



Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
North Carolina Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D.  
Acting Director  
Division of Water Quality

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September 6, 2001

Mr. William D. Gilmore, P.E., Manager  
NCDOT Planning and Environmental Branch  
1548 Mail Service Center  
Raleigh, NC, 27699-1548

Dear Mr. Gilmore:

Re: Water Quality Certification Pursuant to §401 of the Federal Clean Water Act,  
Proposed North Charlotte Outer Loop, Mecklenburg County, TIP Nos. R-2248 BB, C, and D.  
DWQ Project No. 011231

Attached hereto is a copy of Certification No. 3328 issued to The North Carolina Department of Transportation dated September 6, 2001.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Gregory J. Thorpe', is written over the typed name and title.

Gregory J. Thorpe, Ph.D.  
Acting Director

Attachments

cc: Wilmington District Corps of Engineers  
Corps of Engineers Asheville Field Office  
DWQ Mooresville Regional Office  
Ron Ferrell, Wetlands Restoration Program  
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. This certification authorizes the NCDOT to impact 11.96 acres of jurisdictional wetlands through permanent fill, excavation, and mechanized clearing; impact 20.28 acres of surface waters; and fill 17,072 linear feet of stream channels in Mecklenburg County, as described in Tables A1 and A2 of the Application. The project shall be constructed pursuant to the application dated August 15, 2001 filed to construct the North Charlotte Outer Loop (TIP Nos. R-2248 BB, C, and D).

The application provides adequate assurance that the discharge of fill material into the waters of the state 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. Should your project change, you are required to notify the DWQ *in writing*, 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 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, Non-discharge and Water Supply watershed regulations. This Certification shall expire three (3) 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. The applicant must follow the appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of *the North Carolina Sediment and Erosion Control Planning and Design Manual* or *the North Carolina Surface Mining Manual*, whichever is more appropriate (available from the Division of Land Resources (DLR) in the DENR Regional or Central Offices) and shall be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to assure compliance with the appropriate turbidity water quality standard (50 NTUs in all fresh water streams and rivers not designated as trout waters; 25 NTUs in all lakes and reservoirs, and all saltwater classes; and 10 NTUs in trout waters);
2. 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 after the Division of Land Resources has released the project;
3. Storm water shall be directed to buffer areas or retention basins and should not be routed directly into streams. Existing vegetated buffers shall not be mowed in order to utilize it for storm water sheet flow.

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. Live or fresh concrete shall not come 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 must be constructed in a dry work area, and stabilized before stream flows are diverted. Channel relocations shall be completed and stabilized prior to diverting water into the new channel. Whenever possible, channel relocations must 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. Placement of culverts and other structures in waters, streams, and wetlands shall 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.
9. During the construction of the project the applicant shall strictly adhere to North Carolina regulations entitled "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0024) throughout design and construction of the project for activities undertaken in all waters classified as WS (Water Supply), including Thomas Pond, Long Creek and its unnamed tributaries.
10. Hazardous Spill Catch Basins shall be required for all stream crossings located in the Watersupply Watershed Critical Area (Long Branch and its unnamed tributaries). The final designs for the Hazardous Spill Catch Basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Unit prior to beginning construction in the Watersupply Watershed Critical Area. As-builts for the basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Units no later than 30 days after the construction is completed.
11. Prior to any construction activities, the NCDOT shall submit a maintenance plan for all stormwater management facilities and hazardous spill catch basins associated with the project. The NCDOT shall be required to implement the maintenance plan for the life of the road.

12. **Mitigation:** Compensatory mitigation shall be the same as that approved by the US Army Corps of Engineers as long as the mitigation required equals a ratio of 1:1 restoration or creation of lost wetland acres as described in 15A NCAC 2H.0506 (h)(6). A report must be submitted to the NC Division of Water Quality that describes the final approved wetland and stream mitigation for this project within two months of the issuance of the 404 permit issued by the Army Corps of Engineers.

Wetland impacts consist of 11.96 acres, including 8.68 acres of riverine wetlands and 3.28 acres of depressional wetlands. Compensatory mitigation for 8.68 acres of riverine wetlands will be mitigated for at a 2:1 ration via in-lieu payments to the NC Wetlands Restoration Program (WRP) in the amount of \$416,640.00 (\$24,000 per acre). The 3.28-acre depressional wetland will be mitigated for by acquisition of the Ridge Road Mitigation Site.

Stream mitigation will be provided at a ratio of 2:1 except for those sites that were determined to warrant a 1:1 ratio or no mitigation by agency review. Compensatory mitigation for stream impacts will consist of 3,362 linear feet of on-site stream relocation/restoration using natural channel design. The stream relocation shall be built and maintained according to the approved plans before any mitigation credit is given. If this Office determines that the stream restoration or associated riparian area has become unstable, the stream shall be repaired or stabilized using only natural channel design techniques if possible. Additionally, the vegetation in the riparian shall be maintained and/or replaced according to the approved plans. Rip-rap and other hard structures may only be used if required by the Division of Land Resources or a Delegated Local Program. Additionally, all repair designs must be submitted to and receive written approval from this Office before the repair work is performed. Because the restored stream is proposed as compensatory mitigation for stream impacts, the restored portion and associated riparian area shall be preserved in perpetuity through a preservation easement or some other legally binding mechanism or agreement. The above easement or other legally binding mechanism or agreement must be in place before any mitigation credit shall be given. Additionally, the stream physical and biological monitoring plan shall be followed and reports shall be submitted to this Office after the first year and every other year afterwards for a total of five (5) years.

The remaining 22,248 linear feet of stream mitigation shall be provided via in-lieu payments to the WRP in the amount of \$2,781,000.00 (\$125.00 per linear foot).

In accordance with 15A NCAC 2R.0500, this contribution will satisfy our compensatory mitigation requirements under 15A NCAC 2H.0506(h). Until the Wetland Restoration Program receives and clears your check (made payable to DENR – Wetland Restoration Program), wetland or stream fill shall not occur. Mr. Ron Ferrell should be contacted at 919.733.5083 ext. 358 if you have any questions concerning the Wetland Restoration Program. You have two months from the date of this Certification to make the payment.

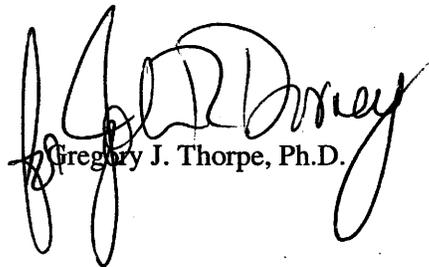
13. Upon completion of the project, the NCDOT shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed. The responsible party shall complete the attached form and return it to the 401/Wetlands Unit of the Division of Water Quality upon completion of the project.
14. 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.

Violations of any condition herein set forth shall 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 Permit. This Certification shall expire upon the expiration of the 404 Permit.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition that conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This certification and its conditions are final and binding unless you ask for a hearing.

This the 6th day of September 2001

DIVISION OF WATER QUALITY

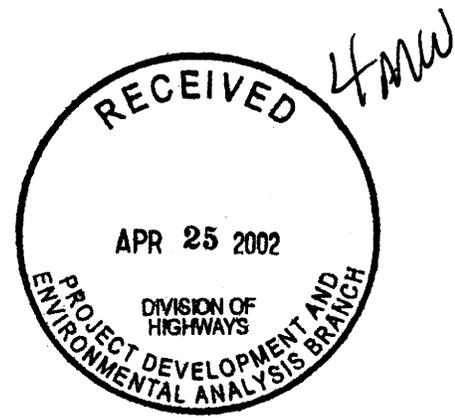


Gregory J. Thorpe, Ph.D.

WQC No. 3328



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



IN REPLY REFER TO

April 22, 2002

Regulatory Division

Action ID. 2001313201

Mr. William D. Gilmore, P.E., Manager  
Project Development and Environmental Analysis Branch  
North Carolina Department of Transportation  
1548 Mail Service Center  
Raleigh, North Carolina 27699-1548

Dear Mr. Gilmore:

In accordance with the written request of August 15, 2001, and the ensuing administrative record, enclosed is a permit to discharge dredged or fill material into 11.96 acres of wetland, 17,252 linear feet of stream channel and 19.28 acres of open water in the waters and adjacent wetlands of Paw Creek, Long Creek, Dixon Branch and unnamed tributaries to facilitate the construction of approximately 8 miles of the North Charlotte Outer Loop (I-485) between Interstate Highway 85 on the west and NC Highway 115 (Old Statesville Road) on the east at Charlotte, Mecklenburg County, North Carolina (TIP No. R-2248 BB/C/D, State Project Nos. 8.U672205, 8.U672212 and 8.U672214).

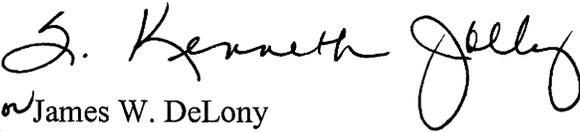
If any change in the authorized work is required because of unforeseen or altered conditions or for any other reason, the plans revised to show the change must be sent promptly to this office. Such action is necessary, as revised plans must be reviewed and the permit modified.

Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant general conditions require that:

- a. You must complete construction before December 31, 2005.
- b. You must notify this office in advance as to when you intend to commence and complete work.
- c. You must allow representatives from this office to make periodic visits to your worksite as deemed necessary to assure compliance with permit plans and conditions.

Should you have questions, contact Mr. Steven Lund, in our Asheville Regulatory Field Office, Regulatory Division, telephone (828) 271-7980 ext. 4.

Sincerely,

  
for James W. DeLony  
Colonel, U.S. Army  
District Engineer

Enclosures

Copy Furnished with enclosures:

Chief, Source Data Unit  
NOAA/National Ocean Service  
ATTN: Sharon Tear N/CS261  
1315 East-West Hwy., Rm 7316  
Silver Spring, MD 20910-3282

Copies Furnished with special conditions and plans:

Mr. Garland Pardue, Field Supervisor  
U.S. Fish and Wildlife Service  
Fish and Wildlife Enhancement  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

Mr. Ron Sechler  
National Marine Fisheries  
Service, NOAA  
Pivers Island  
Beaufort, North Carolina 28516

Mr. David Rackley  
National Marine Fisheries  
Service, NOAA  
219 Fort Johnson Road  
Charleston, South Carolina 29412-9110

Mr. Ronald Mikulak, Chief  
Wetlands Section - Region IV  
Water Management Division  
U.S. Environmental Protection Agency  
Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, Georgia 30303

Mr. Dug Huggett  
Division of Coastal Management  
North Carolina Department of  
Environment and Natural Resources  
1638 Mail Service Center  
Raleigh, North Carolina 27699-1638

Commanding Officer  
United States Coast Guard  
Marine Safety Office Wilmington  
1502 North 23<sup>rd</sup> Street  
Wilmington, North Carolina 28405

Commander, Aoww  
Coast Guard, Atlantic Area  
ATTN: Tom Flynn  
431 Crawford Street  
Portsmouth, Virginia 23704

Mr. Ronald E. Ferrell  
Wetlands Restoration Program  
Division of Water Quality/NCDENR  
1650 Mail Service Center  
Raleigh, NC 27699-1650

RECEIVED

APR 19 2002

WATERWAYS DISTRICT OFFICE

DEPARTMENT OF THE ARMY PERMIT

NC Department of Transportation
Permittee
Permit No. 200131321
Issuing Office CESAW-RG-A

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

To discharge dredged or fill material into 11.96 acres of wetland, 17,252 linear feet of stream channel and 19.28 acres of open water in the waters and adjacent wetlands of Paw Creek, Long Creek, Dixon Branch and unnamed tributaries to facilitate the construction of approximately 8 miles of the North Charlotte Outer Loop (I-485).

Project Location:

Between Interstate Highway 85 (I-85) on the west and NC Highway 115 (Old Statesville Road) on the east at Charlotte, Mecklenburg County, North Carolina (TIP No. R-2248 BB/C/D).

Permit Conditions:

General Conditions:

- 1. The time limit for completing the work authorized ends on December 31, 2005. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

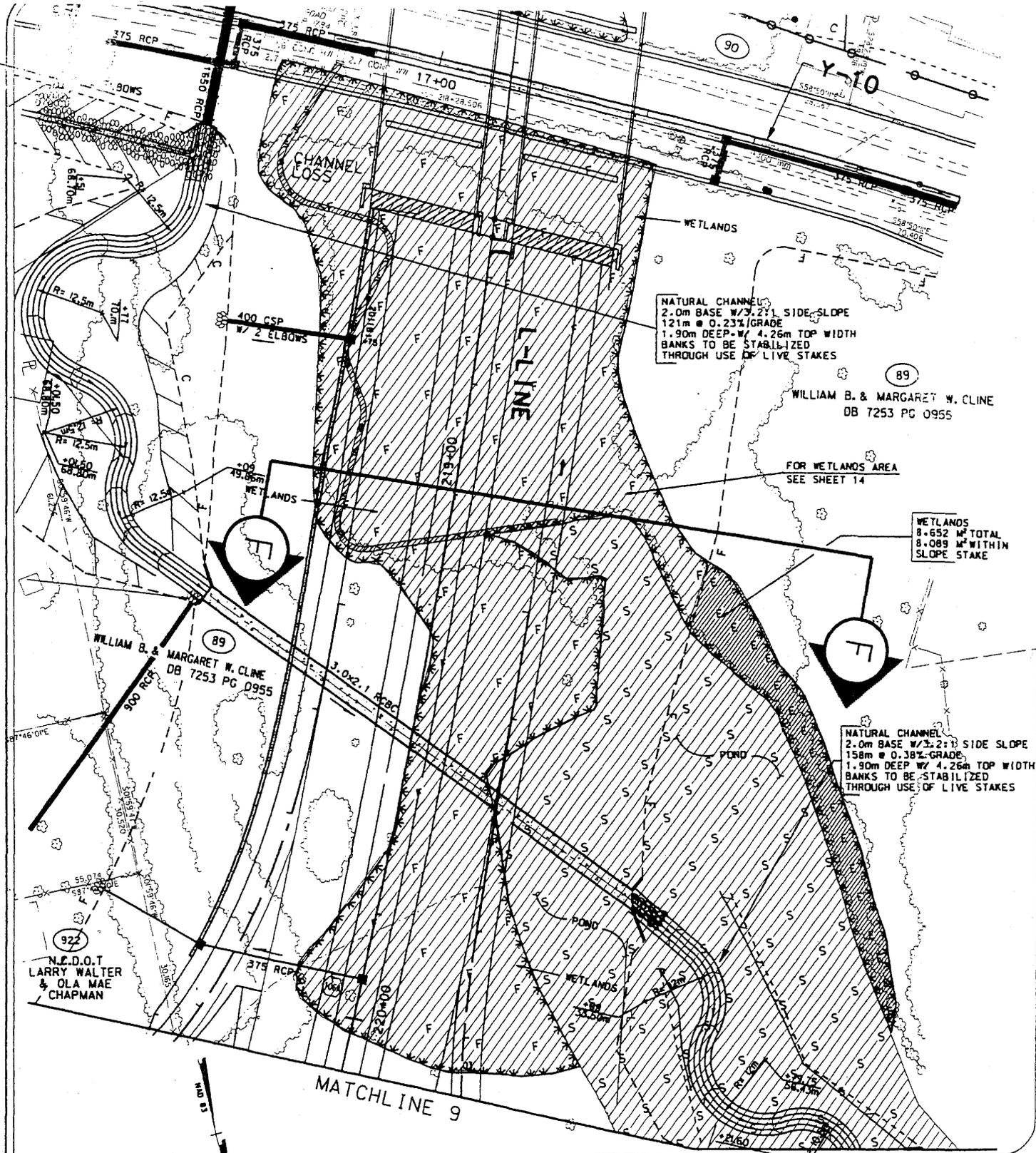
**Special Conditions:**

See enclosed sheet.

**Further Information:**

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:
  - ( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
  - (x) Section 404 of the Clean Water Act (33 U.S.C. 1344).
  - ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).
2. Limits of this authorization.
  - a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
  - b. This permit does not grant any property rights or exclusive privileges.
  - c. This permit does not authorize any injury to the property or rights of others.
  - d. This permit does not authorize interference with any existing or proposed Federal project.
3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
  - a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
  - b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
  - c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
  - d. Design or construction deficiencies associated with the permitted work.





# PLAN VIEW SITE 9

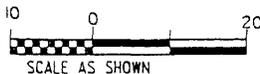
## LEGEND

- WETLANDS
- DENOTES FILL IN WETLANDS
- DENOTES EXCAVATION IN WETLANDS
- DENOTES FILL IN SURFACE WATER

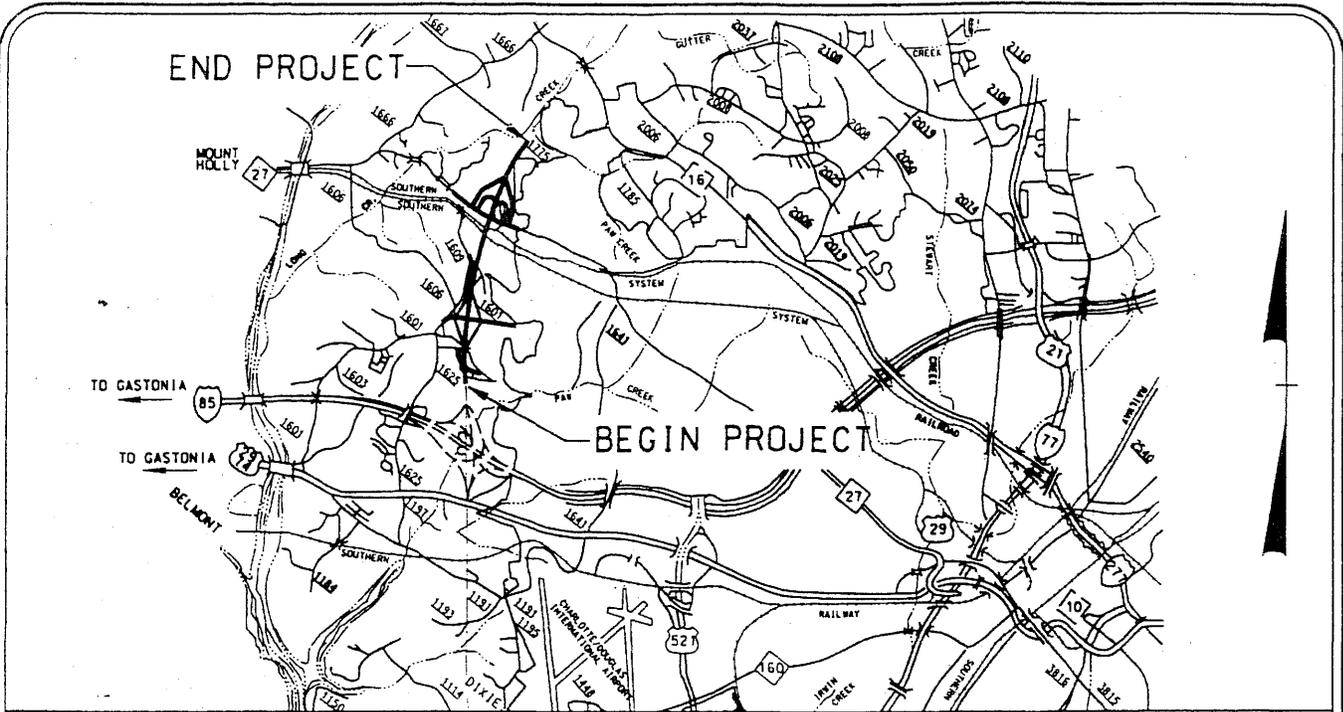


## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

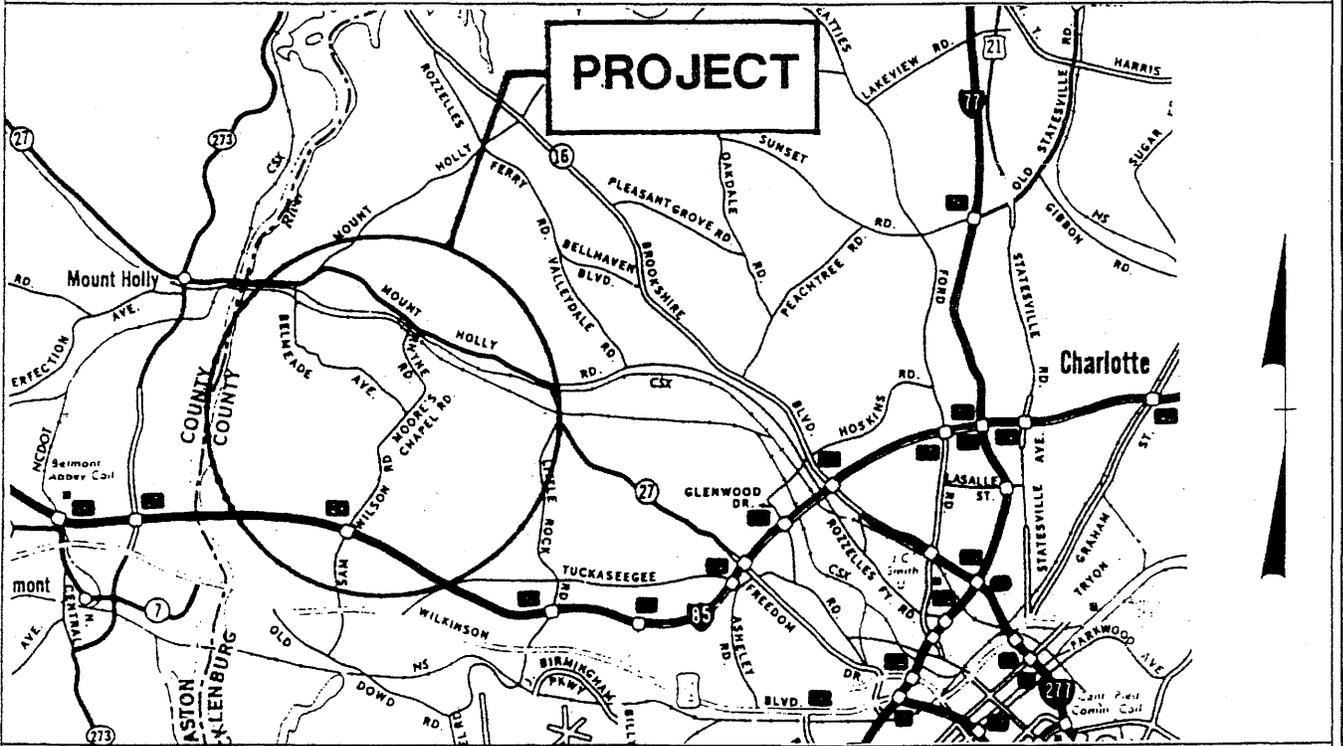
MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85



10/19/01  
 08:09:00 AM  
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PORTION OF MECKLENBURG CO. MAP



PORTION OF STATE HIGHWAY MAP

VICINITY MAPS

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
B.U672205 (R-22488B)

WEST CHARLOTTE OVER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

DWQ Project No.: \_\_\_\_\_  
Applicant: \_\_\_\_\_

County: \_\_\_\_\_

Project Name: \_\_\_\_\_

Date of Issuance of 401 Water Quality Certification: \_\_\_\_\_

**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 401/Wetlands Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. 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, 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, the approved plans and specifications, and other supporting materials.

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

***Engineer's Certification***

\_\_\_\_\_ Partial      \_\_\_\_\_ Final

I, \_\_\_\_\_, as a duly registered Professional Engineer 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, the approved plans and specifications, and other supporting materials.

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

Date \_\_\_\_\_

**NORTH CAROLINA – DIVISION OF WATER QUALITY  
401 WATER QUALITY CERTIFICATION  
SUMMARY OF PERMITTED IMPACTS AND MITIGATION REQUIREMENTS**

In accordance with 15A NCAC 2H.0500, NCDOT, DWQ Project No. 011231, is authorized to impact the surface waters of the State of North Carolina as indicated below for the purpose of constructing North Charlotte Outer Loop (TIP Project Nos. R-2248 BB, C, and D). All activities associated with these authorized impacts must be conducted in accordance with the conditions listed in the attached certification transmittal letter. **THIS CERTIFICATION IS NOT VALID WITHOUT THE ATTACHMENTS.**

**COMPENSATORY MITIGATION REQUIREMENTS FOR WETLAND RESTORATION PROGRAM:**

**LOCATION:** North Charlotte Outer Loop (I-485) just north of the southern intersection with I-85 (R-2248 BA) to past I-77, just east of NC 115 (Old Statesville Road)  
**COUNTY:** Mecklenburg

**BASIN/SUBBASIN:** Catawba, Hydrological Unit 03050101.

As required by 15A NCAC 2H.0506, and the conditions of this certification, you are required to compensate for the above impacts through the restoration, creation, enhancement or preservation of wetlands and surface waters as outlined below prior to conducting any activities that impact or degrade waters of the state.

Note: Acreage requirements proposed to be mitigated through the Wetland Restoration Program must be rounded to one-quarter increments according to 15A 2R.0503(b).

17.36 acres of riverine wetlands (8.68 acres of impact)

0.0 acres of emergent wetlands

0.0 acres of non-riparian wetlands

0 acres of Class SWL wetlands

22,248 linear feet of stream channel

Please sign this form and mail it to the Wetlands Restoration Fund at the address listed below. An invoice for the appropriate amount of payment will be sent to you upon receipt of this form. **PLEASE NOTE, THE ABOVE IMPACTS ARE NOT AUTHORIZED UNTIL YOU RECEIVE NOTIFICATION THAT YOUR PAYMENT HAS BEEN PROCESSED BY THE WETLANDS RESTORATION PROGRAM.**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**WETLANDS RESTORATION PROGRAM  
DIVISION OF WATER QUALITY  
1619 Mail Service Center  
RALEIGH, NC, 27699-1619  
(919) 733-5208 ext. 358**



Michael F. Easley  
Governor

William G. Ross, Jr., Secretary  
Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D.  
Acting Director  
Division of Water Quality

DWQ Project No.: \_\_\_\_\_ County: \_\_\_\_\_  
Applicant: \_\_\_\_\_  
Project Name: \_\_\_\_\_  
Date of Issuance of 401 Water Quality Certification: \_\_\_\_\_

**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 401/Wetlands Unit, North Carolina Division of Water Quality, 1621 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, ect.) 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 \_\_\_\_\_



**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND  
REQUEST FOR APPEAL**

Applicant: NCDOT/TIP No. R-2248BB/C/D		File Number: 200131321	Date: 4-5-2002
Attached is:			See Section below
X	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B	
	PERMIT DENIAL	C	
	APPROVED JURISDICTIONAL DETERMINATION	D	
	PRELIMINARY JURISDICTIONAL DETERMINATION	E	

**SECTION I -** The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:

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

If you only have questions regarding the appeal process you may also contact:

Mr. Arthur Middleton, Administrative Appeal Review Officer  
CESAD-ET-CO-R  
U.S. Army Corps of Engineers, South Atlantic Division  
60 Forsyth Street, Room 9M15  
Atlanta, Georgia 30303-8801

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:
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**DIVISION ENGINEER:**  
Commander  
U.S. Army Engineer Division, South Atlantic  
60 Forsyth Street, Room 9M15  
Atlanta, Georgia 30303-3490



8. Adequate sedimentation and erosion control measures must be implemented prior to any ground disturbing activities to minimize impacts to downstream aquatic resources. These measures must be inspected and maintained regularly, especially following rainfall events.
9. During the clearing phase of the project, heavy equipment must not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.
10. All temporary diversion channels and stream crossings will be constructed of non-erodable materials. Any such structures located outside of the authorized construction limits will be reported in writing to the Corps of Engineers, Asheville Regulatory Field Office, together with a location map and restoration plan.
11. Draining of ponds will be controlled so as not to release more than minimal amounts of sediment and cause no appreciable sediment accumulations in waters or wetlands downstream of the ponds.
12. All channel relocations will be constructed in a dry work area and stabilized before stream flows are diverted through them. To the maximum extent practicable, channel relocations will be completed during the growing season to allow for the establishment of stabilizing vegetation. Stability shall be achieved during the non-growing season through the use of erosion control matting or mats of existing field sod. Native species of woody vegetation will be utilized to provide long-term stream bank stabilization. The NCDOT Project Manager of the Corps of Engineers, Asheville Field Office shall be notified in advance by facsimile transmission or electronic mail of the intended diversion of water into new permanent channels.
13. The stability and success of the natural channel designs at Site 9/Section BB, Site 16/Section D, Site 19/Section D and Site 24 /Section D will be monitored by the permittee for a period of 5 years or through two documented bankful flow events. The permittee will prepare a stream channel monitoring plan and submit it to the Corps of Engineers, Asheville Field Office for review and approval. This monitoring plan must include reference photo sites, plant survival analysis and channel stability analysis and must be approved prior to the initiation of any construction in waters and wetlands.
14. The permittee shall mitigate for unavoidable impacts to wetlands and functional stream channel associated with this project by payment to the North Carolina Wetlands Restoration Program (NCWRP) in an amount determined by the NCWRP, sufficient to perform 17.36 acres of forested riverine wetland and 24,355 linear feet of warm water stream restoration within Cataloging Unit 03050101 of the Catawba River Basin. Construction within wetlands and streams shall begin only after the permittee has made full payment to the NCWRP and the NCWRP has provided written confirmation to the Corps that it agrees to accept responsibility for

**ACTION ID: 200131321; TIP NO. R-2248BB/C/D**

**SPECIAL CONDITIONS**

1. All work authorized by this permit must be performed in strict compliance with the attached plans, which are a part of this permit.
2. All conditions of Section 401, Clean Water Act, Water Quality Certification No. 3328, issued by the North Carolina Division of Water Quality on September 6, 2001, will be regarded as conditions of this Department of the Army permit.
3. The permittee shall schedule a preconstruction meeting between their representatives, the contractor and a representative of the Corps of Engineers, Asheville Regulatory Field Office prior to any work in jurisdictional waters and wetlands to ensure that there is a mutual understanding of all terms and conditions contained in this Department of the Army permit. The permittee shall notify the Corps of Engineers a minimum of thirty (30) days in advance of the meeting.
4. The permittee and his contractors and/or agents shall not excavate, fill or perform land clearing at any time in the construction or maintenance of this project within waters and/or wetlands except as authorized by this permit or any modification to this permit. There shall be no excavation from or waste disposal into jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit.
5. To ensure that all borrow and waste activities occur on uplands, except as authorized by this permit, the permittee shall require its contractors and/or agents to identify all areas to be used to borrow material or to dispose of dredged, fill or waste material. The permittee shall ensure that all such areas comply with Special Condition No. 4 of this permit and shall require and maintain documentation of the location and characteristics of all borrow and disposal sites associated with this project. This information will include data regarding soils, vegetation and hydrology sufficient to clearly demonstrate compliance with Special Condition No. 4 above. All information will be available to the Corps of Engineers upon request.
6. The permittee shall require his contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project and shall provide each of his contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit.
7. The permittee will insure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any deviations in the construction design plans will be brought to the attention of the Corps of Engineers, Asheville Regulatory Field Office prior to any active construction in waters or wetlands.

the required mitigation work in compliance with the MOU between the North Carolina Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District, dated November 4, 1998.

15. In order to compensate for unavoidable impacts to non-riverine, forested wetlands, the permittee will purchase the 7 acres of wetlands known as the Ridge Road Swamp located north of the intersection of Ridge Road (SR 2601) and Beard Road (SR 2463) in Mecklenburg County and an additional 34 acres of forested upland buffer around this wetland. Proof of ownership, including a boundary survey, will be provided to the Corps of Engineers, Asheville Regulatory Field Office. The permittee will pursue the transfer of the Ridge Road Swamp Mitigation Area to an appropriate conservation organization for management as a natural areas preserve. This transfer should be completed within 1 year of the date of this permit. The terms of the property transfer must be approved by the Corps. The owner of the property will be responsible for preserving it in its natural state in perpetuity.

16. In order to compensate for the loss of open water (ponds), the permittee will restore the natural stream channel, including appropriate floodplain, through all ponds drained as a result of the authorized road construction. All channel restorations will be designed and constructed according to the North Carolina Wildlife Resources Commission's "Guidelines for Stream Relocation and Restoration in North Carolina, January 1999" and in consultation with the Commission's Regional Stream Restoration Coordinator.

17. Concrete box culverts will be constructed so that the bottom of the culvert is one foot below the bed of the stream. If not restricted by bedrock, metal pipe culverts should be buried a sufficient depth to allow the accumulation of natural substrate and the passage of indigenous aquatic life during normal flow conditions. Double-cell box culverts will be constructed so that normal and low flows are diverted through only one cell. Triple-cell box culverts will be constructed so that normal and low flows are diverted through only two cells.

18. In order to allow for continued movement of bed load and aquatic organisms, existing stream channel widths and depths will be maintained at the inlet and outlet ends of culverts. Riprap armoring of streams at culvert inlets and outlets shall be minimized in favor of bioengineering techniques such as bank sloping, erosion control matting and revegetation with deep-rooted, woody plants.

19. Where practicable, storm water shall be directed to vegetated buffer areas or retention basins and not directly into water supply or state-designated impaired waters or their tributaries.

20. All mechanized equipment operating near surface waters shall be regularly inspected to prevent contamination of streams from leakage of fuels, lubricants, hydraulic fluids or other toxic materials.

21. In order to assess impacts to state-designated impaired waters from the authorized construction, the permittee will conduct environmental monitoring of waters adjacent to the project area for the life of the project (until the roadway is paved and open to traffic). The permittee will prepare a monitoring plan designed to assess changes in water quality and aquatic biology from highway construction activities. The monitoring plan should identify the parameters to be analyzed, locations of sampling stations, frequency of sampling, descriptions of the sampling and analytical procedures used and a schedule for reporting sampling results. This monitoring plan must be reviewed and approved by the Corps of Engineers, Asheville Regulatory Field Office prior to any construction activities in waters and wetlands. Based on the monitoring results, the Corps may direct the permittee to take appropriate action to remediate adverse construction-related impacts.

DWQ Project No.: \_\_\_\_\_  
Applicant: \_\_\_\_\_

County: \_\_\_\_\_

Project Name: \_\_\_\_\_

Date of Issuance of 401 Water Quality Certification: \_\_\_\_\_

**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 401/Wetlands Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. 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, 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, the approved plans and specifications, and other supporting materials.

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

***Engineer's Certification***

\_\_\_\_\_ Partial \_\_\_\_\_ Final

I, \_\_\_\_\_, as a duly registered Professional Engineer 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, the approved plans and specifications, and other supporting materials.

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

Date \_\_\_\_\_

**NORTH CAROLINA – DIVISION OF WATER QUALITY  
401 WATER QUALITY CERTIFICATION  
SUMMARY OF PERMITTED IMPACTS AND MITIGATION REQUIREMENTS**

In accordance with 15A NCAC 2H.0500, NCDOT, DWQ Project No. 011231, is authorized to impact the surface waters of the State of North Carolina as indicated below for the purpose of constructing North Charlotte Outer Loop (TIP Project Nos. R-2248 BB, C, and D). All activities associated with these authorized impacts must be conducted in accordance with the conditions listed in the attached certification transmittal letter. **THIS CERTIFICATION IS NOT VALID WITHOUT THE ATTACHMENTS.**

**COMPENSATORY MITIGATION REQUIREMENTS FOR WETLAND RESTORATION PROGRAM:**

**LOCATION:** North Charlotte Outer Loop (I-485) just north of the southern intersection with I-85 (R-2248 BA) to past I-77, just east of NC 115 (Old Statesville Road)  
**COUNTY:** Mecklenburg

**BASIN/SUBBASIN:** Catawba, Hydrological Unit 03050101.

As required by 15A NCAC 2H.0506, and the conditions of this certification, you are required to compensate for the above impacts through the restoration, creation, enhancement or preservation of wetlands and surface waters as outlined below prior to conducting any activities that impact or degrade waters of the state.

Note: Acreage requirements proposed to be mitigated through the Wetland Restoration Program must be rounded to one-quarter increments according to 15A 2R.0503(b).

17.36 acres of riverine wetlands (8.68 acres of impact)

0.0 acres of emergent wetlands

0.0 acres of non-riparian wetlands

0 acres of Class SWL wetlands

22,248 linear feet of stream channel

Please sign this form and mail it to the Wetlands Restoration Fund at the address listed below. An invoice for the appropriate amount of payment will be sent to you upon receipt of this form. **PLEASE NOTE, THE ABOVE IMPACTS ARE NOT AUTHORIZED UNTIL YOU RECEIVE NOTIFICATION THAT YOUR PAYMENT HAS BEEN PROCESSED BY THE WETLANDS RESTORATION PROGRAM.**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**WETLANDS RESTORATION PROGRAM  
DIVISION OF WATER QUALITY  
1619 Mail Service Center  
RALEIGH, NC, 27699-1619  
(919) 733-5208 ext. 358**



Michael F. Easley  
Governor

William G. Ross, Jr., Secretary  
Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D.  
Acting Director  
Division of Water Quality

DWQ Project No.: \_\_\_\_\_ County: \_\_\_\_\_  
Applicant: \_\_\_\_\_  
Project Name: \_\_\_\_\_  
Date of Issuance of 401 Water Quality Certification: \_\_\_\_\_

**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 401/Wetlands Unit, North Carolina Division of Water Quality, 1621 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.

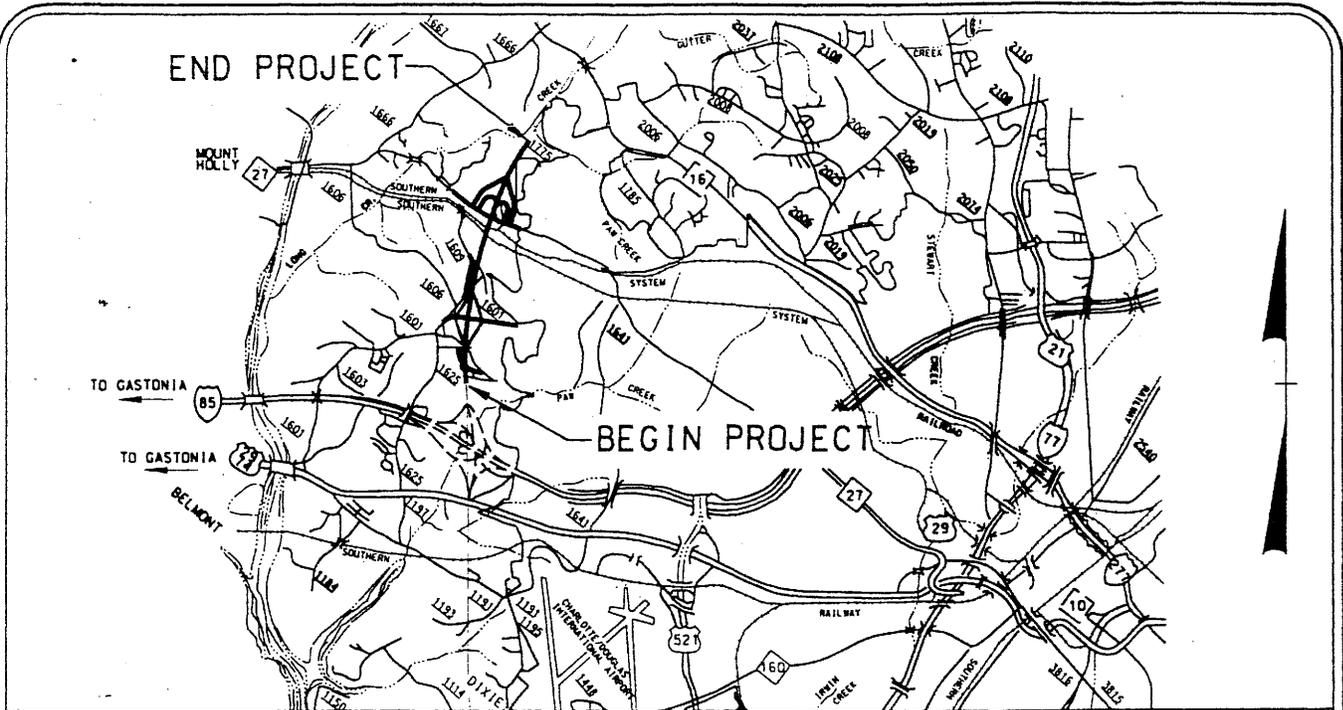
Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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

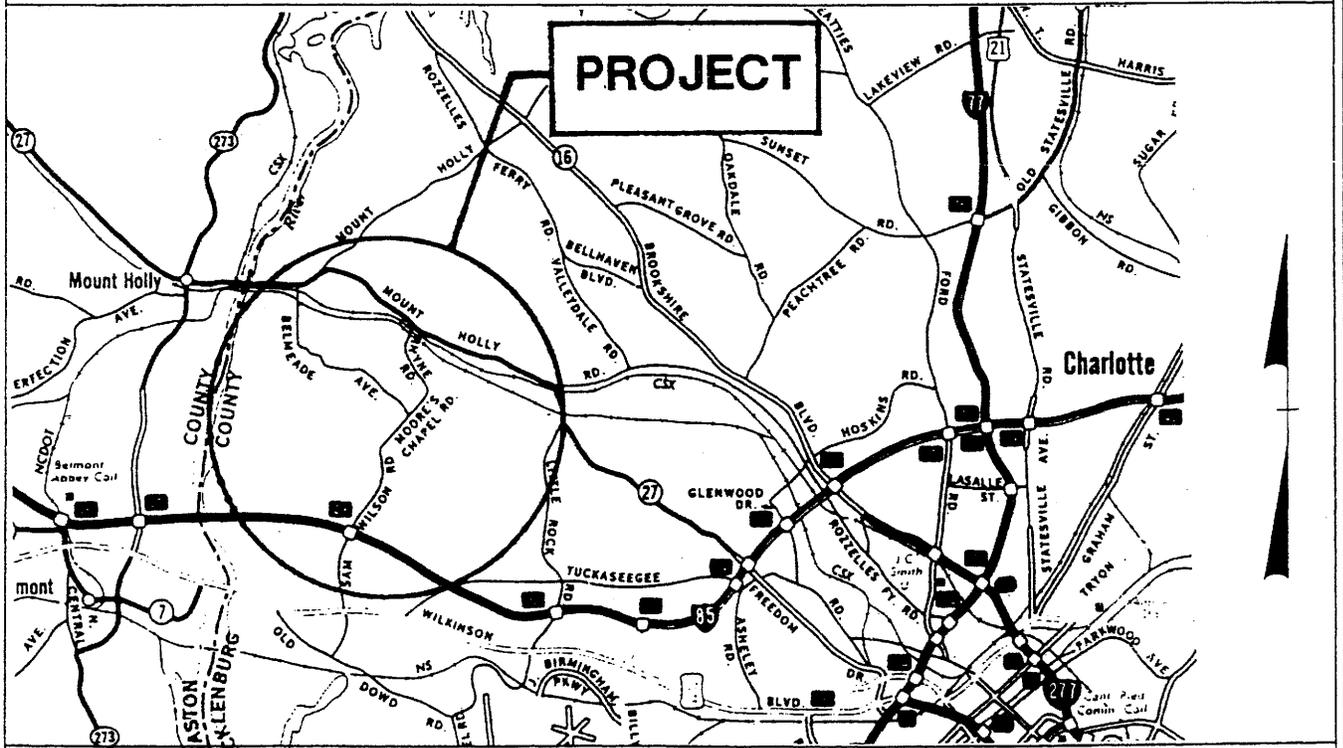
I, \_\_\_\_\_, as a duly registered Professional \_\_\_\_\_ (i.e., Engineer, Landscape Architect, Surveyor, ect.) in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, for the Permittee hereby state that, to the best of my 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 \_\_\_\_\_





PORTION OF MECKLENBURG CO. MAP



PORTION OF STATE HIGHWAY MAP

VICINITY MAPS

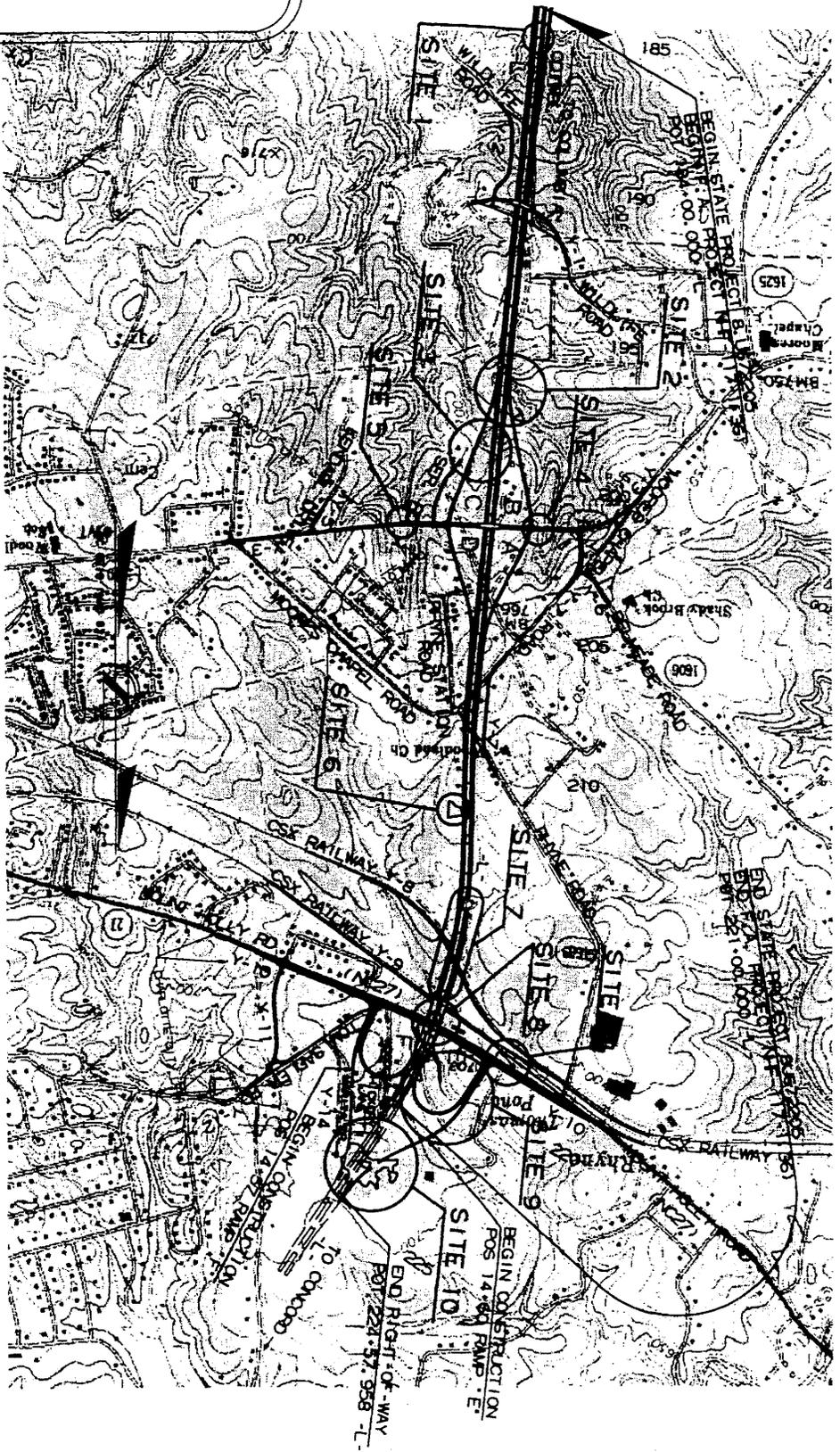
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 B.U.672205 (R-22488B)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8J672205 (R-22488B)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF US 29/74



# SITE LOCATION MAP

## WETLAND & SURFACE WATER IMPACTS

(INCLUDES STREAM IMPACTS AND RELOCATION)



184+00

185+00

BEGIN STATE PROJECT R-2248BB

POT 184+00.00

BEGIN CONSTRUCTION

POC 84+00 CD-WBL

2G1(D)

2G1(B)

184+00

85+00

185+00

1.8 BASE DITCH

0.6 M BASE DITCH  
W/ CLASS 'B' RIP-RAP

JIM COLBERT  
GOLF OF CHARLOTTE INC.

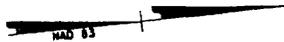
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

PLAN VIEW  
SITE 1

LEGEND

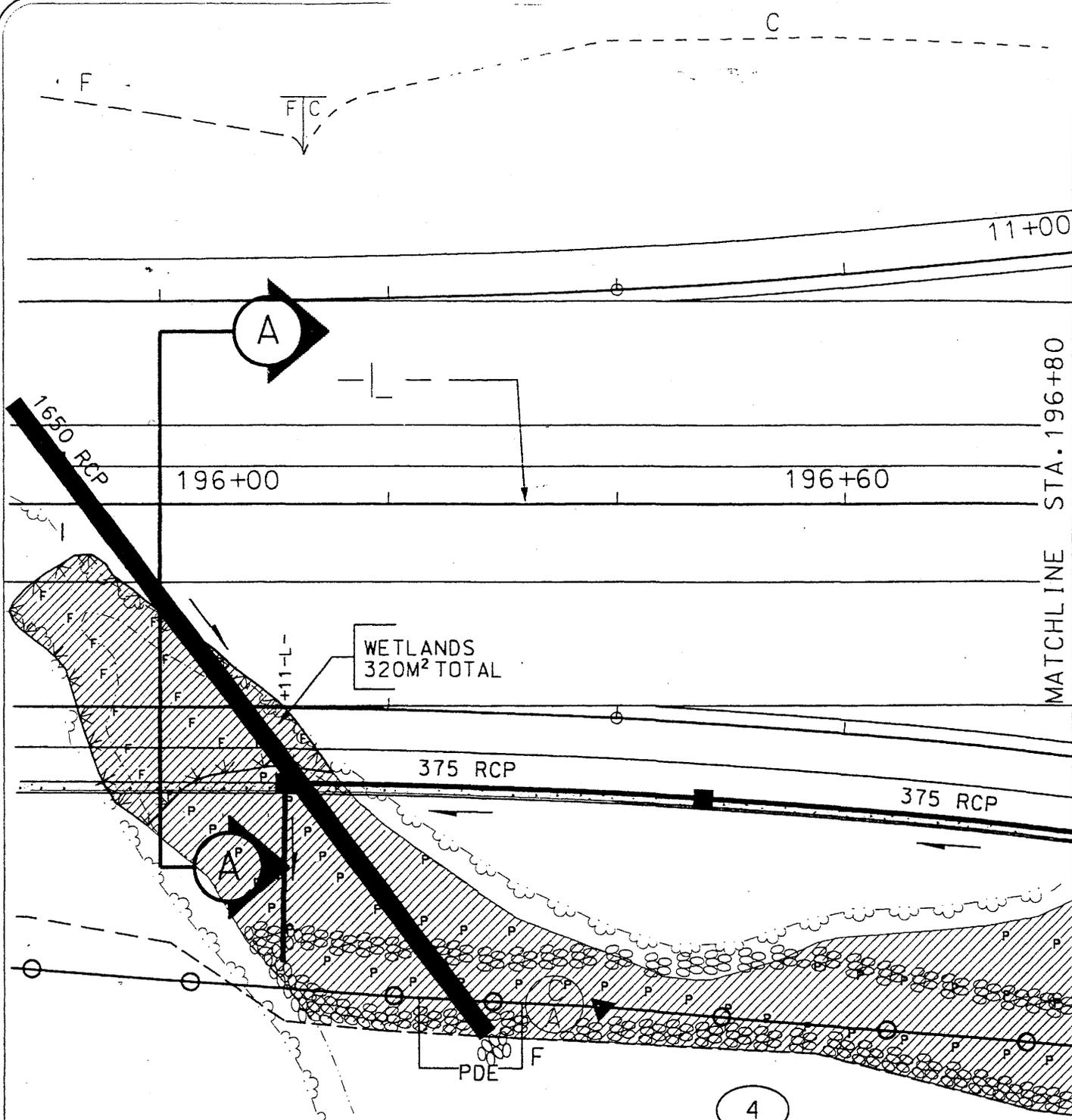
DENOTES  
FILL IN SURFACE WATER



SCALE AS SHOWN

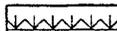
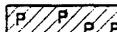
SHEET 5 OF 48

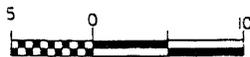
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**PLAN VIEW  
SITE 2**

**LEGEND**

-  WETLANDS
-  DENOTES FILL IN SURFACE WATER (POND)
-  DENOTES FILL IN WETLANDS



4

MECKLENBURG WILD LIFE  
DB 1365 PG 045I

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

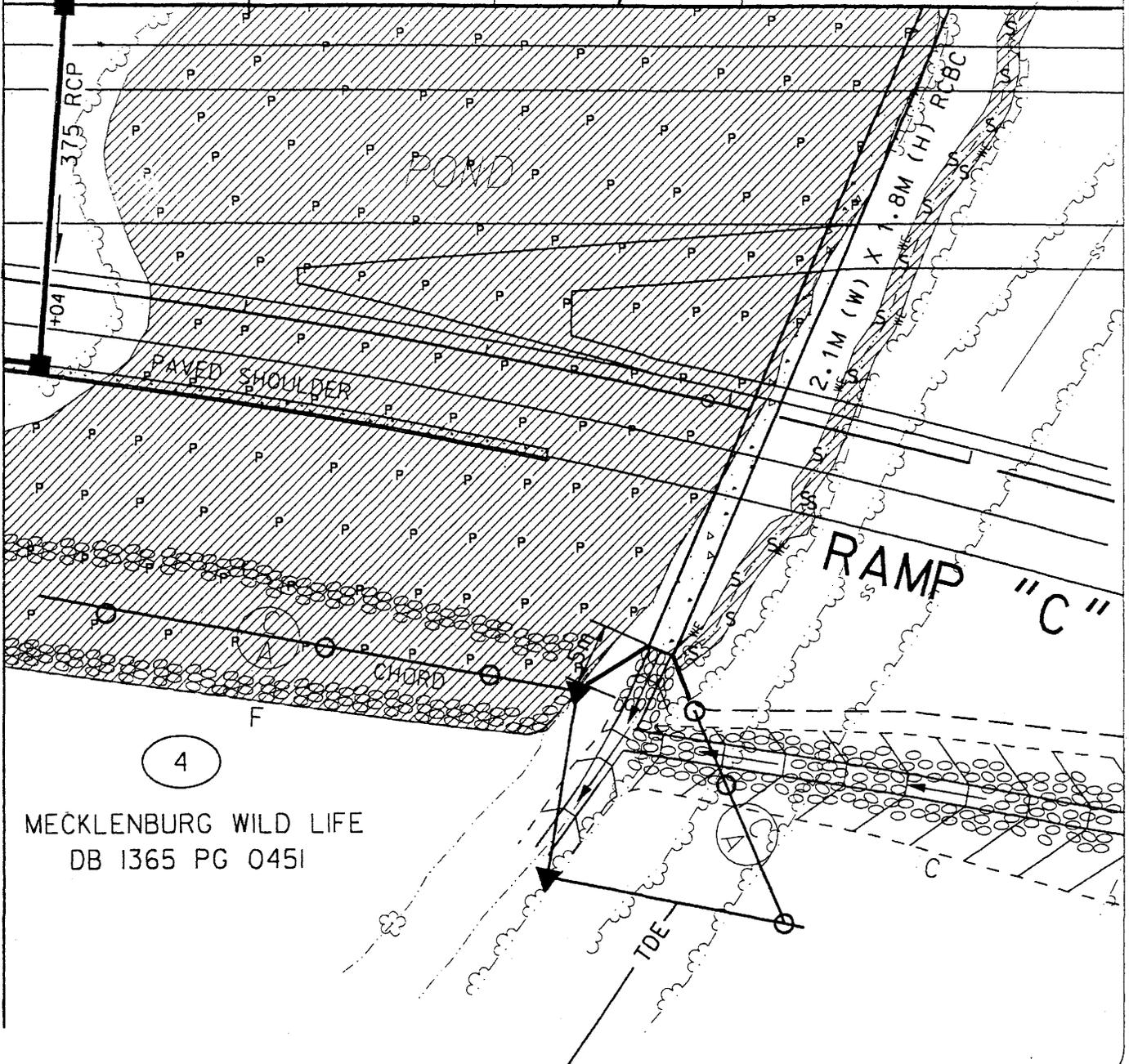
SCALE AS SHOWN

SHEET 6 OF 43



197+00 MATCHLINE 2A 197+40

MATCHLINE STA. 196+80

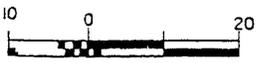


4  
 MECKLENBURG WILD LIFE  
 DB 1365 PG 0451

# PLAN VIEW SITE 2

## LEGEND

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



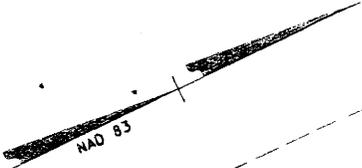
**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 7 OF 48

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500°51'08"W  
201.26

WETLANDS  
600M<sup>2</sup> TOTAL  
270M<sup>2</sup> WITHIN  
SLOPE STAKE

MECKLENBURG WILD LIFE  
DB 1365 PG 0451

(A)

(B)

(C)

(A)

(B)

RAMP "B"

POND

2.1M (W) X 1.8M (H) RCBC

CHANNEL LOSS

E

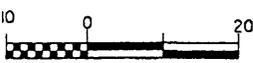
197+80

MATCHLINE 2A

# PLAN VIEW SITE 2

## LEGEND

- WETLANDS
- DENOTES FILL IN WETLAND
- DENOTES FILL IN SURFACE WATER (POND)
- DENOTES MECHANIZED CLEARING
- DENOTES FILL IN SURFACE WATER

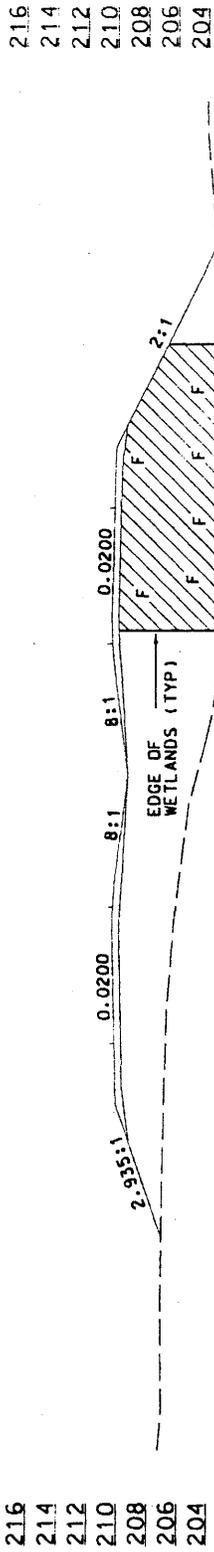


## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

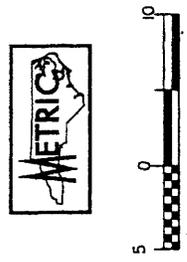
MECKLENBURG COUNTY  
8.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 8 OF 43



**SECTION "A-A"**  
 (-L- 196+00)  
**SITE 2**



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

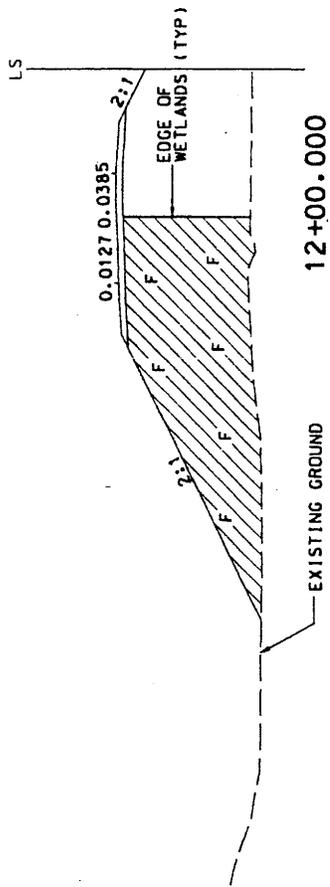
MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 3 OF 48

216  
214  
212  
210  
208  
206  
204



216  
214  
212  
210  
208  
206  
204

**LEGEND**



DENOTES  
FILL IN WETLANDS

**SECTION "B-B"**  
(RP. "B" 12+00)  
**SITE 2**



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.J672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

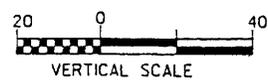
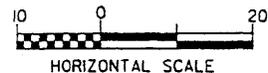
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SHEET 10 OF 48

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**LEGEND**

 DENOTES  
 FILL IN WETLANDS

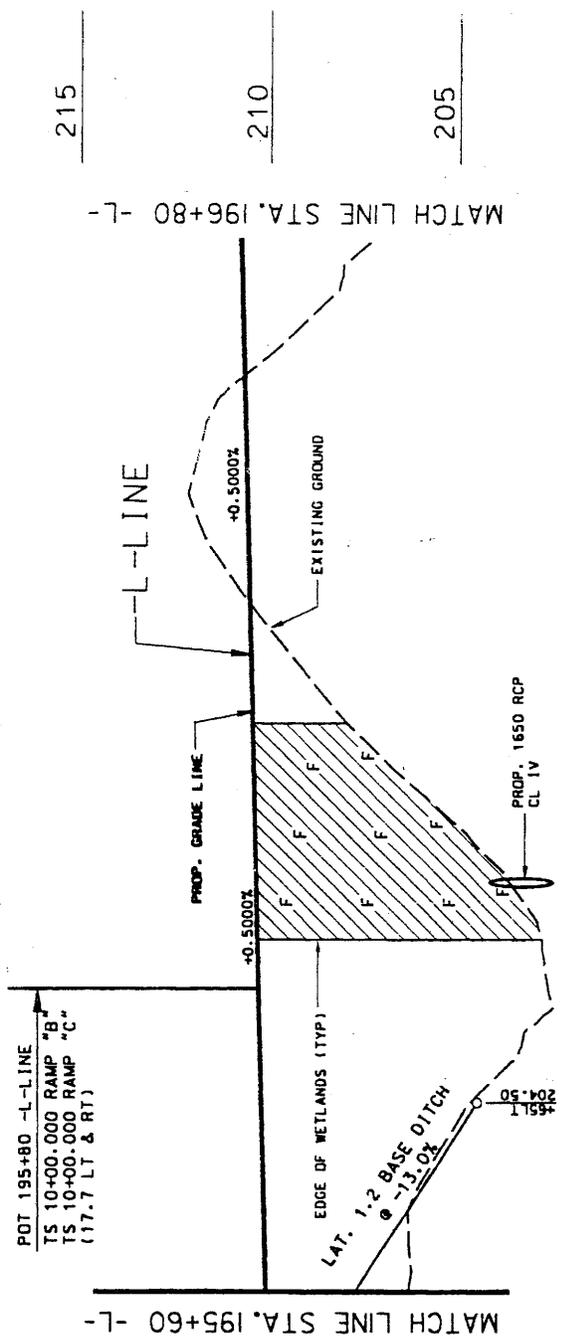


**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 11 OF 48



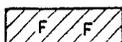
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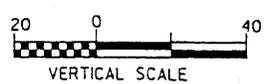
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+80

196+00

**SITE 2**

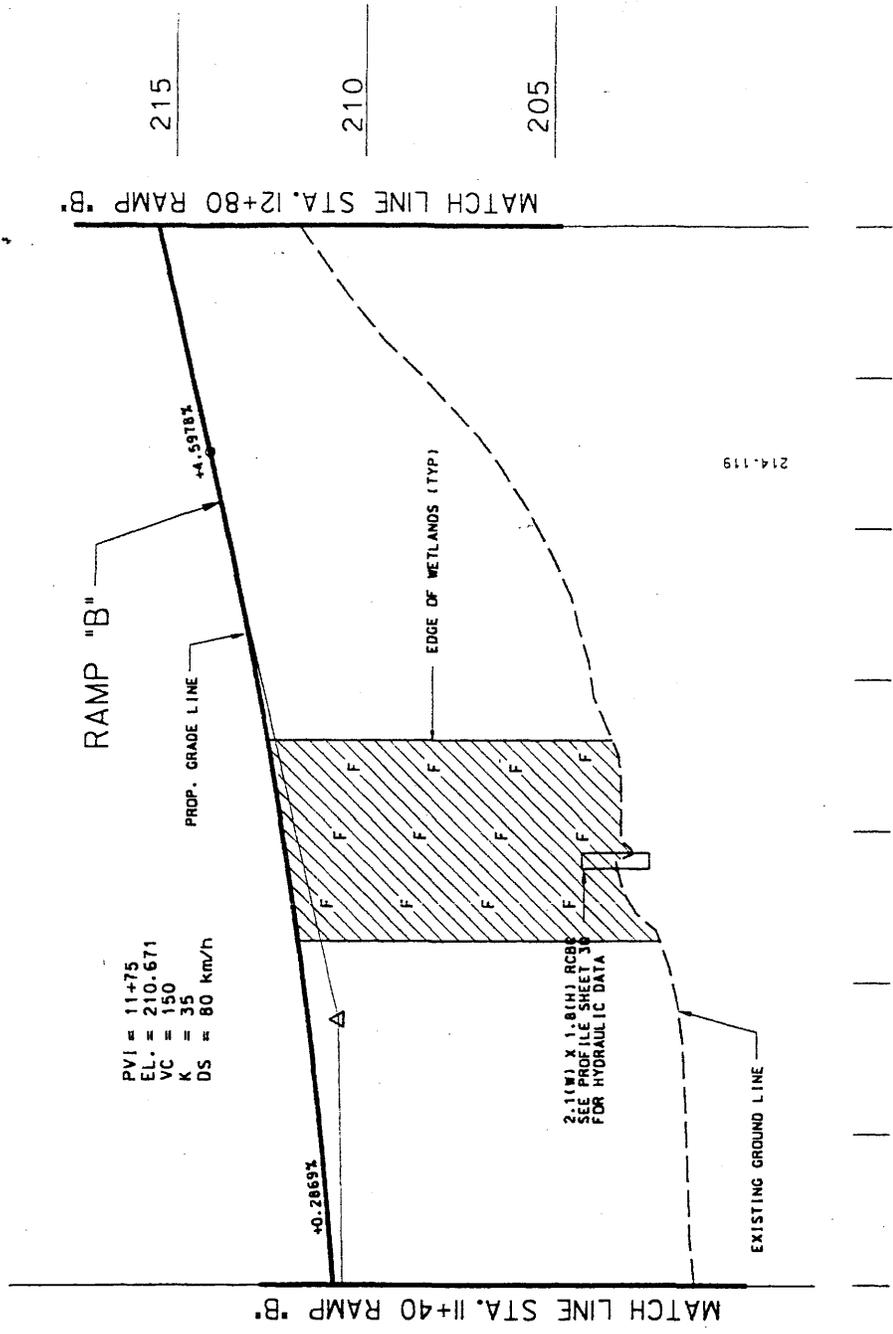
 DENOTES FILL IN WETLANDS



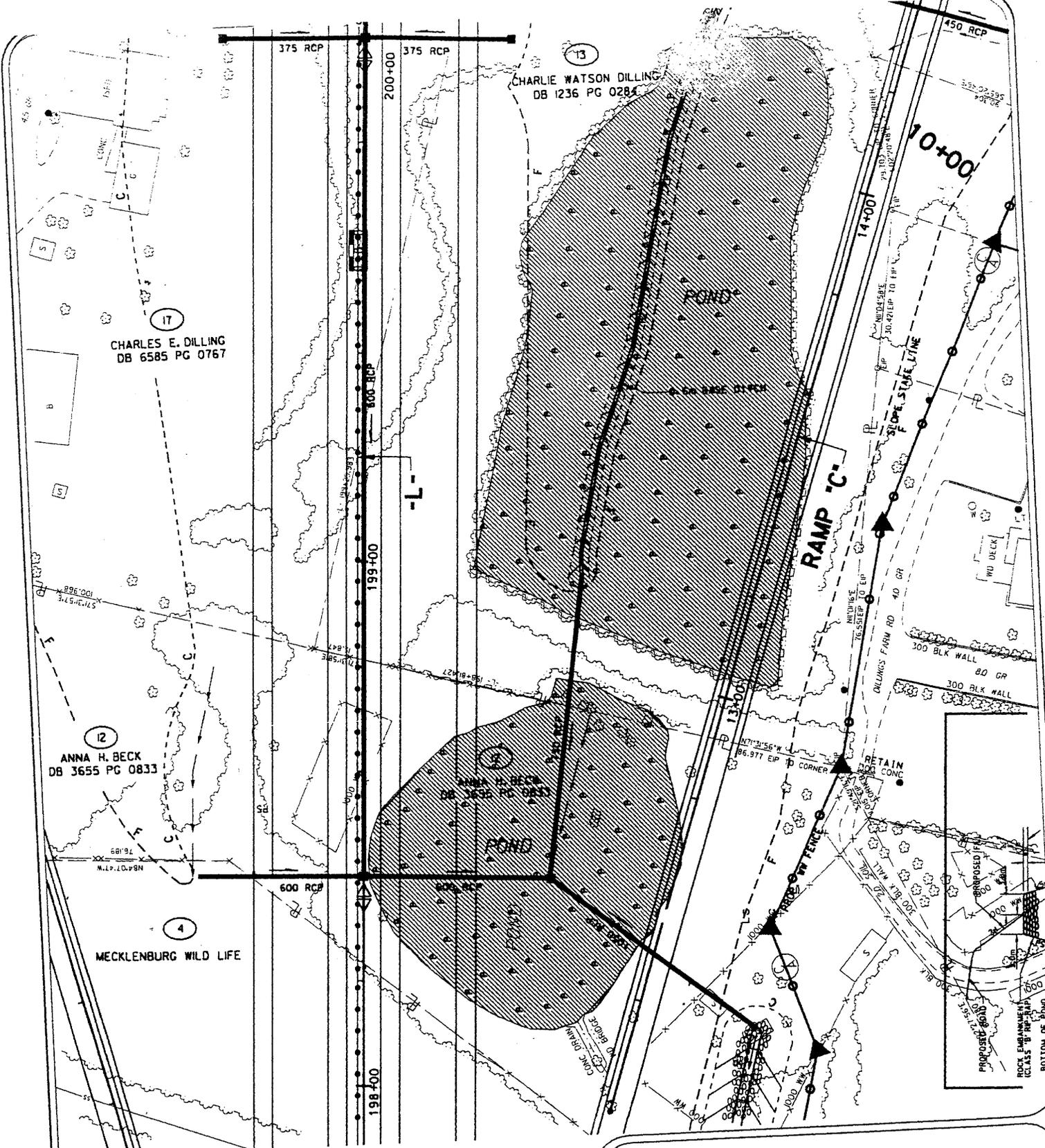
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
 MECKLENBURG COUNTY  
 8.U672205 (R-22488B)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 12 OF 48



