

## PROJECT SPECIAL PROVISION

(10-18-95)

Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

<u>PERMIT</u>	<u>AUTHORITY GRANTING THE PERMIT</u>
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Environmental Management, DENR State of North Carolina

The Contractor shall comply with all applicable permit conditions during construction of this project. Those conditions marked by \* are the responsibility of the department and the Contractor has no responsibility in accomplishing those conditions.

Agents of the permitting authority will periodically inspect the project for adherence to the permits.

The Contractor's attention is also directed to Articles 107-10 and 107-14 of the *Standard Specifications* and the following:

Should the Contractor propose to utilize construction methods (such as temporary structures or fill in waters and/or wetlands for haul roads, work platforms, cofferdams, etc.) not specifically identified in the permit (individual, general, or nationwide) authorizing the project it shall be the Contractor's responsibility to coordinate with the Engineer to determine what, if any, additional permit action is required. The Contractor shall also be responsible for initiating the request for the authorization of such construction method by the permitting agency. The request shall be submitted through the Engineer. The Contractor shall not utilize the construction method until it is approved by the permitting agency. The request normally takes approximately 60 days to process; however, no extensions of time or additional compensation will be granted for delays resulting from the Contractor's request for approval of construction methods not specifically identified in the permit.

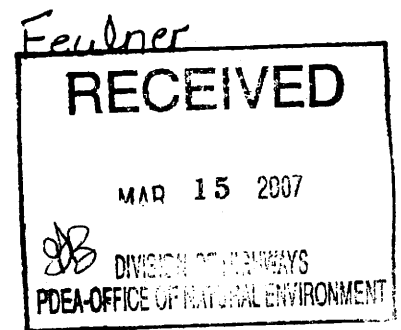
**Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the waters or wetlands provided that activities outside those areas is done in such a manner as to not affect the waters or wetlands.**



375  
DEPARTMENT OF THE ARMY  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 1890  
WILMINGTON, NORTH CAROLINA 28402-1890

IN REPLY REFER TO

March 14, 2007



Regulatory Division

Action ID: SAW-2004-00340, US 311 (High Point East Beltway), Transportation Improvements  
Project R-2606A, B, C and R-0609IA, IB

Dr. Gregory J. Thorpe, PhD, Manager  
Project Development and Environmental Analysis Branch  
North Carolina Department of Transportation  
Division of Highways  
1548 Mail Service Center  
Raleigh, North Carolina 27699-1548

Dear Dr. Thorpe:

Enclosed is a Department of the Army permit to directly discharge dredged and/or fill material into Taylor Branch, Muddy Creek, Bob Branch, unnamed tributaries to the aforementioned waters, Mile Branch, Richland Creek, Deep River, Caraway Creek and Back Creek to facilitate the construction of US 311, Transportation Improvement Project (TIP) R-2606A, B, C and R-0609IA, IB, State Project Number 8.1570601 and 8.1571501, in Guilford and Randolph Counties, North Carolina. The proposed roadway is approximately 23 miles in length and begins at the existing four-lane divided highway at US 311 (LAT. DD 35.7895; LONG DD 79.9649) just south of US 29/70 in Guilford County and ends at the intersection with US 220 in Randolph County (LAT. DD 35.7895; LONG DD 79.8279).

Any deviation in the authorized work will likely require modification of this permit. If a change in the authorized work is necessary, you should promptly submit revised plans to the Corps showing the proposed changes. You may not undertake the proposed changes until the Corps notifies you that your permit has been modified.

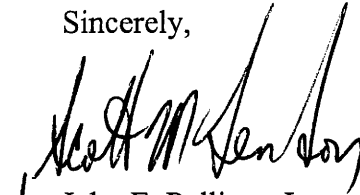
Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant conditions require that:

- a. You must complete construction before December 31, 2012.
- b. 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.

You must notify this office in advance as to when you intend to commence and complete work.

Should you have questions, contact Mr. Richard K. Spencer of my Wilmington Field Office regulatory staff at telephone (910) 251-4172.

Sincerely,



John E. Pulliam, Jr.  
Colonel, U.S. Army  
District Commander

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. Ronald J. Mikulak, Chief  
Wetlands Regulatory Section  
61 Forsyth Street  
Atlanta, Georgia 30303

Mr. Pete Benjamin  
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  
Pivers Island  
Beaufort, North Carolina 28516

Mr. Doug Huggett  
Division of Coastal Management  
North Carolina Department of  
Environment and Natural Resources  
400 Commerce Avenue  
Morehead City, North Carolina 28557

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

## DEPARTMENT OF THE ARMY PERMIT

Permittee **NC DEPARTMENT OF TRANSPORTATION**  
 Permit No. **SAW-2004-00340**  
 Issuing Office **USAED, Wilmington**

**RECEIVED**

MAR - 9 2004

**REGULATORY  
WILM. FLD. OFC.**

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: Directly discharge dredged and/or fill material into Taylor Branch, Muddy Creek, Bob Branch, unnamed tributaries to the aforementioned waters, Mile Branch, Richland Creek, Deep River, Caraway Creek and Back Creek and adjacent wetlands impacting 30,307 linear feet of stream channel and 3.40 acres of wetlands to facilitate the construction of US 311, Transportation Improvement Project (TIP) R-2606A, B, C and R-0609IA, IB, State Project Numbers 8.1570601 and 8.1571501.**

**Project Location: In the Cape Fear and Yadkin River basins, beginning at the existing four-lane divided highway at US 311 (LAT. DD 35.7895; LONG DD 79.9649) just south of US 29/70 in Guilford County and ends at the intersection with US 220 in Randolph County (LAT. DD 35.7895; LONG DD 79.8279), Guilford and Randolph Counties, North Carolina.**

## Permit Conditions:

## General Conditions:

1. The time limit for completing the work authorized ends on **December 31, 2010**. 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 ATTACHED SPECIAL CONDITIONS**

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.

- e. Damage claims associated with any future modification, suspension, or revocation of this permit.
- 4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.
- 5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
  - a. You fail to comply with the terms and conditions of this permit.
  - b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
  - c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit, Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

E. L. Luck for Gregory Thape, PhD 3-8-07  
 (PERMITTEE) NC DEPARTMENT OF TRANSPORTATION (DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

John E. Pulliam, Jr. 3/14/07  
 (DISTRICT ENGINEER) JOHN E. PULLIAM, JR., COLONEL (DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

\_\_\_\_\_  
 (TRANSFEREE) (DATE)

SPECIAL CONDITIONS (Action ID. 2004-00340, US 311 (High Point East Beltway),  
Transportation Improvements Project R-2606A, B, C and R-0609IA, IB)

1. Failure to institute and carry out the details of the following special conditions below will result in a directive to cease all ongoing and permitted work within waters of the United States, including wetlands, associated with the permitted project, or such other remedies and/or fines as the U.S. Army Corps of Engineers District Commander or his authorized representatives may seek.
  2. All work authorized by this permit must be performed in strict compliance with the attached plans, which are a part of this permit. Written verification shall be provided that the final construction drawings comply with the attached permit drawings prior to any active construction in waters of the United States, including wetlands. The permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any deviation in the construction design plans shall be brought to the attention of the Corps of Engineers, Mr. Richard Spencer, Wilmington Regulatory Field Office prior to any active construction in waters or wetlands and any modification to the permit plans must be approved by the Corps of Engineers prior to implementation.
  3. The permittee shall schedule a preconstruction meeting between its representatives, the contractor's representatives, and the Corps of Engineers, Mr. Richard Spencer, Wilmington Regulatory Field Office, prior to any work within jurisdictional waters and wetlands to ensure that there is a mutual understanding of all of the terms and conditions contained within this Department of the Army Permit. The permittee shall notify the Corps of Engineers Project Manager a minimum of thirty (30) days in advance of the scheduled meetings in order to provide that individual with ample opportunity to schedule and participate in the required meetings. One copy of the final half-size construction drawings shall be furnished to the Corps of Engineers, Mr. Richard Spencer, Wilmington Regulatory Field Office prior to the pre-construction meeting.
  4. The permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Written verification shall be provided that the final construction drawings comply with the attached permit drawings prior to any active construction in waters of the United States, including wetlands. Any deviation in the construction design plans will be brought to the attention of the Corps of Engineers, Mr. Richard Spencer, Wilmington Regulatory Field Office prior to any active construction in waters or wetlands.
  5. The permittee shall require its 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 its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit and any authorized modifications. Copies of this permit and any modifications authorized by the USACE shall be available for review at the construction site at all times. All violations, including non-compliance of these conditions, of the authorized permit shall be reported to the District Engineer within 24 hours of the violation.
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6. The permittee shall abide by the conservation measures identified in the Biological Assessment prepared for the Schweinitz's sunflower (*Helianthus schweinitzii*) dated 9 November

2006 and the three recommended conservation measures identified by the US Fish and Wildlife Service in the Biological Opinion dated 30 November 2006.

7. The permittee shall maintain stream base flow through crossings with multiple culverts by use of pipe sills installed on the upstream end of all pipe barrels except the main conveyance culvert, which shall be aligned with the stream thalweg.
- ✱8. The permittee shall mitigate for 1,230 linear feet of unavoidable impact to streams with important aquatic function, associated with the R-2606 project, by completing 1,230 linear feet of onsite stream restoration, as described in the “Stream and Wetland Mitigation Plan for UT to Muddy Creek (CF-16 Site) Randolph County, North Carolina”, Dated August 2006. Furthermore, 1 acre of riparian wetlands impact associated with the R-2606 project will be mitigated for by the preservation of the wetlands and old stream channels located at the CF-16 mitigation site. The existing wetlands shall remain intact and shall not be planted as stated in the mitigation plan. The old stream channels shall be plugged only and allowed to fill with water creating a vernal pool. The permittee shall complete an as-built survey of the mitigation site within sixty days of completion of the site construction. The permittee shall document the final grade elevations as compared to the existing undisturbed grades, water surface elevations, and any structures installed. The permittee shall also include in the as-built survey: photo documentation at representative segments and structures; and a plan view diagram. The permittee shall monitor the mitigation site for five year following completion of the mitigation project. Monitoring shall follow the Monitoring Level 1 protocol outlined in the “Stream Mitigation Guidelines”, dated April 2003.
- ✱9. The permittee shall mitigate for 659 linear feet of unavoidable impact to streams with important aquatic function, associated with this project, by completing 659 linear feet of onsite stream restoration at site number 6 on R-0609IA, as described in the mitigation plan submitted on 18 October 2006. The permittee shall complete an as-built survey of the mitigation site within sixty days of completion of the site construction. The permittee shall document the final grade elevations as compared to the existing undisturbed grades, water surface elevations, and any structures installed. The permittee shall also include in the as-built survey: photo documentation at representative segments and structures; and a plan view diagram. The permittee shall monitor the mitigation site for five year following completion of the mitigation project. Monitoring shall follow the Monitoring Level 1 protocol outlined in the “Stream Mitigation Guidelines”, dated April 2003.
- ✱10. Compensatory mitigation for the unavoidable impacts to 1.42 acres of riparian wetlands, 1.98 acres of non-riparian wetlands, and 26,944 linear feet of stream associated with the proposed project shall be provided by the Ecosystem Enhancement Program (EEP). The following is a breakdown of the impacts to be mitigated within each Cataloging Units:

Cape Fear River CU 03030003: Stream – 18,626 linear feet  
 Riparian wetland – 1.21 acres  
 Non-riparian wetland – 1.95 acres



Yadkin River CU 03040103

Stream – 8,318 linear feet  
Riparian wetland – 0.21 acre  
Non-riparian wetland – 0.03

The EEP will provide 2.84 acres of riparian wetlands, 3.96 acres of non-riparian wetlands, and 53,888 linear feet of stream restoration equivalent in the Central Piedmont Eco-Region, pursuant to Section X of the MOA signed 22 July 2003. The NCDOT shall, within 30 days of the issue date of this permit, certify that sufficient funds have been provided to EEP to complete the required mitigation, pursuant to Paragraph V. of the MOA.

11. The permittee shall continue coordination of design for R-2606 Sections B and C through the NEPA/Section 404 Merger 01 Process – Concurrence points 2A, 4B and 4C. The final design shall incorporate appropriate avoidance, minimization and mitigation of aquatic resource impacts to the fullest extent practicable. The applicant shall not commence any work within waters of the United States within R-2606 Section B or C until after the submittal of a modified application with final design plans reflecting the appropriate avoidance, minimization and mitigation within these sections and has received final approval from Wilmington District Corps of Engineers.

12. The permittee shall continue to pursue on-site mitigation opportunities within R-2606 Sections B and C.

13. Except as authorized by this permit or any USACE approved modification to this permit, no excavation, fill, or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, within waters or wetlands, or shall any activities take place that cause the degradation of waters or wetlands. There shall be no excavation from, waste disposal into, or degradation of, jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit, including appropriate compensatory mitigation. This prohibition applies to all borrow and fill activities connected with this project. In addition, except as specified in the plans attached to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within, into, or out of waters or wetlands or to reduce the reach of waters or wetlands.

14. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area.

15. To ensure that all borrow and waste activities occur on high ground and do not result in loss or the degradation of adjacent wetlands and streams, 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 the preceding condition (#13) 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 the preceding condition (#13). All information will be available to the Corps of Engineers upon request. NCDOT shall require its contractors to complete and execute reclamation plans for each waste and borrow site and provide written documentation that the reclamation plans have been implemented and all work is completed.

This documentation will be provided to the Corps of Engineers within 30 days of the completion of the reclamation work.

16. The permittee shall comply with the conditions specified in the water quality certification, No. 3592, issued by the North Carolina Division of Water Quality on 20 December 2006.

17. All authorized culverts will be installed to allow the passage of low stream flows and the continued movement of fish and other aquatic life as well as to prevent headcutting of the streambed. For all box culverts and for pipes greater than 48 inches in diameter, the bottom of the pipe will be buried at least one foot below the bed of the stream unless burial would be impractical and the Corps of Engineers has waived this requirement. For culverts 48 inches in diameter or smaller, the bottom of the pipe must be buried below the bed of the stream to a depth equal to or greater than 20 percent of the diameter of the culvert. . Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in disequilibrium of wetlands or streambeds or banks, adjacent to, upstream or downstream of the structures. In order to allow for the 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. Culverts shall be set in such a manner as to promote a continuum of water depth through the structure to facilitate aquatic life movement. If necessary, the permittee shall install alternating or notched baffles within the culvert barrel to provide the necessary depth within the structure to facilitate aquatic life movement. Riprap armoring of streams at culvert inlets and outlets shall be minimized above the ordinary high water elevation in favor of bioengineering techniques such as bank sloping, erosion control matting and revegetation with deep-rooted, woody plants.

18. The permittee shall use 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" to assure compliance with the appropriate turbidity water quality standard. 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 standards. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project must remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4). 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. All fill material must be adequately stabilized at the earliest practicable date to prevent sediment from entering into adjacent waters or wetlands.

19. The permittee shall take appropriate measure to control any bottom sediment that may be sluiced by the draining of impacted ponds on the project site. Sediment sluicing from ponds is not authorized by this permit.

20. The permittee shall remove all sediment and erosion control measures placed in wetlands or waters, and shall restore natural grades in those areas, prior to project completion.
21. The permittee shall take measures to prevent live or fresh concrete from coming into contact with any surface waters until the concrete has hardened.
22. The permittee shall install barrier fencing or other acceptable forms of barrier around all wetlands that are not to be disturbed to make them readily visible and prevent construction equipment from inadvertently entering and disturbing the wetland areas that are to remain undisturbed.
23. All mechanized equipment will be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. No equipment staging or storage of construction material will occur in wetlands. Hydro-seeding equipment will not be discharged or washed out into any surface waters or wetlands. In the event of a spill of petroleum products or any other hazardous waste, the permittee shall immediately report it to the N.C. Division of Water Quality at (919) 733-5083 or (800) 662-7956 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act will be followed.
24. If the permittee discovers any previously unknown historic or archeological sites while accomplishing the authorized work, he shall immediately stop work and notify the Wilmington District Engineer who will initiate the required State/Federal coordination.
25. The permittee shall maintain the authorized work in good condition and in conformance with the terms and conditions of this permit. The permittee is not relieved of this requirement if he abandons the permitted activity without transferring it to a third party.
26. Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used.
27. This Department of the Army permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.
28. In issuing this permit, the Federal Government does not assume any liability for:
  - 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 Federal activities initiated on behalf of the general public.
  - c. Damages to other permitted or un-permitted activities or structures caused by the authorized activity.

- d. Design and construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.



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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

December 16, 2006

RECEIVED  
DEC 20 2006  
REGULATORY  
WILM. FLD. OFC.

Dr. Greg Thorpe, PhD., Manager  
Planning and Environmental Branch  
North Carolina Department of Transportation  
1548 Mail Service Center  
Raleigh, North Carolina, 27699-1548

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act, Randleman Buffer Rules, and Randleman Rules General Major Variance with ADDITIONAL CONDITIONS for new construction of the High Point East Beltway, US 311 from south of US 2970 to US 220, in Guilford and Randolph Counties, Federal Aid Project No. MAF-F-119-1(1) and MAF-F-119-1-(1), State Project No. 8.1570601 and 8.1571501, TIP R-06091A, 1B, and R-2606A, B, and C.  
DWQ Project No. 2006-0331

Dear Dr. Thorpe:

Attached hereto is a copy of Certification No. WQC003592 issued to The North Carolina Department of Transportation dated December 18, 2006.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Alan W. Klimek".  
Alan W. Klimek, P.E.  
Director

Attachments

cc: Brett Feulner, NCDOT-PDEA  
Richard Spencer, US Army Corps of Engineers, Wilmington Field Office  
Jerry Parker, Division 7 Environmental Officer  
Kathy Matthews, Environmental Protection Agency  
Travis Wilson, NC Wildlife Resources Commission  
Gary Jordan, US Fish and Wildlife Service  
William D. Gilmore, PE, Ecosystem Enhancement Program  
DWQ Winston-Salem Regional Office  
DWQ Transportation Permitting Unit

Dr. Greg Thorpe, PhD  
December 18, 2006  
DWQ # 2006-0331  
WQC003592

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**401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and RANDLEMAN) BUFFER RULES with ADDITIONAL CONDITIONS**

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 211 .0500 and 15A NCAC 2B.0250 for Randleman This certification authorizes the NCDOT to impact the following in Guilford and Randolph Counties:

**Cape Fear River Basin**

Jurisdictional Wetlands	4.16 acres
Open Waters	10.57 acres
Jurisdictional Streams	23,022 linear feet
Randleman Watershed Riparian Buffer	2,444,596 square feet

**Yadkin River Basin**

Jurisdictional Wetlands	0.24 acres
Open Waters	1.64 acres
Jurisdictional Streams	8,318 linear feet

The project shall be constructed pursuant to the application dated February 27, 2006, and additional information dated April 17, 2006, May 4, 2006, June 2, 2006, October 5, 2006, October 18, 2006, and November 15, 2006.

The authorized impacts are as further described below:

**R-0609IA Stream Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
2			461	69	530	461
3				69	69	
4			363	46	409	363
5			231	49	280	231
6 (Main)			967		967	967
6 (Trib 1)			152		152	152
6 (Trib 2)			384		384	384
7			146		146	146
8			591		591	591
10 (Trib 1)			634		634	634
10 (Trib 2)			68		68	68
10 (Trib 3)			1838		1838	1838
10 (Trib 4)			452		452	452
11 (Trib 1)			1495	69	1564	1495
11 (Trib 2)			438		438	438
12			390		390	390
13			5		5	5
14			79	38	117	79
15			75		75	75
16			177	66	243	177
<b>Total</b>			<b>8946</b>	<b>406</b>	<b>9352</b>	<b>8946</b>

One  
North Carolina  
Naturally

Dr. Greg Thorpe, PhD  
 December 18, 2006  
 DWQ # 2006-0331  
 WQC003592

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**R-06091A Wetland Impacts in the Cape Fear River Basin**

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Riverine (R) or Non-Riverine (NR)	Total Wetland Impact (ac)
1			0.04	0.01		NR	0.05
3	0.03					R	0.03
4	0.16			0.03		R	0.19
11 (Trib 1)	0.20		0.03	0.04		R	0.27
12	0.12			0.007		R	0.127
17	0.012					NR	0.012
<b>Total</b>	<b>0.522</b>		<b>0.07</b>	<b>0.087</b>			<b>0.679</b>

Total Riverine Wetland Impact for R-06091A Project: 0.617 acres

Total Non-Riverine Wetland Impact for R-06091A Project: 0.062 acres

**R-06091A Open Water (Ponds) Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
1	0.12		0.12
9	2.37		2.37
15	0.026		0.026
<b>Total</b>	<b>2.516</b>		<b>2.516</b>

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## R-0609IA Randleman Riparian Buffer Impacts

(Impacts not labeled as allowable are approved through the General Major Variance From the Randleman Buffer Rule)

Site	Zone 1 Impact (sq ft)	minus Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1 (sewer line)	182		182	Allowable	445		445	Allowable
1	28578		28578	85734	18697		18697	28045.5
2	25858	3597	22261	66783	14759	3112	11647	17470.5
3 (Trib)	13738		13738	41214	11028		11028	16542
3 (Main)	8618		8618	n/a - Hand clear below bridge	8487		8487	n/a - Hand clear below bridge
4 (Trib 1)	7266		7266	21798	4601		4601	6901.5
4 (Trib 2)	19786		19786	59358	9486		9486	14229
4 (Main)	57809		57809	173427	30408		30408	45612
5	8962		8962	26886	7934		7934	11901
6	33645		33645	100935	21562		21562	32343
7	28472		28472	85416	19278		19278	28917
8 (Trib 1)	32336		32336	97008	20640		20640	30960
8 (Trib 2)	8291		8291	24873	7406		7406	11109
8 (Trib 3)	102950		102950	308850	64581		64581	96871.5
8 (Trib 4)	21234		21234	63702	16759		16759	25138.5
8 (Trib 5)	84514	6807	77707	233121	59469	1842	57627	86440.5
8 (Trib 6)	24586		24586	73758	16981		16981	25471.5
9	29915	5532	24383	73149	16227		16227	24340.5
10	5935		5935	*	5056		5056	*
11	6325		6325	*	4294		4294	*
12	22575		22575	67725	15354		15354	23031
<b>Totals</b>	<b>571575</b>	<b>15936</b>	<b>555639</b>	<b>1603737</b>	<b>373452</b>	<b>4954</b>	<b>368498</b>	<b>525324</b>

\* n/a = Total for Site is less than 1/3 acre and 150 linear feet of impact, no mitigation required

Total Buffer Mitigation Required for R-0609IA Project: **2,129,061 square feet**

## R-0609IB Stream Impacts in the Cape Fear River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
1			850		850	850
2			483	42	525	483
3			453	134	587	453
4	282		0		282	0
5			151		151	151
6			207	49	256	207
9			233		233	233
<b>Total</b>	<b>282</b>		<b>2377</b>	<b>225</b>	<b>2884</b>	<b>2377</b>

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**R-06091B Wetland Impacts in the Cape Fear River Basin**

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Riverine (R) or Non-Riverine (NR)	Total Wetland Impact (ac)
6	0.082			0.032		R	0.114
7	0.296					R	0.296
8	0.007					R	0.007
9	0.002			0.005		R	0.007
<b>Total</b>	<b>0.387</b>			<b>0.037</b>			<b>0.424</b>

**R-06091B Open Water (Ponds) Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
1	0.445		0.445
4	1.581		1.581
5	0.543		0.543
<b>Total</b>	<b>2.569</b>		<b>2.569</b>

**R-06091B Randleman Riparian Buffer Impacts**

(Impacts not labeled as allowable are approved through the General Major Variance from the Randleman Buffer Rule)

Site	Zone 1 Impact (sq ft)	minus Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1	66177		66177	198531	31777		31777	47665.5
2				*	774		774	*
3	33164		33164	99492	20425		20425	30637.5
4	32497		32497	97491	18178		18178	27267
4A	53352		53352	160056	33769		33769	50653.5
5	9203		9203	27609	6128		6128	9192
6	21600		21600	64800	15749		15749	23623.5
7	14717		14717	44151	13868		13868	20802
<b>Totals</b>	<b>230710</b>		<b>230710</b>	<b>692130</b>	<b>140668</b>		<b>140668</b>	<b>209841</b>

\* n/a = Total for Site is less than 1/3 acre and 150 linear feet of impact, no mitigation required

**Total Buffer Mitigation Required for R-06091B Project: 901,971 square feet**



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**R-2606A Stream Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
2			350	100	450	350
3 (Sta 63+06L)			790	115	905	790
3 (Sta 59+48L)			310	20	330	310
4 (Sta 82-75L)	185	20			205	0
4 (Sta 84+40L)			580	65	645	580
5			472	0	472	472
6			200	50	250	200
7			1490	32	1522	1490
<b>Total</b>	<b>185</b>	<b>20</b>	<b>4192</b>	<b>382</b>	<b>4779</b>	<b>4192</b>

**R-2606A Wetland Impacts in the Cape Fear River Basin**

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Riverine (R) or Non-Riverine (NR)	Total Wetland Impact (ac)
2	0.277					R	0.277
6	0.241		0.04			R	0.281
7	0.240		0.016			NR	0.256
<b>Total</b>	<b>0.758</b>		<b>0.056</b>				<b>0.814</b>

Total Riverine Wetland Impact for R-2606A Project: 0.558 acres

Total Non-Riverine Wetland Impact for R-2606A Project: 0.256 acres

**R-2606A Open Water (Ponds) Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
5	0.262		0.262
6	0.634		0.634
8	2.820		2.820
<b>Total</b>	<b>3.716</b>		<b>3.716</b>

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**R-2606A Randleman Riparian Buffer Impacts**

(Impacts not labeled as allowable are approved through the General Major Variance From the Randleman Buffer Rule)

Site	Zone 1 Impact (sq ft)	minus Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1	10996		10996	n/a - Hand clear below bridge	7131		7131	n/a - Hand clear below bridge
1A	939		939	*	1985		1985	*
2	29846	1250	28596	85788	16473	3560	12913	19369.5
3	55664		55664	166992	34704		34704	52056
4	46952		46952	140856	28059		28059	42088.5
5	44530		44530	133590	21659		21659	32488.5
6	115059	13723	101336	304008	76153	3834	72319	108478.5
<b>Totals</b>	<b>303987</b>	<b>14973</b>	<b>289013</b>	<b>831234</b>	<b>186164</b>	<b>7394</b>	<b>178770</b>	<b>254481</b>

\* n/a = Total for Site is less than 1/3 acre and 150 linear feet of impact, no mitigation required

**Total Buffer Mitigation Required for R-2606A Project: 1,085,715 square feet**

**R-2606B Stream Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)*	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft) *	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
13			738		738	738
14 (Sta 51+50L)	466				466	
14 (Sta 53+90L)			338		338	338
15			430		430	430
16	75				75	
17 (Sta 74+00L)			469		469	469
17 (Sta 76+60L)			344		344	344
18 (Sta 84+80L)	49				49	
18 (Sta 88+90L)	417				417	
19			420		420	420
20 (Sta 101+40L)			315		315	315
20 (Sta 105+20L)			404		404	404
21			1542		1542	1542
<b>Total</b>	<b>1007</b>		<b>5000</b>		<b>6007</b>	<b>5000</b>

\* Temporary Impacts will be calculated in future detailed designs submitted for permit modification

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**R-2606B Wetland Impacts in the Cape Fear River Basin**

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Riverine (R) or Non-Riverine (NR)	Total Wetland Impact (ac)
13	0.3076			0.0096		NR	0.3172
14	0.4510			0.0420		NR	0.4930
15	0.1707					NR	0.1707
16	0.4193			0.0173		R	0.4366
19	0.1779					R	0.1779
20	0.6279			0.0213		NR	0.6492
<b>Total</b>	<b>2.1544</b>			<b>0.0902</b>			<b>2.2446</b>

Total Riverine Wetland Impact for R-2606B Project: 0.6145 acres.  
 Total Non-Riverine Wetland Impact for R-2606B Project: 1.6302 acres.

**R-2606B Open Water (Ponds) Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
13	1.0119		1.0119
17	0.7534		0.7534
<b>Total</b>	<b>1.7653</b>		<b>1.7653</b>

**R-2606B Randleman Riparian Buffer Impacts**

(Impacts not labeled as allowable are approved through the General Major Variance From the Randleman Buffer Rule)

Site	Zone 1 Impact (sq ft)	minus Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
13	49535		49535	148605	24563		24563	36844.5
14 (Sta 51+26L)	33099		33099	99297	11141		11141	16711.5
14 (Sta 53+50L)	24003		24003	72009	13390		13390	20085
15	30839		30839	92517	16856		16856	25284
16	21818		21818	65454	34671		34671	52006.5
17 (Sta 72+70L)	37674		37674	113022	18417		18417	27625.5
17 (Sta 76+10L)	22895		22895	68685	11991		11991	17986.5
18 (Sta 85+40L)	3444		3444	10332	1744		1744	2616
18 (Sta 88+55L)	29881		29881	89643	15446		15446	23169
19	29881		29881	89643	15446		15446	23169
20	22335		22335	67005	11377		11377	17065.5
21	105314		105314	315942	52280		52280	78420
<b>Totals</b>	<b>410718</b>		<b>410718</b>	<b>1232154</b>	<b>227322</b>		<b>227322</b>	<b>340983</b>

Total Buffer Mitigation Required for R-2606B Project: 1,573,137 square feet



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**R-2606C Stream Impacts in the Yadkin River Basin**

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)*	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft) *	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
23 (Sta 117+70L)			433		433	433
23 (Sta 119+50L)	121				121	0
23 (Sta 115+95L)			617		617	617
24 (Sta 121+15L)			630		630	630
24 (Sta 122+10L)	256				256	0
25 (Sta 127+00L)			1296		1296	1296
25 (Sta 129+00L)			427		427	427
27 (Sta 139+30L)			164		164	164
27 (Sta 140+85L)			279		279	279
27 (Sta 142+50L)			135		135	135
28 (Sta 147+30L)			341		341	341
28 (Sta 4+55RP)			276		276	276
28 (Sta 6+50RP)			285		285	285
28 (Sta 149+30L)			420		420	420
29 (Sta 11+10RP)			427		427	427
29 (Sta 14+20RP)			984		984	984
29 (Sta 5+30 RP)			548		548	548
30			551		551	551
30 (Sta 16+00RP)			128		128	128
<b>Total</b>	<b>377</b>		<b>7941</b>		<b>8318</b>	<b>7941</b>

\* Temporary Impacts will be calculated in future detailed designs submitted for permit modification

**R-2606C Wetland Impacts in the Cape Fear River Basin**

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Riverine (R) or Non-Riverine (NR)	Total Wetland Impact (ac)
24	0.0274					NR	0.0274
25	0.0064					NR	0.0064
27	0.2100					R	0.2100
<b>Total</b>	<b>0.2438</b>						<b>0.2438</b>

Total Riverine Wetland Impact for R-2606C Project: 0.2100 acres.

Total Non-Riverine Wetland Impact for R-2606C Project: 0.0338 acres.

**R-2606C Open Water (Ponds) Impacts in the Cape Fear River Basin**

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
26	1.6373		1.6373
<b>Total</b>	<b>1.6373</b>		<b>1.6373</b>



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The application provides adequate assurance that the discharge of fill material into the waters of the Cape Fear River Basin and the Yadkin River Basin 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 dated February 27, 2006, and additional information dated April 17, 2006, May 4, 2006, June 2, 2006, October 5, 2006, October 18, 2006, and November 15, 2006. 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 any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

1. When final design plans are completed for R-2606 Section(s) B & C a modification to the 401 Water Quality Certification and the Randleman Watershed Riparian Buffer Certification shall be submitted with five copies and fees to the NC Division of Water Quality. Final designs shall be reviewed through the Merger 01 Process - Concurrence Points 2A, 4B, & 4C. Final designs shall reflect all appropriate avoidance, minimization, and mitigation for impacts to wetlands, streams, and other surface waters, and buffers. No construction activities that impact any wetlands, streams, surface waters, or buffers located in R-2606 Section(s) B & C shall begin until after the NCDOT applies for, and receives a written modification of the 401 Water Quality Certification and the Randleman Watershed Riparian Buffer Certification from the NC Division of Water Quality.
- \*2. Compensatory mitigation for impacts to 20,515 linear feet of streams in the Cape Fear River Basin at a replacement ratio of 1:1 is required.

**On-Site Stream Mitigation:**

Compensatory mitigation for a portion of the impacts to jurisdictional streams shall be provided by:

Site identifier	Type of mitigation	Stream	Length (linear feet)
R-06091A Site 6	Stream relocation	Unnamed tributary to Richland Creek	659
R-2606WM	Stream restoration	Unnamed tributary to Muddy Creek	1230

**Total onsite mitigation credit**

**1,889**

The onsite stream relocation and restoration shall be constructed in accordance with the designs submitted in your October 18, 2006 application addendum. Please be reminded that as-builts for the completed streams shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Unit with the as-builts for the rest of the project. If the parameters of this condition are not met, then the permittee shall supply additional stream mitigation for the 1,889 linear feet of impacts. All channel relocations and restorations will be constructed in a dry work area, will be completed and stabilized, and must be approved on site by DWQ staff, prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season. All stream relocations shall have a 50-foot wide native wooded buffer planted on both sides of the stream unless otherwise authorized by this Certification. 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. A transitional phase incorporating rolled erosion control product (RECP) and appropriate temporary ground cover is allowable.



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Both onsite stream mitigation sites listed above shall be monitored annually for five years or until success criteria are satisfied. Monitoring protocols shall follow the Monitoring Level 1 outlined in the *Stream Mitigation Guidelines, April 2003*.

**Off-Site Stream Mitigation:**

Compensatory mitigation for the remaining 18,626 linear feet of impact to streams is required. We understand that you have chosen to perform compensatory mitigation for impacts to streams through the North Carolina Ecosystem Enhancement Program (EEP), and that the EEP has agreed to implement the mitigation for the project. EEP has indicated in a letter dated May 15, 2006 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the Tri-Party MOA signed on July 22, 2003 and the Dual-Party MOA signed on April 12, 2004.

- \*3. Compensatory mitigation for impacts to 7,941 linear feet of streams in the Yadkin River Basin at a replacement ratio of 1:1 is required.

**Off-Site Stream Mitigation:**

Compensatory mitigation for 7,941 linear feet of impact to streams in the Yadkin River Basin is required. On-site mitigation will be investigated by the NCDOT during project final design phases. A permit modification will be requested should the NCDOT identify any on-site mitigation opportunities. Until final design is complete, we understand that you have chosen to perform compensatory mitigation for impacts to streams through the North Carolina Ecosystem Enhancement Program (EEP), and that the EEP has agreed to implement the mitigation for the project. EEP has indicated in a letter dated December 8, 2006 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the Tri-Party MOA signed on July 22, 2003 and the Dual-Party MOA signed on April 12, 2004.

- \*4. Compensatory mitigation for impacts to the amounts below shall be required.

<u>Zone 1 Buffer Impacts (ft<sup>2</sup>)</u>	<u>Multiplier</u>	<u>Zone 1 mitigation required (ft<sup>2</sup>)</u>
1,453,085	3	4,359,255

<u>Zone 2 Buffer Impacts (ft<sup>2</sup>)</u>	<u>Multiplier</u>	<u>Zone 2 mitigation required (ft<sup>2</sup>)</u>
887,086	1.5	1,330,629

**Total Buffer Mitigation Required: 5,689,884 ft<sup>2</sup>**

**On-site Buffer Mitigation**

Compensatory mitigation for a portion of the impacts to riparian buffers shall be provided by onsite vegetation re-establishment of:

<u>Site Identifier</u>	<u>Type of mitigation</u>	<u>Stream</u>	<u>Buffer replacement area (square feet)</u>
R-06091A Buffer Site 4	Stream relocation	Unnamed tributary to Richland Creek	72,221
R-2606WM	Buffer Restoration	Unnamed tributary to Muddy Creek	116,496

**Total onsite mitigation credit 188,717**



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The onsite buffer restoration shall be conducted in accordance with the buffer restoration plans and drawings submitted in your June 2, 2006, and November 15, 2006 application addendums. Compensatory mitigation for impacts in accordance with the General Major Variance for Randleman riparian vegetation reestablishment shall include a minimum of at least 2 native hardwood tree species planted at a density sufficient to provide 320 trees per acre at maturity. In addition, within one year proof shall be submitted that the riparian buffer has been restored and an annual report will be submitted for a period of 5 years showing that the trees and vegetation have survived and that diffuse flow through the riparian buffer has been maintained. Failure to achieve the 320 trees per acre after 5 years will require reporting by the DOT to DWQ. The report shall provide appropriate remedial actions to be implemented. Approval of the plan by the DWQ is required. The mitigation area shall be placed under a perpetual conservation.

Onsite buffer mitigation sites listed above shall be visually and photographically monitored annually for five years after final planting. Health of vegetation and presence of nuisance species should be noted. Stem counts shall be performed at each buffer mitigation site in year five of the annual monitoring to ensure that the above density requirements are met.

#### *Off-Site Buffer Mitigation*

Compensatory mitigation for the remaining impacts to 5,501,167 square feet of protected riparian buffers shall be required. We understand that you have chosen to perform compensatory mitigation for impacts to protected buffers through use of the North Carolina Ecosystem Enhancement Program (EEP). Mitigation for unavoidable impacts to Randleman Riparian Buffers shall be provided in Randleman Watershed of the Cape Fear River Basin and done in accordance with the Randleman General Major Variance. EEP has indicated in a letter dated October 10, 2006 that they will assume responsibility for satisfying the compensatory mitigation requirements for the above-referenced project, in accordance with the Tri-Party MOA signed on July 22, 2003 and the Dual-Party MOA signed on April 12, 2004.

5. Compensatory mitigation for jurisdictional wetland impacts as listed below is required at a offsite replacement ratio of 2:1.

#### **Cape Fear River Basin**

<u>Wetland Impacts</u>	<u>Replacement Ratio</u>	<u>Offsite Wetland Mitigation Required</u>
2.21 acres Riverine	2	4.42 acres
1.95 acres Non-Riverine	2	3.90 acres

#### **Yadkin River Basin**

<u>Wetland Impacts</u>	<u>Replacement Ratio</u>	<u>Offsite Wetland Mitigation Required</u>
0.21 acres Riverine	2	0.42 acres
0.03 acres Non-Riverine	2	0.06 acres

#### *Off-Site Wetland Mitigation*

We understand that you have chosen to perform compensatory mitigation for impacts to wetlands through the North Carolina Ecosystem Enhancement Program (EEP), and that the EEP has agreed to implement the mitigation for the project. EEP has indicated in a letter dated May 15, 2006 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the Tri-Party MOA signed on July 22, 2003 and the Dual-Party MOA signed on April 12, 2004.

- Upon completion of this project, the permittee shall maintain a Stormwater Management Plan that addresses perpetual maintenance of the stormwater management facilities, including hazardous spill basins, approved with this Certification, and necessary to meet the Randleman Rules General Major Variance.
- The permittee shall conduct a pre-construction meeting, with all relevant parties and regulatory agencies prior to commencing work on any portion of this project. Two copies of the final construction drawings shall be furnished to NCDWQ Central Office prior to the pre-construction meeting. The permittee shall provide written verification that the final construction drawings comply with the permit drawings contained in the application dated February 27, 2006 and any amendments and modifications subsequently submitted to DWQ and approved with this certification. Any deviations from the approved drawings are not authorized unless approved by the NC Division of Water Quality.

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 North Carolina  
 Naturally



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December 18, 2006  
DWQ # 2006-0331  
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8. The permittee 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 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.
9. 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.
10. The permittee shall follow the *NC DOT Best Management Practices for Construction and Maintenance Activities, August 2003* throughout final design and construction activities associated with this project.
11. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification.
12. The permittee shall use *Design Standards in Sensitive Watersheds* [15A NCAC 4B.0124(a)-(e)]. Temporary cover (wheat, millet, or similar annual grain) or permanent herbaceous cover should be planted on all bare soil within 15 working days of ground disturbing activities to provide long-term erosion control. Tall Fescue should not be used in riparian areas. We encourage NCDOT to utilize onsite vegetation and materials for riverbank stabilization when practicable. Erosion control matting should be used on stream banks and riparian areas with steeper slopes and should be well anchored with 12 inch staples or 12 inch wooden survey stakes.
13. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:
  - a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.
  - b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
  - c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.
  - d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
14. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved as impacted areas by this Certification. Measures may be placed in areas identified as temporary or permanently impacted by this certification even if not shown on the impact drawings.
15. Bridge deck drains should not discharge directly into the stream. Stormwater should be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to the most current version of *Stormwater Best Management Practices*.

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16. Placement of culverts and other structures in waters, streams, and wetlands shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. 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 is being maintained if requested in writing by DWQ. If this condition is unable to be met due to bedrock, extreme slopes, or other limiting features encountered during final design and/or construction, please contact the NC DWQ for guidance on how to proceed and to determine whether or not a permit modification will be required.
17. For stream crossings with multiple pipes or barrels, they should be installed to mimic the natural stream cross section as closely as possible including pipes or barrels at flood plain elevation, flood plain benches, and/or sills where appropriate. Widening the stream channel shall be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.
18. Riprap should not be placed in the active thalweg channel unless approved in this certification. Approved riprap for stream crossing stabilization should not be placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.
19. The dimension, pattern and profile of the stream above and below the crossing should not be modified. Disturbed floodplains and streams should be restored to natural geomorphic conditions.
20. If concrete is used during construction, a dry work area should be maintained to prevent direct contact between curing concrete and stream water. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other dewatering and diversion structures shall be used to maintain a dry work area. Water that inadvertently contacts uncured concrete should not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.
21. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.
22. At locations where ponds will be drained, proper measures will be taken to drain the pond with limited impact to aquatic species. If typical pond draining techniques will create significant disturbance to native aquatic species, additional measures such as collection and relocation may be necessary to prevent a significant fish kill. NCDOT shall consult with NC Wildlife Resources staff to determine if there are any sensitive species, and the most appropriate measures to limit impacts to these species. The permittee shall observe any natural channel re-establishment, or utilize natural channel construction techniques, to ensure that the jurisdictional stream channel above and below the drained pond remain stable, and that no secondary impacts occur within the channel as a result of draining the pond.
23. 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.
24. Heavy equipment shall be operated from the banks rather than in the stream channel in order to minimize sedimentation and reduce the introduction of other pollutants into the stream.
25. 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.
26. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification.
27. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
28. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification.

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29. Native riparian vegetation (ex. list trees and shrubs native to your geographic region) must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.
30. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities.
31. All stormwater runoff shall be directed as sheetflow through stream buffers at nonerosive velocities, unless otherwise approved by this certification.
32. All riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated. Maintained buffers shall be permanently revegetated with non-woody species by the end of the growing season following completion of construction. For the purpose of this condition, maintained buffer areas are defined as areas within the transportation corridor that will be subject to regular DOT maintenance activities including mowing. The area with non-maintained buffers shall be permanently revegetated, with native woody species before the next growing season following completion of construction.
33. Pursuant to NCAC 15A 2B.0250 for Randleman Watershed, sediment and erosion control devices shall not be placed in Zone 1 of any Randleman Buffer without prior approval by the NCDWQ. At this time, the NCDWQ has approved no sediment and erosion control devices in Zone 1 outside of the approved project impacts 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.
34. Upon completion of the project, the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed.

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**401**

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

If this Certification is unacceptable to you have the right to an adjudicatory hearing upon written request within sixty (60) days following receipt of this Certification. This request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. 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 18<sup>th</sup> day of December 2006

DIVISION OF WATER QUALITY

Alan W. Klimck, P.E.  
Director

WQC No. WQC003592

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

Applicant: North Carolina Department of Transportation	File Number: 2004-00340	Date: March 7, 2007
Attached is:	See Section below	
<input checked="" type="checkbox"/> INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
<input type="checkbox"/> PROFFERED PERMIT (Standard Permit or Letter of permission)	B	
<input type="checkbox"/> PERMIT DENIAL	C	
<input type="checkbox"/> APPROVED JURISDICTIONAL DETERMINATION	D	
<input type="checkbox"/> 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://www.usace.army.mil/inet/functions/cw/eccwo/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. Richard K. Spencer, Regulatory Project Manager  
 U.S. Army Corps of Engineers, Wilmington District  
 Wilmington Regulatory Field Office  
 69 Darlington Avenue  
 Wilmington, North Carolina 228402

If you only have questions regarding the appeal process you may also contact:  
 Mr. Michael Bell, 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

21-JAN-2006 13:55  
 C:\PROJECTS\2006\2006091A\CONTRACT.PLOT

1/26/06

# CONTRACT:

# TIP: R-06091A

**GRAPHIC SCALES**

PLANS  
 1" = 10'

PROFILE (HORIZONTAL)  
 1" = 10'

PROFILE (VERTICAL)  
 1" = 10'

**DESIGN DATA**

ADT 2005 - 27,000  
 ADT 2025 - 39,000  
 DHV - 10 %  
 D - 60 %  
 T - 13 %  
 V - 110 mph  
 \* TST 7 % DUAL 4 %  
 PUNC CLASS - FREEWAY

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF HIGH POINT. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES TO THE LIMITS ESTABLISHED BY METHOD (III).

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT R-06091A = 4.929 KM  
 LENGTH STRUCTURE TIP PROJECT R-06091A = 0.012 KM  
 TOTAL LENGTH TIP PROJECT R-06091A = 4.941 KM

Approved in the Office of  
**DIVISION OF HIGHWAYS**  
 1000 Birch Ridge Dr., Raleigh, NC 27619

DATE SUBMITTED FOR REVIEW: SEPTEMBER 2003

RIGHT OF WAY DATE: SEPTEMBER 2003

LETTING DATE: SEPTEMBER 19, 2006

PROJECT MANAGER: JIMMY GOODNIGHT, PE

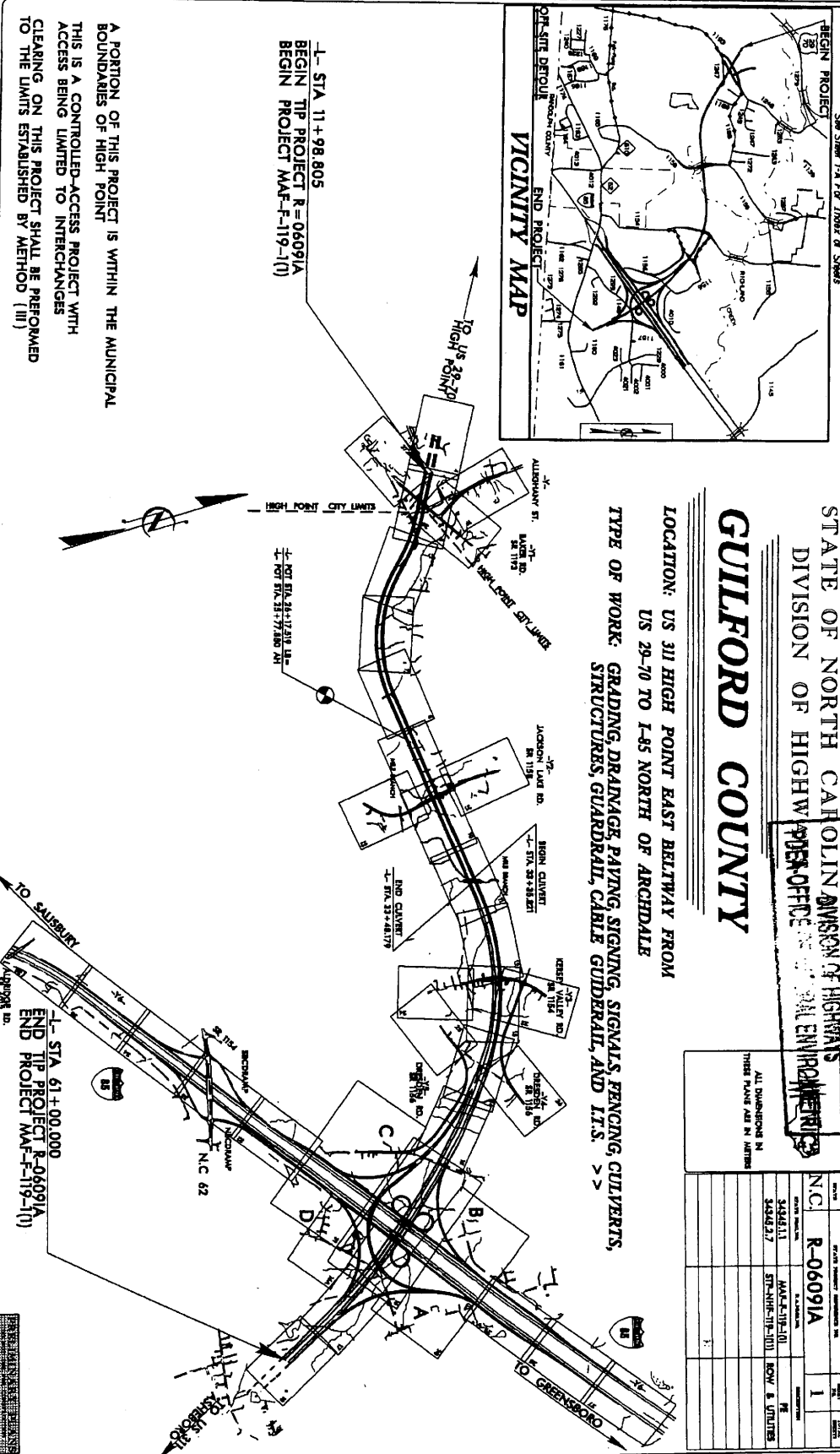
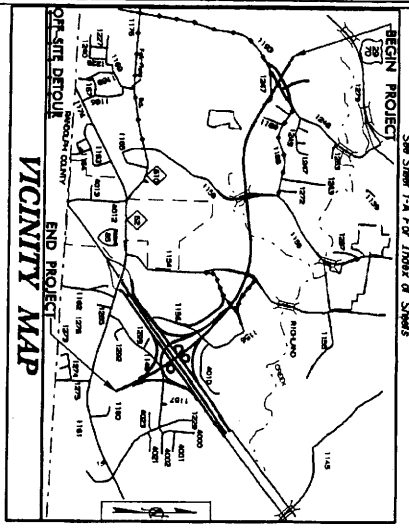
PROJECT ENGINEER: STEVE KENDALL

**HYDROLOGICS ENGINEER**

ROLDWAY DIXSON  
 ENGINEER

**DIVISION OF HIGHWAYS**  
 STATE OF NORTH CAROLINA

FEDERAL ENGINEER: DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION



STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS  
 DIVISION OF HIGHWAY DESIGN OFFICE  
**GUILFORD COUNTY**

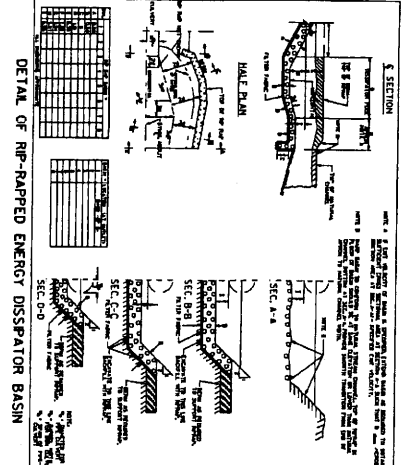
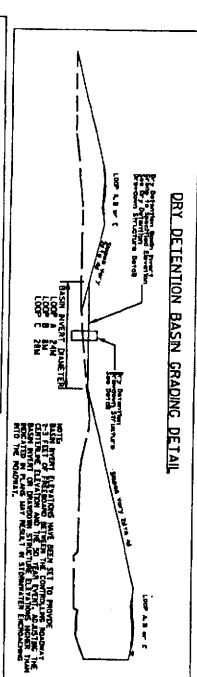
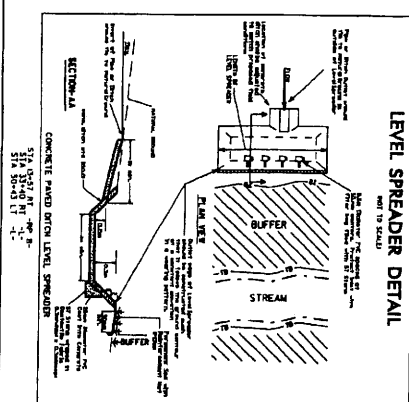
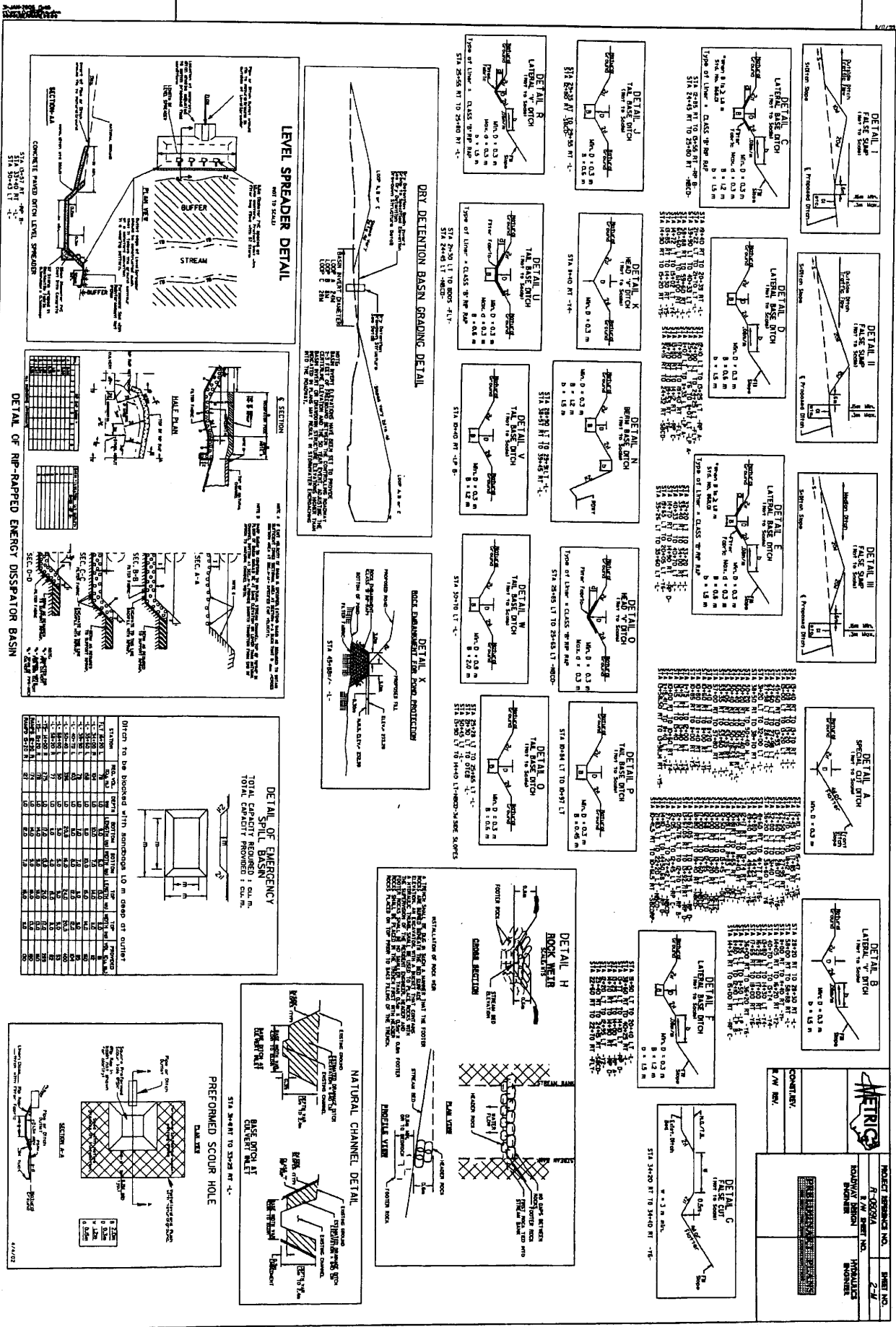
LOCATION: US 311 HIGH POINT EAST BELTWAY FROM US 29-70 TO I-85 NORTH OF ARCHDALE

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING, SIGNALS, FENCING, CULVERTS, STRUCTURES, GUARDRAIL, CABLE GUDDERAIL, AND I.T.S.

ALL DIMENSIONS IN THESE PLANS ARE IN METERS	
NO. 1	NO. 1
N.C. R-06091A	1
DATE: 3/4/06	DATE: 3/4/06
BY: [Signature]	BY: [Signature]
CHECKED: [Signature]	CHECKED: [Signature]
DATE: 3/4/06	DATE: 3/4/06
BY: [Signature]	BY: [Signature]
CHECKED: [Signature]	CHECKED: [Signature]
DATE: 3/4/06	DATE: 3/4/06

RECEIVED  
 MAR 15 2007

VEGETATION

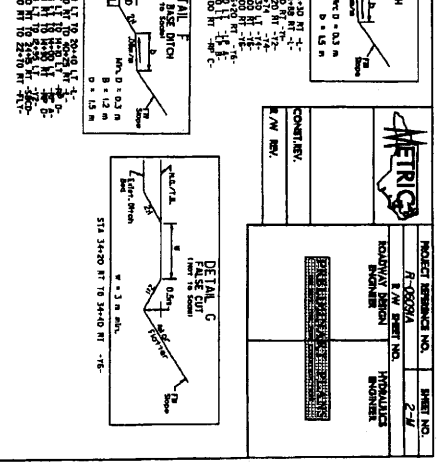
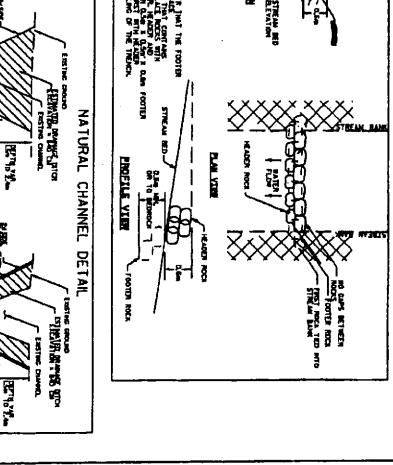
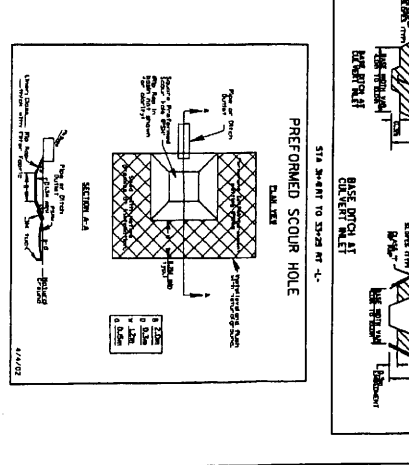


**DETAIL OF EMERGENCY SPILL BASIN**

TOTAL CAPACITY REQUIRED: GAL. M.

Labels: EMERGENCY SPILL BASIN, TOTAL CAPACITY REQUIRED: GAL. M., SECTION A-A.

STATION	NO.	WIDTH	DEPTH	LENGTH	VOLUME	AREA
1+00	1	10	1.0	10	100	100
1+10	2	10	1.0	10	100	100
1+20	3	10	1.0	10	100	100
1+30	4	10	1.0	10	100	100
1+40	5	10	1.0	10	100	100
1+50	6	10	1.0	10	100	100
1+60	7	10	1.0	10	100	100
1+70	8	10	1.0	10	100	100
1+80	9	10	1.0	10	100	100
1+90	10	10	1.0	10	100	100
2+00	11	10	1.0	10	100	100
2+10	12	10	1.0	10	100	100
2+20	13	10	1.0	10	100	100
2+30	14	10	1.0	10	100	100
2+40	15	10	1.0	10	100	100
2+50	16	10	1.0	10	100	100
2+60	17	10	1.0	10	100	100
2+70	18	10	1.0	10	100	100
2+80	19	10	1.0	10	100	100
2+90	20	10	1.0	10	100	100
3+00	21	10	1.0	10	100	100
3+10	22	10	1.0	10	100	100
3+20	23	10	1.0	10	100	100
3+30	24	10	1.0	10	100	100
3+40	25	10	1.0	10	100	100
3+50	26	10	1.0	10	100	100
3+60	27	10	1.0	10	100	100
3+70	28	10	1.0	10	100	100
3+80	29	10	1.0	10	100	100
3+90	30	10	1.0	10	100	100
4+00	31	10	1.0	10	100	100
4+10	32	10	1.0	10	100	100
4+20	33	10	1.0	10	100	100
4+30	34	10	1.0	10	100	100
4+40	35	10	1.0	10	100	100
4+50	36	10	1.0	10	100	100
4+60	37	10	1.0	10	100	100
4+70	38	10	1.0	10	100	100
4+80	39	10	1.0	10	100	100
4+90	40	10	1.0	10	100	100
5+00	41	10	1.0	10	100	100
5+10	42	10	1.0	10	100	100
5+20	43	10	1.0	10	100	100
5+30	44	10	1.0	10	100	100
5+40	45	10	1.0	10	100	100
5+50	46	10	1.0	10	100	100
5+60	47	10	1.0	10	100	100
5+70	48	10	1.0	10	100	100
5+80	49	10	1.0	10	100	100
5+90	50	10	1.0	10	100	100
6+00	51	10	1.0	10	100	100
6+10	52	10	1.0	10	100	100
6+20	53	10	1.0	10	100	100
6+30	54	10	1.0	10	100	100
6+40	55	10	1.0	10	100	100
6+50	56	10	1.0	10	100	100
6+60	57	10	1.0	10	100	100
6+70	58	10	1.0	10	100	100
6+80	59	10	1.0	10	100	100
6+90	60	10	1.0	10	100	100
7+00	61	10	1.0	10	100	100
7+10	62	10	1.0	10	100	100
7+20	63	10	1.0	10	100	100
7+30	64	10	1.0	10	100	100
7+40	65	10	1.0	10	100	100
7+50	66	10	1.0	10	100	100
7+60	67	10	1.0	10	100	100
7+70	68	10	1.0	10	100	100
7+80	69	10	1.0	10	100	100
7+90	70	10	1.0	10	100	100
8+00	71	10	1.0	10	100	100
8+10	72	10	1.0	10	100	100
8+20	73	10	1.0	10	100	100
8+30	74	10	1.0	10	100	100
8+40	75	10	1.0	10	100	100
8+50	76	10	1.0	10	100	100
8+60	77	10	1.0	10	100	100
8+70	78	10	1.0	10	100	100
8+80	79	10	1.0	10	100	100
8+90	80	10	1.0	10	100	100
9+00	81	10	1.0	10	100	100
9+10	82	10	1.0	10	100	100
9+20	83	10	1.0	10	100	100
9+30	84	10	1.0	10	100	100
9+40	85	10	1.0	10	100	100
9+50	86	10	1.0	10	100	100
9+60	87	10	1.0	10	100	100
9+70	88	10	1.0	10	100	100
9+80	89	10	1.0	10	100	100
9+90	90	10	1.0	10	100	100
10+00	91	10	1.0	10	100	100
10+10	92	10	1.0	10	100	100
10+20	93	10	1.0	10	100	100
10+30	94	10	1.0	10	100	100
10+40	95	10	1.0	10	100	100
10+50	96	10	1.0	10	100	100
10+60	97	10	1.0	10	100	100
10+70	98	10	1.0	10	100	100
10+80	99	10	1.0	10	100	100
10+90	100	10	1.0	10	100	100



**METRIX**

PROJECT REFERENCE NO. SHEET NO. 27

DATE: 11/10/00

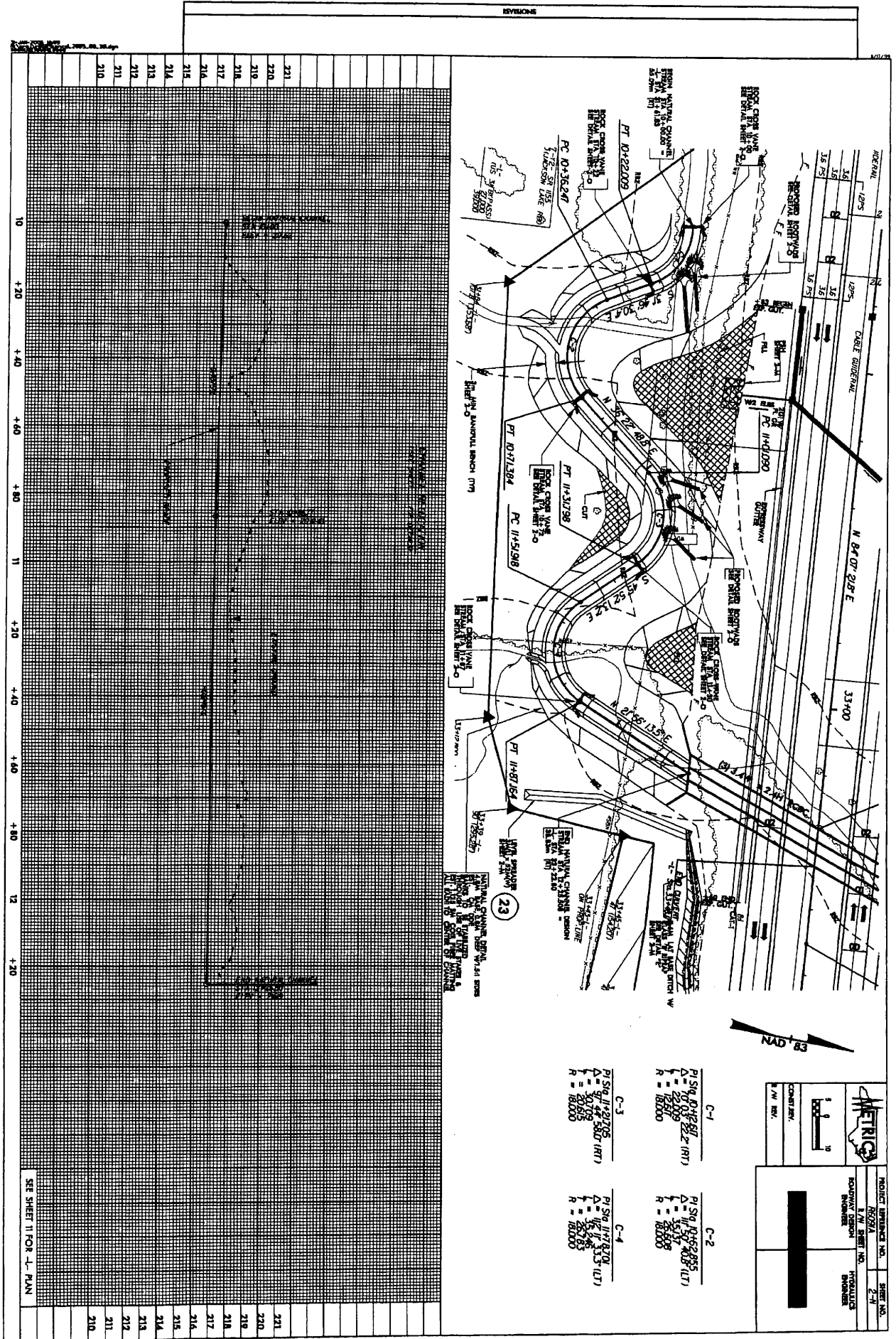
DESIGNED BY: J. W. BENTLEY

CHECKED BY: J. W. BENTLEY

APPROVED BY: J. W. BENTLEY

SCALE: AS SHOWN





REVISIONS

221	
220	
219	
218	
217	
216	
215	
214	
213	
212	
211	
210	

PROJECT NUMBER NO. \_\_\_\_\_ SHEET NO. 2-N

DESIGNER: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

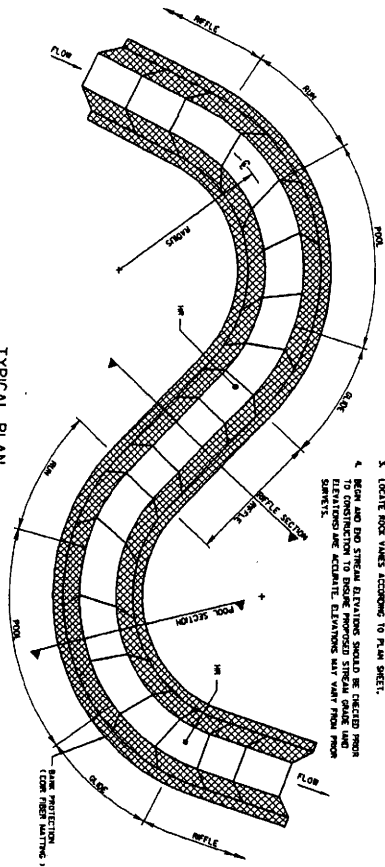
SCALE: 1" = 20'

DATE: \_\_\_\_\_

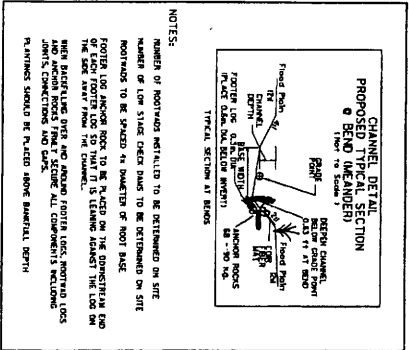
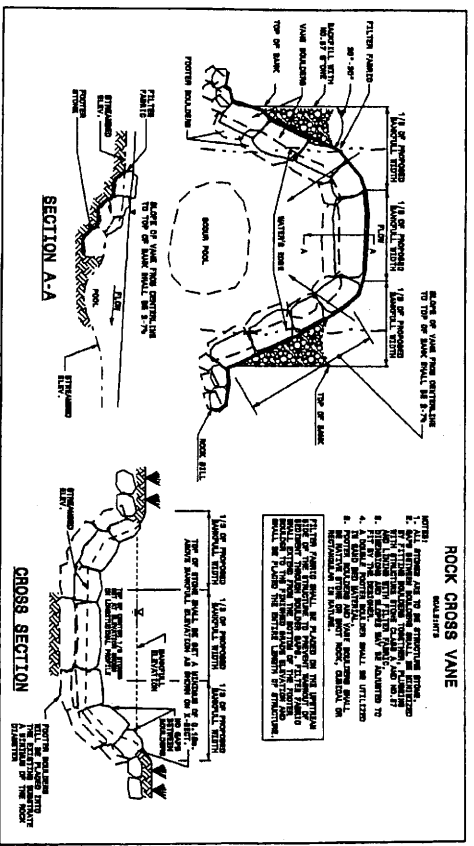
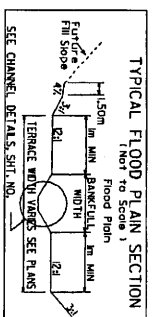
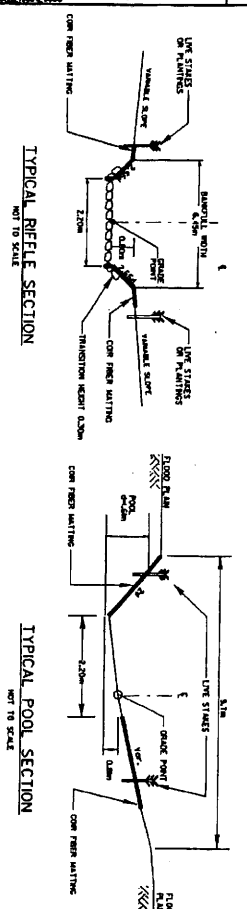
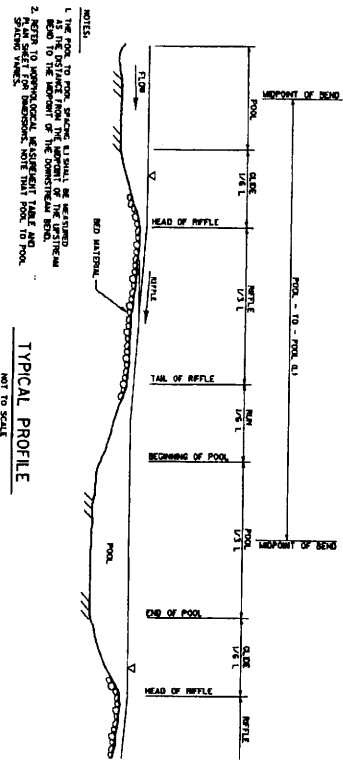
Curve	PI Station	PT Station	PC Station	Curve Length (L)	Radius (R)
C-1	10+22.00	10+52.00	10+00.00	52.00	18000
C-2	11+20.00	11+50.00	11+00.00	50.00	18000
C-3	12+20.00	12+50.00	12+00.00	50.00	18000
C-4	13+20.00	13+50.00	13+00.00	50.00	18000

SEE SHEET 11 FOR L-PLAN

REVISIONS



- NOTES:
1. THE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CHANNEL ALIGNMENT AND THE CHANNEL CROSS SECTION. THE CHANNEL SHALL BE CONSTRUCTED TO THE CENTER LINE OF THE CHANNEL FOR EACH OF THE RIFFLE AND POOL SECTIONS. THE CHANNEL SHALL BE CONSTRUCTED WITH A STRAIGHT LINE BETWEEN SUCCESSIVE RIFFLES.
  2. FIELD ADJUSTMENT OF THE CHANNEL ALIGNMENT SHALL BE REQUIRED TO AVOID CERTAIN OBSTACLES. APPROVAL OF THE FIELD ADJUSTMENT SHALL BE OBTAINED FROM THE CONTRACTOR OF THE CHANNEL.
  3. LOCATE ROCK VANS ACCORDING TO PLAN SHEET.
  4. HEAD AND END STREAM ELEVATIONS SHOULD BE CHECKED FROM THE CONSTRUCTION TO ENSURE PROPOSED STREAM GRADE AND CHANNEL CROSS SECTION ACCURATE ELEVATIONS ARE MAINTAINED FROM POOL TO POOL.



MORPHOLOGICAL MEASUREMENT TABLE

VARIABLES	EXISTING CHANNEL	PROPOSED REACH I	REFERENCE REACH
0 STREAM TYPE	36	36	36
1 CHANNEL WIDTH	3.00m	3.00m	3.00m
2 CHANNEL DEPTH	0.50m	0.50m	0.50m
3 CHANNEL BANK WIDTH	0.50m	0.50m	0.50m
4 CHANNEL CROSS-SECTIONAL AREA	0.75m <sup>2</sup>	0.75m <sup>2</sup>	0.75m <sup>2</sup>
5 CHANNEL WET PERCENT	100%	100%	100%
6 CHANNEL DEPTH AT 10% WET PERCENT	0.20m	0.20m	0.20m
7 CHANNEL DEPTH AT 50% WET PERCENT	0.50m	0.50m	0.50m
8 CHANNEL DEPTH AT 90% WET PERCENT	0.80m	0.80m	0.80m
9 CHANNEL DEPTH AT 100% WET PERCENT	1.00m	1.00m	1.00m
10 CHANNEL DEPTH AT 10% WET PERCENT TO HEAD OF POOL	0.20m	0.20m	0.20m
11 CHANNEL DEPTH AT 10% WET PERCENT TO TAIL OF POOL	0.20m	0.20m	0.20m
12 CHANNEL DEPTH AT 50% WET PERCENT TO HEAD OF POOL	0.50m	0.50m	0.50m
13 CHANNEL DEPTH AT 50% WET PERCENT TO TAIL OF POOL	0.50m	0.50m	0.50m
14 CHANNEL DEPTH AT 90% WET PERCENT TO HEAD OF POOL	0.80m	0.80m	0.80m
15 CHANNEL DEPTH AT 90% WET PERCENT TO TAIL OF POOL	0.80m	0.80m	0.80m
16 CHANNEL DEPTH AT 100% WET PERCENT TO HEAD OF POOL	1.00m	1.00m	1.00m
17 CHANNEL DEPTH AT 100% WET PERCENT TO TAIL OF POOL	1.00m	1.00m	1.00m
18 CHANNEL DEPTH AT 10% WET PERCENT TO HEAD OF POOL TO POOL	0.20m	0.20m	0.20m
19 CHANNEL DEPTH AT 10% WET PERCENT TO TAIL OF POOL TO POOL	0.20m	0.20m	0.20m
20 CHANNEL DEPTH AT 50% WET PERCENT TO HEAD OF POOL TO POOL	0.50m	0.50m	0.50m
21 CHANNEL DEPTH AT 50% WET PERCENT TO TAIL OF POOL TO POOL	0.50m	0.50m	0.50m
22 CHANNEL DEPTH AT 90% WET PERCENT TO HEAD OF POOL TO POOL	0.80m	0.80m	0.80m
23 CHANNEL DEPTH AT 90% WET PERCENT TO TAIL OF POOL TO POOL	0.80m	0.80m	0.80m
24 CHANNEL DEPTH AT 100% WET PERCENT TO HEAD OF POOL TO POOL	1.00m	1.00m	1.00m
25 CHANNEL DEPTH AT 100% WET PERCENT TO TAIL OF POOL TO POOL	1.00m	1.00m	1.00m
26 CHANNEL DEPTH AT 10% WET PERCENT TO HEAD OF POOL TO POOL TO POOL	0.20m	0.20m	0.20m
27 CHANNEL DEPTH AT 10% WET PERCENT TO TAIL OF POOL TO POOL TO POOL	0.20m	0.20m	0.20m
28 CHANNEL DEPTH AT 50% WET PERCENT TO HEAD OF POOL TO POOL TO POOL	0.50m	0.50m	0.50m
29 CHANNEL DEPTH AT 50% WET PERCENT TO TAIL OF POOL TO POOL TO POOL	0.50m	0.50m	0.50m
30 CHANNEL DEPTH AT 90% WET PERCENT TO HEAD OF POOL TO POOL TO POOL	0.80m	0.80m	0.80m
31 CHANNEL DEPTH AT 90% WET PERCENT TO TAIL OF POOL TO POOL TO POOL	0.80m	0.80m	0.80m
32 CHANNEL DEPTH AT 100% WET PERCENT TO HEAD OF POOL TO POOL TO POOL	1.00m	1.00m	1.00m
33 CHANNEL DEPTH AT 100% WET PERCENT TO TAIL OF POOL TO POOL TO POOL	1.00m	1.00m	1.00m

PROJECT REFERENCE NO. 870704

SHEET NO. 2-0

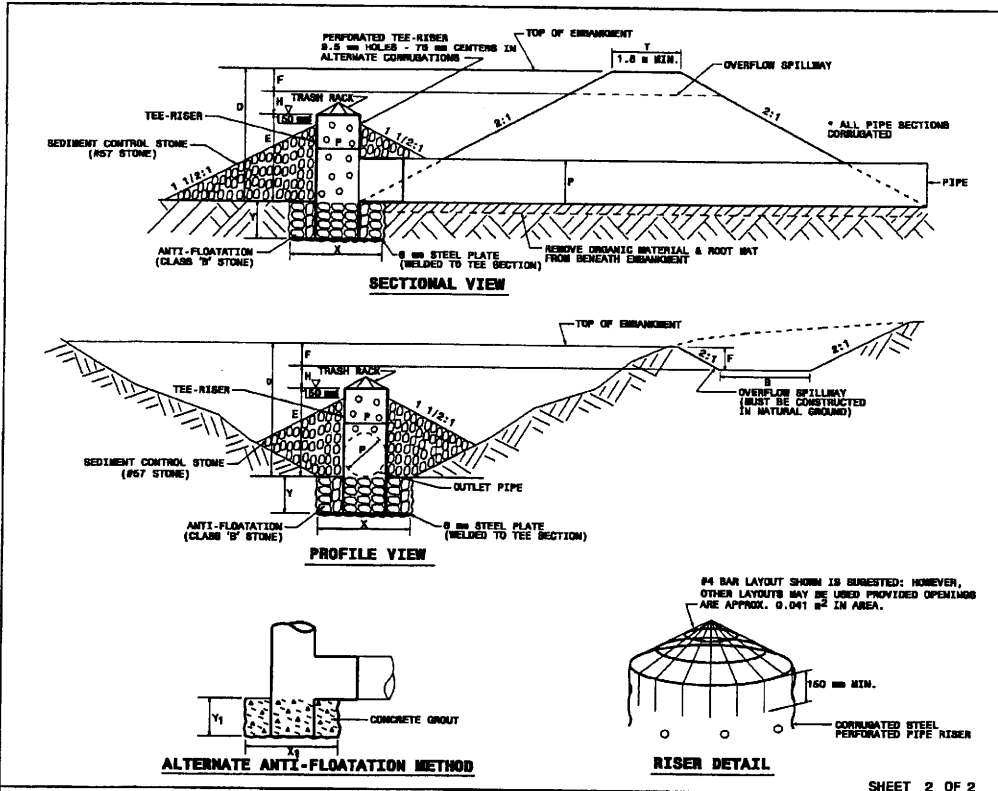
DATE 11/11/04

DESIGNED BY [Signature]

CHECKED BY [Signature]

APPROVED BY [Signature]

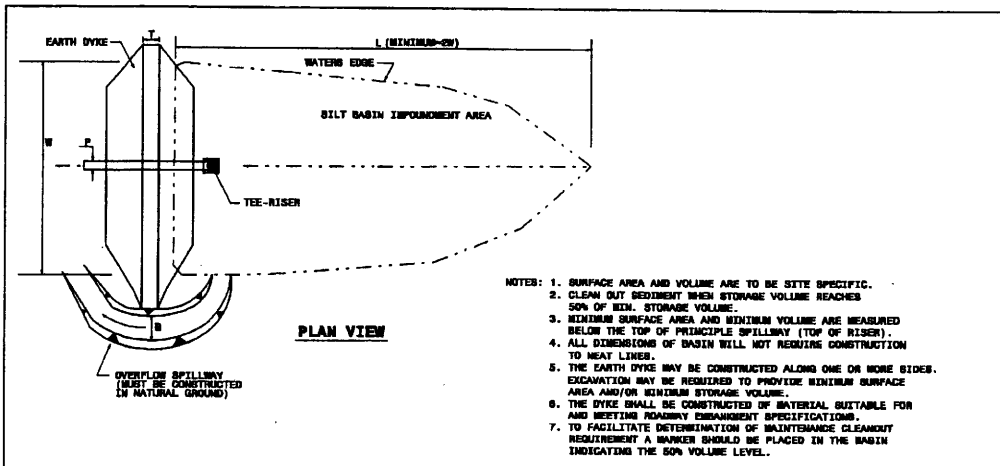
SCALE 1/4" = 1'-0"



SHEET 2 OF 2

**SPECIAL DETAIL FOR TYPE "A" SILT BASIN**

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



BASIN #	APPROX. STA.	P	H	T	D <sup>+</sup>	E	F	B	X	Y	X <sub>1</sub>	Y <sub>1</sub>	SURFACE AREA (sqm)	STORAGE VOLUME (cu m)
1	33+40 (LT)	600	0.3	1.8	2.11	1.20	0.81	1.81	1.2	0.45	1.1	0.45	332	370
2	35+30 (LT)	600	0.3	1.8	2.41	1.50	0.81	2.82	1.3	0.45	1.2	0.45	534	513

\* SHALL NOT EXCEED 3.7 m

HYDRAULIC ENGINEER

DATE

SHEET 1 OF 2

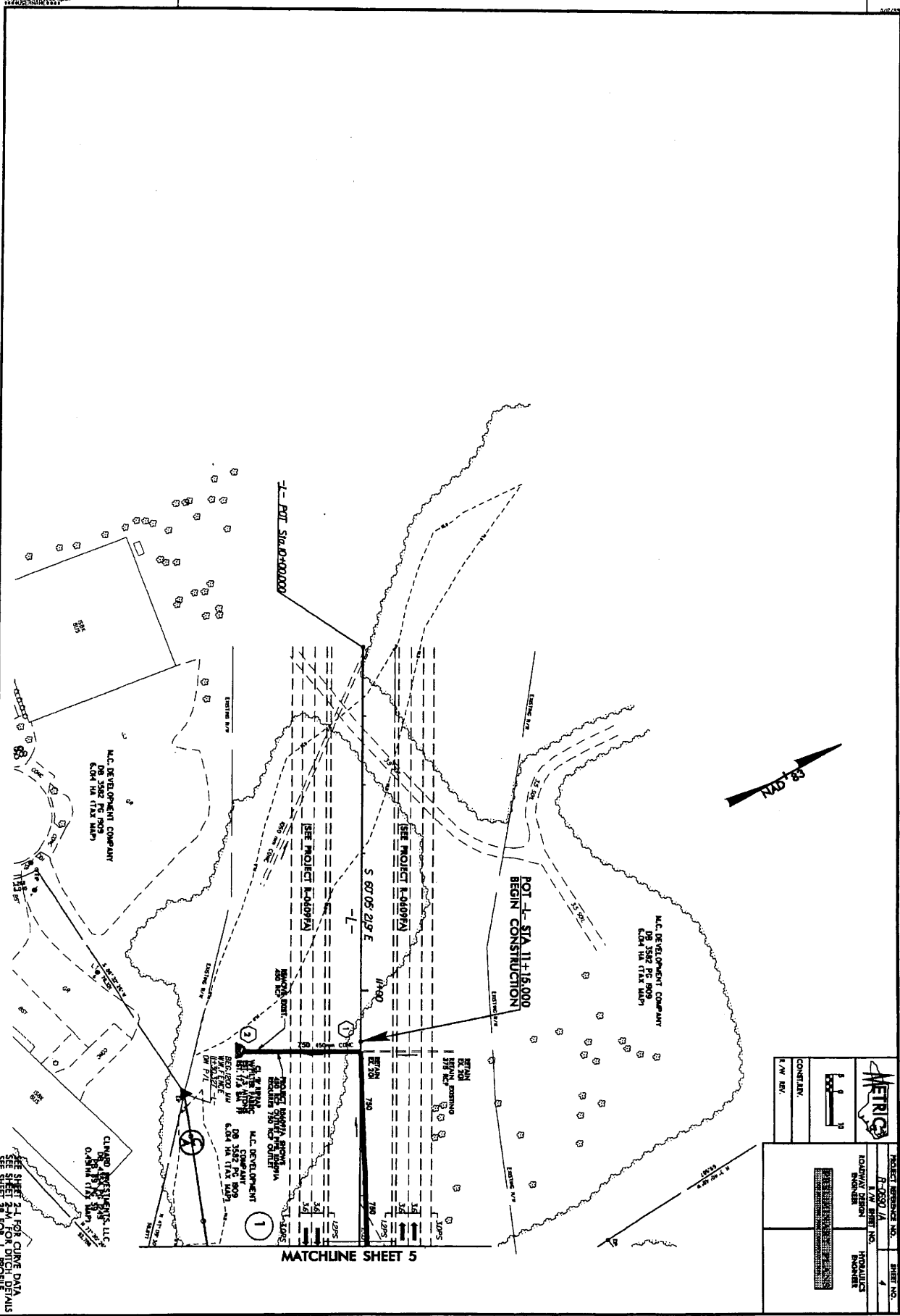
**SPECIAL DETAIL FOR TYPE "A" SILT BASIN**

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

NORTH CAROLINA  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

FROM REVISION, THIS REVISION CONSISTS OF ADDING EXISTING ROM TO PARCEL 1.  
W/P/W 03-17-2005

REVISIONS

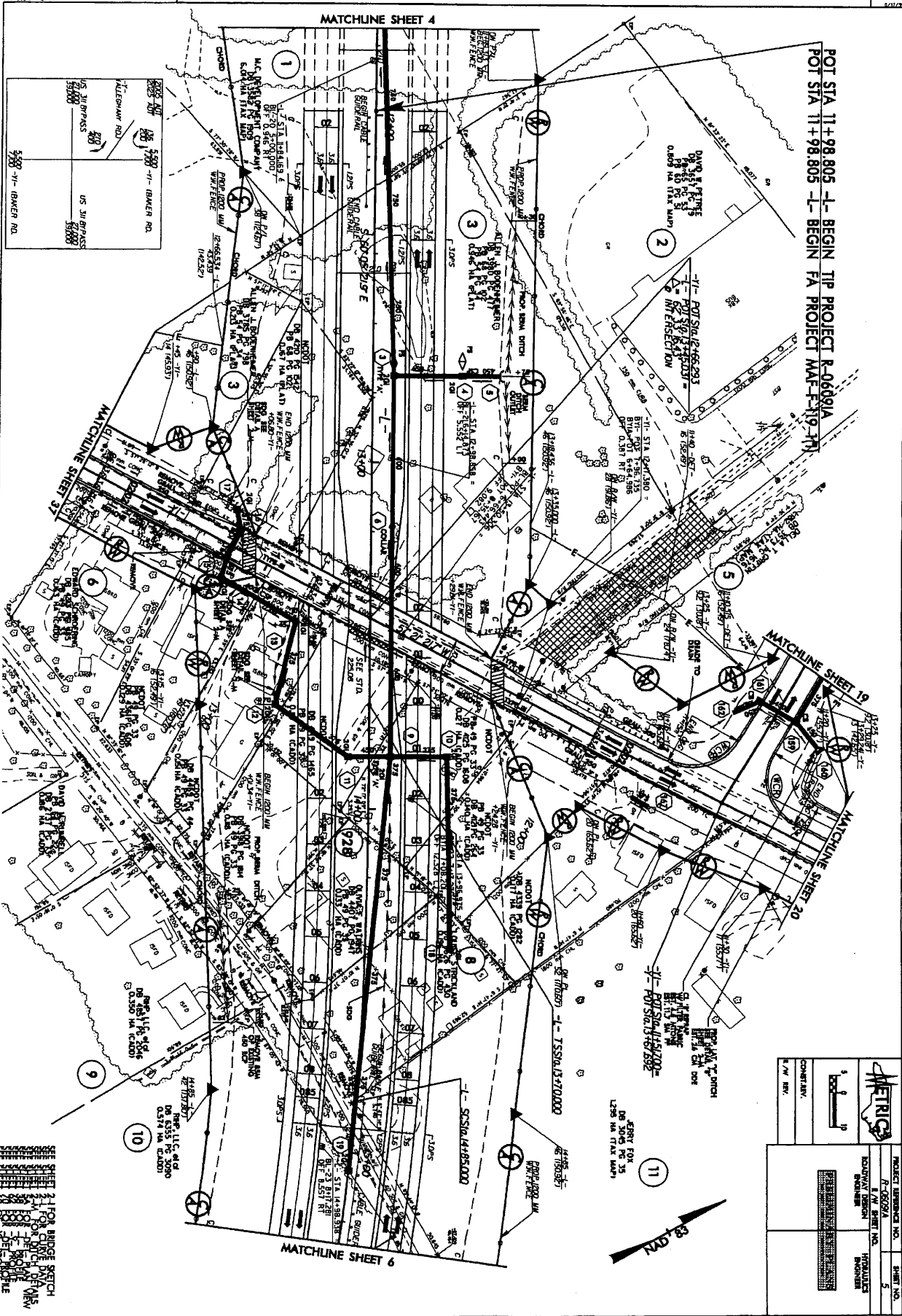


SEE SHEET 21 FOR CURVE DATA  
SEE SHEET 22 FOR DITCH DETAILS  
SEE SHEET 30 FOR 1" PROFILE

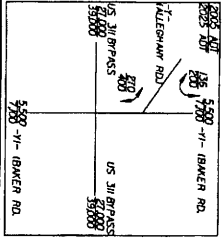
MATCHLINE SHEET 5

	PROJECT NUMBER: 03-00000000	SHEET NO. 4
	DATE: 03-17-2005	PROJECT TITLE: ROADWAY IMPROVEMENT
CONTRACT NO. 03-00000000	CONTRACT DESCRIPTION: ROADWAY IMPROVEMENT	CONTRACT NUMBER: 03-00000000

REVISIONS

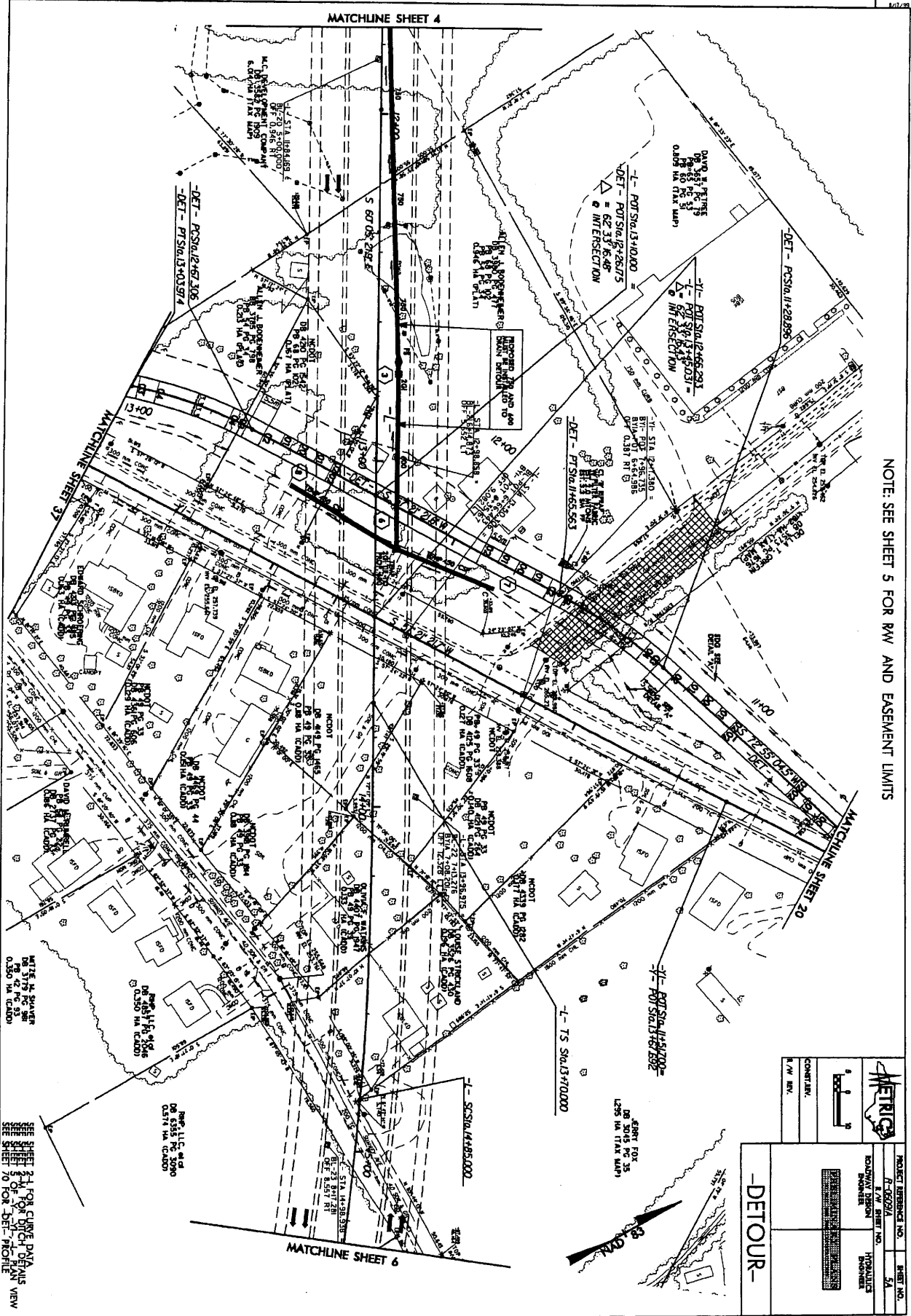


POT STA 11+98.805 -L- BEGIN TIP PROJECT R-06091A  
 POT STA 11+98.805 -L- BEGIN FA PROJECT MAC-E-119-111

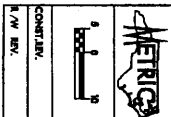


	PROJECT NUMBER NO.	R-06091A
	SHEET NO.	5
	DATE OF PLAN	11/19/08
	PROJECT NO.	119-111
	CONTRACT NO.	MAC-E-119-111
	SCALE	AS SHOWN

SEE SHEET 24 FOR BRIDGE SKETCH  
 SEE SHEET 21 FOR CURVE DATA  
 SEE SHEET 20 FOR GRADE DATA  
 SEE SHEET 19 FOR ELEVATION DATA  
 SEE SHEET 18 FOR PROFILE



NOTE: SEE SHEET 5 FOR RW AND EASEMENT LIMITS



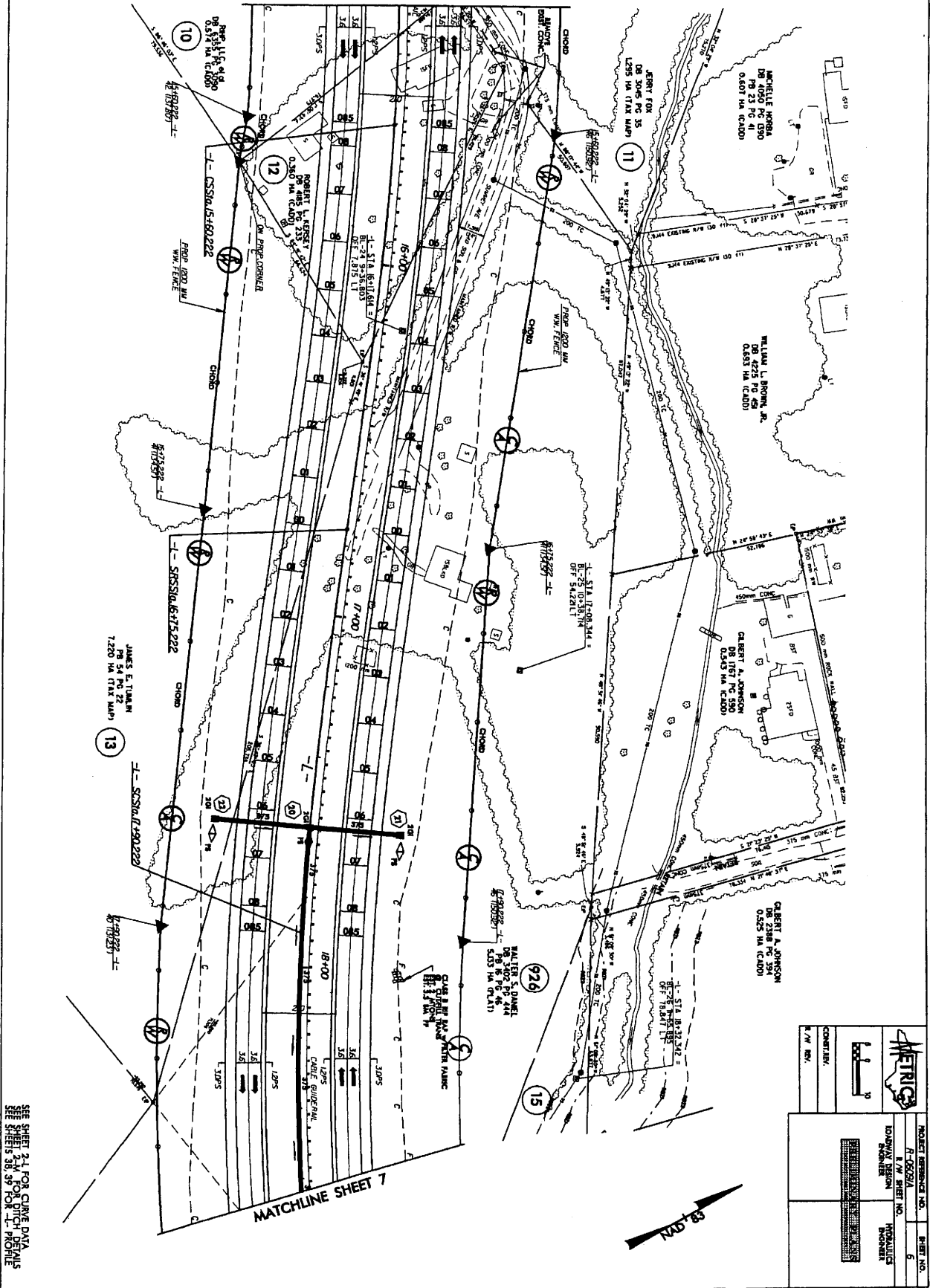
PROJECT REFERENCE NO.		SHEET NO.	
17-0629A		51	
ROADWAY DESIGN		PROBABLE	
SHEET NO.		SHEET NO.	
17-0629A		51	
DATE		DATE	
11/11/11		11/11/11	
DRAWN BY		CHECKED BY	
J. W. BRY		J. W. BRY	
SCALE		SCALE	
1" = 40'		1" = 40'	

DETOUR

SEE SHEET 3 FOR CURVE DATA  
 SEE SHEET 5 OF PLAN FOR EASEMENT VIEW  
 SEE SHEET 20 FOR DET. PROFILE

KEYBOARDS

MATCHLINE SHEET 5



MATCHLINE SHEET 7

SEE SHEET 3-1 FOR CURVE DATA  
SEE SHEET 3-4 FOR DITCH DETAILS  
SEE SHEETS 3B, 3P FOR PROFILE

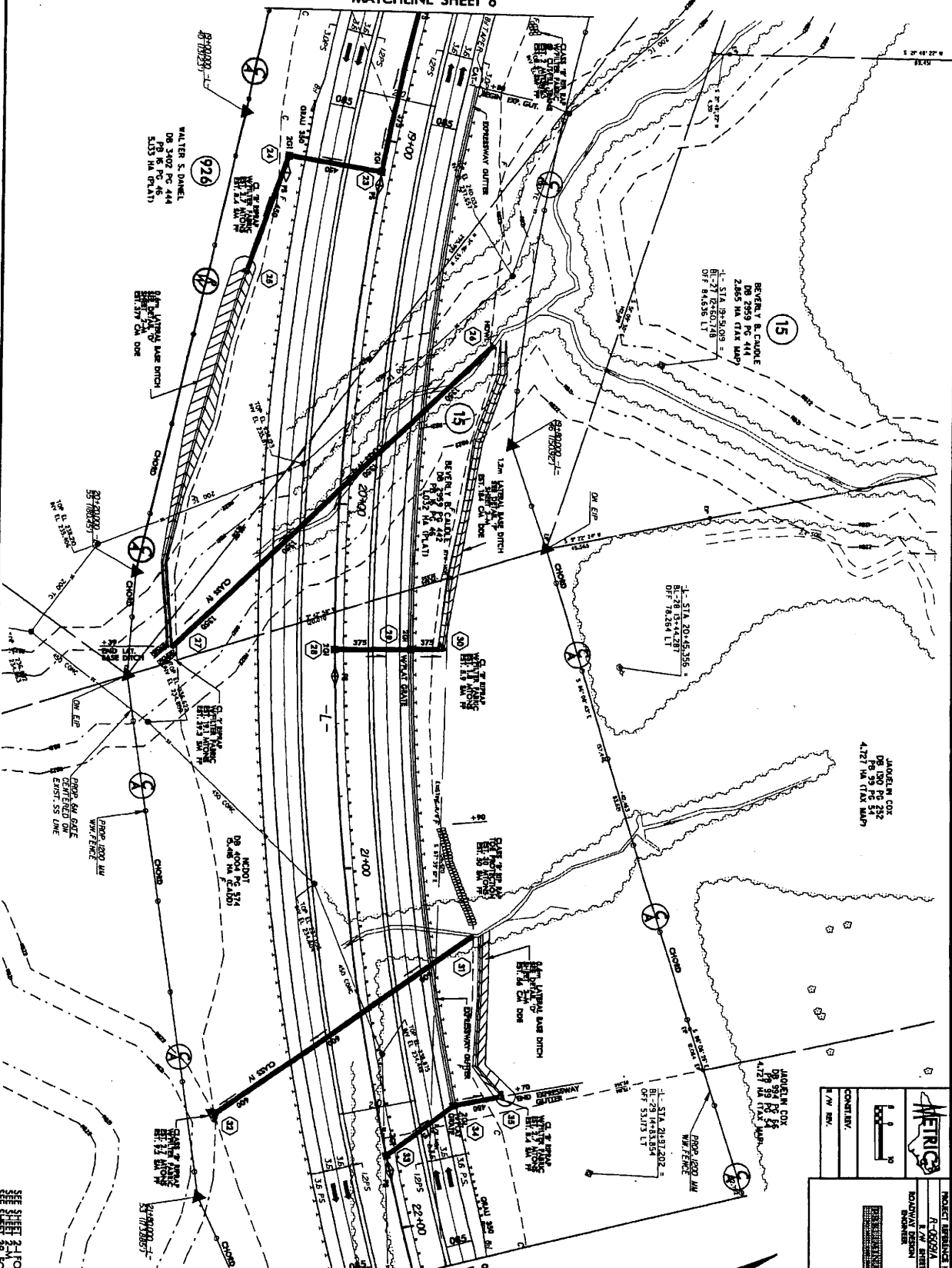
		PROJECT REFERENCE NO.	5
		R/W SHEET NO.	5
		ROADWAY DESIGN	PROVISIONS
		DATE	NOVEMBER
		CONTRACTOR	
		R/W REV.	

