



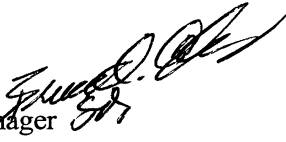
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

January 28, 2005

MEMORANDUM TO: Mr. Timothy Johnson, P.E.  
Division 8 Engineer

FROM: Philip S. Harris, III, P.E., Manager   
Office of the Natural Environment  
Project Development and  
Environmental Analysis Branch

SUBJECT: Richmond County, Ellerbe Bypass and Ellerbe Connector (NC  
Extension) US 220; TIP Number R-2231B;  
Federal Aid Project Number NHF-45-1(49);  
State Work Order Number 8.T550803

Attached are the modifications of the US Army Corps of Engineers Individual 404 permit and the DWQ 401 general Water Quality Certification.

PSH/gyb

**Attachment**

cc: Mr. Art McMillan, P.E.  
Mr. Omar Sultan  
Mr. Jay Bennett, P.E.  
Mr. David Chang, P.E.  
Mr. Randy Garris, P.E.  
Mr. Greg Perfetti, P.E.  
Mr. Mark Staley  
Mr. John F. Sullivan, III, FHWA  
Mr. Art King, Division 8 Environmental Officer

## PROJECT COMMITMENTS

Richmond County  
Ellerbe Bypass and Ellerbe Connector (NC Extension), US 220  
Federal Project No. NHF-45-1(49)  
State Project No. 8.T550803  
TIP No. R-2231B

*The below commitments have been developed during the project modification and project modification addendum and are in addition to all previous permit commitments that remain in effect.*

### COMMITMENTS DEVELOPED THROUGH PROJECT MODIFICATION

#### Myrick Pond:

#### **Division 6 Construction, Roadside Environmental Unit, ONE – Mitigation Unit**

An as-built plan of the impoundment shall be submitted to Mr. Richard Spencer, Wilmington Field Office, within 90 days following completion of the revised work.

The step-pool sequence, associated flood plain, and constructed channel to connect the existing type A basin/permanent impoundment to the existing stream channel shall be constructed in the dry. Water shall not be turned into the step-pool channel sequence until the sequence is completed and stabilized. Water shall not be turned into the relocated step-pool sequence and channel until the USACE and the NCDWQ have conducted a site review of the newly constructed step-pool sequence and associated area.

Prior to the release of water to the step-pool channel, an assessment of the accumulated sediment in the pond shall be made and provide to Mr. Richard Spencer, Wilmington Field Office and if necessary any excess accumulated sediment shall be removed at the direction of the Corps of Engineers prior to any release of water to the step-pool channel.

If any of the step-pool sequence or associated flood plain riparian areas are determined to be unstable, the area shall be repaired. All repair designs must be submitted to and receive written approval from the DWQ before the repair work is performed.

Rock vanes shall be constructed and placed according to the plan sheets titled Site 6 Impoundment w/ Step Pools, Rip Rap Berm and Cross Vane Rock Weir Detail Sheet developed by NCDOT Hydraulics Unit and received by the DWQ Transportation Permitting Unit on September 1, 2004.

*Action taken – see site 6 plan view and detail sheets with permit drawings.*

**Roadside Environmental Unit**

Riparian vegetation, using native trees, shrubs, and herbaceous plants, must be re-established within the flood plain area, as well as the construction area, by the end of the growing season following completion of construction to provide long-term erosion control.

Dagnino



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 1890  
WILMINGTON, NORTH CAROLINA 28402-1890**

December 20, 2004

Regulatory Division

Subject: Action ID No. 199400590, TIP No. R-2231, Ellerbe Bypass, Richmond Counties, North Carolina.

Dr. Gregory J. Thorpe, Ph.D.  
Environmental Management Director  
Project Development & Environmental Analysis  
1548 Mail Service Center  
Raleigh, N.C. 27699-1548

Dear Dr. Thorpe:

I am responding to your request dated September 30, 2004 for a modification to the existing Department of the Army (DA) permit issued for the above referenced project and modified on August 26, 2004. The proposed project modifications are as follows:

**ADDITION OF IMPOUNDMENT STRUCTURE**

**R-2231B, permit drawing sheet 28 of 43, Station 27+00 - 28+75, Site 6**

The referenced modified Section 404 permit authorized the modification to the east side of the Myrick Pond mitigation site. However, NCDENR, as a condition of their revised Section 401 Certification has requested that the redesign incorporate an additional structure within the impoundment area. The structure requested by NCDENR would be a rip-rap berm with cross vane rock wiers located at the ends of the road culverts and extending to the stepped outfall structure previously authorized by the August 26, 2004 modification.

I have determined that the proposed project modification described above is not contrary to the public interest and therefore, the DA permit is hereby modified to include authorization for the modification listed above and as shown on the revised permit drawings (enclosed).

Please note that a modified Water Quality Certification shall be obtained from NCDENR-DWQ. Furthermore, all unmodified terms and conditions of your original Department of the Army permit and modification of August 26, 2004 shall remain in effect and the original permit expiration date shall remain the same.

Should you have any questions, please contact Mr. Richard Spencer, Wilmington Field Office, Regulatory Division, at telephone (910) 251-4172.

Sincerely,



*Charles R. Alexander, Jr.*  
Charles R. Alexander, Jr.  
Colonel, U.S. Army  
District Engineer

Enclosures

Copies Furnished (with enclosures):

Mr. David Cox  
North Carolina Wildlife Resources Commission  
1721 Mail Service Center  
Raleigh, North Carolina 27699-1721

Mr. John Hennessy  
NCDENR-DWQ  
Wetlands Section  
1650 Mail Service Center  
Raleigh, NC 27699-1650

Mr. Pete Benjamin  
U.S. Fish and Wildlife Service  
Fish and Wildlife Enhancement  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

Mr. Chris Militcher  
USEPA/Raleigh Office  
Office of Environmental Assessment  
310 New Bern Avenue, Room 206  
Raleigh, NC 27601

Mr. Art King  
Division Environmental Officer, Division 8  
North Carolina Department of Transportation  
P.O. Box 1067  
Aberdeen, North Carolina 28315

Mr. James J. Rerko, PWS  
Division Environmental Officer, Division 6  
North Carolina Department of Transportation  
P.O. Box 1150  
Fayetteville, North Carolina 28302-1150

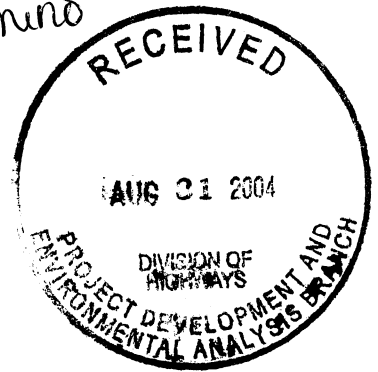


REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
**WILMINGTON DISTRICT, CORPS OF ENGINEERS**  
**P.O. BOX 1890**  
**WILMINGTON, NORTH CAROLINA 28402-1890**

August 27, 2004

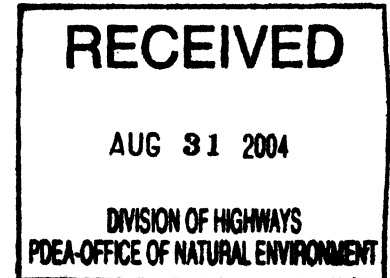
Dagnino



Regulatory Division

Subject: Action ID No. 199400590, TIP No. R-2231 & R-3303, Ellerbe Bypass and Connector, Richmond and Montgomery Counties, North Carolina.

Dr. Gregory J. Thorpe, Ph.D.  
Environmental Management Director  
Project Development & Environmental Analysis  
1548 Mail Service Center  
Raleigh, N.C. 27699-1548



Dear Dr. Thorpe:

I am responding to your request dated April 12, 2004 and July 8, 2004 for a modification to the existing Department of the Army (DA) permit issued for the above referenced project.

In your April 12, 2004 letter, you requested that a credit be given at the Key Branch Mitigation site since impacts on the Ellerbe Connector were reduced in final design. The preliminary impacts, for which the permit was issued, were 1.32 acres of riverine wetlands and 367 linear feet of stream impact. The final impacts after final design are 0.92 acres of riverine wetland impacts and 315 linear feet of stream impacts. This equates to a reduction of 0.40 acres of riverine wetlands and 52 linear feet of stream. The stream impacts compensatory mitigation for this project was at a 1.5 to 1 ratio. The wetland impacts compensatory mitigation for this project was at a 2 to 1 ratio. Based on this information, I have determined that the proposal described above is not contrary to the public interest and therefore, the DA permit is hereby modified to reflect the new mitigation requirement for the final reduction in impacts as follows:

Special Condition 2 shall read - *The permittee shall mitigate for 29.4 acres of unavoidable impacts to riverine wetlands and for 7,548 linear feet of impact to important streams, associated with the project,...*

Special Condition 2.d. shall read - *The permittee shall mitigate for 6872 linear feet of unavoidable impacts to important stream channel associated with this project by restoring 10,673 linear feet of stream channel in the Yadkin River Basin. 6,183 linear feet of perennial stream shall be restored at the Key Branch Mitigation Site in the Yadkin River Basin (Cataloging Unit 03040104). 4,490 linear feet of perennial stream shall be restored at the Haithcock Road Mitigation site in the Yadkin River Basin (Cataloging Unit 03040104).*

Special Condition 2.h. shall read - *The permittee shall mitigate for 20.6 acres of unavoidable impacts to riverine wetlands and 6.7 acres of non-riverine wetlands within the Yadkin River Basin (Hydrologic Catalog Units 03040104 & 03040201) by restoring, at a minimum, 54.6 acres of riverine wetlands at the Key Branch Mitigation Site.*

In addition, in your letter dated July 8, 2004, you have requested authorization to modify the east side of the Myrick Pond mitigation site. The request is being made due to the potential for unstable conditions in the lower part of the drained pond. On March 22, 2004 a site meeting was held with Mr. Richard Spencer of this office to discuss the potential problems associated with the current stream restoration proposal and to develop an alternate proposal for the lower end of Myrick Pond. To avoid the potential sediment and stability problems identified at the site, you have proposed to retain a portion of the existing earthen dam, construct a step-pool channel through the dam and maintain a shallow water impoundment behind the dam in lieu of the original proposed natural stream channel restoration on the east side of the highway project. The proposed revision would involve lowering the existing dam embankment elevation to approximately four feet above existing ground at the tail end of the pond. The existing riser structure shall be removed and a step-pool channel will be constructed through the dam to serve as a grade control and velocity reducing structure. In addition, as a result of the impoundment, there will be a net loss of 0.05 acres of on-site riverine wetland restoration compensation at Myrick Pond. This activity would require DA authorization pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344). Based on this information, I have determined that the proposal described above, including the loss of 0.05 acre of restoration compensation, is not contrary to the public interest and therefore, the DA permit is hereby modified to include authorization for the modification listed above and as shown on the revised permit drawings (enclosed), with the following change to special condition 2.g. and the addition of the following new special conditions:

Special Condition 2.g. shall read - *The permittee shall mitigate for 2.1 acres of unavoidable impacts to riverine wetlands within the Lumber River Basin (Hydrologic Catalog Unit 03040203) by providing 2.45 acres of riverine wetland restoration at the Myrick's Pond Site.*

19. An as-built plan of the impoundment shall be submitted to Mr. Richard Spencer, Wilmington Field Office, within 90 days following completion of the revised work.

20. The step-pool channel shall be constructed in the dry.

21. The existing temporary riser shall remain operable until the step-pool channel has stabilized and approval has been given by the Corps of Engineers that the riser can be taken out of service and removed. Water shall not be directed into the step-pool channel until approved by the Corps of Engineers.

22. Prior to the release of water to the step-pool channel, an assessment of the accumulated sediment in the pond shall be made and provide to Mr. Richard Spencer, Wilmington Field Office and if necessary any excess accumulated sediment shall be removed at the direction of the Corps of Engineers prior to any release of water to the step-pool channel.

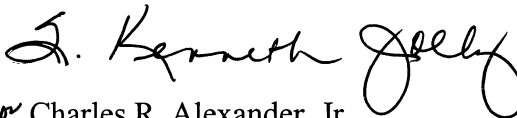


23. A modified Water Quality Certification shall be obtained from NCDENR-DWQ.

Furthermore, please note that all unmodified terms and conditions of your original Department of the Army permit shall remain in effect and the original permit expiration date shall remain the same.

Should you have any questions, please contact Mr. Richard Spencer, Wilmington Field Office, Regulatory Division, at telephone (910) 251-4172.

Sincerely,

  
Charles R. Alexander, Jr.  
Colonel, U.S. Army  
District Engineer

Enclosures

Copies Furnished (with enclosures):

Mr. David Cox  
North Carolina Wildlife Resources  
Commission  
512 N. Salisbury Street  
Raleigh, North Carolina 27604-1188

Mr. Art King  
Division Environmental Officer, Division 8  
North Carolina Department of  
Transportation  
P.O. Box 1067  
Aberdeen, North Carolina 28315

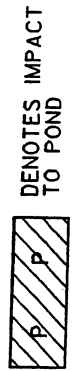
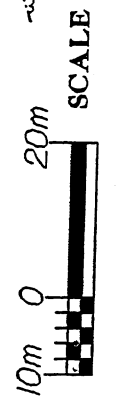
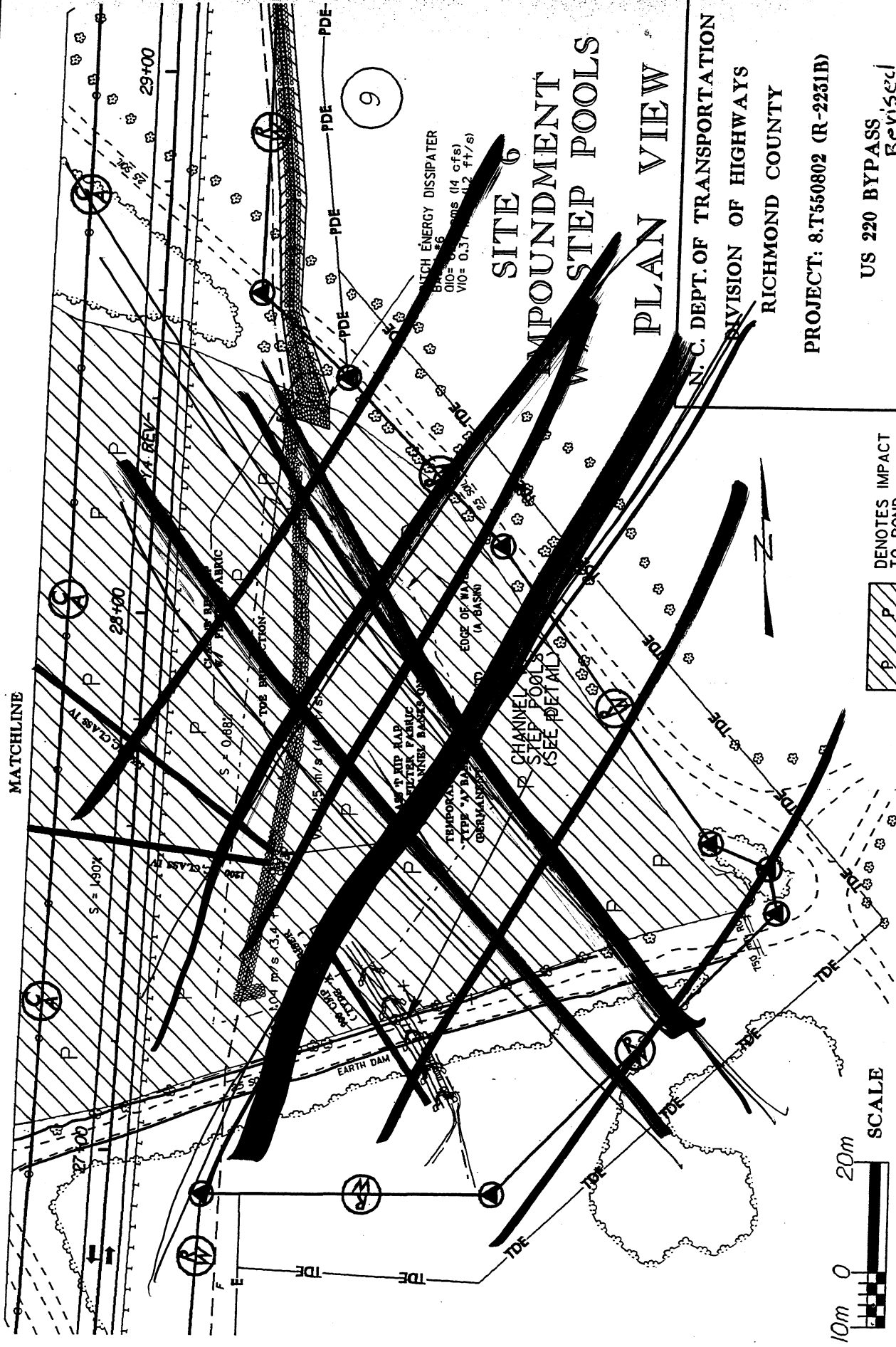
Mr. John Hennessy  
NCDENR-DWQ  
Wetlands Section  
1650 Mail Service Center  
Raleigh, NC 27699-1621

