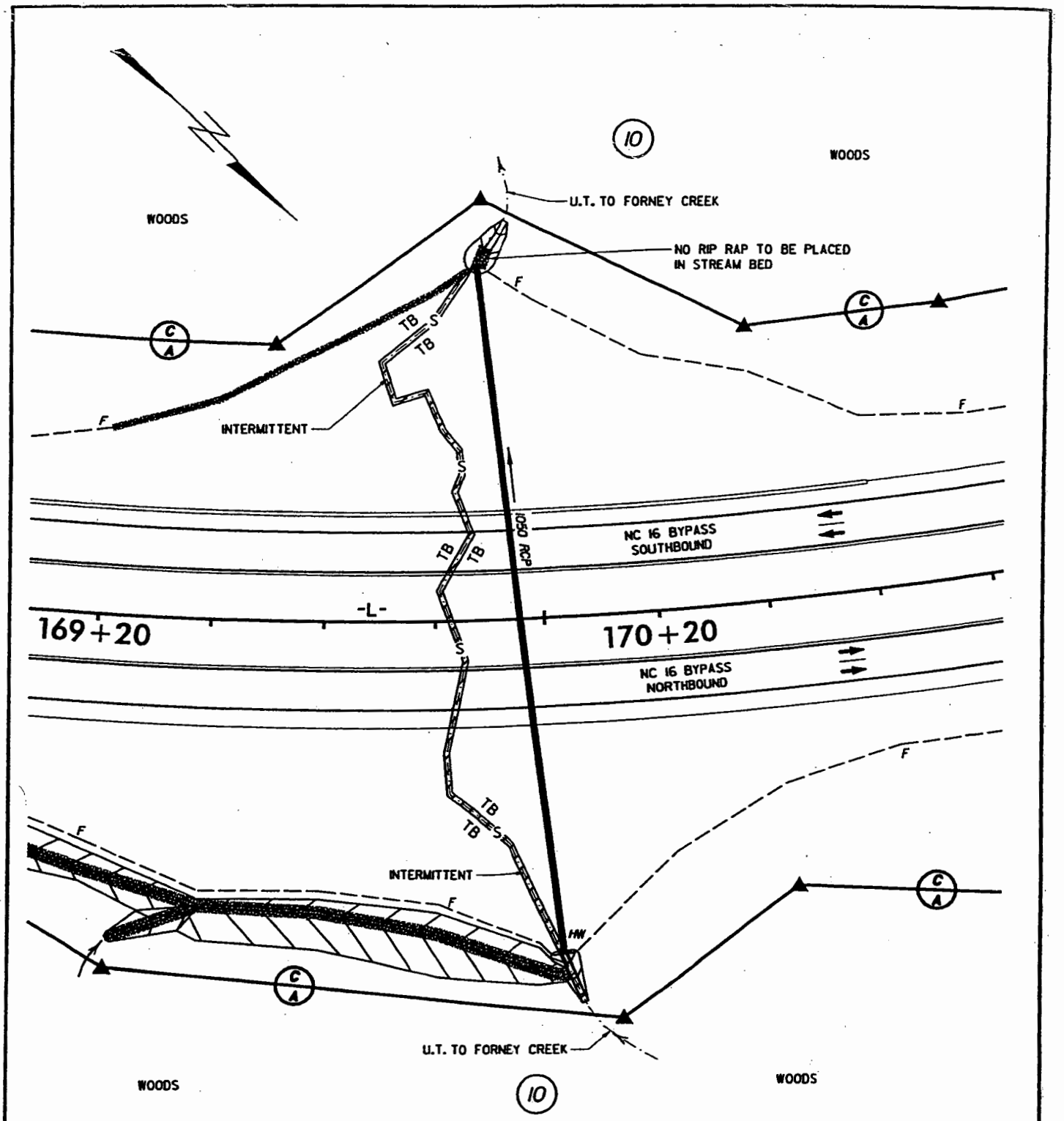

PLAN VIEW
SITE 11B

DENOTES SURFACE WATER IMPACT (NATURAL)

10 0 20

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DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1830501 (R-2206B)
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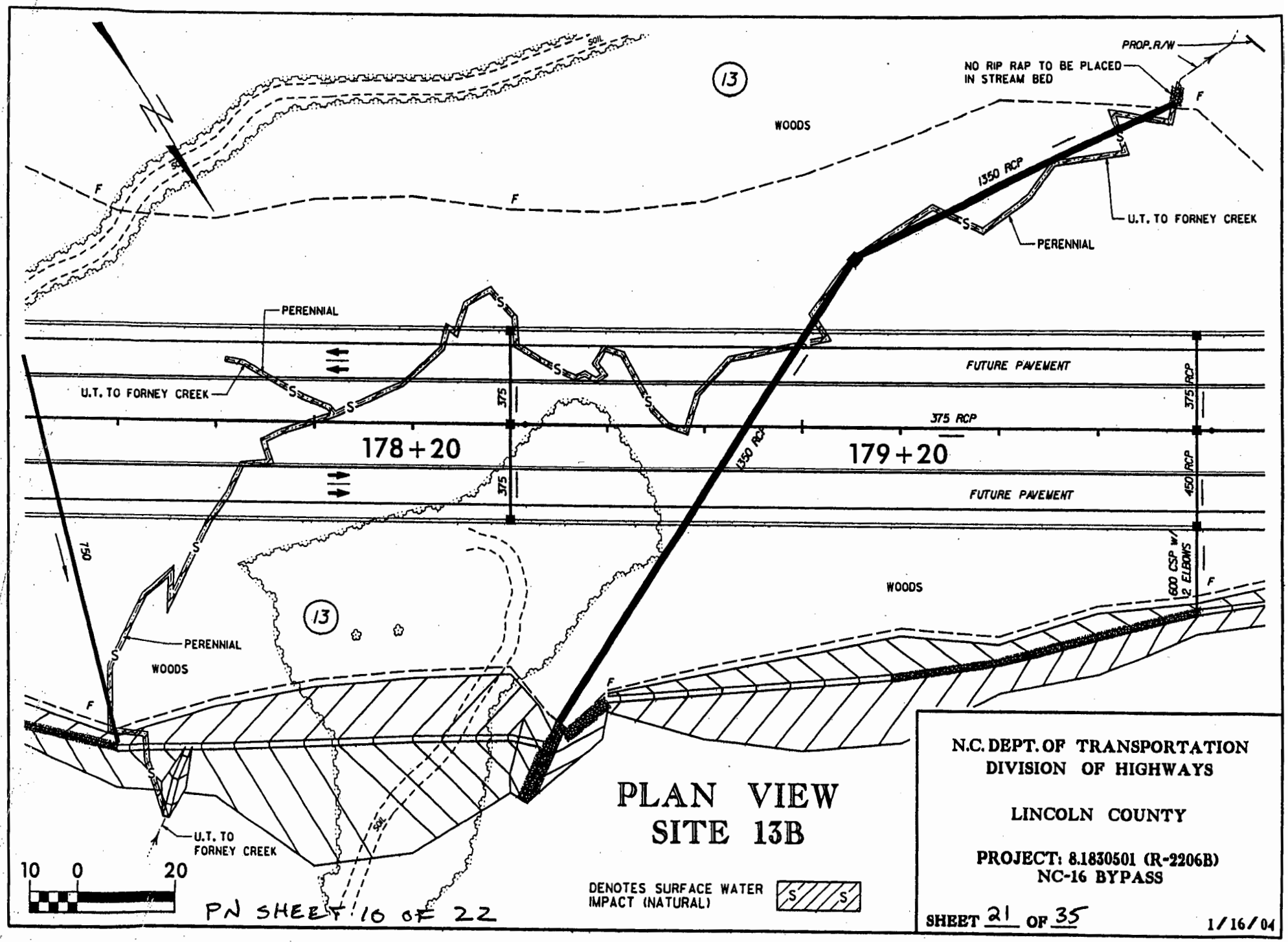