ROW REVISIONS, ADDED PARCEL #15, LETTER DATED 10-05-2004  
WFW 10-25-2004

REVISIONS

31-JAN-2006 03:16  
31-JAN-2006 03:16  
31-JAN-2006 03:16

MATCHLINE SHEET 6

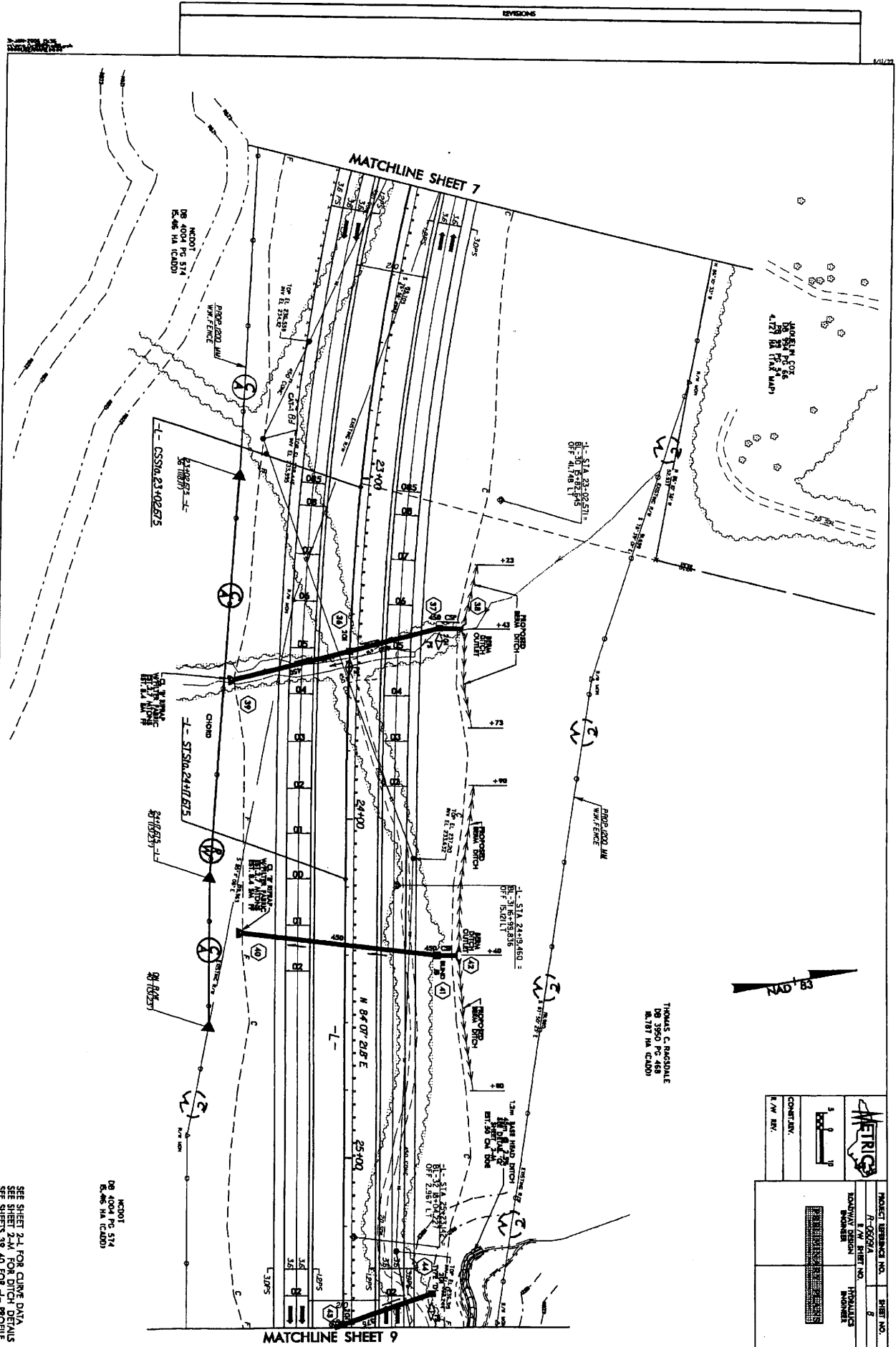


MATCHLINE SHEET 8

SEE SHEET 2 FOR CURVE DATA  
SEE SHEET 3 FOR DITCH DETAILS

	PROJECT REFERENCE NO.	SHEET NO.
	A-00001A	1
	DATE	10/25/04
	BY	WFW
	CHECKED BY	WFW
	DATE	10/25/04
	CONTRACT NO.	10-05-2004
	PROJECT NAME	12-LANE HIGHWAY





SEE SHEET 2-1 FOR CURVE DATA  
 SEE SHEET 2-4 FOR DITCH DETAILS  
 SEE SHEETS 39, 40 FOR 'L' PROFILE

NCDDOT  
 DB 4004 PG 514  
 R.465 1A (CADD)

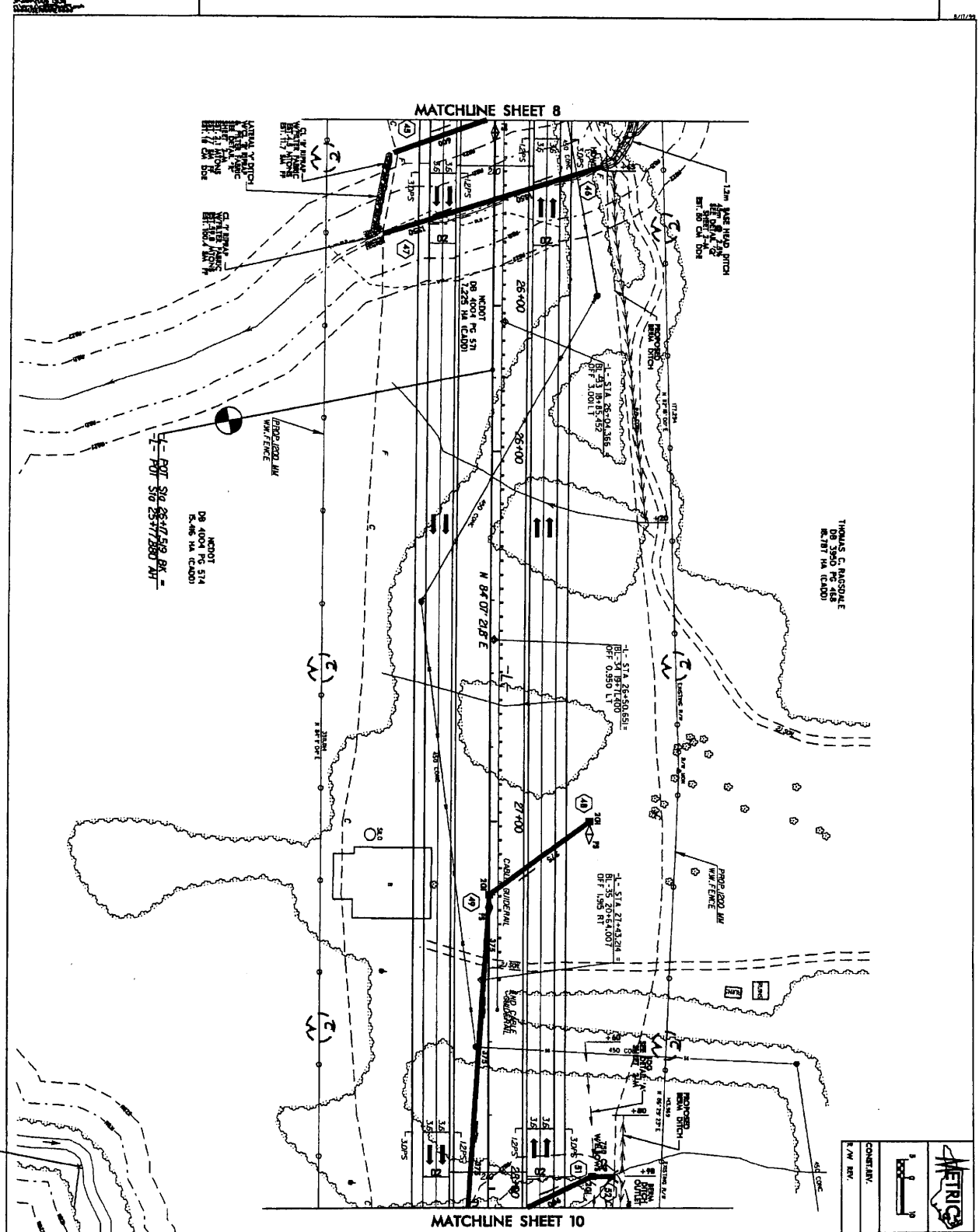
THOMAS C. PASSEALE  
 DB 4004 PG 514  
 R.465 1A (CADD)

PROJECT REFERENCE NO.	7-0002/A
SHEET NO.	8
CONTRACT/ E/V/REV.	
DATE/REV.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
INCHES	

BYEBOHS

MATCHLINE SHEET 8

MATCHLINE SHEET 10



THOMAS G. HANCOCK  
REGISTERED  
SURVEYOR  
No. 1714 (C.A. 2000)

POINT  
DB 4004 PC 514  
S.M. VA. (C.A. 2000)  
--- FORT 506 25+47.588 PC ---  
--- FORT 506 25+77.280 PT ---

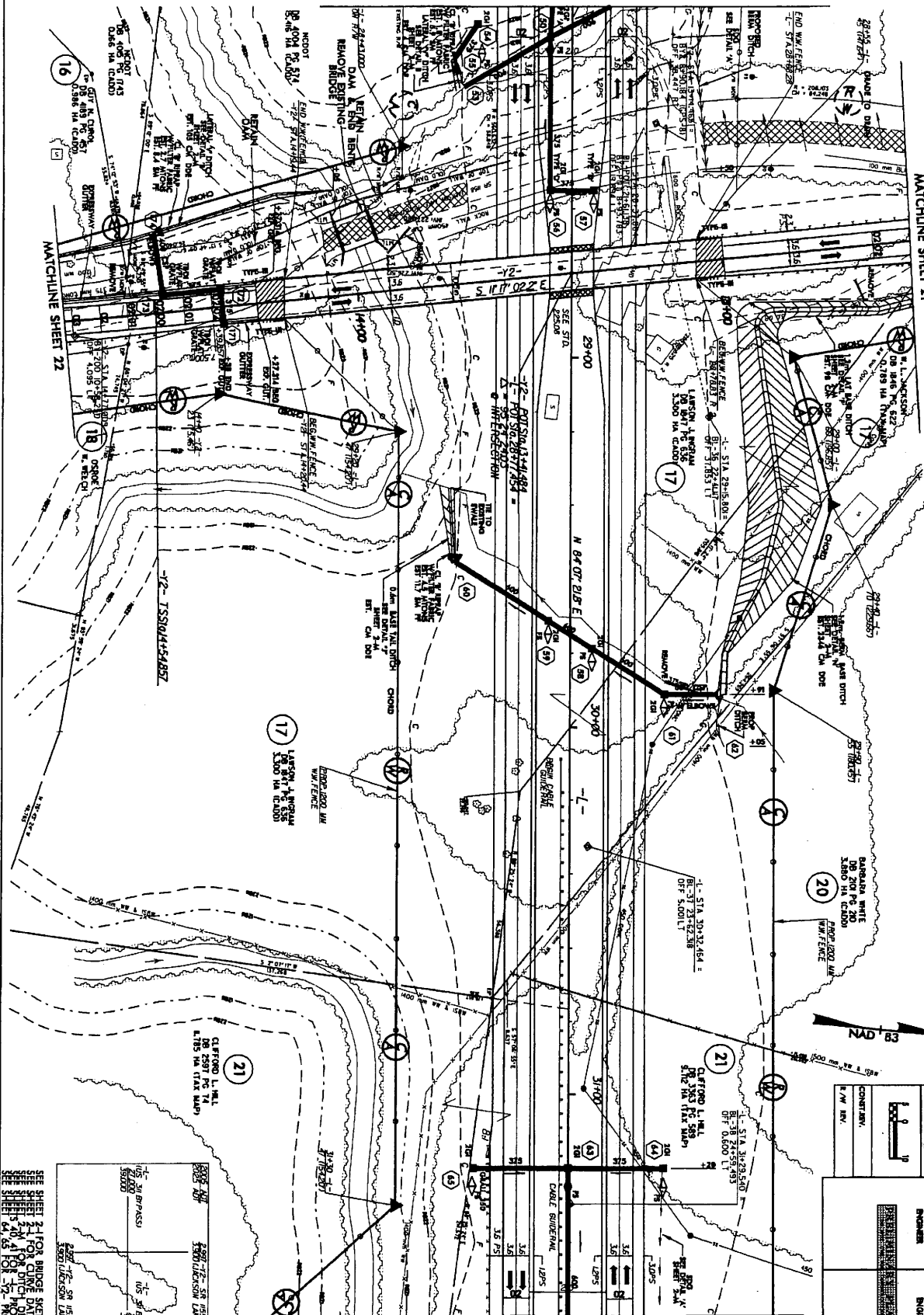
		PROJECT REFERENCE NO. 1702/2/A	SHEET NO. 3
COUNTY/DESIGN ENGINEER		HYDRAULICS ENGINEER	
COUNTY/REV.		DATE	

SEE SHEET 2-1 FOR CURVE DATA  
SEE SHEET 2-4 FOR DITCH DETAILS  
SEE SHEET 20 FOR E. PROFILE

MATCHLINE SHEET 9

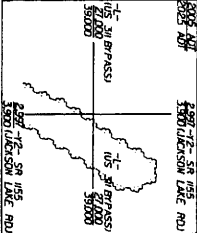
MATCHLINE SHEET 21

MATCHLINE SHEET 22



NAD 83

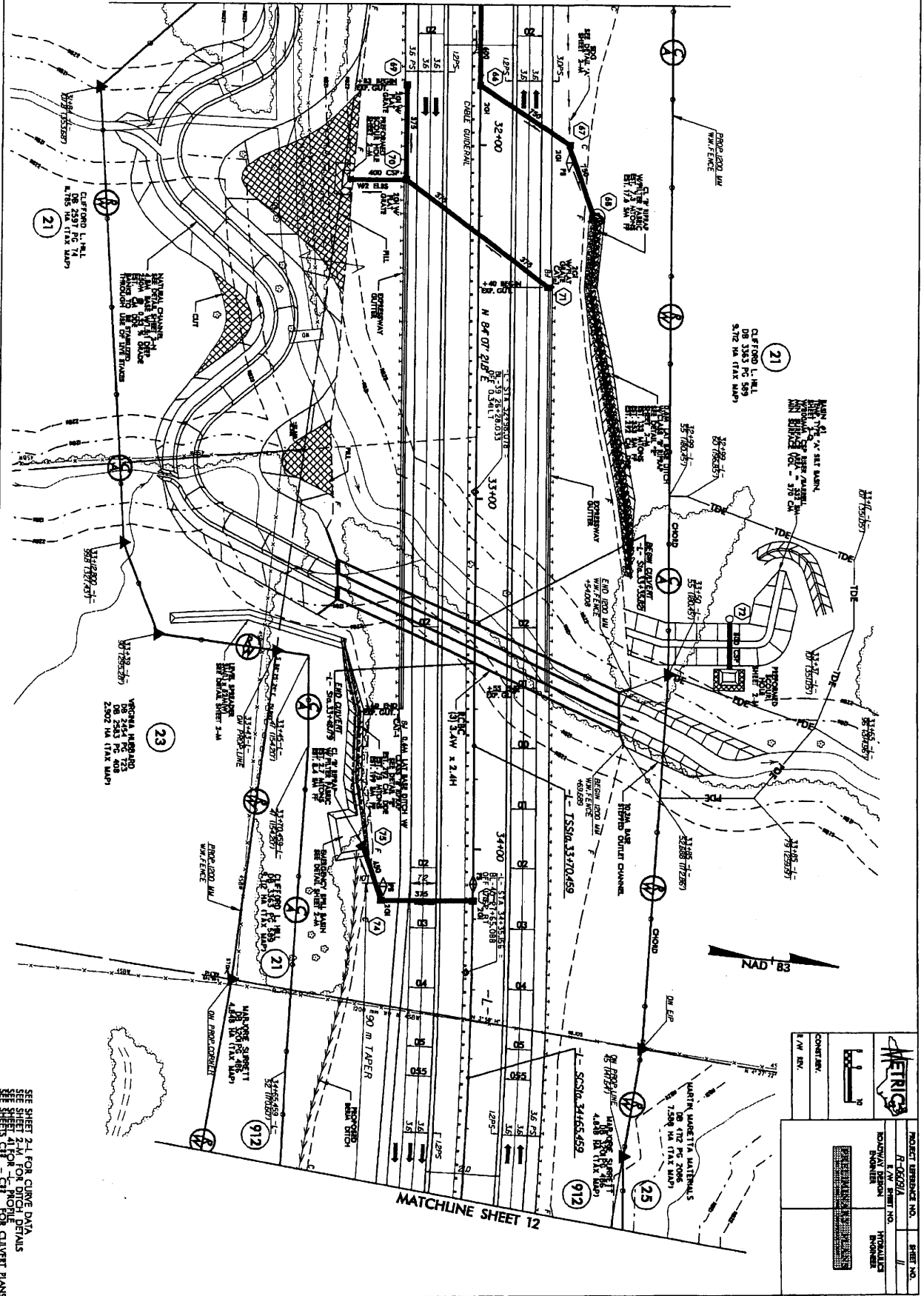
SEE SHEET 21 FOR BRIDGE SKETCH  
 SEE SHEET 21 FOR CURVE DATA  
 SEE SHEET 20 A FOR 1:2 PROFILE  
 SEE SHEET 24.65 FOR 1:2 PROFILE



MATCHLINE SHEET 11

<b>METRIX</b>		PROJECT REFERENCE NO.	SHEET NO.
		R-08292A	10
COURTNEY, S. W. INC.		CONTRACT / W. W. REEL NO.	100000000
		ENGINEER	100000000
		DRAWN BY	100000000

MATCHLINE SHEET 10



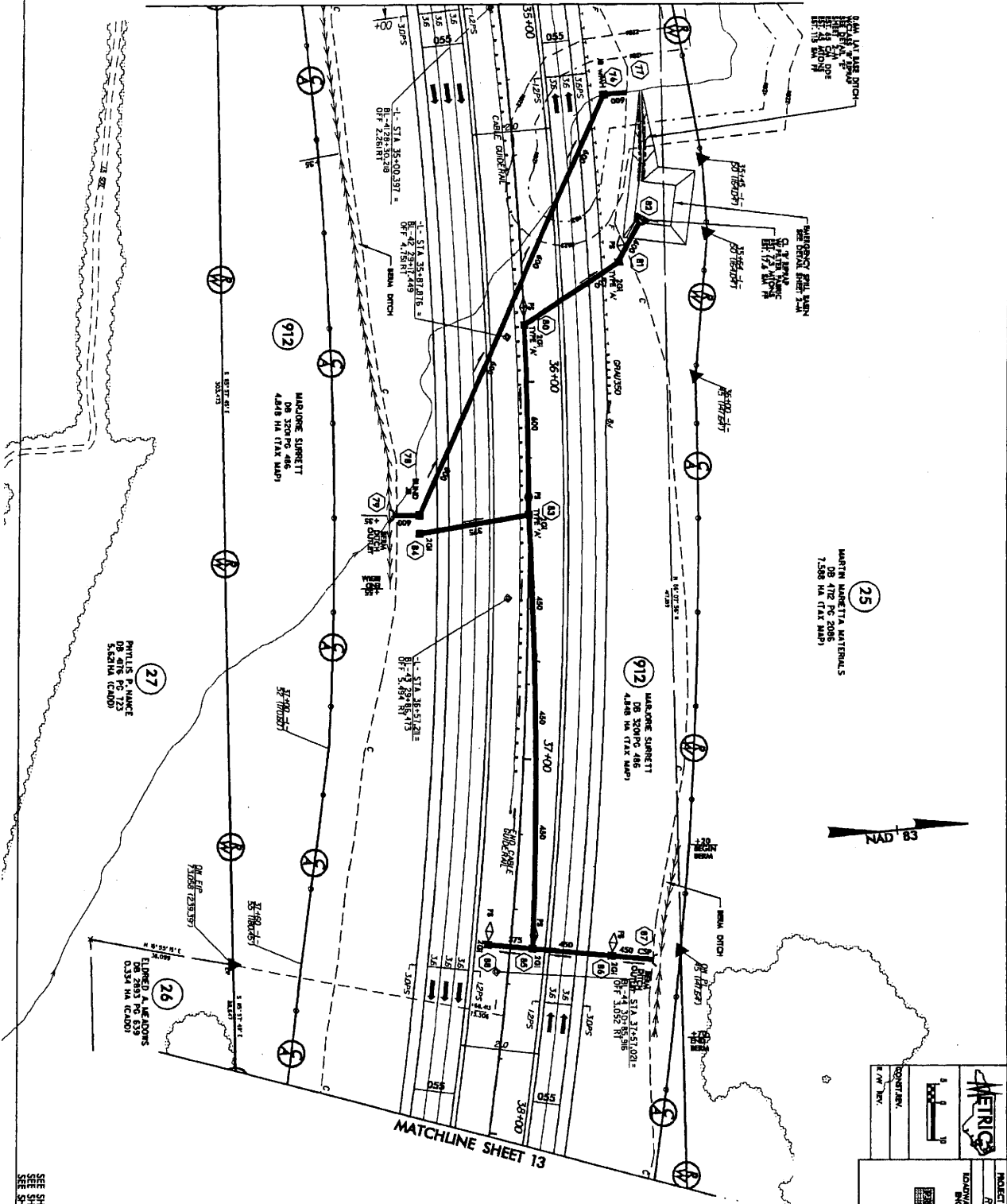
MATCHLINE SHEET 12

SEE SHEET 2-1 FOR CURVE DATA  
 SEE SHEET 4 FOR DIMENSIONS  
 SEE SHEET C-1 FOR CULVERT PLANS

		PROJECT URGENCY NO. _____ SHEET NO. _____
PROJECT NO. 17-0609/A E.W. SHEET NO. 10/10/10/10 ROADWAY DESIGN BROWNSVILLE		CONTRACTOR: E.W. REV. _____
DATE: 10/10/10 DRAWN BY: _____ CHECKED BY: _____		PROJECT NO. 17-0609/A SHEET NO. 10/10/10/10

REVISIONS

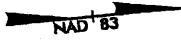
MATCHLINE SHEET 11



OWNER: L. W. HARRIS  
 1. STA. 35+00.397 =  
 B.P. 4.178 RT  
 2. STA. 35+00.397 =  
 B.P. 22.88 RT

OWNER: MARGARET SURRETT  
 1. STA. 35+00.397 =  
 B.P. 4.178 RT  
 2. STA. 35+00.397 =  
 B.P. 22.88 RT

OWNER: MARTIN MABELITA MATERIALS  
 DB 4782 PC 2085  
 7588 HA TAX MAP



OWNER: PHILLIS P. WAIKIE  
 DB 478 PC 723  
 5634 HA CADSD

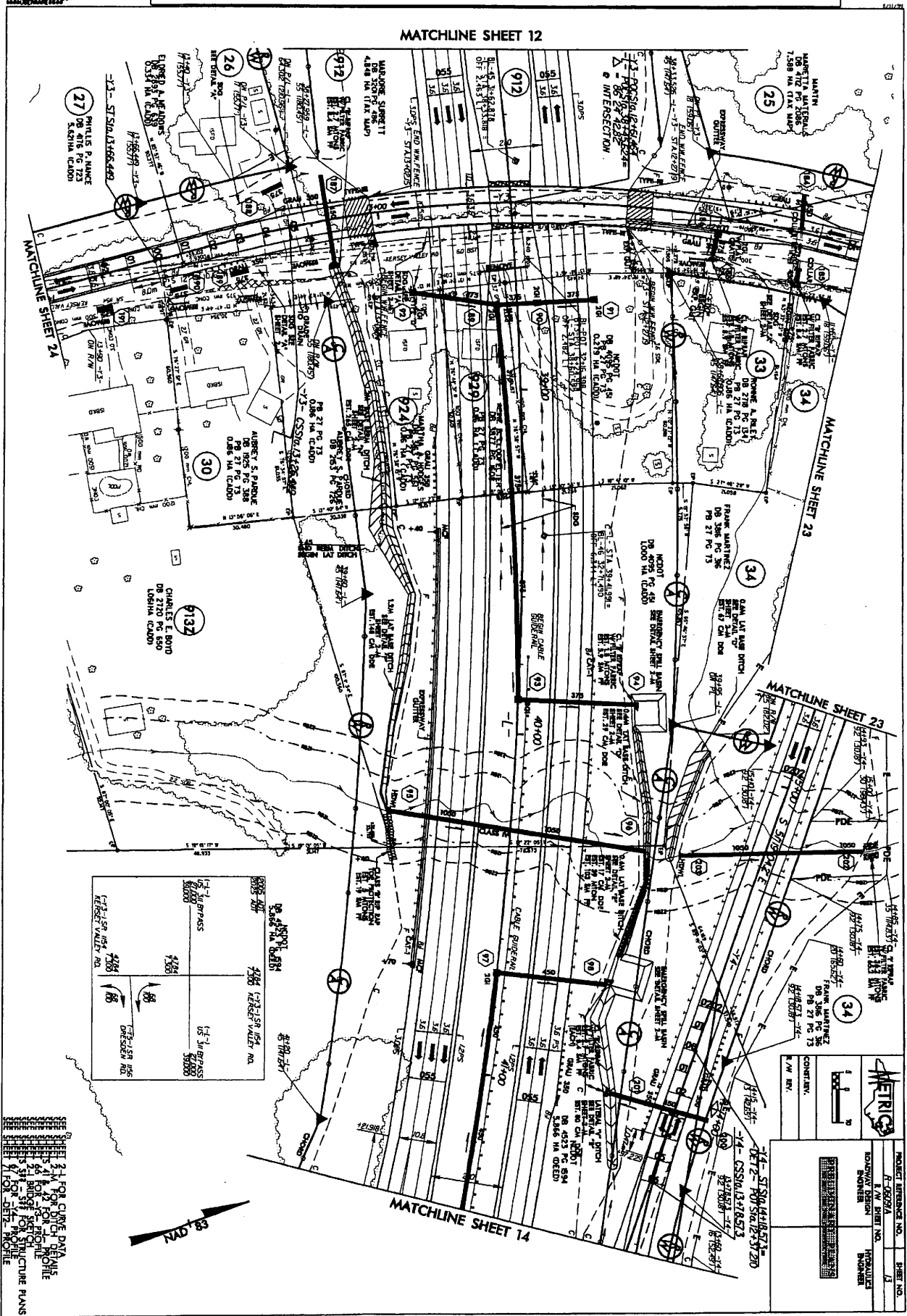
OWNER: LURED A. WEADERS  
 DB 2893 PC 081  
 0354 HA CADSD

MATCHLINE SHEET 13

	PROJECT REFERENCE NO.	SHEET NO.
	17-0507A	2
	DATE OF SHEET NO.	PROJAILIES
	10/20/15	10/20/15
	DATE OF SHEET NO.	PROJAILIES
	DATE OF SHEET NO.	PROJAILIES

SEE SHEET 24 FOR CURVE DATA  
 SEE SHEET 24 FOR DITCH DETAILS  
 SEE SHEET 1 FOR PROFILE

MATCHLINE SHEET 12



DR. ASHPOL BLDG		DR. KESSEL VALLEY RD	
4305	4266	4266	4266
1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS
50000	50000	50000	50000
1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS	1/4-1/2 BR/BRASS
50000	50000	50000	50000

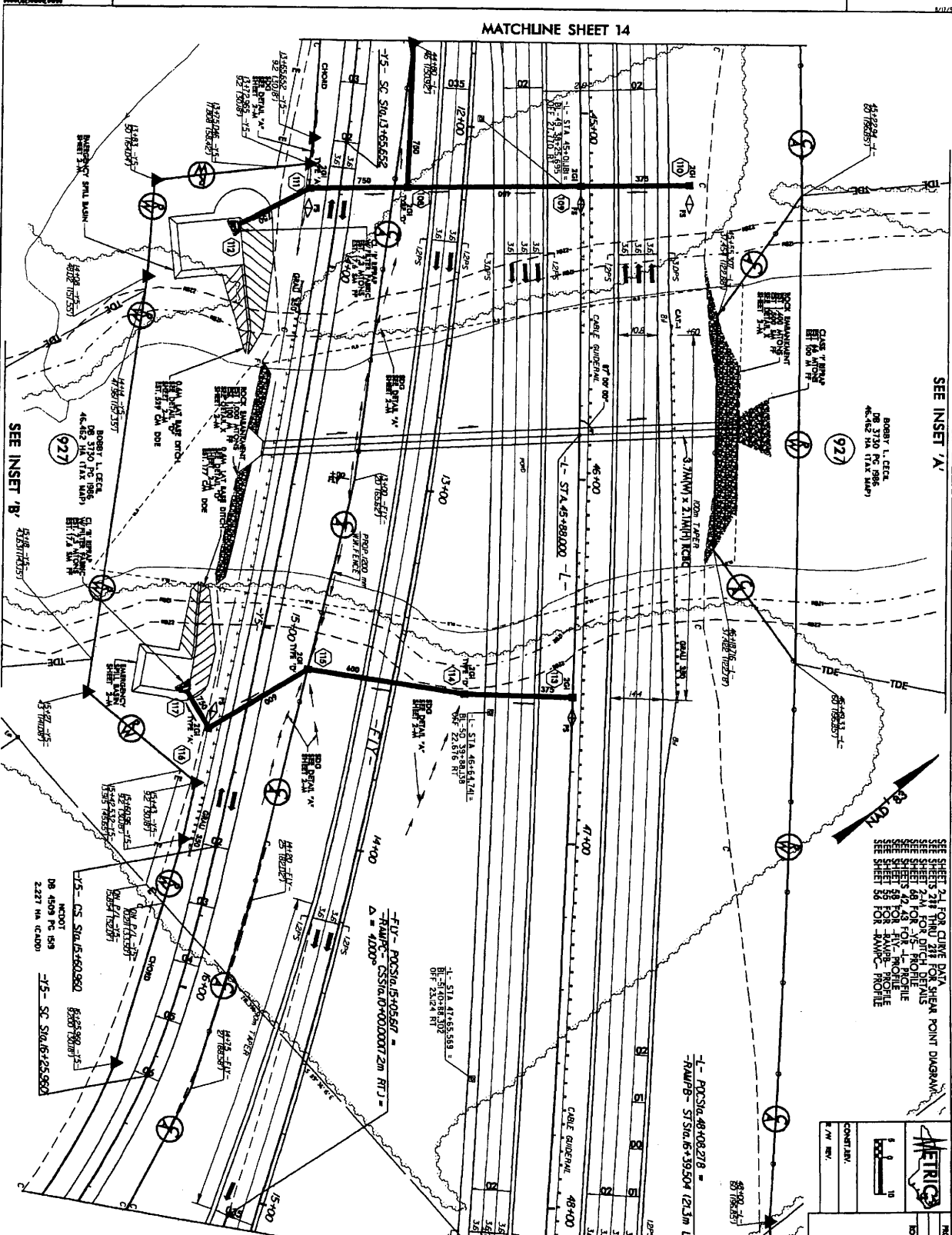
SEE SHEET 23 FOR CURVE DATA  
SEE SHEET 23 FOR CULVERT DATA  
SEE SHEET 23 FOR BRIDGE DATA  
SEE SHEET 23 FOR UTILITY DATA  
SEE SHEET 23 FOR CONSTRUCTION PLANS

<b>AMERIS</b>	
PROJECT REFERENCE NO.	SHEET NO.
12-3000-15	13
DATE	REVISED NUMBER
01/17/11	01/17/11
DESIGNED BY	DRAWN BY
J.A.	J.A.





MATCHLINE SHEET 14



SEE INSET 'B'

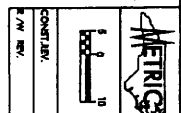
SEE INSET 'A'

ROBERT L. GERR  
DB 3730 PC 2886  
46'x2' HA (TAX MAP)

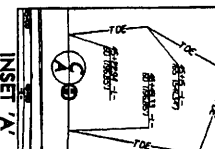
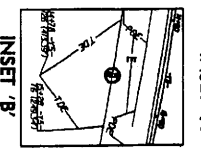
SEE SHEET 21 FOR CLINE DATA  
SEE SHEET 21 THRU 21F FOR SHEAR POINT DIAGRAM  
SEE SHEET 41 FOR ADJUSTMENT PROFILE  
SEE SHEET 41 FOR ELEVATION PROFILE  
SEE SHEET 42 FOR ELEVATION PROFILE  
SEE SHEET 43 FOR ELEVATION PROFILE  
SEE SHEET 44 FOR ELEVATION PROFILE  
SEE SHEET 45 FOR ELEVATION PROFILE  
SEE SHEET 46 FOR ELEVATION PROFILE  
SEE SHEET 47 FOR ELEVATION PROFILE

ROBERT L. GERR  
DB 3730 PC 2886  
46'x2' HA (TAX MAP)

MOROT  
DB 4503 PC 598  
2'x27' HA (C-300)

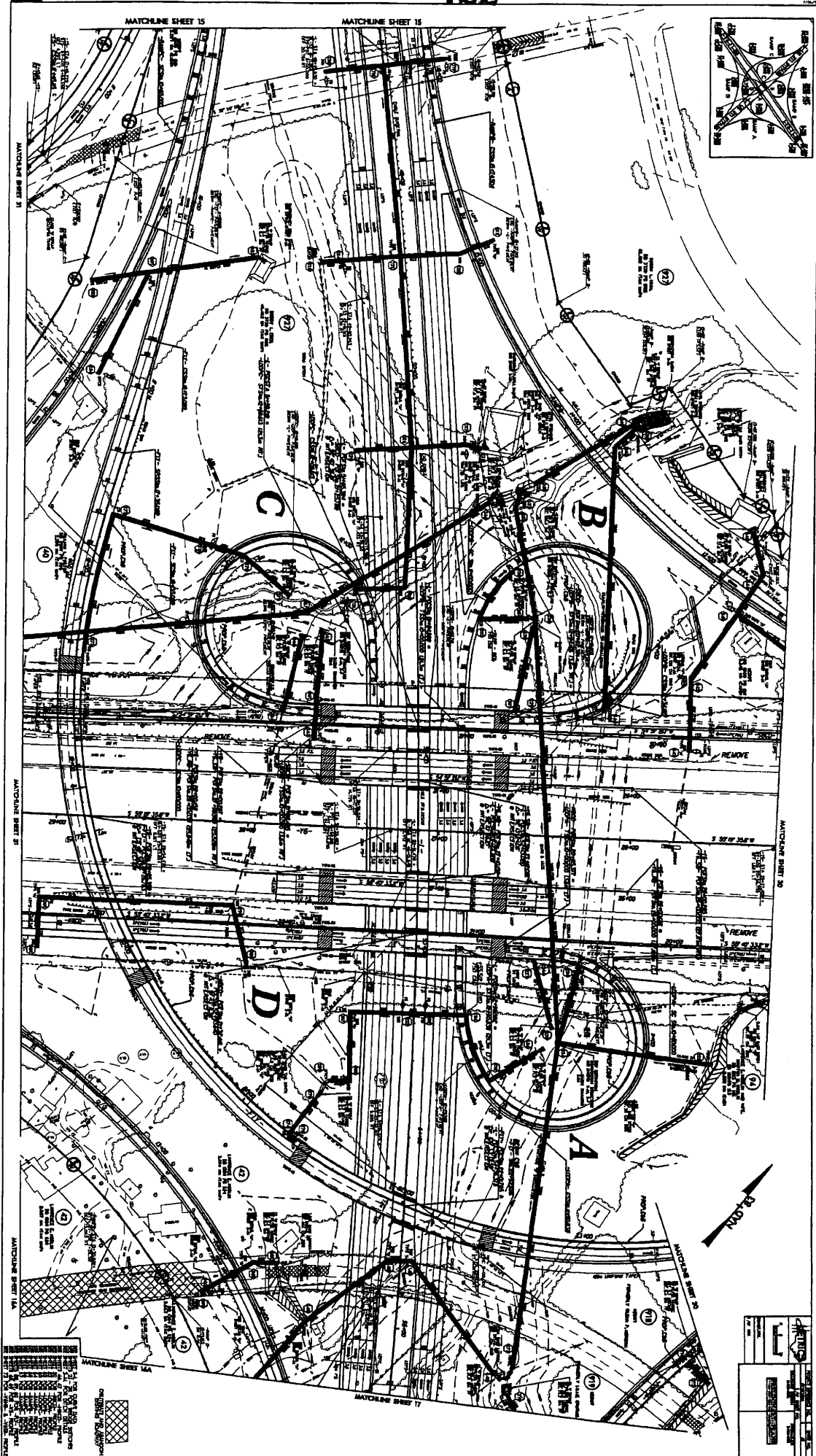


PROJECT REFERENCE NO.	SHEET NO.
17-0297A	15
CONTRACT NO.	
DATE PREPARED	
BY	
CHECKED	
APPROVED	



MATCHLINE SHEET 16





LEGEND

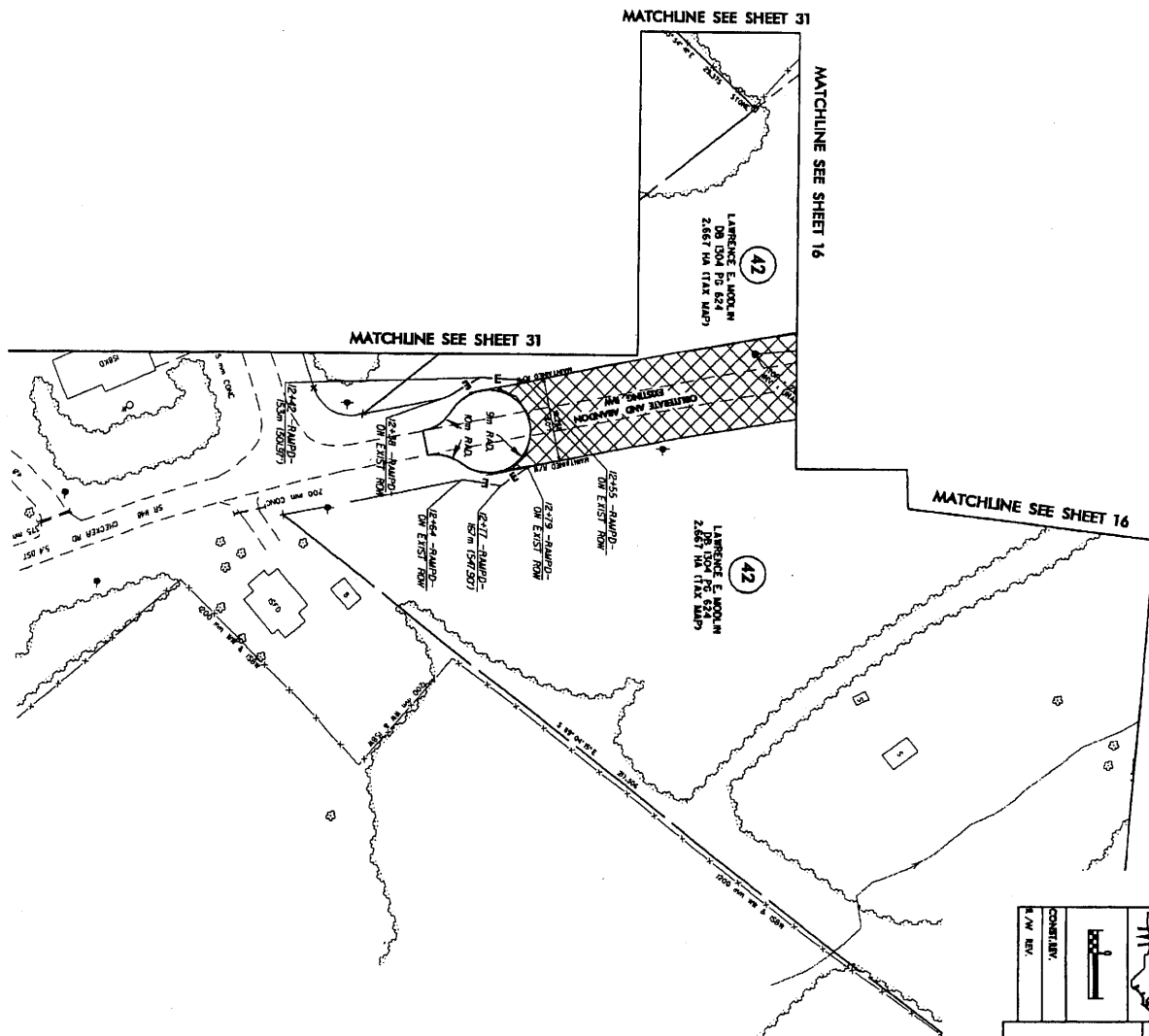
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[Symbol]	REINFORCEMENT
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[Symbol]	FASTENERS
[Symbol]	COATINGS
[Symbol]	PAINTS
[Symbol]	INSULATION
[Symbol]	CLADDING
[Symbol]	REVISIONS

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	1945
2	REVISION	1946
3	REVISION	1947
4	REVISION	1948
5	REVISION	1949
6	REVISION	1950
7	REVISION	1951
8	REVISION	1952
9	REVISION	1953
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72	REVISION	2016
73	REVISION	2017
74	REVISION	2018
75	REVISION	2019
76	REVISION	2020
77	REVISION	2021
78	REVISION	2022
79	REVISION	2023
80	REVISION	2024

REVISIONS  
 NEW RECORDS DATED 04-20-2004 AS PARCELS 42 AND 43 AS PARCEL 42 LETTER DATED 3-2-2004  
 WPM 04-20-2004

3-2-2004 0:37  
 3/2/2004 0:37



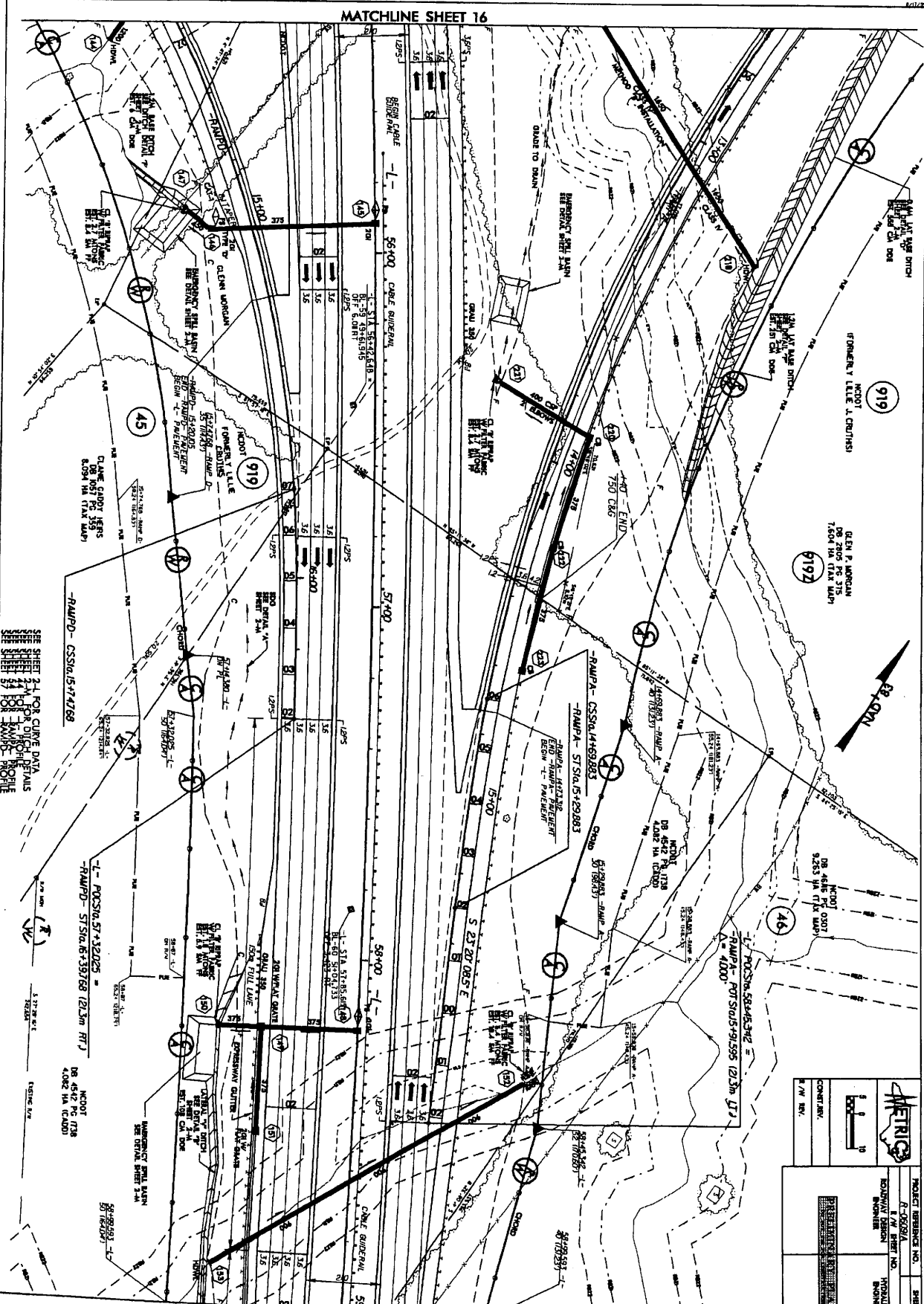
EXISTING AND ABANDONED  
 ROW



	PROJECT RECORD NO.	3602/24	SHEET NO.	5/4
	DATE	04/20/04		
	CONTRACT NO.	11/04/03	PROJECT NO.	11/04/03
	DATE	04/20/04		
		DATE	04/20/04	
		DATE	04/20/04	

REVISIONS

MATCHLINE SHEET 16



MATCHLINE SHEET 18

SEE SHEET 21 FOR CURVE DATA  
 SEE SHEET 22 FOR PROFILES  
 SEE SHEET 24 FOR TANKS  
 SEE SHEET 25 FOR TANKS MOBILE

RAUPD - CSS10.15+74.768

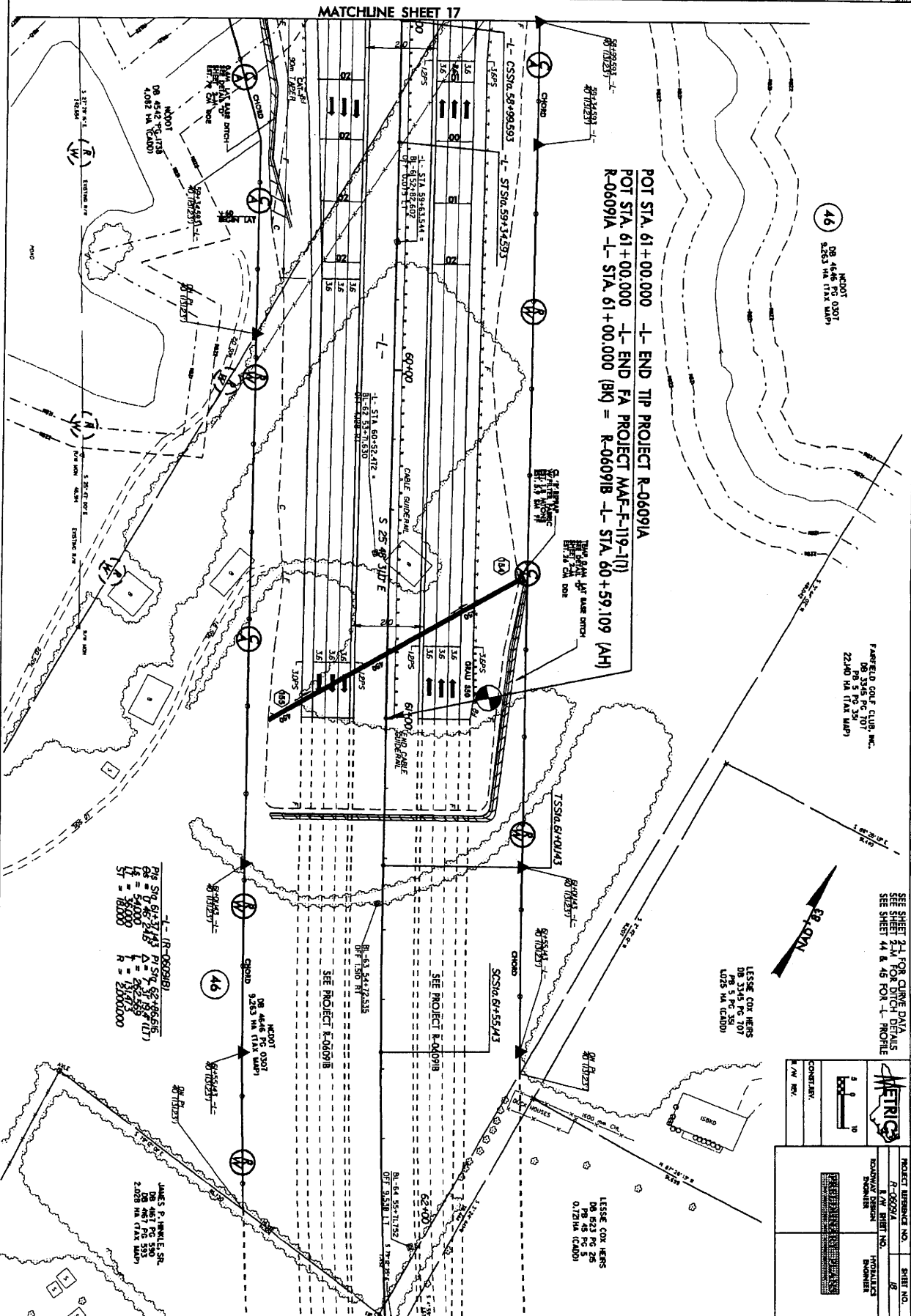
RAUPA - POT Sta. 16+33.768 (2.5m RT)  
 RAUPA - ST Sta. 16+33.768 (2.5m RT)

RAUPA - POT Sta. 15+91.595 (2.5m UT)  
 RAUPA - ST Sta. 15+29.883

		PROJECT REFERENCE NO.	SHEET NO.
		DATE	7
		DESIGNED BY	TRUSSARDI
		CHECKED BY	PROBBER
		DATE	

ROW REVISIONS, PARCEL #6 PROPERTY OWNER CHANGED, LETTER DATED 1-22-2004  
WPM 04-20-2004

MATCHLINE SHEET 17



POT STA. 61+00.000 --L- END TIP PROJECT R-06091A  
 POT STA. 61+00.000 --L- END FA PROJECT MAF-119-11)  
 R-06091A --L- STA. 61+00.000 (BK) = R-06091B --L- STA. 60+59.109 (AH)

DOG SITE  
 DB 4817 PG 590  
 LB 54000  
 LB 30000  
 ST = 18000

JAMES F. HANLEY, SR.  
 DB 4817 PG 590  
 LB 54000  
 LB 30000  
 ST = 18000

46  
 NADOT  
 DB 4646 PG 0307  
 LB 5253 HA (TAI MAP)

FARFIELD GOLF CLUB, INC.  
 DB 3345 PG 707  
 LB 5 PG 234  
 LB 2240 HA (TAI MAP)

LESSOR CON. LEGS  
 DB 3345 PG 707  
 LB 5 PG 234  
 LB 2240 HA (TAI MAP)

SEE SHEET 2-1 FOR CLUMP DATA  
 SEE SHEET 2-1A FOR DITCH DEMAND  
 SEE SHEET 44 & 45 FOR LAYOUT

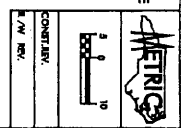
**METRIX**

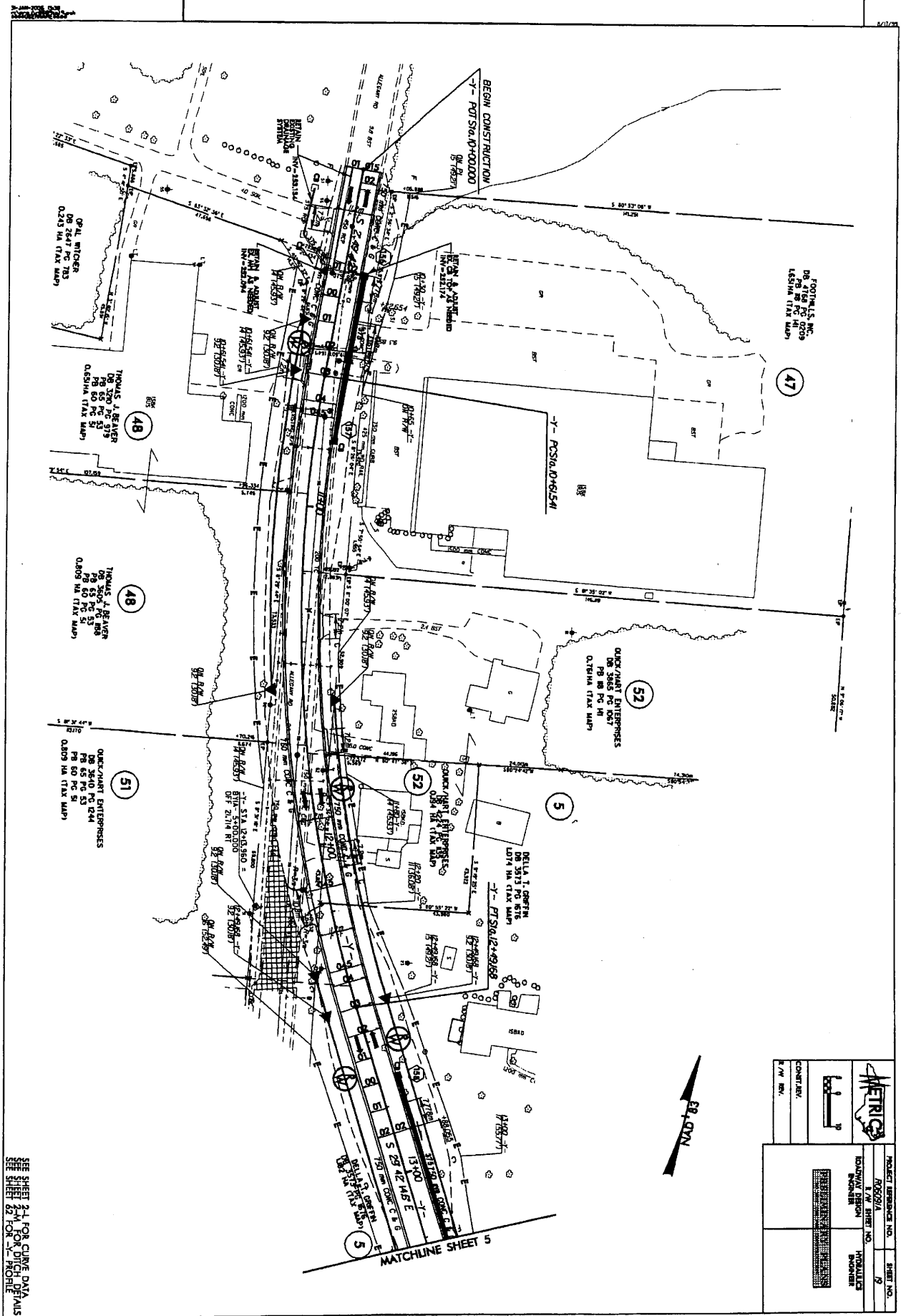
PROJECT UTILITY NO. 17-0091A  
 CONTRACTOR: V.M. HERTZ INC.  
 ENGINEER: JAMES F. HANLEY, SR.  
 ENGINEER: JAMES F. HANLEY, SR.

SHEET NO. 18

DATE: 07/15/04

SCALE: 1" = 20'

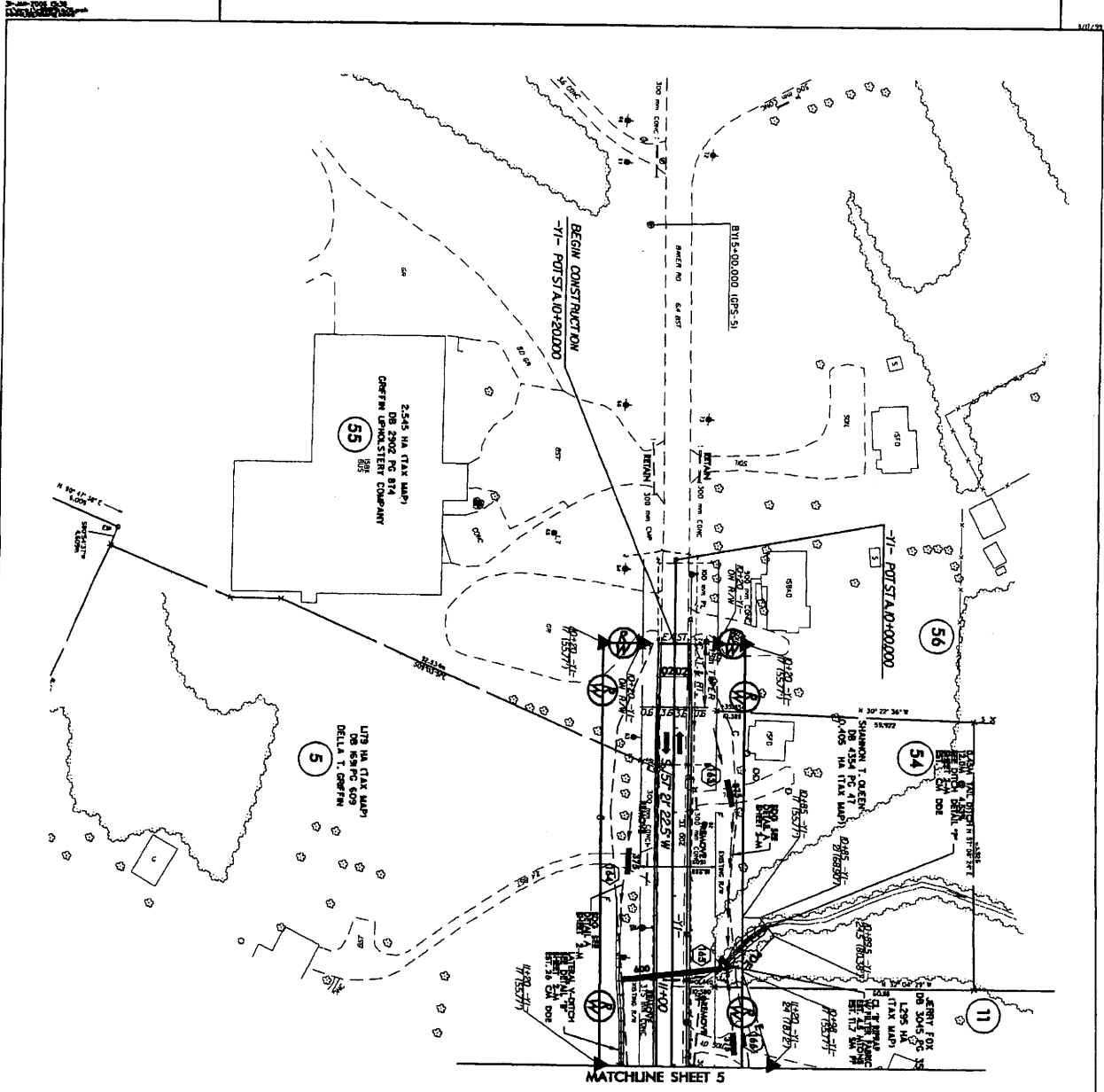




		PROJECT NUMBER NO.	SHEET NO.
		DATE	2
		DESIGNED BY	HMM/LLS
		DRAWN BY	NUMBER
		CHECKED BY	
		DATE	
		SCALE	

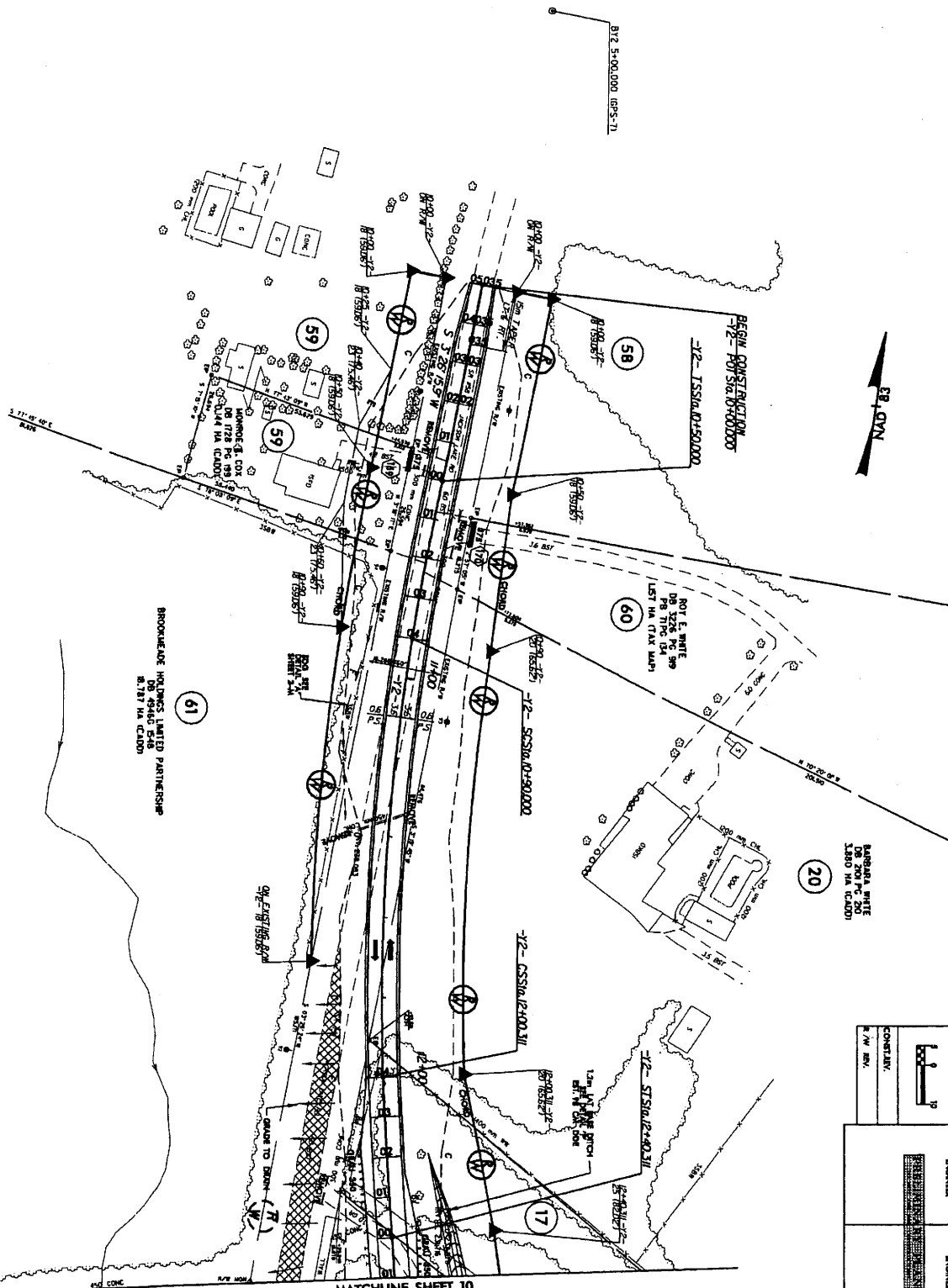
SEE SHEET 2-1 FOR CURVE DATA  
SEE SHEET 2-2 FOR DITCH DETAILS  
SEE SHEET 82 FOR PROFILE

REVISIONS  
 ROW REVISIONS, CHANGED PARCEL 56 OWNER INFORMATION, LETTER DATED 04-29-2004  
 WPM 08-31-2004



SEE SHEET 41 FOR CURVE DATA  
 SEE SHEET 42 FOR PROFILE  
 SEE SHEET 43 FOR 2-D PROFILE

		PROJECT REFERENCE NO. 7-16629/A	SHEET NO. 27
COUNTY/STATE N.W. 1/4		CONTRACTOR METRIX ENGINEERS	SPECIALIST CIVIL ENGINEER

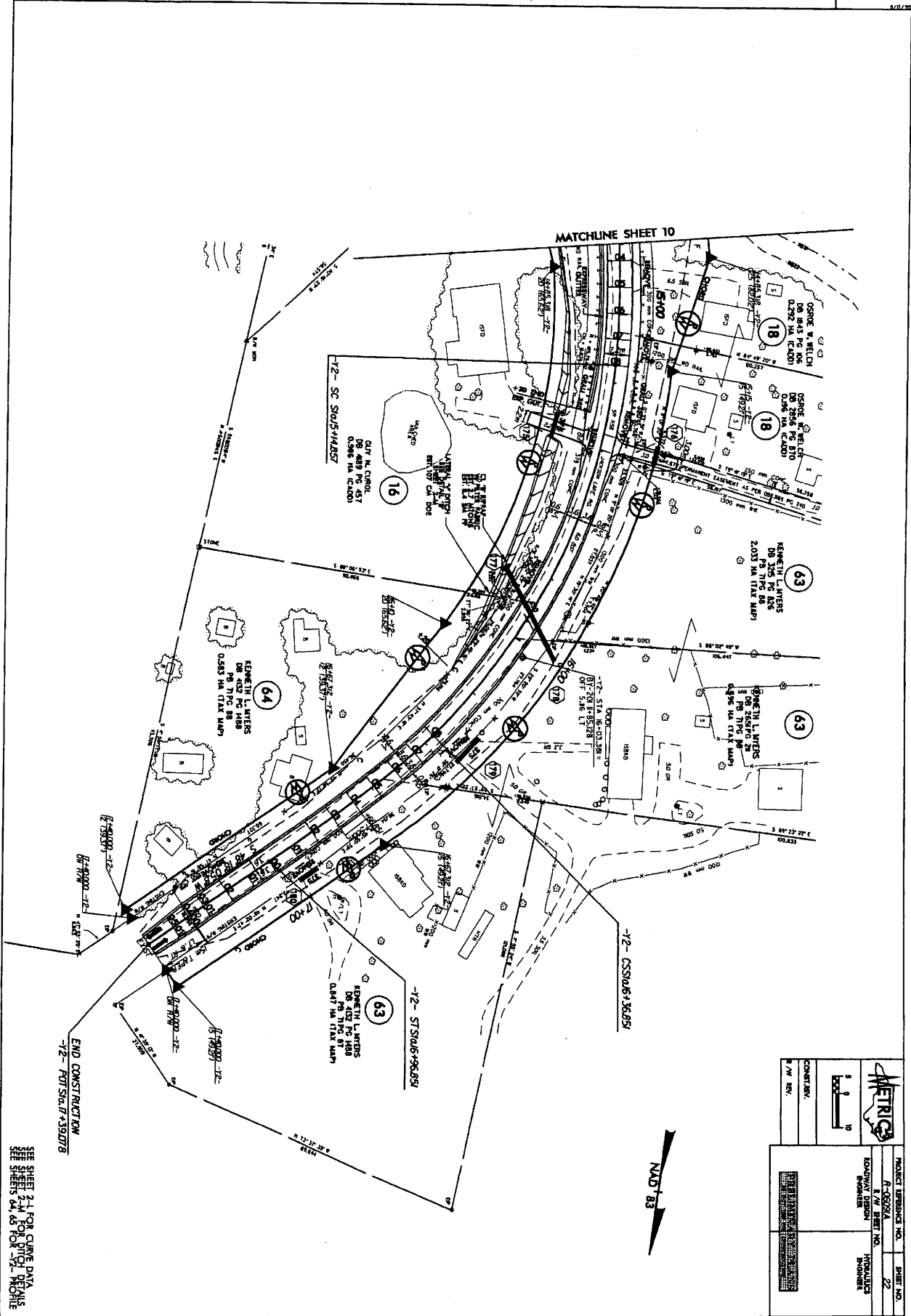


		PROJECT REFERENCE NO. F-000014 SHEET NO. 21
		CONTRACTOR F.W. SHIER NO. 17851 F.W. SHIER NO. 17851
		FIRM F.W. SHIER NO. 17851 F.W. SHIER NO. 17851

SEE SHEET 24 FOR CURVE DATA  
 SEE SHEET 24 FOR DITCH DETAILS  
 SEE SHEET 24 FOR 'Y' PROFILE

MATCHLINE SHEET 10

REVISIONS  
 ROW REVISIONS, PARCELS 18 AND 62 COMBINED, PARCELS 63, 65, AND 66 COMBINED, LETTER DATED 1-22-2004  
 WPM 04-20-2004

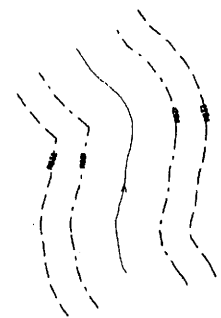
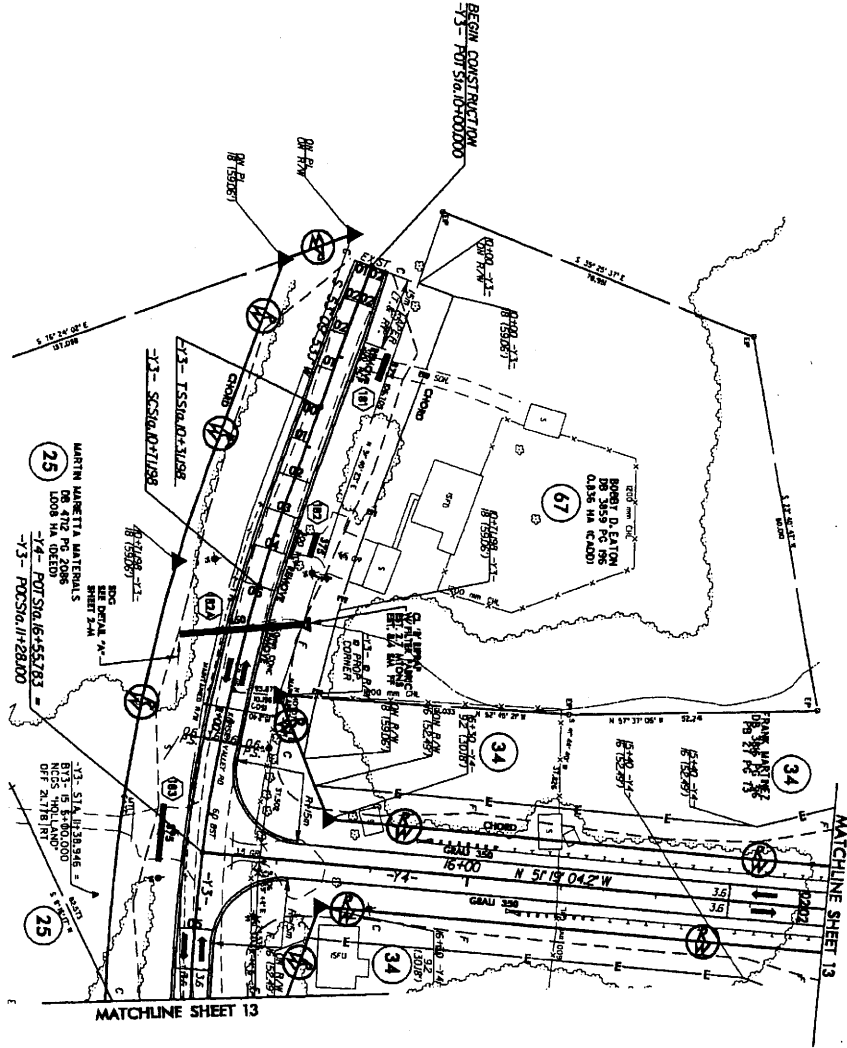


SEE SHEET 2-1 FOR CURVE DATA  
 SEE SHEETS 04, 65 FOR -12- ROWS

END CONSTRUCTION  
 -12- POINTS: 439.078

		PROJECT NUMBER NO. 6-05024	SHEET NO. 22
CONSULTANT W/ REV.		DRAWING DESIGN ENGINEER	HYDRAULICS ENGINEER

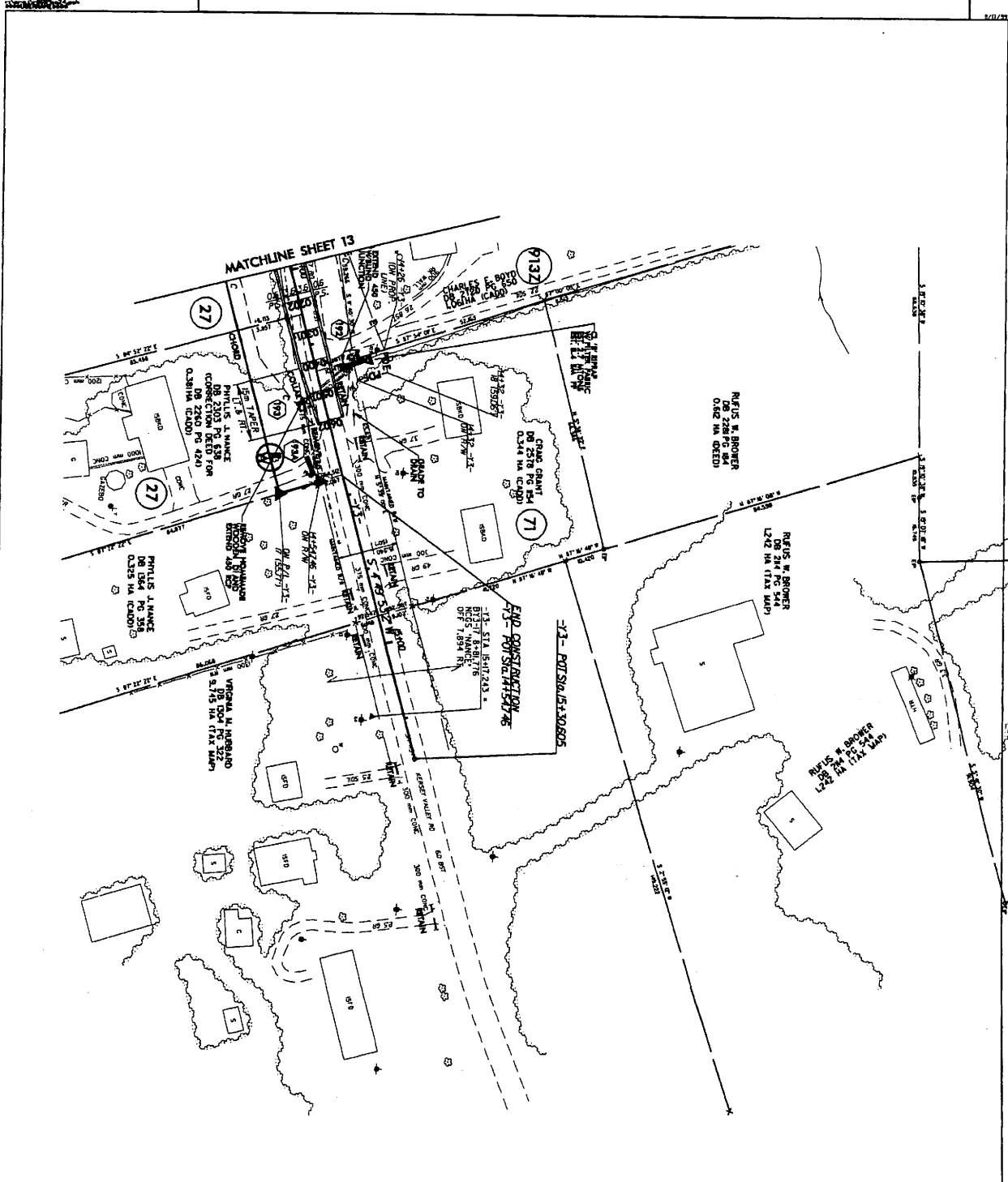




SEE SHEET 24 FOR CURVE DATA  
SEE SHEET 25 FOR PROFILE  
SEE SHEET 26 FOR 1/2 INCH

		PROJECT REFERENCE NO.	SHEET NO.
		17-0303A	2
CONTRACT NO.	17-0303A	PROFESSOR	PROFESSOR
DATE	11/28/00	ENGINEER	ENGINEER
BY	...	CHECKED	CHECKED
DATE	...	DATE	...

RYEBONE

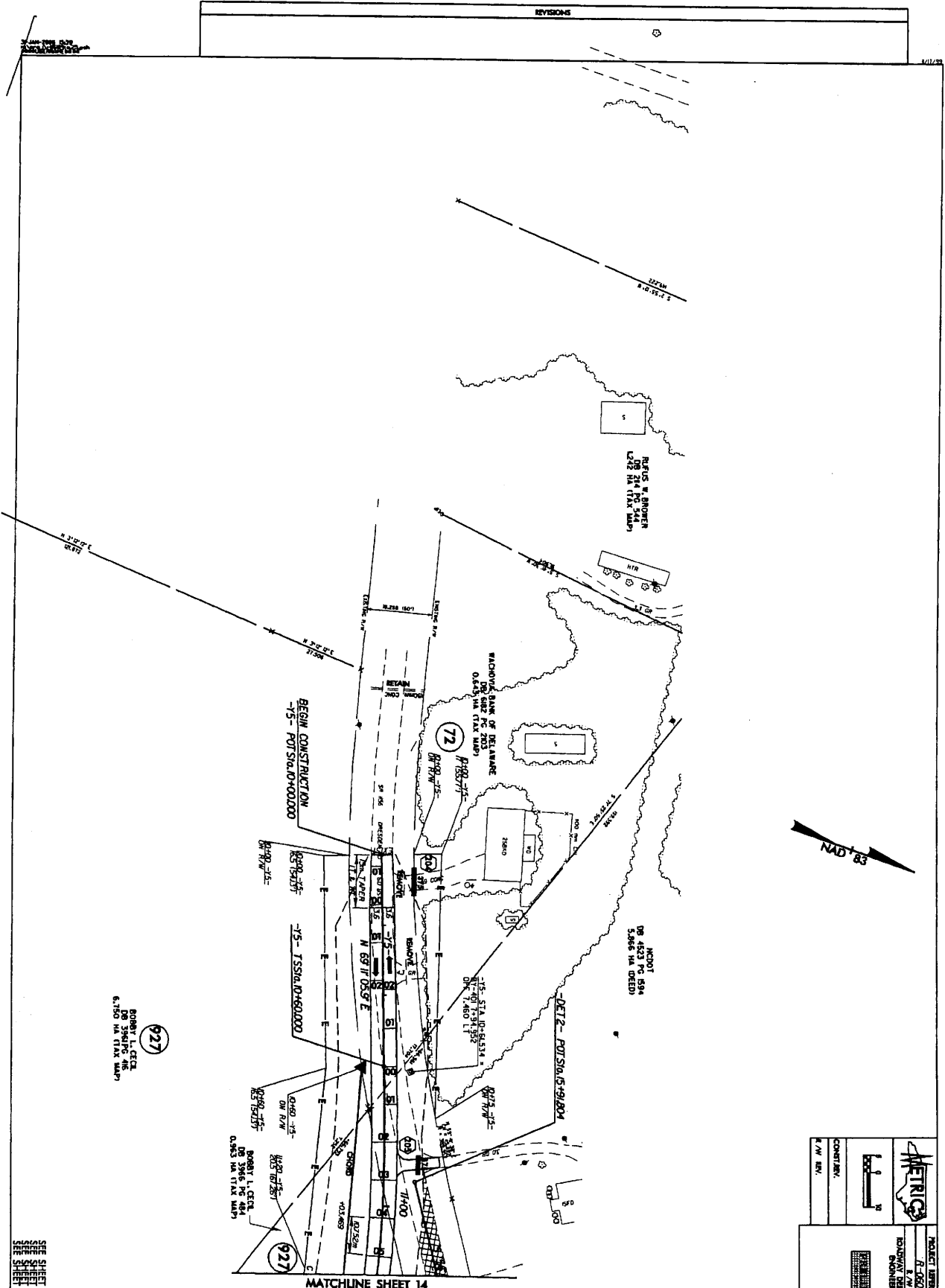


SEE SHEET 2-1 FOR CURVE DATA  
 SEE SHEET 2-2 FOR DITCH DETAILS  
 SEE SHEET 2-3 FOR PROFILE



		PROJECT REFERENCE NO.	SHEET NO.
		8-509/A	24
		DATE	1/20/04
		SCALE	AS SHOWN
COUNTY, VA. DIST.		DESIGNED BY	RWB
DATE		DRAWN BY	RWB
PROJECT NO.		CHECKED BY	RWB
SHEET NO.		APPROVED BY	RWB

REVISIONS



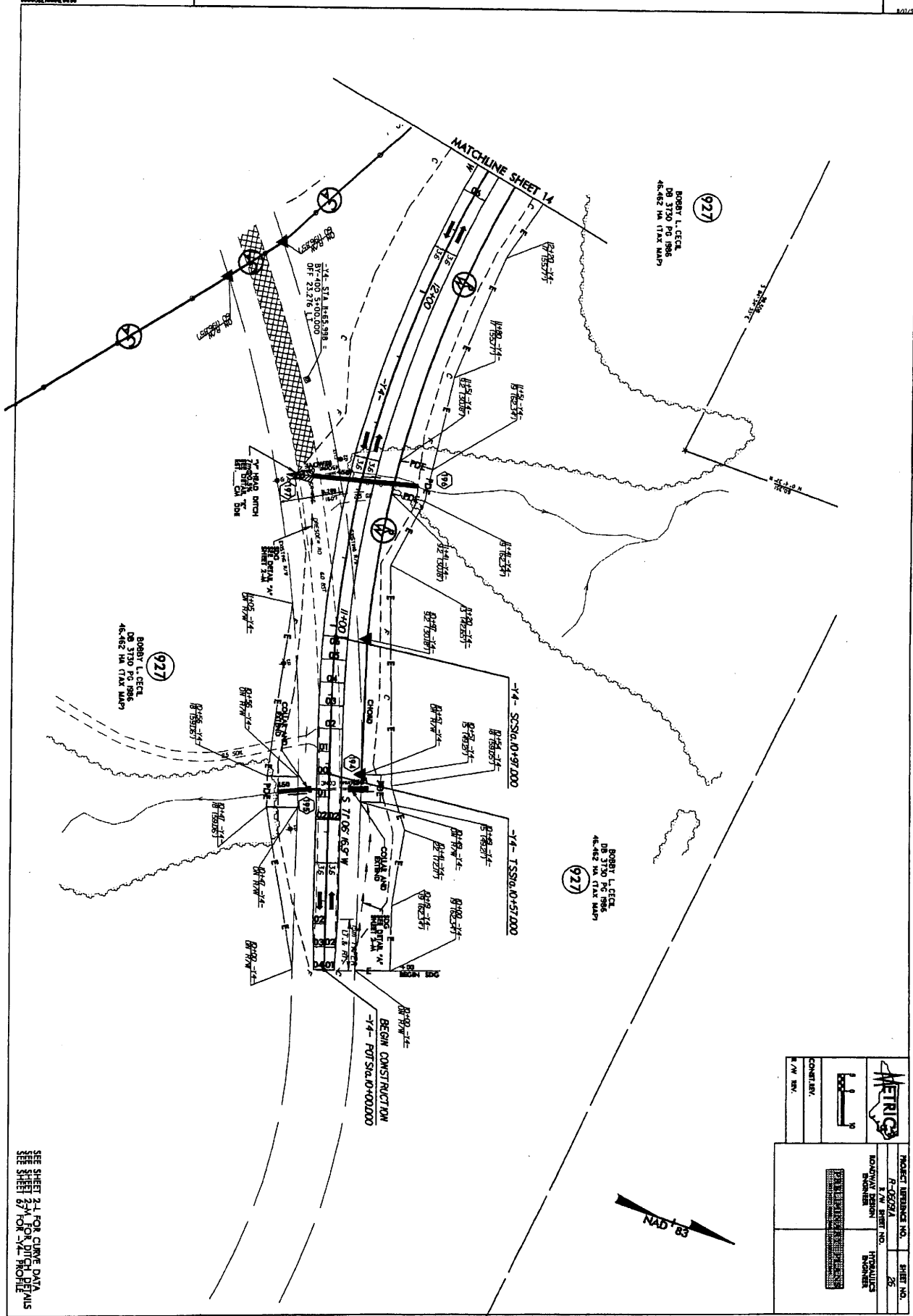
927  
 ROBERT L. CECE  
 6,150 IN. TYP. MAP

927  
 ROBERT L. CECE  
 6,150 IN. TYP. MAP

SEE SHEET 24 FOR CURVE DATA  
 SEE SHEET 24 FOR OFFSET DETAILS  
 SEE SHEET 20 FOR 35' PROFILE

	PROJECT NUMBER NO.	7-28291A	SHEET NO.	25
	DATE	7/28/2011	DRAWN BY	ROBERT L. CECE
	CONTRACT NO.		DESIGNED BY	ROBERT L. CECE
	DATE		CHECKED BY	ROBERT L. CECE
			IN CHARGE	ROBERT L. CECE

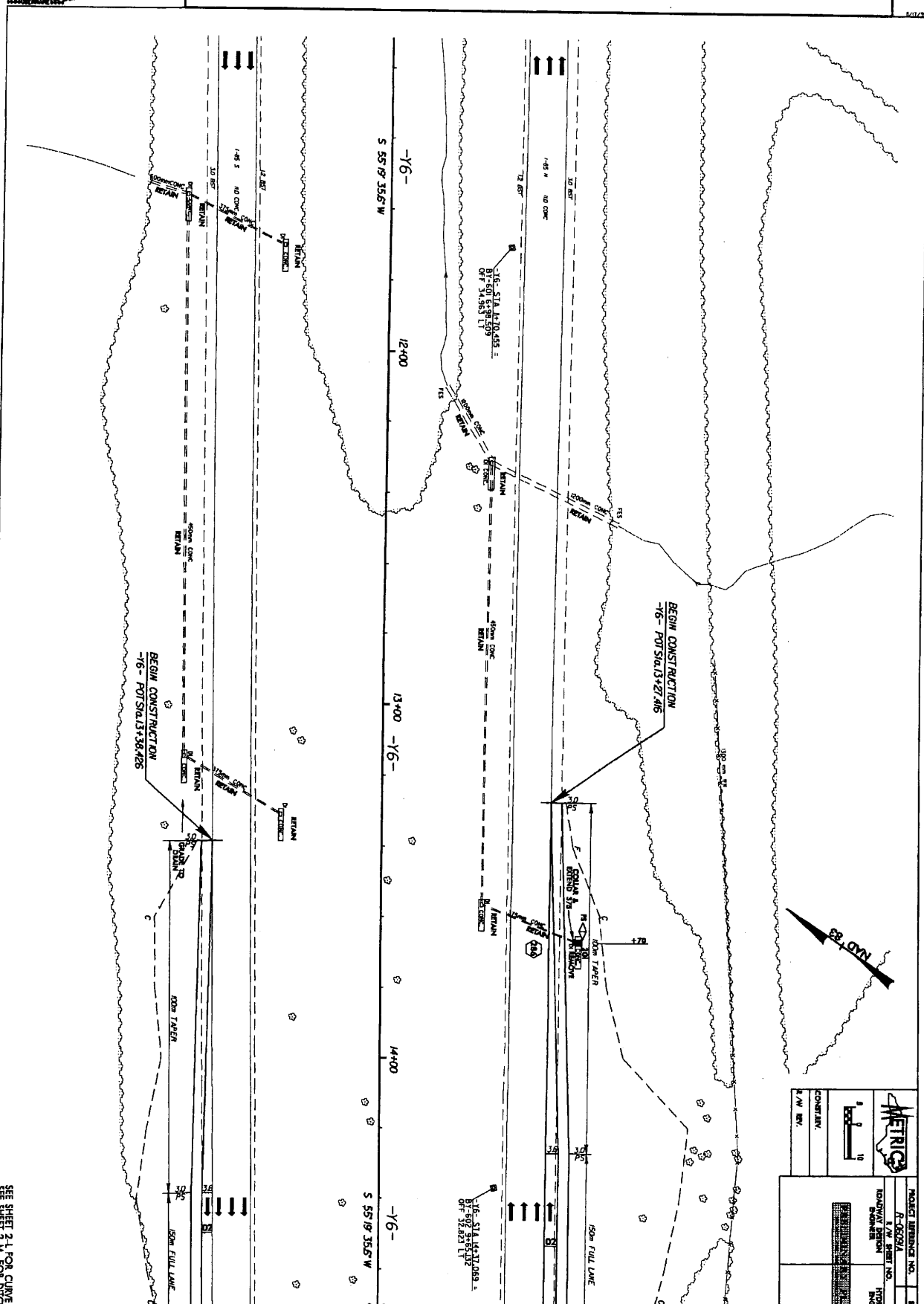
REVISIONS  
 ROW REVISIONS, PARCELS 37,38,73, AND 927 COMBINED INTO PARCEL 927, LETTER DATED 3-24-2004  
 WPM 04-20-2004



SEE SHEET 24 FOR CURVE DATA  
 SEE SHEET 27 FOR ADJUSTMENTS

	PROJECT NUMBER NO.	9-06024	SHEET NO.	26
	CONTRACT NO.	1-06024	DATE	04/20/04
	CONTRACTOR	CONTRACTOR	DATE	04/20/04
	CONTRACTOR	CONTRACTOR	DATE	04/20/04

REVISIONS



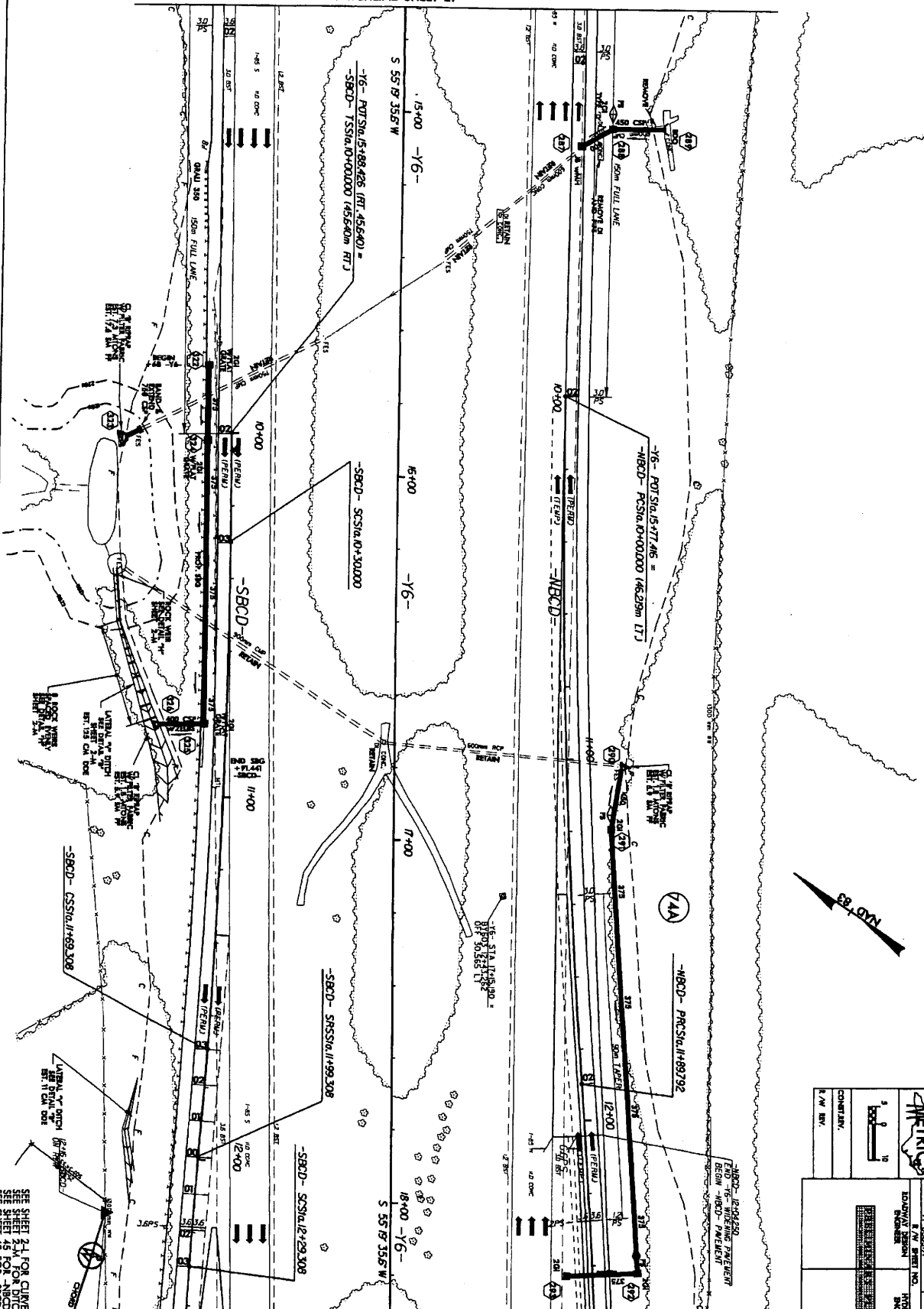
	PROJECT REFERENCE NO.	6-0502/A	SHEET NO.	27
	DATE	1/11/11	DRAWN BY	HYDRAULICS ENGINEER
	CONSTRAINT	1/11/11		

SEE SHEET 24 FOR CURVE DATA  
SEE SHEET 24 FOR DITCH DETAILS

MATCHLINE SHEET 28

FROM REVISIONS, PROPOSED ROW ADJUSTED, PARCEL 76 PROPERTY LINES CHANGED, LETTER DATED 1-22-2004  
 WPM 04-20-2004

MATCHLINE SHEET 27



MATCHLINE SHEET 29

SEE SHEET 21 FOR CURVE DATA  
 SEE SHEET 24 FOR SLOPE DATA  
 SEE SHEET 19 FOR SBCD PROFILE

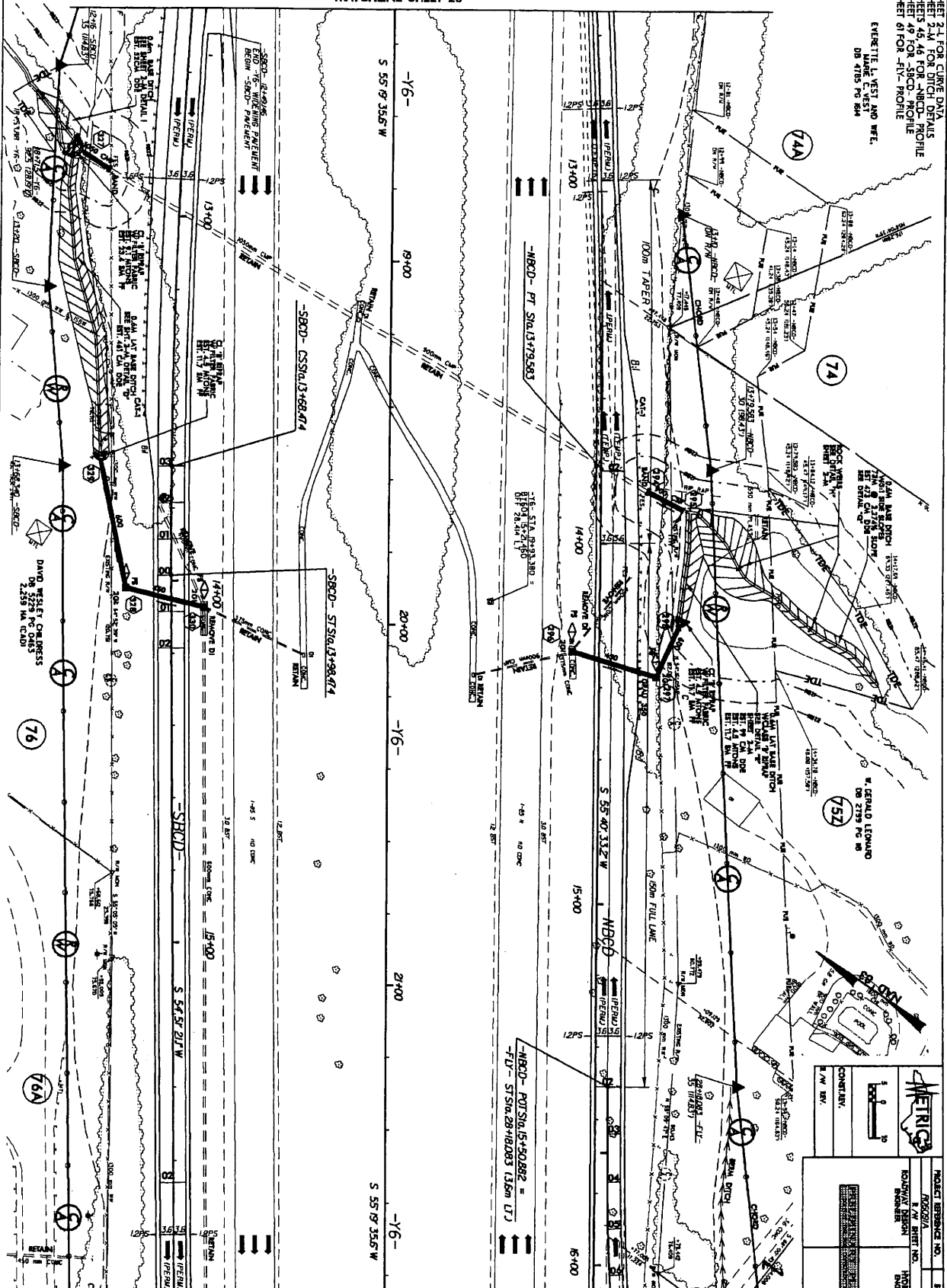


	PROJECT NUMBER NO.	A-10092A	SHEET NO.	28
	DATE/ISSUE NO.	8/14/03	PROJECT NO.	10092A
	DESIGNER	ENGINEER	INCHES	FOOT

REVISIONS  
 FROM REVISIONS, ADDED TDE AND CHANGED PARCEL NUMBER TO 752, ELECTRONIC FILE FROM HYDROLOGY DATED 09-15-2005.  
 WFW 09-22-2005