Mr. James J. Rerko, PWS  
Division Environmental Officer  
North Carolina Department of  
Transportation  
Division 6  
P.O. Box 1150  
Fayetteville, North Carolina 28302-1150

Mr. Howard Hall  
U.S. Fish and Wildlife Service  
Fish and Wildlife Enhancement  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

Mr. Chris Militcher  
United States Environmental Protection  
Agency  
Raleigh Office  
Office of Environmental Assessment  
310 New Bern Avenue, Room 206  
Raleigh, NC 27601

See following pages  
28 & 28A of 43



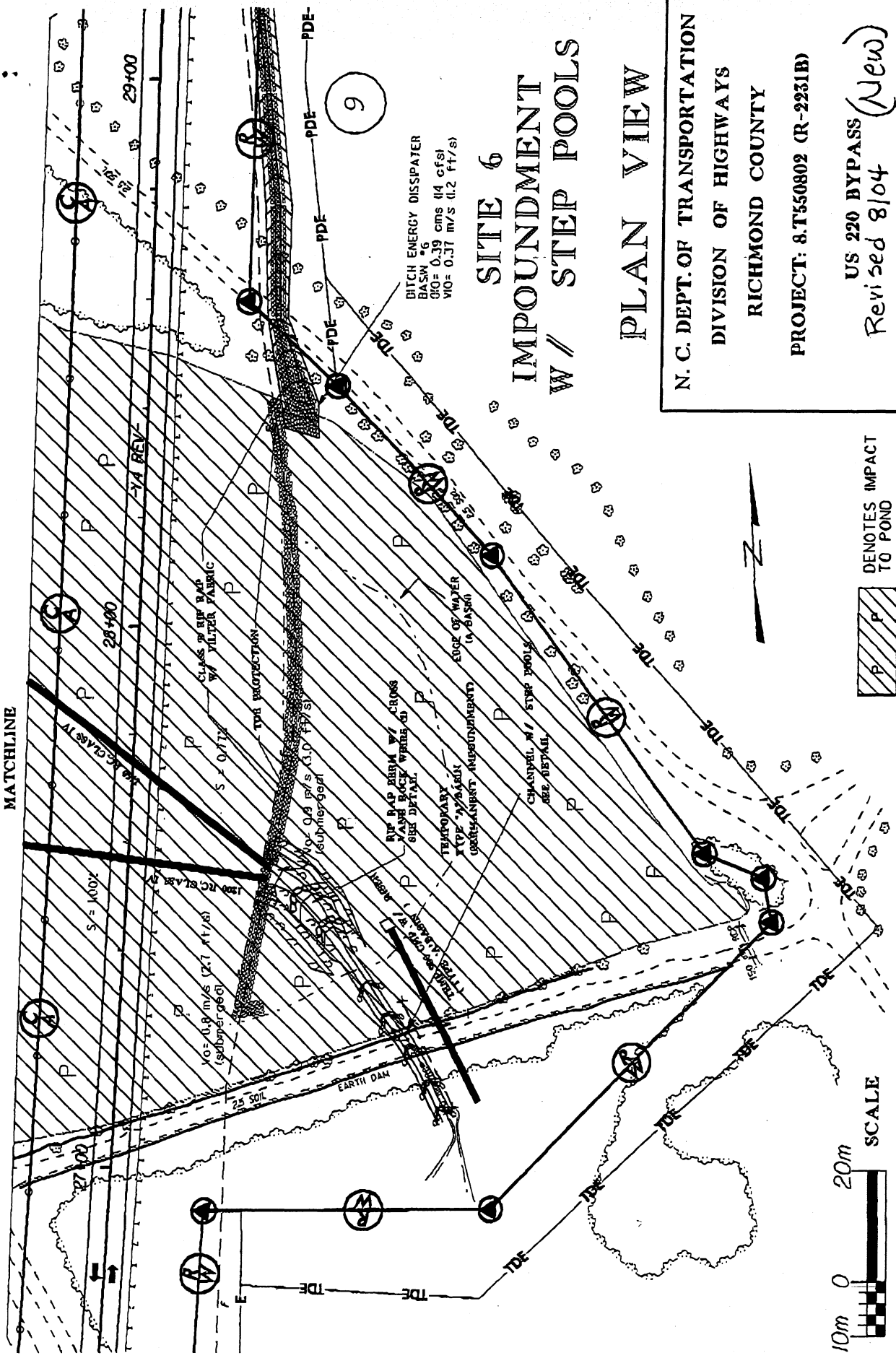
# SITE 6 COMPOUNDMENT STEP POOLS PLAN VIEW

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

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS  
Revised  
7/04

SHEET 28 OF 43



**SITE 6  
IMPOUNDMENT  
W // STEP POOLS**

**PLAN VIEW**

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS (New)  
 Revised 8/04  
 SHEET 28 OF 43

DENOTES IMPACT  
 TO POND

SCALE  
 10m 0 20m

DITCH ENERGY DISSIPATER  
 BASIN # 6  
 Q10 = 0.39 cms (14 cfs)  
 V10 = 0.37 m/s (1.2 ft/s)

9

MATCHLINE

S = 140%

10% 0.8 m/s (2.7 ft/s)  
 (submerged)

2.5 SOIL

EARTH DAM

CLASS IV

CLASS V

TPH PROTECTION

EDGE OF WATER (A-BASIN)

CHANNEL W/ STEP POOLS  
 SEE DETAIL

TEMPORARY TYPING ALTERNATIVE  
 (SEE DETAIL)

RIP RAP BERM W/ CROSS  
 HATCH BACK WEIR  
 SEE DETAIL

10% 0.8 m/s (3.0 ft/s)  
 (submerged)

CLASS IV  
 W/ FILTER FABRIC

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

28+00

29+00

27+00

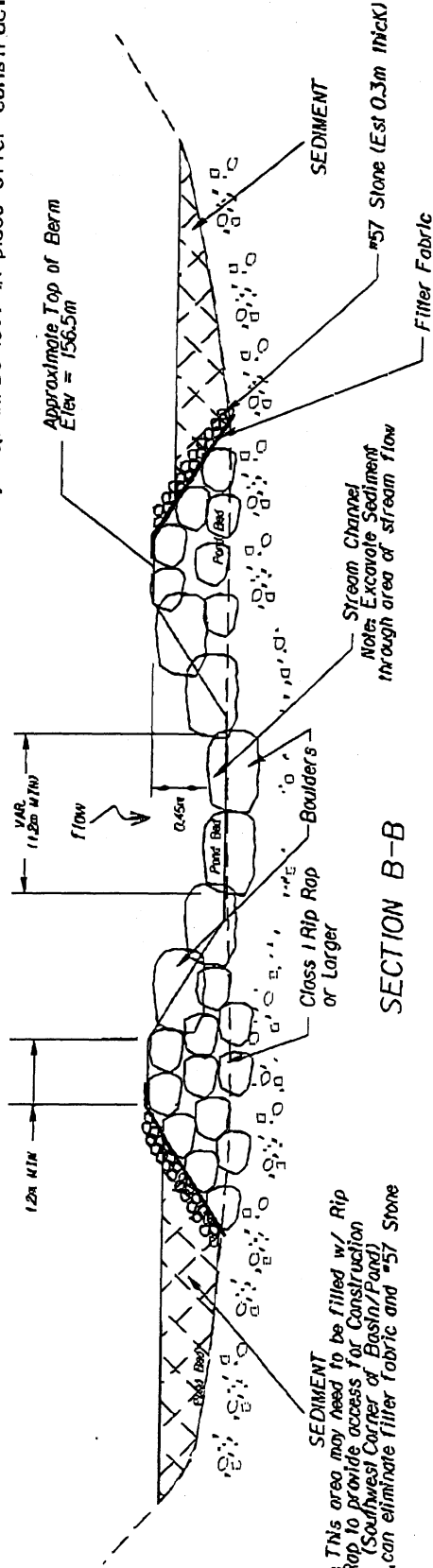
28+00

29+00

# RIP RAP BERM AND CROSS VANE ROCK WEIR DETAIL

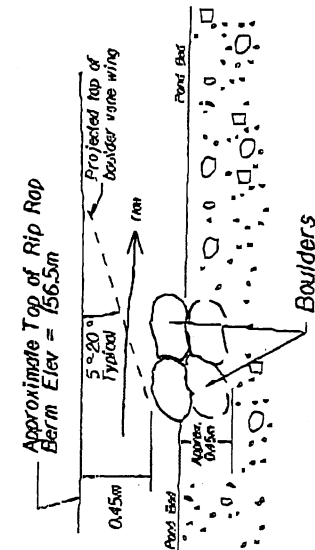
NOTE: Boulders should be angular and oblong with approximate dimensions of 0.75m x 0.6m x 0.6m and weighing approximately (500 lbs)

Rip Rap will be left in place after construction



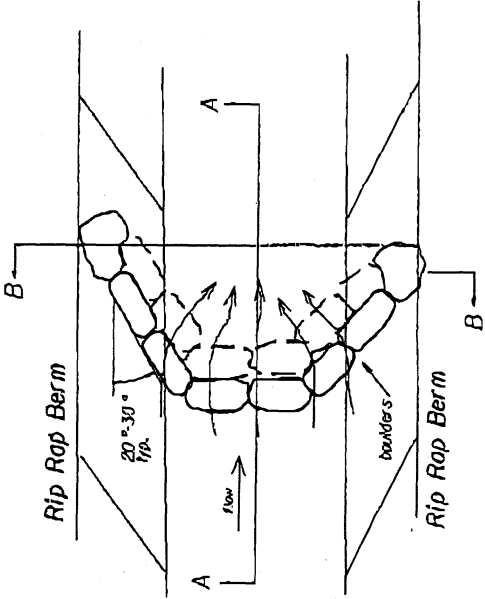
SECTION B-B

NOTE: This area may need to be filled w/ Rip Rap to provide access for Construction (Southwest Corner of Basin/Pond) if so, can eliminate filter fabric and #57 Stone



SECTION A-A

PLAN VIEW

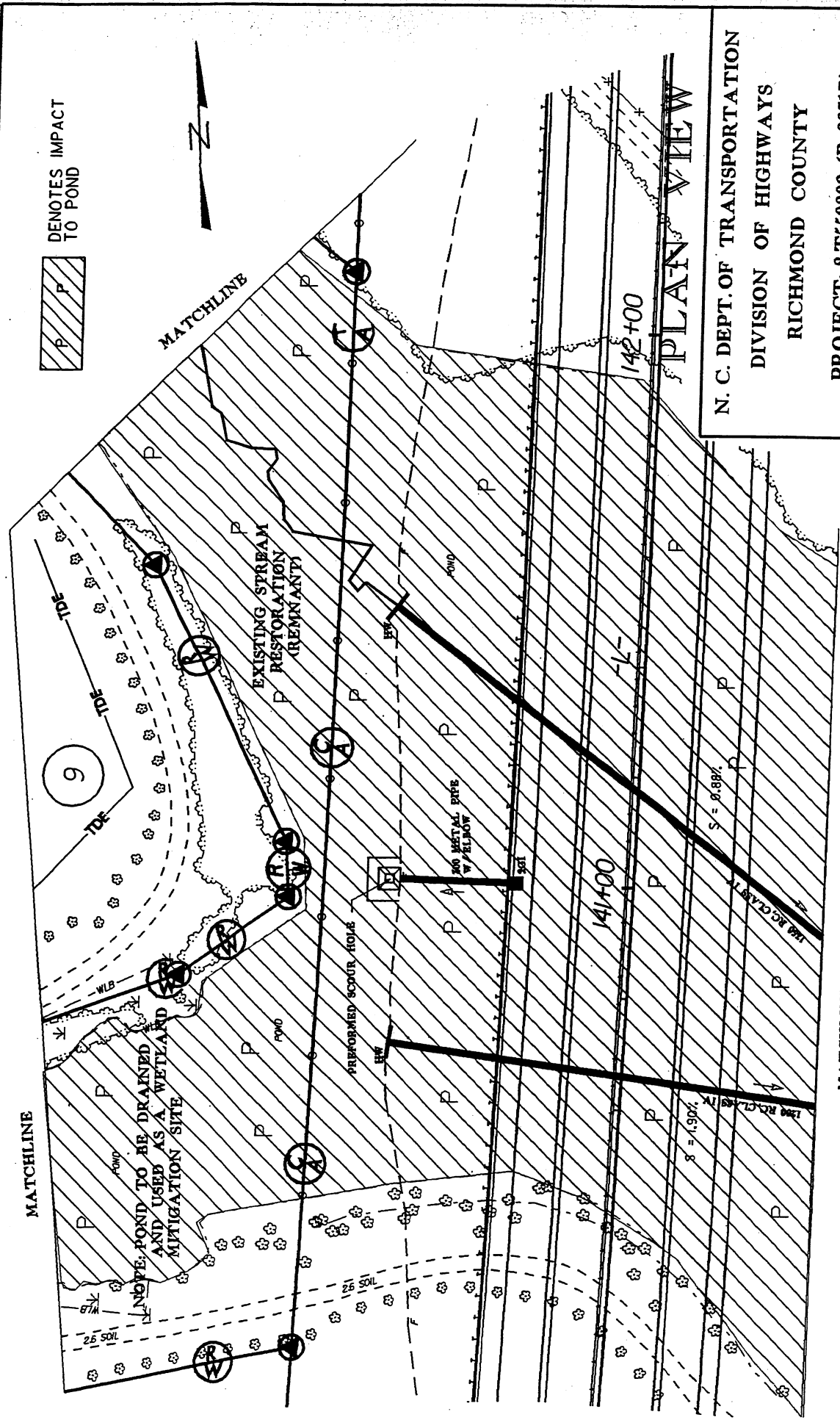


N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RICHMOND COUNTY  
PROJECT: 8-T550802 (R-2231B)

(New) US 220 BYPASS  
Revised 8/04

SHEET 28A OF 43

DENOTES IMPACT TO POND



PLAN VIEW

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

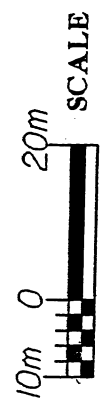
PROJECT: 8.T550802 (R-2251B)

US 220 BYPASS

Revised  
 7/04

SHEET 29 OF 43

MATCHLINE  
 SITE 6  
 STREAM RESTORATION AND  
 WETLAND MITIGATION SITE



SCALE

S = 1.90%

S = 0.88%

200 METAL PIPE  
 W/ ELBOW

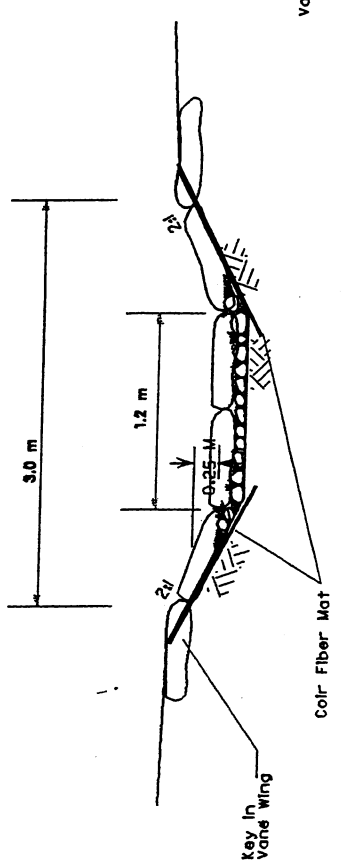
PREFORMED SCOUR HOLE

EXISTING STREAM  
 RESTORATION  
 (REMNANT)

LAND POND TO BE DRAINED  
 AND USED AS A WETLAND  
 MITIGATION SITE

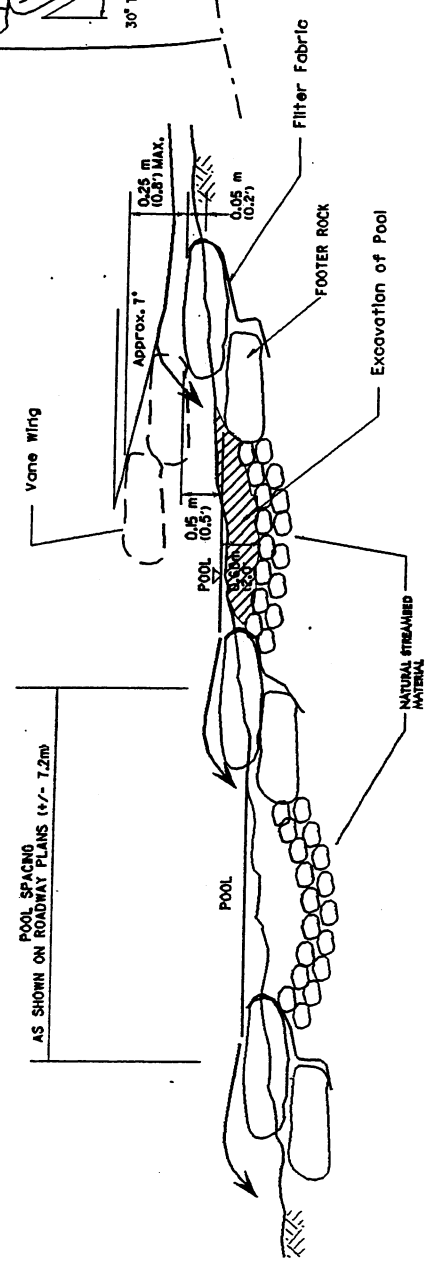
9

# STEP POOL DETAIL FOR INLET CHANNEL OF CULVERT AT 140+20 RT -L-



**PLAN VIEW**  
NOT TO SCALE

**TYPICAL CROSS SECTION**  
NOT TO SCALE



**PROFILE**  
NOT TO SCALE

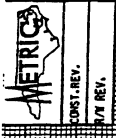
NOTE: FOOTER ROCK SHOULD BE ASSEMBLED ON A WITH WIDE AND APPROXIMATELY 0.3m LENGTH. ROCK SHOULD FIT TIGHTLY TOGETHER WITH MINIMAL VOIDS.