PLAN VIEW
SITE 13B

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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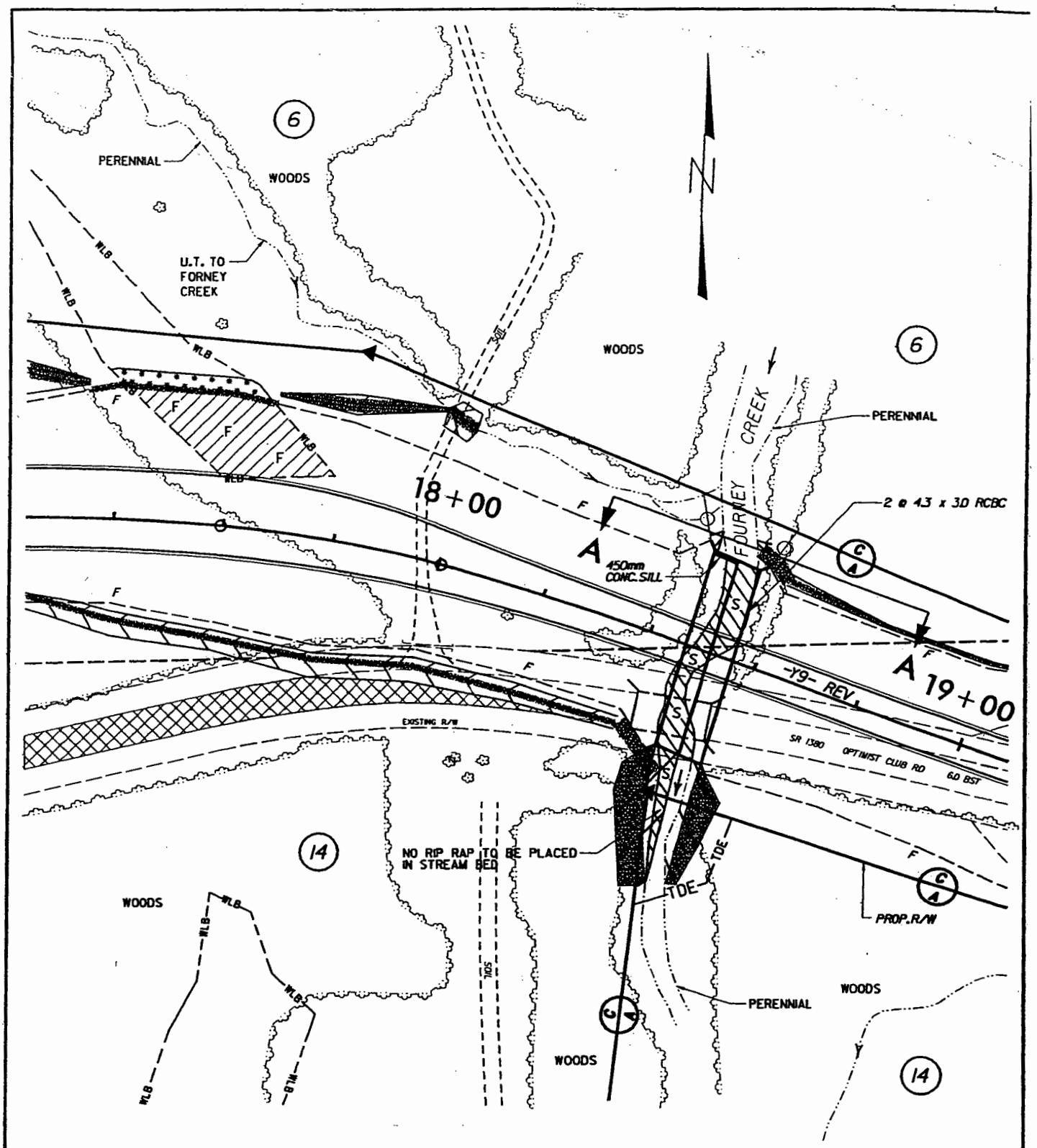