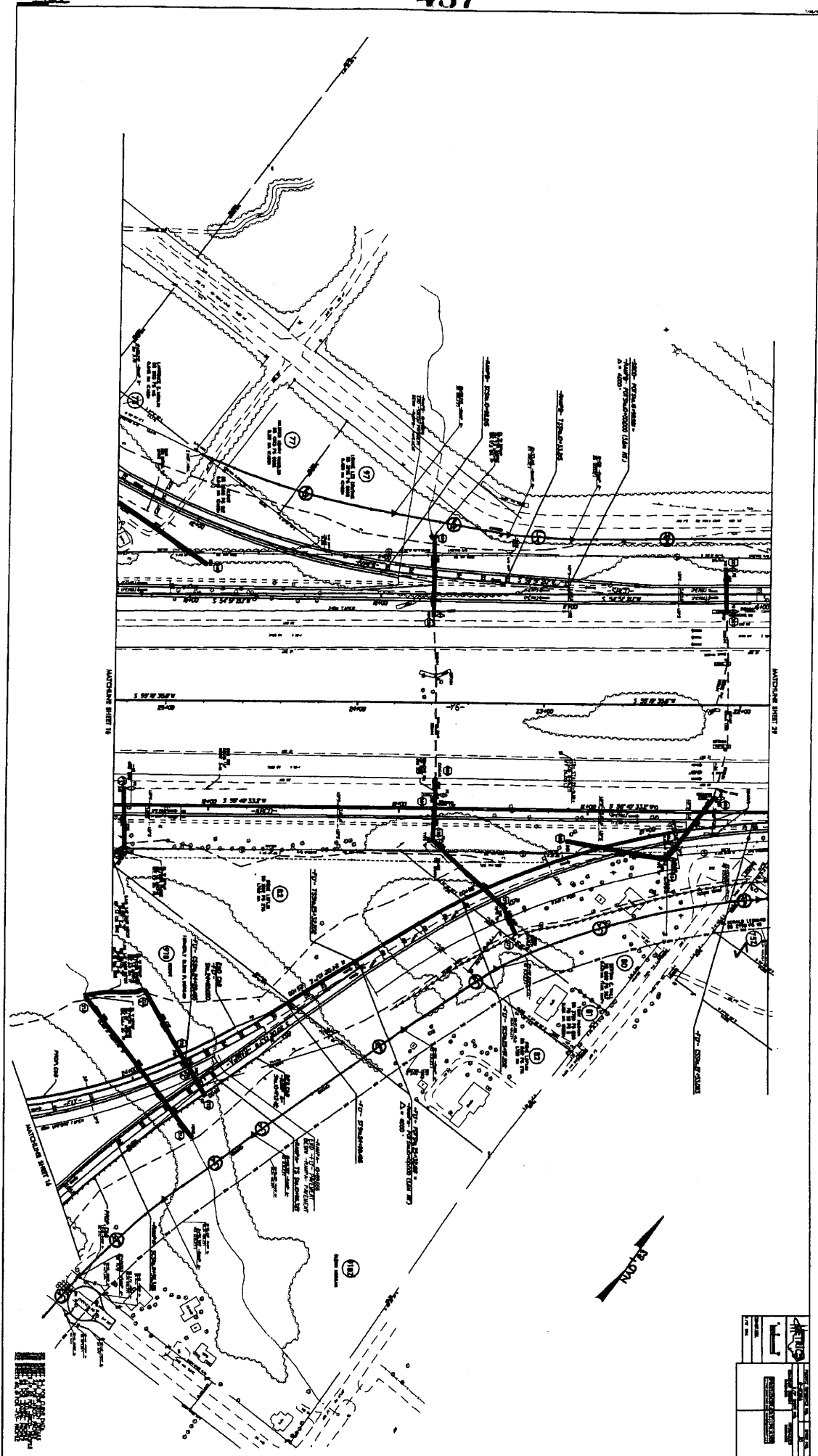
MATCHLINE SHEET 28

SEE SHEET 2-1 FOR CURVE DATA  
 SEE SHEET 46 FOR LAND PROFILE  
 SEE SHEET 49 FOR SBCD PROFILE  
 SEE SHEET 61 FOR FIV PROFILE  
 EVERETTE L. VEST AND WFE,  
 MADE L. VEST AND WFE,  
 DB 4183 PG 84

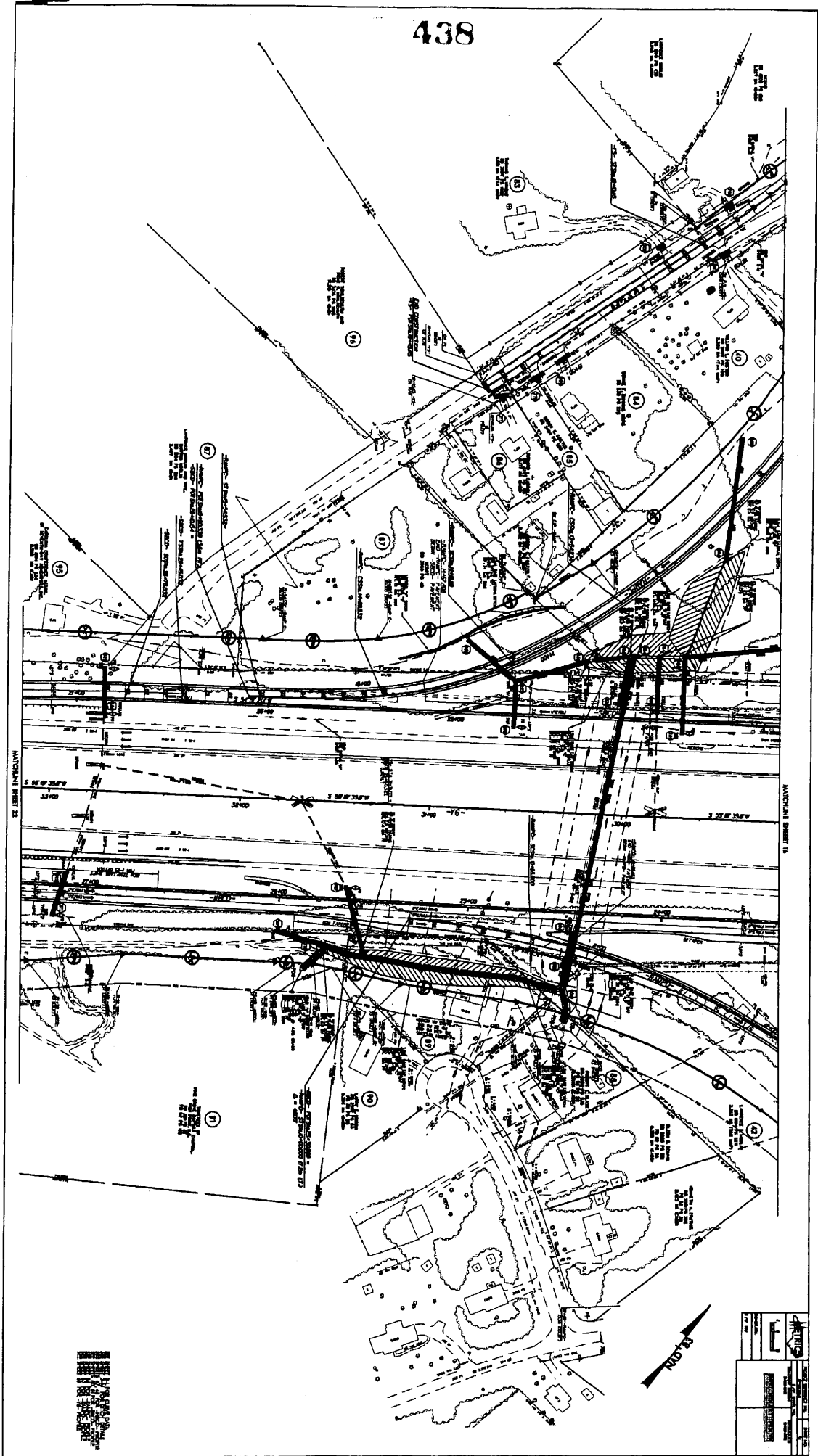


MATCHLINE SHEET 30

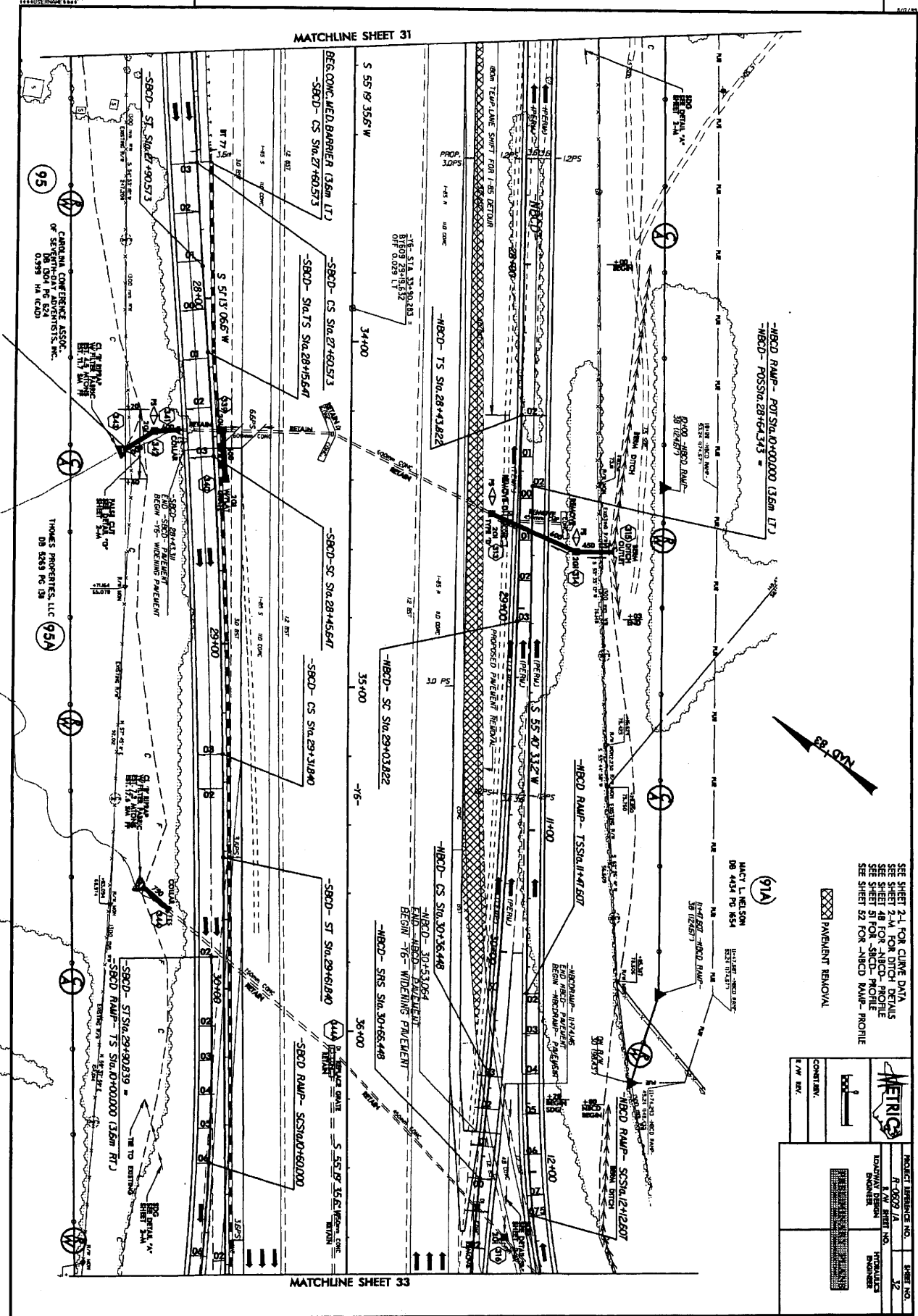
	PROJECT REFERENCE NO.	SHEET NO.
	00000000	29
	NATIONAL DESIGN	PROVIDER
	EVERETT L. VEST AND WFE	EVERETT L. VEST AND WFE







REVISIONS  
 ROW REVISIONS, ADDED PARCEL #91A, ADDED PARCEL #91B AND OWNER INFORMATION, LETTER DATED 10-05-2004  
 WPM 10-29-2004



95  
 CAROLINA CONFERENCE ASSOC.  
 OF SEVENTH-DAY ADVENTISTS, INC.  
 0.989 HA (2.45 AC)

95A  
 THOMAS PROPERTIES, LLC  
 DB 5269 PG 09

SEE SHEET 21 FOR CURVE DATA  
 SEE SHEET 48 FOR -SBCD- PROFILE  
 SEE SHEET 51 FOR -SBCD- PROFILE  
 SEE SHEET 52 FOR -NBCD- PROFILE

PROJECT NUMBER NO.	17-0002 JA
DRAWN BY	E.W. BERT NO.
CHECKED BY	PROJECT NO.
DATE	12/12/07
SCALE	AS SHOWN
CONTRACT NO.	
DATE	

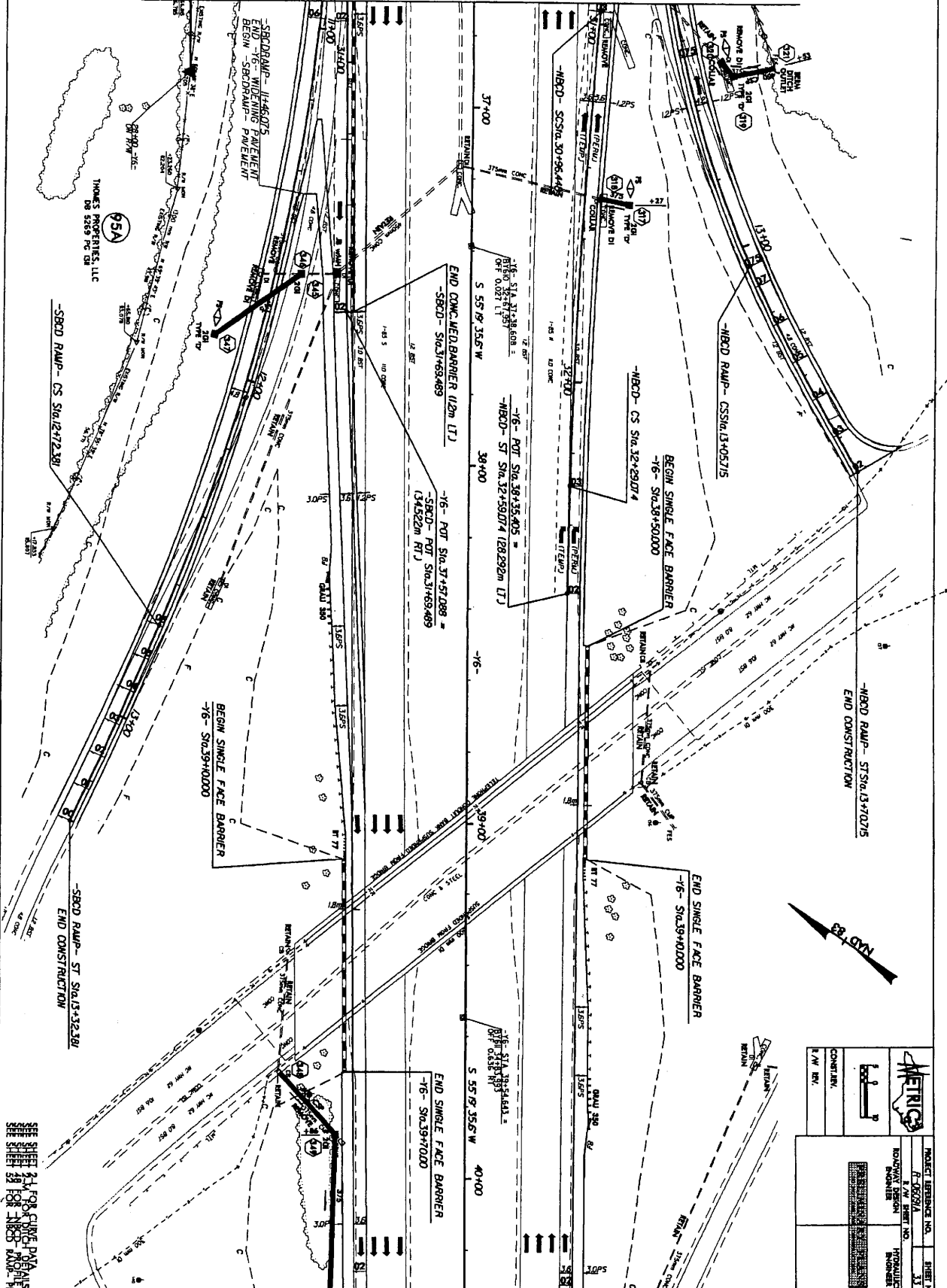
(91A)  
 MARY L. NELSON  
 DB 4431 PG 854

XXXXX PAVEMENT REMOVAL

MATCHLINE SHEET 33

REVISIONS  
ROW REVISIONS, ADDED PARCEL 95A AND OWNER INFORMATION, LETTER DATED 07-22-2004  
W/PW 08-31-2004

MATCHLINE SHEET 32



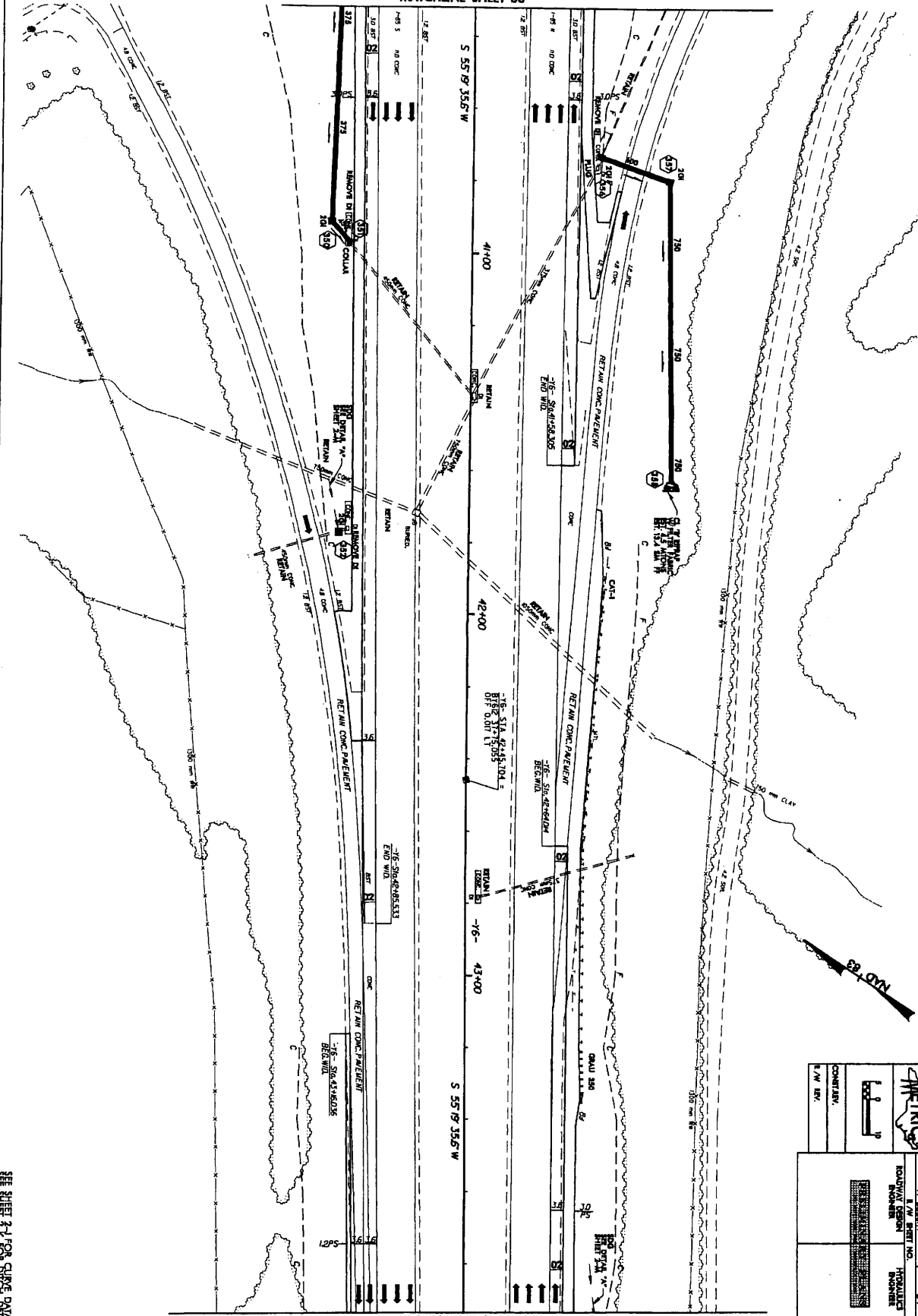
MATCHLINE SHEET 34

	PROJECT LICENSE NO.	07-05292A	SHEET NO.	33
	DATE	07/22/04		
	CONTRACT	07-05292A	SHEET NO.	33
	CONTRACT	07-05292A		
	ROADWAY DESIGN	ROADWAY DESIGN	HYDRAULICS	HYDRAULICS
	ROADWAY DESIGN	ROADWAY DESIGN	HYDRAULICS	HYDRAULICS

SEE SHEET 31 FOR CONC. DETAILS  
SEE SHEET 33 FOR CONC. DETAILS  
SEE SHEET 32 FOR CONC. DETAILS  
SEE SHEET 34 FOR CONC. DETAILS

REVISIONS

MATCHLINE SHEET 33

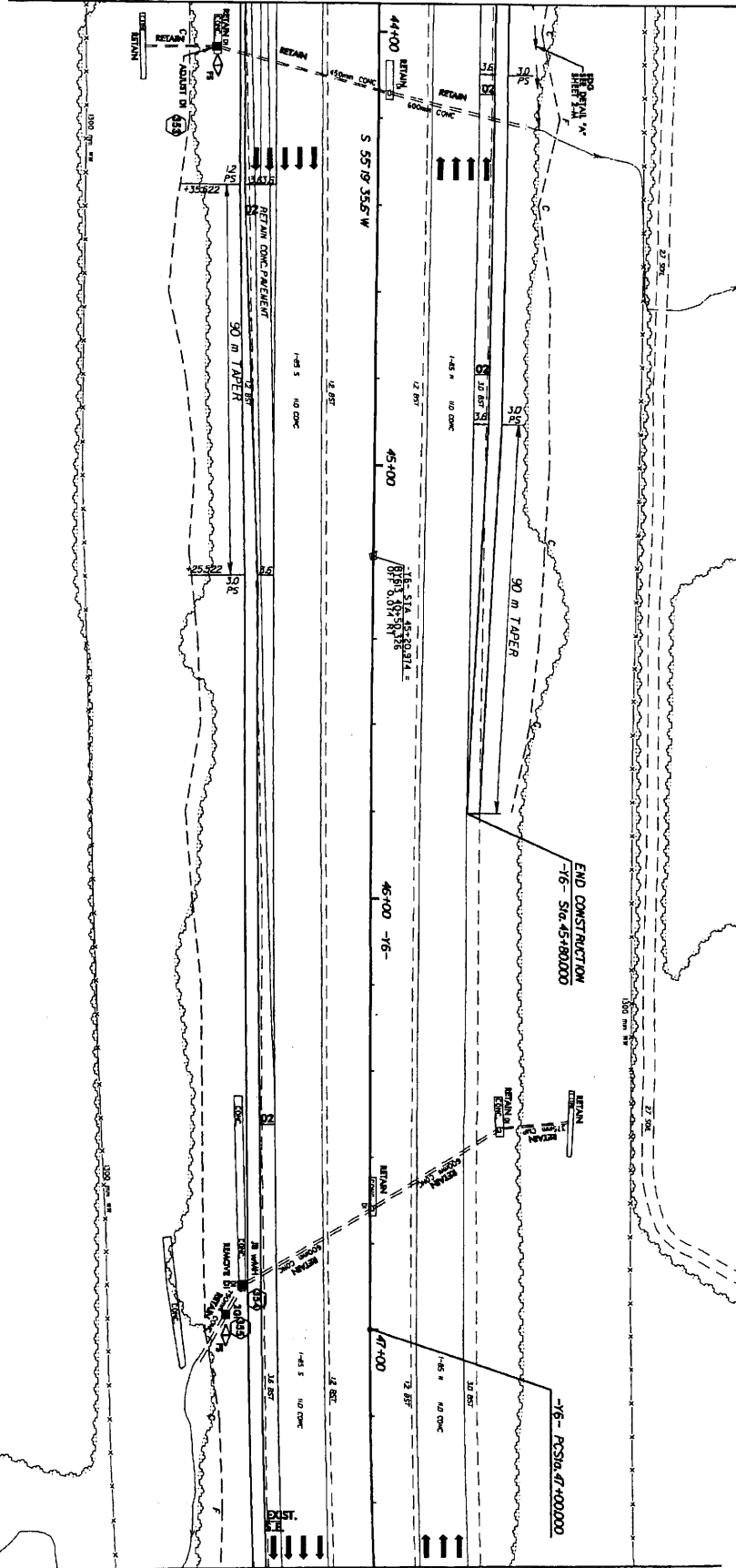



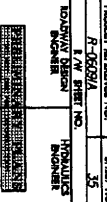
MATCHLINE SHEET 35

SEE SHEET 34 FOR CURB DETAILS

	PROJECT REFERENCE NO.	R-00001A	SHEET NO.	34
	ROADWAY DESIGN NUMBER	R/W BENT NO.	HYDRAULIC DESIGN NUMBER	

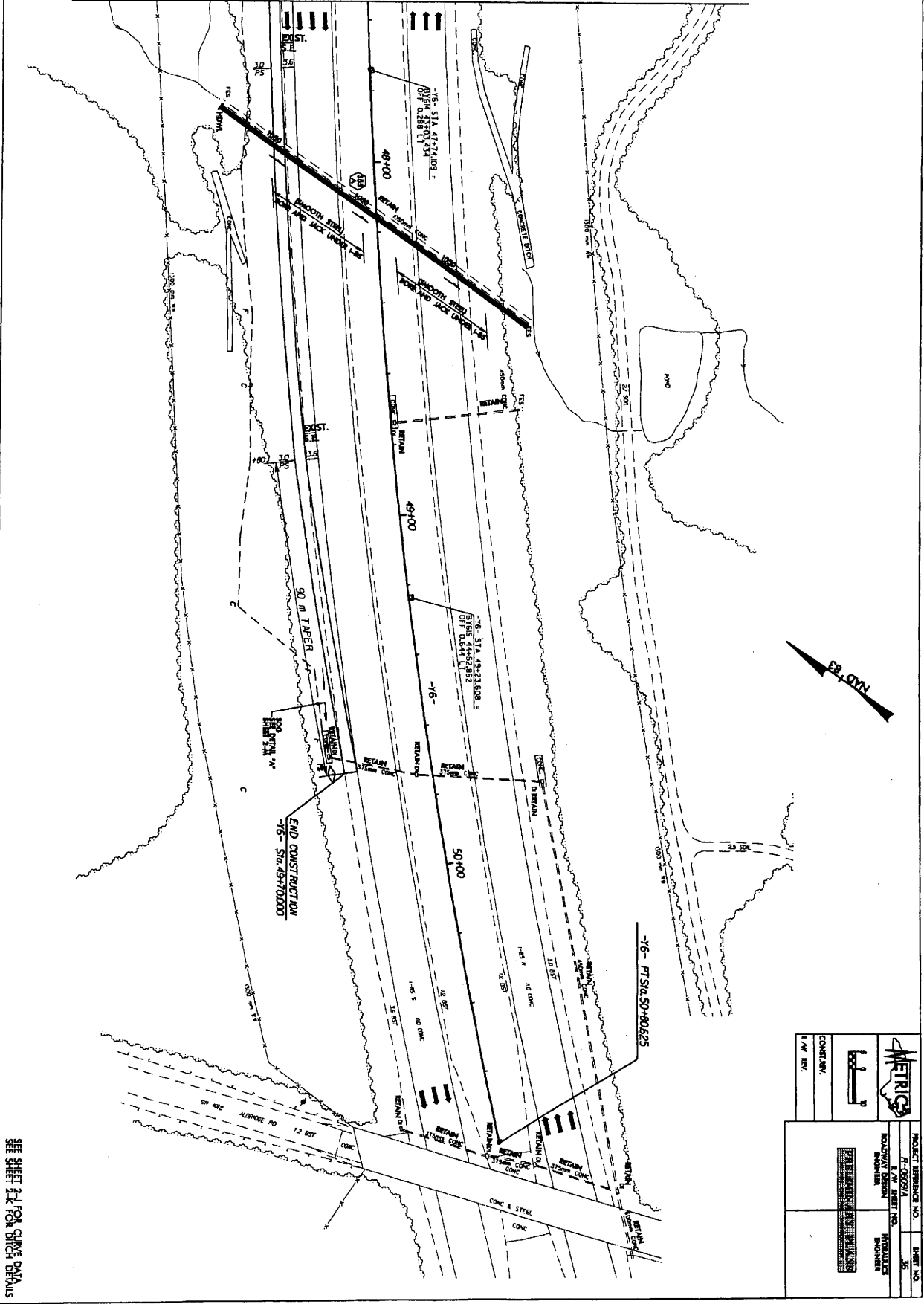
MATCHLINE SHEET 34



	PROJECT NUMBER NO.	SHEET NO.
	4-10307A	35
	DESIGNED BY	INTEGRATED
	DRAWN BY	INTEGRATED

SEE SHEET 2-1 FOR CURVE DATA  
SEE SHEET 2-2 FOR DITCH DETAILS

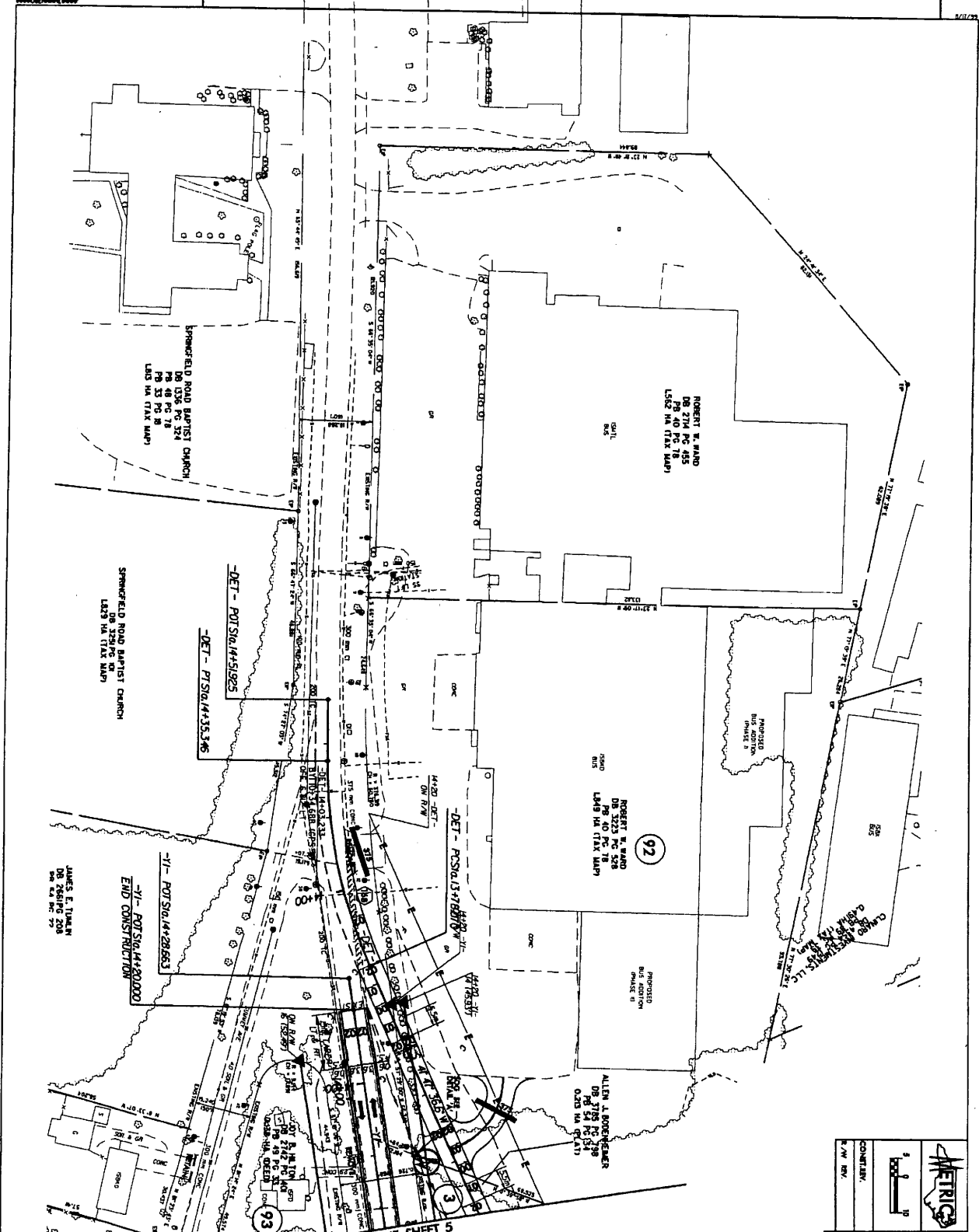
MATCHLINE SHEET 35



SEE SHEET 24 FOR CURVE DATA

	PROJECT REFERENCE NO.	35
	DATE	11/20/2011
	CONTRACT NO.	16-03027A
	CONTRACT NAME	ROADWAY IMPROVEMENT PROJECT
	DESIGNER	TRC CONSULTANTS INC.
	ENGINEER	TRC CONSULTANTS INC.
	ISSUED BY	TRC CONSULTANTS INC.
	DATE	11/20/2011

FROM REVISIONS, CHANGED OWNER AND INFORMATION PARCEL #93, LETTER DATED 10-05-2004  
WPM 4-25-2004

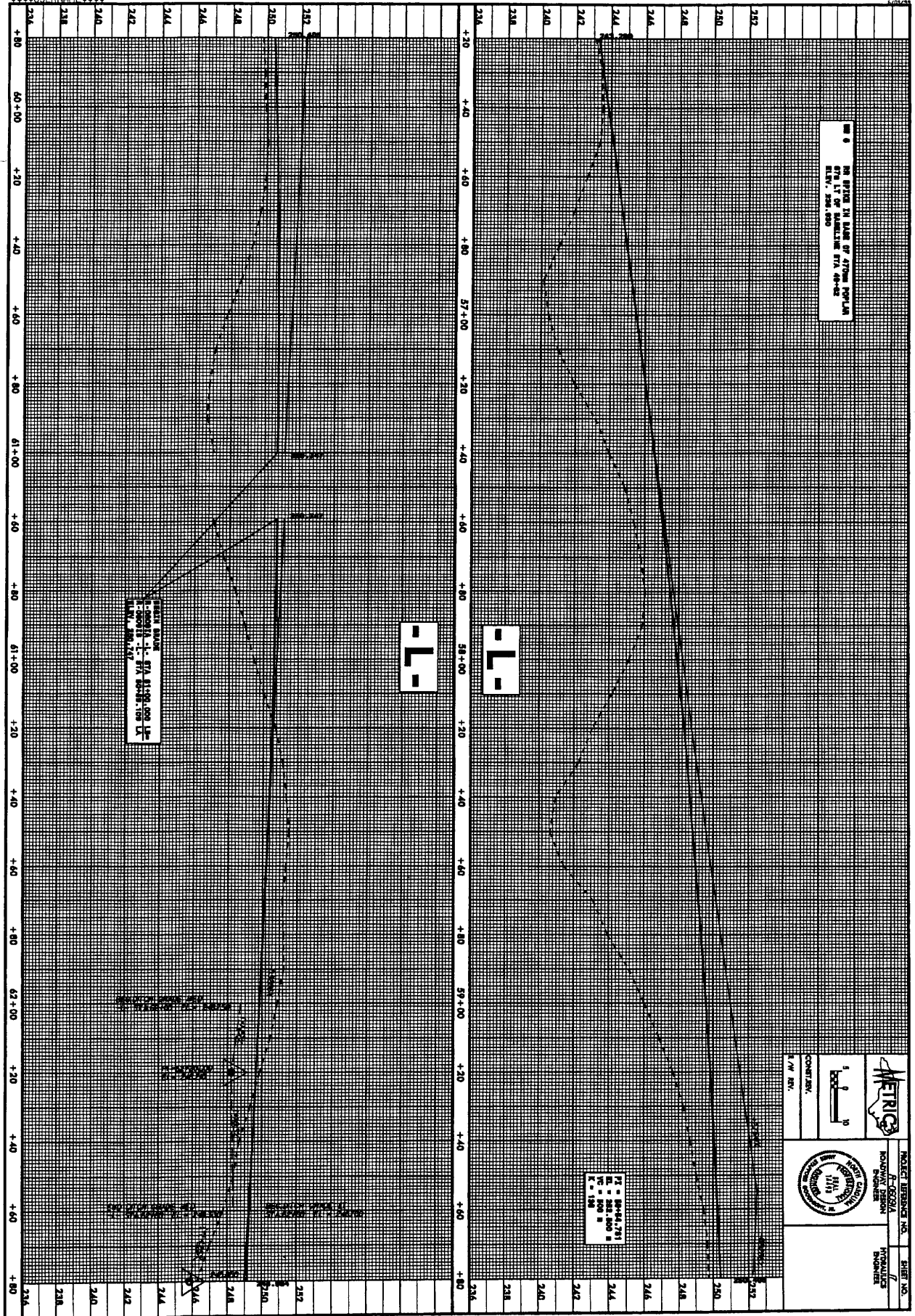


SEE SHEET 2.1 FOR CURVE DATA  
SEE SHEET 2.2 FOR PROFILE  
SEE SHEET 2.3 FOR PROFILE  
SEE SHEET 2.4 FOR PROFILE  
SEE SHEET 2.5 FOR PROFILE  
SEE SHEET 2.6 FOR PROFILE  
SEE SHEET 2.7 FOR PROFILE  
SEE SHEET 2.8 FOR PROFILE  
SEE SHEET 2.9 FOR PROFILE  
SEE SHEET 3.0 FOR PROFILE  
SEE SHEET 3.1 FOR PROFILE  
SEE SHEET 3.2 FOR PROFILE  
SEE SHEET 3.3 FOR PROFILE  
SEE SHEET 3.4 FOR PROFILE  
SEE SHEET 3.5 FOR PROFILE  
SEE SHEET 3.6 FOR PROFILE  
SEE SHEET 3.7 FOR PROFILE  
SEE SHEET 3.8 FOR PROFILE  
SEE SHEET 3.9 FOR PROFILE  
SEE SHEET 4.0 FOR PROFILE

MATCHLINE SHEET 5



	PROJECT REFERENCE NO.	SHEET NO.
	F-05024	37
	DATE	DATE
	1/11/04	1/11/04
	DESIGNED BY	PROJECT NO.
	RODOLFO V. GONZALEZ	100000000000
	DRAWN BY	DATE
	RODOLFO V. GONZALEZ	1/11/04



PROPOSED ELEVATION IN FEET OF ABOVE POINTS  
ELEV. 258.000  
ELEV. 258.000

PROPOSED ELEVATION IN FEET OF ABOVE POINTS  
ELEV. 258.000  
ELEV. 258.000

7.0

7.5

PROJECT NUMBER NO. 16-0000-1  
SHEET NO. 445

DATE: 02/09/06  
DRAWN BY: [Signature]  
CHECKED BY: [Signature]

SCALE: 1" = 10'

CONTRACT NO. 16-0000-1

PROJECT LOCATION: [Location]

DESIGNED BY: [Signature]  
ENGINEER: [Signature]

PROPOSED ELEVATION IN FEET OF ABOVE POINTS  
ELEV. 258.000  
ELEV. 258.000



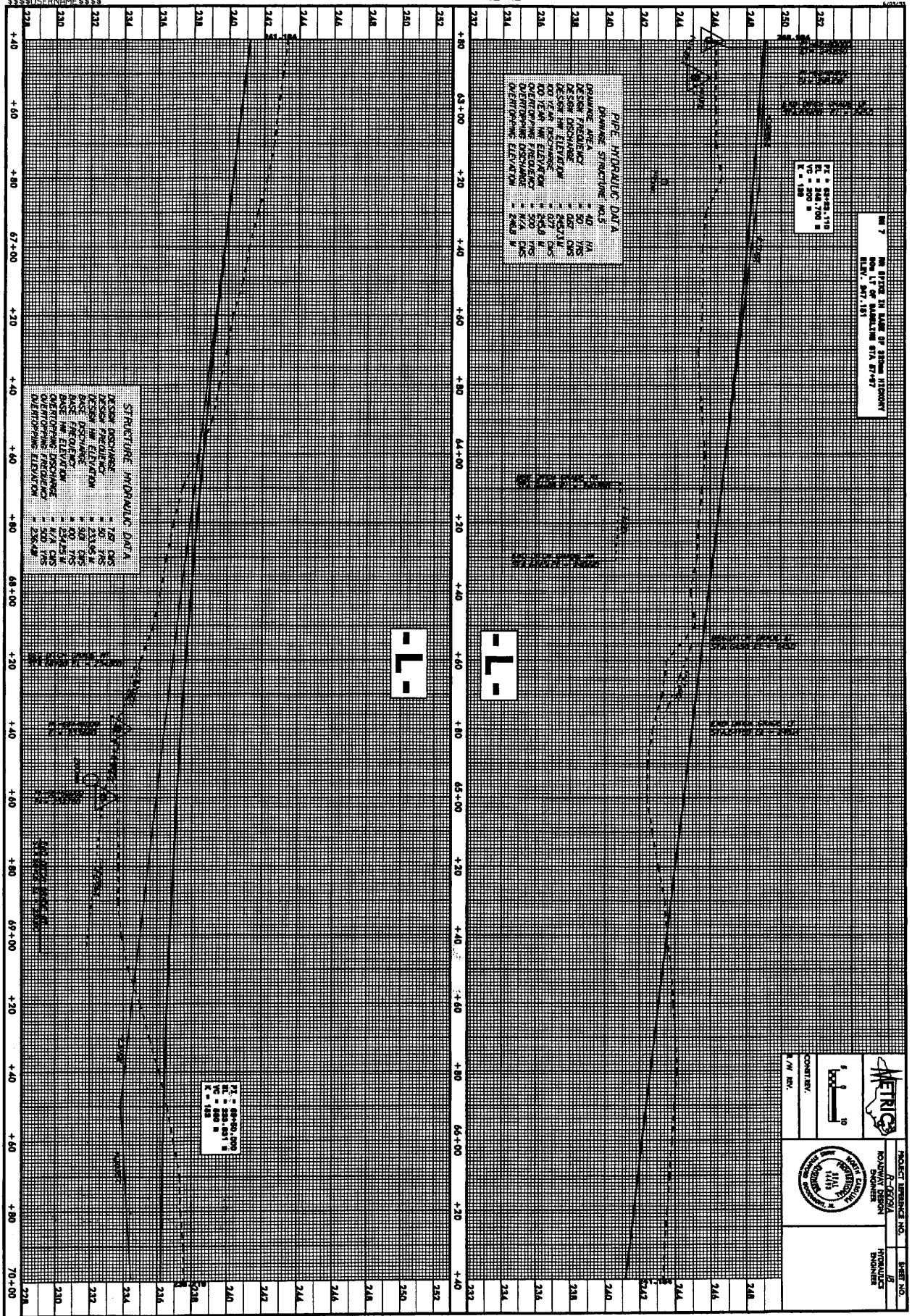
NO. 7  
NO. 7 PIPE IN BANK OF 330M RIPOUT  
PLAN STATION 815  
PLAN STATION 815



PC = 804.500 M  
PI = 804.700 M  
VC = 200 M  
K = 188

**PIPE HYDRAULIC DATA**  
 DRAINAGE STRUCTURE NO. 5  
 SPANNE AREA = 4.43 M<sup>2</sup>  
 DESIGN FREQUNCY = 50 YRS  
 DESIGN DISCHARGE = 2.65 M<sup>3</sup>/S  
 DESIGN ELEVATION = 804.50 M  
 10 YEAR HW ELEVATION = 804.50 M  
 OVERFLOWING DISCHARGE = 500 L/S  
 OVERFLOWING ELEVATION = 803.8 M

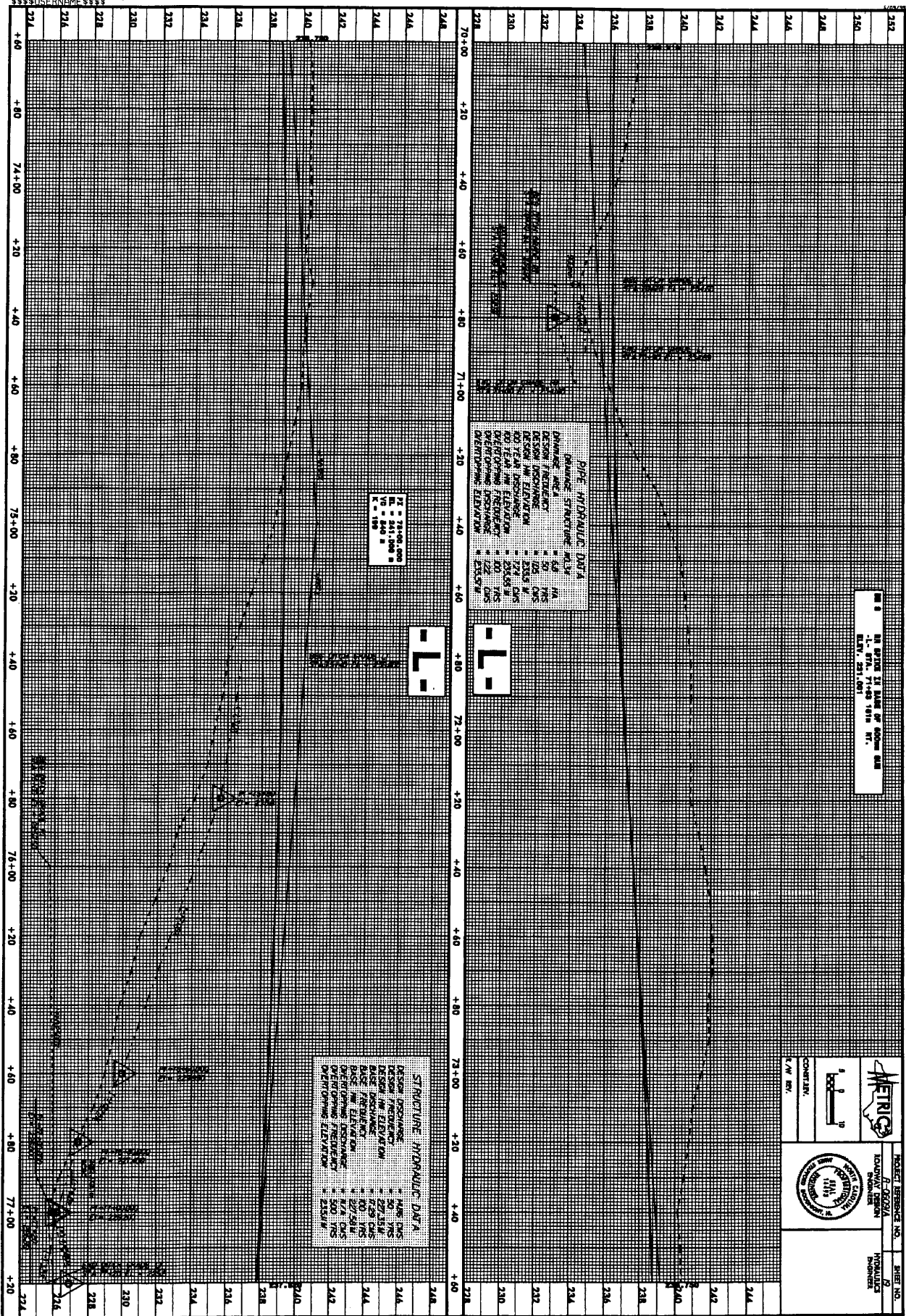
**STRUCTURE HYDRAULIC DATA**  
 DESIGN DISCHARGE = 7.20 M<sup>3</sup>/S  
 DESIGN FREQUNCY = 50 YRS  
 DESIGN ELEVATION = 233.6 M  
 BASE DISCHARGE = 3.92 M<sup>3</sup>/S  
 DESIGN ELEVATION = 233.6 M  
 OVERFLOWING DISCHARGE = 4.10 M<sup>3</sup>/S  
 OVERFLOWING ELEVATION = 233.6 M

PC = 804.500 M  
PI = 804.700 M  
VC = 200 M  
K = 188

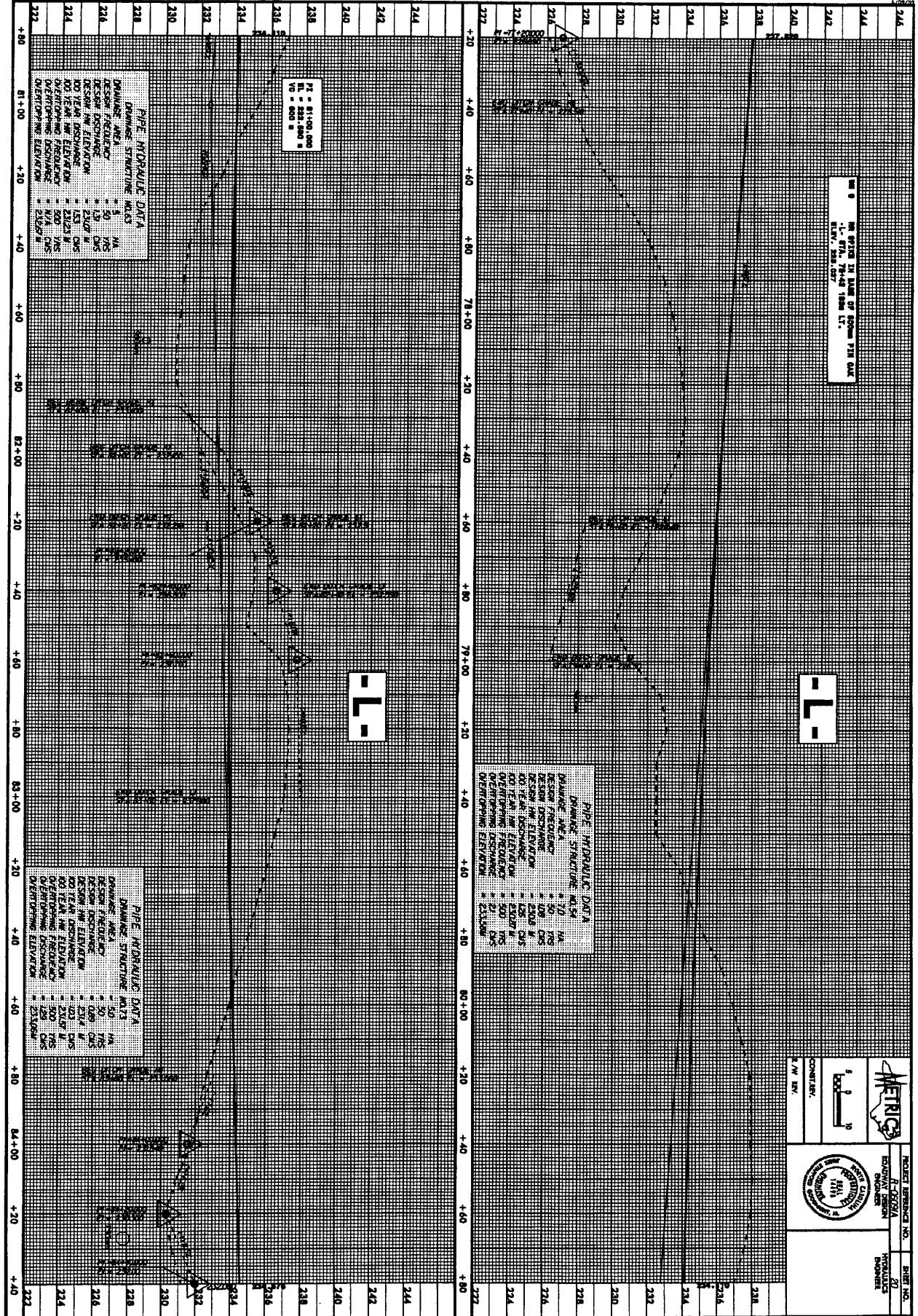


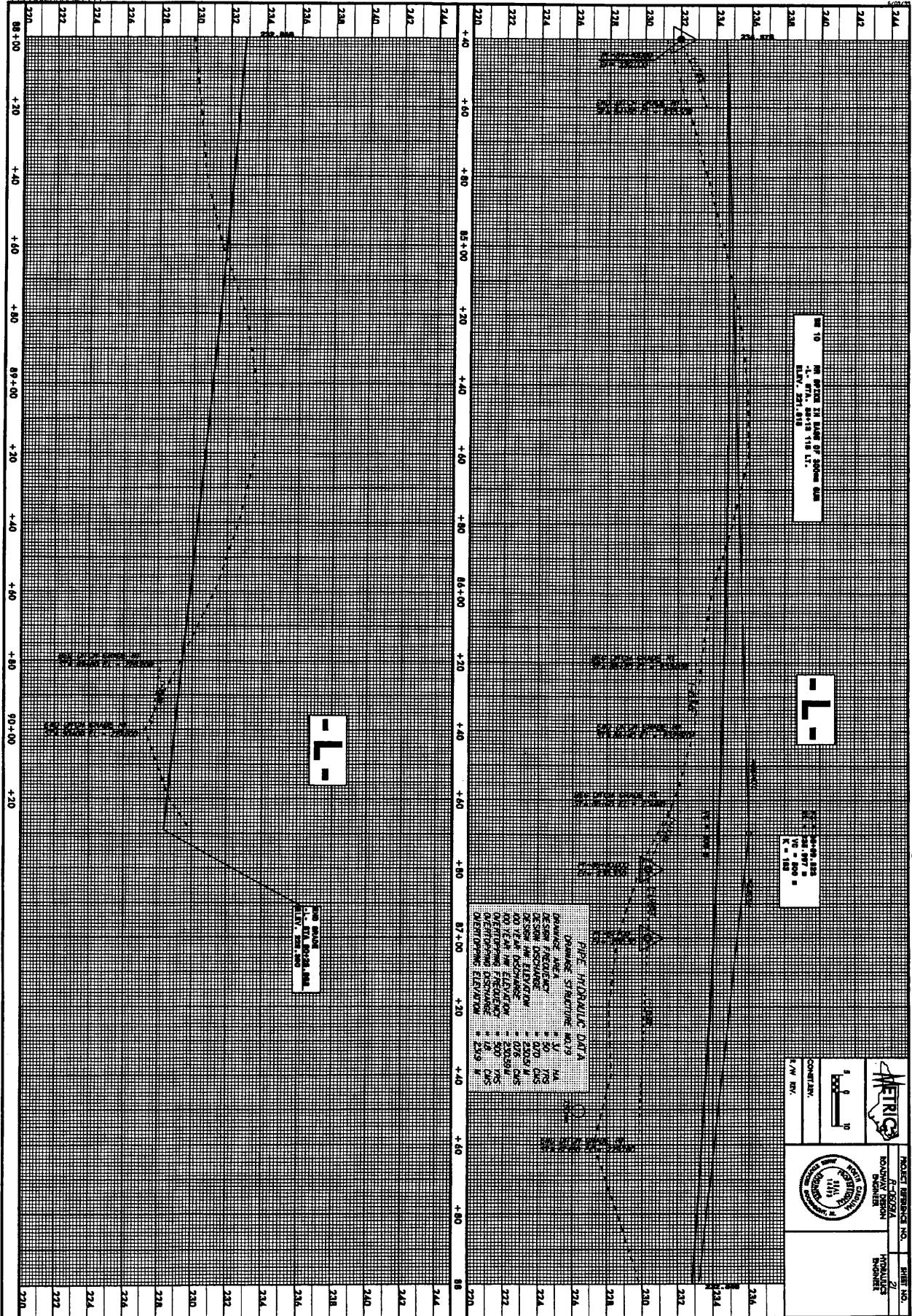
	PROJECT NUMBER NO.	8-00074	
	CONTRIVER.	1-00074	
PROJECT TITLE NO. 7 PIPE IN BANK OF 330M RIPOUT PLAN STATION 815			PROJECT NO. 8-00074 DRAWING NO. HYDRAULICS DRAWING

09-FEB-2006 15:54  
 +\\viro\p26951\p1.dgn



09-FEB-2006 15:54  
 \\s01\proj\66951b\pl.dgn  
 3355\USC\IN\1-3355





SEE NOTE IN BASE OF DRAINAGE DITCH  
 ELEV. 229.018

-0.2%

SEE NOTE IN BASE OF DRAINAGE DITCH  
 ELEV. 229.018

-0.5%

SEE NOTE IN BASE OF DRAINAGE DITCH  
 ELEV. 229.018

PROJECT NUMBER: 15-0000  
 SHEET NO. 27

DATE: 02/09/06

DRAWN BY: [Signature]

CHECKED BY: [Signature]

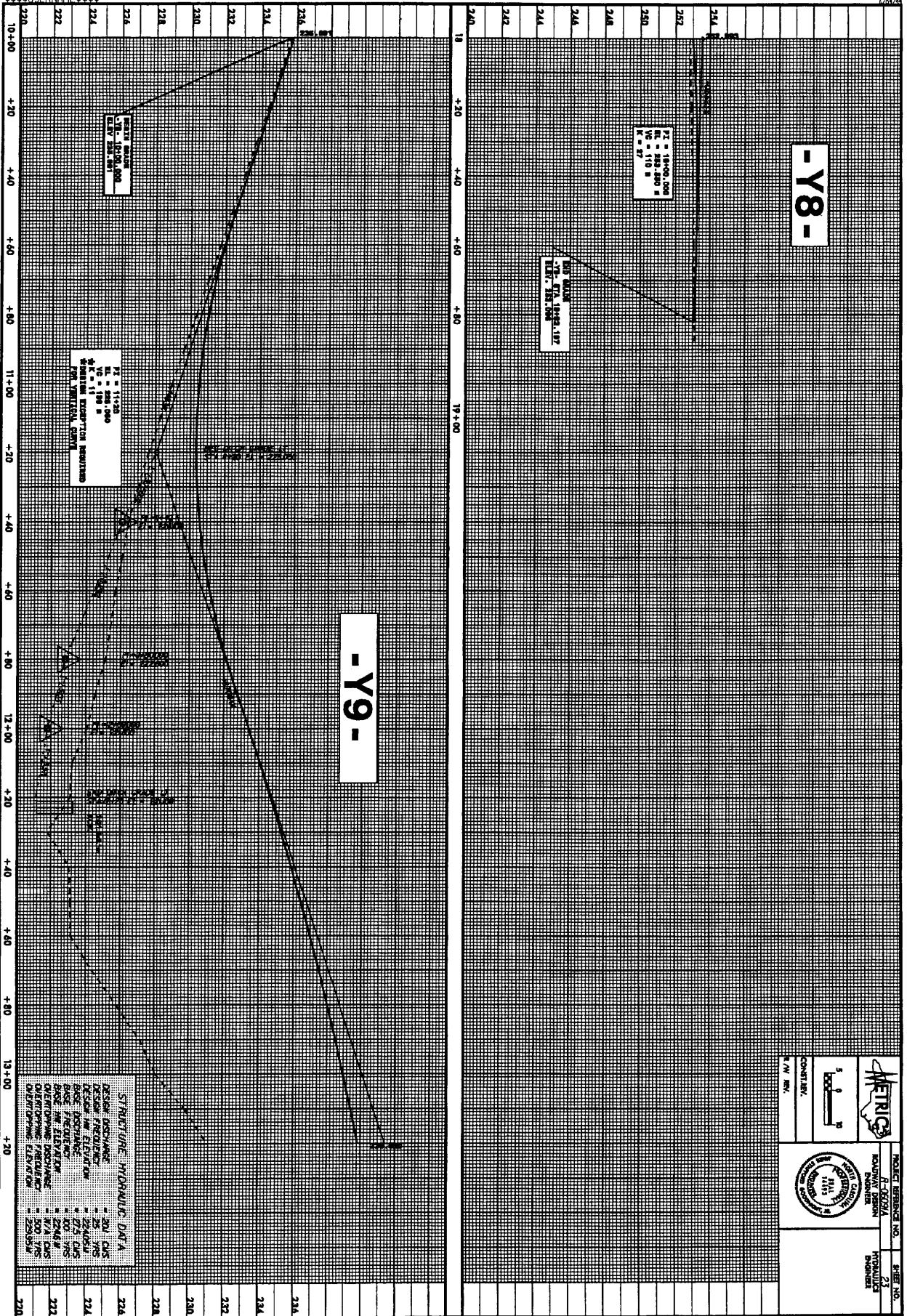
SCALE: 1" = 20'

PROJECT: [Project Name]

LOCATION: [Location]



09-FEB-2006 15:54  
123456789012345678901.dgn  
\$



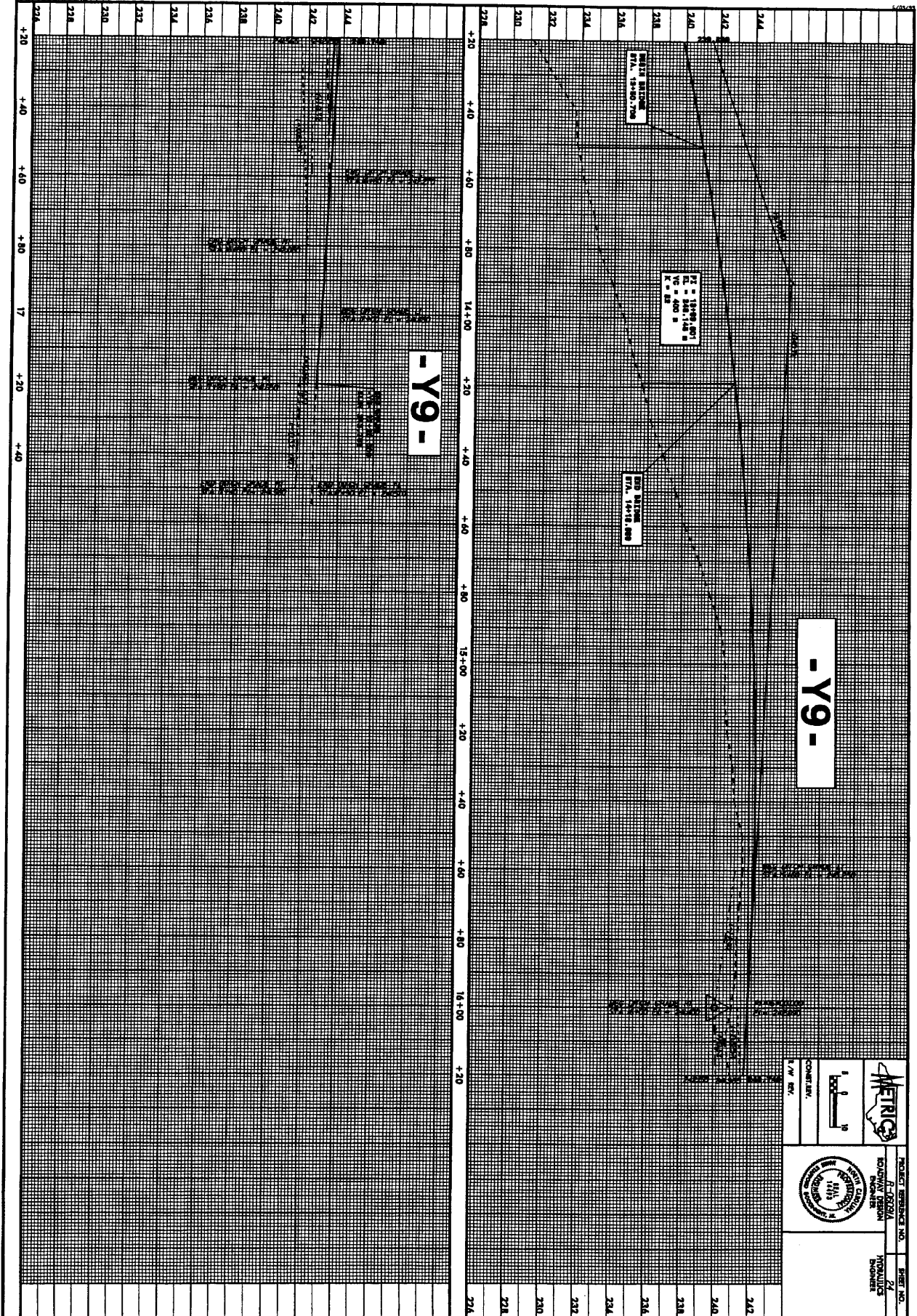
PROJECT REFERENCE NO. A-0001A  
 DRAWING NO. HYDRAULICA  
 SHEET NO. 23

DESIGNED BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

DATE: 02/09/06  
 TIME: 10:30 AM

CONTRACT NO. [Number]  
 DRAWING NO. [Number]

09-FEB-2006 15:54  
 C:\p\060515.pfl.dgn  
 \$\$\$\$\$\$



**-Y9-**

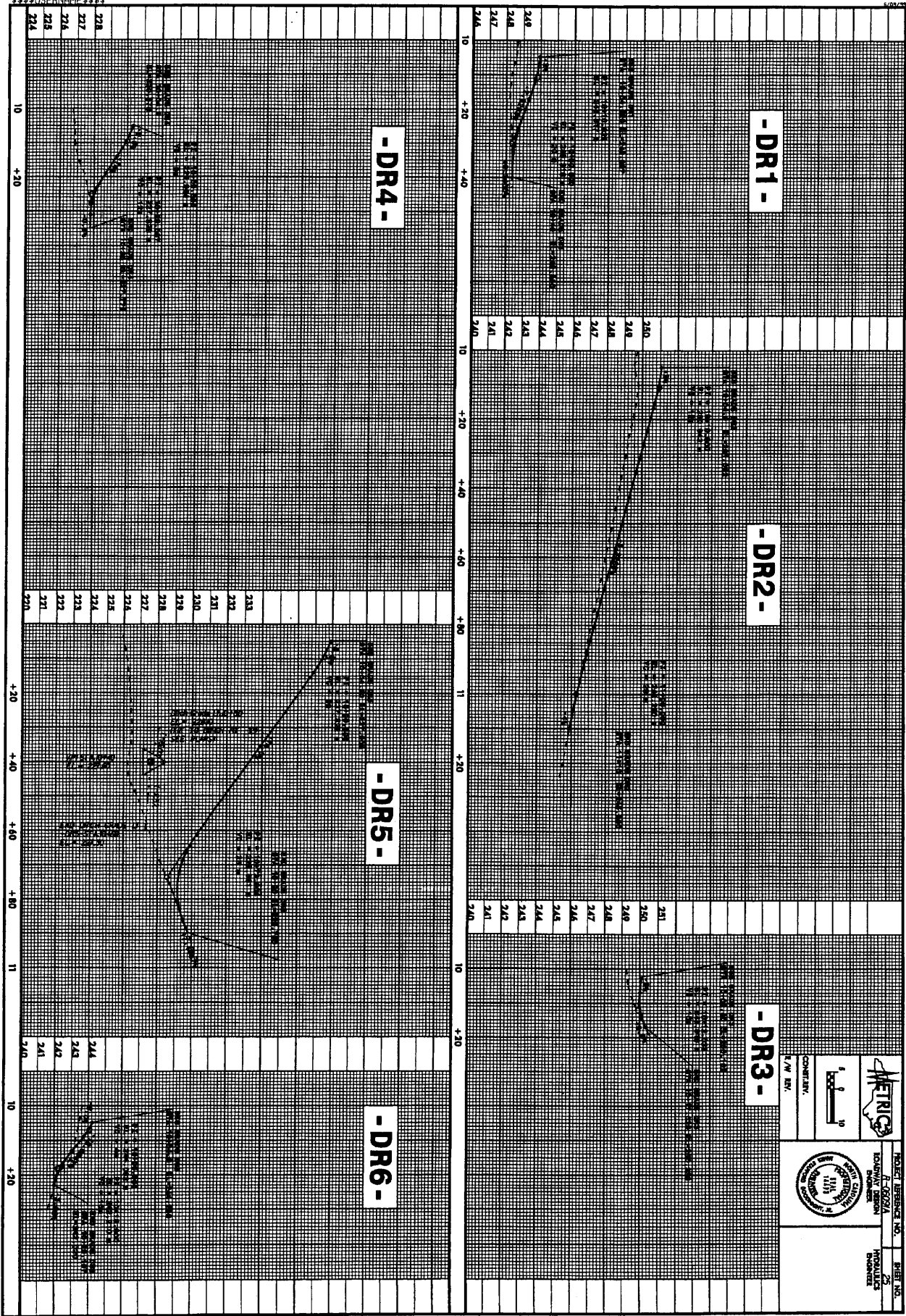
**-Y9-**

PC = 18+49.001  
 HP = 480.148  
 K = 88

P20 BILIRING  
 P.L. 15+13.000

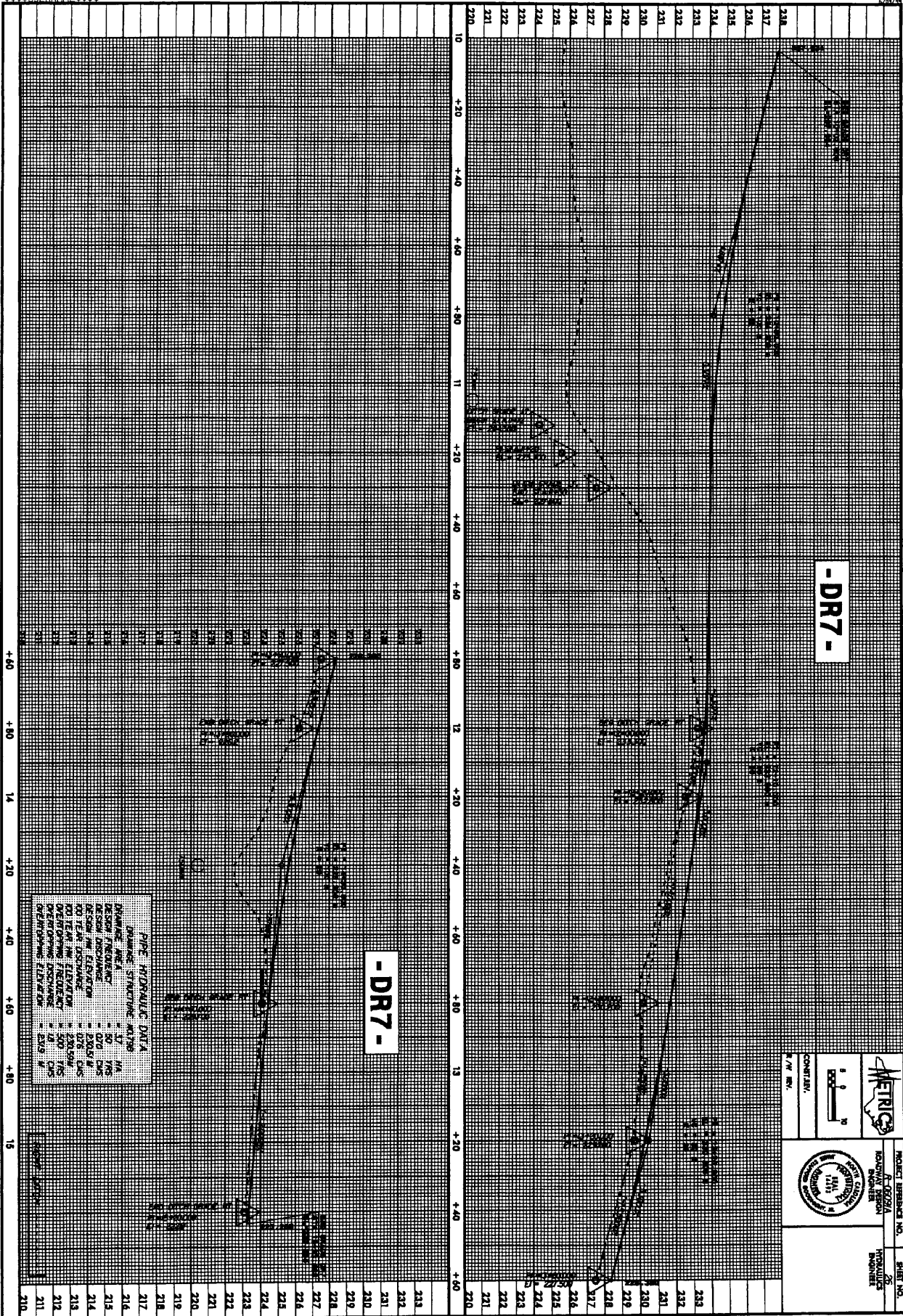
P10 BILIRING  
 P.L. 15+30.700

	PROJECT NUMBER NO. 060515	SHEET NO. 24
	CONSULTING ENGINEER CIVIL DESIGN	HYDRAULICS ENGINEER
	CONTRACT NO. 060515	





09-FEB-2006 15:54  
 r:\vra\vr09\91b.dgn  
 \$\$\$\$SYTIME\$\$\$\$



PIPING HYDRAULIC DATA  
 DRAWING AREA: 17' x 14'  
 DESIGN FLOW: 100 CFS  
 DESIGN HEAD: 20.5 FT  
 DESIGN VELOCITY: 1.5 FT/SEC  
 DESIGN PRESSURE: 2.0 PSI  
 DESIGN TEMPERATURE: 60 F  
 DESIGN MATERIAL: 304 SS  
 DESIGNER: J. W. BROWN  
 CHECKER: J. W. BROWN  
 DATE: 02/09/06

**MERC**  
 MECHANICAL ENGINEERING  
 1000 W. 10TH AVENUE  
 DENVER, CO 80202  
 PHONE: 303.733.1111  
 FAX: 303.733.1112  
 WWW.MERCENGINEERING.COM

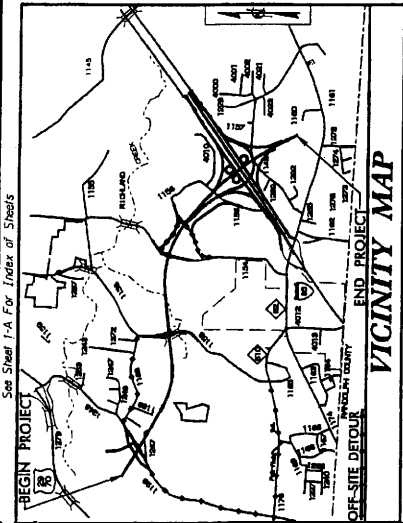
PROJECT NUMBER: 09-0001  
 SHEET NO: 454  
 CONTRACT: 09-0001  
 DATE: 02/09/06

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**GUILFORD COUNTY**

LOCATION: US 311 HIGH POINT EAST BELTWAY FROM  
US 29-70 TO I-85 NORTH OF ARCHDALE

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING,  
FENCING, STRUCTURES, AND I.T.S

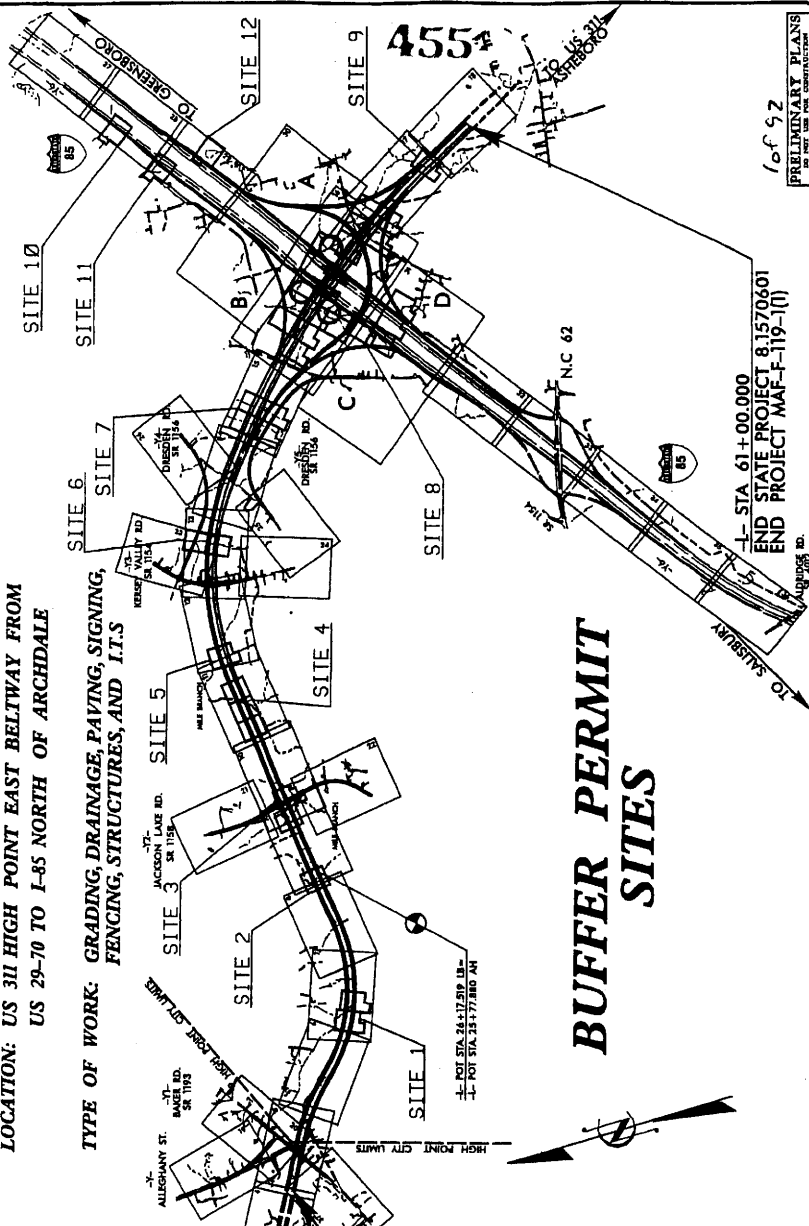


VICINITY MAP

PROJECT NO.	R-06091A
DATE	1
DESIGNER	34345.1.1
PROJECT NO.	MAF-F-119-1(1)
DATE	34345.2.7
PROJECT NO.	STP-NHE-119-1(1)
DATE	ROW & UTILITIES



ALL DIMENSIONS IN  
THESE PLANS ARE IN METERS



PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION  
1 of 92

**BUFFER PERMIT  
SITES**

-L- STA 11+98.805  
BEGIN STATE PROJECT 8.1570601  
BEGIN PROJECT MAF-F-119-1(1)

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL  
BOUNDARIES OF HIGH POINT  
THIS IS A CONTROLLED-ACCESS PROJECT WITH  
ACCESS BEING LIMITED TO INTERCHANGES  
CLEARING ON THIS PROJECT SHALL BE PERFORMED  
TO THE LIMITS ESTABLISHED BY METHOD (II)

<p>Prepared in the office of: <b>DIVISION OF HIGHWAYS</b> 1999 Birch Ridge Dr., Raleigh, NC 27619</p> <p>SEE EXAMINED SUPERVISOR'S SIGNATURE</p> <p>RIGHT OF WAY DATE SEPTEMBER, 2003</p> <p>LETTING DATE: MARCH 15, 2005</p>	<p>HYDRAULICS ENGINEER</p>	<p>DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA</p>
	<p>ROADWAY DESIGN ENGINEER</p>	<p>STATE DESIGN ENGINEER DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION</p>
<p>PROJECT LENGTH</p> <p>LENGTH ROADWAY F.A. PROJECT MAF-F-119-1(1) = 4.901 KM</p> <p>LENGTH STRUCTURE F.A. PROJECT MAF-F-119-1(1) = KM</p> <p>TOTAL LENGTH STATE PROJECT 8.1570601 = 4.901 KM</p>	<p>JIMMY GOODNIGHT, PE PROJECT MANAGER</p> <p>STEVE KENDALL PROJECT DESIGN ENGINEER</p>	<p>APPROVED DIVISION ADMINISTRATOR</p>
<p>DESIGN DATA</p> <p>ADT 2005 = 27,000</p> <p>ADT 2025 = 39,000</p> <p>DHY = 10 %</p> <p>D = 60 %</p> <p>T = 13 %</p> <p>V = 110 km/h</p> <p>* TST 7 % DUAL 6 %</p> <p>RUNC CLASS - FREEWAY</p>	<p>GRAPHIC SCALES</p> <p>PLANS 1" = 100'</p> <p>PROFILE (HORIZONTAL) 1" = 100'</p> <p>PROFILE (VERTICAL) 1" = 10'</p>	<p>DATE</p>

CONTRACT: 34345.1.1  
MAP: R-06091A

RECEIVED

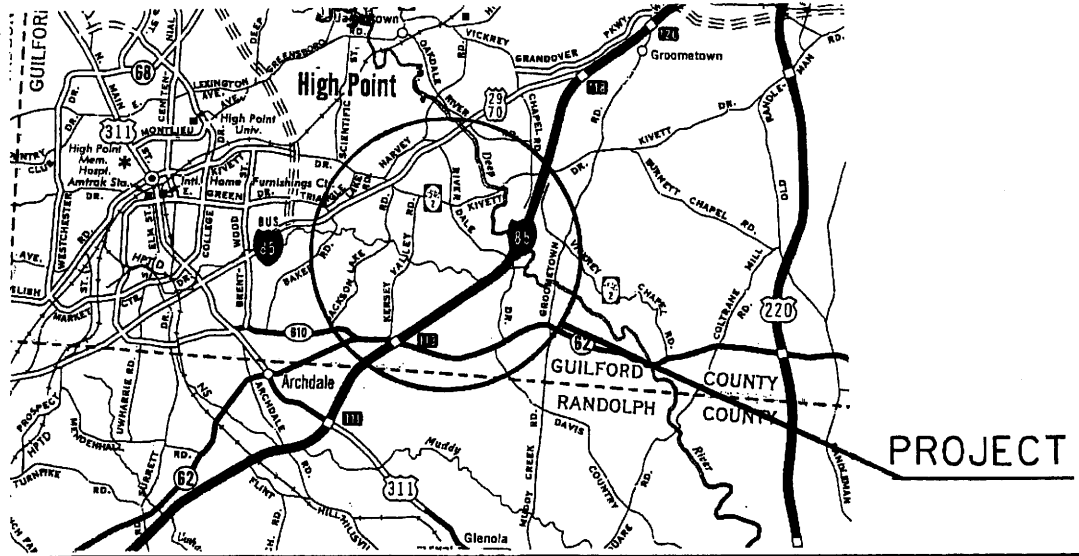
MAD FOR

BEGIN PROJECT

END PROJECT



PORTION OF GUILFORD COUNTY MAP



PROJECT

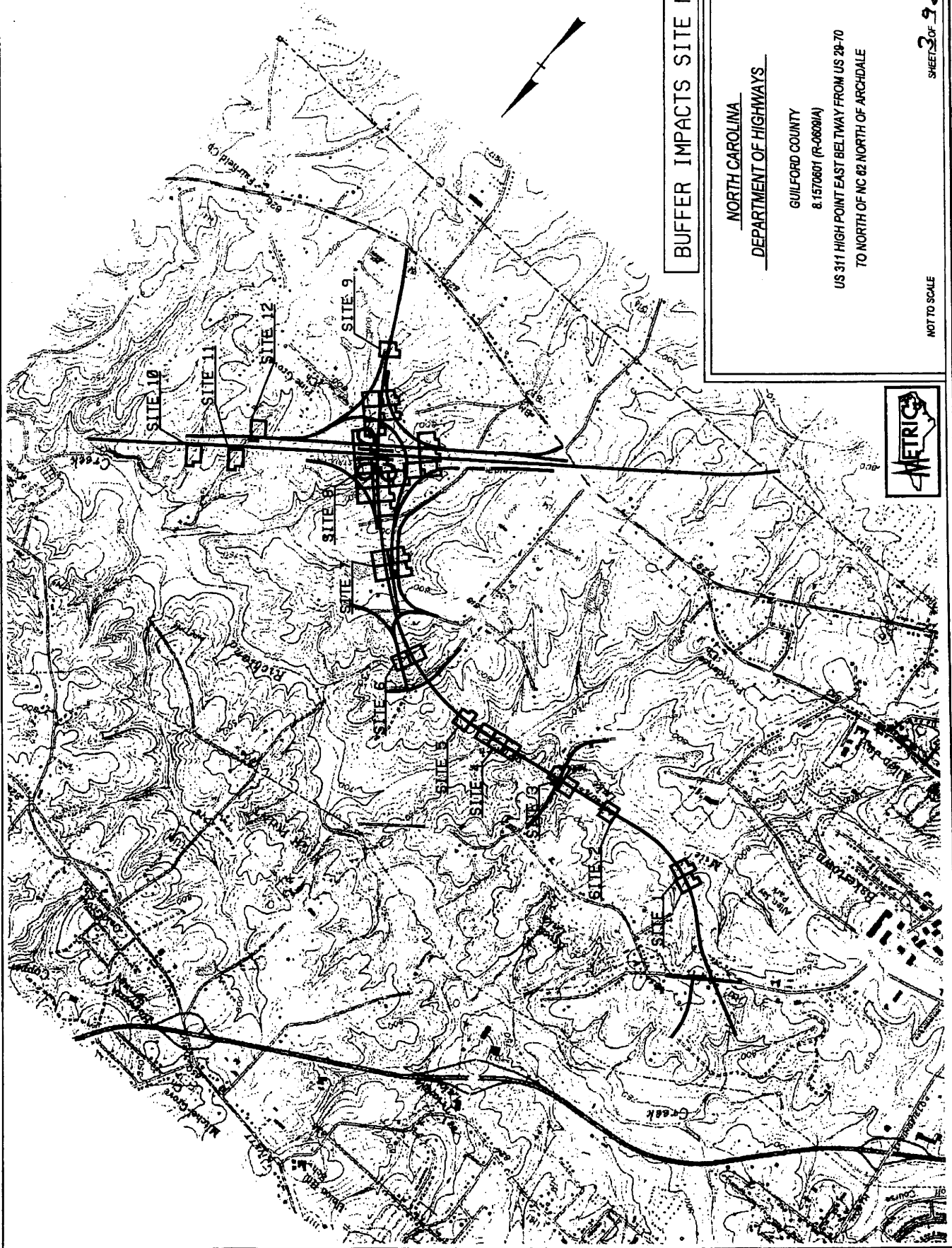
PORTION OF STATE MAP

NORTH CAROLINA  
DIVISION OF HIGHWAYS


GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE



8/17/2005  
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# BUFFER LEGEND

 WETLAND BOUNDARY

 WETLAND

 ALLOWABLE IMPACTS ZONE 1

 ALLOWABLE IMPACTS ZONE 2

 MITIGABLE IMPACTS ZONE 1

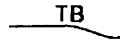
 MITIGABLE IMPACTS ZONE 2

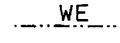
 RIPARIAN BUFFER ZONE

 RIPARIAN BUFFER ZONE 1  
30 ft (9.2m)

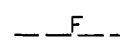
 RIPARIAN BUFFER ZONE 2  
20 ft (6.1m)


 FLOW DIRECTION

 TOP OF BANK

 EDGE OF WATER

 PROP. LIMIT OF CUT

 PROP. LIMIT OF FILL

 PROP. RIGHT OF WAY

 NATURAL GROUND

 PROPERTY LINE

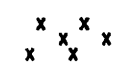
 TEMP. DRAINAGE EASEMENT


 PERMANENT DRAINAGE EASEMENT


 EXIST. ENDANGERED ANIMAL BOUNDARY

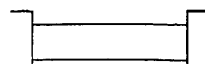
 EXIST. ENDANGERED PLANT BOUNDARY

 WATER SURFACE

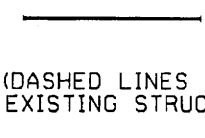
 LIVE STAKES

 BOULDER


 CORE FIBER ROLLS


 PROPOSED BRIDGE

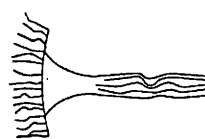
 PROPOSED BOX CULVERT


 PROPOSED PIPE CULVERT  
12"-48" PIPES  
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTING STRUCTURES)


 SINGLE TREE


 WOODS LINE

 DRAINAGE INLET

 ROOTWAD

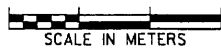
 RIP RAP

 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

 PREFORMED SCOUR HOLE (PSH)

 LEVEL SPREADER (LS)

 GRASS SWALE



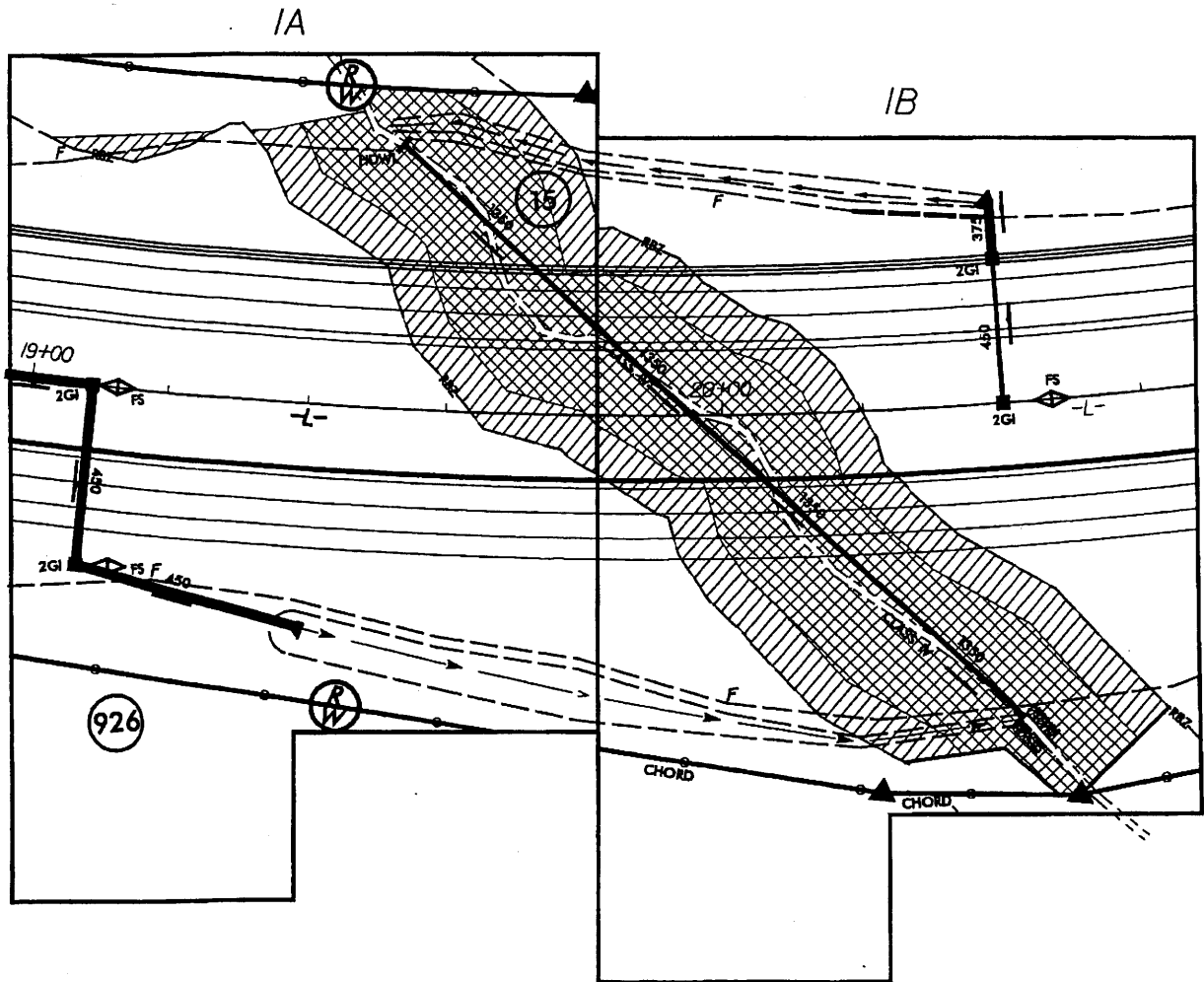
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 4 OF 92

3/7/02/2003 3:46:08 PM J:\7000931\transportation\design\001\PLANS\PERMITS\Buffer\_Permitte\buffer\_legend.dwg



SHEET LAYOUT  
PLAN VIEW  
SITE 1

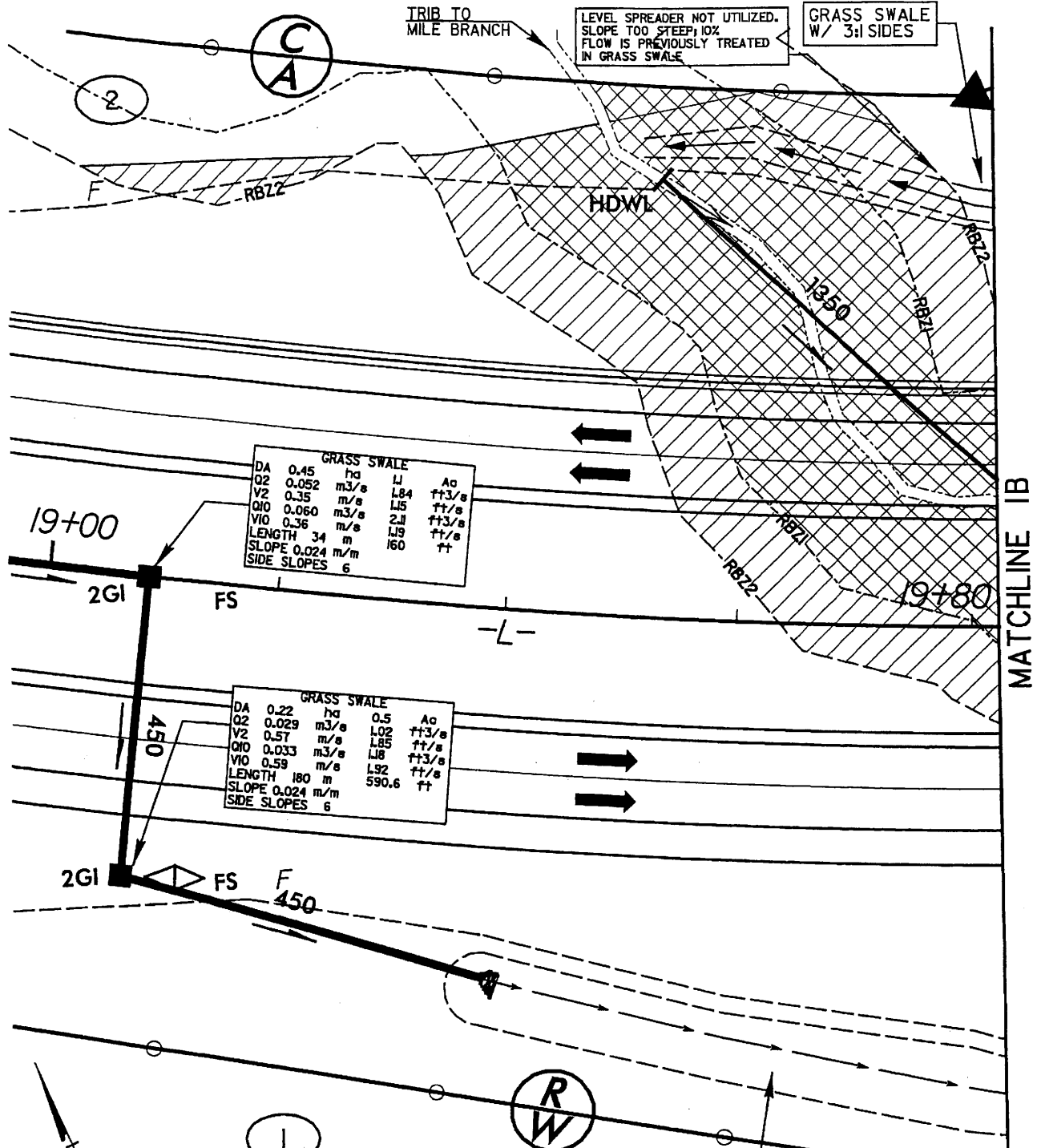


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 5 OF 92

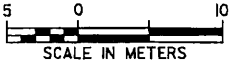


GRASS SWALE			
DA	0.45	ha	1.1
Q2	0.052	m <sup>3</sup> /s	L84
V2	0.35	m/s	L84
Q10	0.060	m <sup>3</sup> /s	L15
V10	0.36	m/s	2.1
LENGTH	34	m	L19
SLOPE	0.024	m/m	160
SIDE SLOPES	6		ft

GRASS SWALE			
DA	0.22	ha	0.5
Q2	0.029	m <sup>3</sup> /s	1.02
V2	0.57	m/s	L85
Q10	0.033	m <sup>3</sup> /s	L18
V10	0.59	m/s	L92
LENGTH	180	m	590.6
SLOPE	0.024	m/m	ft
SIDE SLOPES	6		

PLAN VIEW  
SITE I

- LEGEND**
- RBZ1 RIPARIAN BUFFER - ZONE 1
  - RBZ2 RIPARIAN BUFFER - ZONE 2
  - MITIGABLE IMPACTS ZONE 1
  - MITIGABLE IMPACTS ZONE 2



GRASS SWALE  
W/ 3:1 SIDES

SHEET 1A

**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**  
 GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

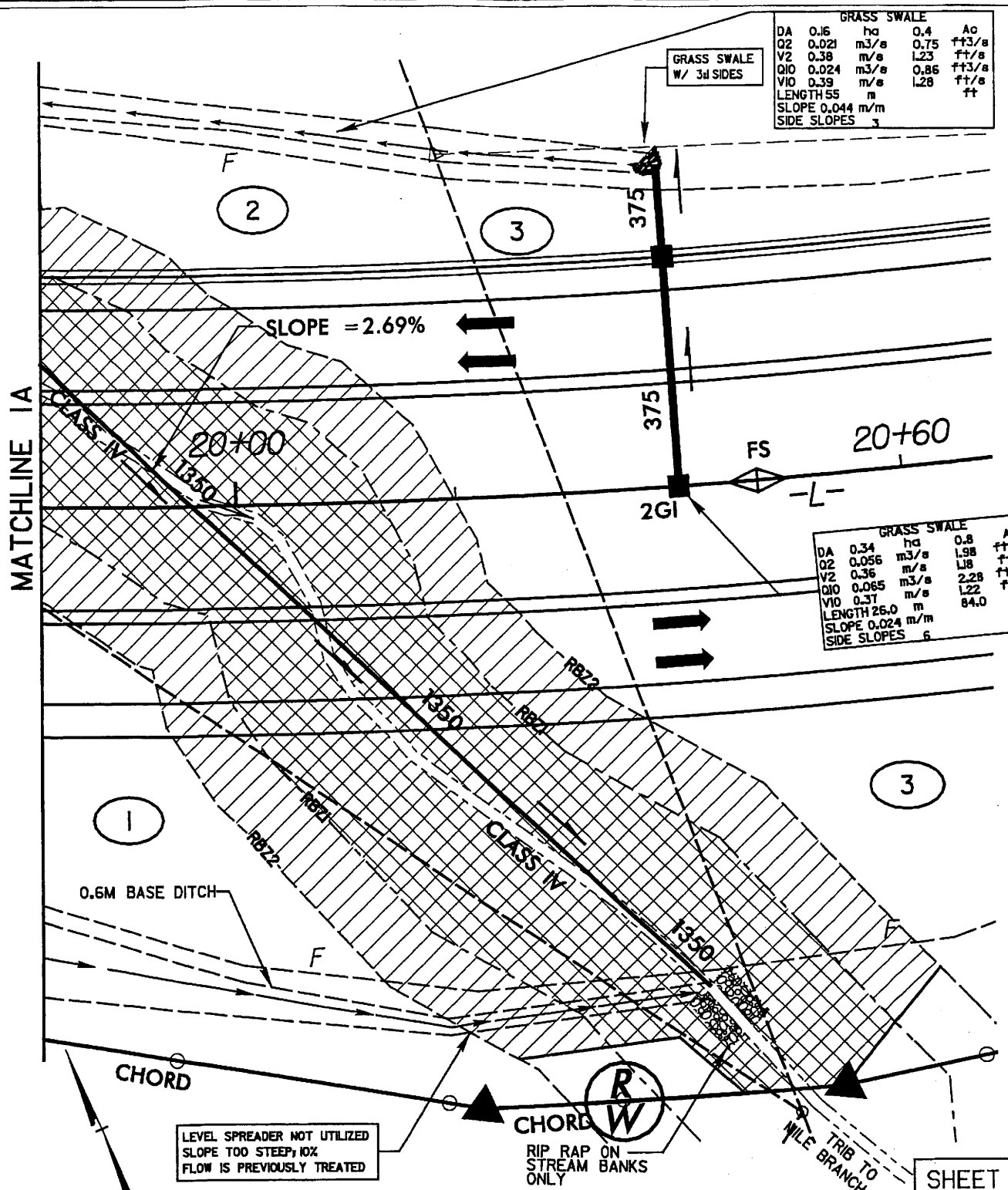
SCALE AS SHOWN

SHEET 6 of 92

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GRASS SWALE			
DA	0.16	ha	0.4
Q2	0.021	m <sup>3</sup> /s	0.75
V2	0.38	m/s	1.23
Q10	0.024	m <sup>3</sup> /s	0.86
V10	0.39	m/s	1.28
LENGTH	55	m	ft
SLOPE	0.044	m/m	
SIDE SLOPES			3

GRASS SWALE			
DA	0.34	ha	0.8
Q2	0.056	m <sup>3</sup> /s	1.98
V2	0.36	m/s	1.18
Q10	0.065	m <sup>3</sup> /s	2.28
V10	0.37	m/s	1.22
LENGTH	26.0	m	ft
SLOPE	0.024	m/m	
SIDE SLOPES			6