SITE 2



# PLAN VIEW SITE 3

## LEGEND



DENOTES  
FILL IN SURFACE WATER (POND)



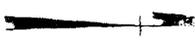
## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 13 OF 48

DE



(C/A)

(C/A)

CHANNEL LOSS

(18)

PAW CREEK FIVE

14+40

14+00

114.790  
S84°05'03"E

Y-3

(31)

JERRY C. &  
SYBIL S. BAREFOOT

900 RCP

1.2M BASE DITCH  
W/ CLASS "B" RIP RAP

1.2m BASE DITCH

PROP R/W

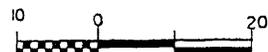
(C/A)

# PLAN VIEW SITE 4

## LEGEND



DENOTES  
FILL IN SURFACE WATER



SCALE AS SHOWN

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-224888)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

10/09/01  
11:28:16 AM  
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0.6m BASE DITCH W/  
CL. "B" RIP RAP

(37)  
MAR BOWERS  
DB 3825 PG 635

N82°08'33"E

N40°39'15"W  
62.326

HEADWALL

CHANNEL LOSS

19+00

19+40

Y-3

400 CSP W/ 2 ELBOWS

SER. RD. NO. 1

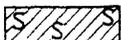
"V"-DITCH W/  
CL. "B" RIP RAP

36

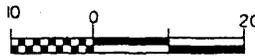
GAYNOR DEVELOPMENT CO.  
DB 2330 PG 0047

# PLAN VIEW SITE 5

## LEGEND



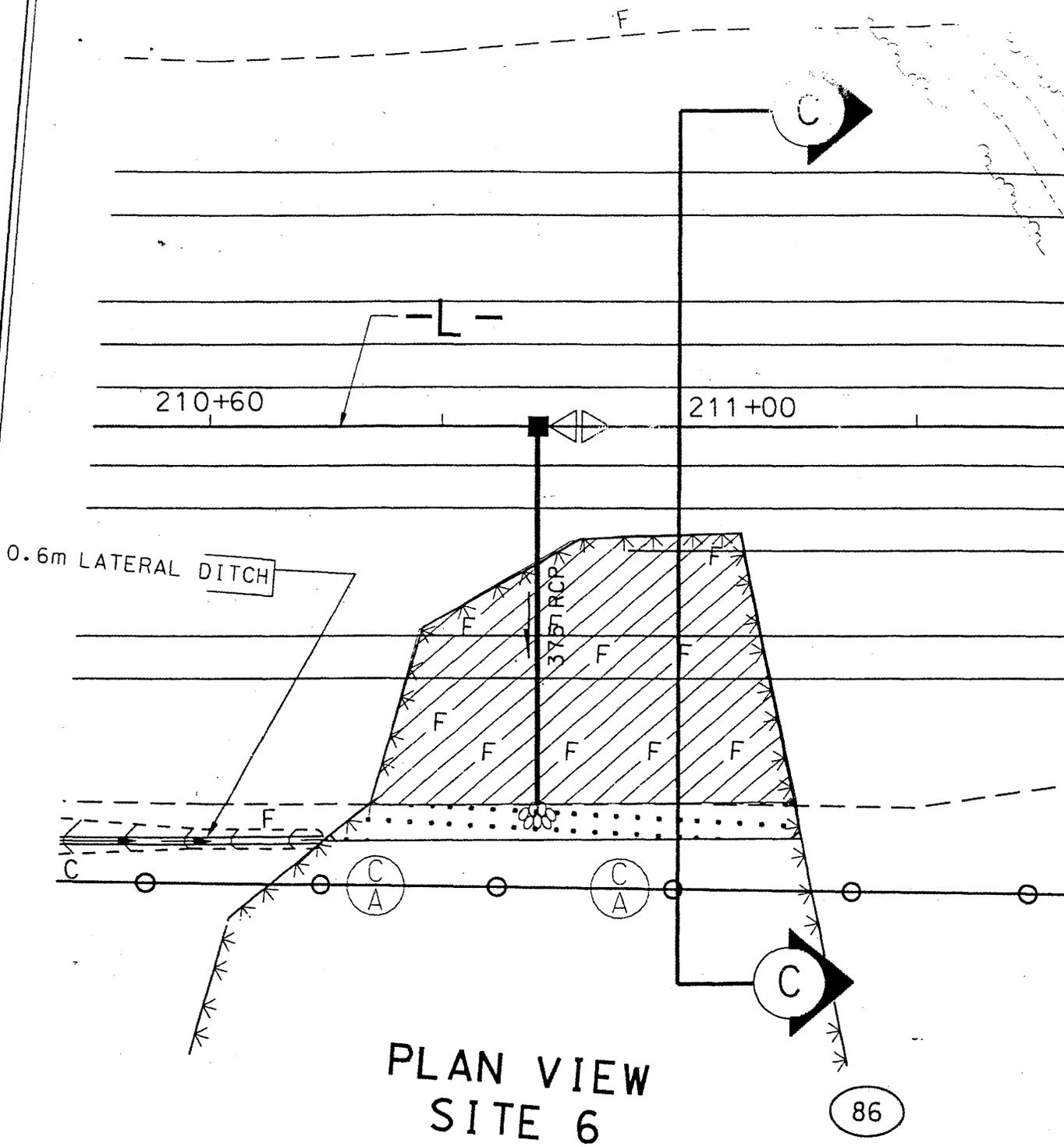
DENOTES  
FILL IN SURFACE WATER



SCALE AS SHOWN

SHEET 15 OF 48

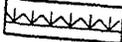
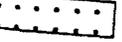
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PLAN VIEW  
SITE 6

NANCY ELIZABETH STOWE  
& JOAN M. BEATTY  
DB 0151PG 0257

LEGEND

-  WETLANDS
-  DENOTES FILL IN WETLANDS
-  DENOTES MECHANIZED CLEARING



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
B.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

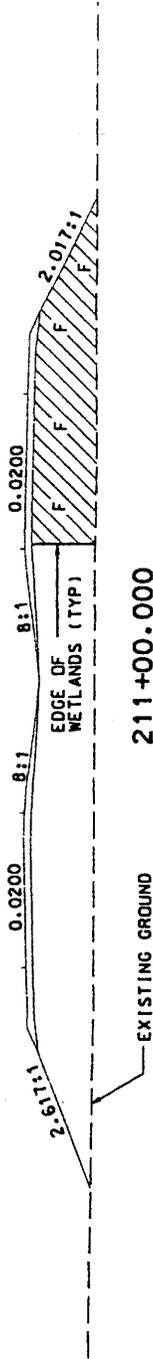
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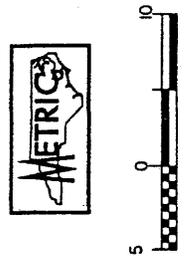
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226  
224  
222



# SECTION "C-C"

(-L- 211+00)  
SITE 6



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.JUG72205 (R-224888)

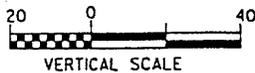
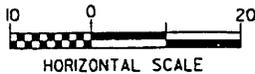
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 17 OF 48



DENOTES  
FILL IN WETLANDS



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-224888)

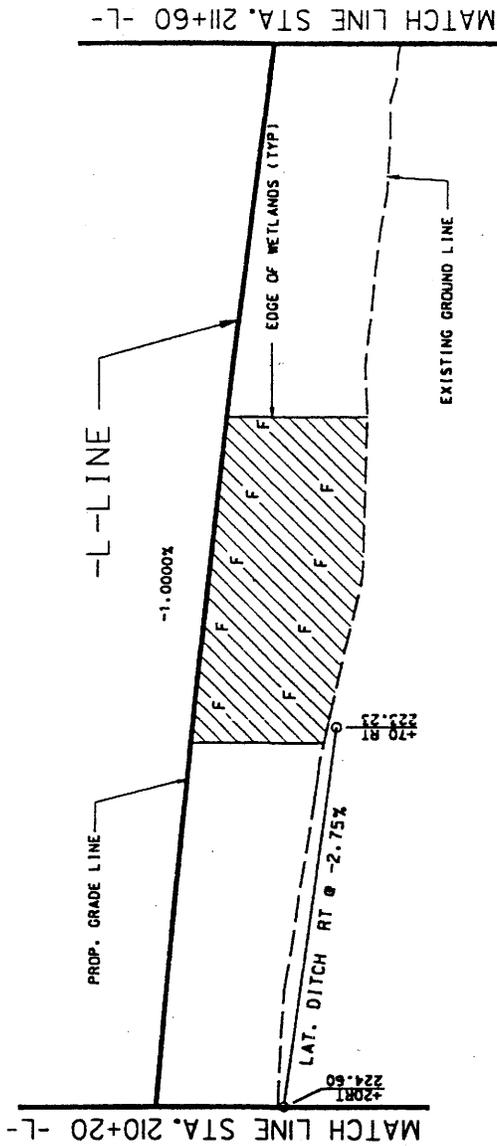
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

235

230

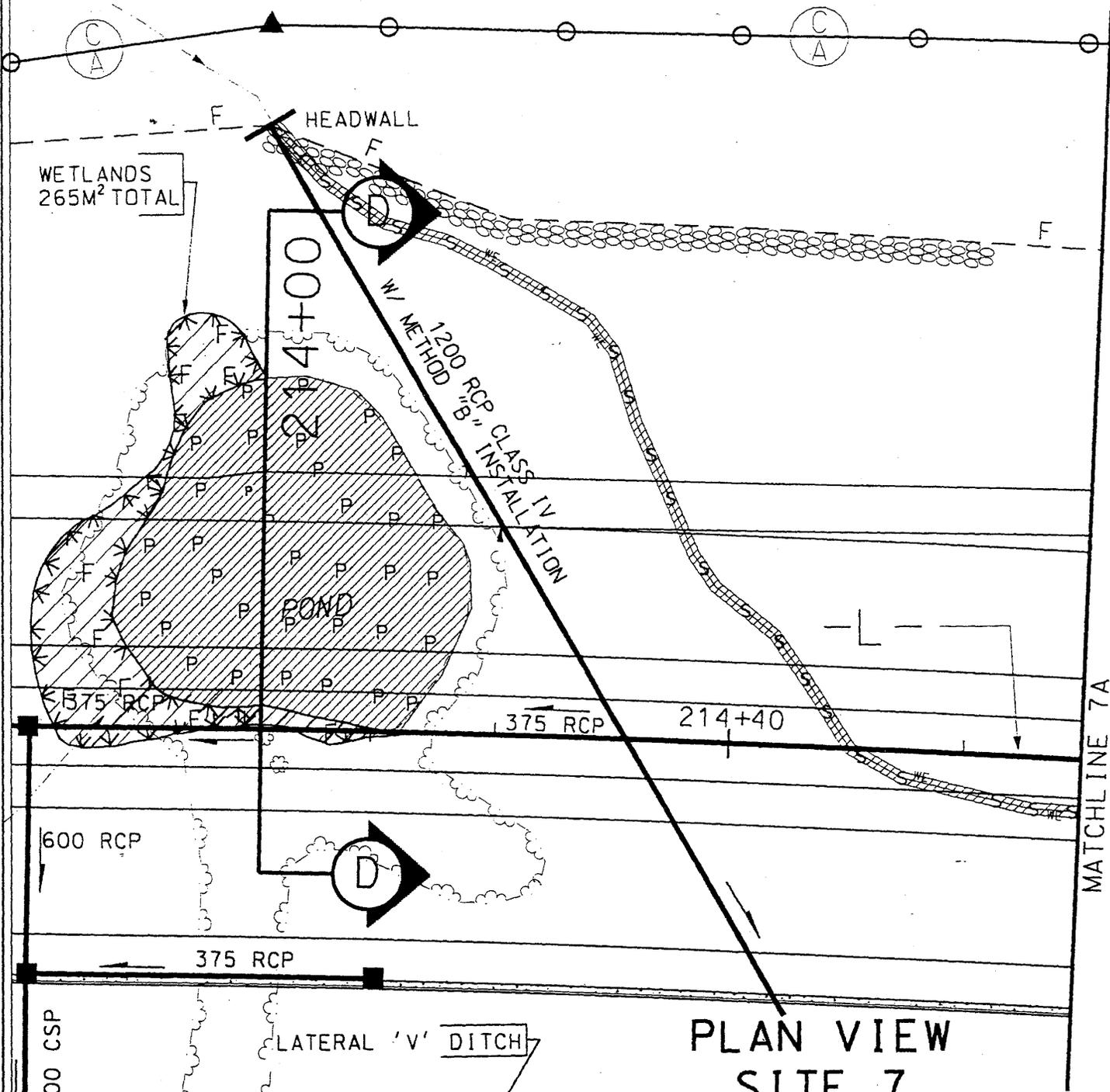
225



SITE 6

86

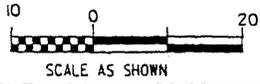
NANCY ELIZABETH STOWE  
& JOAN M. BEATTY  
DB 0151 PG 0257



# PLAN VIEW SITE 7

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.J672205 (R-224888)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85



**LEGEND**

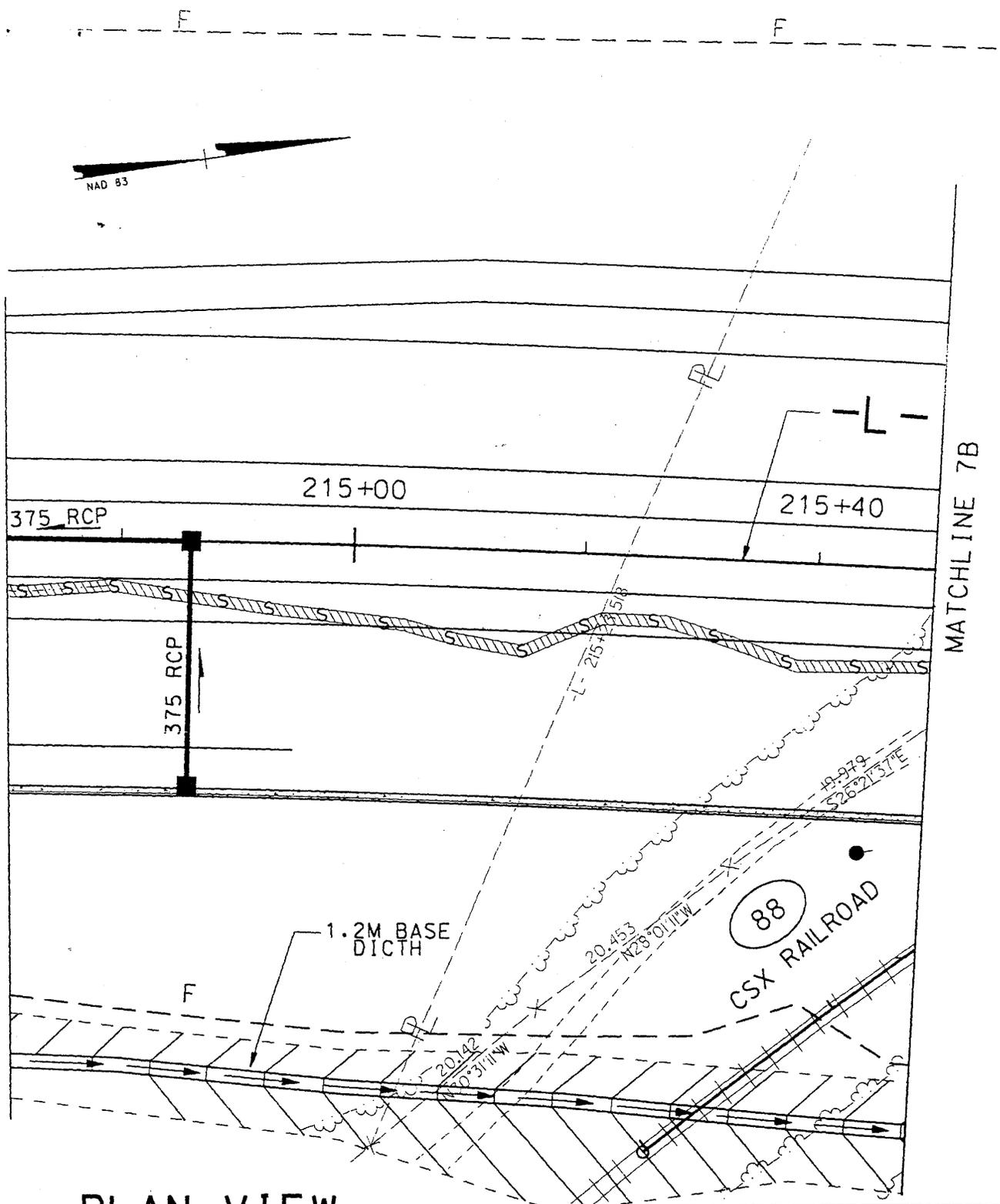
	WETLANDS	
	DENOTES FILL IN SURFACE WATER (POND)	
	DENOTES FILL IN WETLAND	
		DENOTES FILL IN SURFACE WATER

10/02/01  
HSJ/02 AN  
9-138025-00-TRAN/PERMITS/SITE-400N



MATCHLINE 7A

MATCHLINE 7B



# PLAN VIEW SITE 7

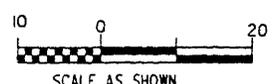
### LEGEND

 FILL IN DENOTES SURFACE WATER

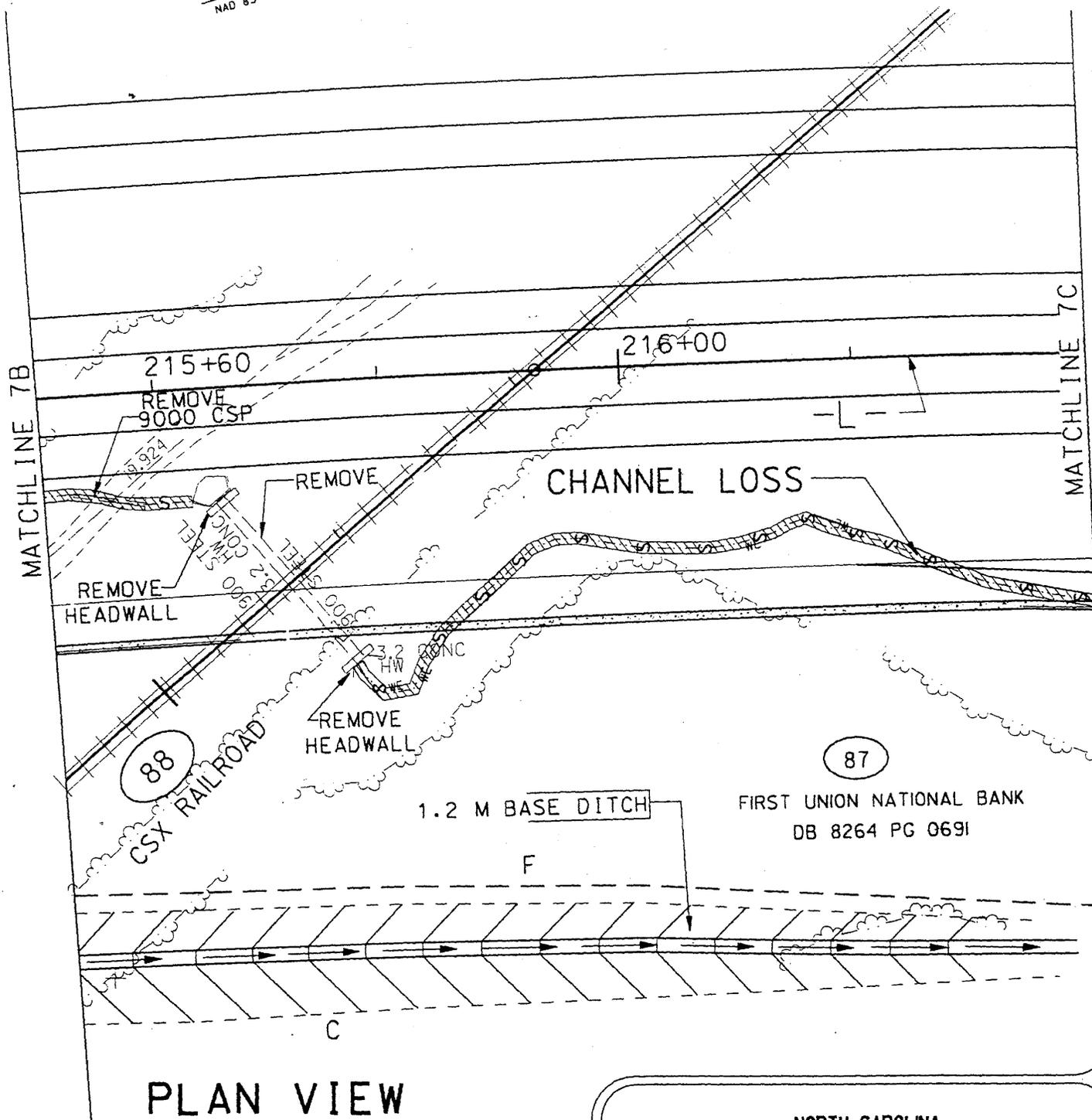


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-224888)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

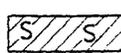


10/02/01 11:52:07 AM  
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**PLAN VIEW  
SITE 7**

**LEGEND**

 DENOTES FILL IN SURFACE WATER



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
B.U672205 (R-224888)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

10 0 20

SHEET 21 OF 48

10/02/01  
11:53:30 AM  
g:\96025\00\TRAIN\PERMITS\1111\1111.dgn



MATCHLINE 7C

216+60

217+00

CHANNEL LOSS

87

FIRST UNION NATIONAL BANK  
DB 8264 PG 0691

1.2M BASE DITCH  
F W/ CLASS 'B' RIP RAP

400 CSP W/  
2 ELBOWS

1200 RCP  
1200 STEEL

HEADWALL

1200 CSP

C  
A

# PLAN VIEW SITE 7

## LEGEND

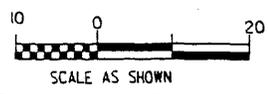


DENOTES FILL IN  
SURFACE WATER



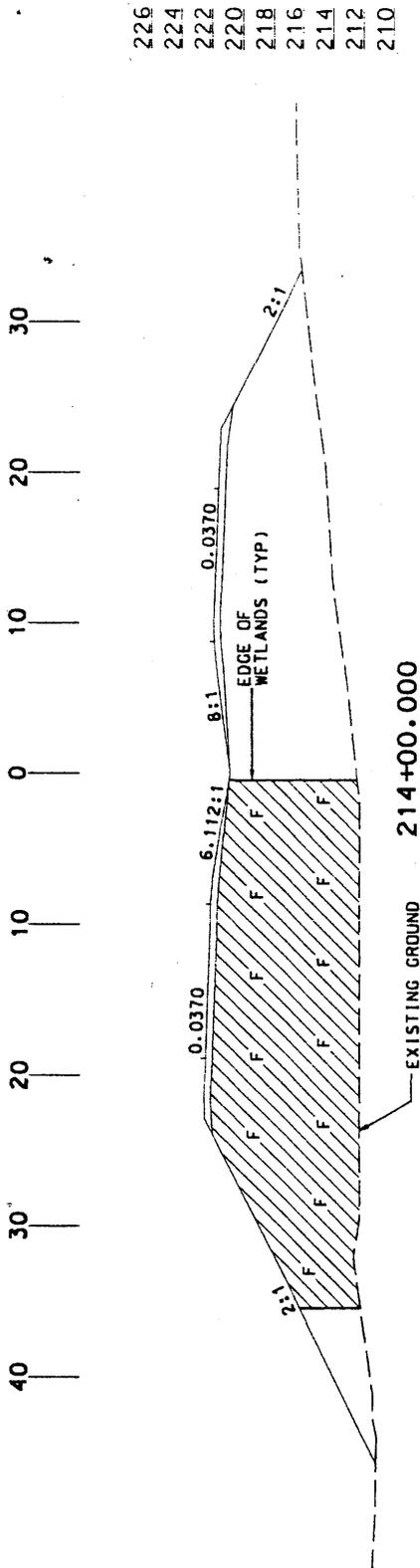
## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85



SHEET 22 OF 48

10/02/01  
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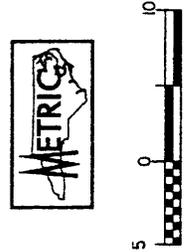


226  
 224  
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 214  
 212  
 210

# SECTION "D-D"

(-L- 214+00)  
 SITE 7

**LEGEND**  
 DENOTES  
 FILL IN WETLANDS



**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)

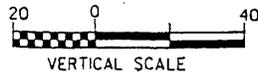
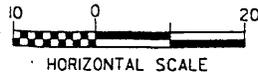
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 23 OF 48



DENOTES FILL IN WETLANDS

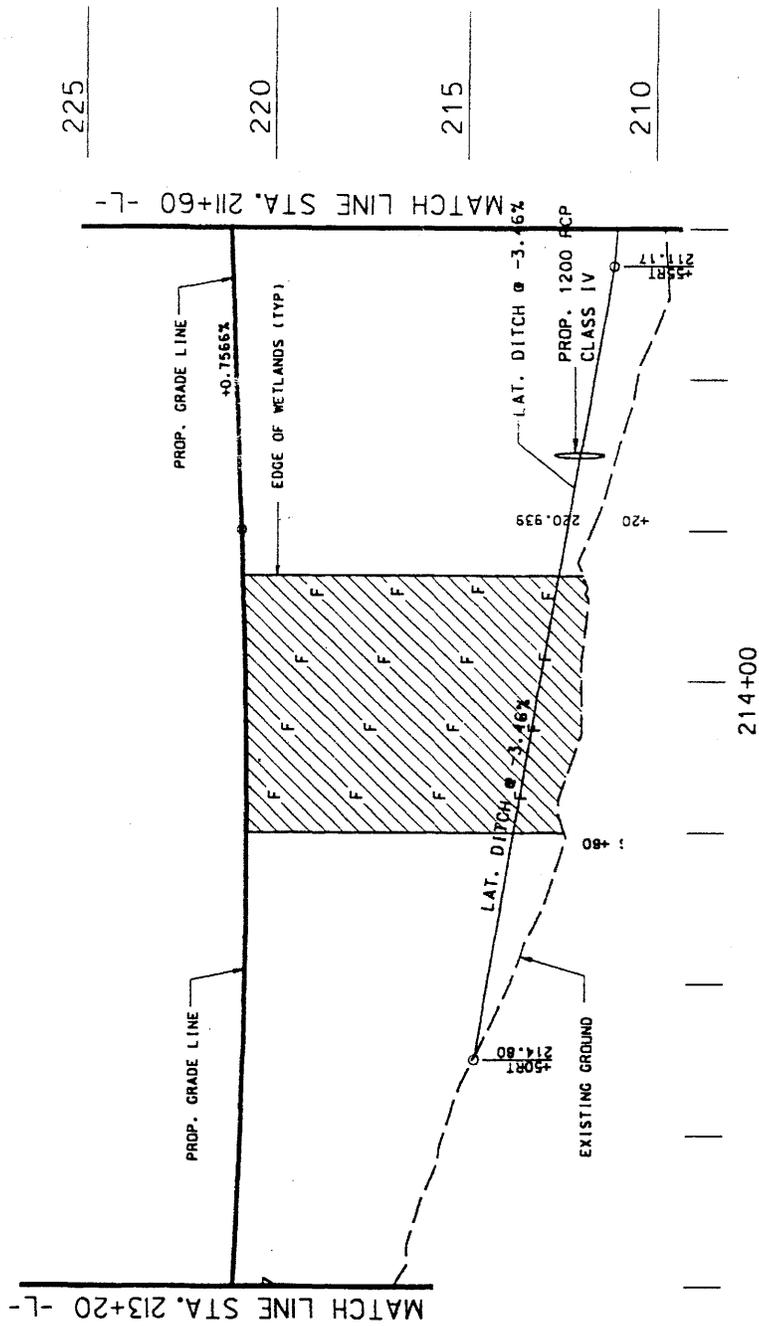


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 24 OF 48



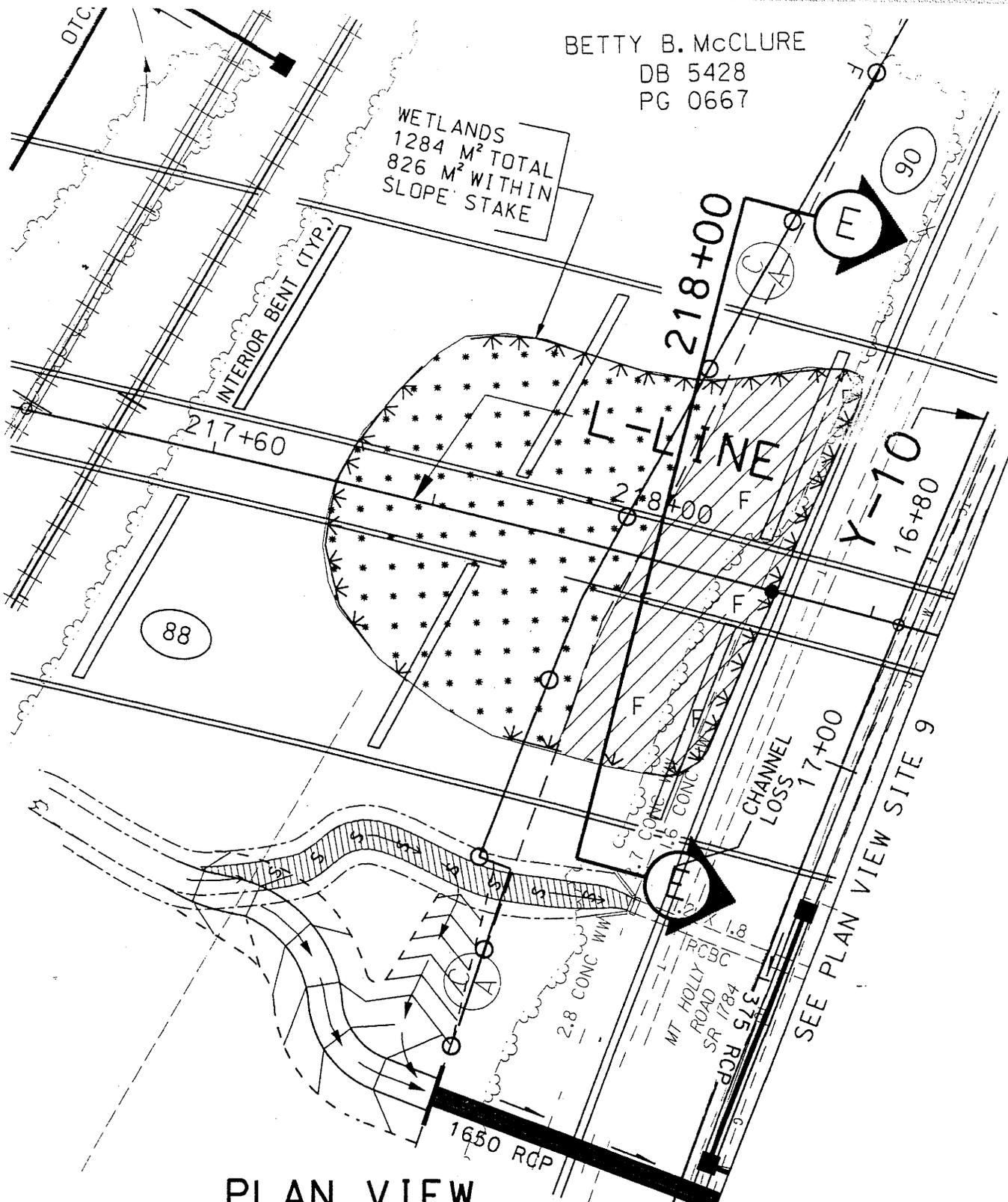
SITE 7

BETTY B. McCLURE

DB 5428

PG 0667

WETLANDS  
1284 M<sup>2</sup> TOTAL  
826 M<sup>2</sup> WITHIN  
SLOPE STAKE



# PLAN VIEW SITE 8

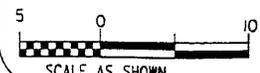
## LEGEND

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



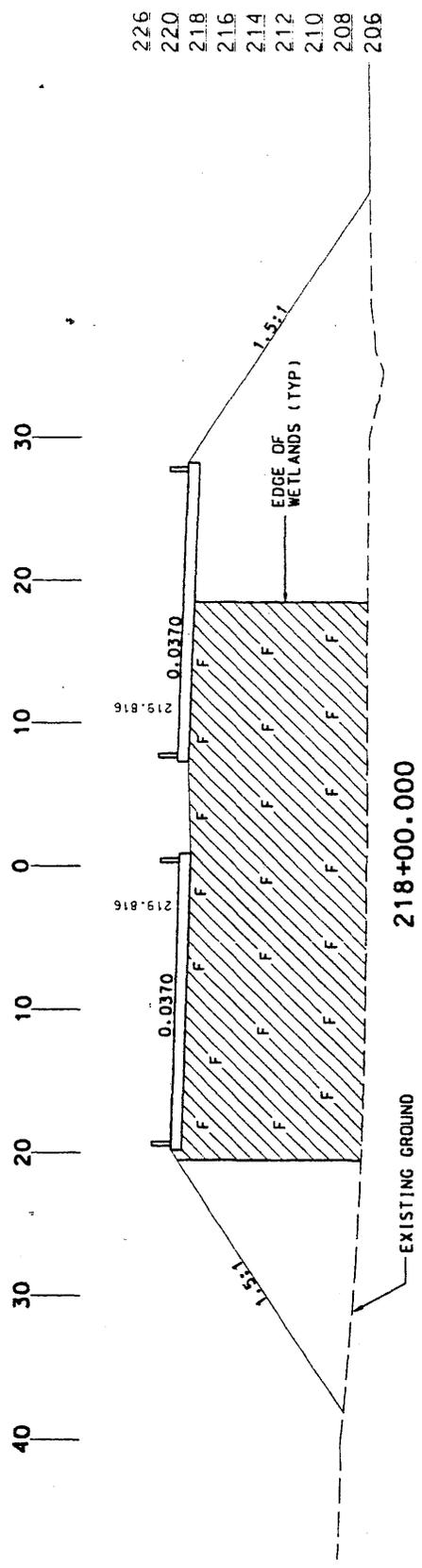
## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85



SCALE AS SHOWN

10/19/01  
01:57:16 AM  
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**SECTION "E-E"**  
(-L- 218+00)  
**SITE 8**

**LEGEND**  
DENOTES  
FILL IN WETLANDS



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)

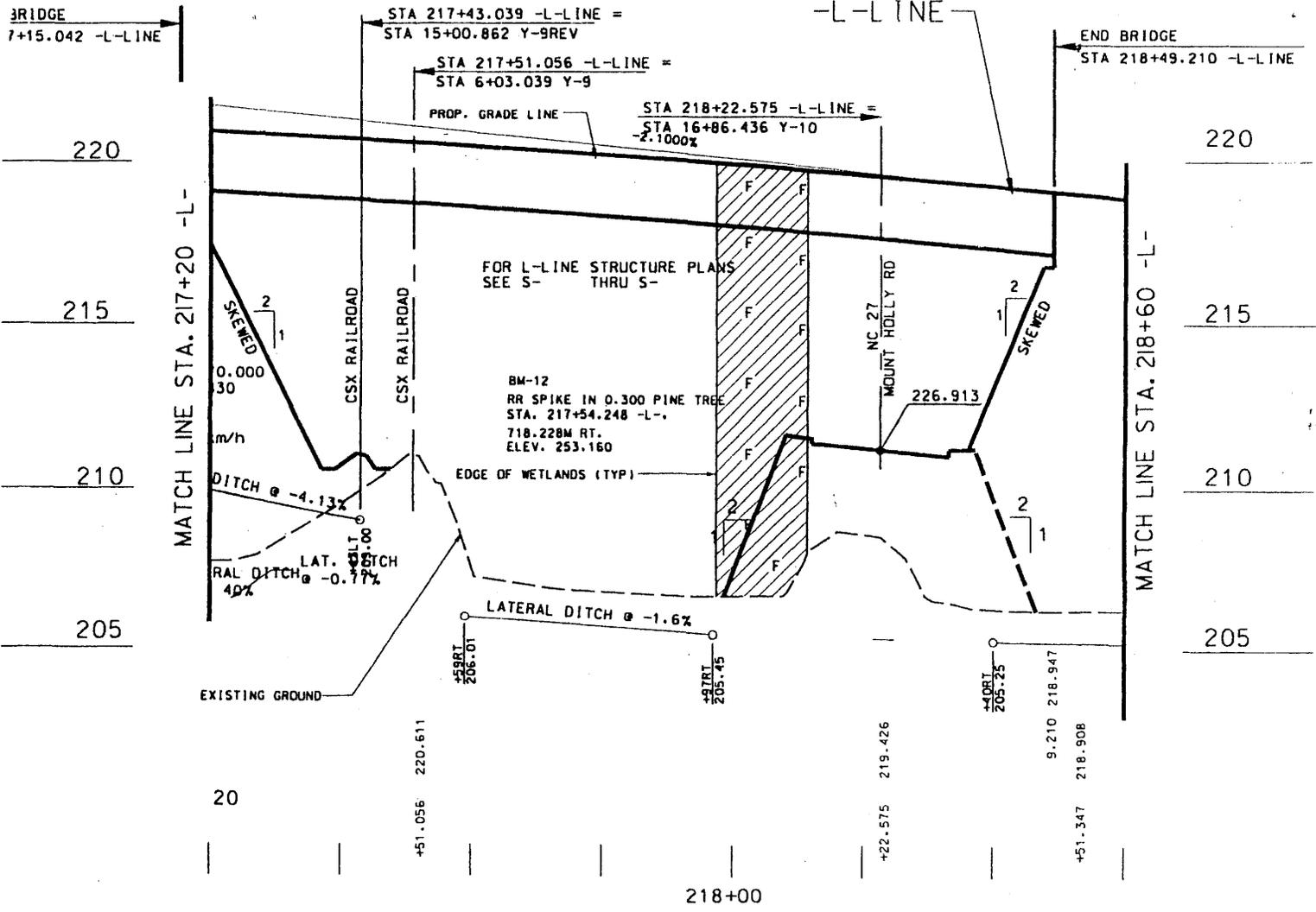
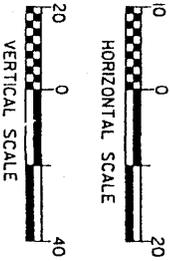
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 26 OF 48



F  
 F  
 DENOTES  
 FILL IN WETLANDS



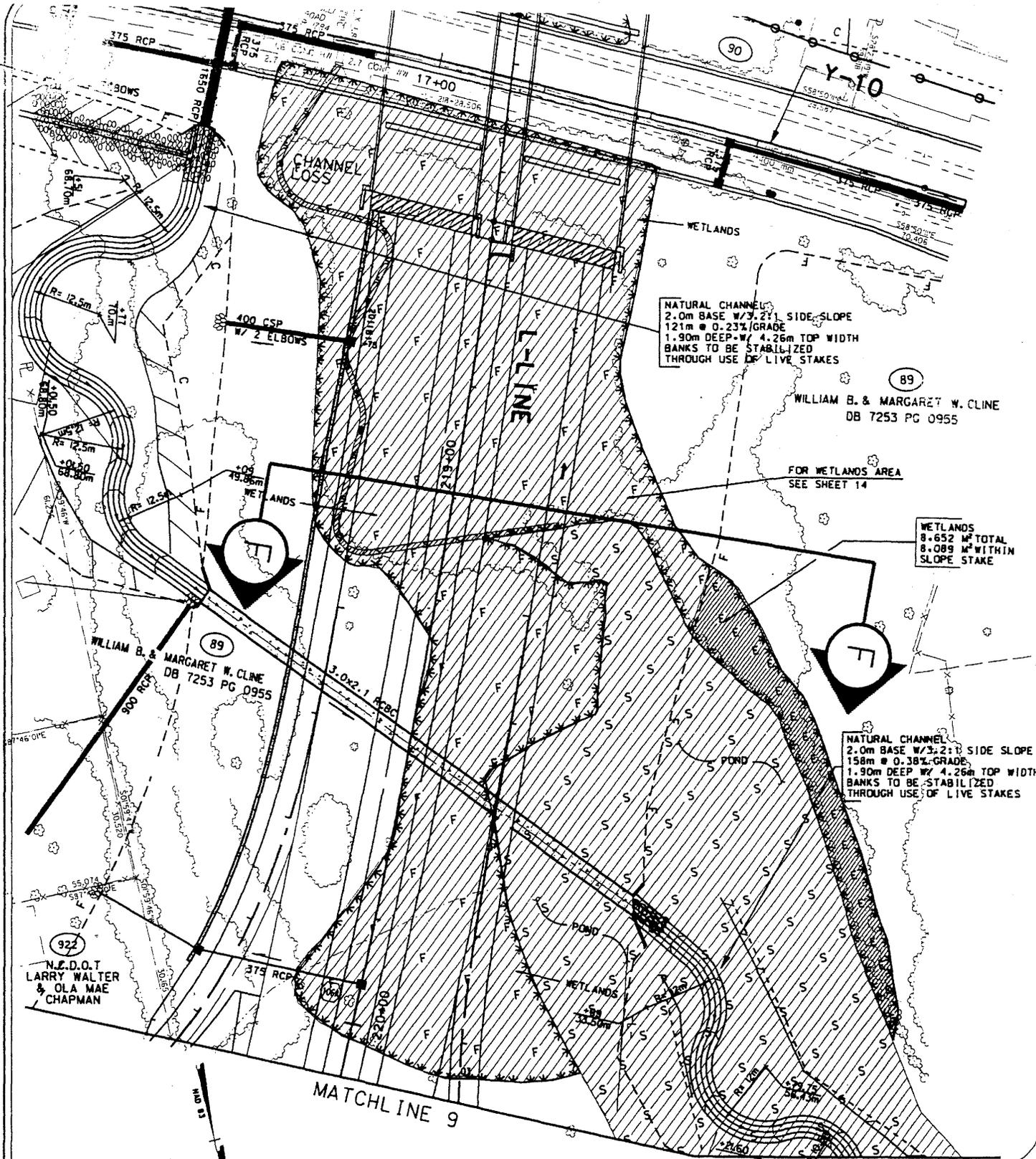
**SITE 8**

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.11672205 (R-22488B)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 27 OF 48



NATURAL CHANNEL  
 2.0m BASE W/3.2% SIDE SLOPE  
 121m @ 0.23% GRADE  
 1.90m DEEP W/ 4.26m TOP WIDTH  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

WETLANDS  
 8.652 M<sup>2</sup> TOTAL  
 8.089 M<sup>2</sup> WITHIN  
 SLOPE STAKE

NATURAL CHANNEL  
 2.0m BASE W/3.2% SIDE SLOPE  
 158m @ 0.38% GRADE  
 1.90m DEEP W/ 4.26m TOP WIDTH  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

**LEGEND**

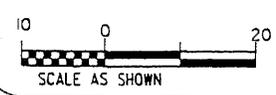
- WETLANDS
- DENOTES FILL IN WETLANDS
- DENOTES EXCAVATION IN WETLANDS
- DENOTES FILL IN SURFACE WATER

**PLAN VIEW  
 SITE 9**



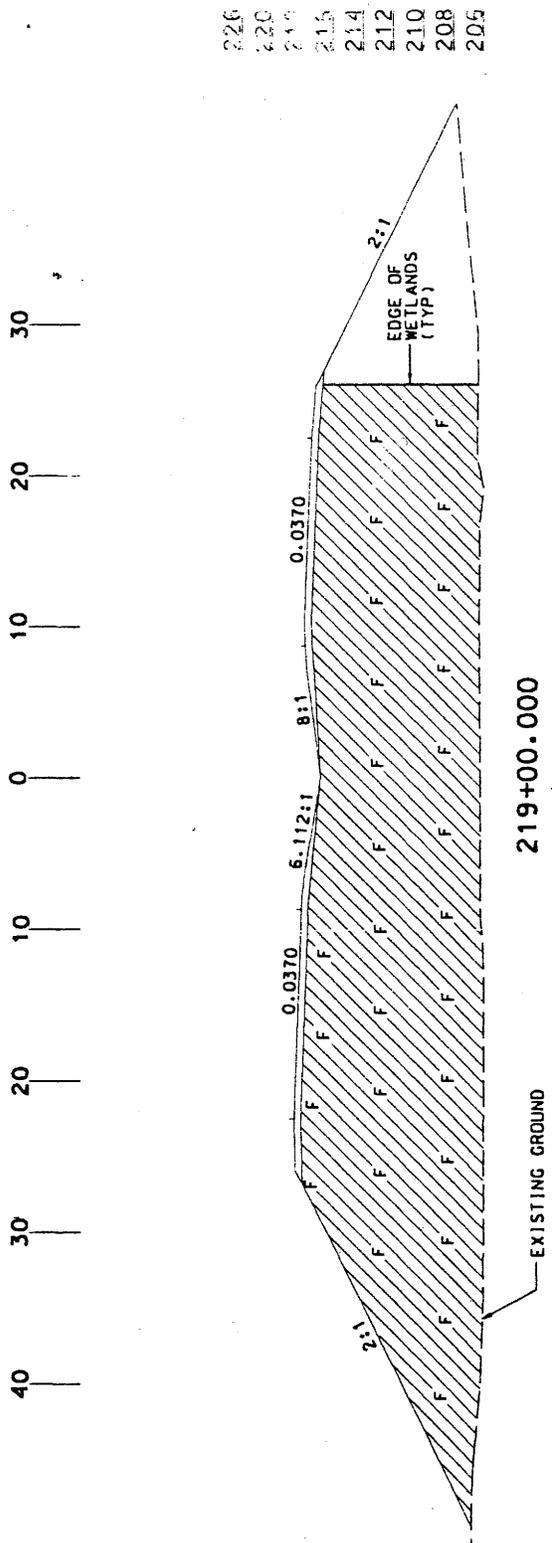
**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85



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226  
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**SECTION "F-F"**  
(-L- 219+00)  
**SITE 9**

**LEGEND**  

 DENOTES  
 FILL IN WETLANDS



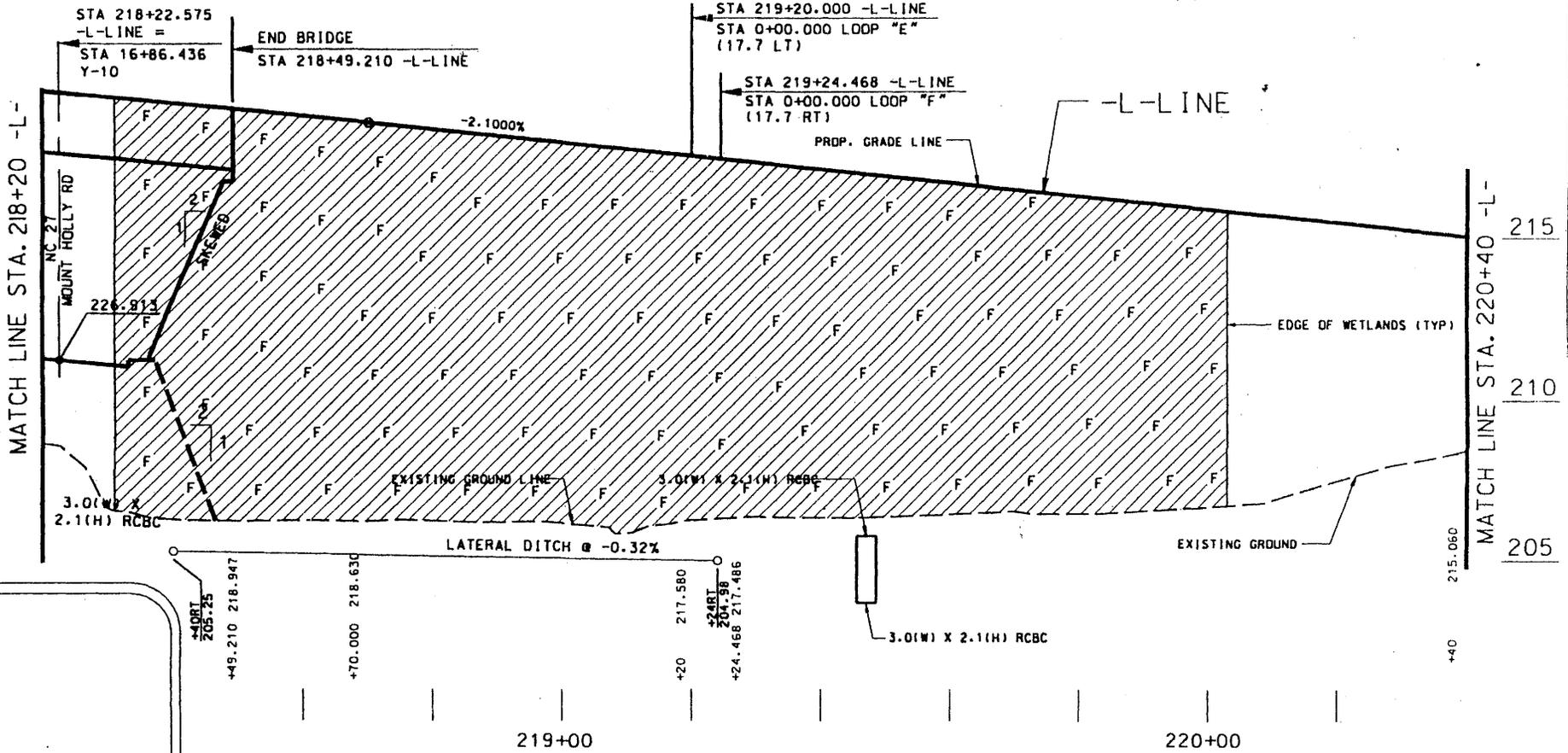
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 30 OF 48



SCALE AS SHOWN

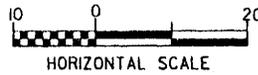
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
 MECKLENBURG COUNTY  
 8,16172205 (R-224888)

SHEET 31 OF 48

**SITE 9**

 DENOTES  
 FILL IN WETLANDS

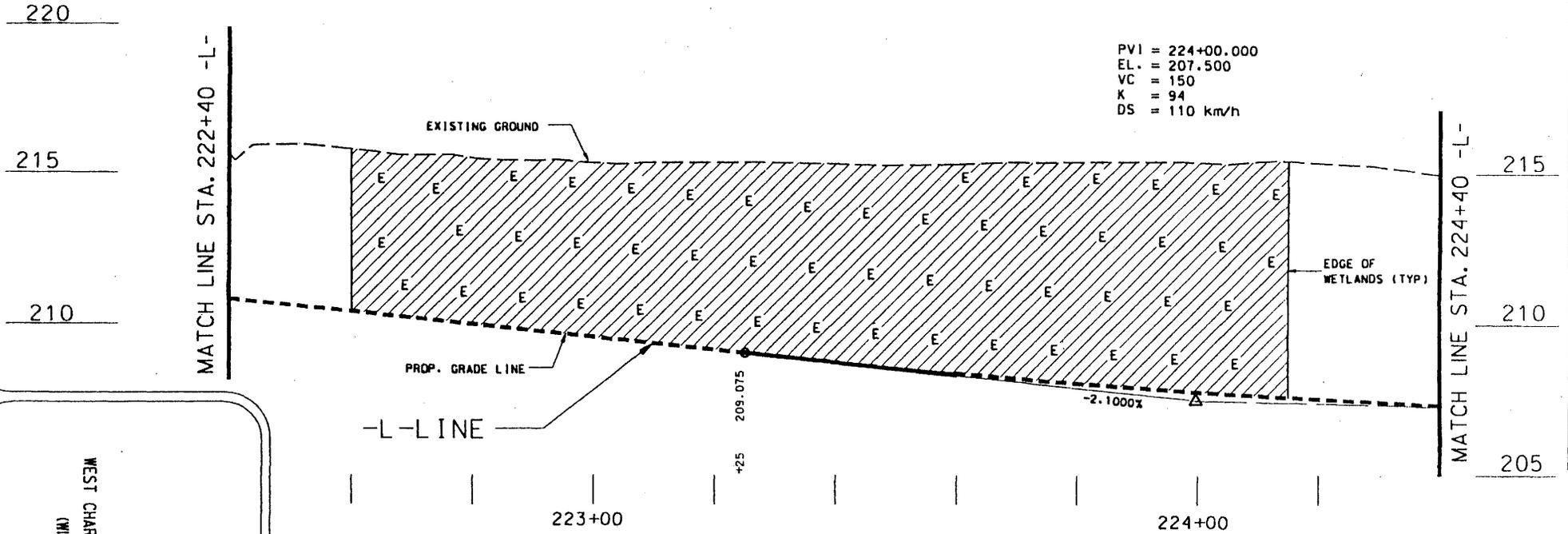






BM-15  
 RR SPIKE IN 0.750 OAK TREE  
 STA. 222+83.902 -L- 28.788 RT  
 ELEV. 215.838

PVI = 224+00.000  
 EL. = 207.500  
 VC = 150  
 K = 94  
 DS = 110 km/h



SCALE AS SHOWN

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

MECKLENBURG COUNTY  
 8.1672205 (R-224888)

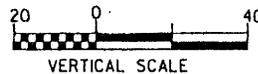
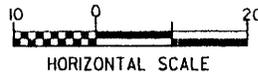
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

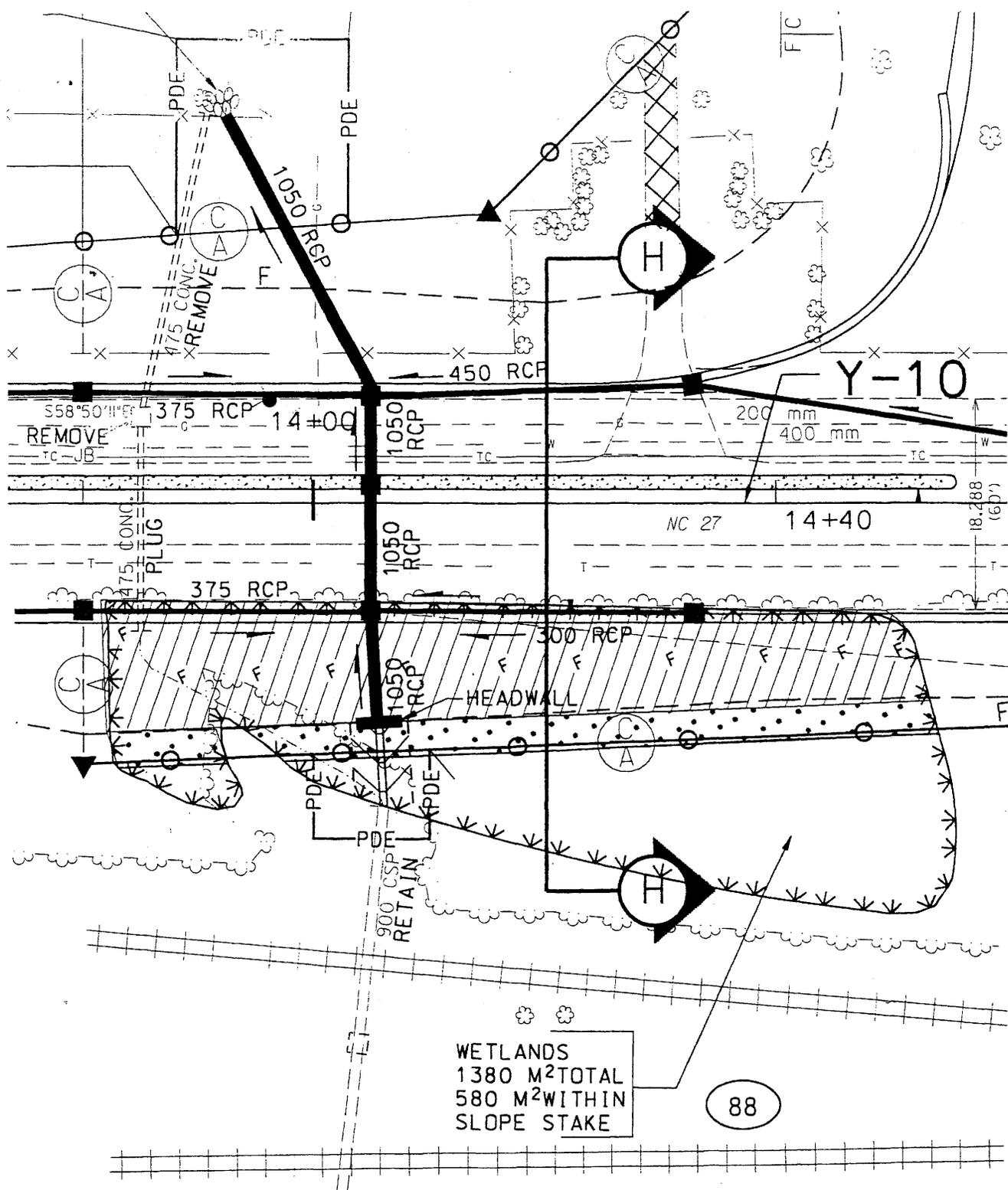
SHEET 24 OF 48

SITE 10



DENOTES EXCAVATION  
 IN WETLANDS



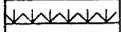
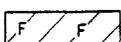
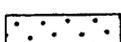


WETLANDS  
1380 M<sup>2</sup>TOTAL  
580 M<sup>2</sup>WITHIN  
SLOPE STAKE

88

# PLAN VIEW SITE 11

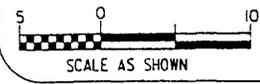
## LEGEND

-  WETLANDS
-  DENOTES  
FILL IN WETLANDS
-  DENOTES  
MECHANIZED CLEARING



## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

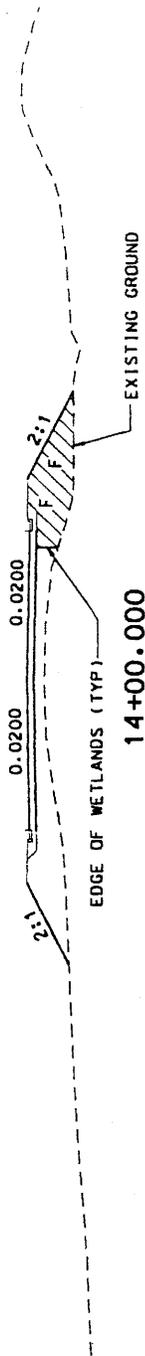
MECKLENBURG COUNTY  
8.U672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85





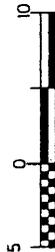
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202

214  
212  
210  
208  
206  
204  
202



**SECTION "H-H"**  
(-Y-10 14+00)  
**SITE J**

**LEGEND**  
DENOTES  
FILL IN WETLANDS



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

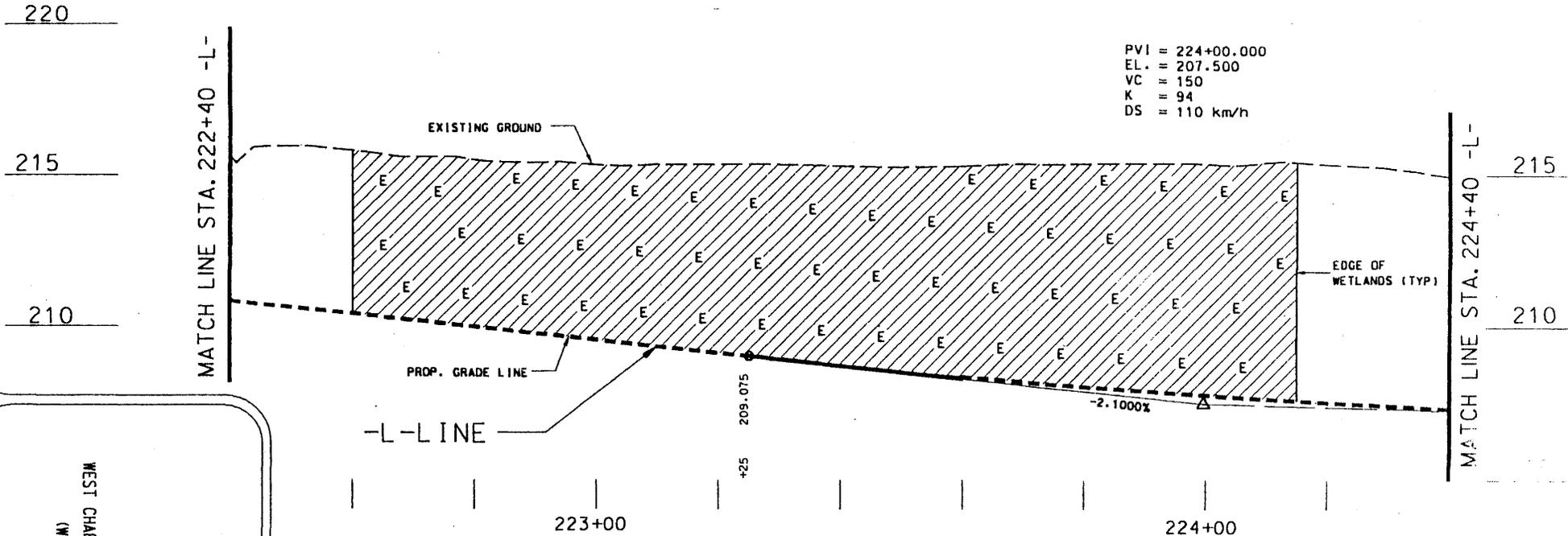
MECKLENBURG COUNTY  
8.U672205 (R-2248BB)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 36 OF 48

BM-15  
 RR SPIKE IN 0.750 OAK TREE  
 STA. 222+83.902 -L- 28.788 RT  
 ELEV. 215.838

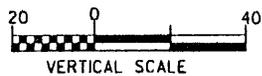
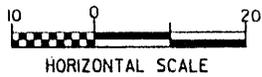
PVI = 224+00.000  
 EL. = 207.500  
 VC = 150  
 K = 94  
 DS = 110 km/h



SITE II



DENOTES EXCAVATION  
 IN WETLANDS



SCALE AS SHOWN

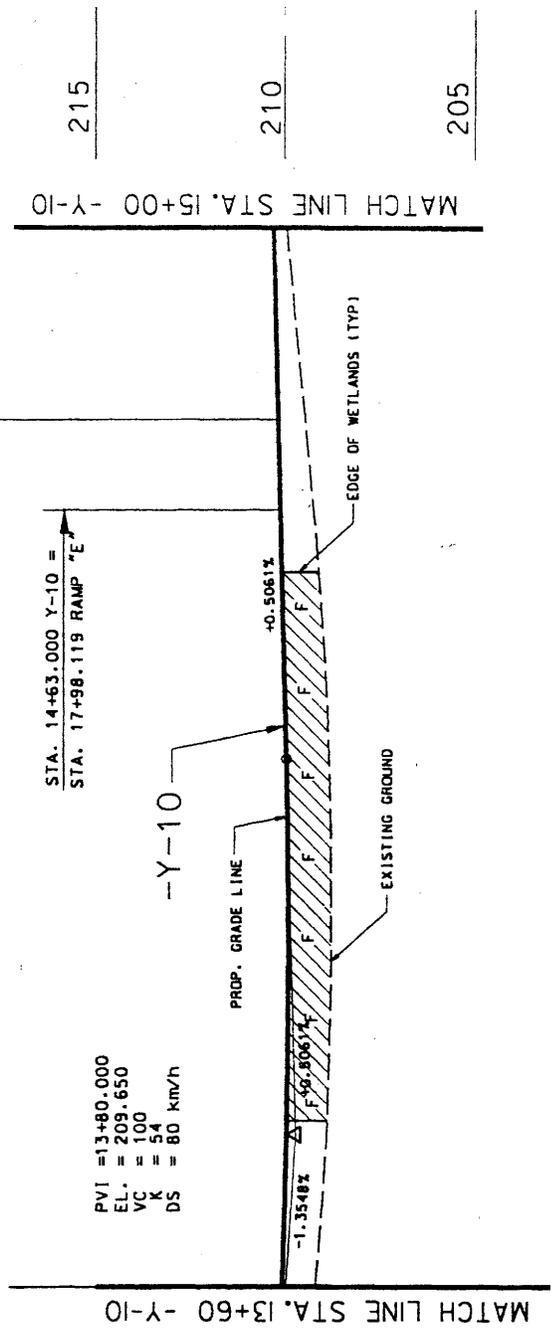
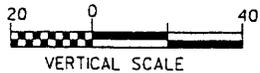
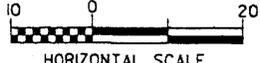
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
 MECKLENBURG COUNTY  
 8JL672205 (R-224888)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SHEET 37 of 48

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DENOTES  
FILL IN WETLANDS



SITE II

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 38 OF 48

NCDOT Project I.D. R-2248BB  
Mecklenburg County, NC  
I-485 (Charlotte Outer Loop) From North of I-85  
To north of NC 27 (Mount Holly Rd.)