**NCDOT**  
**DIVISION OF HIGHWAYS**  
**RICHMOND COUNTY**

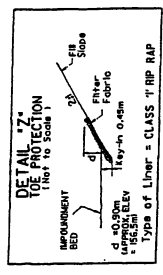
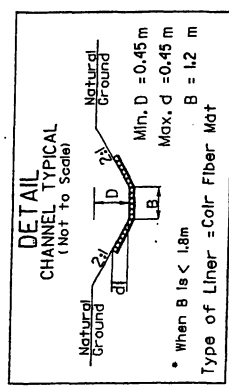
PROJECT: 8.T550802 (R-2231B)  
 US 220 BYPASS

Revised  
 7/04

SHEET 32 OF 43

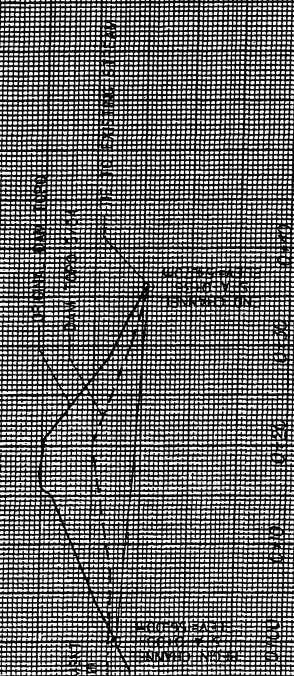


CONST. REV.  
 7/1 REV.

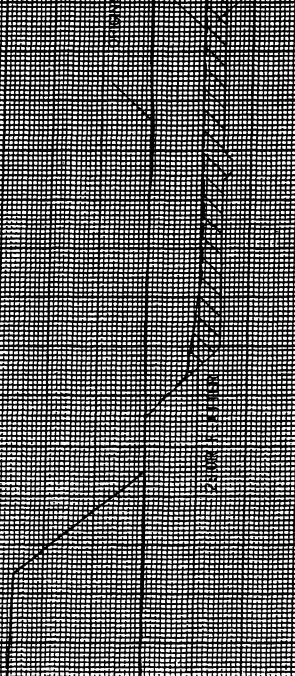


-Y4 REV- STA. 27+23 RT. TO -Y4 REV- STA. 28+40 RT.

PROPOSED CHANNEL PROTECTION



PROPOSED CHANNEL PROTECTION



yes



North Carolina Department of Environment and Natural Resources  
Division of Water Quality

Michael F. Easley, Governor

William G. Ross, Jr., Secretary  
Alan W. Klimek, P.E., Director

September 28, 2004

Mr. Gregory J. Thorpe, Ph.D., Environmental Director  
NCDOT Planning and Environmental Branch  
1548 Mail Service Center  
Raleigh, NC, 27699-1548

Dear Dr. Thorpe:

Re: MODIFICATION TO Water Quality Certification Pursuant to §401 of the Federal Clean Water Act, Ellerbe Bypass and Ellerbe Connector (NC 73 Extension) Richmond and Montgomery Counties.  
TIP No. R-2231;  
Federal Aid No. NHF-45-1(49); State Project No. 8.T550803;  
TIP No. R-3303;  
Federal Aid No. STP-73(4); State Project No. 8.1581201.  
DWQ Project No. 000874

Attached hereto is a copy of the Modification to Certification No. 3419 issued to The North Carolina Department of Transportation dated September 28, 2004. All of the authorized activities and conditions of certification associated with the original Water Quality Certification dated April 1, 2003, and all other corresponding modifications still apply except where superceded by this certification.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Alan W. Klimek, P.E.

Attachments

cc: Wilmington District Corps of Engineers  
Richard Spencer, USACE Wilmington Field Office  
Ken Averitte, NCDWQ Fayetteville Regional Office  
Christopher Militscher, US Environmental Protection Agency – Region IV  
T. Johnson, PE, Division Engineer, NCDOT Division 8  
Central Files  
File Copy



## NORTH CAROLINA 401 WATER QUALITY CERTIFICATION

**THIS CERTIFICATION** is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality (DWQ) Regulations in 15 NCAC 2H, Section .0500. The attached modification authorizes impacts to wetlands and streams as described herein. This modification is applicable only to the additional proposed activities. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated April 1, 2003 and all other corresponding modifications still apply except where superceded by this certification.

### Wetland Impacts in the Yadkin River Basin

Section	Riverine (acres)	Non- Riverine (acres)	Total (acres)
Section A	8.01	4.28	12.29
Section B	5.68	2.38	8.06
Section CA	0.00	0.00	0.00
Section CB	6.02	0.00	6.02
R-3303	0.92	0.00	0.92
<b>Total</b>	<b>20.63</b>	<b>6.66</b>	<b>27.29</b>

### Wetland Impacts in the Lumber River Basin

Section	Riverine (acres)	Non- Riverine (acres)	Total (acres)
Section A	0.00	0.00	0.00
Section B	0.25	0.00	0.25
Section CA	1.87	0.00	1.87
Section CB	0.00	0.00	0.00
R-3303	0.00	0.00	0.00
<b>Total</b>	<b>2.12</b>	<b>0.00</b>	<b>2.12</b>

### Surface Water Impacts for the Yadkin River Basin

Section	Stream Impacts (linear feet)	Natural Channel Design (linear feet)	Offsite Mitigation Requirement (1:1 Ratio)
Section A	2335	0	2335
Section B	1854	0	1854
Section CA	0	0	0
Section CB	2693	676	2017
R-3303	315	0	315
<b>Total</b>	<b>7197</b>	<b>-676</b>	<b>6521</b>

**Surface Water Impacts for the Lumber River Basin**

<b>Section</b>	<b>Impacts (linear feet)</b>	<b>Ponds (acres)</b>	<b>On-Site Natural Channel Design (linear feet)</b>	<b>Mitigation Required</b>
Section A	0	0		0
Section B	0	12.36	1066	-1066
Section CA	351	0		351
Section CB	0	0		0
R-3303	0	0		0
<b>Total</b>	<b>351</b>	<b>12.36</b>	<b>1066</b>	<b>-715</b>

The application provides adequate assurance that the discharge of fill material into the waters of Yadkin and Lumber River Basins in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application, as described in the Public Notice. Should your project change, you are required to notify the DWQ and you may be required to submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire three years from the date of the cover letter from DWQ or on the same day as the expiration date of the corresponding Corps of Engineers Permit, whichever is sooner.

Condition(s) of Certification:

1. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:

September 28, 2004

- a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.
  - b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
  - c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.
  - d. Any reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
2. No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Preconstruction Notice Application. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices, shall be performed so that no violations of state water quality standards, statutes, or rules occur.
3. Sediment and erosion control measures shall not be placed in wetlands or waters to the maximum extent practicable. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, they shall be removed and the natural grade restored within six months of the date that the Division of Land Resources has released the project.
4. If an environmental document is required, this Certification is not valid until a FONSI or ROD is issued by the State Clearinghouse. All water quality-related conditions of the FONSI or ROD shall become conditions of this Certification.
5. Measures shall be taken to prevent live or fresh concrete from coming into contact with waters of the state until the concrete has hardened.
6. There shall be no excavation from or waste disposal into jurisdictional wetlands or waters associated with this permit without appropriate modification of this certification. Should waste or borrow sites be located in wetlands or stream, compensatory mitigation will be required since it is a direct impact from road construction activities.
7. All channel relocations will be constructed in a dry work area, and stabilized before stream flows are diverted. Channel relocations will be completed and stabilized prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30 foot wide wooded and an adjacent 20 foot wide vegetated buffer on both sides of the relocated channel to the

maximum extent practical. A transitional phase incorporating coir fiber and seedling establishment is allowable. Also, rip rap may be allowed if it is necessary to maintain the physical integrity of the stream, but the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage requested.

8. Compensatory mitigation of 54.58 acres shall be done for 27.29 acres of impacts to jurisdictional wetlands in the Yadkin River Basin. In addition, 2.45 acres of compensatory mitigation shall be provided to offset 2.12 acres of jurisdictional wetlands in the Lumber River Basin. The mitigation shall be provided as described below.

Mitigation Site	Acres of WL Debited from Site	Type of Mitigation	River Basin	Acres of Mitigation Credited
Key Branch Mitigation Site	54.58	Restoration	Yadkin	54.58
Myrick Pond Mitigation Site	2.45	Restoration	Lumber	2.45
<b>Total</b>				<b>57.03</b>

9. For the construction activities for the bridge located from Station 190+00 to 191+53, the NCDOT shall strictly adhere to sediment and erosion control Best Management Practices as described for High Quality Waters entitled "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0024) throughout design and construction of the project.

10. Compensatory mitigation for impacts to streams shall be done for 7249 linear feet of stream impact in the Yadkin Basin and 351 linear feet of impact in the Lumber Basin, at a replacement ratio of 1:1. The mitigation shall be provided as described below.

Mitigation Site	Linear Feet of Streams Debited from Site	Type of Mitigation	River Basin	Acres of Mitigation Credited
Sites 3 & 6 in Section B	676	Onsite Restoration	Yadkin	676
Key Branch Mitigation Site	6183	Offsite Restoration	Yadkin	6183
Haithcock Mitigation Site	390	Offsite Restoration	Yadkin	390
Myrick Pond Site	351	Onsite Restoration	Lumber	351
<b>Total</b>				<b>7600</b>

September 28, 2004

11. Construction activities related to the section of the Ellerbe Connector (NC 73 Extension, TIP R-3303) located in Richmond County are hereby authorized by this certification.
12. Placement of culverts and other structures in waters, streams, and wetlands must be placed below the elevation of the streambed to allow low flow passage of water and aquatic life unless it can be shown to DWQ that providing passage would be impractical. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or stream beds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium shall be maintained if requested in writing by DWQ.
13. The permittee shall require its contractors (and/or agents) to comply with all of the terms of this certification, and shall provide each of its contractors (and/or agents) a copy of this certification.
14. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers.
15. Riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.
16. The dimension, pattern and profile of the stream above and below the crossing should not be modified by widening the stream channel or reducing the depth of the stream. Disturbed floodplains and streams should be restored to natural geomorphic conditions.
17. Any riprap used must not interfere with thalweg performance and aquatic life passage during low flow conditions.
18. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.
19. The outside buffer, wetland or water boundary as well as along the construction corridor within these boundaries approved under this authorization shall be clearly marked by orange fabric fencing for the areas that have been approved to infringe within the buffer, wetland or water prior to any land disturbing activities.
20. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
21. Myrick's Pond:
  - a. The step-pool sequence, associated flood plain, and constructed channel to connect the existing type A basin/permanent impoundment to the existing stream channel shall be constructed in the dry. Water shall not be turned into the step-pool channel sequence until the sequence is completed and stabilized. Water shall not be turned into the

September 28, 2004

- relocated step-pool sequence and channel until the USACE and the NCDWQ have conducted a site review of the newly constructed step-pool sequence and associated area.
- b. If any of the step-pool sequence or associated flood plain riparian areas are determined to be unstable, the area shall be repaired. All repair designs must be submitted to and receive written approval from the Division before the repair work is performed.
  - c. Riparian vegetation, using native trees, shrubs, and herbaceous plants, must be re-established within the flood plain area, as well as the construction area, by the end of the growing season following completion of construction to provide long-term erosion control.
  - d. Rock vanes shall be constructed and placed according to the plan sheets titled *Site 6 Impoundment w/ Step Pools, Rip Rap Berm and Cross Vane Rock Weir Detail Sheet* received by the Transportation Permitting Unit on September 1, 2004.

22. Upon completion of the project, the NCDOT shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed. The responsible party shall complete the attached form and return it to the Transportation Permitting Unit of the Division of Water Quality upon completion of the project.

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If this Certification is unacceptable to you have the right to an adjudicatory hearing upon written request within sixty (60) days following receipt of this Certification. This request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, P.O. Box 27447, Raleigh, N.C. 27611-7447. If modifications are made to an original Certification, you have the right to an adjudicatory hearing on the modifications upon written request within sixty (60) days following receipt of the Certification. Unless such demands are made, this Certification shall be final and binding.

This the 28 th day of September 2004

DIVISION OF WATER QUALITY



Alan W. Klimek, P.E.  
Director

**Certificate of Completeness**

DWQ Project No.: 000874

County: Richmond/Montgomery

Applicant: NCDOT

Project Name: Ellerbe Bypass and Ellerbe Connector (NC 73 Extension)

Date of Issuance of 401 Water Quality Certification: September 28, 2004

**Certificate of Completion**

Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the Transportation Permitting Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1621. This form may be returned to DWQ by the applicant, the applicant's authorized agent, or the Project Engineer. It is not necessary to send certificates from all of these.

**Applicant's Certification**

I, \_\_\_\_\_, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Agent's Certification**

I, \_\_\_\_\_, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**If this project was designed by a Certified Professional**

I, \_\_\_\_\_, as a duly registered Professional \_\_\_\_\_ (i.e., Engineer, Landscape Architect, Surveyor, etc.) in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature \_\_\_\_\_

Registration No. \_\_\_\_\_

Date \_\_\_\_\_

## **Summary of Changes**

Background: This project is located in the Yadkin River Basin and the Lumber River Basin. The changes needed for this project are located in the Lumber River Basin. In the existing permit a stream channel was to be restored in the area of the pond (Type "A" Basin or Myrick Pond) and through the fill material of the earthen dam at site 6 below the road (see sheet 28 of 43 of the permit drawings attached). The new channel would have provided 1066 linear feet of onsite mitigation using natural stream design (NSD) at sites above (see sheets 29 and 30 of 43) and below the road. A site visit was conducted on March 22, 2004 with NCDOT Division 8 Construction, NCDOT Hydraulics, Richard Spencer (USACE) and Contractor Personnel (See summary on sheets 38 and 39 of 43). It was determined that the plan for the channel as proposed is currently difficult to stabilize and would likely cause the accumulated fill material from the "A" basin and the dam to erode and be deposited in the downstream area.

Mitigation Changes: A new structure has been developed for the Myrick Pond Mitigation site below the pond. Revisions were made to the permit drawings in order to be consistent with new plans. Changes include removing the unstable channel where water is flowing from the pond ("A" Basin or Myrick Pond) and constructing an alternative structure utilizing a series of step pools to stabilize the site (see sheet No. 28 of 43 of the permit drawings attached). Part of the new plans will also include the creation of a wetland habitat by retaining a shallow pool of water behind the remnants of the earthen dam.

Due to the changes there will be a loss of 249 linear feet of the NSD (see revised impact summary sheet attached, sheets 42 and 43 of 43). The 249 linear feet will be subtracted from the original total NSD of 1066 linear feet. This will give a balance of 817 linear feet of mitigation utilizing NSD in the Lumber River Basin. According to condition 2.e. in the existing 404 permit, 702 linear feet of mitigation were designated at the Myrick Pond site. Since the remaining stream mitigation of 817 linear feet, meets the 702 feet requirement, no further compensation is proposed. The NCDOT will continue to adhere to conditions 2f., 2g. and 2i. as these conditions relate to mitigation at Myrick Pond and the Lumber River Basin.

The specific revision is listed below. The site number corresponds to the permit drawing sheets.