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PLAN VIEW
SITE 14B

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)
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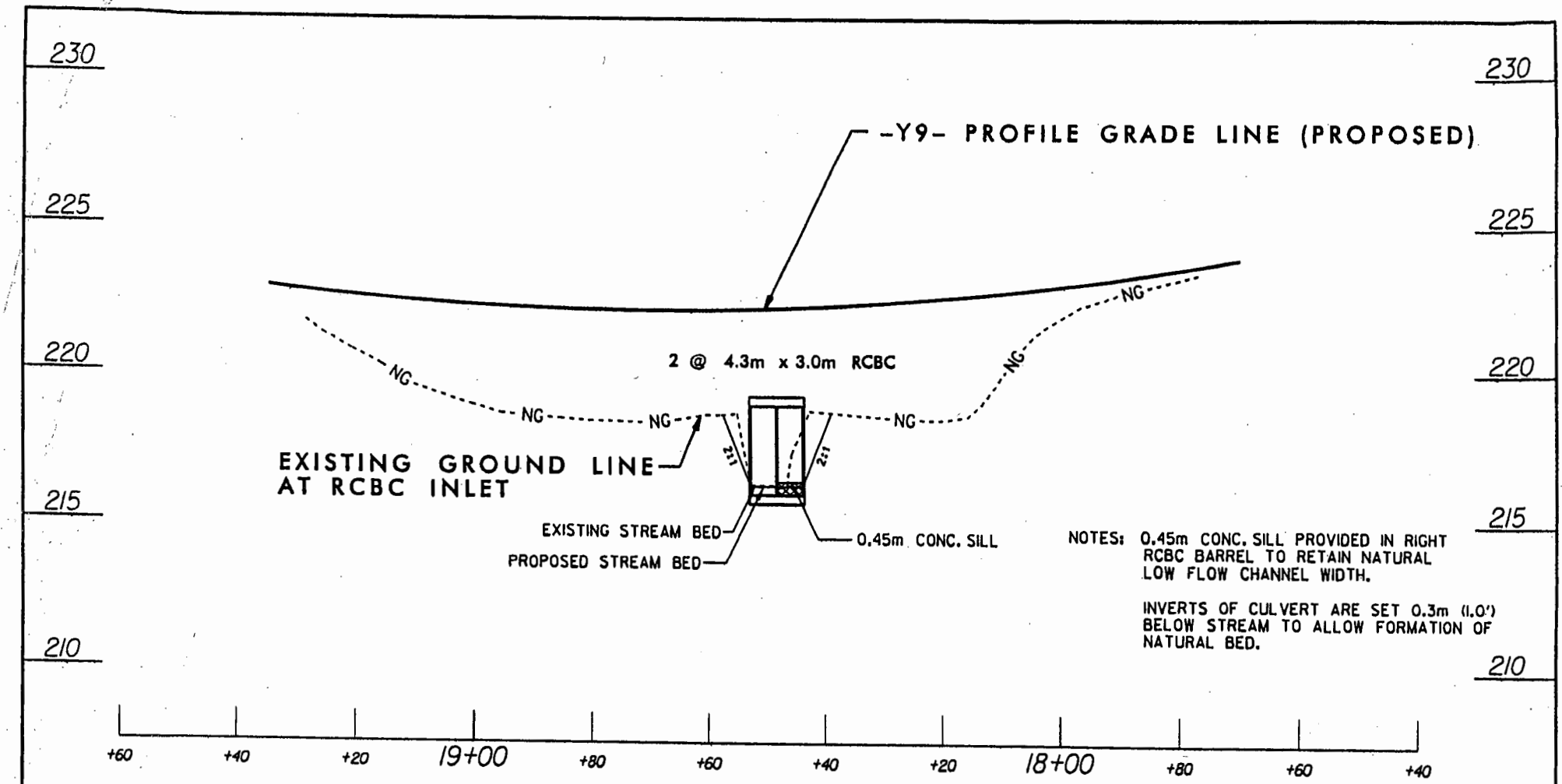

NOTES: 0.45m CONC. SILL PROVIDED IN RIGHT RCBC BARREL TO RETAIN NATURAL LOW FLOW CHANNEL WIDTH.

INVERTS OF CULVERT ARE SET 0.3m (1.0') BELOW STREAM TO ALLOW FORMATION OF NATURAL BED.

PROFILE
SITE 14B

5 0 10 HORIZONTAL SCALE

1 0 2 VERTICAL SCALE

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N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

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

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IMPACT SUMMARY (ENGLISH)

			WETLAND IMPACTS				SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size	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)
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.

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N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN COUNTY

