



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

May 20, 2004

MEMORANDUM TO: Mr. Jon G. Nance, P.E.
Division 5 Engineer

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

SUBJECT: Wake County; Division 5; US 64 from New Hope Road/
SR 2306 to Existing US 64 near SR 1003; Federal Aid No.
NHF-DPI-0199(004), State Project No. 8.1402202; TIP Project No.
R-2547

Attached are the U. S. Army Corps of Engineers Nationwide Permit Nos. 23 and 33 Permit Modifications, Division of Water Quality 401/404 Certification, and the Division of Water Quality Neuse River Buffer Authorization. These permits authorize the construction of the subject project. All environmental permits have been received for the construction of this project.

PSH/ang

Attachment

cc: Mr. Art McMillan, P.E.
Mr. Omar Sultan
Mr. Jay Bennett, P.E.
Mr. David Chang, P.E.
Mr. Randy Garris, P.E.
Mr. Greg Perfetti, P.E.
Mr. Mark Staley
Mr. John F. Sullivan, III, FHWA
Mr. Chris Murray, Division 5 DEO

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

TELEPHONE: 919-733-3141
FAX: 919-733-9794
WEBSITE: WWW.DOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

PROJECT COMMITMENTS

US 64 from New Hope Rd. SR 2306 to Existing US 64 near SR 1003;
Wake County
State Project No.: 8.1402202
Federal Aid Project No.: NHF-DPI-0199(004)
TIP No.: R-2547

In addition to the standard Individual Section 404 and 401 Permit Conditions, State Consistency Conditions, NCDOT's Guidelines for Best Management Practices for Protection of Surface Waters, the following special commitments have been agreed to by NCDOT:

All other conditions written into previous Water Quality Certifications and Neuse River Riparian Buffer Certifications for this project still apply.

Commitments Developed through Permit Modifications

Roadside Environmental/Division 5 Construction

Construction will 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 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 project.
- b. For borrow pit sites, the erosion and sediment control measures must equal or exceed the proper design, installation, 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 and Pollution Control Act.

At the bridge crossing of Poplar Creek and Marks Creek, after the project construction is completed, the NCDOT shall remove all temporary fills placed in wetlands and protected riparian buffers. The sites shall be graded to their preconstruction contours, ripped, and revegetated. Prior to planting any vegetation, a list of species to be used will be submitted to, and approved by, the NCDWQ. In addition, an annual site inspection that includes representatives from the NCDOT and the NCDWQ shall be performed to monitor the sites restoration. The NCDOT shall be responsible for ensuring that the annual site inspection occurs. The annual monitoring site inspection shall be executed for at least 5 years, or until the NCDWQ waives this requirement in writing.

PROJECT COMMITMENTS

Riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.

Pursuant to NCAC15A 2B .0233(6), sediment and erosion control devices shall not be placed in Zone 1 of any Neuse Buffer without prior approval by the NCDWQ. At this time, the NCDWQ has approved no sediment and erosion control devices in Zone 1 anywhere on this project. Moreover, sediment and erosion control devices shall be allowed in Zone 2 of the buffers provided that Zone 1 is not compromised and that discharge is released as diffuse flow.

Division 5 Construction

The stormwater discharge presently directed to a pre-formed scour hole at Station Number 150+00 shall be redesigned to discharge into a properly designed flow spreader. The NCDWQ (in conjunction with the NCDOT) has established design standards for use of pre-formed scour holes. That guidance requires that they be used on discharge pipes of approximately 15-16 inches or less. The present design has a 24-inch pipe discharging to the pre-formed scour hole. Prior to any construction activities occurring at this site, a reconfigured stormwater design shall be submitted to, and approved by, the NCDWQ.

The 900 mm pipes presently proposed for Ramp BDY1 at Station Number 16+20, and Ramp CY1 at Station Number 13+95 shall be replaced with the 1500 mm pipes approved in the original 401 Water Quality Certification. The NCDOT can submit a request to have this condition waived to the NCDWQ. The submittal will need to explain how the smaller (900 mm) pipes will not destabilize the stream. The NCDWQ must approve, in writing, any waiver from this condition.

At Section CC, Site 9, the lateral base ditch located on the north side of Ramp CY1 shall be shortened in length to a point where it stops outside the protected riparian buffers. In addition, an appropriately designed flow spreader shall be added to the project design at this location. In lieu of a flow spreader, the NCDOT can submit to, and receive approval from, the NCDWQ appropriate information to demonstrate that the stormwater from the new impervious surface from this site will be treated in accordance with the Neuse River Riparian Buffer Rules (15A NCAC 2B .0233).

During the construction of the project, no staging of equipment of any kind is permitted in waters of the US, or protected riparian buffers.

The dimension, pattern and profile of the stream above and below the crossing should not be modified by widening the stream channel or reducing the depth of the stream. Disturbed floodplains and streams should be restored to natural geomorphic conditions.

Any riprap used must not interfere with thalweg performance and aquatic life passage during low flow conditions.

PROJECT COMMITMENTS

All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.

Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.

The outside buffer, wetland or water boundary as well as along the construction corridor within these boundaries approved under this authorization shall be clearly marked by orange fabric fencing for the areas that have been approved within the buffer, wetland or water prior to any land disturbing activities.

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 Section 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 US 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.

A copy of this Water Quality Certification shall be posted on the construction site at all times. In addition, the Water Quality Certification (and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.

Project Development and Environmental Analysis

Compensatory mitigation for impacts to streams shall be done for 59 linear feet of stream impact at a replacement ratio of 1:1. We understand that you have chosen to perform compensatory mitigation for impacts to streams through an in lieu payment to the North Carolina Ecosystem Enhancement Program (NCEEP) and that the NCEEP has agreed to implement the mitigation for the project. Mitigation for unavoidable impacts to streams shall be provided through an in-lieu payment to the NCEEP at a rate of \$200 per linear foot. Therefore, a total payment of \$11,800 shall be submitted to the NCEEP to offset the impacts.

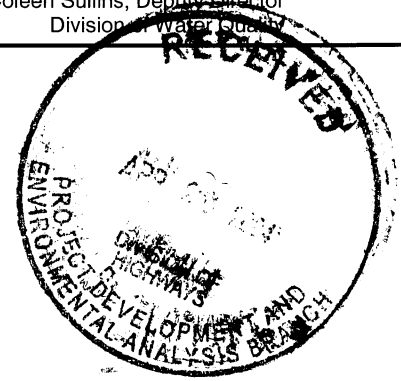
NCDOT shall provide documentation to the NCDWQ within 2 months of the issuance of this 401 Water Quality Certification that demonstrates acceptance of the riparian buffer mitigation by the NC Wetlands Restoration Program or NCEEP.



Deauregara Todd Lutz
 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 Sullins, Deputy Director
 Division of Water Quality

RECEIVED
 APR 26 2004
 DIVISION OF HIGHWAYS
 IDEA OFFICE OF NATURAL ENVIRONMENT

April 19, 2004



Dr. Greg Thorpe, PhD., NCEM
 Planning & Environmental Branch
 N.C. Department of Transportation
 1548 Mail Service Center
 Raleigh, North Carolina, 27699-1548

Dear Dr. Thorpe:

Re: Certification Pursuant to Section 401 of the Federal Clean Water Act,
 Proposed US 64 Bypass of Knightdale from I-440 (Raleigh Beltline) to existing US 64 near SR 1003, I-440
 from 0.83 miles south of US 64 to Poole Road and a portion of the East Wake Expressway from existing US
 64 to the proposed US 64 Bypass in Wake County (TIP R-2547).
 WQC Project No. 011689

Attached hereto is a modification to Certification No. 3377 issued to the North Carolina Department of Transportation on April 10, 2002. The attached modification authorizes changes to the project design as described in your submittal dated February 19, 2004. The modification authorizes a reduction in impacts to wetlands of 0.28 acres, an increase in impacts to jurisdictional streams of 59 linear feet, and a reduction in impacts to protected Neuse River Riparian B of 0.35 acres in Zone 1 and 0.04 acres in Zone 2. The only modifications to the design of the project authorized by this certification are those submitted in your February 19, 2004. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated April 10, 2002 and all other corresponding modifications still apply except where superseded by this certification.

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

Sincerely,

 Alan W. Klimek, P.E.
 Director

Attachments:

Modification to WQC No. 3377

cc: Wilmington District Corps of Engineers
 Corps of Engineers Raleigh Field Office
 DWQ Raleigh Regional Office
 Bill Gilmore, NC Ecosystem Enhancement Program
 Danny Smith, NC Division of Water Quality
 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. Attached hereto is a modification to Certification No. 3377 issued to the North Carolina Department of Transportation on April 10, 2002. The attached modification authorizes changes to the project design as described in your submittal dated February 19, 2004. The modification authorizes a reduction in impacts to wetlands of 0.28 acres, an increase in impacts to jurisdictional streams of 59 linear feet, and a reduction in impacts to protected Neuse River Riparian B of 0.35 acres in Zone 1 and 0.04 acres in Zone 2. The only modifications to the design of the project authorized by this certification are those submitted in your February 19, 2004. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated April 10, 2002 and all other corresponding modifications still apply except where superceded by this certification.

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

This approval is only valid for the purpose and design that you submitted in your application, as described in the Public Notice. Should your project change, you are required to notify the DWQ and 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 total wetland fills for this project (now or in the future exceed one acre, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations.

Condition(s) of Certification:

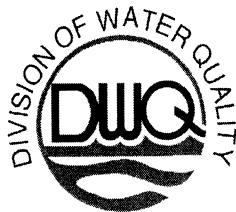
1. Construction will be conducted in such a manner as to prevent a significant increase in turbidity outside the area of construction or construction-related discharge. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation 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 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 project.
 - 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.
2. There shall be no excavation from or waste disposal into jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit. 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;



3. No live or fresh concrete shall come into contact with waters of the state until the concrete has hardened.
4. All 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;
5. At the bridge crossing of Popular Creek and Marks Creek, after the project construction is completed, the NCDOT shall remove all temporary fills placed in wetlands and protected riparian buffers. The sites shall be graded to their preconstruction contours, ripped, and revegetated. Prior to planting any vegetation, a list of species to be used will be submitted to, and approved by, the NCDWQ. In addition, an annual site inspection that includes representatives from the NCDOT and the NCDWQ shall be performed to monitor the sites restoration. The NCDOT shall be responsible for ensuring that the annual site inspection occurs. The annual monitoring site inspection shall be executed for at least 5 years, or until the NCDWQ waives this requirement in writing.
6. The stormwater discharge presently directed to a pre-formed scour hole at Station Number 150+00 shall be redesigned to discharge into a properly designed flow spreader. The NCDWQ (in conjunction with the NCDOT) has established design standards for use of pre-formed scour holes. That guidance requires that they be used on discharges pipes of approximately 15-16 inches or less. The present design has a 24-inch pipe discharging to the pre-formed scour hole. Prior to any construction activities occurring at this site, a reconfigured stormwater design shall be submitted to, and approved by, the NCDWQ.
7. The 900 mm pipes presently proposed for Ramp BDY1 at Station Number 16+20, and Ramp CY1 at Station Number 13+95 shall be replaced with the 1500 mm pipes approved in the original 401 Water Quality Certification. The NCDOT can submit a request to have this condition waived to the NCDWQ. The submittal will need to explain how the smaller (900 mm) pipes will not destabilize the stream. The NCDWQ must approve, in writing, any waiver from this condition.
8. At Section CC, Site 9, the lateral base ditch located on the north side of Ramp CY1 shall be shortened in length to a point where it stops outside the protected riparian buffers. In addition, an appropriately designed flow spreader shall be added to the project design at this location. In lieu of a flow spreader, the NCDOT can submit to, and receive approval from, the NCDWQ appropriate information to demonstrate that the stormwater from the new impervious surface from this site will be treated in accordance with the Neuse River Riparian Buffer Rules (15A NCAC 2B .0233).
9. Compensatory mitigation for impacts to streams shall be done for 59 linear feet of stream impact at a replacement ratio of 1:1. We understand that you have chosen to perform compensatory mitigation for impacts to streams through an in lieu payment to the North Carolina Ecosystem Enhancement Program (NCWRP), and that the EEP has agreed to implement the mitigation for the project. Mitigation for unavoidable impacts to streams shall be provided through an in-lieu payment to the North Carolina Ecosystem Enhancement Program (NCEEP) at a rate of \$200 per linear foot. Therefore, a total payment of \$11,800 shall be submitted to the NCEEP to offset the impacts.
10. All stormwater runoff shall be directed to sheetflow through stream buffers at nonerosive velocities, unless approved otherwise by this certification.
11. NCDOT shall provide documentation to the NC Division of Water Quality with 2 months of the issuance of this 401 Water Quality Certification that demonstrates acceptance of the riparian buffer mitigation by the NC Wetlands Restoration Program, or the NC Ecosystem Enhancement Program.



-
12. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers.
 13. No changes to the horizontal or vertical placement of the stormwater outfall locations, the horizontal or vertical placement of the culverts, the horizontal or vertical placement of bridges, the horizontal or vertical placement of grassed swales, or the horizontal or vertical placement of open ditches is permitted without written approval from the NC Division of Water Quality 401 Wetlands Unit. In addition, no changes to the flow spreader locations or designs, preformed scour hole locations or designs are permitted without written approval from the NC Division of Water Quality 401 Wetlands Unit. Any request for changes to the referenced items above will require submittal of a modification request, with seven copies, and corresponding fees will need to be submitted to the North Carolina Division of Water Quality.
 14. Riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.
 15. The dimension, pattern and profile of the stream above and below the crossing should not be modified by widening the stream channel or reducing the depth of the stream. Disturbed floodplains and streams should be restored to natural geomorphic conditions.
 16. Any riprap used must not interfere with thalweg performance and aquatic life passage during low flow conditions.
 17. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.
 18. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
 19. Pursuant to NCAC15A 2B.0233(6), sediment and erosion control devices shall not be placed in Zone 1 of any Neuse Buffer without prior approval by the NCDWQ. At this time, the NCDWQ has approved no sediment and erosion control devices in Zone 1 anywhere on this project. Moreover, sediment and erosion control devices shall be allowed in Zone 2 of the buffers provided that Zone 1 is not compromised and that discharge is released as diffuse flow.
 20. The outside buffer, wetland or water boundary as well as along the construction corridor within these boundaries approved under this authorization shall be clearly marked by orange fabric fencing for the areas that have been approved to infringe within the buffer, wetland or water prior to any land disturbing activities.
 21. 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.



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 Sullins, Deputy Director
Division of Water Quality

-
22. A copy of this Water Quality Certification shall be posted on the construction site at all times. In addition, the Water Quality Certification (and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.
 23. All other conditions written into previous Water Quality Certifications and Neuse River Riparian Buffer Certifications for this project still apply.

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 404 and/or coastal Area Management Act Permit. This Certification shall expire upon expiration of the 404 or CAMA permit.

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

This the 19th day of April 2004
DIVISION OF WATER QUALITY

Alan W. Klimek, P.E.
Director

Modification to WQC No. 3377

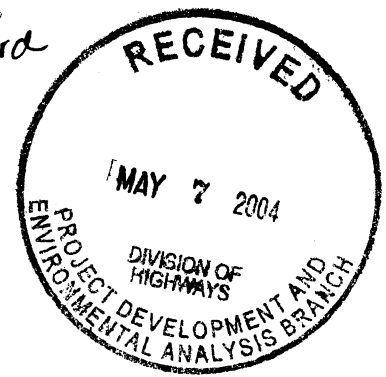
c:\ncdot\TIP R-2547\wqc\011689wqcmoc04.doc



REPLY TO
ATTENTION OF:

A-Gordon
R. Beauregard

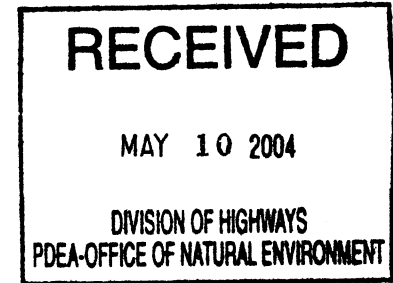
DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890



May 4, 2004

Regulatory Division

SUBJECT: Action ID 200220819; TIP No. R-2547



Dr. Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Dr. Thorpe:

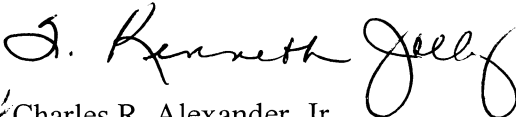
Reference the Department of the Army permit issued on April 25, 2002, for the discharges of fill material in waters of the United States, including wetlands, to facilitate construction of the US 64 Knightdale Bypass (T.I.P. No. R-2547), in the Neuse River basin, Wake County, North Carolina. Reference also your February 19, 2004 letter requesting modification of the permit, to authorize additional impacts to waters of the United States, including impacts that have been completed without prior authorization. You state that these additional impacts are necessary because of discrepancies between current construction plans and the approved permit drawings, with the exception of the mechanized clearing and temporary fill impacts at Marks Creek and Poplar Creek, associated with bridge construction access, which were completed without authorization because of a misunderstanding of your contractor as to what was authorized by a North Carolina Division of Water Quality Buffer Certification Modification. NCDOT shall remove all of the unauthorized fill from the bridge construction access, seed and mulch the areas using riparian seed mixtures, and plant wetland tree species where practicable.

We have reviewed your proposal and have determined that impacts are temporary or relatively minor, and an additional public notice is not necessary. Therefore, the permit is hereby modified to authorize the revised design, as described in your request, and as shown in the attached modified drawings, with net impacts of an additional 59 linear feet of stream, and 0.43 acre of wetlands. No additional mitigation will be required for this modification.

It is understood that all other conditions of the permit, including the expiration date, remain applicable. Please note that the current permit expiration date is December 31, 2005. Additionally, please note that this authorization does not imply satisfactory resolution of your permit violation on this project. Further administrative action may be pursued in this matter.

If you have questions, please contact Eric Alsmeyer of the Raleigh Regulatory Field Office, at telephone (919) 876-8441, extension 23.

Sincerely,


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

Enclosure

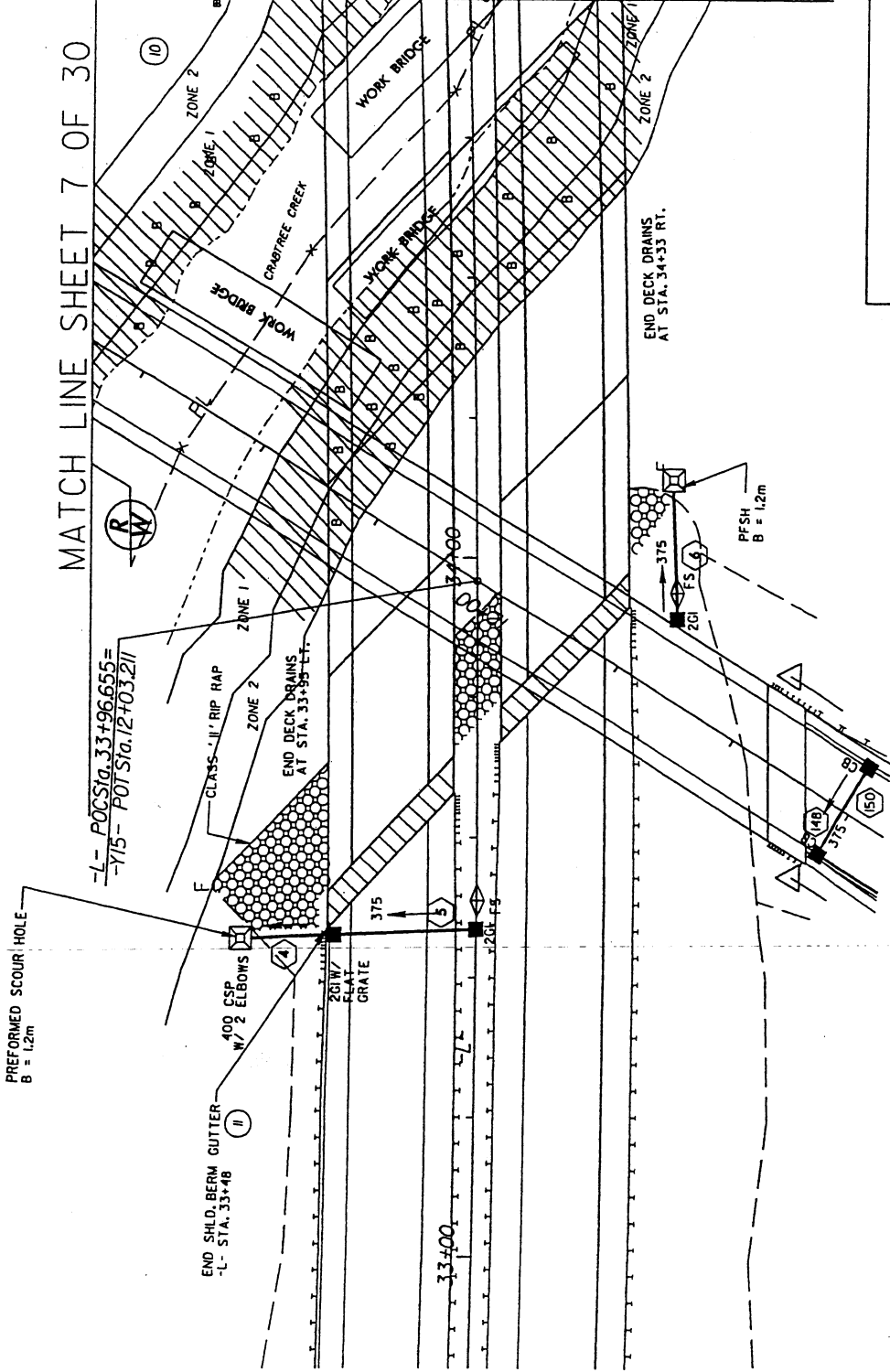
Copies Furnished (without enclosure):

Ms. Emily Lawton
Federal Highway Administration
310 New Bern Ave., Rm. 410
Raleigh, North Carolina 27601-1442

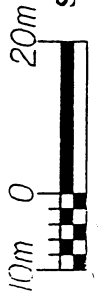
Mr. John Dorney
Division of Water Quality
North Carolina Department of
Environment and
Natural Resources
1650 Mail Service Center
Raleigh, NC 27699-1650

MATCH LINE SHEET 7 OF 30

MATCH LINE STA. 34+80
SHEET 9 OF 30



PLAN VIEW FOR CONSTRUCTION OF BRIDGE SITE 1



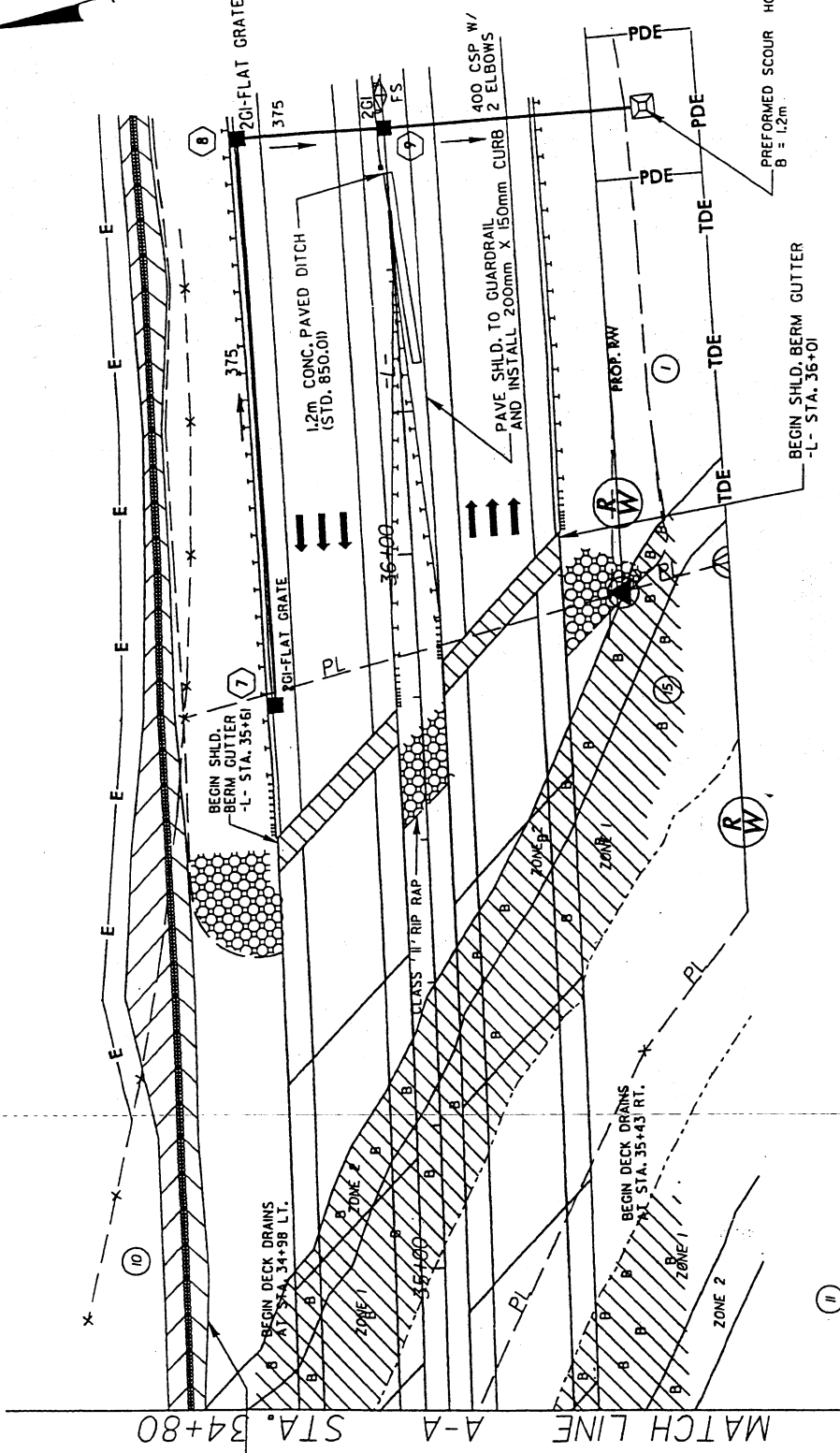
SCALE



DENOTES TEMPORARY IMPACTS TO THE BUFFER ZONES

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547BB)
US 64 BYPASS FROM NEW HOPE
ROAD TO EAST OF SR 2601
CLIFTON ROAD

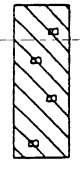
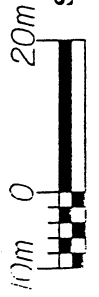
SHEET 8 OF 30 REV 12/11/03



'V' DITCH
CLASS 'B' RIP RAP
W/ FILTER FABRIC
EST. 235 TONS
EST. 651SM FABRIC

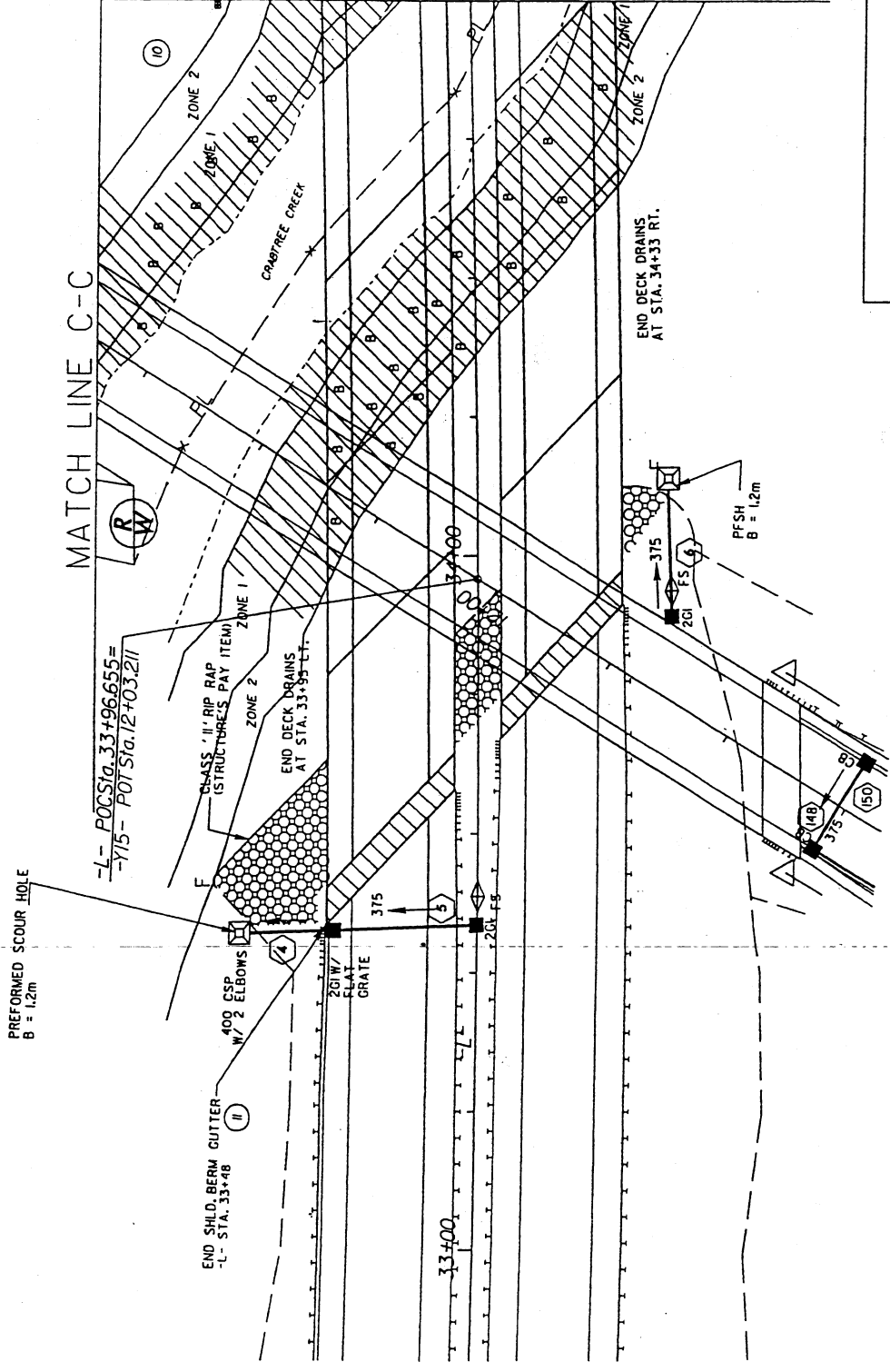
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547BB)
US 64 BYPASS FROM NEW HOPE
ROAD TO EAST OF SR 2601
CLIFTON ROAD
SHEET 6 OF 30 REV 12/11/03