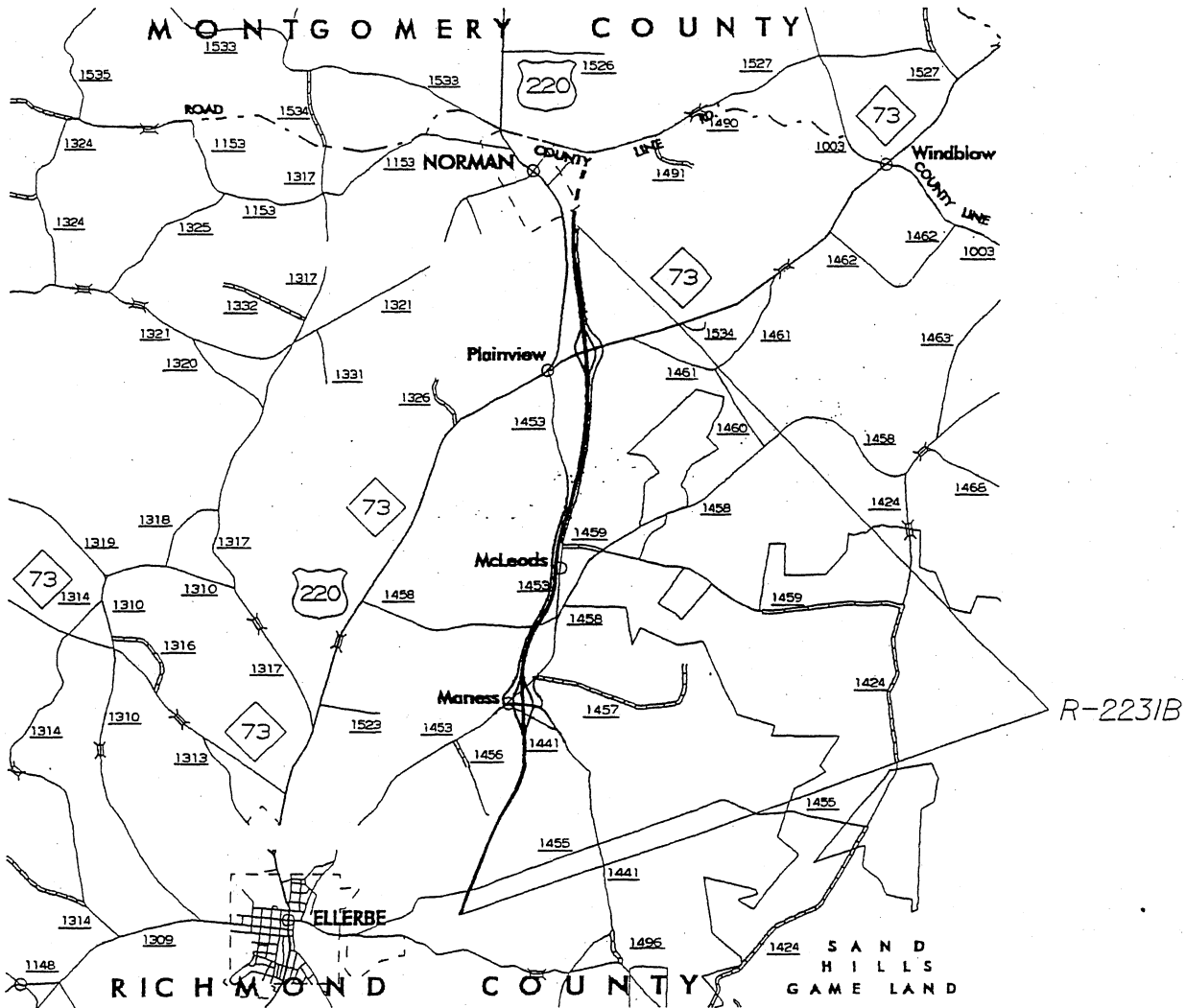
### Site 6, Sheet 28 of 43

Station 140+20 TO Station 141+40-L-(Rt)

Eliminate the stream relocation design below the proposed roadway. A step-pool channel is proposed through the dam to stabilize this site. See attached hydraulic plans and supporting data.

**Mitigation change: elimination of 249 linear feet of Natural Stream Design**





VICINITY MAP

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

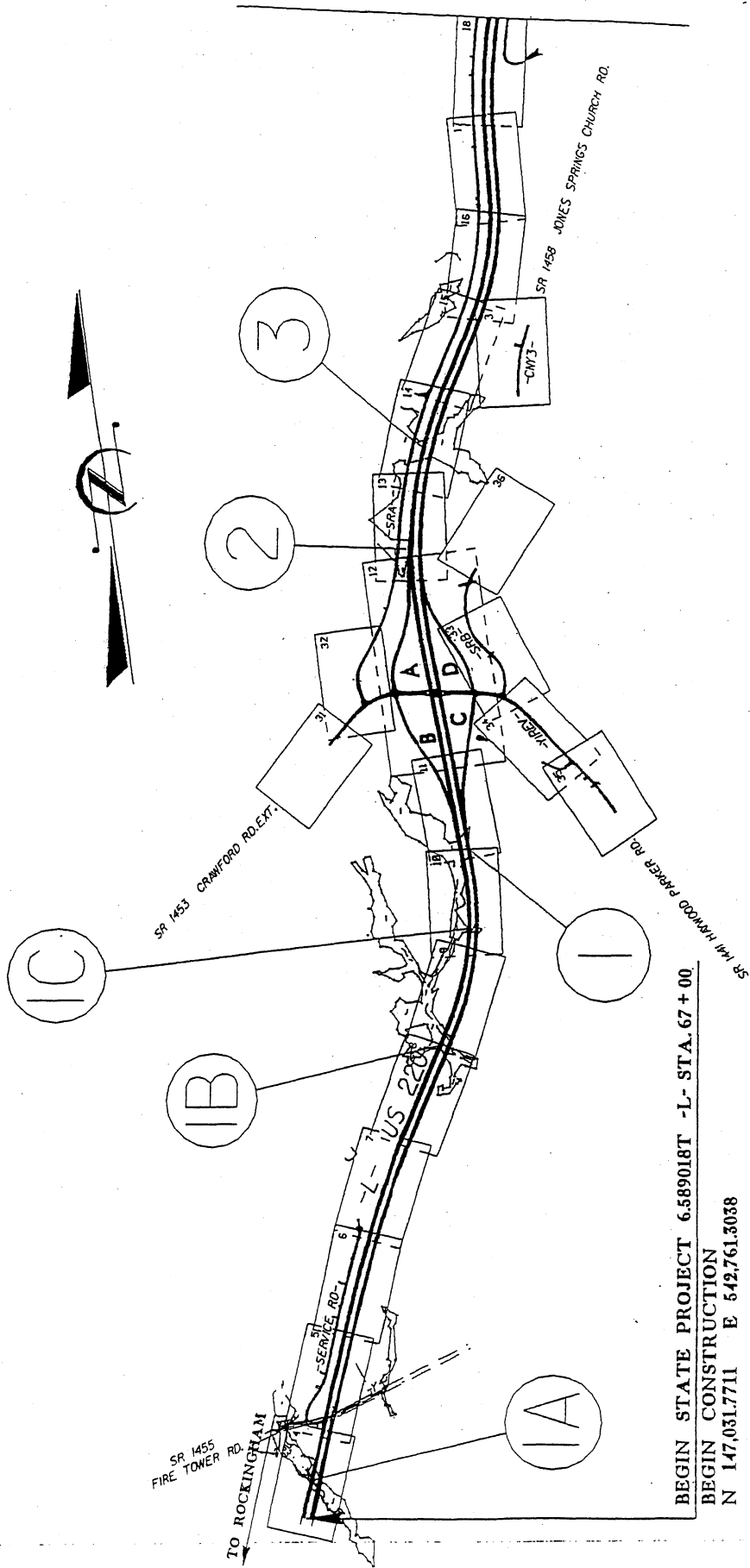
PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

9/02

10443

cl.



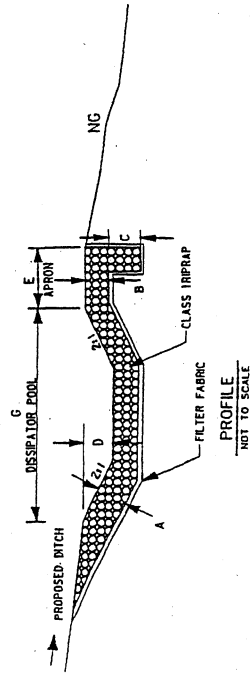
BEGIN STATE PROJECT 6.589018T -L- STA. 67 + 00.  
 BEGIN CONSTRUCTION  
 N 147,031.7711 E 542,761.3038

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)  
 US 220 BYPASS

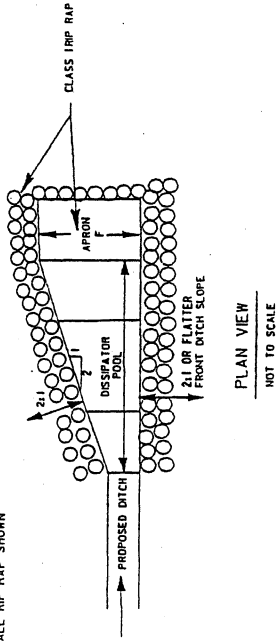
VICINITY MAP

# DETAIL OF RIP-RAPPED DITCH ENERGY DISSIPATOR BASIN

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



NOT ALL RIP RAP SHOWN



BASIN #	LOCATION
1	Sta 67+54 To 67+71-L- (Rt)
2	Sta 68+28 To 68+45 -L- (Lt)
3	Sta 68+41 To 68+69 -L- (Rt)
4	Sta 85+16 To 85+31-L- (Lt)
5	Sta 86+35 To 86+50 -L- (Lt)
6	Sta 28+20 To 28+37 -L- (Rt)

DIM. (m)	RIP RAP BASIN #					
	1	2	3	4	5	6
A	0.60	0.60	0.60	0.60	0.60	0.60
B	0.60	0.60	0.60	0.60	0.60	0.60
C	0.60	0.60	0.60	0.60	0.60	0.60
D	0.60	0.60	0.60	0.60	0.60	0.60
E	3.0	3.0	3.0	3.0	3.0	3.0
F	6.0	6.0	6.0	6.0	6.0	6.0
G	12.0	12.0	12.0	12.0	12.0	12.0

ALL DIMENSIONS APPROXIMATE

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

PROJECT: 8.T550802 (R-2231B)

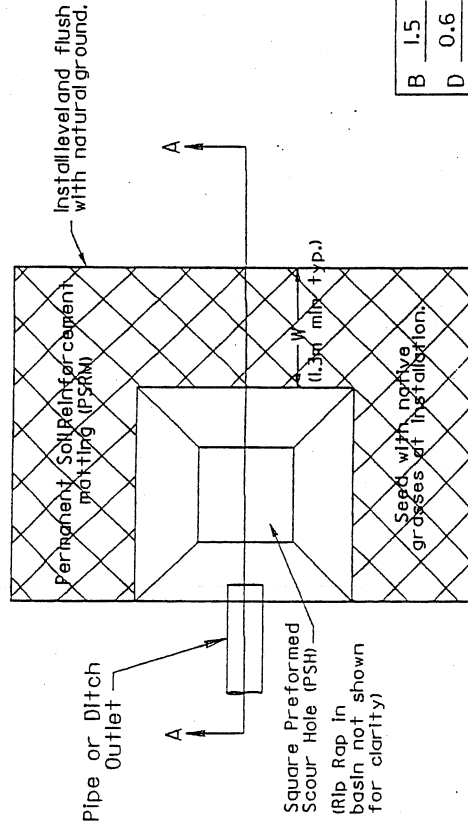
US 220 BYPASS

9/02

SHEET 5 OF 43

# PREFORMED SCOUR HOLE

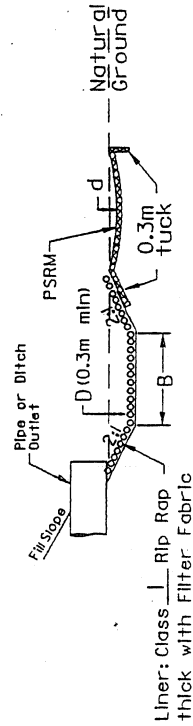
PLAN VIEW



B	1.5
D	0.6
W	2.0
d	0.15

BASIN #	LOCATION (AT OUTLET)
1	Sta 69+34 -L- (Rt)
2	Sta 85+00 -L- (Rt)
3	Sta 85+73 -L- (Rt)
4	Sta 15+81 -SRA- (Lt)
5	Sta 16+67 -SRA- (Lt)
6	Sta 22+78 -Y4REV- (Rt)
7	Sta 141+00 -L- (Lt)

SECTION A-A

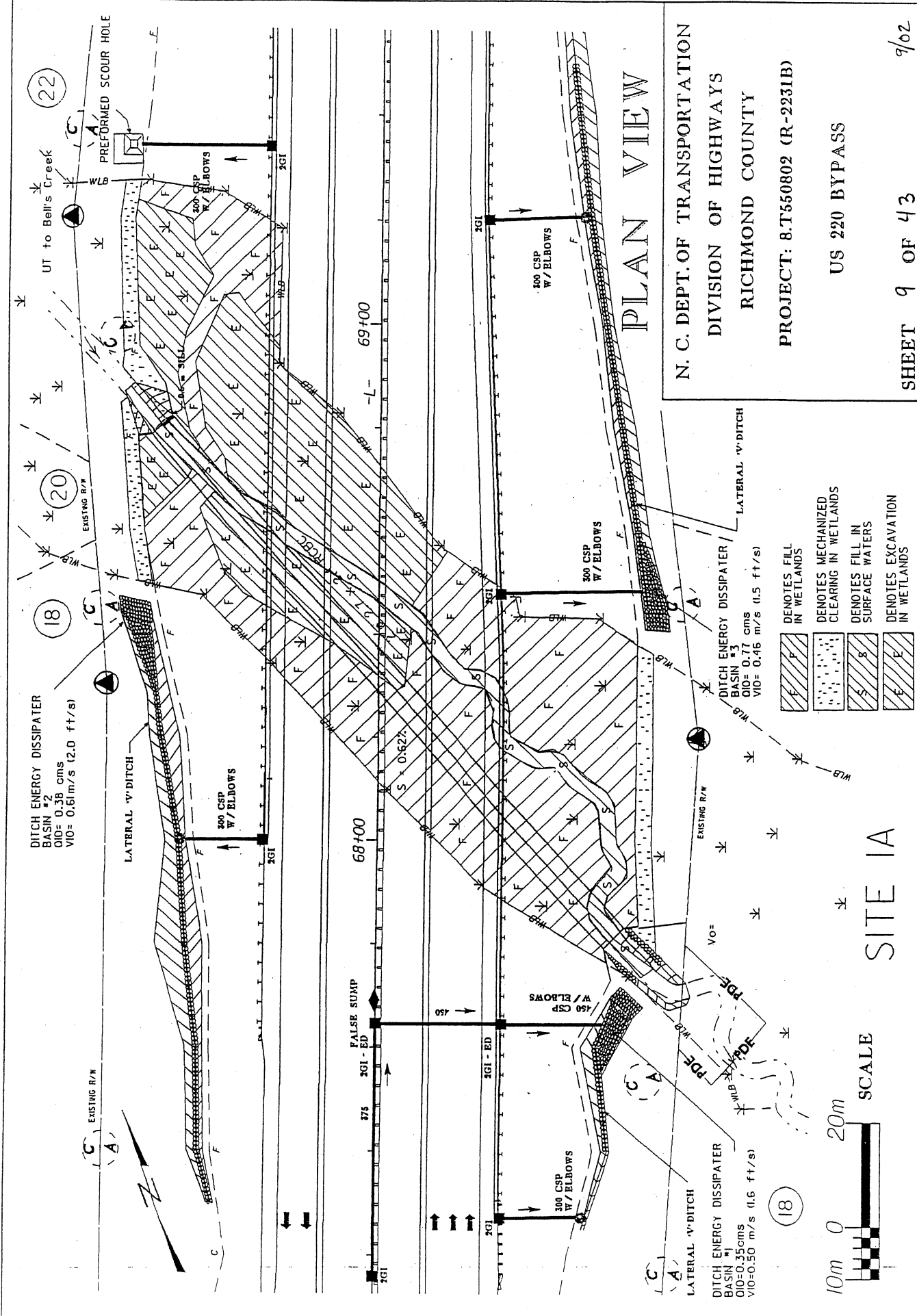


N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

9/02

SHEET 7 OF 43



# PLAN VIEW

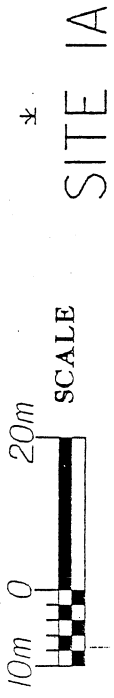
N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)  
 US 220 BYPASS  
 SHEET 9 OF 43 9/02

DITCH ENERGY DISSIPATER  
 BASIN #2  
 Q10= 0.38 cms  
 V10= 0.5 m/s (2.0 ft/s)

DITCH ENERGY DISSIPATER  
 BASIN #3  
 Q10= 0.77 cms  
 V10= 0.46 m/s (1.5 ft/s)

DITCH ENERGY DISSIPATER  
 BASIN #1  
 Q10= 0.35 cms  
 V10= 0.50 m/s (1.6 ft/s)

- DENOTES FILL IN WETLANDS
- DENOTES MECHANIZED CLEARING IN WETLANDS
- DENOTES FILL IN SURFACE WATERS
- DENOTES EXCAVATION IN WETLANDS