PROJECT: 8.1630501
NCDOT T.I.P. No: R-2206B

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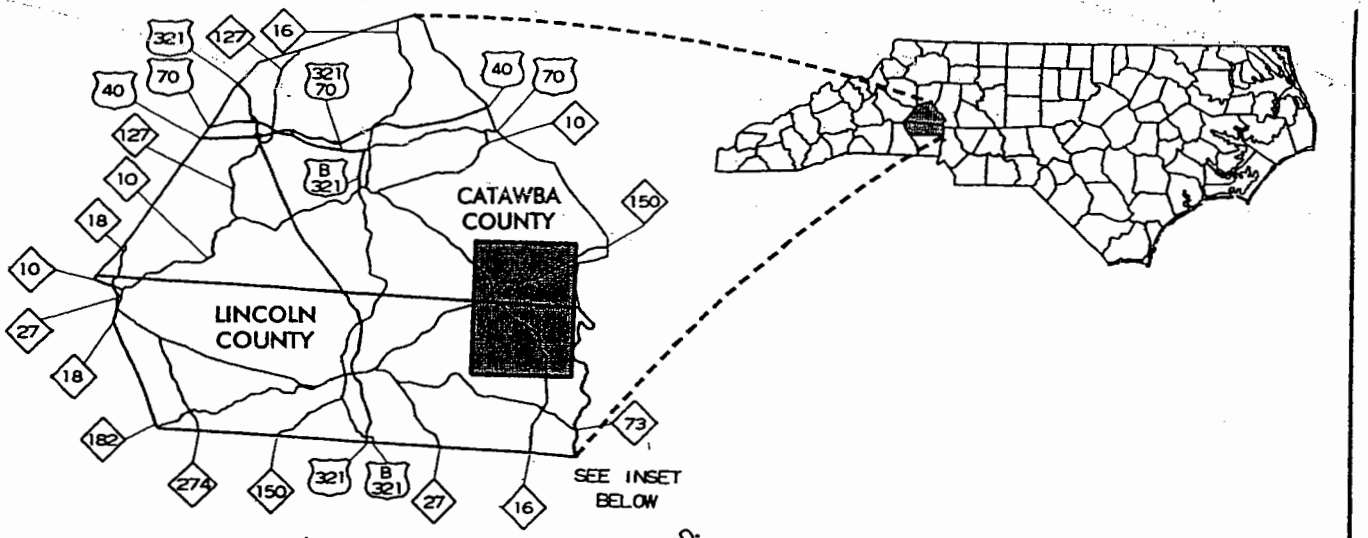
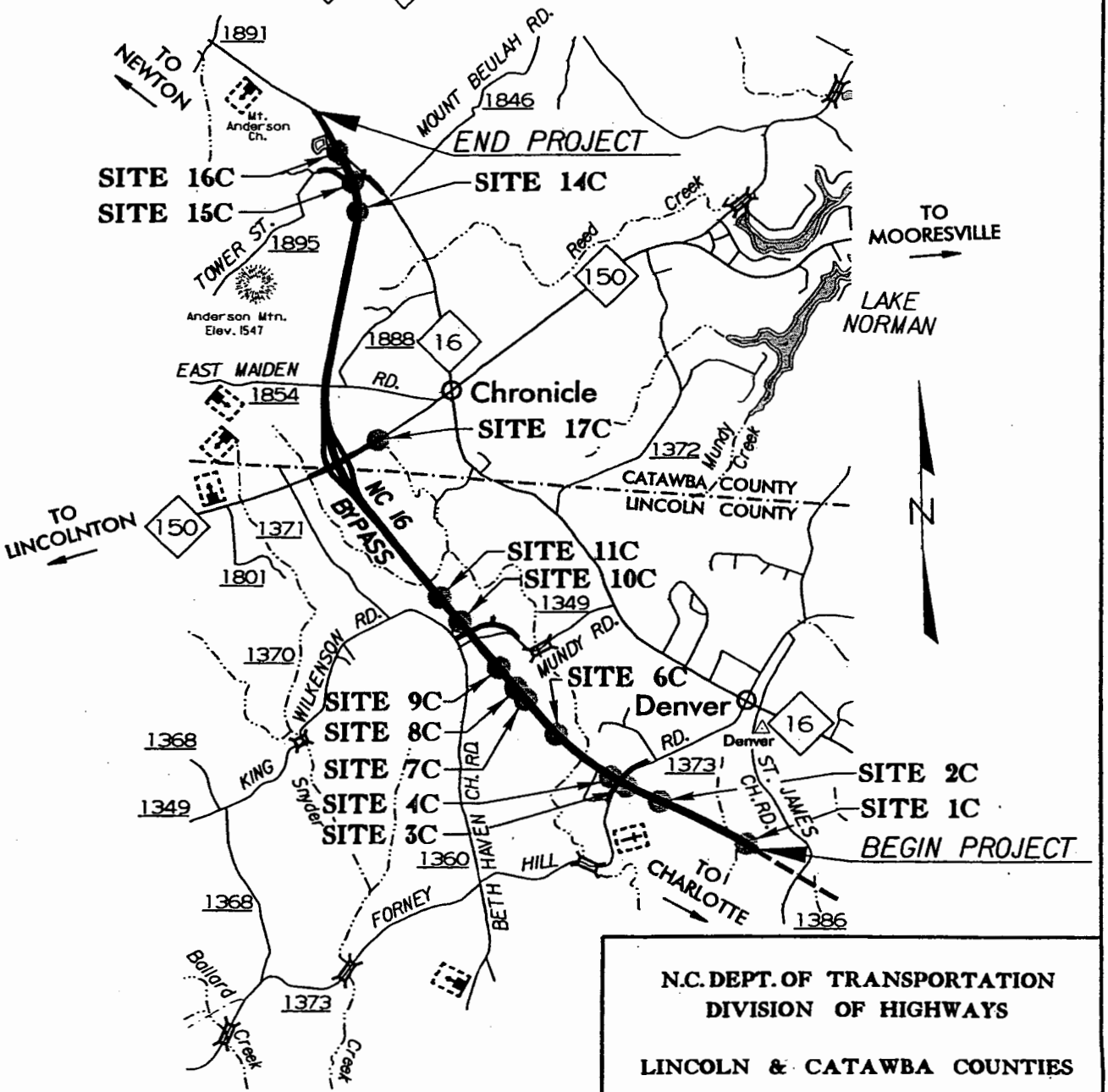
1/16/2004





PN SHEET 14 OF 22

LOCATION MAP

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

SCALE .5 0 1 KM

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

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

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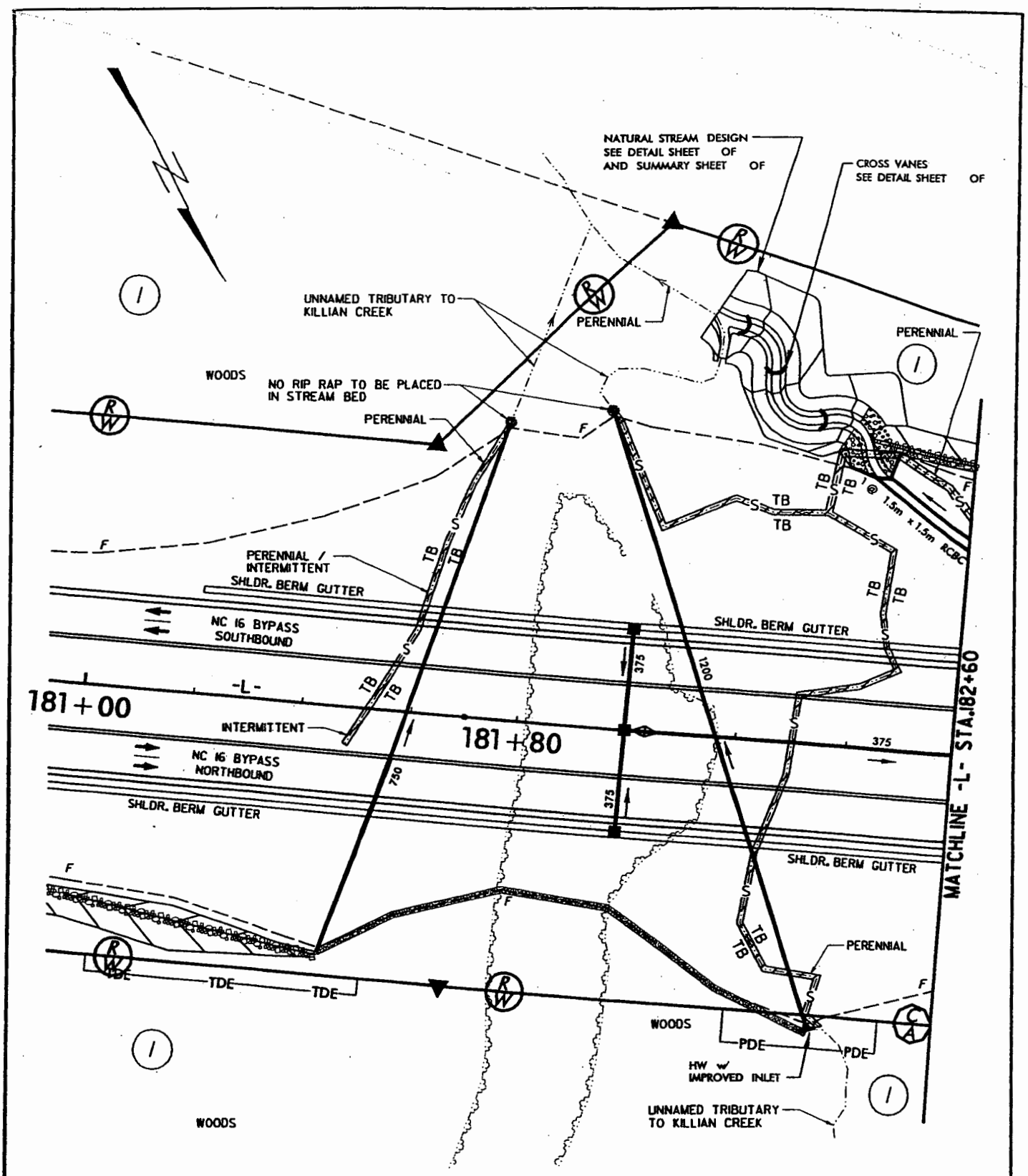