PLAN VIEW
SITE 1



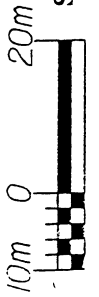
DENOTES IMPACTS TO BUFFER ZONES

MATCH LINE C-C
 MATCH LINE A-A STA. 34+80

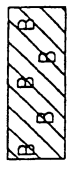


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 5 OF 30 REV 12/11/03

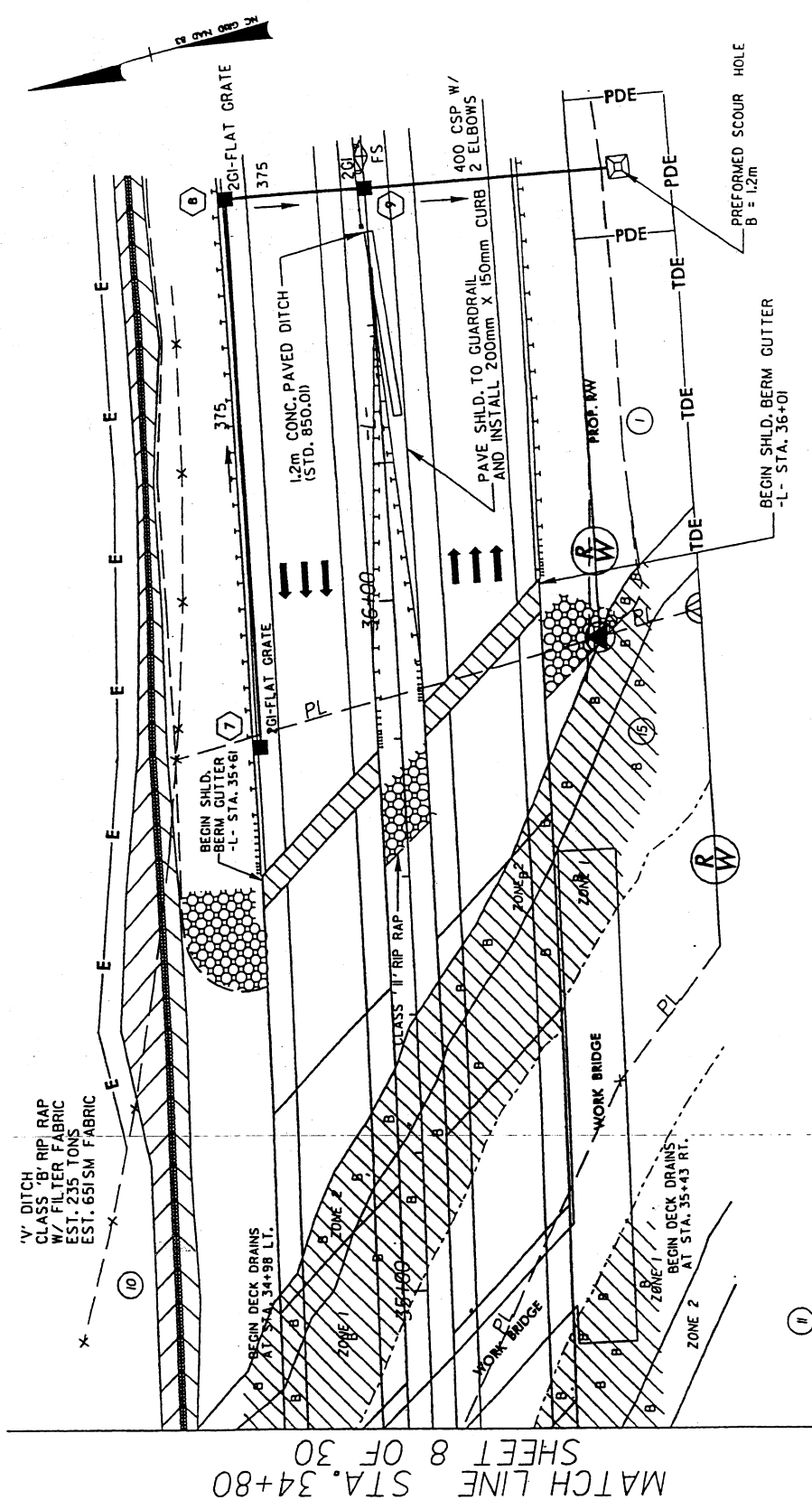
PLAN VIEW
 SITE 1



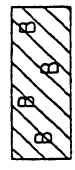
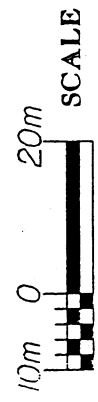
SCALE



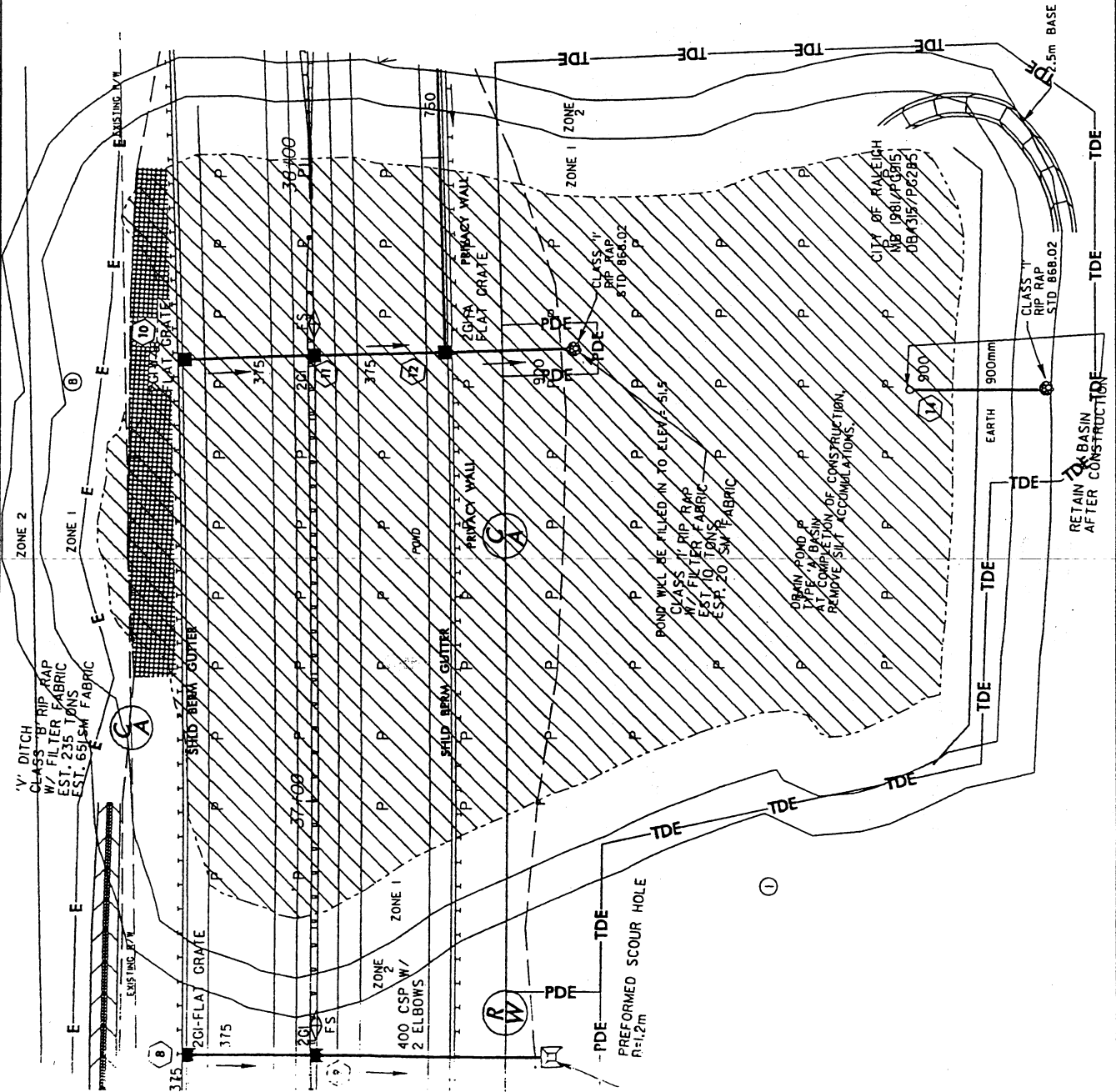
DENOTES IMPACTS TO BUFFER ZONES



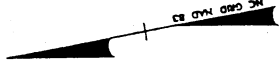
PLAN VIEW FOR CONSTRUCTION OF BRIDGE SITE 1



N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 9 OF 30 REV 12/11/03

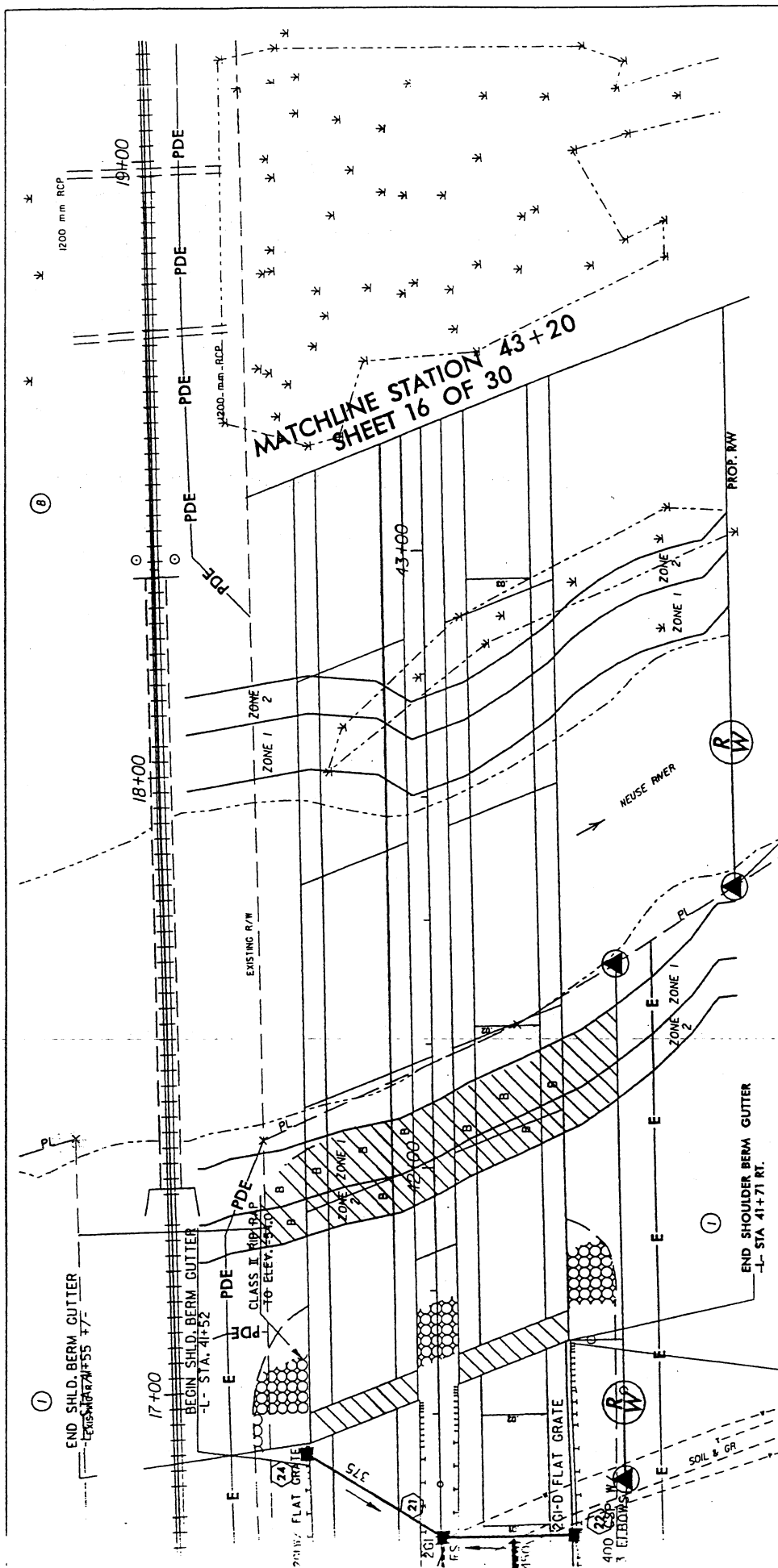


PLAN VIEW SITE 2

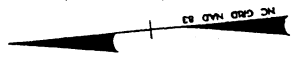


10m 0 20m
SCALE

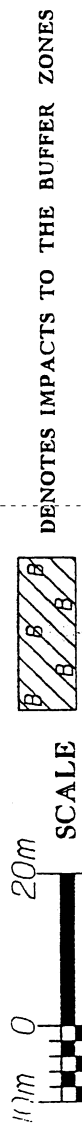
N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 12 OF 30 REV 12/11/03

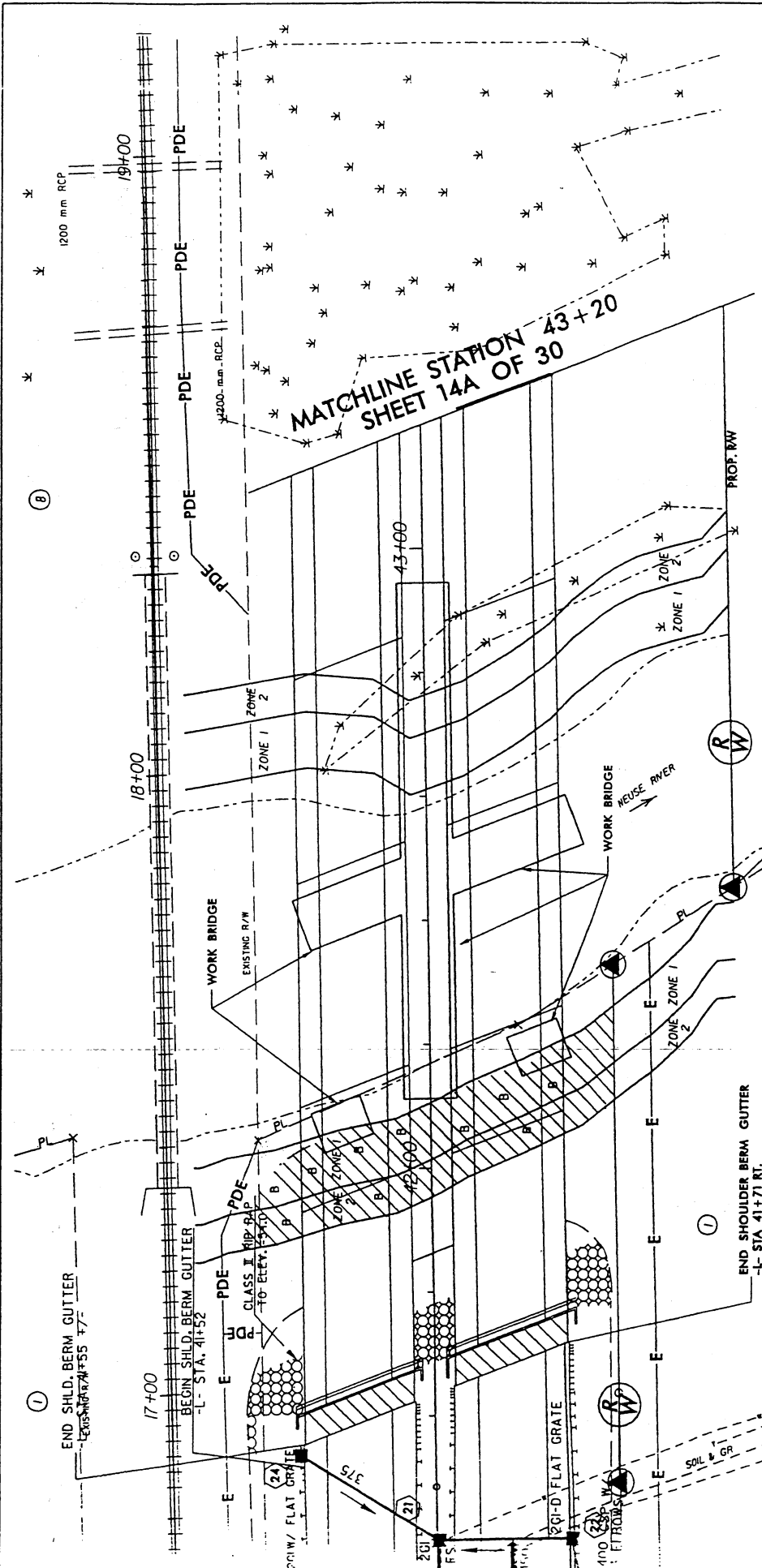


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 13 OF 30 REV 12/11/03



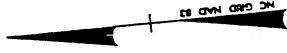
PLAN VIEW SITE 3



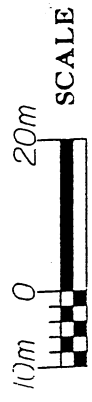


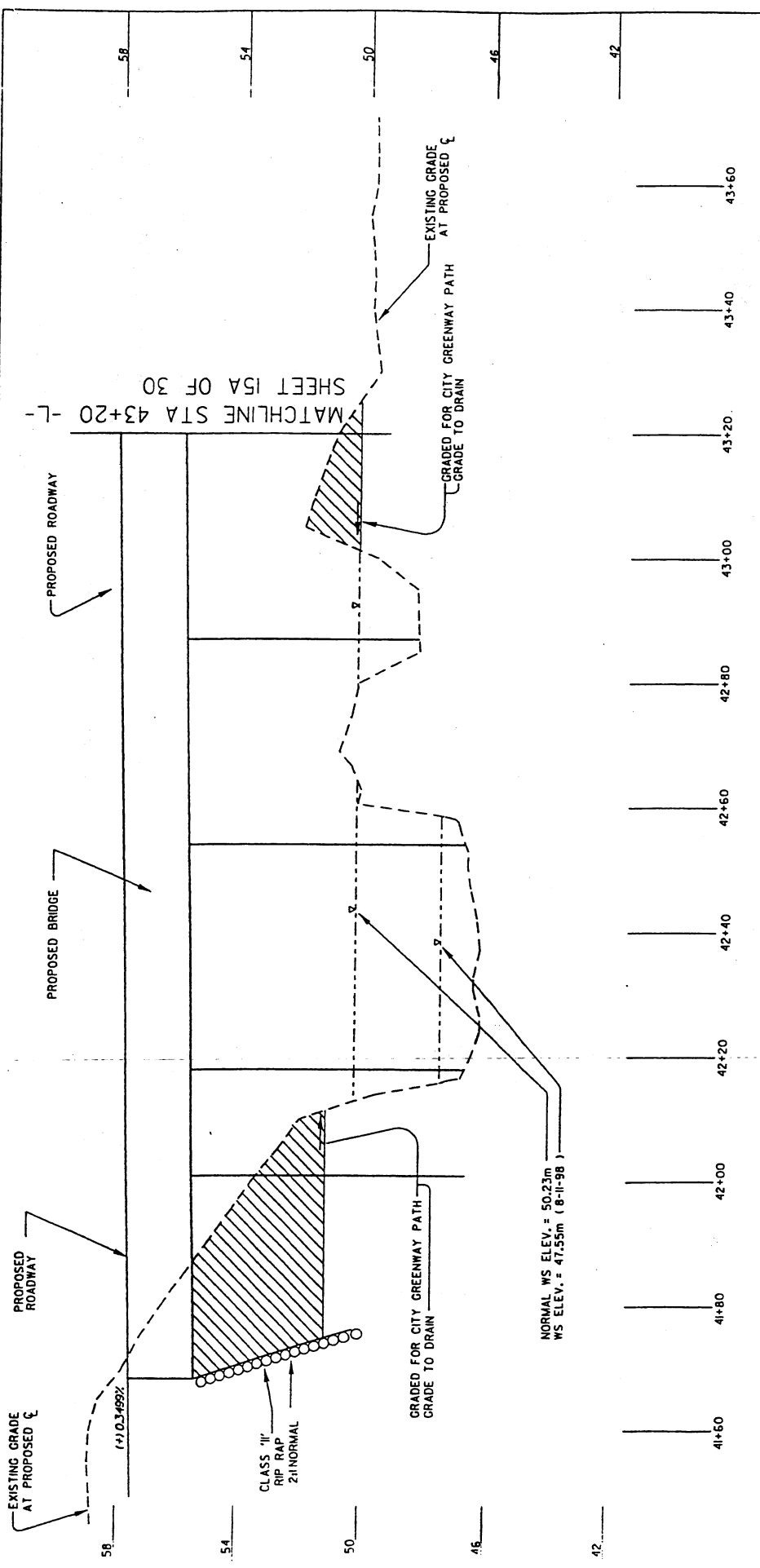
PLAN VIEW FOR CONSTRUCTION OF BRIDGE SITE 3

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547BB)
US 64 BYPASS FROM NEW HOPE
ROAD TO EAST OF SR 2601
CLIFTON ROAD
SHEET 14 OF 30 REV 12/11/03



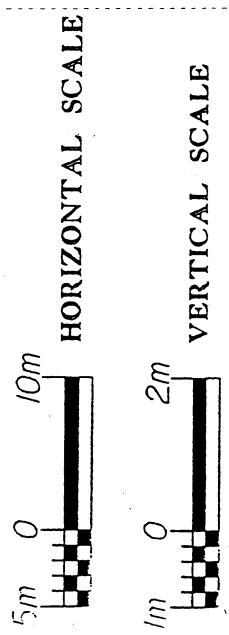
- DENOTES TEMPORARY FILL IN WETLANDS
- DENOTES TEMPORARY IMPACTS TO THE BUFFER ZONES



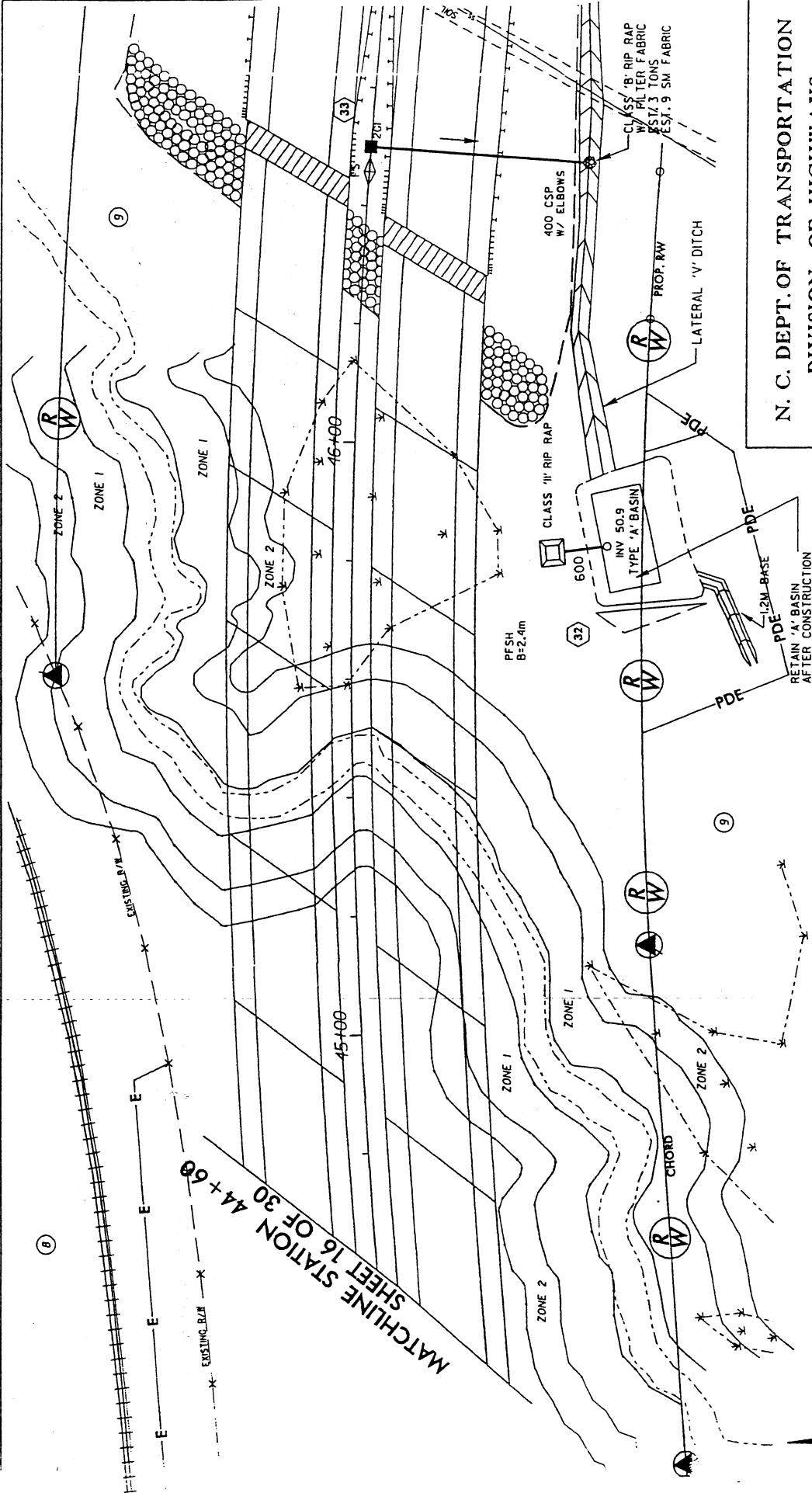


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE ROAD TO EAST OF SR 2601 CLIFTON ROAD
 SHEET 15 OF 30 REV 12/11/2003

PROFILE
 SITE 3

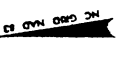
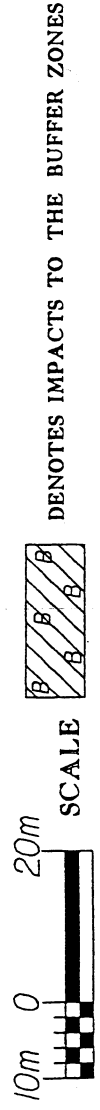