LEVEL SPREADER NOT UTILIZED  
SLOPE TOO STEEP; 10%  
FLOW IS PREVIOUSLY TREATED

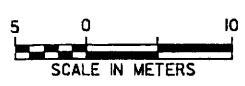
RIP RAP ON  
STREAM BANKS  
ONLY

SHEET 1B

**LEGEND**

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE I



**NORTH CAROLINA  
DIVISION OF HIGHWAYS**

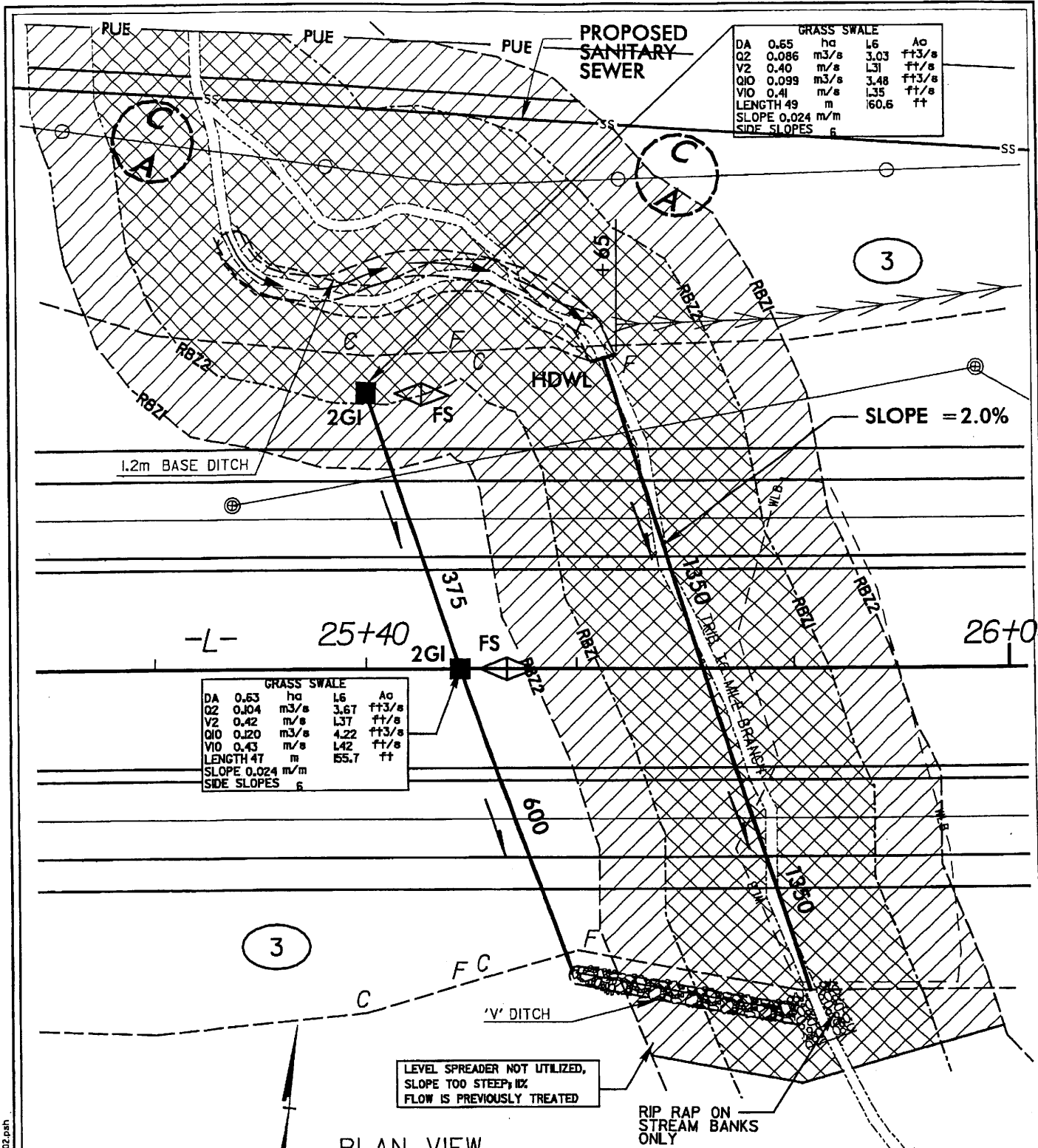
GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 92

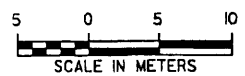
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PLAN VIEW SITE 2

- LEGEND**
- RBZ1 RIPARIAN BUFFER - ZONE 1
  - RBZ2 RIPARIAN BUFFER - ZONE 2
  - MITIGABLE IMPACTS ZONE 1
  - MITIGABLE IMPACTS ZONE 2



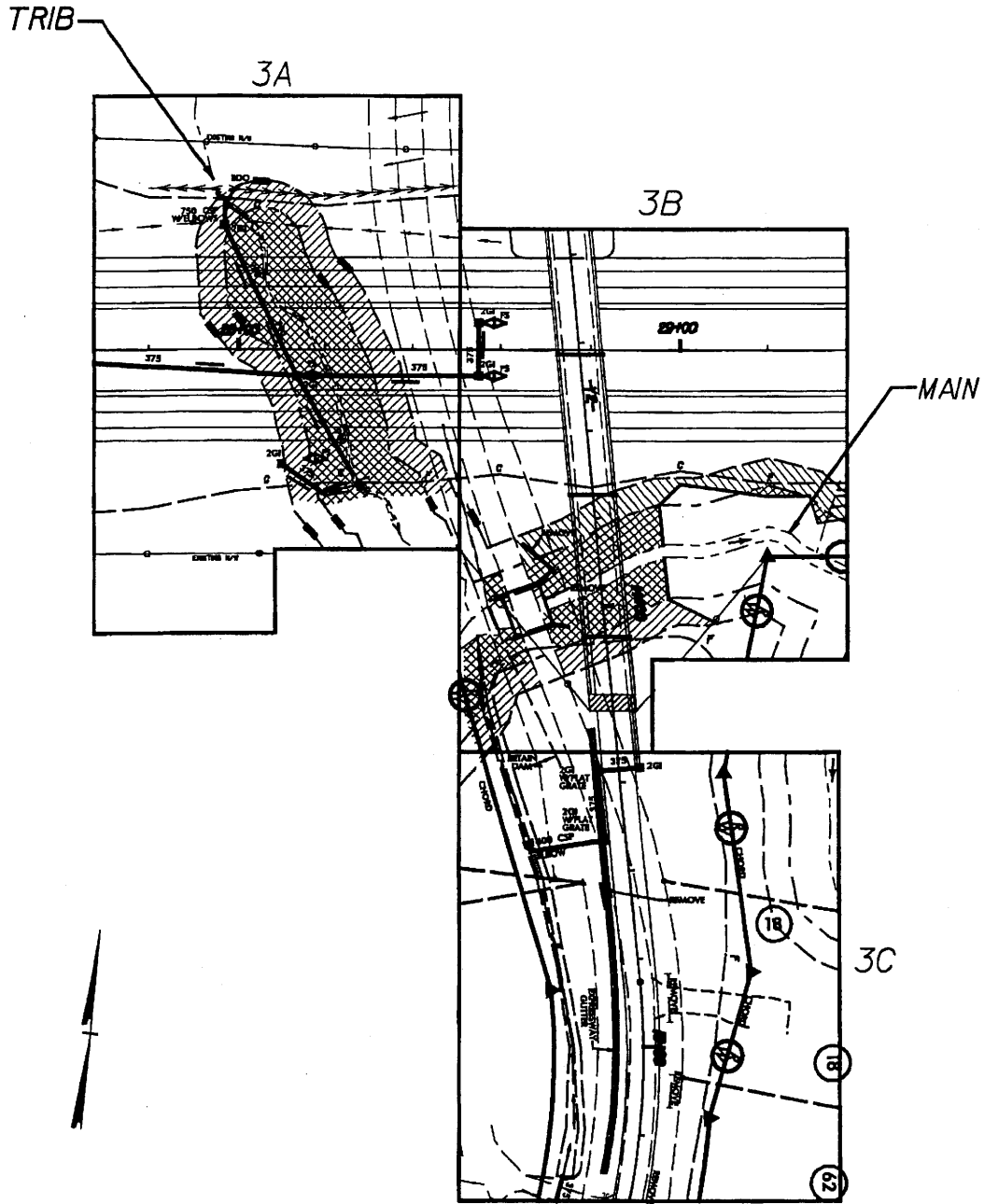
**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 8 OF 92

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SHEET LAYOUT  
 PLAN VIEW  
 SITE 3



SCALE AS SHOWN

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SHEET 1 OF 3 ~~02~~ 02

GRASS SWALE				
DA	1.06	ha	2.6	Ac
Q2	0.40	m <sup>3</sup> /s	4.94	ft <sup>3</sup> /s
V2	0.43	m/s	1.43	ft/s
Q10	0.61	m <sup>3</sup> /s	5.68	ft <sup>3</sup> /s
V10	0.45	m/s	1.48	ft/s
LENGTH	80	m	261.9	ft
SLOPE	0.021	m/m		
SIDE SLOPES	6			

GRASS SWALE				
DA	0.05	ha	0.1	Ac
Q2	0.006	m <sup>3</sup> /s	0.23	ft <sup>3</sup> /s
V2	0.28	m/s	0.92	ft/s
Q10	0.007	m <sup>3</sup> /s	0.27	ft <sup>3</sup> /s
V10	0.29	m/s	0.95	ft/s
LENGTH	50	m	164	ft
SLOPE	0.01	m/m		
SIDE SLOPES	6			

GRASS SWALE				
DA	0.46	ha	1.1	Ac
Q2	0.091	m <sup>3</sup> /s	3.22	ft <sup>3</sup> /s
V2	0.30	m/s	0.98	ft/s
Q10	0.105	m <sup>3</sup> /s	3.70	ft <sup>3</sup> /s
V10	0.31	m/s	1.01	ft/s
LENGTH	35	m	113.7	ft
SLOPE	0.011	m/m		
SIDE SLOPES	6			

CL 'B' RIPRAP  
W/ FILTER FABRIC  
EST. 1.8 MTONS  
EST. 5.9 SM FF

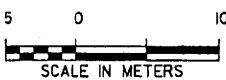
LEVEL SPREADER NOT UTILIZED,  
SLOPE TOO STEEP; 15%  
FLOW IS PREVIOUSLY TREATED

SHEET 3A

PLAN VIEW  
SITE 3

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



SCALE AS SHOWN

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SHEET 10 OF 92

MATCH LINE SHEET 3B

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 GUILFORD COUNTY  
 8.1570601 (R-0608/A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



- LEGEND
- RBZ1 - RIPARIAN BUFFER - ZONE 1
  - RBZ2 - RIPARIAN BUFFER - ZONE 2
  - MITTIGABLE IMPACTS ZONE 1
  - MITTIGABLE IMPACTS ZONE 2

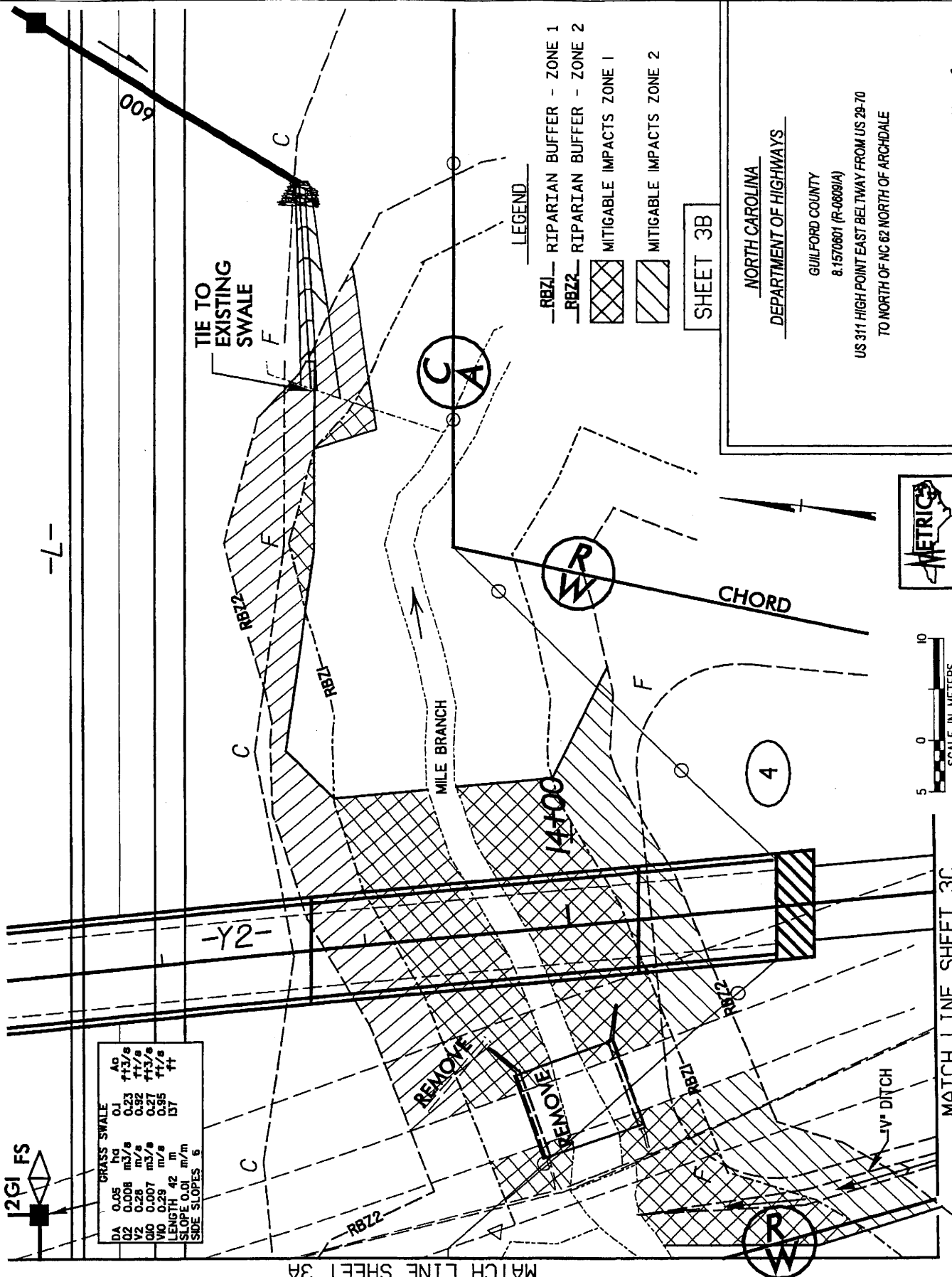
SHEET 3B

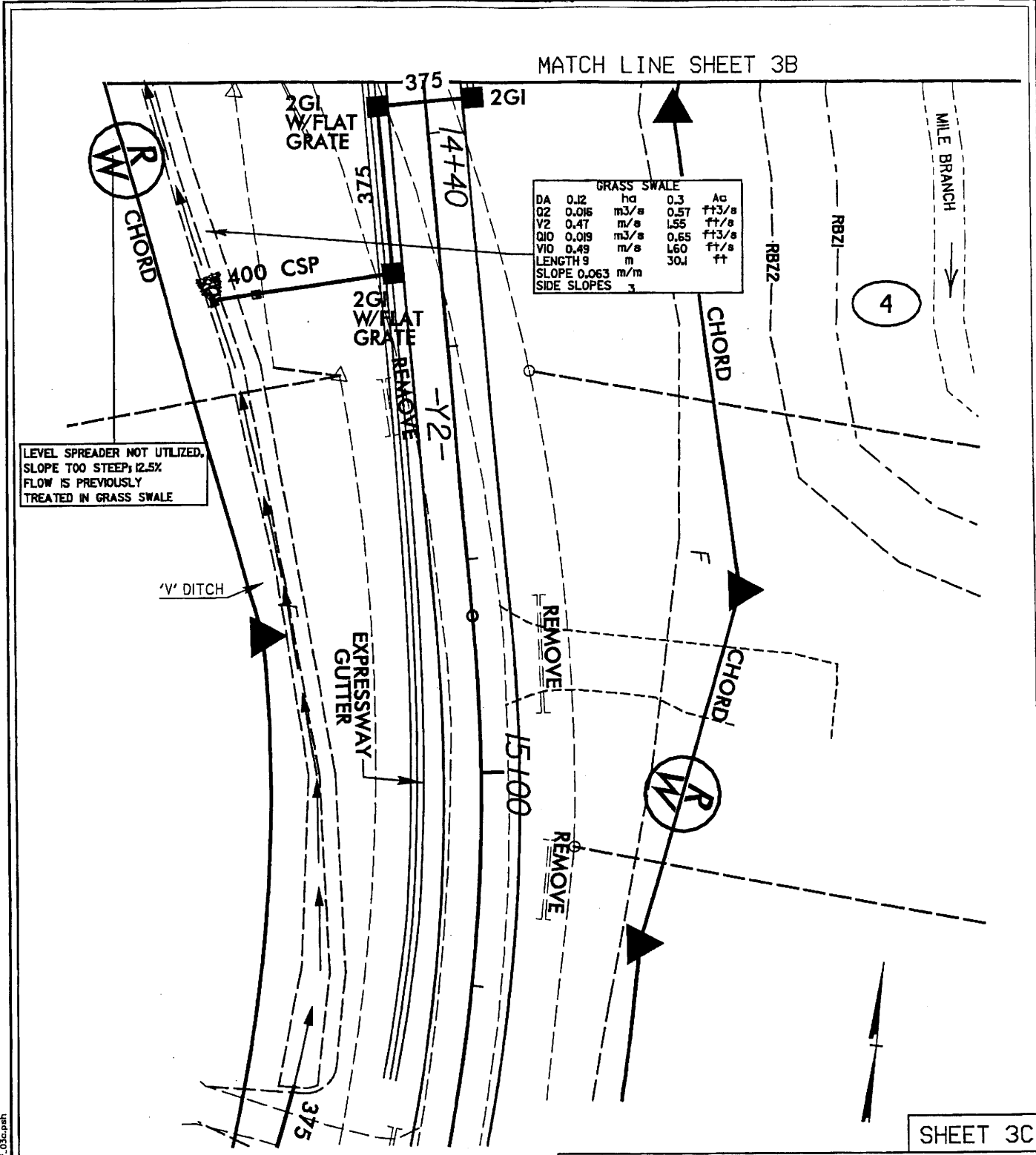
MATCH LINE SHEET 3C

MATCH LINE SHEET 3A

GRASS SWALE		AD
DA	0.05	ft/s
I02	0.008	m/s
I03	0.28	ft/s
I04	0.007	m/s
I05	0.28	ft/s
I06	0.28	ft
I07	0.137	ft

LENGTH 42 m  
 SLOPE 0.01 m/m  
 SIDE SLOPES 6









GRASS SWALE				
DA	0.12	ha	0.3	Ac
Q2	0.016	m <sup>3</sup> /s	0.57	ft <sup>3</sup> /s
Y2	0.47	m/s	1.55	ft/s
Q10	0.019	m <sup>3</sup> /s	0.65	ft <sup>3</sup> /s
V10	0.49	m/s	1.60	ft/s
LENGTH	9	m	30.1	ft
SLOPE	0.063	m/m		
SIDE SLOPES	3			

LEVEL SPREADER NOT UTILIZED,  
SLOPE TOO STEEP; 12.5%  
FLOW IS PREVIOUSLY  
TREATED IN GRASS SWALE

SHEET 3C

LEGEND

-  RBZ1 RIPARIAN BUFFER - ZONE 1
-  RBZ2 RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2



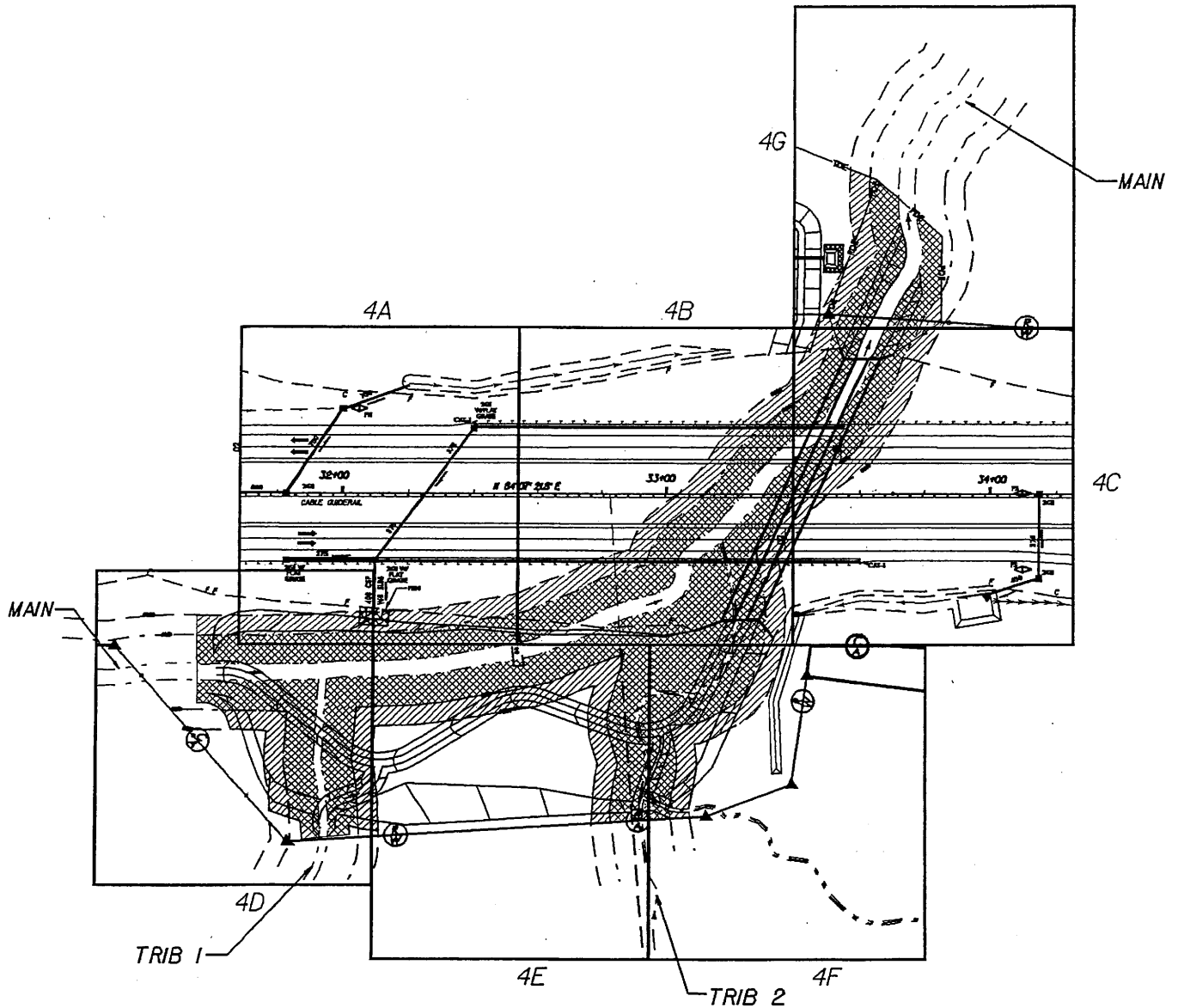
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

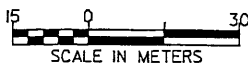
SCALE AS SHOWN

SHEET 12 OF 92

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SHEET LAYOUT  
 PLAN VIEW  
 SITE 4



NORTH CAROLINA 10106  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 & 1570801 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

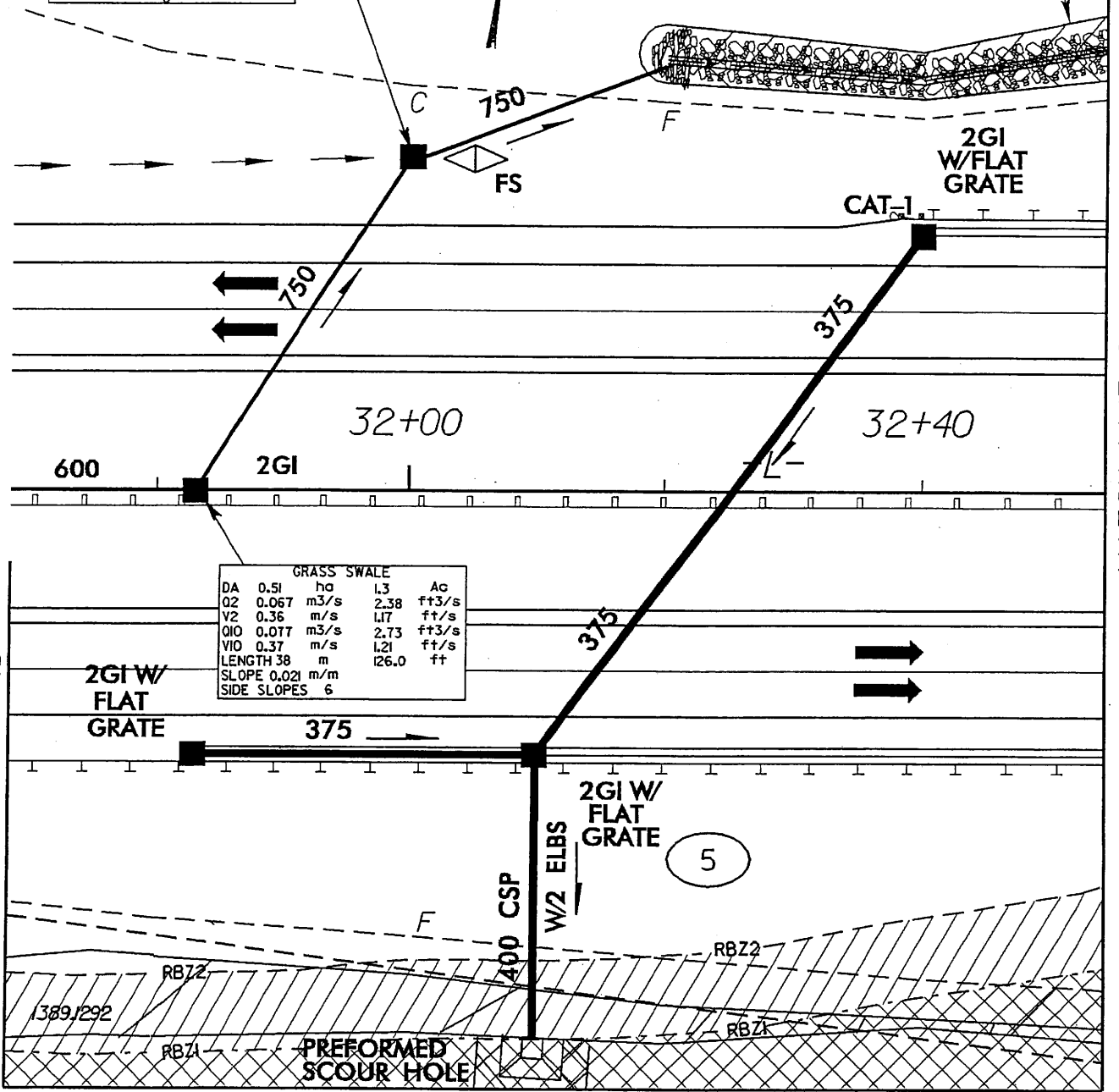
13 92  
 SHEET \_\_\_ OF \_\_\_

468

GRASS SWALE		
DA	0.32	ha
Q2	0.048	m <sup>3</sup> /s
V2	0.17	m/s
Q10	0.055	m <sup>3</sup> /s
V10	0.17	m/s
LENGTH	24	m
SLOPE	0.003	m/m
SIDE SLOPES	6	

5

0.6m LATERAL BASE DITCH



GRASS SWALE		
DA	0.51	ha
Q2	0.067	m <sup>3</sup> /s
V2	0.36	m/s
Q10	0.077	m <sup>3</sup> /s
V10	0.37	m/s
LENGTH	38	m
SLOPE	0.021	m/m
SIDE SLOPES	6	

MATCH LINE SHEET 4D

MATCH LINE SHEET 4B

MATCH LINE SHEET 4D

MATCH LINE SHEET 4E

SHEET 4A

LEGEND

- RBZ1 - RIPARIAN BUFFER - ZONE 1
- RBZ2 - RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 4



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

H192  
SHEET OF

469

0.6m LATERAL  
BASE DITCH

5

MATCH LINE SHEET 4A

MATCH LINE SHEET 4C

32+60

33+00

-L-

3-3.4M(W) x 2.4M(H) RCBC  
SLOPE = 0.69%

SILL

RBZ2

RBZ1

MILE BRANCH

RBZ2





RBZ1

MATCH LINE SHEET 4E

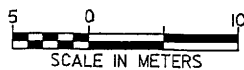
MATCH LINE SHEET 4F

SHEET 4B

LEGEND

-  RBZ1 - RIPARIAN BUFFER - ZONE 1
-  RBZ2 - RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 4



NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

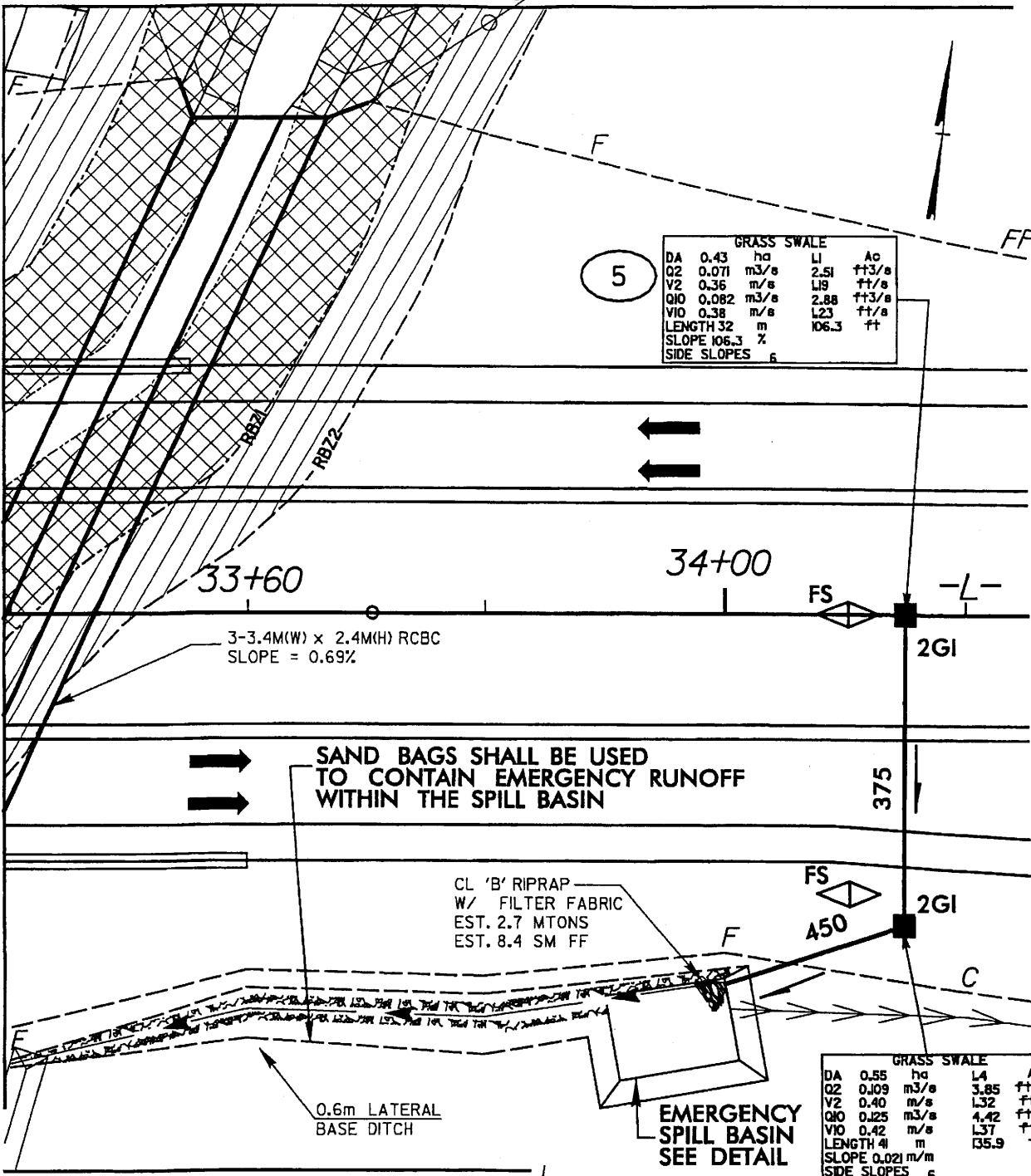
SCALE AS SHOWN

15 92  
SHEET OF



MATCH LINE SHEET 4G

MATCH LINE SHEET 4B



GRASS SWALE				
DA	0.43	ha	L1	Ac
Q2	0.071	m <sup>3</sup> /s	2.51	ft <sup>3</sup> /s
V2	0.36	m/s	L9	ft/s
Q10	0.082	m <sup>3</sup> /s	2.88	ft <sup>3</sup> /s
V10	0.38	m/s	L23	ft/s
LENGTH	32	m	106.3	ft
SLOPE	106.3	%		
SIDE SLOPES			6	

3-3.4M(W) x 2.4M(H) RCBC  
SLOPE = 0.69%

SAND BAGS SHALL BE USED  
TO CONTAIN EMERGENCY RUNOFF  
WITHIN THE SPILL BASIN

CL 'B' RIPRAP  
W/ FILTER FABRIC  
EST. 2.7 MTONS  
EST. 8.4 SM FF

0.6m LATERAL  
BASE DITCH

EMERGENCY  
SPILL BASIN  
SEE DETAIL

GRASS SWALE				
DA	0.55	ha	L4	Ac
Q2	0.109	m <sup>3</sup> /s	3.85	ft <sup>3</sup> /s
V2	0.40	m/s	L32	ft/s
Q10	0.125	m <sup>3</sup> /s	4.42	ft <sup>3</sup> /s
V10	0.42	m/s	L37	ft/s
LENGTH	41	m	135.9	ft
SLOPE	0.021	m/m		
SIDE SLOPES			6	

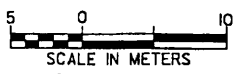
MATCH LINE SHEET 4F

PLAN VIEW  
SITE 4

SHEET 4C

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

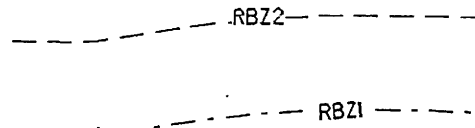
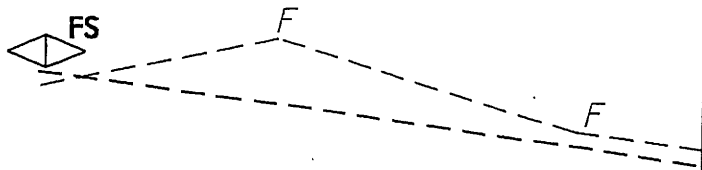
GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 16 OF 92

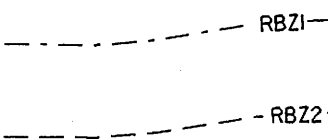
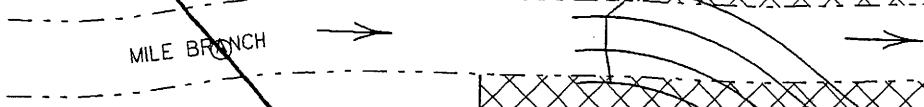
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471



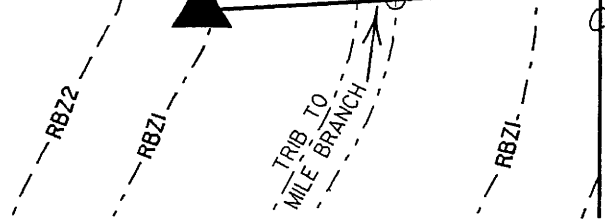
MATCH LINE SHEET 4A

MILE BRANCH



NATURAL CHANNEL DETAIL  
201m @ 0.24% GRADE  
2.2m BASE 2.66:1 SIDE SLOPES  
0.8m DEEP W/ 6.46m TOP WIDTH  
RADIUS TO CENTER OF CHANNEL  
BANKS TO BE STABILIZED  
THROUGH USE OF LIVE STAKES

5



MATCH LINE SHEET 4E



PLAN VIEW  
SITE 4

SHEET 4D

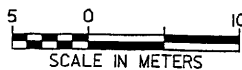
LEGEND

RBZ1 RIPARIAN BUFFER - ZONE 1

RBZ2 RIPARIAN BUFFER - ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

17 OF 92  
SHEET OF

DATES  
TIMES  
FILES

MATCH LINE SHEET 4A 472

MATCH LINE SHEET 4B

MILE BRANCH

MATCH LINE SHEET 4D

MATCH LINE SHEET 4F

5

C  
A

NATURAL CHANNEL DETAIL  
 201m @ 0.24% GRADE  
 2.2m BASE 2.66:1 SIDE SLOPES  
 0.8m DEEP W/ 6.46m TOP WIDTH  
 RADIUS TO CENTER OF CHANNEL  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES



LEGEND

- RBZ1 - RIPARIAN BUFFER - ZONE 1
- RBZ2 - RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



SHEET 4E

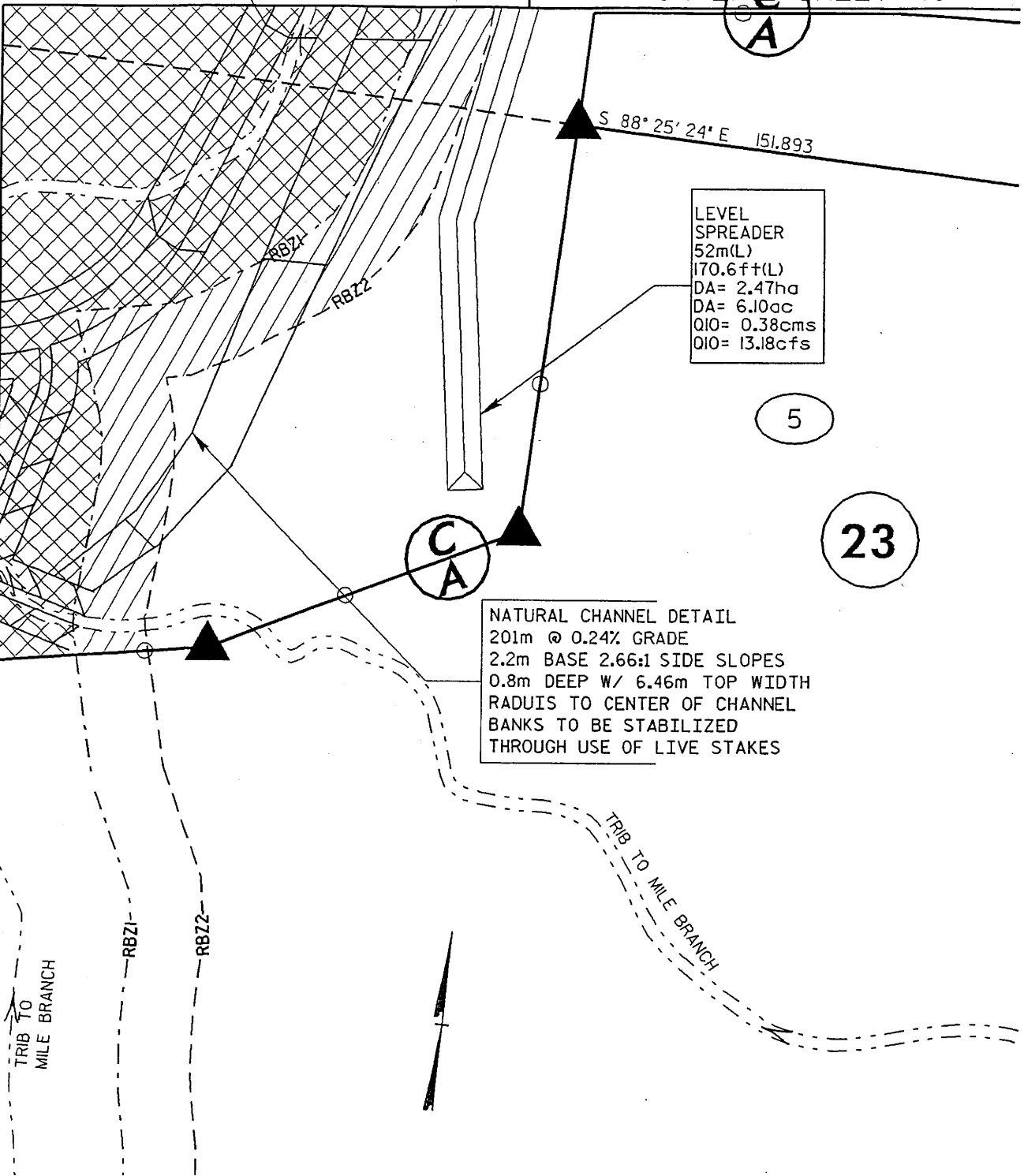
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

18 92  
 SHEET OF

MATCH LINE SHEET 4E



LEVEL SPREADER  
 52m(L)  
 170.6ft(L)  
 DA= 2.47ha  
 DA= 6.10ac  
 Q10= 0.38cms  
 Q10= 13.18cfs

NATURAL CHANNEL DETAIL  
 201m @ 0.24% GRADE  
 2.2m BASE 2.66:1 SIDE SLOPES  
 0.8m DEEP W/ 6.46m TOP WIDTH  
 RADUIS TO CENTER OF CHANNEL  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

5

23

S 88° 25' 24" E 151.893

TRIB TO MILE BRANCH

TRIB TO MILE BRANCH

RBZ1

RBZ2

RBZ1

RBZ2





C  
A

C  
A

SHEET 4F

PLAN VIEW SITE 4

LEGEND

-  RBZ1 RIPARIAN BUFFER - ZONE 1
-  RBZ2 RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2



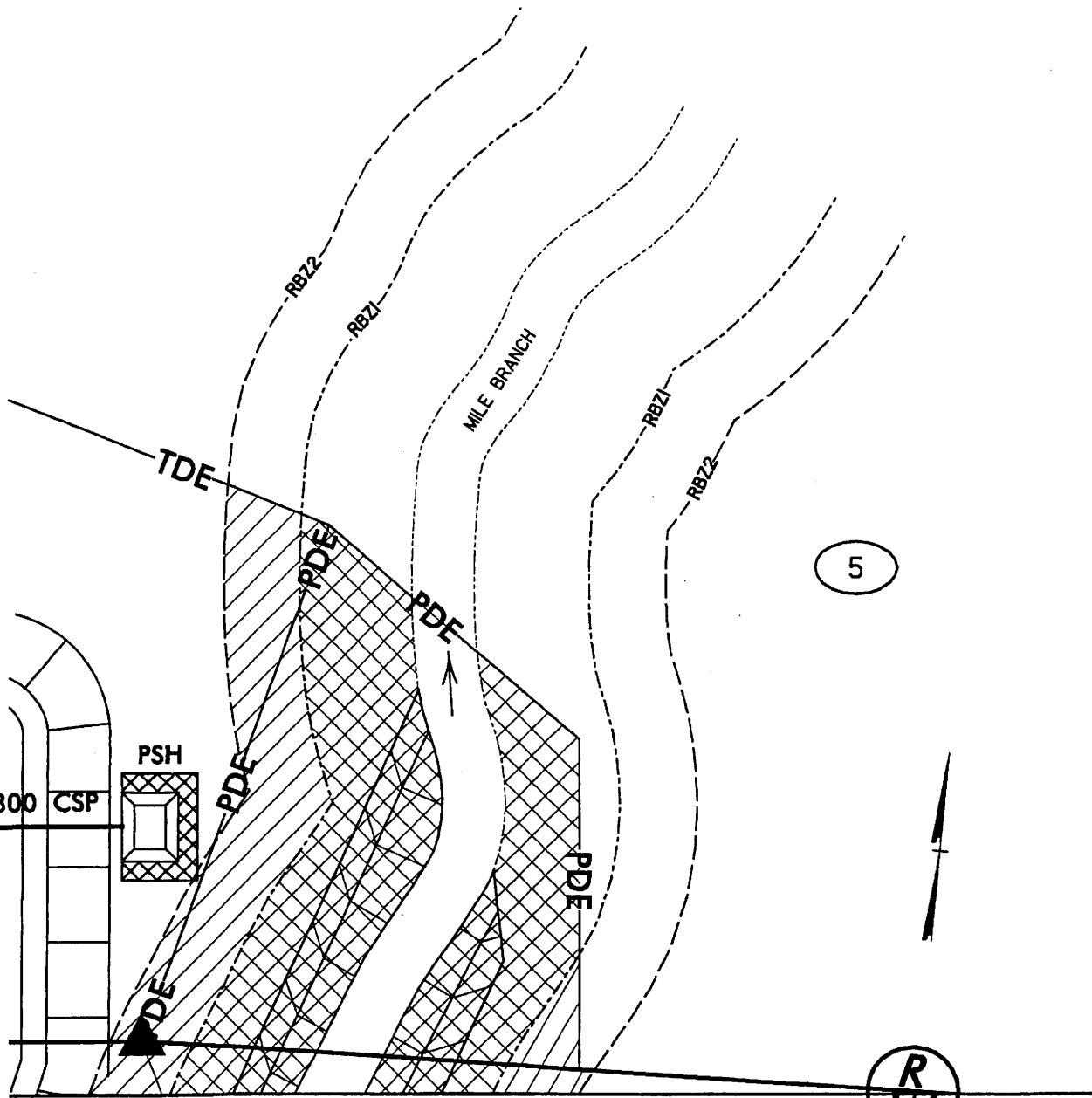
NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

GUILFORD COUNTY  
 R.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

14 92  
SHEET OF



MATCH LINE SHEET 4C

SHEET 4G

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 4



NORTH CAROLINA  
DIVISION OF HIGHWAYS

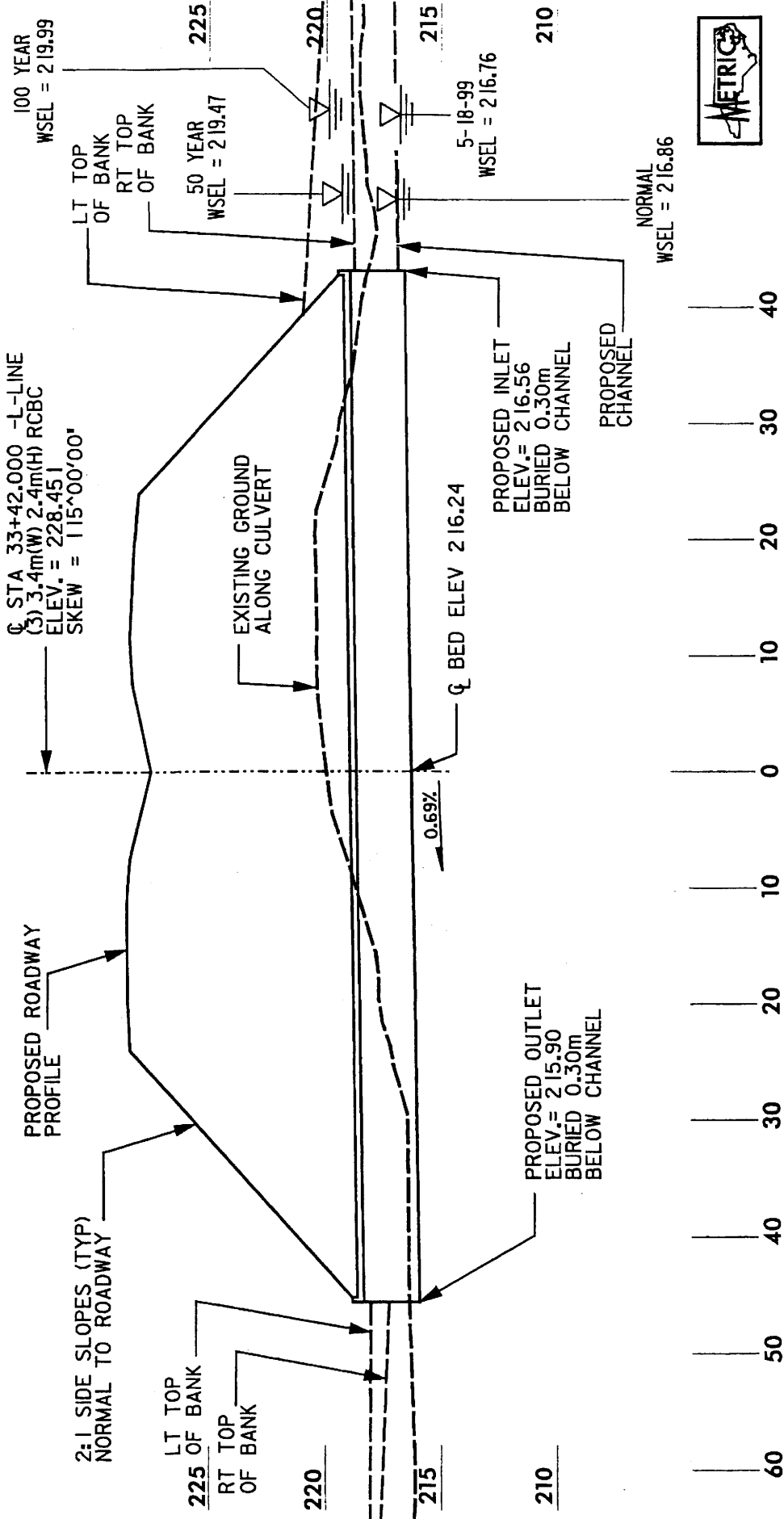
GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 20 OF 92

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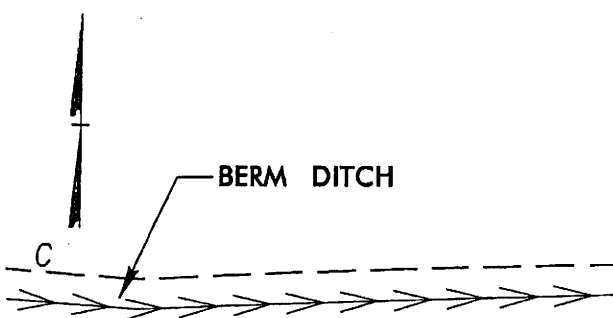
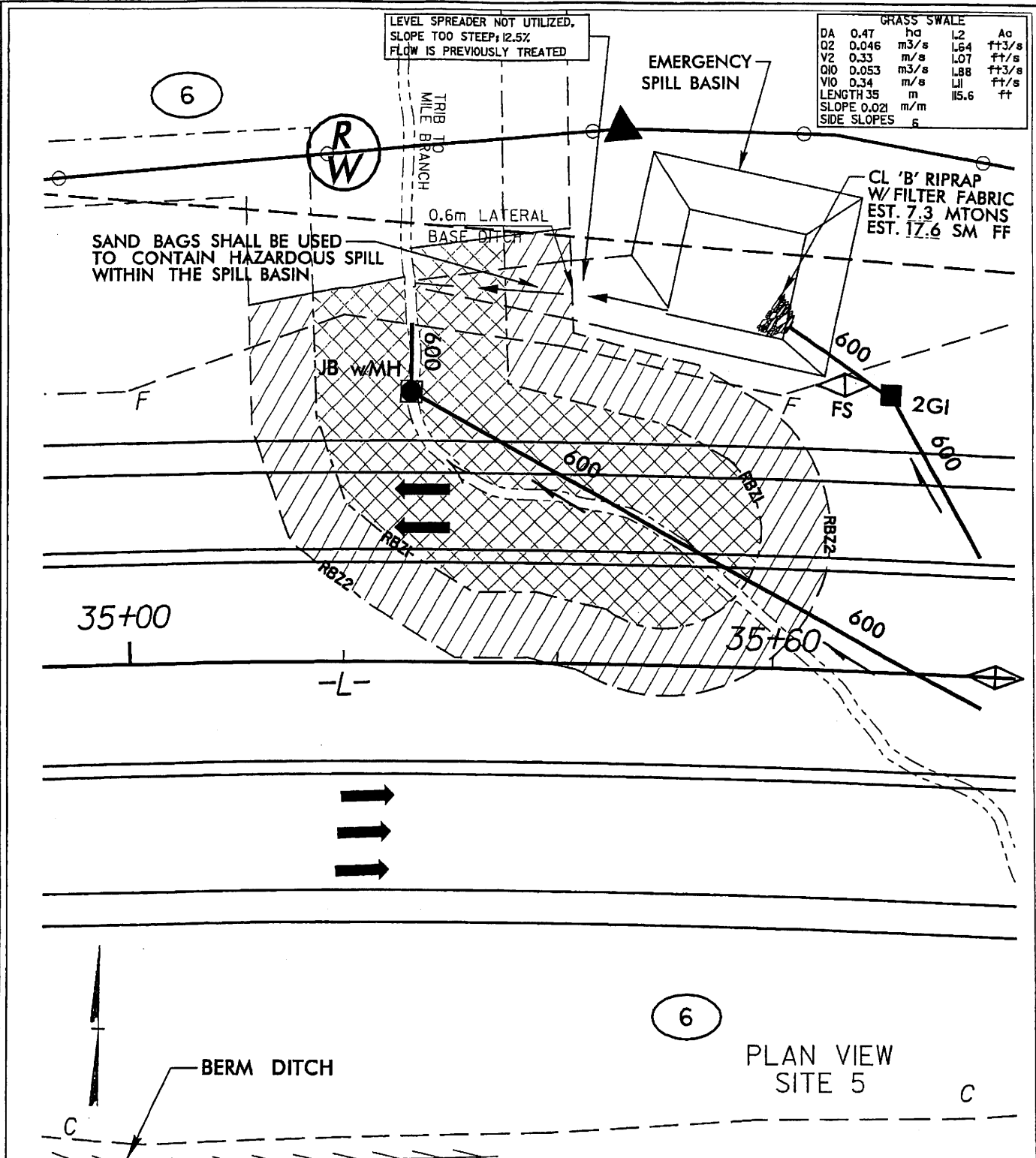
NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 GUILFORD COUNTY  
 8.1570801 (R-0608/A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

PROFILE  
 PERMIT SITE 4 (4B & 4C)  
 (3) 3.4m X 2.4m RCBC

SCALE:  
 1" = 500' HORIZONTAL  
 1" = 250' VERTICAL

GRASS SWALE			
DA	0.47	ha	L2
O2	0.046	m <sup>3</sup> /s	L64
V2	0.33	m/s	L07
Q10	0.053	m <sup>3</sup> /s	L88
V10	0.34	m/s	L1
LENGTH	35	m	115.6
SLOPE	0.021	m/m	ft
SIDE SLOPES	6		



**LEGEND**

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

SCALE IN METERS

6

**PLAN VIEW  
SITE 5**

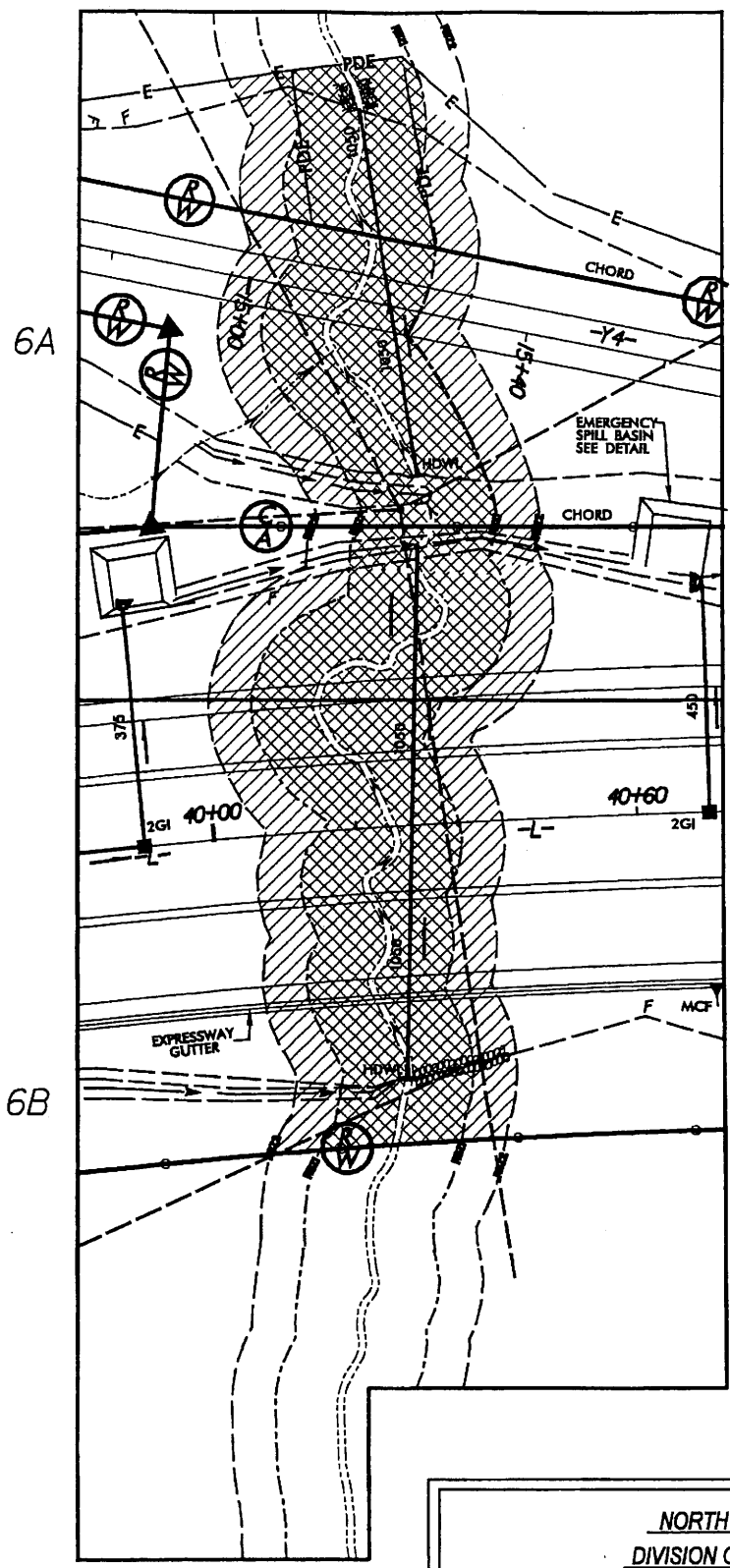
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

22 OF 92

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SHEET LAYOUT  
 PLAN VIEW  
 SITE 6



NORTH CAROLINA  
DIVISION OF HIGHWAYS

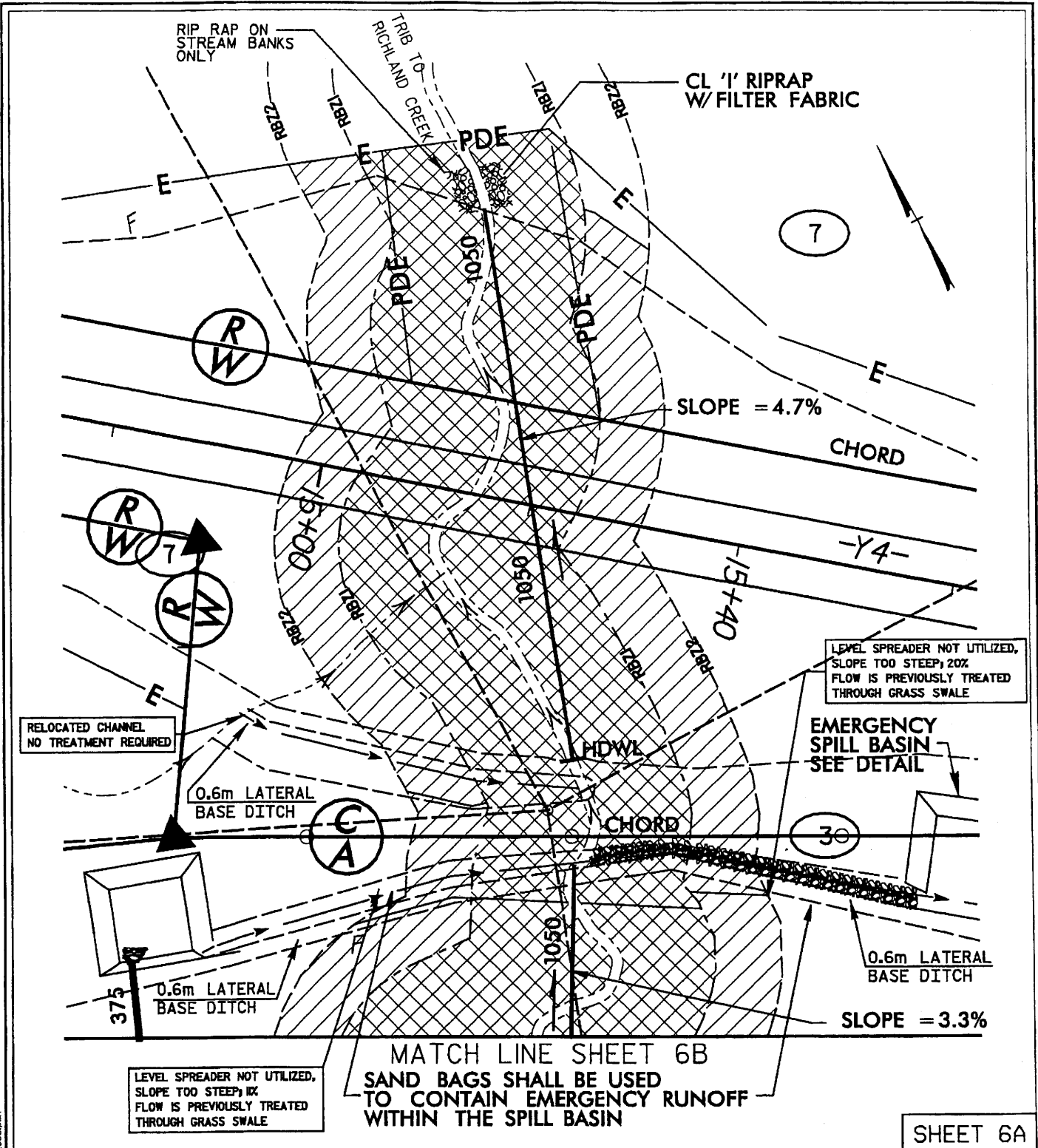
GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 23 OF 92

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- LEGEND**
- RBZ1 — RIPARIAN BUFFER - ZONE 1
  - RBZ2 — RIPARIAN BUFFER - ZONE 2
  - [Cross-hatched] MITIGABLE IMPACTS ZONE 1
  - [Diagonal hatched] MITIGABLE IMPACTS ZONE 2

**PLAN VIEW SITE 6**



**NORTH CAROLINA DIVISION OF HIGHWAYS**

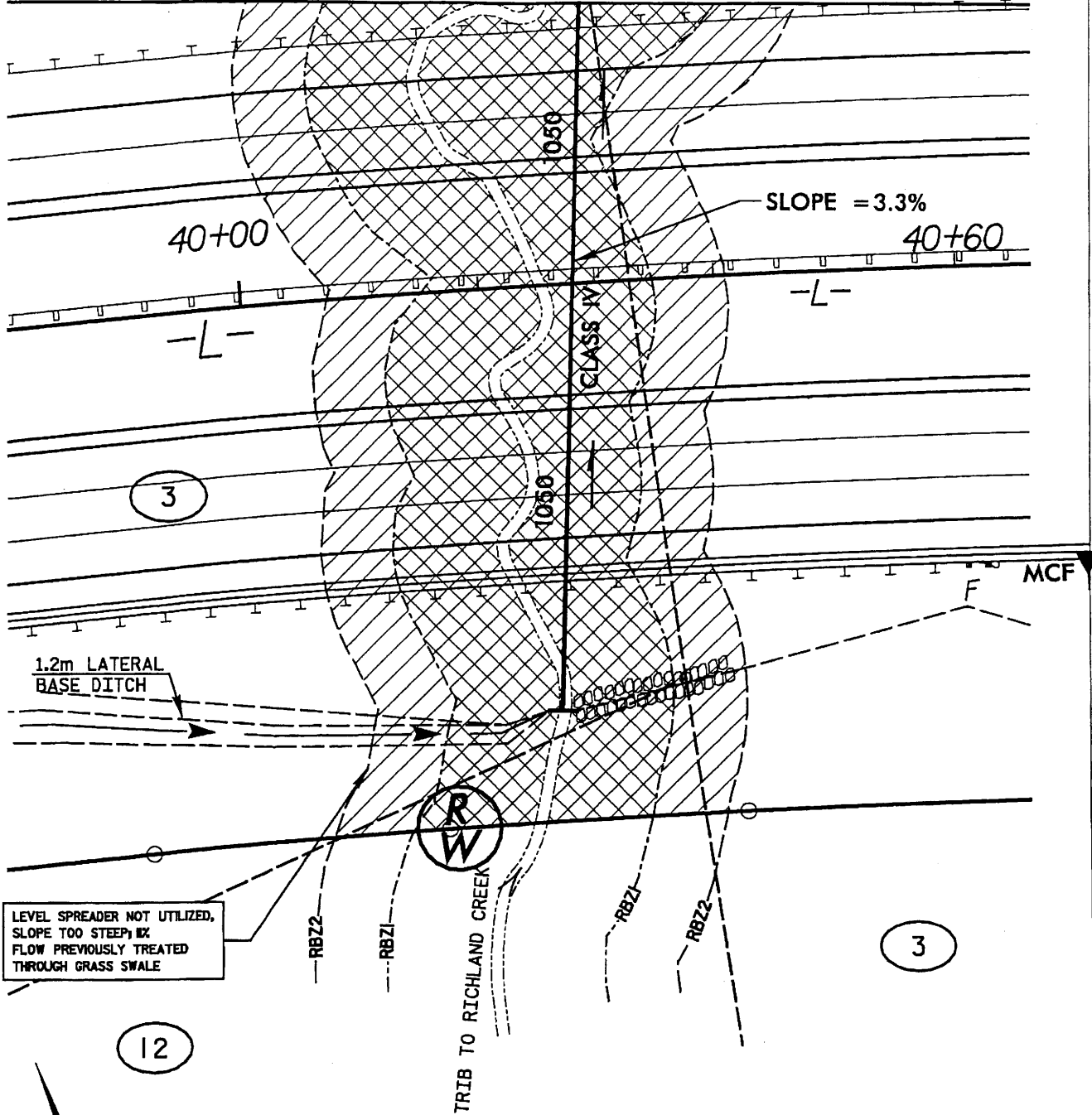
GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

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 SHEET OF

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MATCH LINE SHEET 6A

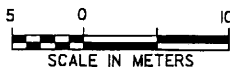


LEVEL SPREADER NOT UTILIZED,  
SLOPE TOO STEEP; NO  
FLOW PREVIOUSLY TREATED  
THROUGH GRASS SWALE

PLAN VIEW  
SITE 6

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



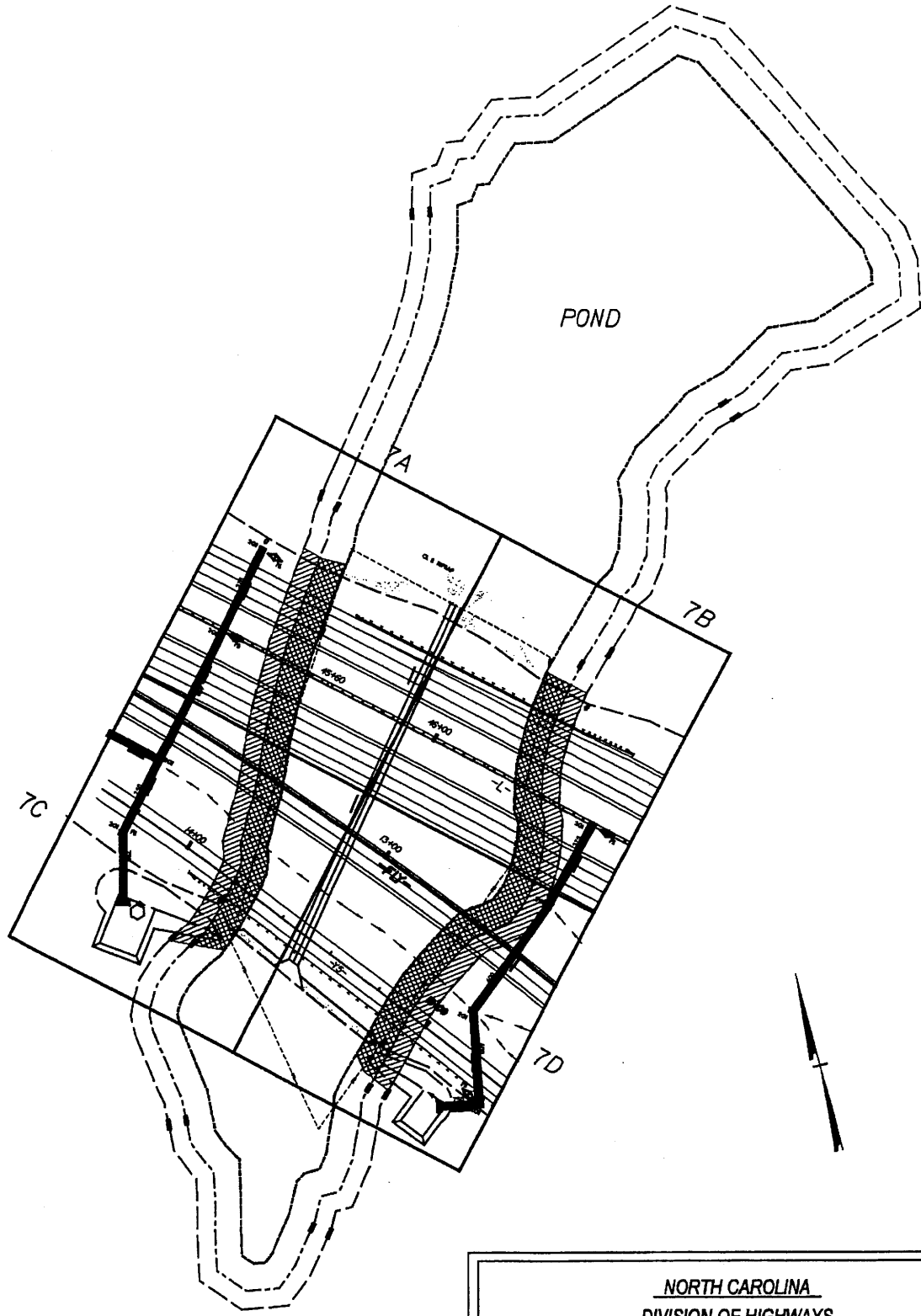
SHEET 6B

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

2592  
SHEET OF 1



SHEET LAYOUT  
 PLAN VIEW  
 SITE 7

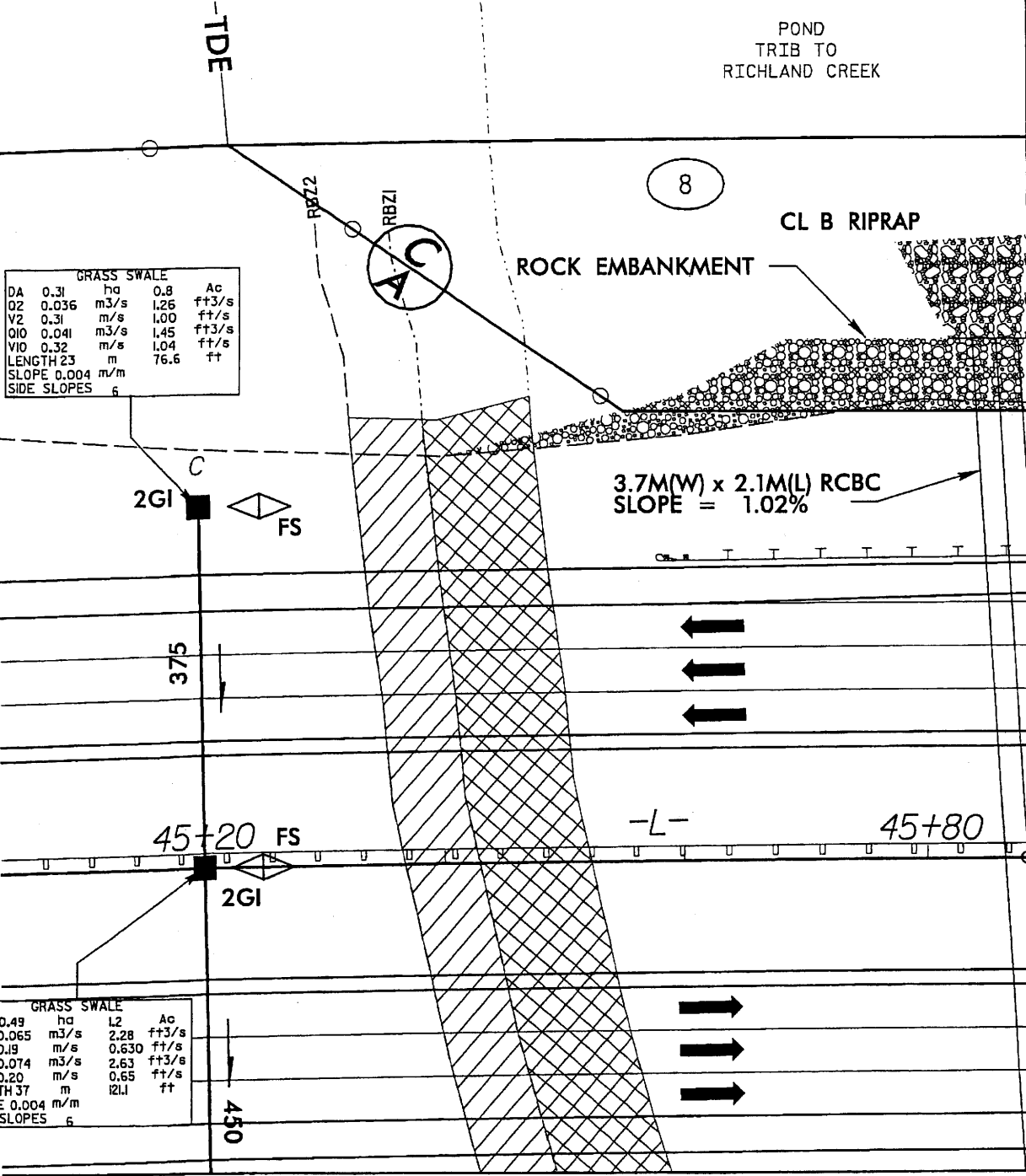


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 & 1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 26 OF 92



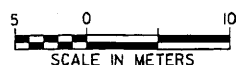
GRASS SWALE

DA	0.31	hd	0.8	Ac
Q2	0.036	m <sup>3</sup> /s	1.26	ft <sup>3</sup> /s
V2	0.31	m/s	1.00	ft/s
Q10	0.041	m <sup>3</sup> /s	1.45	ft <sup>3</sup> /s
V10	0.32	m/s	1.04	ft/s
LENGTH	23	m	76.6	ft
SLOPE	0.004	m/m		
SIDE SLOPES	6			

GRASS SWALE

DA	0.49	hd	1.2	Ac
Q2	0.065	m <sup>3</sup> /s	2.28	ft <sup>3</sup> /s
V2	0.19	m/s	0.630	ft/s
Q10	0.074	m <sup>3</sup> /s	2.63	ft <sup>3</sup> /s
V10	0.20	m/s	0.65	ft/s
LENGTH	37	m	121.1	ft
SLOPE	0.004	m/m		
SIDE SLOPES	6			

- LEGEND**
- RBZ1 - RIPARIAN BUFFER - ZONE 1
  - RBZ2 - RIPARIAN BUFFER - ZONE 2
  - [Cross-hatched box] MITIGABLE IMPACTS ZONE 1
  - [Diagonal hatched box] MITIGABLE IMPACTS ZONE 2



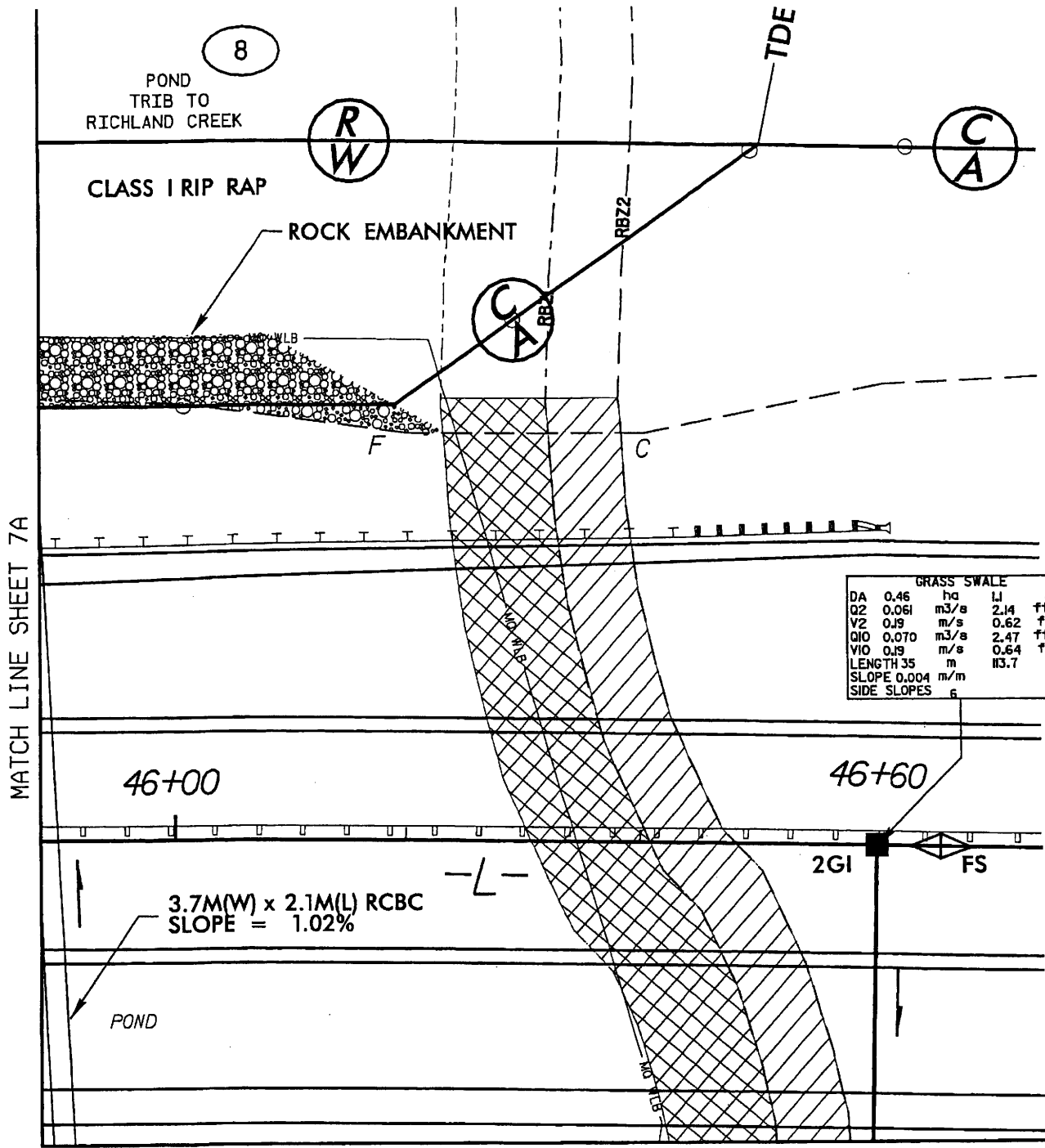
**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 27 OF 92

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GRASS SWALE			
DA	0.46	hd	1.1
Q2	0.061	m <sup>3</sup> /s	2.14
V2	0.19	m/s	0.62
Q10	0.070	m <sup>3</sup> /s	2.47
V10	0.19	m/s	0.64
LENGTH	35	m	113.7
SLOPE	0.004	m/m	ft
SIDE SLOPES			6

MATCH LINE SHEET 7A

46+00

46+60

3.7M(W) x 2.1M(L) RCBC  
SLOPE = 1.02%

POND

MATCH LINE SHEET 7D

SHEET 7B

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

2842  
SHEET 2 OF 2

MATCH LINE SHEET 7A

12+00

-FLY-

12+80

450

2GI



GRASS SWALE		
DA	0.25	ha
Q2	0.033	m <sup>3</sup> /s
V2	0.29	m/s
Q10	0.038	m <sup>3</sup> /s
V10	0.30	m/s
LENGTH	19	m
SLOPE	0.003	%
SIDE SLOPES	6	

13+60

750

14+00

-Y5-

FS

0.6m LATERAL  
BASE DITCH

GRASS SWALE		
DA	0.10	ha
Q2	0.015	m <sup>3</sup> /s
V2	0.55	m/s
Q10	0.017	m <sup>3</sup> /s
V10	0.56	m/s
LENGTH	8	m
SLOPE	0.034	m/m
SIDE SLOPES	6	

8



ROCK EMBANKMENT

POND  
TRIB TO  
RICHLAND CREEK

LEVEL SPREADER NOT UTILIZED  
AT THIS LOCATION. ROADWAY SECTION  
IS IN CUT AND LENGTH OF LEVEL  
SPREADER REQUIRED IS GREATER  
THAN 9m (300ft)

SAND BAGS SHALL BE USED  
TO CONTAIN HAZARDOUS RUNOFF  
WITHIN THE SPILL BASIN

MATCH LINE SHEET 7D

SHEET 7C

PLAN VIEW  
SITE 7

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

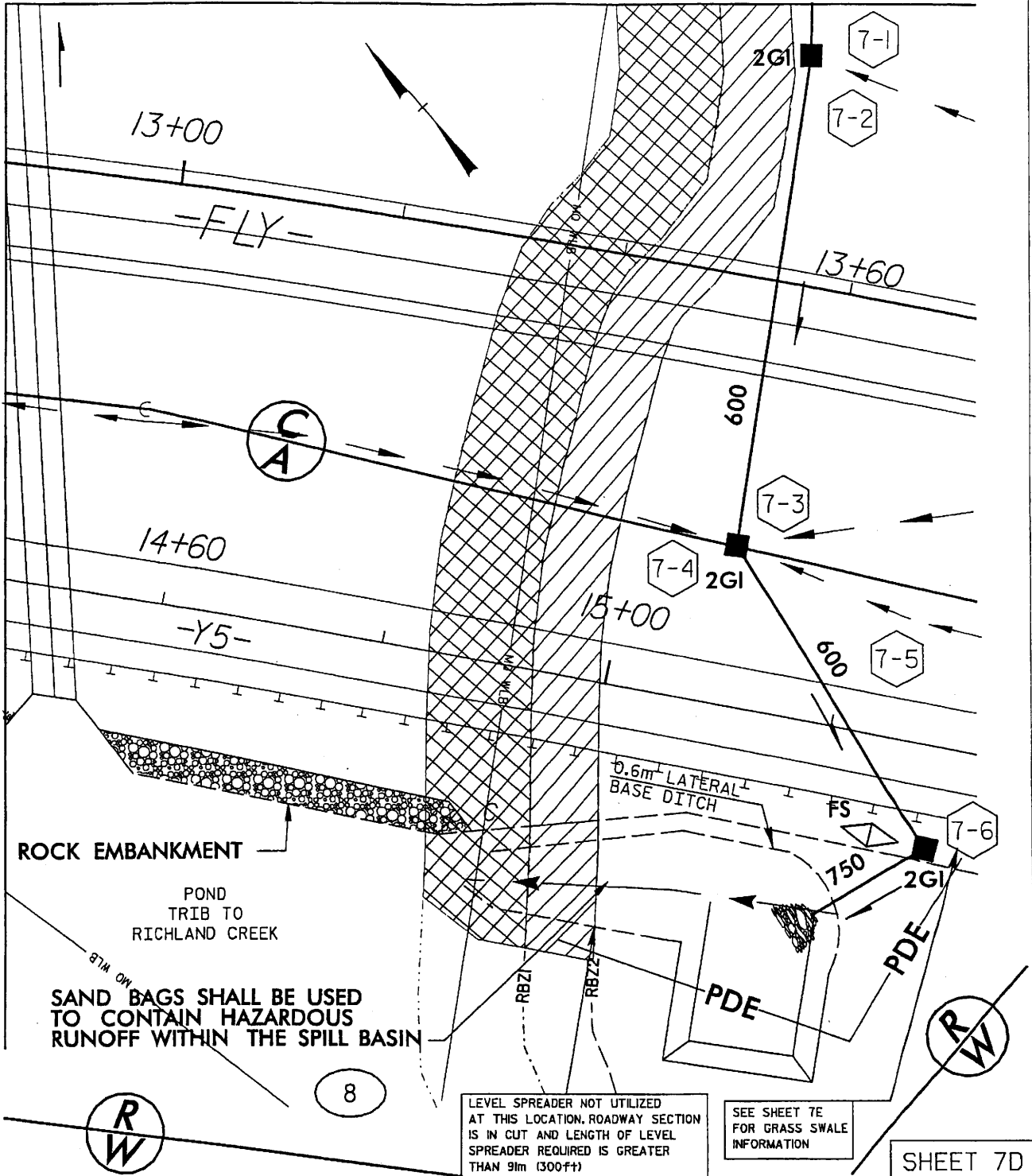
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 7C OF 92

MATCH LINE SHEET 7B

MATCH LINE SHEET 7C



ROCK EMBANKMENT

POND TRIB TO RICHLAND CREEK

SAND BAGS SHALL BE USED TO CONTAIN HAZARDOUS RUNOFF WITHIN THE SPILL BASIN

LEVEL SPREADER NOT UTILIZED AT THIS LOCATION. ROADWAY SECTION IS IN CUT AND LENGTH OF LEVEL SPREADER REQUIRED IS GREATER THAN 91m (300FT)

SEE SHEET 7E FOR GRASS SWALE INFORMATION

SHEET 7D

LEGEND

- RBZ1 - RIPARIAN BUFFER - ZONE 1
- RBZ2 - RIPARIAN BUFFER - ZONE 2
- [Cross-hatched box] MITIGABLE IMPACTS ZONE 1
- [Diagonal hatched box] MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 7



NORTH CAROLINA DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

30 92  
SHEET OF 1

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7-1

GRASS SWALE			
DA	0.40	ha	1.0 Ac
Q2	0.066	m <sup>3</sup> /s	2.33 ft <sup>3</sup> /s
V2	0.19	m/s	0.63 ft/s
Q10	0.076	m <sup>3</sup> /s	2.68 ft <sup>3</sup> /s
V10	0.20	m/s	0.65 ft/s
LENGTH	30	m	98.8 ft
SLOPE	0.004	m/m	
SIDE SLOPES	6		

7-2

GRASS SWALE			
DA	0.44	ha	1.1 Ac
Q2	0.058	m <sup>3</sup> /s	2.05 ft <sup>3</sup> /s
V2	0.49	m/s	1.61 ft/s
Q10	0.067	m <sup>3</sup> /s	2.36 ft <sup>3</sup> /s
V10	0.51	m/s	1.66 ft/s
LENGTH	33	m	108.7 ft
SLOPE	0.054	m/m	
SIDE SLOPES	6		

7-3

GRASS SWALE			
DA	0.60	ha	1.5 Ac
Q2	0.099	m <sup>3</sup> /s	3.50 ft <sup>3</sup> /s
V2	0.69	m/s	2.26 ft/s
Q10	0.114	m <sup>3</sup> /s	4.02 ft <sup>3</sup> /s
V10	0.71	m/s	2.34 ft/s
LENGTH	45	m	148.3 ft
SLOPE	0.094	m/m	
SIDE SLOPES	6		

7-4

GRASS SWALE			
DA	0.18	ha	0.4 Ac
Q2	0.030	m <sup>3</sup> /s	1.05 ft <sup>3</sup> /s
V2	0.40	m/s	1.30 ft/s
Q10	0.034	m <sup>3</sup> /s	1.21 ft <sup>3</sup> /s
V10	0.41	m/s	1.34 ft/s
LENGTH	14	m	44.5 ft
SLOPE	0.009	m/m	
SIDE SLOPES	6		

7-5

GRASS SWALE			
DA	0.24	ha	0.6 Ac
Q2	0.032	m <sup>3</sup> /s	1.12 ft <sup>3</sup> /s
V2	0.48	m/s	1.57 ft/s
Q10	0.036	m <sup>3</sup> /s	1.29 ft <sup>3</sup> /s
V10	0.50	m/s	1.63 ft/s
LENGTH	18	m	59.3 ft
SLOPE	0.076	m/m	
SIDE SLOPES	6		

7-6

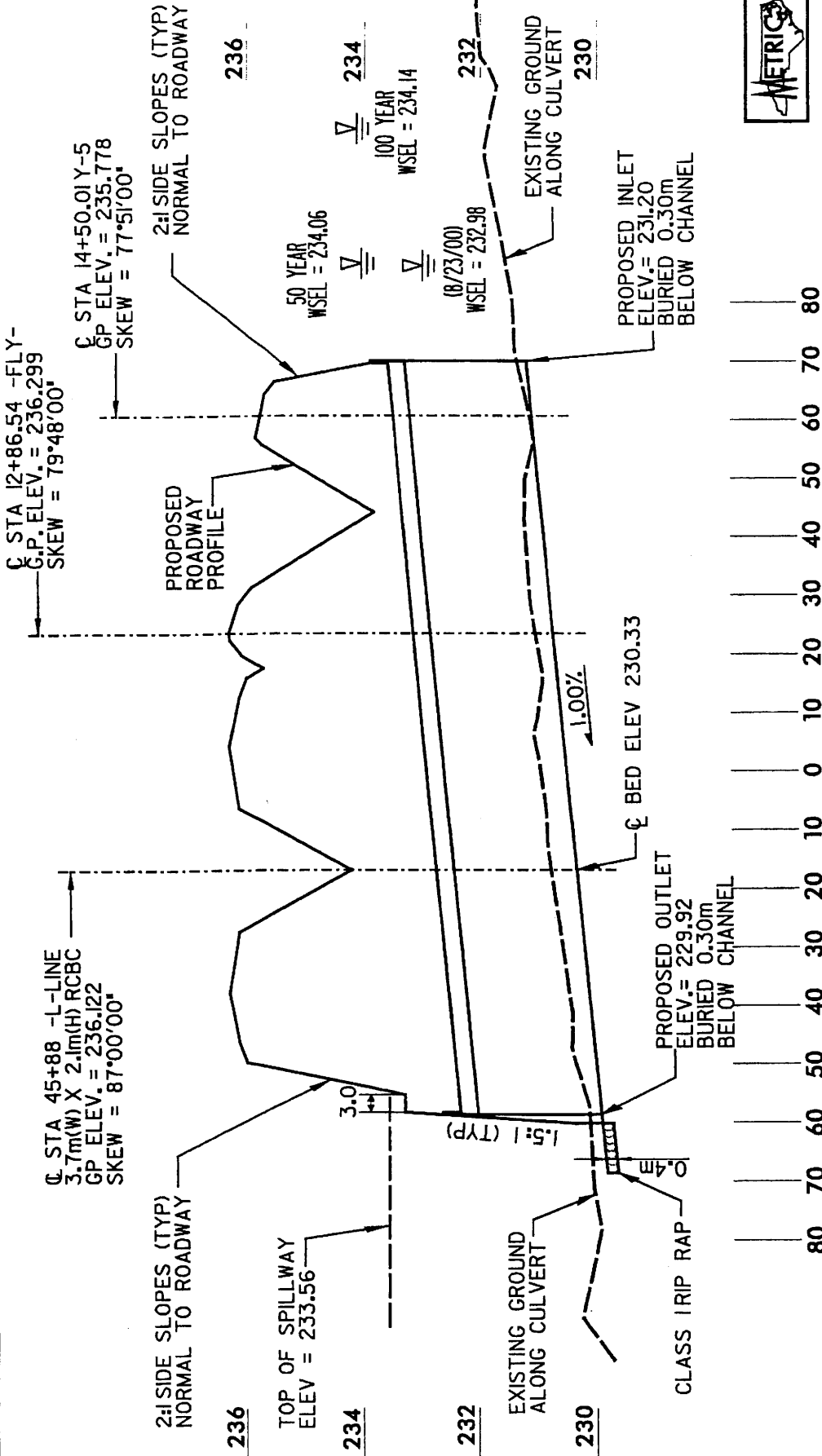
GRASS SWALE			
DA	0.12	ha	0.3 Ac
Q2	0.020	m <sup>3</sup> /s	0.70 ft <sup>3</sup> /s
V2	0.71	m/s	2.33 ft/s
Q10	0.023	m <sup>3</sup> /s	0.80 ft <sup>3</sup> /s
V10	0.73	m/s	2.41 ft/s
LENGTH	9	m	29.7 ft
SLOPE	0.056	m/m	
SIDE SLOPES	6		

SHEET 7E

NORTH CAROLINA  
DIVISION OF HIGHWAYS  
  
 GUILFORD COUNTY  
 8.1570801 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE  
  
 SCALE AS SHOWN  
 SHEET 7 OF 92



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NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

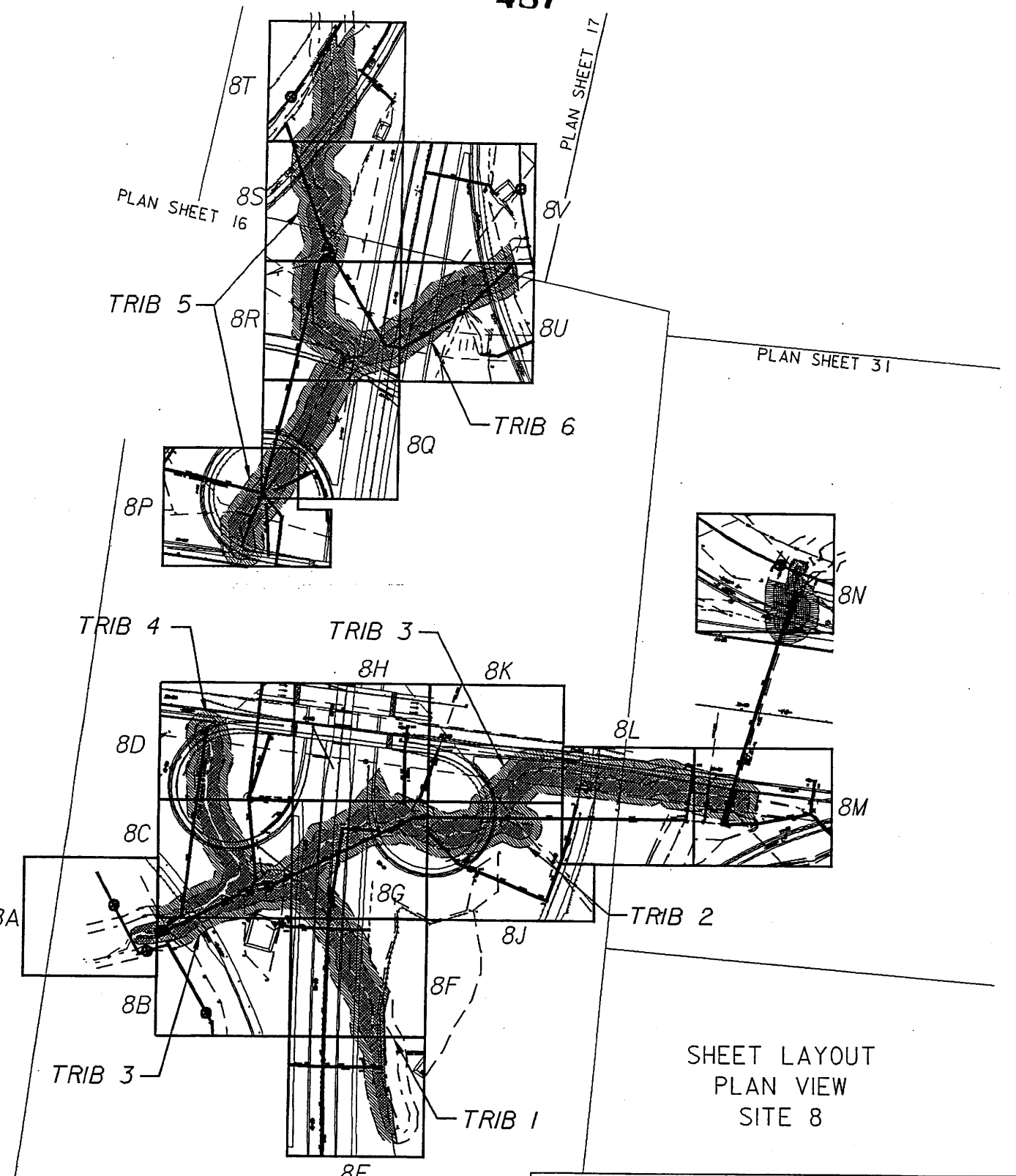
SCALE AS SHOWN

SHEET 22 OF 52

PROFILE  
PERMIT SITE 7 (7A - 7D)  
2100mm RCP

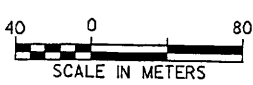
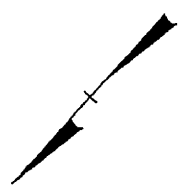
SCALE:  
1 = 100 HORIZONTAL  
1 = 100 VERTICAL

487



SHEET LAYOUT  
 PLAN VIEW  
 SITE 8

PLAN SHEET 16



NORTH CAROLINA  
DIVISION OF HIGHWAYS

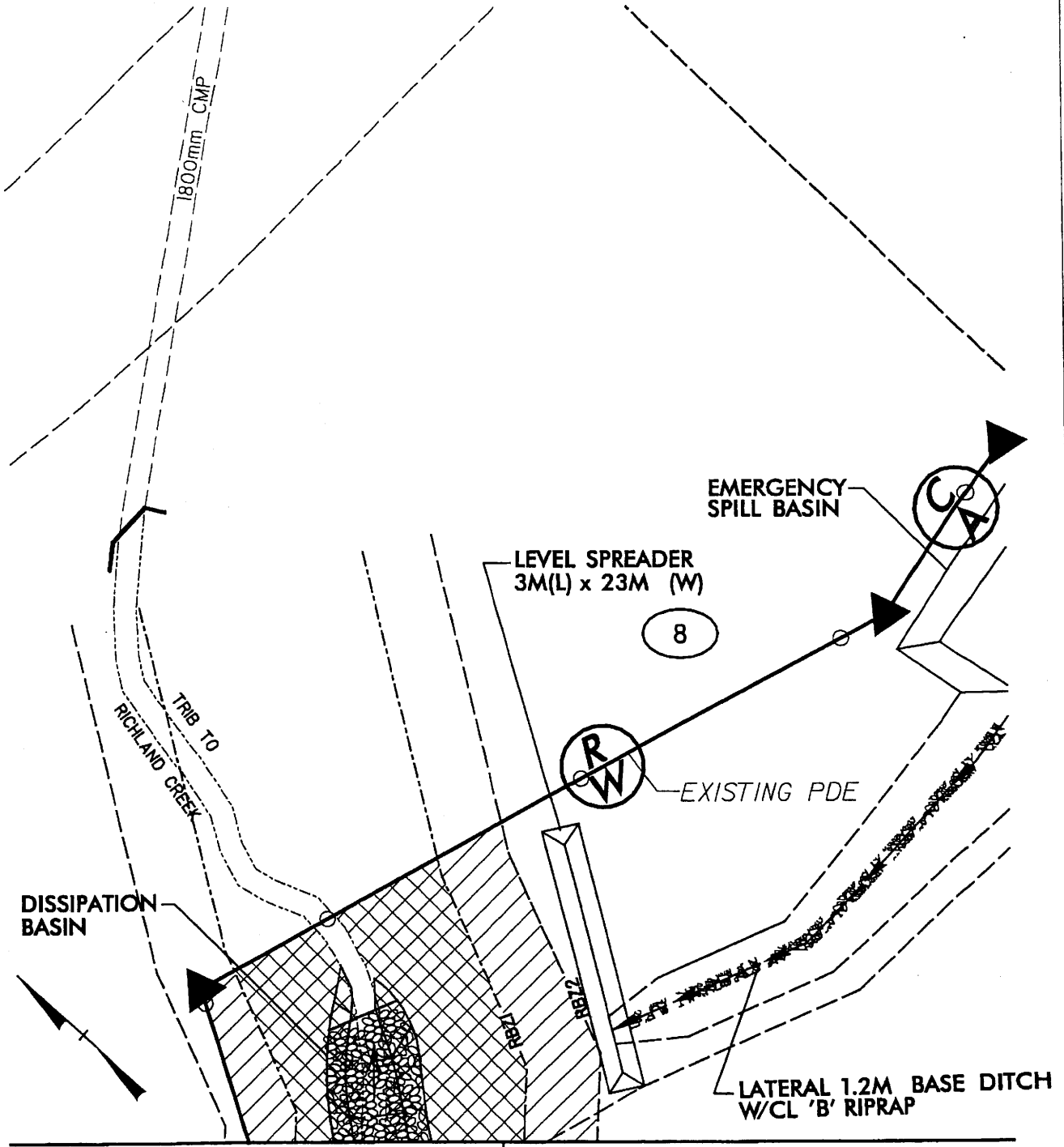
10/06

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

33 92  
 SHEET OF

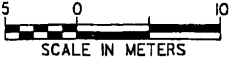
DATE  
 TIME  
 FILE



LEGEND

- RBZ1** RIPARIAN BUFFER - ZONE 1
- RBZ2** RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