Prepared by: Stantec Consulting  
801 Jones Franklin Road Suite 300  
Raleigh, NC 27606

October 15, 2001

## NATURAL CHANNEL DESIGN

### TRIBUTARY TO LONG CREEK

Right of Project Station 218+40 to Right of Station 16+00 Ramp E  
Permit Site 9

The alignment of I-485 (Charlotte Outer Loop) will require that a portion of a Tributary to Long Creek be relocated from Right of Project Station 218+40 -L- to Right of Station 16+00 Ramp "E", approximately 357 meters in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The Tributary's drainage area is mostly rural and wooded in nature, but is expected to become urban-residential with the arrival of the Charlotte Outer Loop. The stream was found to be intermittent in nature, having dry riffles and pools.

There is no hydraulic gage data available on this stream nor on nearby streams. Current discharges were estimated using the NCDOT procedures for rural watersheds.

#### EXISTING CHANNEL

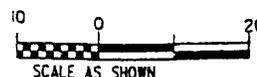
A representative portion of the existing channel (around station 218+80) was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 9.78, a width/depth ratio of 49, a sinuosity of 1.15 and an average slope of 0.003 ft/ft. A pebble count was performed and the channel was found to have a classification of sand bottom. The channel was found to be a C5 stream type according to the Rosgen classification system.



#### **NORTH CAROLINA** **DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85



SHEET 39 OF 48

## REFERENCE REACH

The reference reach was surveyed in detail for the purpose of channel classification and use in natural channel design. A 143 ft long reach was surveyed in detail. The reference reach channel was measured to have an entrenchment ratio of 8.55, a width/depth ratio of 10.13, a sinuosity of 1.19 and an average slope of 0.015 ft/ft. A pebble count was performed and the channel was found to have a classification of sand bottom. The channel was found to be a C5 stream type according to the Rosgen classification system.

## PROPOSED CHANNEL

Based upon the existing valley type and the flood prone width desired, the proposed channel design has a C5 stream type classification. Design data is given in the attached table along with existing reach and reference reach data. Culverts control channel gradient up and downstream of each section except for the ending tie in is with the natural channel. Mean "bankfull" depth was set at 1.25 feet, close to the measured depth of 1.5 feet for the reference reach. This gives a maximum bankfull depth of 2.00 feet. Above bankfull depth it is proposed to excavate an approximately 50-100 foot wide flood plain (including the channel).

It is believed that by forming a flood plain above bankfull depth channel stability will be enhanced by reducing velocities for those discharges above the bankfull discharge. This should lead to a more stable channel during and after watershed development. It is anticipated that the proposed channel will have a sand bottom. Maximum pool depths of 3.00 feet are proposed at outside bends of meanders.

Sediment transport computations were performed, using the proposed channel geometry. To determine whether the bankfull discharge would be able to transport the D50 particle without excessive bankfull shear stress the stream power was analyzed. The stream power will be significantly reduced from the existing conditions.

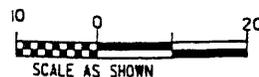
Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that channel banks will be planted with native trees and shrubs above bankfull depth. Rock Vanes and "V" Cross Vanes will be utilized to control the near bank shear stress in the meanders, along the proposed roadway.



### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672205 (R-22488B)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85



SHEET 40 OF 48



Stantec

LOCATION: TRIMBLE CREEK

Trib to Long Creek (Thomas Pond)

Design by: Kathleen McKeithan 8/23/01

Checked by: Kevin Williams, PE 10/15/01

ITEM	EXISTING CHANNEL	PROPOSED REACH	PROPOSED REACH	PROPOSED REACH	REFERENCE REACH
STREAM NAME	Tributary to Long Creek	Tributary to Long Creek - A	Tributary to Long Creek - B	Tributary to Cline - C	Dixon Branch
STREAM TYPE	C5	C5	C5	C5	C5
DRAINAGE AREA (DA)	390 Ac	390 Ac	390 Ac	390 Ac	402 Ac
BANKFULL WIDTH ( $W_{bkt}$ )	18.40 ft	14.00 ft	14.00 ft	14.00 ft	15.20 ft
BANKFULL MEAN DEPTH ( $d_{bkt}$ )	0.37 ft	1.17 ft	1.17 ft	1.17 ft	1.50 ft
WIDTH/DEPTH RATIO ( $W_{bkt}/d_{bkt}$ )	49.73	12.00	12.00	12.00	10.13
BANKFULL X-SECTION AREA ( $A_{bkt}$ )	6.80 ft <sup>2</sup>	15.31 ft <sup>2**</sup>	15.31 ft <sup>2**</sup>	15.31 ft <sup>2**</sup>	22.70 ft <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	9.18 fps	4.07 fps	4.07 fps	4.07 fps	2.81 fps
BANKFULL DISCHARGE, m <sup>3</sup> /s	62 cfs	62 cfs	62.38 cfs	62 cfs	64 cfs
BANKFULL MAX DEPTH ( $d_{max}$ )	1.00 ft	1.87 ft	1.87 ft	1.87 ft	1.60 ft
WIDTH Flood-Prone Area ( $W_{fpa}$ )	180.0 ft	52.0 ft	52.00 ft	100.0 ft	130.0 ft
ENTRENCHMENT RATIO (ER)	9.78	3.71	3.71	7.14	8.55
MEANDER LENGTH (Lm)	30.0 ft	126 ft	126 ft	126.0 ft	33 - 71 ft
RATIO OF Lm TO $W_{bkt}$	1.63	9	9.00	9.0	2.2 - 4.7
RADIUS OF CURVATURE	8.3 ft	35.0 ft	35 ft	35.0 ft	6 - 9 ft
RATIO OF R <sub>c</sub> TO $W_{bkt}$	0.5	2.5	2.50	2.5	0.37 -
BELT WIDTH	25.0	56.0	56	56.0	30
MEANDER WIDTH RATIO*	1.4	4.0	4.0	4.0	2.0
SINUOSITY (K)	1.15	1.40	1.22	1.37	1.19
VALLEY SLOPE	0.004 ft/ft	0.0032 ft/ft	0.005 ft/ft	0.005 ft/ft	0.018 ft/ft
AVERAGE SLOPE (S)	0.003 ft/ft	0.0023 ft/ft	0.004 ft/ft	0.004 ft/ft	0.015 ft/ft
POOL SLOPE	na*** ft/ft	0.0007 ft/ft	0.001 ft/ft	0.001 ft/ft	0.003 - 0.012 ft/ft
RATIO OF POOL SLOPE TO AVERAGE SLOPE	na***	0.30	0.30	0.30	0.19 - 0.83
MAX POOL DEPTH	1.90 ft	3.50 ft	3.50 ft	3.50 ft	1.90 - 5.80 ft
RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	5.14	3.00	3.00	3.00	1.3 - 3.9
POOL WIDTH	16.56 ft	28.00 ft	28.00 ft	28.00 ft	31 ft
RATIO OF POOL WIDTH TO BANKFULL WIDTH	0.90	2.00	2.00	2.00	2.04
POOL TO POOL SPACING	32.00 ft	28.0 ft	28.0 ft	28.0 ft	18 - 30 ft
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	1.74	2.00	2.00	2.00	1.2 - 2.0

\* Due to mature vegetation root mass in the Reference Reach's side slopes and floodplain, the reference reach data will not be matched in proposed design. The use of a higher ratio will allow the meanders to be stable while the root system is established.

\*\* X-Section Area from NC Regional Curves.

\*\*\* Pool Slope not obtained, channel was dry at the time of survey.

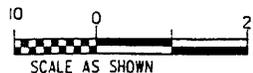
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NORTH CAROLINA DEPARTMENT OF HIGHWAYS

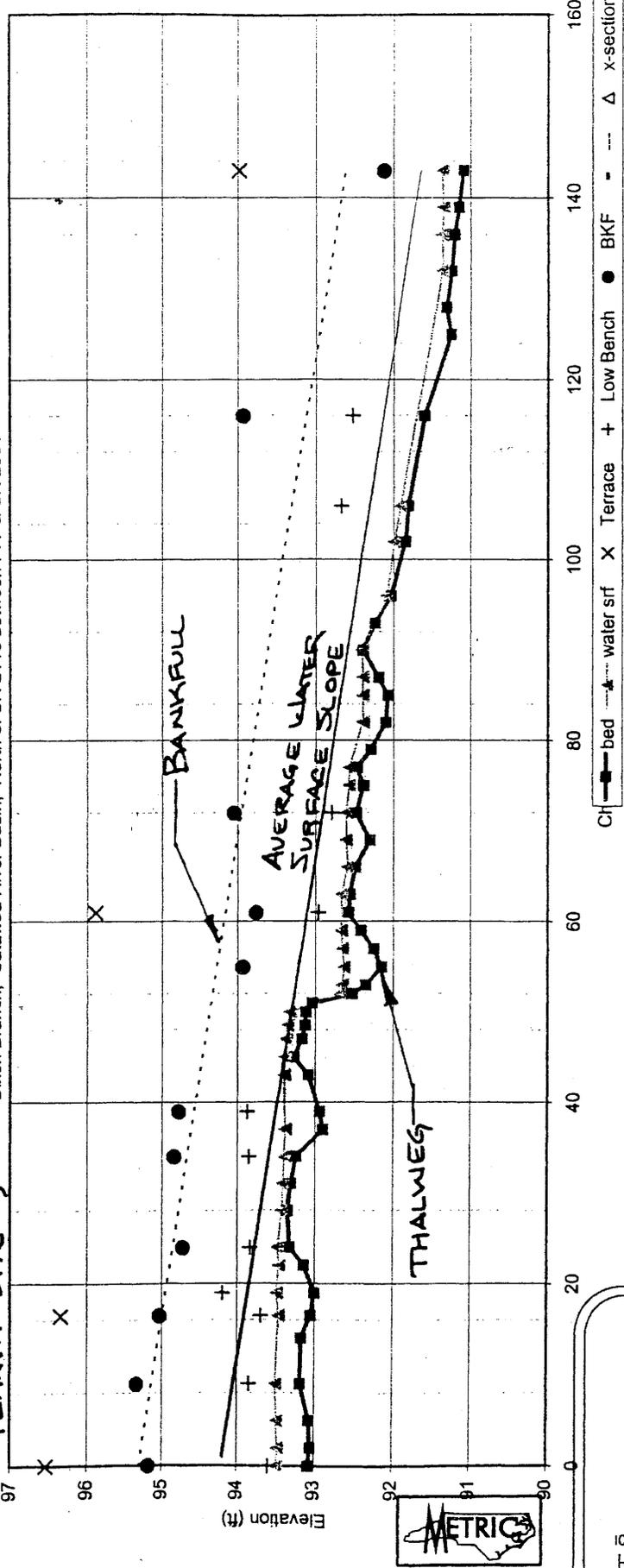
MECKLENBURG COUNTY 8.U672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74 (WILKINSON BOULEVARD) TO NORTH OF I-85



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PERMIT SITE 9  
Dixon Branch, Catawba River Basin, North of SR 2116 between I-77 & SR 2004



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

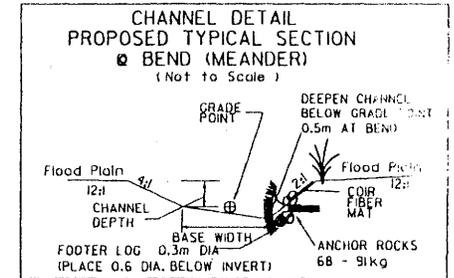
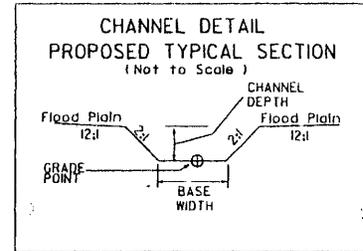
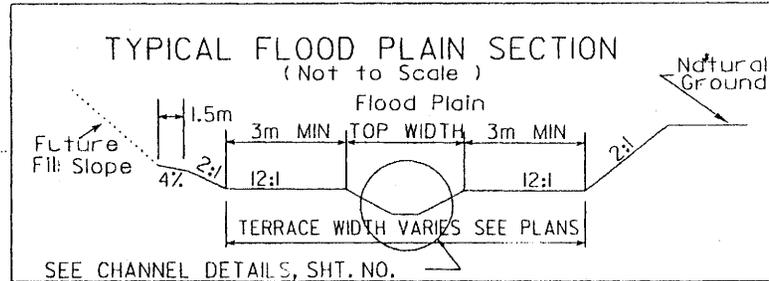
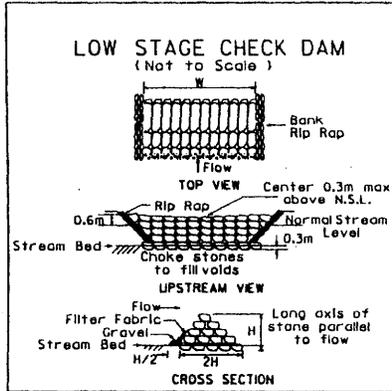
MECKLENBURG COUNTY  
8.JU672205 (R-2248BB)

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

SHEET 42 OF 43

# NATURAL CHANNEL DESIGN TYPICALS

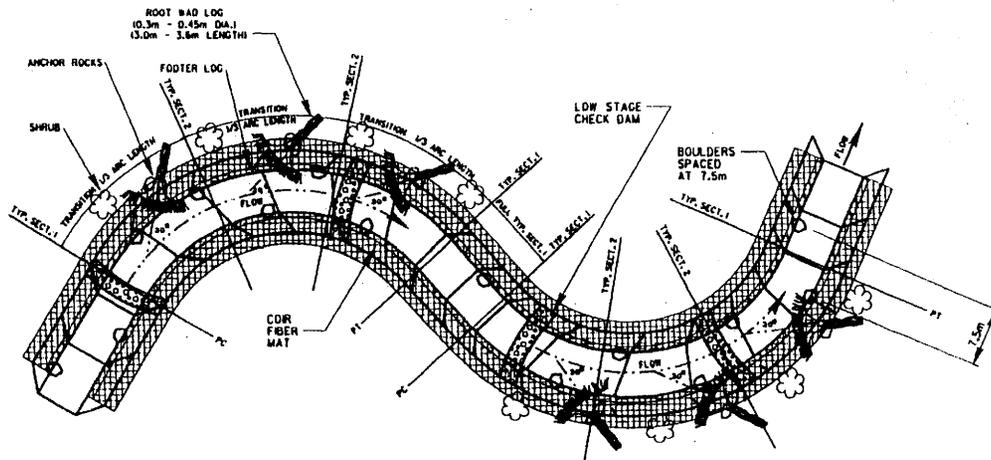


**NOTES:**

- NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE
- NUMBER OF LOW STAGE CHECK DAMS TO BE DETERMINED ON SITE
- ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE
- 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.
- WHEN BACKFILLING OVER AND AROUND FOOTER LOGS, ROOTWAD LOGS AND ANCHOR ROCKS FIRMLY SECURE ALL COMPONENTS INCLUDING JOINTS, CONNECTIONS AND GAPS.
- PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH

TYPICAL SECTION 1 BETWEEN BENDS

TYPICAL SECTION 2 AT BENDS



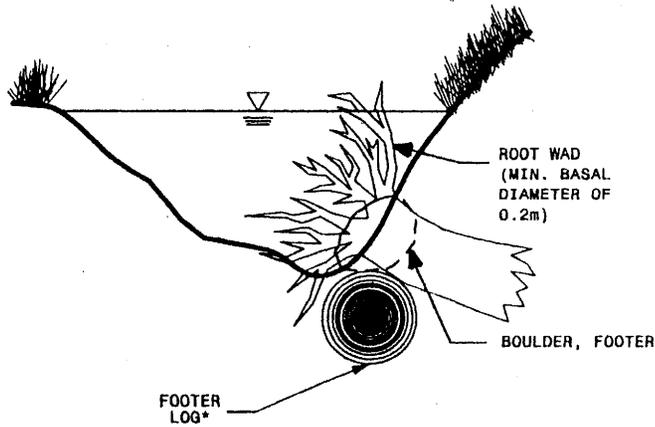
CHANNEL PLAN VIEW



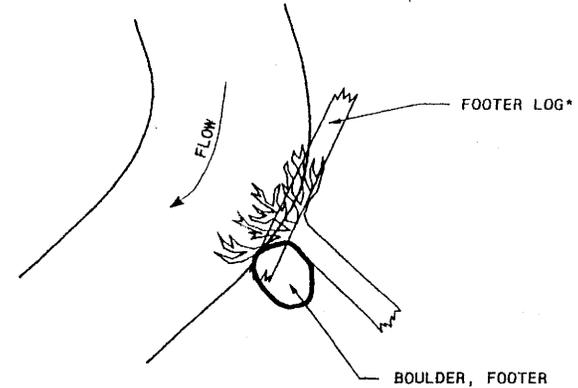
SHEET 43 OF 48

WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 BL1672205 (R-2248881)



CROSS SECTION



PLAN VIEW



\*FOOTER LOGS SHALL HAVE A MINIMUM BASAL DIAMETER OF 0.2m AND HAVE A LENGTH OF 2.1m -3.0m.

PLACEMENT OF ROOT WAD STRUCTURES

A TRENCH SHALL BE DUG ALONG THE TOE OF THE BANK TO A DEPTH OF  $\frac{1}{2}$  THE DIAMETER OF THE FOOTER LOG. A PRUNED FOOTER LOG SHALL BE PLACED AT THE TOE OF THE CHANNEL AND THE ROOT WAD SHALL BE PLACED DIRECTLY ABOVE IT. THE ROOT MASS SHALL BE ORIENTED IN SUCH A WAY THAT THE VELOCITY VECTORS OF THE WATER WILL INTERSECT THE ROOT MASS AT A 90-DEGREE ANGLE. THERE SHALL BE NO VOID BETWEEN THE ROOT MASS AND THE BANK ON THE UPSTREAM SIDE OF THE CHANNEL. A BOULDER SHALL BE PLACED ON THE DOWNSTREAM SIDE BETWEEN THE ROOT MASS AND THE BANK TO PROVIDE EROSION CONTROL. THE BOULDER, FOOTER SHALL BE APPROXIMATELY 0.9m X 0.9m X 0.6m.

THE PREFERRED METHOD FOR INSTALLATION OF A ROOT WAD IS TO DRIVE THE SHARPENED TRUNK OF THE ROOT WAD INTO THE STREAMBANK USING A BACKHOE. IF IT IS DEEMED NOT POSSIBLE TO DRIVE THE TRUNK INTO THE BANK, A TRENCH SHALL BE DUG IN THE BANK AND THE TRUNK SHALL BE PLACED IN THE TRENCH. THE TRENCH SHALL BE BACK FILLED AND COMPACTED.

ROOT WAD

SCALE: NTS

ROADWAY      STATION  
 Y-7                      11+14.713

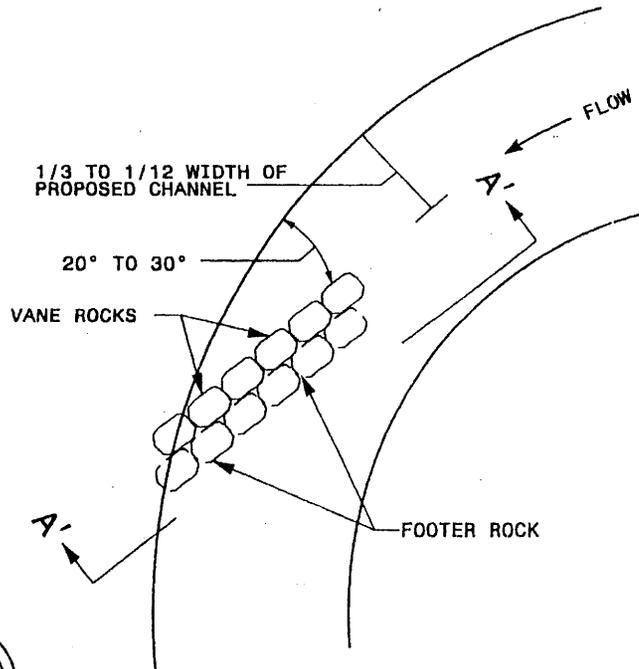


WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

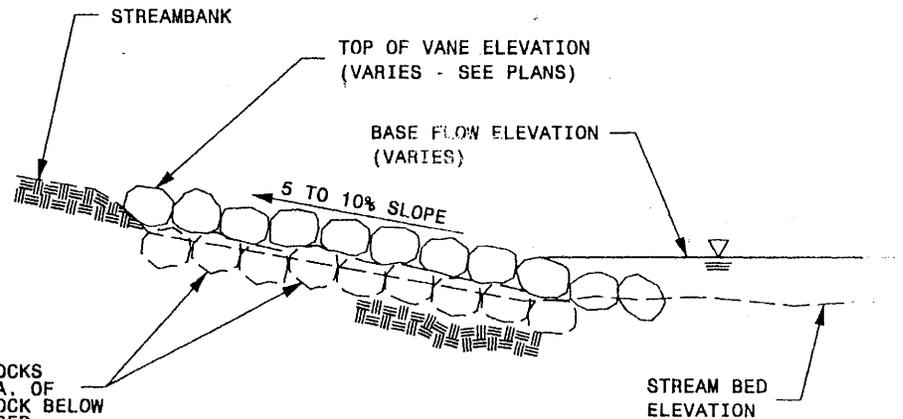
MECKLENBURG COUNTY  
 81672205 (R-224888)

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

SHEET 44 OF 48



PLAN VIEW



SECTION A A' VIEW

NOTE: ALL ROCKS OR STONE ARE NATURAL STONE BOULDERS

## ROCK VANE

SCALE: NTS



SCALE

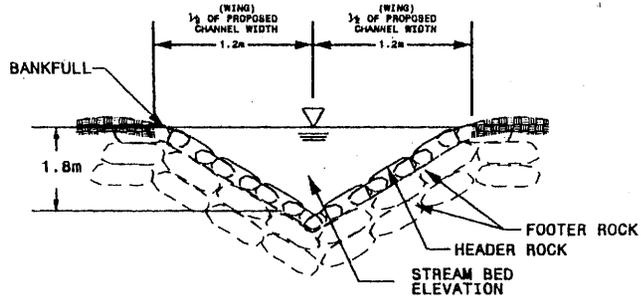
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
MECKLENBURG COUNTY  
81672205 (R-224888)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SHEET **45** OF **48**

# "V" CROSS VANE

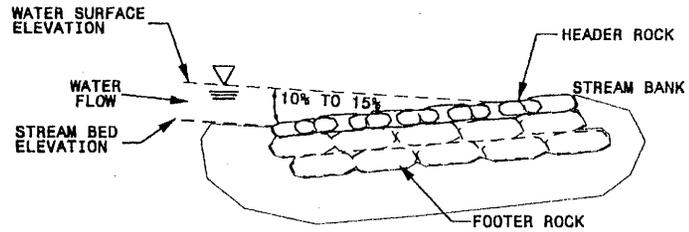
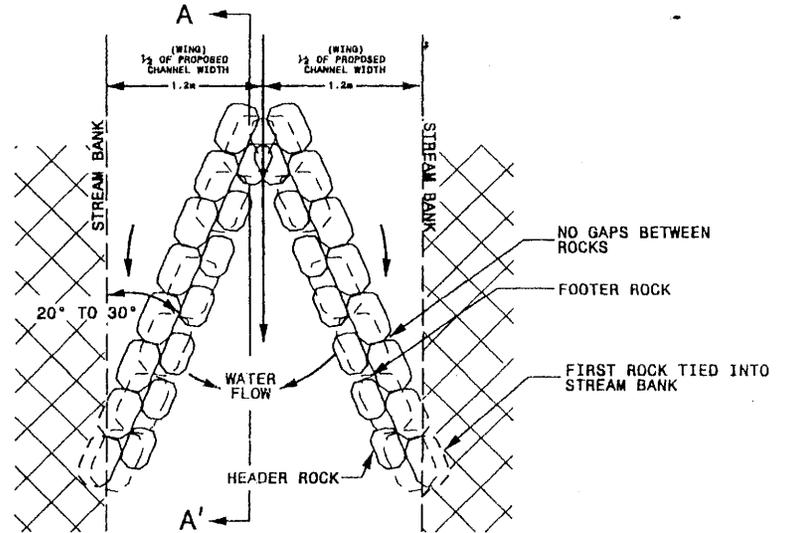
SCALE: NTS

ROADWAY	STATION
CD-WBL	79+35.606
RAMP "2D"	14+08.891
Y-7	9+90.250
Y-7	11+20.254

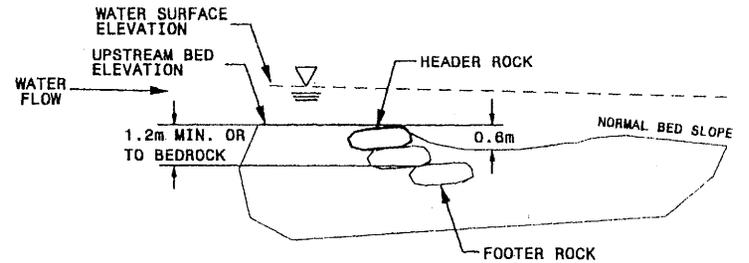


CROSS SECTION

## PLAN VIEW



PROFILE VIEW



SECTION A A' VIEW

### INSTALLATION OF CROSS VANE

A TRENCH SHALL BE DUG IN SUCH A MANNER THAT THE FOOTER ROCKS, THE CROSS HEADER ROCKS AND AT LEAST 1/3 OF THE WING HEADER ROCKS ARE BURIED BENEATH THE BED SURFACE ELEVATION. AN EXCAVATOR, WITH A BUCKET THAT CONTAINS A HYDRAULIC THUMB, SHALL BE USED TO PLACE ROCKS WITH THE SUPERVISION OF THE RESIDENT ENGINEER. HEADER AND FOOTER ROCKS SHALL BE NO SMALLER THAN 0.9m X 0.9m X 0.6m. FOOTER ROCKS SHALL BE PLACED IN THE TRENCH FIRST WITH HEADER ROCKS PLACED ON TOP PRIOR TO BACK FILLING OF THE TRENCH. IN THE CENTER, OR CROSS, PORTION OF THE CHANNEL, THE HEADER ROCKS SHALL BE PLACED SUCH THAT THE TOP OF THE HEADER ROCK IS PLACED AT AN ELEVATION EQUAL TO THE BED ELEVATION. THE HEADER ROCKS ON THE SIDE, OR WING, PORTION SHALL BE PLACED IN SUCH A MANNER AS THEY SLOPE UP FROM BED ELEVATION AT THE CROSS PORTION TO THE TOP OF THE BANK AT A 10-15% SLOPE.



SHEET 46 OF 48

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 81672205 (R-224886)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (WILKINSON BOULEVARD) TO NORTH OF I-85

SITE	PROJECT STATION	STRUCTURE TYPE	WETLAND IMPACTS				SURFACEWATER IMPACTS					
			FILL IN WETLANDS (ha)	TEMPORARY FILL IN WETLANDS (ha)	EXCAVATION IN WETLANDS (ha)	MECHANIZED CLEARING IN WETLANDS (METHOD) (ha)	FILL IN SURFACE WATERS (NATURAL) (ha)	FILL IN SURFACE WATERS (POND) (ha)	TEMP FILL IN SW (ha)	LENGTH OF EXISTING CHANNEL IMPACTED (m)	NATURAL STREAM DESIGN (m)	
1	185+00-L-	2.1 X 1.5 RCBC					0.042				208	
2	196+00 -L-	1650 RCP	0.030									
	12+00 RP " B"	2.1 X 1.8 RCBC	0.027			0.007	0.026	0.716			147	
3	199+00 -L-							0.858				
4	14+20 Y-3	900 RCP					0.130				86	
5	19+15 Y-3	1350 RCP					0.110				74	
6	211+00 -L-		0.064				0.012					
7	214+00 -L-		0.026				0.019	0.068			192	
		1200 RCP					0.017				169	
8	218+00 -L-		0.046				0.009				35	
9	219+00 -L-	3.0 X 2.1 RCBC	0.809		0.056		0.015	2.073			200	357
10	223+40 -L-				1.347							
11	14+20 -Y-10	1050 RCP	0.068			0.02						
SHEET TOTAL			1.070		1.403	0.121	0.369	3.715			1111	357

SCALE AS SHOWN

SHEET 47 OF 48

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 81672205 (R-22488B)  
 WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
 (MILKINSON BOULEVARD) TO NORTH OF I-85

# SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	OWNER	ADDRESS	SITE NO.
4	MECKLENBURG WILD LIFE	P.O. BOX 32732 CHARLOTTE N.C. 28232	2
86	NANCY ELIZABETH STOWE & JOAN M. BEATTY	133 OAKLAND STREET MT. HOLLY N.C. 28120	6 & 7
88	CSX RAILROAD	-----	8 & 11
89	WILLIAM B. & MARGARET W. CLINE	9624 MT. HOLLY RD CHARLOTTE N.C. 28214	9 & 10
90	BETTY B. McCLURE	133 QUEENSGATE LANE CHARLOTTE N.C. 28214	8
116	WILLIAM THOMAS ARNETTE	7455 ALDERSHOT PL PURCELLVILL VA. 22132	10
137	PATRICIA K. POWER	1905 WOODLEA RD CHARLOTTE N.C. 28208	10
925	PATRICIA K. POWER	1905 WOODLEA RD CHARLOTTE N.C. 28208	10

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672205 (R-22488B)  
WEST CHARLOTTE OUTER LOOP FROM NORTH OF US 29/74  
(WILKINSON BOULEVARD) TO NORTH OF I-85

SCALE AS SHOWN

# PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
18	NC DEPT.OF TRANSPORTATION	716 WEST MAIN STREET ALBEMARLE, NC 28001
19	DIANE COX LAWS	8092 GOLF COURSE DRIVE DENVER, NC 28037
20	CLYDE AND JEWEL COX REVOCABLE TRUST	4000 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
21	WILLIAM DOWD MCRORIE JR (ET AL)	819 GRAYS CREEK LN CHARLOTTE, NC 28214
22	JOHN JULIUS SHELL	4926 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
23	WALLACE DEAN AND RUTISHA G.CARTER	5118 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
24	EMMETT N.AND NANCY P.THOMPSON	5124 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
25	JAMES PARKS JR AND LOUISE GRIFFIN	5476 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
26	JAMES P.GRIFFIN	5484 MT HOLLY HUNTERSVILLE RD CHARLOTTE, NC 28216
27	G. C. MCCALL	6000 MT HOLLY-HUNTERSVILLE RD CHARLOTTE, NC 28216
28	ILA R.GODFREY	4421 OAKDALE ROAD CHARLOTTE, NC 28216
29	E.D.AND GERALDINE BIRMINGHAM	RT 2 BOX 6-A POLKTON, NC 28135
30	TED LEE BIRMINGHAM	16106 HENRY LN HUNTERSVILLE, NC 28078
31	RUBY H.SASSER (BY ENTIRETY)	4600 OAKDALE RD. CHARLOTTE, NC 28216
32	STEVEN W.AND MARIA H.MCCLURE	4504 OAKDALE RD. CHARLOTTE, NC 28216

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

PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
OUTER LOOP

# PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
1	MARY OATES MOORE	1225 GUM BRANCH ROAD CHARLOTTE, NC 28214
2	MAGGIE OATES MILLER EST	1201 GUM BRANCH ROAD CHARLOTTE, NC 28214
3	JOHN J. AND JEAN S. OATES	1032 GUM BRANCH ROAD CHARLOTTE, NC 28214
4	VIRGINIA I. OATES	1136 GUM BRANCH ROAD CHARLOTTE, NC 28214
5	DORSEY OATES WHITE	1201 GUM BRANCH ROAD CHARLOTTE, NC 28214
6	LEON R. AND TARA B. TYNER	10120 SPARKLING BROOK CO CHARLOTTE, NC 28214
7	HILDRED ROACH	13 BRYANTS NURSERY ROAD SILVER SPRINGS, MD 20905
8	CALVARY BAPTIST CHURCH INC. OF CHARLOTTE	2200 ASHLEY ROAD CHARLOTTE, NC 28208
9	NORMAN G. AND GLORIA R. ROACH	9832 OLD ROZZ FERRY ROAD CHARLOTTE, NC 28214
10	HOLLAND AND FRONIA ROACH	2823 BELLHAVEN DR CHARLOTTE, NC 28214
11	A. CALDWELL AND M.C. JOHNSON (ET AL)	7532 S. MAY STREET CHICAGO, IL 60643
12	HAYWOOD W. CALDWELL	19 TRENTON AVENUE FANWOOD, NJ 07023
13	RICHARD R. MOORE	8800 SHORE FRONT PKWY FAR ROCKAWAY, NY 11693
14	JOHN W. BROOME	17244 133RD AVE. APT 4C JAMAICA, NY 11434
15	MELISSA FRANCINE JOHNSON	PO BOX 3214 TEANECK, NJ 07666
16	HENRY LEWIS COX	9530 BELHAVEN BLVD CHARLOTTE, NC 28214
17	LAWINGS INC	5521 BROOKSHIRE BLVD CHARLOTTE, NC 28216

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

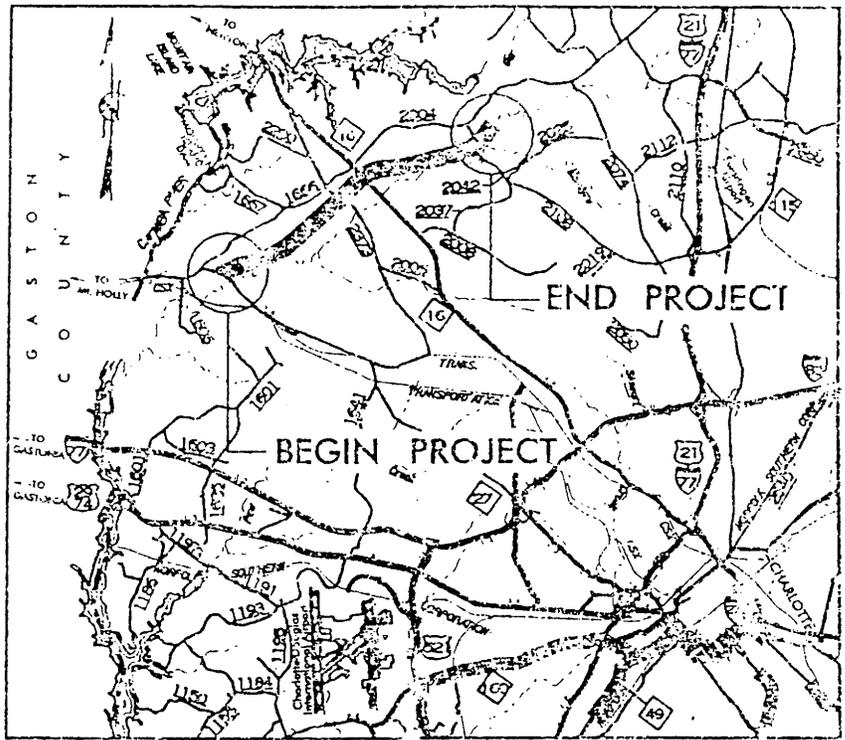
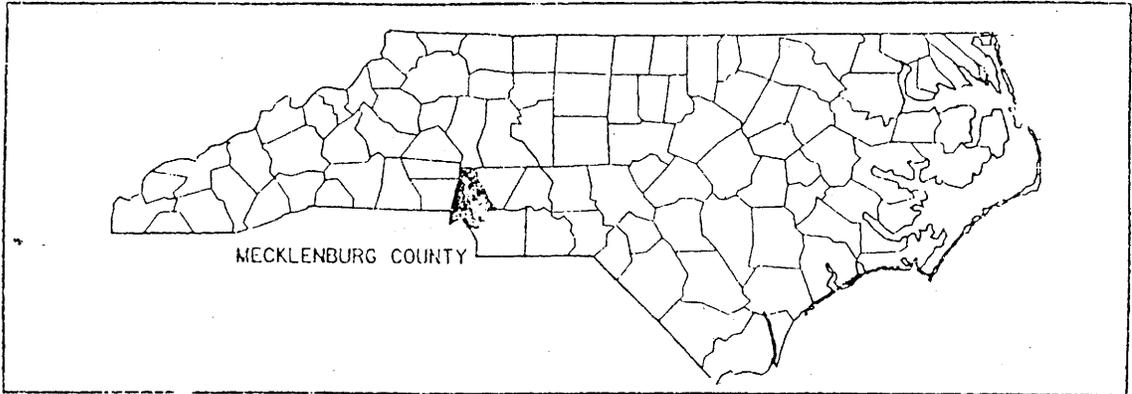
PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
OUTER LOOP

SITE	PROJECT STATION	STRUCTURE TYPE	WETLAND IMPACTS			CHANNEL IMPACTS			
			FILL IN WETLANDS (ha)	EXCAVATION IN WETLANDS (ha)	MECHANIZED CLEARING IN WETLANDS (METHOD) (ha)	SURFACE WATERS LOST (POND) (ha)	LENGTH OF EXISTING CHANNEL (FILLED) (m)	PROPOSED CHANNEL RELOCATION (m)	PROPOSED ENCLOSED CHANNEL (m)
1	196+00 -L-	1650 RCP	0.032						
2	12+00 RP "B"	2.1 X 1.8 RCBC	0.027		0.007				
3	211+00 -L-		0.064		0.012				
4	214+00 -L-		0.027						
5	218+00 -L-		0.046		0.083				
6	219+00 -L-	3.0 X 2.1 RCBC	0.865	0.056					
7	223+40 -L-			1.328					
8	14+20 -Y-10	1050 RCP	0.058		0.02				
SITE	SURFACE WATER DRAWING								
A	12 OF 37	2.1 X 1.5 RCBC					208	40	117.50
B	13 OF 37	2.1 X 1.8 RCBC				0.716	147	10	131.00
C	14 OF 37					0.858			
D	15 OF 37	900 RCP					102		80.40
E	16 OF 37					0.068	182	215	
F	17 OF 37	900 RCP					160	125	92.4
G-H	18 OF 37	3.0 X 2.1 RCBC				0.037	200	140	43.55
H	19 OF 37	3.0 X 2.1 RCBC				0.603		75	101.8
H	20 OF 37	3.0 X 2.1 RCBC				1.433		135	
I	21 OF 37	1350 RCP					74		65.60
TOTAL			1.119	1.384	0.122	3.715	1073	740	632

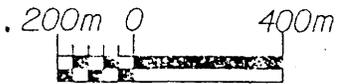
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.JU672205 (R-22488B)

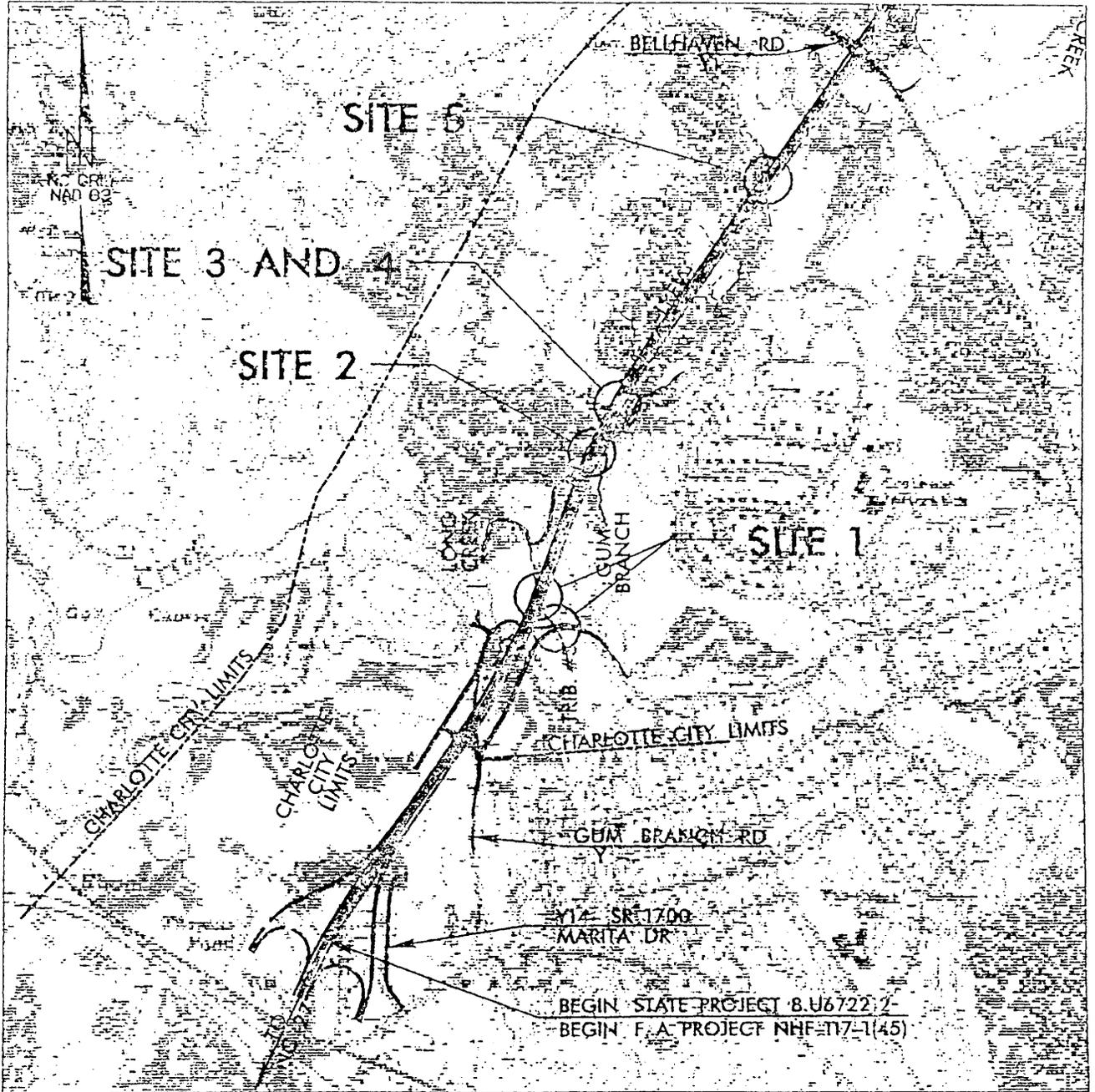


VICINITY  
MAPS

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP



# MATCHLINE SITE MAP 2

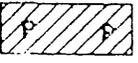
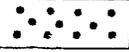
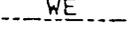
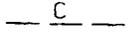
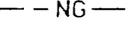
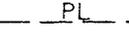
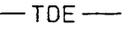
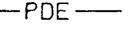
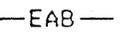
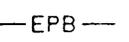
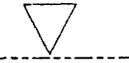


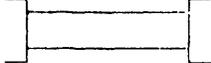
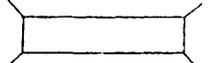
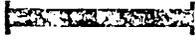
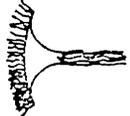
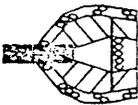
# SITE MAP 1

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 MECKLENBURG COUNTY  
 PROJECT: 8.U672212 (R-2248C)  
 WEST CHARLOTTE  
 OUTER LOOP

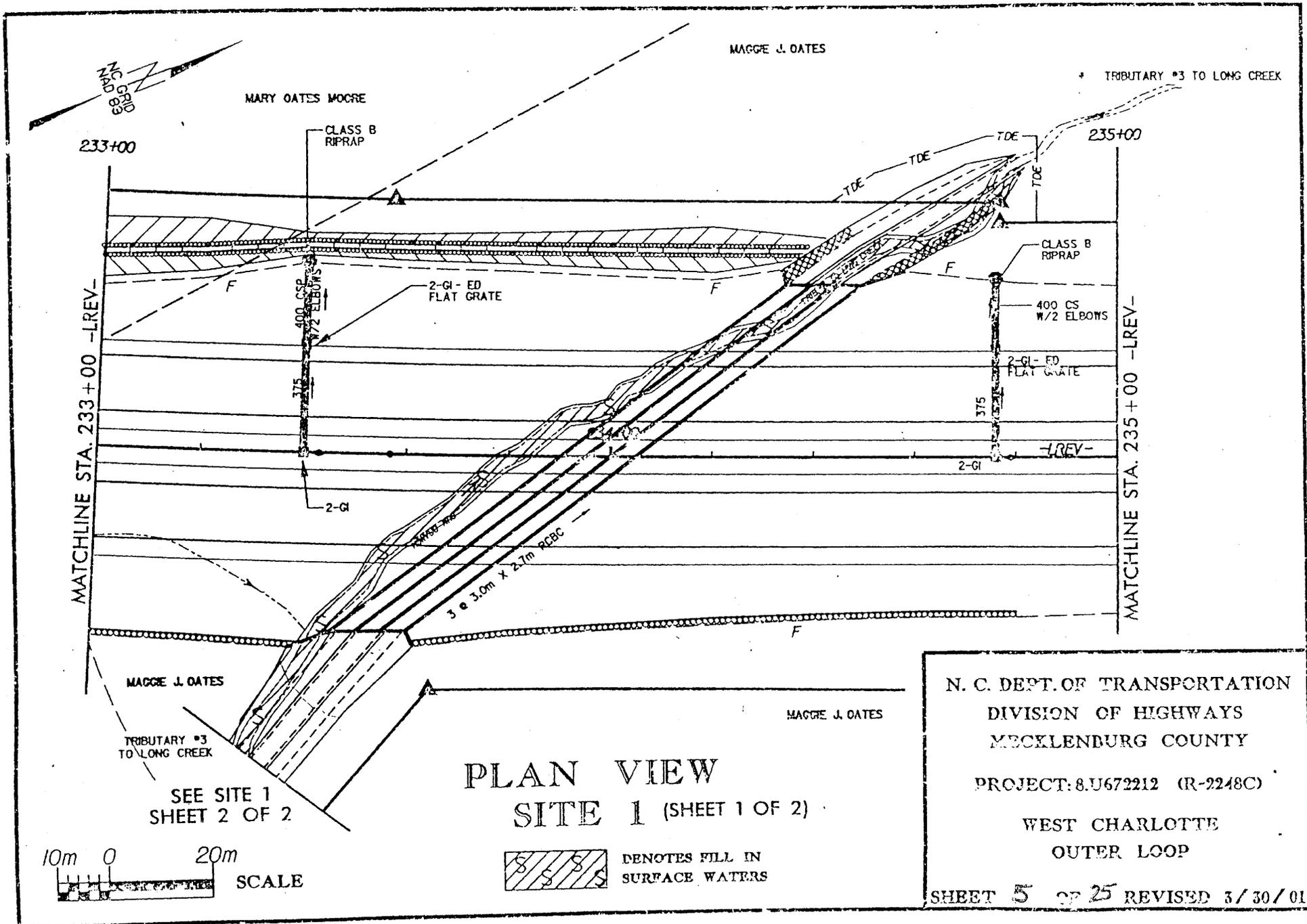


# LEGEND

-  WETLAND BOUNDARY
-  WETLAND
-  DENOTES FILL IN WETLAND
-  DENOTES FILL IN SURFACE WATER
-  DENOTES FILL IN SURFACE WATER (POND)
-  DENOTES TEMPORARY FILL IN WETLAND
-  DENOTES EXCAVATION IN WETLAND
-  DENOTES TEMPORARY FILL IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING
-  FLOW DIRECTION
-  TOP OF BANK
-  EDGE OF WATER
-  PROP. LIMIT OF CUT
-  PROP. LIMIT OF FILL
-  PROP. RIGHT OF WAY
-  NATURAL GROUND
-  PROPERTY LINE
-  TEMP. DRAINAGE EASEMENT
-  PERMANENT DRAINAGE EASEMENT
-  EXIST. ENDANGERED ANIMAL BOUNDARY
-  EXIST. ENDANGERED PLANT BOUNDARY
-  WATER SURFACE

-  LIVE STAKES
-  BOULDER
-  COIR FIBER ROLLS
-  ADJACENT PROPERTY OWNER OR PARCEL NUMBER
-  PROPOSED BRIDGE
-  PROPOSED BOX CULVERT
-  PROPOSED PIPE CULVERT
- (DASHED LINES DENOTE EXISTING STRUCTURES)
-  SINGLE TREE
-  WOODS LINE
-  DRAINAGE INLET
-  ROOTWAD
-  VANE
-  RIP RAP
-  RIP RAP ENERGY DISSIPATOR BASIN

**N. C. DEPT. OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
  
**MECKLENBURG COUNTY**  
  
**PROJECT: 8.U672212 (R-2248C)**  
**WEST CHARLOTTE**  
**OUTER LOOP**



MAGGE J. OATES

TRIBUTARY #3 TO LONG CREEK

MARY OATES MOORE

233+00

235+00

MATCHLINE STA. 233+00 -LREV-

MATCHLINE STA. 235+00 -LREV-

CLASS B RIPRAP

CLASS B RIPRAP

400 CS W/2 ELBOWS

400 CS W/2 ELBOWS

2-GI-ED FLAT GRATE

2-GI-ED FLAT GRATE

2-GI

2-GI

3 @ 3.0m X 2.7m RBCB

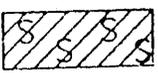
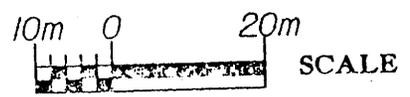
MAGGE J. OATES

MAGGE J. OATES

TRIBUTARY #3 TO LONG CREEK

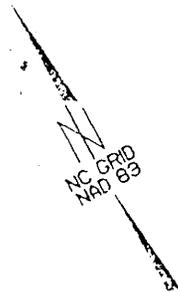
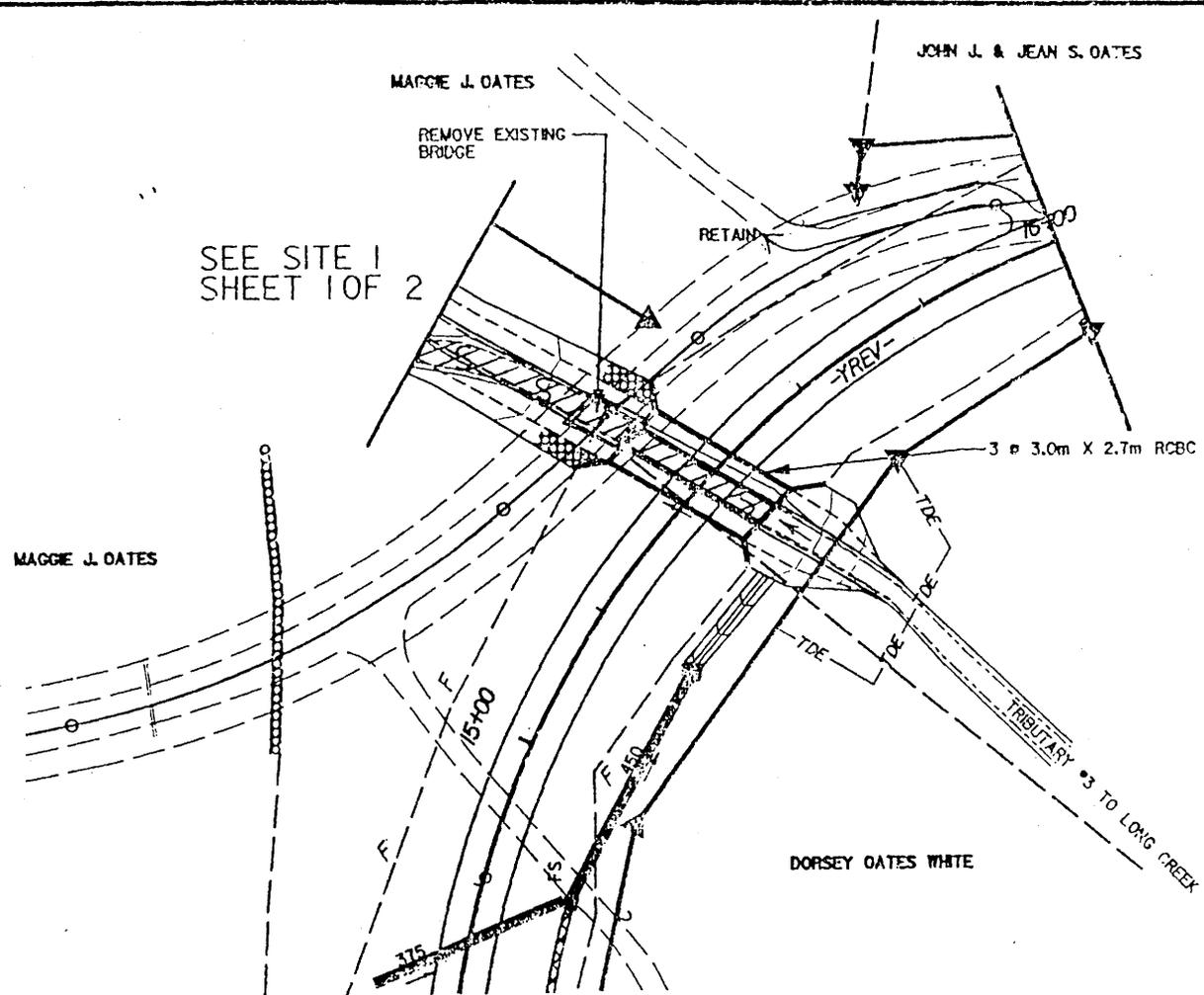
SEE SITE 1 SHEET 2 OF 2

PLAN VIEW  
SITE 1 (SHEET 1 OF 2)



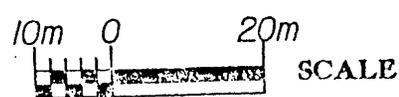
DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 5 OF 25 REVISED 3/30/01



SEE SITE 1  
SHEET 1 OF 2

PLAN VIEW  
SITE 1 (SHEET 2 OF 2)



 DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 6 OF 25 REVISED 3/30/01

LEON R. & WIFE, TARA B. TYLER

N  
240  
03

MAGGE J. OATES

CLASS B  
RIPRAP

LONG CREEK

400 CSP  
W/2 ELBOWS

2-GI

MILDRED BOACH

-REV-

239+00

239+00

2-GI

240+00

2-GI  
FLAT GRATE

375

CLASS II  
RIPRAP

400 CSP  
W/2 ELBOWS  
CLASS B RIPRAP

2-GI  
FLAT GRATE

JOHN J. & JEAN S. OATES

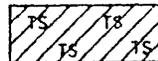
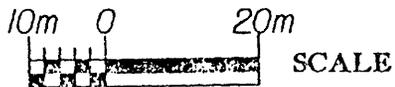
GUM BR

400 CSP  
W/2 ELBOWS

LONG CREEK

CALVARY BAPTIST  
CHURCH, INC.  
OF CHARLOTTE

# PLAN VIEW SITE 2



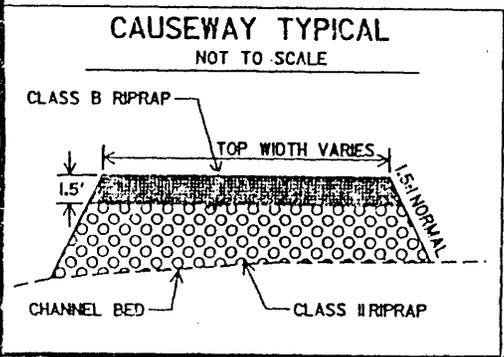
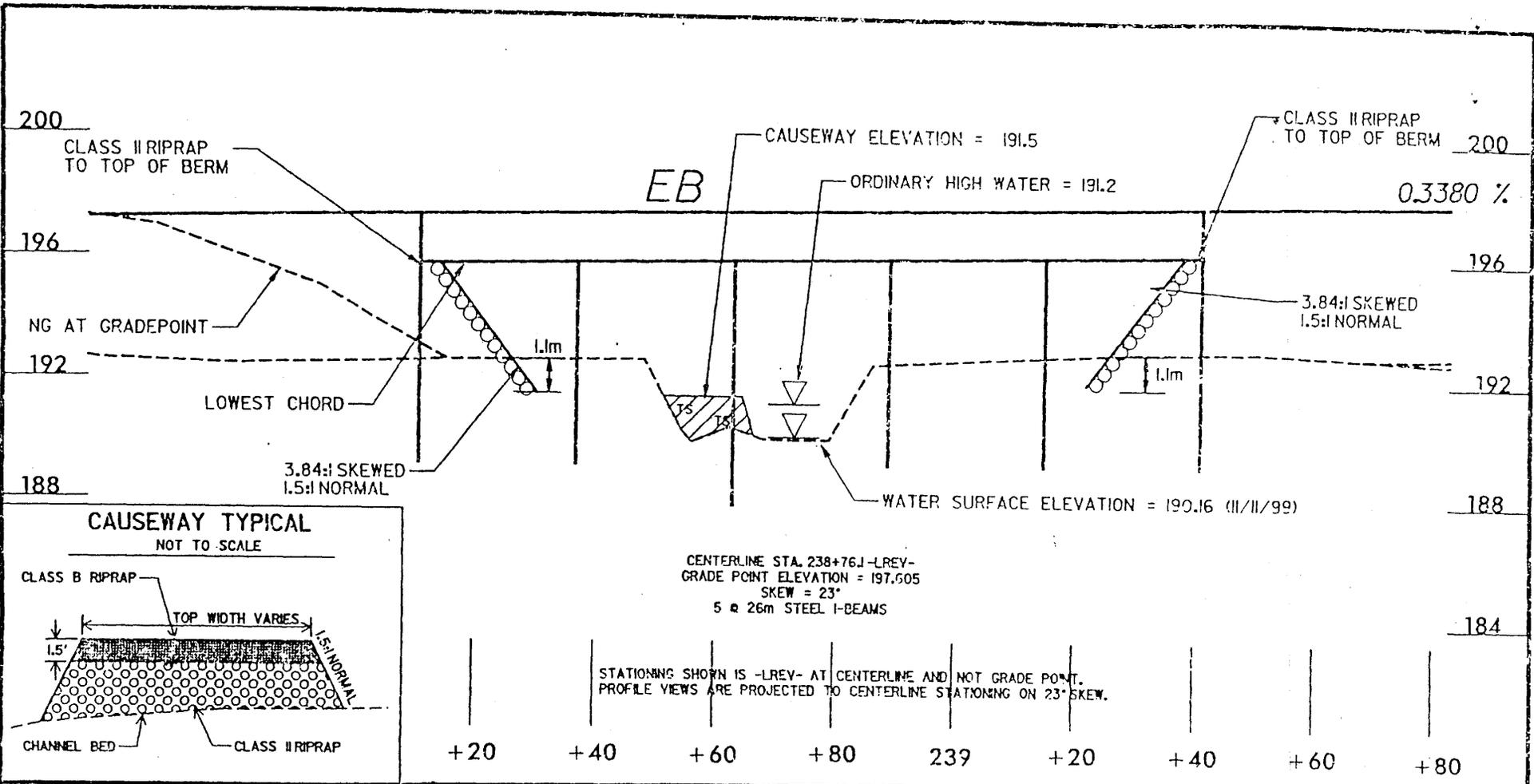
DENOTES TEMPORARY FILL  
IN SURFACE WATERS

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

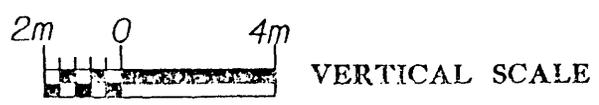
PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
OUTER LOOP

SHEET 7 OF 25 REVISED 3/21/01

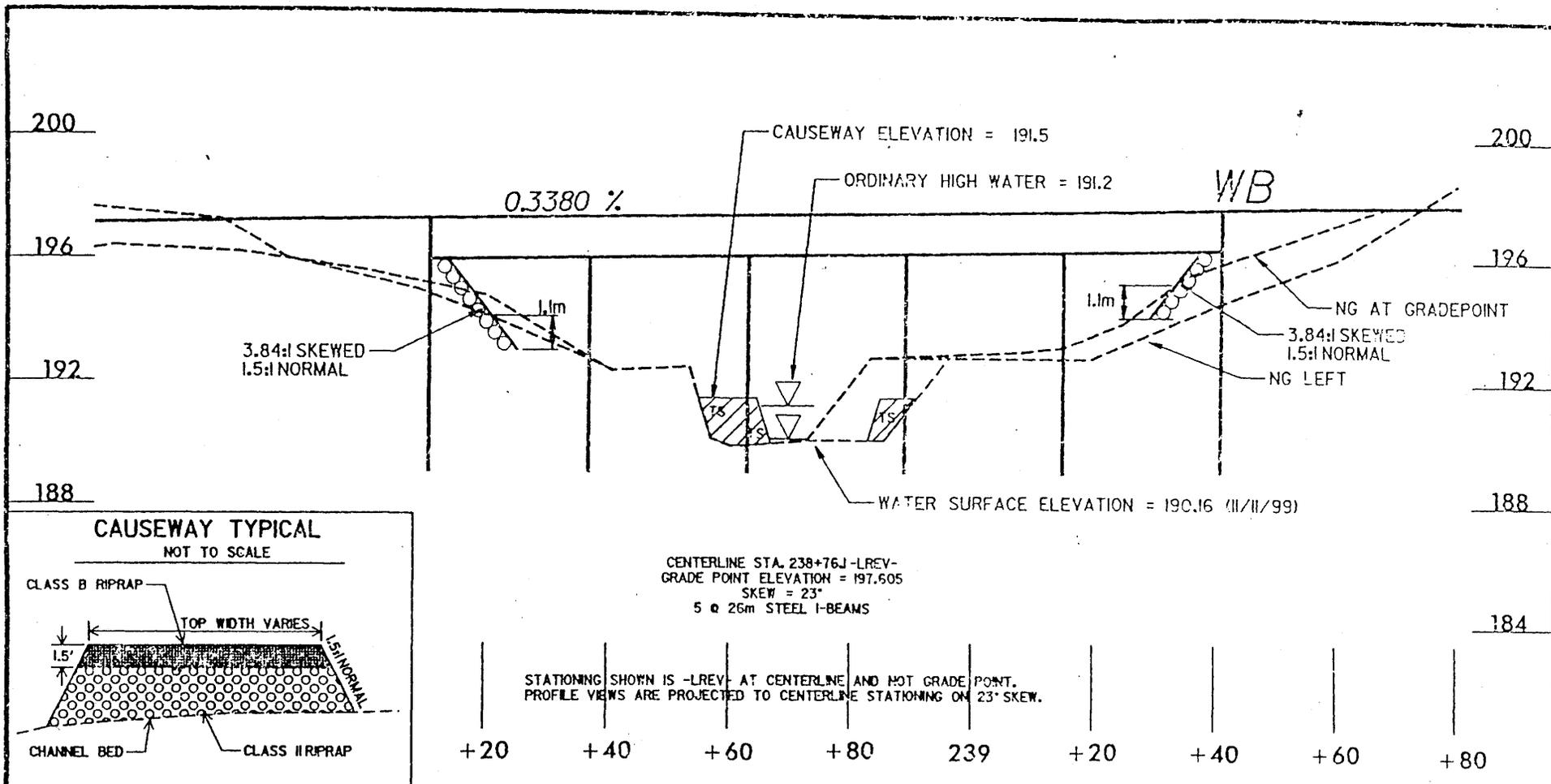


**SITE 2 EAST BOUND PROFILE**

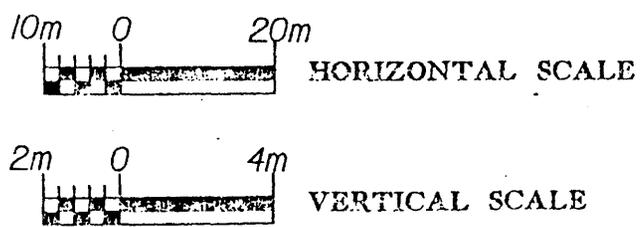


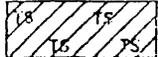
DENOTES TEMPORARY FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 MECKLENBURG COUNTY  
 PROJECT: 8.U672212 (R-2248C)  
 WEST CHARLOTTE  
 OUTER LOOP  
 SHEET 8 OF 25 3/21/01



# SITE 2 WEST BOUND PROFILE



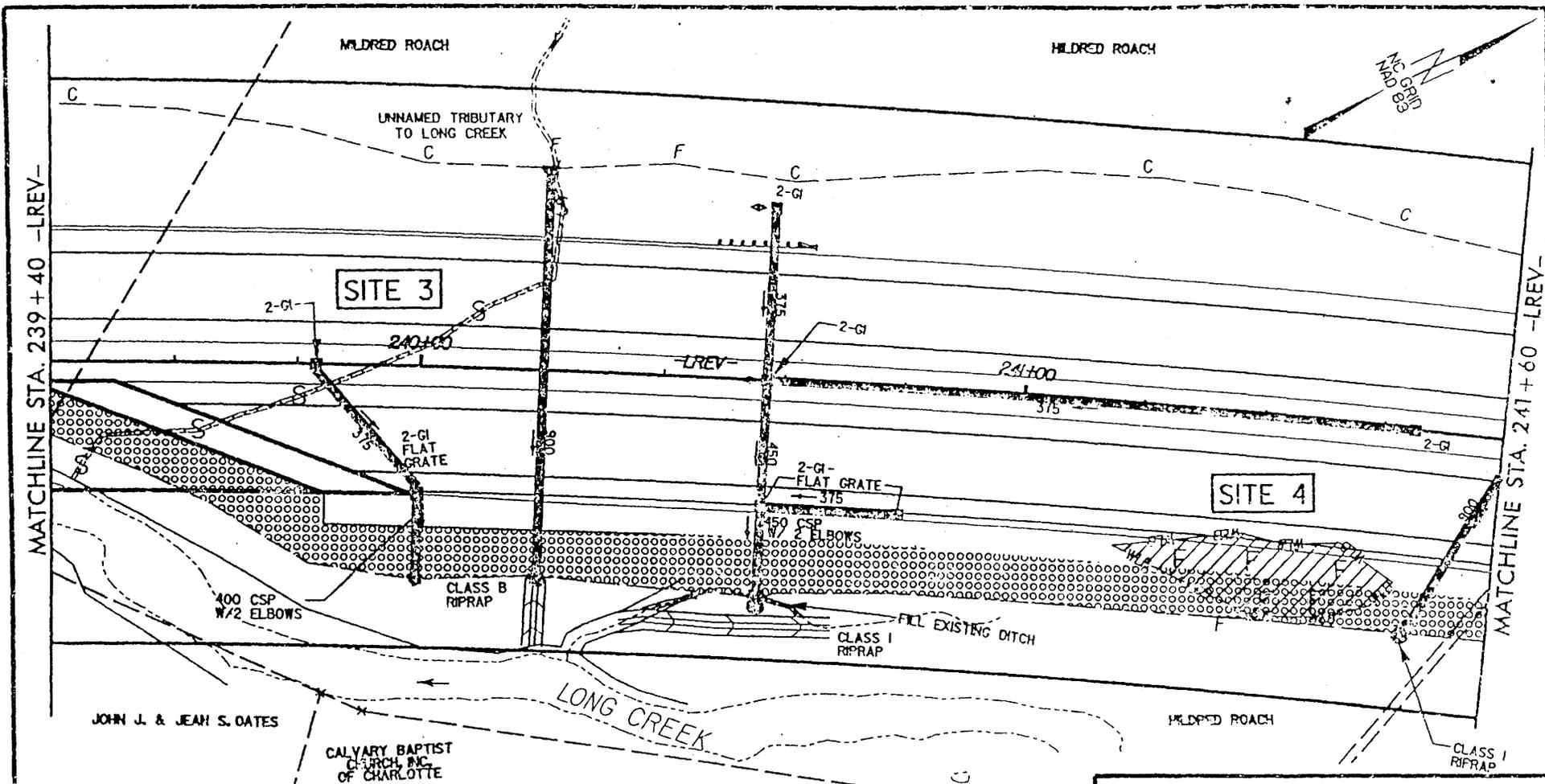
 DENOTES TEMPORARY FILL IN SURFACE WATERS