 DENOTES EXCAVATION

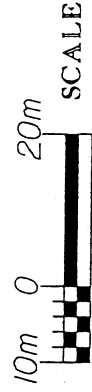


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 17 OF 30 REV 12/11/03

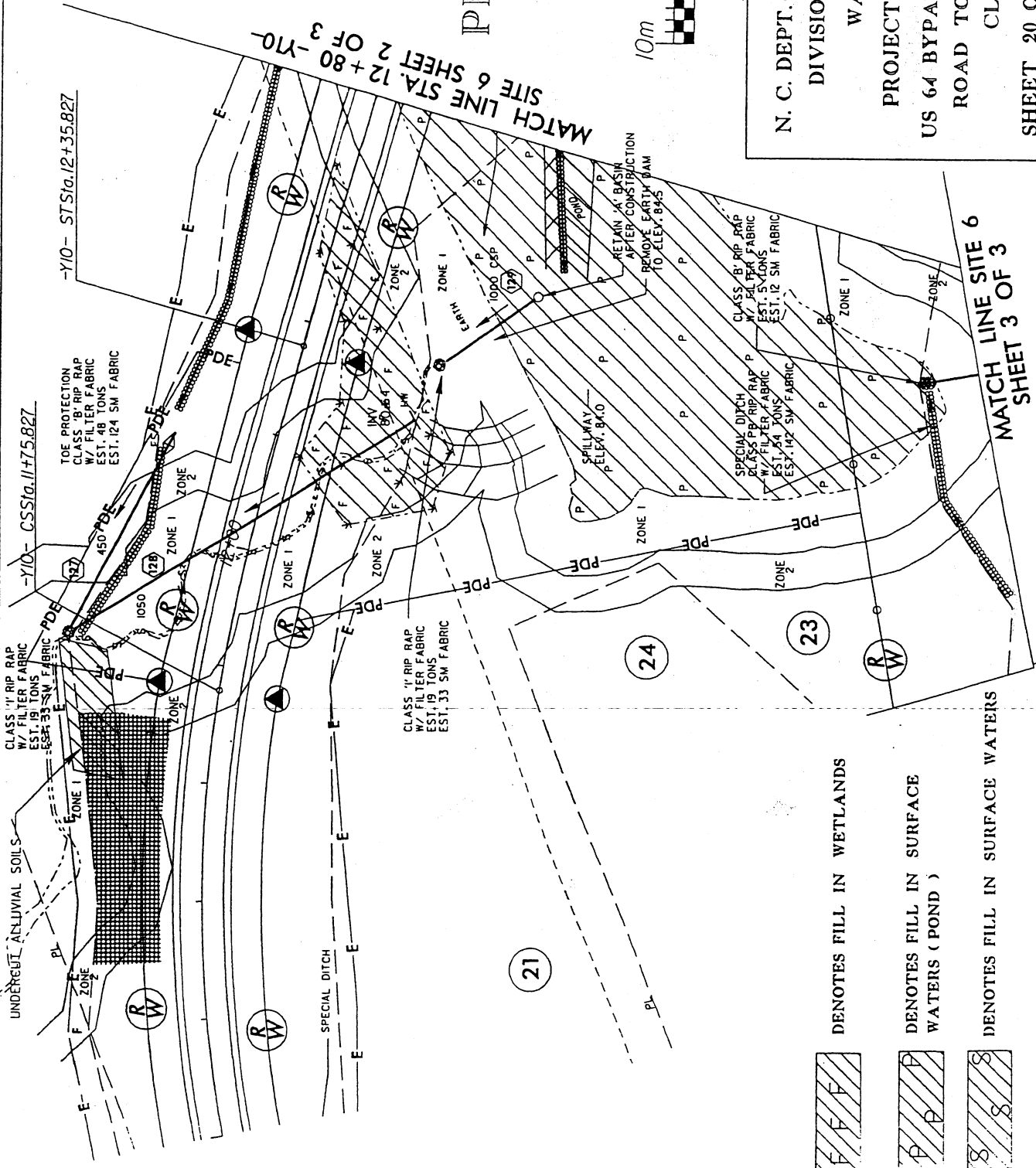
PLAN VIEW
 SITE 3

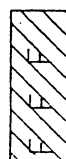
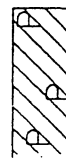
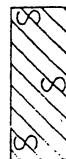


PLAN VIEW SITE 6 SHEET 1 OF 3



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547BR)
US 64 BYPASS FROM NEW HOPE
ROAD TO EAST OF SR 2601
CLIFTON ROAD
SHEET 20 OF 30 REV 12/11/03



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

-Y10- ST Sta. 12+35.827

-Y10- CSS Sta. 11+75.827

MATCH LINE STA 12+80 -Y10-
SITE 6 SHEET 2 OF 3

MATCH LINE SITE 6
SHEET 3 OF 3

TOE PROTECTION
CLASS 'B' RIP RAP
W/ FILTER FABRIC
EST. 48 TONS
EST. 124 SM FABRIC

CLASS 'I' RIP RAP
W/ FILTER FABRIC
EST. 19 TONS
EST. 33 SM FABRIC

CLASS 'I' RIP RAP
W/ FILTER FABRIC
EST. 19 TONS
EST. 33 SM FABRIC

CLASS 'B' RIP RAP
W/ FILTER FABRIC
EST. 54 TONS
EST. 142 SM FABRIC

SPECIAL DITCH
CLASS 'B' RIP RAP
W/ FILTER FABRIC
EST. 54 TONS
EST. 142 SM FABRIC

RETAIN 'A' BASIN
AFTER CONSTRUCTION
REMOVE EARTH DAM
TO ELEV. 84.5

SPILLWAY
PELEV. 84.0

UNDERCUT ALLUVIAL SOILS

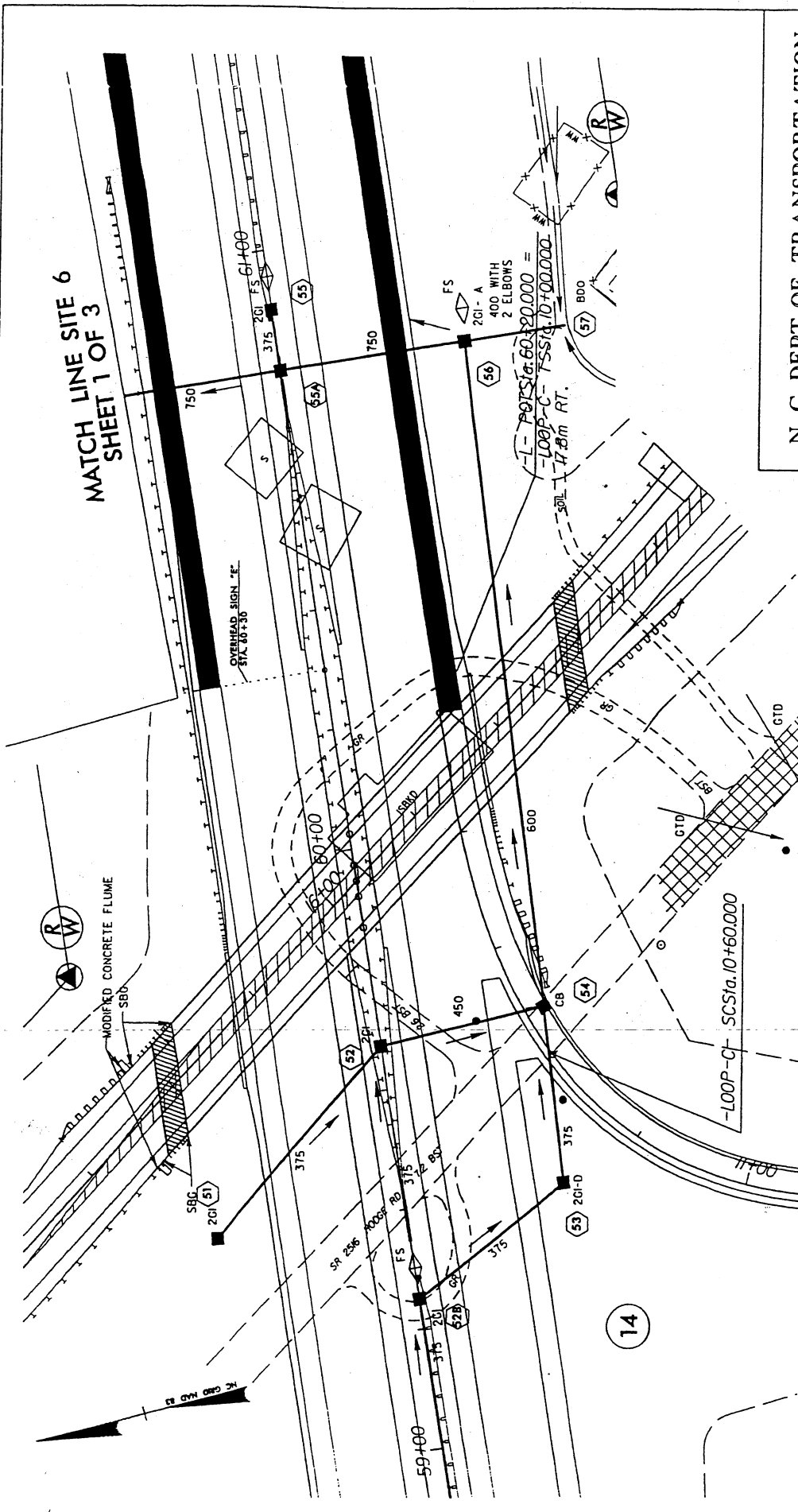
SPECIAL DITCH

(21)

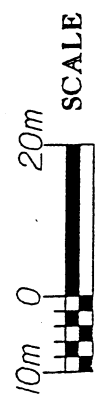
(24)

(23)

MATCH LINE SITE 6
SHEET 1 OF 3

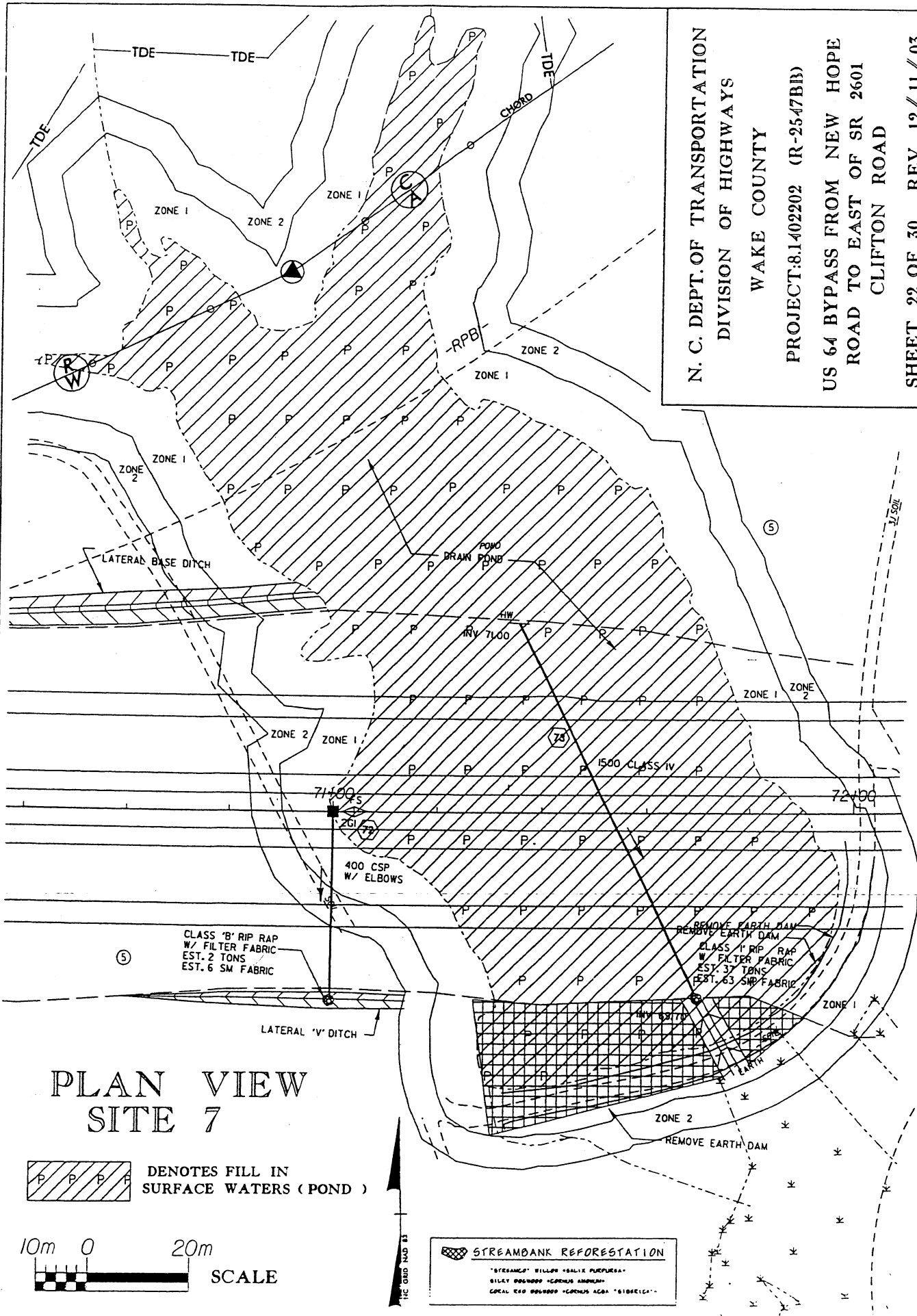


PLAN VIEW
SITE 6
SHEET 3 OF 3



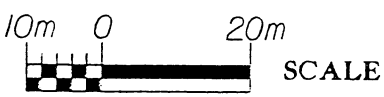
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547BB)
US 64 BYPASS FROM NEW HOPE
ROAD TO EAST OF SR 2601
CLIFTON ROAD
SHEET 20A OF 30 12/11/03

N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 22 OF 30 REV 12/11/03



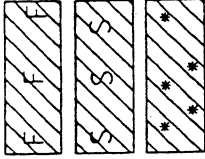
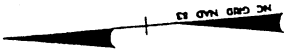
PLAN VIEW
 SITE 7

 DENOTES FILL IN SURFACE WATERS (POND)



STREAMBANK REFORESTATION
 "STEREAMC" BELLUM "SALIX PURPUREA"
 "SILEX BUNNODI" "CORNUS AMOMUM"
 "CORAL EBO BUNNODI" "CORNUS ACBA" "SIBIRICA"

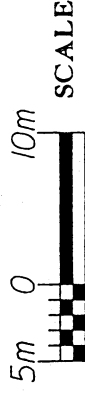
PLAN VIEW
 SITE 8A
 SHEET 1 OF 2



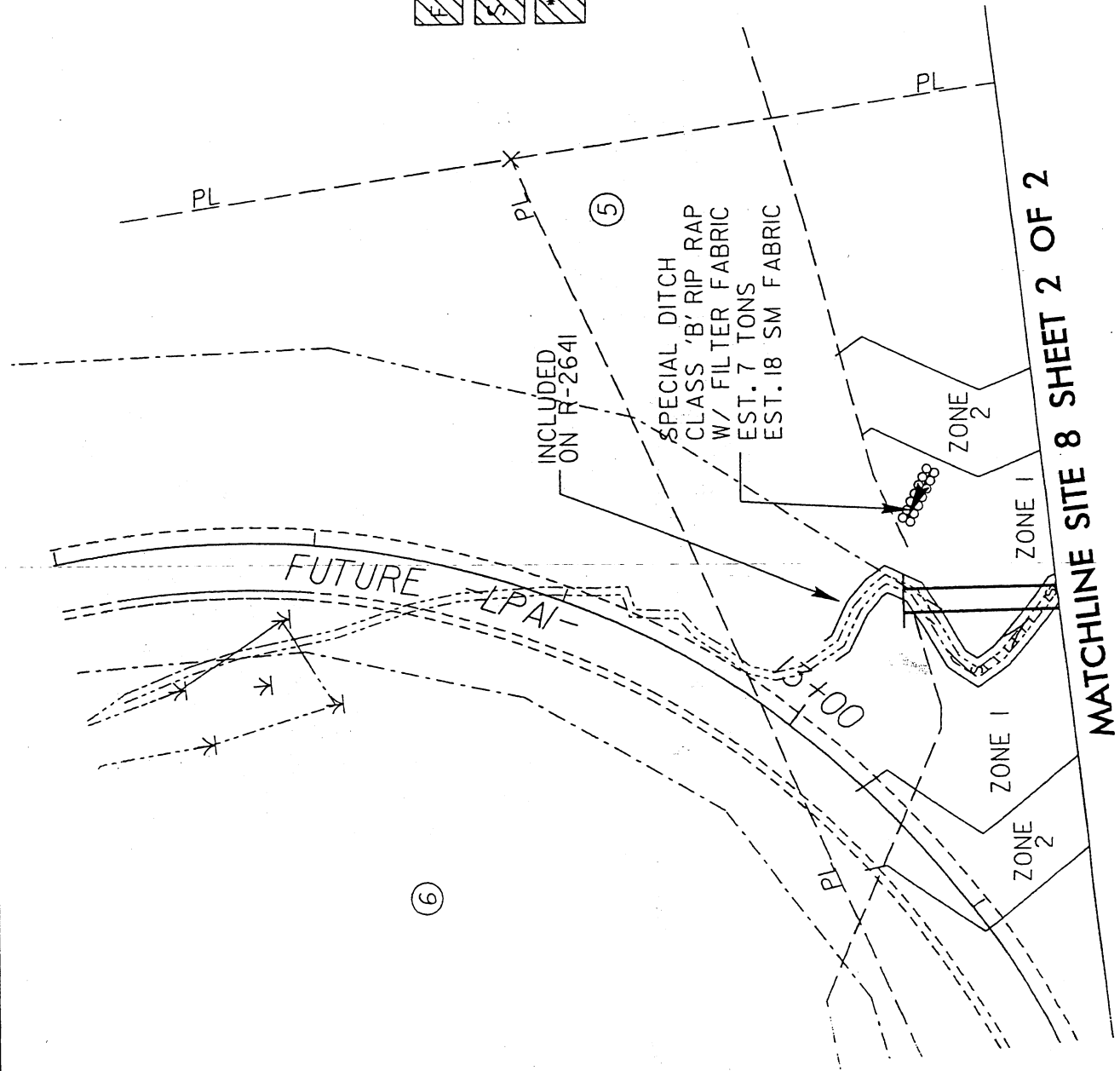
DENOTES FILL IN WETLANDS

DENOTES FILL IN SURFACE WATERS

DENOTES MECHANIZED CLEARING

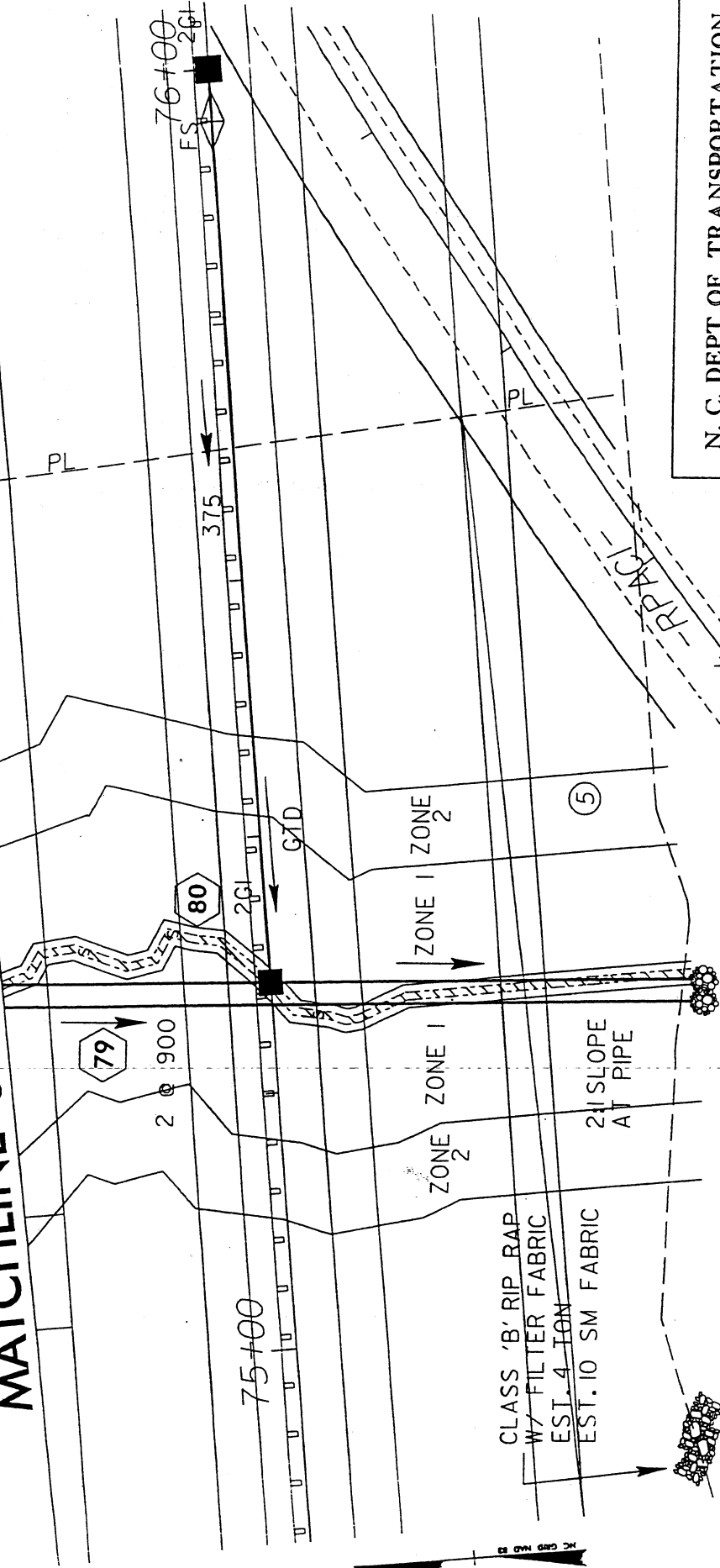


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD
 SHEET 23 OF 30 REV 12/11/03



MATCHLINE SITE 8 SHEET 2 OF 2

MATCHLINE SITE 8 SHEET 1 OF 2

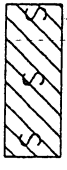


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547BB)
 US 64 BYPASS FROM NEW HOPE
 ROAD TO EAST OF SR 2601
 CLIFTON ROAD

SHEET 24 OF 30 REV 12/11/03

SITE 8 SHEET 2 OF 2

5 S S DENOTES FILL IN SURFACE WATERS



CLASS '1' RIP RAP
 W/ FILTER FABRIC
 EST. 10 TONS EA.
 EST. 20 SM FABRIC EA.

CLASS 'B' RIP RAP
 W/ FILTER FABRIC
 EST. 4 TON
 EST. 10 SM FABRIC

24\"/>



SCALE

IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size	WETLAND IMPACTS				SURFACE WATER IMPACTS					FILL IN BUFFER			
			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	33+80-35+80 L	BRIDGE												0.241	0.002
	12+70 -Y15	BRIDGE												0.0005	
2	36+80-38+00 L								1.276					0.157	0.005
3	41+80-43+20 L	BRIDGE												0.043	0.035
4	43+20-43+80 L	--DELETED--BRIDGED													
5	44+60-46+40 L	--DELETED--PART OF 3													
6	11+80-14+40 Y10	1050	0.073					0.005	1.096			93		0.349	0.23
7	71+0072+00 L	1500 RCP							0.71					0.239	0.153
8	12+60-13+00 LPA1 75+20-76+40 L	2 @ 900 RCP	0.0005					0.003				136		0.107	0.07
9	79+20-79+60 L	1 @ 2.7m X 1.8m RCBC	0.565					0.047				87		0.327	0.217
10	11+60 TO 12+80 LPC1		0.42					0.04							
TOTALS:			1.06	0.00	0.00	0.22	0.06	3.08	7.62	0.10	316.00	1037	0.00	147.00	1.46
			2.62	0.00	0.00	0.22	0.06						0	482	3.62
			ha/meters												
			ac/feet												

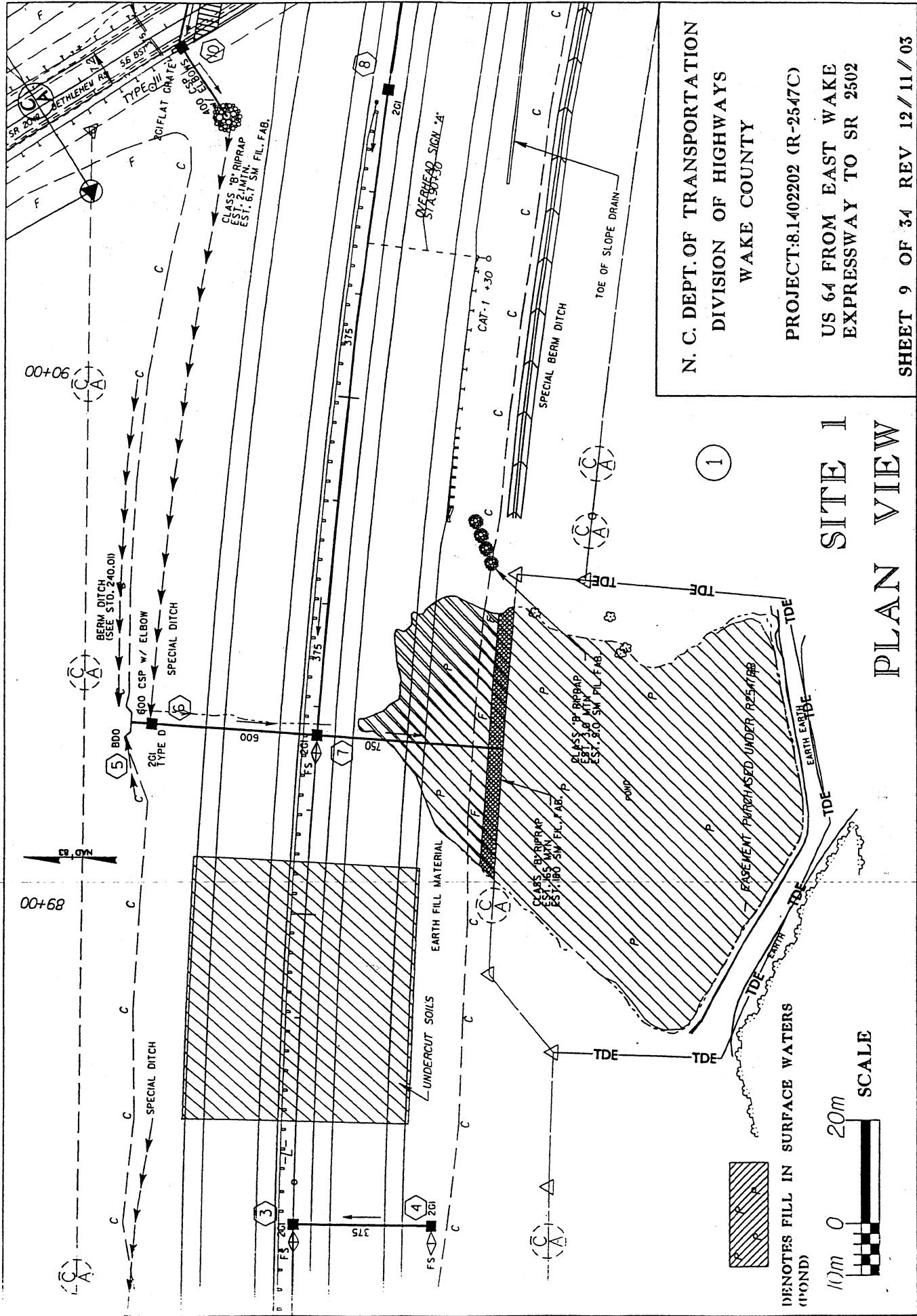
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJEC 8-1402202 R-2547BB