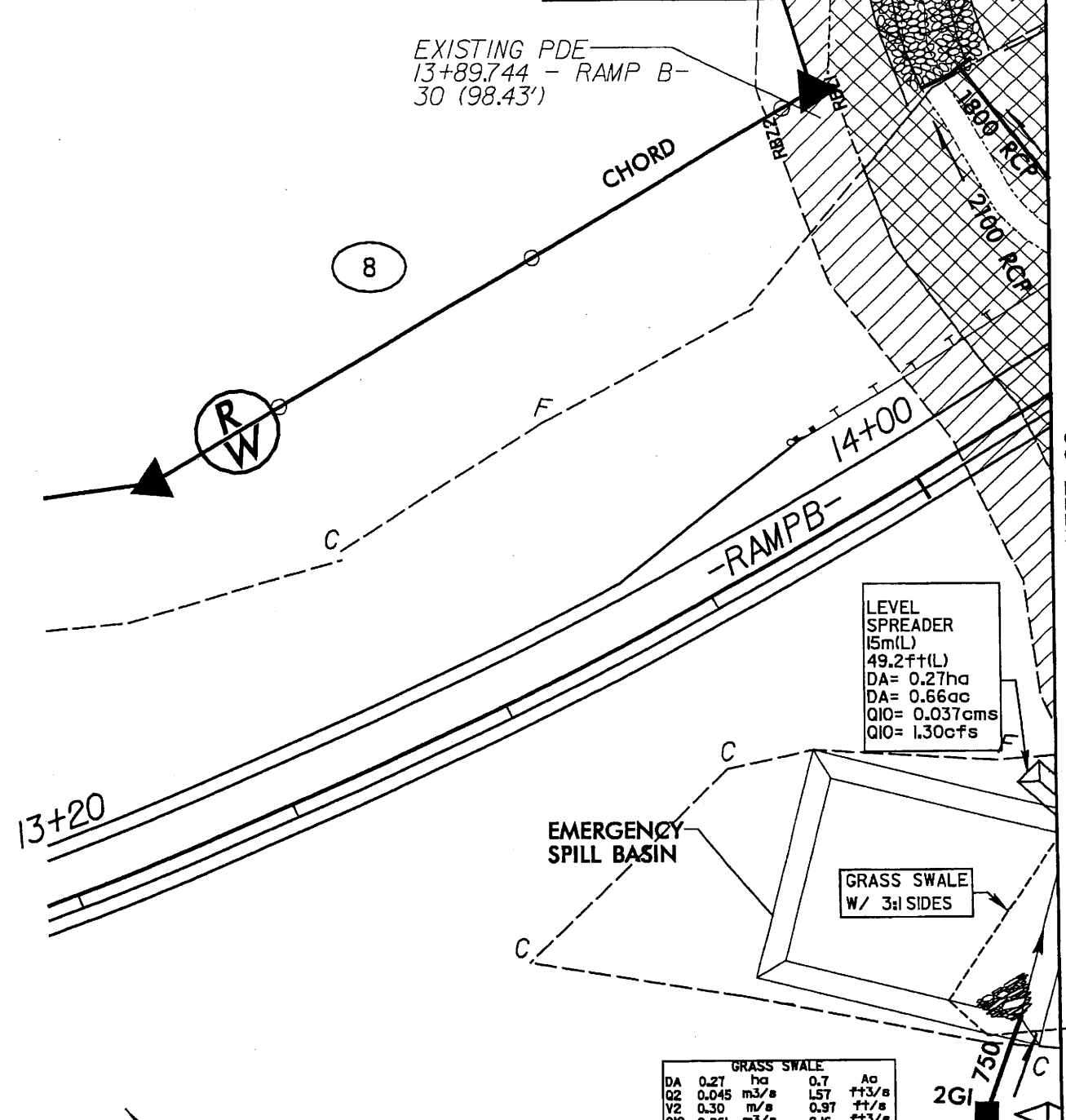
SCALE AS SHOWN

SHEET 8A OF 92

12/2006 08:39 PM \\gon\Roadway\proj\PERMITS\Buffer\_Permits\vr0609buf\_08A.dwg

MATCH LINE SHEET 8A

EXISTING PDE  
13+89.744 - RAMP B-  
30 (98.43')



LEVEL SPREADER  
15m(L)  
49.2ft(L)  
DA= 0.27ha  
DA= 0.66ac  
Q10= 0.037cms  
Q10= 1.30cfs

EMERGENCY SPILL BASIN

GRASS SWALE  
W/ 3:1 SIDES

GRASS SWALE		
DA	0.27	ha
Q2	0.045	m <sup>3</sup> /s
V2	0.30	m/s
Q10	0.061	m <sup>3</sup> /s
V10	0.32	m/s
LENGTH	20	m
SLOPE	0.016	m/m
SIDE SLOPES	6	
Ao	0.7	ft <sup>2</sup> /s
	1.57	ft <sup>2</sup> /s
	0.97	ft <sup>2</sup> /s
	2.16	ft <sup>2</sup> /s
	1.05	ft <sup>2</sup> /s
	66.7	ft

SHEET 8B

LEGEND

- RIPARIAN BUFFER - ZONE 1
- RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



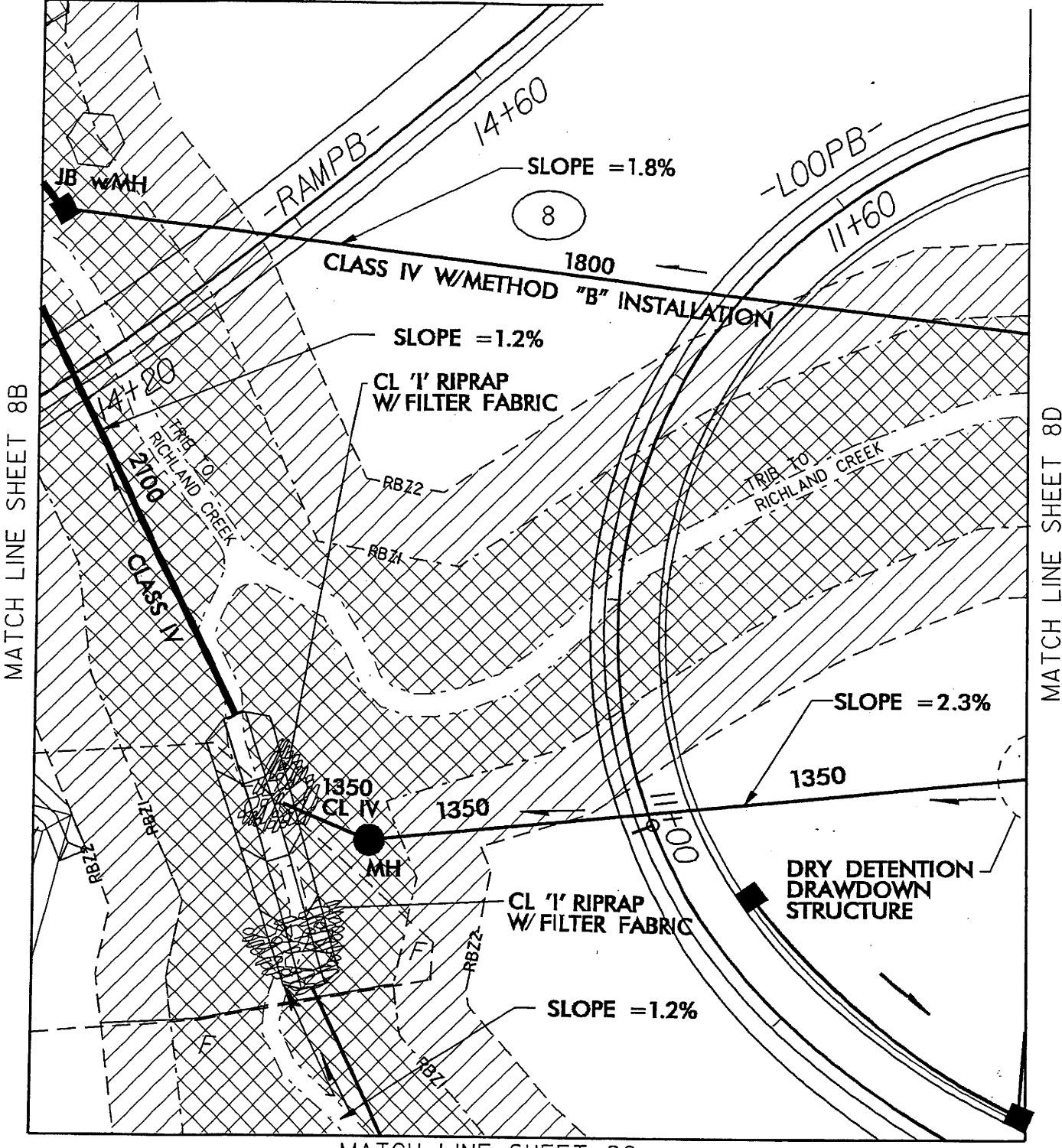
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 5 OF 2

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MATCH LINE SHEET 8B

MATCH LINE SHEET 8D

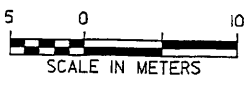
MATCH LINE SHEET 8G

SHEET 8C

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

10/06

36 92  
SHEET OF

491

8  
12+00  
3

-SBCD-  
20+00

SLOPE = 1.8%

CLASS IV W/METHOD "B" INSTALLATION

DRY DETENTION BASIN  
DRAW DOWN STRUCTURE  
DESIGNED FOR 1" RUNOFF,  
AND 2 WEIRS, ONE FOR 10 YR  
AND ONE FOR 50 YR STORM EVENT

MATCH LINE SHEET 8C

1350 CL IV  
400 CSP  
2 ELBOWS  
COLLAR  
1350 STEEL BORE & JACK

375 RCP



MCF

MATCH LINE SHEET 8H

SHEET 8D

PLAN VIEW  
SITE 8

LEGEND

- RBZ1— RIPARIAN BUFFER - ZONE 1
- RBZ2— RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

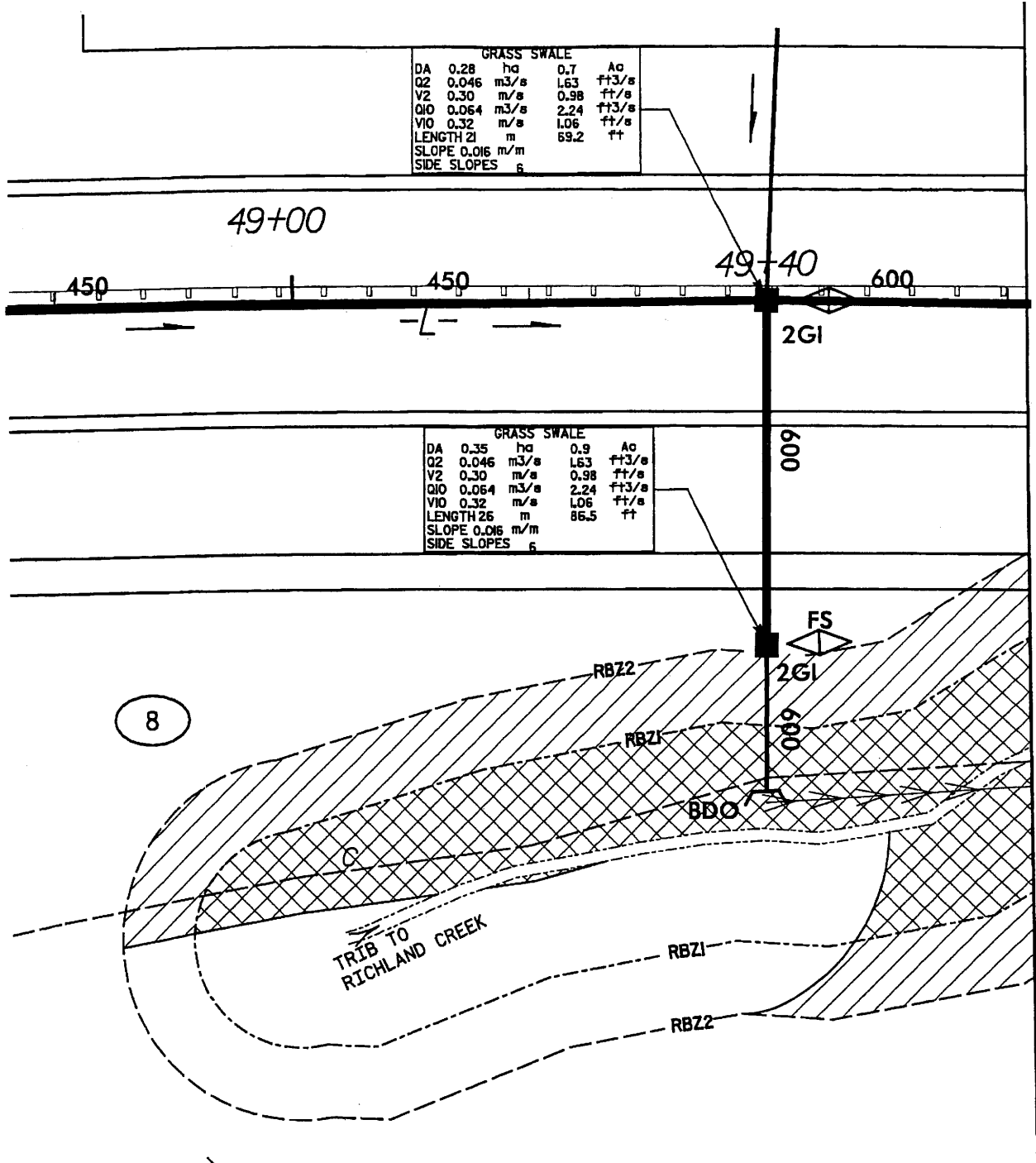
GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

37 92

SHEET \_\_\_ OF \_\_\_

DATE: 10/06  
TIME: 10:00  
FILE: 37 92

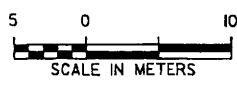


MATCH LINE SHEET 8F

SHEET 8E

- LEGEND**
- RBZ1 RIPARIAN BUFFER - ZONE 1
  - RBZ2 RIPARIAN BUFFER - ZONE 2
  - MITIGABLE IMPACTS ZONE 1
  - MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

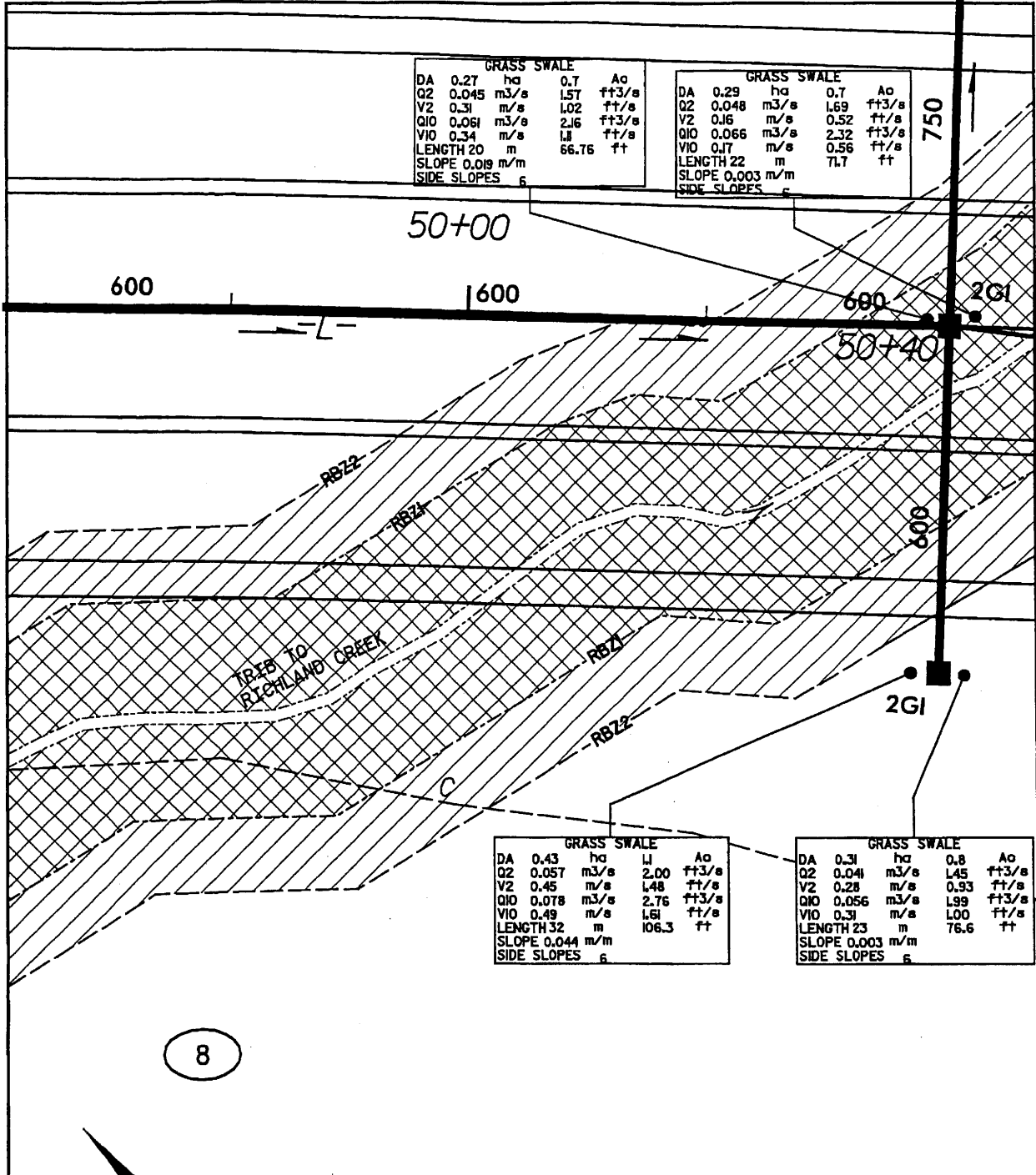
SHEET 8E OF 12

2/2006 2:45 PM \\pdm\Roadway\proj\PERMITS\Buffer\_Permit\80609Buf\_08E.dwg

MATCH LINE SHEET 8B

MATCH LINE SHEET 8E

MATCH LINE SHEET 8G



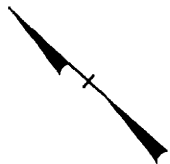
GRASS SWALE			
DA	ha	LI	Ao
0.27	0.7	1.57	1.57
0.045	0.13	1.02	1.02
0.31	0.87	2.16	2.16
0.061	0.17	1.11	1.11
0.34	0.96	66.76	66.76
LENGTH 20 m			
SLOPE 0.019 m/m			
SIDE SLOPES 6			

GRASS SWALE			
DA	ha	LI	Ao
0.29	0.8	1.69	1.69
0.048	0.13	1.02	1.02
0.16	0.45	2.32	2.32
0.066	0.17	1.11	1.11
0.17	0.47	71.7	71.7
LENGTH 22 m			
SLOPE 0.003 m/m			
SIDE SLOPES 6			

GRASS SWALE			
DA	ha	LI	Ao
0.43	1.2	2.00	2.00
0.057	0.16	1.48	1.48
0.45	1.28	2.76	2.76
0.078	0.22	1.61	1.61
0.49	1.38	106.3	106.3
LENGTH 32 m			
SLOPE 0.044 m/m			
SIDE SLOPES 6			

GRASS SWALE			
DA	ha	LI	Ao
0.31	0.8	1.45	1.45
0.041	0.11	0.93	0.93
0.28	0.78	1.99	1.99
0.056	0.15	1.00	1.00
0.31	0.87	76.6	76.6
LENGTH 23 m			
SLOPE 0.003 m/m			
SIDE SLOPES 6			

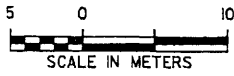
8



LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8



SHEET 8F

**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 2

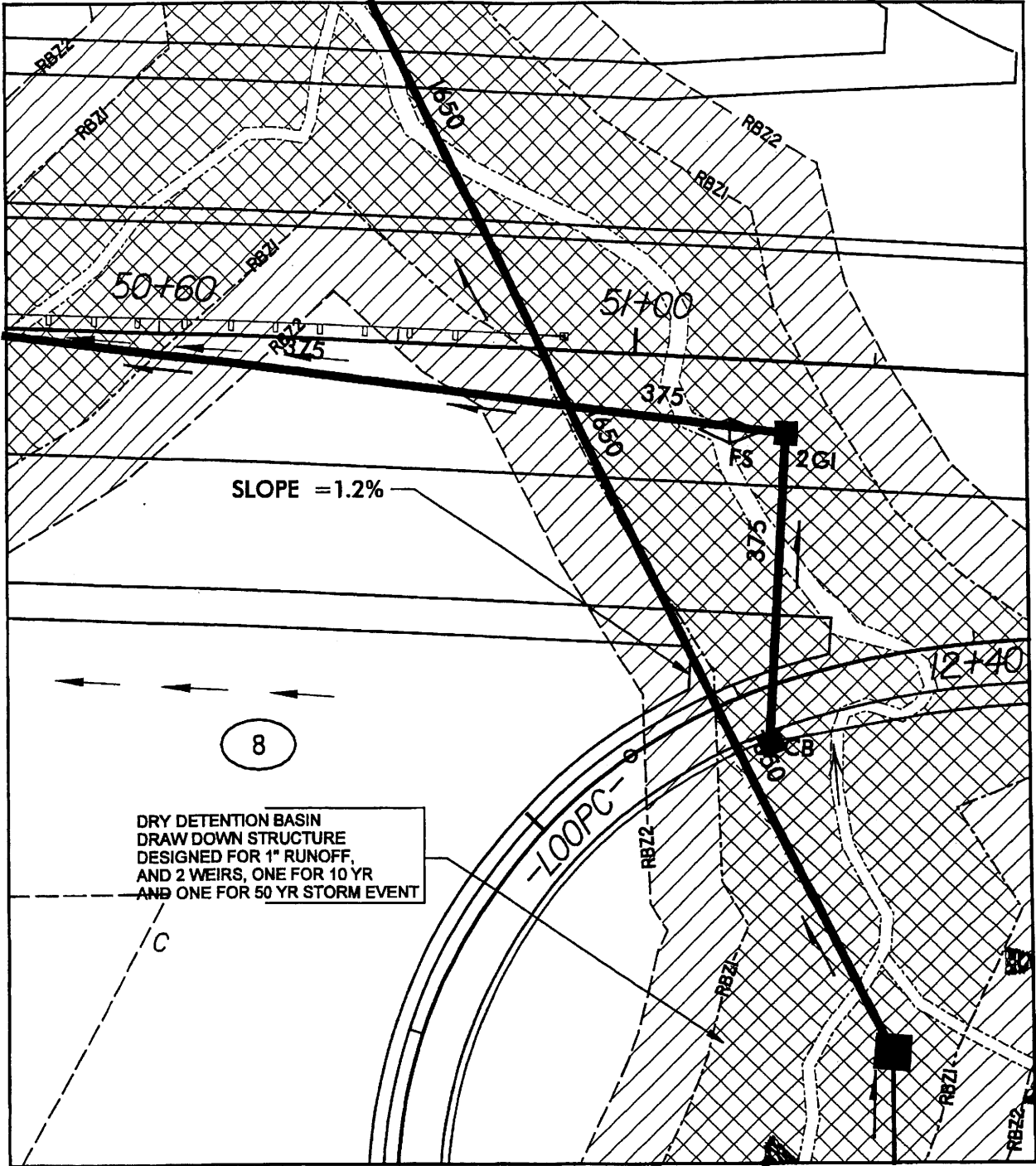
12/2006 2:32:27 PM \\gdn\Roadway\proj\PERMITS\Buffer\_Permit\8\0609burf\_08F.psh



MATCH LINE SHEET 8C

MATCH LINE SHEET 8F

MATCH LINE SHEET 8H



DRY DETENTION BASIN  
 DRAW DOWN STRUCTURE  
 DESIGNED FOR 1" RUNOFF,  
 AND 2 WEIRS, ONE FOR 10 YR  
 AND ONE FOR 50 YR STORM EVENT

MATCH LINE SHEET 8J

SHEET 8G

PLAN VIEW  
SITE 8

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

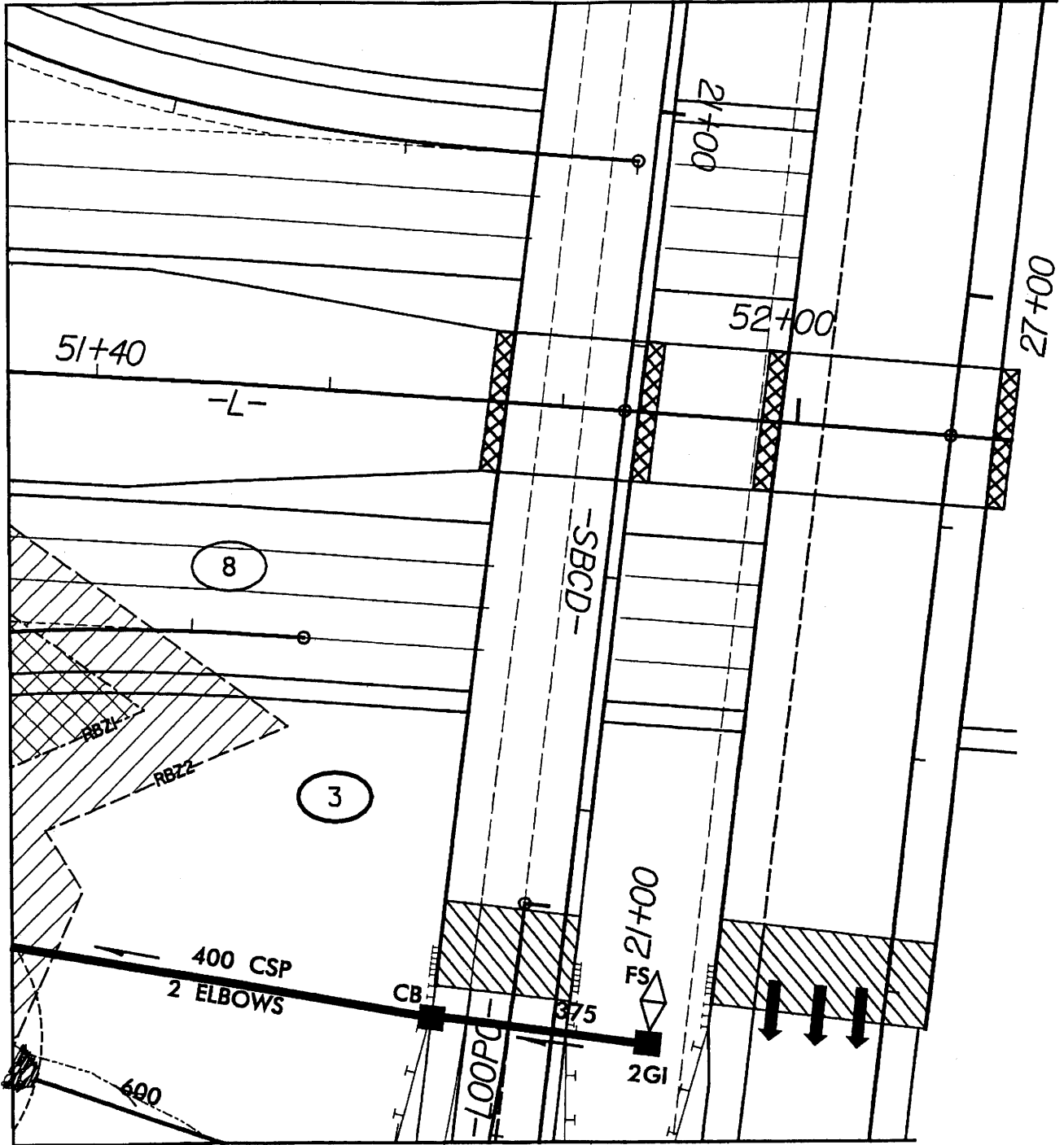
GUILFORD COUNTY  
 8.1570601 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 40 OF 92

MATCH LINE SHEET 8D

MATCH LINE SHEET 8G



MATCH LINE SHEET 8K

SHEET 8H

PLAN VIEW  
SITE 8

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2



NORTH CAROLINA  
DIVISION OF HIGHWAYS

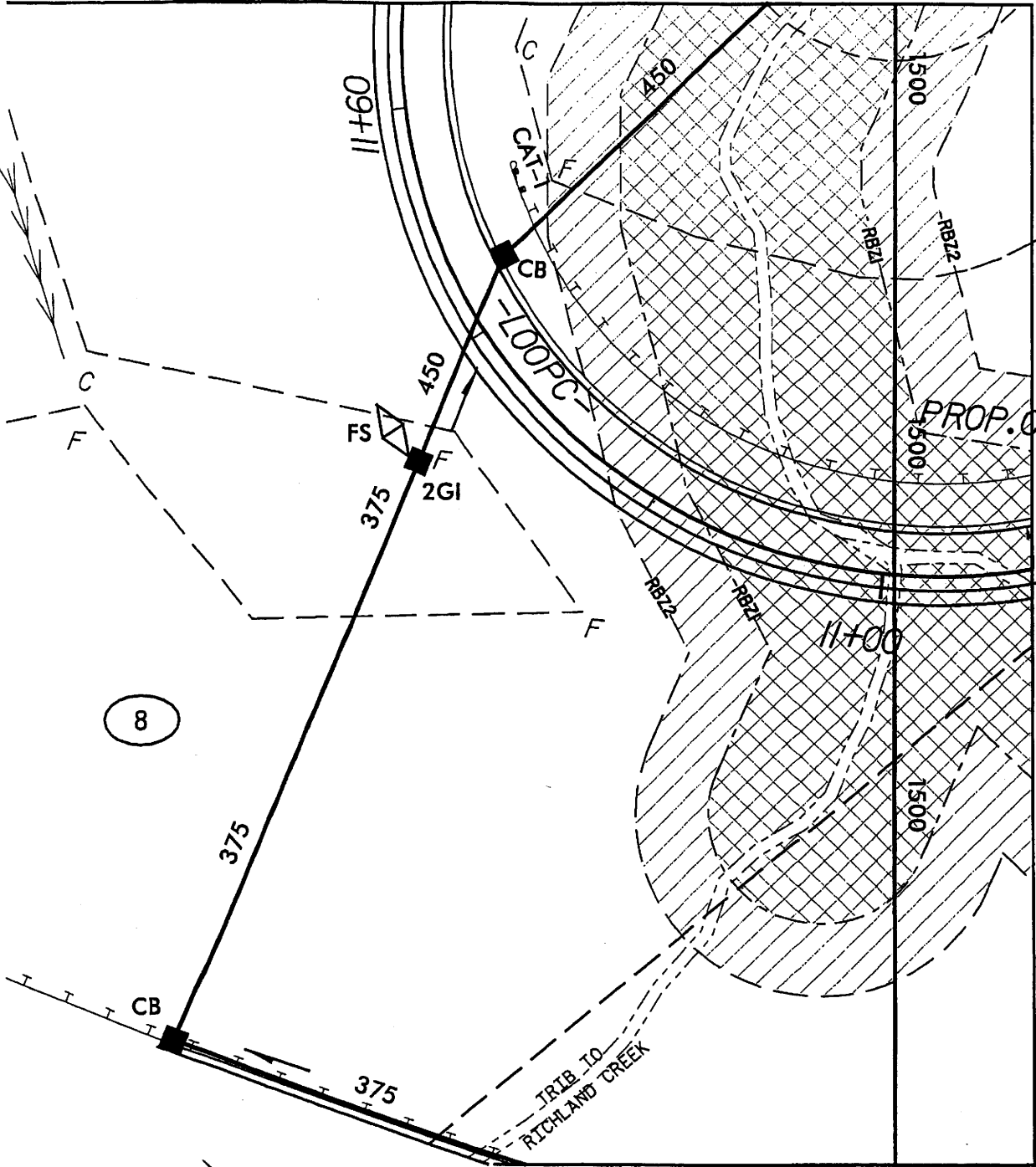
GUILFORD COUNTY  
8.1570801 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 8H OF 92

MATCH LINE SHEET 8G



MATCH LINE SHEET 8J

MATCH LINE SHEET 8L

SHEET 8J

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8



NORTH CAROLINA  
DIVISION OF HIGHWAYS

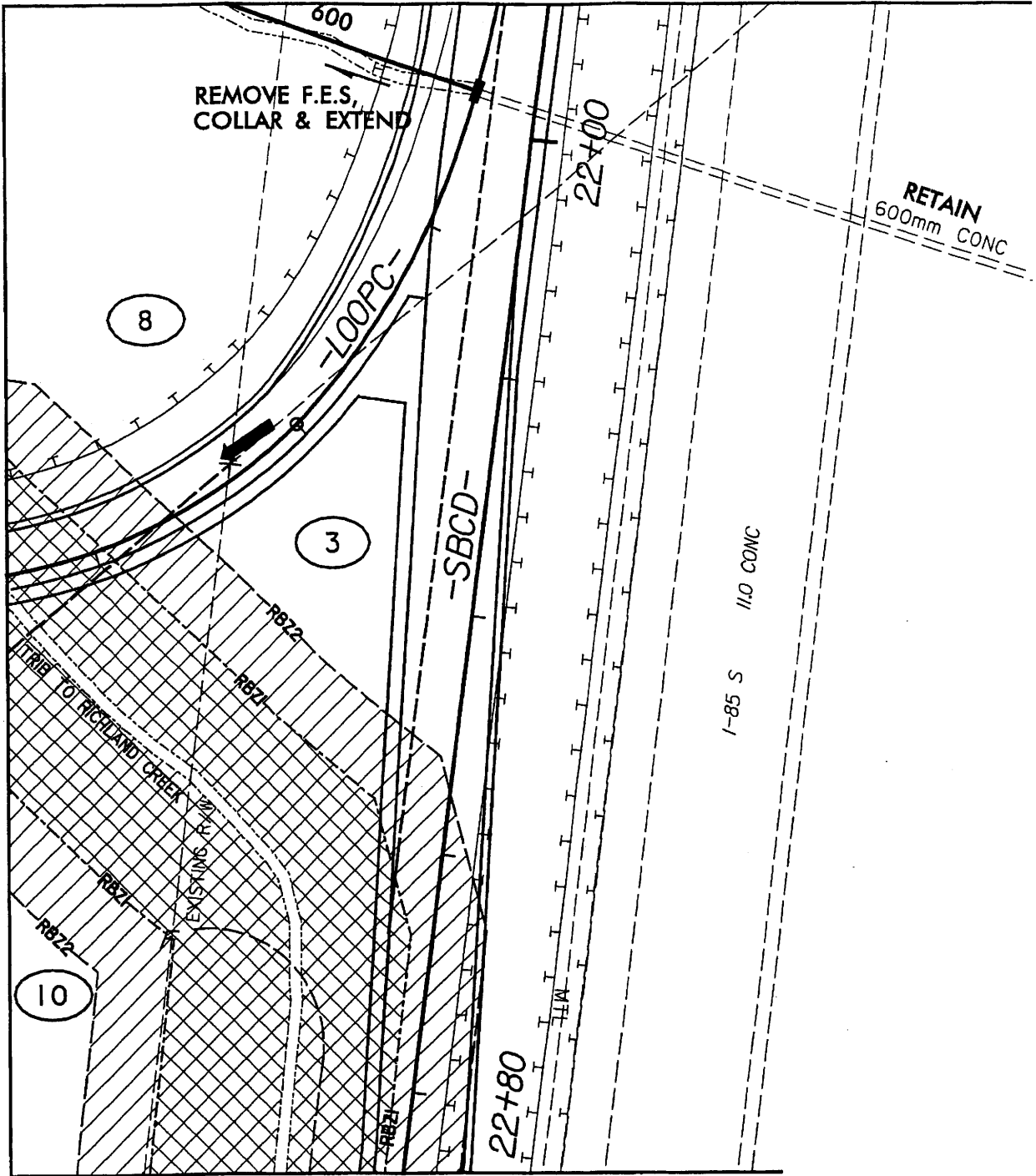
GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 42 of 62

MATCH LINE SHEET 8H

MATCH LINE SHEET 8J



MATCH LINE SHEET 8M

SHEET 8K

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8

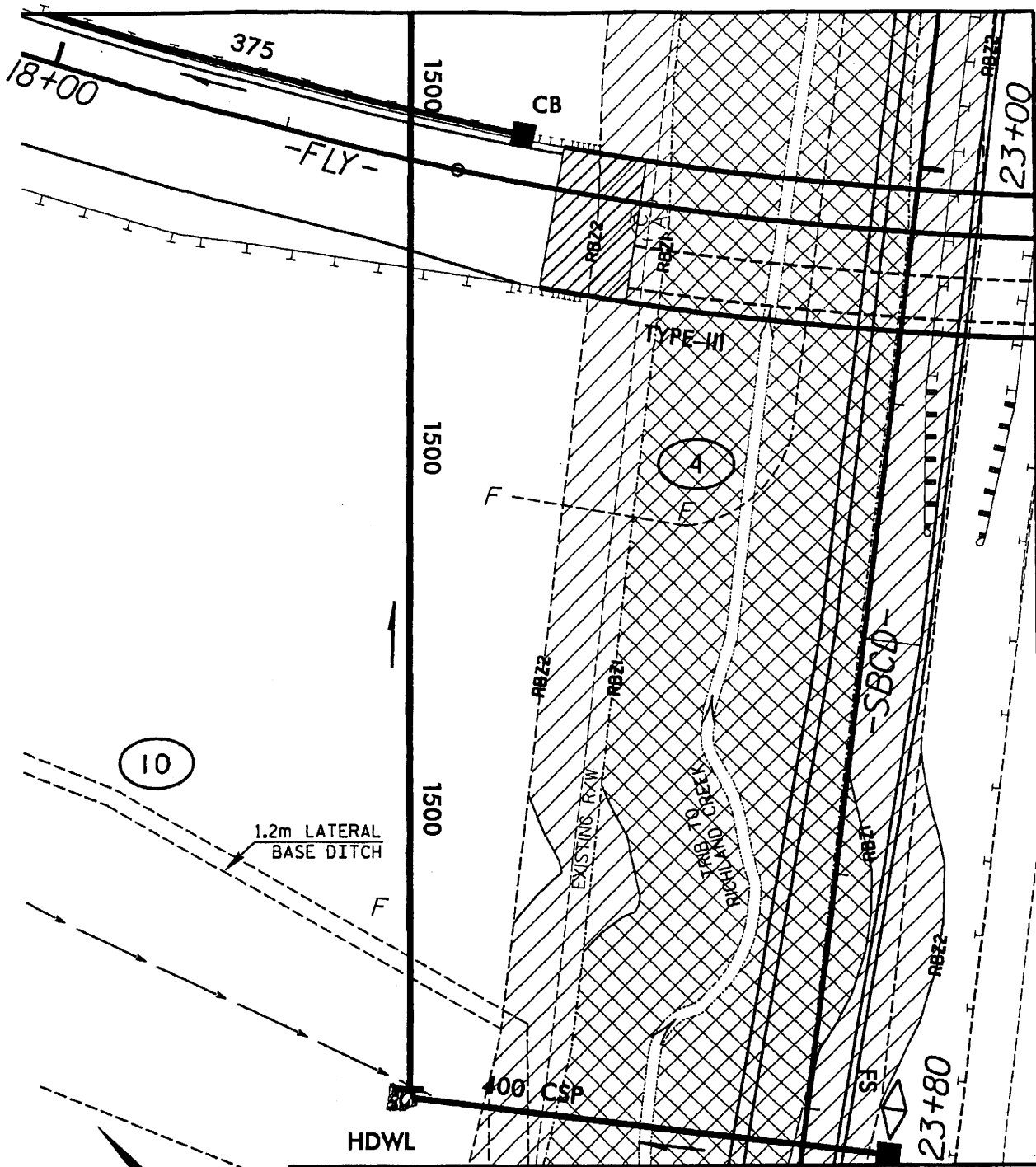


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 13 of 92



LEGEND

- RBZ1- RIPARIAN BUFFER - ZONE 1
- RBZ2- RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8



NORTH CAROLINA DIVISION OF HIGHWAYS

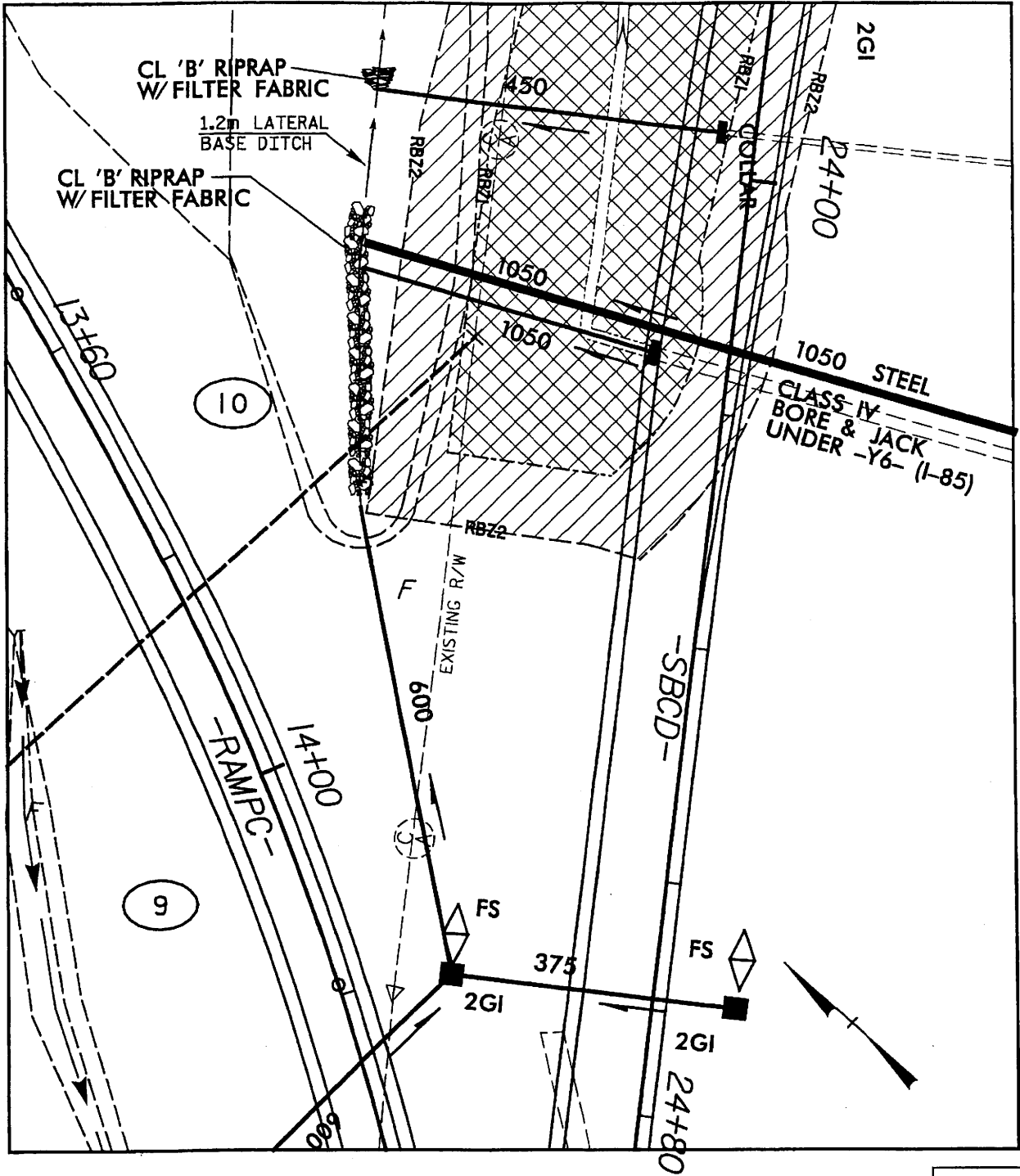
GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 41 OF 2





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MATCH LINE SHEET 8L



SHEET 8M

LEGEND

-  RBZ1 RIPARIAN BUFFER - ZONE 1
-  RBZ2 RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8

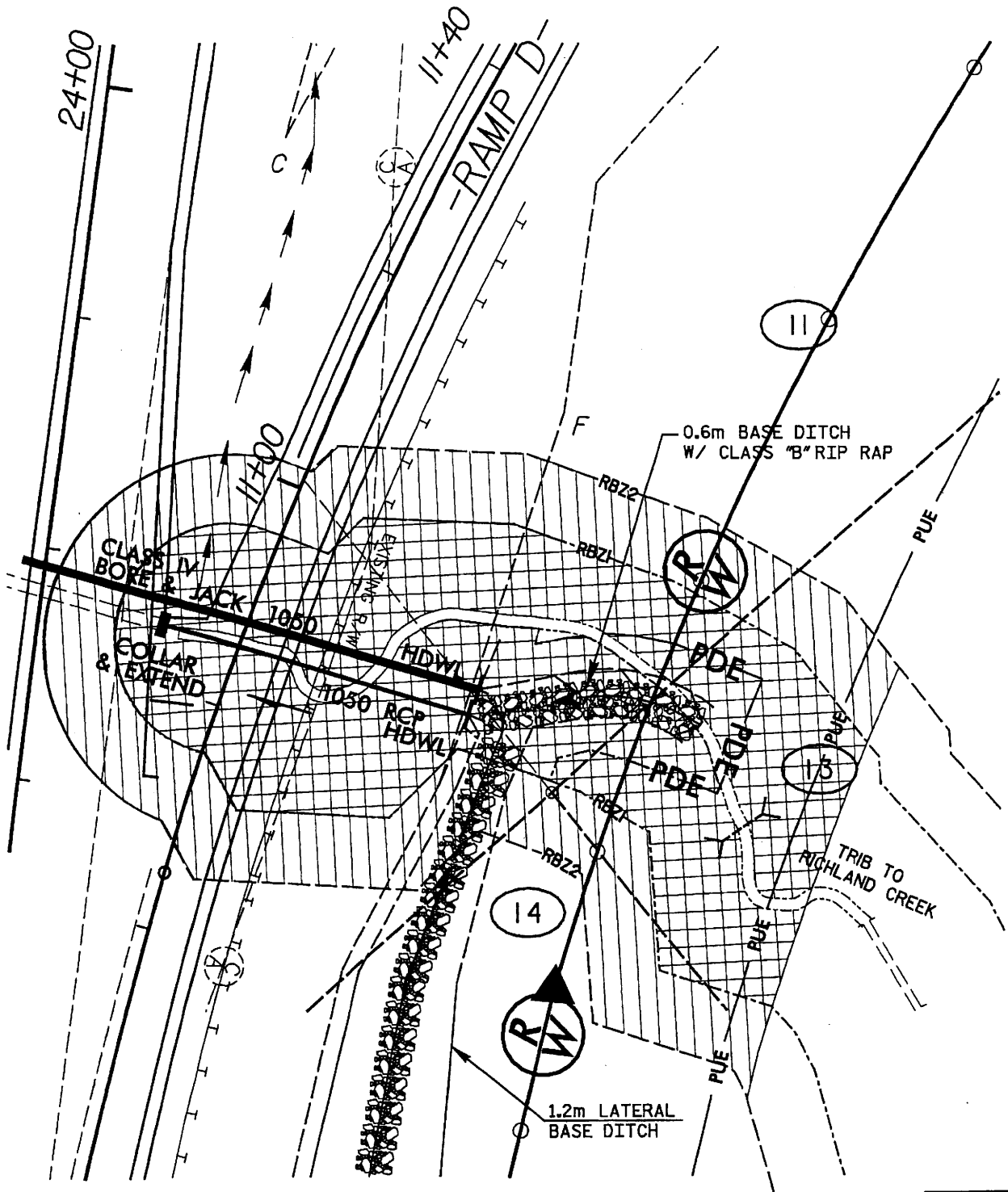


NORTH CAROLINA DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE





SCALE AS SHOWN

SHEET 8M OF 92



SHEET 8N

LEGEND

-  RBZ1 RIPARIAN BUFFER - ZONE 1
-  RBZ2 RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8

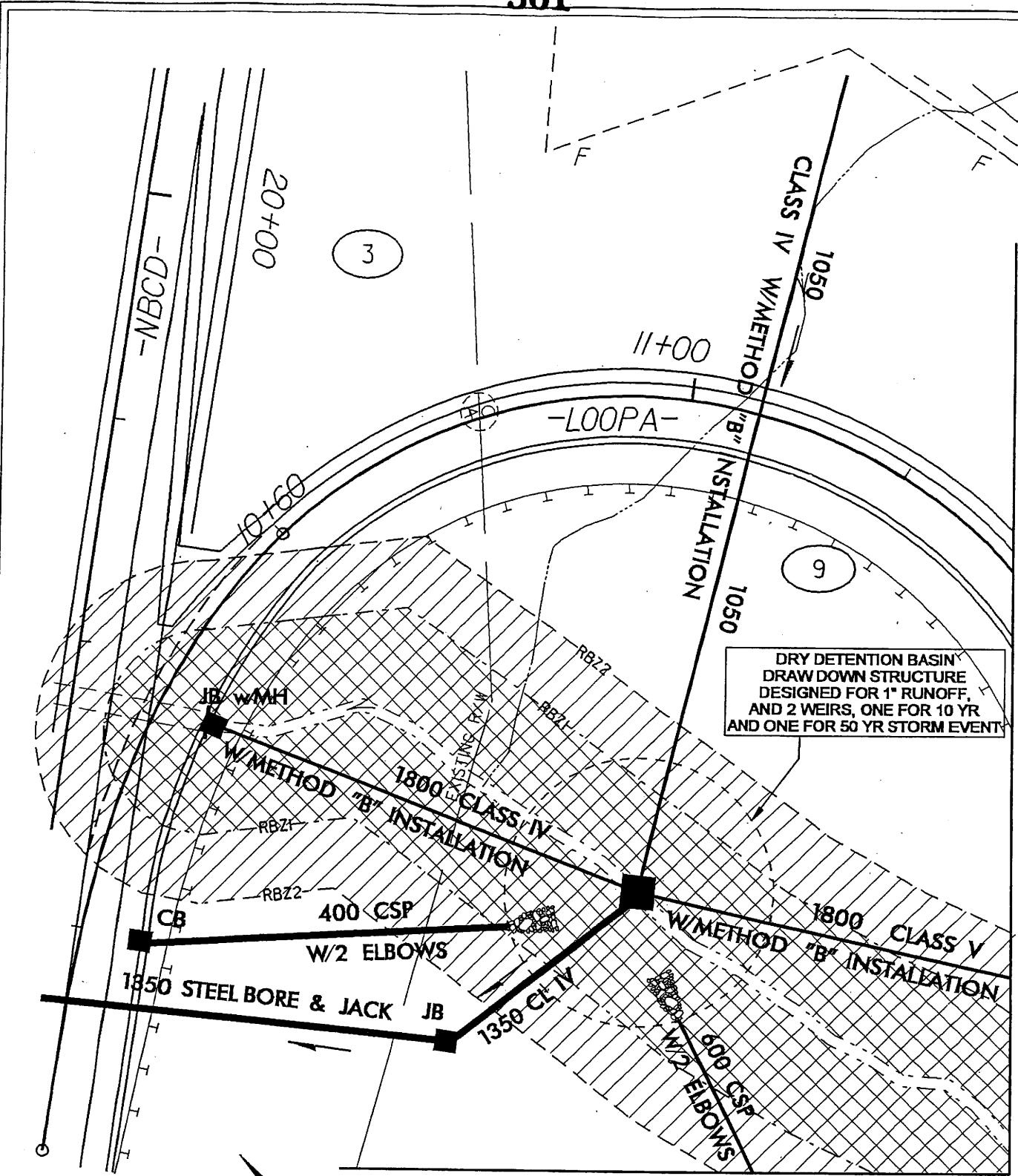


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 46 of 92



DRY DETENTION BASIN  
DRAW DOWN STRUCTURE  
DESIGNED FOR 1" RUNOFF,  
AND 2 WEIRS, ONE FOR 10 YR  
AND ONE FOR 50 YR STORM EVENT

MATCH LINE SHEET 80

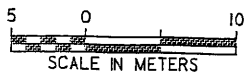
MATCH LINE SHEET 8Q

SHEET 8P

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



NORTH CAROLINA  
DIVISION OF HIGHWAYS

10/06

GUILFORD COUNTY  
B.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

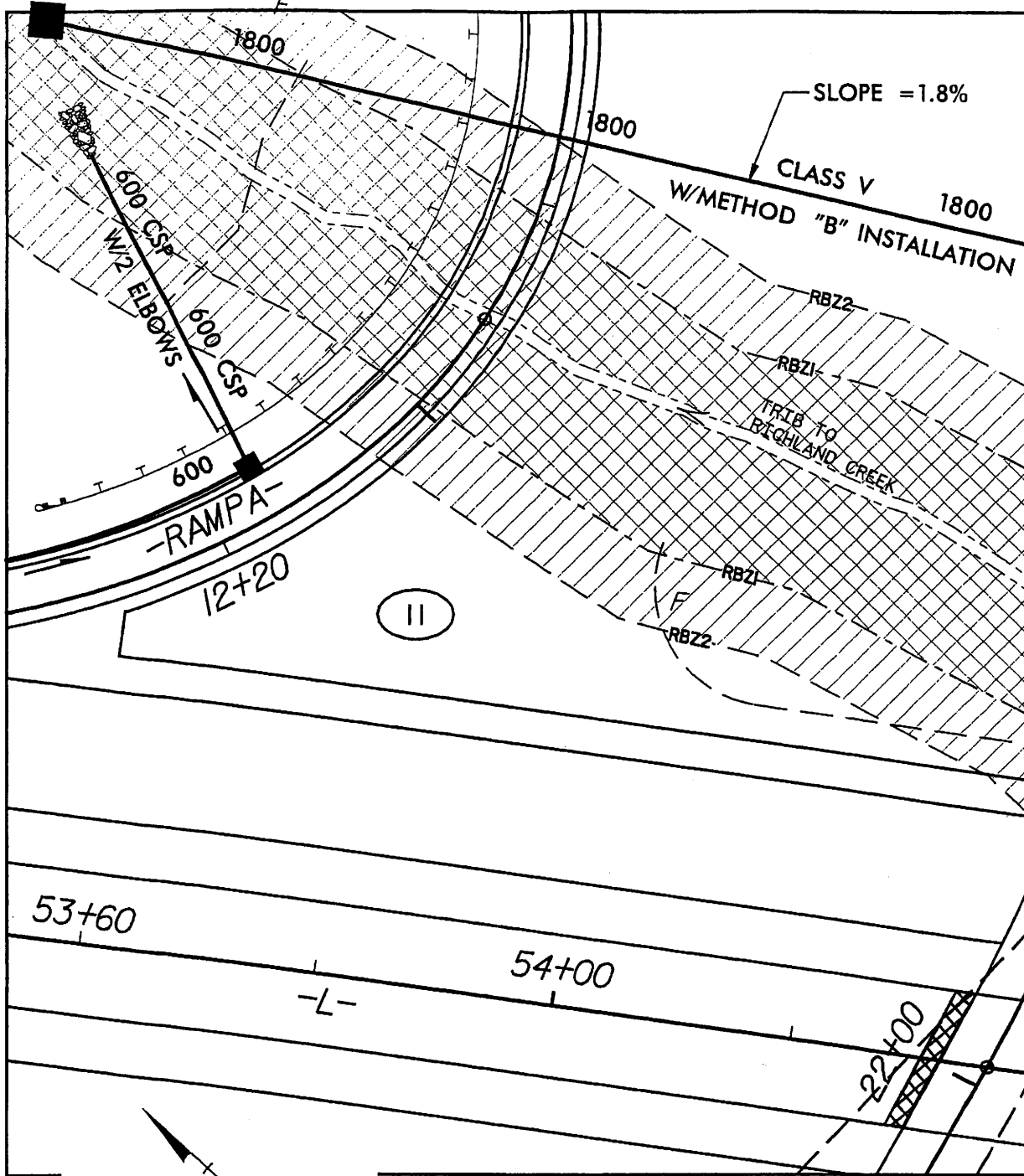
47.92  
SHEET OF



MATCH LINE SHEET 8P

MATCH LINE SHEET 8P

MATCH LINE SHEET 8R



SHEET 8Q

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW SITE 8

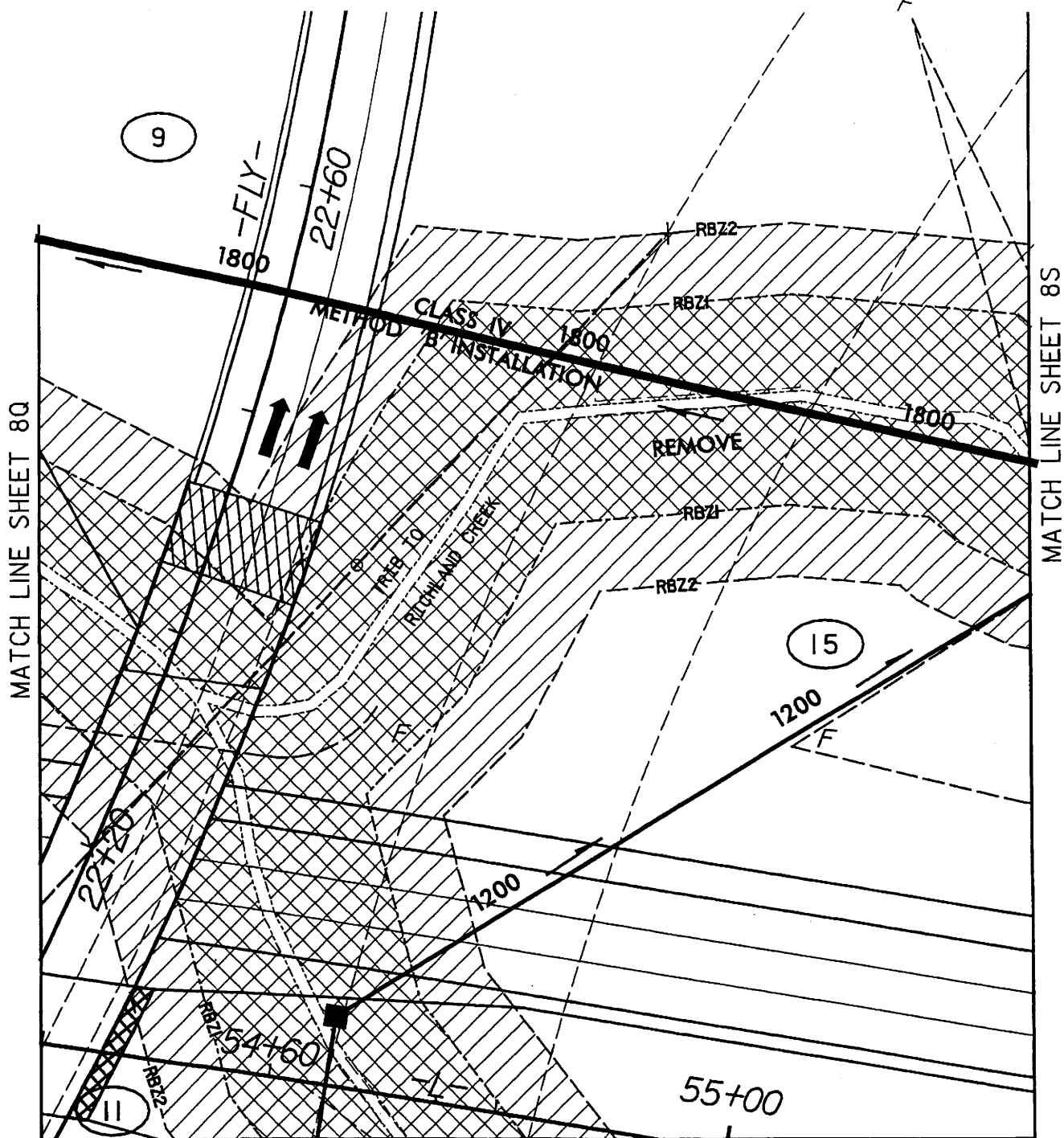


NORTH CAROLINA DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 8Q OF 92



MATCH LINE SHEET 8Q

MATCH LINE SHEET 8S

MATCH LINE SHEET 8U

SHEET 8R

LEGEND

- RBZ1 RIPARIAN BUFFER - ZONE 1
- RBZ2 RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8

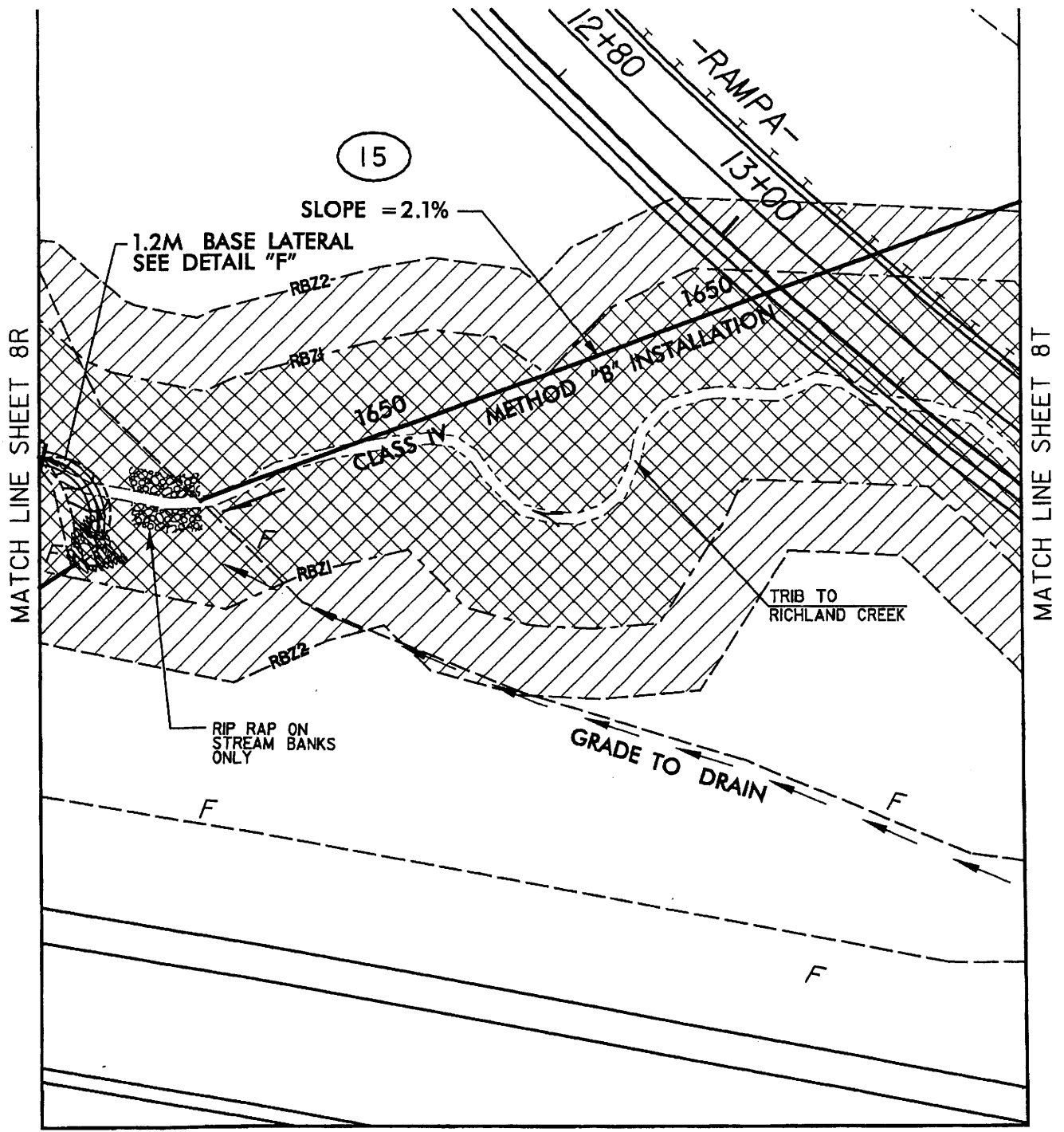


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 46 OF 92

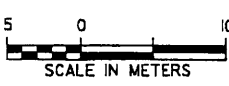


MATCH LINE SHEET 8V

SHEET 8S

- LEGEND**
- RBZ1 RIPARIAN BUFFER - ZONE 1
  - RBZ2 RIPARIAN BUFFER - ZONE 2
  - MITIGABLE IMPACTS ZONE 1
  - MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



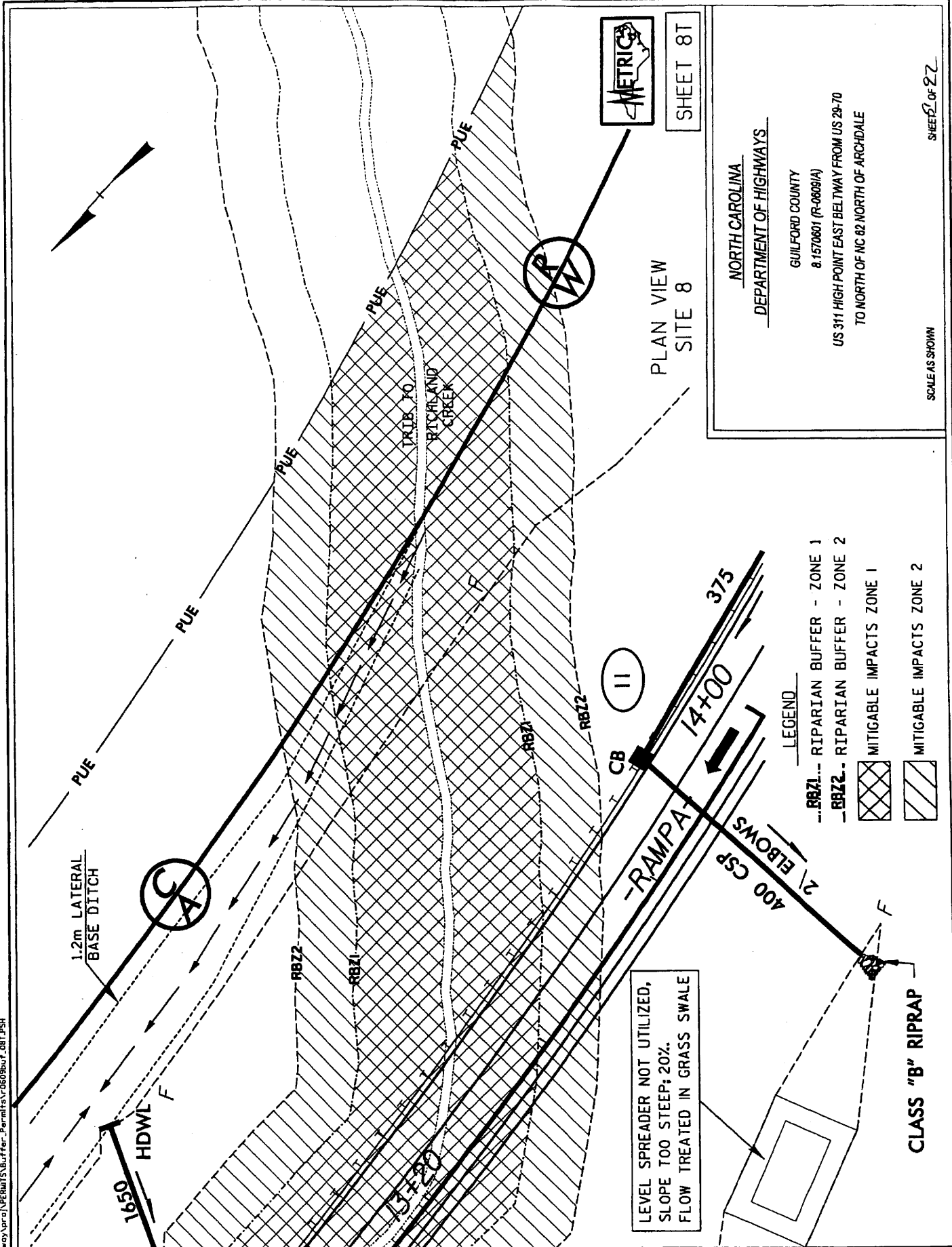
**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 50 OF 92

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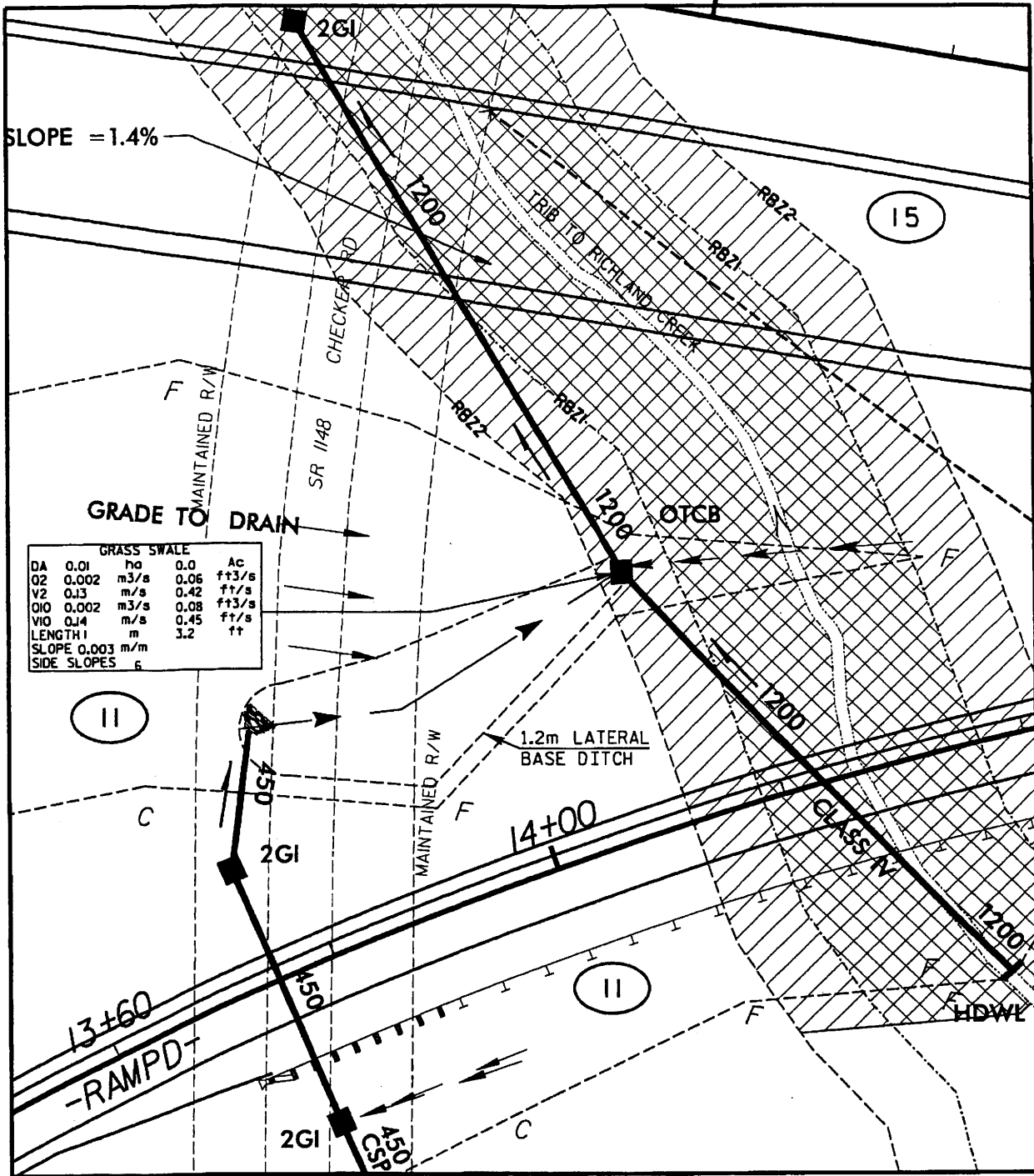


NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

LEGEND  
---RBZ1--- RIPARIAN BUFFER - ZONE 1  
---RBZ2--- RIPARIAN BUFFER - ZONE 2  
[Cross-hatched] MITIGABLE IMPACTS ZONE 1  
[Diagonal hatching] MITIGABLE IMPACTS ZONE 2

SCALE AS SHOWN  
SHEET 8T OF 27

MATCH LINE SHEET 8R



GRASS SWALE		
DA	0.01	ho 0.0
Q2	0.002	m <sup>3</sup> /s 0.06
V2	0.13	m/s 0.42
Q10	0.002	m <sup>3</sup> /s 0.08
V10	0.14	m/s 0.45
LENGTH	1	m 3.2
SLOPE	0.003	m/m
SIDE SLOPES	6	

II

II

SHEET 8U

LEGEND

- RBZ1- RIPARIAN BUFFER - ZONE 1
- RBZ2- RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

PLAN VIEW  
SITE 8



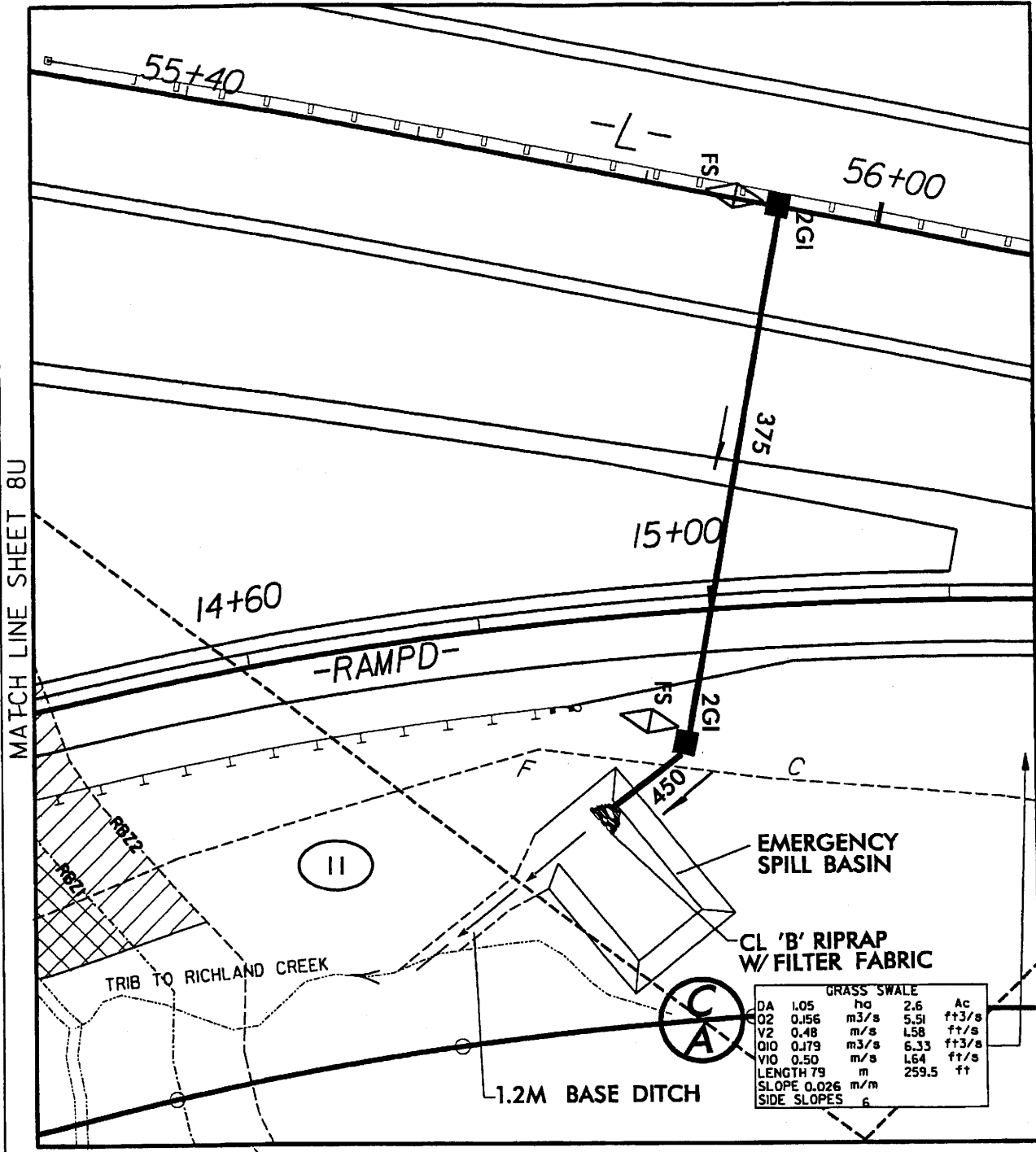
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 8U OF 92

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GRASS SWALE			
DA	1.05	no	2.6
O2	0.56	m3/s	5.51
V2	0.48	m/s	1.58
Q10	0.179	m3/s	6.33
V10	0.50	m/s	1.64
LENGTH	79	m	259.5
SLOPE	0.026	m/m	
SIDE SLOPES			6

MATCH LINE SHEET 8U

SHEET 8V

**LEGEND**

- RBZ1** RIPARIAN BUFFER - ZONE 1
- RBZ2** RIPARIAN BUFFER - ZONE 2
- MITIGABLE IMPACTS ZONE 1
- MITIGABLE IMPACTS ZONE 2

**PLAN VIEW  
SITE 8**



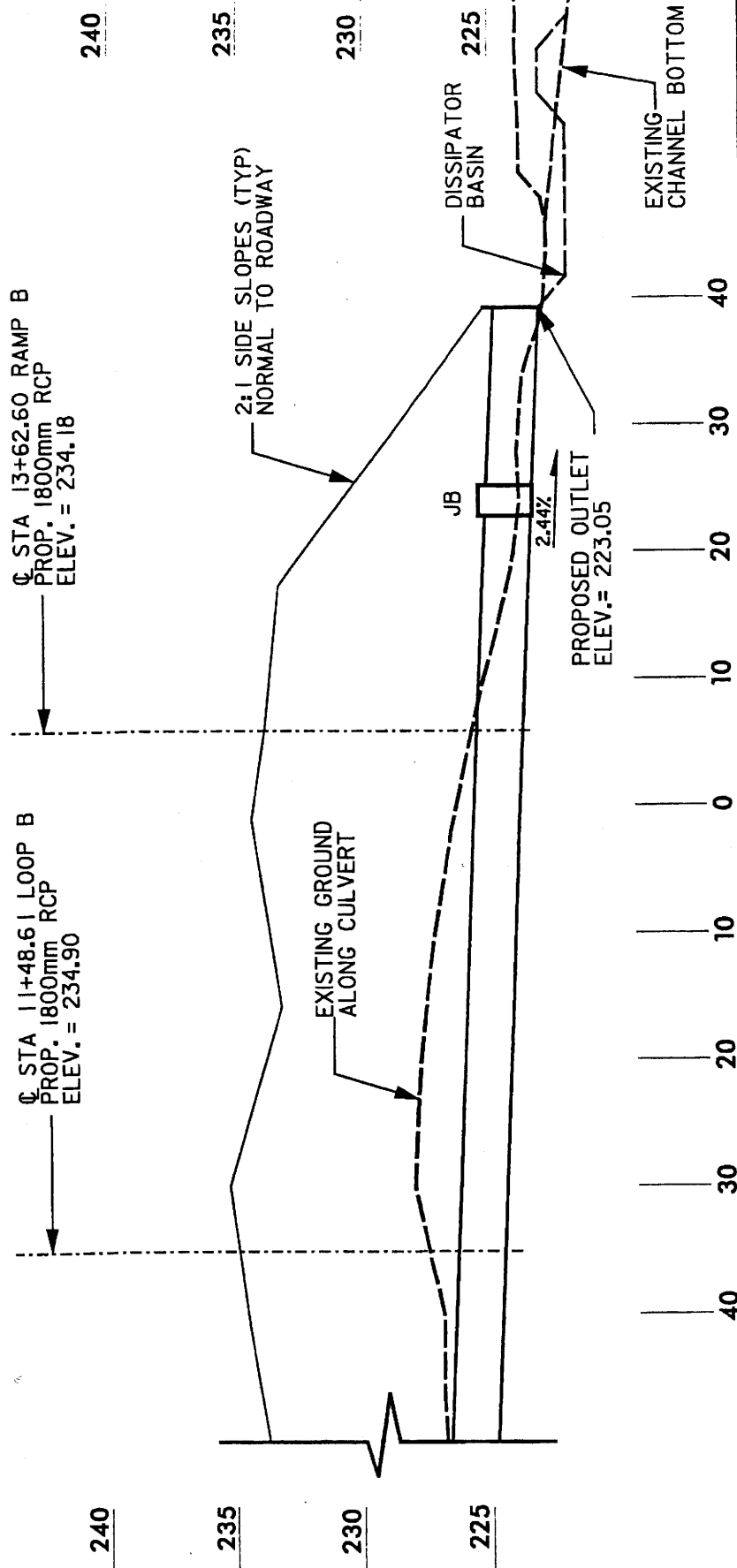
**NORTH CAROLINA  
DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 22 OF 42

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☉ STA 13+62.60 RAMP B  
PROP. 1800mm RCP  
ELEV. = 234.18

☉ STA 11+48.61 LOOP B  
PROP. 1800mm RCP  
ELEV. = 234.90

2:1 SIDE SLOPES (TYP)  
NORMAL TO ROADWAY

EXISTING GROUND  
ALONG CULVERT

JB

DISSIPATOR  
BASIN

2.44%  
PROPOSED OUTLET  
ELEV. = 223.05

EXISTING  
CHANNEL BOTTOM

240

235

230

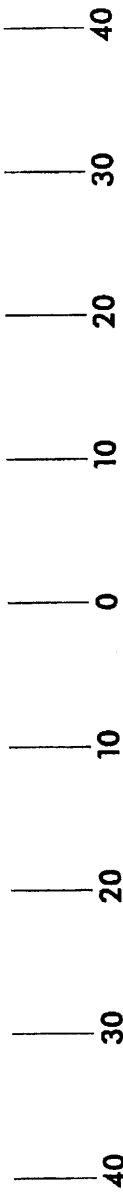
225

240

235

230

225



SCALE:  
1 = 500 HORIZONTAL  
1 = 250 VERTICAL

PROFILE  
PERMIT SITE 8 (8B & 8C)  
1800mm RCP

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

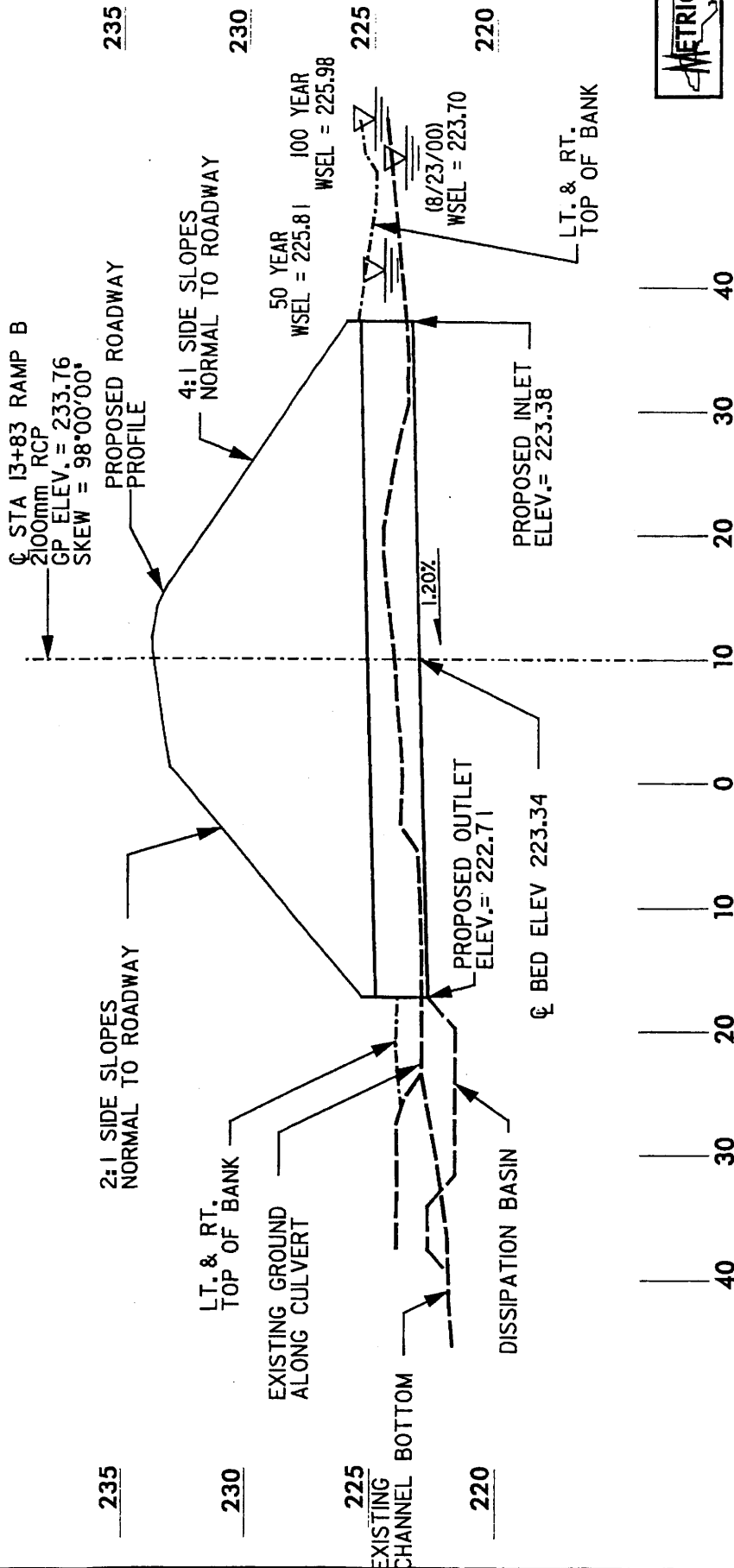
GUILFORD COUNTY  
8.1570801 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 22

12/2005  
4:52:39 PM  
\\dgn\Roadway\proj\PERMITS\Buffer\_Permits\18-6091A\_Drm\_buf\_plp\prj.as.dgn



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 GUILFORD COUNTY  
 8.1570801 (R-0609/A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 5 OF 22

SCALE:  
 1" = 500' HORIZONTAL  
 1" = 250' VERTICAL

PROFILE  
 PERMITE SITE 8 (8B & 8C)  
 2100mm RCP



7/2/2005 3:50:05 PM

N:\gpn\roadway\p01\PERMIT'S Buffer\_Permit\11-6091A.prm.buf\_pip\prop.asdgn

4:1 SIDE SLOPES (SKEWED)  
250  
245  
240  
235  
230  
225

250

245

240

235

230

225

PROPOSED ROADWAY PROFILE

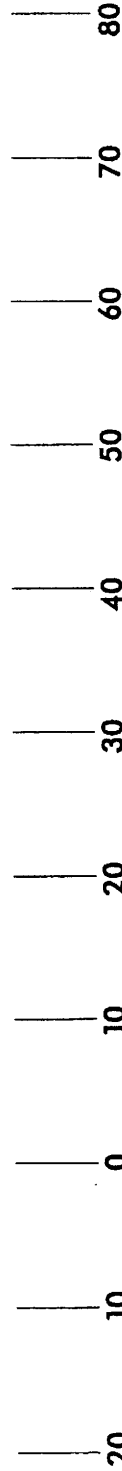
3:1 SIDE SLOPES (SKEWED)

EXISTING GROUND ALONG PIPE

1500 RCP

4.99%

PROPOSED INLET ELEV. = 235.24



SCALE:  
1" = 500' HORIZONTAL  
1" = 250' VERTICAL

PROFILE  
PERMIT SITE 8 (8L)  
1500mm RCP

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 6 OF 92

C STA 13+07.00 RAMP A  
PROP. 1650mm RCP  
ELEV = 246.07

PROPOSED ROADWAY  
PROFILE

4:1 SIDE  
SLOPES  
(SKEWED)

2:1 SIDE  
SLOPES  
(SKEWED)

EXISTING GROUND  
ALONG PIPE

1650 RCP

PROPOSED INLET  
ELEV.= 233.90

1.2m BASE DITCH

PROPOSED OUTLET  
ELEV.= 231.95

245

240

235

230

225

245

240

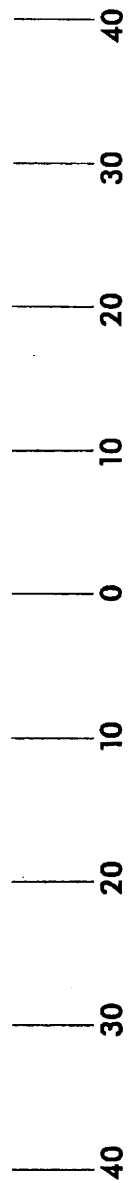
235

230

225

0.604%

2.1%



NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08081A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

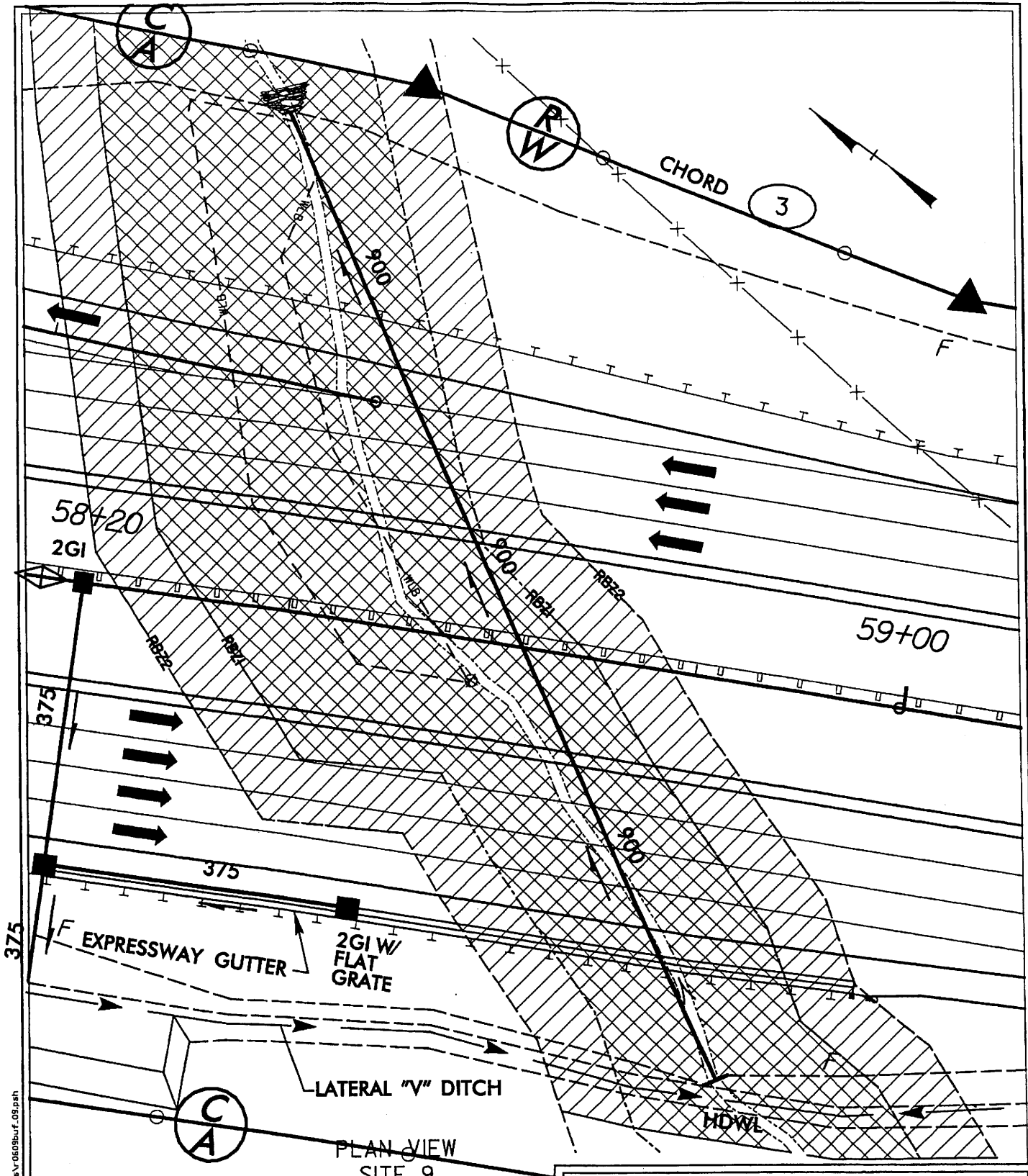
SCALE AS SHOWN

SHEET 5 OF 92





SCALE:  
1" = 500' HORIZONTAL  
1" = 250' VERTICAL

PROFILE  
PERMIT SITE 8 (8S & 8T)  
1650mm RCP



PLAN VIEW  
SITE 9

LEGEND

- RBZ1— RIPARIAN BUFFER - ZONE 1
- RBZ2— RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

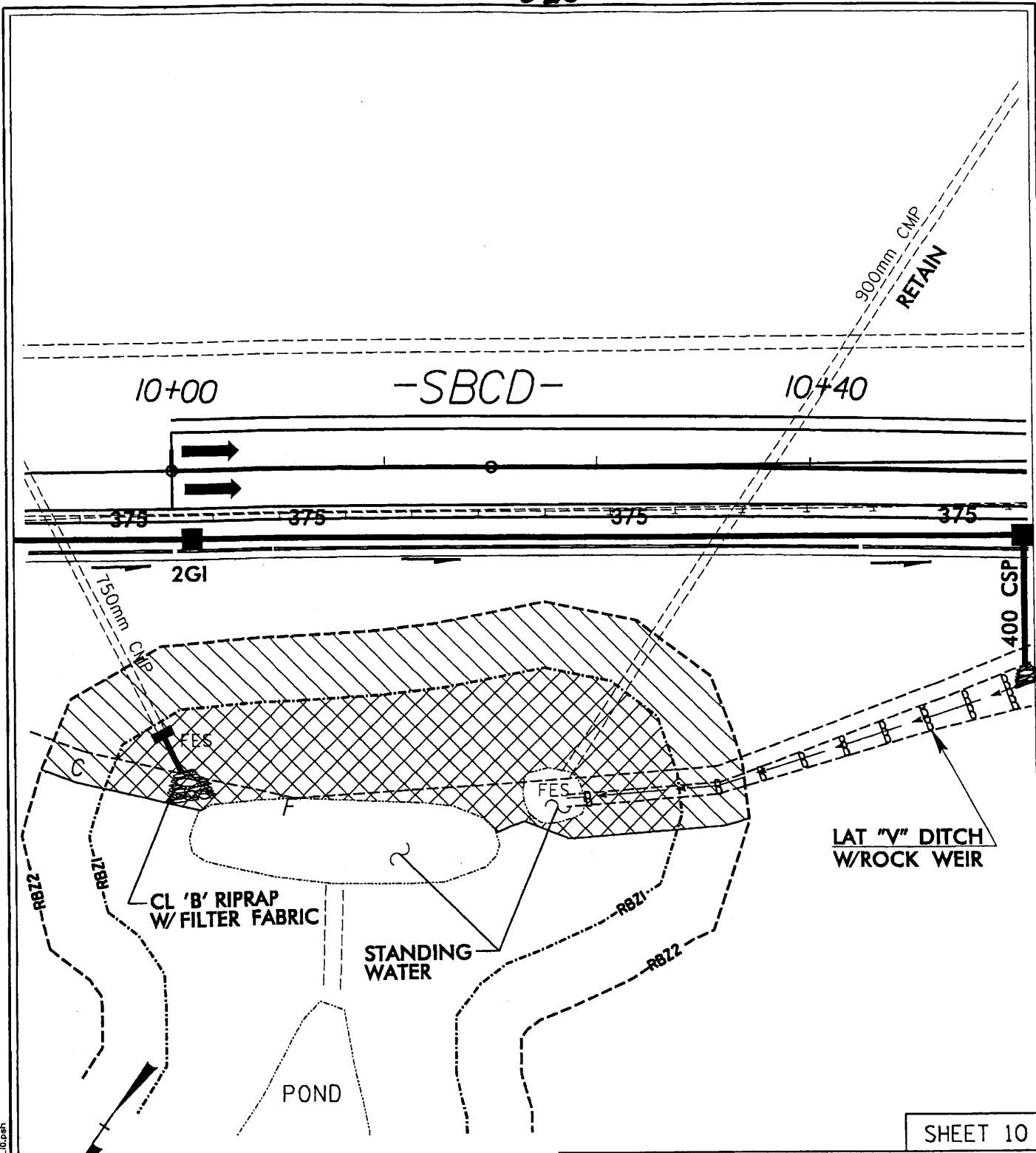


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN



SHEET 58 OF 92



PLAN VIEW SITE 10

SHEET 10

**LEGEND**

- RBZ1--- RIPARIAN BUFFER - ZONE 1
- ...RBZ2... RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

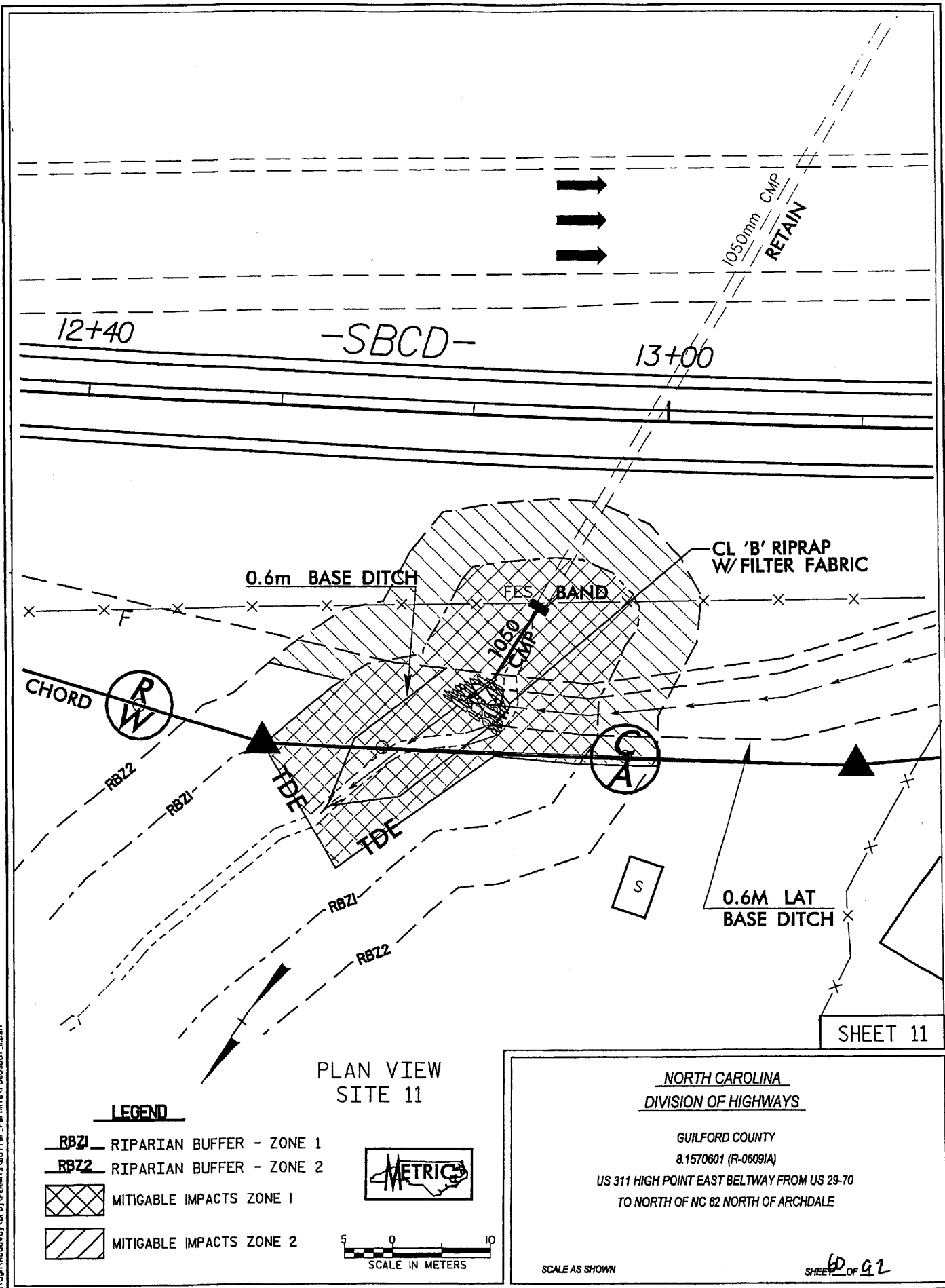


**NORTH CAROLINA  
DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
 B.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN



SHEET 2 OF 92



SHEET 11

PLAN VIEW  
SITE 11

**LEGEND**

- RBZ1** RIPARIAN BUFFER - ZONE 1
- RBZ2** RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