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

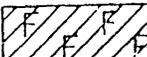
PROJECT: 8.U672212 (R-2248C)

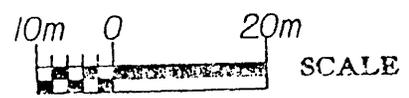
WEST CHARLOTTE  
OUTER LOOP

SHEET 9 OF 25 3/21/01

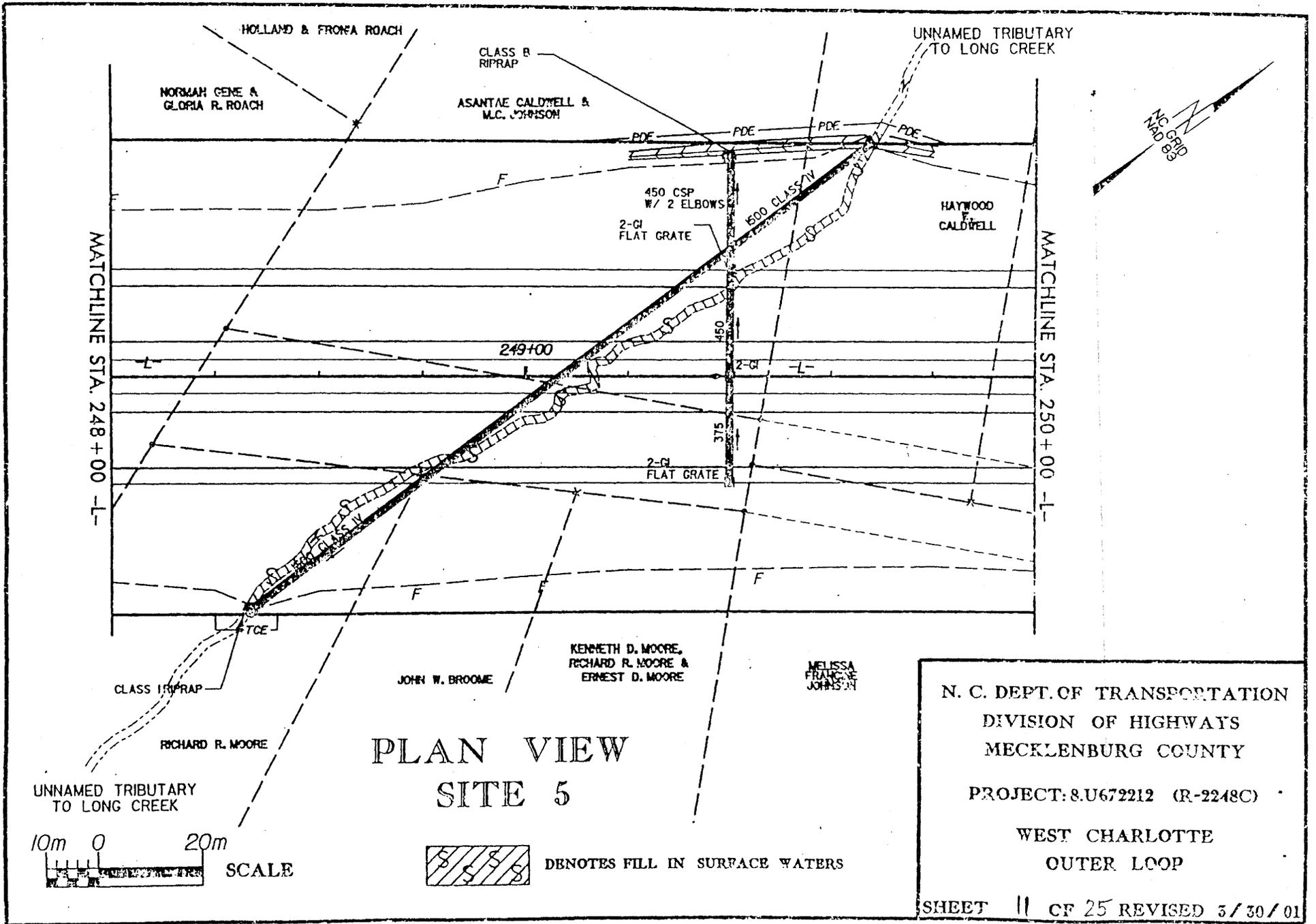


PLAN VIEW  
SITE 3 & SITE 4

-  DENOTES FILL IN SURFACE WATERS
-  DENOTES FILL IN WETLANDS



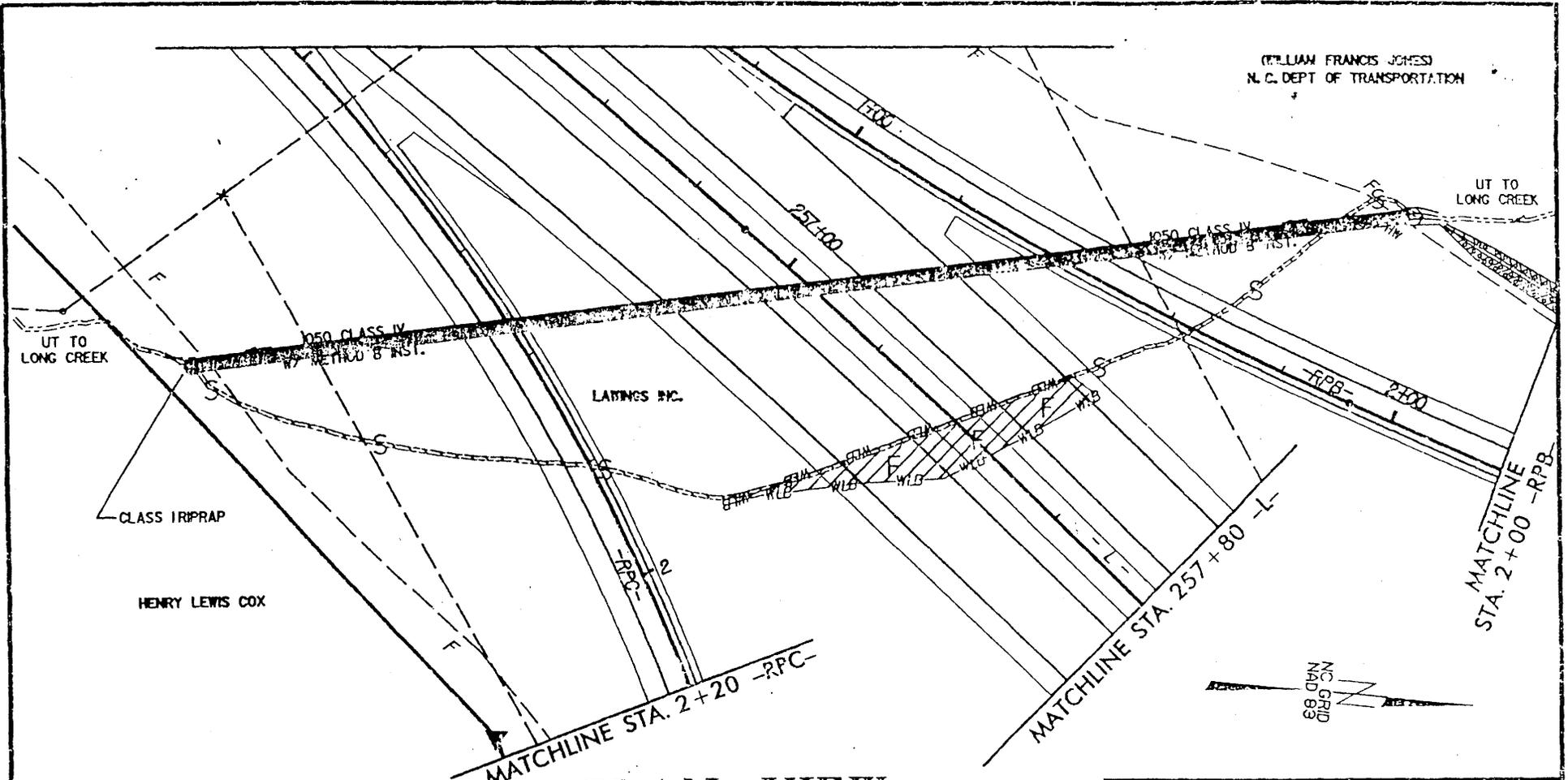
N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-22100)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 10 OF 25 REVISED 3/30/01



PLAN VIEW  
SITE 5

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 MECKLENBURG COUNTY  
 PROJECT: 8.U672212 (R-2248C)  
 WEST CHARLOTTE  
 OUTER LOOP  
 SHEET 11 OF 25 REVISED 5/30/01

WILLIAM FRANCIS JONES  
N. C. DEPT. OF TRANSPORTATION



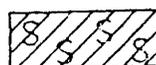
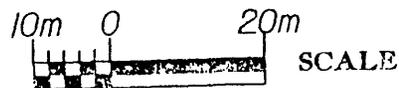
### PLAN VIEW SITE 6

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

PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
OUTER LOOP

SHEET 12 OF 25 REVISED 3/30/01

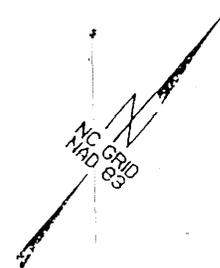
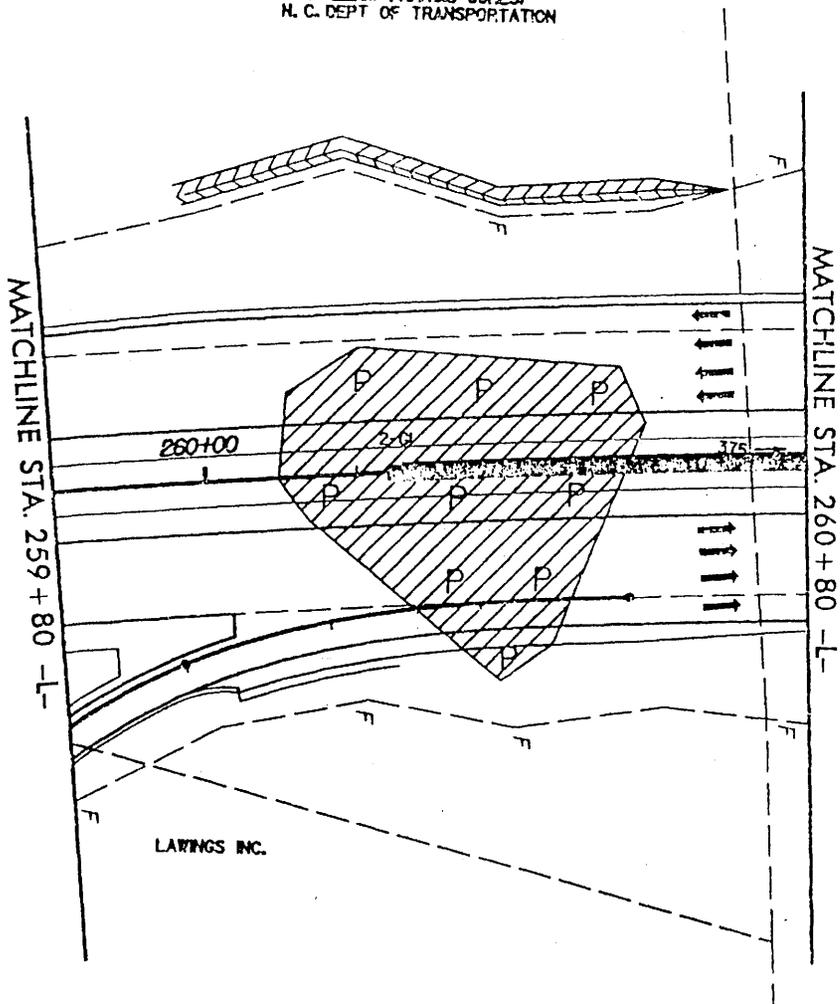


DENOTES FILL IN  
SURFACE WATERS



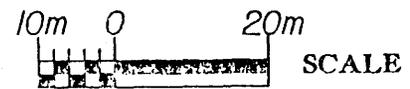
DENOTES FILL IN WETLANDS

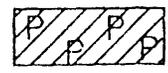
WILLIAM FRANCIS JONES  
N. C. DEPT. OF TRANSPORTATION



# PLAN VIEW SITE 7

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C) .  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 13 OF 25 REVISED 3/30/01

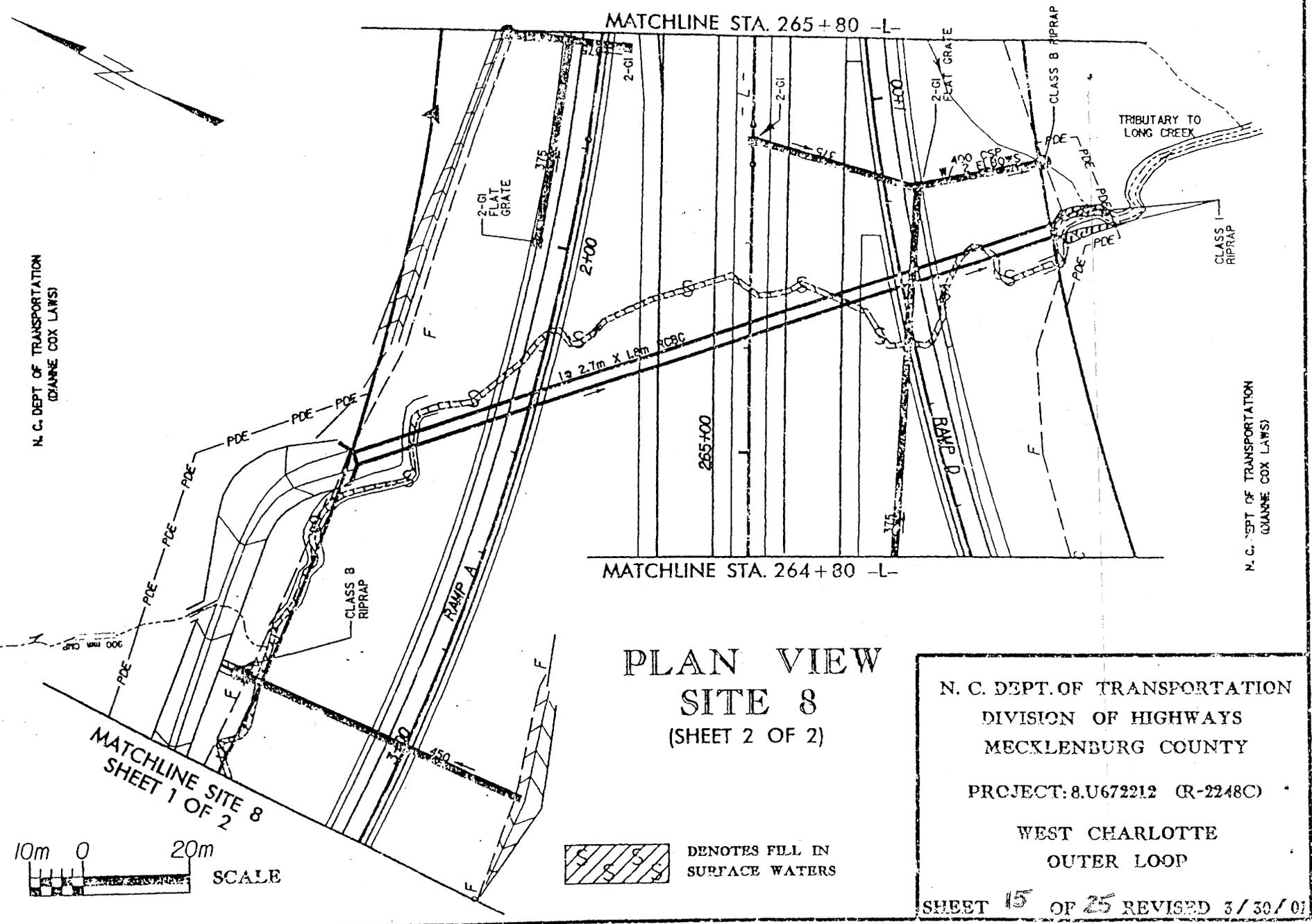


 DENOTES FILL IN SURFACE WATER (POND)



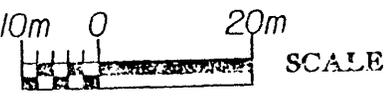
N. C. DEPT. OF TRANSPORTATION  
(DIANNE COX LAWS)

N. C. DEPT. OF TRANSPORTATION  
(DIANNE COX LAWS)



PLAN VIEW  
SITE 8  
(SHEET 2 OF 2)

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 15 OF 25 REVISED 3/30/01

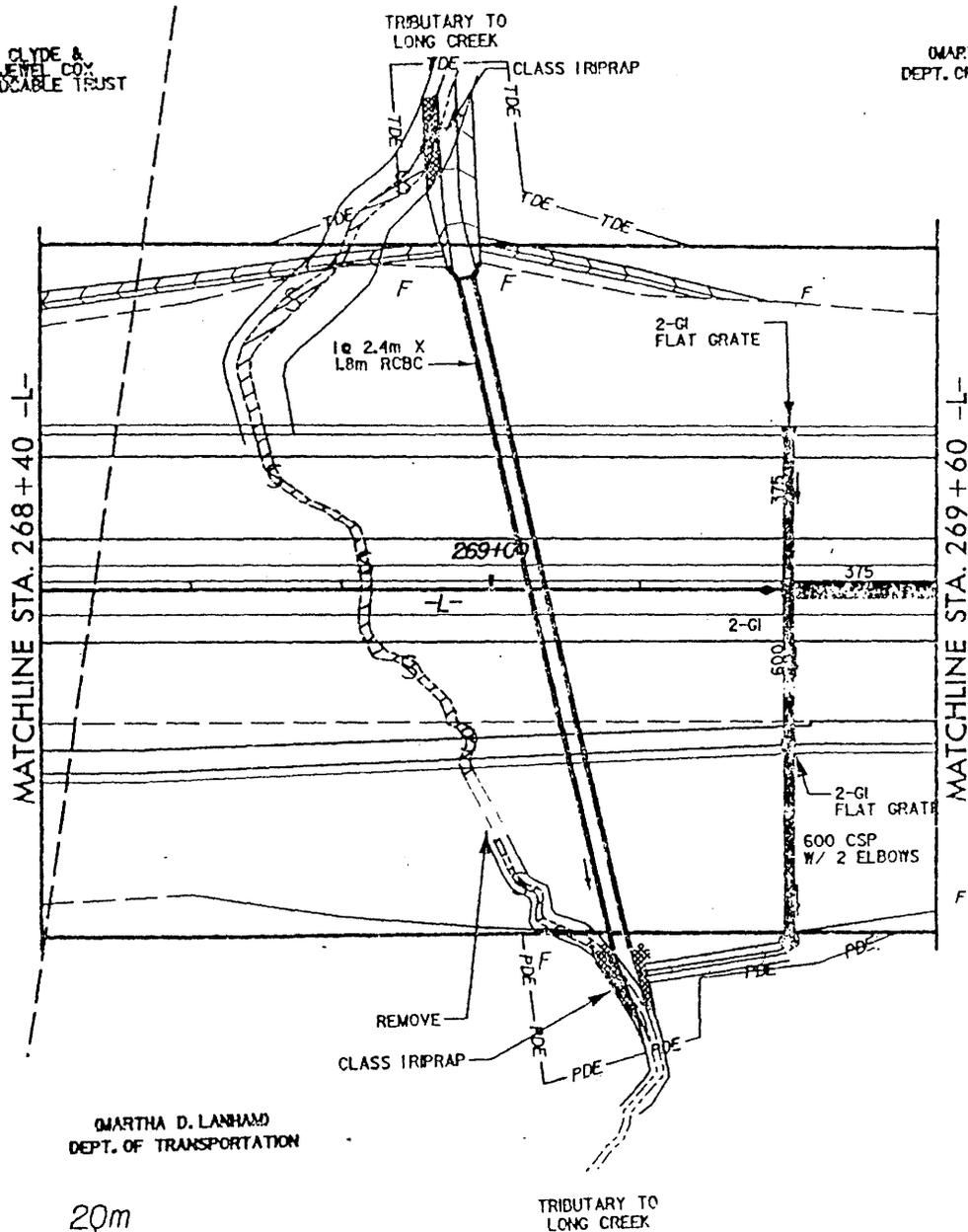


 DENOTES FILL IN SURFACE WATERS

CLYDE &  
WEBB CO.  
REVOCABLE TRUST

MARTHA D. LANHAM  
DEPT. OF TRANSPORTATION

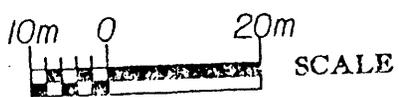
NC GRID  
NAD 83



# PLAN VIEW SITE 9

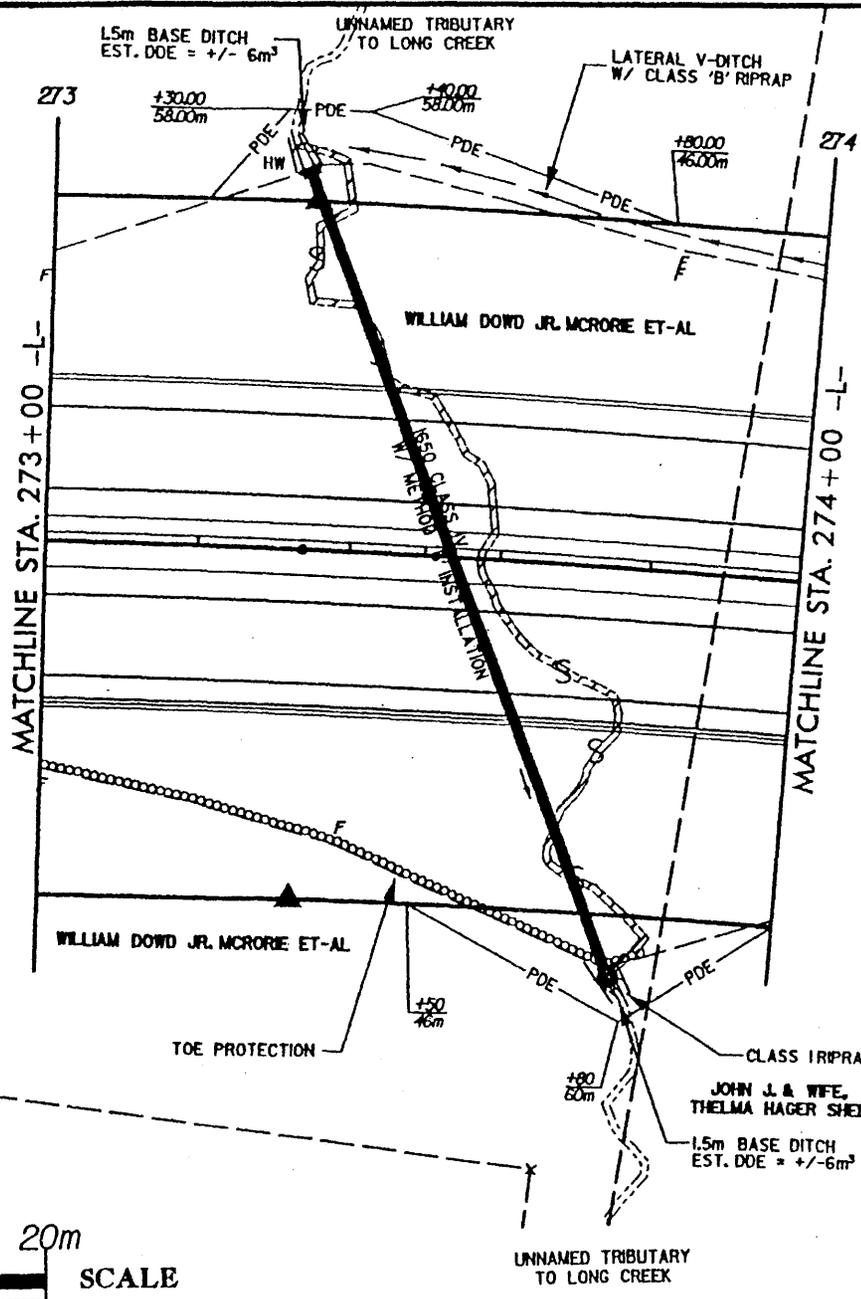
 DENOTES FILL IN  
SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 MECKLENBURG COUNTY  
 PROJECT: 8.U672212 (R-2248C)  
 WEST CHARLOTTE  
 OUTER LOOP  
 SHEET 16 OF 25 REVISED 3/30/01



MARTHA D. LANHAM  
DEPT. OF TRANSPORTATION

TRIBUTARY TO  
LONG CREEK

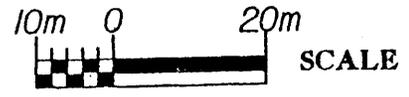


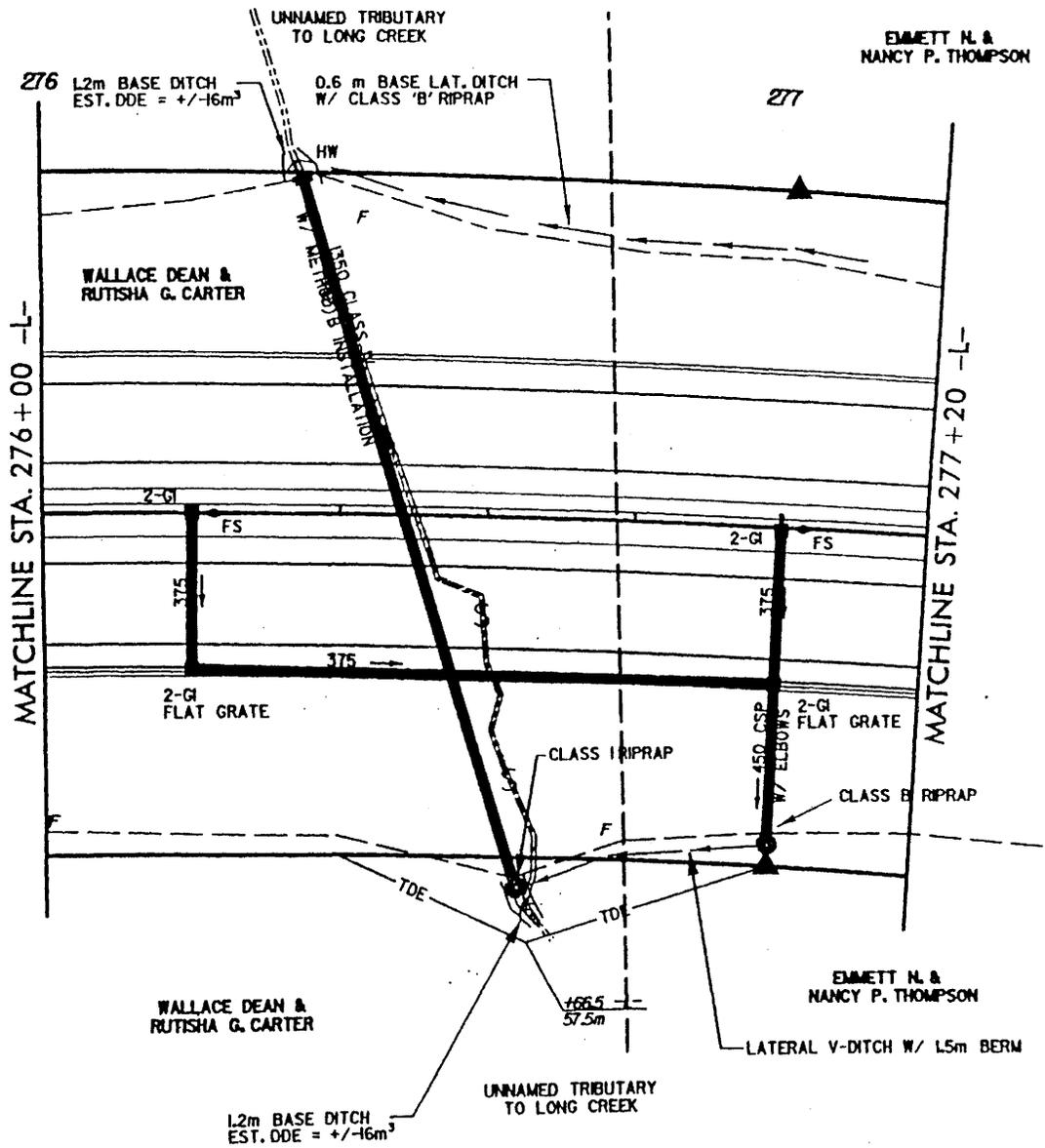
PLAN VIEW  
SITE 10



DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 17 OF 25 REVISED 6/18/01





EMMETT N. &  
NANCY P. THOMPSON

276 L2m BASE DITCH  
EST. DDE = +/-16m

0.6 m BASE LAT. DITCH  
W/ CLASS 'B' RIPRAP

277

WALLACE DEAN &  
RUTISHA G. CARTER

MATCHLINE STA. 276+00 -L-

MATCHLINE STA. 277+20 -L-

2-GI  
FLAT GRATE

2-GI  
FLAT GRATE

CLASS I RIPRAP

CLASS B RIPRAP

WALLACE DEAN &  
RUTISHA G. CARTER

EMMETT N. &  
NANCY P. THOMPSON

L2m BASE DITCH  
EST. DDE = +/-16m

UNNAMED TRIBUTARY  
TO LONG CREEK

LATERAL V-DITCH W/ 1.5m BERM

166.5  
57.5m

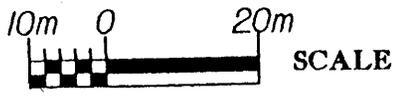


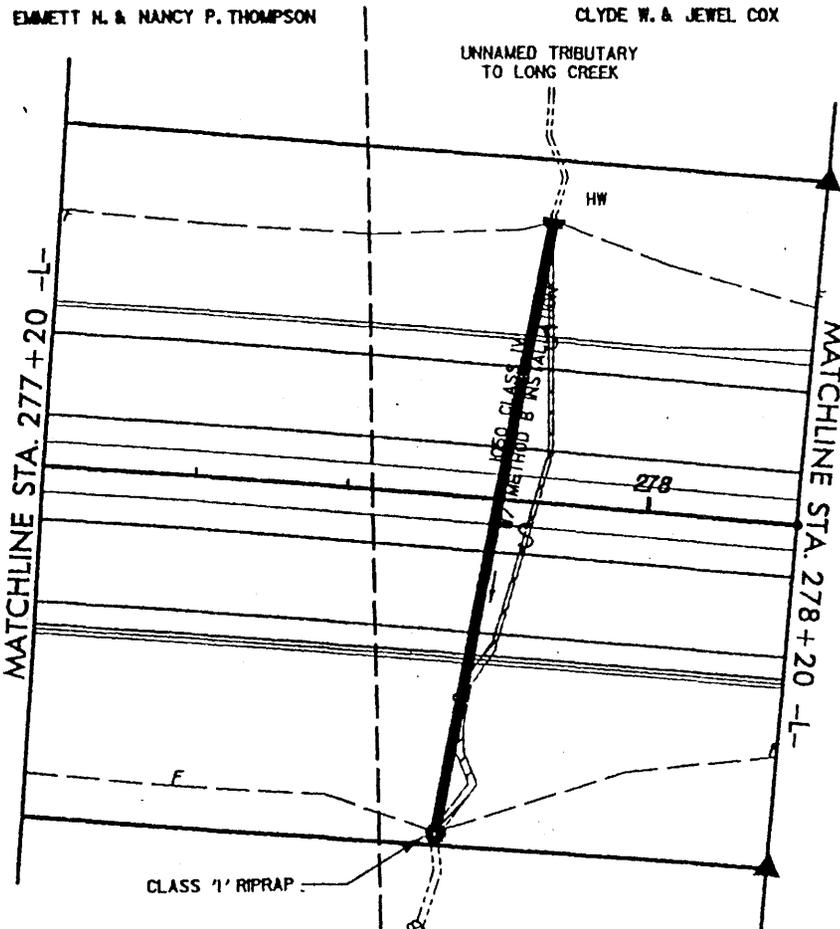
# PLAN VIEW SITE 11



DENOTES FILL IN  
SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP  
SHEET 18 OF 25 REVISED 6/18/01





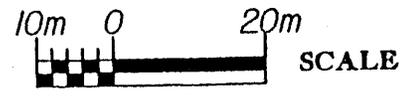
PLAN VIEW  
SITE 12

 DENOTES FILL IN SURFACE WATERS

EMMETT N. & NANCY P. THOMPSON

UNNAMED TRIBUTARY TO LONG CREEK

CLYDE W. & JEWEL COX



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

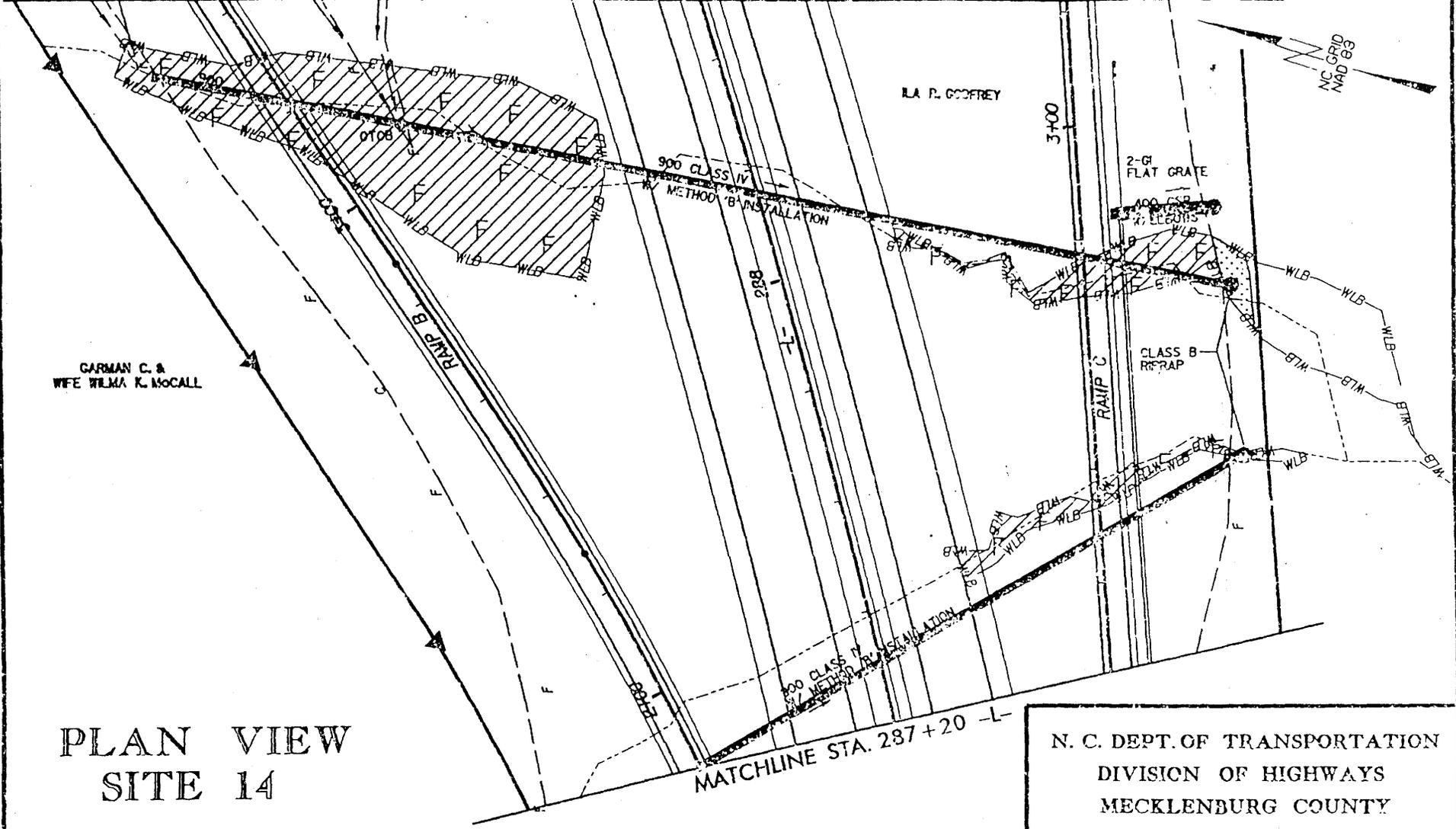
PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
OUTER LOOP

SHEET 19 OF 25 REVISED 6/18/01



MATCHLINE STA. 288+50 -L-



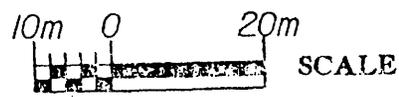
# PLAN VIEW SITE 14

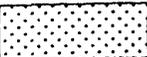
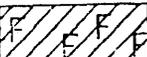
N. C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 MECKLENBURG COUNTY

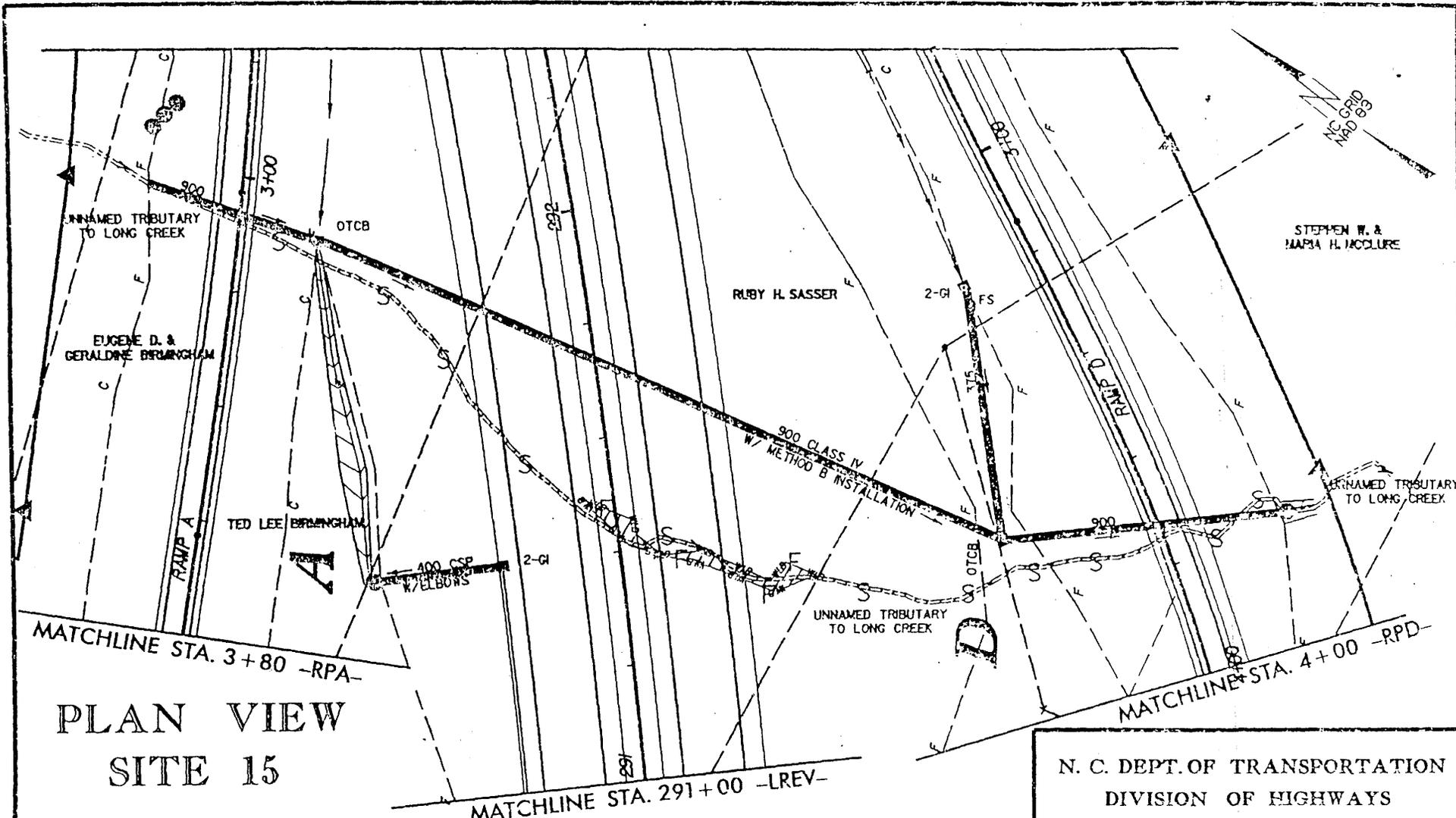
PROJECT: 8.U672212 (R-2248C)

WEST CHARLOTTE  
 OUTER LOOP

SHEET 21 OF 25 REVISED 3/30/01



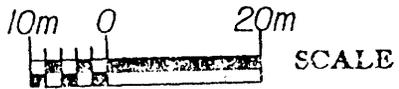
-  DENOTES MECHANIZED CLEARING
-  DENOTES FILL IN WETLANDS

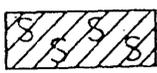


PLAN VIEW  
SITE 15

N. C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
MECKLENBURG COUNTY  
PROJECT: 8.U672212 (R-2248C)  
WEST CHARLOTTE  
OUTER LOOP

SHEET 22 OF 25 REVISED 3/30/01



-  DENOTES FILL IN SURFACE WATERS
-  DENOTES FILL IN WETLANDS

### IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size	WETLAND IMPACTS				SURFACE WATER IMPACTS						BUFFER IMPACTS			
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Relocated Channel (m)	Enclosed Channel (m)	Zone 1 (ha)	Zone 2 (ha)		
1	234+00	3 @ 3.0m X 2.7m RCBC					0.0574					265	128	133		
2	238+00/239+40	5 @ 26m BRIDGE					0.0149		0.0847							
3	239+40/240+00	900 RCP					0.0063					106	11	68		
4	241+20/241+60	N/A	0.0385													
5	249+10	1500 RCP					0.0262					158		152		
6	257+40	1050 RCP	0.0273				0.0135					226		208		
7	260+10/260+40	N/A							0.1425							
8	265+25	1 @ 2.7m X 1.8m RCBC					0.042					435	100	276		
9	268+80	1 @ 2.4m X 1.8m RCBC					0.0178					137	31	90		
10	273+60	1650 RCP					0.0141					157	4	113		
11	276+50	1350 RCP					0.007					115		99		
12	277+80	1050 RCP					0.0065					87		83		
13	280+60/282+00	1050 RCP / 1650 RCP	0.0612				0.0007	0.5521				12		12		
14	287+40/288+50	900 RCP / 900 RCP	0.2099			0.0055										
15	291+45	900 RCP	0.0074				0.0139					235	5	211		
<b>TOTALS:</b>			0.3443	0	0	0.0055	0.2203	0.6946	0.0847			1933	279	1445	0	0

N.C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

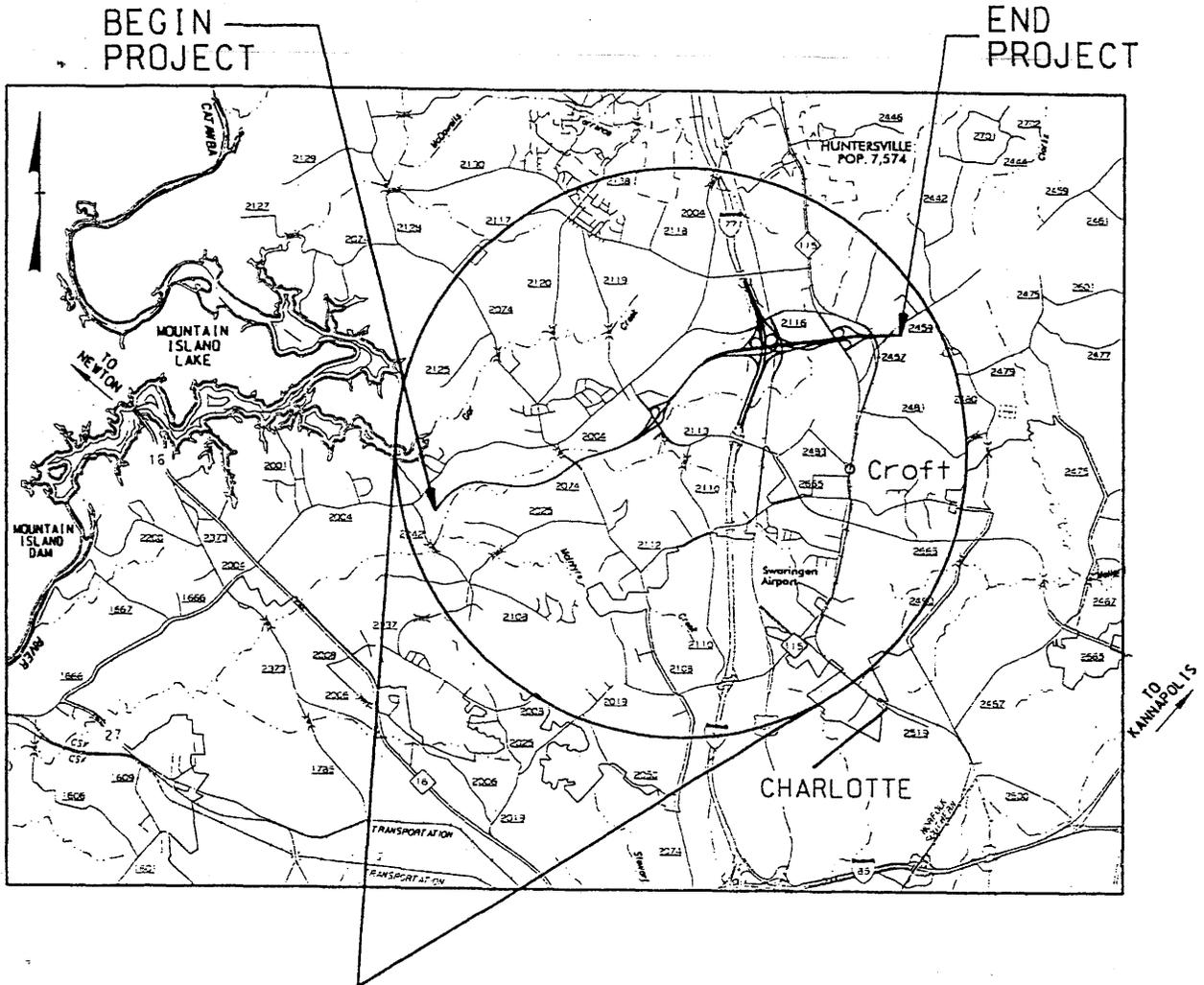
MECKLENBURG COUNTY

PROJECT: 8.U672212 (R-2248C)

SHEET 23 OF 25

REVISED 06/18/2001

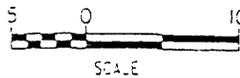
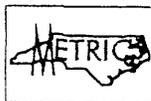
# VICINITY MAP



SITE

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



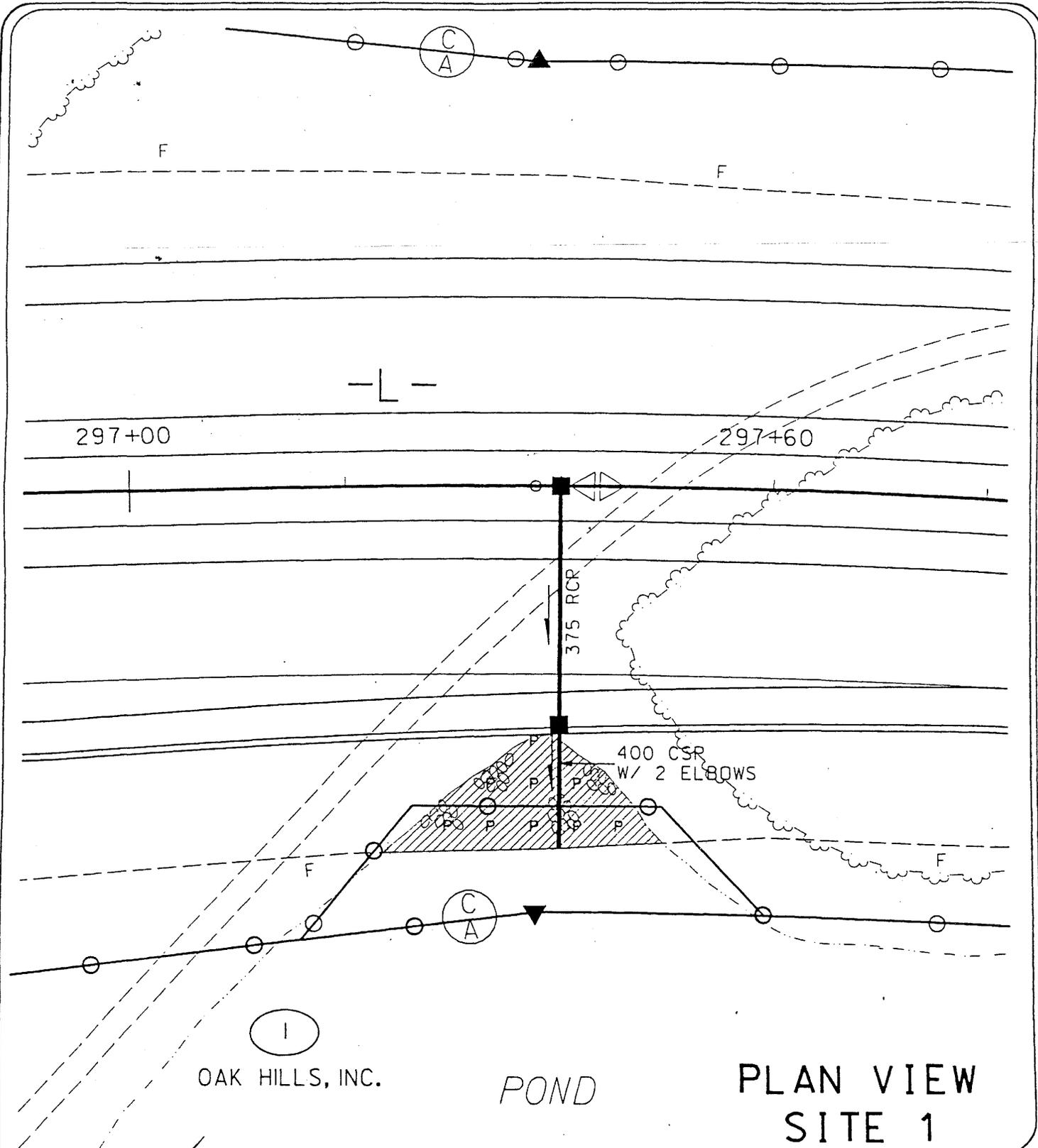
SHEET 1 OF 98

DATE: 2/26/98  
DRAWN BY: J. G. G. TRANSMISSY, JR. @ permits.vicinity.dgn









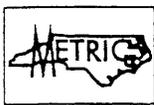
OAK HILLS, INC.

POND

# PLAN VIEW SITE 1

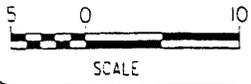
### LEGEND

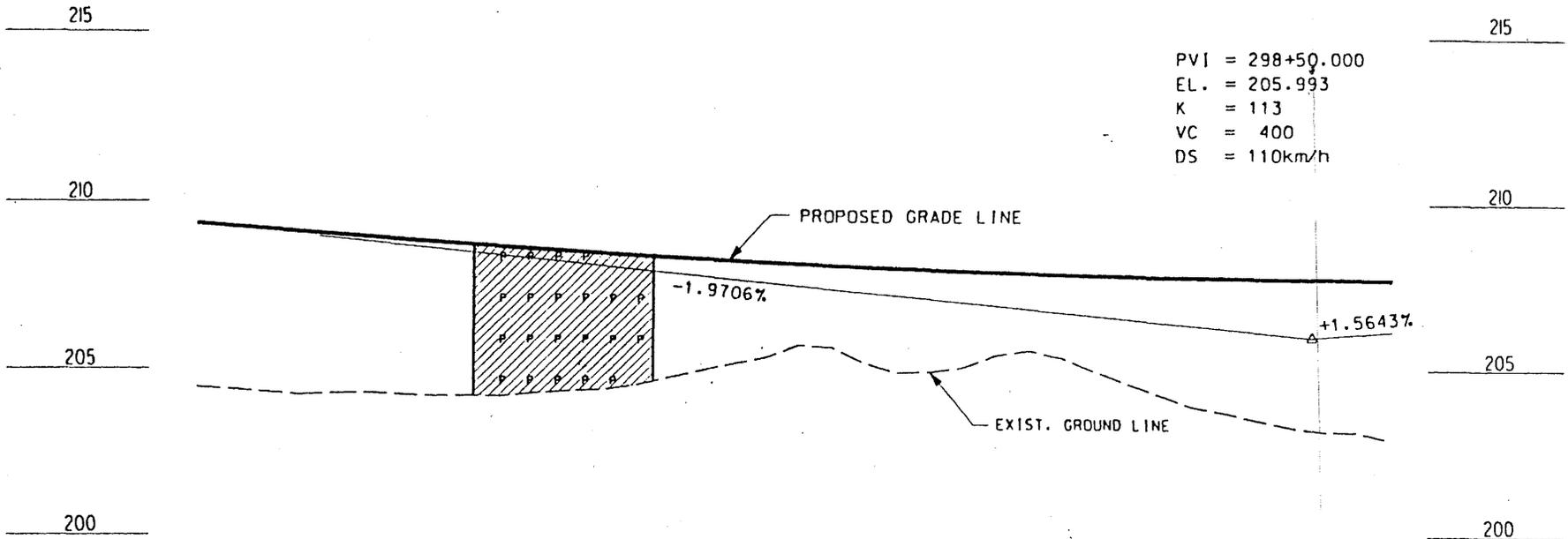
 DENOTES FILL IN SURFACE WATER (POND)



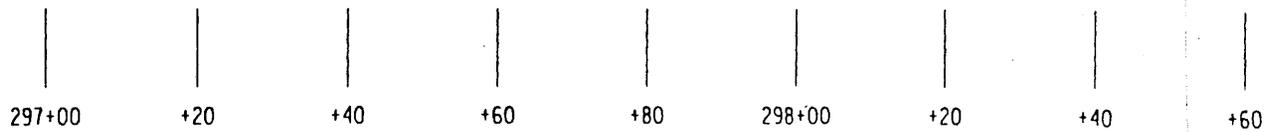
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-22480)  
CHARLOTTE OUTER LOOP

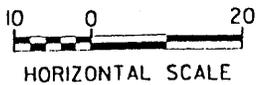
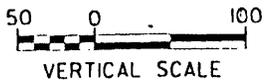




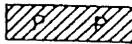
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 EL. = 205.993  
 K = 113  
 VC = 400  
 DS = 110km/h



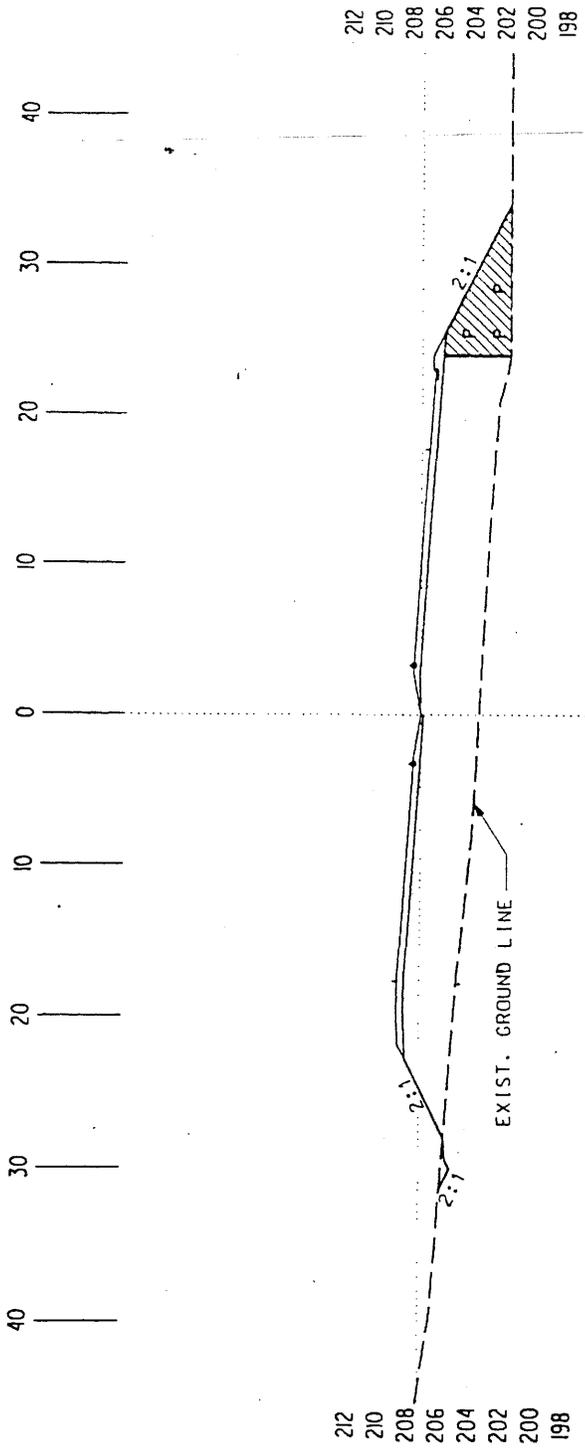
**SITE 1**  
 -L-LINE PROFILE-



**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 8,067,2214 (R-22480)  
 CHARLOTTE OUTER LOOP



**LEGEND**

DENOTES FILL IN  
SURFACE WATER  
(POND)

**SITE 1**  
**CROSS SECTION**  
(L-LINE 297+40)



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

OAK HILLS, INC.

SANDY COOPER

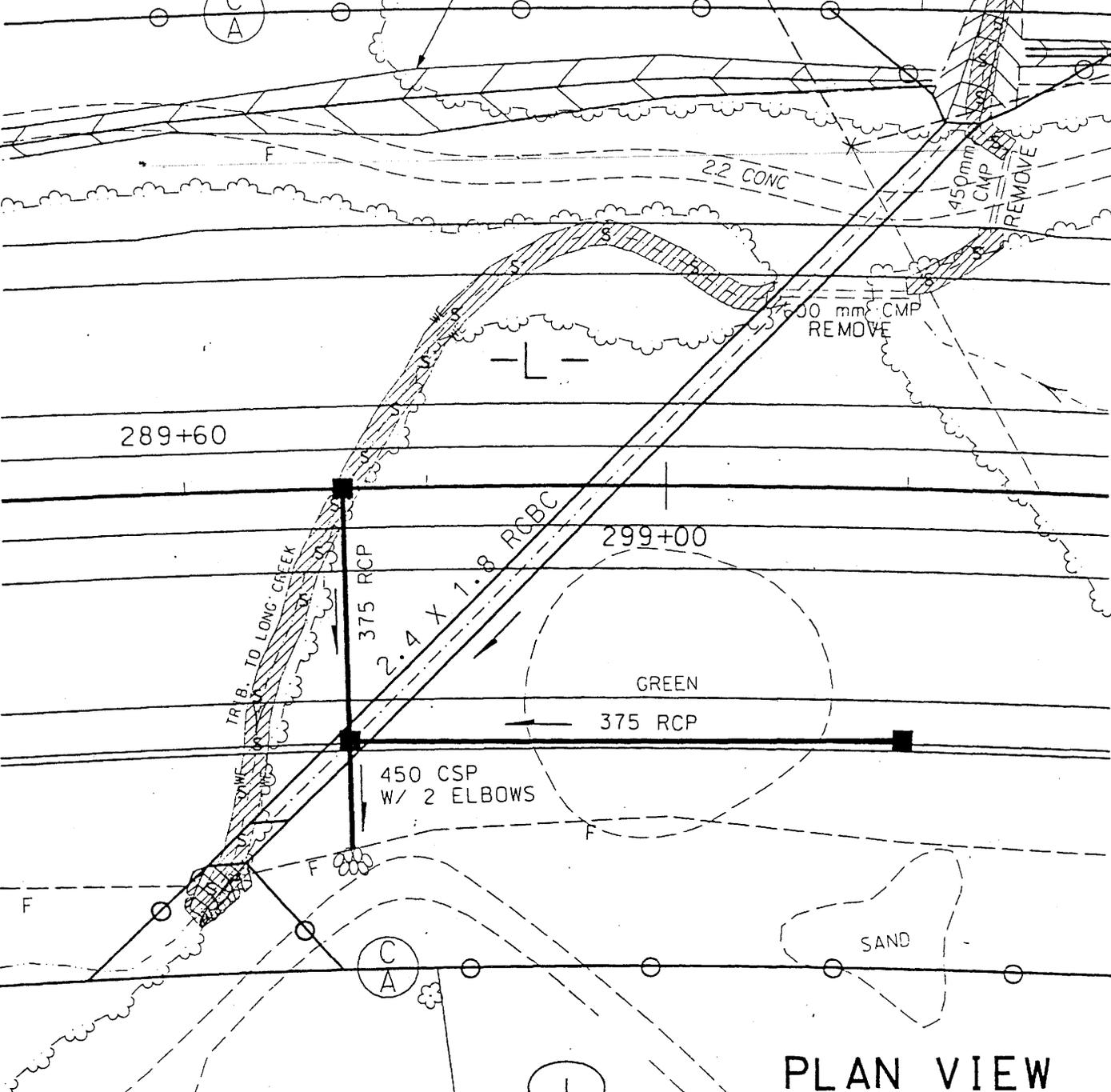
LAT. "V" DITCH

TDE

1

2

C  
A



289+60

299+00

GREEN

375 RCP

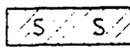
450 CSP  
W/ 2 ELBOWS

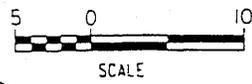
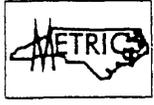
SAND

OAK HILLS, INC.