PROPOSED GRADE

+3.0000%

-0.549%

WETLAND LIMIT

END CULVERT  
-L- STA. 68+37.188

NATURAL GROUND

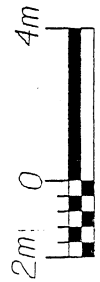
WETLAND LIMIT

2 @ 27m x 2.4m RCBC  
BEGIN CULVERT  
-L- STA. 68+28.812

68

69

# PROFILE



N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 11 OF 43

9/02

124

120

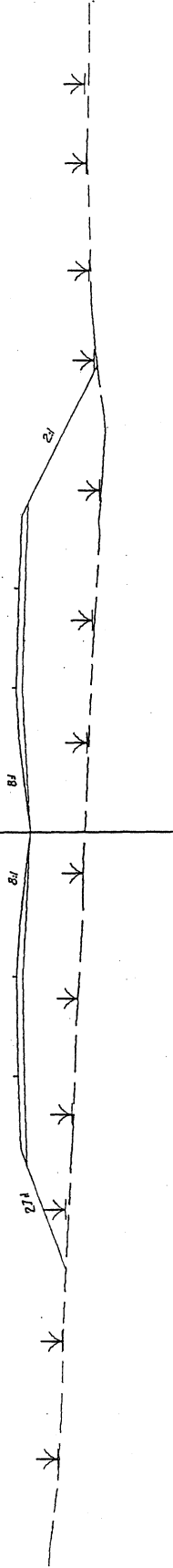
116

112

108

Elevation (m)

# Typical Section 85+60 -L-



## SECTION



HORIZONTAL SCALE

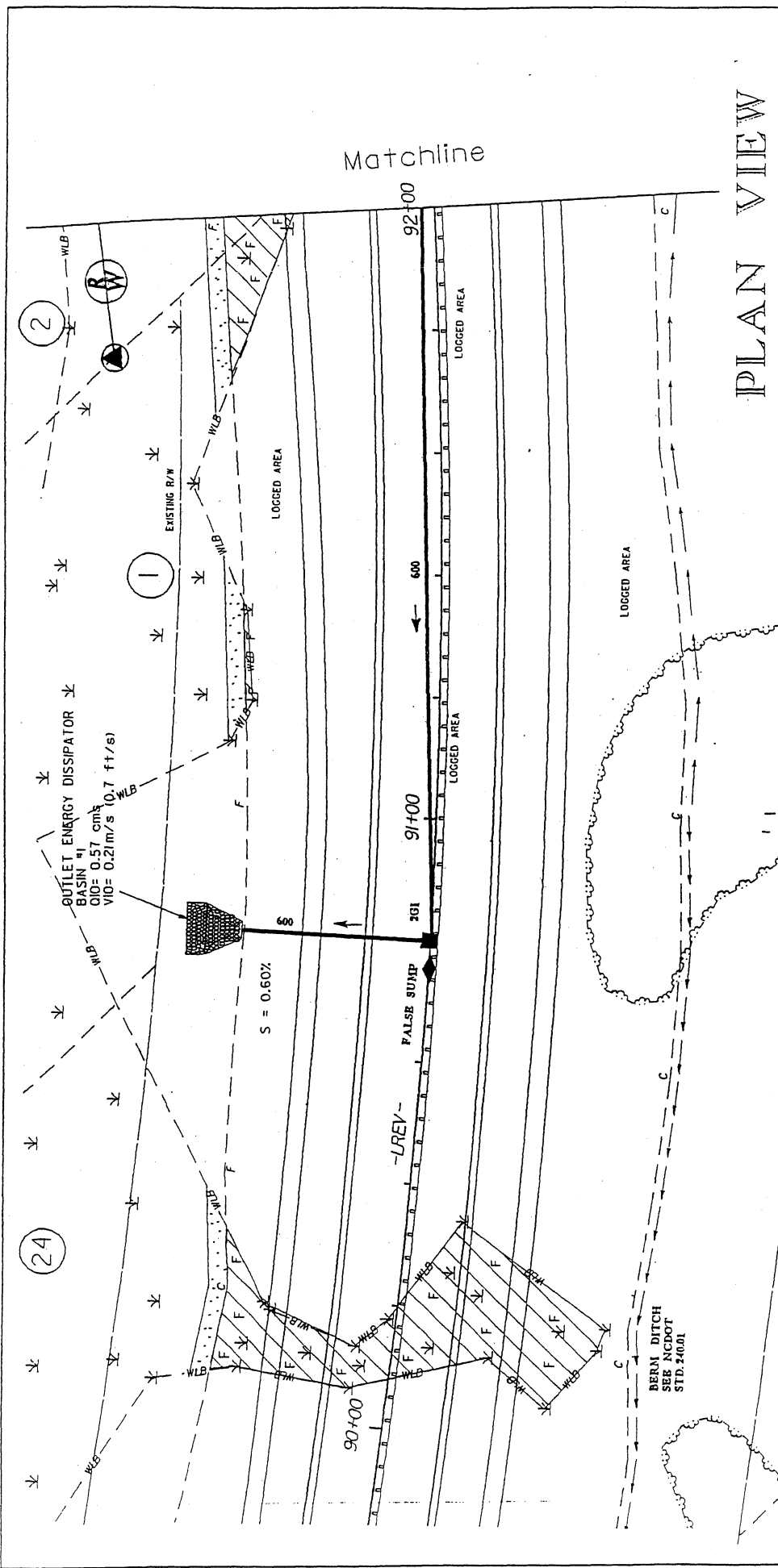


VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-223IB)  
 US 220 BYPASS

SHEET 13 OF 43

9/02



**PLAN VIEW**

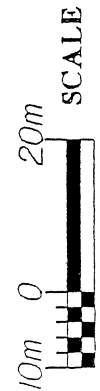
N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)  
 US 220 BYPASS

SHEET 15 OF 43

9/02

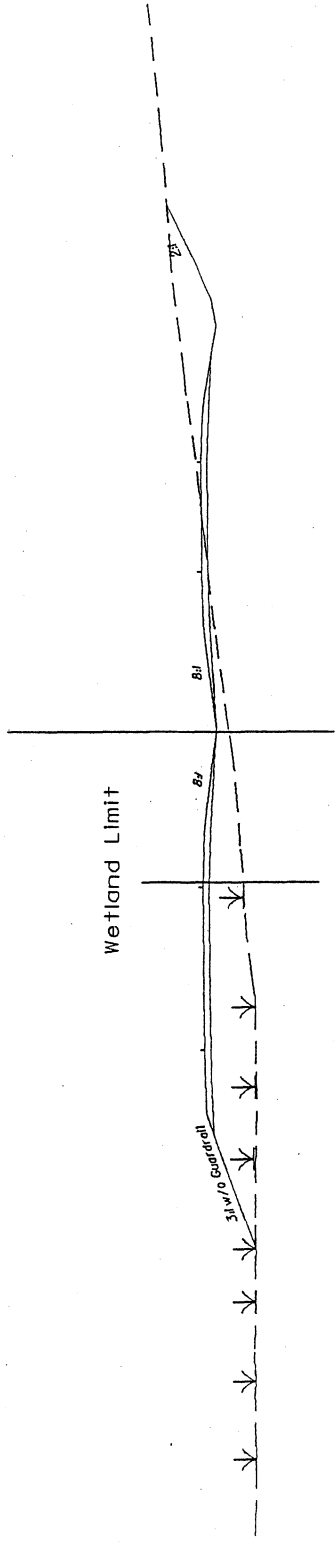
- DENOTES FILL IN WETLANDS
- DENOTES FILL IN SURFACE WATERS
- DENOTES MECHANIZED CLEARING IN WETLANDS



SITE IC



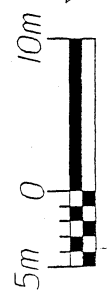
# Typical Section 92+80 -L-



## SECTION



HORIZONTAL SCALE





VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RICHMOND COUNTY  
PROJECT: 8.T550803 (R-2231B)

US 220 BYPASS

SHEET 17 OF 43

9/02

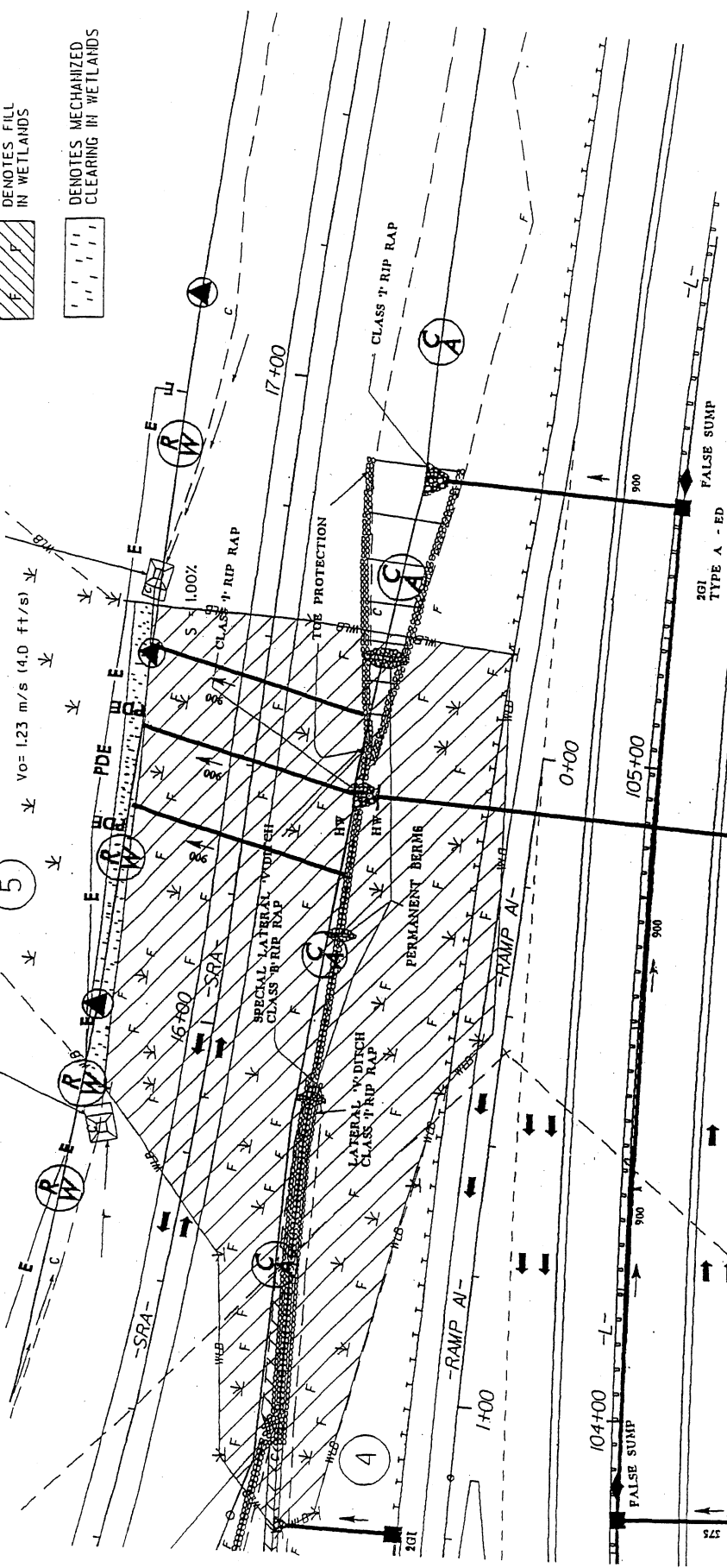
 DENOTES FILL IN WETLANDS  
 DENOTES MECHANIZED CLEARING IN WETLANDS

PREFORMED SCOUR HOLE

$V_0 = 1.23 \text{ m/s (4.0 ft/s)}$   


PREFORMED SCOUR HOLE

5



# PLAN VIEW

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

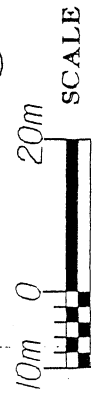
SHEET 19 OF 43

9/02

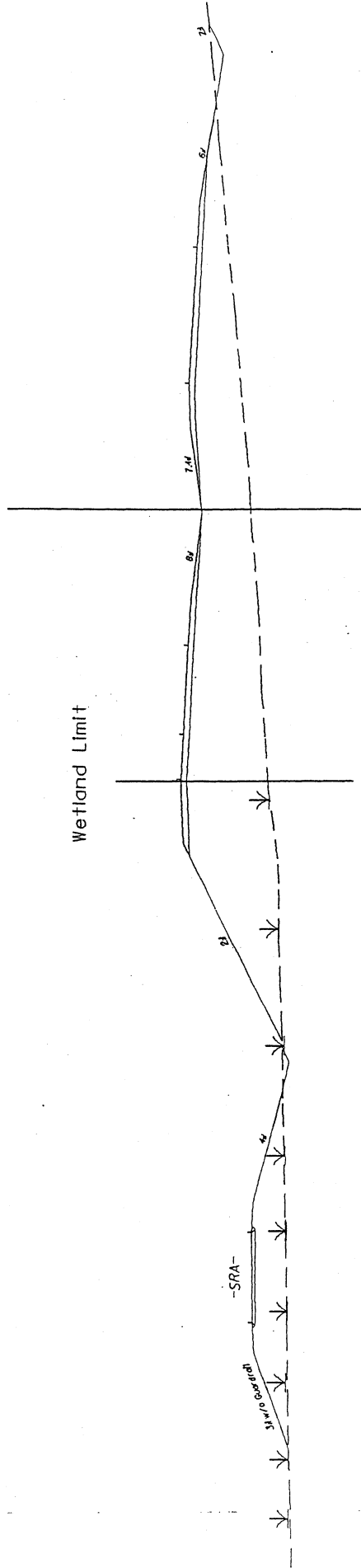


5

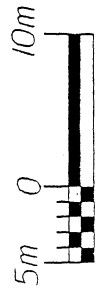
SITE 2



# Typical Section 105+00 -L-



## SECTION

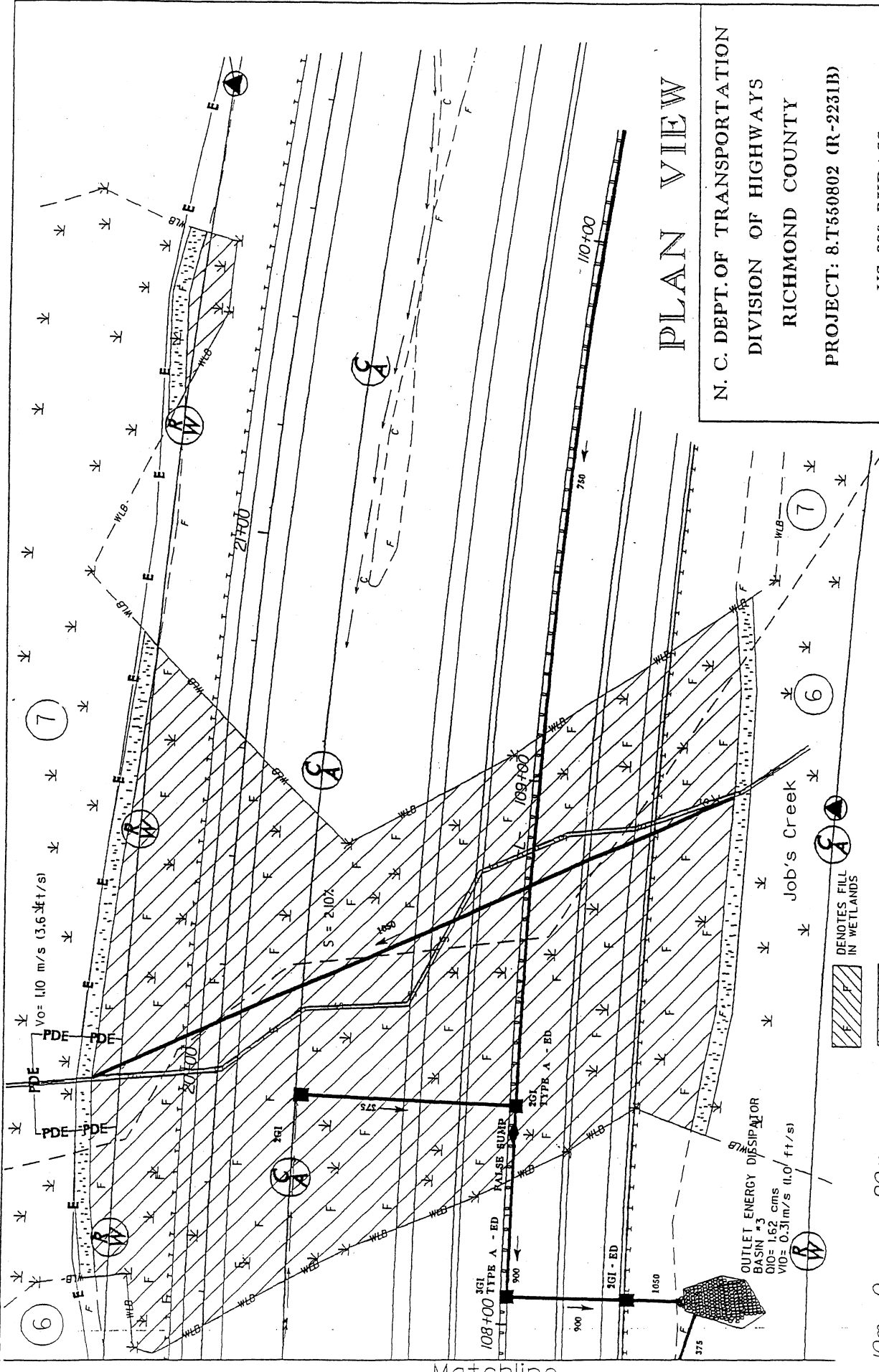


N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550803 (R-2231B)