PLAN VIEW
SITE 1C

10 0 20

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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

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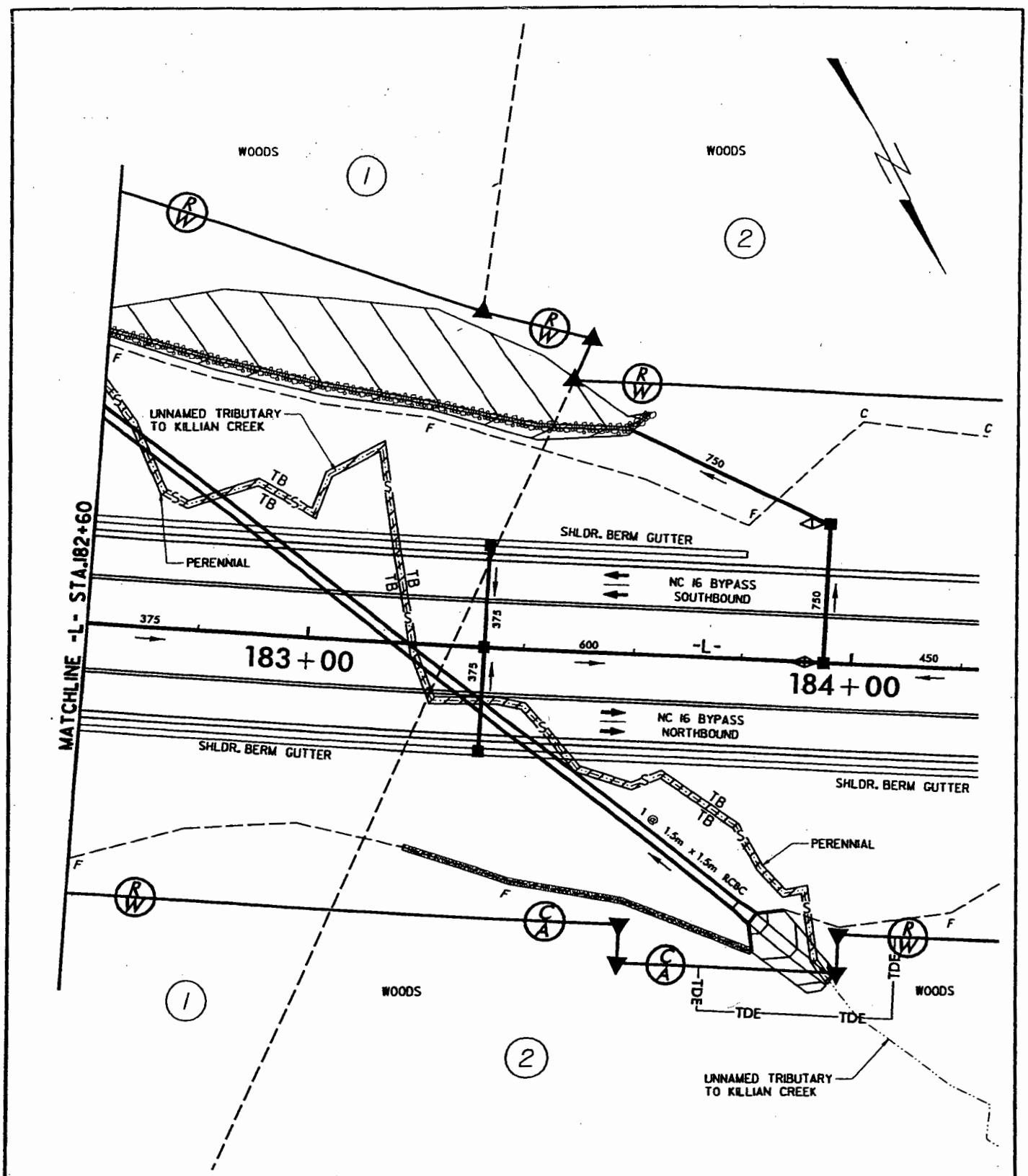