# PLAN VIEW SITE 2

## LEGEND

 DENOTES FILL IN SURFACE WATER

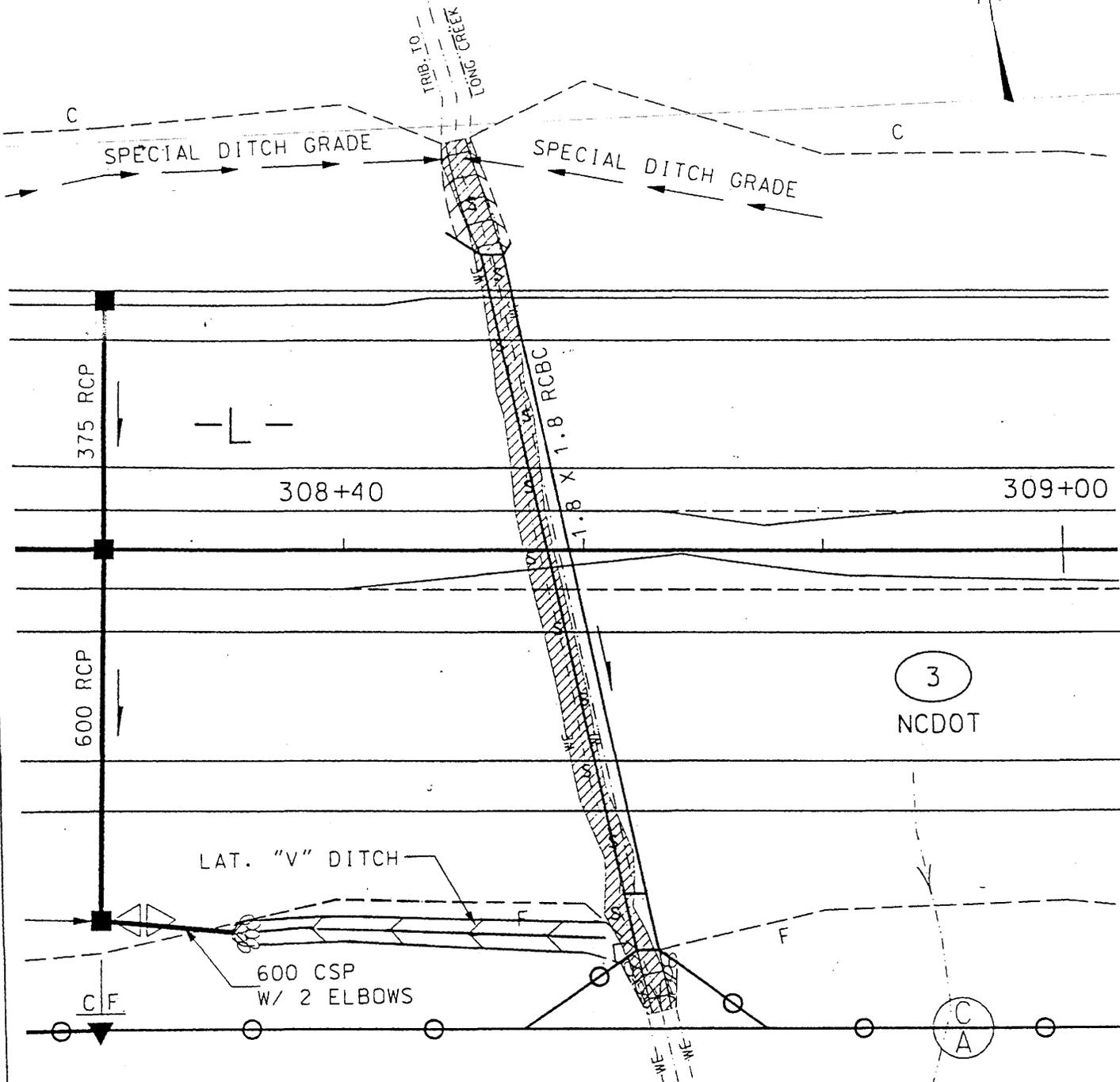


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
B.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

C:\p11\110311\p110311.dwg

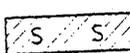
3  
NCDOT

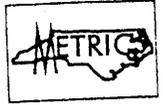


3  
NCDOT

# PLAN VIEW SITE 3

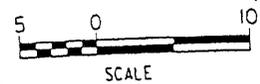
## LEGEND

 DENOTES FILL IN SURFACE WATER



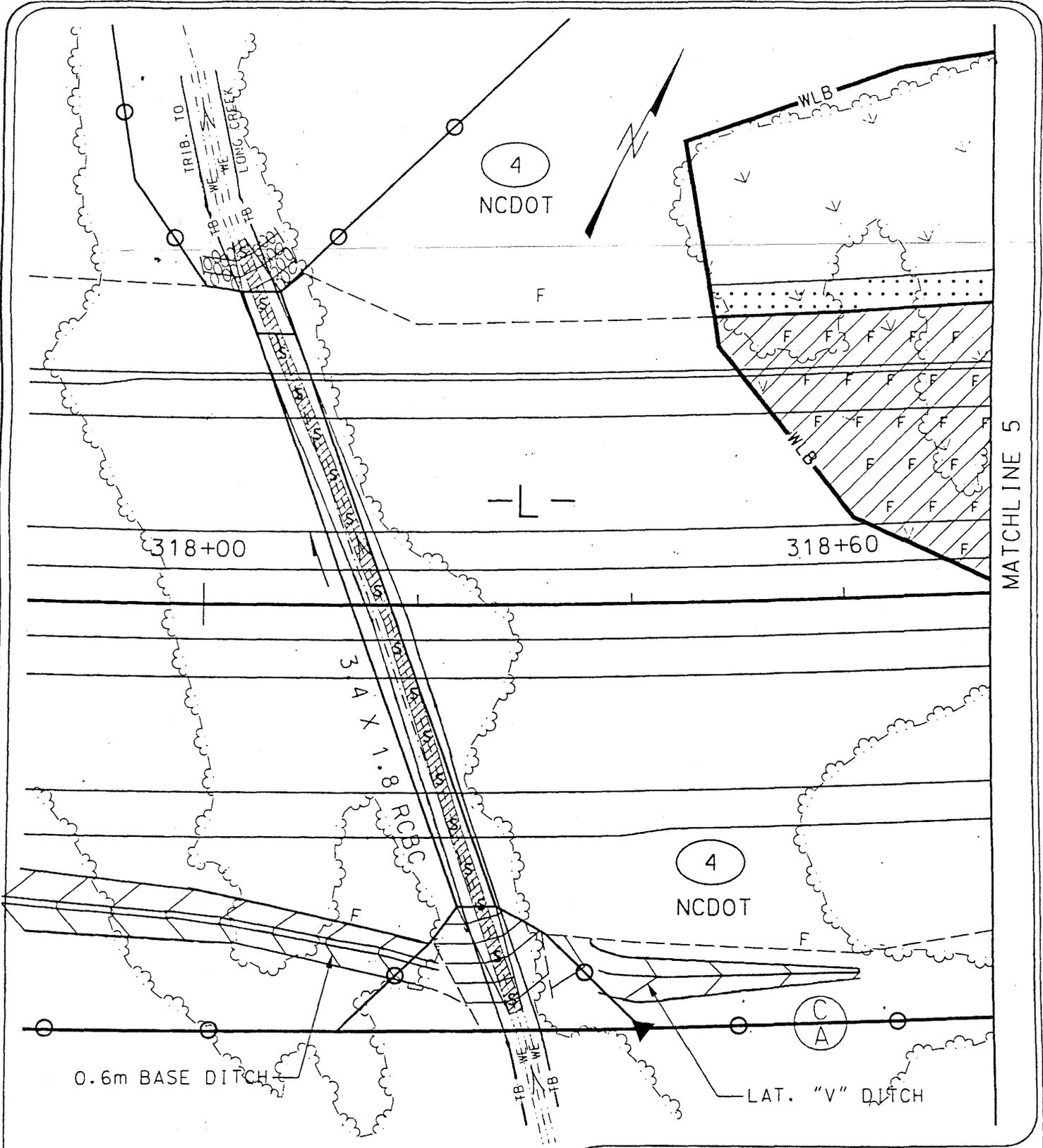
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



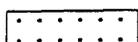
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MATCHLINE 5

**LEGEND**

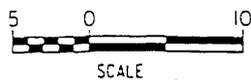
-  WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING

**PLAN VIEW  
SITE 5**



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



MECKLENBURG COUNTY

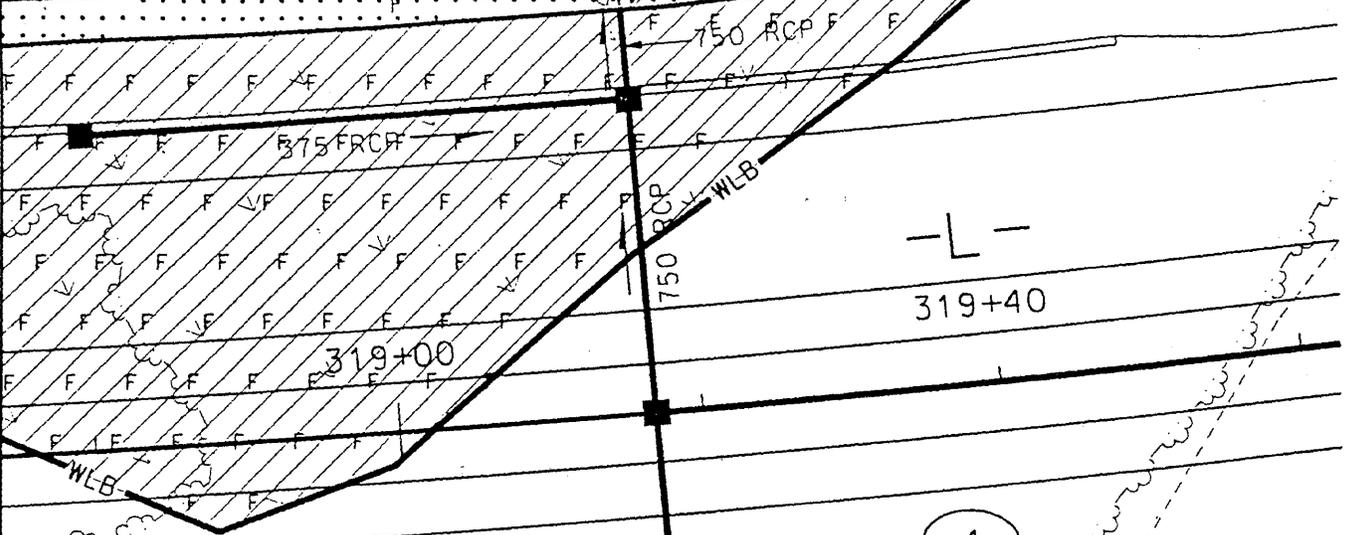
4  
NCDOT

C  
A

WLB

LAT. "V" DITCH

MATCHLINE 5



-L-

319+40

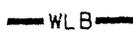
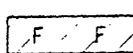
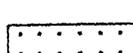
319+00

4  
NCDOT

SPECIAL DITCH GRADE

# PLAN VIEW SITE 5

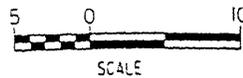
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES MECHANIZED CLEARING

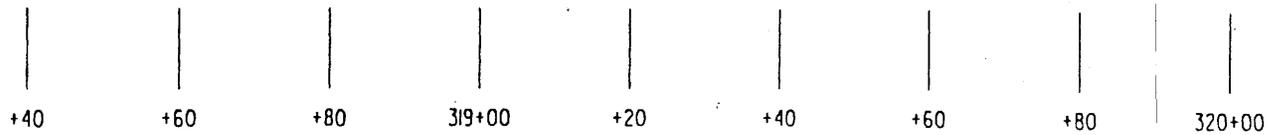
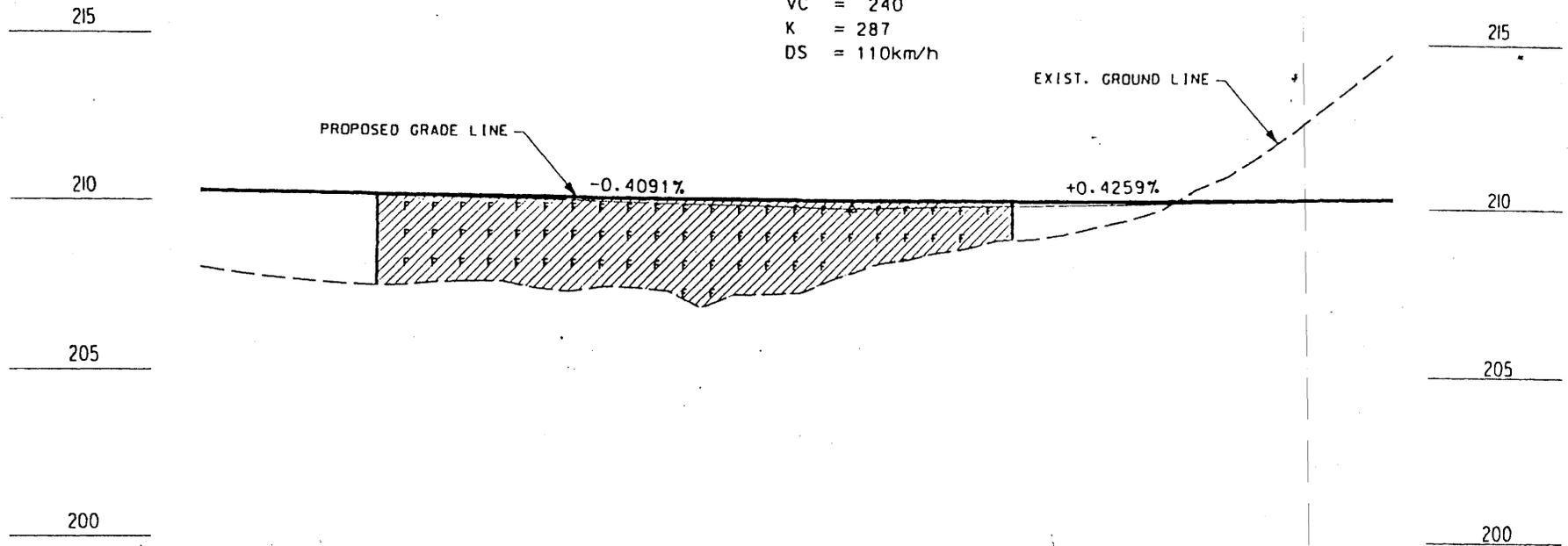


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

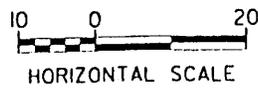
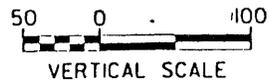
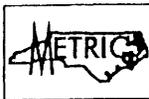
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



PVI = 319+20.000  
 EL. = 209.900  
 VC = 240  
 K = 287  
 DS = 110km/h



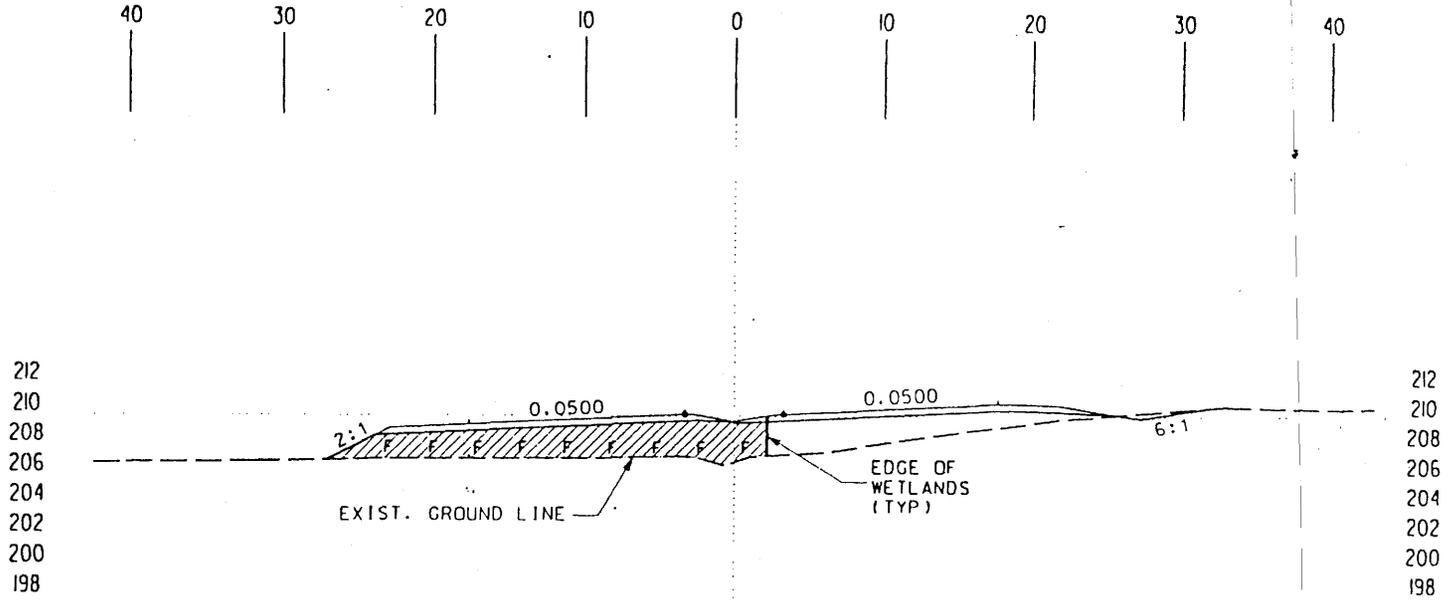
**SITE 5**  
 -L-LINE PROFILE



**LEGEND**

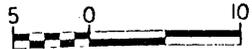
 DENOTES FILL IN WETLANDS

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 8.UG172214 (R-2248D)  
 CHARLOTTE OUTER LOOP



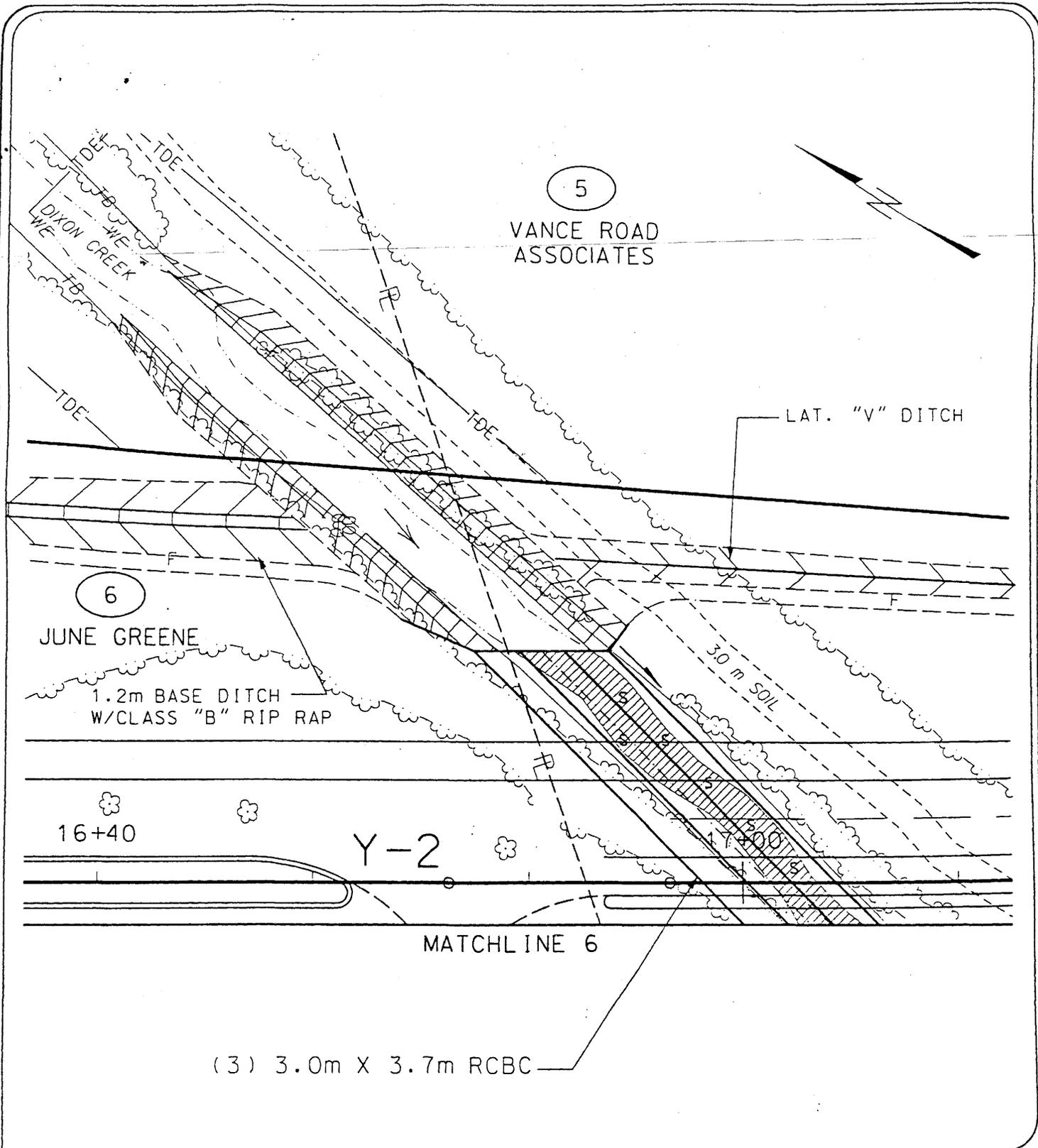
**SITE 5**  
**CROSS SECTION**  
 (L-LINE 319+00)

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
 MECKLENBURG COUNTY  
 8.UG72214 (R-2248D)  
 CHARLOTTE OUTER LOOP



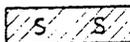
**LEGEND**

 DENOTES FILL IN WETLANDS

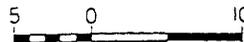


# PLAN VIEW SITE 6

## LEGEND



DENOTES FILL IN  
SURFACE WATER



SCALE

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

5

VANCE ROAD ASSOCIATES

(3) 3.0m X 3.7m RCBC

MATCHLINE 6

Y-2

TAIL DITCH W/  
CLASS "1" RIP RAP

GRADE  
TO  
DRAIN

GRADE  
TO  
DRAIN

EXISTING  
RCBC TO  
BE REMOVED

RETAIN  
450 RCP

1300 mm  
BK WALL

6

JUNE GREENE

7

RUSSELL KAKALEY

# PLAN VIEW SITE 6

## LEGEND

 DENOTES FILL IN  
SURFACE WATER



SCALE

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

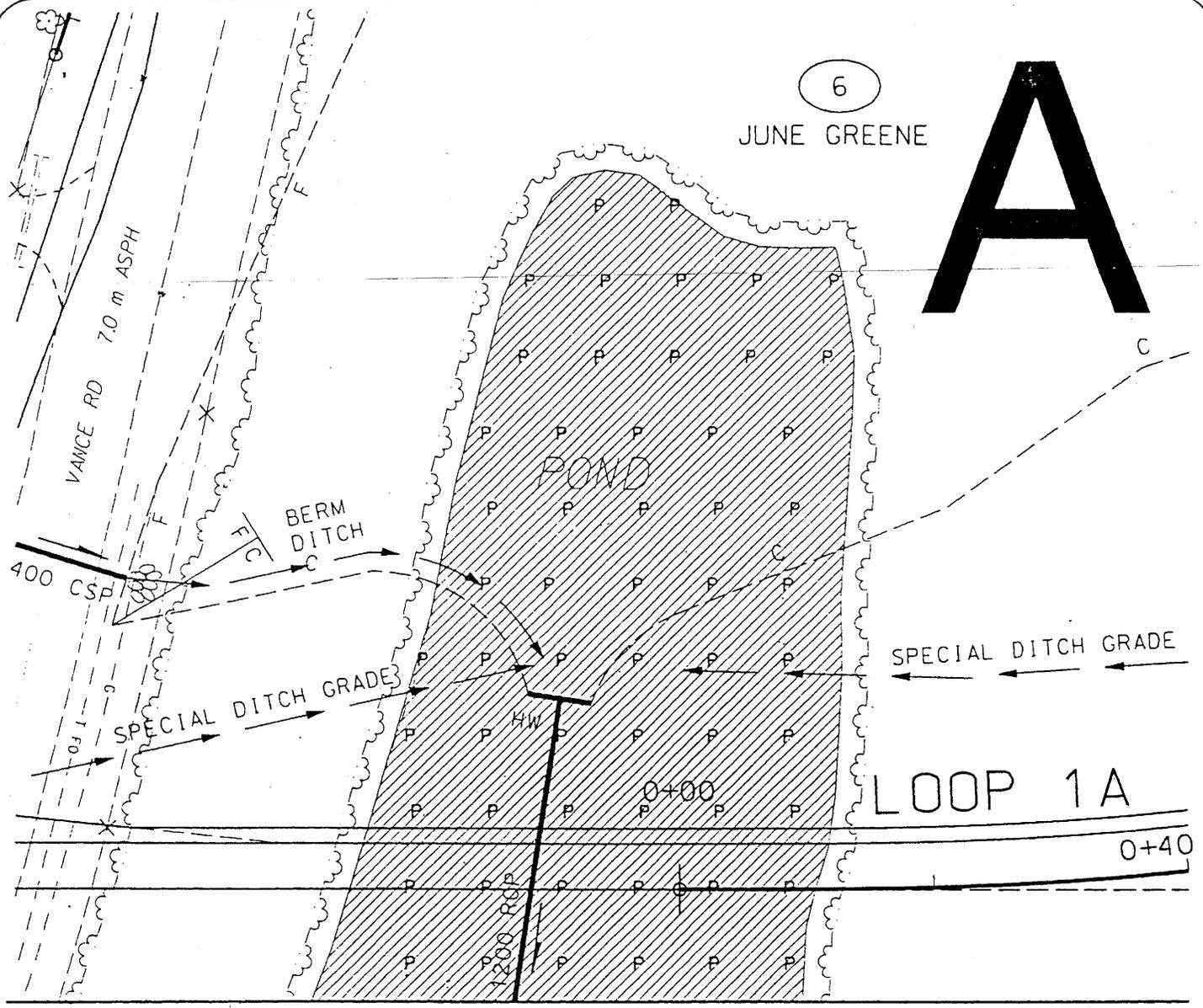
SHEET 16 OF 98

0815306  
G:\nc1\001\tr\ar\hydro\per\mfs\cmh120a.dgn

6

JUNE GREENE

A



MATCHLINE 7

# PLAN VIEW SITE 7

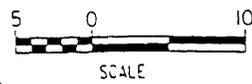
## LEGEND

 SURFACE WATER LOSS



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



DATE: 08/14/00 BY: G. VANCE MIT 85-13440.000

MATCHLINE 7

341+00

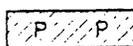
341+60

1.2m BASE  
TAIL DITCH

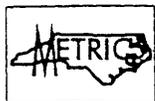
6  
JUNE GREENE

# PLAN VIEW SITE 7

## LEGEND



DENOTES FILL IN  
SURFACE WATER  
(POND)

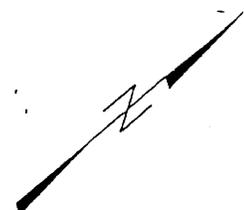


SCALE

SHEET 18 OF 98

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.J672214 (R-2248D)  
CHARLOTTE OUTER LOOP

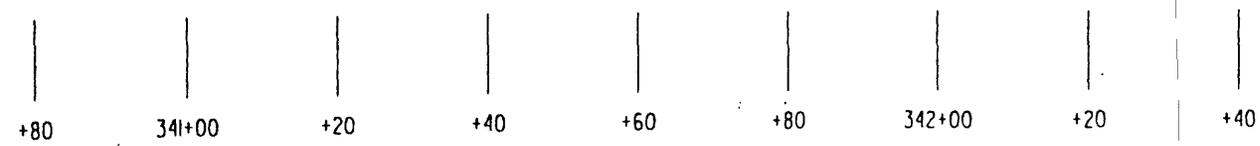
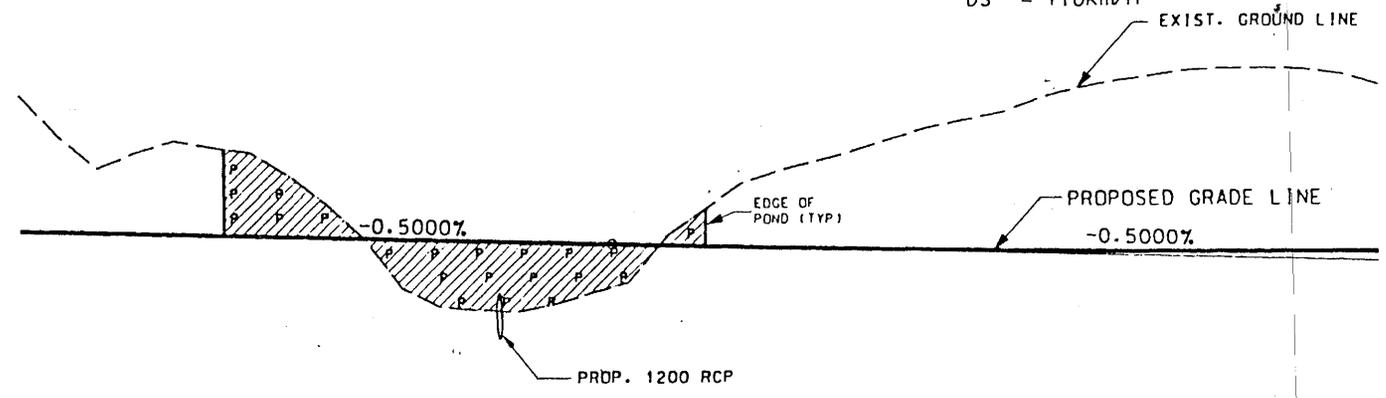


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230  
225  
220  
215

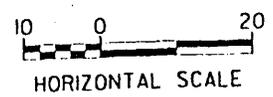
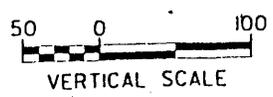
230  
225  
220  
215

PVI = 342+60.000  
EL. = 222.400  
VC = 240  
K = 207  
DS = 110km/h



### SITE 7

-L-LINE PROFILE



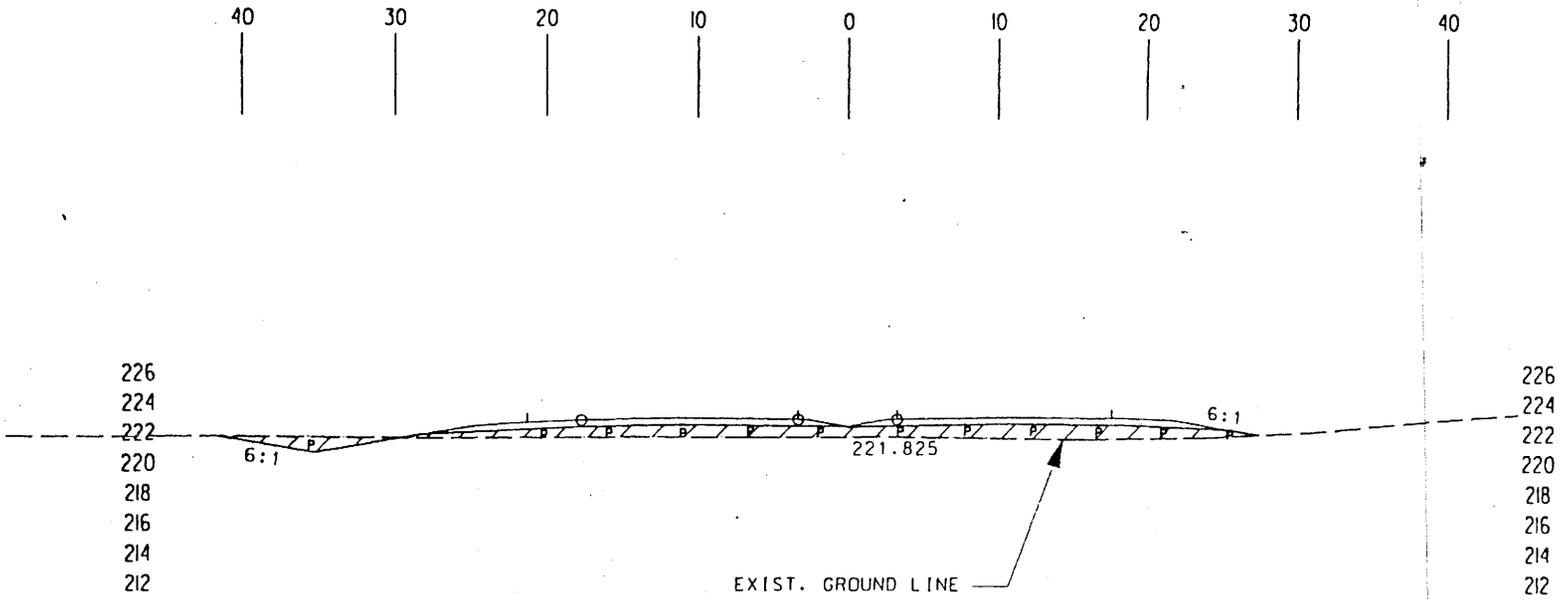
### LEGEND

 DENOTES FILL IN SURFACE WATER (POND)

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.06.72214 (R-2248D)  
CHARLOTTE OUTER LOOP

SHEET 19 OF 25



SITE 7  
CROSS SECTION  
(L-LINE 341+40)

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.UG72214 (R-2248D)  
CHARLOTTE OUTER LOOP



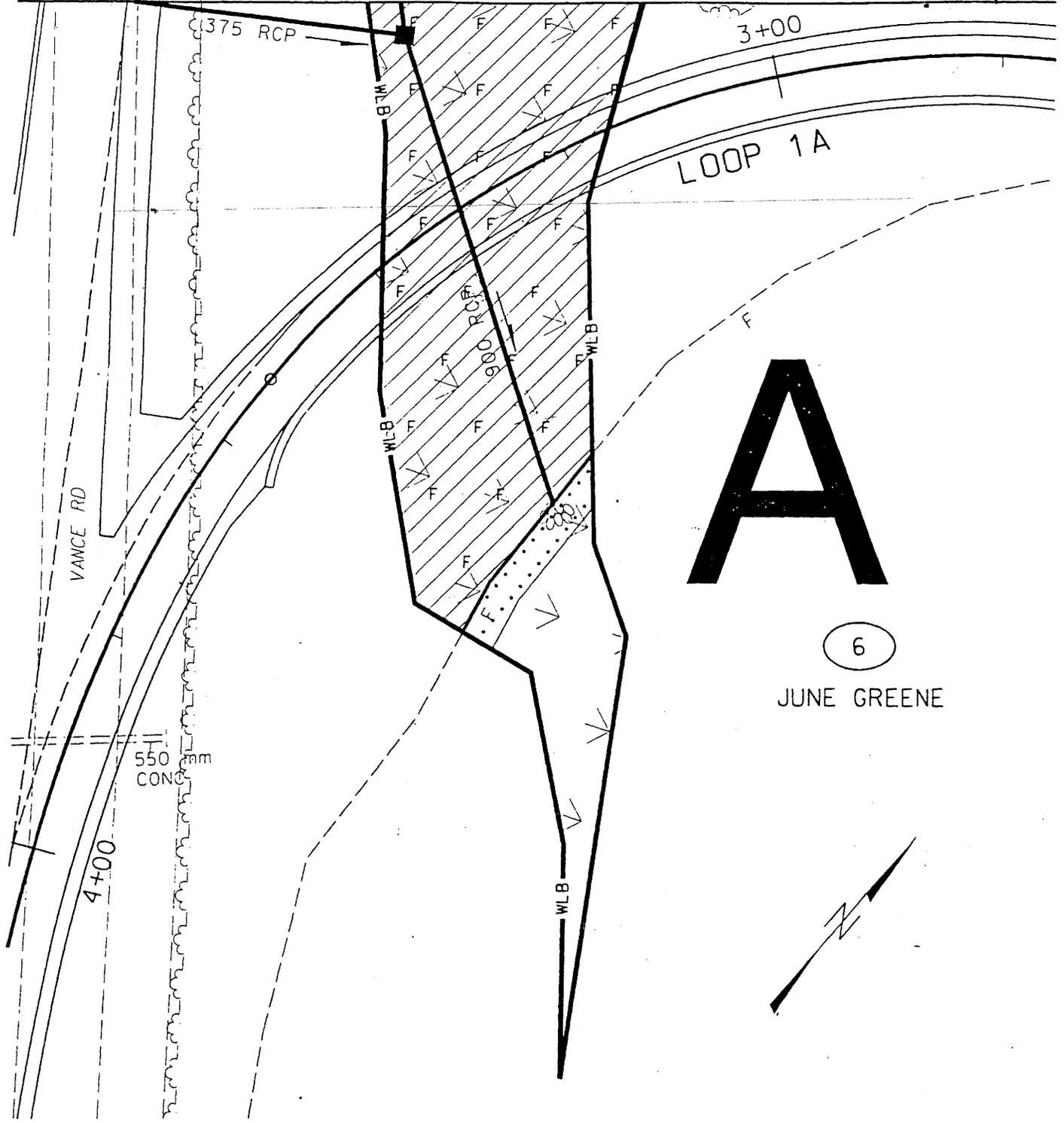
LEGEND



DENOTES FILL IN  
SURFACE WATER  
(POND)



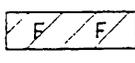
MATCHLINE 8

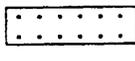


PLAN VIEW  
SITE 8

LEGEND

— WLB — WETLAND

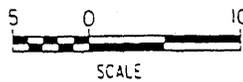
 DENOTES FILL IN WETLANDS

 DENOTES MECHANIZED CLEARING



NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP





MATCHLINE 9

6

JUNE GREENE

SPECIAL DITCH GRADE

HEAD DITCH

TRIB. TO DIXON CREEK  
WE  
WE

400 CSP W  
2 ELBOWS

- L -

343+00

343+60

2.7 X 1.8 RCBC

6

JUNE GREENE

MATCHLINE 9A

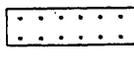
# PLAN VIEW SITE 9

## LEGEND

— WLB — WETLAND

 DENOTES FILL  
IN WETLANDS

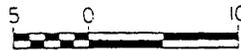
 DENOTES FILL IN  
SURFACE WATER

 DENOTES MECHANIZED  
CLEARING



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SCALE

SHEET 24 OF 98

D:\proj\00\trans\1\p\0\per.mlls\cml34330a.dgn



6

JUNE GREENE

375 RCP

344+20

344+60

10+80

RAMP 1D

375 RCP

375 RCP

3400 CSP W/4  
2 ELBOWS

10+00

MATCHLINE 10

8

TED MERRELL

6

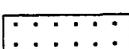
JUNE GREENE

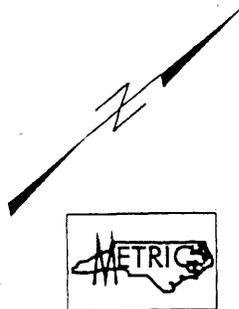
# PLAN VIEW SITE 10

## LEGEND

— WLB — WETLAND

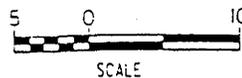
 DENOTES FILL IN WETLANDS

 DENOTES MECHANIZED CLEARING



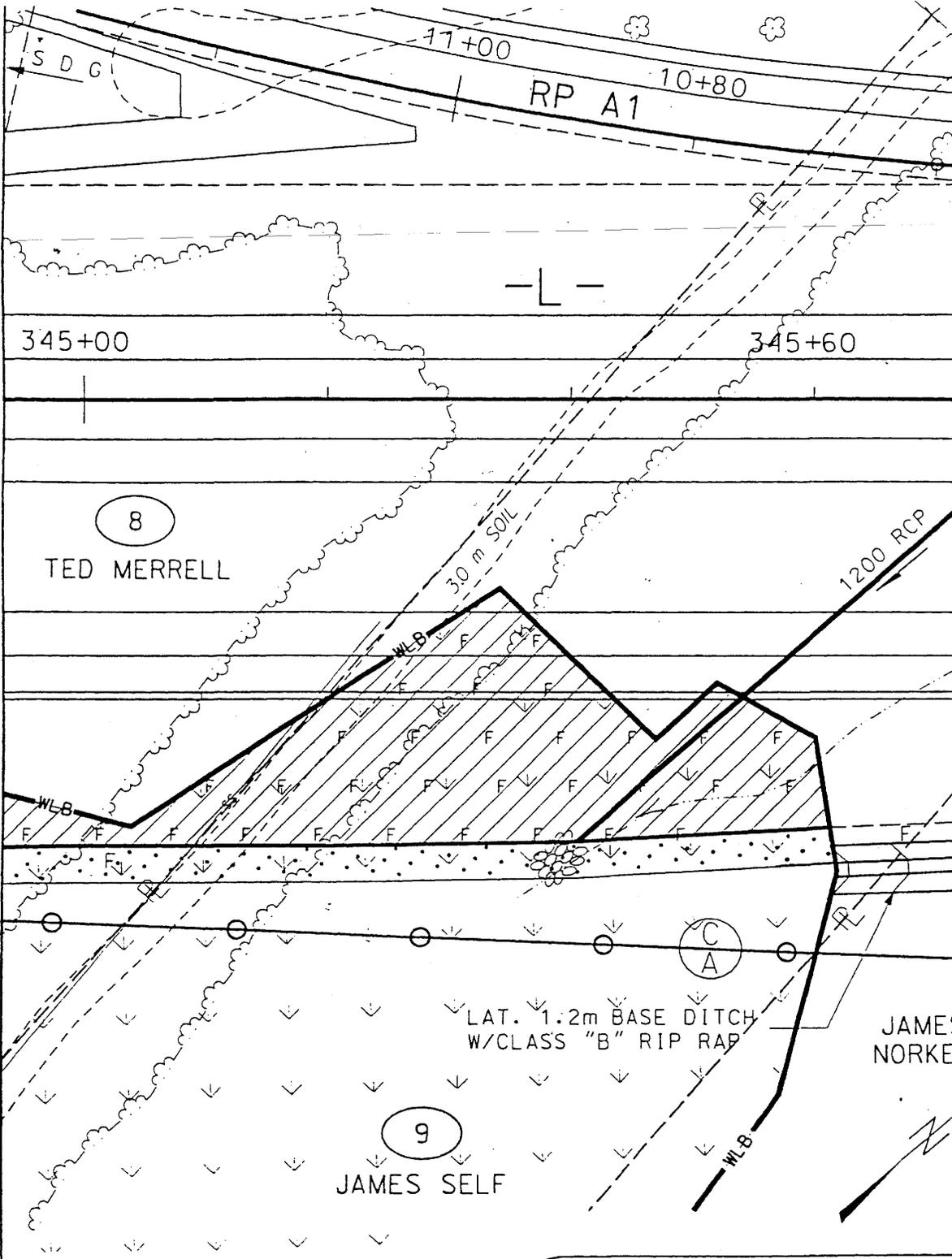
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



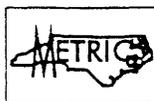
\\s01c01\work\11401\11401.dwg 0 1/26/01 11:51:11 AM

MATCHLINE 10



**LEGEND**

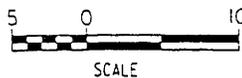
- WETLAND
- DENOTES FILL IN WETLANDS
- DENOTES MECHANIZED CLEARING



**PLAN VIEW  
SITE 10**

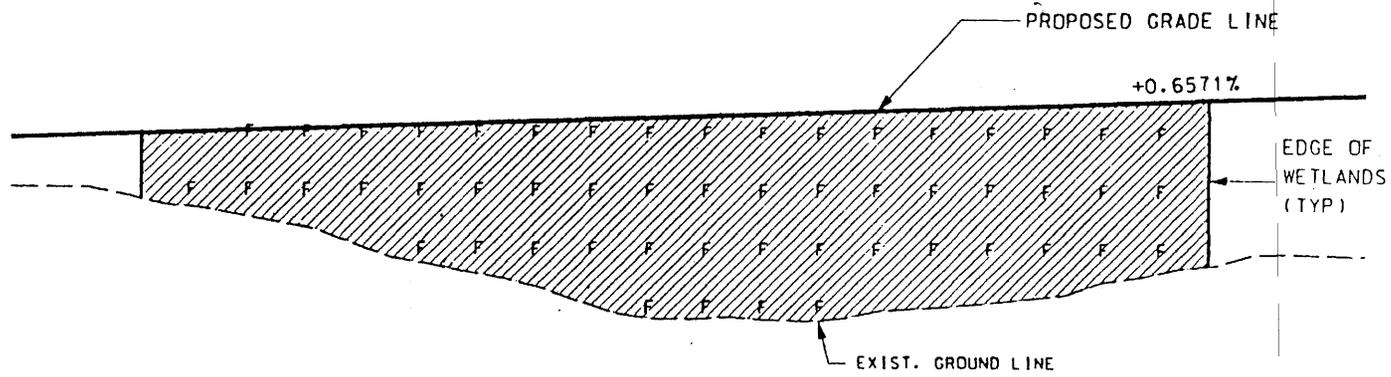
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

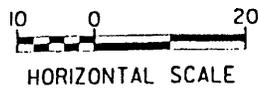
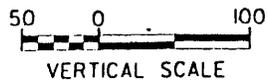
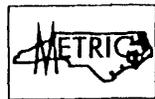


230  
225  
220  
215

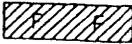
230  
225  
220  
215



**SITE 10**  
RAMP ID PROFILE

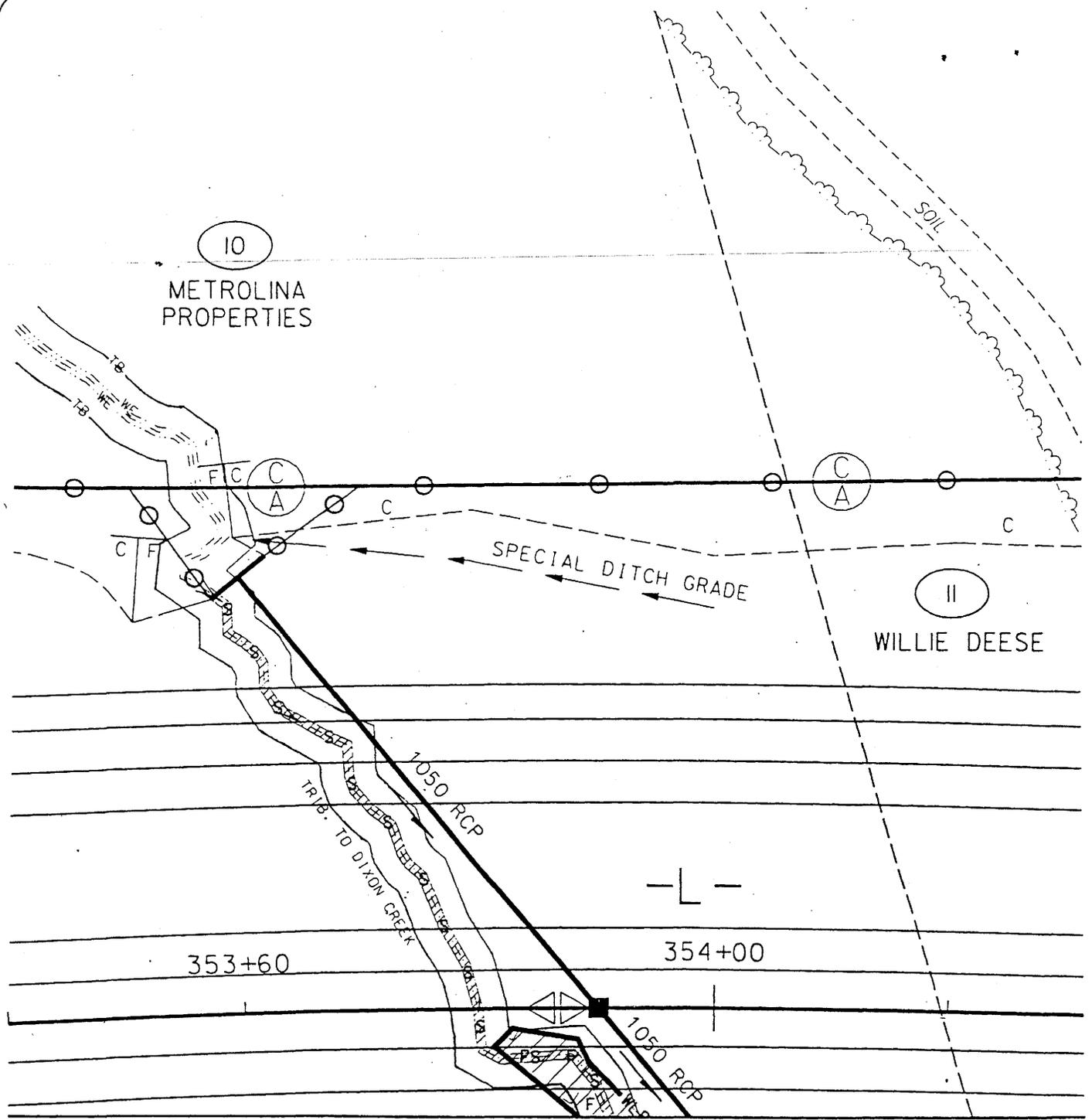


**LEGEND**

 DENOTES FILL IN WETLANDS

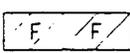
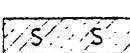
NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
MECKLENBURG COUNTY  
8.JUG72214 (R-22480)  
CHARLOTTE OUTER LOOP





# PLAN VIEW SITE 11

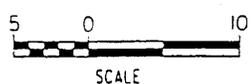
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER



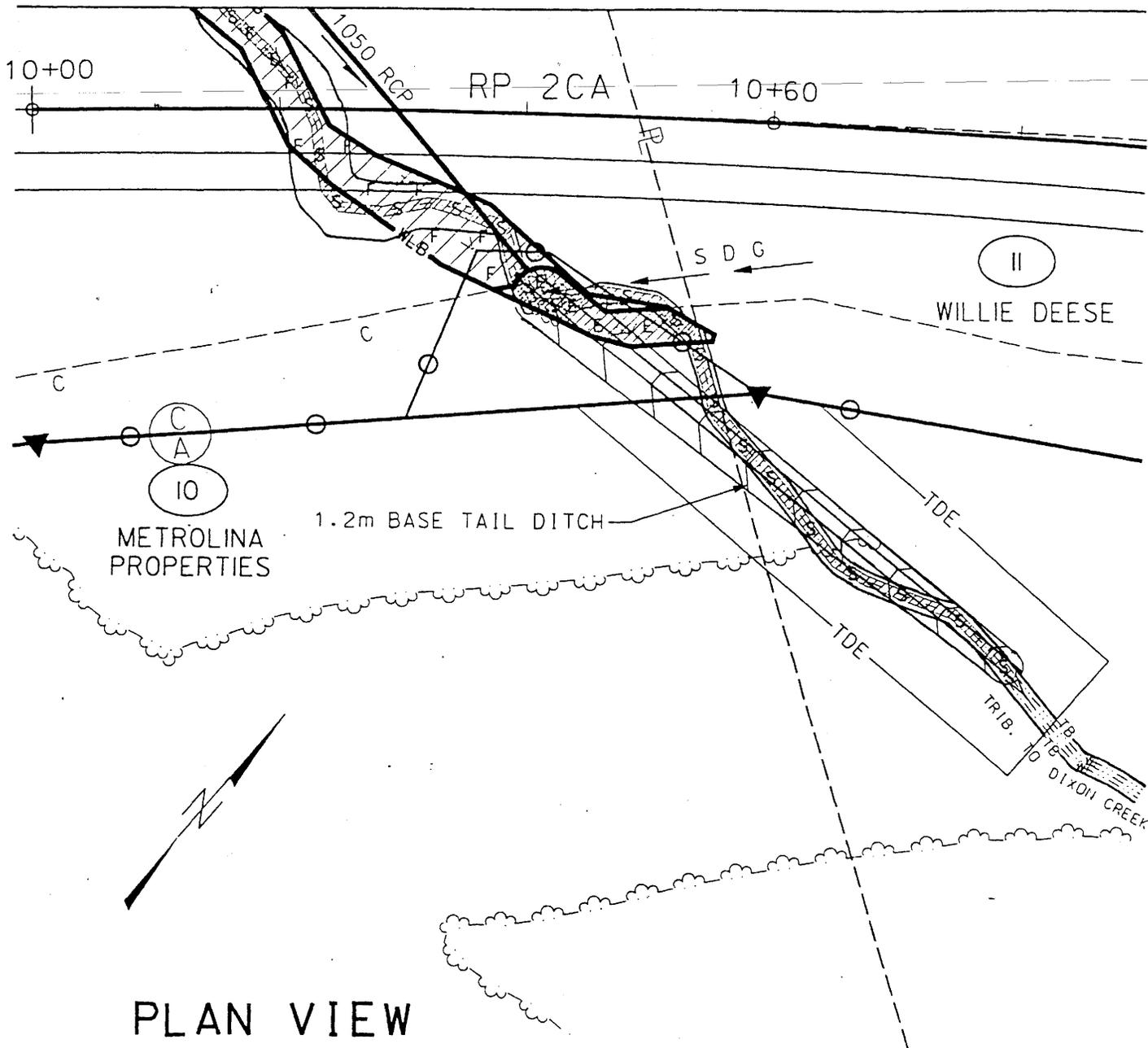
## NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-22480)  
CHARLOTTE OUTER LOOP



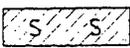
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MATCHLINE 11



PLAN VIEW  
SITE 11

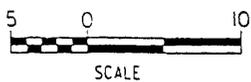
LEGEND

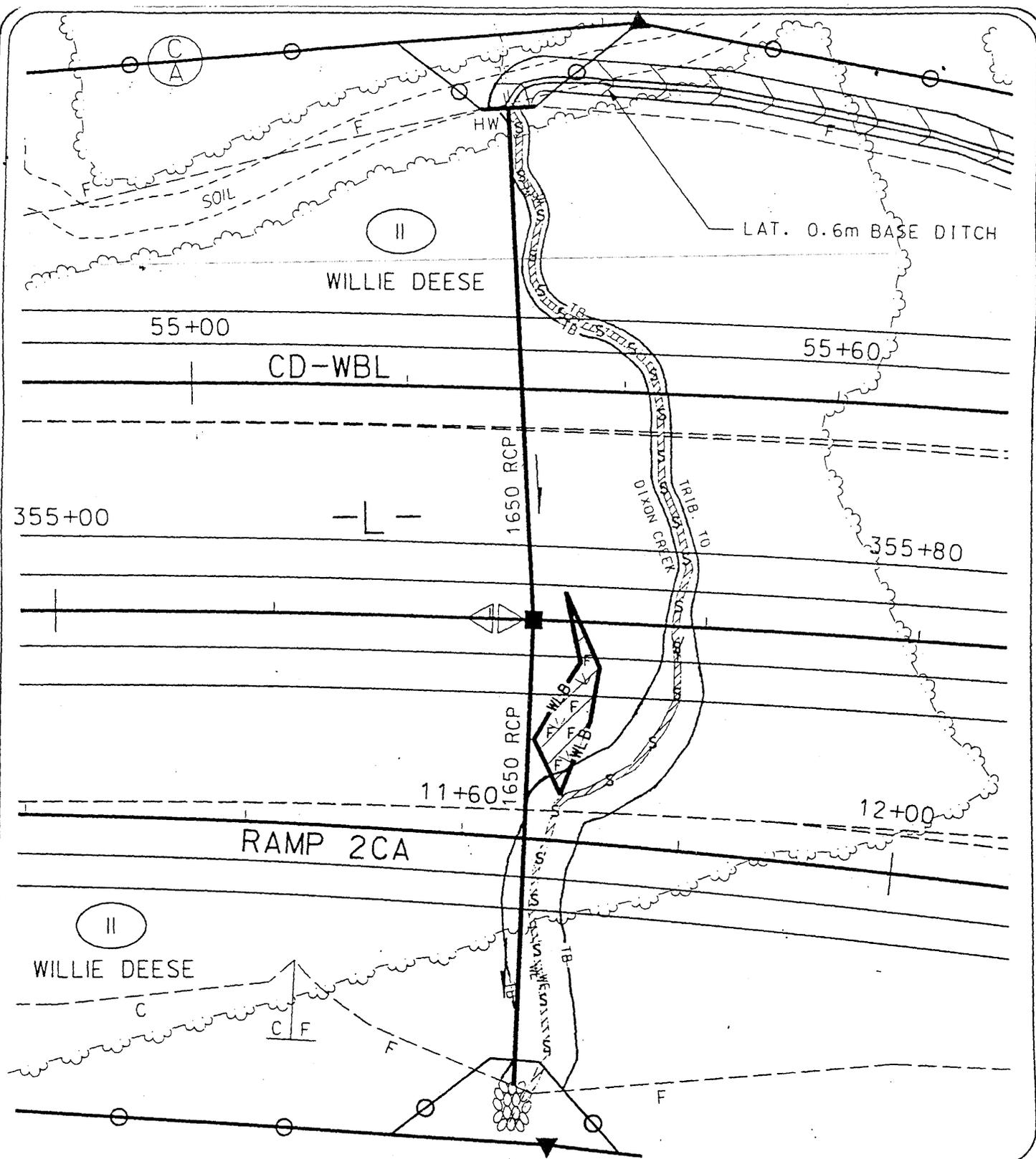
- WLB — WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER
-  DENOTES EXCAVATION IN WETLANDS



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

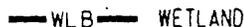
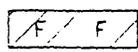
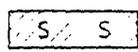
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

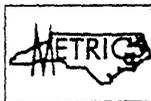




# PLAN VIEW SITE 12

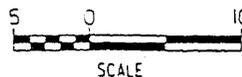
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER



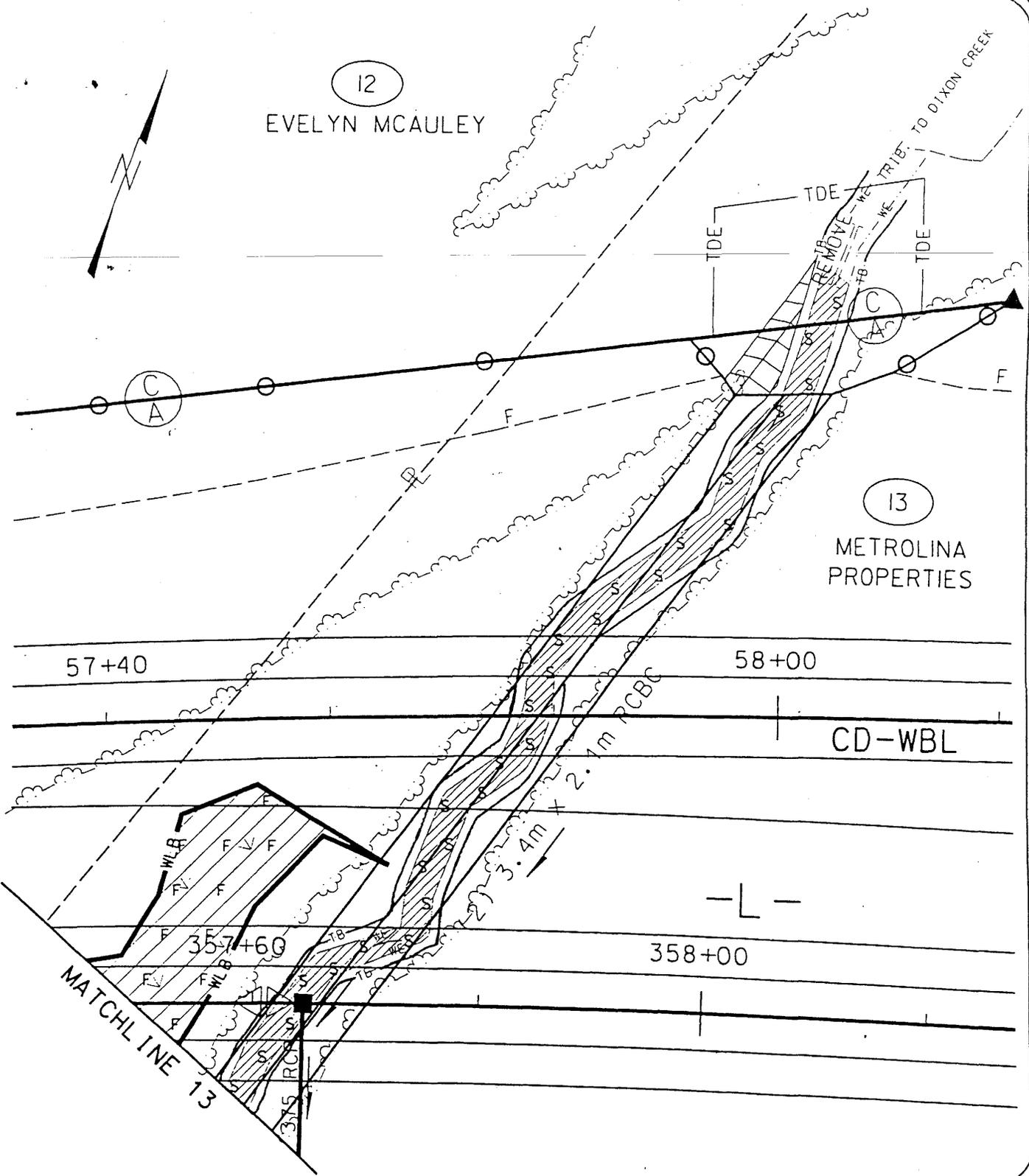
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



12  
EVELYN MCAULEY

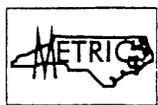
13  
METROLINA  
PROPERTIES



# PLAN VIEW SITE 13

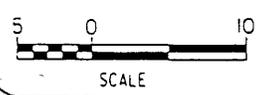
## LEGEND

- WLB WETLAND
- DENOTES FILL IN WETLANDS
- DENOTES FILL IN SURFACE WATER

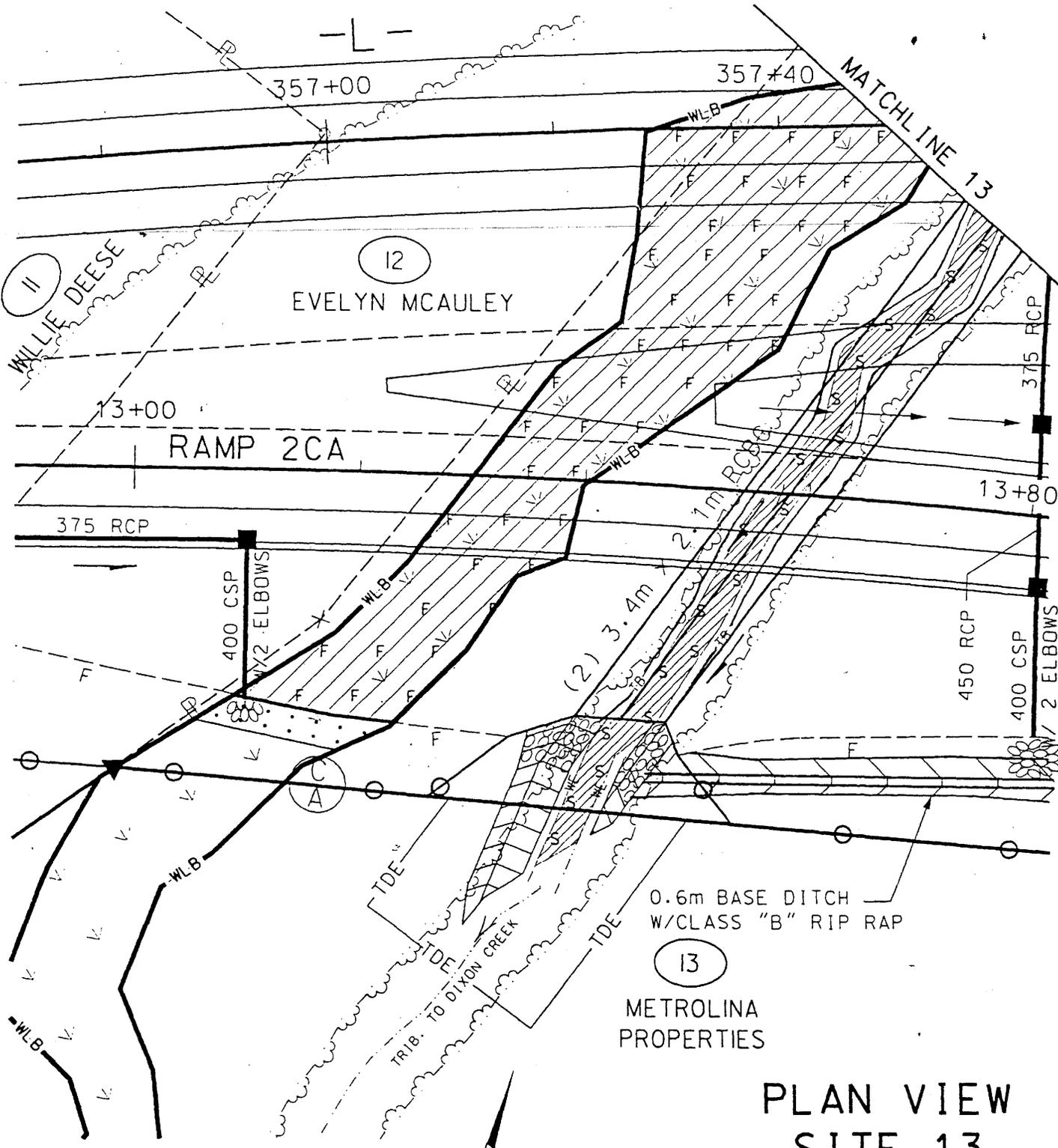


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
B.U672214 (R-22480)  
CHARLOTTE OUTER LOOP

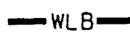
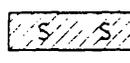
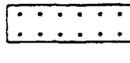


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# PLAN VIEW SITE 13

## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SCALE

SHEET **34** OF **96**

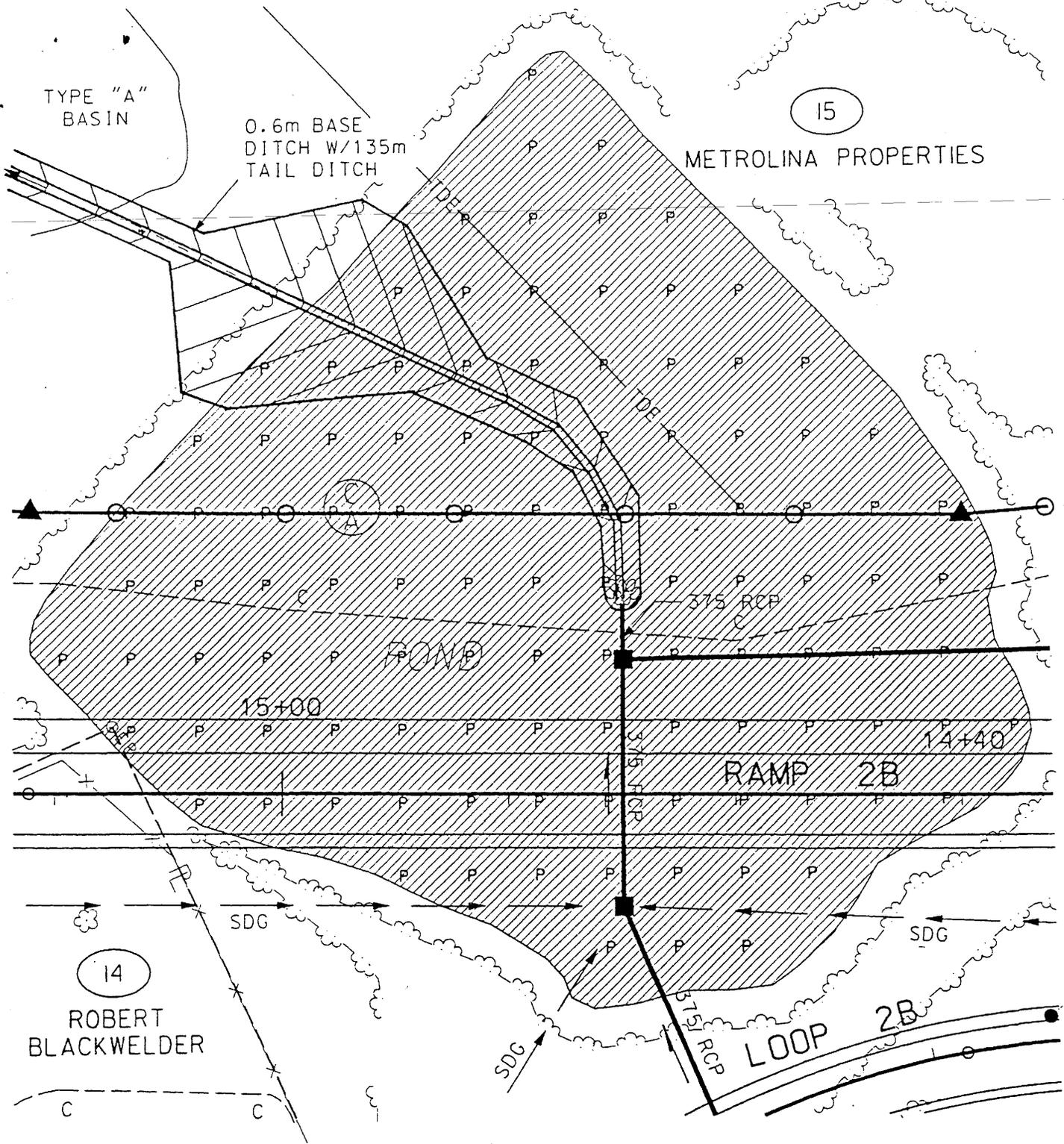
g:\nc1\016\trd\hydra\barmit5\cpl35770a.dgn

TYPE "A"  
BASIN

0.6m BASE  
DITCH W/135m  
TAIL DITCH

15

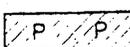
METROLINA PROPERTIES

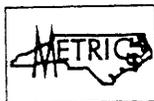


14  
ROBERT  
BLACKWELDER

# PLAN VIEW SITE 14

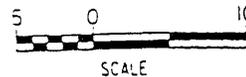
## LEGEND

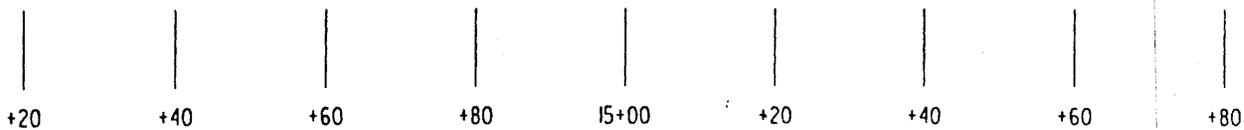
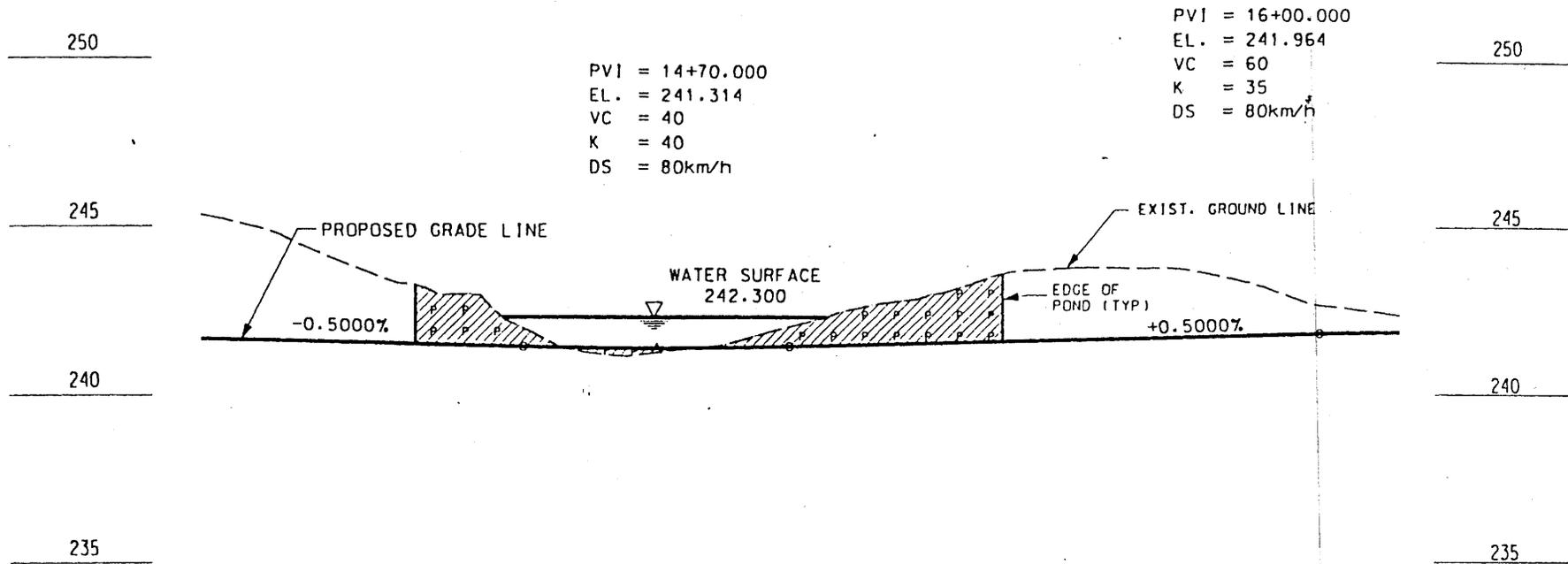
 DENOTES FILL IN  
SURFACE WATER  
(POND)