US 220 BYPASS

SHEET 21 OF 43

9/02


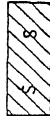
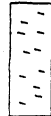


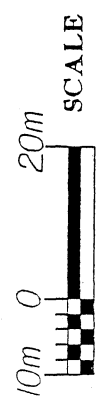
# PLAN VIEW

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

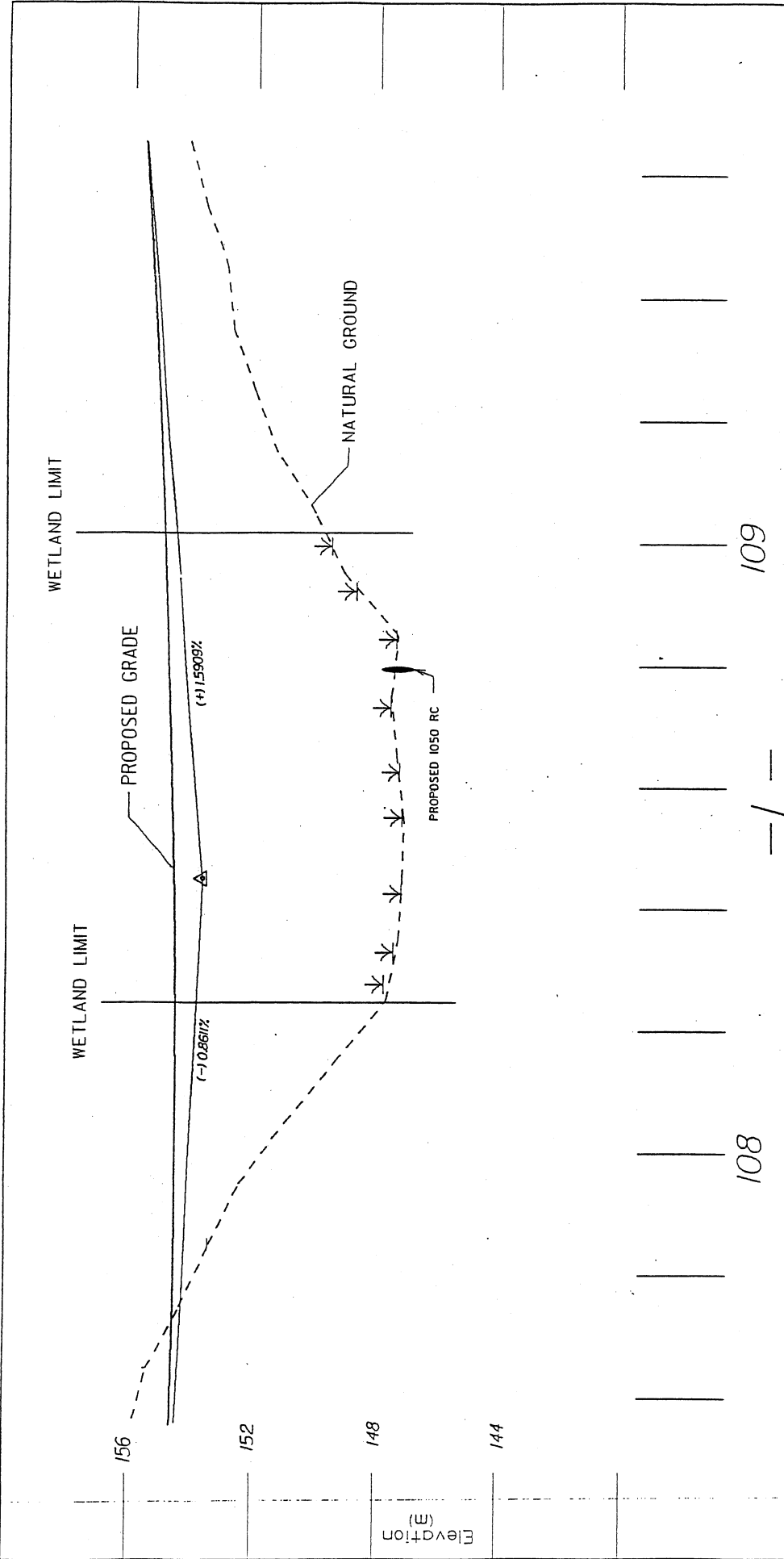
US 220 BYPASS

SITE 3

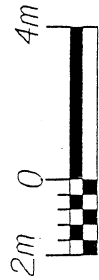
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATERS
-  DENOTES MECHANIZED CLEARING IN WETLANDS



Matchline



# PROFILE



N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)  
 US 220 BYPASS

# PLAN VIEW

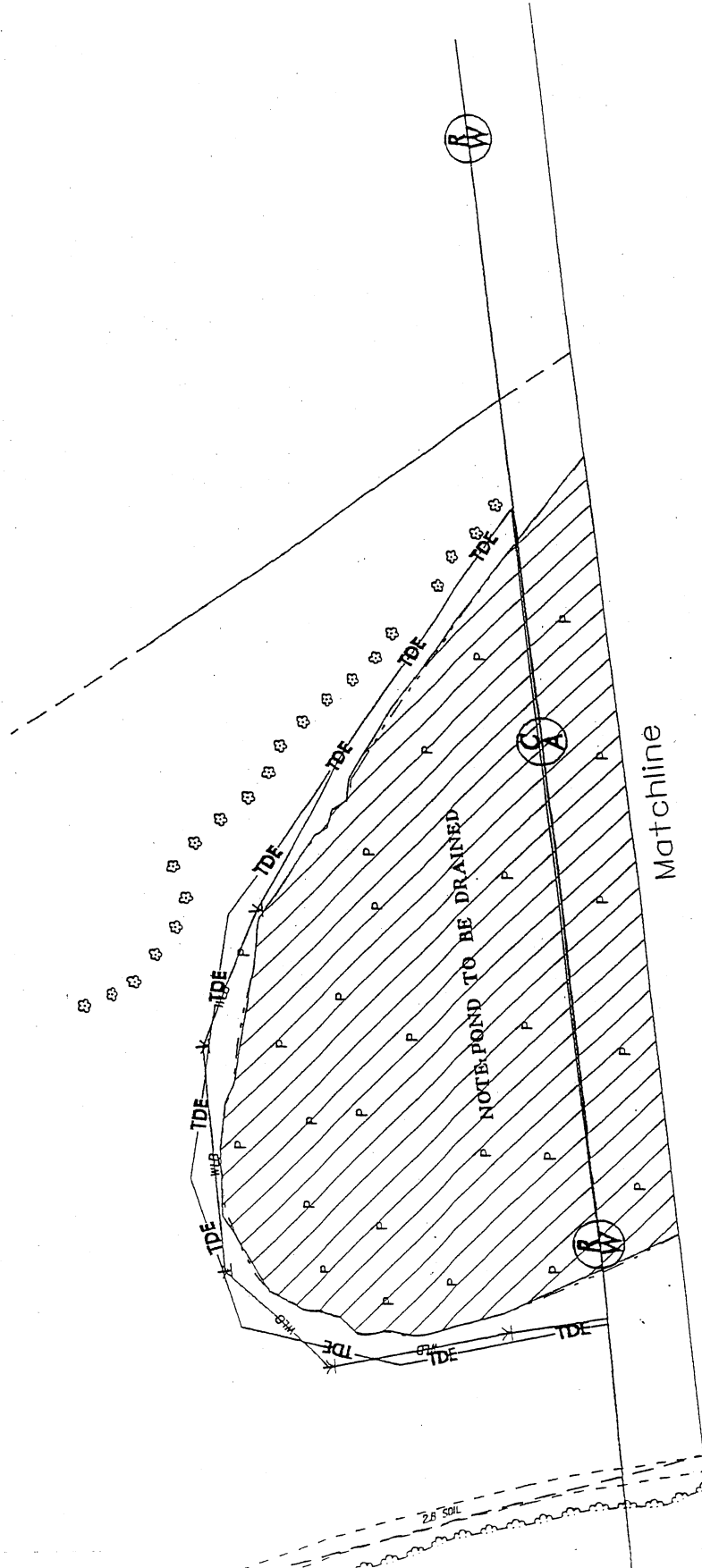
N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

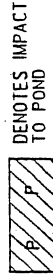
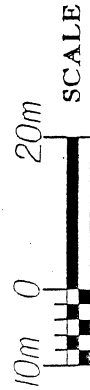
US 220 FROM SOUTH OF SR 1448  
TO SOUTH OF SR 1441

SHEET 27 OF 43

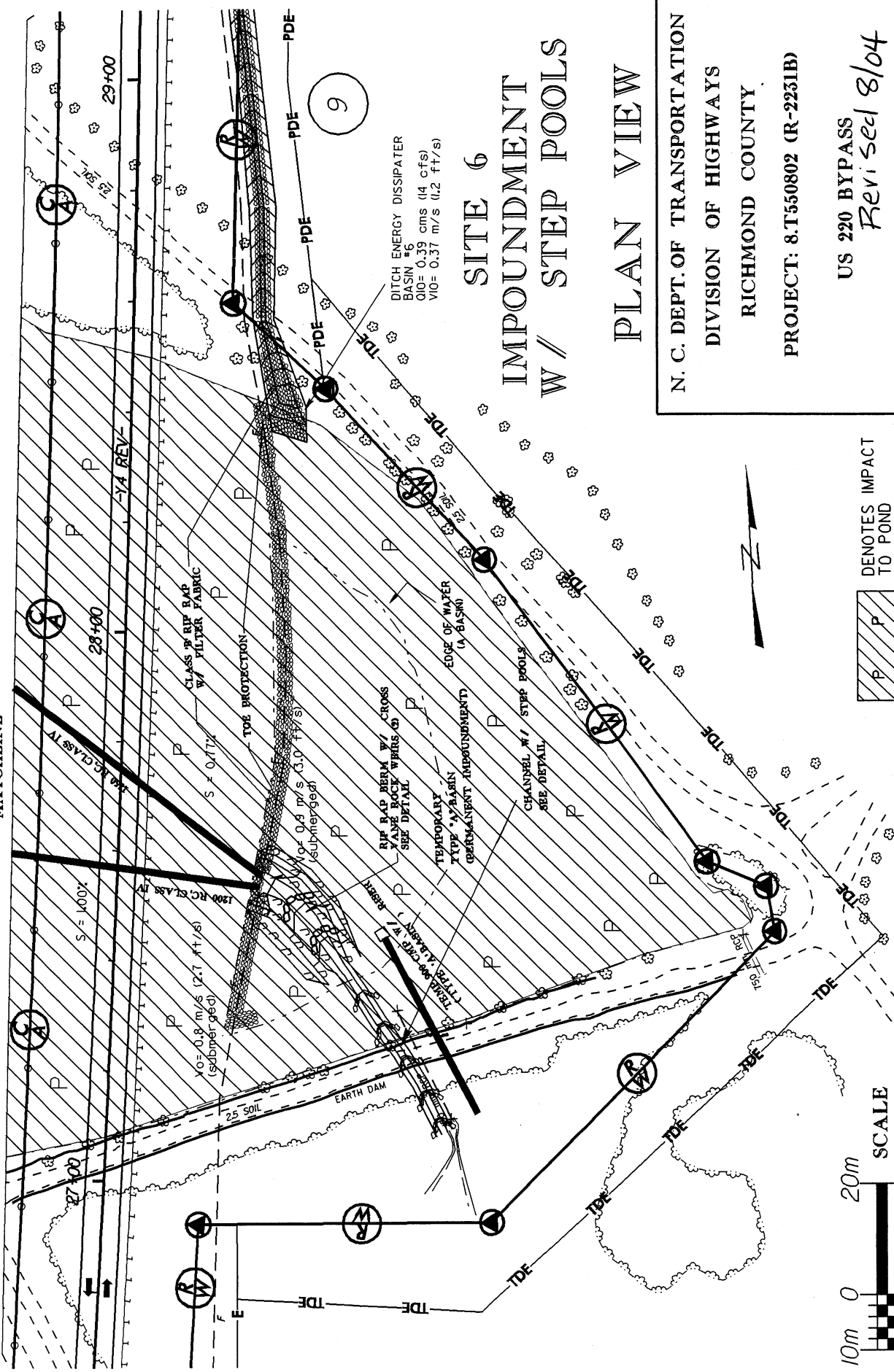
9/02



SITE 5



MATCHLINE

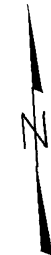


DITCH ENERGY DISSIPATER  
 BASIN #6  
 Q10= 0.39 cms (14 cfs)  
 V10= 0.37 m/s (1.2 ft/s)

# SITE 6 IMPOUNDMENT W// STEP POOLS PLAN VIEW

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS  
 Revised 8/04  
 SHEET 28 OF 43



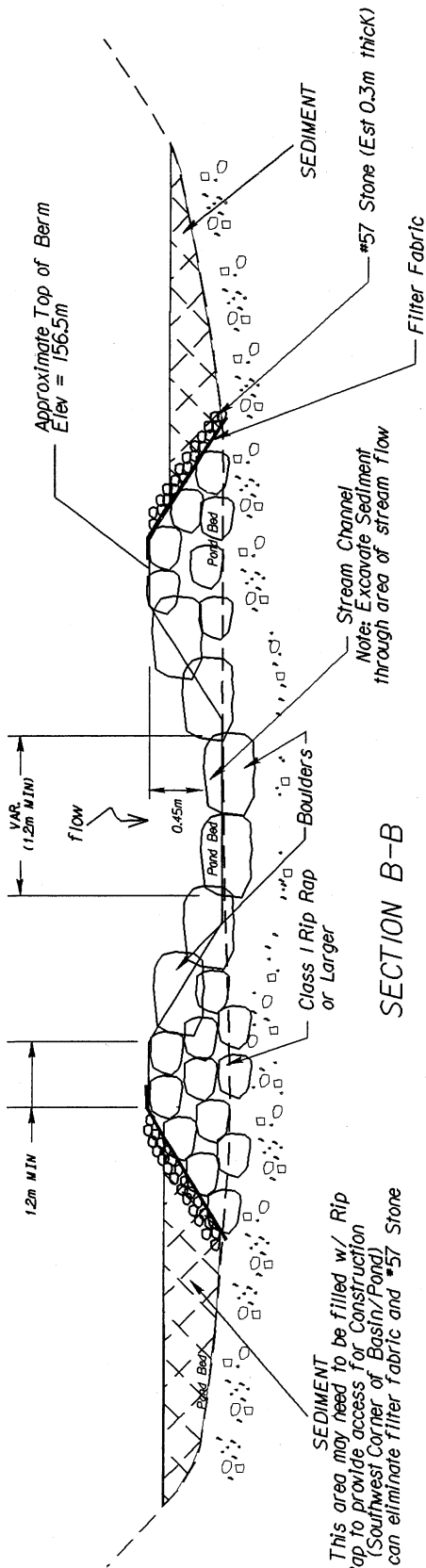
Denotes IMPACT  
 TO POND



# RIP RAP BERM AND CROSS VANE ROCK WEIR DETAIL

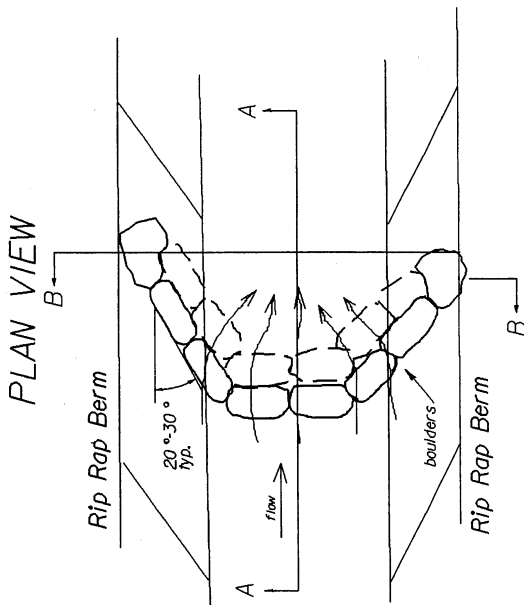
NOTE: Boulders should be angular and oblong with approximate dimensions of 0.75m x 0.6m x 0.6m and weighing approximately (1500 lbs)