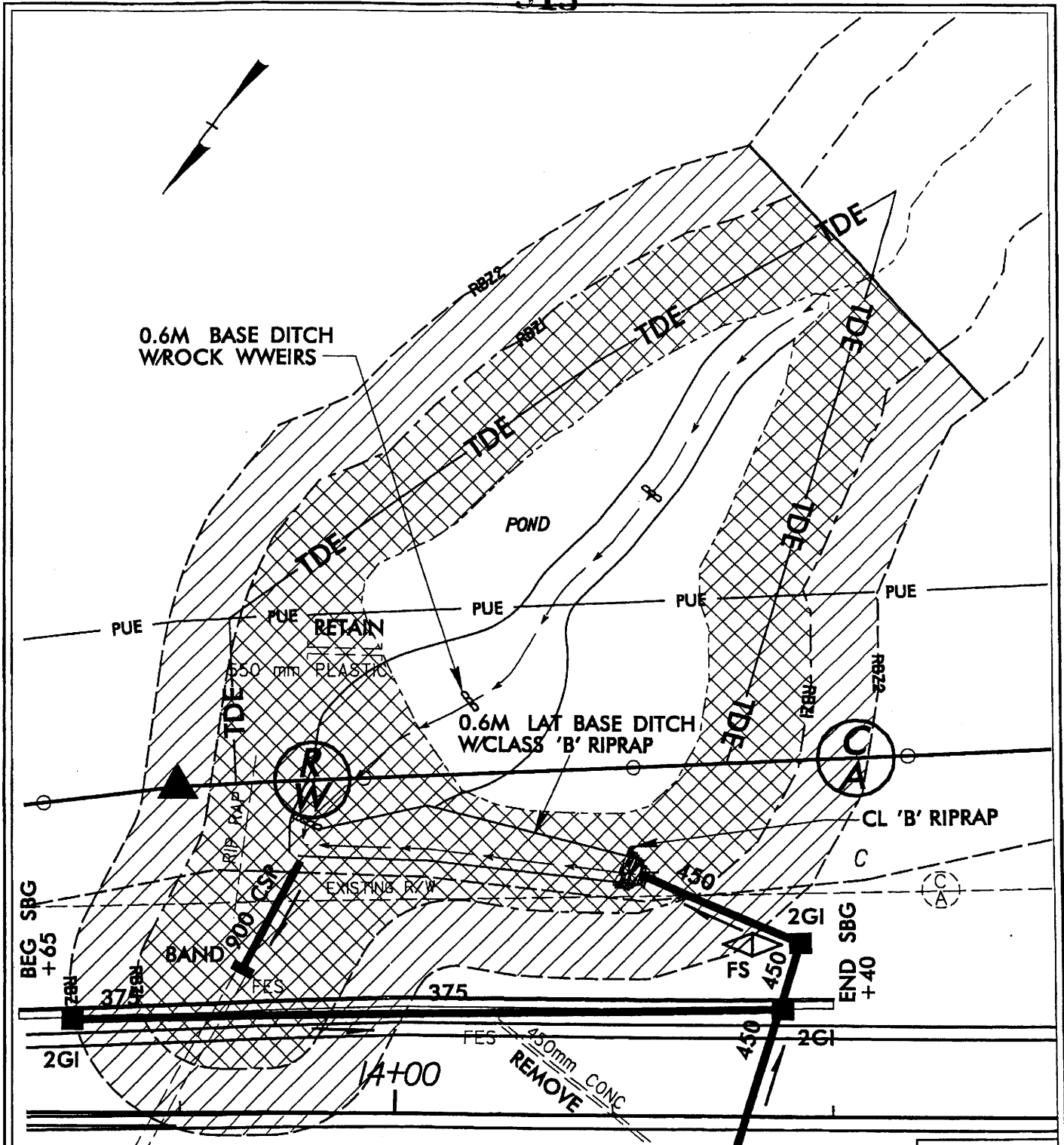


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN





SHEET **60** OF **92**



SHEET 12

PLAN VIEW  
SITE 12

LEGEND

-  RBZ1 RIPARIAN BUFFER - ZONE 1
-  RBZ2 RIPARIAN BUFFER - ZONE 2
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

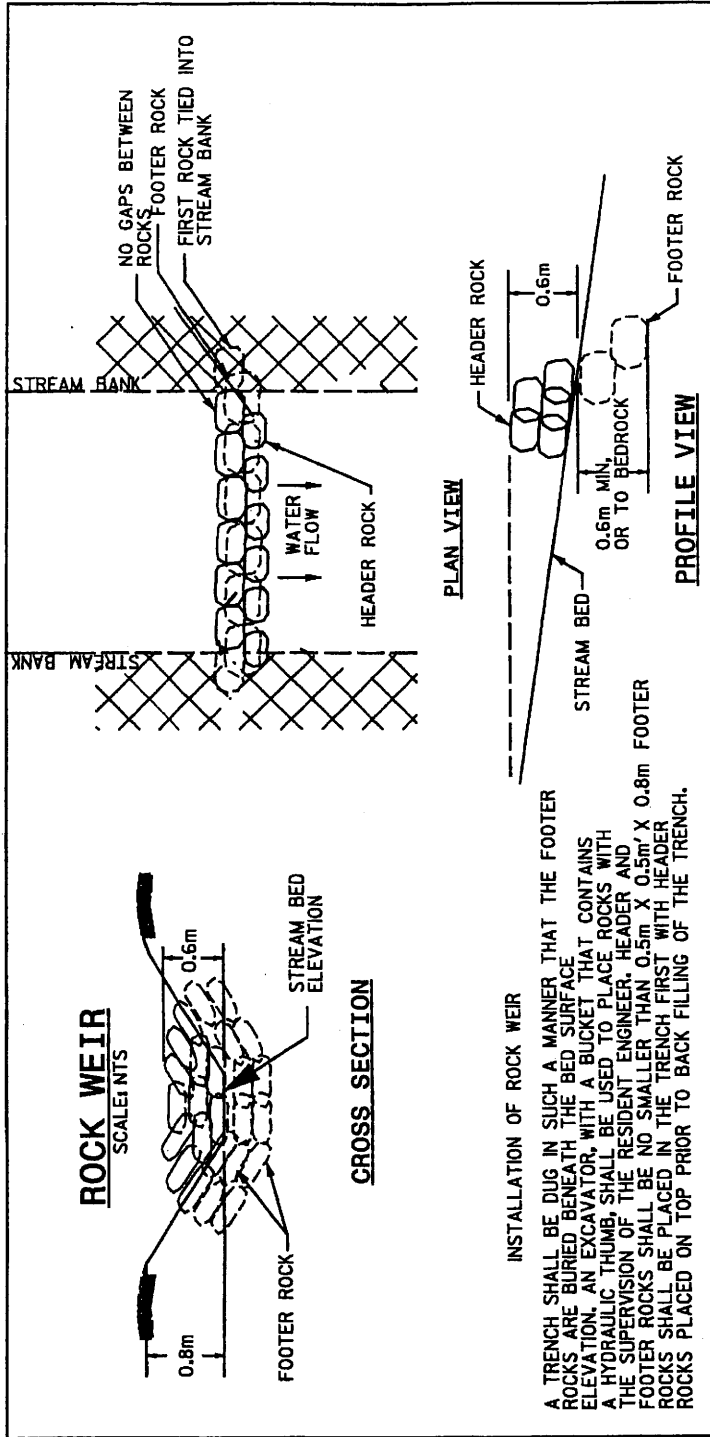


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 B.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

61.92  
SHEET 12 OF 12



**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

62 OF 92  
SHEET OF

R-06091A GUILFORD COUNTY Co. Level Spreaders

Date: 8/11/2005  
 Dsn. By: RKW  
 Check:

PLAN SHT.	Align	Station	Total D.A.		Ex Ground Slope (%)	Rational C	Q10 138 mm/hr	Q10 5.4 in/hr	Ground Cover		Level Spreader Design for	Level Spreader Length Required in meters	REMARKS
			Ha	ac					None - Forested	Thick - Grass			
13	L	40+10R	1.9	4.6	11	0.4	0.284	9.981	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
13	L	40+10L	0.2	0.4	11	0.4	0.023	0.801		X	13 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
13	L	40+15L	0.70	1.73	10	0.4	0.106	3.736		X	13 ft/cfs	Too Steep for Level Spreader	Relocated Channel, No Treatment Required
13	L	40+50L	1.58	3.90	20	0.7	0.420	14.758		X	13 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
15	L	45+20R	6.46	15.96	10	0.28	0.686	24.136	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
15	L	46+50R	3.02	7.46	11	0.45	0.516	18.134	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
16	RpB	14+50R	0.14	0.35	6	0.4	0.021	0.747	X		100 ft/cfs	23	Flow previously treated in grass swale
17	RpA	13+60R	34.56	85.40	7	0.2	2.623	92.230	X		100 ft/cfs	Too Steep for Level Spreader	Relocated Channel, No Treatment Required
17	L	58+70R	1.23	3.04	7	0.5	0.233	8.206	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
17	L	59+10R	0.30	0.74	10	0.6	0.068	2.402	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale

N.C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 PROJECT: 8.1570601 (R-6091A)

8/10/2005  
 SHEET 63 OF 92



R-06091A GUILFORD COUNTY Co. Level Spreaders

Date: 8/11/2005  
 Dsn. By: RKW  
 Check:

PLAN SHT.	Align	Station	Total D.A.		Ex Ground Slope (%)	Rational C	Q10 138 mm/hr	Q10 5.4 in/hr	Ground Cover		Level Spreader Design for	Level Spreader Length Required in meters	REMARKS
			Ha	(ac)					None - Forested	Thick - Grass			
7	L	19+80L	2.7	6.6	14	0.4	0.407	14.304	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
7	L	20+20R	0.4	0.9	19	0.4	0.058	2.028	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
9	L	25+65R	1.58	3.90	10	0.7	0.420	14.758	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
10	L	28+20R	0.46	1.14	15	0.6	0.105	3.683	X		100 ft/cfs	Too Steep for Level Spreader	Discharge point is inside of Zone 1 and previously treated
10	Y2	14+30R	0.29	0.72	12	0.5	0.055	1.935	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
10	L	29+40R	2.32	5.73	15	0.36	0.317	11.144	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale
11	L	33+40L	4.13	10.21	6	0.4	0.627	22.043		X	13 ft/cfs	87	Level Spreader not utilized due to Basin and PSH
11	L	33+40R	2.47	6.10	8	0.4	0.375	13.183		X	13 ft/cfs	52	USE LEVEL SPREADER
12	L	35+40L	2.71	6.70	12.5	0.45	0.463	16.272	X		100 ft/cfs	Too Steep for Level Spreader	Flow previously treated in grass swale

N.C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 PROJECT: 8.1570601 (R-6091A)

8/10/2005  
 SHEET 67 OF 92

Date: 10/11/2003  
 Dsn. By: HAH/SNR  
 Check: RKW

R-609 IA Guilford Co. Affected Buffer Areas Site #1

Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	ac									
5	L		11+80L	GS	0.24	0.6	60.0	95	0.0035	6	YES	1.42	1.63	0.53	GS
5	L	2	12+75L	2GI	0.22	0.5	54.4	70	0.0035	6	YES	1.78	1.47	0.51	GS
5	L	6	13+45L	2GI	0.11	0.3	27.2	8	0.0275	3	YES	0.51	1.03	0.59	GS
5	L	9	13+80L	2GI	0.51	1.3	126.0	194	0.003	6	YES	2.67	3.08	0.60	GS
5	L	9	13+80L	SDG	0.03	0.1	7.4	20	0.0371	6	YES	0.24	1.53	0.28	GS
5	L	8B	15+05M	2GI	0.21	0.5	51.9	69	0.0028	6	YES	1.35	1.55	0.92	GS
5	L	8	13+85ML	2GI	0.24	0.6	59.3	85	0.003	6	YES	1.79	2.06	1.01	GS
5	L	3	12+75ML	2GI	0.13	0.3	32.1	110	0.003	6	YES	0.67	0.77	0.79	GS
5	L		11+85ML	GS	0.09	0.2	22.2	7	0.008	6	YES	0.37	0.42	0.98	GS
5	L		11+80R	GS	0.31	0.8	77.2	145	0.0035	6	YES	2.37	2.72	0.62	GS
5	L		13+70R	SDG	0.09	0.2	22.2	7	0.0271	6	YES	0.32	1.64	1.70	GS
5	L	7	13+70R	2GI	0.40	1.0	98.8	194	0.0035	6	YES	2.33	2.68	0.62	GS
5	L		14+62R	BERM	0.30	0.7	72.9	237	0.07	3	YES	1.03	1.19	1.80	GS
5	YI		11+83L	SDG	0.30	0.7	73.6	103	0.003	3	YES	1.39	1.60	0.60	GS
5	YI	5	13+00L	2GI	0.11	0.3	28.2	9	0.0176	3	YES	0.66	0.93	0.76	GS
5	YI		13+20L	SDG	0.11	0.3	28.2	9	0.0145	6	YES	0.66	1.38	0.76	GS
5	YI		13+41L	GS	0.09	0.2	21.0	40	0.0298	6	YES	0.50	1.68	0.37	GS
5	YI		14+04L	GS	0.02	0.1	5.1	2	0.0115	6	YES	0.12	0.82	0.14	GS
5	YI		11+65R	SDG	0.13	0.3	30.9	86	0.003	3	YES	0.58	0.86	0.67	GS
5	YI	4	13+09R	2GI	0.07	0.2	16.3	5	0.0184	3	YES	0.38	1.53	0.44	GS
5	YI		13+20R	SDG	0.07	0.2	16.3	20	0.0145	6	YES	0.38	1.20	0.44	GS
5	YI		13+41R	GS	0.04	0.1	10.6	3	0.0298	6	YES	0.25	1.41	0.29	GS
5	L	8A	13+85MR	2GI	0.12	0.3	29.7	115	0.004	6	YES	0.49	0.79	0.56	GS
5	L		11+85MR	GS	0.20	0.5	49.4	200	0.005	6	YES	0.82	0.97	0.94	GS
5	L	470	11+18M	2GI	0.13	0.3	32.1	67	0.01	6	YES	0.33	1.13	1.17	GS

BDS = BERM DRAINAGE OUTLET STRUCTURE

OTCB = OPEN THROAT CATCH BASIN

OPEN = OPEN END PIPE

PSH = PRE FORMED SCOUR HOLE

LS = LEVEL SPREADER

PT=PREVIOUSLY TREATED

2GI = 2 GRATED INLET

SBG = SHOULDER BERM GUTTER

CB = CATCH BASIN

DDB = DRY DETENTION BASIN

B = BASIN

GS = GRASS SWALE

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY

8.1570801 (R-0608/A)

US 311 HIGH POINT EAST BEL TWAY FROM US 29-70

TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 92 OF 92

Date: 6/13/02  
 Den. By: HAH  
 Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Areas Site #2  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align.	Structure	Station	Type	Total D.A.		equipped length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharger?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
6	L	10	17+60L	2G	0.45	1.1	111.2	34	187	0.024	6	YES	2.62	1.26	3.02	1.31	GS
6	L		18+00L	GS	0.05	0.1	12.8	4	40	0.024	6	YES	0.30	1.37	0.35	1.42	GS
6	L		18+60L	GS	0.05	0.1	12.8	4	40	0.024	6	YES	0.30	1.37	0.35	1.42	GS
6	L	12	17+60M	2GI	0.44	1.1	108.7	33	187	0.024	6	YES	1.54	1.10	1.77	1.14	GS
6	L	11	17+60R	2GI	0.51	1.3	126.0	38	187	0.024	6	YES	3.86	1.39	4.44	1.44	GS
6	L	13A	19+30R	2GI	0.37	0.9	91.4	28	180	0.024	6	YES	1.29	1.06	1.49	1.09	GS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DBB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE  
 BDOS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 28-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN



Date: 6/13/02  
 Dsn. By: HAH  
 Check: BKW/SNR

Site #3

**R-609 IA Guilford Co. Affected Buffer Areas**

Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	ac										
7	L	19+52L	LAT	2GI	0.86	2.1	212.5	83	0.0444	3	YES	4.01	1.86	4.61	1.94	PT
7	L	20+40L	2GI	2GI	0.16	0.4	39.5	55	0.044	3	YES	0.75	1.23	0.86	1.28	GS
7	L	21+22L	LAT	2GI	0.92	2.3	227.3	48	0.085	3	NO	4.29	2.87	4.93	2.98	PT
7	L	21+70L	2GI	2GI	0.31	0.8	76.6	48	0.08	3	YES	1.45	1.85	1.66	1.93	GS
7	L	19+20M	2GI	2GI	0.45	1.1	111.2	160	0.024	6	YES	1.84	1.15	2.11	1.19	GS
7	L	20+40M	2GI	2GI	0.34	0.8	84.0	120	0.024	6	YES	1.98	1.18	2.28	1.22	GS
7	L	21+80M	2GI	2GI	0.39	1.0	96.4	120	0.024	6	YES	2.27	1.22	2.61	1.26	GS
7	L	13A	19+30R	2GI	0.22	0.5	54.4	180	0.024	6	YES	1.03	1.85	1.18	1.92	GS
7	L		20+35R	LAT	0.37	0.9	91.4	95	0.1233	3	NO	1.72	2.45	1.98	2.53	PT

BDS = BERM DRAINAGE OUTLET STRUCTURE

OTCB = OPEN THROAT CATCH BASIN

OPEN = OPEN END PIPE

PSH = PRE FORMED SCOUR HOLE

LS = LEVEL SPREADER

PT=PREVIOUSLY TREATED

2GI = 2 GRATED INLET

SBG = SHOULDER BERM GUTTER

CB = CATCH BASIN

DDB = DRY DETENTION BASIN

B = BASIN

GS = GRASS SWALE



NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-0609/A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 67 OF 92

Date: 6/13/02  
Dsn. By: HAH  
Check: RKW/SNR

Site #4

R-609 1A Guilford Co. Affected Buffer Areas

Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

SHT	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
8	L	21	23+43L	2GI	0.96	2.4	237.2	72	163	0.024	6	YES	4.48	1.44	5.15	1.49	GS
8	L	26	25+60L	2GI	0.65	1.6	160.6	49	120	0.024	6	YES	3.03	1.31	3.48	1.35	GS
8	L	22	23+51M	2GI	0.48	1.2	118.6	36	171	0.024	6	YES	2.80	1.28	3.22	1.33	GS
8	L	27	25+45M	2GI	0.63	1.6	155.7	47	225	0.024	6	YES	3.67	1.37	4.22	1.42	GS
8	L		25+40R	GS	0.20	0.5	49.4	15	100	0.024	6	YES	1.17	1.03	1.34	1.07	GS

2GI = 2 GRATED INLET  
SBG = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE

BDOS = BERM DRAINAGE OUTLET STRUCTURE  
OTCB = OPEN THROAT CATCH BASIN  
OPEN = OPEN END PIPE  
PSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT=PREVIOUSLY TREATED

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (P-06081A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

61 of 72  
SHEET

R-609 IA Guilford Co. Affected Buffer Areas Site #5  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2, yr. velocity is less than or equal to 2 ft./sec.

Date: 10/17/2003  
 Des. By: HAH/SNR  
 Check: RKW

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (ft.)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)										
9	L		25+25L	TAIL D	0.98	2.4	242.2	45	0.0106	3	NO	5.14	1.30	5.91	1.34	PT
9	L	28	26+20L	2GI	0.77	1.9	190.3	160	0.01	6	YES	4.04	1.01	4.64	1.05	GS
9	L		27+60L	GS	0.20	0.5	49.4	60	0.01	6	YES	1.05	1.34	1.21	1.39	PT
9	L	31	28+00L	2GI	0.30	0.7	74.1	100	0.022	6	YES	1.40	1.04	1.61	1.08	GS
9	L		25+80R	TAIL D	2.26	5.6	558.4	170	0.003	3	NO	10.01	0.95	11.51	0.98	PT
9	L	33	28+10R	2GI	0.49	1.2	121.1	214	0.01	6	YES	3.43	0.97	3.94	1.01	GS
9	L	29	27+20M	2GI	0.44	1.1	108.7	210	0.01	6	YES	2.05	0.85	2.36	0.88	GS
9	L	29	27+20M	2GI	0.05	0.1	12.4	44	0.009	6	YES	0.23	0.89	0.27	0.92	GS
9	L	32A	28+55ML	2GI	0.12	0.3	29.7	91	0.01	6	YES	0.56	1.15	0.64	1.19	GS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE  
 BDOS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT = PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 GUILFORD COUNTY  
 B.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 68 OF 72

Date: 10/1/2003  
 Dsn. By: HAH/SNR  
 Check: RKW

R-609 IA Guilford Co. Affected Buffer Areas Site #6  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
10	L	31	27+98L	SDG	0.15	0.4	38.1	12	100	0.003	6	YES	1.08	0.46	1.24	0.48	GS
10	L	32	28+50L	BASE BERM	3.80	9.4	939.0	286	50	0.016	3	NO	13.29	2.28	15.28	2.37	PT
10	L	33D	29+91L	2GI	0.36	0.9	89.0	27	111	0.01	6	YES	1.89	0.84	2.17	0.87	GS
10	L	34A	31+20L	2GI	0.45	1.1	111.2	34	130	0.01	6	YES	2.36	0.88	2.71	0.92	GS
10	L	33C	32+91LL	2GI	1.48	3.7	365.7	111	140	0.0031	3	YES	7.76	0.90	8.93	0.93	GS
10	L	37	32+00L	SDG	0.32	0.8	79.3	24	80	0.0035	6	YES	1.68	0.55	1.94	0.57	GS
10	L	33E	29+78ML	2GI	0.10	0.2	24.7	8	93	0.01	6	YES	0.47	1.10	0.54	1.14	GS
10	L		30+20M	GS	0.05	0.1	12.4	4	42	0.009	6	YES	0.23	0.89	0.27	0.92	GS
10	L	32	28+14MR	2GI	0.05	0.1	12.4	4	50	0.01	6	YES	0.23	0.92	0.27	0.95	GS
10	L	32B	28+55MR	2GI	0.05	0.1	12.4	4	42	0.01	6	YES	0.23	0.92	0.27	0.95	GS
10	L	33F	29+71MR	2GI	0.09	0.2	22.2	7	86	0.01	6	YES	0.42	1.07	0.48	1.11	GS
10	L		31+20M	GS	0.05	0.1	12.4	4	49	0.01	6	YES	0.23	0.92	0.27	0.95	GS
10	L	34B	31+20M	2GI	0.31	0.8	76.6	23	100	0.019	6	YES	1.45	1.00	1.66	1.03	GS
10	L		28+20R	SDG	0.50	1.2	123.6	38	20	0.074	6	NO	2.91	1.98	3.35	2.05	PT
10	L		28+37R	LAT	12.90	31.9	3187.6	972	17	0.003	3	NO	52.62	1.86	60.51	1.93	PT
10	L		29+53R	LAT	2.32	5.7	573.3	175	20	0.026	3	NO	9.73	2.53	11.19	2.62	PT
10	L	34	31+20R	2GI	0.42	1.0	103.8	32	160	0.01	6	YES	2.69	0.91	3.10	0.95	GS
10	Y2		14+52R	LAT	0.12	0.3	30.1	9	177	0.063	3	YES	0.57	1.44	0.65	1.49	GS
10	Y2		14+00R	LAT	0.33	0.8	81.5	25	52	0.063	3	YES	1.54	1.85	1.77	1.91	GS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE  
 BDO = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT = PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS  
 GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE



SCALE AS SHOWN

Date: 6/13/02  
Dsn. By: HAH  
Check: RKW/SNR

Site #7

**R-609 IA Guilford Co. Affected Buffer Areas**

Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area, AND  
2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated ischarge	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
11	L		33+00L	LAT	3.19	7.9	788.2	240	80	0.0741	3	NO	14.87	4.62	17.10	4.80	PT
11	L		33+20L	LAT	4.13	10.2	1020.5	311	20	0.01	3	NO	11.55	1.76	13.28	1.82	PT
11	L	36	31+84M	2GI	0.51	1.3	126.0	38	231	0.0211	6	YES	2.38	1.17	2.73	1.21	GS
11	L	39	34+15M	2GI	0.43	1.1	106.3	32	155	0.0211	6	YES	2.51	1.19	2.88	1.23	GS
11	L		33+40R	LAT	2.47	6.1	610.3	186	60	0.095	3	NO	11.51	4.64	13.24	4.81	PT
11	L	40	34+15R	2GI	0.55	1.4	135.9	41	120	0.0211	6	YES	3.85	1.32	4.42	1.37	GS

2GI = 2 GRATED INLET  
SBG = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE

BDS = BERM DRAINAGE OUTLET STRUCTURE  
OTCB = OPEN THROAT CATCH BASIN  
OPEN = OPEN END PIPE  
PSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT=PREVIOUSLY TREATED

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8-1570801 (R-0609IA)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN



**R-609 IA Guilford Co. Affected Buffer Areas**  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

Site #8

Date: 6/13/02  
Des. By: HAH  
Check: RKW/SNR

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Chauvel. Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. f/ps	Q10 cfs	Q10 vel. f/ps	Treatment Provided
					ha	(ac)										
12	L	35+23L	LAT	2GI	6.76	16.7	1670.4	15	0.0226	3	NO	18.00	2.99	20.70	3.10	PT
12	L	48	37+50L	2GI	0.45	1.1	111.2	125	0.0211	6	YES	1.57	1.06	1.81	1.10	GS
12	L	42	35+70L	2GI	0.47	1.2	115.6	180	0.0211	6	YES	1.64	1.07	1.88	1.11	GS
12	L	41	35+70M	2GI	0.18	0.4	44.5	65	0.0211	6	YES	1.05	0.96	1.21	0.99	GS
12	L	43	36+35M	2GI	0.28	0.7	69.2	105	0.0211	6	YES	1.63	1.07	1.88	1.11	GS
12	L	46	37+40M	2GI	0.35	0.9	86.5	130	0.0211	6	YES	3.06	1.25	3.52	1.29	GS
12	L	44	36+35R	2GI	0.47	1.2	116.1	235	0.0211	6	YES	4.11	1.34	4.72	1.39	GS

2GI = 2 GRATED INLET  
SBG = SHOULDER BERM CUTTER  
CB = CATCH BASIN  
DOB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE  
BIDOS = BERM DRAINAGE OUTLET STRUCTURE  
OTCB = OPEN THROAT CATCH BASIN  
OPEN = OPEN END PIPE  
PSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT=PREVIOUSLY TREATED

**NORTH CAROLINA**  
**DEPARTMENT OF HIGHWAYS**  
GUILFORD COUNTY  
81570601 (R-06081A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE



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Date: 10/1/2003  
Dan. By: HAH/SNR  
Check: RKW

Site #9

R-609 IA Guilford Co. Affected Buffer Areas  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					in	ac	(ft.)	(m.)									
13	L	49	38+75L	2GI	0.15	0.4	37.8	12	85	0.0211	6	YES	0.71	1.61	0.82	1.67	GS
13	L	49	38+75L	SDG	0.02	0.0	4.9	2	22	0.0368	6	YES	0.09	1.20	0.11	1.24	GS
13	L		40+10L	LAT	0.04	0.1	8.6	3	20	0.14	3	NO	0.20	2.80	0.23	2.90	PT
13	L		40+30L	LAT	0.04	0.1	8.6	3	20	0.07	3	NO	0.20	2.16	0.23	2.23	PT
13	L		40+30L	LAT	0.18	0.4	44.5	14	20	0.14	3	NO	1.26	2.37	1.45	2.46	PT
13	L		40+50L	LAT	0.18	0.4	44.5	14	20	0.09	3	YES	0.84	1.82	0.96	1.88	GS
13	L	49A	38+75ML	2GI	0.26	0.6	64.2	20	80	0.0029	6	YES	1.97	0.53	2.26	0.55	GS
13	L	51	38+75MR	2GI	0.13	0.3	32.1	10	80	0.003	6	YES	0.61	0.75	0.70	0.77	GS
13	L	51B	40+70M	2GI	0.44	1.1	108.7	33	80	0.0075	6	YES	2.05	0.77	2.36	0.79	GS
13	L	50	38+70R	2GI	0.25	0.6	62.3	19	90	0.0211	6	YES	1.17	0.98	1.35	1.02	GS
13	L	50	38+70R	SDG	0.03	0.1	7.4	2	20	0.0135	6	YES	0.17	0.96	0.20	0.99	GS
13	L		39+00R	LAT	1.12	2.8	276.8	84	40	0.0975	3	NO	7.83	3.55	9.01	3.70	PT
13	L		39+45R	LAT	1.12	2.8	276.8	84	45	0.077	3	NO	5.22	2.64	6.00	2.76	PT
13	L		40+25R	LAT	1.87	4.6	462.1	141	80	0.0562	3	NO	8.72	3.01	10.02	3.13	PT
13	L		39+25R	LAT	1.87	4.6	462.1	141	86	0.04	3	NO	8.72	2.62	10.02	2.73	PT
13	L		40+25R	LAT	1.87	4.6	462.1	141	66	0.0405	3	NO	8.72	2.64	10.02	2.75	PT
13	Y-3		11+75L	SDG	0.08	0.2	19.8	6	25	0.0512	6	YES	0.33	1.85	0.38	1.92	GS
13	Y-3		13+15L	SDG	0.03	0.1	7.4	2	20	0.0435	6	YES	0.10	1.31	0.12	1.36	GS
13	Y-3		13+15L	SDG	0.40	1.0	98.8	30	125	0.0385	3	YES	2.33	1.71	2.68	1.77	GS
13	Y-3		13+46L	GS	0.35	0.9	86.5	26	94	0.0145	6	YES	1.22	0.86	1.41	0.89	GS
13	Y-3		13+15R	SDG	0.02	0.0	4.9	2	22	0.0468	6	YES	0.07	1.22	0.08	1.26	GS
13	Y-3		13+15R	SDG	0.31	0.8	76.6	23	25	0.0404	3	YES	1.45	1.54	1.66	1.60	GS
13	Y-3		13+46R	GS	0.28	0.7	69.2	21	94	0.0042	6	YES	1.63	0.58	1.88	0.60	GS
13	Y-4		14+72L	LAT	0.85	2.1	210.0	64	30	0.0462	3	NO	3.96	2.13	4.56	2.22	PT
13	Y-4	53	13+73L	SDG	0.17	0.4	42.0	13	15	0.072	6	YES	0.99	1.49	1.14	1.55	GS
13	Y-4	52	13+25R	2GI	0.18	0.4	44.5	14	115	0.0077	6	YES	1.05	0.65	1.21	0.68	GS

2GI = 2 GRATED INLET

SBG = SHOULDER BERM GUTTER

CB = CATCH BASIN

DDB = DRY DETENTION BASIN

B = BASIN

GS = GRASS SWALE

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OTCB = OPEN THROAT CATCH BASIN

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PSH = PRE FORMED SCOUR HOLE

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NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN



**R-609 1A Guilford Co. Affected Buffer Areas**

Date: 6/13/02  
Dsn. By: HAH  
Check: RKW/SNR

Site #10  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)										
14	L	302	42+00M	ZGI	0.55	1.4	135.9	41	0.00405	6	YES	3.85	0.71	4.42	0.74	GS
14	L	301	42+00L	ZGI	0.20	0.5	49.4	15	0.00405	6	YES	0.82	0.90	0.94	0.93	GS
14	L	303	42+00R	ZGI	0.64	1.6	158.1	48	0.00405	6	YES	2.98	0.67	3.43	0.69	GS
14	L	308	43+65M	ZGI	0.51	1.3	126.4	39	0.00405	6	YES	3.28	0.68	3.77	0.71	GS
14	L	309	43+65L	ZGI	0.49	1.2	121.1	37	0.00405	6	YES	2.00	0.60	2.30	0.63	GS
14	L	307	43+65R	ZGI	0.83	2.0	203.9	62	0.00405	6	YES	5.29	0.77	6.08	0.80	GS
14	Y-4		13+40L	GS	0.10	0.2	23.5	7	0.0388	6	YES	0.33	1.67	0.38	1.73	GS
14	Y-4	53	13+73L	SDG	0.10	0.2	23.5	7	0.0341	6	YES	0.33	1.60	0.38	1.65	GS
14	Y-4	313	13+80R	ZGI	0.10	0.2	24.7	8	0.0341	6	YES	0.52	1.79	0.60	1.85	GS
14	Y-4	52	14+00R	ZGI	0.21	0.5	51.9	16	0.0388	6	YES	0.73	1.10	0.84	1.14	GS
14	Y-5	305	12+05L	ZGI	0.22	0.6	55.1	17	0.0697	6	YES	0.78	1.39	0.90	1.44	GS
14	Y-5	304	12+00R	ZGI	0.64	1.6	158.6	48	0.0697	6	YES	2.62	1.88	3.01	1.95	GS
14	Y-5		13+80R	GS	0.67	1.7	166.5	51	0.0481	6	YES	3.14	1.71	3.61	1.77	GS

ZGI = Z GRATED INLET  
SBG = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE

BDOS = BERM DRAINAGE OUTLET STRUCTURE  
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NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN



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**R-609 1A Guilford Co. Affected Buffer Areas Site #11**  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

Date: 6/13/02  
Des. By: HAH  
Check: RKW/SNR

SHT.	Align	Structure	Station	Type	Ina	Total D.A.	Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/n)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
15	L	310	45+20L	ZGI	0.31	0.8	76.6	23	0.00405	6	YES	1.26	1.00	1.45	1.04	GS
15	L	311	48+40L	GS	0.60	1.5	148.3	45	0.0168	6	YES	2.80	1.12	3.22	1.16	GS
15	L	312	45+20M	ZGI	0.49	1.2	121.1	37	0.00405	6	YES	2.28	0.63	2.63	0.65	GS
15	L	314	46+60M	ZGI	0.46	1.1	113.7	35	0.00405	6	YES	2.14	0.62	2.47	0.64	GS
15	L	315	48+40M	GS	0.63	1.6	155.7	47	0.0168	6	YES	4.41	1.26	5.07	1.30	GS
15	L	315	46+60R	SDG	0.44	1.1	108.7	33	0.054	6	YES	2.05	1.61	2.36	1.66	GS
15	L	315	46+60R	ZGI	0.40	1.0	98.8	30	0.00405	6	YES	2.33	0.63	2.68	0.65	GS
15	L	317	48+40R	GS	0.77	1.9	190.3	58	0.0169	6	YES	4.49	1.26	5.16	1.31	GS
15	Y5		15+30L	GS	0.54	1.3	133.4	41	0.0341	6	YES	3.15	1.51	3.62	1.56	GS
15	Y5		14+14R	GS	0.03	0.1	6.2	2	0.0481	6	YES	0.15	1.48	0.17	1.53	GS
15	Y5		14+30R	LAT	6.46	16.0	1596.3	487	0.003	3	NO	33.12	1.57	38.09	1.63	PT
15	Y5		14+90R	LAT	3.02	7.5	746.2	227	0.003	3	NO	15.84	1.18	18.21	1.22	PT
15	Y5		15+11R	GS	0.01	0.0	3.2	1	0.0568	6	YES	0.08	1.34	0.09	1.38	GS
15	Y5		15+30R	ZGI	0.12	0.3	29.7	9	0.0568	6	NO	0.70	2.33	0.80	2.41	PT
15	FLY		13+93L	GS	0.40	1.0	98.8	30	0.0341	6	YES	1.86	1.32	2.14	1.37	GS
15	FLY		13+74R	GS	0.22	0.5	54.4	17	0.0568	6	YES	1.03	1.38	1.18	1.43	GS
15	FLY		12+17R	SDG	0.25	0.6	61.8	19	0.00316	6	YES	1.17	0.94	1.34	0.97	GS
15	FLY		13+54R	SDG	0.18	0.4	44.5	14	0.0091	6	YES	1.05	1.30	1.21	1.34	GS
15	FLY		13+54R	SDG	0.24	0.6	59.3	18	0.076	6	YES	1.12	1.57	1.29	1.63	GS
15	FLY		13+54R	SDG	0.60	1.5	148.3	45	0.094	6	NO	3.50	2.26	4.02	2.34	PT

ZGI = 2 GRATED INLET  
SBG = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE  
BDOS = BERM DRAINAGE OUTLET STRUCTURE  
OTCB = OPEN THROAT CATCH BASIN  
OPEN = OPEN END PIPE  
PSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT=PREVIOUSLY TREATED

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 15 OF 17

Date: 6/13/02  
 Dsn. By: HAH  
 Check: RKW/SNR

R-609 1A Guilford Co. Affected Buffer Area Site #12  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
16	L	60	48+40L	ZGI	0.60	1.5	148.3	45.	180	0.0168	6	YES	3.50	1.19	4.81	1.28	GS
16	L	71	50+40L	ZGI	0.27	0.7	66.7	20	120	0.0168	6	YES	1.57	0.97	2.16	1.05	GS
16	L	61	48+40M	ZGI	0.63	1.6	155.7	47	180	0.0168	6	YES	2.94	1.14	4.04	1.23	GS
16	L	65	49+40M	ZGI	0.28	0.7	69.2	21	100	0.0168	6	YES	1.63	0.98	2.24	1.06	GS
16	L	70	50+20M	GS	0.22	0.5	54.4	17	80	0.0168	6	YES	1.28	0.92	1.76	1.00	GS
16	L	72	50+40M	SDG	0.27	0.7	66.7	20	20	0.0194	6	YES	1.57	1.02	2.16	1.11	GS
16	L	72	50+40M	SDG	0.21	0.5	51.9	16	55	0.0303	6	YES	1.22	1.14	1.68	1.23	GS
16	L	72	50+40M	SDG	0.29	0.7	71.7	22	30	0.003	6	YES	1.69	0.52	2.32	0.56	GS
16	L	82	51+15M	ZGI	0.53	1.3	131.0	40	220	0.0276	6	YES	3.09	1.38	4.25	1.50	GS
16	L	98	53+55M	ZGI	0.38	0.9	93.9	29	135	0.0276	6	YES	2.21	1.27	3.04	1.38	GS
16	L	109	54+70M	ZGI	0.42	1.0	103.8	32	150	0.0276	6	YES	2.45	1.31	3.37	1.41	GS
16	L	62	48+40R	ZGI	0.77	1.9	190.3	58	180	0.0169	6	YES	3.59	1.20	4.94	1.30	GS
16	L	66	49+40R	ZGI	0.35	0.9	86.5	26	100	0.0168	6	YES	1.63	0.98	2.24	1.06	GS
16	L	70	50+20R	GS	0.32	0.8	79.1	24	80	0.0168	6	YES	1.49	0.96	2.05	1.04	GS
16	L	73	50+40R	SDG	0.31	0.8	76.6	23	30	0.003	6	YES	1.45	0.93	1.99	1.00	GS
16	L	73	50+40R	SDG	0.43	1.1	106.3	32	100	0.0443	6	YES	2.00	1.48	2.76	1.61	GS
16	L	99	53+70R	GS	0.21	0.5	51.9	16	30	0.0275	6	YES	0.98	1.04	1.35	1.12	GS
16	L	99	53+33R	SDG	0.11	0.3	27.2	8	30	0.003	6	YES	0.51	0.71	0.71	0.77	GS
16	L	101	53+72R	ZGI	0.16	0.4	39.5	12	47	0.0276	6	YES	0.75	0.97	1.03	1.05	GS
16	L	99	53+33R	SDG	0.22	0.5	54.4	17	35	0.034	6	YES	1.03	1.14	1.41	1.23	GS
16	L	110	54+95R	ZGI	0.30	0.7	74.1	23	205	0.0276	6	YES	1.40	1.14	1.92	1.23	GS
16	L	54+60R	SDG	0.12	0.3	29.7	9	30	0.0033	6	YES	0.56	0.76	0.77	0.82	GS	
16	L	110	54+95R	SDG	0.32	0.8	79.1	24	35	0.0057	6	YES	1.49	0.64	2.05	0.69	GS

ZGI = Z GRATED INLET

SBG = SHOULDER BERM GUTTER

CB = CATCH BASIN

DDB = DRY DETENTION BASIN

B = BASIN

GS = GRASS SWALE

BDOS = BERM DRAINAGE OUTLET STRUCTURE

OTCB = OPEN THROAT CATCH BASIN

OPEN = OPEN END PIPE

PSH = PRE FORMED SCOUR HOLE

LS = LEVEL SPREADER

NOTE 1: Actual Length includes distance of entire swale from the structure located upstream.

PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8-1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 16 OF 92

R-609 JA, Guilford Co., Affected Buffer Areas Site #12  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

Date: 6/14/2002  
Dsn. By: HAH  
Check: RKW/SNR

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	ac	(ft.)	(m.)									
16	Ramp B	75	12+70L	SDG	0.18	0.4	44.5	14	61	0.003	6	YES	0.84	0.81	1.15	0.88	GS
16	Ramp B	64	15+06L	ZGI	0.10	0.2	24.7	8	81	0.016	6	YES	0.47	1.31	0.64	1.42	GS
16	Ramp B	64	15+06L	ZGI	0.03	0.1	7.4	2	81	0.021	6	YES	0.14	1.07	0.19	1.16	GS
16	Ramp B	74	12+70R	ZGI	0.29	0.7	71.7	22	130	0.0217	6	YES	1.35	1.03	1.86	1.11	GS
16	Ramp B	63	13+73R	LAT	3.09	7.6	763.5	233	30	0.0567	3	NO	14.40	4.16	19.81	4.51	PT
16	Ramp B	63	15+06R	ZGI	0.40	1.0	98.8	30	101	0.0096	6	YES	1.86	0.82	2.56	0.89	GS
16	Ramp B	63	15+06R	ZGI	0.18	0.4	44.5	14	59	0.0217	6	YES	0.84	1.70	1.15	1.84	GS
16	Ramp D																
16	Ramp D		13+67L	ZGI	0.44	1.1	108.7	33	220	0.0256	6	YES	2.05	1.22	2.82	1.32	GS
16	Ramp D	105	13+75L	SDG	0.01	0.0	3.2	1	8	0.003	6	YES	0.06	0.42	0.08	0.45	GS
16	Ramp D	110	14+10L	LAT	1.15	2.8	284.2	87	33	0.403	3	NO	5.36	6.72	7.37	7.28	PT
16	Ramp D																
16	Ramp D		13+67R	ZGI	0.44	1.1	108.7	33	220	0.0256	6	YES	2.05	1.22	2.82	1.32	GS
16	Ramp D	106	13+75R	SDG	0.01	0.0	2.5	1	8	0.003	6	YES	0.05	0.39	0.06	0.43	GS
16	Ramp D	106	13+75R	SDG	0.03	0.1	7.4	2	17	0.0048	3	YES	0.14	0.72	0.19	0.78	GS
16	Loop A		11+35L	LAT	0.54	1.3	133.4	41	42	0.003	3	YES	2.52	0.67	3.46	0.72	GS
16	Loop A		11+07L	LAT	0.13	0.3	32.1	10	28	0.1133	3	YES	0.61	1.83	0.83	1.98	GS
16	Loop A		11+07L	LAT	0.64	1.6	158.1	48	15	0.074	3	NO	2.98	2.46	4.10	2.66	PT
16	Loop B		12+15L	LAT	0.34	0.8	84.0	26	50	0.01	3	YES	1.58	0.93	2.18	1.01	GS
16	Loop C	85	11+35L	ZGI	0.18	0.4	44.5	14	55	0.1	4	YES	0.84	1.78	1.15	1.93	GS
16	Loop C		50+90R	GS	0.10	0.2	24.7	8	80	0.066	4	YES	0.47	1.31	0.64	1.42	GS
16	Ramp C	68	11+33L	ZGI	0.06	0.1	14.3	4	26	0.0341	6	YES	0.27	1.52	0.37	1.64	GS
16	Ramp C		12+45L	SDG	0.16	0.4	39.5	12	40	0.0325	6	YES	0.75	1.03	1.03	1.12	GS
16	Ramp C	68	11+33L	ZGI	0.10	0.2	24.7	8	57	0.0164	6	YES	0.47	1.32	0.64	1.43	GS
16	NBCD		19+98L	LAT	0.55	1.4	135.7	41	58	0.13	3	NO	3.20	3.27	4.40	3.54	PT
16	NBCD	92	22+20L	ZGI	0.11	0.3	27.2	8	40	0.008	6	YES	0.64	1.09	0.88	1.18	GS
16	NBCD	94	23+30L	SDG	0.07	0.2	17.3	5	35	0.003	6	YES	0.41	0.68	0.56	0.73	GS

ZGI = 2 GRATED INLET  
SDG = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE  
\* NOTE 1: Actual Length includes distance of entire swale from the structure located upstream.

BDS = BERM DRAINAGE OUTLET STRUCTURE  
OTCS = OPEN THROAT CATCH BASIN  
OPEN = OPEN END PIPE  
FSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT=PREVIOUSLY TREATED

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
GUILFORD COUNTY  
8 1570801 (R-0609/A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET OF  
7792

Date: 6/13/02  
Dsn. By: HAH  
Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Areas Site #12  
Discharge is considered to be treated if it meets the following criteria:  
100 ft. of grass swale for every 1 acre of drainage area. AND  
2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)										
16	Y6	162	25+20L	ZGI	0.63	1.6	155.7	47	0.0107	6	YES	3.67	1.01	5.05	1.10	GS
16	Y6	91	28+07L	ZGI	0.30	0.7	74.1	23	0.009	6	YES	1.75	0.79	2.40	0.85	GS
16	Y6	91	28+07L	SDG	0.14	0.3	34.6	11	0.0019	6	YES	0.82	0.68	1.12	0.73	GS
16	Y6	77	25+70R	ZGI	0.28	0.7	69.2	21	0.0095	6	YES	1.63	0.79	2.24	0.86	GS
16	Y6	89	27+60R	ZGI	0.48	1.2	118.6	36	0.0095	6	YES	2.80	0.91	3.85	0.98	GS
16	Y6	90	27+90M	SGD	0.24	0.6	59.3	18	0.003	6	YES	1.40	0.49	1.92	0.54	GS

ZGI = 2 GRATED INLET  
SBC = SHOULDER BERM GUTTER  
CB = CATCH BASIN  
DDB = DRY DETENTION BASIN  
B = BASIN  
GS = GRASS SWALE  
BDOS = BERM DRAINAGE OUTLET STRUCTURE  
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OPEN = OPEN END PIPE  
PSH = PRE FORMED SCOUR HOLE  
LS = LEVEL SPREADER  
PT = PREVIOUSLY TREATED

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
GUILFORD COUNTY  
8.1570801 (R-06081A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 18 OF 92

Date: 6/13/02  
 Dan. By: HAH  
 Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Areas Site #13  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)										
17	L		56+40L	RDWY	0.30	0.7	74.1	80	0.0275	6	YES	1.75	1.20	2.01	1.24	GS
17	L	112	55+90M	ZGI	0.79	1.9	194.7	250	0.0275	6	YES	5.51	1.60	6.34	1.65	GS
17	L	113	55+90R	SDG	1.05	2.6	259.5	110	0.0268	6	YES	5.51	1.58	6.33	1.64	GS
17	L		57+00R	SDG	0.84	2.1	207.6	40	0.003	4	NO	3.92	0.70	4.50	0.73	PT
17	L		57+40R	SDG	0.42	1.0	103.8	20	0.045	5	NO	1.96	1.55	2.25	1.60	PT
17	L		57+60R	SDG	0.16	0.4	39.5	40	0.0914	6	YES	0.84	1.57	0.96	1.62	GS
17	L		57+80R	GS	0.05	0.1	12.8	20	0.0275	6	YES	0.39	1.54	0.45	1.59	GS
17	L		58+40R	LAT	0.12	0.3	29.7	40	0.08	3	YES	0.84	1.74	0.96	1.80	GS
17	L		58+72R	LAT	1.23	3.0	303.9	32	0.031	3	NO	7.17	2.42	8.24	2.50	PT
17	A		12+80L	LAT	0.46	1.1	113.7	70	0.06	3	YES	2.14	1.88	2.47	1.95	GS
17	A		13+25L	LAT	0.70	1.7	173.0	45	0.0466	3	NO	3.26	1.95	3.75	2.03	PT
17	A		13+25L	LAT	34.56	85.4	8539.8	75	0.006	3	NO	120.83	3.35	138.95	3.47	PT
17	D		14+70R	LAT	1.90	4.7	469.5	20	0.0511	3	NO	11.07	3.23	12.73	3.37	PT

ZGI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE

BDS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8 1570601 (R-0609IA)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 29 OF 92





Date: 6/13/02  
 Dsn. By: HAH  
 Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Areas Site #14  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment (ft.)	Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)										
18	L	60+60L	LAT		2.16	5.3	533.7	163	0.05	3	NO	8.81	3.15	10.13	3.27	PT
18	L	61+00L	LAT		2.11	5.2	521.4	159	0.0333	3	NO	8.61	2.82	9.90	2.72	PT
18	L	58+40M	2GI		0.58	1.4	142.1	43	0.0275	6	YES	3.02	1.37	3.47	1.42	GS
18	L	61+00M	GS		0.17	0.4	42.0	13	0.0193	6	YES	0.65	1.53	0.75	1.58	GS
18	L	59+13R	LAT		0.18	0.4	44.5	14	0.066	3	YES	1.26	1.79	1.45	1.85	GS
18	L	59+40R	GS		0.30	0.7	74.1	23	0.0275	6	YES	2.10	1.26	2.41	1.30	GS
18	L	61+00R	GS		0.55	1.4	135.9	41	0.0193	6	YES	2.88	1.19	3.32	1.23	GS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE  
 BDOS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8-1570601 (R-0609/A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 22 OF 92



Date: 6/13/02  
 Dsn. By: HAH  
 Check: RKW/SNR

**R-609 JA Guilford Co. Affected Buffer Areas Site #15**  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
20	Y1		10+40L	GS	0.20	0.5	49.4	15	20	0.0298	6	YES	0.93	1.96	1.07	2.03	GS
20	Y1		10+80L	SDG	0.25	0.6	61.3	19	40	0.0656	3	YES	1.30	1.80	1.50	1.86	GS
20	Y1		10+97L	SDG	0.26	0.6	64.2	20	57	0.003	3	YES	1.36	0.57	1.57	0.59	GS
20	Y1		10+97L	SDG	0.15	0.4	36.3	11	23	0.0767	6	NO	0.77	2.67	0.89	2.76	PT
20	Y1		11+20L	GS	0.12	0.3	29.7	9	80	0.0114	6	YES	0.56	1.21	0.64	1.25	GS
20	Y1		10+60R	GS	0.10	0.2	23.5	7	40	0.0298	6	YES	0.50	1.68	0.57	1.74	GS
20	Y1		11+00R	SDG	0.32	0.8	79.8	24	40	0.0369	6	YES	1.51	1.29	1.73	1.34	GS
20	Y1		11+00R	LAT	0.35	0.9	85.7	26	240	0.0148	3	YES	1.62	1.09	1.86	1.13	GS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE

BDS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 92

Date: 6/13/02  
 Dsn. By: HAH  
 Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Area Site #15  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Type	Total D.A.		Required length for treatment		Actual Length (m)	Channel Slope (m/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
					ha	(ac)	(ft.)	(m.)									
21	Y2		10+45L	GS	0.10	0.2	24.0	7	45	0.0523	6	YES	0.40	1.96	0.45	2.03	GS
21	Y2		10+77L	GS	0.23	0.6	56.8	17	32	0.0672	6	YES	1.07	1.48	1.23	1.54	GS
21	Y2		11+57L	GS	1.00	2.5	246.6	75	80	0.0493	6	YES	4.65	1.91	5.35	1.97	GS
21	Y2		12+20L	GS	1.15	2.8	284.2	87	67	0.00815	6	NO	5.36	1.01	6.16	1.04	PT
21	Y2		12+60L	LAT	1.22	3.0	301.5	92	40	0.093	3	NO	6.40	3.76	7.36	3.90	PT
21	Y2		13+00L	LAT	1.40	3.5	345.9	105	40	0.003	3	NO	7.34	0.87	8.44	0.90	PT
21	Y2		12+50R	GS	0.43	1.1	106.3	32	80	0.04	6	YES	2.00	1.43	2.31	1.48	GS
21	Y2		10+80R	GS	0.11	0.3	27.7	8	80	0.0672	6	NO	0.65	2.44	0.75	2.52	DGS
21	Y2		11+40R	SDG	0.16	0.4	38.8	12	20	0.0725	6	NO	0.73	2.58	0.84	2.67	DGS
21	Y2		11+20R	SDG	0.16	0.4	38.8	12	40	0.0725	6	NO	0.73	2.58	0.84	2.67	DGS

2GI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE  
 DGS=DOWNSTREAM GRASS SWALE

BDS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN

SHEET 2 OF 12

Date: 6/13/02  
 Dsn. By: HAH  
 Check: RKW/SNR

R-609 IA Guilford Co. Affected Buffer Areas Site #15  
 Discharge is considered to be treated if it meets the following criteria:  
 100 ft. of grass swale for every 1 acre of drainage area. AND  
 2 yr. velocity is less than or equal to 2 ft./sec.

SHT.	Align	Structure	Station	Total D.A.		Required length for treatment (ft.)	Actual Length (ft.)	Channel Slope (ft/m)	Side Slopes	Treated Discharge?	Q2 cfs	Q2 vel. fps	Q10 cfs	Q10 vel. fps	Treatment Provided
				ha	ac										
22	Y2	16+00L	GS	0.04	0.1	9.9	56	0.00127	6	YES	0.19	0.40	0.21	0.42	GS
22	Y2	17+40L	GS	0.11	0.3	27.7	84	0.0224	6	YES	0.52	1.53	0.60	1.58	GS
22	Y2	14+00R	LAT	0.12	0.3	30.1	40	0.063	3	NO	0.78	2.90	0.90	3.00	PT
22	Y2	15+00R	GS	0.18	0.4	44.5	136	0.046	6	NO	0.63	2.09	0.72	2.17	PT
22	Y2	16+20R	GS	0.09	0.2	22.2	40	0.00127	6	YES	0.63	0.55	0.72	0.56	GS

ZGI = 2 GRATED INLET  
 SBG = SHOULDER BERM GUTTER  
 CB = CATCH BASIN  
 DDB = DRY DETENTION BASIN  
 B = BASIN  
 GS = GRASS SWALE

BDOS = BERM DRAINAGE OUTLET STRUCTURE  
 OTCB = OPEN THROAT CATCH BASIN  
 OPEN = OPEN END PIPE  
 PSH = PRE FORMED SCOUR HOLE  
 LS = LEVEL SPREADER  
 PT=PREVIOUSLY TREATED

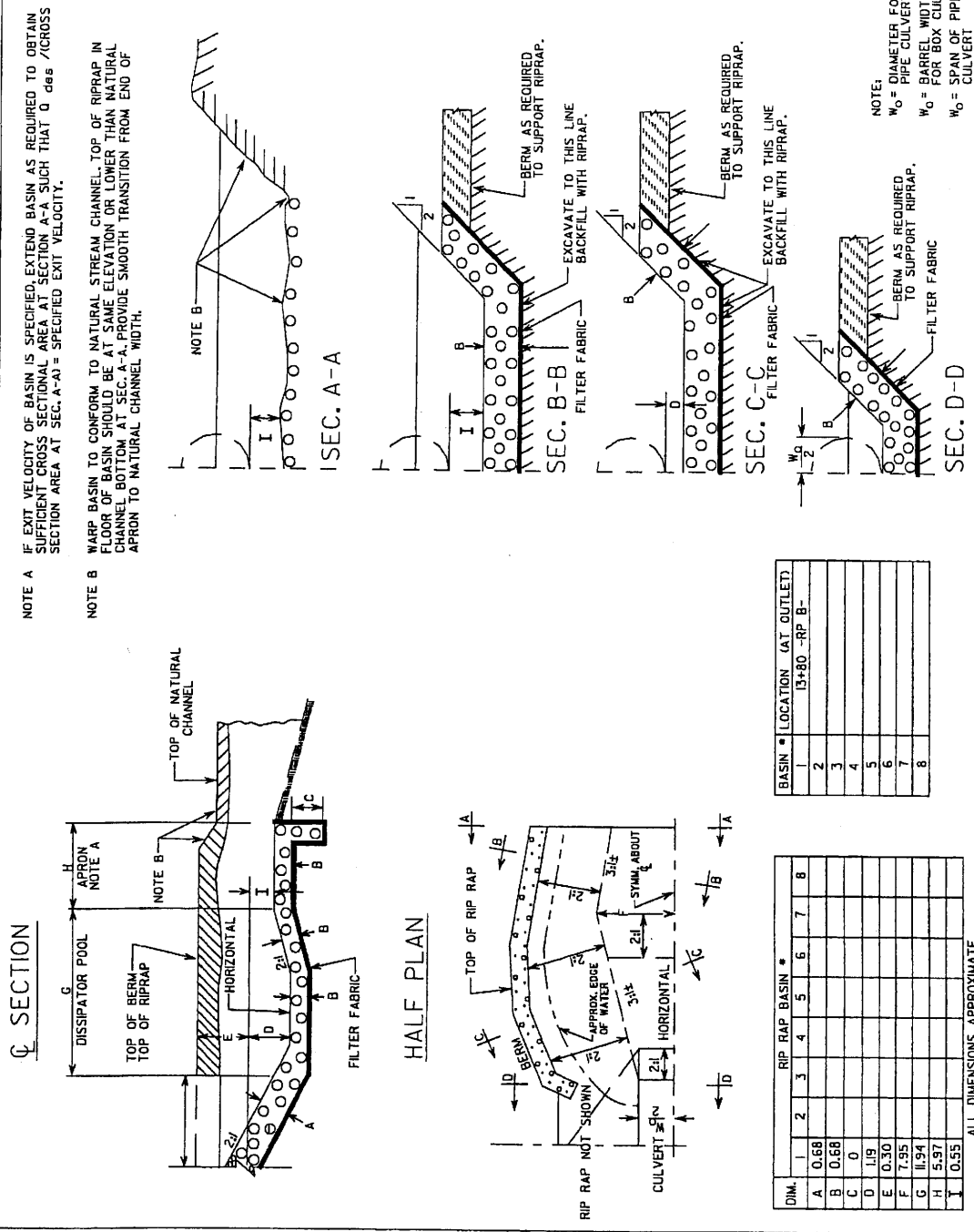
NORTH CAROLINA  
 DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-0608/A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



SCALE AS SHOWN





NOTE A IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS SECTIONAL AREA AT SECTION A-A SUCH THAT  $Q_{obs} / \text{CROSS SECTIONAL AREA AT SEC. A-A} = \text{SPECIFIED EXIT VELOCITY}$ .

NOTE B WARP BASIN TO CONFORM TO NATURAL STREAM CHANNEL. TOP OF RIPRAP IN FLOOR OF BASIN SHOULD BE AT SAME ELEVATION OR LOWER THAN NATURAL CHANNEL BOTTOM AT SEC. A-A. PROVIDE SMOOTH TRANSITION FROM END OF APRON TO NATURAL CHANNEL WIDTH.

NOTE:  
 $W_0$  = DIAMETER FOR PIPE CULVERT  
 $W_0$  = BARREL WIDTH FOR BOX CULVERT  
 $W_0$  = SPAN OF PIPE-ARCH CULVERT

SECTION I

HALF PLAN

BASIN #	LOCATION (AT OUTLET)
1	13+80 - RP B-
2	
3	
4	
5	
6	
7	
8	

DIM.	1	2	3	4	5	6	7	8
A								
B	0.68							
C	0							
D	1.19							
E	0.30							
F	7.95							
G	11.94							
H	5.97							
I	0.55							

ALL DIMENSIONS APPROXIMATE

DETAIL OF RIP-RAPPED ENERGY DISSIPATOR BASIN

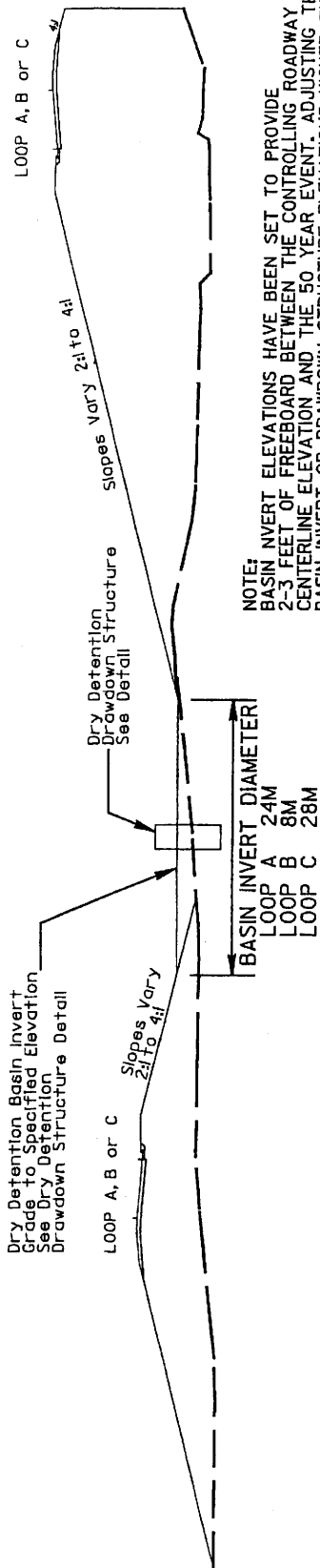
85 of 92



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570501 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

# DRY DETENTION BASIN GRADING DETAIL



NORTH CAROLINA  
DIVISION OF HIGHWAYS

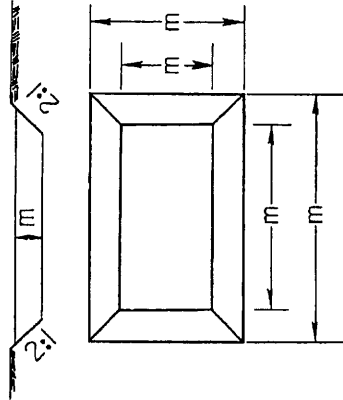
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 8 OF 92

**DETAIL OF EMERGENCY  
SPILL BASIN**

TOTAL CAPACITY REQUIRED : CU. M.  
TOTAL CAPACITY PROVIDED : CU. M.



Ditch to be blocked with sandbags 1.0 m deep at outlet

STATION	REQ. VOL. (CU. M.)	DEPTH (m)	BOTTOM LENGTH (m)	BOTTOM WIDTH (m)	TOP LENGTH (m)	TOP WIDTH (m)	PROVIDED VOL (CU. M.)
FLY 16+20 L	78	1.0	9.0	5.0	13.0	9.0	81
-L- 34+00 R	104	1.0	10.0	7.0	14.0	11.0	112
-L- 35+60 L	158	1.0	11.0	10.0	15.0	14.0	160
-L- 39+90 L	78	1.0	7.0	7.0	11.0	11.0	85
-L- 40+70 L	103	1.0	8.0	8.0	12.0	12.0	104
-L- 50+40 L	396	1.0	20.0	16.0	24.0	20.0	400
-L- 56+00 L	50	1.0	5.0	5.0	9.0	9.0	53
-L- 58+20 R	77	1.0	11.0	4.0	15.0	8.0	82
-Y5- 14+00 R	275	1.0	17.0	13.0	21.0	17.0	289
-Y5- 15+20 R	178	1.0	14.0	9.0	18.0	13.0	180
RAMPB 12+90 R	174	1.0	14.0	9.0	18.0	13.0	180
RAMPD 15+20 R	127	1.0	12.0	7.0	16.0	11.0	130



**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 87 OF 92



# SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
1	WALTER S. DANIEL	1620 EASTCHESTER DIVE HIGH POINT, NC 27265	1
2	BEVERLY B. CAUDLE	1308 COX AVE HIGH POINT, NC 27263	1
3	NCDOT	P. O. BOX 14996 GEENSBORO, NC 27415	1,2,3,6,8,9
4	LAWSON INGRAM	1603 JACKSON LAKE RD HIGH POINT, NC 27263	3
5	CLIFFORD L. HILL	RT. 4 BOX 385 HIGH POINT, NC 27263	4
6	MARJORIE SURRETT	6802 DRESDEN RD HIGH POINT, NC 27263	5
7	FRANK MARTINEZ	1539 KESEY VALLEY RD HIGH POINT, NC 27263	6
8	BOBBY L. CECIL	1119 LIBERTY RD ARCHDALE, NC 27263	7,8
9	GLENN P. MORGAN	6027 CHECKER RD HIGH POINT, NC 27263	8
10	MR. FOSTER	6861 DRESDEN RD HIGH POINT, NC 27263	8
11	LAWRENCE E. MODLIN	6132 CHECKER RD HIGH POINT, NC 27263	8
12	CHARLES BOYD	1553 KESEY VALLEY RD HIGH POINT, NC 27263	6
13	ROBERT L. SLATE	7008 WINDCREEK CT HIGH POINT, NC 27263	8
14	JERRY W. LEWIS	7010 WINDCREEK CT HIGH POINT, NC 27263	8
15	LILLIE CRUTHERS	6027 CRUTHERS RD HIGH POINT, NC 27263	8
16	W. GERALD LEONARD	6801 JOPLIN DRIVE HIGH POINT, NC 27263	12



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

8891  
SHEET 2 OF 2

### BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT										BUFFER REPLACEMENT			
			TYPE		ALLOWABLE			MITIGABLE			TOTAL		ZONE 1 (m <sup>2</sup> )	ZONE 2 (m <sup>2</sup> )		
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (m <sup>2</sup> )	ZONE 2 (m <sup>2</sup> )	TOTAL (m <sup>2</sup> )	ZONE 1 (m <sup>2</sup> )	ZONE 2 (m <sup>2</sup> )	TOTAL (m <sup>2</sup> )	ZONE 1 (m <sup>2</sup> )	ZONE 2 (m <sup>2</sup> )				
1	1350mm	19+60 to 20+20	X								2655.0	1737.1	4392.1			
2	1350mm	25+55 to 25+90	X								2402.3	1371.2	3773.5			
3 (Trib)	900mm	27+95 to 28+35	X								1276.4	1024.6	2300.9			
3 (Main)	Bridge	28+60 to 29+00	X				800.7	788.5	1589.2							
4 (Trib 1)	Stream	32+00		X							675.1	427.5	1102.6			
4 (Trib 2)	Stream	33+00		X							1838.2	881.3	2719.5			
4 (Main)	3@3.4m x 2.4m	31+60 to 33+80	X								5370.7	2825.1	8195.8	4042.6	2667.2	
5	600mm	35+10 to 35+65	X								832.6	737.1	1569.8			
6	1050mm	40+00 to 40+40	X								3125.8	2003.2	5129.0			
7	1@3.8m x 3.8m	45+30 to 46+50	X								2645.2	1791.0	4436.3			
8 (Trib 1)	Interchange	48+85 to 50+75	X								3004.2	1917.6	4921.8			
8 (Trib 2)	Interchange	51+20	X								770.3	688.1	1458.4			
8 (Trib 3)	Interchange	50+20 to 51+60	X								9564.6	5999.9	15564.5			
8 (Trib 4)	Interchange	50+70 to 51+90	X								1972.7	1557.0	3529.7			
8 (Trib 5)	Interchange	53+00 to 56+75	X								7851.8	5525.0	13376.8			
8 (Trib 6)	Interchange	54+40 to 55+45	X								2284.1	1577.7	3861.8			
9	900mm	58+20 to 59+00	X								2779.3	1507.6	4286.9			
10	900mm	10+20 R -SBCD-	X				551.3	469.7	1021.0							
11	1050mm	12+80 R -SBCD-	X				587.6	398.9	986.5							
12	900mm	14+00 -NBCD-	X				1939.6	1657.1	3596.7							
<b>TOTAL:</b>																
							1939.6	1657.1	3596.7		2097.3	1426.5	3523.8	1538.0	1232.0	
											51145.8	32997.3	84143.1	5580.6	3899.2	

N.C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
PROJECT: 8.1570601 (R-609IA)

# BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT										BUFFER REPLACEMENT		
			TYPE		ALLOWABLE			MITIGABLE			TOTAL		ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	TOTAL (ft <sup>2</sup> )	ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	TOTAL (ft <sup>2</sup> )	ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )			
1	54 inch	19+60 to 20+20	X								28578	18697	47275		
2	54 inch	25+55 to 25+90	X								25858	14759	40617		
3 (Trib)	36 inch	27+95 to 28+35	X								13738	11028	24766		
3 (Main)	Bridge	28+60 to 29+00	X			8618	8487	17105							
4 (Trib 1)	Stream	32+00		X							7266	4601	11867		
4 (Trib 2)	Stream	33+00		X							19786	9486	29272		
4 (Main)	3@ 11.2 ft x 7.8 ft	31+60 to 33+80	X								57809	30408	88217	43513	28708
5	24 inch	35+10 to 35+65	X								8962	7934	16896		
6	42 inch	40+00 to 40+40	X								33645	21562	55207		
7	1@ 12.5 ft x 12.5 ft	45+30 to 46+50	X								28472	19278	47750		
8 (Trib 1)	Interchange	48+85 to 50+75	X								32336	20640	52976		
8 (Trib 2)	Interchange	51+20	X								8291	7406	15697		
8 (Trib 3)	Interchange	50+20 to 51+60	X								102950	64581	167531		
8 (Trib 4)	Interchange	50+70 to 51+90	X								21234	16759	37993		
8 (Trib 5)	Interchange	53+00 to 56+75	X								84514	59469	143983		
8 (Trib 6)	Interchange	54+40 to 55+45	X								24586	16981	41567		
9	36 inch	58+20 to 59+00	X								29915	16227	46142		
10	900mm	10+20 R -SBCD-	X			5935	5056	10991							
11	1050mm	12+80 R -SBCD-	X			6325	4294	10619							
12	900mm	14+00 -NBCD-	X			20878	17837	38715			22575	15354	37929	16554	13261
<b>TOTAL:</b>											550515	355170	905685	60067	41969

N.C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
PROJECT: 8.1570601 (R-6091A)

October-06  
SHEET 90 OF 92

544

BUFFER IMPACTS SUMMARY

Site	Station	WETLANDS IN BUFFER	
		ZONE 1 (m <sup>2</sup> )	ZONE 2 (m <sup>2</sup> )
2	25+75 to 25+95	334.2	289.1
8 (Trib 5)	55+70 to 56+60	632.4	171.1
9	58+20 to 59+00	2780.6	0.0
		3747.2	460.2

N.C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GUILFORD COUNTY  
 PROJECT: 8.1570601 (R-609IA)  
 2/19/2004  
 SHEET 91 OF 92

### BUFFER IMPACTS SUMMARY

Site	Station	WETLANDS IN BUFFER	
		ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )
Buffer Site 2	25+75 - 25+95	3597.2	3111.8
Buffer Site 8 (Trib. 5)	55+70 - 56+60	8806.9	1841.7
Buffer Site 9	58+20 - 59+00	5532.0	0.0
		15936.1	4953.5

Stream/Wetland Site 4

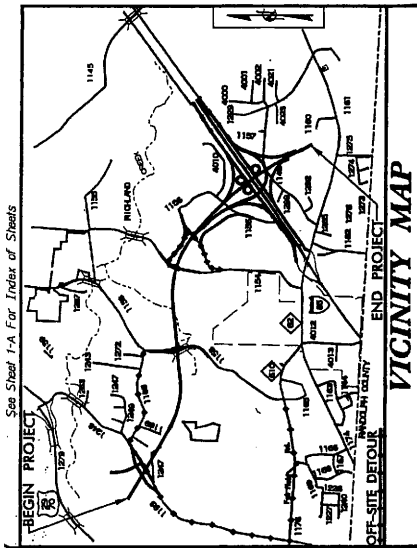
Stream/Wetland Site 11 @ -RAMPA-

Stream/Wetland Site 12

NC DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GUILFORD CO  
PROJECT: R-06091A  
US 311 HIGH POINT EAST BELTWAY

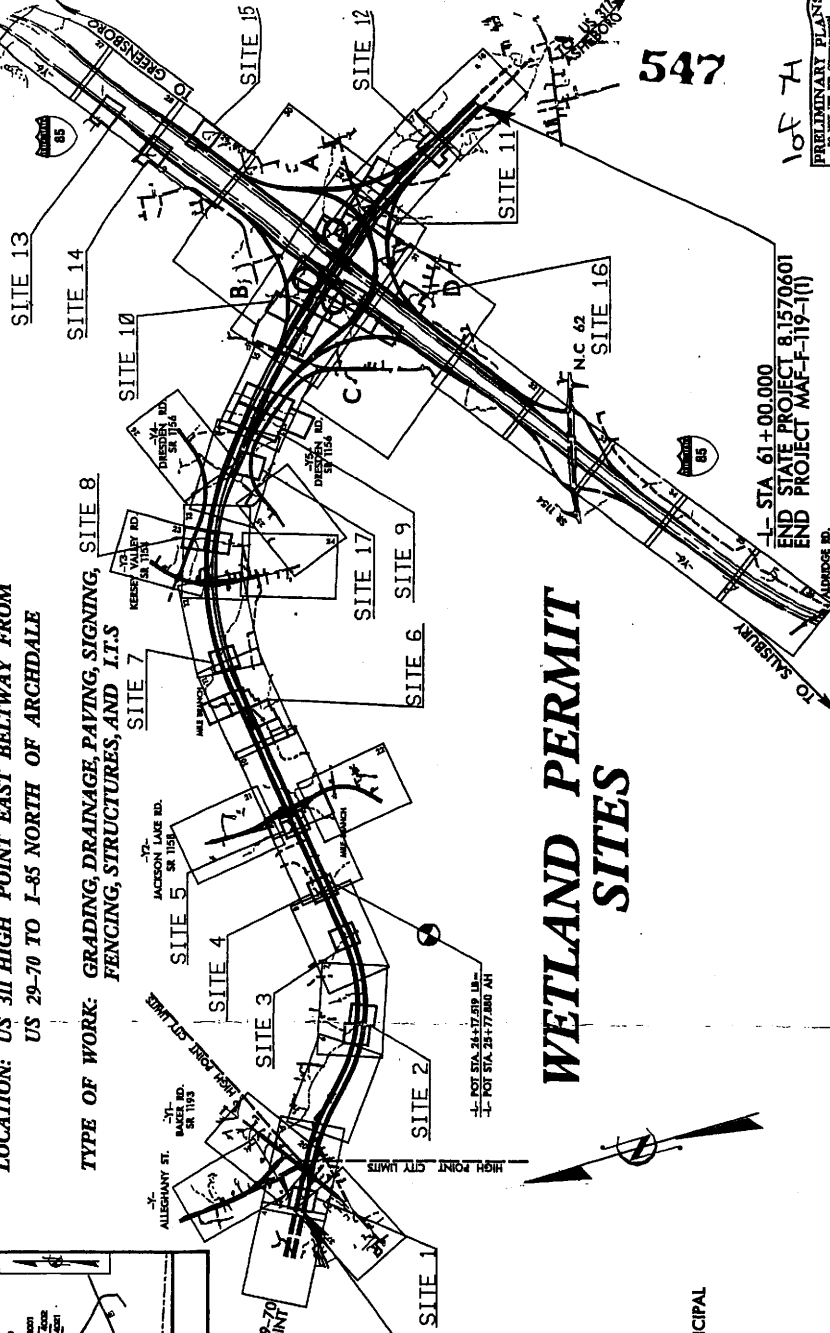
Sheet 920 of 92  
Revised 10/06



**STATE OF NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**  
**GUILFORD COUNTY**

**LOCATION: US 311 HIGH POINT EAST BELTWAY FROM  
US 29-70 TO I-85 NORTH OF ARCHDALE**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING, SITE 8  
FENCING, STRUCTURES, AND I.T.S**



**RECEIVED**

MAR - 1 2006

**REGULATORY**  
WILM. FLD. OFC.

L- STA. 11+98.805  
BEGIN STATE PROJECT 8.1570601  
BEGIN PROJECT MAF-F-119-1(1)

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL  
BOUNDARIES OF HIGH POINT  
THIS IS A CONTROLLED-ACCESS PROJECT WITH  
ACCESS BEING LIMITED TO INTERCHANGES  
CLEARING ON THIS PROJECT SHALL BE PERFORMED  
TO THE LIMITS ESTABLISHED BY METHOD (II)

**GRAPHIC SCALES**

PLANS

PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

**DESIGN DATA**

ADT 2005 = 27,000  
ADT 2025 = 39,000  
DHV = 10 %  
D = 60 %  
T = 13 %  
V' = 110 km/h  
\* TTST 7 % DUAL 6 %  
FUNC CLASS - FREEWAY

**PROJECT LENGTH**

LENGTH ROADWAY F.A PROJECT MAF-F-119-1(1) = 4.901 KM  
LENGTH STRUCTURE F.A PROJECT MAF-F-119-1(1) = 4.901 KM  
TOTAL LENGTH STATE PROJECT 8.1570601 = 4.901 KM

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
1000 Birch Ridge Dr., Raleigh, NC 27610

**RIGHT OF WAY DATE:**  
SEPTEMBER, 2003

**LETTING DATE:**  
MARCH 15, 2005

HYDRAULICS ENGINEER  
**JIMMY GOODNIGHT, PE**  
PROJECT MANAGER

ROADWAY DESIGN ENGINEER  
**STEVE KENDALL**  
PROJECT MANAGER

HYDRAULICS ENGINEER  
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

ROADWAY DESIGN ENGINEER  
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

HYDRAULICS ENGINEER  
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

ROADWAY DESIGN ENGINEER  
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

DATE	N.C.	R-06091A	PROJECT	I
DESIGNER	34345.1.1	MAF-F-119-1(1)	STATE	NC
DATE	34345.2.7	STR-NHE-119-1(1)	TITLE	ROW & UTILS

**METRICS**  
ALL DIMENSIONS IN THESE PLANS ARE IN METERS

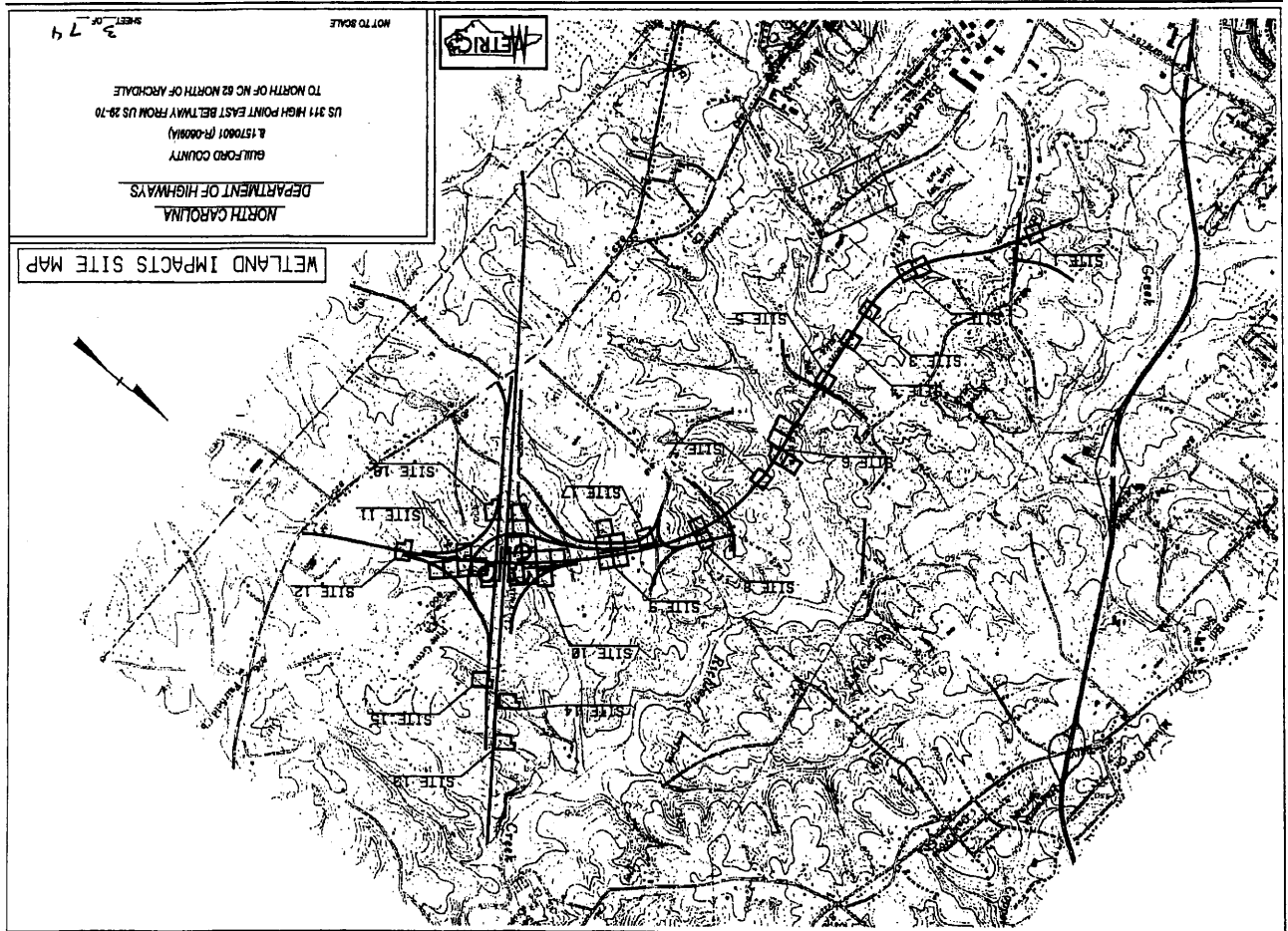
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547

**RECORDED**

MAR 15 2007

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA



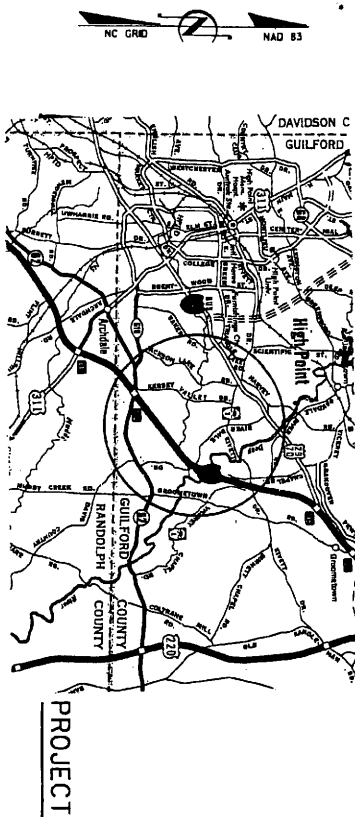
NOT TO SCALE  
SHEET OF 2 7 4



WETLAND IMPACTS SITE MAP



PORTION OF GUILFORD COUNTY MAP



PORTION OF STATE MAP

WETLAND IMPACTS



SCALE AS SHOWN


SHEET 2 OF 14

NORTH CAROLINA  
DIVISION OF HIGHWAYS  
GUILFORD COUNTY  
8,157(S) (R30894)  
US 311 HIGH POINT EAST BELTWAY FROM US 29 TO  
TO NORTH OF NC 82 NORTH OF ARCADE




# WETLAND 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

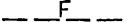
 DENOTES MECHANIZED CLEARING


 FLOW DIRECTION

 TOP OF BANK

 EDGE OF WATER

 PROP. LIMIT OF CUT


 PROP. LIMIT OF FILL

 PROP. RIGHT OF WAY

 NATURAL GROUND

 PROPERTY LINE

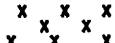
 TEMP. DRAINAGE EASEMENT


 PERMANENT DRAINAGE EASEMENT


 EXIST. ENDANGERED ANIMAL BOUNDARY

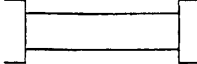
 EXIST. ENDANGERED PLANT BOUNDARY

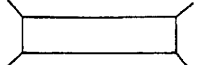
 WATER SURFACE


 LIVE STAKES


 BOULDER


 CORE FIBER ROLLS


 PROPOSED BRIDGE

 PROPOSED BOX CULVERT

 PROPOSED PIPE CULVERT  
 (DASHED LINES DENOTE EXISTING STRUCTURES)  
 12"-48" PIPES  
 54" PIPES & ABOVE


 SINGLE TREE


 WOODS LINE

 DRAINAGE INLET

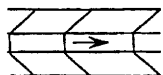
 ROOTWAD

 RIP RAP

 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

 PREFORMED SCOUR HOLE (PSH)

 LEVEL SPREADER (LS)

 GRASS SWALE



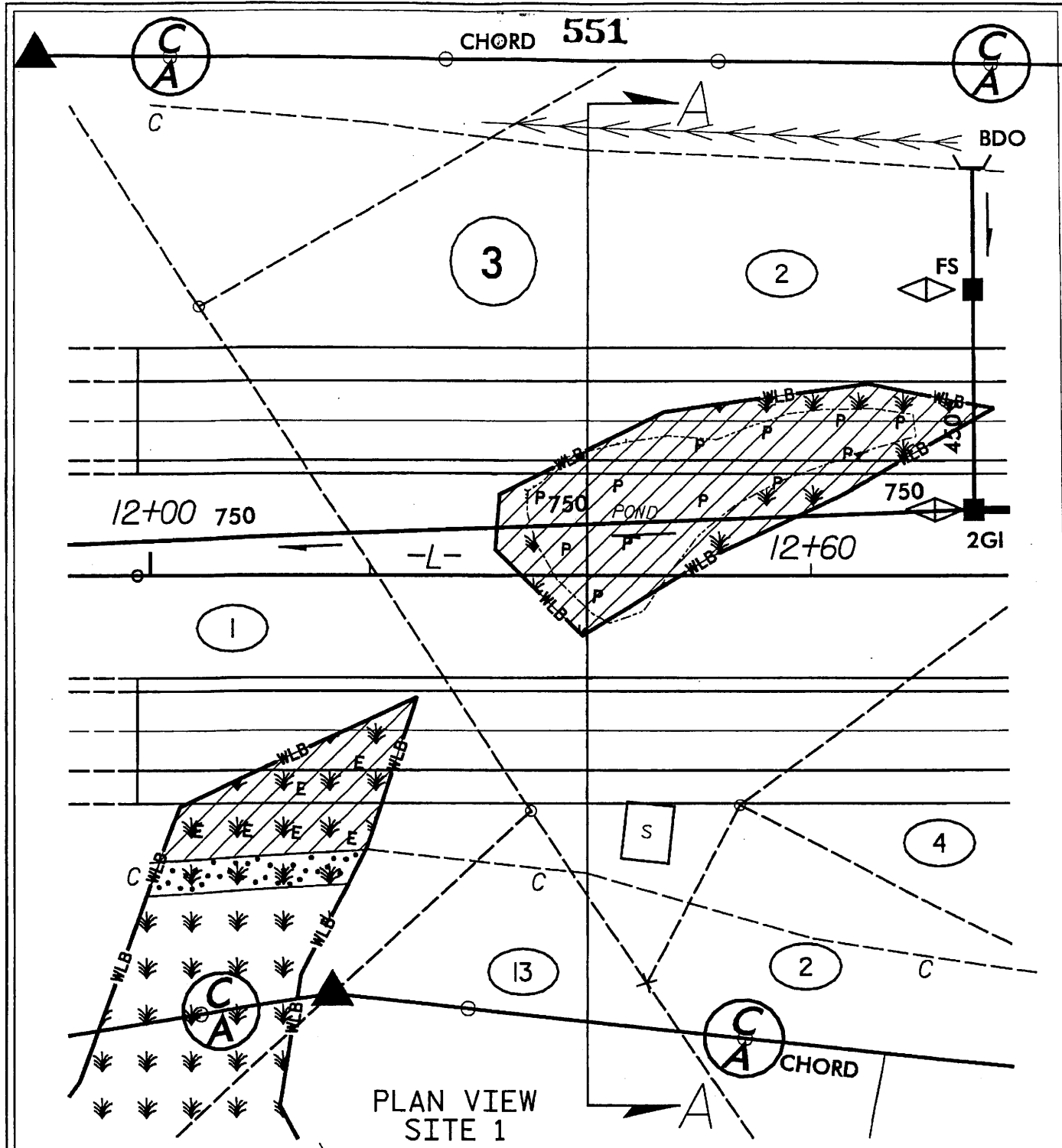
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

4 74  
 SHEET \_\_\_ OF \_\_\_

SCALE AS SHOWN

11/02/2003  
 12:48:28 AM  
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SHEET 1

- LEGEND**
- WLB — WETLAND
  - DENOTES EXCAVATION IN WETLAND
  - DENOTES FILL IN SURFACE WATER (POND)
  - DENOTES MECHANIZED CLEARING



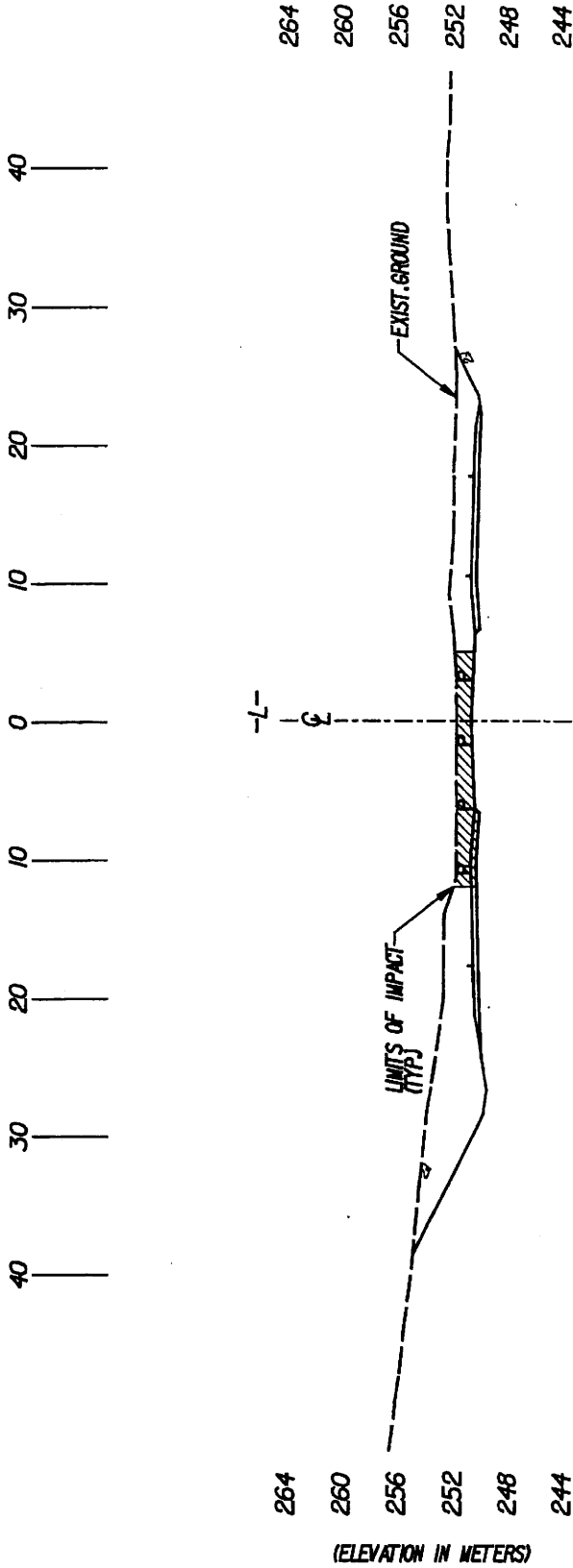
**NORTH CAROLINA  
DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 5 OF 7

7/3/2006 3:33:44 AM \\s:\dgn\Roadway\pco\PERMITS\Wetland\Permit\8-08091A\01.psh



**LEGEND**

 DENOTES FILL IN SURFACE WATER (POND)

**SECTION 'A-A'**

**SITE 1**  
**CROSS SECTION**  
 (-L- 12+40)



**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
 B.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

6  
 SHEET OF 74

255

250

245

255

250

(ELEVATION IN METERS)

+0.3501%

EDGE OF IMPACTS (TYP.)

+80

+60

+40

+20

12+00

SITE I  
-L- LINE PROFILE

LEGEND



DENOTES FILL IN SURFACE WATER (POND)

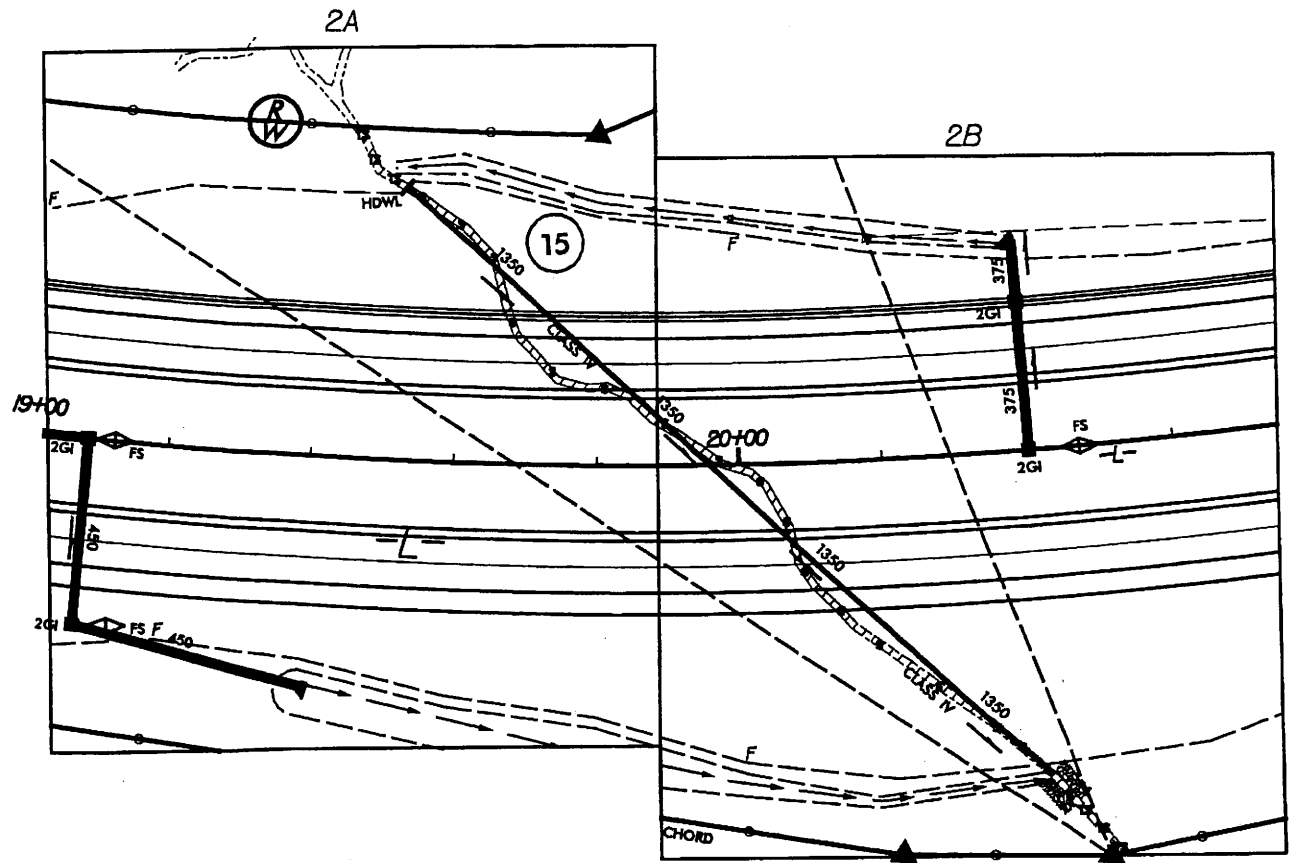


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 7 OF 74



SHEET LAYOUT  
 PLAN VIEW  
 SITE 2

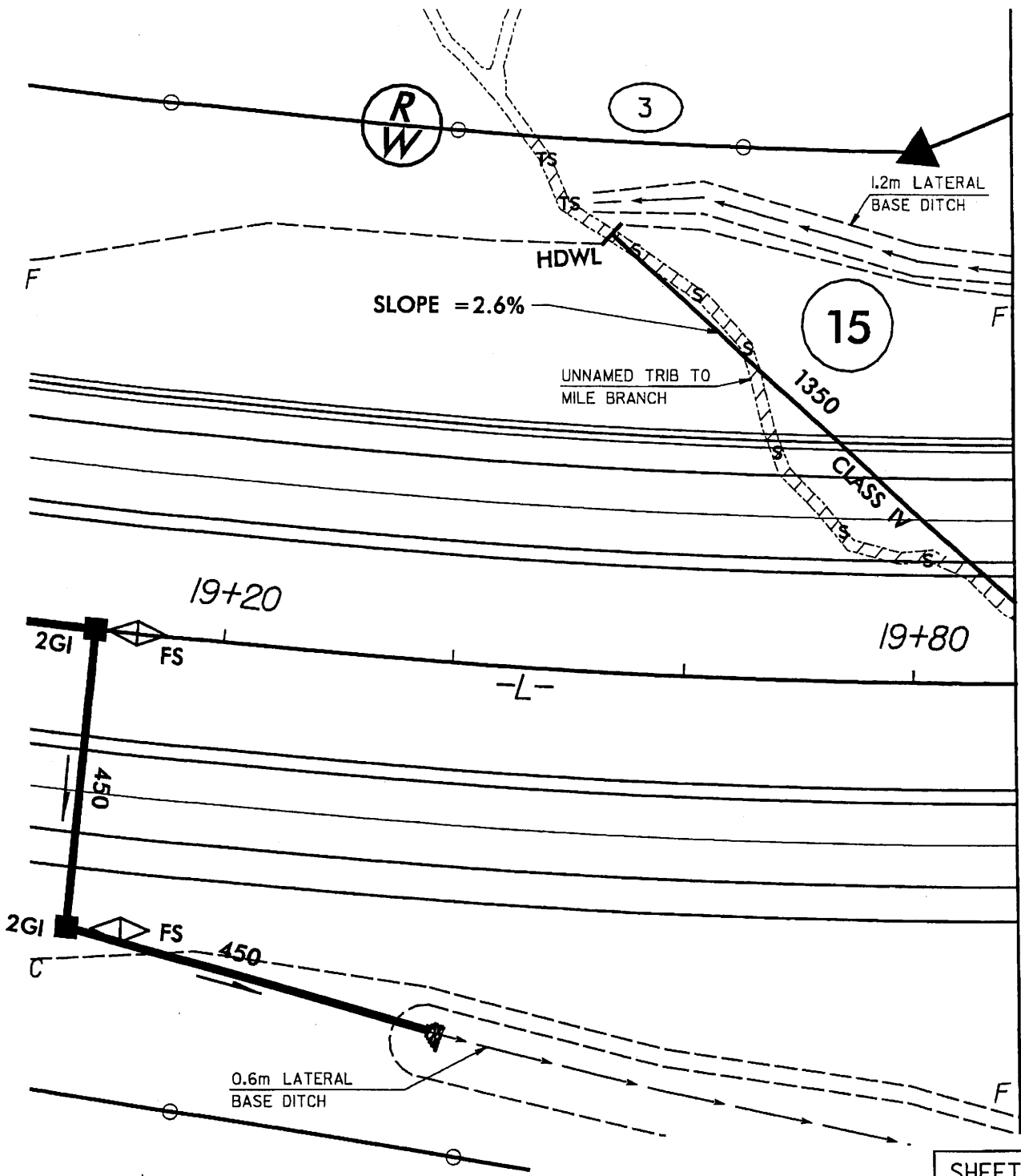


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE



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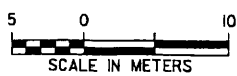
SHEET 2 OF 11



PLAN VIEW  
SITE 2

LEGEND

-  DENOTES SURFACE WATER LOSS
-  DENOTES TEMPORARY SURFACE WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

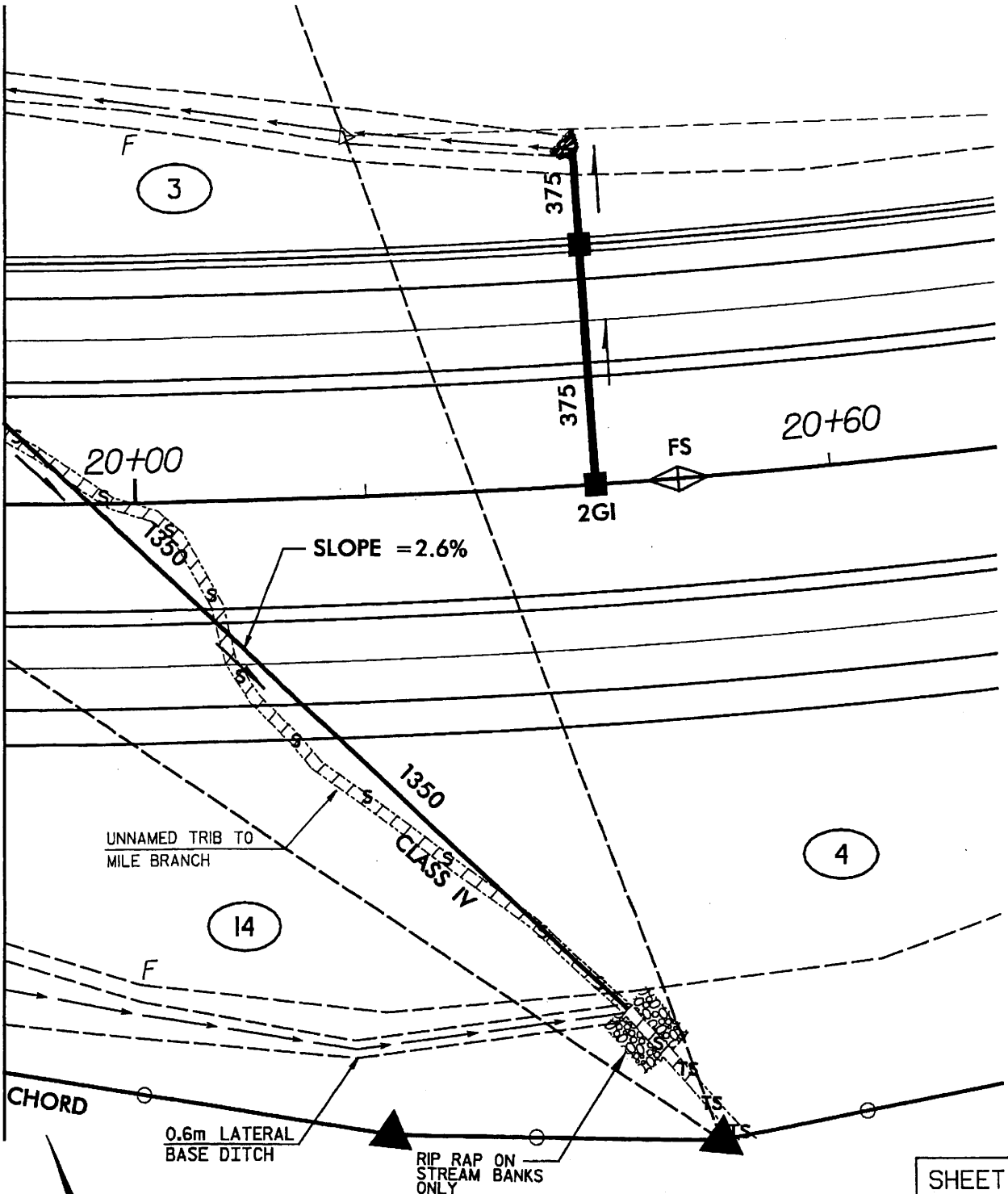
SHEET 2A

9 of 74

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_

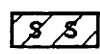

MATCH LINE SHEET 2A



SHEET 2B

PLAN VIEW  
SITE 2

LEGEND

-  DENOTES SURFACE WATER LOSS
-  DENOTES TEMPORARY SURFACE WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

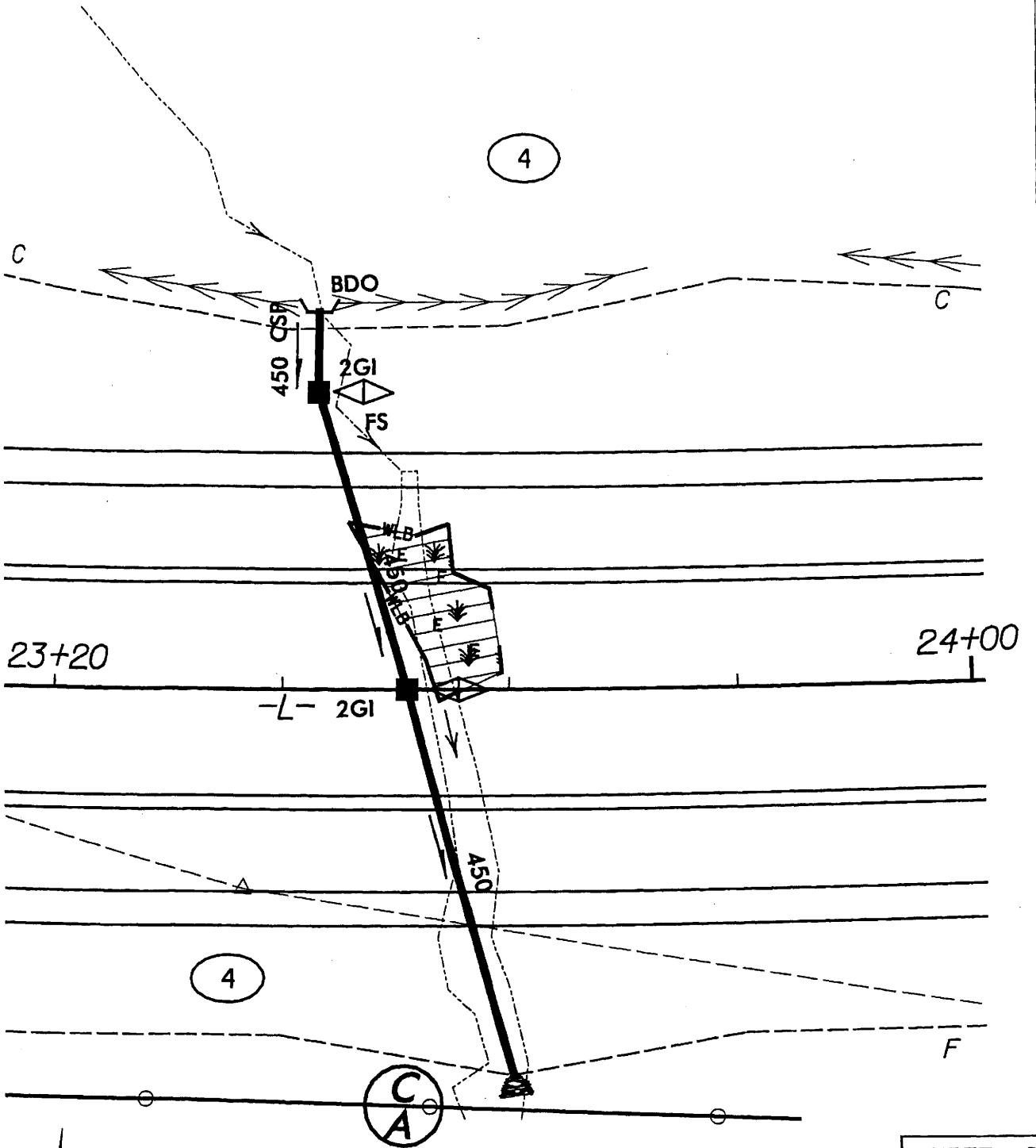
GUILFORD COUNTY  
8.1570801 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

10 of 74

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_

13/2006  
06:04 AM  
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PLAN VIEW  
SITE 3

LEGEND

-  WETLAND
-  DENOTES EXCAVATION IN WETLAND



SHEET 3

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_

11 05 74



558

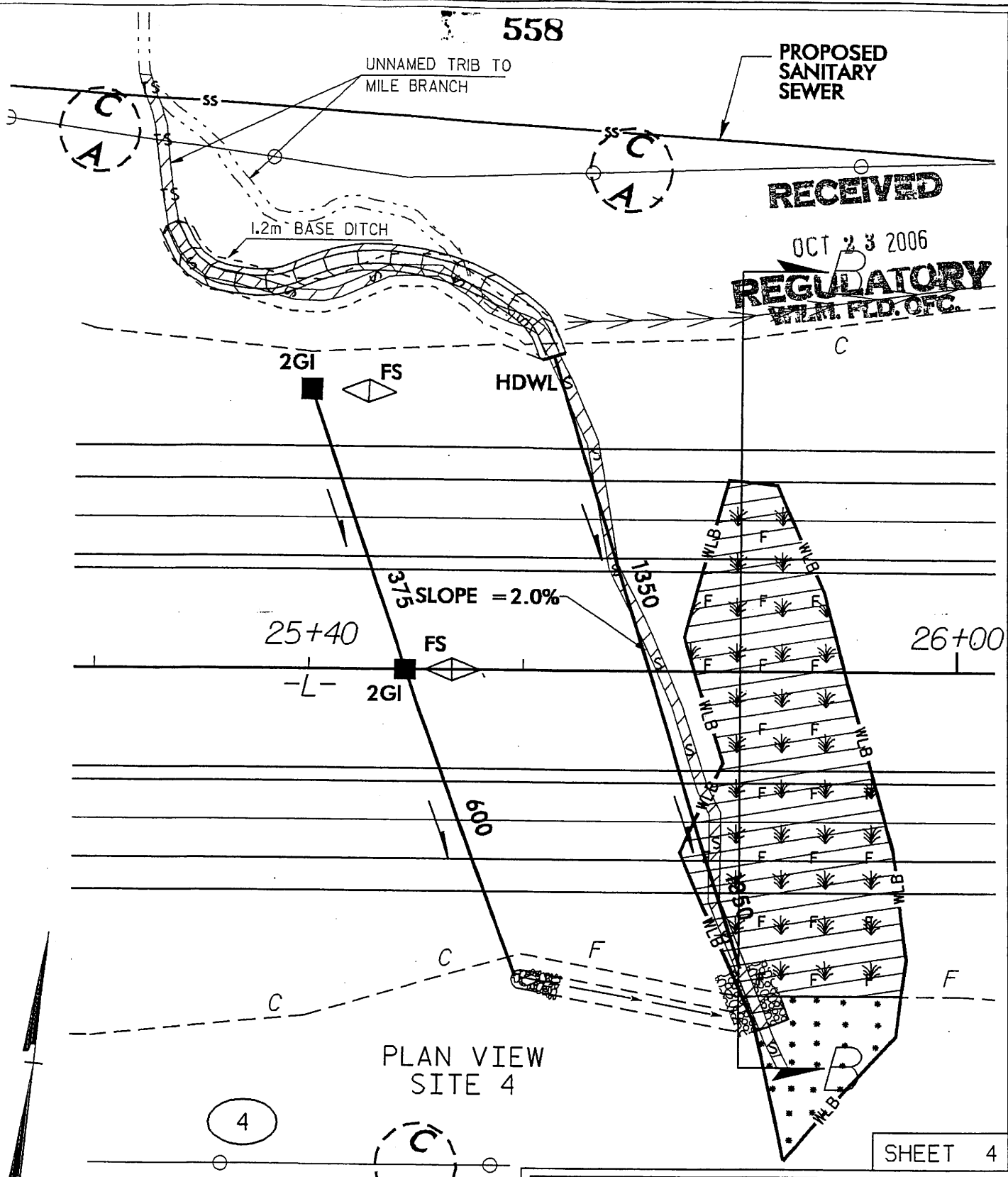
UNNAMED TRIB TO MILE BRANCH

PROPOSED SANITARY SEWER

RECEIVED

OCT 23 2006

REGULATORY  
WLM. FLD. OFC.