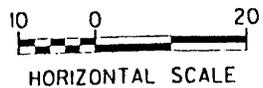
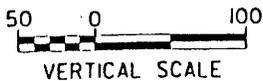
NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-22480)  
CHARLOTTE OUTER LOOP





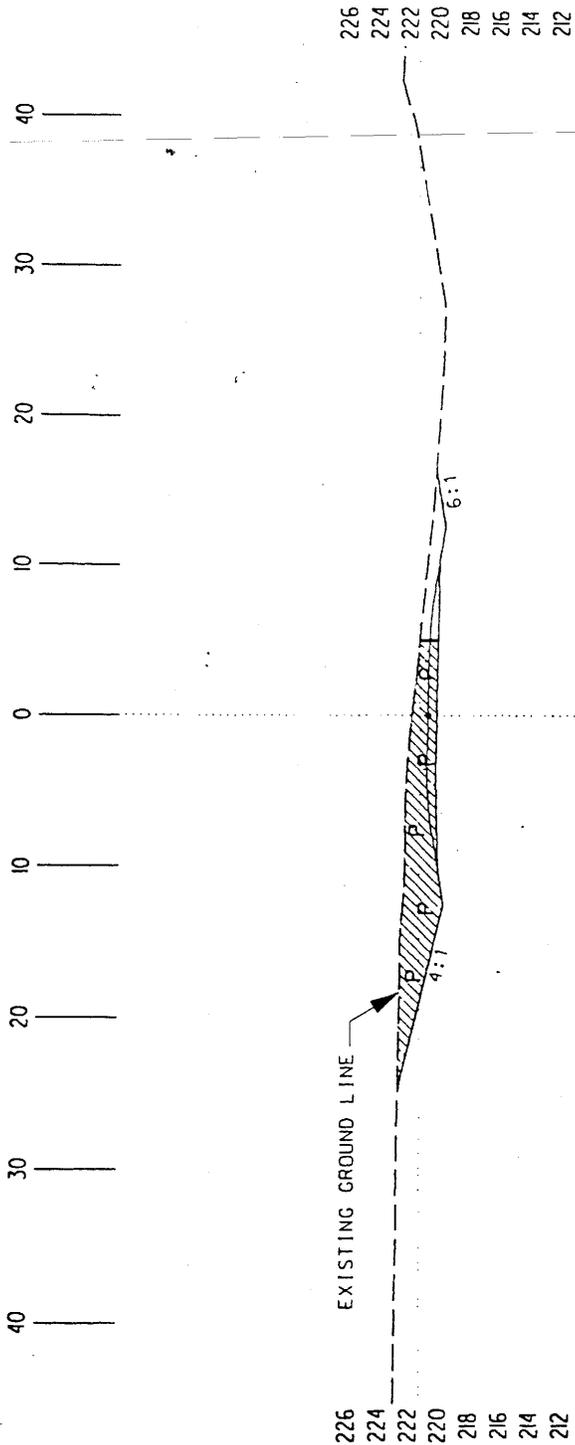
**SITE 14**  
 RAMP 2B PROFILE



**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 8.UG72214 (R-22480)  
 CHARLOTTE OUTER LOOP



SITE 14  
 CROSS SECTION  
 (RAMP 2B 15+00)

**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 B.U672214 (R-2248D)  
 CHARLOTTE OUTER LOOP

LAT. "V" DITCH

16

JOE LEE  
PUCKETT, III

65+40

CD-WBL

400 CSP  
W/ 2 ELBOWS

66+00

600 RCP

365+40

366+00

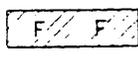
16

JOE LEE  
PUCKETT, III

# PLAN VIEW SITE 15

## LEGEND

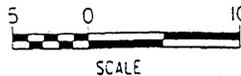
— WLB — WETLAND

 DENOTES FILL IN  
WETLANDS



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SHEET 38 OF 98



MATCHLINE 16

375 RCP

17

MARC SILVERMAN

LAT. 0.6 BASE DITCH

RAMP 2BD

21+00

RAMP 2CA

21+80

TAIL DITCH W/  
CLASS "I" RIP RAP

LAT. "V" DITCH

HEAD DITCH

17

MARC SILVERMAN

3.0 x 1.8 RCBC

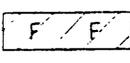
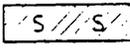
24+00

23+60

MATCHLINE 16A

# PLAN VIEW SITE 16

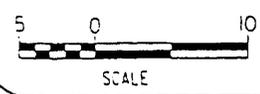
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER



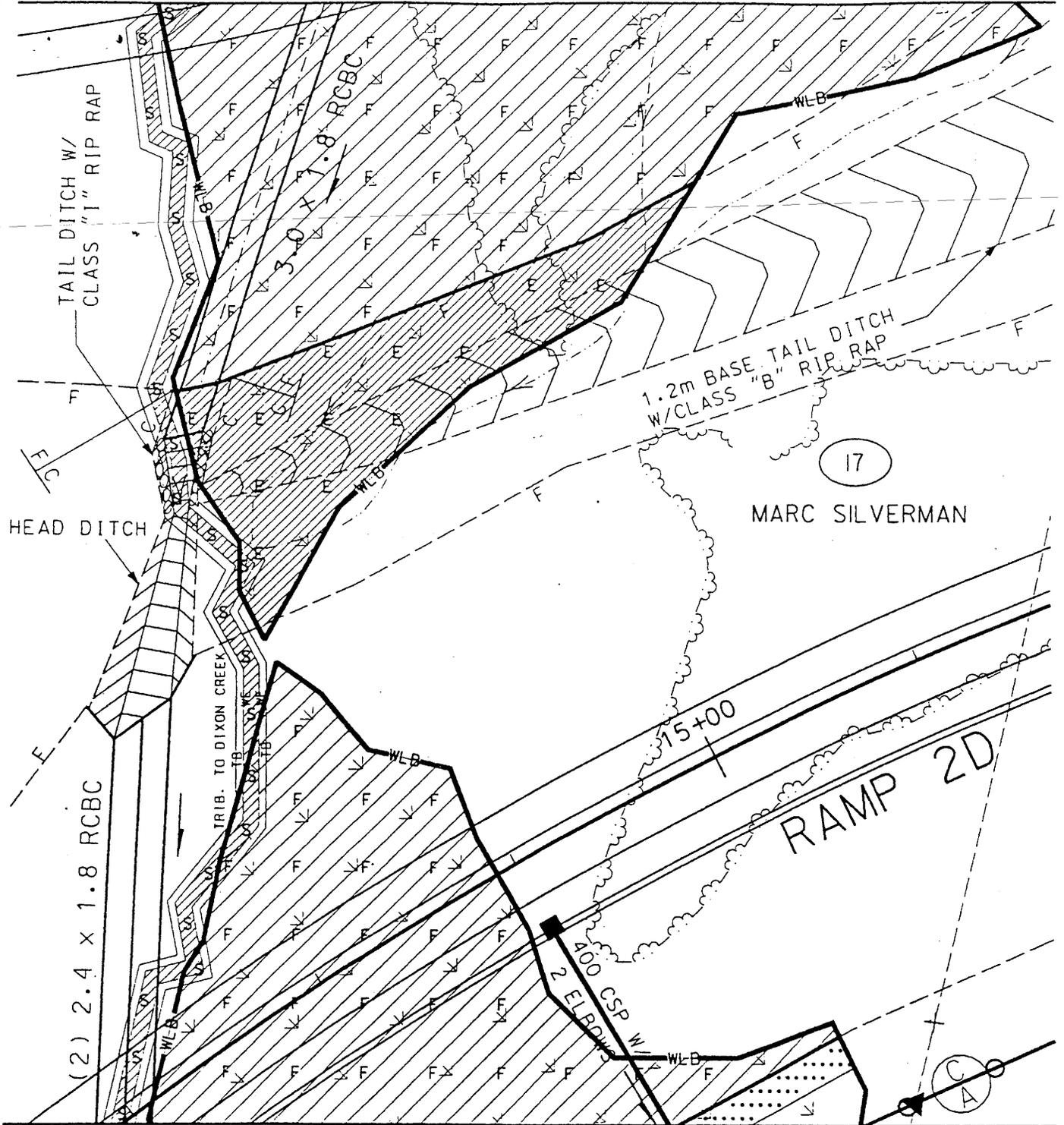
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



S:\proj\1009\1009.dwg 10/10/09 10:00:00 AM

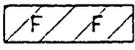
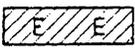
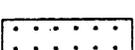
MATCHLINE 16A



MATCHLINE 16B

# PLAN VIEW SITE 16

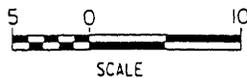
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES EXCAVATION IN WETLANDS
-  DENOTES FILL IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

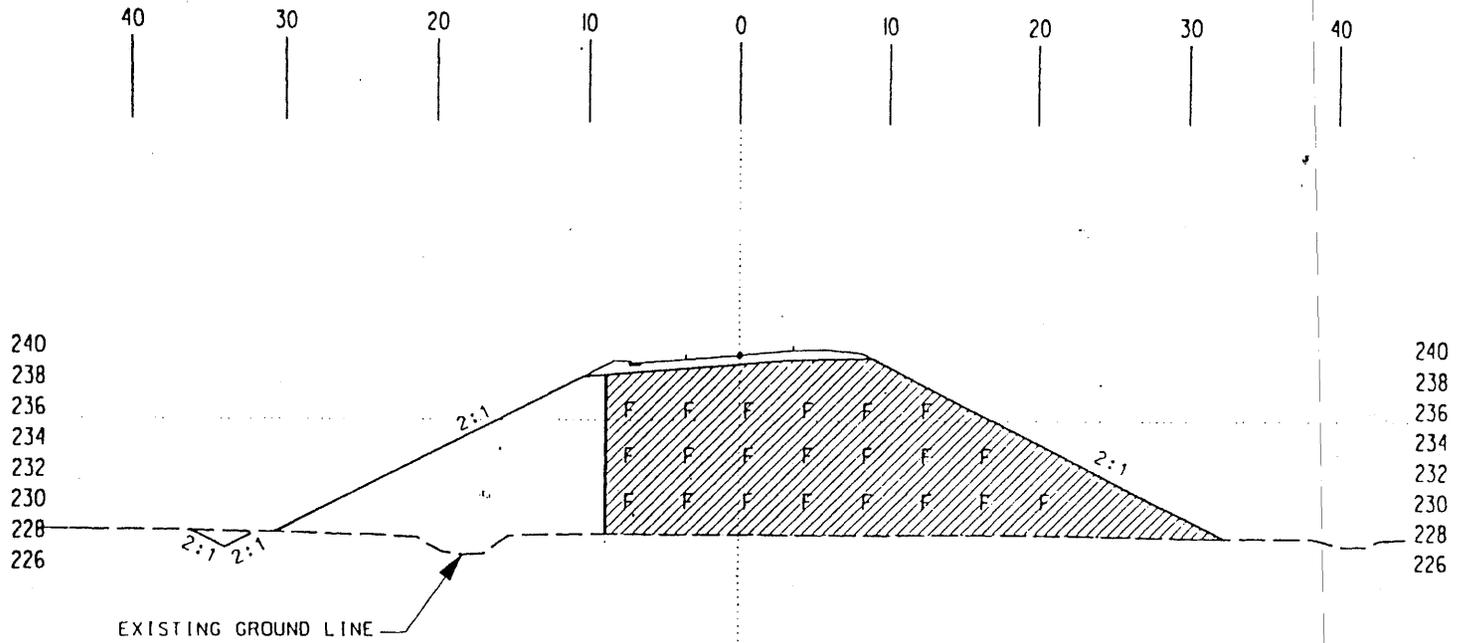
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP







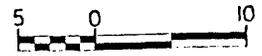




SITE 16  
 CROSS SECTION  
 (RAMP 2CA 23+80)

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
 8JUG72214 (R-22480)  
 CHARLOTTE OUTER LOOP



LEGEND

DENOTES FILL IN WETLANDS

245

PVI = 13+60.000  
EL. = 236.879  
VC = 100  
K = 34  
DS = 80km/h

245

240

PROPOSED GRADE LINE

+3.9218%

240

235

EDGE OF WETLANDS (TYP)

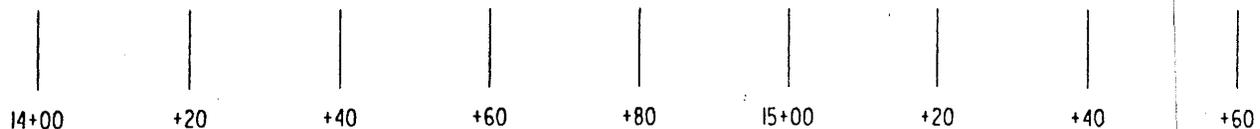
235

(2) 2.40(W)X1.8(H) RCBC

230

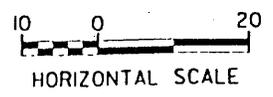
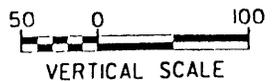
EXIST. GROUND LINE

230



# SITE 16

RAMP 2D PROFILE

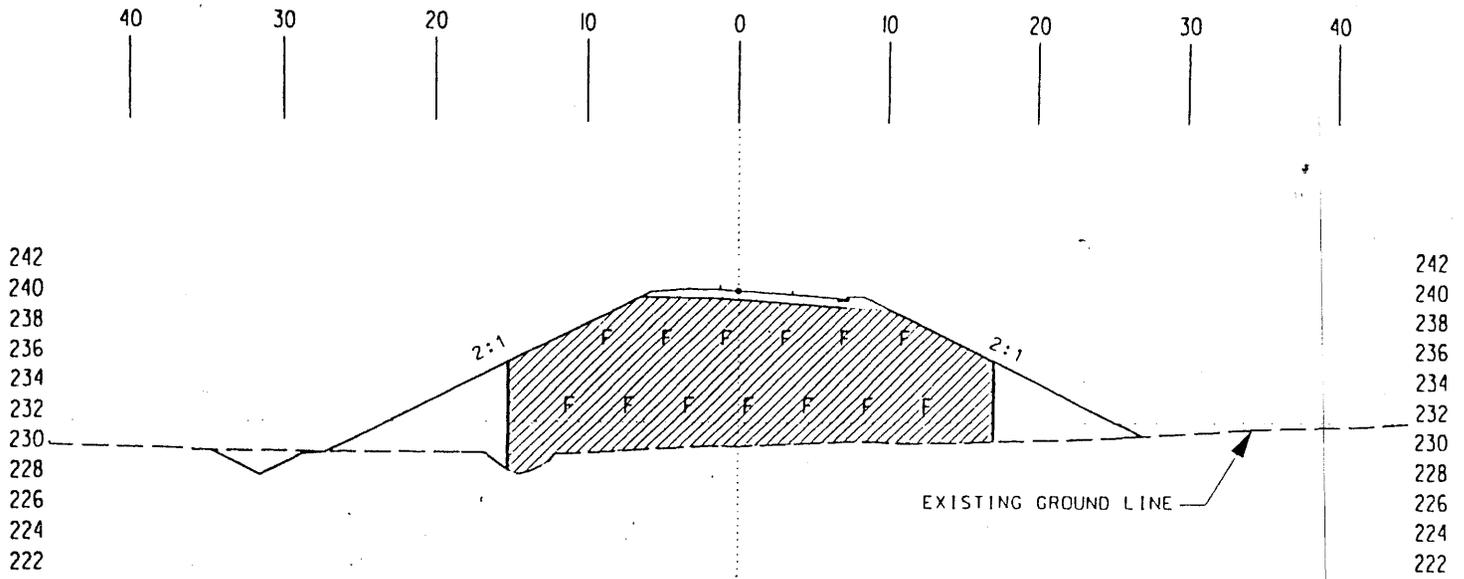


### LEGEND

DENOTES FILL IN WETLANDS

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8,067,221/4 (R-22480)  
CHARLOTTE OUTER LOOP



SITE 16  
 CROSS SECTION  
 (RAMP 2D 14+60)



LEGEND

 DENOTES FILL IN WETLANDS

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
 MECKLENBURG COUNTY  
 8.JUG12214 (R-2248D)  
 CHARLOTTE OUTER LOOP

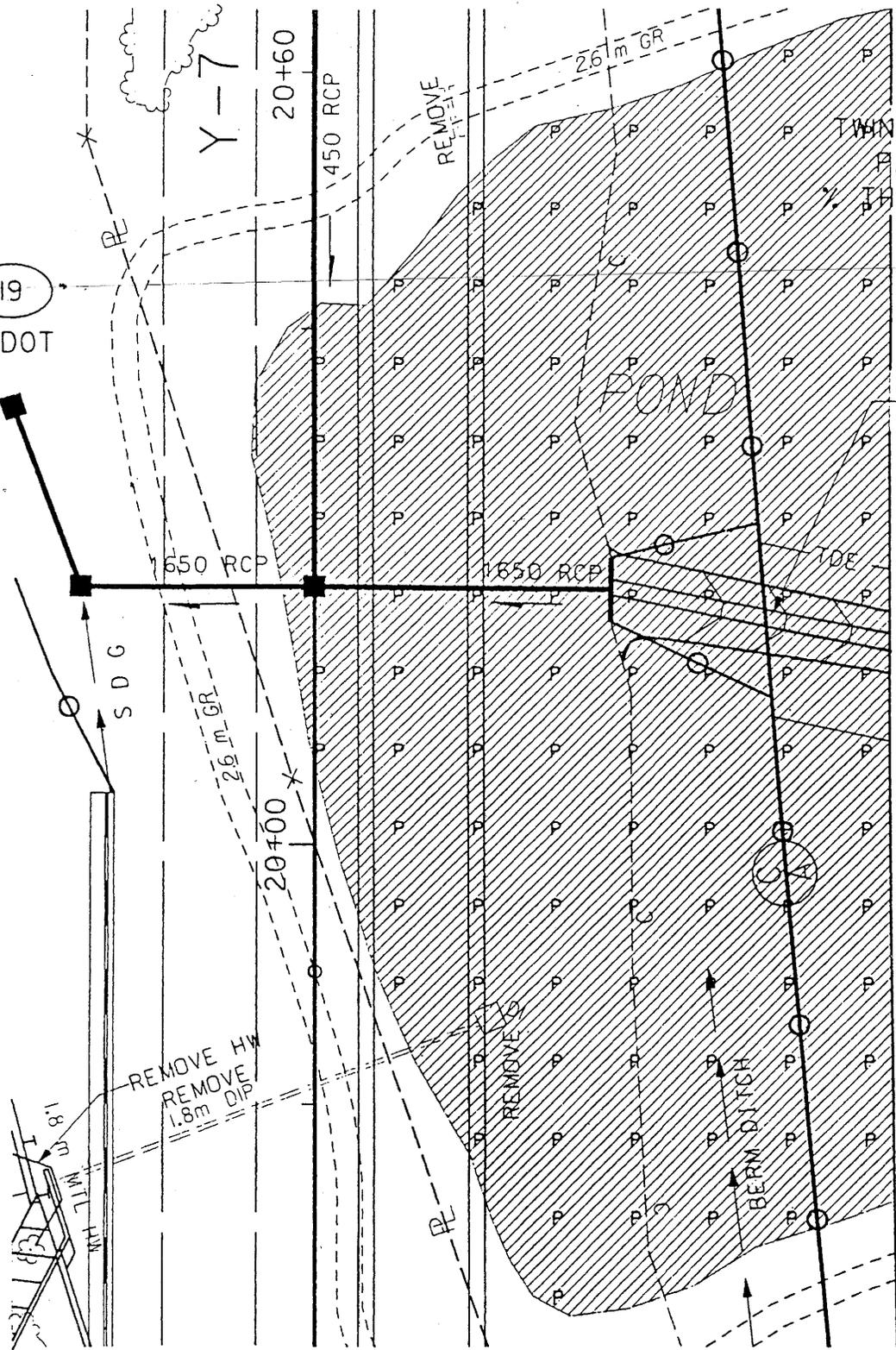
19  
NCDOT

20

TWIN LAKE LIMITED  
PARTNERSHIP  
THE KEITH GROUP

1.2m BASE  
HEAD DITCH  
W/CLASS "B"  
RIP RAP

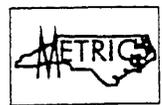
MATCHLINE 17



# PLAN VIEW SITE 17

## LEGEND

 DENOTES FILL IN  
SURFACE WATER  
(POND)



NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



2000-09-15 10:00 AM 10/10/00 10:00 AM 10/10/00 10:00 AM 10/10/00 10:00 AM

MATCHLINE 17

MATCHLINE 17A

20

TWIN LAKE LIMITED PARTNERSHIP  
% THE KEITH GROUP

26 m GR

1.2m BASE HEAD DITCH  
W/CLASS "B" RIP RAP

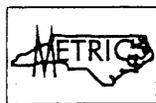
POND

RETAIN  
CB PL

# PLAN VIEW SITE 17

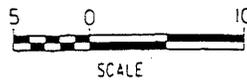
## LEGEND

 DENOTES FILL IN SURFACE WATER (POND)



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

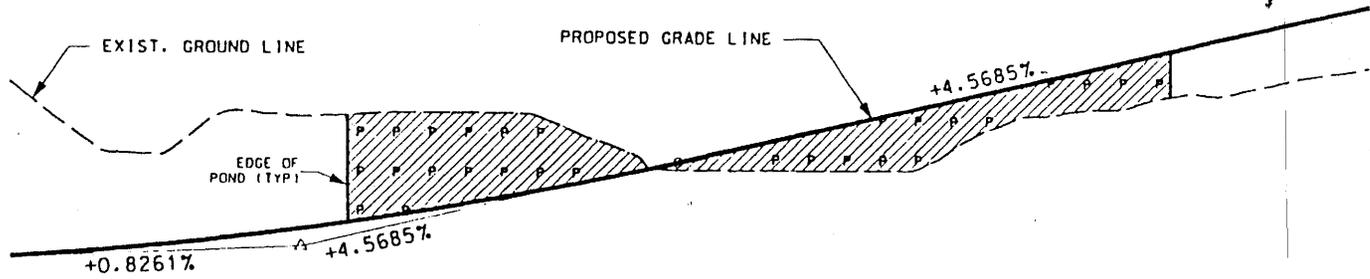




PVI = 19+60.000  
 EL. = 237.367  
 VC = 100  
 K = 27  
 DS = 80km/h

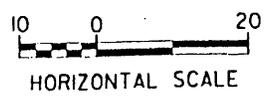
245  
 240  
 235  
 230

245  
 240  
 235  
 230

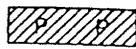


+40      +60      +80      20+00      +20      +40      +60      +80      21+00

SITE 17  
 Y-7 PROFILE

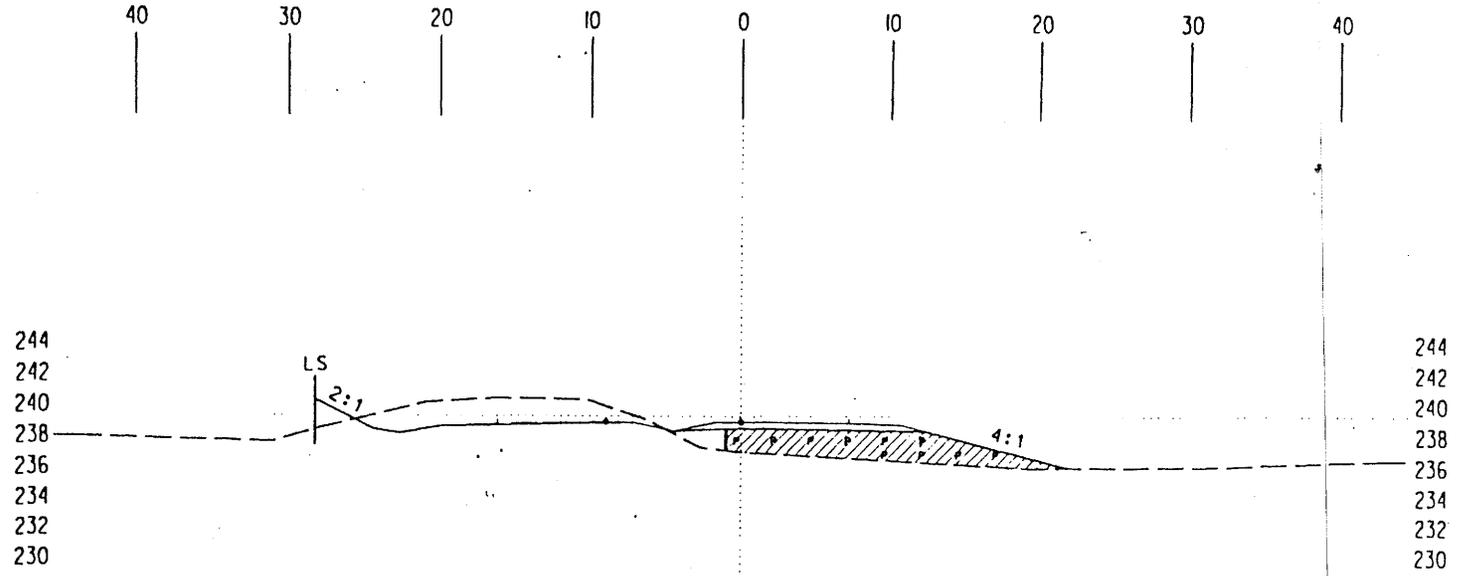


LEGEND

 DENOTES FILL IN SURFACE WATER (POND)

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
 8.JJ672214 (R-2248D)  
 CHARLOTTE OUTER LOOP



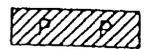
**SITE 17**  
**CROSS SECTION**  
 (Y-7 20+11.802)

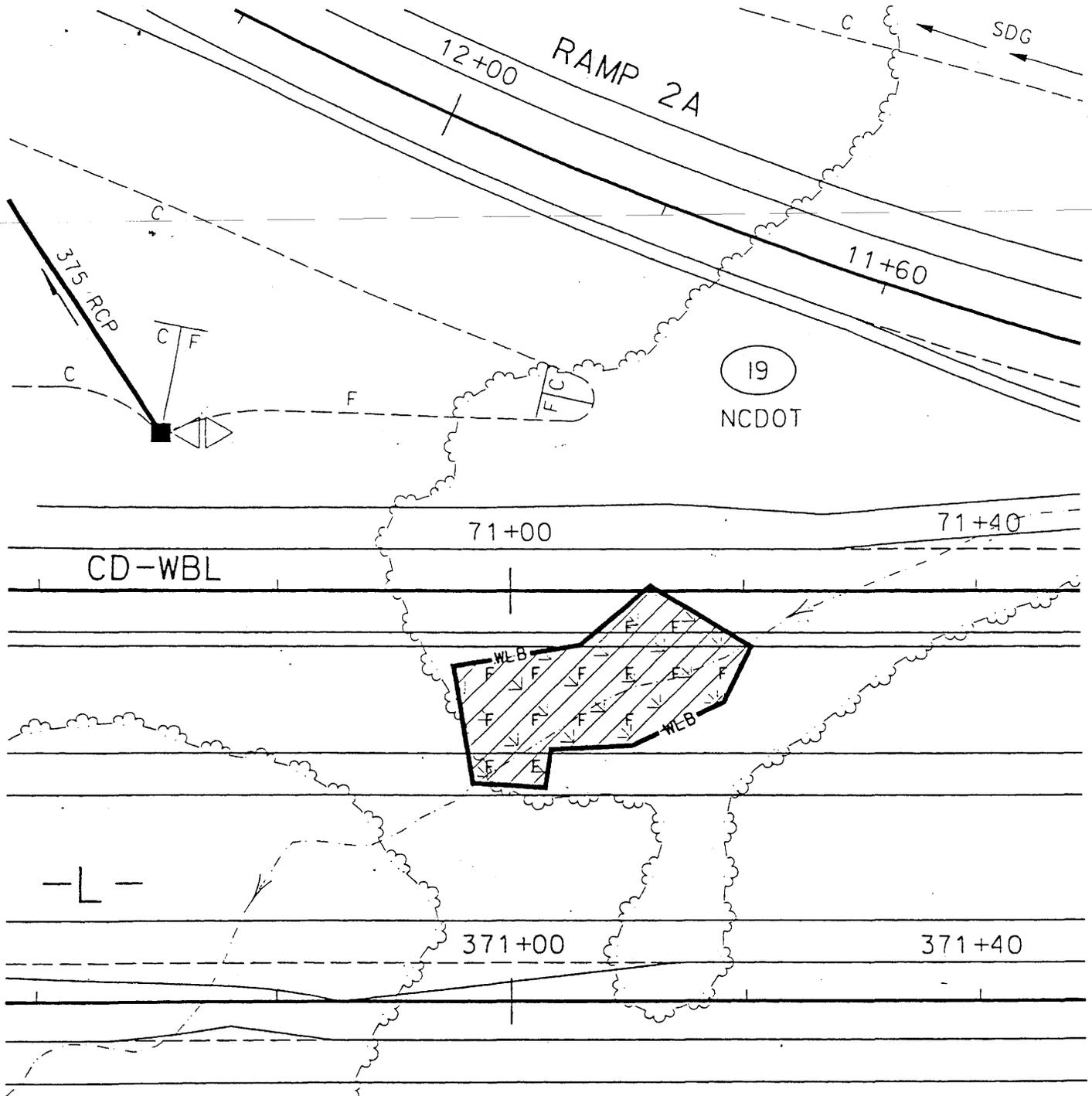
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.UG72214 (R-2248D)  
 CHARLOTTE OUTER LOOP



**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)

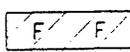


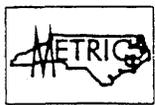
PLAN VIEW  
SITE 18



LEGEND

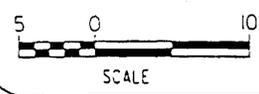
— WLB — WETLAND

 DENOTES FILL IN WETLANDS



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



24

SMITH CORNERS, LLC

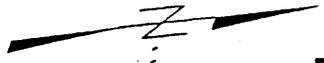
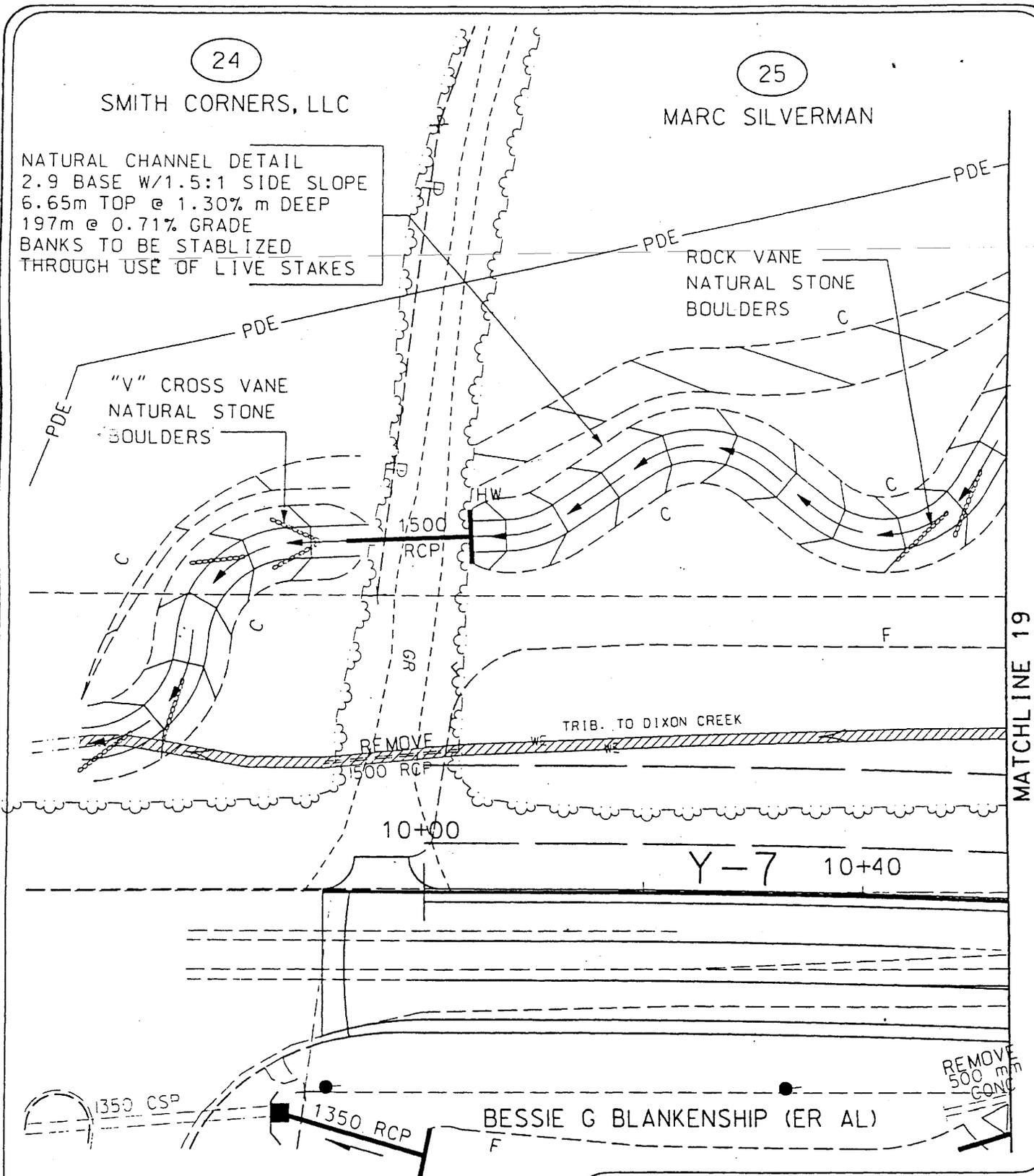
25

MARC SILVERMAN

NATURAL CHANNEL DETAIL  
 2.9 BASE W/1.5:1 SIDE SLOPE  
 6.65m TOP @ 1.30% m DEEP  
 197m @ 0.71% GRADE  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

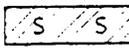
ROCK VANE  
 NATURAL STONE  
 BOULDERS

"V" CROSS VANE  
 NATURAL STONE  
 BOULDERS



PLAN VIEW  
 SITE 19

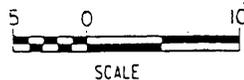
LEGEND

 DENOTES FILL IN SURFACE WATER



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
 B.U672214 (R-2248D)  
 CHARLOTTE OUTER LOOP



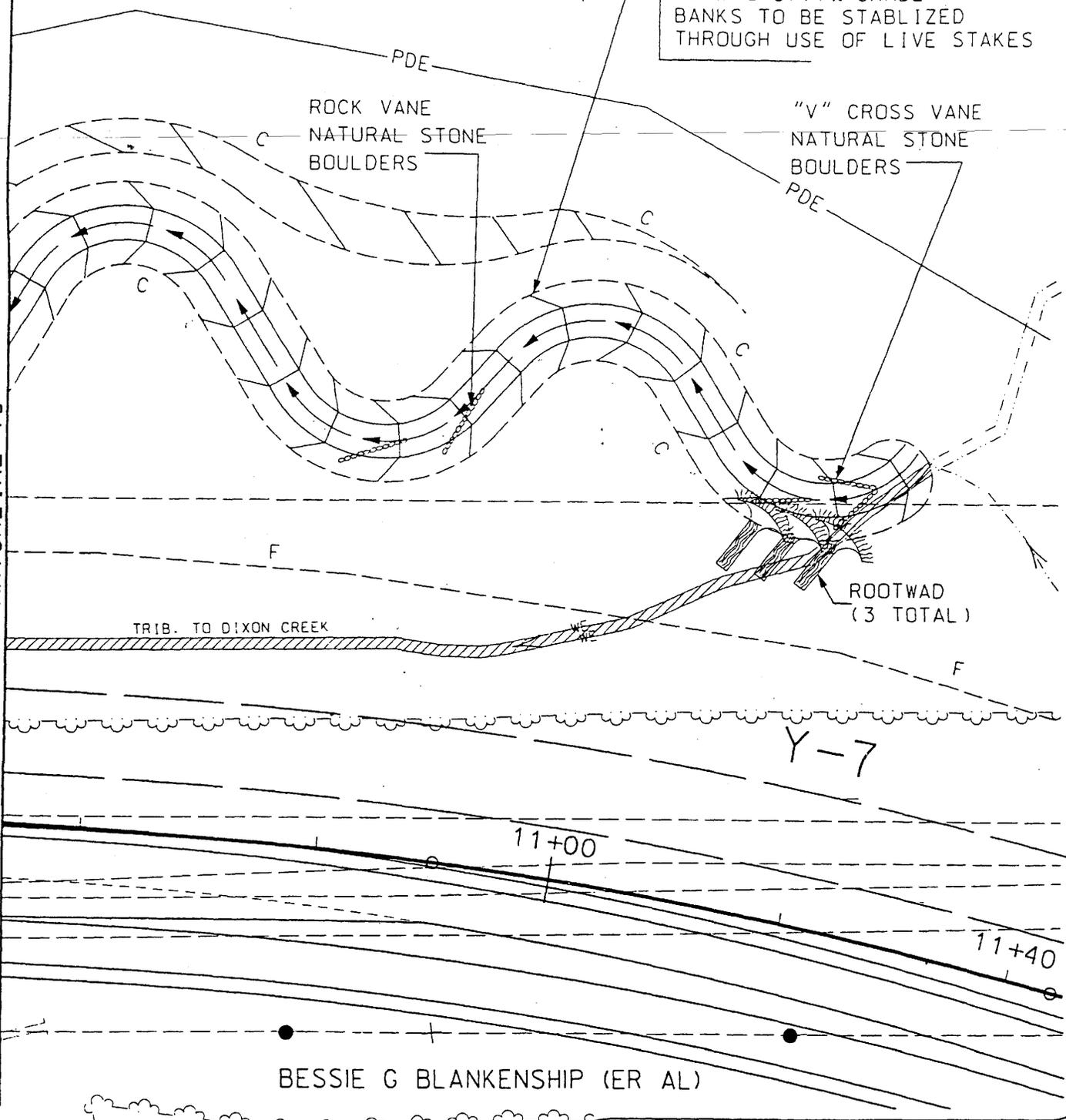
g:\snc\1\001\1r\am\hy\c\0\per\m\l\l\c\h\000.dgn

25

MARC SILVERMAN

NATURAL CHANNEL  
2.9 BASE W/1.5:1 SIDE SLOPE  
6.65m TOP @ 1.30% m DEEP  
197m @ 0.71% GRADE  
BANKS TO BE STABILIZED  
THROUGH USE OF LIVE STAKES

MATCHLINE 19

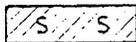


BESSIE G BLANKENSHIP (ER AL)



# PLAN VIEW SITE 19

## LEGEND



DENOTES FILL IN  
SURFACE WATER



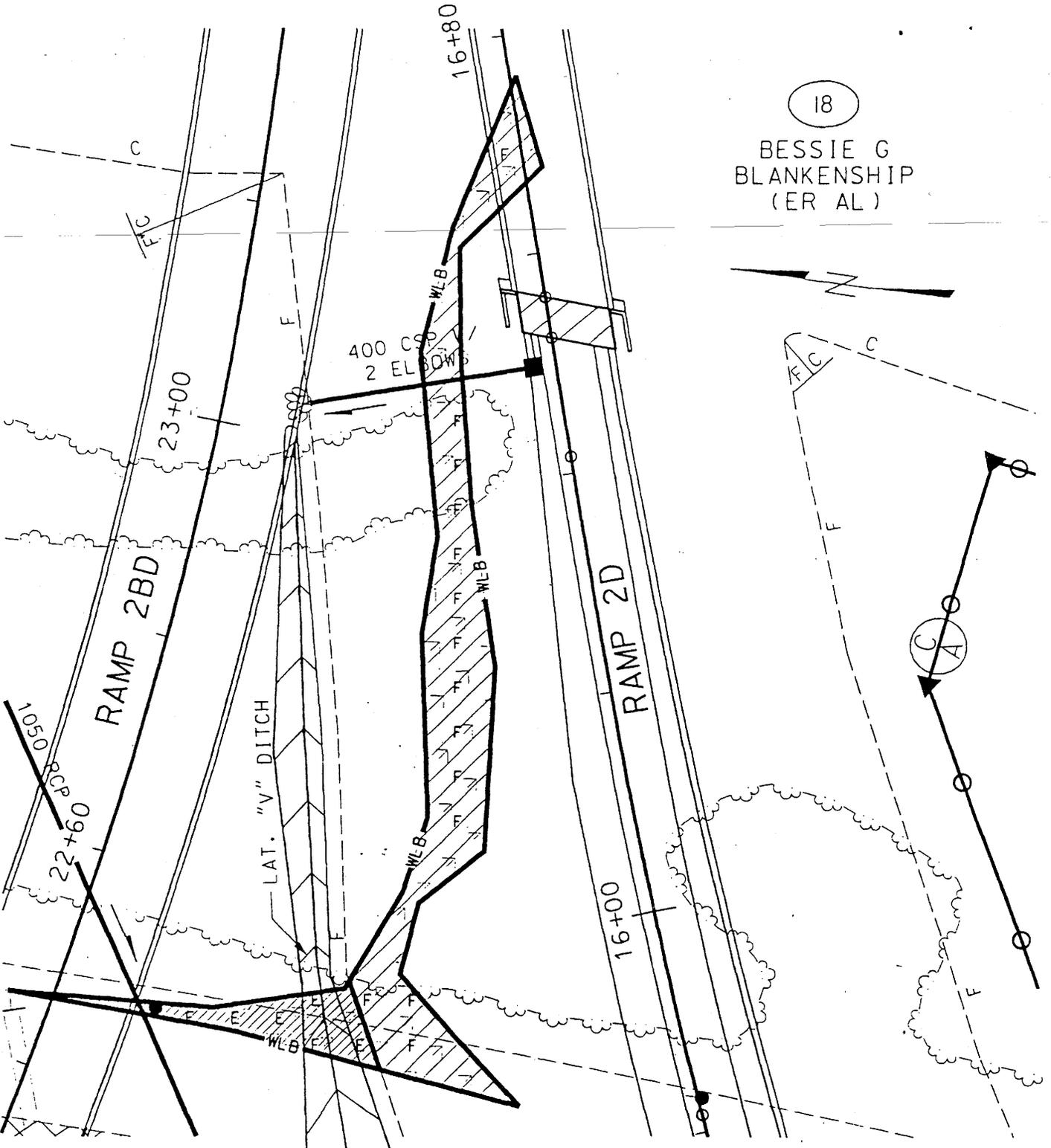
SCALE

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

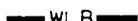
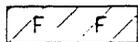
18

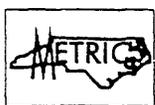
BESSIE G  
BLANKENSHIP  
(ER AL)



# PLAN VIEW SITE 20

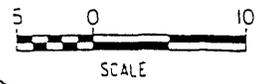
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES EXCAVATION IN WETLAND

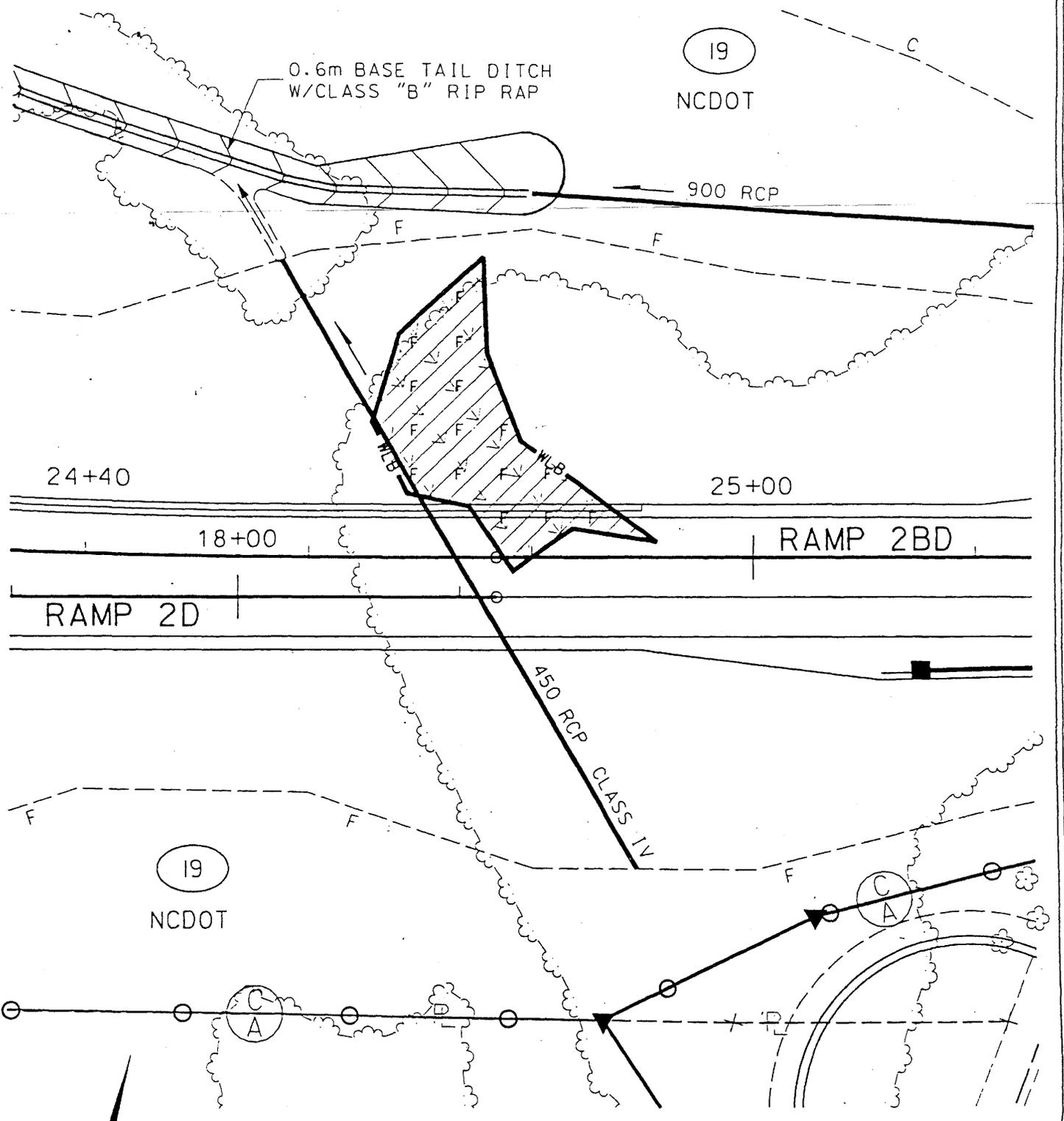


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

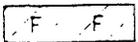


2025.10.23 11:00 AM 11/01/2025 11:00 AM 11/01/2025



# PLAN VIEW SITE 21

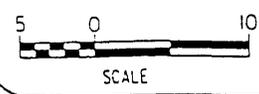
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS



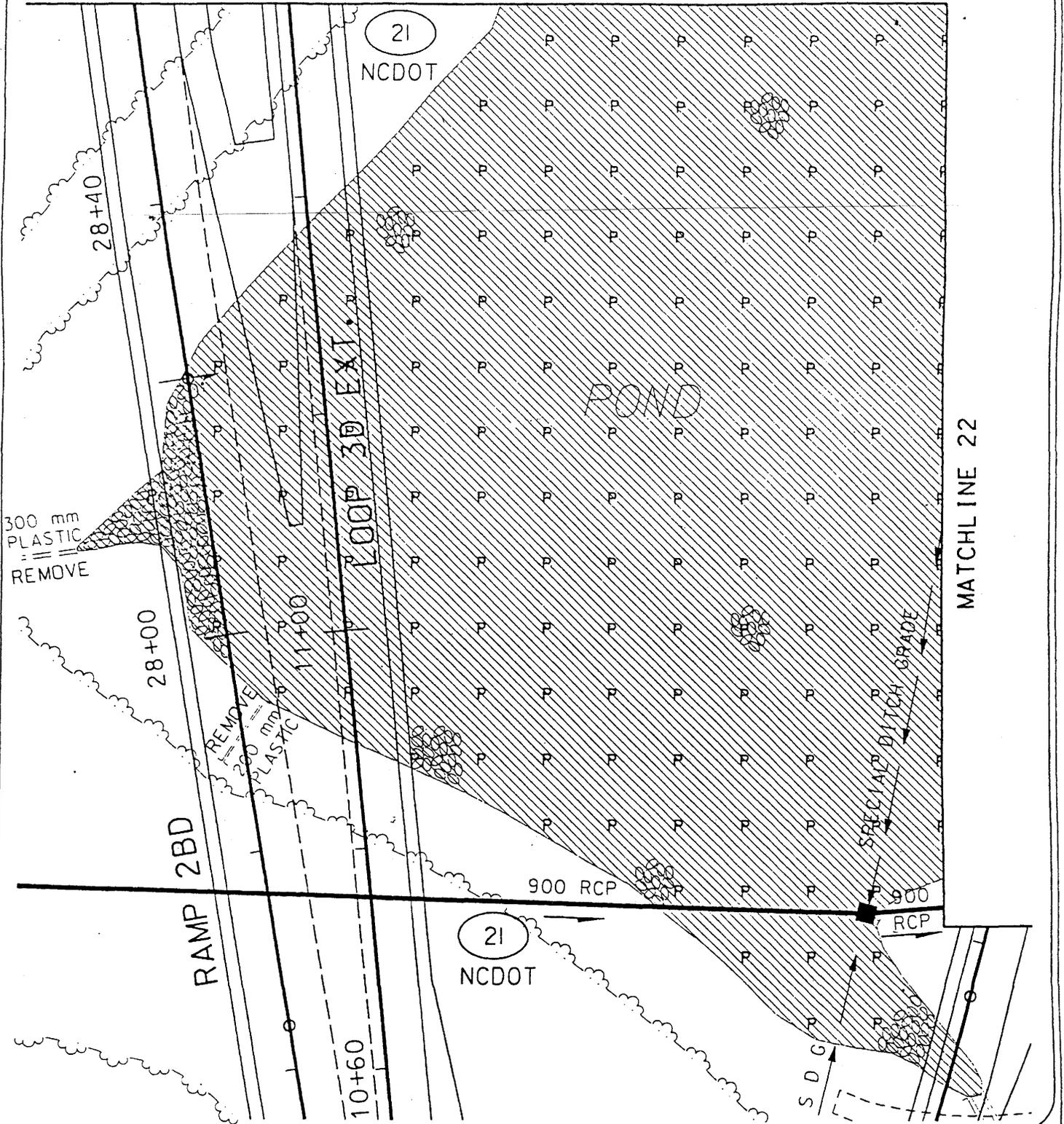
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-22480)  
CHARLOTTE OUTER LOOP



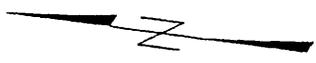
MATCHLINE 22B

21  
NCDOT

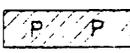


MATCHLINE 22

# PLAN VIEW SITE 22



### LEGEND

 DENOTES FILL IN SURFACE WATER (POND)



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

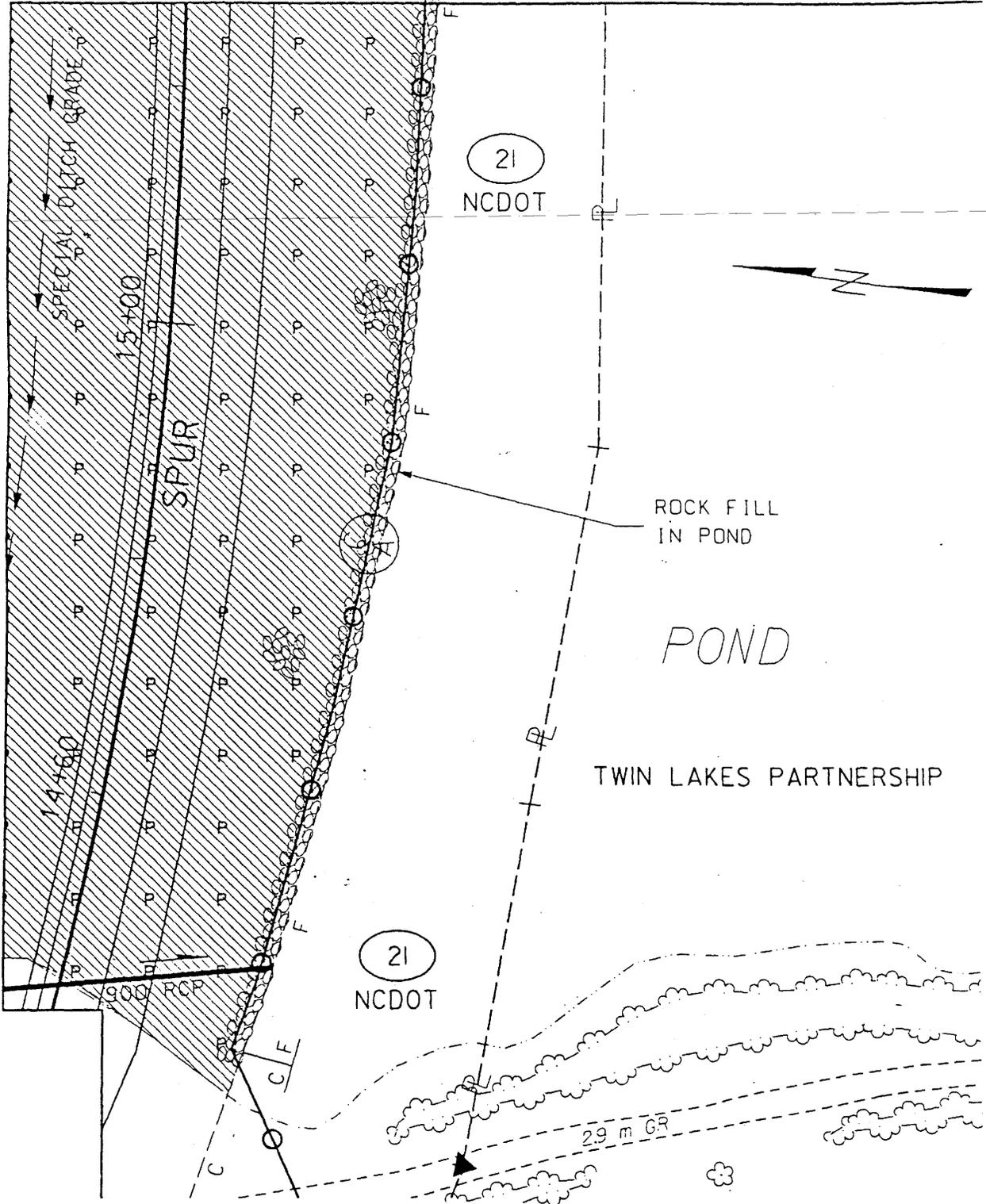
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

5 0 10  
SCALE

g:\c1\001\tr\plan\pdr\o\pdr.mif\1s1\1-11920.dgn

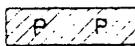
MATCHLINE 22A

MATCHLINE 22

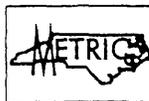


# PLAN VIEW SITE 22

## LEGEND

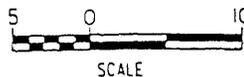


DENOTES FILL IN  
SURFACE WATER  
(POND)



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



MATCHLINE 22B

MATCHLINE 22A

REMOVE  
300 mm  
PLASTIC

21  
NCDOT

POND

SPECIAL DITCH GRADE

SPUR

15+40

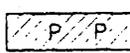
16+00

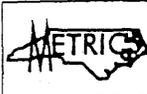
ROCK FILL IN POND

21  
NCDOT

# PLAN VIEW SITE 22

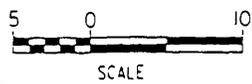
## LEGEND

 DENOTES FILL IN  
SURFACE WATER  
(POND)



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SHEET 41 OF 98

D:\NCT\05\11\gr\m\rd\6\per\m\ts\sw\220b.dgn

250

250

245

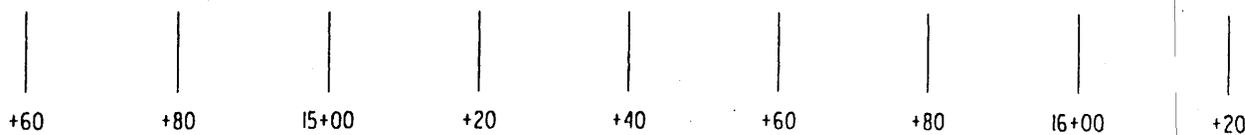
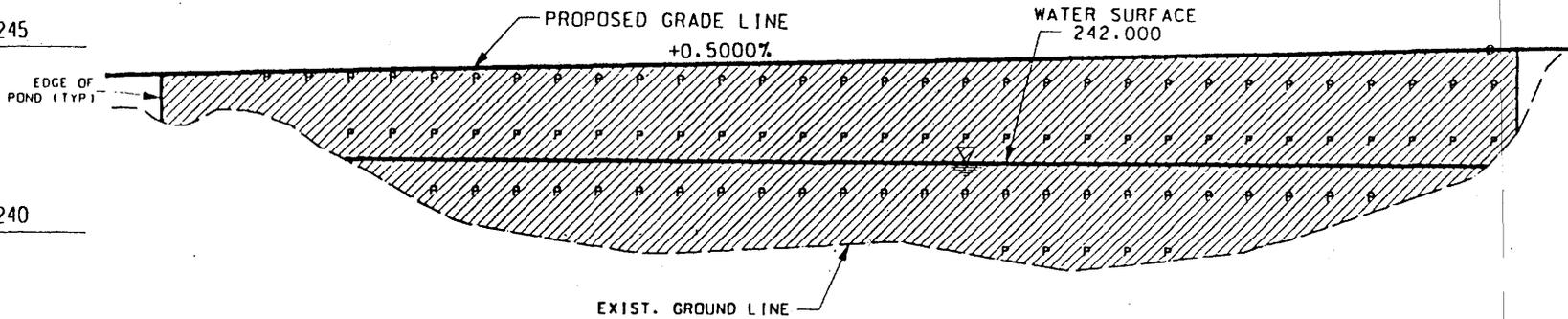
245

240

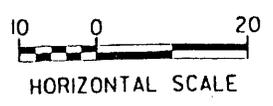
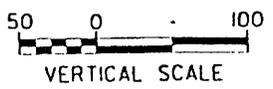
240

235

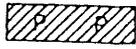
235



**SITE 22**  
SPUR PROFILE

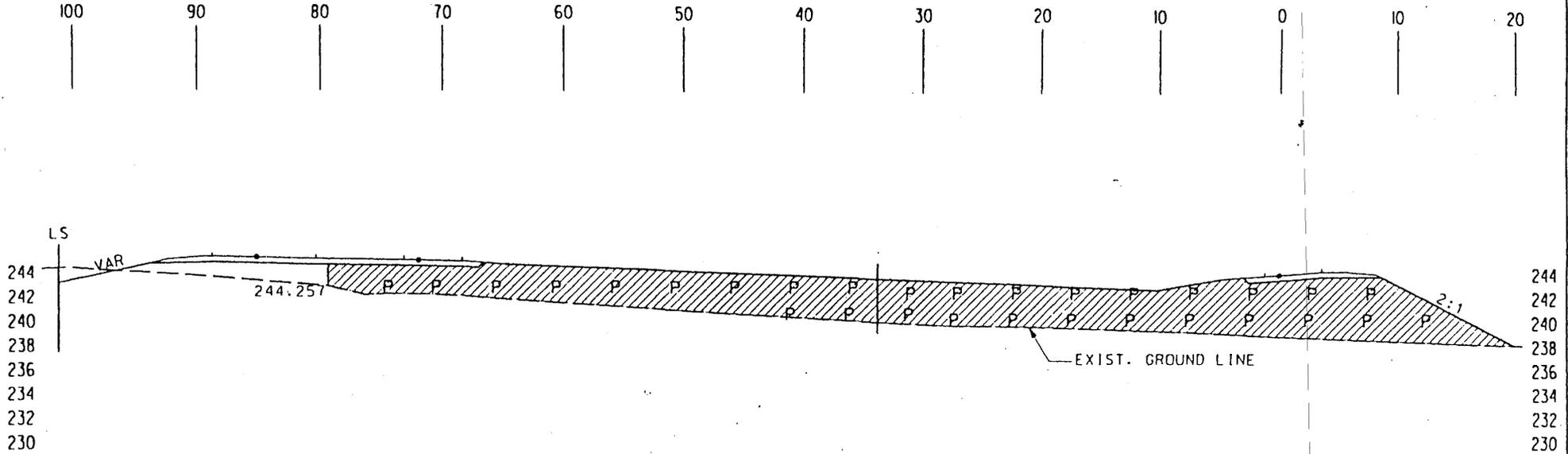


**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

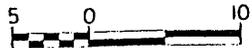
MECKLENBURG COUNTY  
8.11672214 (R-22480)  
CHARLOTTE OUTER LOOP



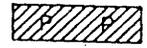
**SITE 22**  
**CROSS SECTION**  
 (SPUR 15+00)

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.JUG72214 (R-2248D)  
 CHARLOTTE OUTER LOOP



**LEGEND**

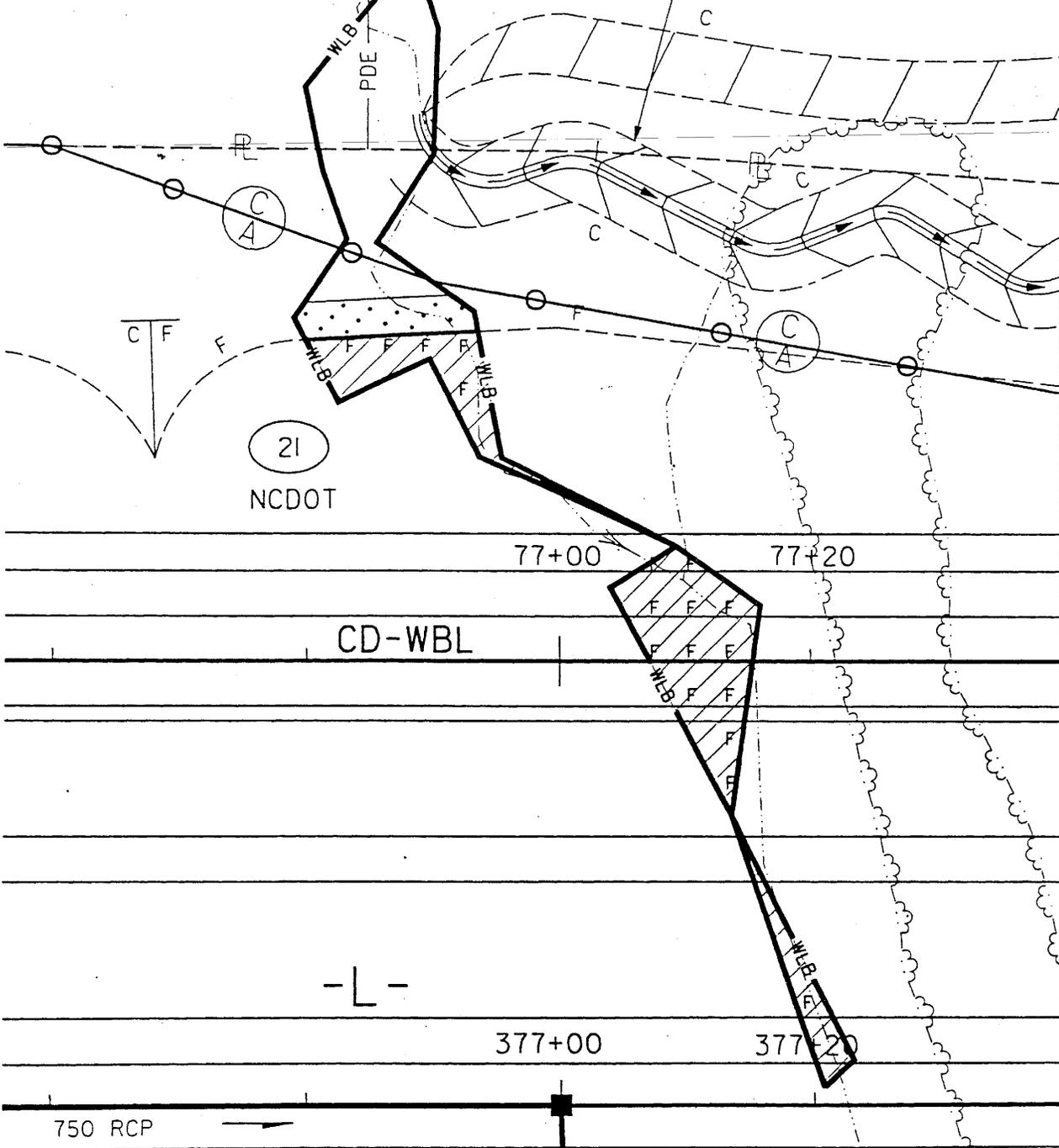
 DENOTES FILL IN SURFACE WATER (POND)

26

TWIN LAKES LTD PTRNSP  
% THE KEITH GROUP

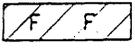
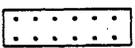
CHANNEL REALIGNMENT  
1.0 BASE W/2:1 SIDE SLOPE  
160m @ 0.59% GRADE

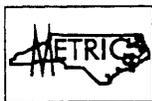
PDE



# PLAN VIEW SITE 23

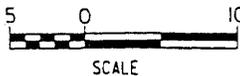
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES MECHANIZED CLEARING

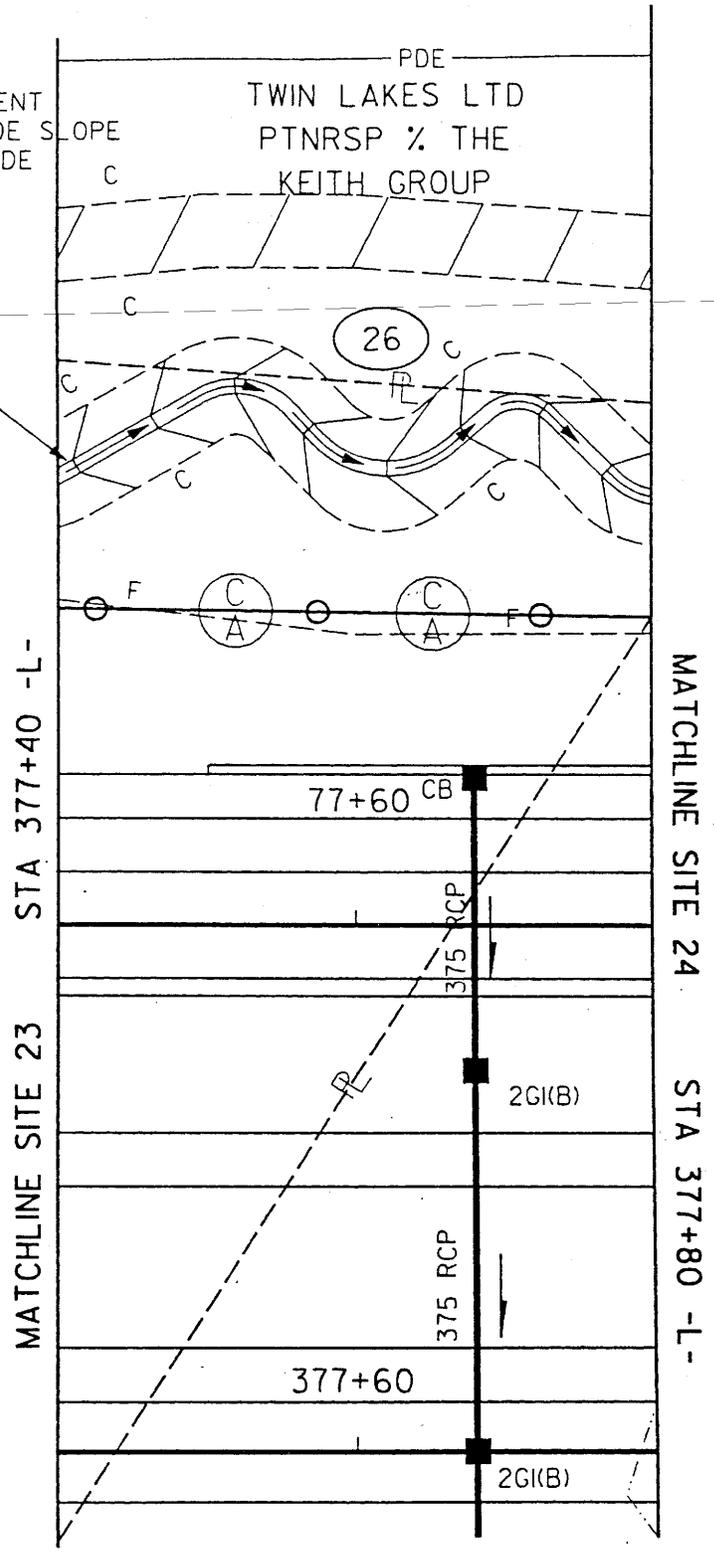


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



CHANNEL REALIGNMENT  
 1.0 BASE W/2:1 SIDE SLOPE  
 160m @ 0.59% GRADE



# PLAN VIEW SITE 23

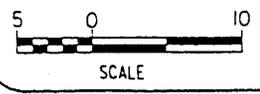
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES MECHANIZED CLEARING



**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672214 (R-2248D)  
 CHARLOTTE OUTER LOOP



G:\NCT\010\TRAN\Hydro\PERMITS\11w37160.dgn

MATCHLINE 24(a)

378+60

378+00

378+40

21  
NCDOT

32+40

RAMP 2BD

32+00

14+40

15+00

LOOP 3D EXT.