Rip Rap will be left in place after construction

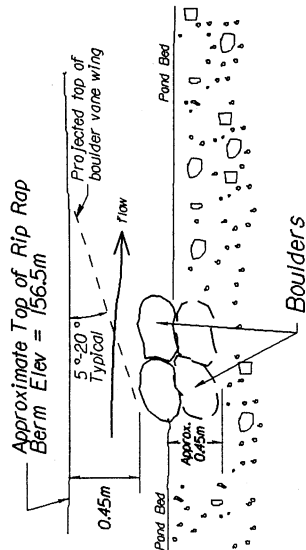


SECTION B-B

Note: This area may need to be filled w/ Rip Rap to provide access for Construction (Southwest Corner of Basin/Pond) if so, can eliminate filter fabric and #57 Stone



PLAN VIEW



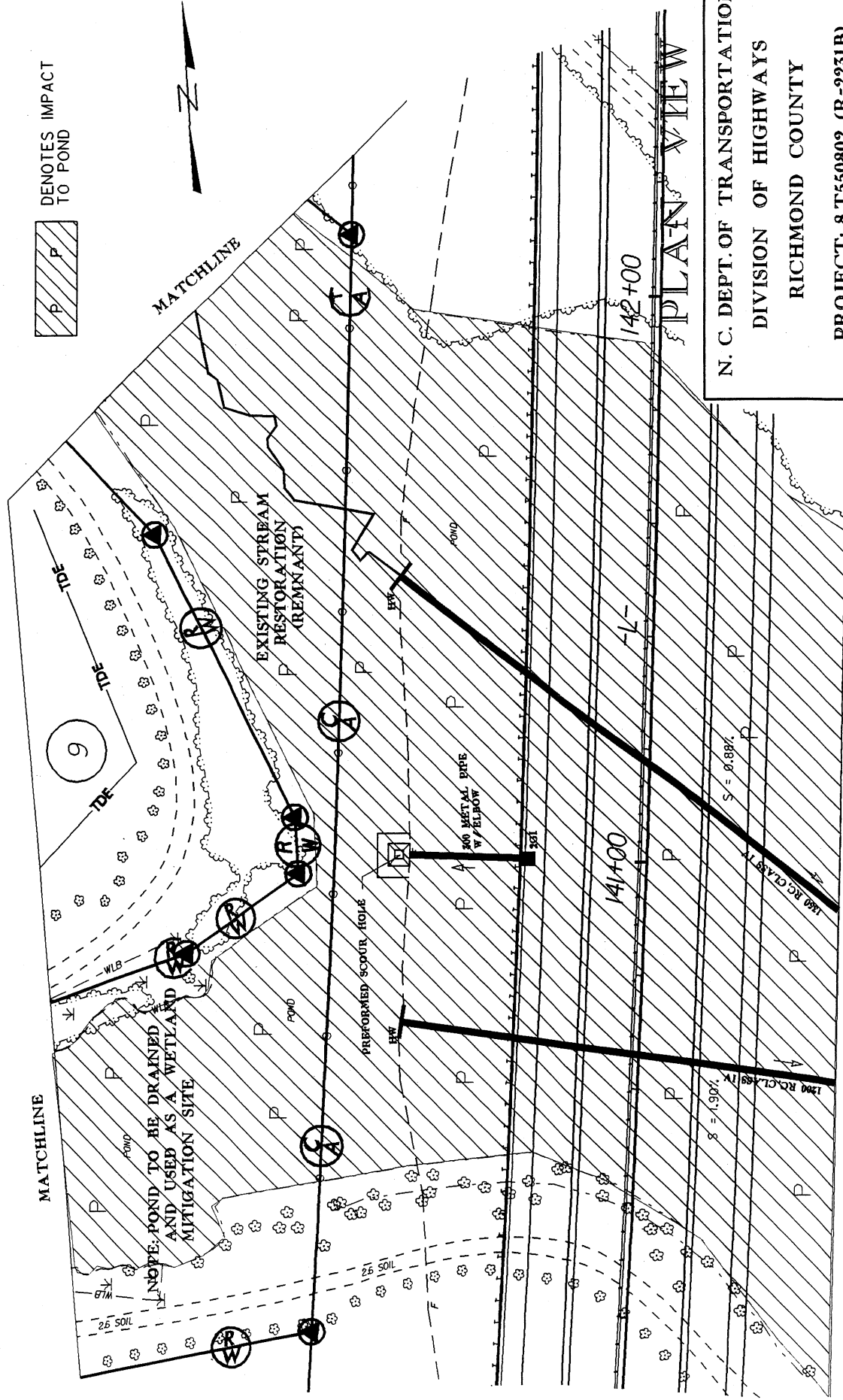
SECTION A-A

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS  
 Revised 8/04  
 SHEET 28A OF 43



DENOTES IMPACT  
TO POND



MATCHLINE

NOTE: POND TO BE DRAINED  
AND USED AS A WETLAND  
MITIGATION SITE

EXISTING STREAM  
RESTORATION  
(REMNANT)

200 METAL PIPE  
W/ ELBOW

PERFORMED SCOUR HOLE

141+00

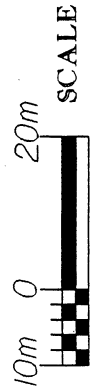
142+00

PLAN VIEW

MATCHLINE

SITE 6

STREAM RESTORATION AND  
WETLAND MITIGATION SITE

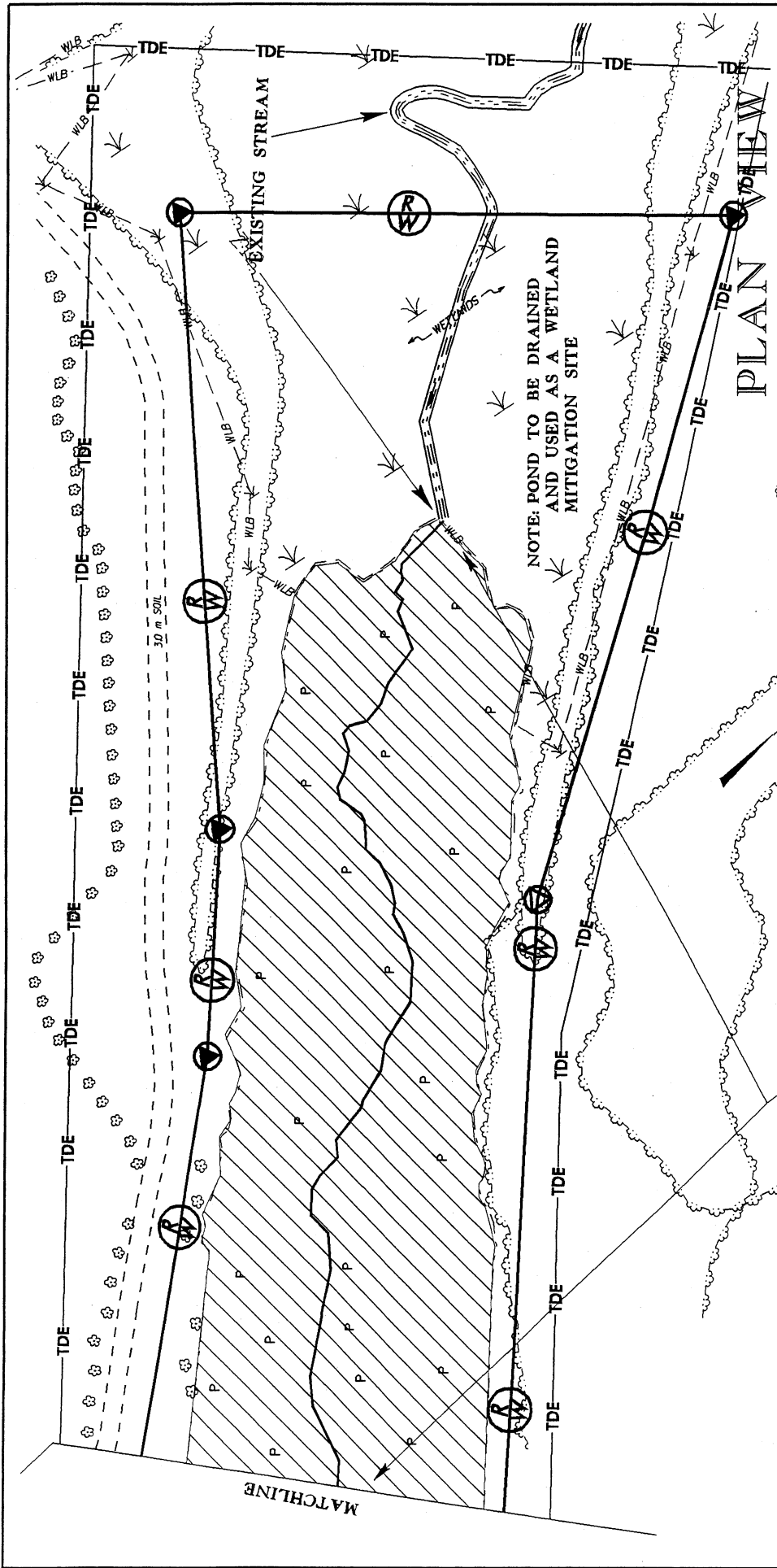


SCALE

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2251B)

US 220 BYPASS  
 Revised  
 7/04

SHEET 29 OF 43



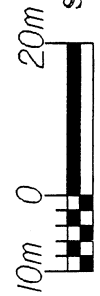
NOTE: POND TO BE DRAINED  
AND USED AS A WETLAND  
MITIGATION SITE

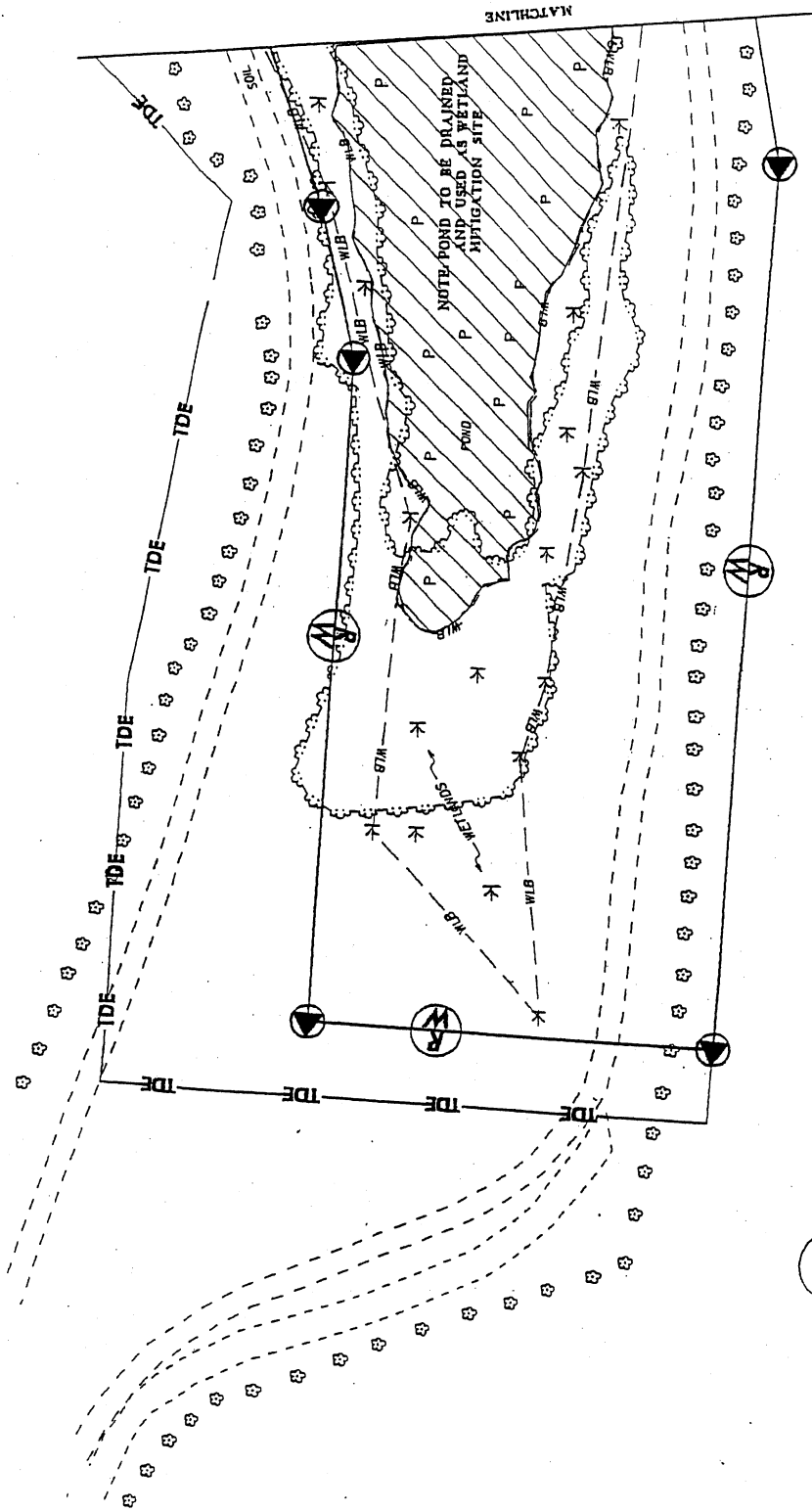
PLAN VIEW

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RICHMOND COUNTY  
PROJECT: 8.T550802 (R-2231B)  
US 290 BYPASS  
Revised 7/04

SITE 6  
STREAM RESTORATION AND  
WETLAND MITIGATION SITE

EXISTING STREAM  
RESTORATION  
(REMNANT)





# PLAN VIEW

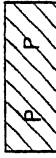
N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT: 8.T550802 (R-2231B)

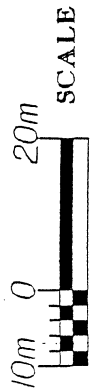
US 220 BYPASS

10/16/02

SHEET 31 OF 43

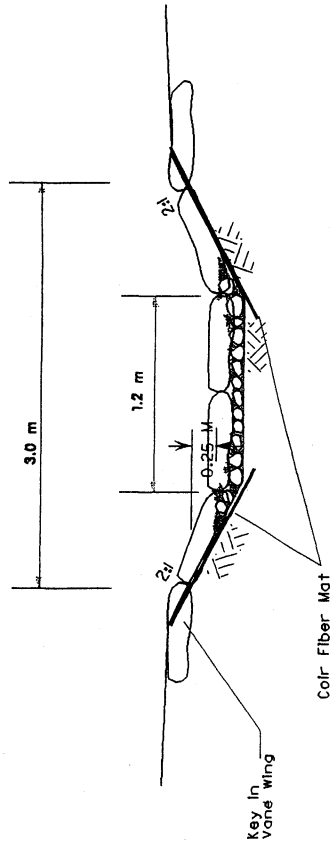
## SITE 6 WETLAND MITIGATION SITE

 DENOTES IMPACT TO POND



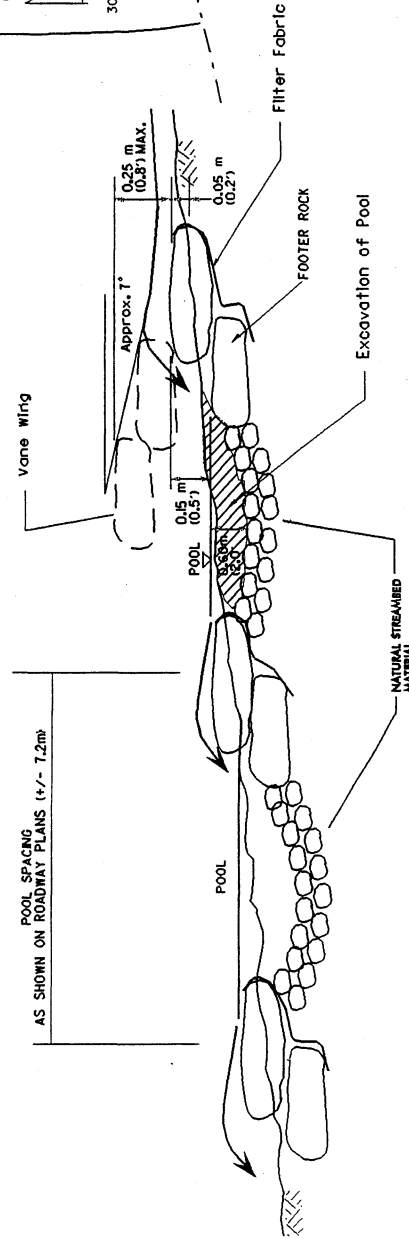
9

# STEP POOL DETAIL FOR INLET CHANNEL OF CULVERT AT 140+20 RT -L-



**PLAN VIEW**  
NOT TO SCALE

**TYPICAL CROSS SECTION**  
NOT TO SCALE



NOTE: FOOTER ROCK SHOULD BE ANGULAR AND BELONG WITH WIDE AXIS APPROXIMATELY 0.75m IN LENGTH. ROCK SHOULD FIT TIGHTLY TOGETHER WITH MINIMAL VOIDS.