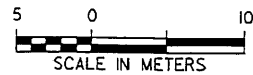


PLAN VIEW  
SITE 4

SHEET 4

LEGEND

- WLB — WETLAND
- DENOTES FILL IN WETLAND
- DENOTES SURFACE WATER LOSS
- DENOTES MECHANIZED CLEARING



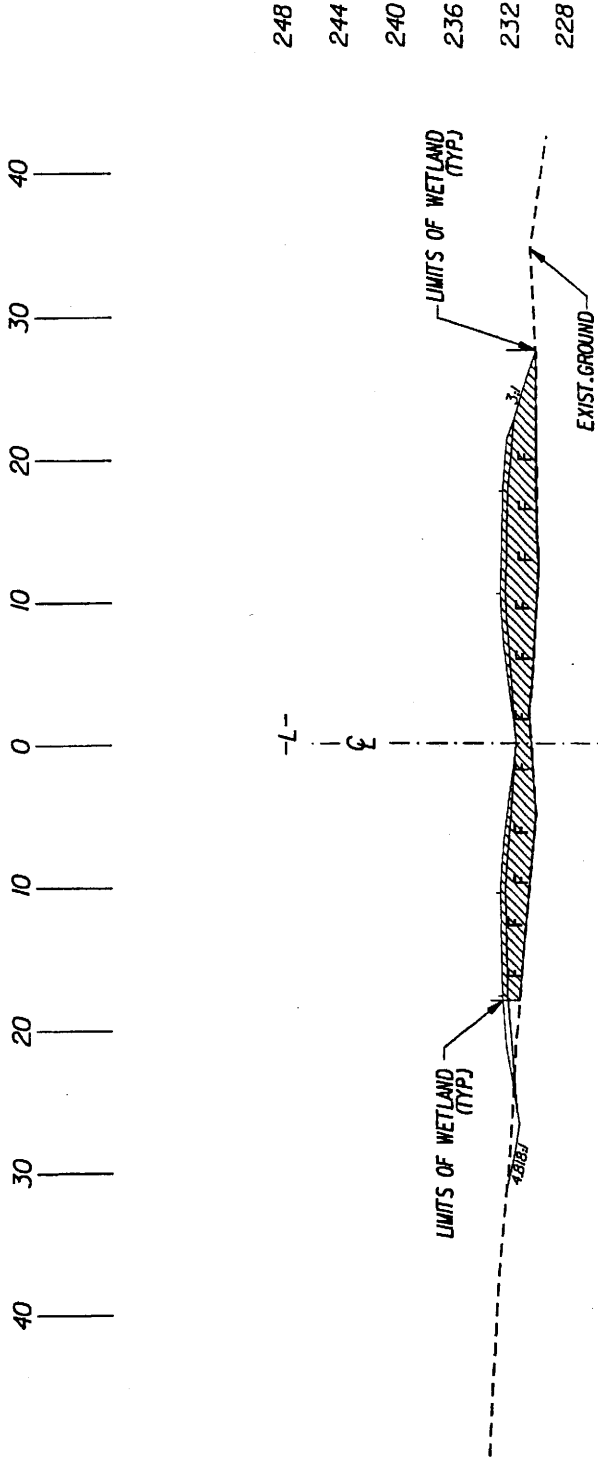
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 R.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE  
 Revised May '06

SCALE AS SHOWN

SHEET 4 OF 71

DATE: 10/23/06  
DRAWN BY: J. STINEBAUGH  
CHECKED BY: J. STINEBAUGH



**LEGEND**  
 DENOTES FILL IN WETLAND

**SECTION 'B-B'**  
**SITE 4**  
**CROSS SECTION**  
**(-L- 25+80)**



248  
 244  
 240  
 236  
 232  
 228  
 (ELEVATION IN METERS)

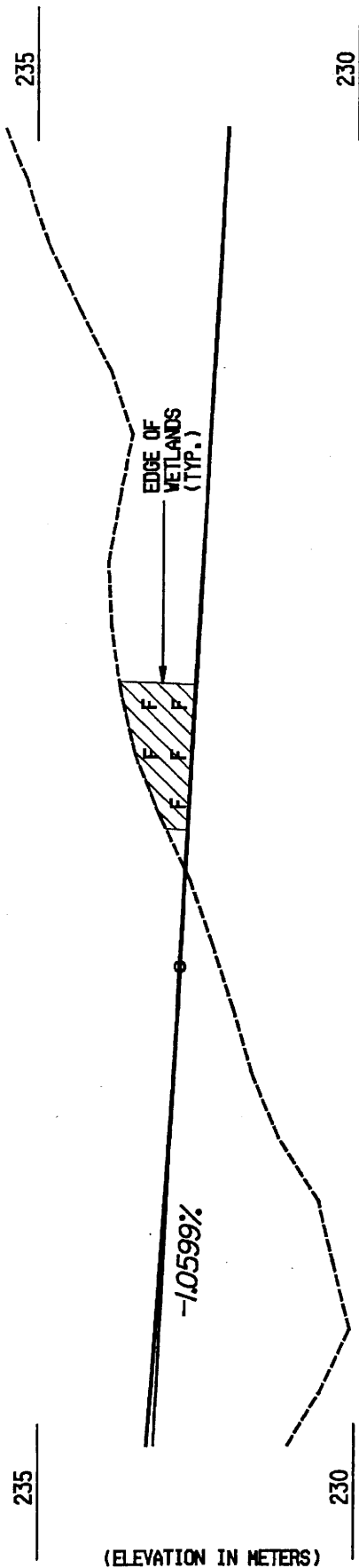
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_

13 of 7



**SITE 4**  
-L- LINE PROFILE

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_

14 05 74

561

UNNAMED TRIB TO MILE BRANCH

15

EXISTING R/W

PROPOSED BERM DITCH

PROPOSED BERM DITCH

4

C  
A

SR 1155

JACKSON LAKE RD

750 CSP W/ELBS

2GI

28+00

900

28+40

375

FS

-L-

375

2GI

2GI

SLOPE = 0.5%

2GI

FS

375

F

LATERAL 'V' DITCH W/  
CL 'B' RIPRAP

SHEET 5

PLAN VIEW  
SITE 5

LEGEND



DENOTES SURFACE WATER LOSS



DENOTES TEMPORARY SURFACE WATER LOSS



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

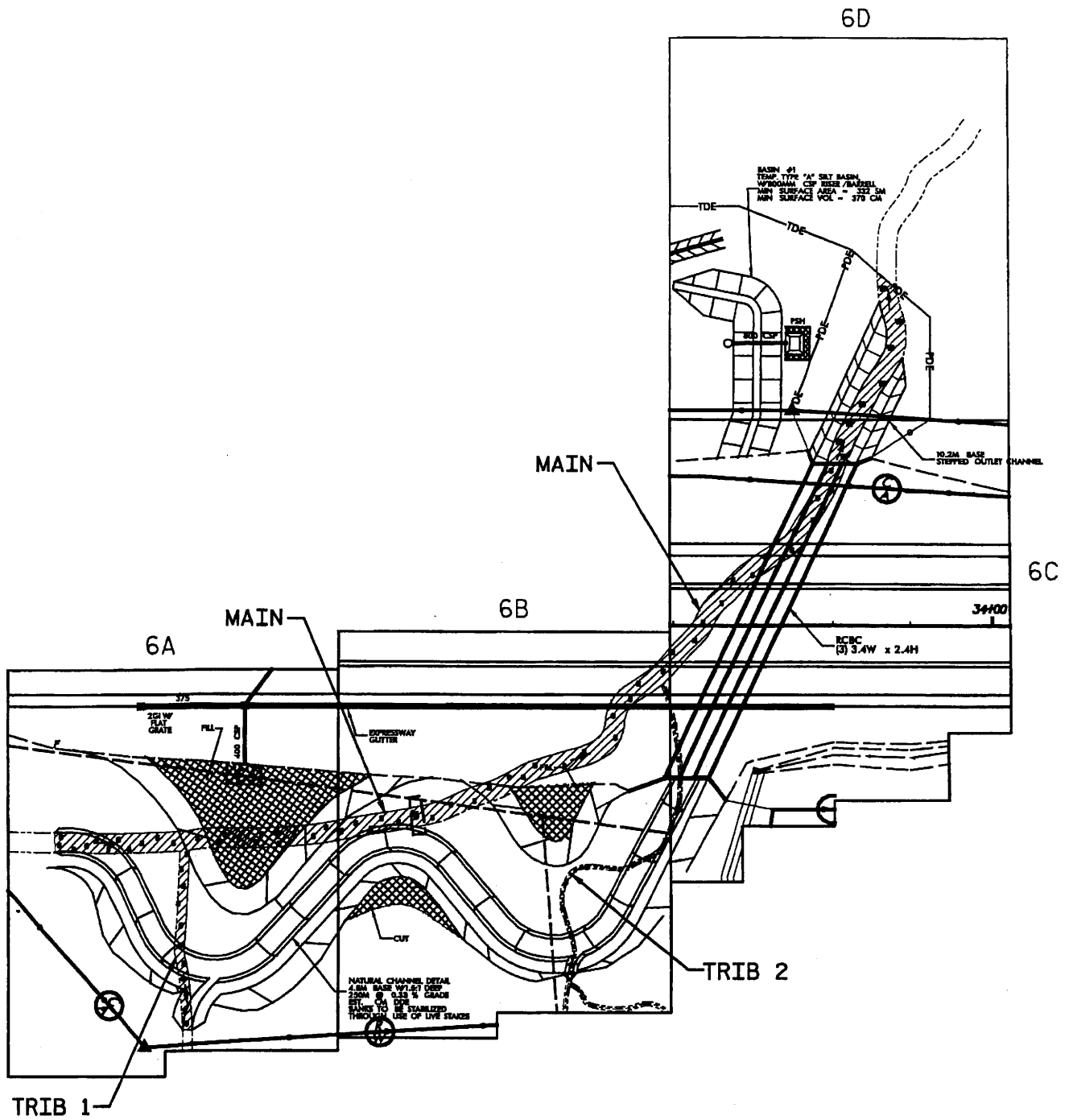
GUILFORD COUNTY  
8.1570601 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

15 OF 74

SCALE AS SHOWN

SHEET \_\_\_ OF \_\_\_



SHEET LAYOUT  
 PLAN VIEW  
 SITE 6



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

16 of 74  
 SHEET \_\_\_ OF \_\_\_

SCALE AS SHOWN

1/2006 9:00 AM  
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563



375

375

2GI W/  
FLAT  
GRATE

2GI W/  
FLAT  
GRATE

FILL

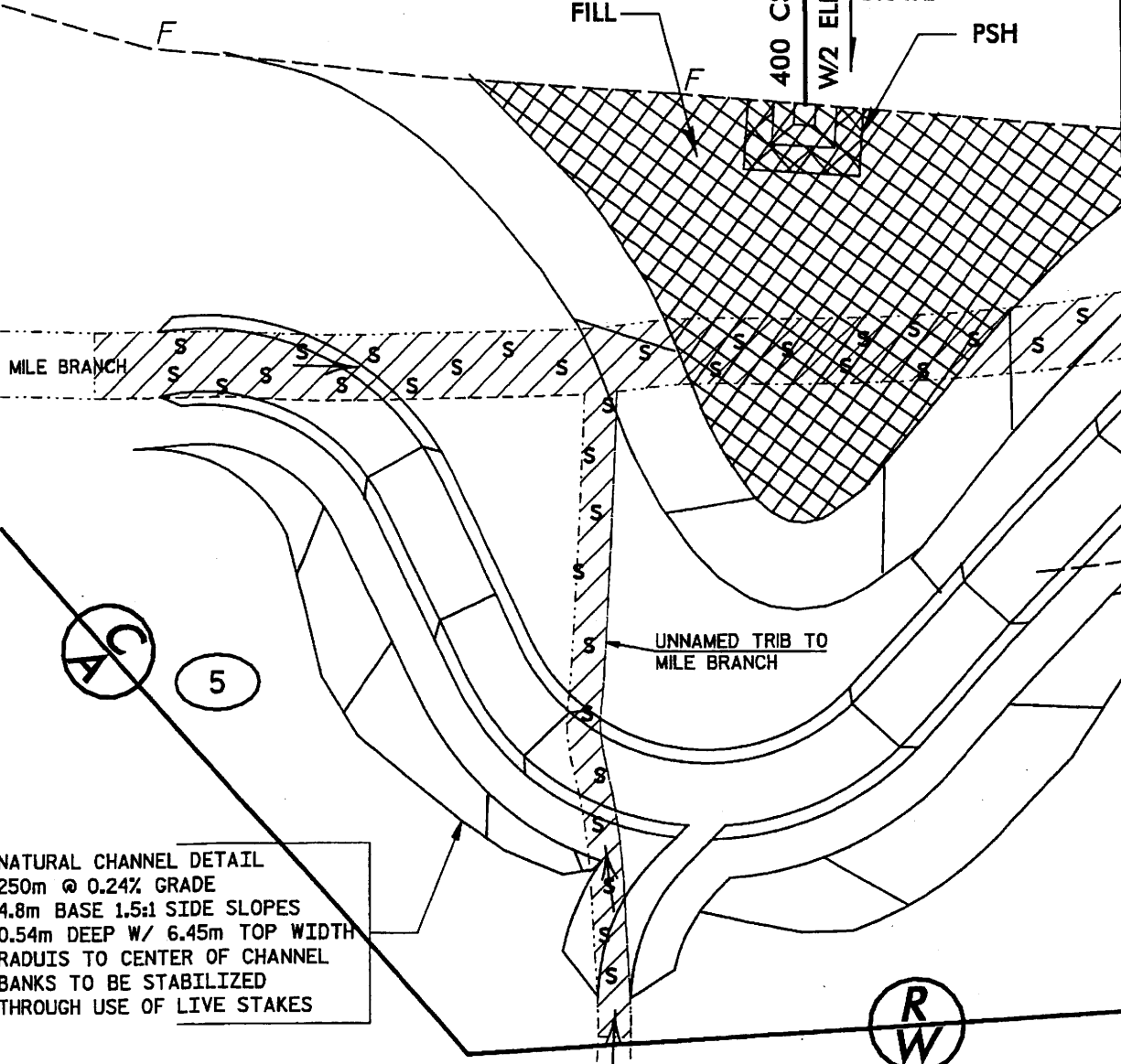
400 CSP

W/2 ELBS

PSH

F

F



NATURAL CHANNEL DETAIL  
250m @ 0.24% GRADE  
4.8m BASE 1.5:1 SIDE SLOPES  
0.54m DEEP W/ 6.45m TOP WIDTH  
RADIUS TO CENTER OF CHANNEL  
BANKS TO BE STABILIZED  
THROUGH USE OF LIVE STAKES

MATCH LINE SHEET 6B



5



SHEET 6A

PLAN VIEW  
SITE 6



LEGEND

 DENOTES SURFACE  
WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

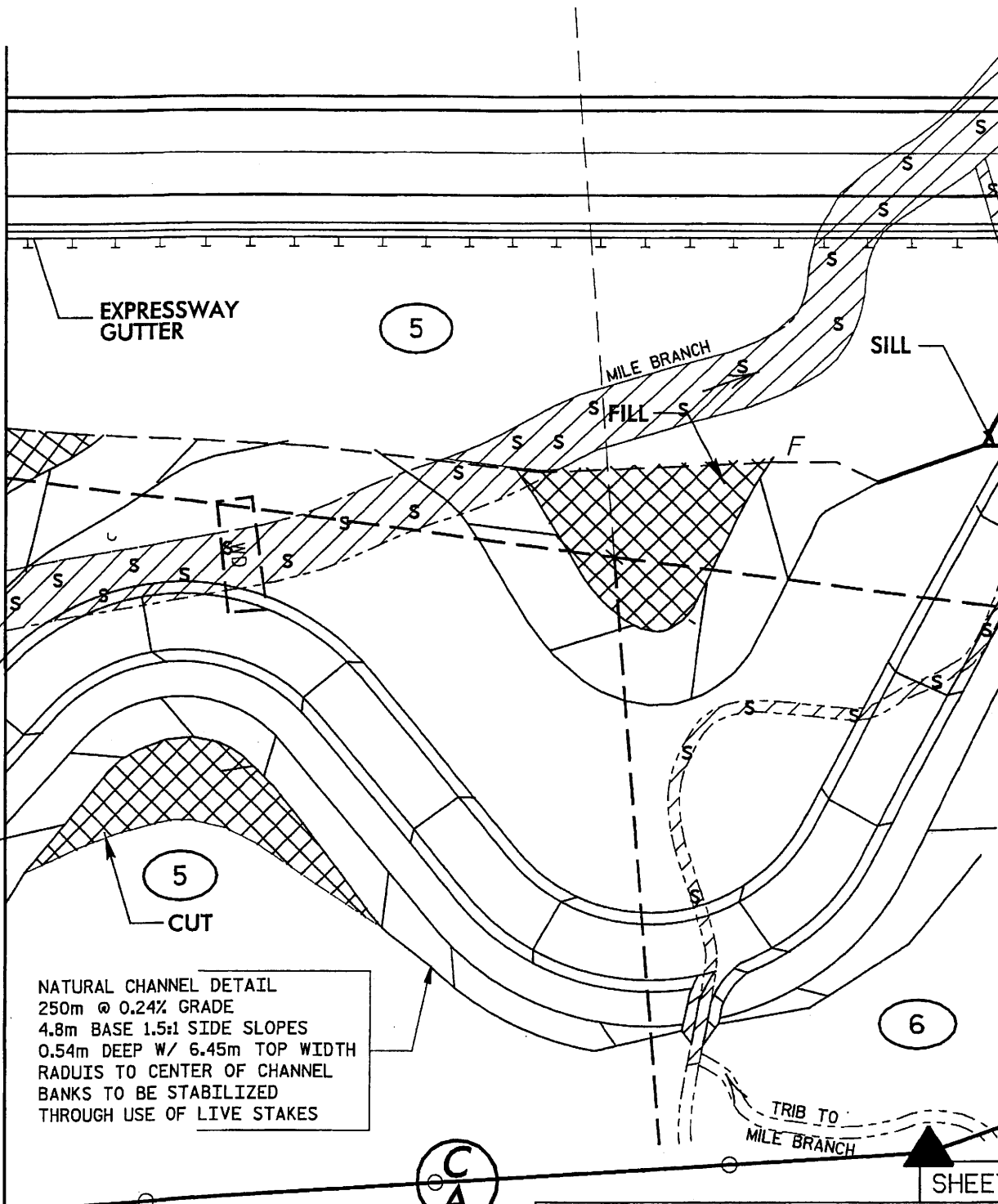
74  
SHEET OF 74

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564

MATCH LINE SHEET 6A

MATCH LINE SHEET 6C



EXPRESSWAY GUTTER

5

MILE BRANCH

SILL

FILL

5

CUT

NATURAL CHANNEL DETAIL  
 250m @ 0.24% GRADE  
 4.8m BASE 1.5:1 SIDE SLOPES  
 0.54m DEEP W/ 6.45m TOP WIDTH  
 RADUIS TO CENTER OF CHANNEL  
 BANKS TO BE STABILIZED  
 THROUGH USE OF LIVE STAKES

6

TRIB TO MILE BRANCH

C  
A

SHEET 6B

LEGEND



DENOTES SURFACE WATER LOSS



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 14 OF 14

MATCH LINE SHEET 6D

BASIN #1  
TEMP. TYPE "A" SILT BASIN,  
W/800MM CSP RISER /BARRELL  
MIN SURFACE AREA = 332 SM  
MIN SURFACE VOL = 370 CM

10.2M BASE  
STEPPED OUT CHANNEL

PROP 3 @ 3.4m x 2.4m RCBC  
SLOPE = 0.69%  
SILLS ARE USED

MATCH LINE SHEET 6B

MILE BRANCH

33+60

SAND BAGS SHALL BE USED TO CONTAIN  
EMERGENCY RUNOFF WITHIN THE SPILL  
BASIN

0.6M LAT BASE DITCH W/  
CLASS 'B' RIPRAP

SILL

CL 'B' RIPRAP  
W/ FILTER FABRIC

EMERGENCY  
SPILL BASIN  
SEE DETAIL

SHEET 6C

PROPOSED CHANNEL  
CHANGE

PLAN VIEW  
SITE 6

LEGEND



DENOTES SURFACE  
WATER LOSS



DENOTES TEMPORARY  
SURFACE WATER LOSS



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

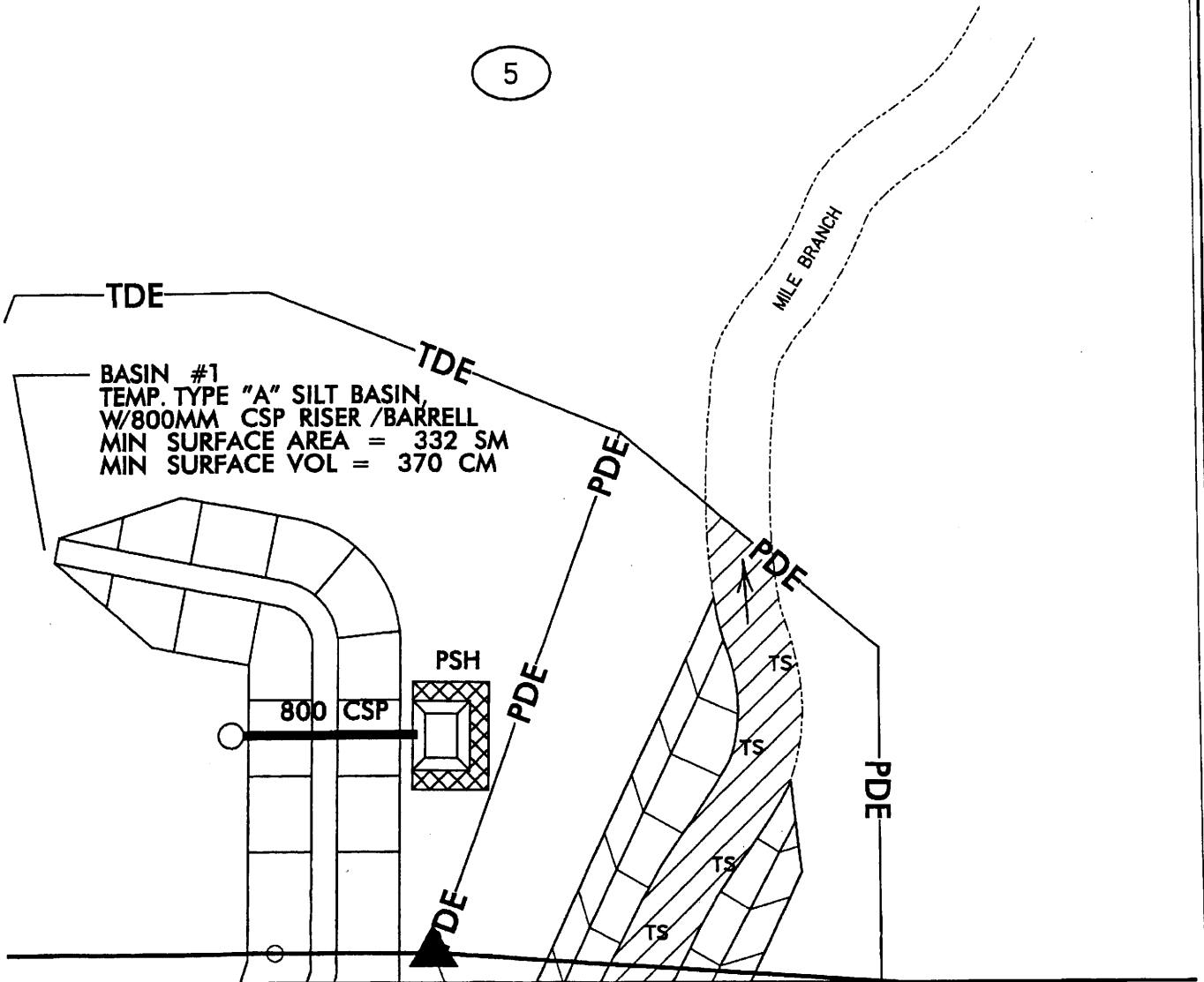
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

19 74  
SHEET OF



5



**BASIN #1**  
 TEMP. TYPE "A" SILT BASIN,  
 W/800MM CSP RISER /BARRELL  
 MIN SURFACE AREA = 332 SM  
 MIN SURFACE VOL = 370 CM

MATCH LINE SHEET 6c

PLAN VIEW  
SITE 6

LEGEND



DENOTES SURFACE  
WATER LOSS



DENOTES TEMPORARY  
SURFACE WATER LOSS



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

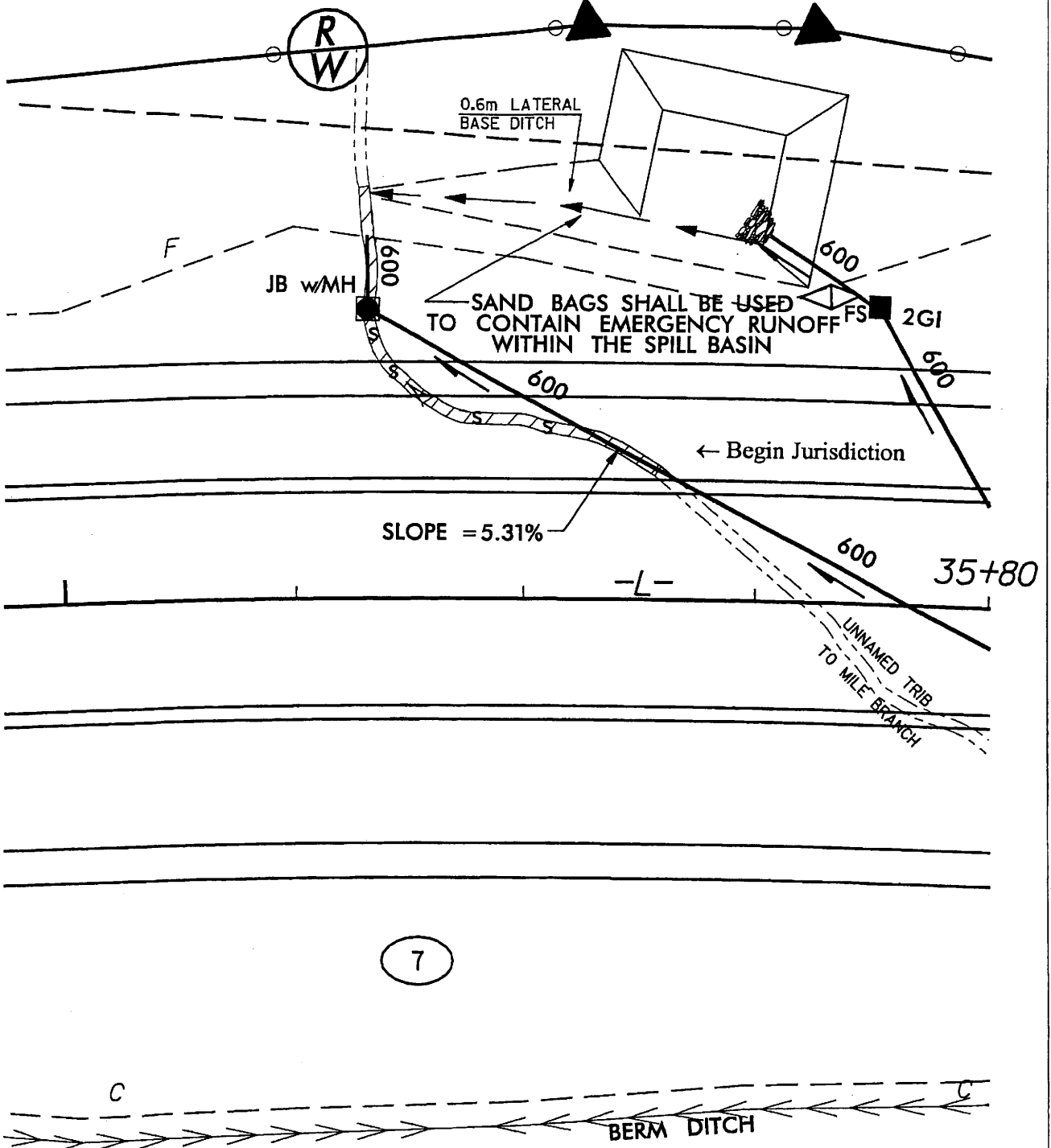
GUILFORD COUNTY  
8.1570801 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 20 OF 74

567



SHEET 7

PLAN VIEW SITE 7



LEGEND



DENOTES SURFACE WATER LOSS



SCALE AS SHOWN

NORTH CAROLINA DIVISION OF HIGHWAYS

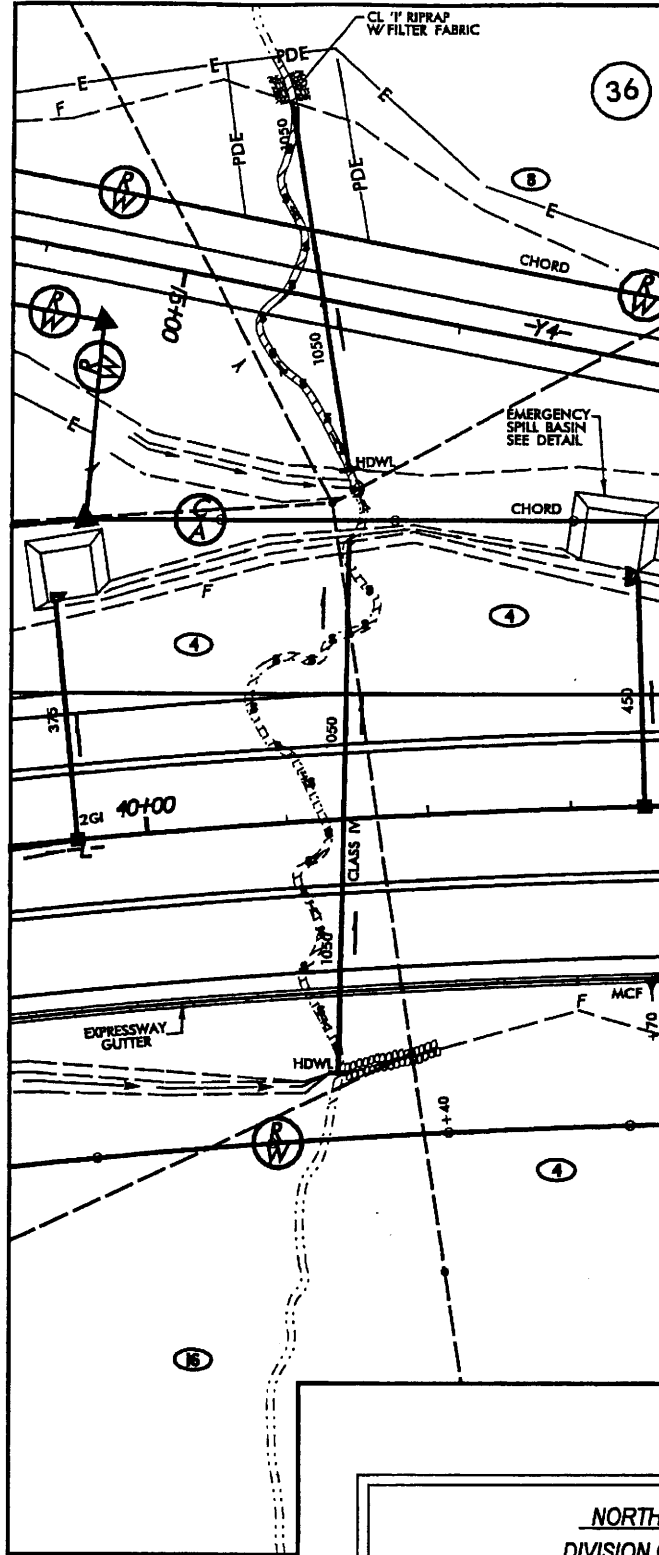
GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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SHEET 7 OF 7

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8A

8B



SHEET LAYOUT  
 PLAN VIEW  
 SITE 8

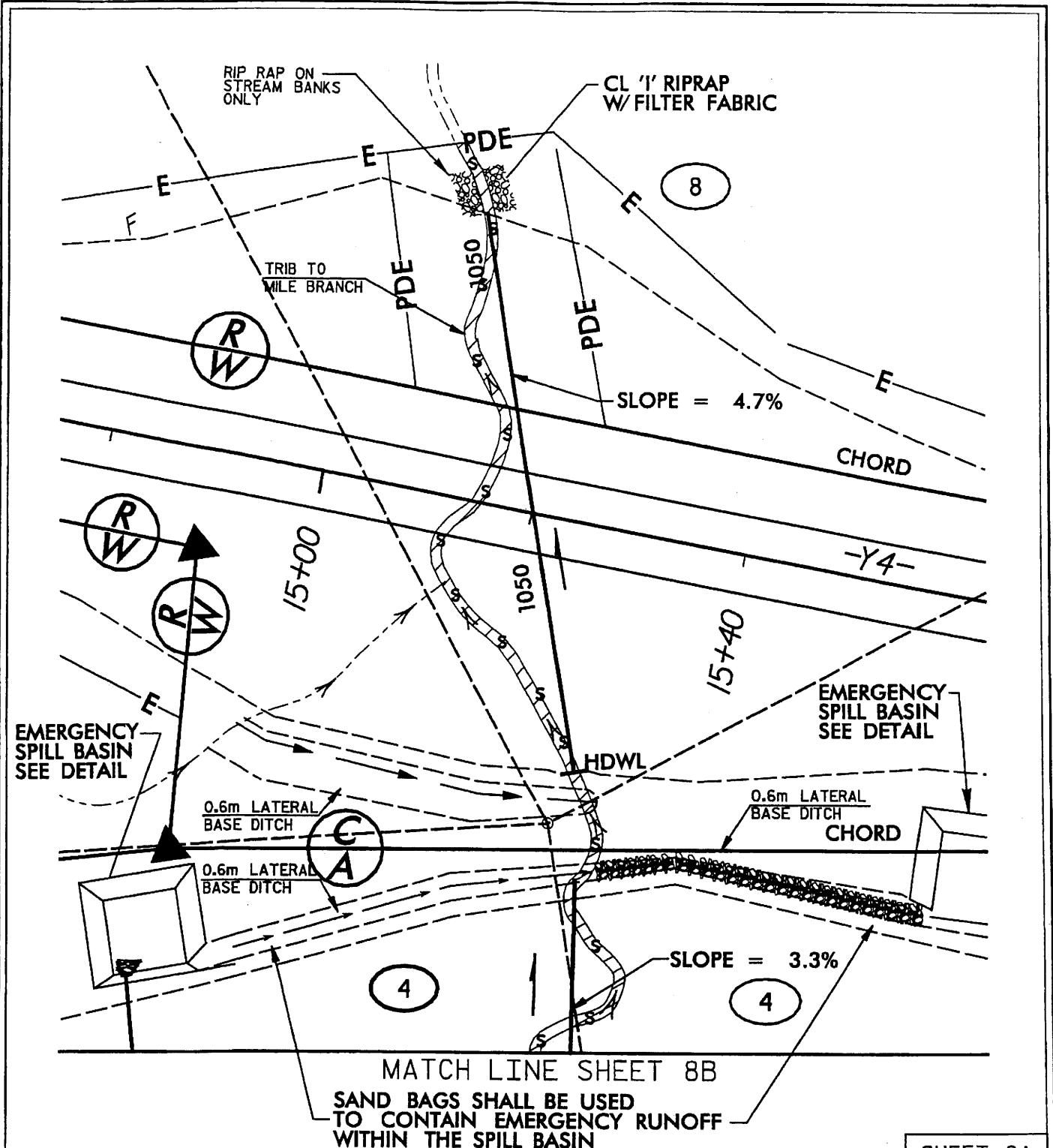


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 R.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 22 OF 174



MATCH LINE SHEET 8B  
 SAND BAGS SHALL BE USED  
 TO CONTAIN EMERGENCY RUNOFF  
 WITHIN THE SPILL BASIN

SHEET 8A

PLAN VIEW  
 SITE 8



LEGEND

DENOTES SURFACE WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

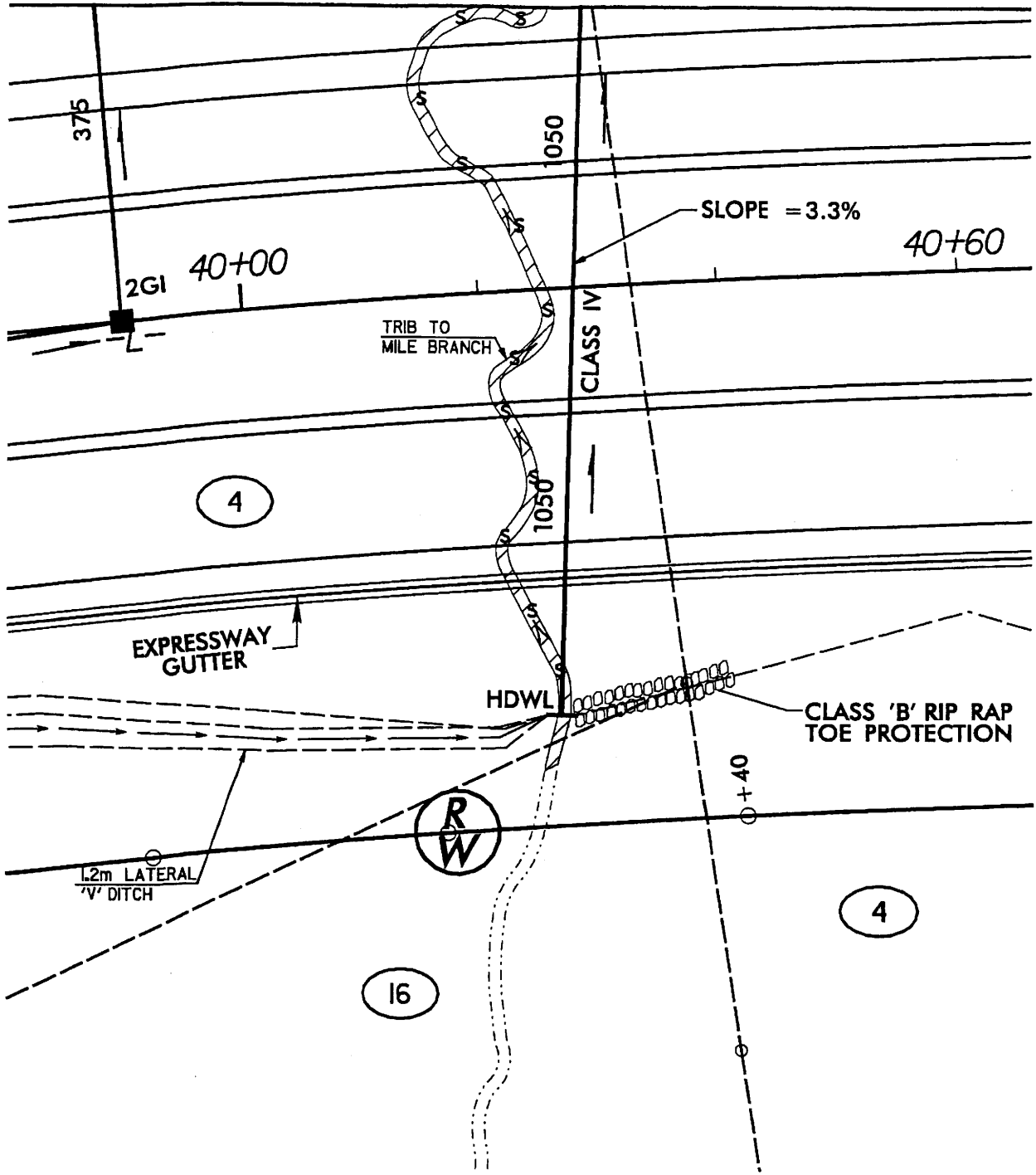
GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 23 OF 174

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MATCH LINE SHEET 8A

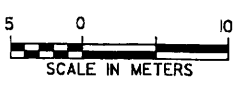


SHEET 8B

PLAN VIEW  
SITE 8

LEGEND

 DENOTES SURFACE WATER LOSS

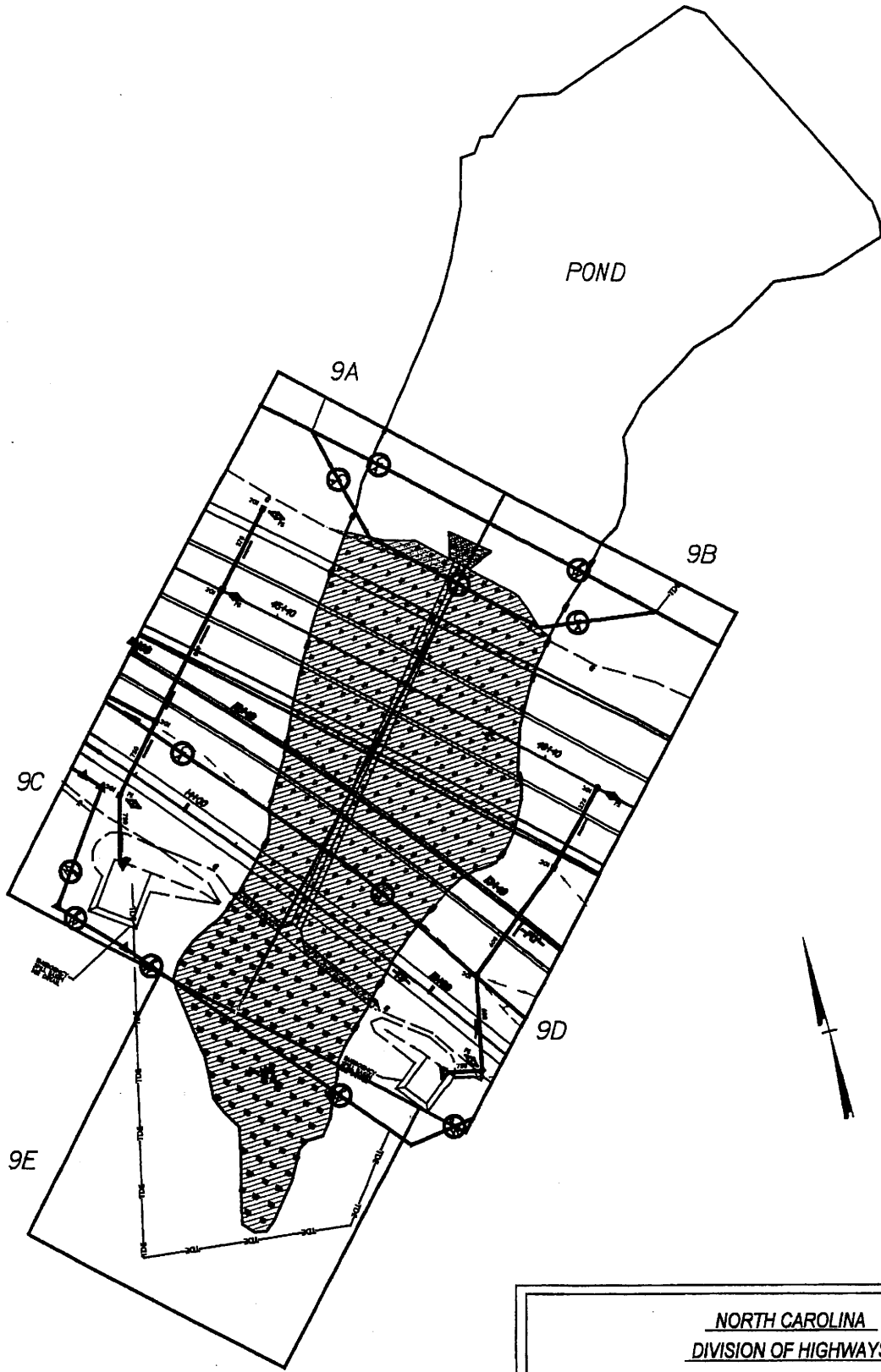


NORTH CAROLINA  
DIVISION OF HIGHWAYS

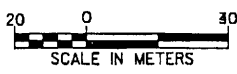
GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

24  
74  
SHEET    OF



SHEET LAYOUT  
 PLAN VIEW  
 SITE 9



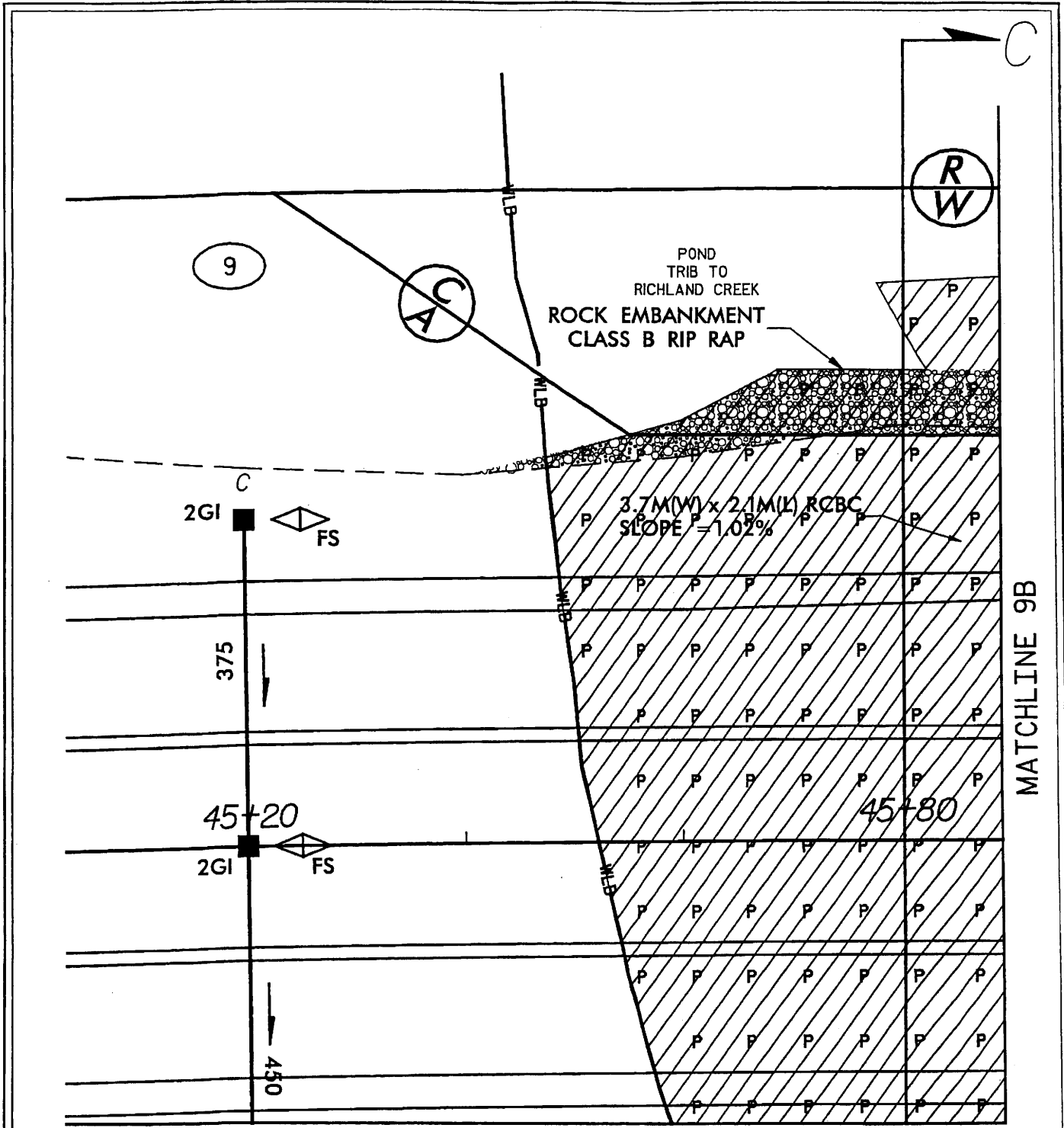
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

25  
 SHEET OF 74

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MATCHLINE 9C

MATCHLINE 9B

SHEET 9A

PLAN VIEW SITE 9

**LEGEND**

—WLB— WETLAND

DENOTES FILL IN POND



5 0 10  
SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

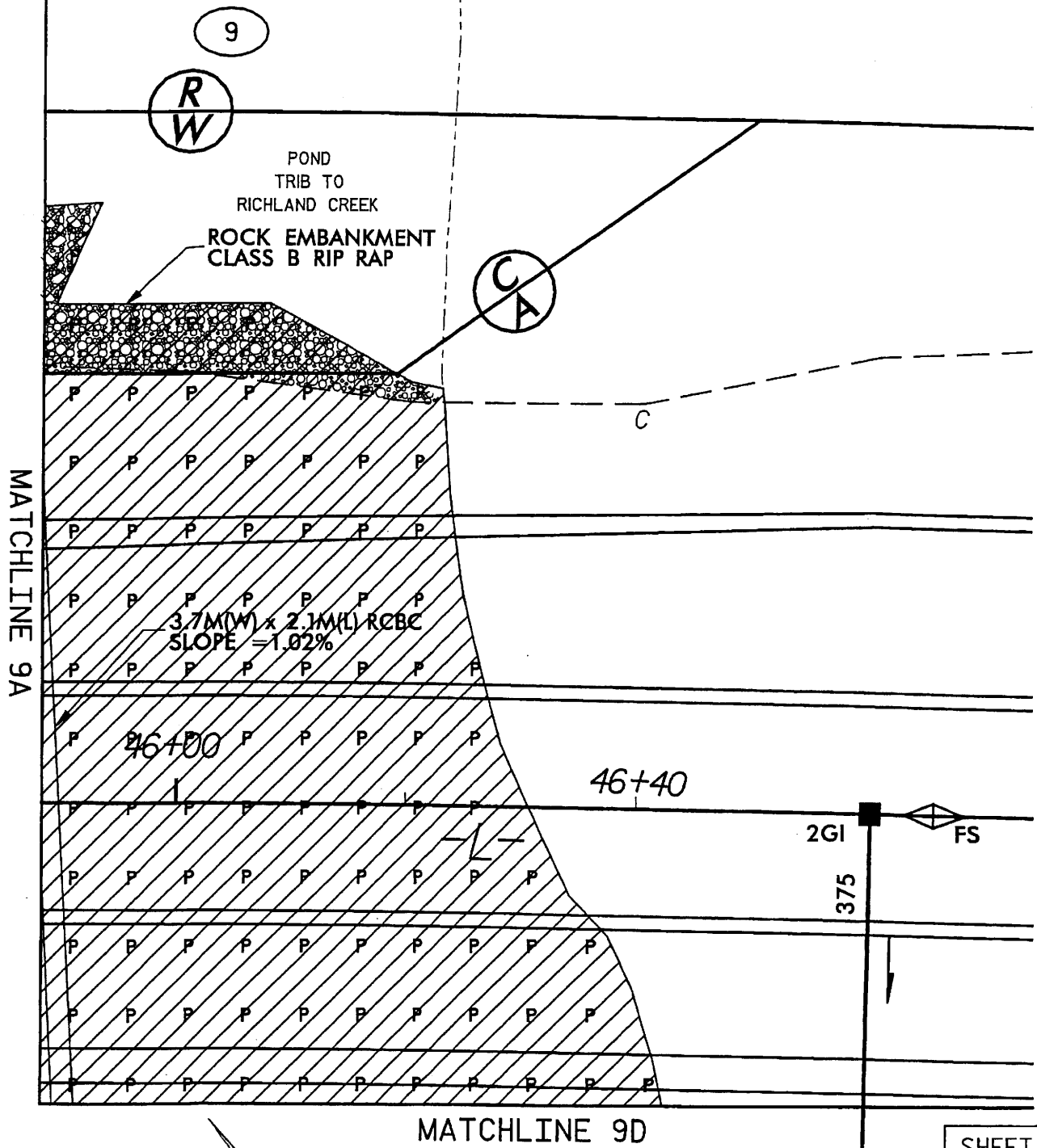
GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 9A OF 74

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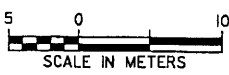
MATCHLINE 9A

MATCHLINE 9D

SHEET 9B

PLAN VIEW  
SITE 9

- LEGEND**
- WLB WETLAND
  - DENOTES FILL IN POND



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 9B OF 74

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MATCHLINE 9A

12+00

-FLY-

12+50

13+60

750

14+00

-Y5-

MATCHLINE 9D

ROCK EMBANKMENT  
CLASS B RIPRAP

CL 'B' RIPRAP  
W/FILTER FABRIC

0.6M LAT BASE DITCH

9



MATCHLINE 9D

SAND BAGS SHALL BE USED  
TO CONTAIN EMERGENCY RUNOFF  
WITHIN THE SPILL BASIN

SHEET 9C

PLAN VIEW  
SITE 9

LEGEND

- WLB WETLAND
- DENOTES FILL IN POND
- DENOTES TEMPORARY FILL IN SURFACE WATER (POND)



NORTH CAROLINA  
DIVISION OF HIGHWAYS

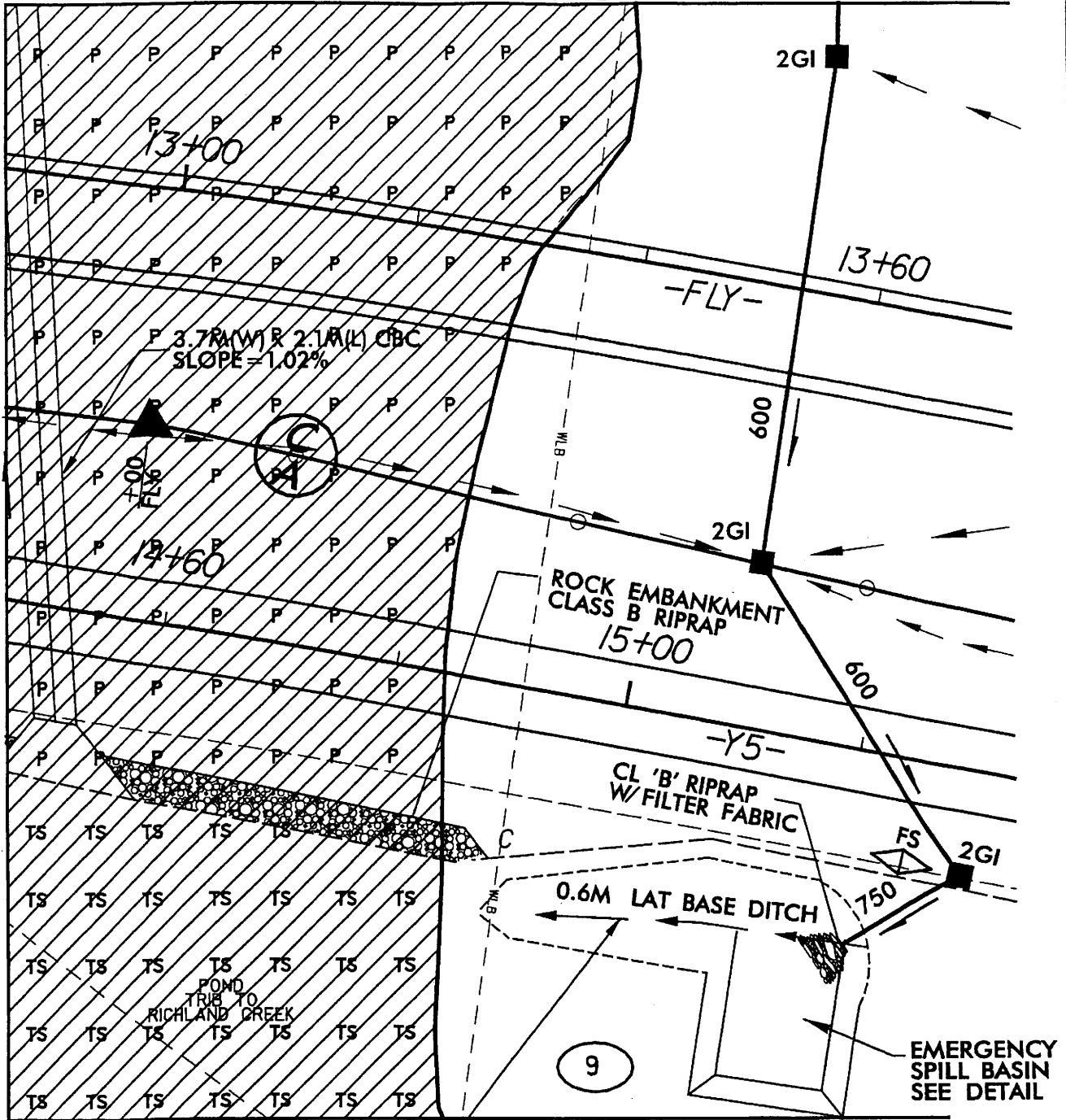
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 9C OF 14

MATCHLINE 9B

MATCHLINE 9C



MATCHLINE 9E

SAND BAGS SHALL BE USED TO CONTAIN EMERGENCY RUNOFF WITHIN THE SPILL BASIN

SHEET 9D

### PLAN VIEW SITE 9

#### LEGEND

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



NORTH CAROLINA  
DIVISION OF HIGHWAYS

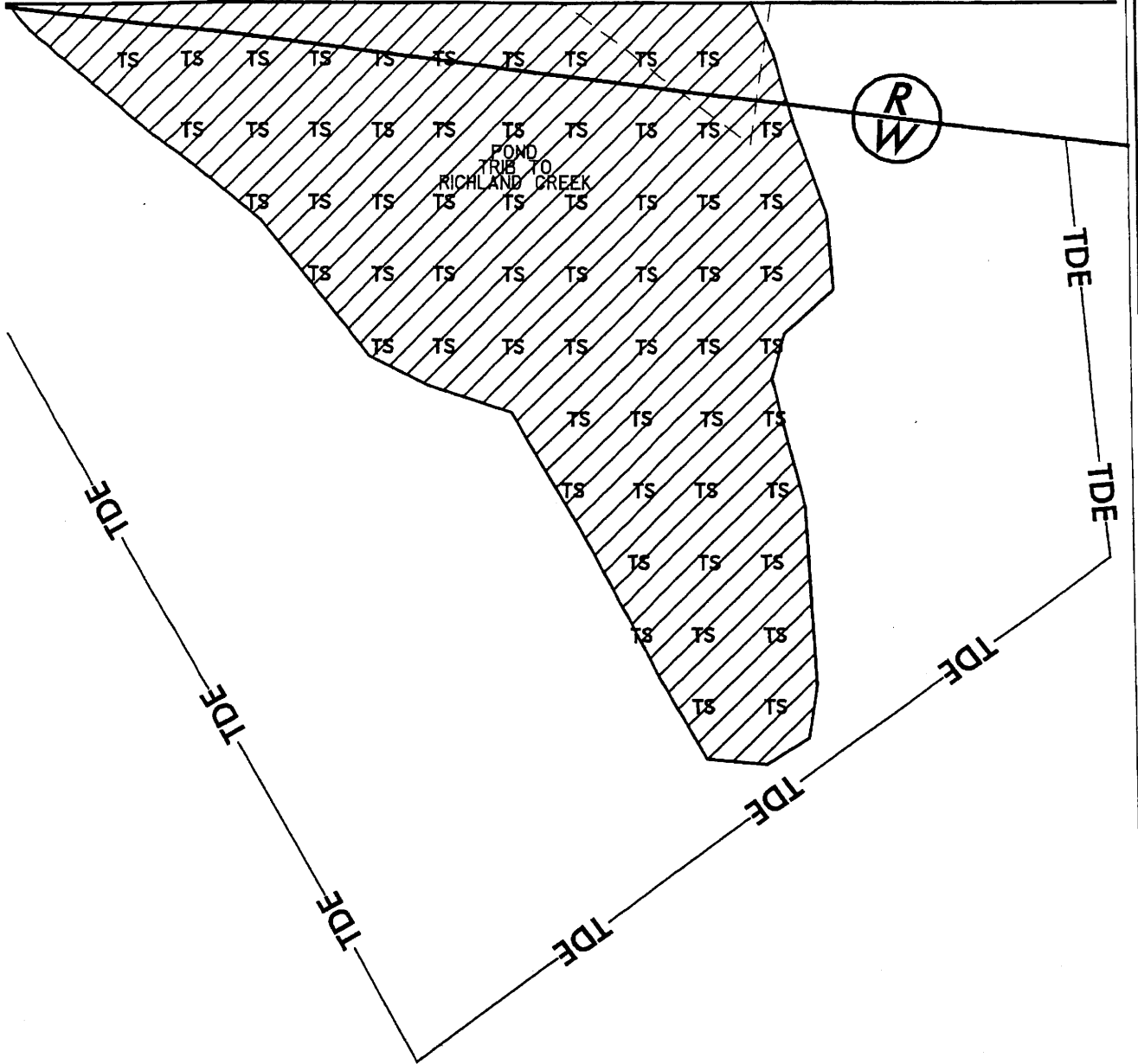
GUILFORD COUNTY  
 8.1570801 (R-08091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 9D OF 95

MATCHLINE 9C

MATCHLINE 9D



PLAN VIEW  
SITE 9

SHEET 9E

LEGEND

— WLB — WETLAND



DENOTES TEMPORARY  
FILL IN SURFACE WATER  
(POND)



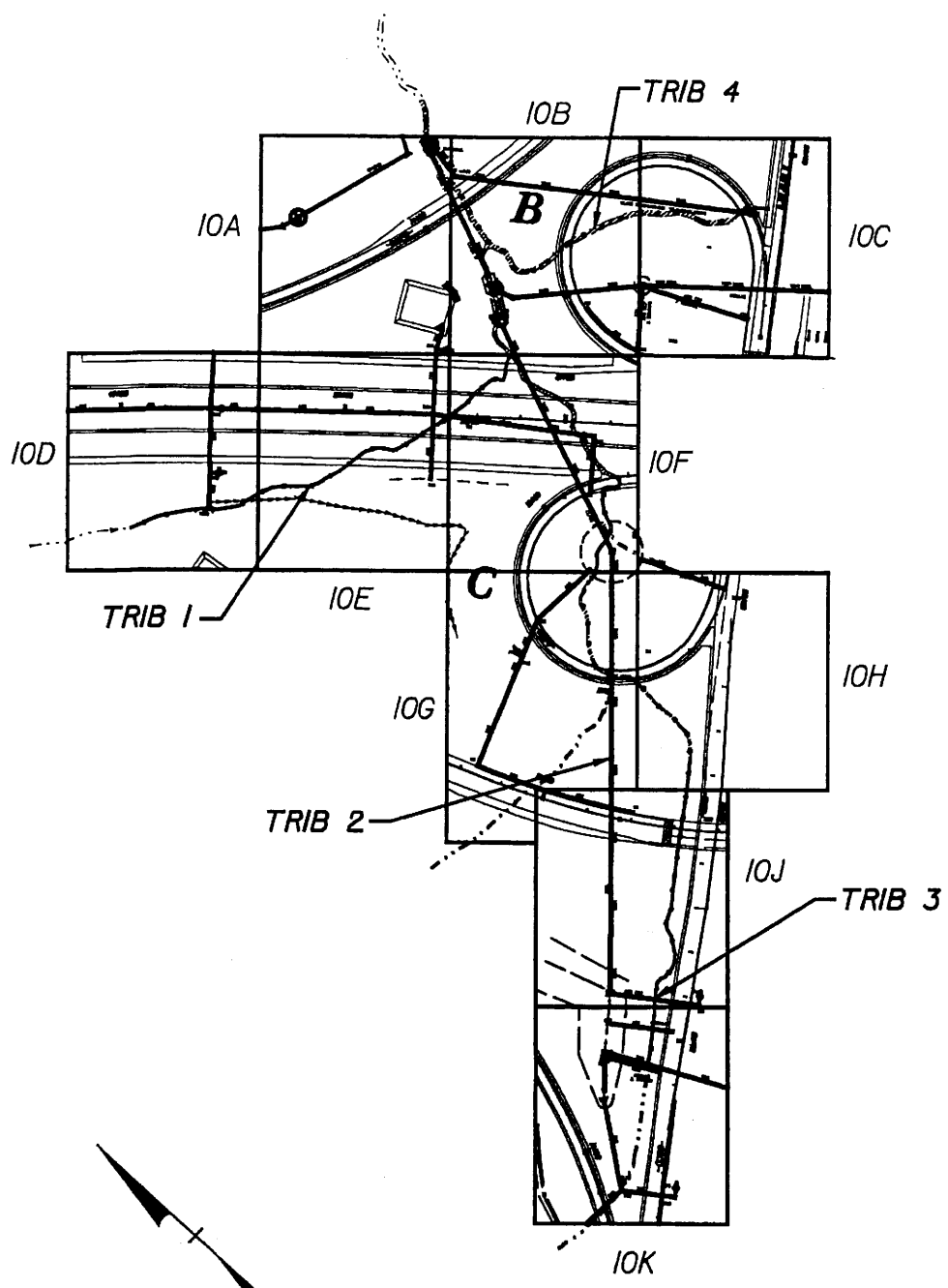
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)

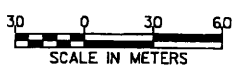
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 30 OF 174



SHEET LAYOUT  
 PLAN VIEW  
 SITE 10



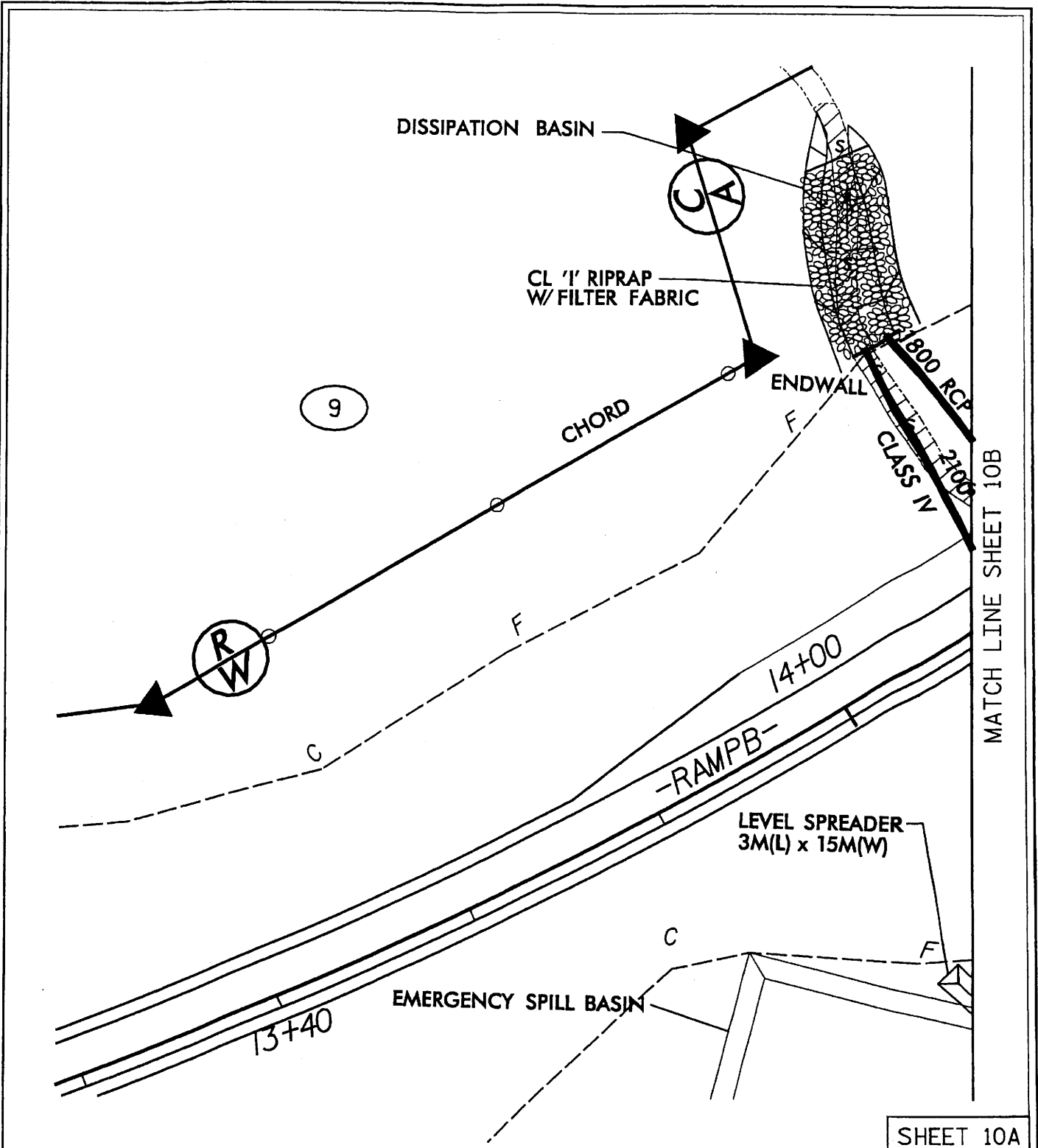
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

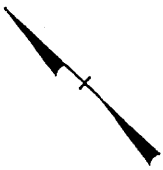
SHEET    OF   

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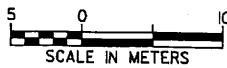
PLAN VIEW  
SITE 10

SHEET 10A



LEGEND

 DENOTES SURFACE WATER LOSS



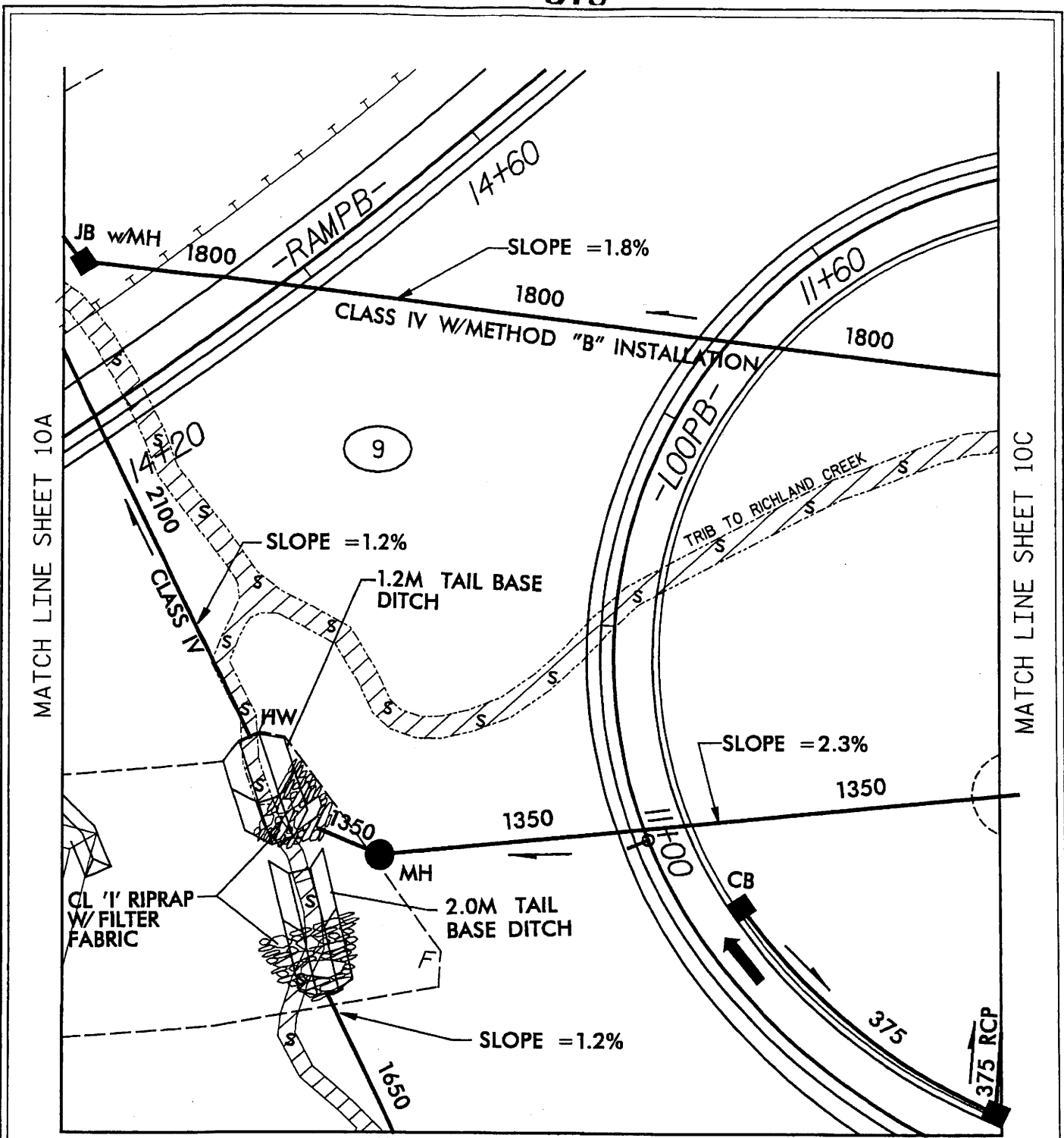
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

33 OF 71  
SHEET

7/3/2006 2:09:09 PM  
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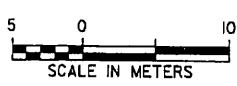
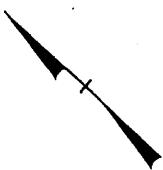
MATCH LINE SHEET 10A

MATCH LINE SHEET 10C


MATCH LINE SHEET 10F

SHEET 10B

PLAN VIEW  
SITE 10



**LEGEND**

 DENOTES SURFACE WATER LOSS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

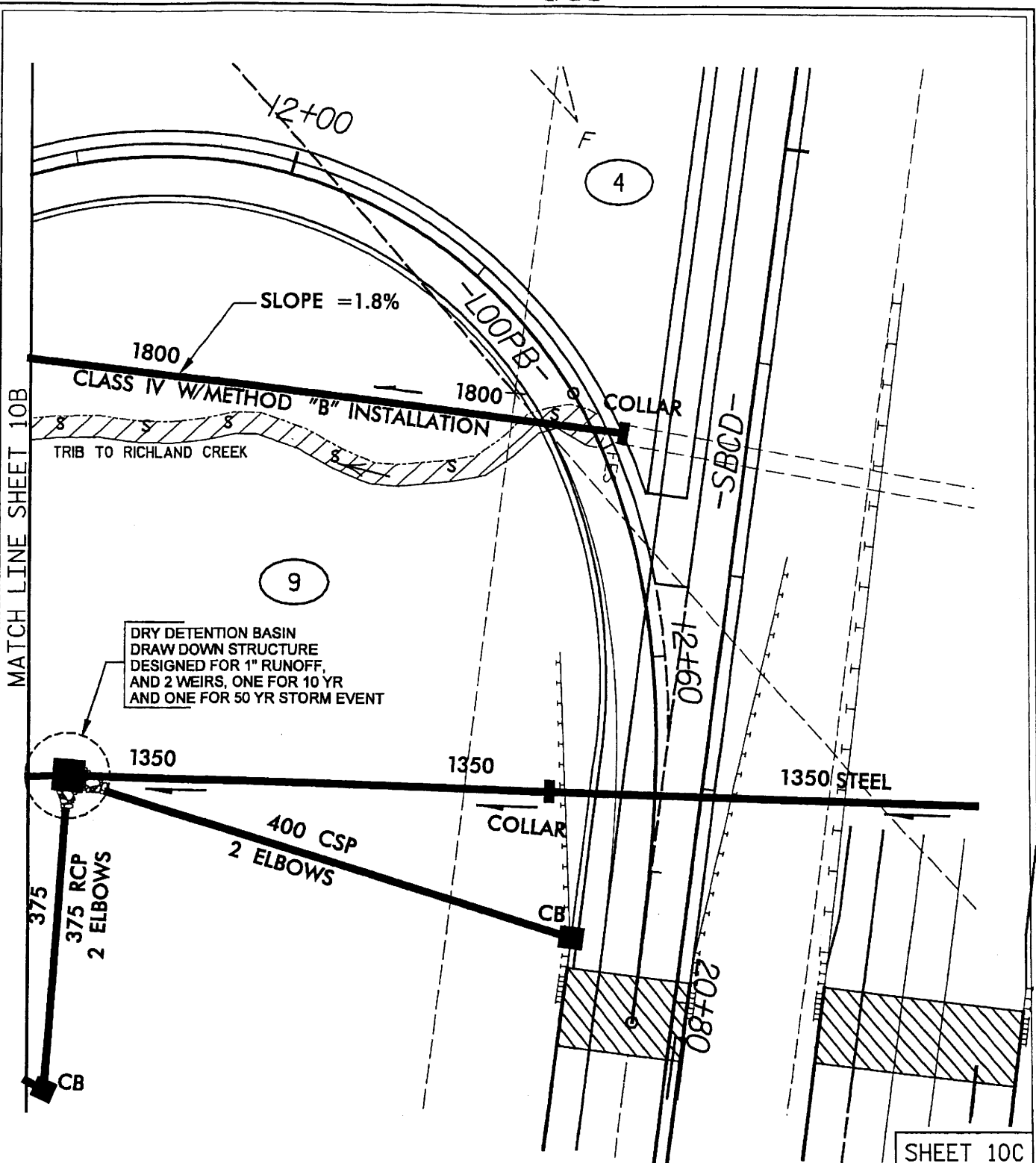
GUILFORD COUNTY  
8.1570601 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 10B OF 11

1/19/2006 9:34:59 AM  
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MATCH LINE SHEET 10B

PLAN VIEW  
SITE 10



LEGEND

DENOTES SURFACE WATER LOSS

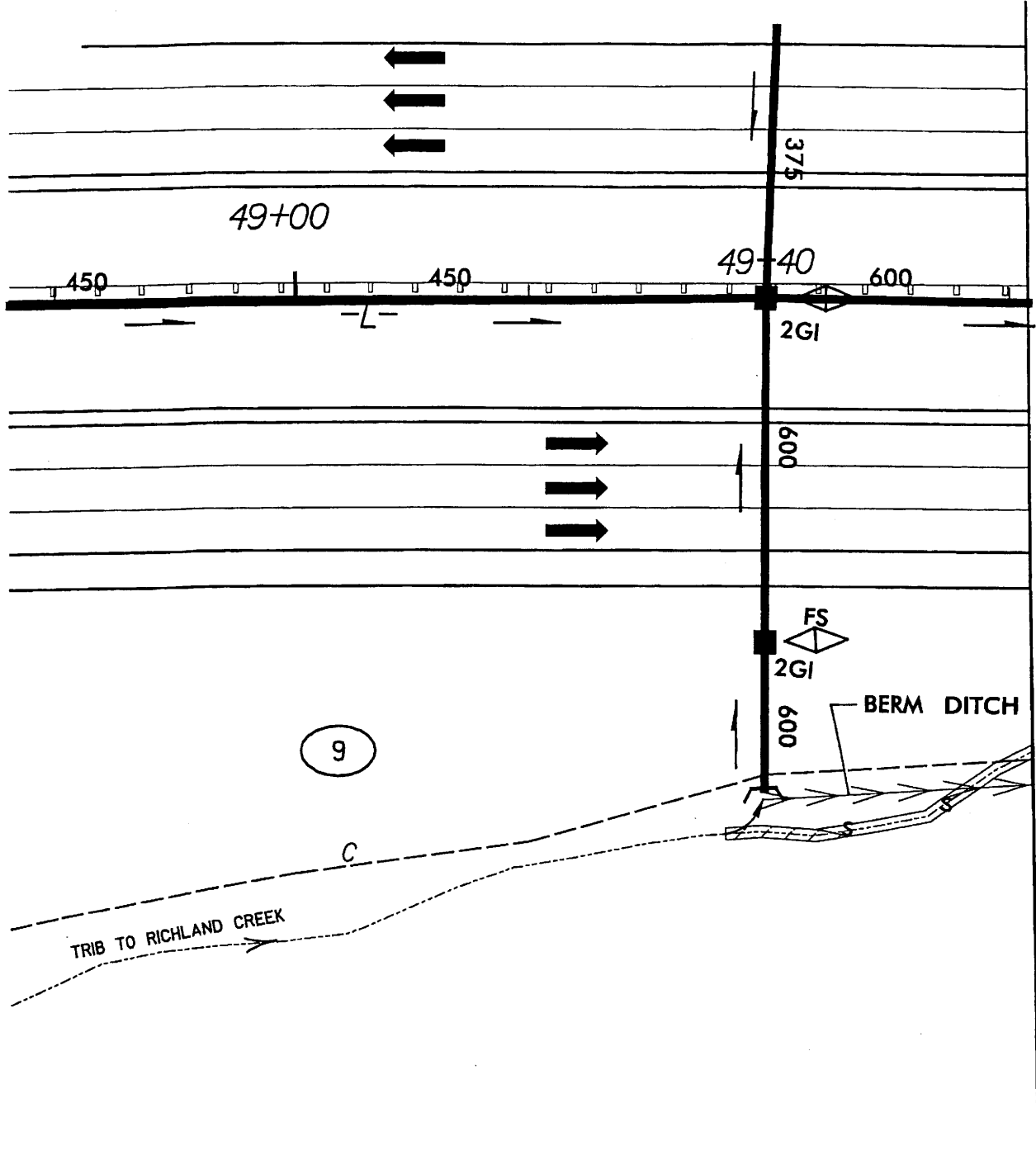


NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

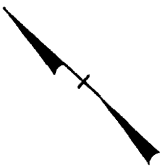
SCALE AS SHOWN

SHEET 10C OF 125



SHEET 10D

PLAN VIEW  
SITE 10



LEGEND

 DENOTES SURFACE WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

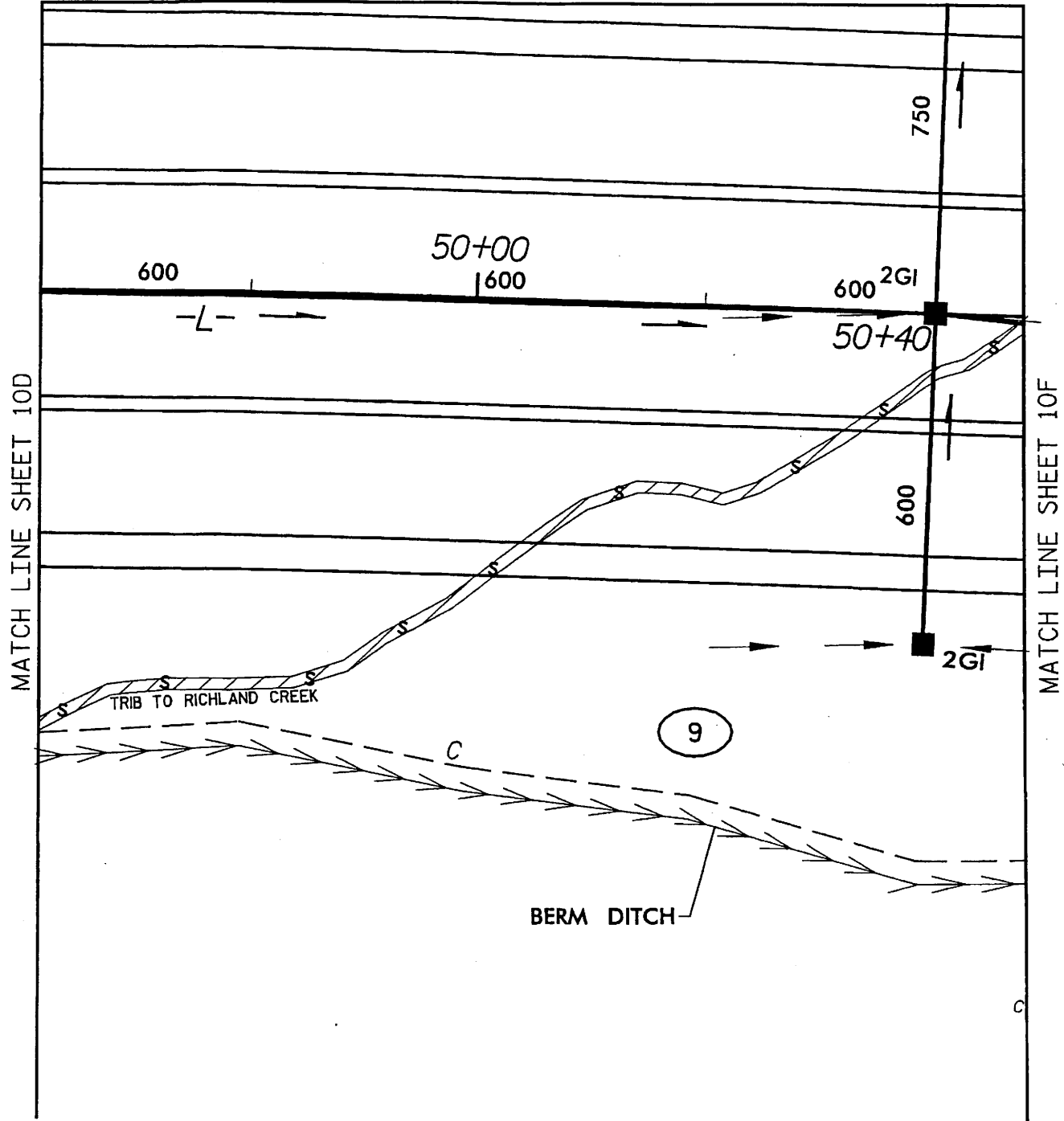
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 35 OF 74



MATCH LINE SHEET 10A



SHEET 10E

PLAN VIEW  
SITE 10





LEGEND

 DENOTES SURFACE WATER LOSS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

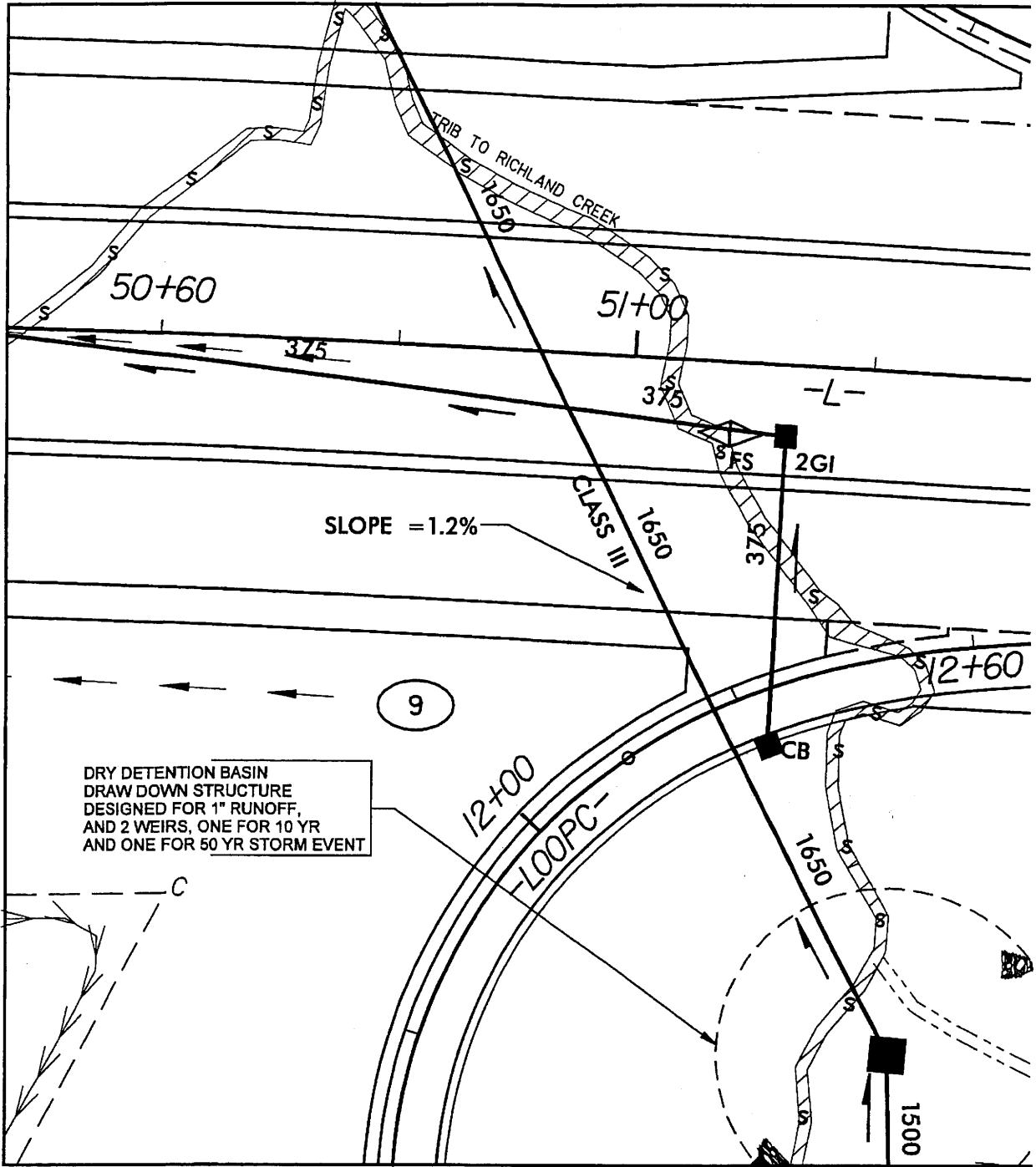
SCALE AS SHOWN

SHEET  OF 

1/6/2005  
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MATCH LINE SHEET 10B

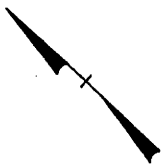
MATCH LINE SHEET 10E



MATCH LINE SHEET 10G

SHEET 10F

PLAN VIEW  
SITE 10



LEGEND

 DENOTES SURFACE  
WATER LOSS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

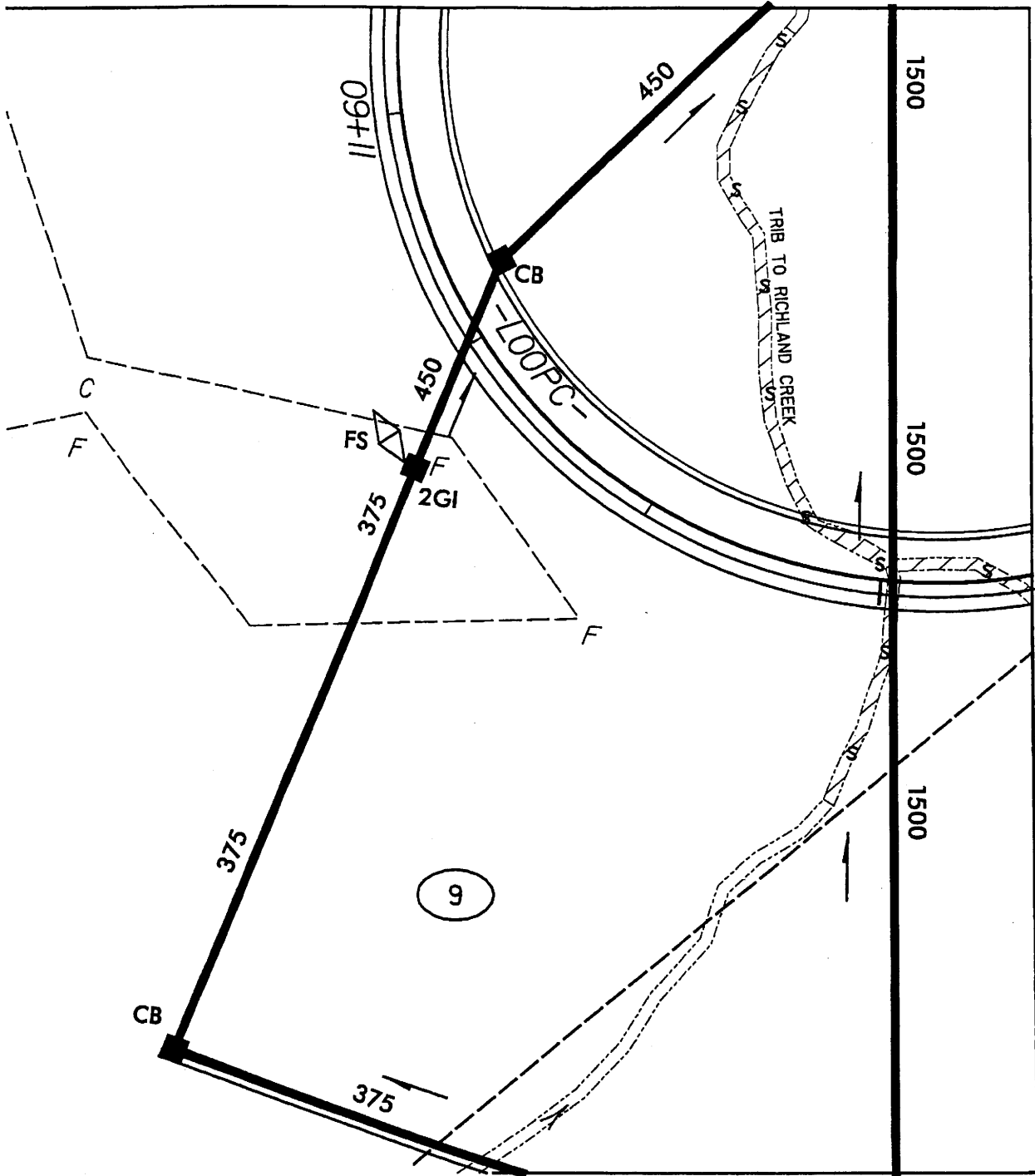
GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 2