SHEET 29 OF 30

REVISED 12/11/2003

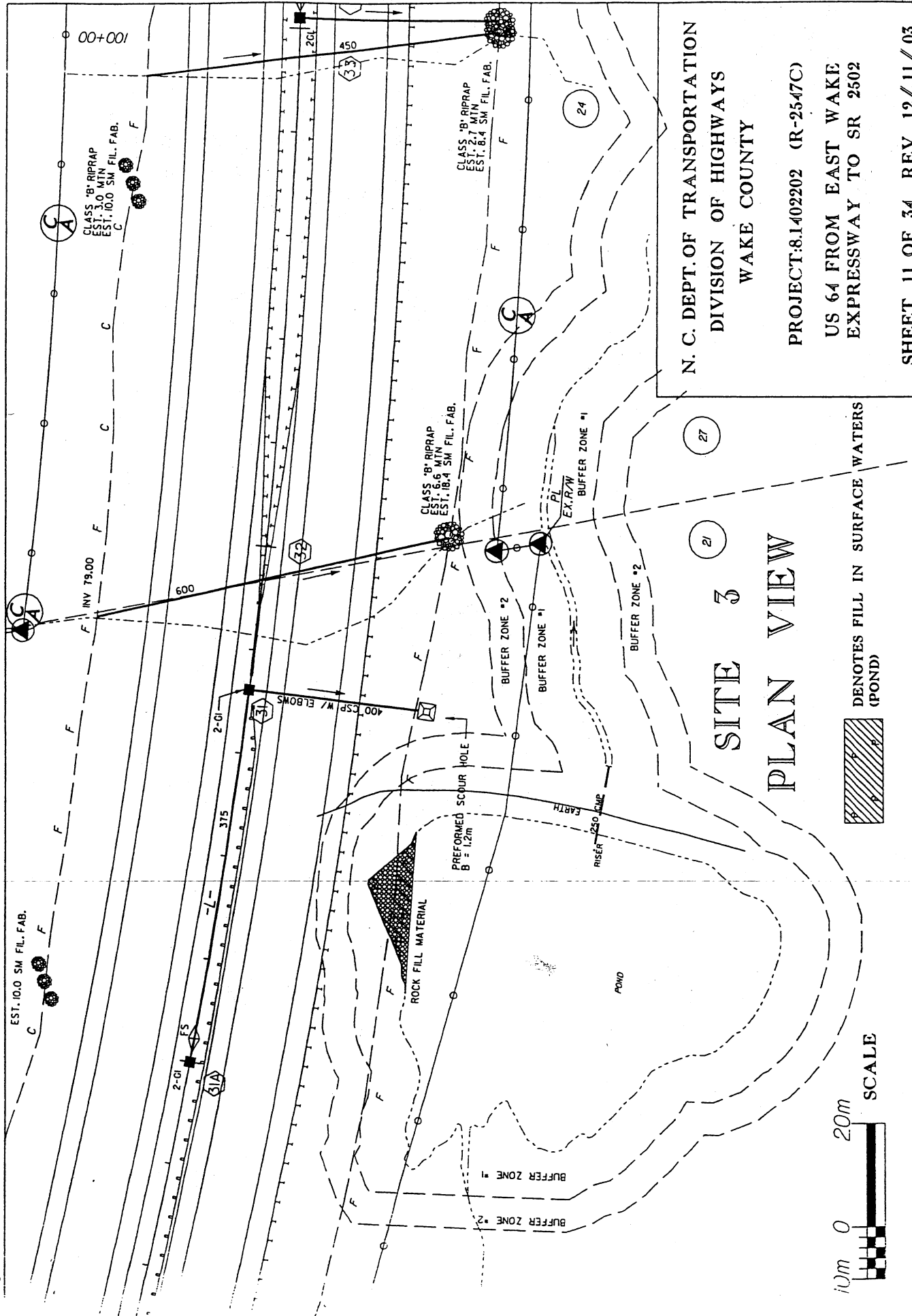


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE EXPRESSWAY TO SR 2502
 SHEET 9 OF 34 REV 12/11/03

SITE 1
 PLAN VIEW

DIENOTES FILL IN SURFACE WATERS (1"=0ND)

10m 0 20m SCALE



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

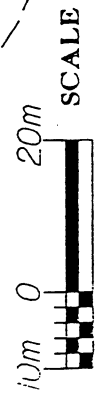
PROJECT: 8.1402202 (R-2547C)

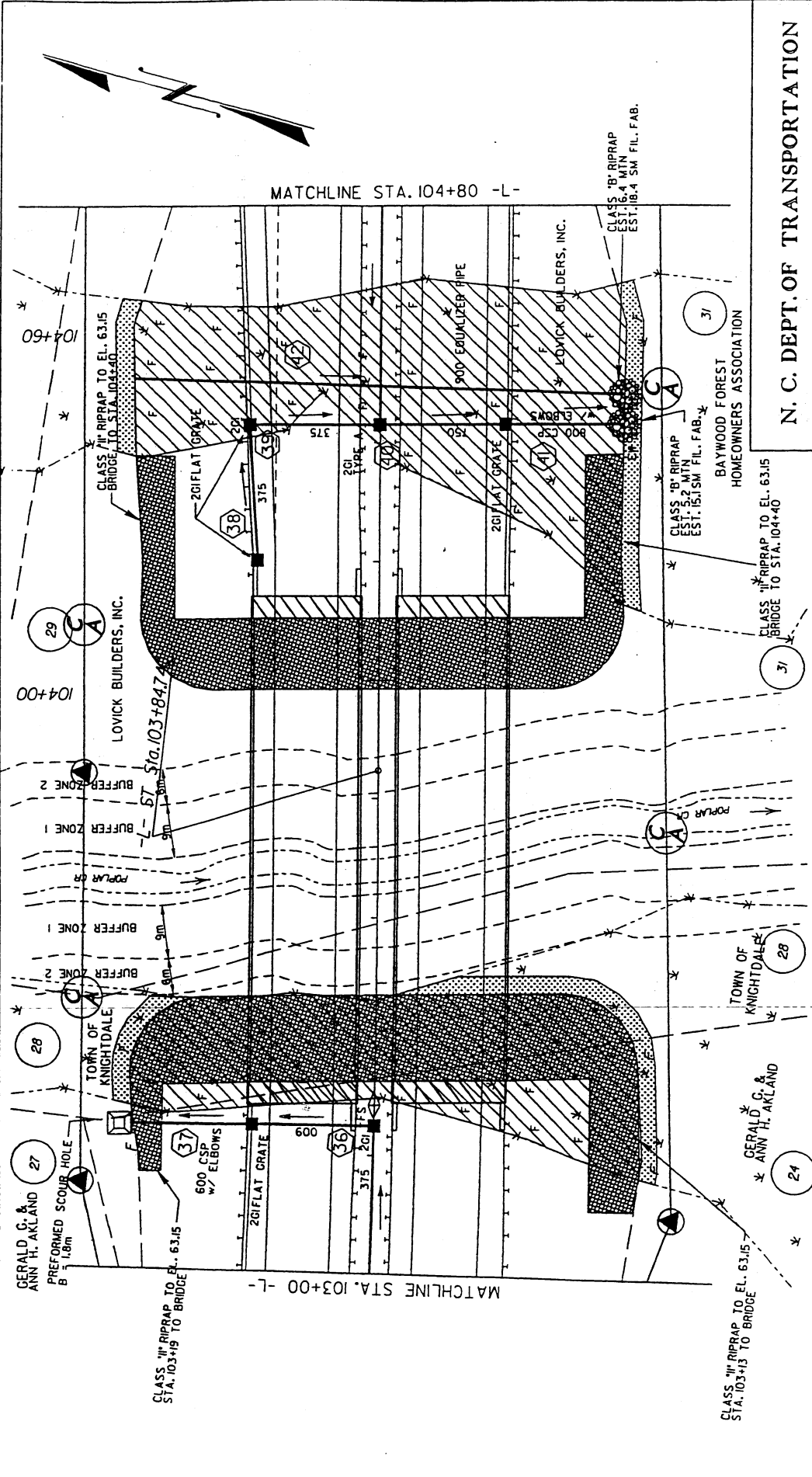
US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 11 OF 34 REV 12/11/03

SITE 3
 PLAN VIEW

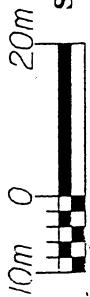
■ DENOTES FILL IN SURFACE WATERS (POND)





PLAN VIEW

SITE 4



DENOTES TEMP. MECHANIZED CLEARING

DENOTES FILL IN WETLANDS

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

PROJECT: 8.1402202 (R-2547C)

US 64 FROM EAST WAKE EXPRESSWAY TO SR 2502

SHEET 12 OF 34 REV 12/11/03

MATCHLINE STA. 104+80 -L-

MATCHLINE STA. 103+00 -L-

CLASS #1 RIPRAP TO EL. 63.15
STA. 103+19 TO BRIDGE

CLASS #1 RIPRAP TO EL. 63.15
STA. 103+15 TO BRIDGE

CLASS #1 RIPRAP TO EL. 63.15
BRIDGE TO STA. 103+40

CLASS #1 RIPRAP TO EL. 63.15
BRIDGE TO STA. 104+40

CLASS #2 RIPRAP
EST. 16.4 MTN
EST. 18.4 SM FIL. FAB.

CLASS #2 RIPRAP
EST. 5.2 MTN
EST. 15.1 SM FIL. FAB.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

BAYWOOD FOREST
HOMEOWNERS ASSOCIATION

TOWN OF
KNIGHTDALE

GERALD C. &
ANN H. AKLAND

GERALD C. &
ANN H. AKLAND
PERFORMED SCOUR HOLE
B = 1.8m

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

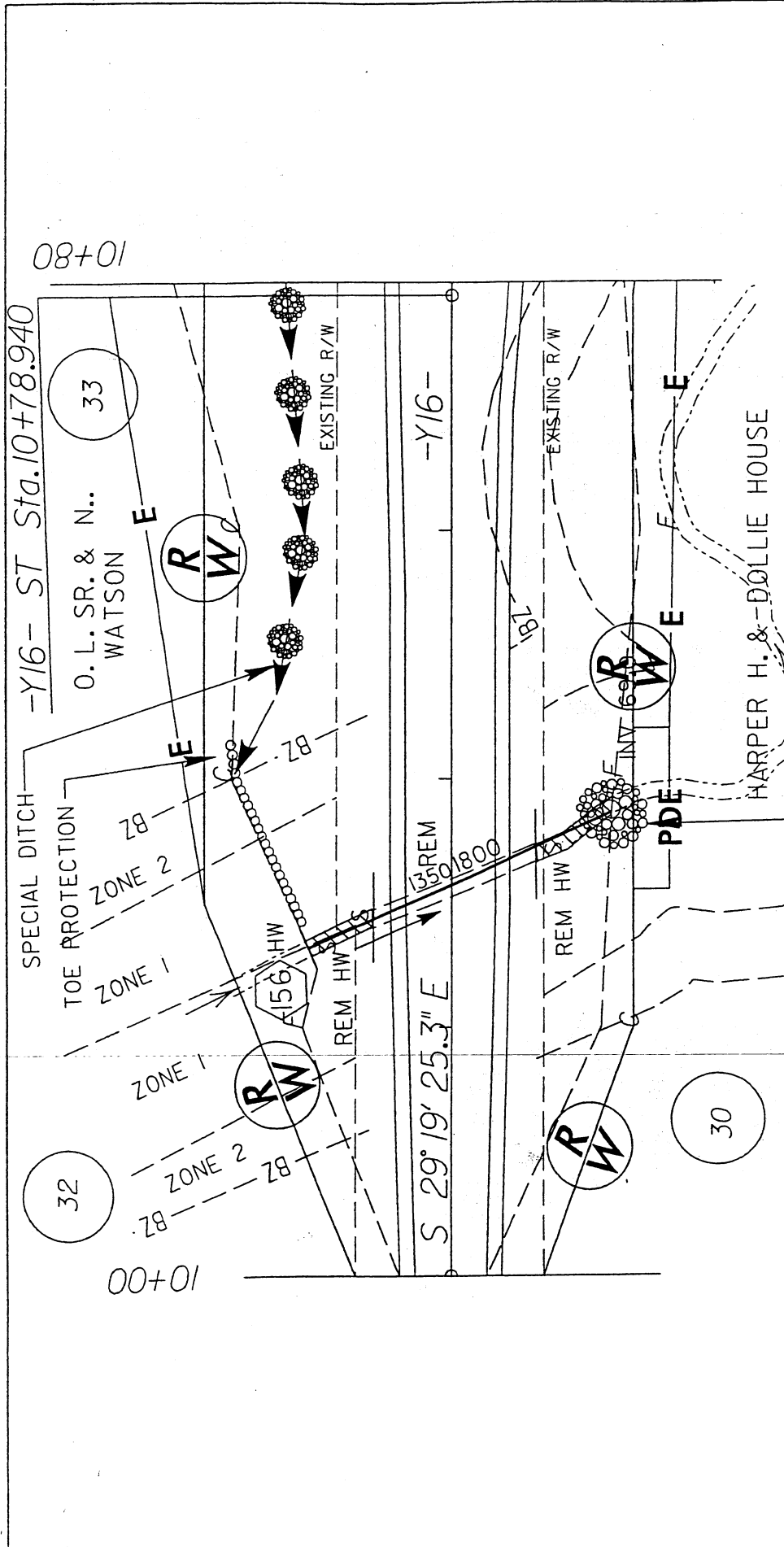
LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.

LOVICK BUILDERS, INC.



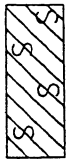
N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502
 SHEET 14 OF 34 REV 12/11/03

PLAN VIEW
 SITE 5



SCALE

CLASS "I" RIPRAP
 EST. 51.7 MTN
 EST. 87.0 SM FIL. FAB.



DENOTES FILL IN SURFACE WATERS

00+60

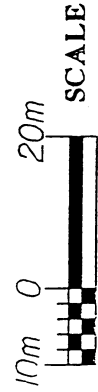
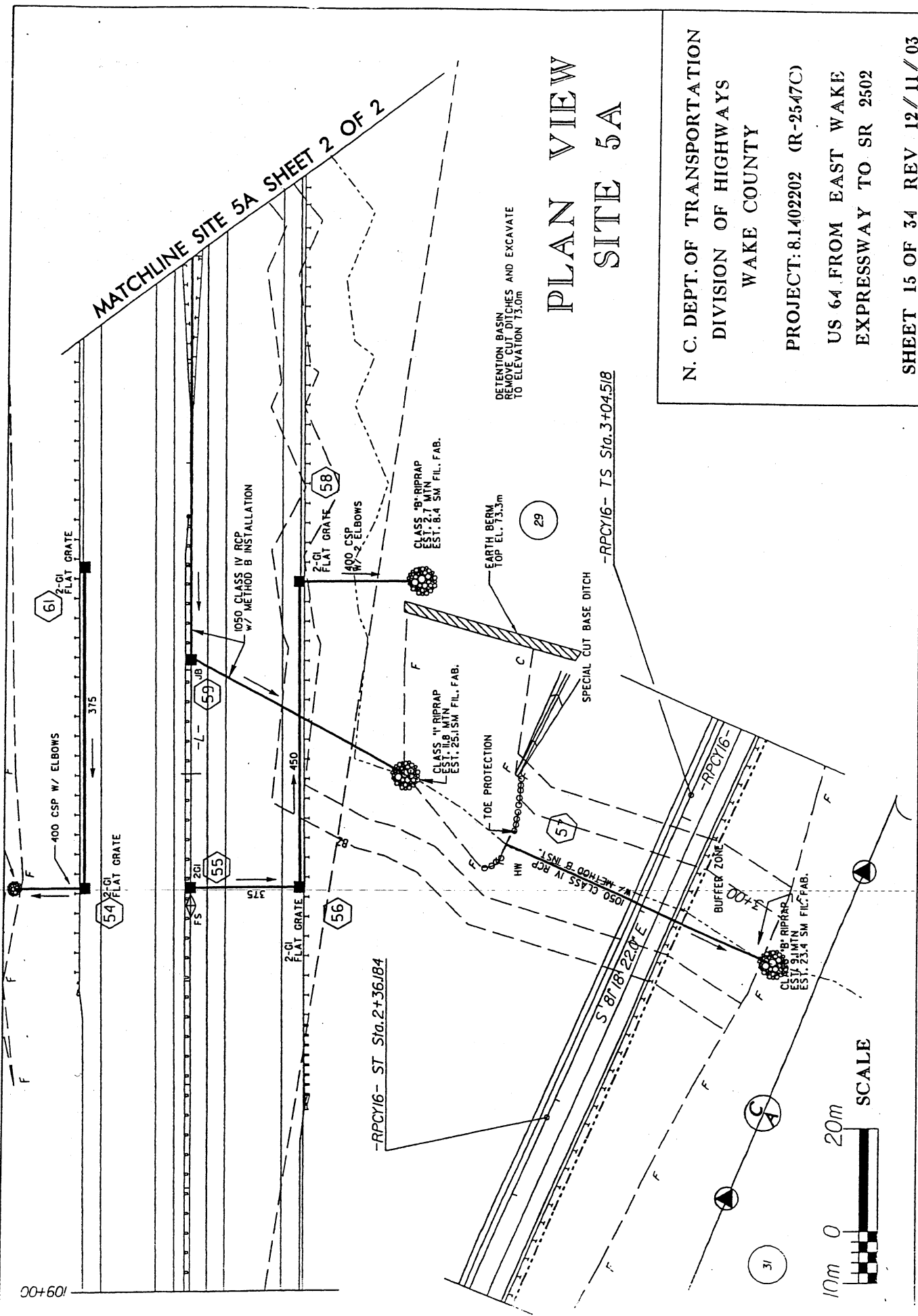
MATCHLINE SITE 5A SHEET 2 OF 2

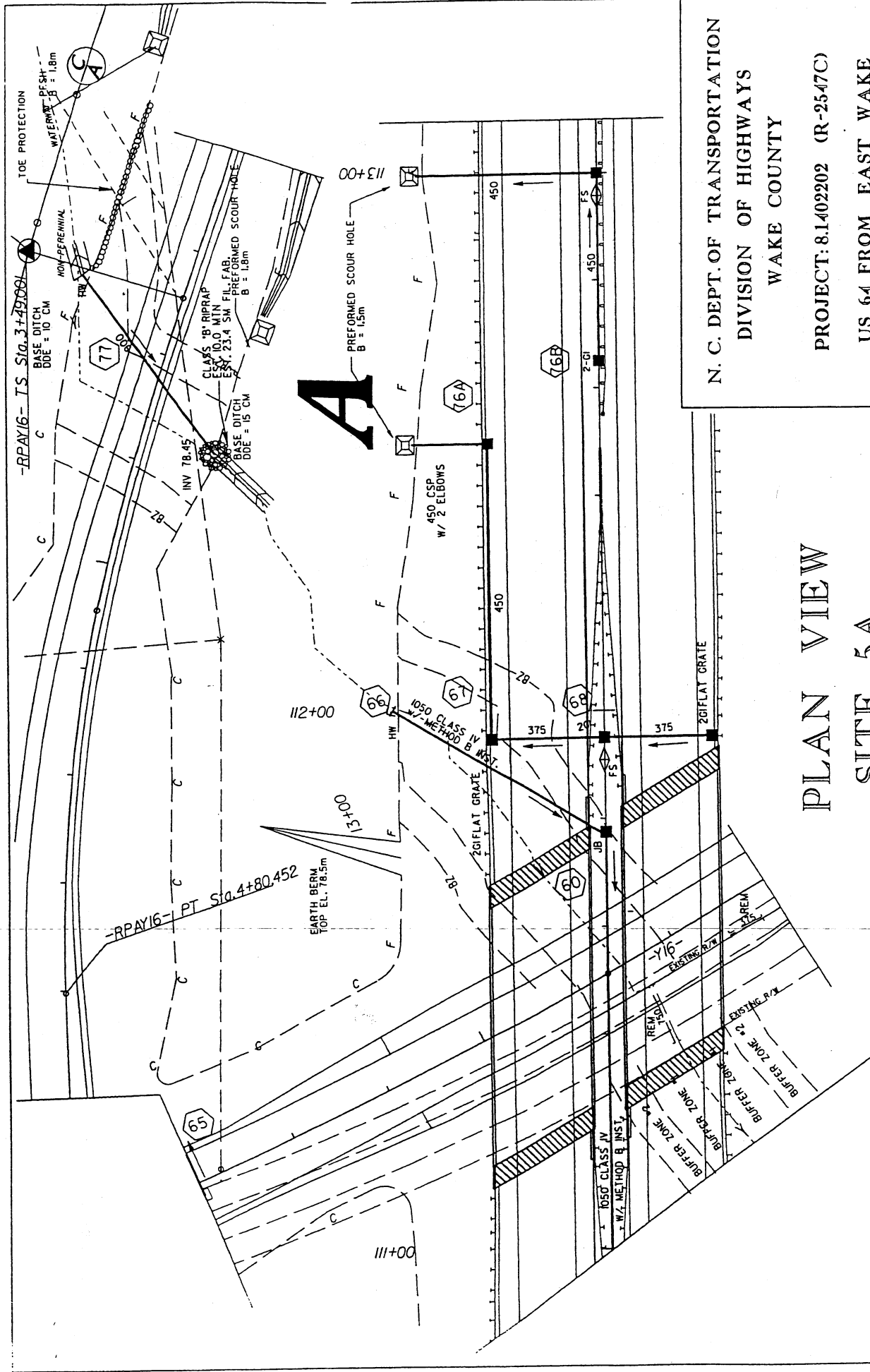
PLAN VIEW SITE 5A

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

PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 15 OF 34 REV 12/11/03

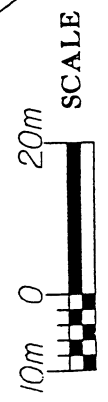




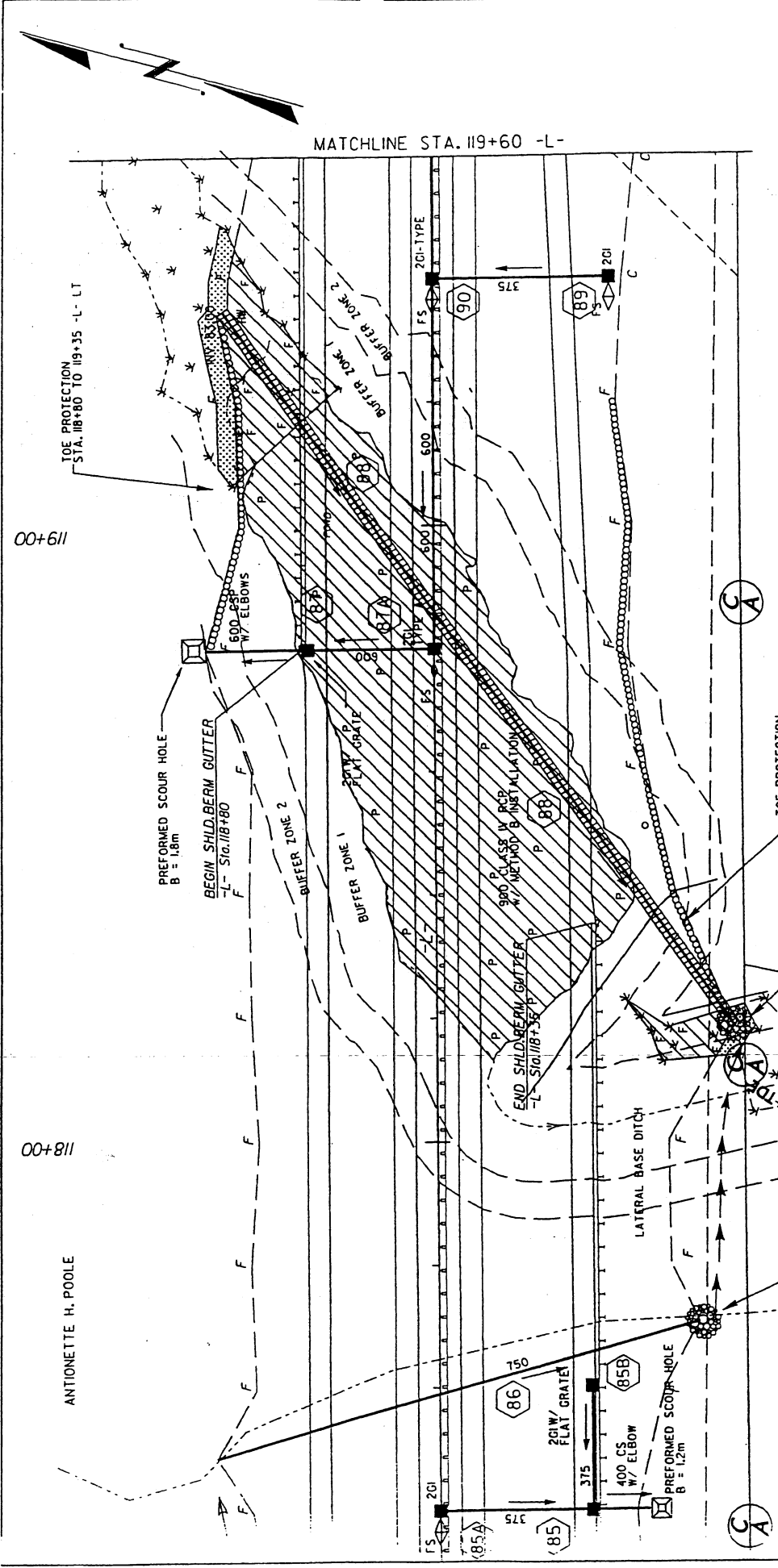
PLAN VIEW

SITE 5A

SHEET 2 OF 2



N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502
 SHEET 16 OF 34 REV 12/11/03



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

PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

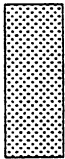
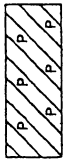

SHEET 18 OF 34 REV 12/11/03

119+00

118+00

ANTIONETTE H. POOLE

37

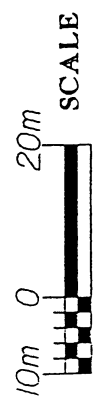
-  DENOTES TEMP. MECHANIZED CLEARING
-  DENOTES FILL IN SURFACE WATERS (POND)
-  DENOTES FILL IN WETLANDS

TOE PROTECTION
 STA. 118+18 TO 119+20 -L- RT
 CLASS 'B' RIPRAP
 EST. 10.0 MTN
 EST. 23.4 SM FIL. FAB.