19+00

SDG

SPUR

18+20

375 RCP

21  
NCDOT

LAT. "V" DITCH

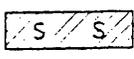
TAIL DITCH W/  
CLASS "I" RIP RAP

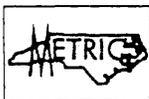
LAT 0.6m BASE DITCH  
W/CLASS "B" RIP RAP

MARY DAVIS  
FIRST SECURITY BANK

# PLAN VIEW SITE 24

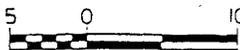
## LEGEND

 DENOTES FILL IN  
SURFACE WATER



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SCALE

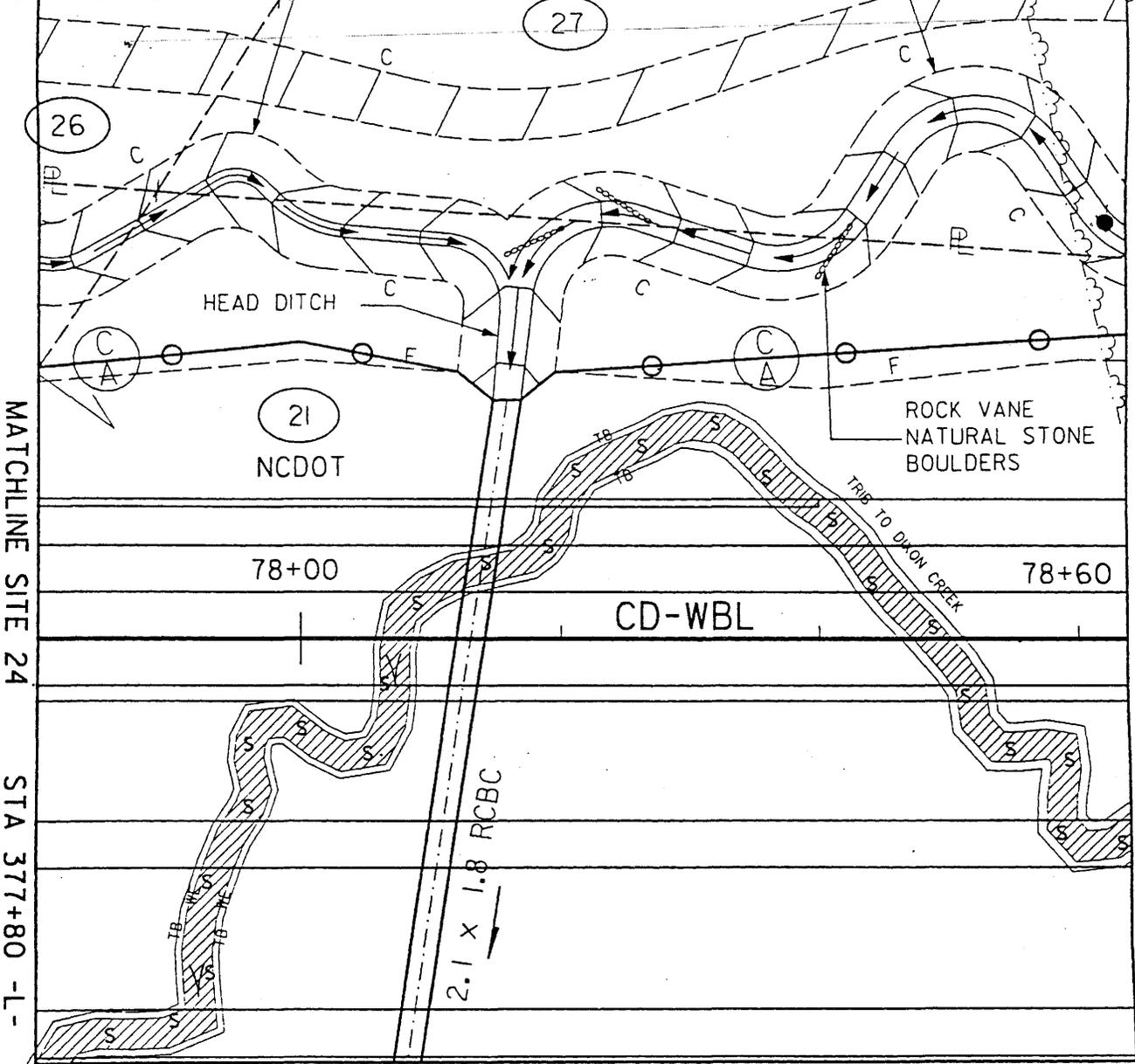
SHEET 65 OF 89

CHANNEL REALIGNMENT  
 1.0 BASE W/  
 2:1 SIDE SLOPE  
 160m @ 0.59% GRADE

NATURAL CHANNEL  
 2.0 BASE W/1.5:1 SIDE SLOPE  
 175m @ 1.148% GRADE  
 1.30m DEEP W/ 5.9m TOP WIDTH  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

TWIN LAKES LTD  
 PTNRSP 1/2 THE  
 KEITH GROUP

MARY S DAVIS & S.W.  
 DAVIS PROPERTY INC.



MATCHLINE 24 (a)

PLAN VIEW  
 SITE 24

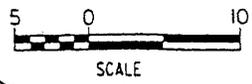
LEGEND

 DENOTES FILL IN SURFACE WATER



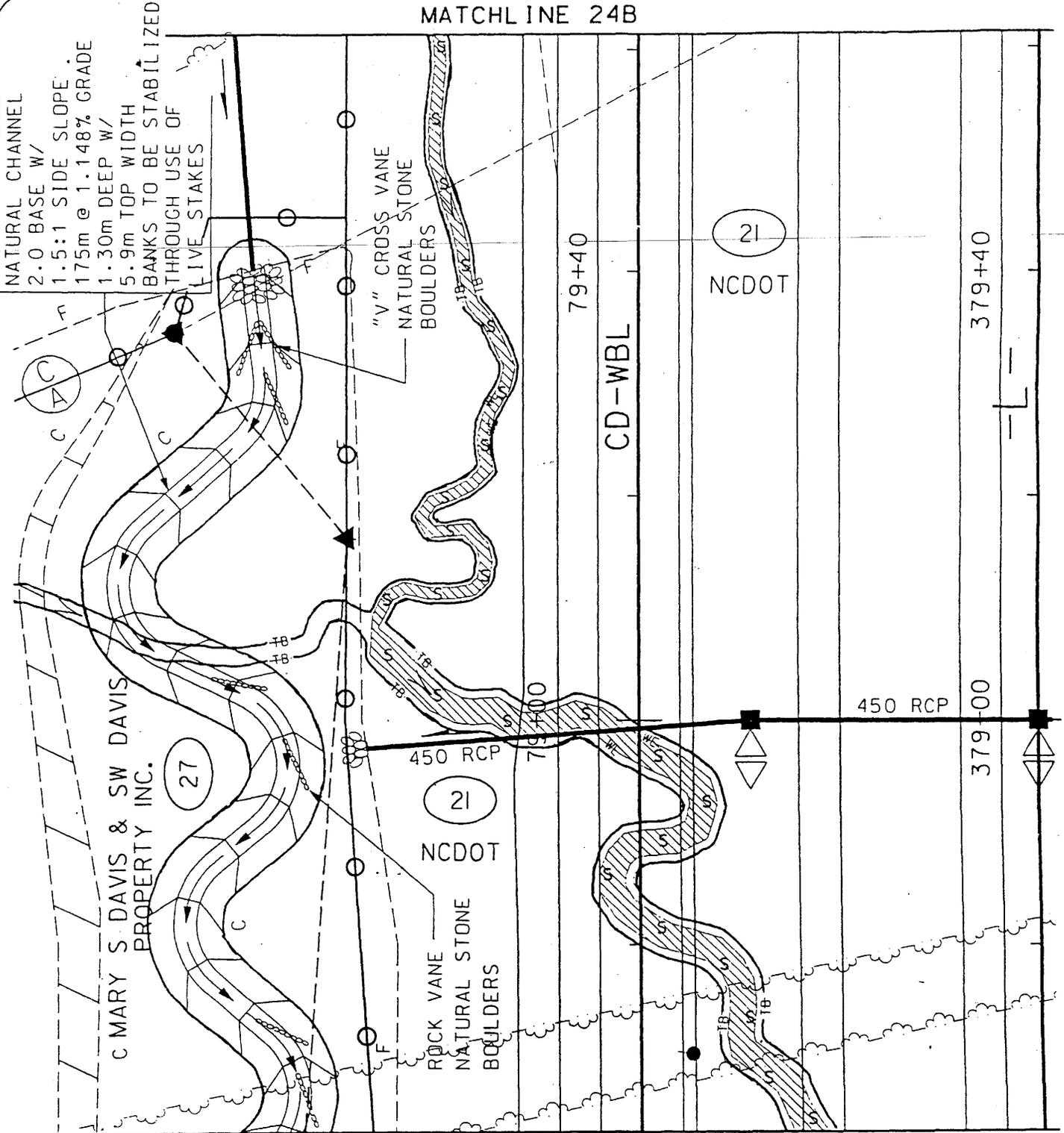
NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
 8.U672214 (R-2248D)  
 CHARLOTTE OUTER LOOP



g:\mct\adv\tr\am\hydr\o\pdr\mills\acn\317800r.ev.dgn

MATCHLINE 24B



MATCHLINE 24A

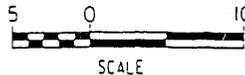
# PLAN VIEW SITE 24



### LEGEND



DENOTES FILL IN  
SURFACE WATER



SCALE

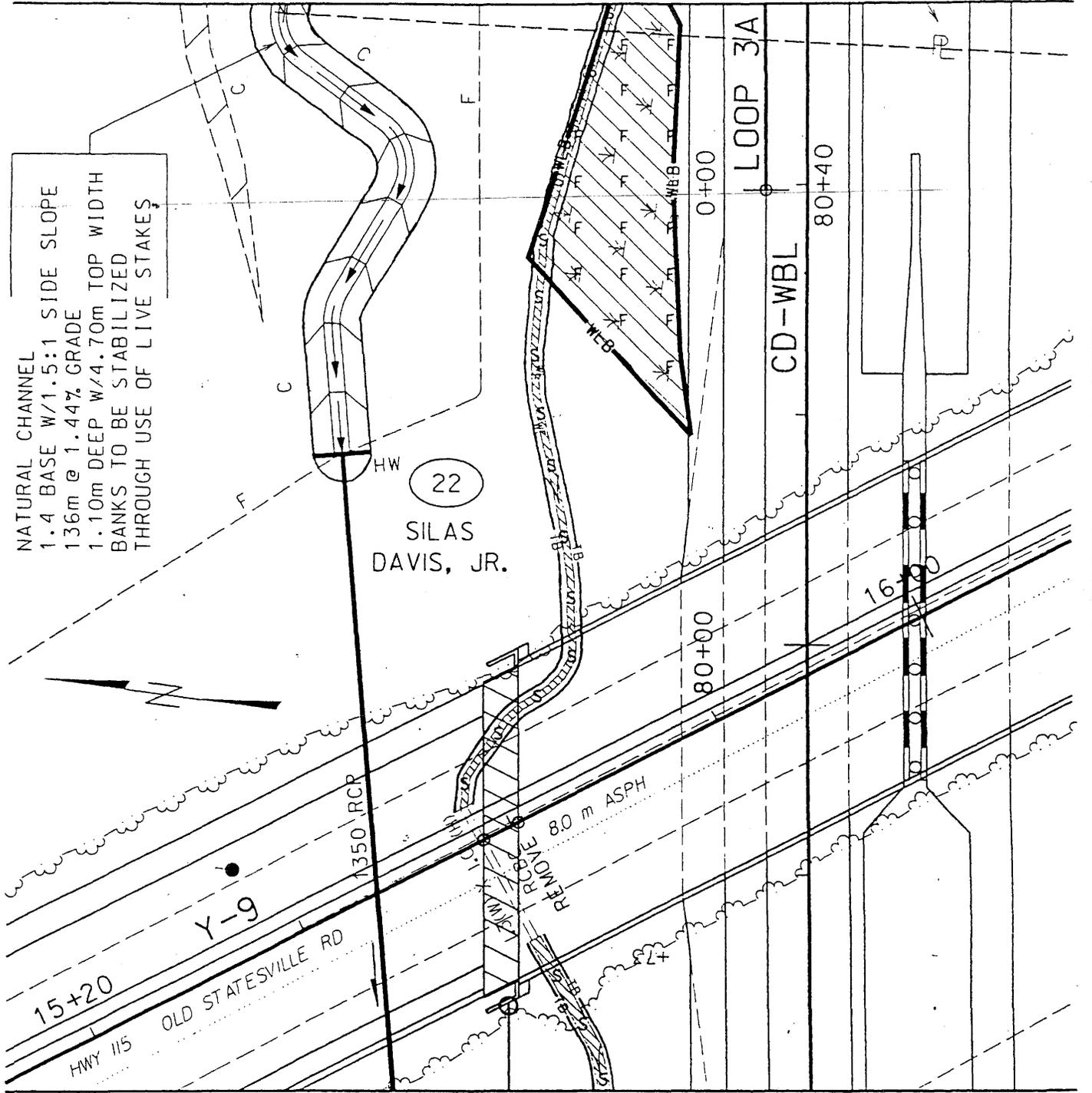
NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

MATCHLINE 24C

23 NCDOT

NATURAL CHANNEL  
 1.4 BASE W/1.5:1 SIDE SLOPE  
 136m @ 1.44% GRADE  
 1.10m DEEP W/4.70m TOP WIDTH  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

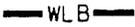
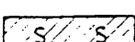


22  
SILAS DAVIS, JR.

MATCHLINE 24B

# PLAN VIEW SITE 24

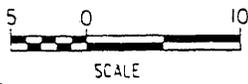
## LEGEND

-  WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SILAS DAVIS, JR.

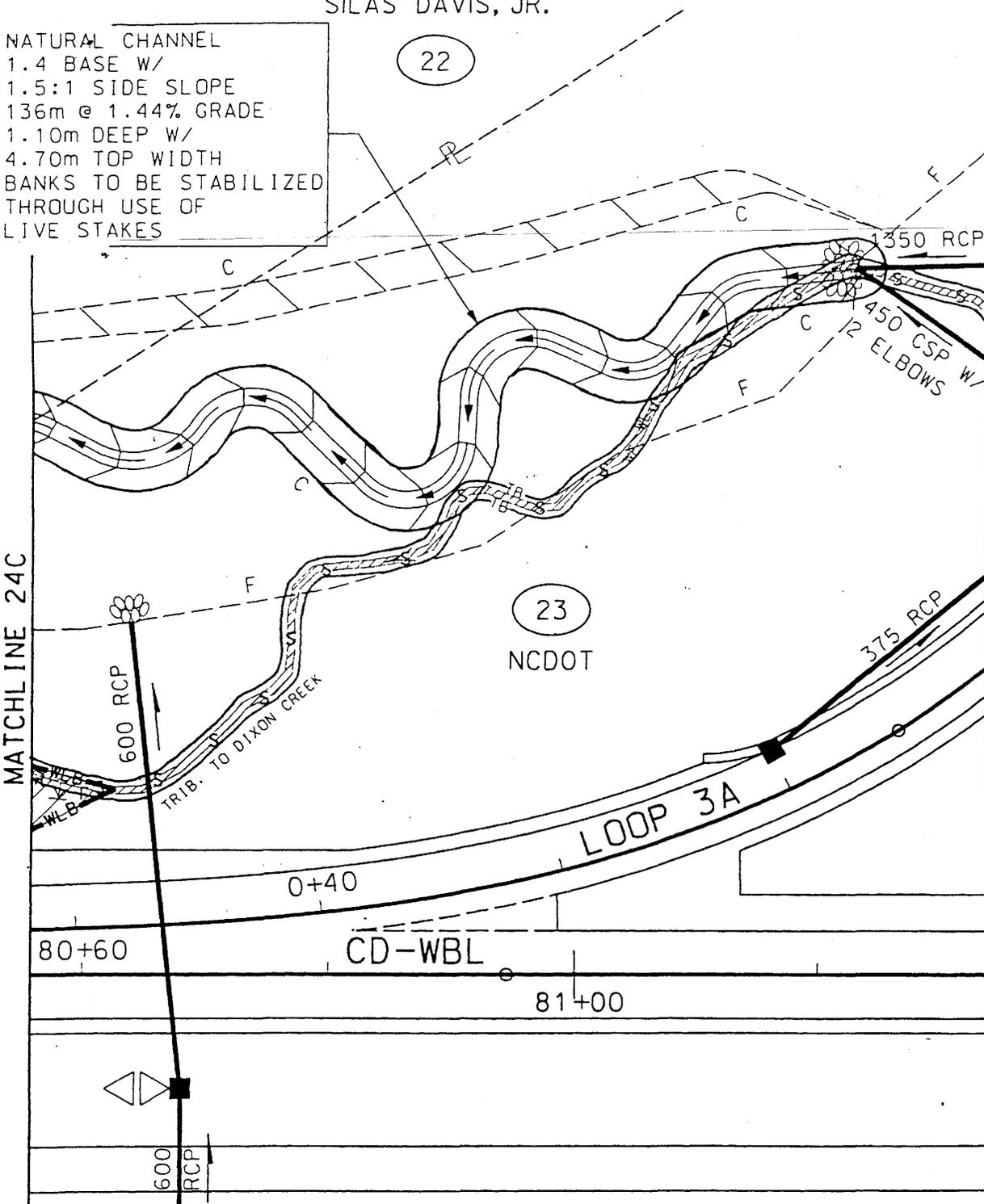
NATURAL CHANNEL  
1.4 BASE W/  
1.5:1 SIDE SLOPE  
136m @ 1.44% GRADE  
1.10m DEEP W/  
4.70m TOP WIDTH  
BANKS TO BE STABILIZED  
THROUGH USE OF  
LIVE STAKES

22

23  
NCDOT

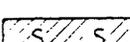
MATCHLINE 24C

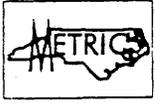
MATCHLINE 24D



# PLAN VIEW SITE 24

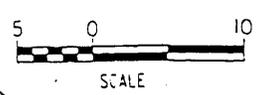
## LEGEND

-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

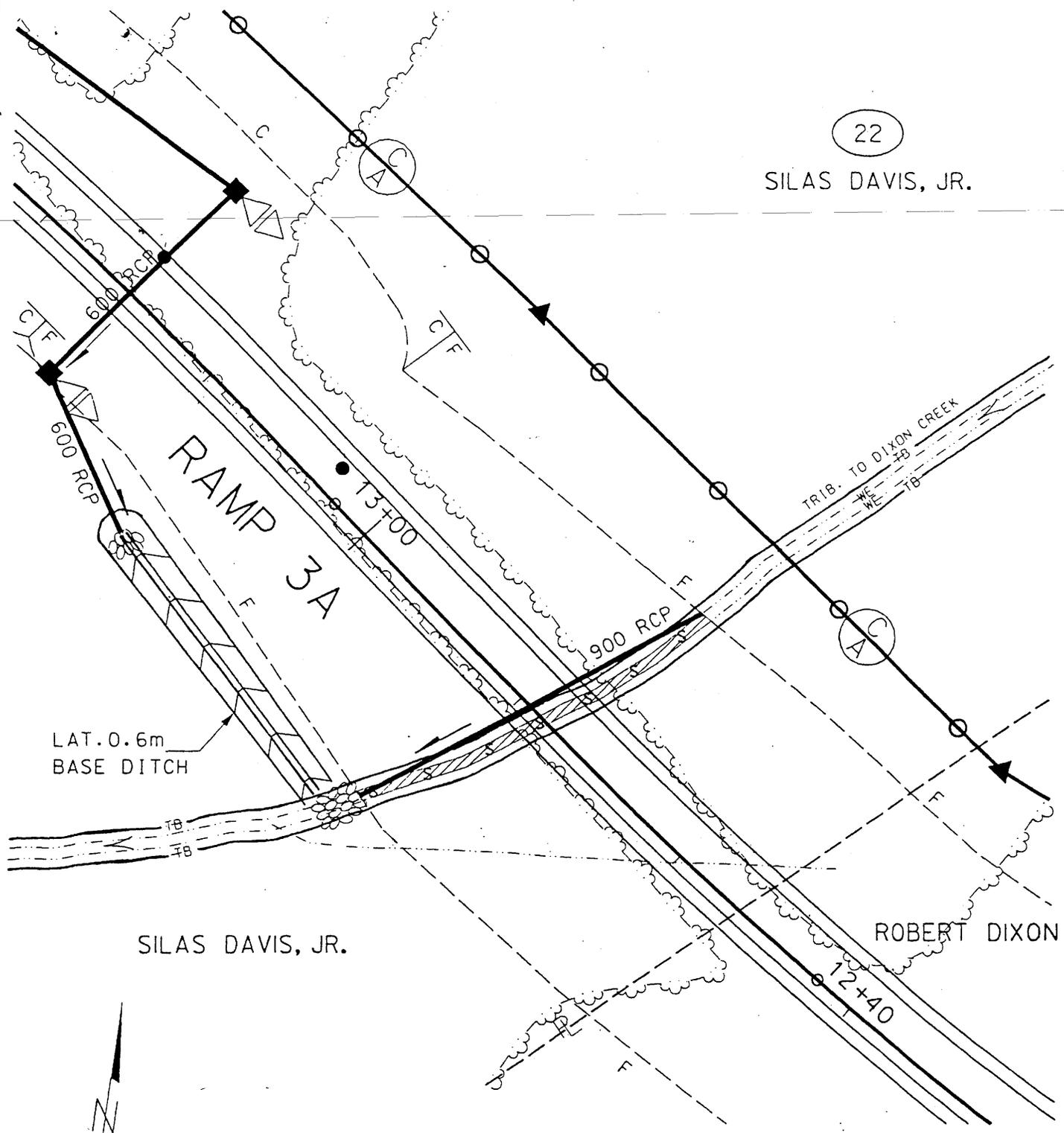
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP





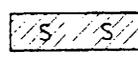
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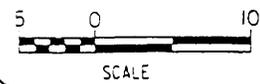
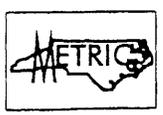
SILAS DAVIS, JR.



# PLAN VIEW SITE 25

## LEGEND

 DENOTES FILL IN SURFACE WATER

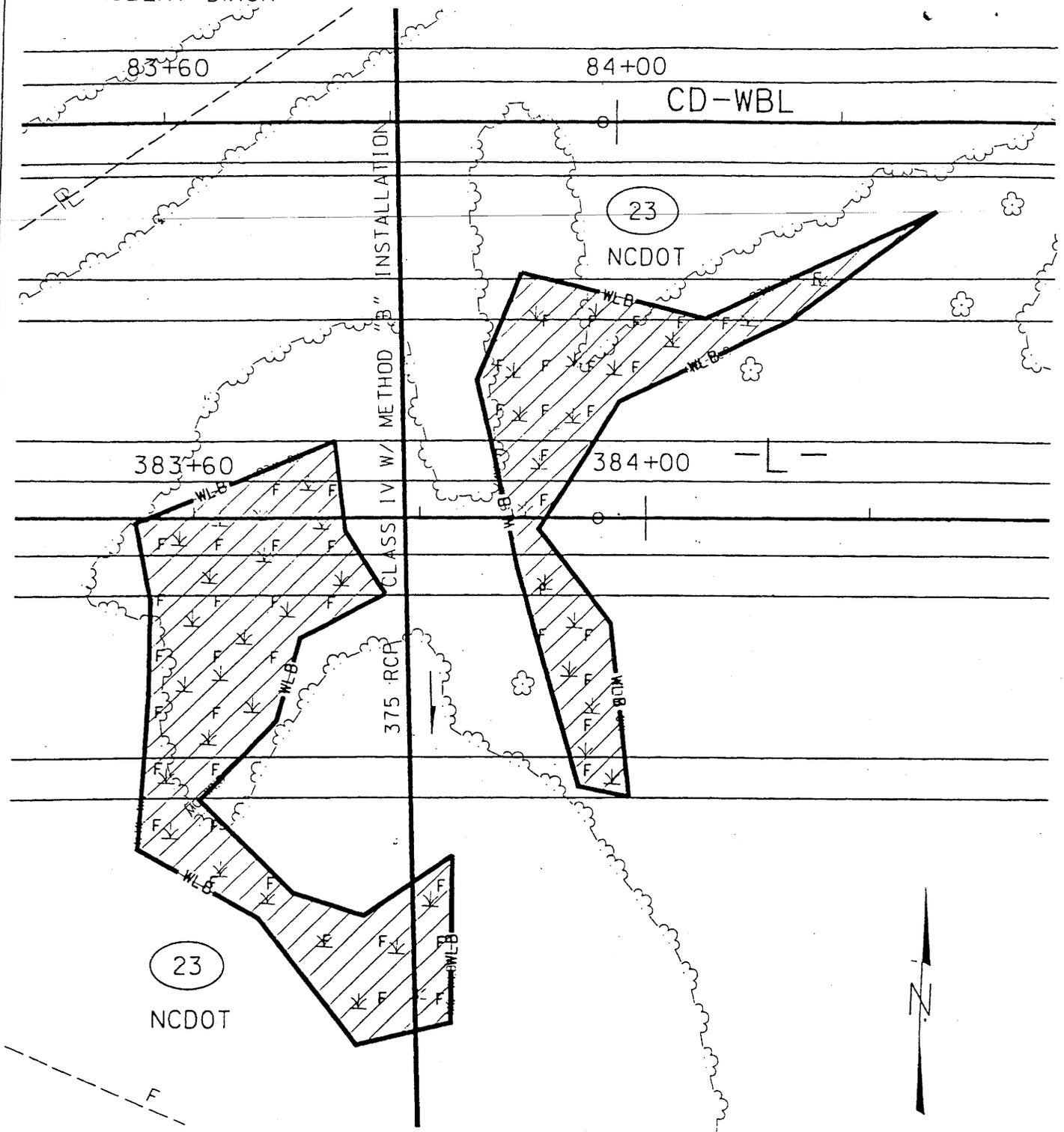


**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

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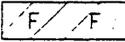
ROBERT DIXON

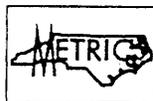


PLAN VIEW  
SITE 26

LEGEND

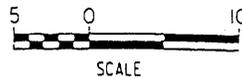
— WLB — WETLAND

 DENOTES FILL IN WETLANDS



NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SCALE



386+00

11+00

11+40

RAMP 3D

23  
NCDOT

"V" TAIL DITCH

ELBOWS

375 RCP

1350 mm WW



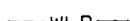
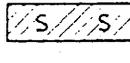
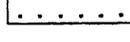
REMOVE  
300 mm  
CONC

EXST. R/W

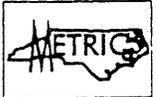
LAT. 1.2m BASE DITCH  
W/CLASS "B" RIP RAP

SILAS DAVIS, JR.

**LEGEND**

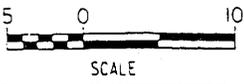
-  WLB WETLAND
-  DENOTES FILL IN WETLANDS
-  DENOTES FILL IN SURFACE WATER
-  DENOTES MECHANIZED CLEARING

**PLAN VIEW  
SITE 28**



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



PVI = 11+45.000  
 EL. = 259.635  
 VC = 160  
 K = 63  
 DS = 80km/h

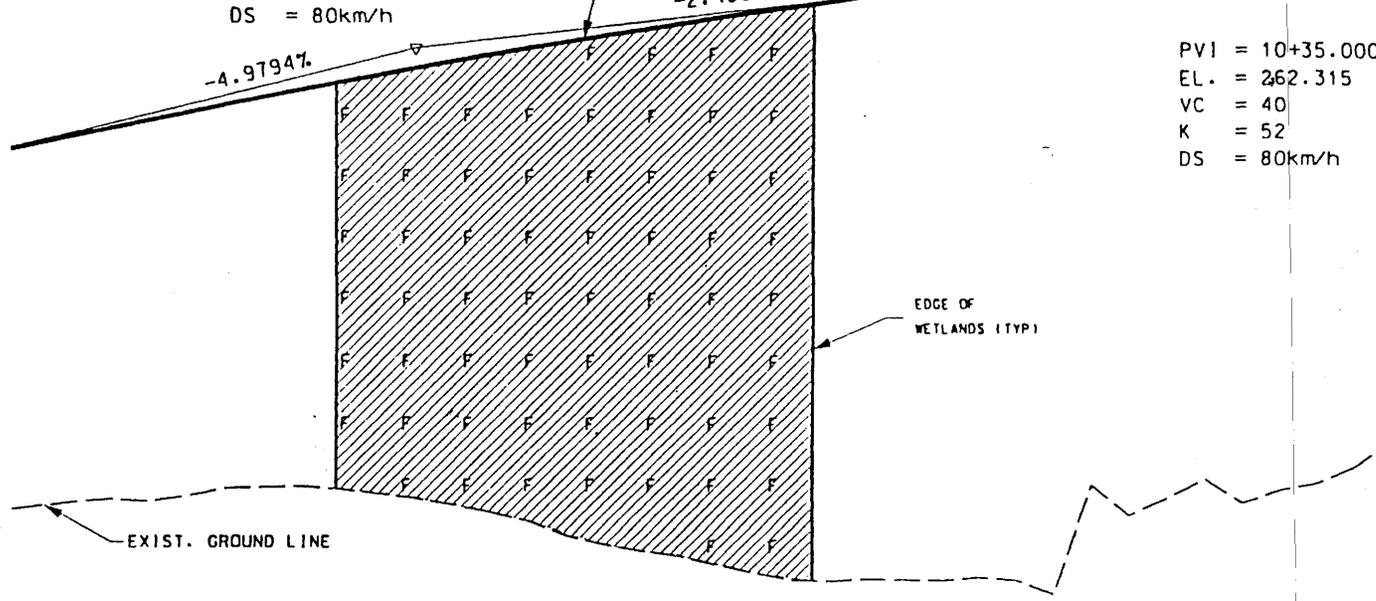
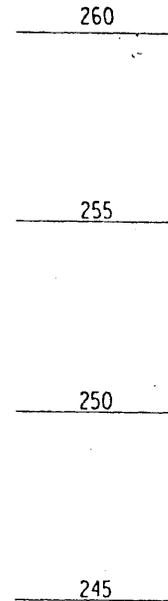
PROFILE GRADE LINE

-1.6600%

-2.4364%

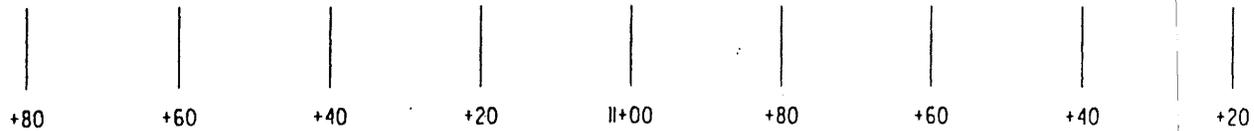
-4.9794%

PVI = 10+35.000  
 EL. = 262.315  
 VC = 40  
 K = 52  
 DS = 80km/h

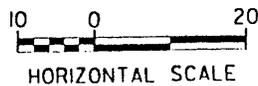
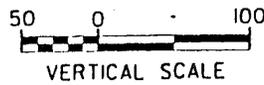


EXIST. GROUND LINE

EDGE OF WETLANDS (TYP)



**SITE 28**  
 RAMP 3D PROFILE

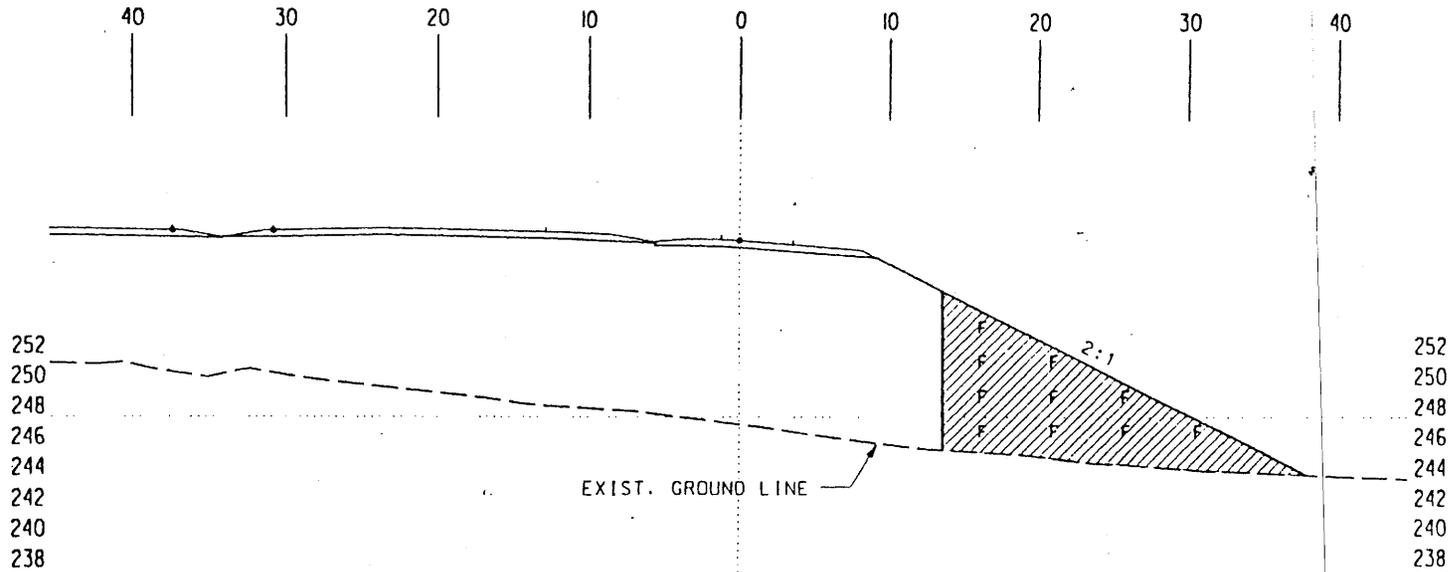


**LEGEND**

 DENOTES FILL IN WETLANDS

**NORTH CAROLINA**  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
 8.0672214 (R-2248D)  
 CHARLOTTE OUTER LOOP

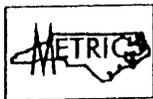


SITE 28  
 CROSS SECTION  
 (RAMP 3D 11+09.639)

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY

CHARLOTTE OUTER LOOP



LEGEND



DENOTES FILL IN  
 WETLANDS

NCDOT Project I.D. R-2248D  
Mecklenburg County, NC  
I-485 (Charlotte Outer Loop) From east of SR 2042 (Oakdale Rd.)  
To east of NC 115 (Old Statesville Rd.)

Prepared by: Stantec Consulting  
801 Jones Franklin Road Suite 300  
Raleigh, NC 27606

May 16, 2001

**NATURAL CHANNEL DESIGN**  
**TRIBUTARY TO DIXON BRANCH**

Right of Project Station 13+50 Ramp 2D  
Permit Site 16  
And  
Left of Project Station 10+00 Y-7  
Permit Site 19

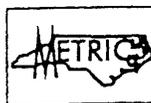
The alignment of I-485 (Charlotte Outer Loop) will require that a portion of a Tributary to Dixon Branch be relocated from Project Station 9+68 Rt. to 11+25 Rt. of Y-7 for approximately 197 meters in length and 13+16 Rt. to 14+14 Rt. Ramp 2D, approximately 122 meters in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The Tributary's drainage area is mostly rural and wooded in nature, but is expected to become urban-residential with the arrival of the Charlotte Outer Loop. The stream was found to be perennial in nature, having flow through the riffles and pools.

There is no hydraulic gage data available on this stream nor on nearby streams. Current discharges were estimated using the NCDOT procedures for rural watersheds.

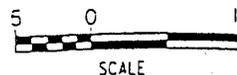
**EXISTING CHANNEL**

A representative portion of the existing channel (around station 14+40 Ramp 2D) was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 2.0, a width/depth ratio of 5.7, a sinuosity of 1.15 and an average slope of 0.006 m/m. A pebble count was performed and the channel was found to have a concentration of sand in the pools, gravel in the riffles and a classification of gravel bottom. The channel was found to be a F4 stream type according to the Rosgen classification system.



**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SHEET 57 OF 98

## REFERENCE REACH

The existing stream was found to be a stable unaltered reach and was used as the "reference reach" for the natural channel design. A 49.6-meter long reach was surveyed in detail. Riffle reaches were flowing with about 0.05 meters of water and pools were about 0.40 meters deep. The portion of channel that was surveyed had a gravel bed. Analysis of reference reach data led to a stream classification of F4.

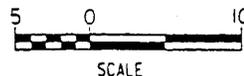
## PROPOSED CHANNEL

Based upon the existing valley type and the flood prone width desired, the proposed channel design has a C4 stream type classification. Design data is given in the attached table along with existing reach and reference reach data. Channel gradient is controlled by the natural channel tie upstream and by the relocated 1500 mm reinforced concrete culvert downstream. Mean "bankfull" depth was set at 0.32 meters, close to the measured depth of 0.32 meters for the existing/reference reach. This gives a maximum bankfull depth of 0.46 meters. Above bankfull depth it is proposed to excavate an approximately 25 meter wide flood plain (including the channel).

It is believed that by forming a flood plain above bankfull depth channel stability will be enhanced by reducing velocities for those discharges above the bankfull discharge. This should lead to a more stable channel during and after watershed development. It is anticipated that the proposed channel will have a gravel bottom. Maximum pool depths of 0.80 meters are proposed at outside bends of meanders.

Sediment transport computations were performed, using the proposed channel geometry, to determine whether the bankfull discharge would be able to transport the D50 particle without excessive bankfull shear stress. The D50 particle was found to be 16mm and the proposed bankfull shear stress was calculated to be  $0.0402 \text{ kg/m}^3$ . Based upon shields diagram the calculated shear stress will move the 20mm particle size

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that channel banks will be planted with native trees and shrubs above bankfull depth. Rock Vanes and "V" Cross Vanes will be utilized to control the near bank shear stress in the meanders, along the proposed roadway. Root wads will be placed at station 11+17 left Y-7 in order to protect the newly placed fill in the abandoned channel from bank erosion.



### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

SHEET 70 OF 98



**Stantec**

Location: **Permit Site 16**

**Site #2 Sta 10+00 Y-7 Left**

Design by: Kevin Williams, PE

2/1/00

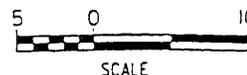
Checked by: Paul Koch, PE

2/2/00

ITEM	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
STREAM NAME	Tributary to Dixon Branch	Tributary to Dixon Branch		Tributary to Dixon Branch
STREAM TYPE	F4	C4		F4
DRAINAGE AREA (DA)	58.66 ha	58.66 ha		58.66 ha
BANKFULL WIDTH ( $W_{bkf}$ )	1.84 m	3.85 m		1.84 m
BANKFULL MEAN DEPTH ( $d_{bkf}$ )	0.32 m	0.32 m		0.32 m
WIDTH/DEPTH RATIO ( $W_{bkf}/d_{bkf}$ )	5.68	12.00		5.68
BANKFULL X-SECTION AREA ( $A_{bkf}$ )	0.60 m <sup>2</sup>	1.06 m <sup>2</sup>		0.60 m <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	1.38 mps	0.78 mps		1.38 mps
BANKFULL DISCHARGE, m <sup>3</sup> /s	0.82 m <sup>3</sup> /s	0.82 m <sup>3</sup> /s		0.82 m <sup>3</sup> /s
BANKFULL MAX DEPTH ( $d_{max}$ )	0.47 m	0.46 m		0.47 m
WIDTH Flood-Prone Area ( $W_{fpa}$ )	3.68 m	5.65 m		3.68 m
ENTRENCHMENT RATIO (ER)	2.00	1.47		2.00
MEANDER LENGTH (Lm)	13.0 m	35 m		13.0 m
RATIO OF Lm TO $W_{bkf}$	7.06	9		7.1
RADIUS OF CURVATURE	3.0 m	10 m		3.0 m
RATIO OF $R_c$ TO $W_{bkf}$	1.6	2.5		1.6
BELT WIDTH	9.0	77.0		9.0
MEANDER WIDTH RATIO	4.9	20.0		4.9
SINUOSITY (K)	1.15	1.25		1.15
VALLEY SLOPE	0.007 m/m	0.0089 m/m		0.007 m/m
AVERAGE SLOPE (S)	0.006 m/m	0.0071 m/m		0.006 m/m
POOL SLOPE	0.009 m/m	0.0014 m/m		0.009 m/m
RATIO OF POOL SLOPE TO AVERAGE SLOPE	1.42	0.20		1.42
MAX POOL DEPTH	0.69 m	0.80 m		0.69 m
RATIO OF POOL DEPTH TO AVERAGE BANKFULL WIDTH	2.13	2.50		2.13
POOL WIDTH	1.92 m	5.01 m		1.92 m
RATION OF POOL WIDTH TO BANKFULL WIDTH	1.04	1.30		1.04
POOL TO POOL SPACING	15.20 m	19.3 m		15.20 m
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	8.26	5		8.26

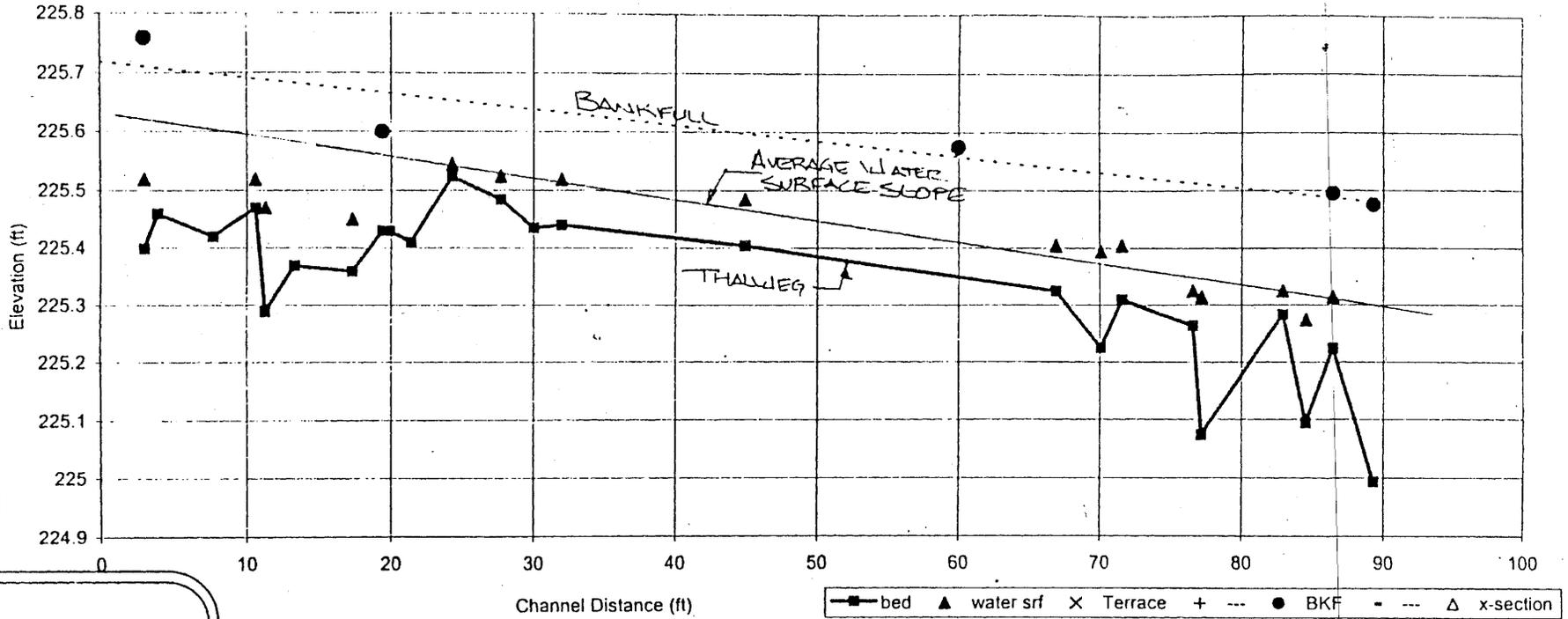
**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



# PERMIT SITE 16

Stream Site 2, Tributary to Dixon Branch, Catawba River Basin, Left of Sta 10+00 -Y7- (NCDOT TIP R-2248D)



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 81672214 (R-2248D)  
 CHARLOTTE OUTER LOOP



Stantec

Location: Permit Site 19

Site #1 Sta 13+00 Rp2D Right

Design by: Kevin Williams, PE

2/1/00

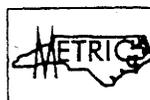
Checked by: Paul Koch, PE

2/2/00

ITEM	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
STREAM NAME	Tributary to Dixon Branch	Tributary to Dixon Branch		Tributary to Dixon Branch
STREAM TYPE	F4	C4		F4
DRAINAGE AREA (DA)	58.66 ha	58.66 ha		58.66 ha
BANKFULL WIDTH ( $W_{bkt}$ )	1.84 m	2.95 m		1.84 m
BANKFULL MEAN DEPTH ( $d_{bkt}$ )	0.32 m	0.25 m		0.32 m
WIDTH/DEPTH RATIO ( $W_{bkt}/d_{bkt}$ )	5.68	12.00		5.68
BANKFULL X-SECTION AREA ( $A_{bkt}$ )	0.60 m <sup>2</sup>	0.62 m <sup>2</sup>		0.60 m <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	0.40 mps	0.39 mps		0.40 mps
BANKFULL DISCHARGE, m <sup>3</sup> /s	0.24 m <sup>3</sup> /s	0.24 m <sup>3</sup> /s		0.24 m <sup>3</sup> /s
BANKFULL MAX DEPTH ( $d_{max}$ )	0.47 m	0.35 m		0.47 m
WIDTH Flood-Prone Area ( $W_{fpa}$ )	3.68 m	4.33 m		3.68 m
ENTRENCHMENT RATIO (ER)	2.00	1.47		2.00
MEANDER LENGTH (Lm)	13.0 m	42 m		13.0 m
RATIO OF Lm TO $W_{bkt}$	7.06	14		7.1
RADIUS OF CURVATURE	3.0 m	9 m		3.0 m
RATIO OF Rc TO $W_{bkt}$	1.6	3.0		1.6
BELT WIDTH	9.0	17.7		9.0
MEANDER WIDTH RATIO	4.9	6.0		4.9
SINUOSITY (K)	1.15	1.36		1.15
VALLEY SLOPE	0.007 m/m	0.0081 m/m		0.007 m/m
AVERAGE SLOPE (S)	0.006 m/m	0.0060 m/m		0.006 m/m
POOL SLOPE	0.009 m/m	0.0012 m/m		0.009 m/m
RATIO OF POOL SLOPE TO AVERAGE SLOPE	1.42	0.20		1.42
MAX POOL DEPTH	0.69 m	0.61 m		0.69 m
RATIO OF POOL DEPTH TO AVERAGE BANKFULL WIDTH	2.13	2.50		2.13
POOL WIDTH	1.92 m	3.84 m		1.92 m
RATION OF POOL WIDTH TO BANKFULL WIDTH	1.04	1.30		1.04
POOL TO POOL SPACING	15.20 m	14.8 m		15.20 m
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	8.26	5		8.26

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



NCDOT Project I.D. R-2248D  
Mecklenburg County, NC  
I-485 (Charlotte Outer Loop) From east of SR 2042 (Oakdale Rd.)  
To east of NC 115 (Old Statesville Rd.)

Prepared by: Stantec Consulting  
801 Jones Franklin Road Suite 300  
Raleigh, NC 27606

May 16, 2001

## NATURAL CHANNEL DESIGN

### TRIBUTARY TO DIXON BRANCH

Left of Project Station 378+15 to 379+40  
Permit Site 24

The alignment of I-485 (Charlotte Outer Loop) will require that a portion of a Tributary to Dixon Branch be relocated from Project Station 378+15 Lt. to Station 379+40 Lt., approximately 175 meters in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The Tributary's drainage area is mostly rural and wooded in nature, but is expected to become urban-residential with the arrival of the Charlotte Outer Loop. The stream was found to be ephemeral in nature, having dry riffles and water standing in pools.

There is no hydraulic gage data available on this stream nor on nearby streams. Current discharges were estimated using the NCDOT procedures for rural watersheds.

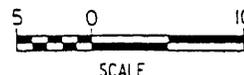
#### EXISTING CHANNEL

A representative portion of the existing channel (around station 377+80) was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 1.45, a width/depth ratio of 8.0, a sinuosity of 1.65 and an average slope of 0.009 m/m. A pebble count was performed and the channel was found to have a concentration of sand in the pools, gravel in the riffles and a classification of gravel bottom. The channel was found to be a G4c stream type according to the Rosgen classification system.



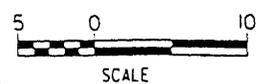
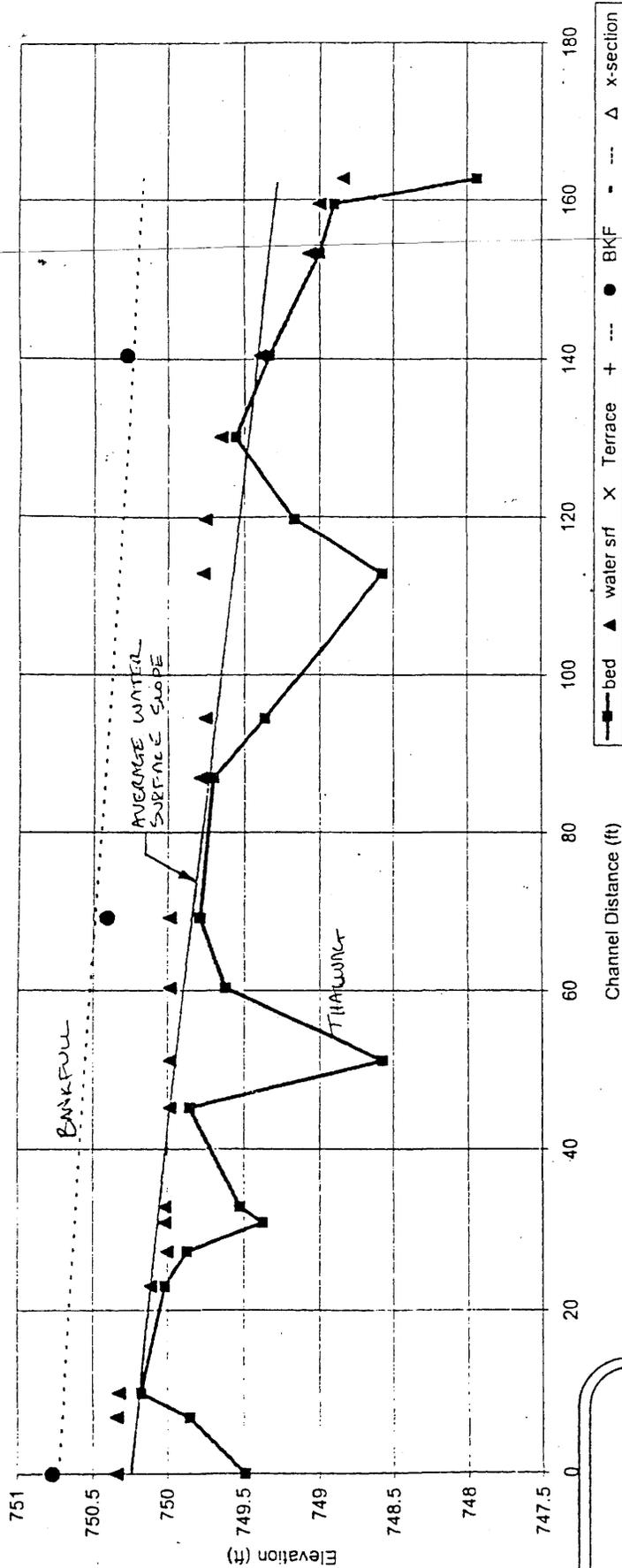
#### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



**PERMIT SITE 19**

Stream Site 1, Tributary to Dixon Branch, Catawba River Basin, Right of Sta 13+00 Ramp 2D, (NCDOT TIP R-2248D)



**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

4/11/88  
BFL/EB

## REFERENCE REACH

Since an undisturbed, stable reach of stream could not be found in the area, the existing channel was also used as the "reference reach" for the natural channel design. A 49.5-meter long reach was surveyed in detail. Riffle reaches were dry and pools were standing about 0.2 meters deep. The portion of channel that was surveyed had a gravel bed. Analysis of reference reach data led to a stream classification of G4c.

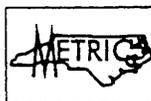
## PROPOSED CHANNEL

Based upon the existing valley type and the flood prone width desired, the proposed channel design has a C4 stream type classification. Design data is given in the attached table along with existing reach and reference reach data. Channel gradient is controlled by the natural channel tie upstream and by the proposed 2.1 m X 1.8 m reinforced concrete box culvert downstream. Mean "bankfull" depth was set at 0.22 meters, close to the measured depth of 0.25 meters for the existing/reference reach. This gives a maximum bankfull depth of 0.32 meters. Above bankfull depth it is proposed to excavate an approximately 20 meter wide flood plain (including the channel).

It is believed that by forming a flood plain above bankfull depth channel stability will be enhanced by reducing velocities for those discharges above the bankfull discharge. This should lead to a more stable channel during and after watershed development. It is anticipated that the proposed channel will have a gravel bottom. Maximum pool depths of 0.55 meters are proposed at outside bends of meanders.

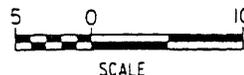
Sediment transport computations were performed, using the proposed channel geometry, to determine whether the bankfull discharge would be able to transport the D50 particle without excessive bankfull shear stress. The D50 particle was found to be 20mm and the proposed bankfull shear stress was calculated to be  $0.045 \text{ kg/m}^3$ . Based upon shields diagram the calculated shear stress will move the 20mm particle size.

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that channel banks will be planted with native trees and shrubs above bankfull depth. Rock Vanes and "V" Cross Vanes will be utilized to control the near bank shear stress in the meanders, along the proposed roadway.



### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP





**Stantec**

Location: **Permit Site 24**

**Site #3 Sta 378+15 -L- Left**

Design by: Kevin Williams, PE

2/1/00

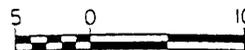
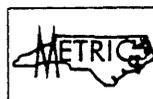
Checked by: Paul Koch, PE

2/2/00

ITEM	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
STREAM NAME	Tributary to Dixon Branch	Tributary to Dixon Branch		Tributary to Dixon Branch
STREAM TYPE	G4c	C4		G4c
DRAINAGE AREA (DA)	33.87 ha	33.87 ha		33.87 ha
BANKFULL WIDTH ( $W_{bkf}$ )	2.03 m	2.65 m		2.03 m
BANKFULL MEAN DEPTH ( $d_{bkf}$ )	0.25 m	0.22 m		0.25 m
WIDTH/DEPTH RATIO ( $W_{bkf}/d_{bkf}$ )	8.00	12.00		8.00
BANKFULL X-SECTION AREA ( $A_{bkf}$ )	0.52 m <sup>2</sup>	0.50 m <sup>2</sup>		0.52 m <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	0.60 mps	0.62 mps		0.60 mps
BANKFULL DISCHARGE, m <sup>3</sup> /s	0.31 m <sup>3</sup> /s	0.31 m <sup>3</sup> /s		0.31 m <sup>3</sup> /s
BANKFULL MAX DEPTH ( $d_{max}$ )	0.37 m	0.32 m		0.37 m
WIDTH Flood-Prone Area ( $W_{fpa}$ )	2.96 m	3.92 m		2.96 m
ENTRENCHMENT RATIO (ER)	1.46	1.48		1.46
MEANDER LENGTH (Lm)	16.0 m	38 m		16.0 m
RATIO OF Lm TO $W_{bkf}$	7.87	14		7.9
RADIUS OF CURVATURE	5.0 m	7 m		5.0 m
RATIO OF Rc TO $W_{bkf}$	2.5	2.5		2.5
BELT WIDTH	11.5	15.9		11.5
MEANDER WIDTH RATIO	5.7	6.0		5.7
SINUOSITY (K)	1.65	1.41		1.65
VALLEY SLOPE	0.016 m/m	0.0162 m/m		0.016 m/m
AVERAGE SLOPE (S)	0.009 m/m	0.0115 m/m		0.009 m/m
POOL SLOPE	0.009 m/m	0.0023 m/m		0.009 m/m
RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.91	0.20		0.91
MAX POOL DEPTH	0.43 m	0.55 m		0.43 m
RATIO OF POOL DEPTH TO AVERAGE BANKFULL WIDTH	1.69	2.50		1.69
POOL WIDTH	1.87 m	3.45 m		1.87 m
RATION OF POOL WIDTH TO BANKFULL WIDTH	0.92	1.30		0.92
POOL TO POOL SPACING	10.00 m	13.3 m		10.00 m
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	4.92	5		4.92

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

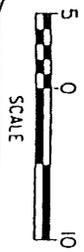
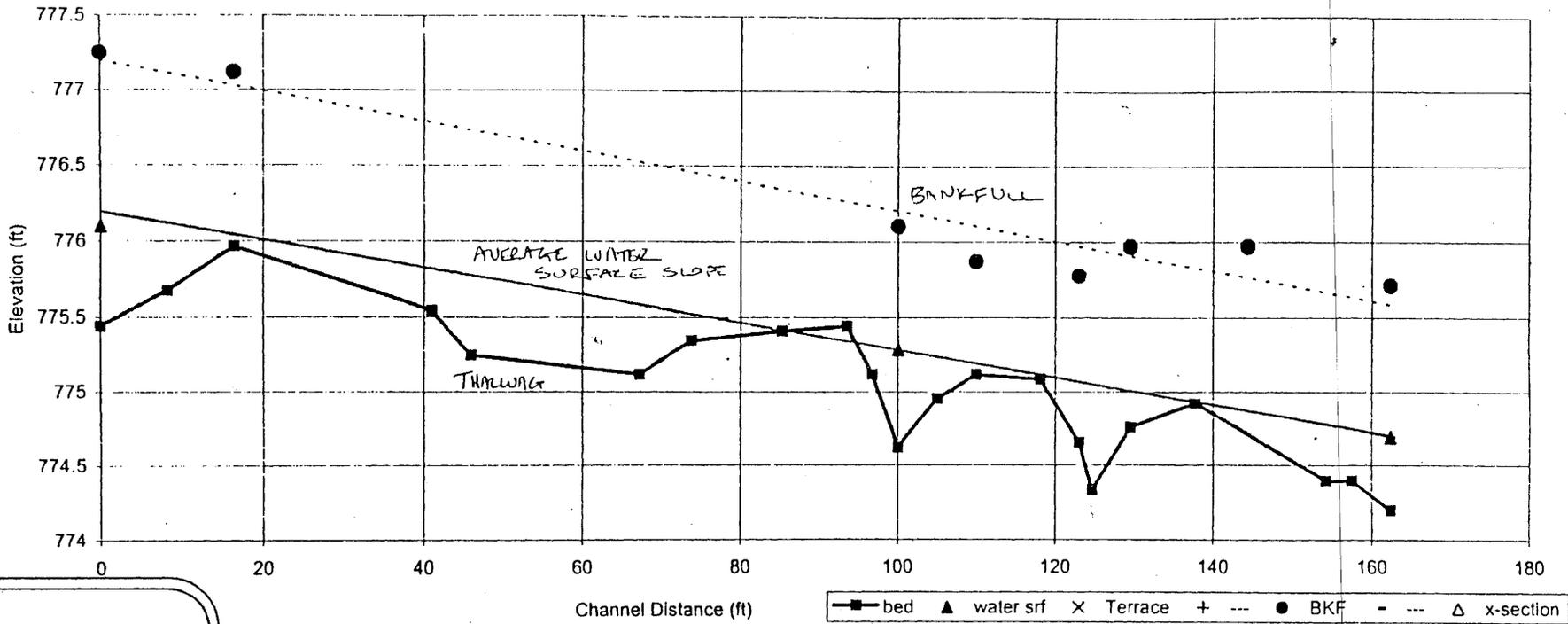
MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



SCALE

# PERMIT SITE 2A

Stream Site 3, Tributary to Dixon Branch, Catawba River Basin, Left of Sta 378+15 -L-, (NCDOT TIP R-2248D)



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 8.U.672214 (R-2248D)  
 CHARLOTTE OUTER LOOP

NCDOT Project I.D. R-2248D  
Mecklenburg County, NC  
I-485 (Charlotte Outer Loop) From east of SR 2042 (Oakdale Rd.)  
To east of NC 115 (Old Statesville Rd.)

Prepared by: Stantec Consulting  
801 Jones Franklin Road Suite 300  
Raleigh, NC 27606

May 16, 2001

## NATURAL CHANNEL DESIGN

### TRIBUTARY TO DIXON BRANCH

Left of Project Station 380+16 to 381+23  
Permit Site 24

The alignment of I-485 (Charlotte Outer Loop) will require that a portion of a Tributary to Dixon Branch be relocated from Project Station 380+16 Lt. to Station 381+23 Lt., approximately 136 meters in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The Tributary's drainage area is mostly rural and wooded in nature, but is expected to become urban-residential with the arrival of the Charlotte Outer Loop. The stream was found to be ephemeral in nature, having dry riffles and water standing in pools.

There is no hydraulic gage data available on this stream nor on nearby streams. Current discharges were estimated using the NCDOT procedures for rural watersheds.

### EXISTING CHANNEL

A representative portion of the existing channel (around station 379+00) was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 1.28, a width/depth ratio of 8.6, a sinuosity of 1.1 and an average slope of 0.010 m/m. A pebble count was performed and the channel was found to have a concentration of sand in the pools, gravel in the riffles and a classification of gravel bottom. The channel was found to be a G4c stream type according to the Rosgen classification system.



### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP



## REFERENCE REACH

Since an undisturbed, stable reach of stream could not be found in the area, the existing channel was also used as the "reference reach" for the natural channel design. A 41.5-meter long reach was surveyed in detail. Riffles were flowing with 0.02 meters of water and pools were flowing with water about 0.14 meters deep. The portion of channel that was surveyed had a gravel bed. Analysis of reference reach data led to a stream classification of G4c.

## PROPOSED CHANNEL

Based upon the existing valley type and the flood prone width desired, the proposed channel design has a C4 stream type classification. Design data is given in the attached table along with existing reach and reference reach data. Channel gradient is controlled by the natural channel tie upstream and by the proposed 1350 mm reinforced concrete culvert downstream. Mean "bankfull" depth was set at 0.15 meters, close to the measured depth of 0.18 meters for the existing/reference reach. This gives a maximum bankfull depth of 0.19 meters. Above bankfull depth it is proposed to excavate an approximately 20 meter wide flood plain (including the channel).

It is believed that by forming a flood plain above bankfull depth channel stability will be enhanced by reducing velocities for those discharges above the bankfull discharge. This should lead to a more stable channel during and after watershed development. It is anticipated that the proposed channel will have a gravel bottom. Maximum pool depths of 0.385 meters are proposed at outside bends of meanders.

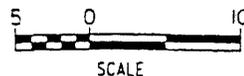
Sediment transport computations were performed, using the proposed channel geometry, to determine whether the bankfull discharge would be able to transport the D50 particle without excessive bankfull shear stress. The D50 particle was found to be 15mm and the proposed bankfull shear stress was calculated to be  $0.0398 \text{ kg/m}^3$ . Based upon shields diagram the calculated shear stress will move the 15mm particle size.

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that channel banks will be planted with native trees and shrubs above bankfull depth.