PLAN VIEW
SITE 1C

PN SHEET 16 OF 22

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

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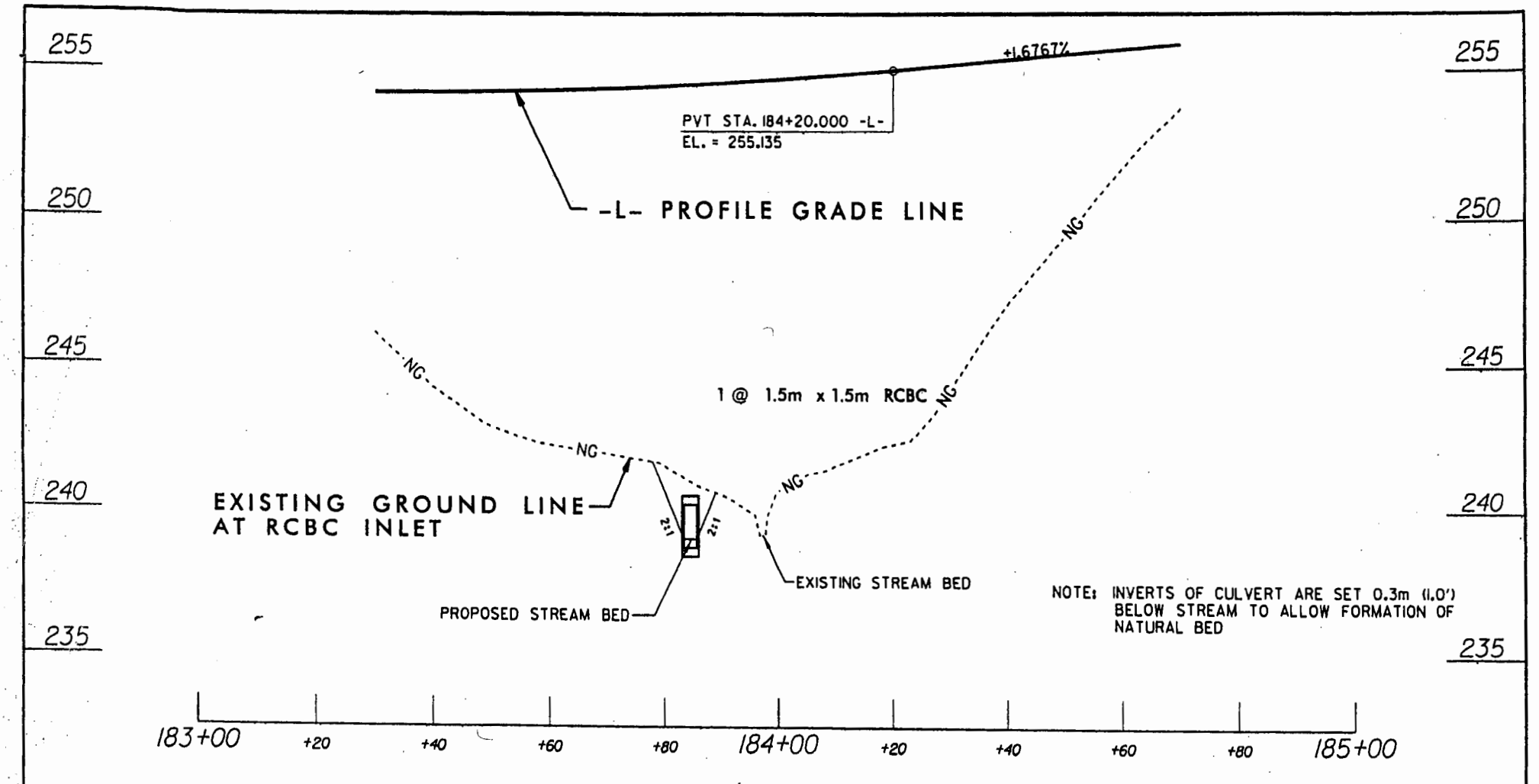
1/16/04

REVISED 4/29/04



PROFILE
SITE 1C

5 0 10 HORIZONTAL SCALE

1 0 2 VERTICAL SCALE

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N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

LINCOLN & CATAWBA COUNTIES

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

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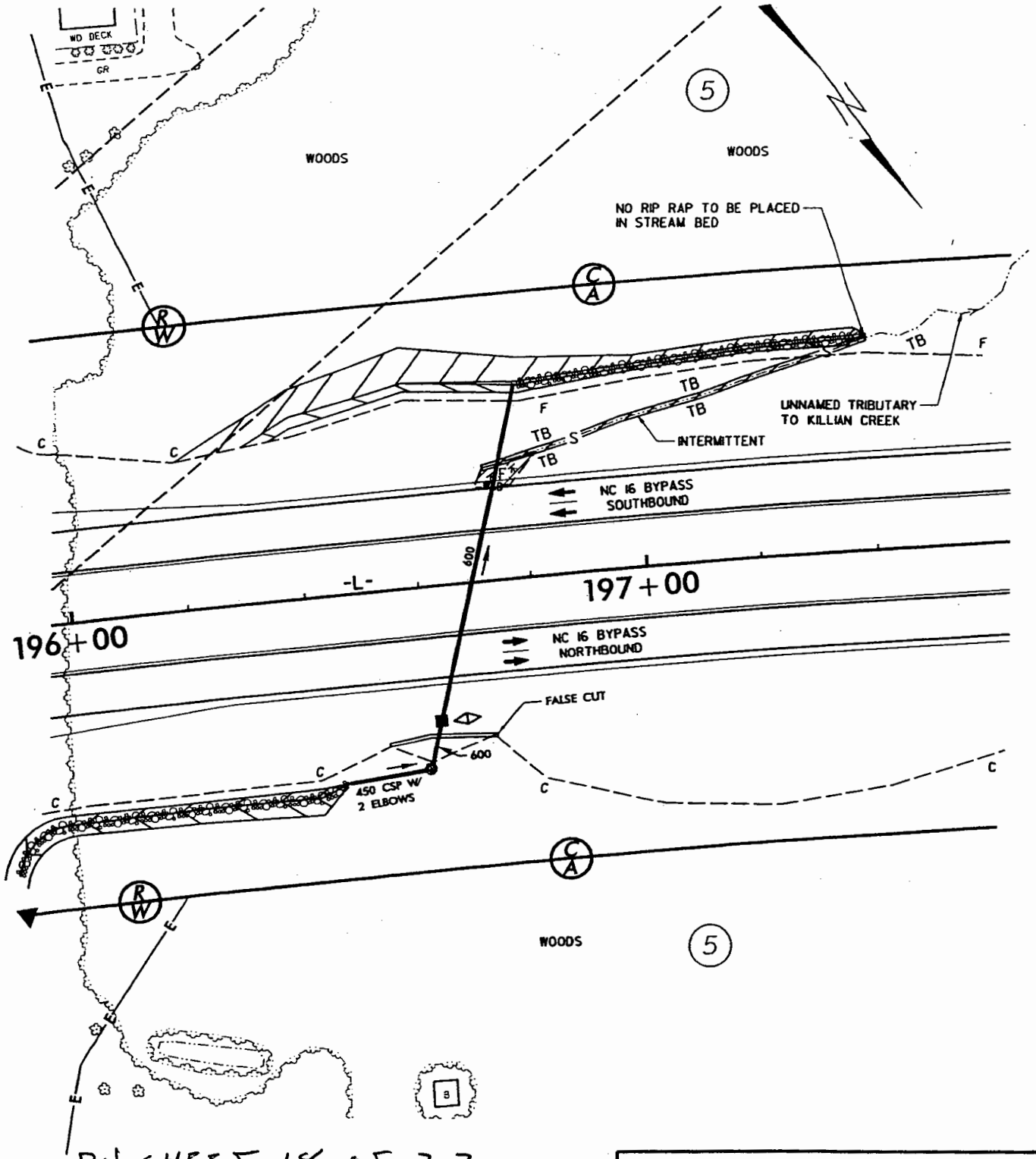