**PROFILE**  
NOT TO SCALE

**NCDOT**

**DIVISION OF HIGHWAYS  
RICHMOND COUNTY**

**PROJECT: 8.T550802 (R-2231B)**

**US 220 BYPASS**

Revised  
7/04

**SHEET 32 OF 43**

# Appendix B

# Morphological Measurement Table

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream type	E5	E5	N/A	E5
2. Drainage area	160 Ac (0.25mi <sup>2</sup> )	160 - 193 Ac		160 Ac (0.25mi <sup>2</sup> )
3. Bankfull width	5.1 ft	5.2 ft		5.1ft
4. Bankfull mean depth	0.5 ft	0.4 ft		0.5 ft
5. Width/depth ratio	10.2	13		10.2
6. Bankfull cross-sectional area	2.2 ft <sup>2</sup>	2.2 ft <sup>2</sup>		2.2 ft <sup>2</sup>
7. Bankfull mean velocity	3.7 ft/s	3.7 ft/s		3.7 ft/s
8. Bankfull discharge, cfs	8.1 ft <sup>3</sup> /s	8.1 ft <sup>3</sup> /s		8.1 cfs
9. Bankfull max depth	0.8 ft	0.7 ft		0.8 ft
10. Width of floodprone area	180 ft	150 - 180 ft		180 ft
11. Entrenchment ratio	112	88		112
12. Meander length	40 ft	30 - 50 ft		40 ft
13. Ratio of meander length to bankfull width	7.8	7.7		7.8
14. Radius of curvature	12 ft	12 ft		12 ft
15. Ratio of radius of curvature to bankfull width	2.4	2.3		2.4
16. Belt width	10 - 20 ft	15 - 20 ft		10 - 20 ft
17. Meander width ratio	2.9	3.4		2.9
18. Sinuosity (stream length/valley length)	1.10	1.16		1.10
19. Valley slope	1.30%	1.30%		1.30%
20. Average slope	0.90%	0.80%		0.90%
21. Pool slope	0.30%	0.00%		0.30%
22. Ratio of pool slope to average slope	0.33	0.38		0.33
23. Maximum pool depth	1.4 ft	1.2 ft		1.4 ft
24. Ratio of pool depth to average bankfull depth	2.8	2.2		2.8
25. Pool width	5 - 6 ft	5.8 ft		5 - 6 ft
26. Ratio of pool width to bankfull width	1.08	1.11		1.08
27. Pool to pool spacing	25 ft	25 ft		25 ft
28. Ratio of pool to pool spacing to bankfull width	4.9	4.8		4.9

**Proposed**

Q <sub>BKF</sub>	8.1	ft <sup>3</sup> /s
W/D	13.0	
Side Slope	3:1	
Mannings n	0.035	
Valley Slope	0.0130	ft/ft
Sinuosity	1.16	

Valley Slope/Sinuosity	0.0112	ft/ft
Velocity	2.9	ft/s
Area	2.2	ft <sup>2</sup>
W <sub>BKF</sub>	5.2	ft
Base Width	1.0	ft
Mean Depth	0.4	ft
Wetted Perimeter	5.4	ft
Hydraulic Radius	0.41	ft

Shear Stress	0.28	lb/ft <sup>2</sup>
Particle Moved	18.0	mm

**Reference**

Q <sub>BKF</sub>	8.1	ft <sup>3</sup> /s
W/D	10.2	
Side Slope	Var.	
Mannings n	0.035	
Valley Slope	0.0130	ft/ft
Sinuosity	1.10	

Valley Slope/Sinuosity	0.0118	ft/ft
Velocity	3.0	ft/s
Area	2.2	ft <sup>2</sup>
W <sub>BKF</sub>	5.1	ft
Base Width	Var. - 2	ft
Mean Depth	0.5	ft
Wetted Perimeter	5.4	ft
Hydraulic Radius	0.41	ft

Shear Stress	0.30	lb/ft <sup>2</sup>
Particle Moved	16.0	mm

**Stream Power:**

**Reference:**  
stream power = 0.135 lb/ft<sup>2</sup>/sec

**Proposed:**  
stream power = 0.113 lb/ft<sup>2</sup>/sec



ROSENTHAL, NERSON  
ENGINEERS  
INC.

May 2004

CONSTR. REV.

R/A REV.

### DETAIL CHANNEL TYPICAL (Not to Scale)

Natural Ground

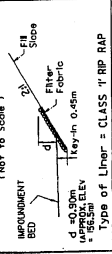


Min. D = 0.45 m  
Max. d = 0.45 m  
B = 1.2 m

- When B is < 1.8m

Type of Liner = Color Fiber Mat

### DETAIL '7" TOE PROTECTION (Not to Scale)



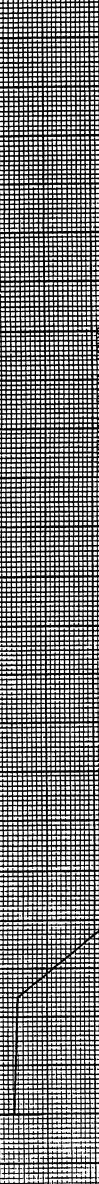
d = 0.50m  
Filter = 0.45m  
Type of Liner = CLASS 1 RPP RAP

-Y4 REV- STA. 27+23 RT. TO -Y4 REV- STA. 28+40 RT.

PROFILE OF EROSION PROTECTIVE LINER

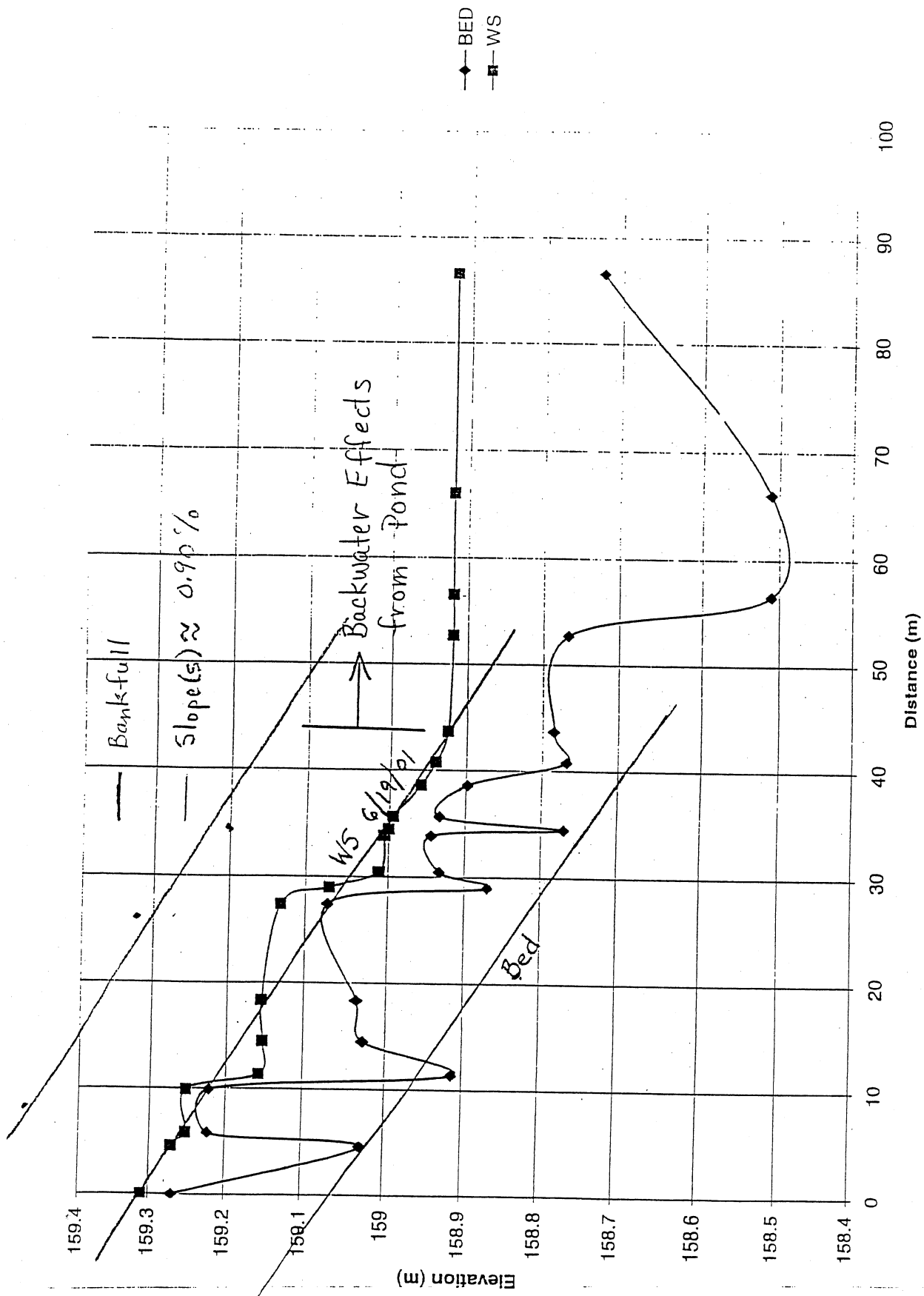


PROPOSED CHANNEL AND EXISTING GROUND



yes

Sheet 34 of 43





**Summary from site visit March 22, 2004**

**PROJECT #:** 8.T550803 (R-2231B)  
**COUNTY:** RICHMOND

**IMPOUNDMENT BELOW ROADWAY  
(Myrick Pond)  
Sta 140+20 TO Sta 141+40 -L- (Rt))**

A field meeting was held on 3/22/04 to review the site and discuss design options. Those in attendance were NCDOT Construction, NCDOT Hydraulics, USACE and Contractor personnel. The proposal was to eliminate the stream relocation design below the proposed roadway and instead propose an impoundment. The impoundment would consist of retaining a portion of the existing dam. The proposal came out of concern that establishing a stream through the sediment would be difficult to access and stabilize. This was due in part that the pond is presently being utilized as a Temporary A Basin. The basin would be removed after construction and prior to the stream design. The proposal was found to be acceptable but further design specifics and mitigation credit losses would have to be analyzed.

The impoundment design and mitigation losses were analyzed and resubmitted on 5/27/04. It is proposed to remove the 900mm CSP riser and lower the existing dam. The riser will be removed to eliminate future maintenance issues. The existing dam will be lowered to approximate elevations of 156.5m at the head of the pond to 155.2m at the tail of the pond. Also, it is proposed to construct a step-pool channel through the dam. The channel invert elevations are approximately 156.00m at the head of the pond and 154.7m at the tail of the pond. The channel will have coir fiber mat on the banks along with the footer rocks and streambed material at the step-pools. The width of the dam excavation has been designed at 45m but may be wider if needed. Toe protection has been proposed along the fill in the impoundment to an approximate elevation of 156.5m.

The drainage area at the existing dam is 193 acres. The basin is rural and is located in the Sandhills hydrologic region. The basin drains pine/hardwood forest and agricultural fields. The channel through the dam was designed based on Piedmont regional curves. This produced a bankfull discharge and area of 37 cfs and 9.5 ft<sup>2</sup>, respectively. The Piedmont curves were used at this location since they are more conservative than the numbers generated by the Coastal curves (7 cfs and 6.6 ft<sup>2</sup>). As a backup, the 10 yr discharge generated by the USGS Rural Equations for the Sandhills region was 32 cfs. This reconfirmed a conservative discharge and cross section for the step-pool channel. The 50 yr discharge at this location is estimated at 53 cfs.

There was also analysis to estimate the "turnover" rate of the impoundment. A turnover rate was analyzed for both the bankfull and "normal water surface" discharges. These discharges were calculated to be 37 cfs and 1.6 cfs, respectively. For an impoundment

Revised 7/04

Sheet 38 of 43

volume of approximately 10,000 yds<sup>3</sup> the turnover rate for bankfull and normal flows was 15 minutes and 5.6 hours, respectively.

The proposed impoundment reduced potential stream mitigation credit. The original stream mitigation plan proposed 1066'. The revised stream mitigation proposes 817'. The 817' length is based on surveys provided by the Construction unit on 5/18/04. The wetland mitigation may also be effected but will have to be reviewed by others.

Revised 7/04

Sheet 39 of 43

PARCEL NO.	PROPERTY OWNER NAME	PROPERTY OWNER ADDRESS
(1)	EMMA & ROLYN ELLERBE	RT 4 BOX 295 WADESBORO, N.C. 28170
(2)	JOSEPH G. JR. & BETTY DAVIS	915. MORNINGSIDE DR. ROCKINGHAM, N.C. 28379
(3)	ROBERT LEE & BRENDA KAY THORSBY	PO BOX 212 ELLERBE, N.C. 28338
(4)	MELVIN G ELLINGER	PO BOX 1152 ELLERBE, N.C. 28338
(5)	DUNCAN H & CHARLOTTE Q GRANT	1836 N. US. HWY. 220 ELLERBE, N.C. 28338
(6)	NEAL HAYWOOD GRANT	1836 N. US. HWY. 220 ELLERBE, N.C. 28338
(7)	DANIEL BROWN JR	PO BOX 604 ELLERBE, N.C. 28338
(8)	BOBBY ANN NICHOLSON TERRY	PO BOX 352 ELLERBE, N.C. 28338
(9 & 10)	JUANITA ASKEW	1230 SOUBREL HILL RD. CHARLOTTE, N.C. 28213
(11)	HAROLD JEROME NICHOLSON	PO BOX 152 ELLERBE, N.C. 28338
(12)	WALTER RAY & EMMA STANCIL	127 STANCIL DR. ELLERBE, N.C. 28338
(13)	ANNIE JORDAN BUJE	PO BOX 216 ELLERBE, N.C. 28338
(14)	ANTHONY A & BRENDA CAPEL	PO BOX 462 ELLERBE, N.C. 28338
(17 & 18)	ROGER H ALLRED SR	6726 LANCER DR. CHARLOTTE, N.C. 28226
(23)	JOHN B & BETTY PARKER	109 PATTERNOTE RD. MOORESVILLE, N.C. 28115
(22)	LESTER WILLIAM HINES	840 CAPEL MILL RD. ELLERBE, N.C. 28338

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

PROJECT R-2231B

US 220 BYPASS

9/02

SHEET 40 OF 43



**WETLAND PERMIT IMPACT SUMMARY**

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS			SURFACE WATER IMPACTS					Natural Stream Design (m)	
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)		
1A	68+12 - 68+74 -L-	2@2.7mX2.4m	0.41		0.211	0.045	0.028				174	
1B	85+60 - 86+04 -L-	1200 RCP	0.39			0.041	0.017				89	
1C	90+08 - 90+20 -L-	N/A	0.087			0.008						
1	91+20 - 94+00 -L-	750 RCP	0.688			0.063					202	
2	103+80 - 105+20 -L-	3@900 RCP	0.543			0.023						
3	106+60 - 110+00 -L-	1050 RCP	0.976			0.094					100	
4	22+80 - 23+20 -Y4REV-	900 RCP	0.082			0.021						
5	135+00 - 137+00 -L-	750 RCP						1.21				
* 6	140+00 - 142+00 -L-	1350 RCP						3.79				249
<b>TOTALS:</b>			<b>3.176</b>	<b>0</b>	<b>0.211</b>	<b>0.295</b>	<b>0.045</b>	<b>5.00</b>	<b>0</b>	<b>565</b>	<b>249</b>	

**NCDOT**  
 DIVISION OF HIGHWAYS  
 RICHMOND COUNTY  
 PROJECT 8.T550802 (R-2231B)  
 Revised May 2004

SHEET **42** OF **43**

\* WETLAND SITE 6 MITIGATION ESTIMATE = 1.00 Ha

5/04 Reduction in Wetland and Stream Mitigation (from 1.27 Ha and 325m, respectively) due to elimination of mitigation below roadway. Modifications made to the existing pond to be incorporated as a permanent impoundment.

WETLAND PERMIT IMPACT SUMMARY													
Site No.	Station (From/To)	Structure Size / Type	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)		
1A	68+12 - 68+74 -L-	2@9'X8'	1.01		0.52	0.11	0.07					571	
1B	85+60 - 86+04 -L-	48" RCP	0.18			0.1	0.04					292	
1C	90+08 - 90+20 -L-	N/A	0.22			0.02							
1	91+20 - 94+00 -L-	30" RCP	1.7			0.16						663	
2	103+80 - 105+20 -L-	3@36" RCP	1.34			0.06							
3	106+60 - 110+00 -L-	42" RCP	2.41			0.23						328	
4	22+80 - 23+20 -Y4REV-	36" RCP	0.2			0.05							
5	135+00 - 137+00 -L-	30" RCP								3			
*6	140+00 - 142+00 -L-	54" RCP								9.36			817
TOTALS:			7.06	0	0.52	0.73	0.11	12.36	0	1854	817		

\* WETLAND SITE 6 MITIGATION ESTIMATE = 2.45 AC

5/04 Reduction in Wetland and Stream Mitigation (from 3.12 Ac and 1066', respectively) due to elimination of mitigation below roadway. Modifications made to the existing pond to be incorporated as a permanent impoundment.

Form Revised 3/22/01

NC DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 May 2004  
 RICHMOND COUNTY  
 PROJECT 8.T550802 (R-2231B)  
 SHEET 43 OF 43