### NORTH CAROLINA DEPARTMENT OF HIGHWAYS

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP





Stantec

Location: Permit Site 24

Site #4 Sta 380+16 -L- Left

Design by: Kevin Williams, PE

2/1/00

Checked by: Paul Koch, PE

2/2/00

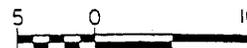
ITEM	EXISTING CHANNEL	PROPOSED REACH	USGS STATION	REFERENCE REACH
STREAM NAME	Tributary to Dixon Branch	Tributary to Dixon Branch		Tributary to Dixon Branch
STREAM TYPE	G4c	C4		G4c
DRAINAGE AREA (DA)	12.10 ha	12.10 ha		12.10 ha
BANKFULL WIDTH ( $W_{bkt}$ )	1.53 m	1.85 m		1.53 m
BANKFULL MEAN DEPTH ( $d_{bkt}$ )	0.18 m	0.15 m		0.18 m
WIDTH/DEPTH RATIO ( $W_{bkt}/d_{bkt}$ )	8.59	12.00		8.59
BANKFULL X-SECTION AREA ( $A_{bkt}$ )	0.27 m <sup>2</sup>	0.25 m <sup>2</sup>		0.27 m <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	0.45 mps	0.50 mps		0.45 mps
BANKFULL DISCHARGE, m <sup>3</sup> /s	0.12 m <sup>3</sup> /s	0.12 m <sup>3</sup> /s		0.12 m <sup>3</sup> /s
BANKFULL MAX DEPTH ( $d_{max}$ )	0.22 m	0.19 m		0.22 m
WIDTH Flood-Prone Area ( $W_{fpa}$ )	1.96 m	2.53 m		1.96 m
ENTRENCHMENT RATIO (ER)	1.28	1.37		1.28
MEANDER LENGTH (Lm)	12.5 m	26 m		12.5 m
RATIO OF Lm TO $W_{bkt}$	8.16	14		8.2
RADIUS OF CURVATURE	10.0 m	5 m		10.0 m
RATIO OF R <sub>c</sub> TO $W_{bkt}$	6.5	2.5		6.5
BELT WIDTH	9.0	7.4		9.0
MEANDER WIDTH RATIO	5.9	4.0		5.9
SINUOSITY (K)	1.09	1.24		1.09
VALLEY SLOPE	0.011 m/m	0.0178 m/m		0.011 m/m
AVERAGE SLOPE (S)	0.010 m/m	0.0144 m/m		0.010 m/m
POOL SLOPE	0.002 m/m	0.0029 m/m		0.002 m/m
RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.23	0.20		0.23
MAX POOL DEPTH	0.34 m	0.39 m		0.34 m
RATIO OF POOL DEPTH TO AVERAGE BANKFULL WIDTH	1.91	2.50		1.91
POOL WIDTH	1.91 m	2.41 m		1.91 m
RATION OF POOL WIDTH TO BANKFULL WIDTH	1.25	1.30		1.25
POOL TO POOL SPACING	10.70 m	9.3 m		10.70 m
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	6.99	5		6.99

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY

8.U672214 (R-2248D)

CHARLOTTE OUTER LOOP

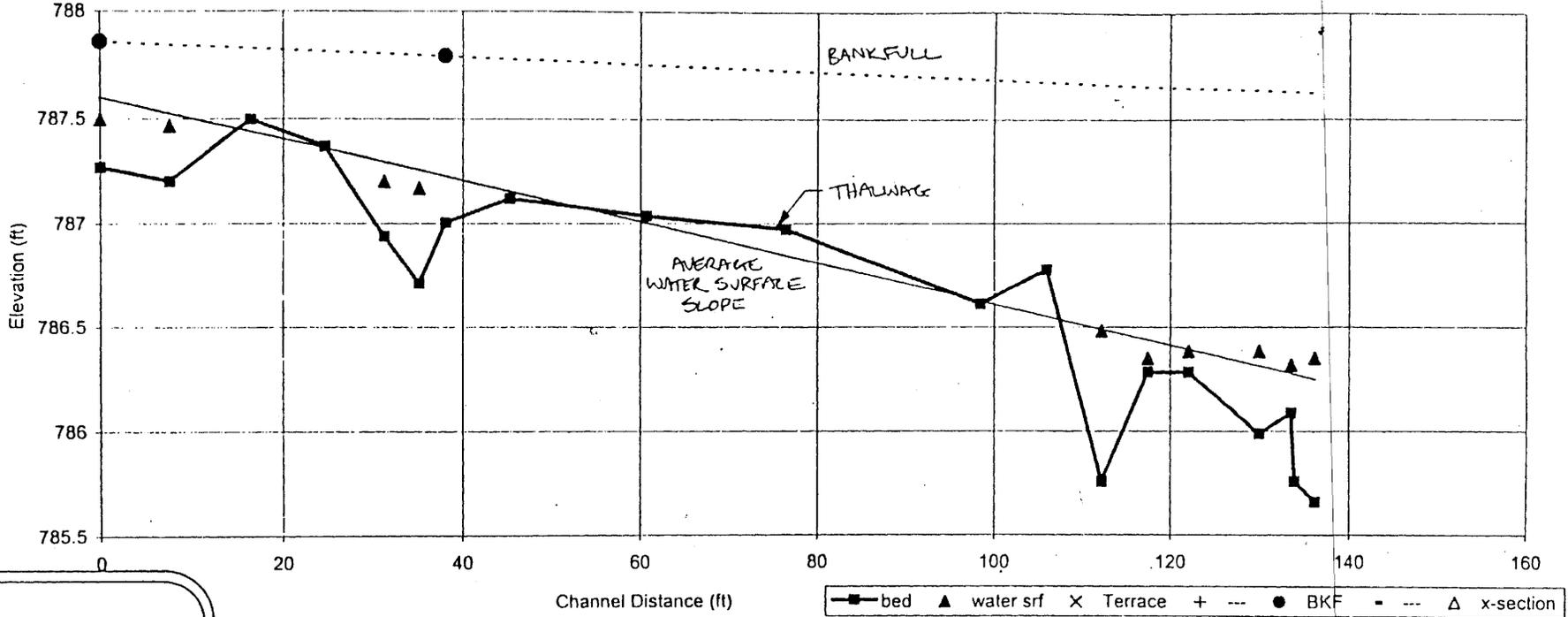


SCALE

DATE  
TIME  
FILE

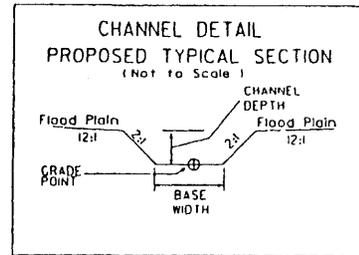
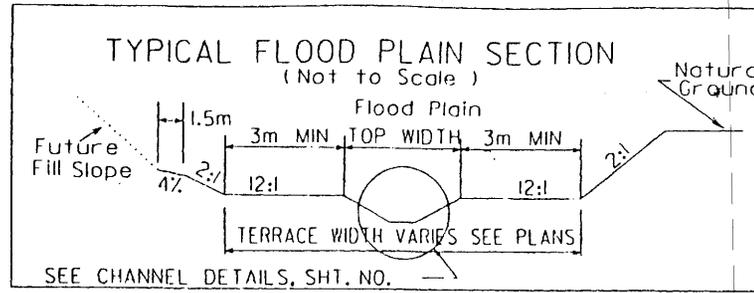
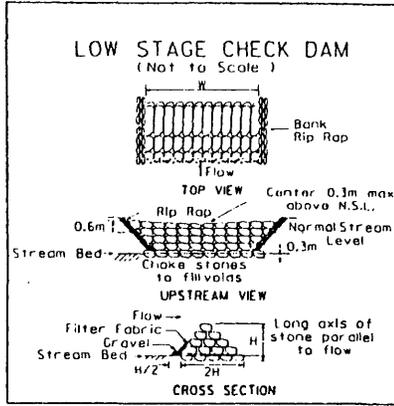
# PERMIT SITE 24

Stream Site 4, Tributary to Dixon Branch, Catawba River Basin, Left of Sta 380+40 -L-, (NCDOT TIP R-2248D)

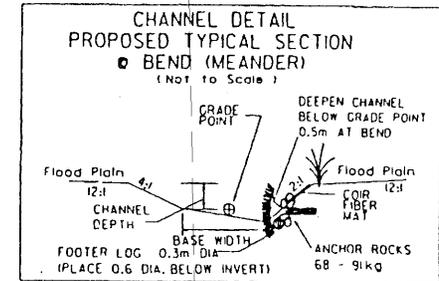


NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
MECKLENBURG COUNTY  
8J1672214 (R-2248D)  
CHARLOTTE OUTER LOOP

# NATURAL CHANNEL DESIGN TYPICALS



TYPICAL SECTION 1 ( BETWEEN BENDS )



TYPICAL SECTION 2 AT BENDS

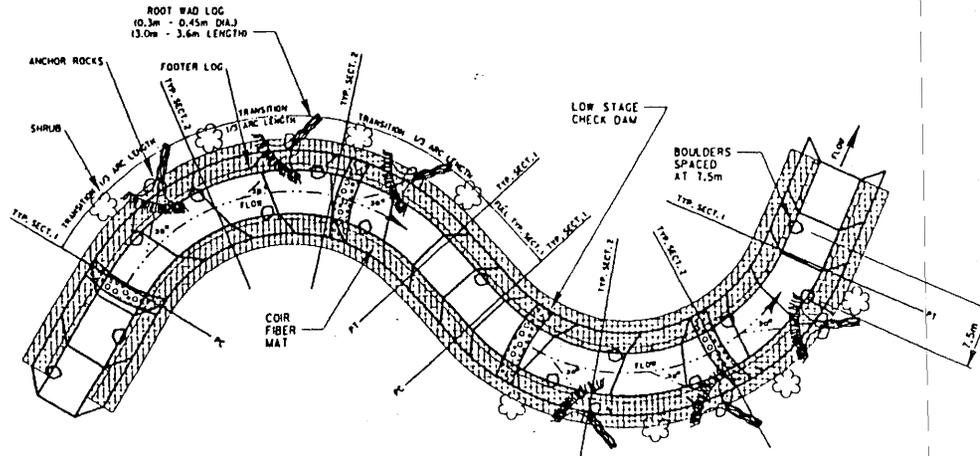
**NOTES:**

NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE  
 NUMBER OF LOW STAGE CHECK DAMS TO BE DETERMINED ON SITE  
 ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE

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.

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

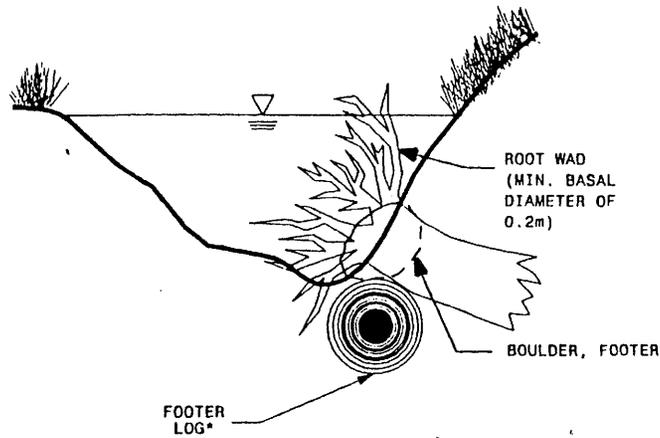
PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH



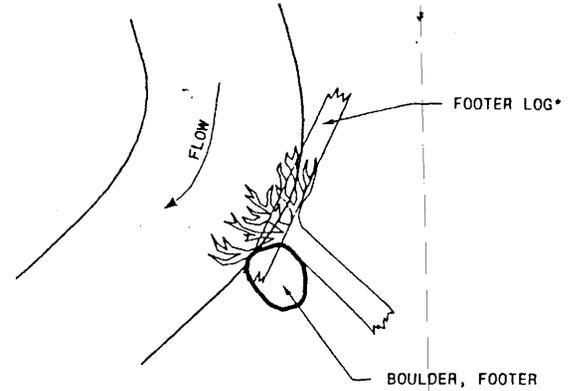
CHANNEL PLAN VIEW



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 8.0672214 (R-22480)  
 CHARLOTTE OUTER LOOP



**CROSS SECTION**



**PLAN VIEW**

\*FOOTER LOGS SHALL HAVE A MINIMUM BASAL DIAMETER OF 0.2m AND HAVE A LENGTH OF 2.1m -3.0m.

**PLACEMENT OF ROOT WAD STRUCTURES**

A TRENCH SHALL BE DUG ALONG THE TOE OF THE BANK TO A DEPTH OF 1/2 THE DIAMETER OF THE FOOTER LOG. A PRUNED FOOTER LOG SHALL BE PLACED AT THE TOE OF THE CHANNEL AND THE ROOT WAD SHALL BE PLACED DIRECTLY ABOVE IT. THE ROOT MASS SHALL BE ORIENTED IN SUCH A WAY THAT THE VELOCITY VECTORS OF THE WATER WILL INTERSECT THE ROOT MASS AT A 90-DEGREE ANGLE. THERE SHALL BE NO VOID BETWEEN THE ROOT MASS AND THE BANK ON THE UPSTREAM SIDE OF THE CHANNEL. A BOULDER SHALL BE PLACED ON THE DOWNSTREAM SIDE BETWEEN THE ROOT MASS AND THE BANK TO PROVIDE EROSION CONTROL. THE BOULDER, FOOTER SHALL BE APPROXIMATELY 0.9m X 0.9m X 0.6m.

THE PREFERRED METHOD FOR INSTALLATION OF A ROOT WAD IS TO DRIVE THE SHARPENED TRUNK OF THE ROOT WAD INTO THE STREAMBANK USING A BACKHOE. IF IT IS DEEMED NOT POSSIBLE TO DRIVE THE TRUNK INTO THE BANK, A TRENCH SHALL BE DUG IN THE BANK AND THE TRUNK SHALL BE PLACED IN THE TRENCH. THE TRENCH SHALL BE BACK FILLED AND COMPACTED.

**ROOT WAD**

SCALE: NTS

**ROADWAY**      **STATION**  
Y-7                      11+14.713



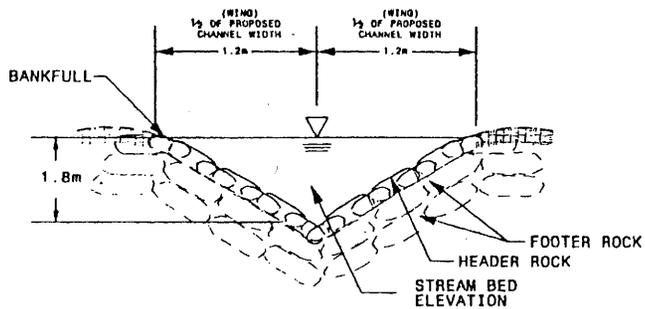
**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
MECKLENBURG COUNTY  
8.UG72214 (R-22480)  
CHARLOTTE OUTER LOOP



# "V" CROSS VANE

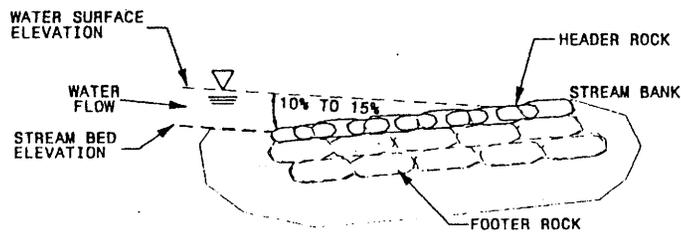
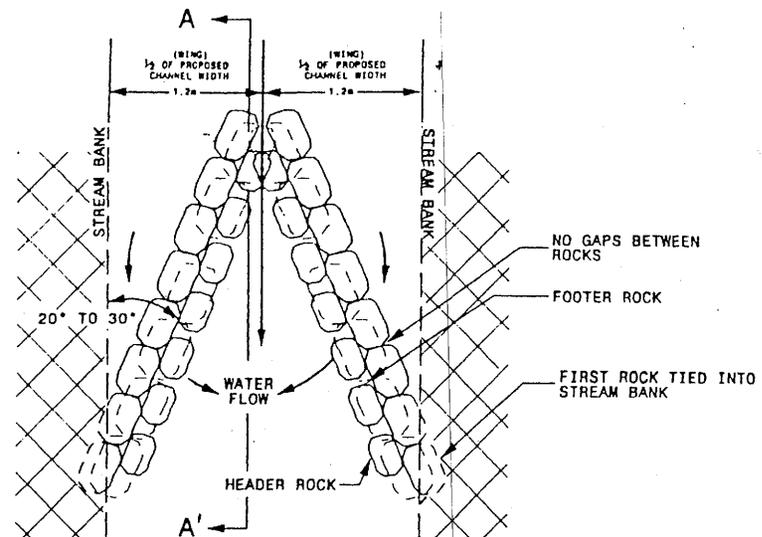
SCALE: NTS

ROADWAY	STATION
CD-WBL	79+35.606
RAMP "20"	14+08.891
Y-7	9+90.250
Y-7	11+20.254

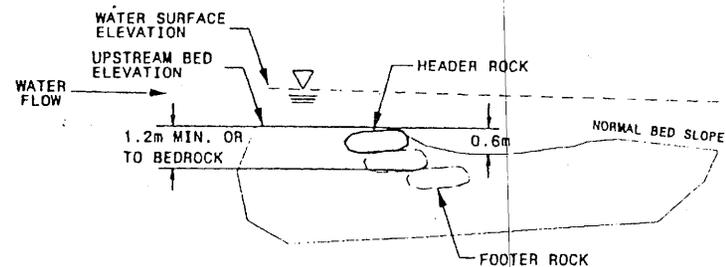


CROSS SECTION

## PLAN VIEW



PROFILE VIEW



SECTION A-A' VIEW

### INSTALLATION OF CROSS VANE

A TRENCH SHALL BE DUG IN SUCH A MANNER THAT THE FOOTER ROCKS, THE CROSS HEADER ROCKS AND AT LEAST 1/3 OF THE WING HEADER ROCKS ARE BURIED BENEATH THE BED SURFACE ELEVATION. AN EXCAVATOR, WITH A BUCKET THAT CONTAINS A HYDRAULIC THUMB, SHALL BE USED TO PLACE ROCKS WITH THE SUPERVISION OF THE RESIDENT ENGINEER. HEADER AND FOOTER ROCKS SHALL BE NO SMALLER THAN 0.9m X 0.9m X 0.6m. FOOTER ROCKS SHALL BE PLACED IN THE TRENCH FIRST WITH HEADER ROCKS PLACED ON TOP PRIOR TO BACK FILLING OF THE TRENCH. IN THE CENTER, OR CROSS, PORTION OF THE CHANNEL, THE HEADER ROCKS SHALL BE PLACED SUCH THAT THE TOP OF THE HEADER ROCK IS PLACED AT AN ELEVATION EQUAL TO THE BED ELEVATION. THE HEADER ROCKS ON THE SIDE, OR WING, PORTION SHALL BE PLACED IN SUCH A MANNER AS THEY SLOPE UP FROM BED ELEVATION AT THE CROSS PORTION TO THE TOP OF THE BANK AT A 10-15% SLOPE.



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 MECKLENBURG COUNTY  
 81672214 (R-22480)  
 CHARLOTTE OUTER LOOP

SITE	PROJECT STATION	STRUCTURE TYPE	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			FILL IN WETLANDS (ha)	TEMPORARY FILL IN WETLANDS (ha)	EXCAVATION IN WETLANDS (ha)	MECHANIZED CLEARING IN WETLANDS (METHOD) (ha)	FILL IN SURFACE WATERS (NATURAL) (ha)	FILL IN SURFACE WATERS (POND) (ha)	TEMP FILL IN SW (ha)	LENGTH OF EXISTING CHANNEL IMPACTED (m)	RELOCATED CHANNEL (m)
1	297+40 L	375 RCP 400 CSP						0.016			
2	299+00 L	2.4 X 1.8 RCBC					0.023			118	21
3	308+55 L	1.8 X 1.8 RCBC					0.018			75	15
4	317+00 L		0.022								
5	318+15 L	3.4 X 1.8 RCBC	0.180			0.029	0.009			75	16
6	17+00 Y-2	(3)3.0 X 3.7 RCBC					0.035			66	26
7	0+00 LOOP 1A	1200 RCP						0.488			
8	15+20 RAMP 1A	900 RCP	0.186		0.010	0.004					
9	13+00 RAMP 1A	2.7 X 1.8 RCBC	0.142			0.005	0.045			206	40
10	10+30 RAMP 1D		0.208			0.043					
11	354+00 L	1050 RCP	0.016		0.003		0.013			152	52
12	355+45 L	1650 RCP	0.004				0.006			105	
13	357+45 L	(2)3.4 X 2.1 RCBC	0.108			0.007	0.042			155	25
14	14+80 RAMP 2B	375 RCP						0.445			
15	365+70 L		0.024								
SHEET TOTAL			0.890		0.013	0.088	0.191	0.949		952	195

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

SCALE AS SHOWN

SITE	PROJECT STATION	STRUCTURE TYPE	WETLAND IMPACTS				SURFACE WATER IMPACTS					
			FILL IN WETLANDS (ha)	TEMPORARY FILL IN WETLANDS (ha)	EXCAVATION IN WETLANDS (ha)	MECHANIZED CLEARING IN WETLANDS (METHOD) (ha)	FILL IN SURFACE WATERS (NATURAL) (ha)	FILL IN SURFACE WATERS (POND) (ha)	TEMP FILL IN SW (ha)	LENGTH OF EXISTING CHANNEL IMPACTED (m)	RELOCATED CHANNEL (m)	
16	0+40 LOOP 2A	(1) 2.1 X 1.8 & (2) 2.4 X 1.8 RCBC	0.470		0.051	0.009	0.069				458	167
17	20+40 Y-7	1650 RCP						1.042				
18	371+00 L		0.024									
19	10+00 Y-7						0.017				165	197 **
20	16+40 RAMP 2D	400 CSP	0.039		0.007							
21	24+80 RAMP 2BD	450 RCP	0.026									
22	28+00 RAMP 2BD							1.196				
23	77+10 CDWBL		0.023			0.004						
24	365+70 L	2.1 X 1.8 RCBC 450 RCP 1350 RCP	0.030				0.095				550	311
25	13+80 RAMP 3A	900 RCP					0.004				36	
26	383+80 L	375 RCP	0.107									
27	13+00 RAMP 3D	600 RCP	0.001			0.002						
28	11+20 RAMP 3D	400 CSP	0.063			0.012	0.006				70	
SHEET TOTAL			0.783			0.027	0.191	2.238			1279	675
PROJECT TOTAL			1.673		0.013	0.115	0.382	3.187			2231	870

NOTE:  
 \*\* RELOCATED CHANNEL CONTAINS 122m OF NATURAL CHANNEL DESIGN

**NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
 8.U672214 (R-2248D)  
 CHARLOTTE OUTER LOOP

SCALE AS SHOWN

# SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
1	OAK HILLS, INC	4008 OAKDALE RD CHARLOTTE NC 28216	1 & 2
2	SANDY COOPER	RT 1 BOX 218-D MT. HOLLY NC 28120	2
3	NCDOT	716 WEST MAIN STREET ALBERMARLE NC 28001	3
4	NCDOT	716 WEST MAIN STREET ALBERMARLE NC 28001	4 & 5
5	VANCE RD ASSOCIATES	6853 FAIRVIEW RD #20 CHARLOTTE NC 28210	6
6	JUNE GREEN	P.O. BOX 220924 CHARLOTTE NC 28222	6, 7, 8 & 9
7	RUSSELL KAKALEY	9342 VANCE RD CHARLOTTE NC 28216	6
8	TED MERRELL	9920 FOREST DR CHARLOTTE NC 28216	10
9	JAMES SELF	9902 FOREST DRIVE CHARLOTTE NC 28216	10
10	METROLINA PROPERTIES	P.O. BOX 220325 CHARLOTTE NC 28222	11
11	WILLIE DEESE	716 W. MAIN STREET ALBERMARLE NC 28001	11 & 12
12	EVELYN MCAULEY	10900 ALEXANDERANA ROAD HUNTERVILLE NC 28078	13
13	METROLINA PROPERTIES	P.O. BOX 220325 CHARLOTTE NC 28222	13
14	ROBERT BLACKWELDER	10409 PUCKETT RD HUNTERVILLE NC 28078	14

1 OF 2

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.U672214 (R-2248D)  
CHARLOTTE OUTER LOOP

SCALE AS SHOWN

SHEET 97 OF 98

# SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
(15)	METROLINA PROPERTIES	P.O. BOX 220325 CHARLOTTE NC 28222	14
(16)	JOE LEE PUCKETT III	171 TIFTON STREET ADVANCE NC 27006	15
(17)	MARC SILVERMAN	6707 FAIRVIEW RD *C CHARLOTTE NC 28210	16
(18)	BESSIE G. BLANKENSHIP	1526 COVENTRY RD CHARLOTTE NC 28211	20
(19)	NCDOT	716 WEST MAIN STREET ALBERMARLE NC 28001	18 & 21
(20)	TWIN LAKE LIMITED PARTNERSHIP % THE KEITH GROUP	2719 COLLSGATE RD CHARLOTTE NC 28211	17
(21)	NCDOT	716 WEST MAIN STREET ALBERMARLE NC 28001	22, 23 & 24
(22)	SILAS DAVIS JR	9223 OLD STATESVILLE RD CHARLOTTE NC 28269	24 & 25
(23)	NCDOT	716 WEST MAIN STREET ALBERMARLE NC 28001	24, 25, 26, 27 & 28
(24)	SMITH CORNERS, LLC		19
(25)	MARC SILVERMAN	6707 FAIRVIEW RD *C CHARLOTTE NC 28210	19
(26)	TWIN LAKE LIMITED PARTNERSHIP % THE KEITH GROUP	2719 COLLSGATE RD CHARLOTTE NC 28211	23 & 24
(27)	MARY S. DAVIS & SW DAVIS PROPERTY INC.	10424 OLD STATESVILLE RD CHARLOTTE NC 28269	24

2 OF 2

**NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS**

MECKLENBURG COUNTY  
8.J0672214 (R-22480)  
CHARLOTTE OUTER LOOP

SCALE AS SHOWN

SHEET 10 OF 12

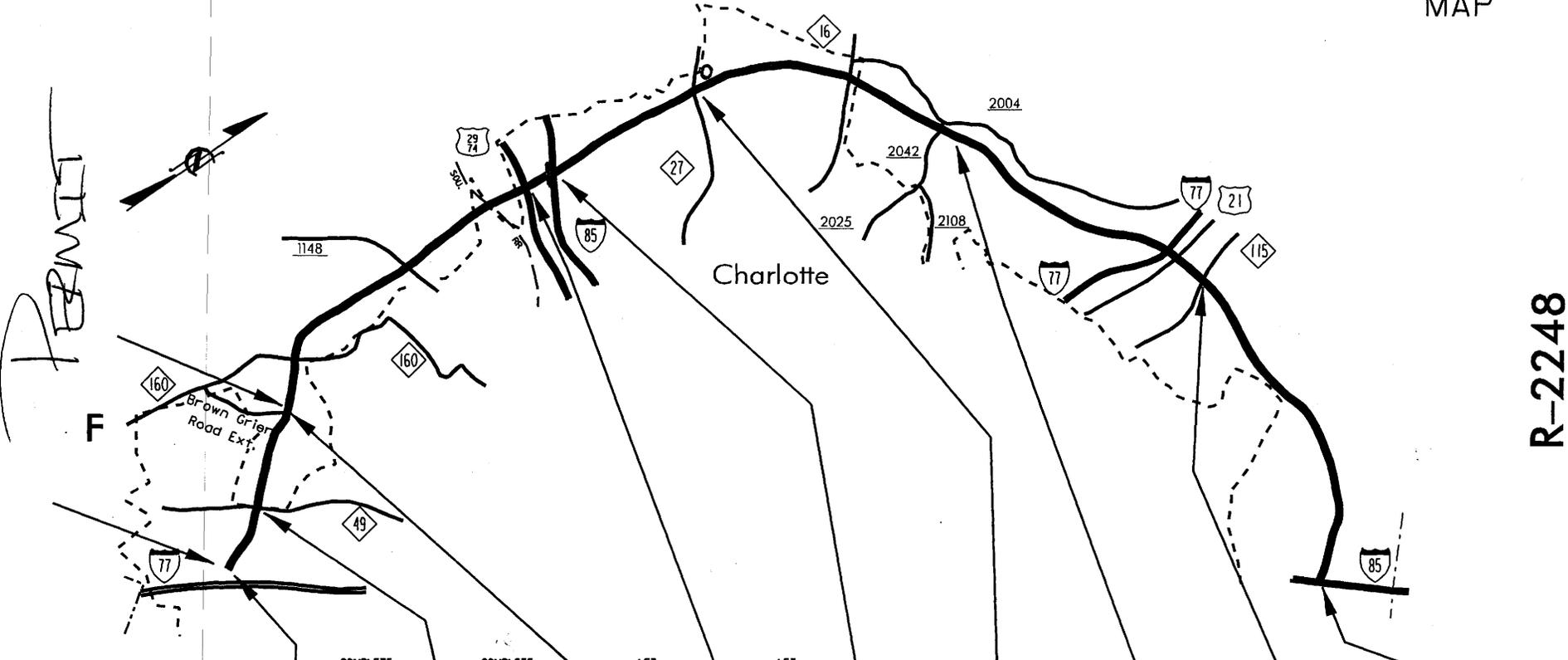
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# R-2248 MECKLENBURG COUNTY

## CHARLOTTE OUTER LOOP

PROJECT  
BREAKDOWN  
MAP

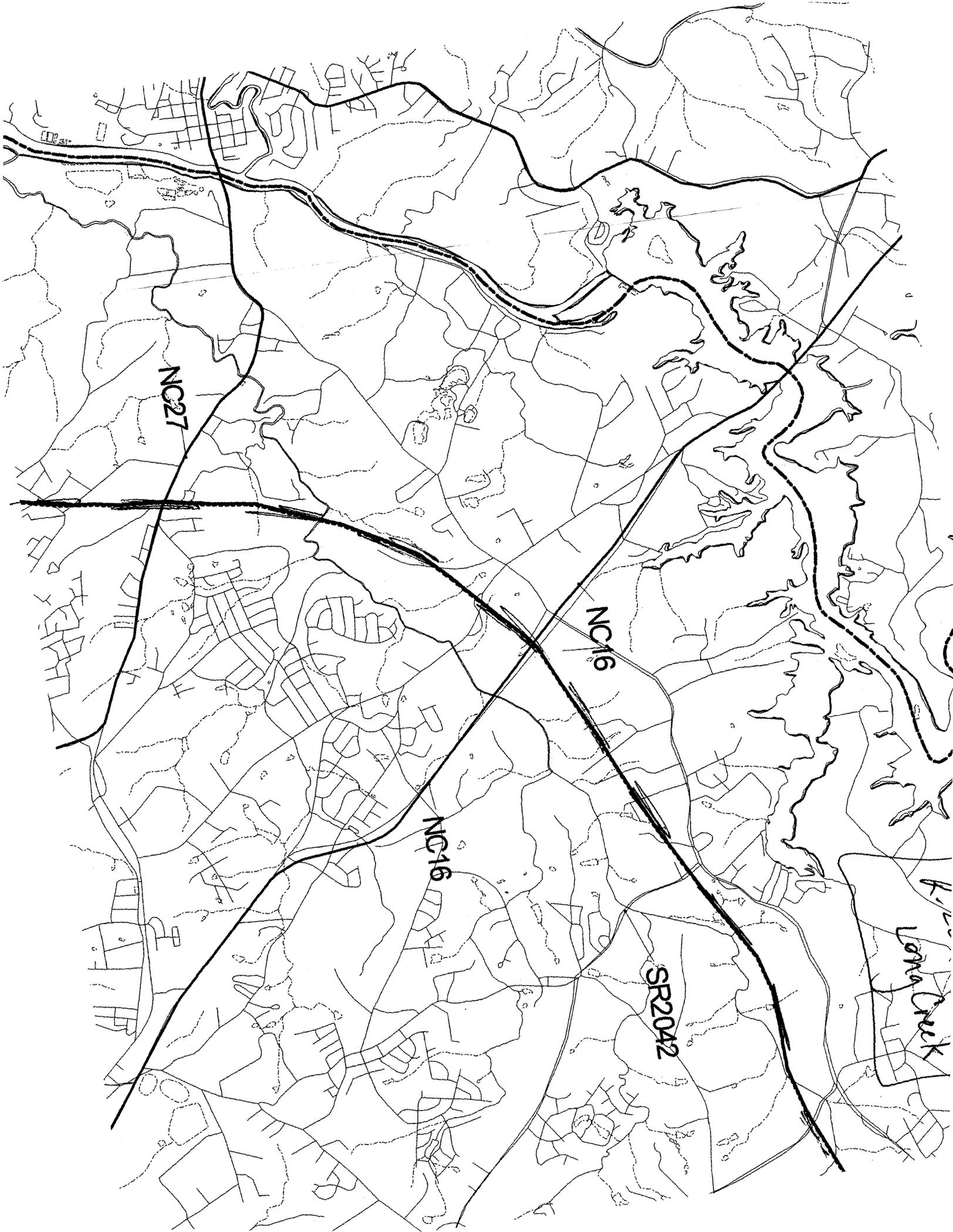
PROJECT SCHEDULES AND COSTS ARE ACCURATE AS OF DATE SHOWN



R-2248

	COMPLETE	COMPLETE	LET	LET					
I.B. NO. / D.S.R. NO.	R-2248 AA	R-2248 AB	R-2248 A (AC & AD)	R-2248 BA	R-2248 BB	R-2248 C	R-2248 D	R-2248 E	R-2248 F
STATE PROJECT NO. (P.E.)	BARBOUR/SALMON	Z. SMITH/SALMON	BREW	BLEVINS / HAMIDI	BLEVINS / HAMIDI	BREW	BLEVINS / HAMIDI	BREW	BREW
PROJECT ENGINEER	8.U672204	8.U672204	8.U672204	8.U672205	8.U672205	8.U672214	8.U672214	8.U672205	8.U672204
PROJECT DESCRIPTION	WEST OF I-77 TO NC-49	NC-49 TO BROWN-GRIER RD.	BROWN-GRIER RD. TO US 29 / 74	US-29/74 TO NORTH OF I-85	NORTH OF I-85 TO NC 27	NC-27 TO EAST OF SR 2042	EAST OF SR 2042 TO NC-115	NC-115 TO I-85	WEST OF I-77 TO NC-49
COUNTY / DIVISION	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10	MECKLENBURG / DIV. 10
LENGTH	1.5 MILES / 2.4 Km.	2.1 MILES / 3.38 Km.	6.7 MILES / 10.8 Km.	1.305 MILES / 1.56 Km.	2.3 MILES / 3.7 Km.	4.5 MILES / 7.2 Km.	6.0 MILES / 9.68 Km.	5.4 MILES / 8.7 Km.	3.6 MILES / 5.8 Km.
TYPE OF CONTRACT									
REMARKS	SEE 'F' FOR ADDITIONAL LANES		R/W AC 6-17-97 R/W AD 2-28-97						ADDING 2 ADDITIONAL LANES TO PART 'AA' & 'AB'
BEGIN R/W ACQUISITION (T.J.P.)	5-28-93	4-27-95		2-6-97	12-22-97	6-30-00	7-6-00	FY-05	
BEGIN R/W ACQUISITION (PRODUCTION)									
PROPOSED LETTING (T.J.P.)	12-20-94	6-18-96	11-16-99	10-19-99	FY-02	FY-03	FY-03	FY-07	FY-07
PROPOSED LETTING (PRODUCTION)						FY-02			
EST. COMP. DATE (T.J.P.)	12-28-97	8-26-98	12-31-03	1-13-04					
ESTIMATED R/W COST	\$7,000,000	\$6,400,000	\$ 25,281,485	\$ 7,600,000	\$ 18,885,000	\$ 12,351,000	\$ 22,857,000	\$ 18,800,000	\$ 11,800,000
ESTIMATED CONSTRUCTION COST	\$12,000,000	\$ 13,300,000	\$ 73,000,000	\$ 43,000,000	\$ 30,900,000	\$ 60,800,000	\$ 133,300,000	\$ 68,100,000	\$ 11,800,000

UPDATED - 7/24/02



NC27

NC16

NC16

SR2042

Long Creek



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

DAVID MCCOY  
SECRETARY

December 17, 1999

MEMO TO: Mr. Jay Twisdale, P.E.  
Hydraulics Unit

FROM: Michael G. Wood, LSS *MW*  
Project Development & Environmental Analysis

SUBJECT: JURISDICTIONAL STREAMS, R-2248 C, WEST CHARLOTTE  
OUTER LOOP.

On January 26, 27 and February 18, 1998, a field review of the wetland and stream impacts for the subject projects was convened. As a result of these meetings and subsequent field reviews, the following streams were determined to be jurisdictional surface waters. While each of these streams will have to be accounted for in the summary sheets, only those that will require mitigation, and are depicted with asterisks (\*), need to be included in the permit drawings. Please note, that the U. S. Army Corps of Engineers and N. C. Division of Water Quality have stated that they now require drawings for all mitigable streams even if the impacts are less and 150.

233+80\*  
238+80\* Any impacts to Gum Branch or Long Creek  
239+90\*  
249+10\*  
257+40  
265+30\*  
268+80\*  
273+80\*  
276+60\*  
277+65\* Count stream from edge of wetland north only.  
280+60\* Count only stream channel coming from the 600 pipe  
291+60

If you need additional information, my number is (919) 733-1194.

cc: Greg Brew, Roadway Design  
Charles Bruton, PDEA  
Bruce Ellis, PDEA



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

DAVID MCCOY  
ACTING SECRETARY

June 9, 1999

MEMORANDUM TO: Mr. R. L. Hill, P.E., Manager  
Highway Design Branch

FROM: *for* William D. Gilmore, P.E., Manager *V. C. Brater*  
Planning and Environmental Branch

SUBJECT: WETLAND AND STREAM IMPACTS FOR R-2248 C &  
D, WESTERN CHARLOTTE OUTER LOOP,  
MECKLENBURG COUNTY.

On March 5, 1999, a pre-application field meeting was convened for the subject project. In attendance were representatives of the U. S. Army Corps of Engineers, N. C. Division of Water Quality, and U. S. Fish & Wildlife Service. The wetland and stream impacts were reviewed. The following is a list of concerns and comments that were voiced at the meeting.

R-2248 C

238+00 to 240+80: The preliminary designs for crossing Long Creek and Gum Branch was lacking in details. However, the agencies expressed concern over the amount of channel change that appeared proposed for these streams. They requested NCDOT reexamine the design such that relocation and culverting is minimized.

274+80: Bedrock Outcrop. This was deemed a significant natural feature for this area. The agencies requested the NCDOT attempt to preserve the feature by shifting the road or incorporating it in the median.

279+00 to 280+00: This is the highest quality wetland on the project. Since it would be very difficult to provide in-kind mitigation for a wetland of this nature, the agencies strongly suggested this wetland be avoided.

R-2248 D

344+00 to 345+80: The proposed highway and more directly, the proposed relocation of the adjacent road, will impact a high quality wetland. The agencies requested NCDOT consider shifting the relocated road and redesigning the intersection to avoid this wetland.

Vance Road Interchange: The agencies questioned whether this intersection could be eliminated from the design since it appeared other intersections were fairly close by and could provide the access to the proposed highway. This would also avoid the impacts to the wetland just mentioned.

Miscellaneous Issues

- The final impact summary sheet should also include impacts from detours and Y lines.
- All proposed channel relocations throughout the project area should make every effort to minimize piping and maximize channel relocations. All relocations should be designed to replicate natural dimensions, pattern and profile, and include natural substrates and riparian vegetation. Complete relocation plans need to be provided with the permit application if DOT expects to obtain any onsite credit for stream restoration.

In order to help expedite the permitting process, a statement will be needed which explains why any of these avoidance/minimization measures cannot be taken. Michael Wood is the contact person for this project. If you need additional information, please contact him at (919) 733-1194. I appreciate your attention to this matter.

cc: Steve Lund, ACOE Raleigh  
John Hennessy, DWQ  
Mike Parker, DWQ  
Mark Cantrell, USFWS  
David Cox, WRC  
Greg Brew, Roadway Design  
Scott Blevins, Design Services  
Kevin Williams, DS Atlantic  
Charles Bruton, PD & EA  
Phil Harris, PD & EA



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

DAVID MCCOY  
SECRETARY

February 14, 2000

MEMO TO: Mr. Jay Twisdale, P.E.  
Hydraulics Unit

FROM: *for* Michael G. Wood, LSS *Michael G. Wood*  
Project Development & Environmental Analysis

SUBJECT: JURISDICTIONAL STREAMS [REDACTED] EST CHARLOTTE  
OUTER LOOP.

On January 26, 27 and February 18, 1998, a field review of the wetland and stream impacts for the subject projects was convened. As a result of these meetings and subsequent field reviews, the following streams were determined to be jurisdictional surface waters. While each of these streams will have to be accounted for in the summary sheets, only those that will require mitigation and are depicted with asterisks (\*), need to be included in the permit drawings. Please note that the U. S. Army Corps of Engineers and N. C. Division of Water Quality have stated that they now require drawings for all mitigable streams even if the impacts are less than 150 ft.

296+60

298+70\*

308+55\*

315+20

318+20\*

331+20

343+30\*

355+60\*

357+70\*

367+80\* Mitigation required until stream enters culvert at approx. Sta. 368+40 (-L-),  
offset 95 m right.

370+70

377+20\* Mitigation required until stream reaches wetland at approximately Sta. 380+20  
(-L-), offset 60 m left. From here to Sta. 383+17 (-L-), offset 117 m left, no  
mitigation required. From Sta. 383+17 and on, mitigation is required.

383+70\* Mitigation required until stream reaches the pipe at approx. Sta. 386+30 (-L-),  
offset 20 m right.

17+20\* [(Y-2), offset 55 m right] Dixon Creek culvert extension

I will be out of the office until 2/23/00, so if you have questions or need additional  
information, please contact Ms. Lynn Smith at (919) 733-0374. After 2/23/00, please  
contact me at (919) 733-1194.

cc: Scott Blevins, Design Services  
Charles Bruton, Ph.D., PDEA  
Bruce Ellis, PDEA  
Kevin Williams, DS Atlantic



Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E., Director  
Division of Water Quality  
Coleen H. Sullins, Deputy Director  
Division of Water Quality

*Handwritten initials: X AB*

October 2, 2003

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: AFTER-THE FACT MODIFICATION to Water Quality Certification Pursuant to §401 of the Federal Clean Water Act,  
Charlotte Outer Loop.  
State Project No. 9.8103406  
TIP No. R-2248BB  
DWQ Project No. 011231

Attached hereto is a copy of the Modification to Certification No. 3328 issued to The North Carolina Department of Transportation dated October 2, 2003.

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

Sincerely,

*Handwritten signature: Cyndi Kardly*

*Handwritten initials: fw*  
Alan W. Klimek, P.E.

Attachments

cc: Wilmington District Corps of Engineers  
Steve Lund, USACE Asheville Field Office  
NCDWQ Mooresville Regional Office  
Christopher Militscher, US Environmental Protection Agency – Region IV  
Ron Ferrell, NC Wetlands Restoration Program  
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, .0500. This Certification authorizes the NCDOT to impact an additional 0.05 acres of wetlands above the previously-authorized impacts which include: 11.96 acres of jurisdictional wetlands through permanent fill, excavation, and mechanized clearing; 20.28 acres of surface waters; and 17,072 linear feet of stream channels in Mecklenburg County, as described in Tables A1 and A2 of the Application. The project shall be constructed pursuant to the application dated August 15, 2001 and the After-the-Fact Modification dated September 19, 2003 filed to construct the North Charlotte Outer Loop (TIP Nos. R-2248 BB, C, and D).

The August 15, 2001 Application and the September 19, 2003 After-the-Fact Modification Application provide adequate assurance that the discharge of fill material into the waters of the state 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 August 15, 2001 and September 19, 2003 applications. All work authorized by this Certification must be done in strict compliance with the plans attached to these Applications. If the above-referenced project changes, incurring additional impacts to streams, wetlands or buffers, you are required to notify the DWQ *in writing*, and you may be required to submit a new application. 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, Non-discharge and Water Supply watershed regulations.

This Certification shall expire three (3) years from the date of the cover letter from DWQ or on the same day as the expiration date of the corresponding US Army Corps of Engineers Permit, whichever is later.

### Condition(s) of Certification:

1. Two copies of the final construction drawings shall be furnished to NCDWQ within thirty (30) days of receipt of this Certification. Written verification shall be provided that the final construction drawings comply with the attached permit drawings contained in the Application dated August 15, 2001.
2. 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.
3. Construction shall be conducted in such a manner as to prevent a significant increase in turbidity outside the area of construction or construction-related discharge. 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 assure compliance with the appropriate turbidity water quality standard.
  - a. The erosion and sediment control measures for the U-2009B project must equal or exceed the proper design, installation, operation and maintenance outlined in the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*. These 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 projects included under this Certification.

- b. For borrow pit sites, the erosion and sediment control measures must equal or exceed the proper design, installation, operation and maintenance outlined in the most recent version of the *North Carolina Surface Mining Manual*. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
- c. During the construction of the project the applicant shall strictly adhere to North Carolina regulations entitled "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0124) throughout design and construction of the project for activities undertaken in all waters classified as WS (Water Supply), including Thomas Pond, Long Creek and its unnamed tributaries.
4. Stormwater shall not be routed to flow directly into streams. Stormwater shall be transported by vegetated conveyance or other means that are appropriate to the site conditions before being discharged into the streams. Existing wooded stream buffers shall not be mowed in order to allow them to provide diffuse stormwater flow and/or streambank stabilization.
5. 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, the devices shall be removed and the natural grade restored within 30 days after the Division of Land Resources has released the project.
6. NCDOT and its contractors and/or agents shall not excavate, fill, or perform mechanized land clearing at any time in the construction or maintenance of this project within waters and/or wetlands, except as authorized by this Certification, or any modification to this Certification. There shall be no excavation from or waste disposal into jurisdictional wetlands or waters associated with this Certification without appropriate modification. If this occurs, compensatory mitigation will be required since it is a direct impact from road construction activities.
7. Excavation of stream crossings should be conducted in the dry unless demonstrated by the applicant or its authorized agent to be unfeasible. Sandbags, cofferdams, flexible pipe, or other diversion structures should be used to minimize excavation in flowing water.
8. All channel relocations must be constructed in a dry work area, and stabilized before stream flows are diverted. Channel relocations shall be completed and stabilized prior to diverting water into the new channel. Whenever possible, channel relocations must 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.
9. Live or fresh concrete shall not come into contact with waters of the state until the concrete has hardened.
10. Discharging hydroseeding mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is strictly prohibited.

11. Hazardous Spill Catch Basins shall be required for all stream crossings located in the Watersupply Watershed Critical Area (Long Branch and its unnamed tributaries). The final designs for the Hazardous Spill Catch Basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Unit prior to beginning construction in the Water Supply Watershed Critical Area. As-built drawings for the basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Units no later than 30 days after the construction is completed.
12. Riparian vegetation, using native trees and shrubs, must be re-established within the construction limits of the project by the end of the growing season following completion of construction to reestablish the riparian zone and to provide long-term erosion control.
13. Placement of culverts and other structures in waters, streams, and wetlands shall 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 streambeds 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.
14. Heavy equipment should be operated from the bank rather than in the stream channel unless demonstrated by the applicant or its authorized agent to be unfeasible. All mechanized equipment operated near surface waters should be inspected and maintained regularly to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids or other toxic substances.
15. *Mitigation:* Compensatory mitigation shall be the same as that approved by the US Army Corps of Engineers as long as the mitigation required equals a ratio of 1:1 restoration or creation of lost wetland acres as described in 15A NCAC 2H.0506 (h)(6). A report must be submitted to the NC Division of Water Quality that describes the final approved wetland and stream mitigation for this project within two months of the issuance of the 404 permit issued by the Army Corps of Engineers.
  - o Wetland impacts consist of 12.01 acres, including 8.73 acres of riverine wetlands and 3.28 acres of depressional wetlands. Compensatory mitigation of 17.50 acres of riverine wetlands (2:1 ratio rounded to the nearest quarter acre) will be accomplished via in-lieu payments to the NC Wetlands Restoration Program (WRP). The 3.28-acre depressional wetland will be mitigated for by acquisition of the Ridge Road Mitigation Site.
  - o Stream mitigation will be provided at a 2:1 ratio except for those sites that were determined to warrant a 1:1 ratio or no mitigation by Agency review. Compensatory mitigation for stream impacts will consist of 3,362 linear feet of on-site stream relocation/restoration using natural channel design. The stream relocation shall be built and maintained according to the approved plans before any mitigation credit is given. If the Division determines that the stream restoration or associated riparian area has become unstable, the stream shall be repaired or stabilized using only natural channel design techniques if possible. Additionally, the vegetation in the riparian shall be maintained and/or replaced according to the approved plans. Rip-rap and other hard structures may only be used if required by the Division of Land Resources or a Delegated Local Program. Additionally, all repair designs must be submitted to and receive written approval from NCDWQ before the repair work is performed. Because the restored stream is proposed as compensatory mitigation for stream impacts, the restored portion and associated riparian area shall be preserved in perpetuity through a preservation easement or some other legally binding mechanism or agreement. The above easement

or other legally binding mechanism or agreement must be in place before any mitigation credit shall be given. Additionally, the stream physical and biological monitoring plan shall be followed and reports shall be submitted to NCDWQ after the first year and every other year afterwards for a total of five (5) years.

- The remaining 22,248 linear feet of stream mitigation shall be provided via in-lieu payments to the WRP.
  - In accordance with 15A NCAC 2R.0500, this contribution will satisfy our compensatory mitigation requirements under 15A NCAC 2H.0506(h). Until the Wetland Restoration Program receives and clears your check (made payable to DENR – Wetland Restoration Program), wetland or stream fill shall not occur. Mr. Ron Ferrell should be contacted at 919.733.5083 ext. 358 if you have any questions concerning the Wetland Restoration Program. You have two months from the date of this Certification to make the payment.
16. 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 401/Wetlands Unit of the Division of Water Quality upon completion of the project.
17. NCDOT and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State law and Federal law. If DWQ determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, DWQ may reevaluate and modify this Certification to include conditions appropriate to assure compliance with such standards and requirements in accordance with 15A NCAC 2H.0507(d). Before modifying the Certification, DWQ shall notify NCDOT and the US Army Corps of Engineers, provide public notice in accordance with 15A NCAC 2H.0503 and provide opportunity for public hearing in accordance with 15A NCAC 2H.0504. Any new or revised conditions shall be provided to NCDOT in writing, shall be provided to the United States Army Corps of Engineers for reference in any permit issued pursuant to Section 404 of the Clean Water Act, and shall also become conditions of the 404 Permit for the project.

NCDOT shall require its contractors (and/or agents) to comply with all of the terms and conditions of this Certification in the construction and maintenance of this project, and shall provide each of its contractors (and/or agents) a copy of this Certification.

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 Permit. This Certification shall expire upon the expiration of the 404 Permit.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition that conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This certification and its conditions are final and binding unless you ask for a hearing.

This the 2<sup>nd</sup> day of October 2003

DIVISION OF WATER QUALITY



for Alan W. Klimek, P.E.

WQC No. 3328

DWQ Project No.: \_\_\_\_\_  
Applicant: \_\_\_\_\_

County: \_\_\_\_\_

Project Name: \_\_\_\_\_

Date of Issuance of 401 Water Quality Certification: \_\_\_\_\_

**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 401/Wetlands Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. 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, 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, the approved plans and specifications, and other supporting materials.

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

***Engineer's Certification***

\_\_\_\_\_ Partial      \_\_\_\_\_ Final

I, \_\_\_\_\_, as a duly registered Professional Engineer 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, the approved plans and specifications, and other supporting materials.

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

Date \_\_\_\_\_

7/12/05 ON SITE

4/24/06 "

April 22, 2002

Regulatory Division

Action ID. 2001313201  
200131321

Mr. William D. Gilmore, P.E., Manager  
Project Development and Environmental Analysis Branch  
North Carolina Department of Transportation  
1548 Mail Service Center  
Raleigh, North Carolina 27699-1548

Dear Mr. Gilmore:

In accordance with the written request of August 15, 2001, and the ensuing administrative record, enclosed is a permit to discharge dredged or fill material into 11.96 acres of wetland, 17,252 linear feet of stream channel and 19.28 acres of open water in the waters and adjacent wetlands of Paw Creek, Long Creek, Dixon Branch and unnamed tributaries to facilitate the construction of approximately 8 miles of the North Charlotte Outer Loop (I-485) between Interstate Highway 85 on the west and NC Highway 115 (Old Statesville Road) on the east at Charlotte, Mecklenburg County, North Carolina (TIP No. R-2248 BB/C/D, State Project Nos. 8.U672205, 8.U672212 and 8.U672214).

If any change in the authorized work is required because of unforeseen or altered conditions or for any other reason, the plans revised to show the change must be sent promptly to this office. Such action is necessary, as revised plans must be reviewed and the permit modified.

Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant general conditions require that:

- a. You must complete construction before December 31, 2005.
- b. You must notify this office in advance as to when you intend to commence and complete work.
- c. You must allow representatives from this office to make periodic visits to your worksite as deemed necessary to assure compliance with permit plans and conditions.

Should you have questions, contact Mr. Steven Lund, in our Asheville Regulatory Field Office, Regulatory Division, telephone (828) 271-7980 ext. 4.

Sincerely,

FILENAME:R-2248CL68

~~CESAW-RG/FRANKLIN~~

CESAW-RG/JOLLY *th/s*

MAIL *A. Smith 4/16/92*

CESAW-RG/FILE

James W. DeLony  
Colonel, U.S. Army  
District Engineer

Enclosures

Copy Furnished with enclosures:

Chief, Source Data Unit  
NOAA/National Ocean Service  
ATTN: Sharon Tear N/CS261  
1315 East-West Hwy., Rm 7316  
Silver Spring, MD 20910-3282

Copies Furnished with special conditions and plans:

Mr. Garland Pardue, Field Supervisor  
U.S. Fish and Wildlife Service  
Fish and Wildlife Enhancement  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

Mr. Ron Sechler  
National Marine Fisheries  
Service, NOAA  
Pivers Island  
Beaufort, North Carolina 28516

Mr. David Rackley  
National Marine Fisheries  
Service, NOAA  
219 Fort Johnson Road  
Charleston, South Carolina 29412-9110

Mr. Ronald Mikulak, Chief  
Wetlands Section - Region IV  
Water Management Division  
U.S. Environmental Protection Agency  
Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, Georgia 30303

Mr. Doug Huggett  
Division of Coastal Management  
North Carolina Department of  
Environment and Natural Resources  
1638 Mail Service Center  
Raleigh, North Carolina 27699-1638

Commanding Officer  
United States Coast Guard  
Marine Safety Office Wilmington  
1502 North 23<sup>rd</sup> Street  
Wilmington, North Carolina 28405

Commander, Aoww  
Coast Guard, Atlantic Area  
ATTN: Tom Flynn  
431 Crawford Street  
Portsmouth, Virginia 23704

Mr. Ronald E. Ferrell  
Wetlands Restoration Program  
Division of Water Quality/NCDENR  
1650 Mail Service Center  
Raleigh, NC 27699-1650

BCF:

CESAW-RG-A/LUND  
CESAW-RG-A/JOHNSON  
CESAW-RG/FRANKLIN

DEPARTMENT OF THE ARMY PERMIT

RECEIVED

APR 19 2002

WILMINGTON DISTRICT

Permittee NC Department of Transportation

Permit No. 200131321

Issuing Office CESAW-RG-A

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

To discharge dredged or fill material into 11.96 acres of wetland, 17,252 linear feet of stream channel and 19.28 acres of open water in the waters and adjacent wetlands of Paw Creek, Long Creek, Dixon Branch and unnamed tributaries to facilitate the construction of approximately 8 miles of the North Charlotte Outer Loop (I-485).

Project Location:

Between Interstate Highway 85 (I-85) on the west and NC Highway 115 (Old Statesville Road) on the east at Charlotte, Mecklenburg County, North Carolina (TIP No. R-2248 BB/C/D).

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on December 31, 2005. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

**Special Conditions:**

See enclosed sheet.

**Further Information:**

1. **Congressional Authorities:** You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(x) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. **Limits of this authorization.**

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. **Limits of Federal Liability.** In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.



**ACTION ID: 200131321; TIP NO. R-2248BL/C/D**

**SPECIAL CONDITIONS**

1. All work authorized by this permit must be performed in strict compliance with the attached plans, which are a part of this permit.
2. All conditions of Section 401, Clean Water Act, Water Quality Certification No. 3328, issued by the North Carolina Division of Water Quality on September 6, 2001, will be regarded as conditions of this Department of the Army permit.
3. The permittee shall schedule a preconstruction meeting between their representatives, the contractor and a representative of the Corps of Engineers, Asheville Regulatory Field Office prior to any work in jurisdictional waters and wetlands to ensure that there is a mutual understanding of all terms and conditions contained in this Department of the Army permit. The permittee shall notify the Corps of Engineers a minimum of thirty (30) days in advance of the meeting.
4. The permittee and his contractors and/or agents shall not excavate, fill or perform land clearing at any time in the construction or maintenance of this project within waters and/or wetlands except as authorized by this permit or any modification to this permit. There shall be no excavation from or waste disposal into jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit.
5. To ensure that all borrow and waste activities occur on uplands, except as authorized by this permit, the permittee shall require its contractors and/or agents to identify all areas to be used to borrow material or to dispose of dredged, fill or waste material. The permittee shall ensure that all such areas comply with Special Condition No. 4 of this permit and shall require and maintain documentation of the location and characteristics of all borrow and disposal sites associated with this project. This information will include data regarding soils, vegetation and hydrology sufficient to clearly demonstrate compliance with Special Condition No. 4 above. All information will be available to the Corps of Engineers upon request.
6. The permittee shall require his contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project and shall provide each of his contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit.
7. The permittee will insure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any deviations in the construction design plans will be brought to the attention of the Corps of Engineers, Asheville Regulatory Field Office prior to any active construction in waters or wetlands.

8. Adequate sedimentation and erosion control measures must be implemented prior to any ground disturbing activities to minimize impacts to downstream aquatic resources. These measures must be inspected and maintained regularly, especially following rainfall events.
9. During the clearing phase of the project, heavy equipment must not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.
10. All temporary diversion channels and stream crossings will be constructed of non-erodable materials. Any such structures located outside of the authorized construction limits will be reported in writing to the Corps of Engineers, Asheville Regulatory Field Office, together with a location map and restoration plan.
11. Draining of ponds will be controlled so as not to release more than minimal amounts of sediment and cause no appreciable sediment accumulations in waters or wetlands downstream of the ponds.
12. All channel relocations will be constructed in a dry work area and stabilized before stream flows are diverted through them. To the maximum extent practicable, channel relocations will be completed during the growing season to allow for the establishment of stabilizing vegetation. Stability shall be achieved during the non-growing season through the use of erosion control matting or mats of existing field sod. Native species of woody vegetation will be utilized to provide long-term stream bank stabilization. The NCDOT Project Manager of the Corps of Engineers, Asheville Field Office shall be notified in advance by facsimile transmission or electronic mail of the intended diversion of water into new permanent channels.
13. The stability and success of the natural channel designs at Site 9/Section BB, Site 16/Section D, Site 19/Section D and Site 24 /Section D will be monitored by the permittee for a period of 5 years or through two documented bankful flow events. The permittee will prepare a stream channel monitoring plan and submit it to the Corps of Engineers, Asheville Field Office for review and approval. This monitoring plan must include reference photo sites, plant survival analysis and channel stability analysis and must be approved prior to the initiation of any construction in waters and wetlands.
14. The permittee shall mitigate for unavoidable impacts to wetlands and functional stream channel associated with this project by payment to the North Carolina Wetlands Restoration Program (NCWRP) in an amount determined by the NCWRP, sufficient to perform 17.36 acres of forested riverine wetland and 24,355 linear feet of warm water stream restoration within Cataloging Unit 03050101 of the Catawba River Basin. Construction within wetlands and streams shall begin only after the permittee has made full payment to the NCWRP and the NCWRP has provided written confirmation to the Corps that it agrees to accept responsibility for

the required mitigation work in compliance with the MOU between the North Carolina Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District, dated November 4, 1998.

15. In order to compensate for unavoidable impacts to non-riverine, forested wetlands, the permittee will purchase the 7 acres of wetlands known as the Ridge Road Swamp located north of the intersection of Ridge Road (SR 2601) and Beard Road (SR 2463) in Mecklenburg County and an additional 34 acres of forested upland buffer around this wetland. Proof of ownership, including a boundary survey, will be provided to the Corps of Engineers, Asheville Regulatory Field Office. The permittee will pursue the transfer of the Ridge Road Swamp Mitigation Area to an appropriate conservation organization for management as a natural areas preserve. This transfer should be completed within 1 year of the date of this permit. The terms of the property transfer must be approved by the Corps. The owner of the property will be responsible for preserving it in its natural state in perpetuity.

16. In order to compensate for the loss of open water (ponds), the permittee will restore the natural stream channel, including appropriate floodplain, through all ponds drained as a result of the authorized road construction. All channel restorations will be designed and constructed according to the North Carolina Wildlife Resources Commission's "Guidelines for Stream Relocation and Restoration in North Carolina, January 1999" and in consultation with the Commission's Regional Stream Restoration Coordinator.

17. Concrete box culverts will be constructed so that the bottom of the culvert is one foot below the bed of the stream. If not restricted by bedrock, metal pipe culverts should be buried a sufficient depth to allow the accumulation of natural substrate and the passage of indigenous aquatic life during normal flow conditions. Double-cell box culverts will be constructed so that normal and low flows are diverted through only one cell. Triple-cell box culverts will be constructed so that normal and low flows are diverted through only two cells.

18. In order to allow for continued movement of bed load and aquatic organisms, existing stream channel widths and depths will be maintained at the inlet and outlet ends of culverts. Riprap armoring of streams at culvert inlets and outlets shall be minimized in favor of bioengineering techniques such as bank sloping, erosion control matting and revegetation with deep-rooted, woody plants.

19. Where practicable, storm water shall be directed to vegetated buffer areas or retention basins and not directly into water supply or state-designated impaired waters or their tributaries.

20. All mechanized equipment operating near surface waters shall be regularly inspected to prevent contamination of streams from leakage of fuels, lubricants, hydraulic fluids or other toxic materials.

21. In order to assess impacts to state-designated impaired waters from the authorized construction, the permittee will conduct environmental monitoring of waters adjacent to the project area for the life of the project (until the roadway is paved and open to traffic). The permittee will prepare a monitoring plan designed to assess changes in water quality and aquatic biology from highway construction activities. The monitoring plan should identify the parameters to be analyzed, locations of sampling stations, frequency of sampling, descriptions of the sampling and analytical procedures used and a schedule for reporting sampling results. This monitoring plan must be reviewed and approved by the Corps of Engineers, Asheville Regulatory Field Office prior to any construction activities in waters and wetlands. Based on the monitoring results, the Corps may direct the permittee to take appropriate action to remediate adverse construction-related impacts.



Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
North Carolina Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D.  
Acting Director  
Division of Water Quality

September 6, 2001

RECEIVED

OCT 05 2001

Mr. William D. Gilmore, P.E., Manager  
NCDQT Planning and Environmental Branch  
1548 Mail Service Center  
Raleigh, NC, 27699-1548

Dear Mr. Gilmore:

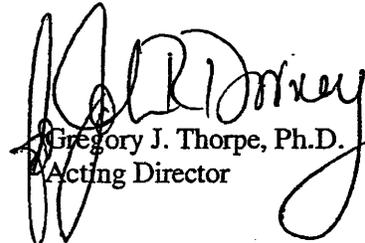
CESAW-CO-RA

Re: Water Quality Certification Pursuant to §401 of the Federal Clean Water Act,  
Proposed North Charlotte Outer Loop, Mecklenburg County, TIP Nos. R-2248 BB, C, and D.  
DWQ Project No. 011231

Attached hereto is a copy of Certification No. 3328 issued to The North Carolina Department of Transportation dated September 6, 2001.

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

Sincerely,



Gregory J. Thorpe, Ph.D.  
Acting Director

Attachments

cc: Wilmington District Corps of Engineers  
Corps of Engineers Asheville Field Office  
DWQ Mooresville Regional Office  
Ron Ferrell, Wetlands Restoration Program  
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. This certification authorizes the NCDOT to impact 11.96 acres of jurisdictional wetlands through permanent fill, excavation, and mechanized clearing; impact 20.28 acres of surface waters; and fill 17,072 linear feet of stream channels in Mecklenburg County, as described in Tables A1 and A2 of the Application. The project shall be constructed pursuant to the application dated August 15, 2001 filed to construct the North Charlotte Outer Loop (TIP Nos. R-2248 BB, C, and D).

The application provides adequate assurance that the discharge of fill material into the waters of the state 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. Should your project change, you are required to notify the DWQ *in writing*, 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 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, Non-discharge and Water Supply watershed regulations. This Certification shall expire three (3) 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. The applicant must follow the appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of *the North Carolina Sediment and Erosion Control Planning and Design Manual* or *the North Carolina Surface Mining Manual*, whichever is more appropriate (available from the Division of Land Resources (DLR) in the DENR Regional or Central Offices) and shall be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to assure compliance with the appropriate turbidity water quality standard (50 NTUs in all fresh water streams and rivers not designated as trout waters; 25 NTUs in all lakes and reservoirs, and all saltwater classes; and 10 NTUs in trout waters);
2. 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 after the Division of Land Resources has released the project;
3. Storm water shall be directed to buffer areas or retention basins and should not be routed directly into streams. Existing vegetated buffers shall not be mowed in order to utilize it for storm water sheet flow.

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. Live or fresh concrete shall not come 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 must be constructed in a dry work area, and stabilized before stream flows are diverted. Channel relocations shall be completed and stabilized prior to diverting water into the new channel. Whenever possible, channel relocations must 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. Placement of culverts and other structures in waters, streams, and wetlands shall 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.
9. During the construction of the project the applicant shall strictly adhere to North Carolina regulations entitled "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0024) throughout design and construction of the project for activities undertaken in all waters classified as WS (Water Supply), including Thomas Pond, Long Creek and its unnamed tributaries.
10. Hazardous Spill Catch Basins shall be required for all stream crossings located in the Watersupply Watershed Critical Area (Long Branch and its unnamed tributaries). The final designs for the Hazardous Spill Catch Basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Unit prior to beginning construction in the Watersupply Watershed Critical Area. As-builts for the basins shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Units no later than 30 days after the construction is completed.
11. Prior to any construction activities, the NCDOT shall submit a maintenance plan for all stormwater management facilities and hazardous spill catch basins associated with the project. The NCDOT shall be required to implement the maintenance plan for the life of the road.

12. *Mitigation:* Compensatory mitigation shall be the same as that approved by the US Army Corps of Engineers as long as the mitigation required equals a ratio of 1:1 restoration or creation of lost wetland acres as described in 15A NCAC 2H.0506 (h)(6). A report must be submitted to the NC Division of Water Quality that describes the final approved wetland and stream mitigation for this project within two months of the issuance of the 404 permit issued by the Army Corps of Engineers.

Wetland impacts consist of 11.96 acres, including 8.68 acres of riverine wetlands and 3.28 acres of depressional wetlands. Compensatory mitigation for 8.68 acres of riverine wetlands will be mitigated for at a 2:1 ration via in-lieu payments to the NC Wetlands Restoration Program (WRP) in the amount of \$416,640.00 (\$24,000 per acre). The 3.28-acre depressional wetland will be mitigated for by acquisition of the Ridge Road Mitigation Site.

Stream mitigation will be provided at a ratio of 2:1 except for those sites that were determined to warrant a 1:1 ratio or no mitigation by agency review. Compensatory mitigation for stream impacts will consist of 3,362 linear feet of on-site stream relocation/restoration using natural channel design. The stream relocation shall be built and maintained according to the approved plans before any mitigation credit is given. If this Office determines that the stream restoration or associated riparian area has become unstable, the stream shall be repaired or stabilized using only natural channel design techniques if possible. Additionally, the vegetation in the riparian shall be maintained and/or replaced according to the approved plans. Rip-rap and other hard structures may only be used if required by the Division of Land Resources or a Delegated Local Program. Additionally, all repair designs must be submitted to and receive written approval from this Office before the repair work is performed. Because the restored stream is proposed as compensatory mitigation for stream impacts, the restored portion and associated riparian area shall be preserved in perpetuity through a preservation easement or some other legally binding mechanism or agreement. The above easement or other legally binding mechanism or agreement must be in place before any mitigation credit shall be given. Additionally, the stream physical and biological monitoring plan shall be followed and reports shall be submitted to this Office after the first year and every other year afterwards for a total of five (5) years.

The remaining 22,248 linear feet of stream mitigation shall be provided via in-lieu payments to the WRP in the amount of \$2,781,000.00 (\$125.00 per linear foot).

In accordance with 15A NCAC 2R.0500, this contribution will satisfy our compensatory mitigation requirements under 15A NCAC 2H.0506(h). Until the Wetland Restoration Program receives and clears your check (made payable to DENR – Wetland Restoration Program), wetland or stream fill shall not occur. Mr. Ron Ferrell should be contacted at 919.733.5083 ext. 358 if you have any questions concerning the Wetland Restoration Program. You have two months from the date of this Certification to make the payment.

13. 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 401/Wetlands Unit of the Division of Water Quality upon completion of the project.

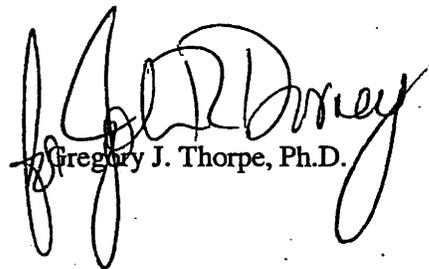
14. The permittee shall require its contractors (and/or agents) to comply with all of the terms of this Certification, and shall provide each of its contractors (and/or agents) a copy of this Certification.

Violations of any condition herein set forth shall 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 Permit. This Certification shall expire upon the expiration of the 404 Permit.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition that conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This certification and its conditions are final and binding unless you ask for a hearing.

This the 6th day of September 2001

DIVISION OF WATER QUALITY



Gregory J. Thorpe, Ph.D.

WQC No. 3328