TOE PROTECTION
 STA. 118+80 TO 119+35 -L- LT

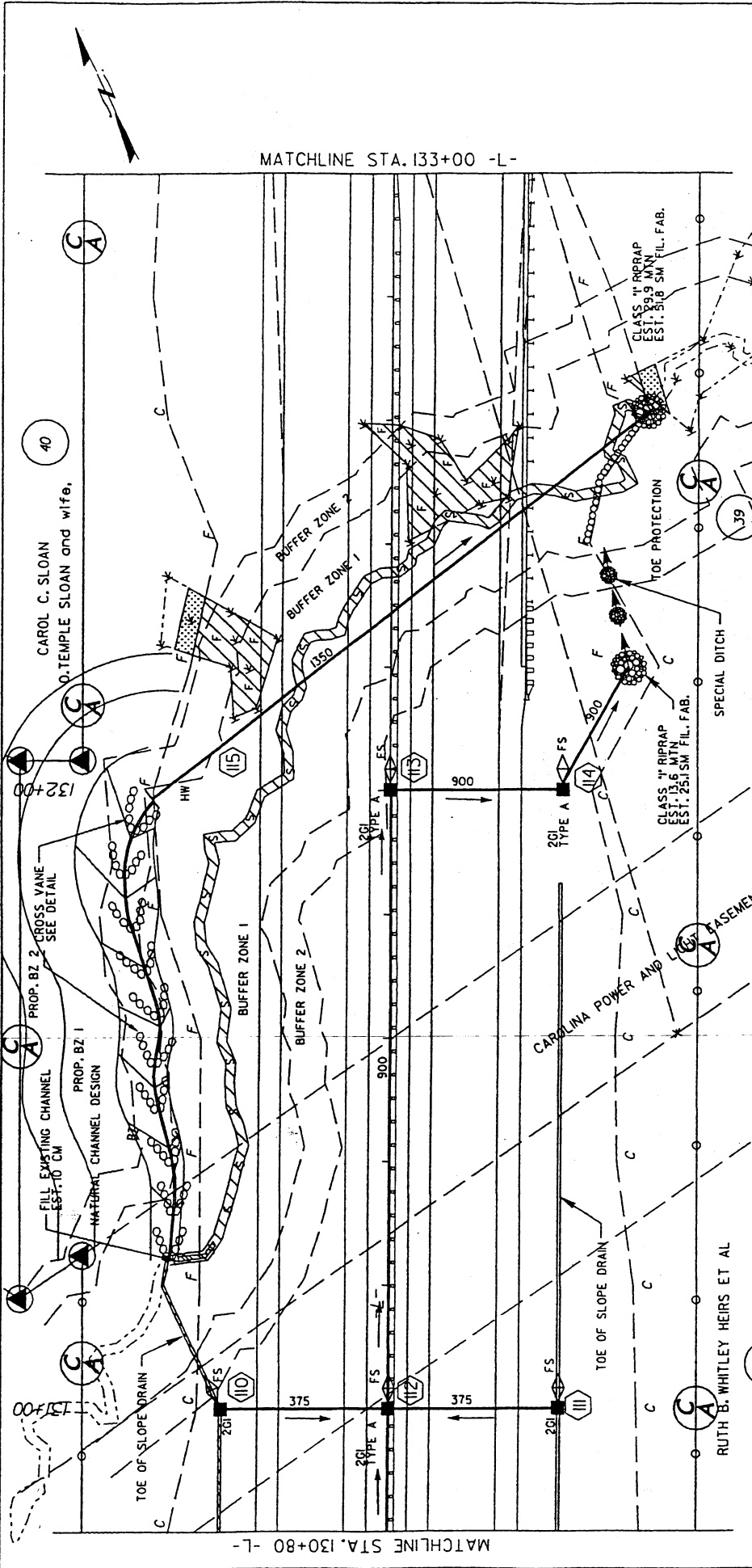
CLASS 'B' RIPRAP
 EST. 7.3 MTN
 EST. 17.5 SM FIL. FAB.
 DWIGHT A. WHITLEY

PLAN VIEW SITE 6



MATCHLINE STA. 133+00 -L-

MATCHLINE STA. 130+80 -L-

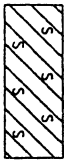

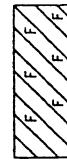


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502
 SHEET 19 OF 34 REV 1/30/04

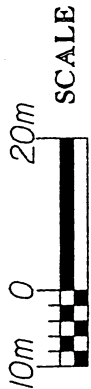
O. TEMPLE SLOAN, JR. and
 wife, CAROL C. SLOAN

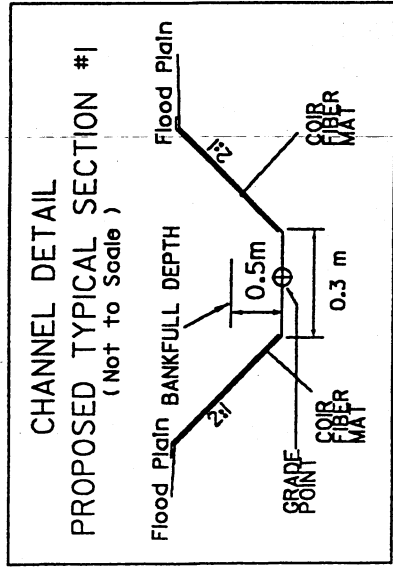
RUTH B. WHITLEY HEIRS ET AL

CAROLINA POWER AND
 LIGHT

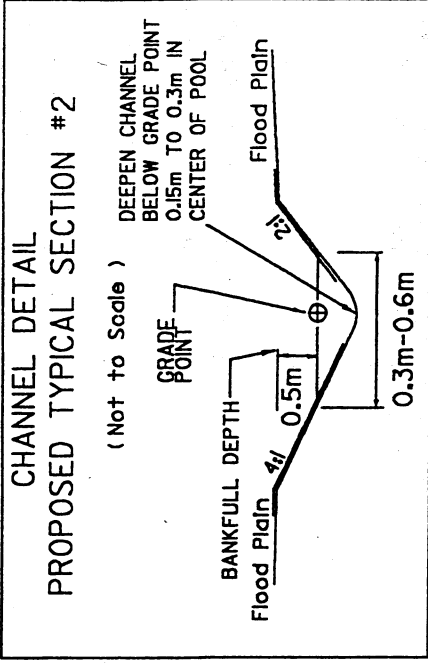
- 
 DENOTES TEMP.
 MECHANIZED CLEARING
- 
 DENOTES TEMP.
 MECHANIZED CLEARING
- 
 DENOTES FILL IN WETLANDS

PLAN VIEW SITE 7

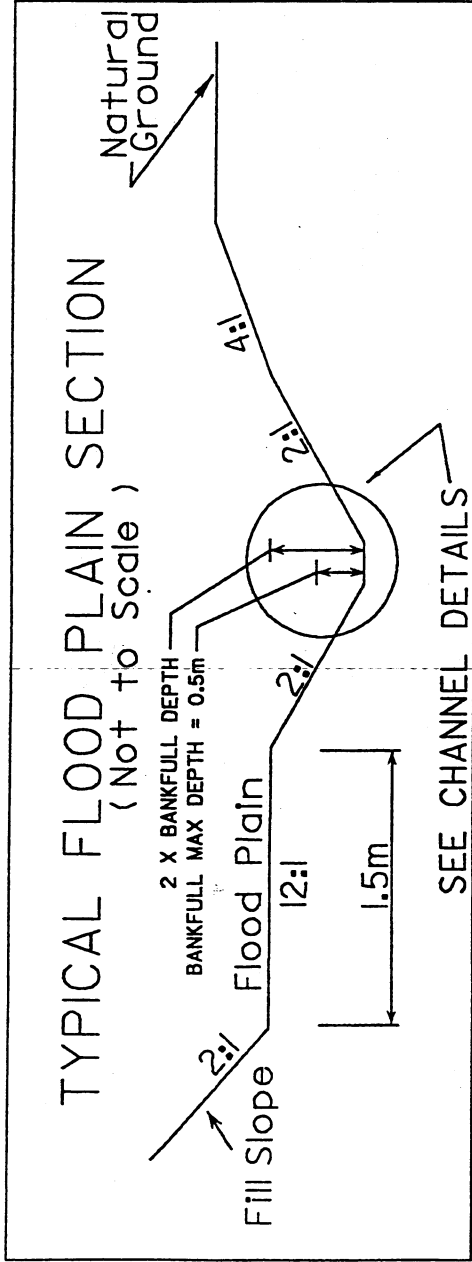




TYPICAL RUN SECTION



TYPICAL POOL SECTION



NATURAL CHANNEL DESIGN TYPICALS
STATION 131+60 -L- LT.

SITE 7

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

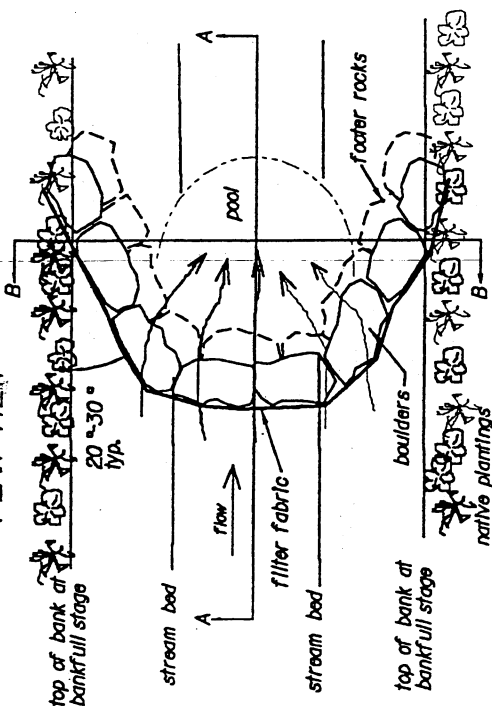
PROJECT: 8.1402202 (R-2547C)

US 64 FROM EAST WAKE
EXPRESSWAY TO SR 2502

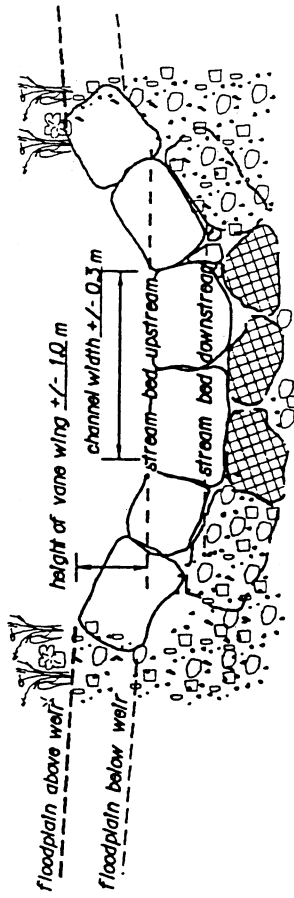
SHEET 20 OF 34 REVISED 1/30/04

CROSS VANE ROCK WEIR DETAIL

PLAN VIEW

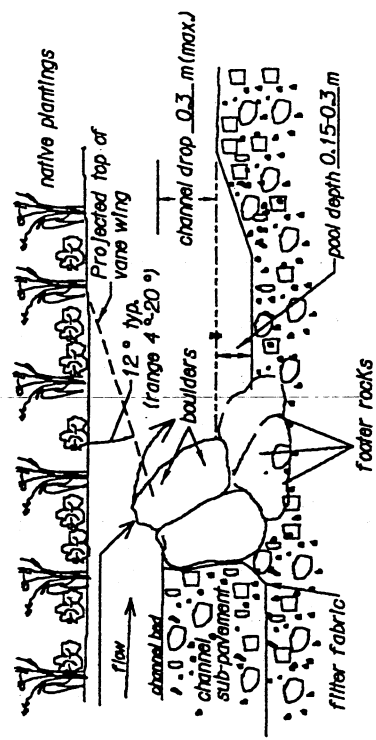


SECTION B-B



Notes: Boulders should be native stone or shot rock, angular and oblong; minimum size: 0.6 m x 0.6 m.

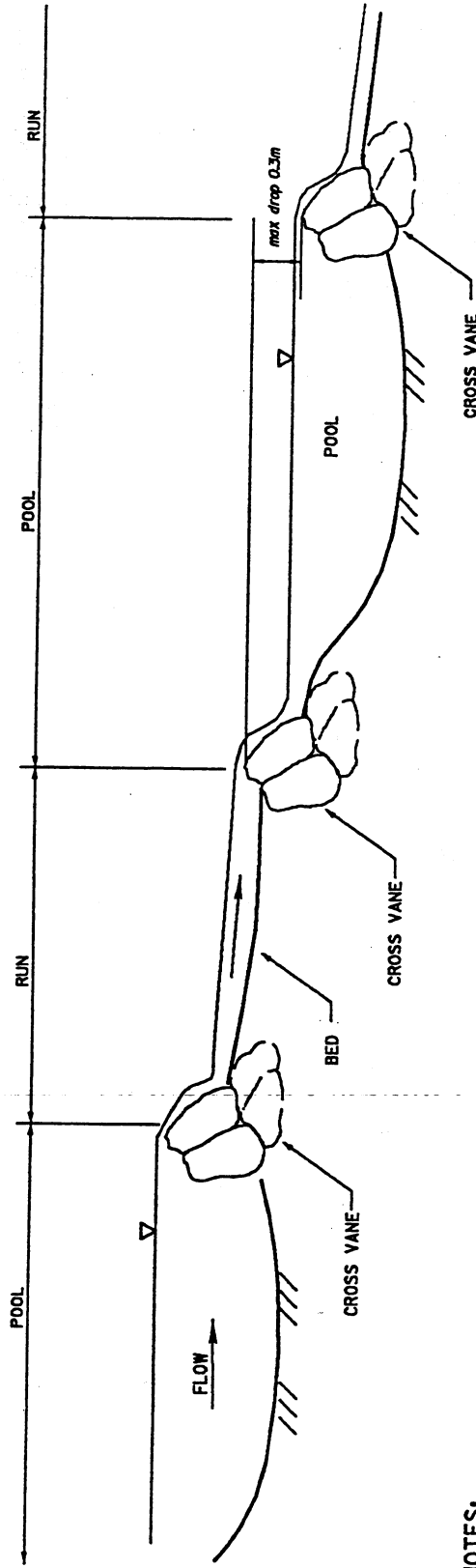
SECTION A-A



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

N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

**TYPICAL STEP - POOL PROFILE
(NOT TO SCALE)**



NOTES:

1. POOL AND RUN LENGTHS ARE DEPENDENT ON A MAXIMUM DROP OF 0.3m AT CROSS VANES.
2. CHANNEL BED TO PLACED ON BEDROCK TO THE EXTENT POSSIBLE.

**N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY**

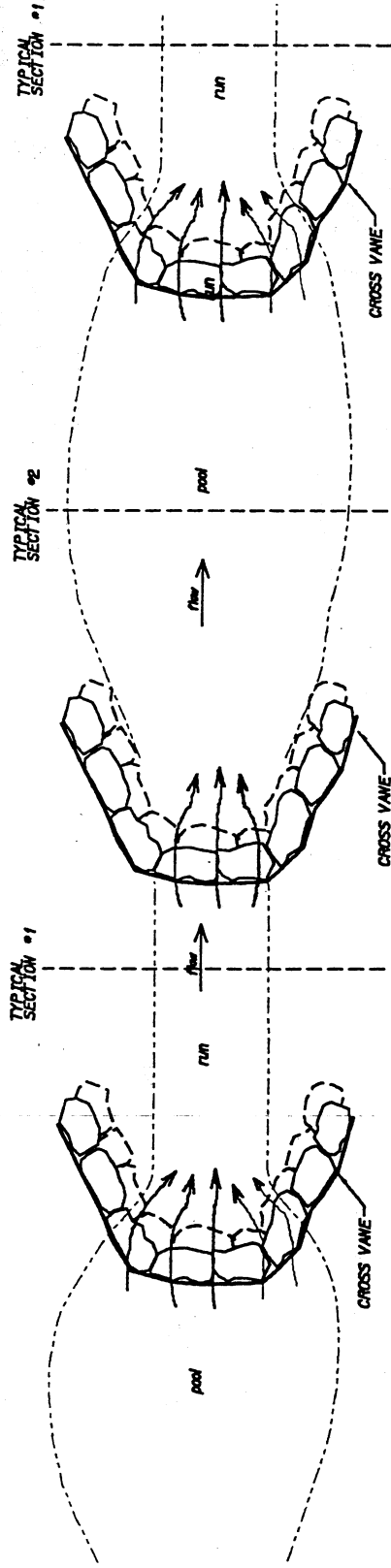
**PROJECT: 8.1402202 (R-2547C)
US 64 FROM EAST WAKE
EXPRESSWAY TO SR 2502**

SHEET 20 B OF 34 REVISED 1/30/04

**NATURAL CHANNEL DESIGN TYPICALS
STATION 131+60 -L- LT.**

SITE 7

TYPICAL STEP - POOL
PLAN VIEW



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

PROJECT: 8.1402202 (R-2547C)
US 64 FROM EAST WAKE
EXPRESSWAY TO SR 2502

SHEET 20 OF 34 REVISED 1/30/04

NATURAL CHANNEL DESIGN TYPICALS
STATION 131+60 - L - LT.

SITE 7

Morphological Measurement Table for R-2547C

Stream @ 131+60 -L- Lt.

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach (NCSRI Reg. Curves)
1. Stream type(Rosgen Classification)	B5a	A5/B5a Step-Pool	na	B
2. Drainage area (HA)	31.6	31.6	na	31.6
3. Bankfull width (m)	2.3	2.3	na	2.2
4. Bankfull mean depth (m)	0.36	0.32	na	0.28
5. Width/depth ratio	6.4	7.5	na	7.9
6. Bankfull cross-sectional area (m ³)	0.42	0.65	na	0.26-1.30
7. Bankfull mean velocity (m/s)	1.41	1.37	na	0.81-1.70
8. Bankfull discharge, cms	0.57	0.57	na	0.21-2.2
9. Bankfull max depth (riffle)	0.5	0.5	na	0.48
10. Width of floodprone area (m)	4.2	4.3	na	na
11. Entrenchment ratio	1.8	1.8	na	na
12. Meander length (m)	11	10	na	14
13. Ratio of meander length to bankfull width	4.8	4.2	na	6.3
14. Radius of curvature (m)	7	12	na	5
15. Ratio of radius of curvature to bankfull width	3	5	na	2.3
16. Belt width (m)	1	1	na	1.5
17. Meander width ratio	0.43	0.43	na	0.68
18. Sinuosity (stream length/valley length)	1.07	1.0-1.08	na	na
19. Valley slope (m/m)	0.025-0.04	0.025-0.040	na	na
20. Average slope valley slope/sinuosity	0.023-0.04	0.023-0.04	na	na
21. Pool slope (m/m)	0.005	0.005	na	na
22. Ratio of pool slope to average slope	0.2	0.2	na	na
23. Maximum pool depth (m)	0.66	0.6 or bedrock	na	0.57
24. Ratio of pool depth to average bankfull depth	1.83	1.88	na	2.03
25. Pool width(m)	0.1-1.3	0.3-0.6	na	na
26. Ratio of pool width to bankfull width	0.04-0.13	0.13-0.26	na	na
27. Pool to pool spacing (m)	1.1-4.5	1.0-3.0	na	6.5
28. Ratio of pool to pool spacing to bankfull width	0.48-1.96	0.43-1.3	na	2.95

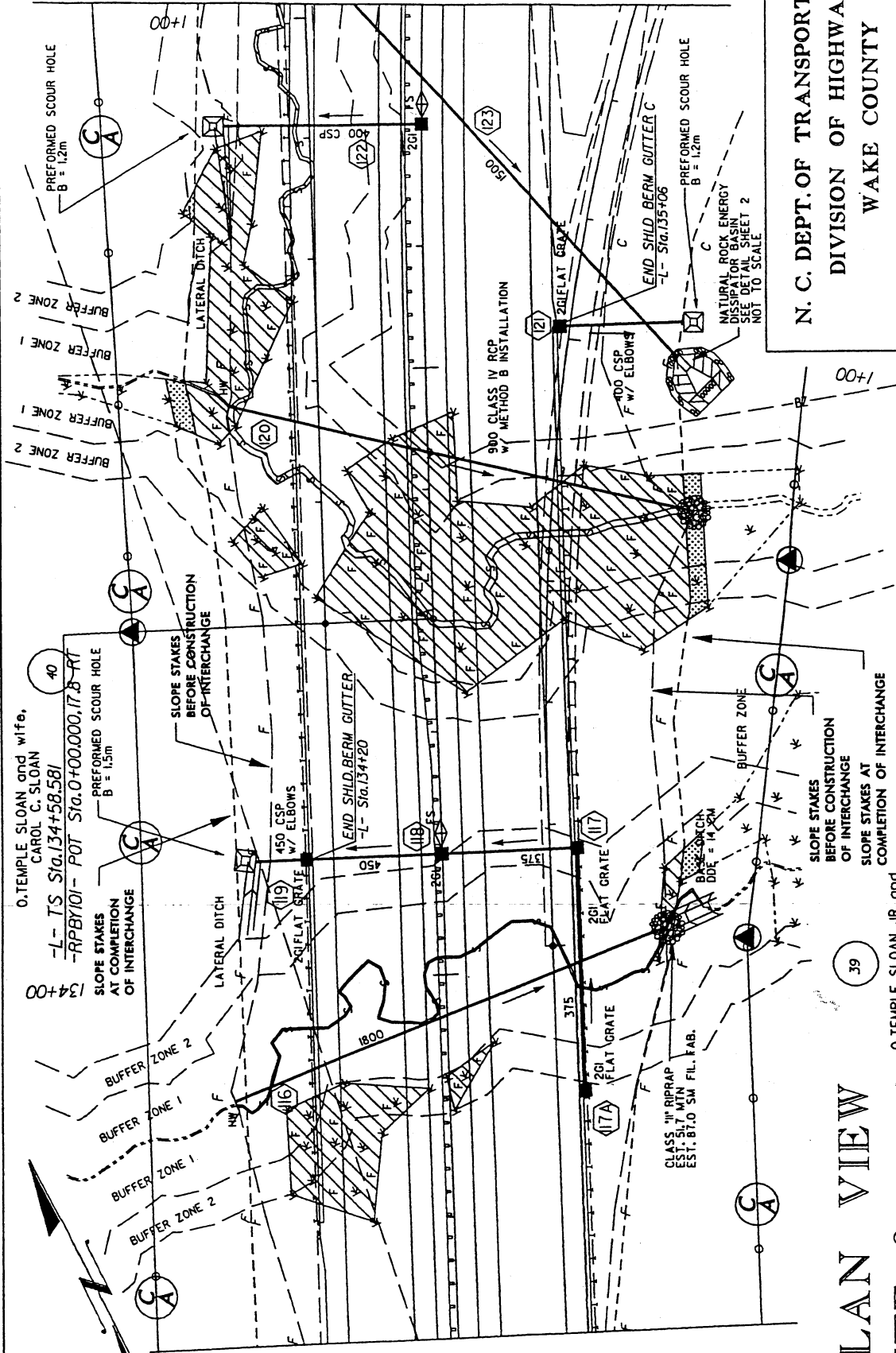
SHEET 21 OF 34
REV 1/30/04

MATCHLINE SITE 8 SHEET 2 OF 2

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



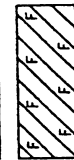
PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 22 OF 34 REV 1/30/04



PLAN VIEW
 SITE 8
 SHEET 1 OF 2



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

O. TEMPLE SLOAN, JR. and wife, CAROL C. SLOAN

O. TEMPLE SLOAN and wife, CAROL C. SLOAN
 -L- TS Sta. 134+58.581
 -R- PBY101- POT Sta. 0+00.000, 17.8 RT

SLOPE STAKES AT COMPLETION OF INTERCHANGE
 PREFORMED SCOUR HOLE
 B = 1.5m

SLOPE STAKES BEFORE CONSTRUCTION OF INTERCHANGE

END SHLD. BERM GUTTER
 -L- Sta. 134+20

CLASS III RIPRAP
 EST. 5.7 MTN
 EST. 87.0 SM FIL. FAB.

END SHLD. BERM GUTTER C
 -L- Sta. 135+06
 PREFORMED SCOUR HOLE
 B = 1.2m

NATURAL ROCK ENERGY DISSIPATOR BASIN
 SEE DETAIL SHEET 2
 NOT TO SCALE

SLOPE STAKES BEFORE CONSTRUCTION OF INTERCHANGE
 SLOPE STAKES AT COMPLETION OF INTERCHANGE

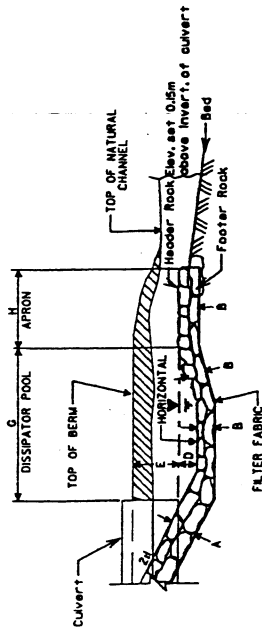
DENOTES TEMP. MECHANIZED CLEARING

DENOTES FILL IN SURFACE WATERS

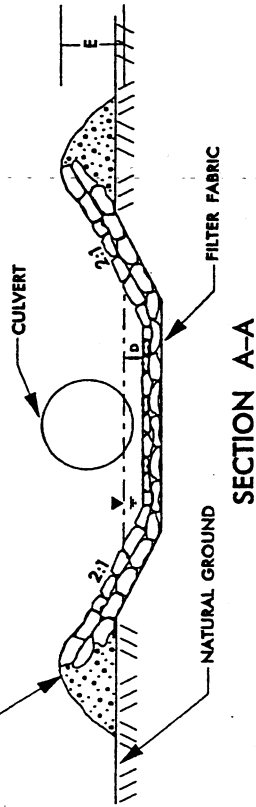
DENOTES FILL IN WETLANDS

DISSIPATOR BASIN

SECTION



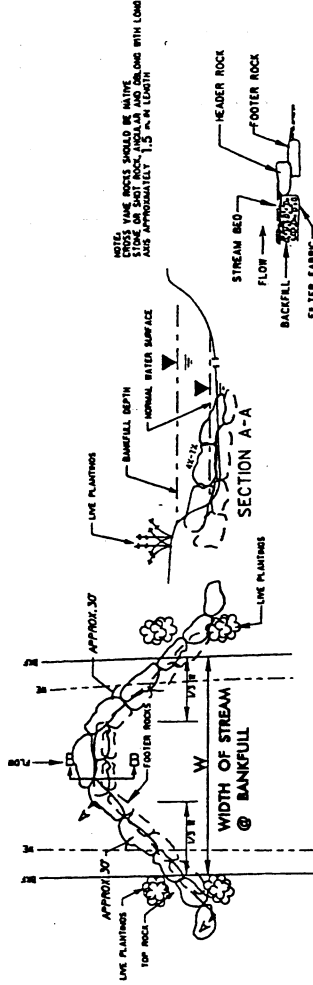
NOTE: DISSIPATOR ROCKS SHOULD BE NATIVE STONE OR SOFT ROCK, UNDERLAIN AND COVERED WITH AN APPROXIMATE 200 G.S.M. OF 0.25M.



SECTION A-A

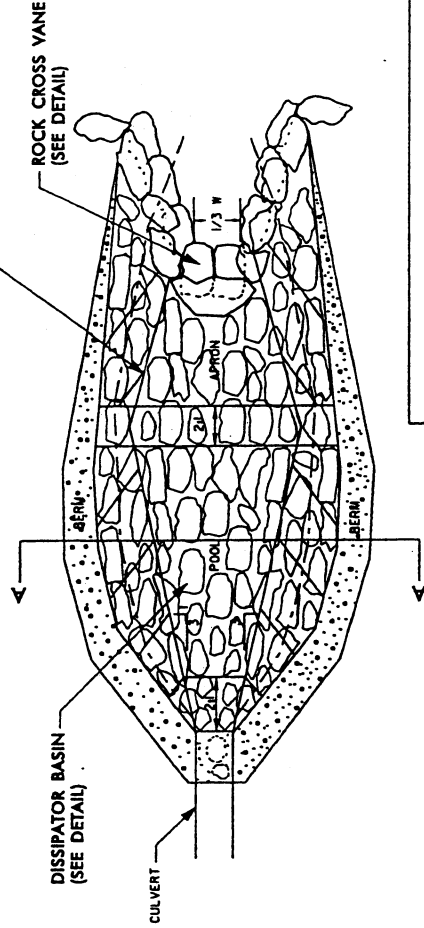
ROCK CROSS VANE

NOT TO SCALE



PLAN VIEW

NOT TO SCALE



Dim.	1	2	3	4	5	6	7	8
A	1.0							
B	1.0							
C								
D	1.0							
E	1.0							
F	10.0							
G	10.0							
H	3.0							

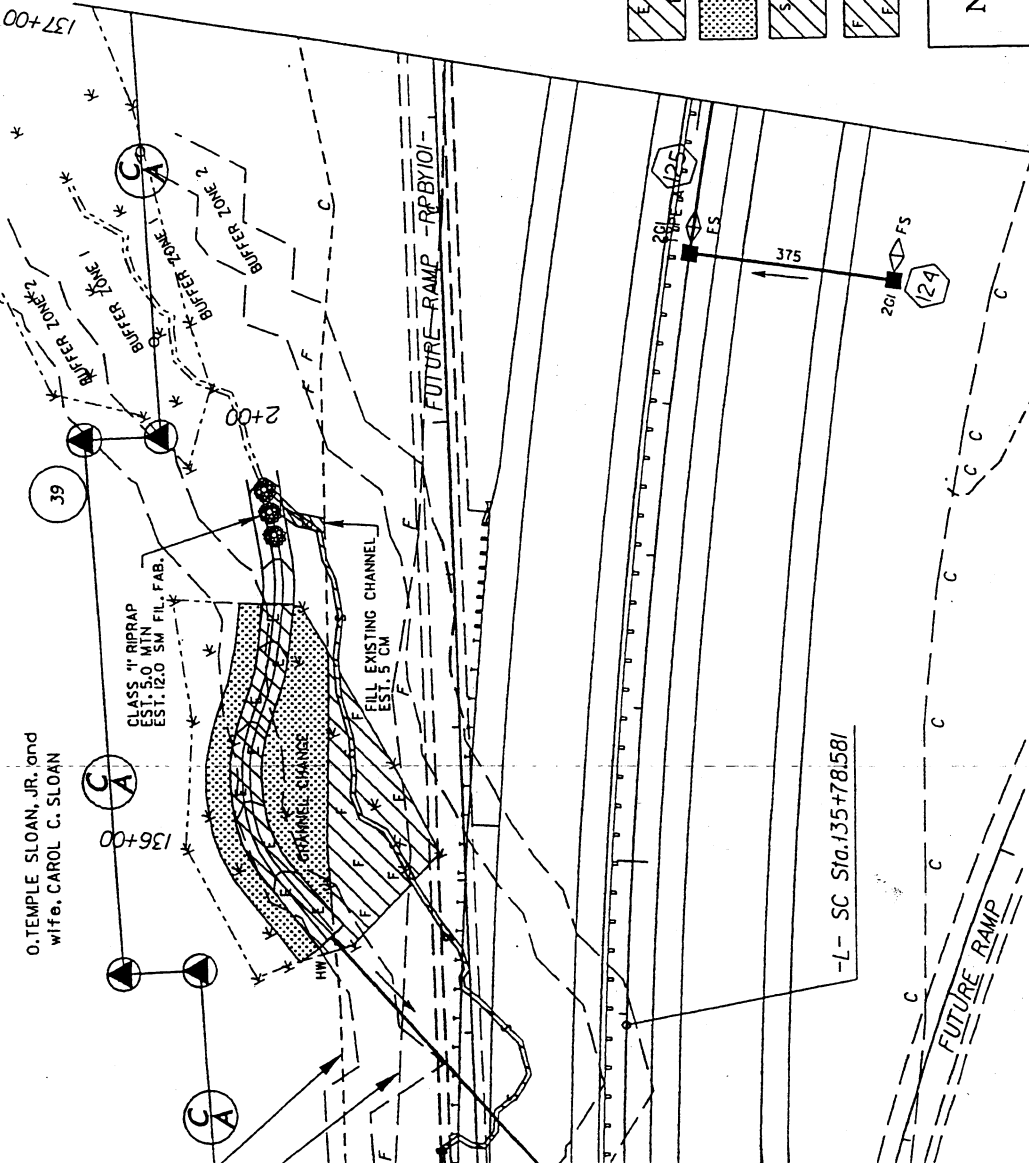
Basin #	Location (at Outlet)
1	35+50 RT.
2	
3	
4	
5	
6	
7	
8	

ALL DIMENSIONS APPROXIMATE IN IN.