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PLAN VIEW
SITE 4C

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

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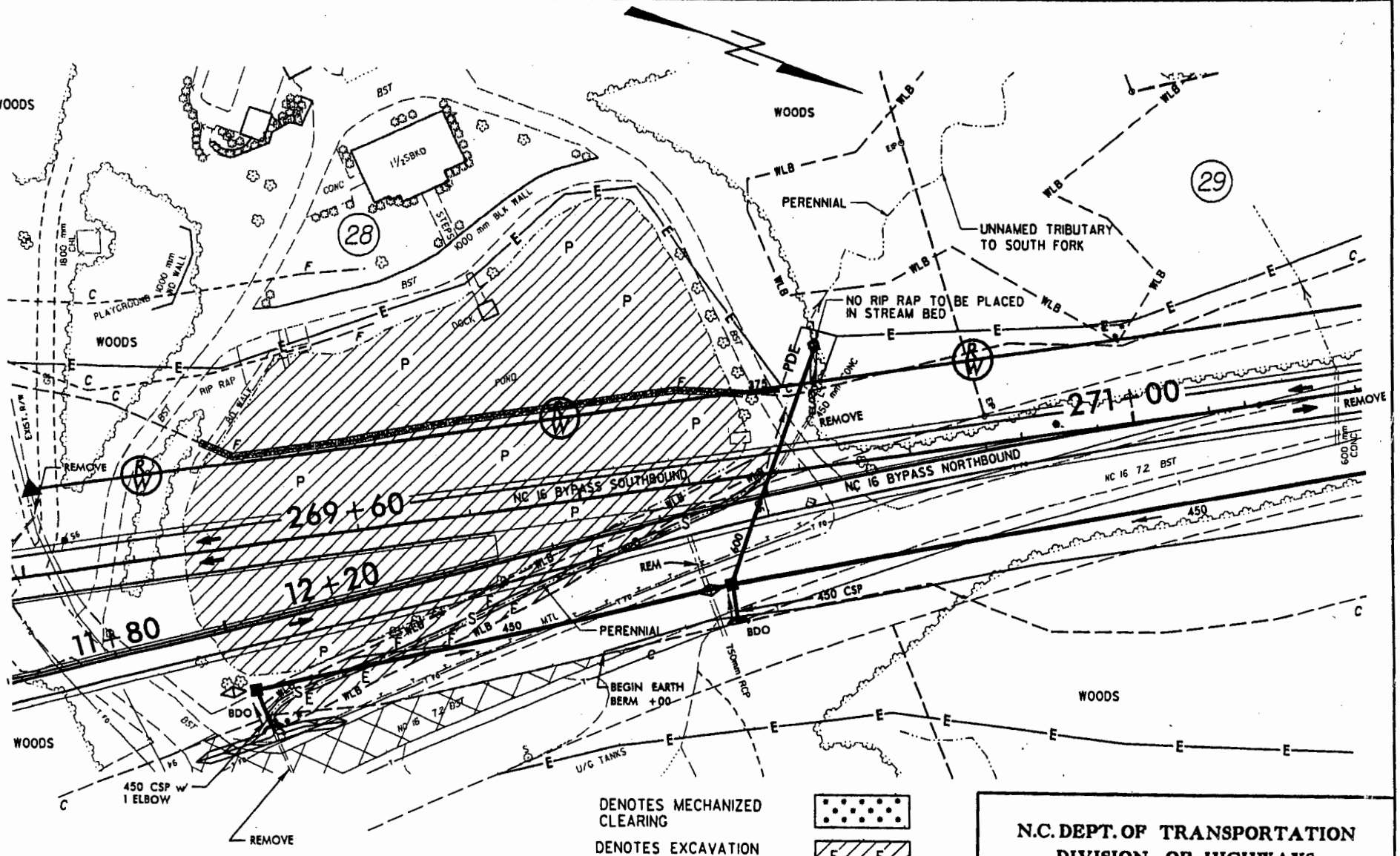

PLAN VIEW
SITE 16C

10 0 20

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DENOTES MECHANIZED CLEARING

DENOTES EXCAVATION IN WETLANDS

DENOTES FILL IN WETLANDS

DENOTES SURFACE WATER IMPACT (NATURAL)

DENOTES SURFACE WATER IMPACT (POND)

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

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.

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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.