N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

DETAIL OF NATURAL ROCK ENERGY DISSIPATOR BASIN
 (NOT TO SCALE)


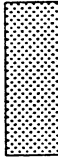
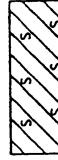
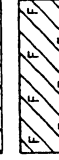
O. TEMPLE SLOAN, JR. and wife, CAROL C. SLOAN



SLOPE STAKES AT COMPLETION OF INTERCHANGE

SLOPE STAKES BEFORE CONSTRUCTION OF INTERCHANGE

MATCHLINE SITE 8 SHEET 1 OF 2

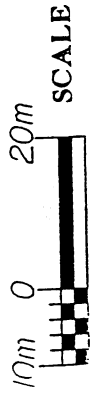
-  DENOTES EXCAVATION IN WETLANDS
-  DENOTES TEMP. MECHANIZED CLEARING
-  DENOTES FILL IN SURFACE WATERS
-  DENOTES FILL IN WETLANDS

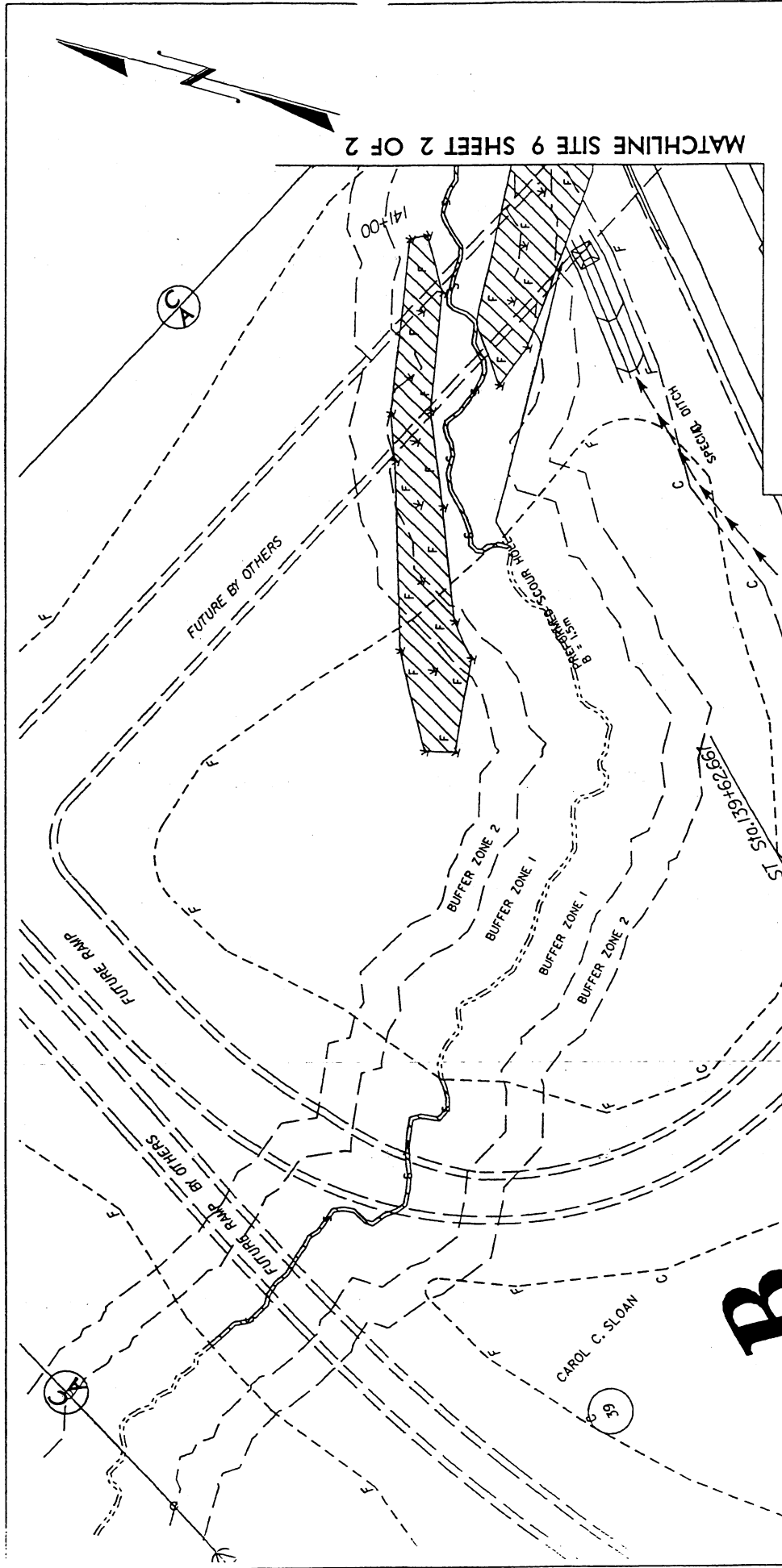
N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY

PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE EXPRESSWAY TO SR 2502

SHEET 23 OF 34 REV 12/11/03

PLAN VIEW
 SITE 8
 SHEET 2 OF 2





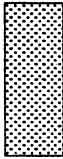
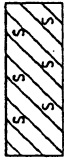

MATCHLINE SITE 9 SHEET 2 OF 2

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

PROJECT: 8.1402202 (R-2547C)

US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 26 OF 34 REV 12/11/03

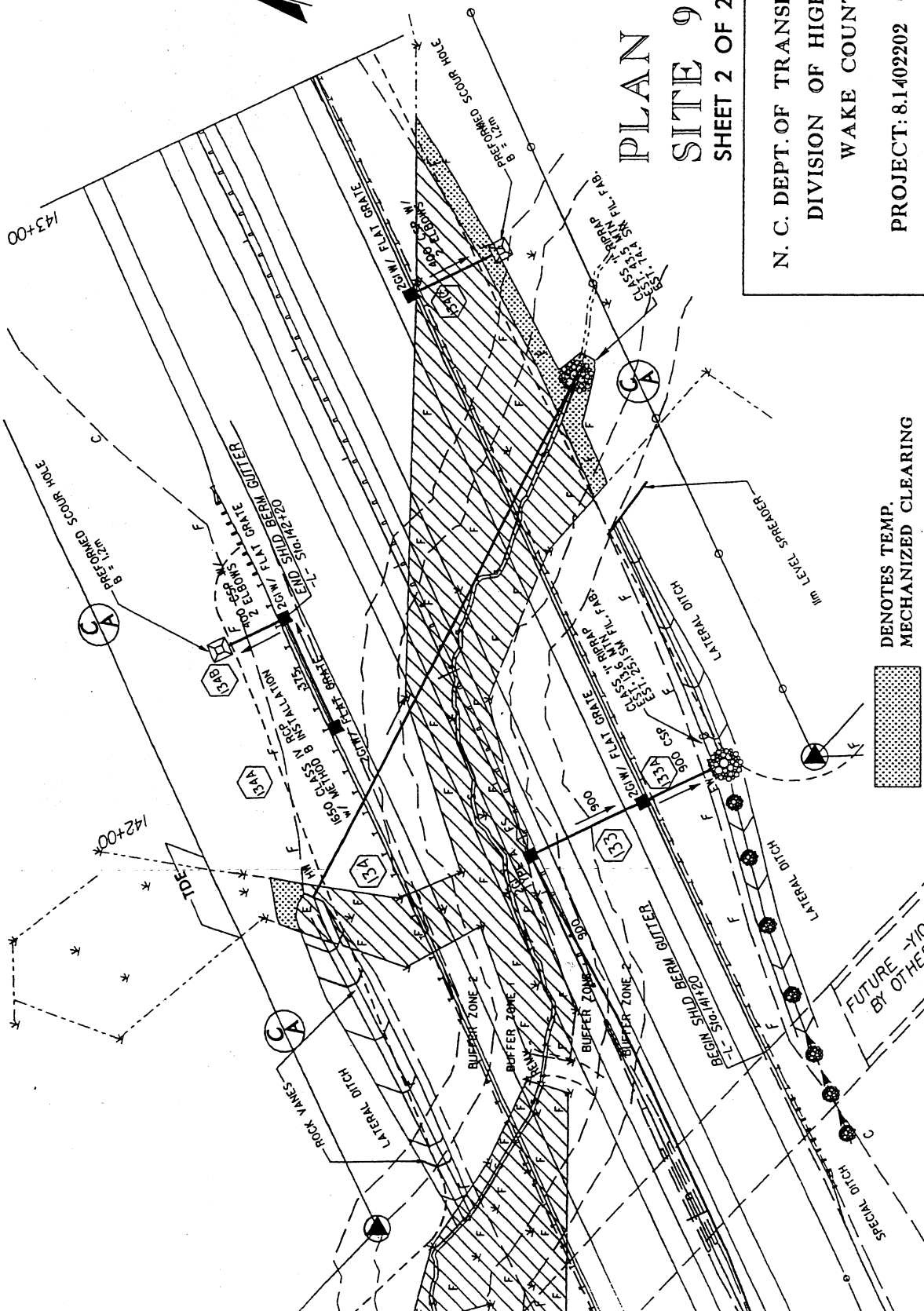
-  DENOTES TEMP. MECHANIZED CLEARING
-  DENOTES FILL IN SURFACE WATERS
-  DENOTES FILL IN WETLANDS

PLAN VIEW
 SITE 9
 SHEET 1 OF 2

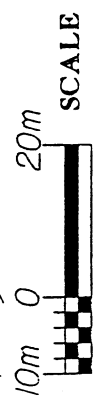


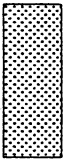
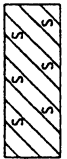

SCALE

B



MATCHLINE SITE 9 SHEET 1 OF 2



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

PLAN VIEW

SITE 9

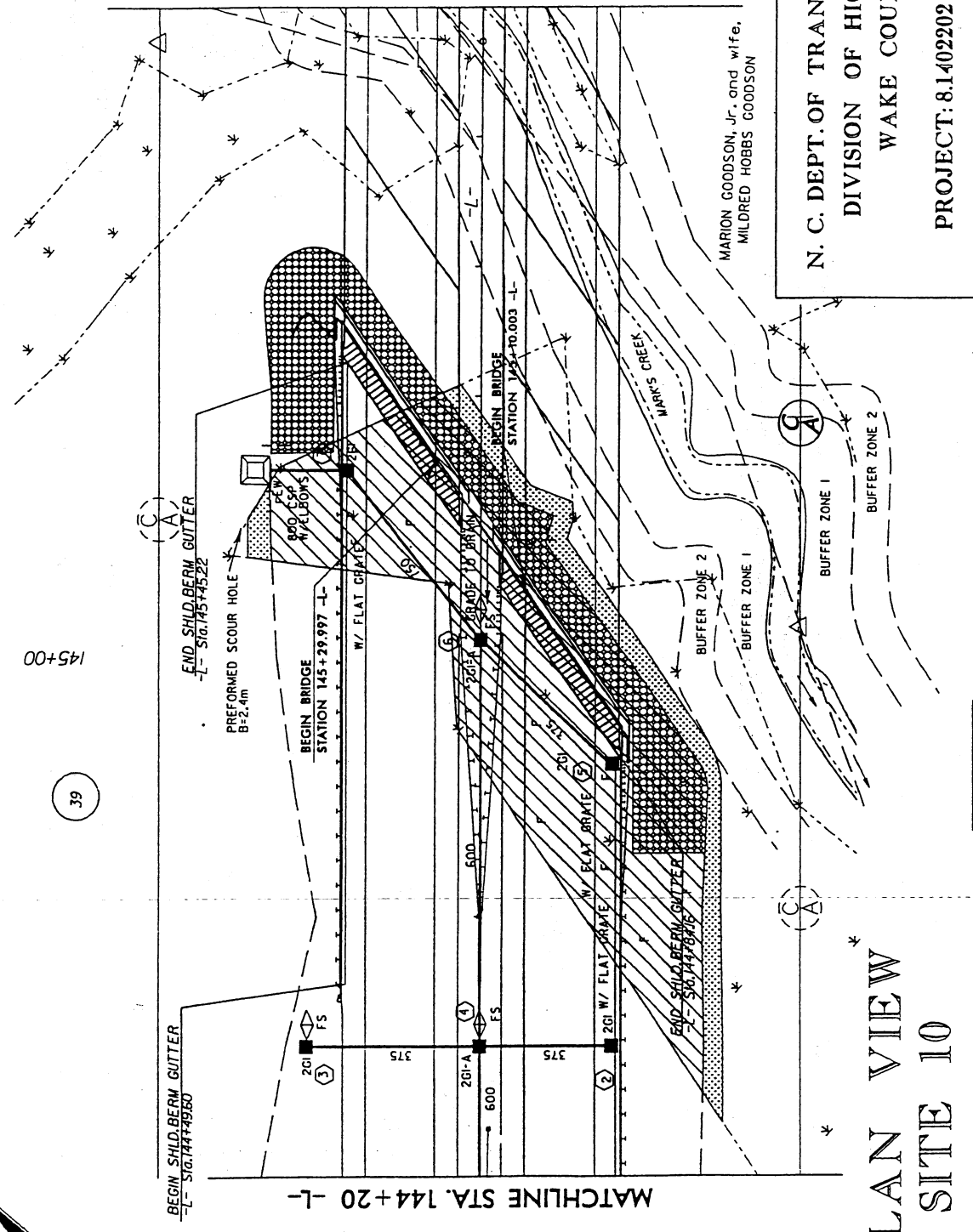
SHEET 2 OF 2

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

PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 27 OF 34 REV 12/11/03

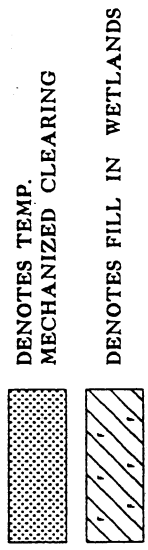
MATCHLINE STA. 146+00 -L-
SITE 10 SHEET 2 OF 2



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

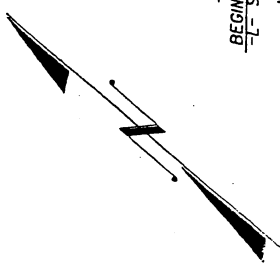
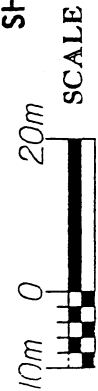
PROJECT: 8.1402202 (R-2547C)
US 64 FROM EAST WAKE
EXPRESSWAY TO SR 2502

SHEET 29 OF 34 REV 12/11/03

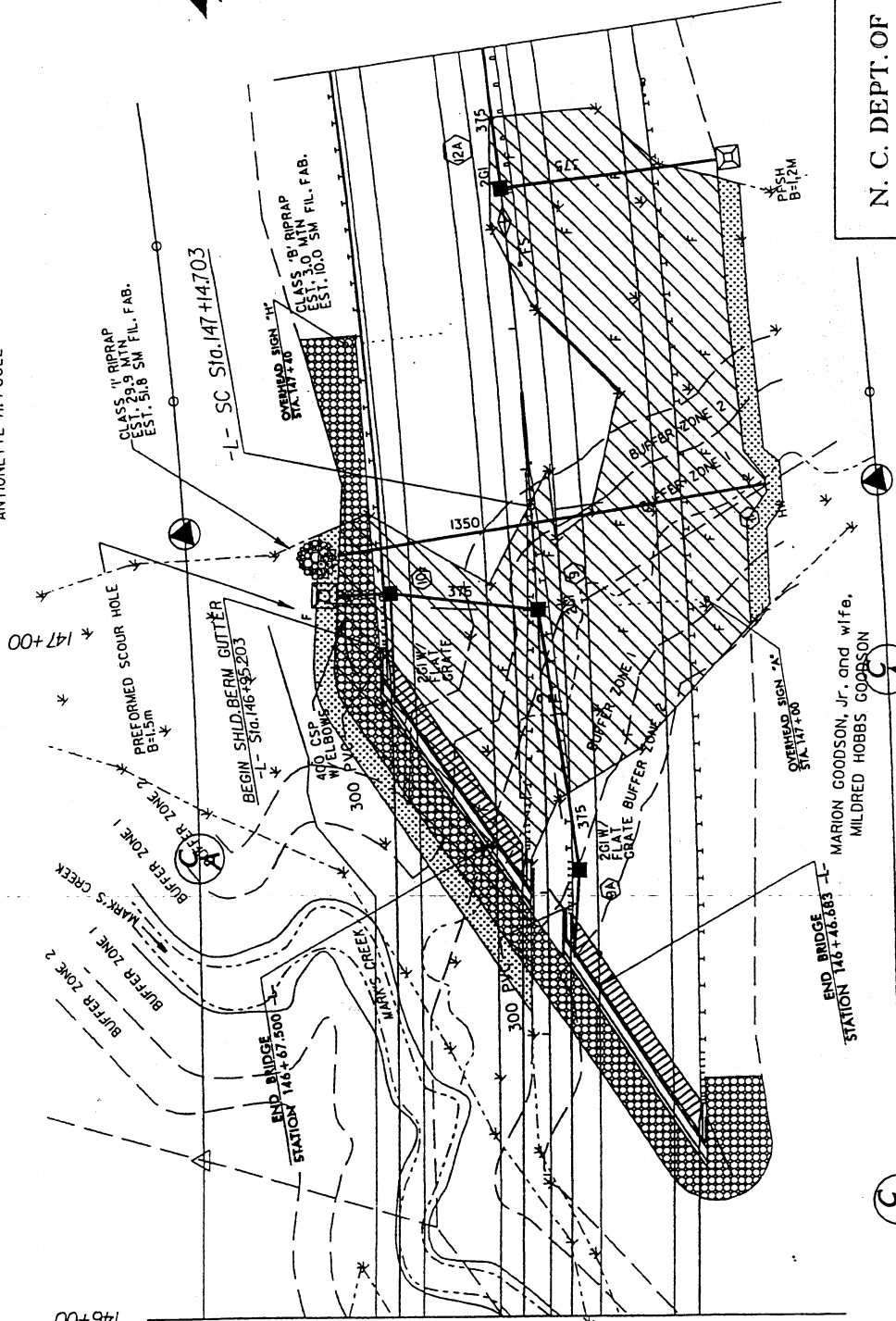


PLAN VIEW
SITE 10

SHEET 1 OF 2



ANTIONETTE H. POOLE



MATCHLINE STA. 146+00 -L- SITE 10 SHEET 1 OF 2

146+00

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

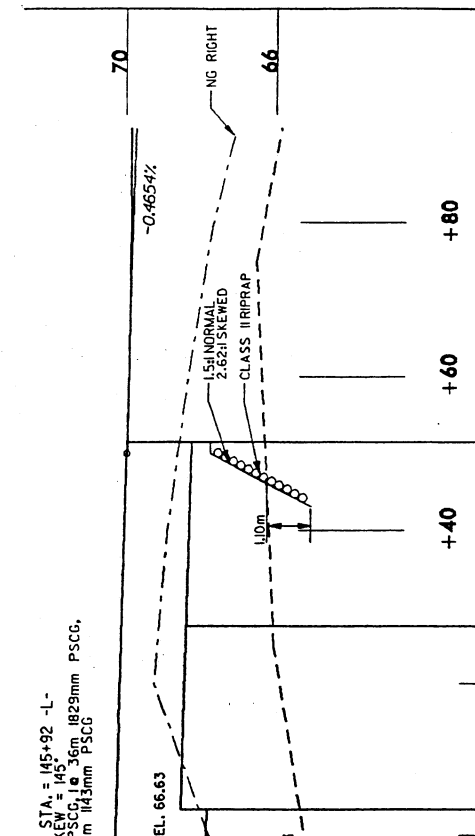
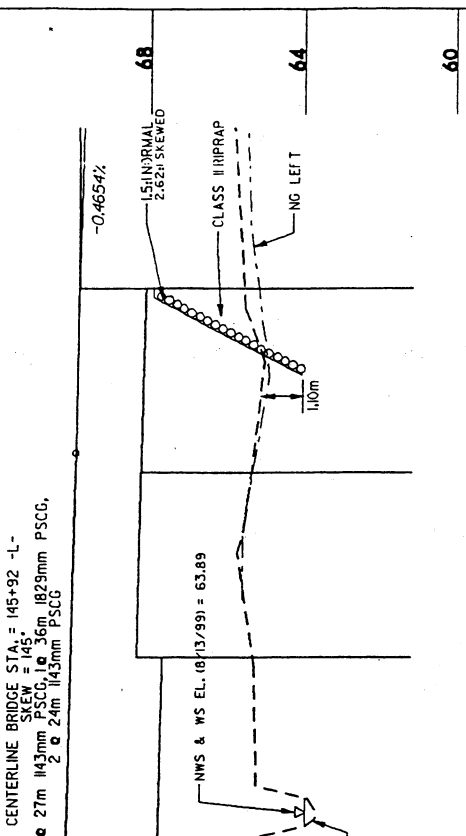
PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE EXPRESSWAY TO SR 2502

SHEET 30 OF 34 REV 12//11//05

PLAN VIEW
 SITE 10
 SHEET 2 OF 2

- DENOTES TEMP. MECHANIZED CLEARING
- DENOTES FILL IN WETLANDS



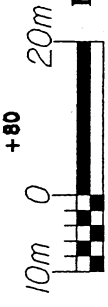


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547C)
 US 64 FROM EAST WAKE
 EXPRESSWAY TO SR 2502

SHEET 31 OF 34 REVISED 2/16/04

**PROFILE
 SITE 10**

HORIZONTAL SCALE



VERTICAL SCALE



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	89+08/89+63	1-1750 RCP							0.44								
2	95+95/96+62	1-N/A						0.217									
3	98+20/98+50	1-N/A						0.012								0.0275	0.054
4	103/104+80-L	3 @ 26m BRIDGE	0.427	0.0121		0.048							13			0.0698	0.0672
5	10+30-Y16-	1800 RCP							0.002							0.022	0.014
5A	110/113-L	1050 RCP														0.471	0.292
6	118/119+80-L	1900 RCP	0.040			0.015										0.308	0.148
7	131/133-L	1350 RCP	0.033			0.003							203	80		0.387	0.23
8A	134+00-L	1800 RCP	0.038			0.003		0.004					137	7		0.201	0.095
8B	134+40/137-L	1500 RCP, 900 RCP	0.225			0.019		0.023					316	76		0.52	0.281
9	140/143-L	1650 RCP	0.456			0.003		0.019					310	56		0.575	0.368
10	144/147+80-L	2 @ 27m, 1 @ 36, 2 @ 23.5m	0.61	0.274		0.079										0.291	0.254
11	17/18+40-Y10	1 @ 24m, 2 @ 17m BRIDGE	0.253			0.059										0.022	0.039
TOTALS:			2.082	0.2861	0.022	0.292	0.081	0.081	0.984	0.984	0	0	979	219	627	2.8943	1.842
			5.14	0.71	0.05	0.72	0.20	0.20	2.43	2.43	0.00	0.00	3212	719	2057	7.15	4.55

hectare/meter
acre/feet

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.1402202 (R-2547C)

149+00

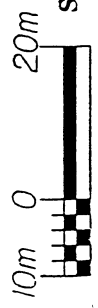
150+00

ANTIONETTE H. POOLE

ANTIONETTE H. POOLE

ANTIONETTE H. POOLE

SITE 3 PLAN VIEW

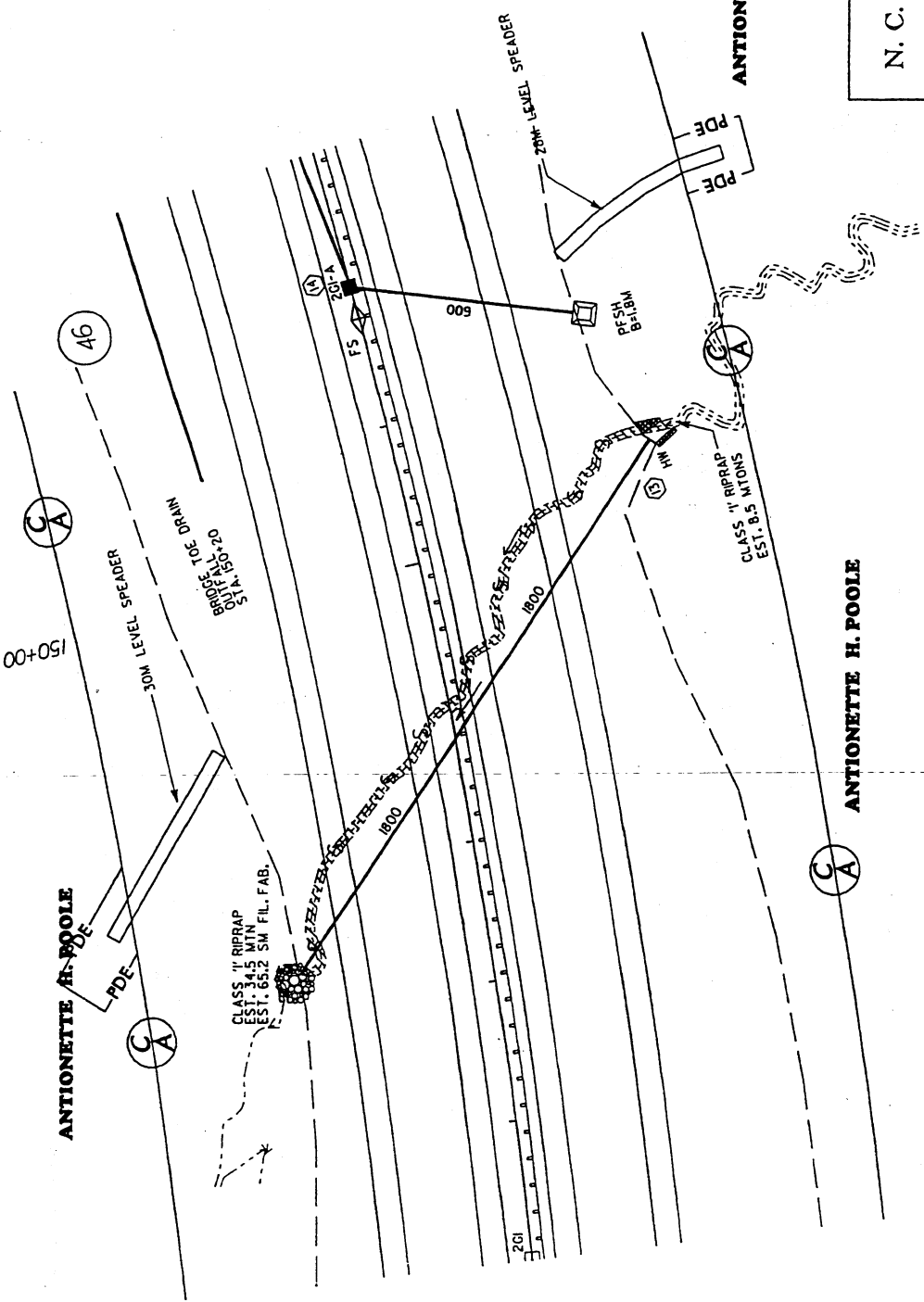
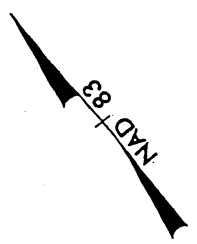


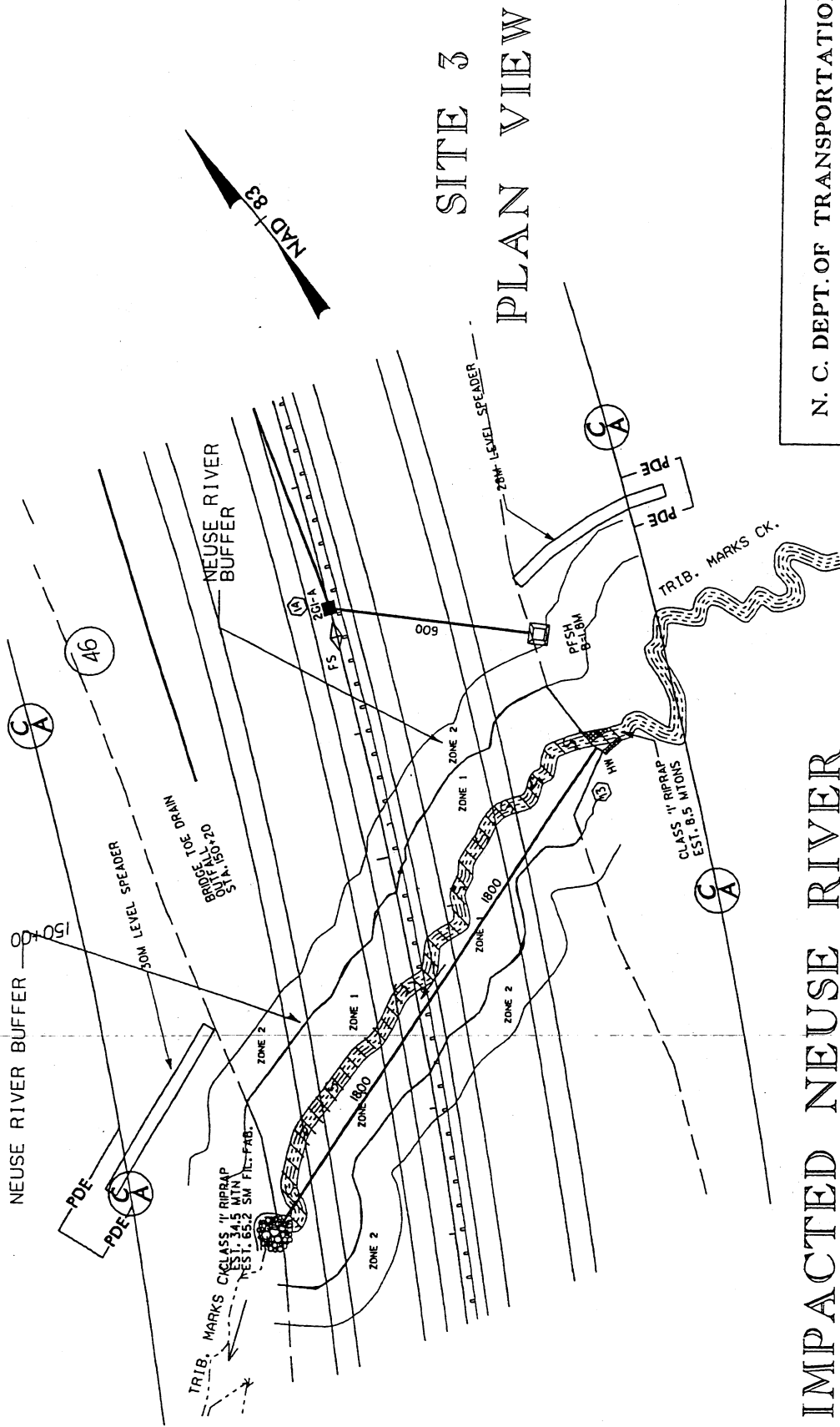
SCALE



DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547CC)
 US64 FROM SR2502 TO EXISTING
 US64 NEAR SRI003
 SHEET 6 OF 24 REV 12/11/03





SITE 3
PLAN VIEW

IMPACTED NEUSE RIVER
BUFFER ZONES
AND STREAM IMPACTS

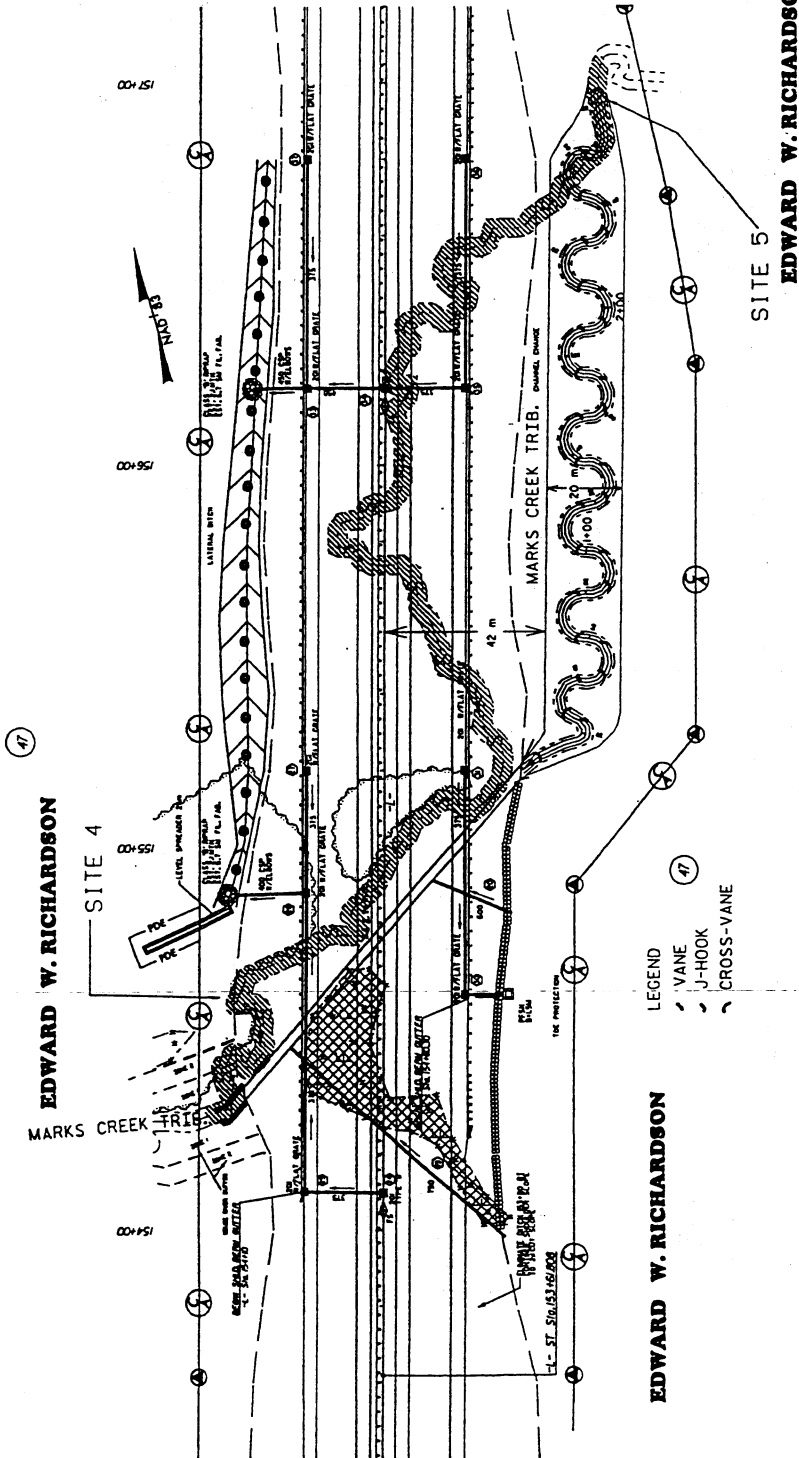


SCALE

DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547CC)
US64 FROM SR2502 TO EXISTING
US64 NEAR SR1003

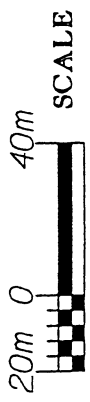
SHEET 7 OF 24 REV 12/11/03



**SITE 4 & SITE 5
PLAN VIEW**

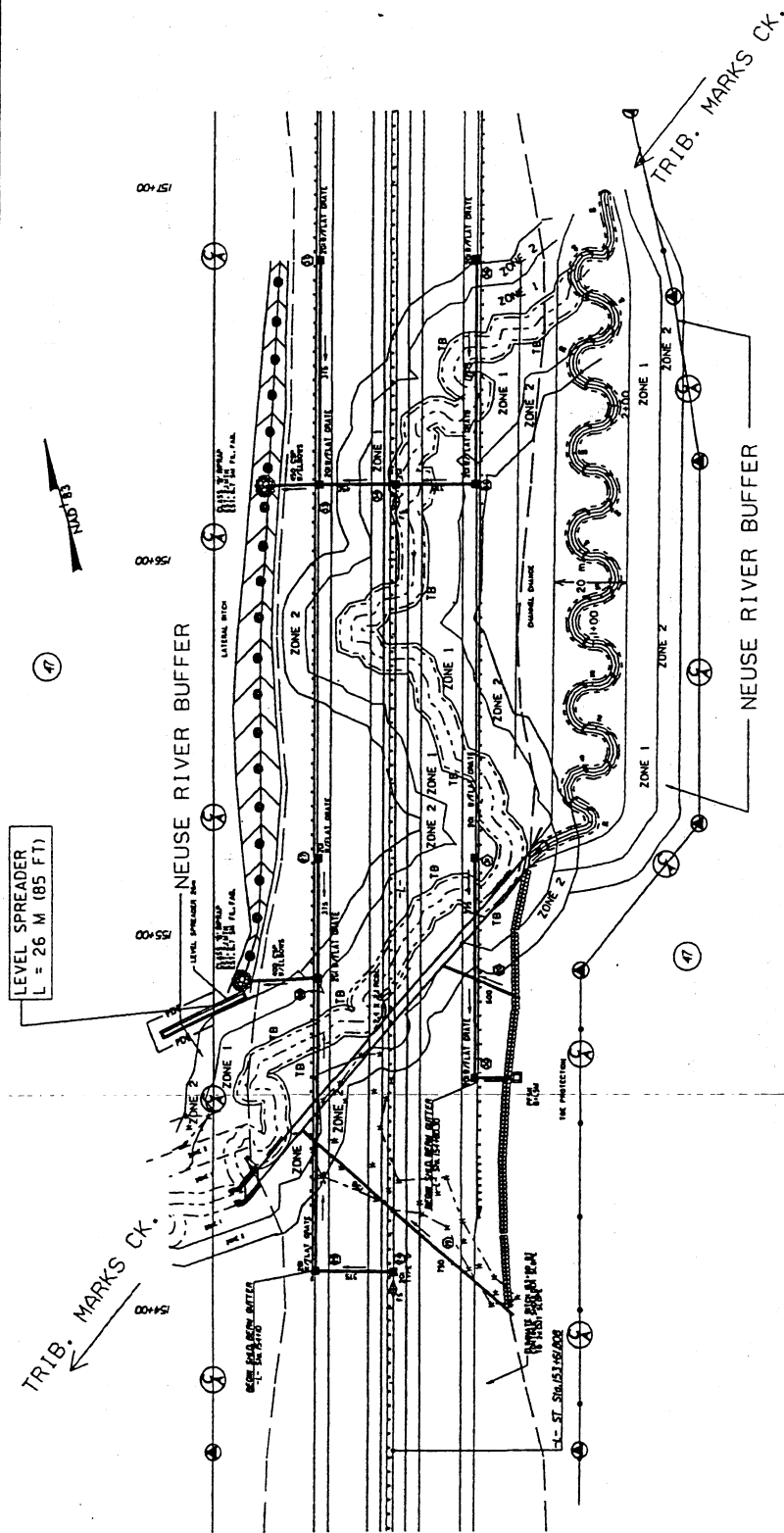
LEGEND
 VANE
 J-HOOK
 CROSS-VANE

DENOTES FILL IN WETLANDS
 DENOTES FILL IN SURFACE WATERS

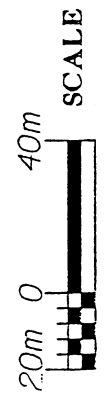


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547CC)
 US64 FROM SR2502 TO EXISTING
 US64 NEAR SR1003

SHEET 8 OF 24 REV 12/11/03

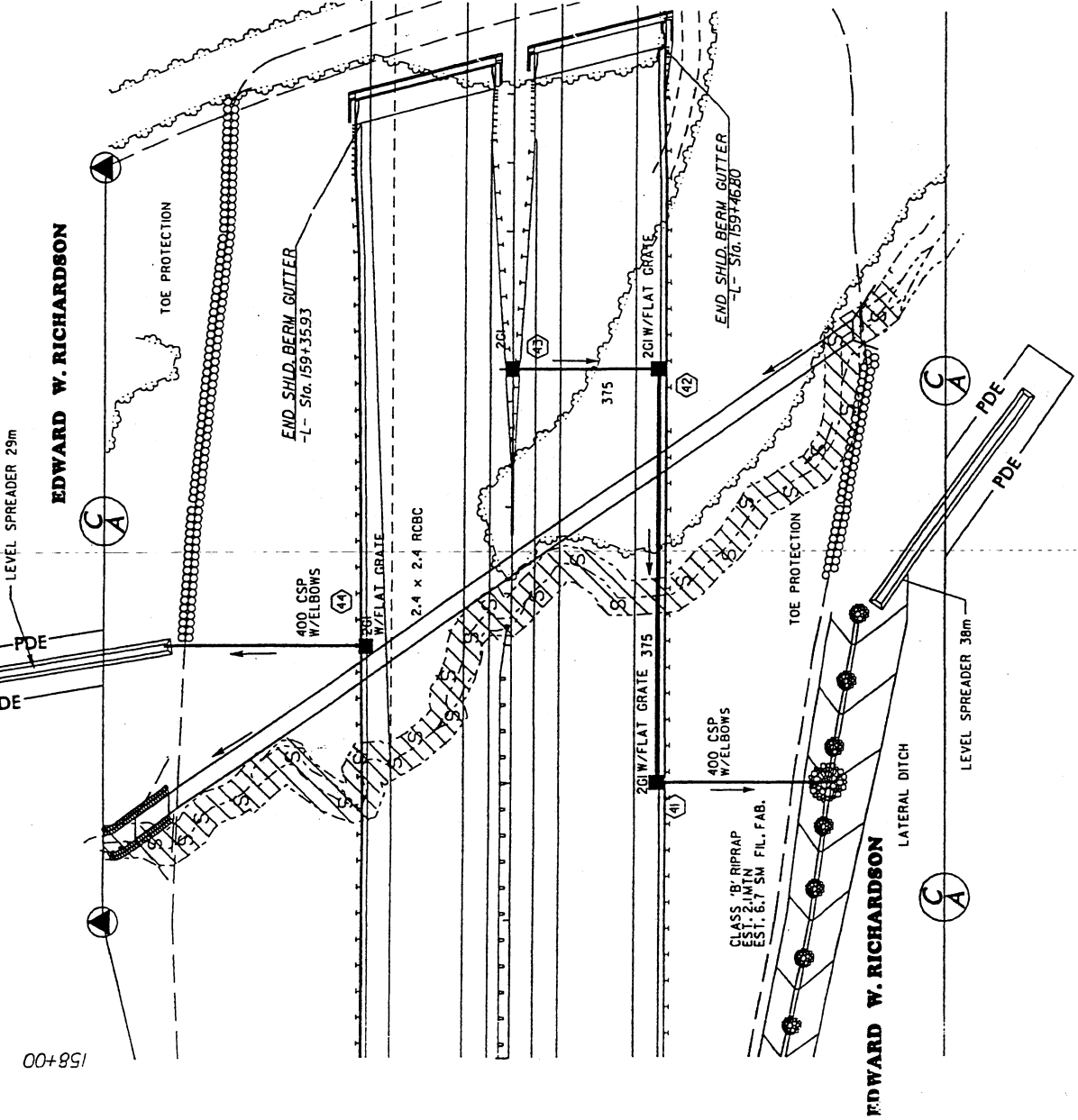


IMPACTED NEUSE RIVER
 BUFFER ZONES
 PLAN VIEW
 SITE 4 & SITE 5



N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1.402202 (R-2547CC)
 US64 FROM SR2502 TO EXISTING
 US64 NEAR SR1003
 SHEET 9 OF 24 REV 12/11/03

00+65/



158+00

EDWARD W. RICHARDSON

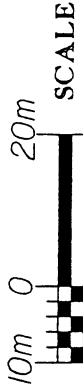
EDWARD W. RICHARDSON

NAD 83

PLAN VIEW SITE 6



DENOTES FILL IN SURFACE WATERS

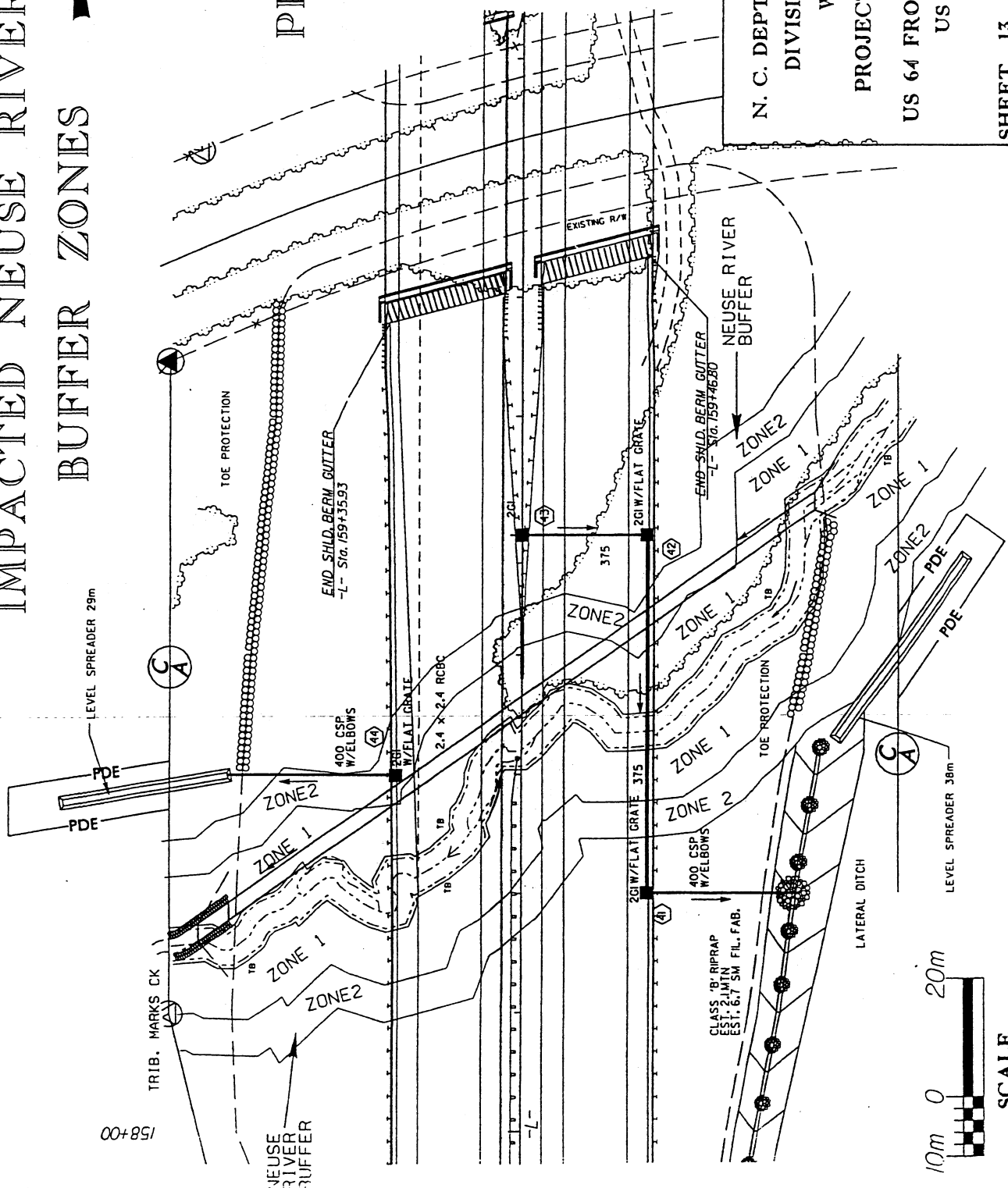


N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547CC)
 US 64 FROM SR2502 TO EXISTING
 US 64 NEAR SR1003

IMPACTED NEUSE RIVER BUFFER ZONES

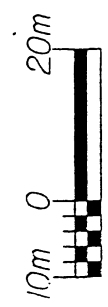


SITE 6 PLAN VIEW

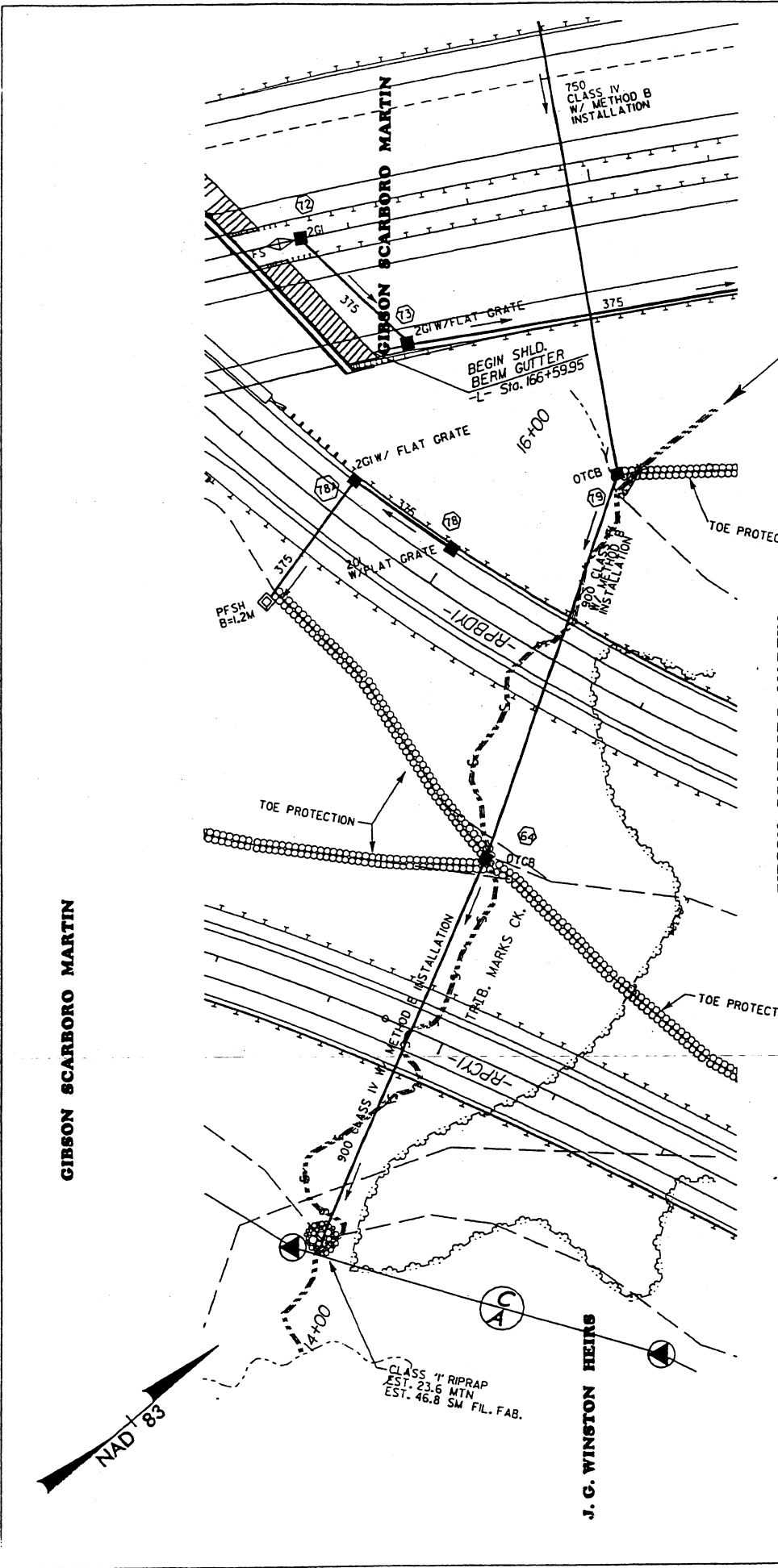


N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547CC)
US 64 FROM SR2502 TO EXISTING
US 64 NEAR SR1003

SHEET 13 OF 24 REV 12/11/03



SCALE



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

PROJECT: 8.1402202 (R-2547CC)

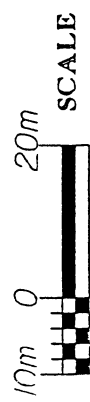
US 64 FROM SR2502 TO EXISTING
 US 64 NEAR SR1003

SHEET 14 OF 24 REV 12/11/03

GIBSON SCARBORO MARTIN

SITE 7 & SITE 8
 PLAN VIEW

DENOTES FILL IN SURFACE WATERS



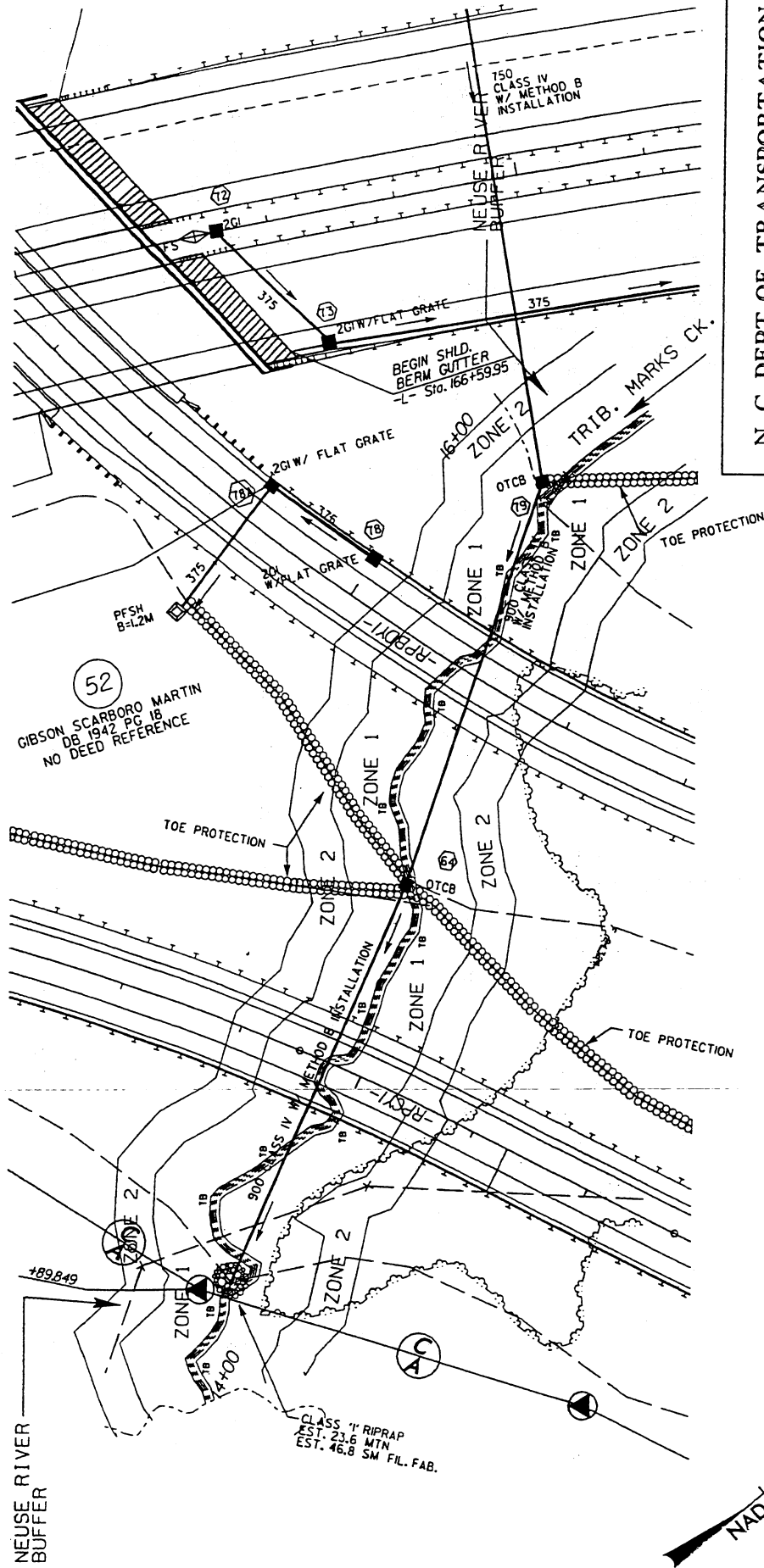
SCALE

GIBSON SCARBORO MARTIN

J. G. WINSTON HEIRS

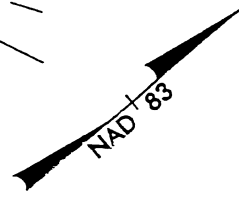
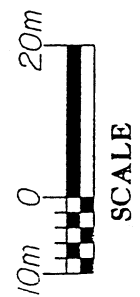
CLASS 'I' RIPRAP
 EST. 23.6 MTN
 EST. 46.8 SM FIL. FAB.