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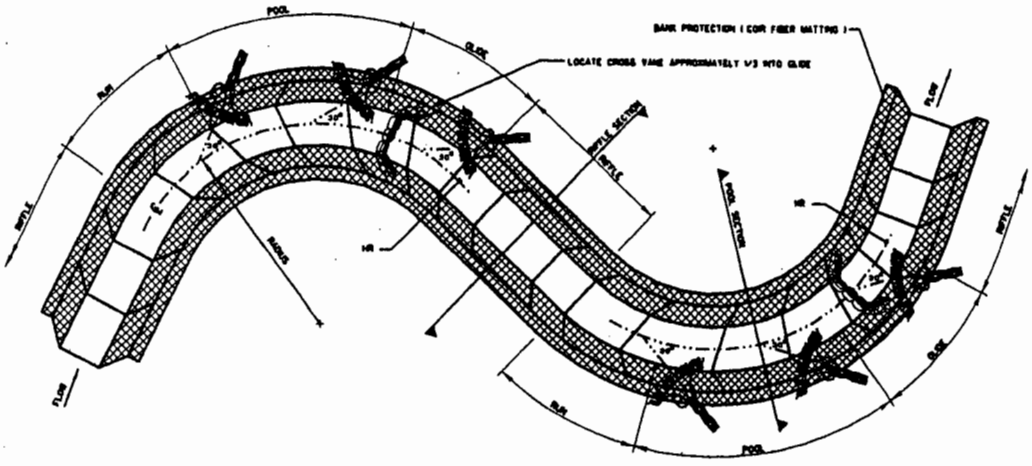
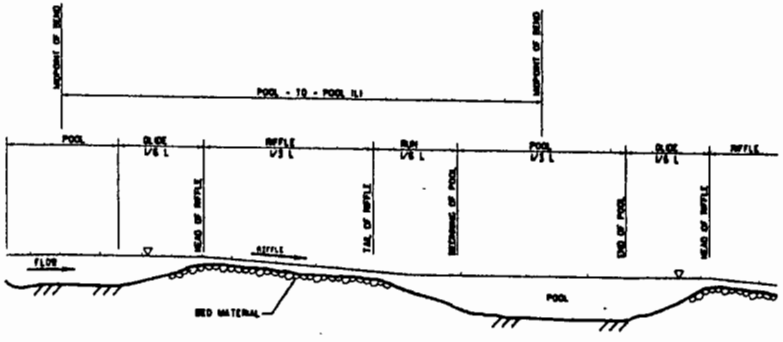


TYPICAL PLAN

NOT TO SCALE

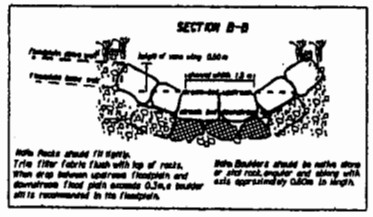


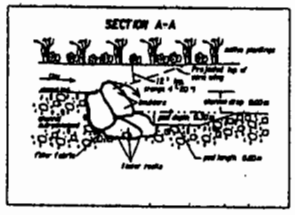
TYPICAL PROFILE

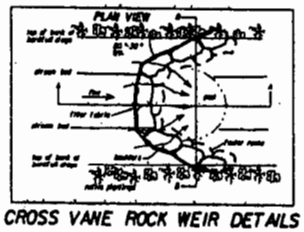
NOT TO SCALE

NOTES:

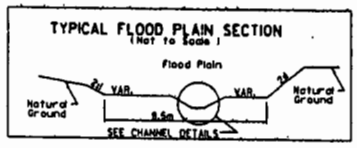
1. THE POOL TO POOL SPACING (L) SHALL BE MEASURED AS THE DISTANCE FROM THE MIDPOINT OF THE UPSTREAM BEND TO THE MIDPOINT OF THE DOWNSTREAM BEND.
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS.

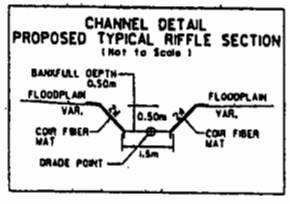


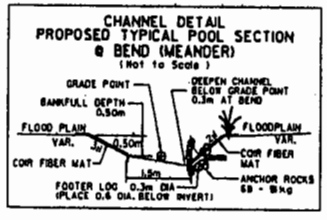




CROSS VANE ROCK WEIR DETAILS







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. RM 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	0.13 km² / 0.05 mi²	0.13 km² / 0.05 mi²	-	0.13 km² / 0.05 mi²
3) BANKFULL WIDTH	2.32 m / 7.61 ft	2.06 m / 6.80 ft	-	2.32 m / 7.61 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	5.16	5.69	-	5.16
6) BANKFULL CROSS-SECTIONAL AREA	1.05 m² / 11.3 ft²	0.74 m² / 0.25 ft²	-	1.05 m² / 11.3 ft²
7) BANKFULL MEAN VELOCITY	0.98 m/s / 3.22 ft/s	0.49 m/s / 1.62 ft/s	-	0.98 m/s / 3.22 ft/s
8) BANKFULL DISCHARGE	1.03 m³/s / 36.3 ft³/s	1.03 m³/s / 36.3 ft³/s	-	1.03 m³/s / 36.3 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 / 21.21 ft (wide)	8.6 m / 21.00 ft	-	6.35 m / 21.21 ft (wide)
11) ENTRENCHMENT RATIO	2.74	2.43	-	2.74
12) MEANDER LENGTH	12-20 m / 39-66 ft	24.8 m / 76.14 ft	-	12-20 m / 39-66 ft
13) RATIO OF MEANDER LENGTH TO BANKFULL WIDTH	5.2-8.6	8.26	-	5.2-8.6
14) RADIUS OF CURVATURE	3.5-7.0 m / 11.5-23.0 ft	6.38 m / 20.92 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	12.0-24.0 m / 39.4-78.8 ft	18 m / 59.0 ft	-	12.0-24.0 m / 39.4-78.8 ft
17) MEANDER WIDTH RATIO	5.2-8.6	7.74	-	5.2-8.6
18) SINUOSITY (STREAM LENGTH/VALLEY LENGTH)	1.2	1.15	-	1.2
19) VALLEY SLOPE	0.022	0.0223	-	0.022
20) AVERAGE SLOPE	0.0172	0.0172	-	0.0172
21) POOL SLOPE	0.0002	0.0002	-	0.0002
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.01	0.01	-	0.01
23) MAXIMUM POOL DEPTH	0.85 m / 2.80 ft	0.85 m / 2.79 ft	-	0.85 m / 2.8 ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	1.41	2.36	-	1.41
25) POOL WIDTH	2.70 m / 8.86 ft	4.3 m / 14.07 ft	-	2.70 m / 8.86 ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.16	1.49	-	1.16
27) POOL TO POOL SPACING	20.0 m / 65.6 ft	16.0 m / 52.5 ft	-	20.0 m / 65.6 ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	8.61	7.80	-	8.61
29) RATIO OF LOWEST BL HEIGHT TO BANKFUL HGT.(= 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

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10/10/03

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