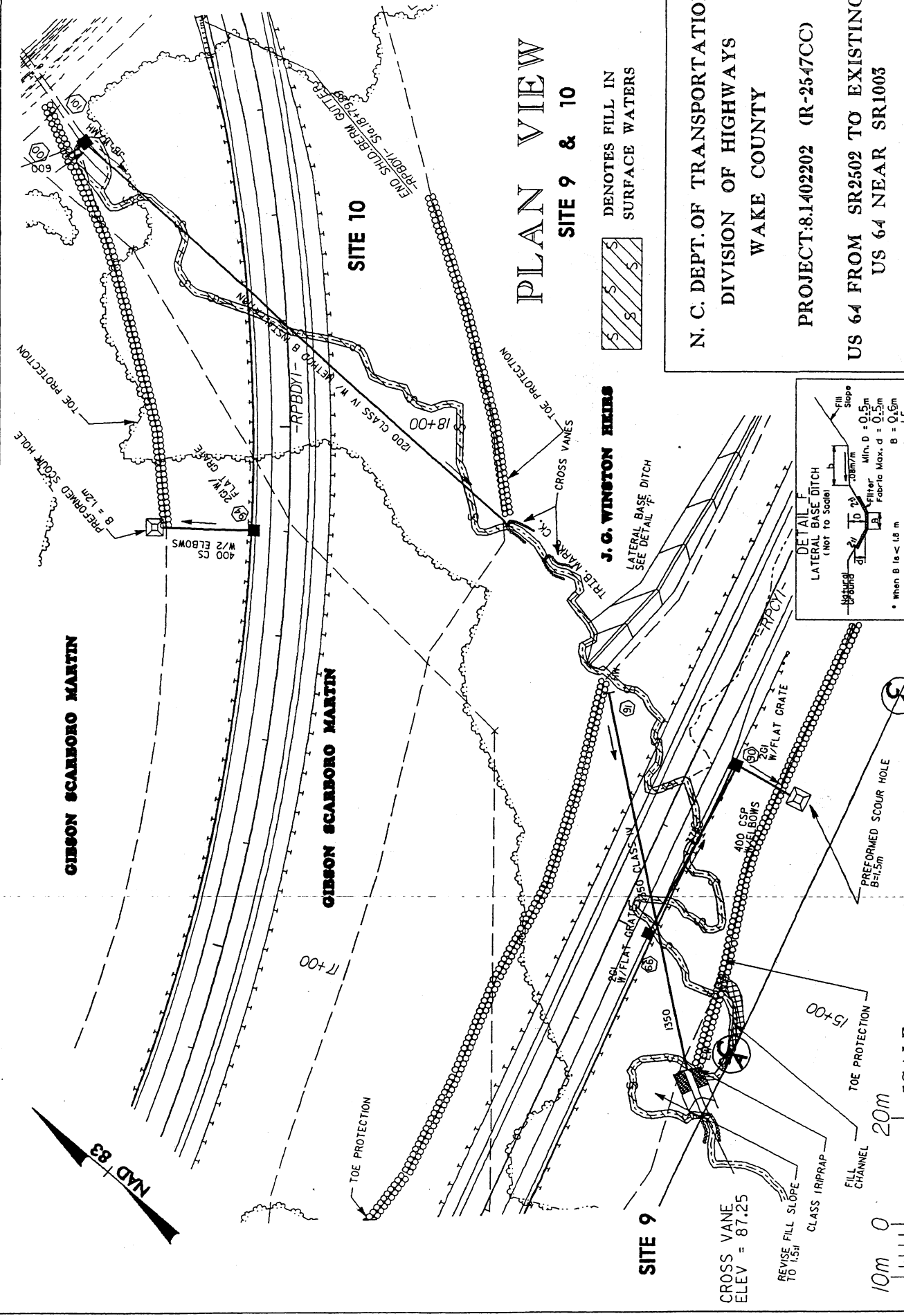
NAD 83



N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547CC)
 US 64 FROM SR2502 TO EXISTING
 US 64 NEAR SR1003
 SHEET 15 OF 24 REV 12/11/03

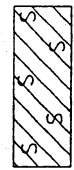
SITE 7 & SITE 8
 PLAN VIEW
 IMPACTED NEUSE RIVER
 BUFFER ZONES





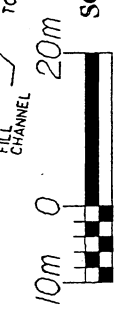
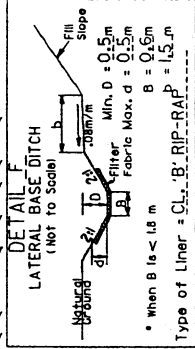
PLAN VIEW

SITE 9 & 10



DENOTES FILL IN SURFACE WATERS

N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1402202 (R-2547CC)
 US 64 FROM SR2502 TO EXISTING
 US 64 NEAR SR1003
 SHEET 16 OF 24 REV 12/11/03



SCALE

J. G. WINSTON HEIRS

GIBSON SCARBORO MARTIN

GIBSON SCARBORO MARTIN

SITE 9

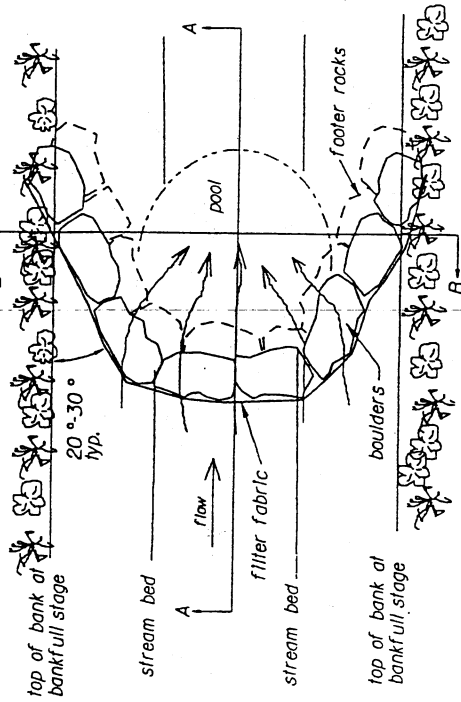
SITE 10

NAD 83

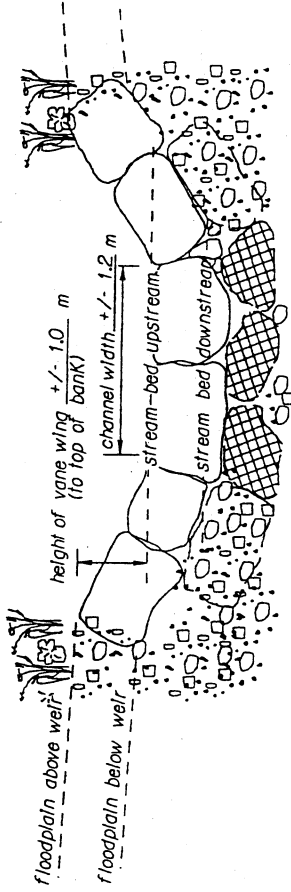
CROSS VANE ROCK WEIR DETAIL

SITE 9 & SITE 10

PLAN VIEW



SECTION B-B

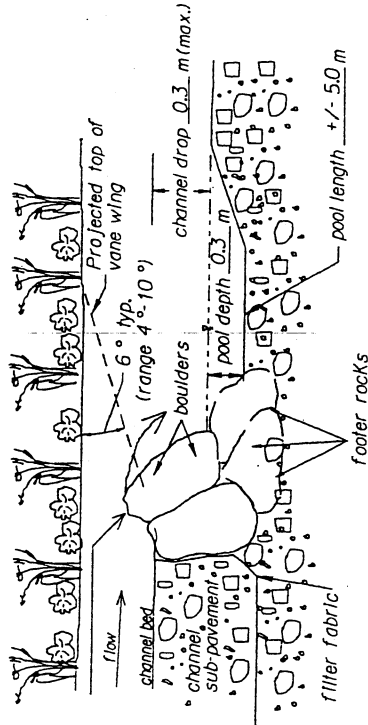


Note: Boulders should be native stone or shot rock angular and oblong; minimum size: 0.9 m x 0.6 m.

Note:

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

SECTION A-A



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

PROJECT: 8.1402202 (R-2547CC)

US 64 FROM SR2502 TO EXISTING
US 64 NEAR SR1003

SHEET 16A OF 24 REV 12/11/03

SITE 9 & SITE 10

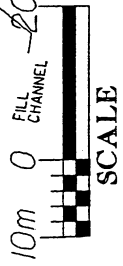
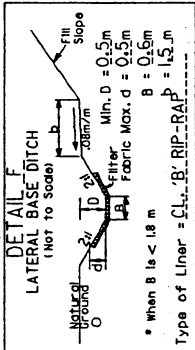
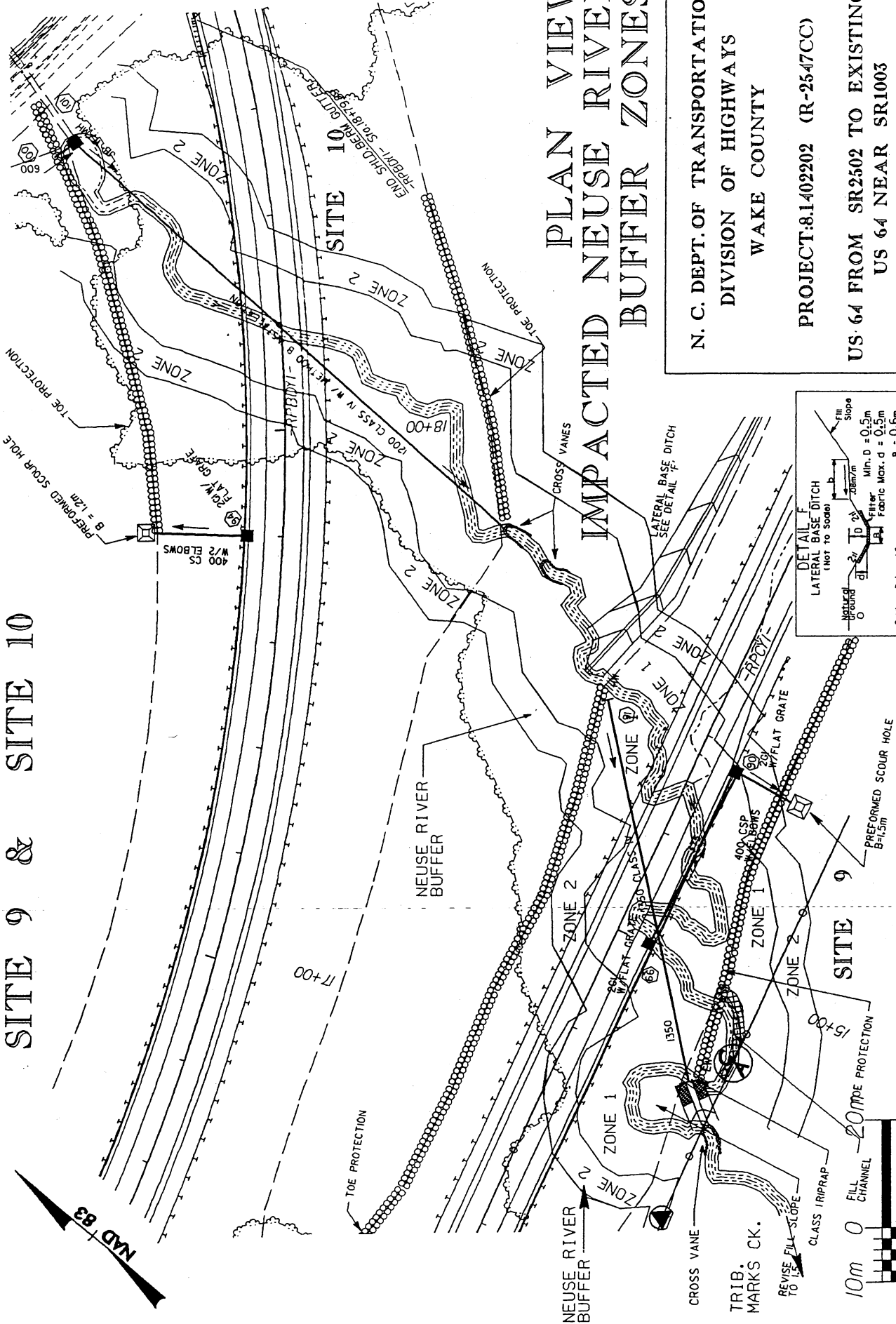
PLAN VIEW
IMPACTED NEUSE RIVER
BUFFER ZONES

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

PROJECT: 8.1402202 (R-2547CC)

US 64 FROM SR2502 TO EXISTING
US 64 NEAR SR1003

SHEET 17 OF 24 REV 12/11/03



LS PLUS TWO, A N.C. GENERAL PARTNERSHIP, CO WILLIAM L. SHANKLE

186+00

185+00

184+00

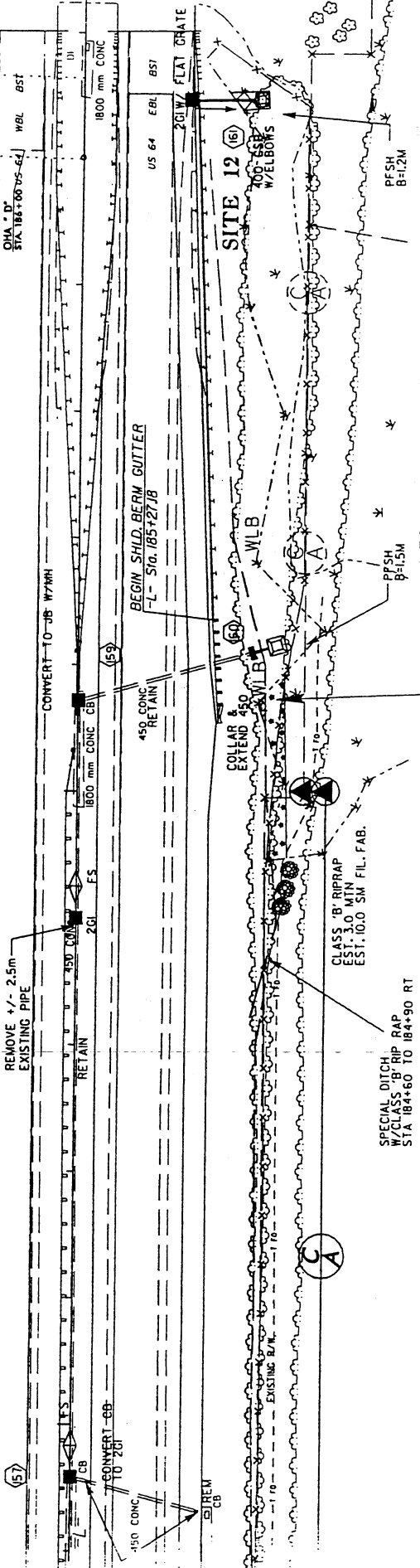
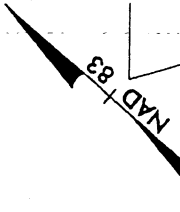
MECHANIZED CLEARING

SITE II

SITE I2

JEROME B. LILES

MECHANIZED CLEARING



SITE II & SITE I2 PLAN VIEW

W.W. HORTON HEIRS, ETAL
GATTIS TRUETT HORTON AND
WIFE MARY SUE HORTON

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

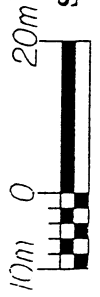
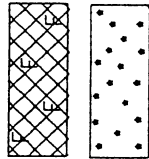
PROJECT: 8.1402202 (R-2547CC)

US 64 FROM SR2502 TO EXISTING
US 64 NEAR SRI003

SHEET 18 OF 24 REV 12/11/03

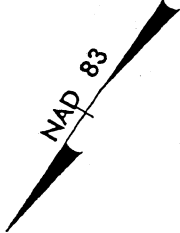
DENOTES FILL IN WETLANDS

DENOTES MECHANIZED CLEARING
IN WETLANDS

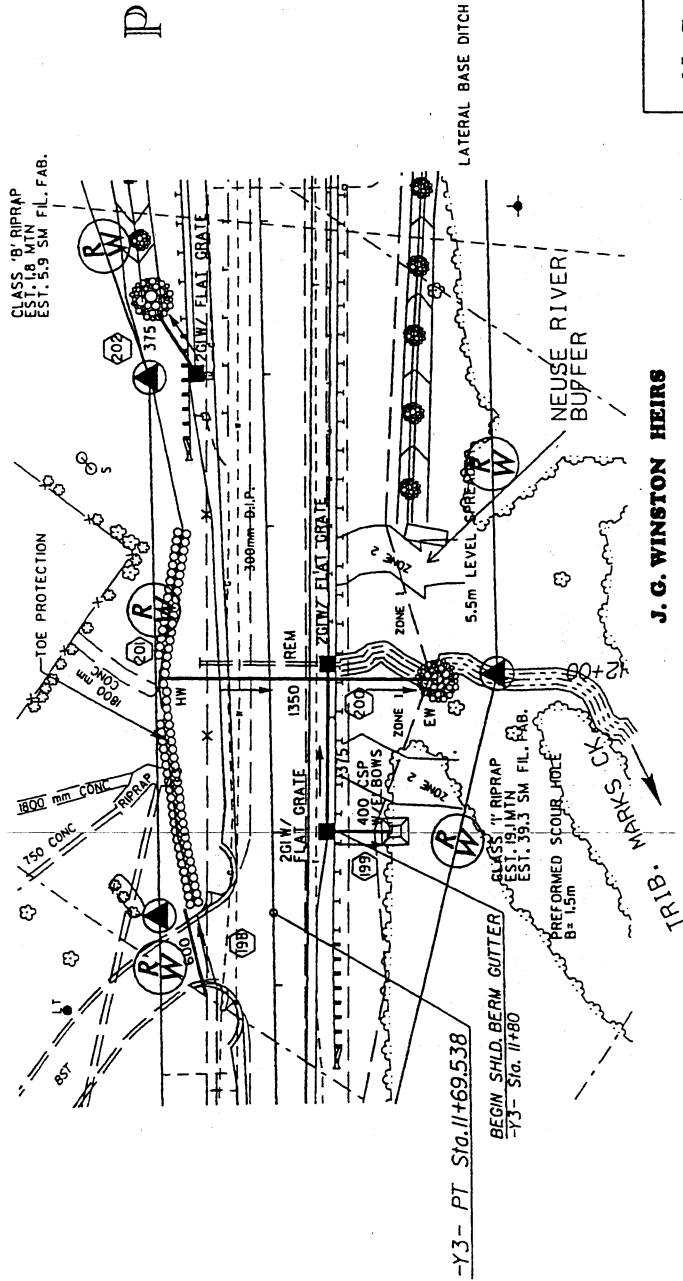


IMPACTED NEUSE RIVER BUFFER ZONES

WAKE COUNTY BOARD OF EDUCATION



PLAN VIEW SITE 13



J. G. WINSTON HEIRS



N. C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1.402202 (R-2547CC)
 US64 FROM SR2502 TO EXISTING
 US64 NEAR SR1003
 SHEET 20 OF 24 REV 12/11/03

00+181

180+00

NC GRID
MAD 83

SITE 14 PLAN VIEW

DENOTES FILL IN
SURFACE WATER

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.1402202 (R-2547CC)

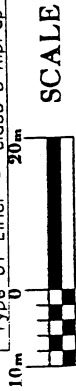
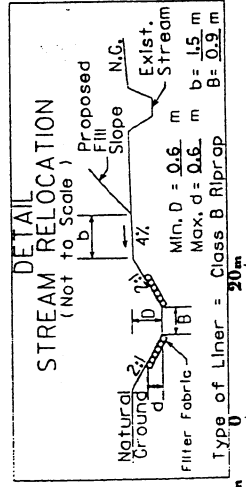
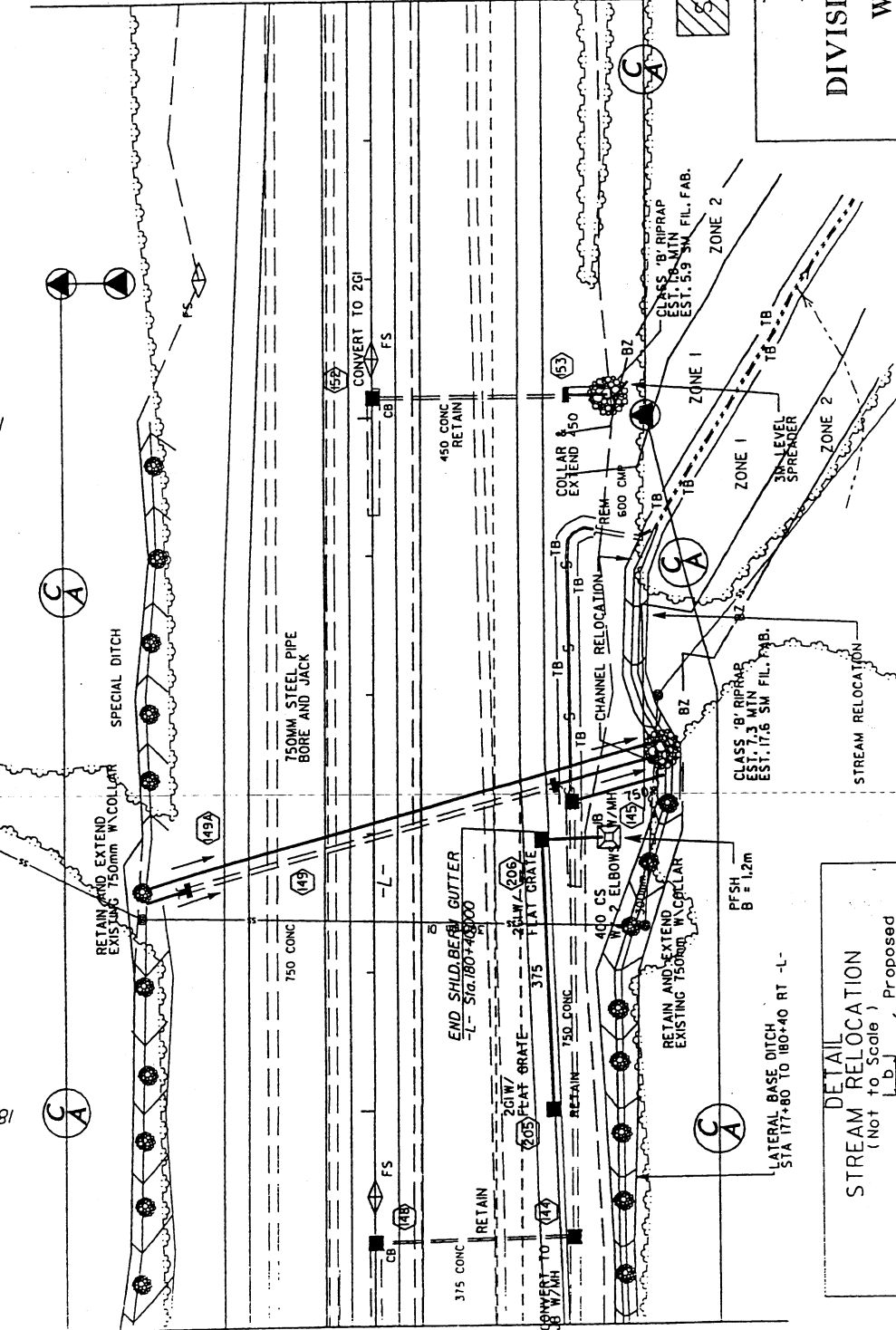
US 64 FROM SR 2502

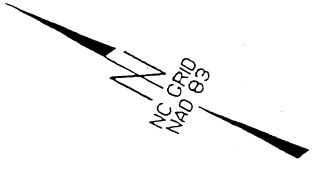
TO EXISTING

US 64 NEAR SR 1003

SHEET 21 OF 24 REV 12/11/03

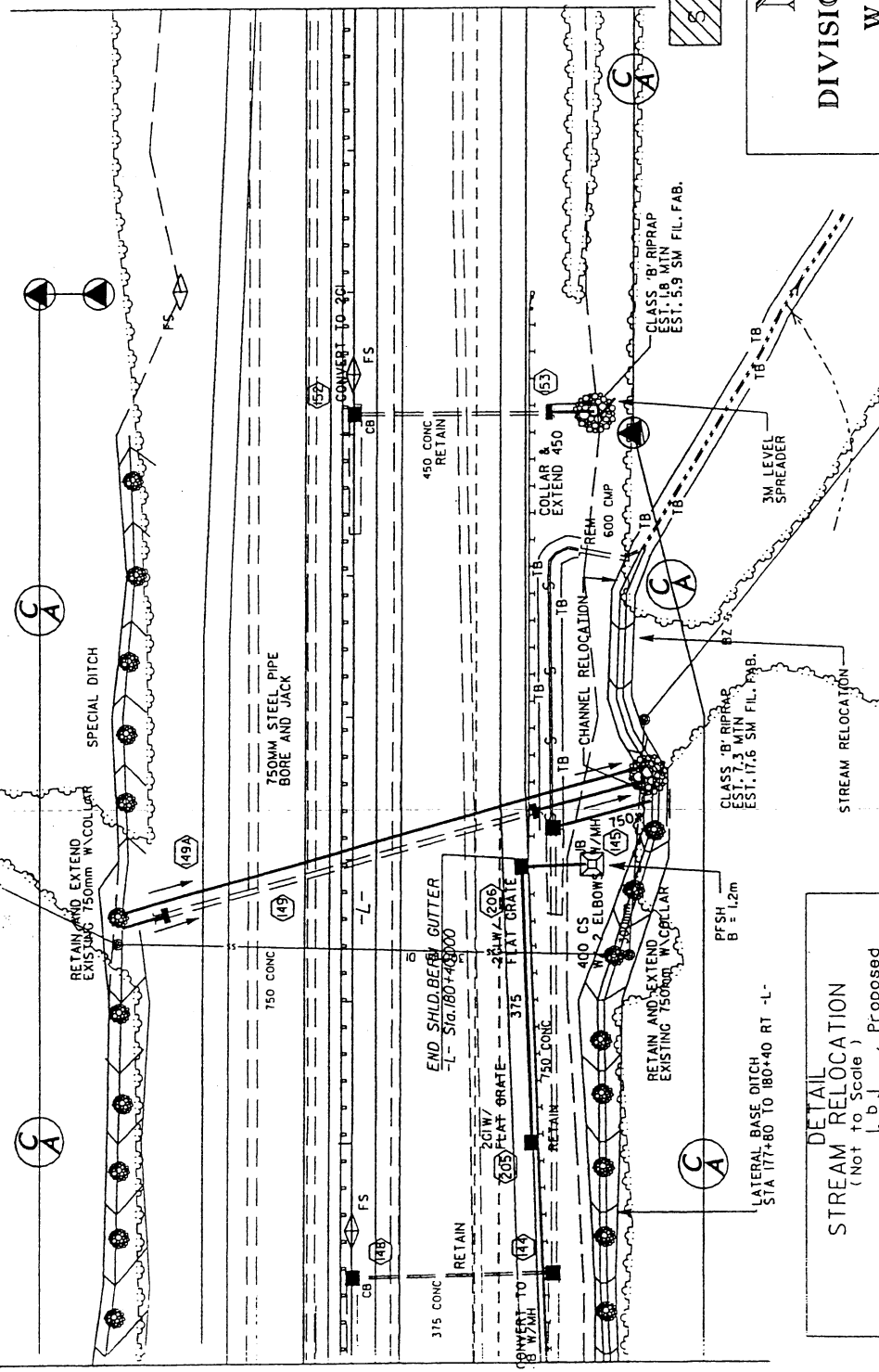
IMPACTED NEUSE RIVER AND BUFFER ZONES AND STREAM IMPACTS





181+00

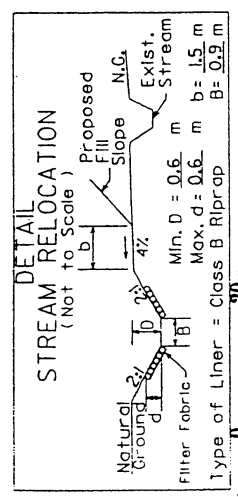
180+00




 DENOTES FILL IN SURFACE WATER

NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1402202 (R-2547CC)
US 64 FROM SR 2502
TO EXISTING
US 64 NEAR SR 1003
SHEET 22 OF 24 REV 12/11/03

PLAN VIEW
SITE 14



10m



SCALE

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	SEE SITE 10 OF SECTION R-2547C FOR IMPACTS															
2	SEE SITE 10 OF SECTION R-2547C FOR IMPACTS															
3	149+79 -L- 1800mm RCP															
4	154+78.5 -L- 1 @ 2.4m X 2.1m RCBC															
5	154+60 -L- 1 @ 2.4m X 2.4m RCBC		0.092													
6	158+71.6 -L- 900 RCP															
7 & 8	13+92 -RPCY1- 1200 RCP															
9	8+15 -RPBDY1- 1350 RCP															
10	15+10 -RPCY1- 1350 RCP															
11	184+60 -L- 1350 RCP		0.024													
12	185+40 -L- 2 @ 750 PIPES		0.002													
13	12+00 -Y3- 1350 RCP															
14	180+60 -L- 2 @ 750 PIPES															
TOTALS:			0.118	0.29	0.00	0.00	0.029	0.459	0.00	0.00	0.00	1126	289	660	1.826	1.251
								1.13	0.00	0.00	3694	948	2231	4.51	3.09	

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.1402202 (R-2547CC)

SHEET 23 OF 24

REV. 12/11/2003