MATCH LINE SHEET 10F



MATCH LINE SHEET 10H

MATCH LINE SHEET 10J

SHEET 10G

PLAN VIEW  
SITE 10



LEGEND



DENOTES SURFACE  
WATER LOSS



SCALE AS SHOWN

NORTH CAROLINA  
DIVISION OF HIGHWAYS

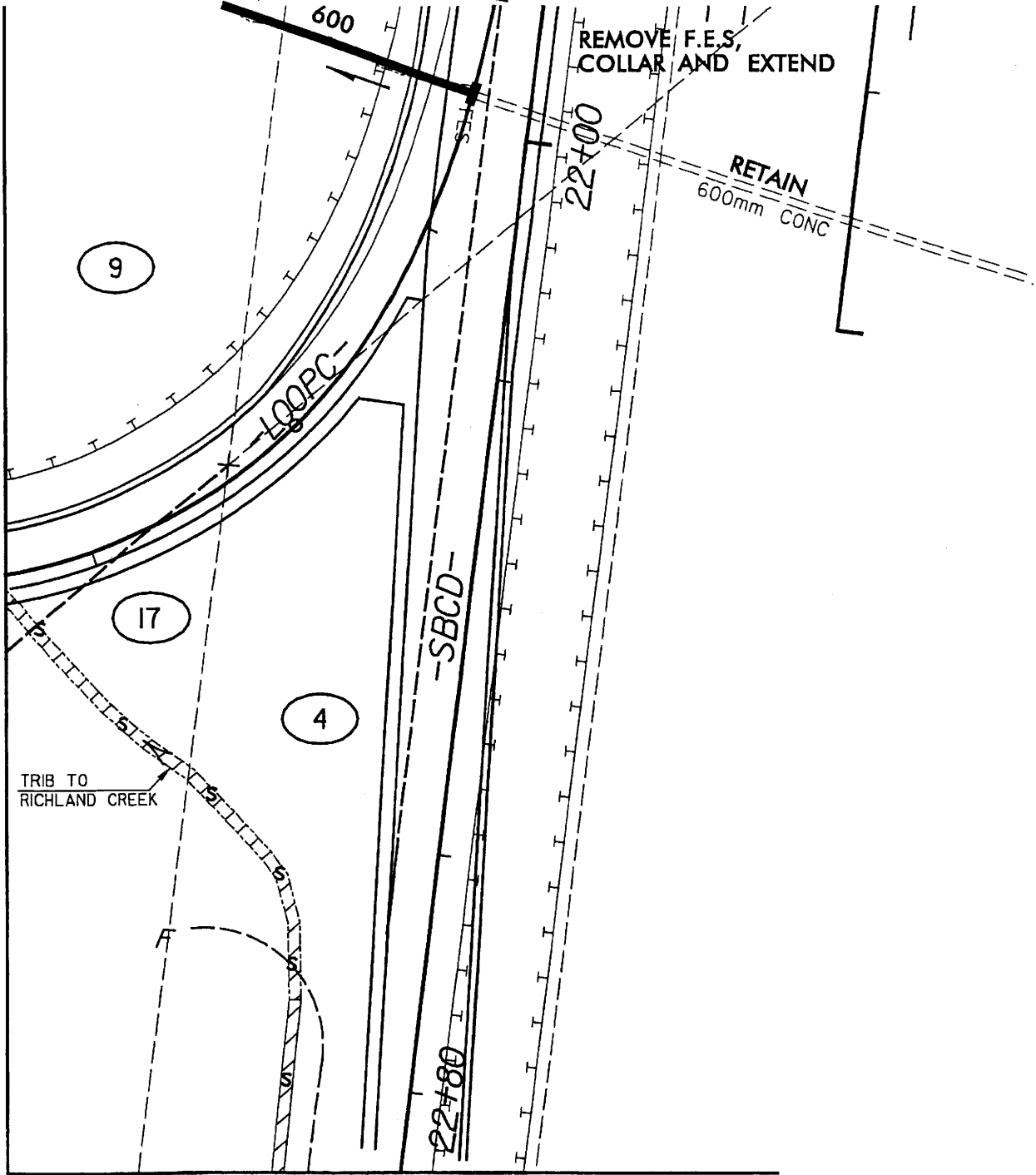
GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SHEET 10G  
OF 14

1/13/2006 2:26:45 PM R:\dgn\Roadway\proj\PERMITS\Westland\_Permit\8x\0609\wet\_10g.dwg

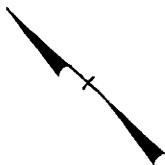
MATCH LINE SHEET 10K



MATCH LINE SHEET 10J

SHEET 10H

PLAN VIEW  
SITE 10



LEGEND



DENOTES SURFACE  
WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

29  
SHEET OF 24

MATCH LINE SHEET 10H

18+00

375

1500

CB

-FLY-

23+00

1500

4

17

R/W  
MON

0.6m LATERAL  
BASE DITCH

EXISTING R/W

1500

HDWL 400 CSP

23+80

FS

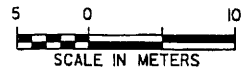
2GI

MATCH LINE SHEET 10K

1.2m LATERAL  
BASE DITCH

SHEET 10J

PLAN VIEW  
SITE 10



LEGEND

DENOTES SURFACE  
WATER LOSS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

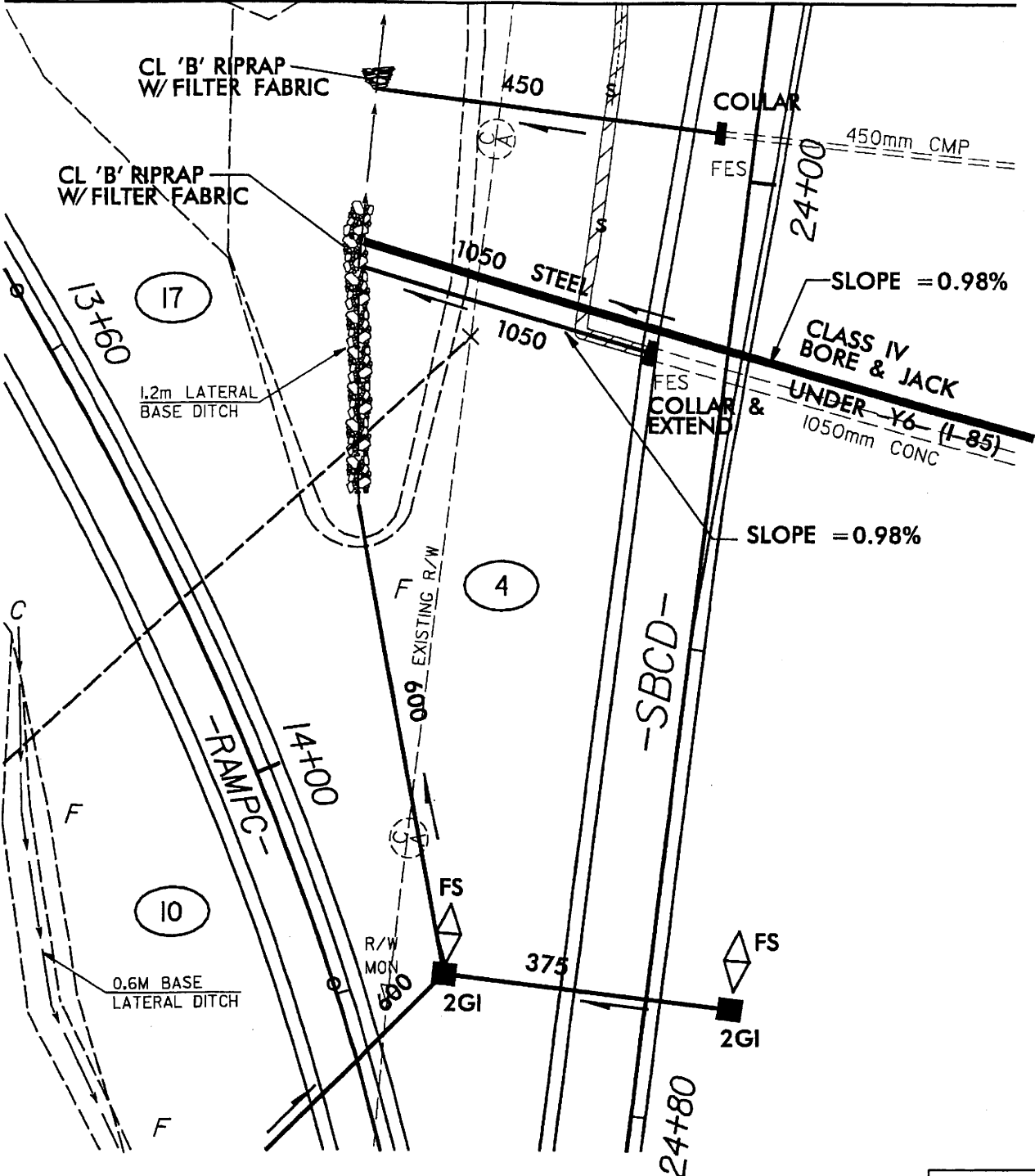
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

48  
SHEET OF 74

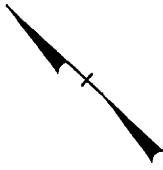
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MATCH LINE SHEET 10J



SHEET 10K

PLAN VIEW  
SITE 10



LEGEND

 DENOTES SURFACE WATER LOSS



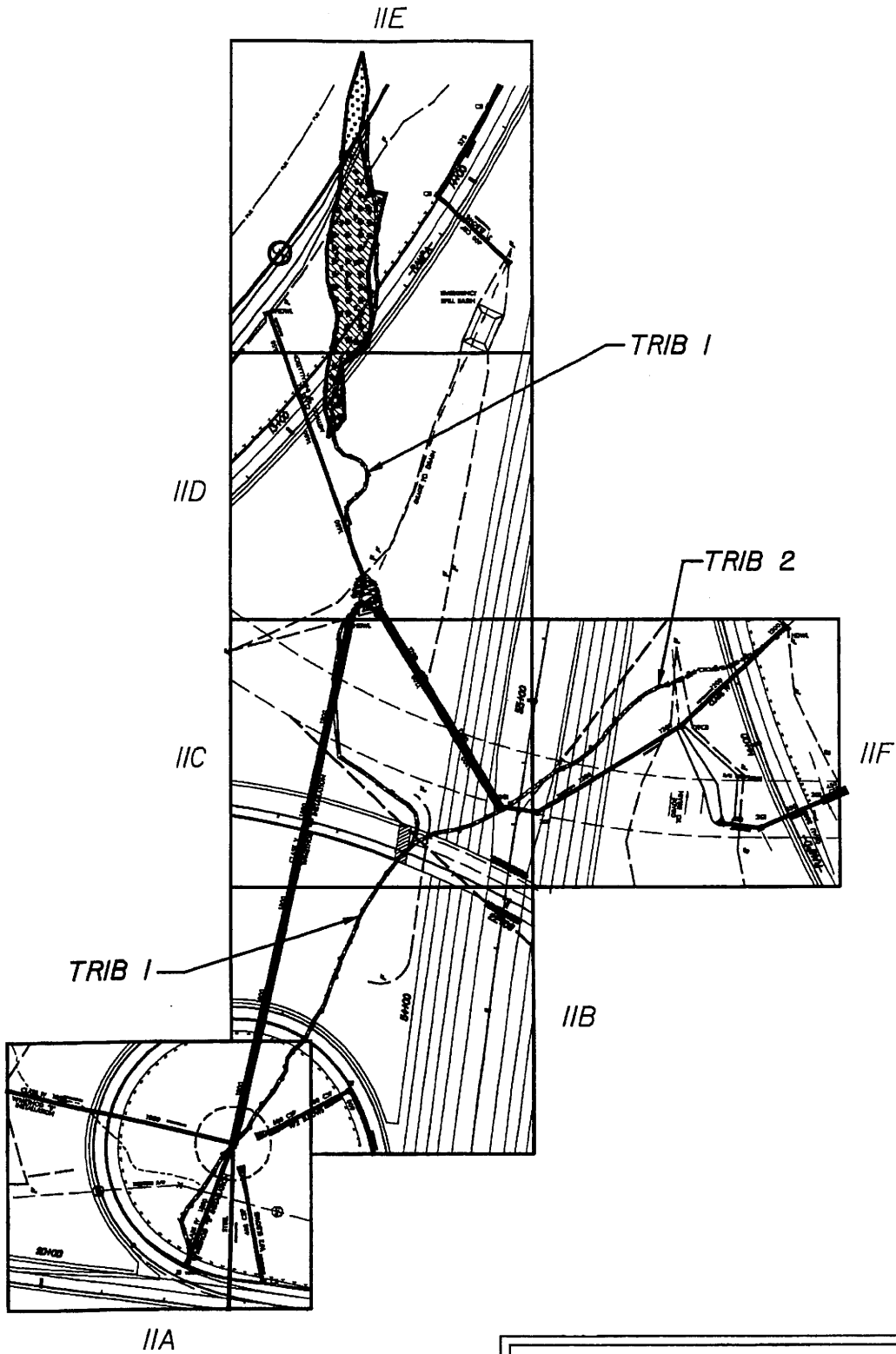
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

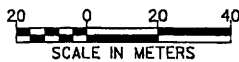
SCALE AS SHOWN

SHEET 10K OF 14

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SHEET LAYOUT  
PLAN VIEW  
SITE II



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-08091A)

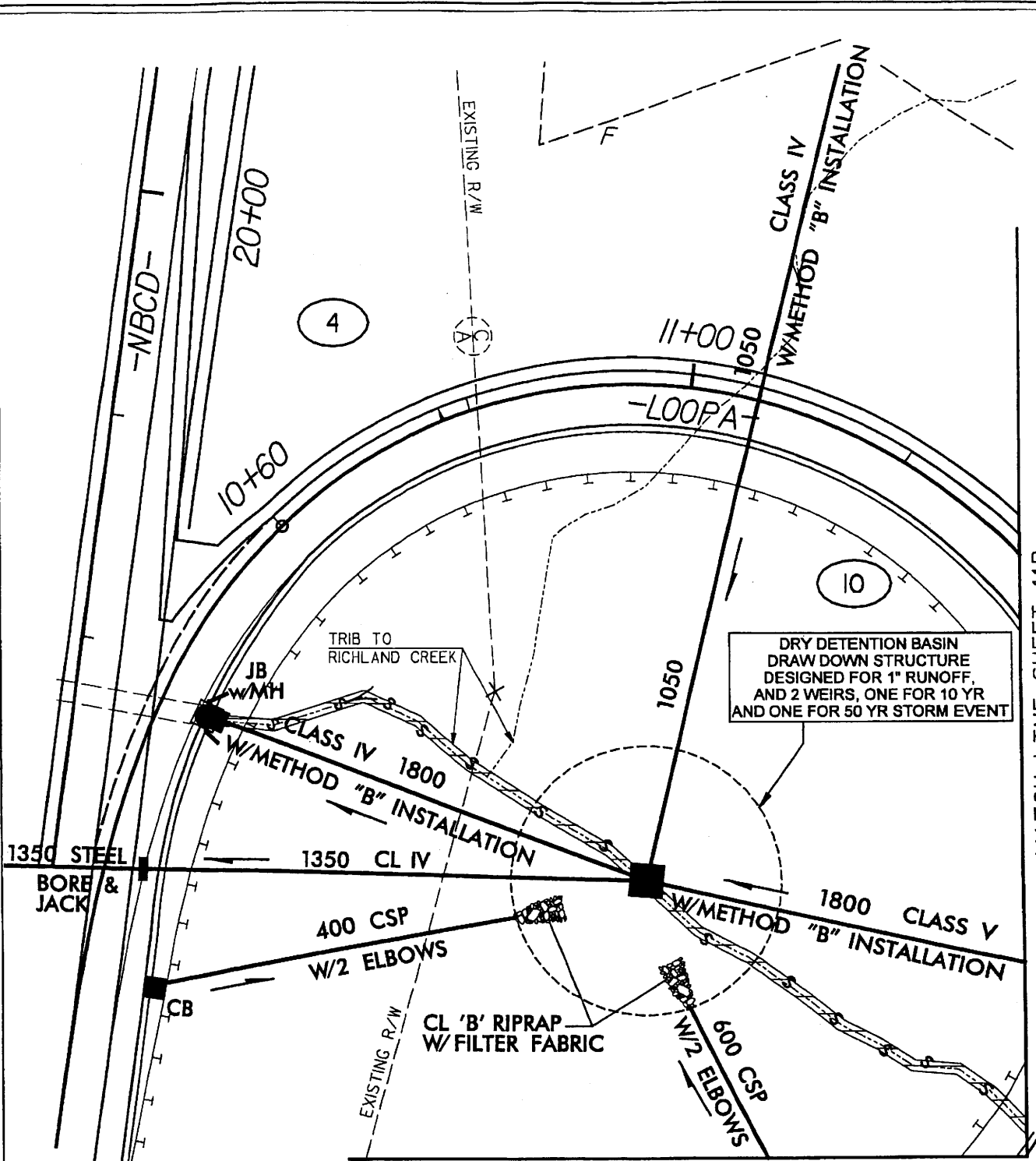
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 42 OF 74

1/13/2006 3:03 PM R:\dm\Roadway\proj\PERMITS\Westford\Permit\A\0609\swt\_1\_102.dwg

MATCH LINE SHEET 11B



1350 STEEL BORE & JACK

400 CSP W/2 ELBOWS

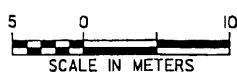
1800 CLASS V W/METHOD 'B' INSTALLATION

DRY DETENTION BASIN DRAW DOWN STRUCTURE DESIGNED FOR 1" RUNOFF, AND 2 WEIRS, ONE FOR 10 YR AND ONE FOR 50 YR STORM EVENT

SHEET 11A

MATCH LINE SHEET 11B

PLAN VIEW SITE 11



LEGEND

SS DENOTES SURFACE WATER LOSS

NORTH CAROLINA DIVISION OF HIGHWAYS

GUILFORD COUNTY 8.1570801 (R-08091A)

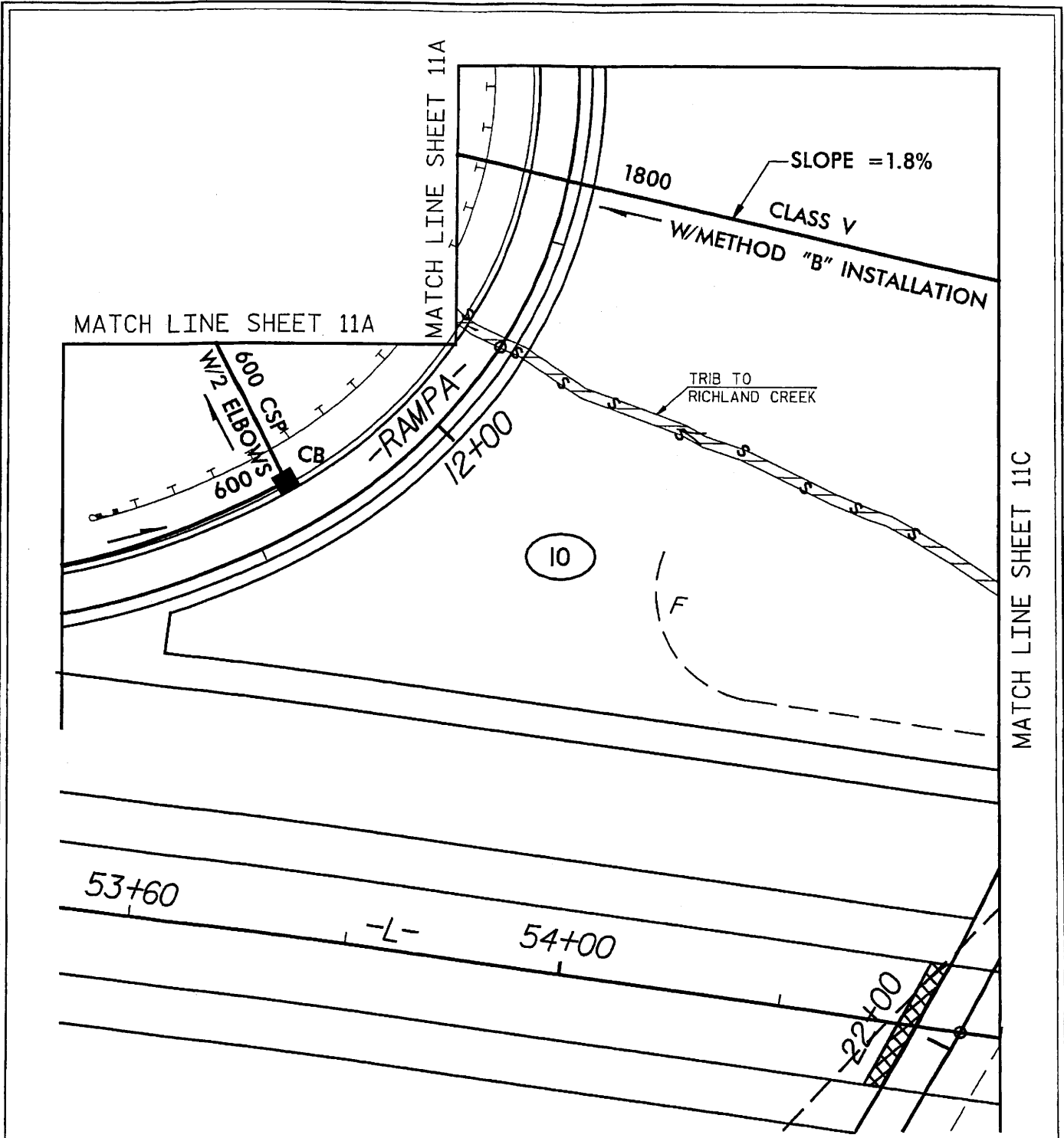
US 311 HIGH POINT EAST BELTWAY FROM US 29-70 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 43 OF 74

7/9/2006 14:05:59 AM E:\gpn\Roadway\proj\PERMITS\Wetland\_Permit\11\0609wef\_11a.pht





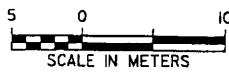
SHEET 11B

PLAN VIEW  
SITE 11



LEGEND

 DENOTES SURFACE WATER LOSS



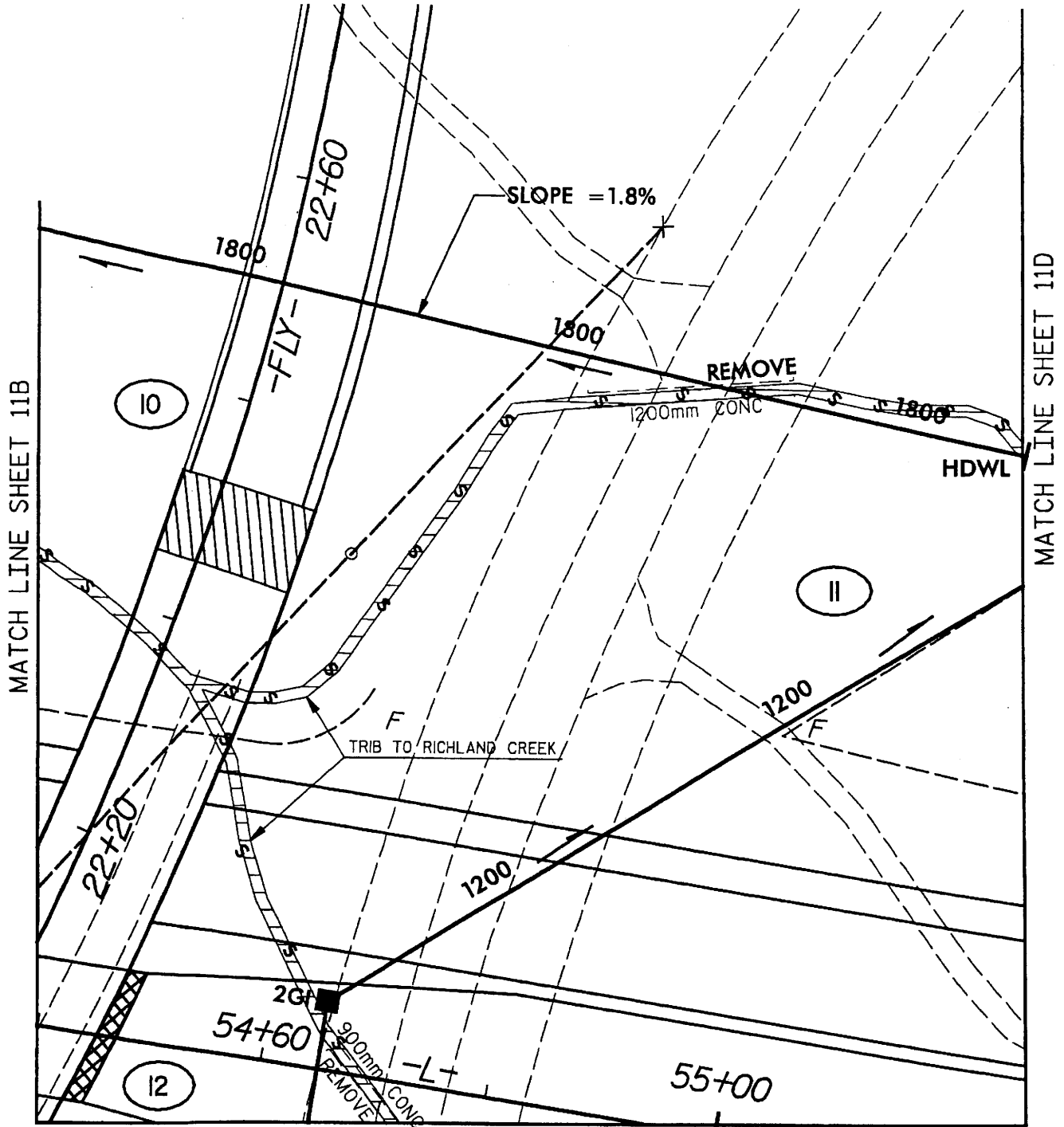
NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 11B OF 114

1/6/2005  
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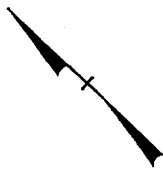
MATCH LINE SHEET 11B

MATCH LINE SHEET 11D

MATCH LINE SHEET 11F

SHEET 11C

PLAN VIEW  
SITE 11



LEGEND

DENOTES SURFACE WATER LOSS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

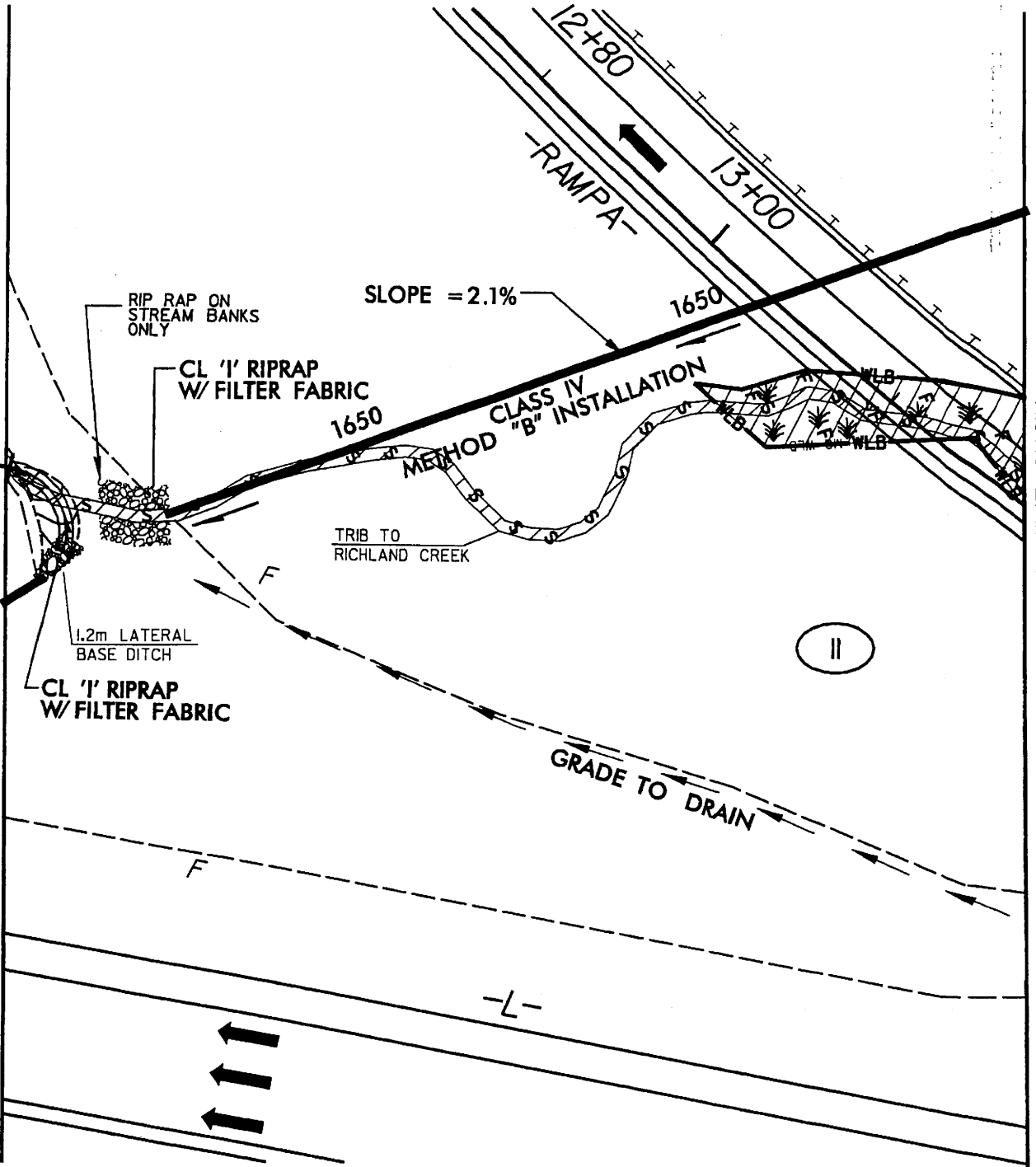
GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 11C OF 11

MATCH LINE SHEET 11C



MATCH LINE SHEET 11E



SHEET 11D

PLAN VIEW  
SITE 11

LEGEND

-  DENOTES FILL IN WETLAND
-  DENOTES SURFACE WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

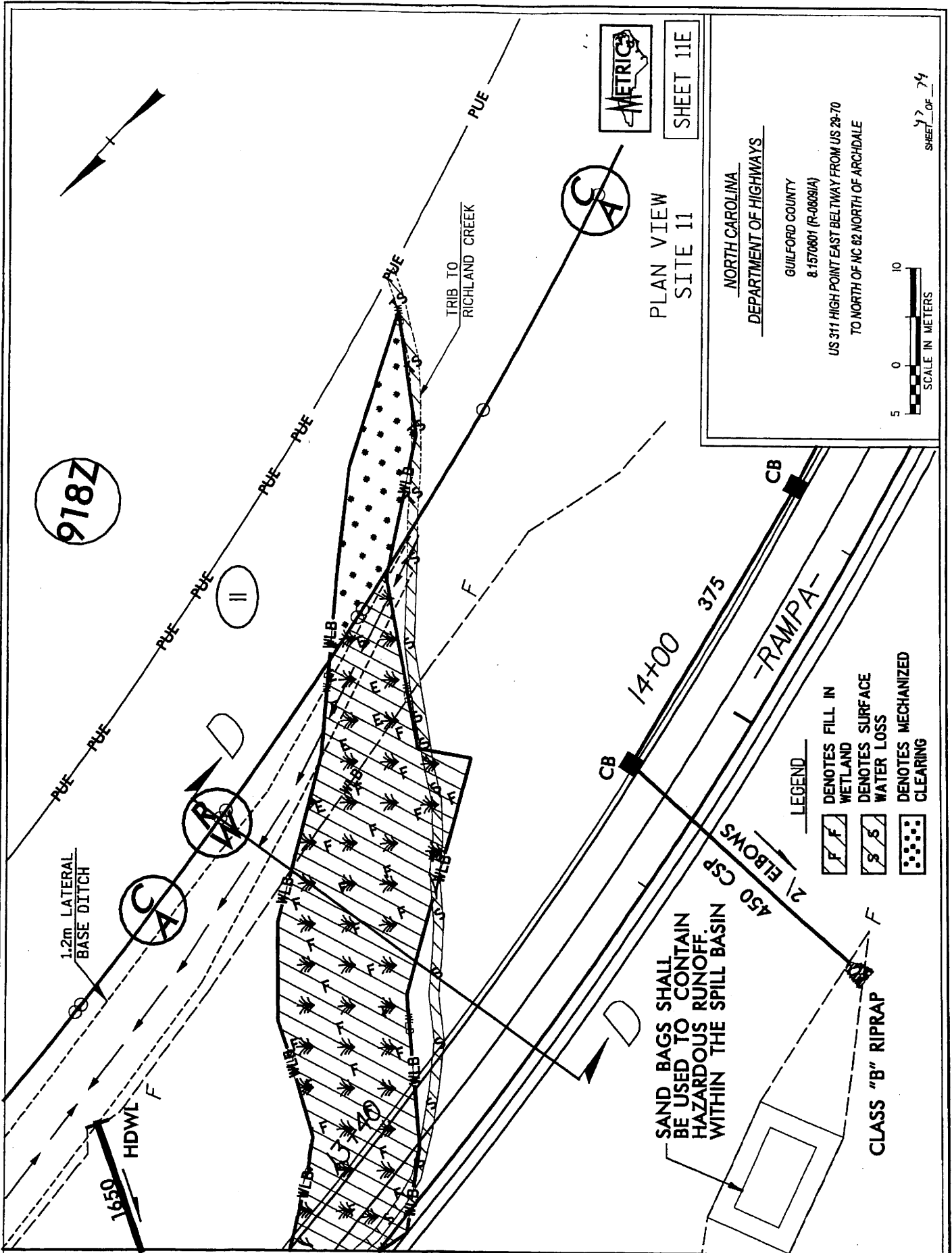
GUILFORD COUNTY  
 8.1570801 (R-08081A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 46 OF 74

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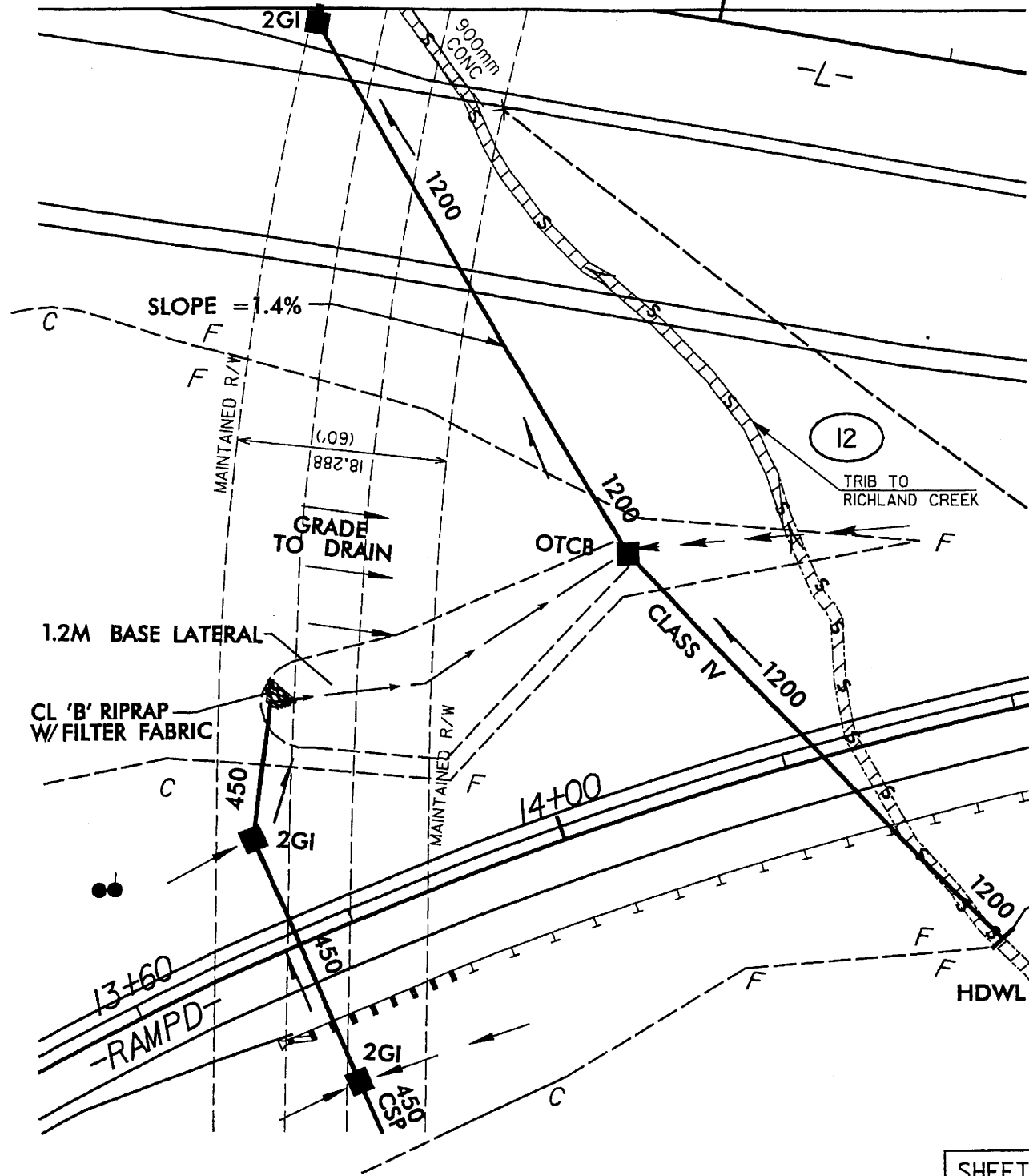
MATCH LINE SHEET 11D



SHEET 11E

SHEET OF 74

MATCH LINE SHEET 11C



SHEET 11F

PLAN VIEW  
SITE 11



LEGEND

 DENOTES SURFACE WATER LOSS

**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570801 (R-08091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

47  
SHEET OF 24

1/13/2006 2:51:24 PM R:\gdm\Roadway\Proc\PERMITS\WeHond\_Permits\Y-0605\swt\_11F.dwg

250

245

240

235

-0.4474%

EDGE OF WETLANDS (TYP.)

+60

+40

+20

13+00

+80

LEGEND

— WLB — WETLAND

▨ DENOTES FILL IN WETLAND

**SITE 11**

-RAMPA - LINE PROFILE



250

245

240

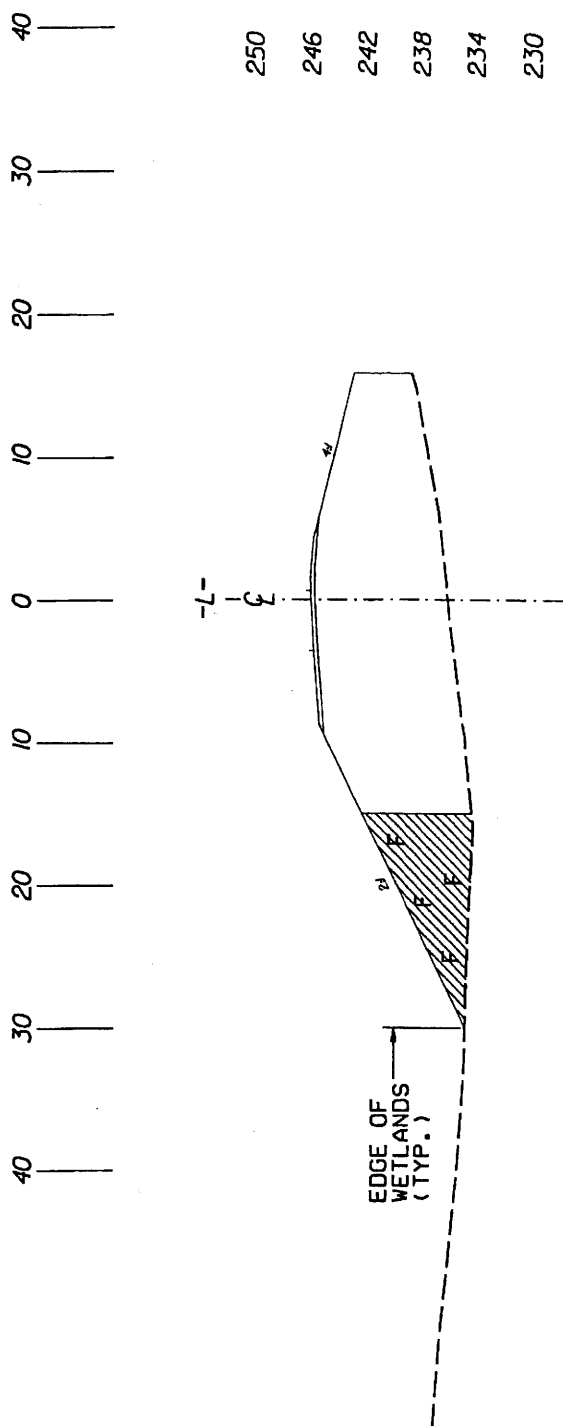
(ELEVATION IN METERS)

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

49 OF 74  
SHEET OF



LEGEND

- WLB — WETLAND
- ▨ DENOTES FILL IN WETLAND

**SECTION "D-D"**  
**SITE II**  
**CROSS SECTION**  
**(-RAMPA- 13+60)**



250  
 246  
 242  
 238  
 234  
 230  
 (ELEVATION IN METERS)

NORTH CAROLINA  
DIVISION OF HIGHWAYS  
  
 GUILFORD COUNTY  
 8.1570801 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE  
  
 SCALE AS SHOWN SHEET 50 OF 74

CL 'B' RIPRAP W/ FILTER FABRIC 597

RIP RAP ON STREAM BANKS ONLY

-RAMP A-

FS 58+20

2GI

58+80

-L-

2GI W/ FL GR

375

EXPRESSWAY GUTTER

2GI W/ FL GR

CL 'B' RIPRAP W/ FILTER FABRIC




EMERGENCY SPILL BASIN

LATERAL "V" DITCH

SHEET 12

PLAN VIEW SITE 12

LEGEND

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



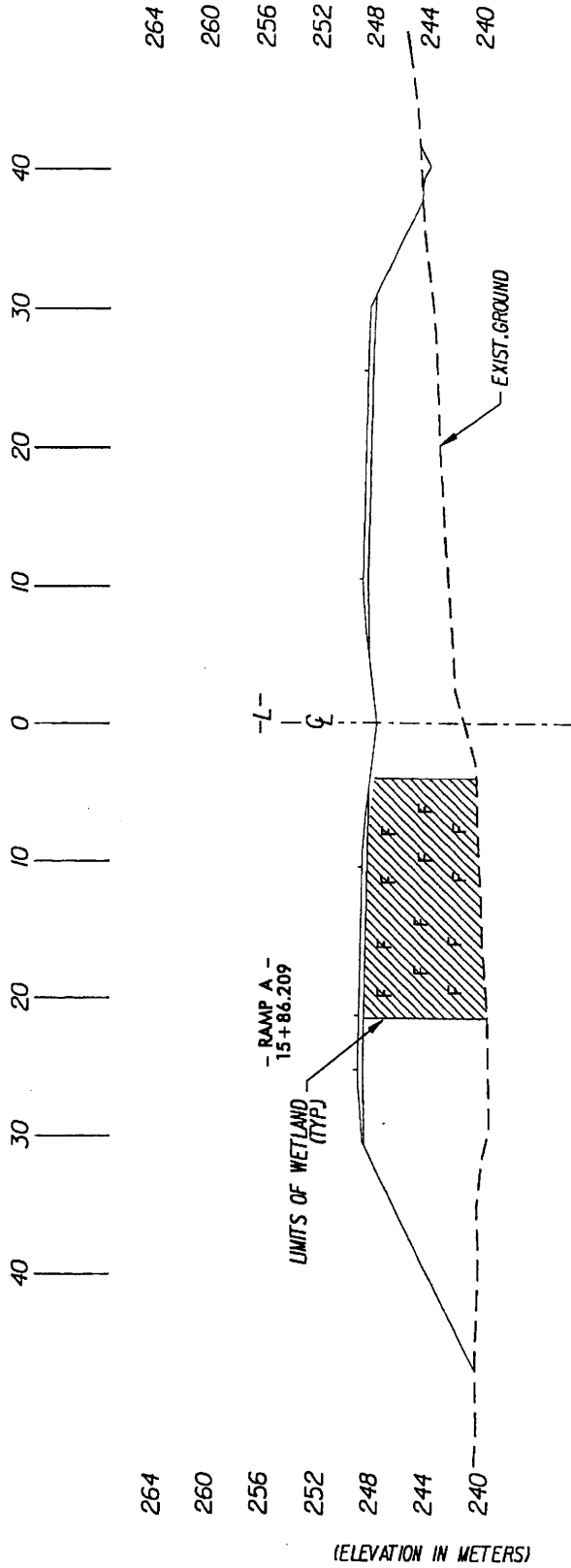
**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE  
*Revised May '06*

SCALE AS SHOWN

SHEET 12 OF 14





LEGEND  
 DENOTES FILL IN WETLAND

SECTION "E-E"

SITE 12  
 CROSS SECTION  
 (-L- 58+40)



264  
 260  
 256  
 252  
 248  
 244  
 240  
 (ELEVATION IN METERS)

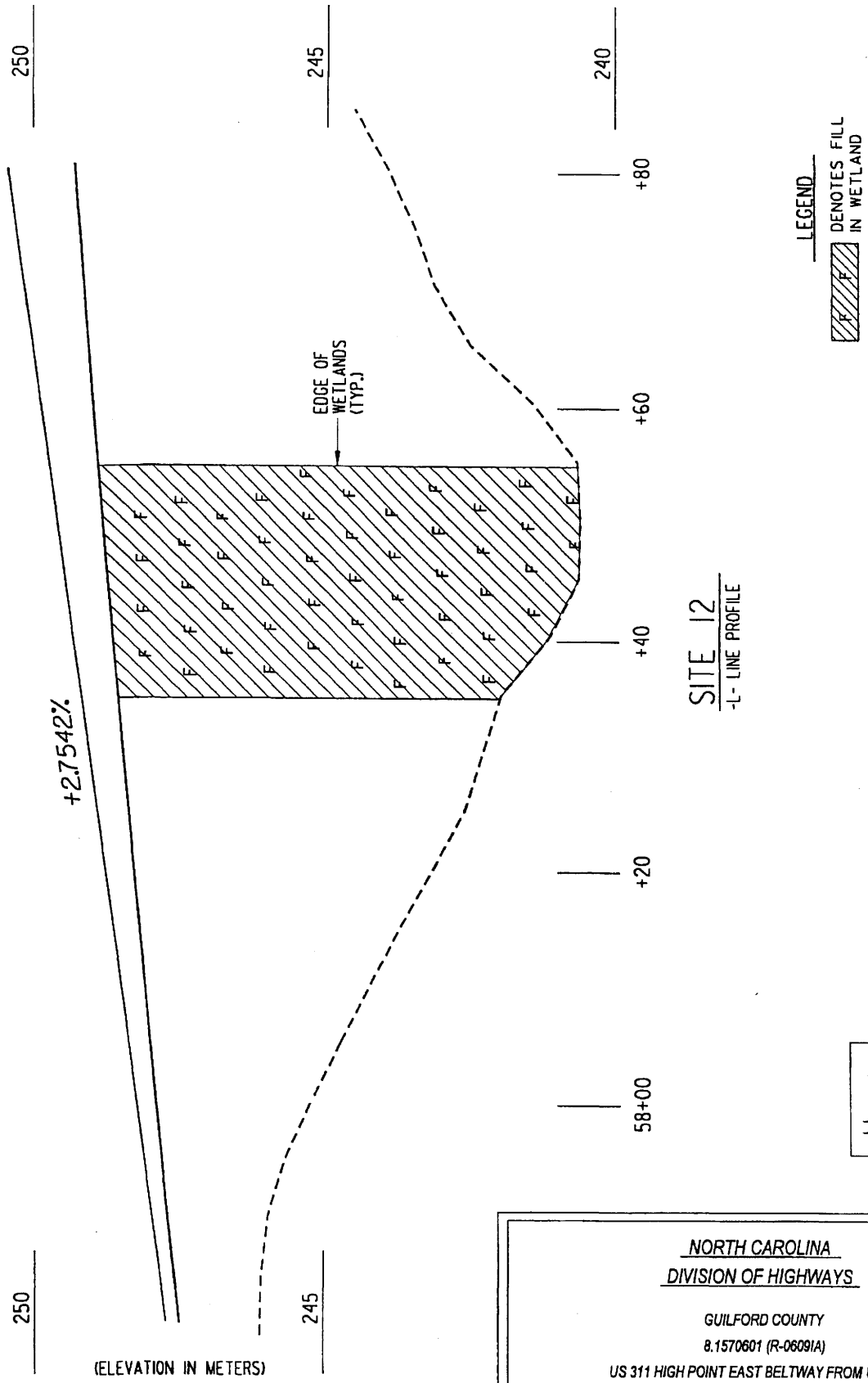
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

57-74  
 SHEET 2 OF 1

02/20/2004 02:02:00 PM g:\hwy\car-6091A\sgn\roadway\proj\PERMITS\Weiland\_Permit\car-0609\wet\_12.dwg



**LEGEND**  
 DENOTES FILL IN WETLAND

**SITE 12**  
 -L- LINE PROFILE

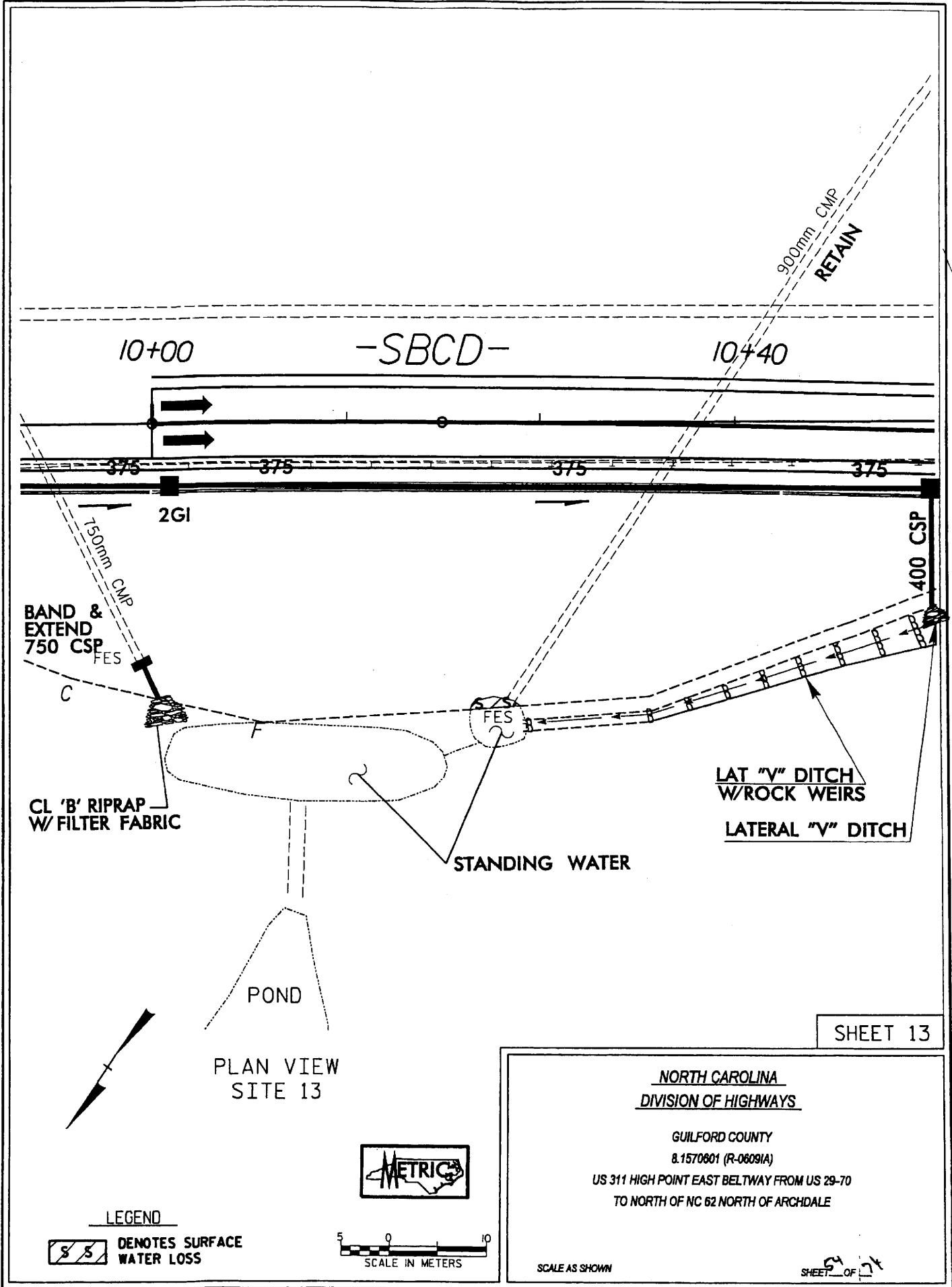


**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 53 OF 74



SHEET 13

NORTH CAROLINA  
DIVISION OF HIGHWAYS

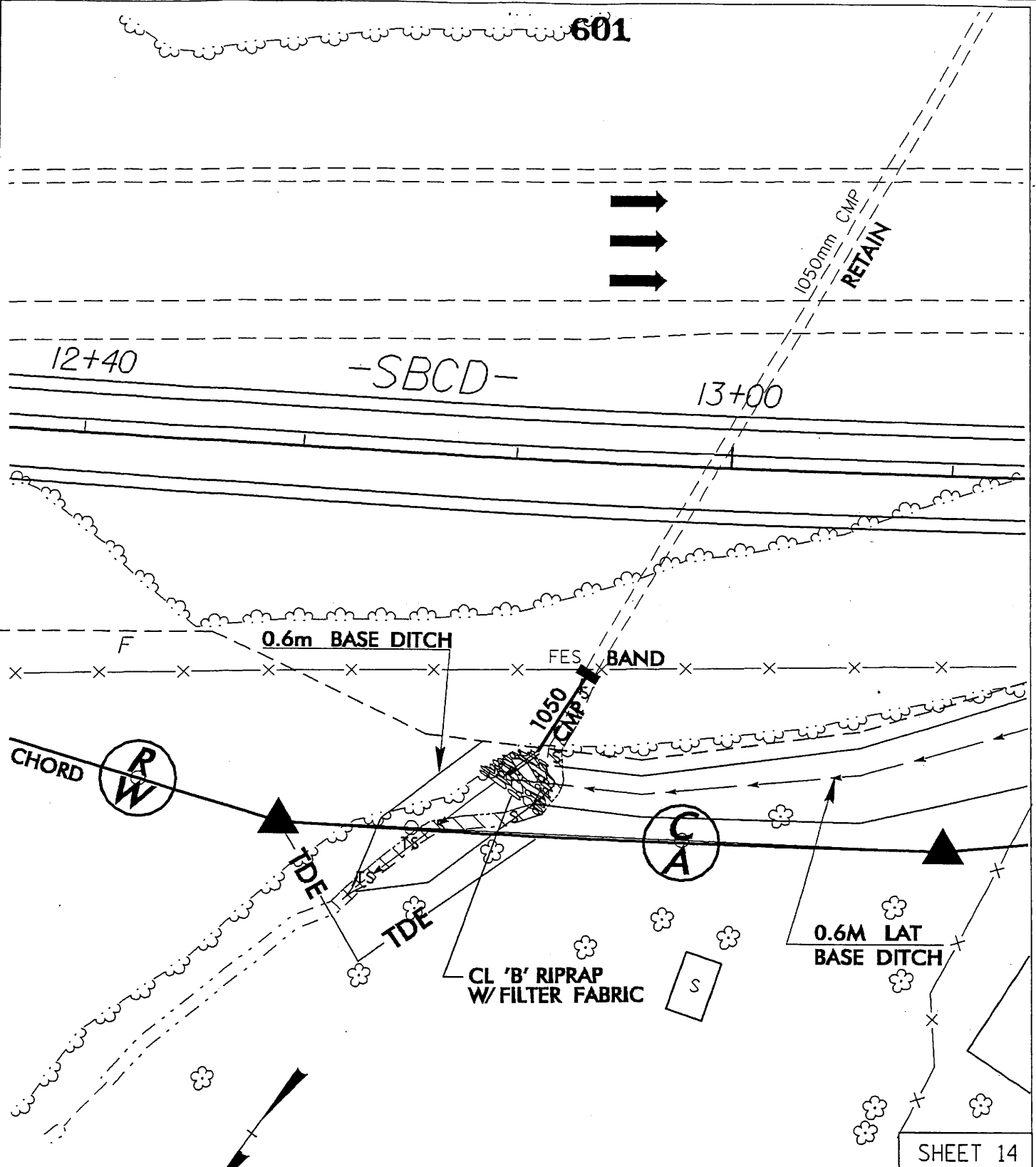
GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 13 OF 24

8/10/2005 9:22:34 AM R:\dgn\Roadway\p01\PERMITS\Method\_Permit\14\0609\set\_13.dwg


601




SHEET 14

PLAN VIEW  
SITE 14

LEGEND

 DENOTES SURFACE WATER LOSS



  
SCALE IN METERS

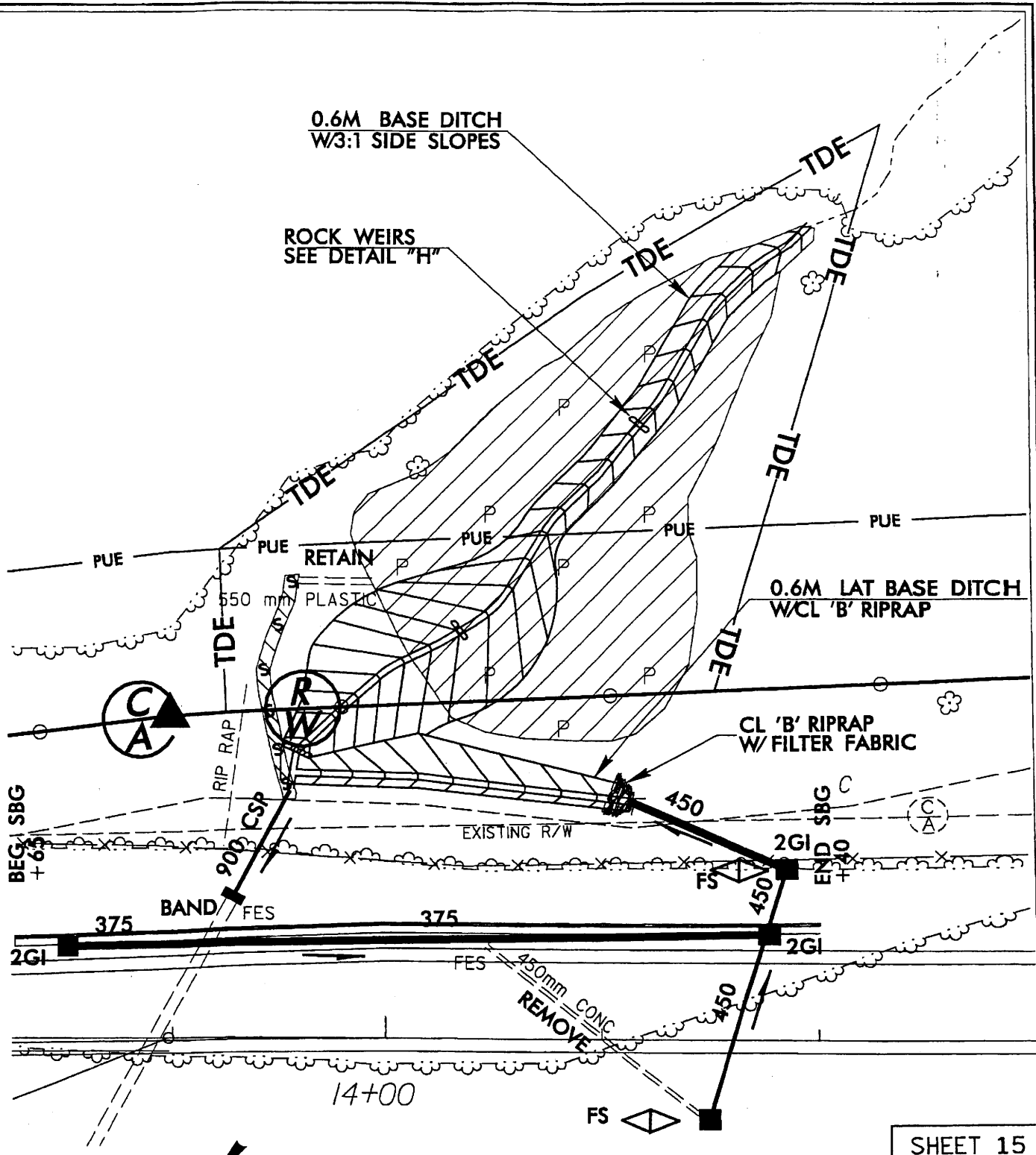
NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570601 (R-06091A)  
US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

55  
74  
SHEET OF

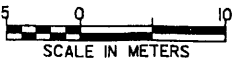
DATE:  
TIME:  
FILE:



SHEET 15

PLAN VIEW  
SITE 15

- LEGEND
- DENOTES SURFACE WATER LOSS
  - DENOTES SURFACE WATER LOSS (POND)



NORTH CAROLINA  
DIVISION OF HIGHWAYS

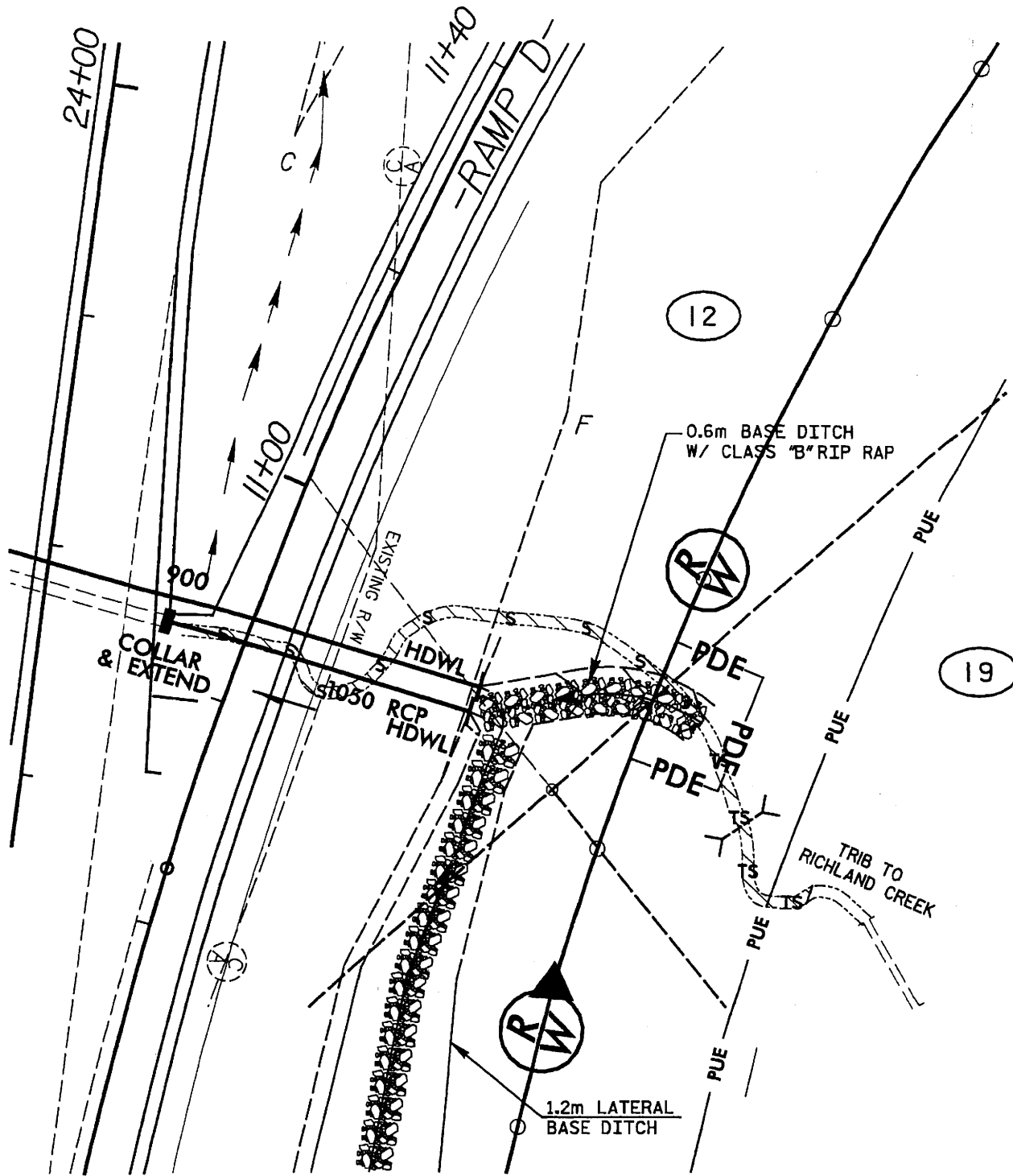
GUILFORD COUNTY  
8.1570601 (R-08091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 15 OF 14

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SHEET 16

PLAN VIEW  
SITE 16

LEGEND

 DENOTES SURFACE  
WATER LOSS



NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 16 OF 17

604

10+40

-FLY-

11+00

2GI  
TYPE 'D'

750

OTCB

+85  
END  
BERM

CHORD

(C)  
A

375

12+60

-Y5-

2GI  
TYPE 'A'

FS



12+00

(R)  
W

375

2GI  
TYPE 'D'

FS

E

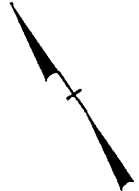
E

E

E

E

E



PLAN VIEW  
SITE 17



LEGEND

 DENOTES FILL IN WETLAND

SHEET 17

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

59  
SHEET 2 OF 1

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NCDOT Project I.D. R-609IA  
 Guildford County, NC  
 US 311 High Point East Beltway From US 29-70  
 To North of NC 62 North of Archdale

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

May 20, 2002

## NATURAL CHANNEL DESIGN

### MILE BRANCH

Right of Project Station 31+60  
 through  
 Right of Project Station 33+25  
 Permit Site 6

The alignment of US 311 (High Point East Beltway) will require that a portion of Mile Branch be relocated south from Project Station 31+60 Rt. to 33+25 Rt. of L-Line for approximately 165 meters in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

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 32+20) was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 7.37, a width/depth ratio of 6.23, a sinuosity of 1.24 and an average slope of 0.003 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 B4c stream type according to the Rosgen classification system.

NORTH CAROLINA  
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GUILFORD COUNTY  
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 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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SCALE AS SHOWN

56 74  
 SHEET OF



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 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 three 3.4m by 2.4m reinforced concrete box culverts downstream. Mean "bankfull" depth was set at 0.54 meters. This gives a maximum bankfull depth of 0.80 meters. Above bankfull depth it is proposed to excavate an approximately 45 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 natural gravel bottom. Maximum pool depths of 1.61 meters are proposed at outside bends of meanders.

Using the proposed channel geometry, sediment transport computations were performed to determine whether the bankfull discharge would be able to initiate movement of the D50 particle obtained. The proposed bankfull shear stress has been reduced from 2.39 to 1.24 kg/m<sup>2</sup> (0.49 to 0.254 lbs/ft sq). The D50 particle recorded during the bar sample was 16mm. Using Rosgen's version of Shields Curve the shear stress to initiate movement of a 16mm particle can be as low as 0.97 kg/m<sup>2</sup> (0.20 lbs/ft sq). Therefore since the proposed shear stress for the Type C channel is less than the existing conditions the proposed channel should be stable.

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, Cross Vanes and Root Wads will be utilized to control the near bank shear stress in the meanders, along the proposed roadway.

NORTH CAROLINA  
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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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SCALE AS SHOWN

10 74  
SHEET OF



Stantec

Location: WETLAND PERMIT SITE 6

Site #1b Sta 32+20-L-R to 33+25 -L-R

Design by: C. Heath Wadsworth, EI

12/1/2000

Checked by: Kevin Williams, PE

12/2/2000

ITEM	EXISTING CHANNEL	PROPOSED REACH	REFERENCE REACH (English)	REFERENCE REACH (Metric)
STREAM NAME	Mile Branch	Mile Branch	Dixon Branch	Dixon Branch
STREAM TYPE	B4c	C4	C5	C5
DRAINAGE AREA (DA)	581.03 ha	581.03 ha	402 Ac	162.69 ha
BANKFULL WIDTH ( $W_{bkt}$ )	5.75 m	6.45 m	15.20 ft	4.63 m
BANKFULL MEAN DEPTH ( $d_{bkt}$ )	0.92 m	0.54 m	1.50 ft	0.46 m
WIDTH/DEPTH RATIO ( $W_{bkt}/d_{bkt}$ )	6.23	12.00	10.13	10.13
BANKFULL X-SECTION AREA ( $A_{bkt}$ )	5.32 m <sup>2</sup>	3.45 m <sup>2</sup>	22.70 ft <sup>2</sup>	2.11 m <sup>2</sup>
BANKFULL MEAN VELOCITY, m/s	1.15 mps	1.77 mps	2.81 fps	0.86 mps
BANKFULL DISCHARGE, m <sup>3</sup> /s	6.09 m <sup>3</sup> /s	6.10 m <sup>3</sup> /s	64 cfs	1.81 m <sup>3</sup> /s
BANKFULL MAX DEPTH ( $d_{max}$ )	1.37 m	0.80 m	1.60 ft	0.49 m
WIDTH Flood-Prone Area ( $W_{fpa}$ )	42.40 m	45.00 m	130.0 ft	39.62 m
ENTRENCHMENT RATIO (ER)	7.37	6.98	8.55	8.55
MEANDER LENGTH (Lm)	9.5 m	75 m	33 - 71 ft	10 - 22 m
RATIO OF Lm TO $W_{bkt}$	1.65	12	2.2 - 4.7	2.2 - 4.7
RADIUS OF CURVATURE	10.0 m	18 m	6 - 9 ft	2 - 3 m
RATIO OF R <sub>c</sub> TO $W_{bkt}$	1.7	2.8	0.37	0.4
BELT WIDTH	16.0	45.2	30	9.14
MEANDER WIDTH RATIO	2.8	7.0	2.0	2.0
SINUOSITY (K)	1.24	1.40	1.19	1.19
VALLEY SLOPE	0.004 m/m	0.0034 m/m	0.018 ft/ft	0.018 m/m
AVERAGE SLOPE (S)	0.003 m/m	0.0024 m/m	0.015 ft/ft	0.015 m/m
POOL SLOPE	0.005 m/m	0.0005 m/m	0.003 - 0.012 ft/ft	0.003 - 0.012m/m
RATIO OF POOL SLOPE TO AVERAGE SLOPE	1.78	0.20	0.19 - 0.83	0.19 - 0.83
MAX POOL DEPTH	1.86 m	1.61 m	1.90 - 5.80 ft	0.58 - 2 m
RATIO OF POOL DEPTH TO AVERAGE BANKFULL WIDTH	2.01	3.00	1.3 - 3.9	1.3 - 3.9
POOL WIDTH	10.98 m	9.68 m	31 ft	9 m
RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.91	1.50	2.04	2.04
POOL TO POOL SPACING	30.00 m	32.3 m	18 - 30 ft	5 - 9 m
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	5.21	5	1.2 - 2.0	1.2 - 2.0

NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS

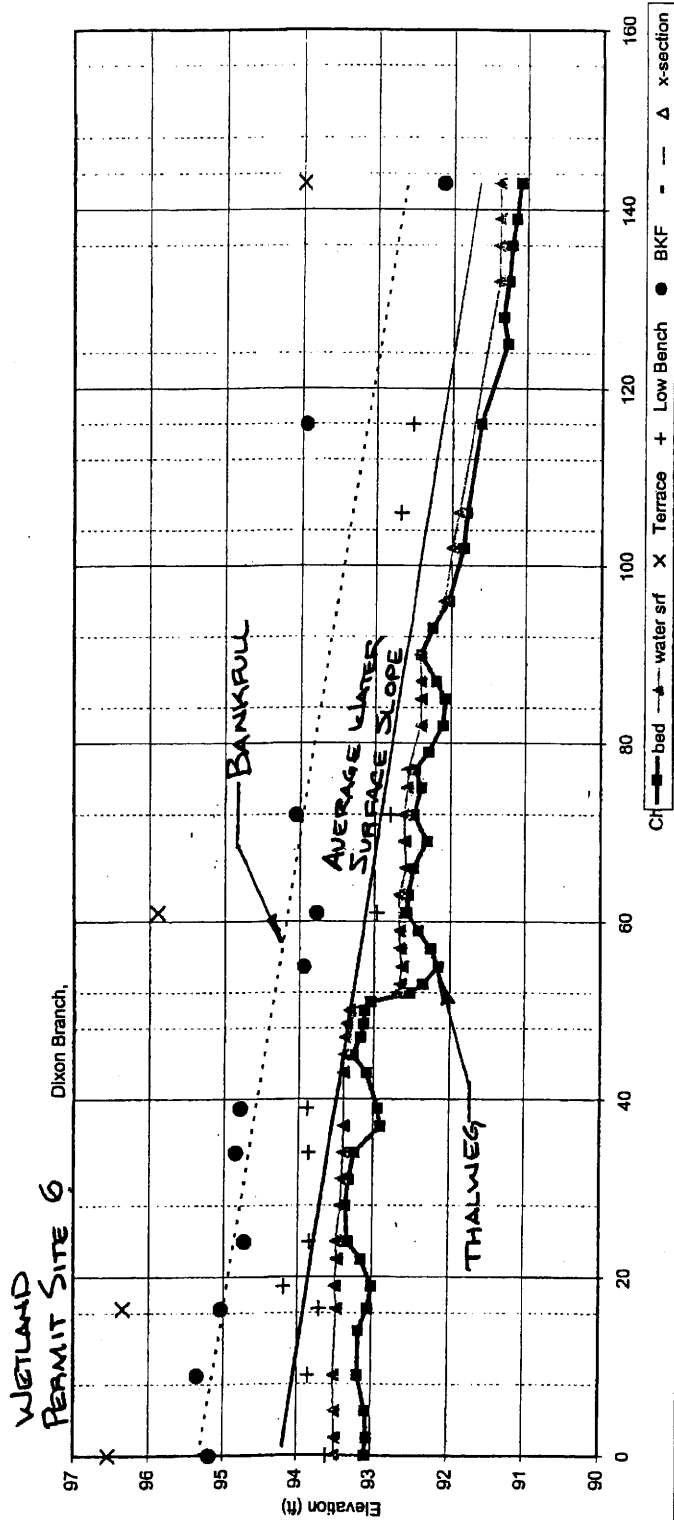
GUILFORD COUNTY

8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

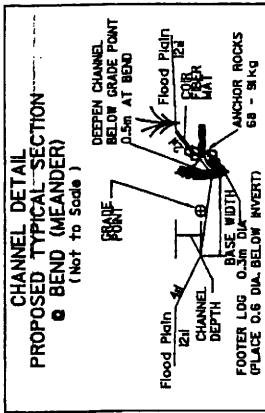
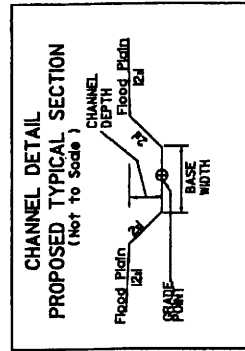
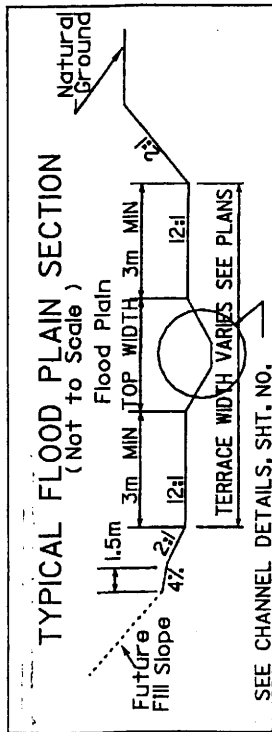
SHEET 6 OF 74



NORTH CAROLINA  
DEPARTMENT OF HIGHWAYS  
  
 GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE  
  
 SCALE AS SHOWN  
 SHEET 10 OF 74



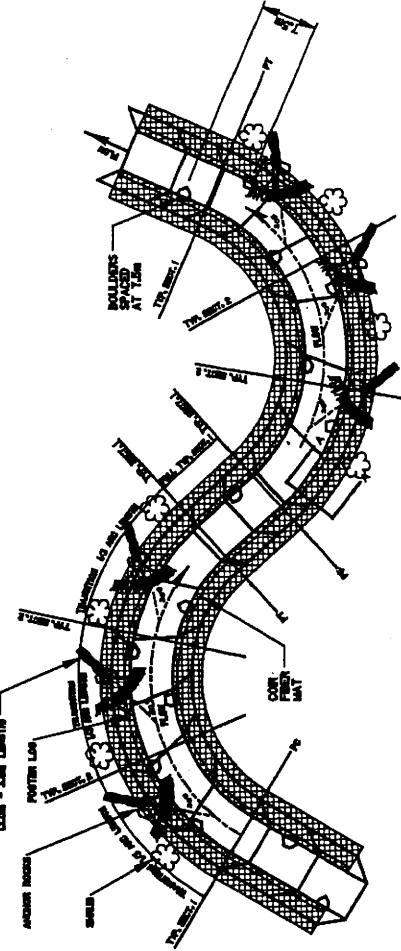
NATURAL CHANNEL DESIGN TYPICALS



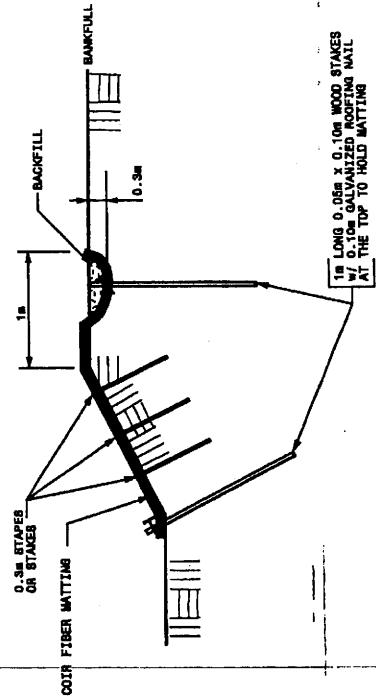
TYPICAL SECTION 2 AT BENDS

TYPICAL SECTION 1 BETWEEN BENDS

- NOTES:**
- NUMBER OF ROOTWAYS INSTALLED TO BE DETERMINED ON SITE
  - NUMBER OF LOW STAGE CHECK DAMS TO BE DETERMINED ON SITE
  - ROOTWAYS 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 BANKFILL DEPTH



CHANNEL PLAN VIEW



SECTION A-A

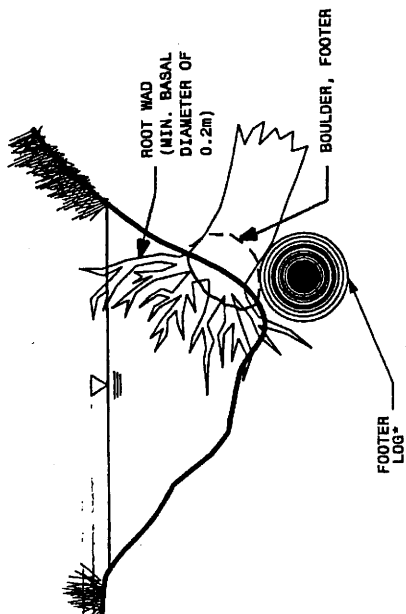
- NOTES:**
- USE WOOD STAKES (NOT METAL) FOR MATTING
  - USE OF METAL STAPLES IS ACCEPTABLE WHEN INSTALLED IN PUMP AROUNDS OR IN THE WEIR
  - USE OF METAL STAPLES IS ACCEPTABLE WHEN CONSTRUCTING IN THE DRY AND VEGETATION IS ESTABLISHED PRIOR TO DIVERTING WATER.

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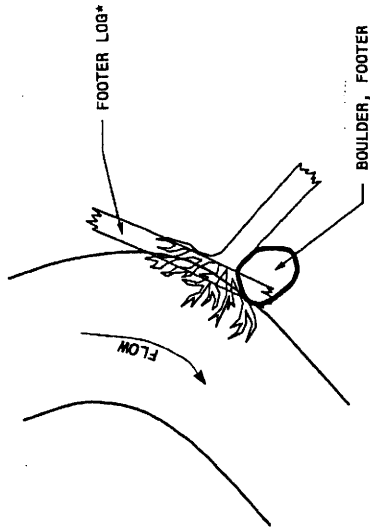
GUILFORD COUNTY  
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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

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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



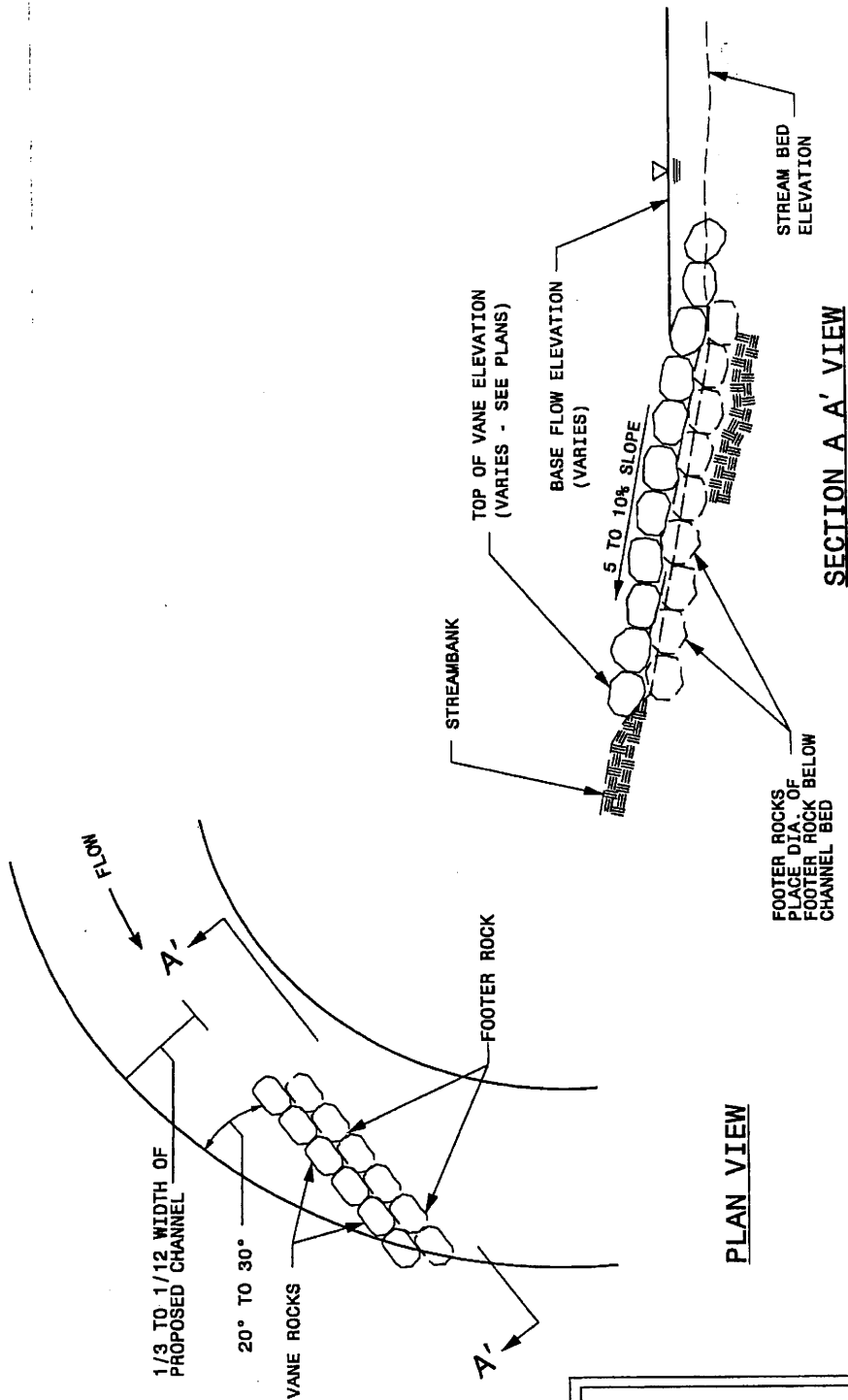
SCALE AS SHOWN

NORTH CAROLINA  
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GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

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NOTE: ALL ROCKS OR STONE ARE NATURAL STONE BOULDERS

# ROCK VANE

SCALE: NTS

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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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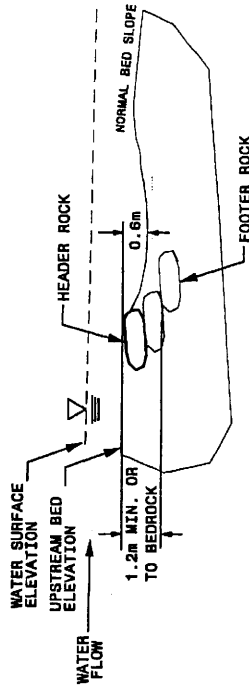
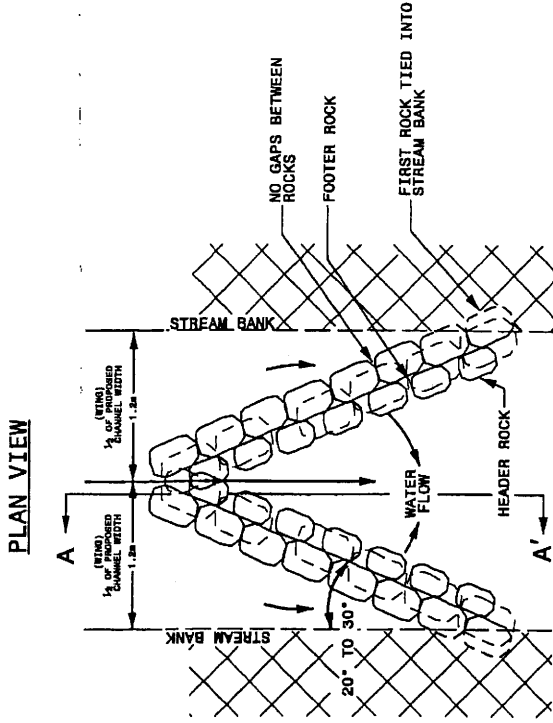


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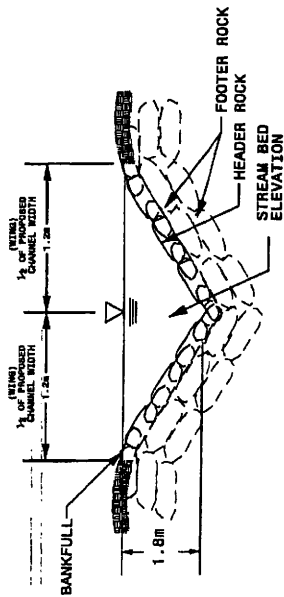
SHEET 65 OF 74

# "V" CROSS VANE

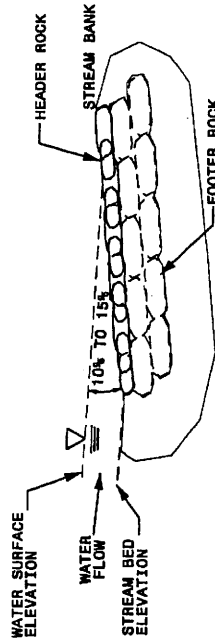
SCALE: NTS



SECTION A-A' VIEW



CROSS SECTION



PROFILE 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 0.5m X 0.5m X 0.5m. 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 DIVISION OF HIGHWAYS

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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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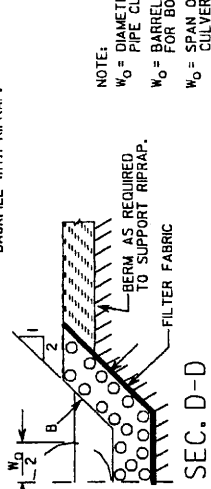
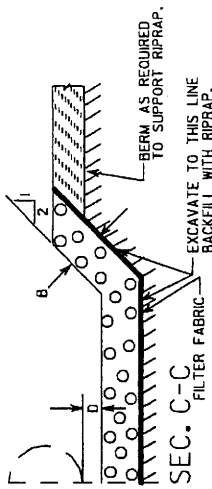
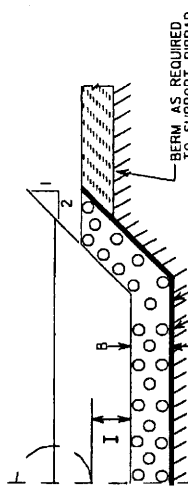
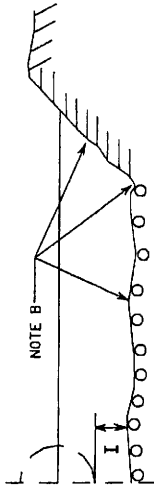
SCALE AS SHOWN

SHEET 5 OF 7



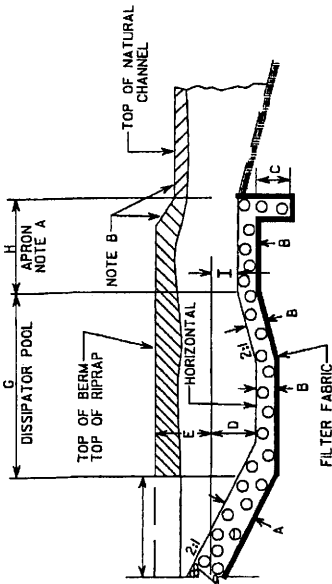
NOTE A IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS SECTIONAL AREA AT SECTION A-A SUCH THAT  $Q_{obs} / \text{CROSS SECTION AREA AT SEC. A-A} = \text{SPECIFIED EXIT VELOCITY}$ .

NOTE B WARP BASIN TO CONFORM TO NATURAL STREAM CHANNEL. TOP OF RIPRAP IN FLOOR OF BASIN SHOULD BE AT SAME ELEVATION OR LOWER THAN NATURAL CHANNEL BOTTOM AT SEC. A-A. PROVIDE SMOOTH TRANSITION FROM END OF APRON TO NATURAL CHANNEL WIDTH.

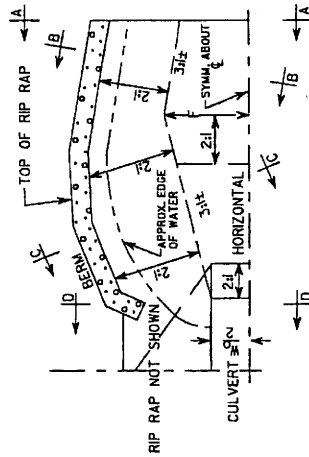


NOTE:  
 $W_0$  = DIAMETER FOR PIPE CULVERT  
 $W_0$  = BARREL WIDTH FOR BOX CULVERT  
 $W_0$  = SPAN OF PIPE-ARCH CULVERT

SECTION



HALF PLAN



BASIN #	LOCATION (AT OUTLET)
1	13+80 - RP B-
2	
3	
4	
5	
6	
7	
8	

DIM.	1	2	3	4	5	6	7	8
A	0.68							
B	0.68							
C	0							
D	1.19							
E	0.30							
F	7.95							
G	11.94							
H	5.97							
I	0.55							

ALL DIMENSIONS APPROXIMATE

DETAIL OF RIP-RAPPED ENERGY DISSIPATOR BASIN



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 DIVISION OF HIGHWAYS

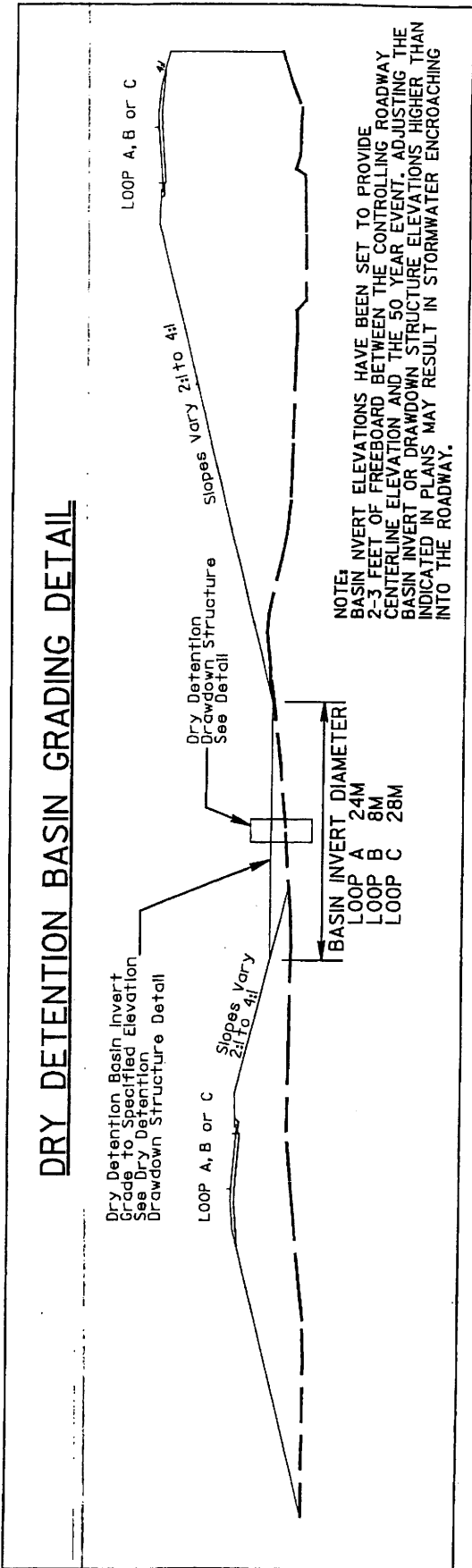
GUILFORD COUNTY  
 8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 3

# DRY DETENTION BASIN GRADING DETAIL



NOTE:  
 BASIN INVERT ELEVATIONS HAVE BEEN SET TO PROVIDE  
 2-3 FEET OF FREEBOARD BETWEEN THE CONTROLLING ROADWAY  
 CENTERLINE ELEVATION AND THE 50 YEAR EVENT. ADJUSTING THE  
 BASIN INVERT OR DRAWDOWN STRUCTURE ELEVATIONS HIGHER THAN  
 INDICATED IN PLANS MAY RESULT IN STORMWATER ENCRoACHING  
 INTO THE ROADWAY.

Dry Detention Basin Invert  
 Grade to Specified Elevation  
 See Dry Detention  
 Drawdown Structure Detail

LOOP A, B or C

Slopes Vary  
 2:1 to 4:1

LOOP A, B or C

Slopes Vary 2:1 to 4:1

Dry Detention  
 Drawdown Structure  
 See Detail

BASIN INVERT DIAMETER  
 LOOP A 24M  
 LOOP B 8M  
 LOOP C 28M

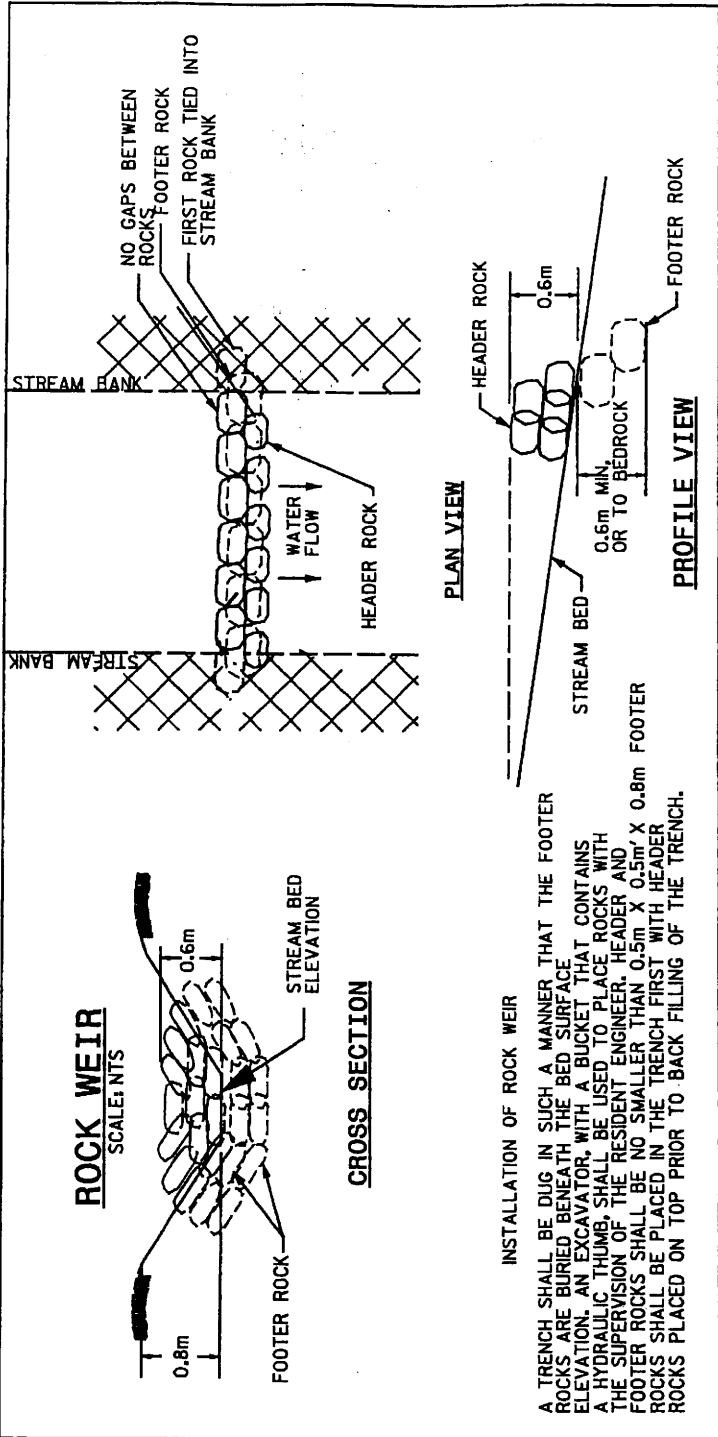


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GUILFORD COUNTY  
 8.1570601 (R-06091A)  
 US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
 TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 2 OF 74



A TRENCH SHALL BE DUG IN SUCH A MANNER THAT THE FOOTER 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 0.5m X 0.5m X 0.8m. FOOTER ROCKS SHALL BE PLACED IN THE TRENCH FIRST WITH HEADER ROCKS PLACED ON TOP PRIOR TO BACK FILLING OF THE TRENCH.

**NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

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US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
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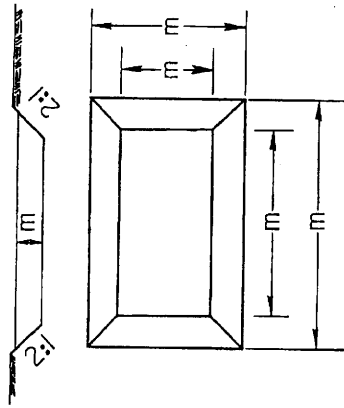


SCALE AS SHOWN

70  
SHEET OF 71

**DETAIL OF EMERGENCY  
SPILL BASIN**

TOTAL CAPACITY REQUIRED : cu. m.  
TOTAL CAPACITY PROVIDED : cu. m.



Ditch to be blocked with sandbags 1.0 m deep at outlet

STATION	REQ. VOL. (Cu. m.)	DEPTH (m)	BOTTOM LENGTH (m)	BOTTOM WIDTH (m)	TOP LENGTH (m)	TOP WIDTH (m)	PROVIDED VOL (Cu. m.)
FLY 16+20 L	78	1.0	9.0	5.0	13.0	9.0	81
-L- 34+00 R	104	1.0	10.0	7.0	14.0	11.0	112
-L- 35+60 L	158	1.0	11.0	10.0	15.0	14.0	160
-L- 39+90 L	78	1.0	7.0	7.0	11.0	11.0	85
-L- 40+70 L	103	1.0	8.0	8.0	12.0	12.0	104
-L- 50+40 L	396	1.0	20.0	16.0	24.0	20.0	400
-L- 56+00 L	50	1.0	5.0	5.0	9.0	9.0	53
-L- 58+20 R	77	1.0	11.0	4.0	15.0	8.0	82
-Y5- 14+00 R	275	1.0	17.0	13.0	21.0	17.0	289
-Y5- 15+20 R	178	1.0	14.0	9.0	18.0	13.0	180
RAMPB 12+90 R	174	1.0	14.0	9.0	18.0	13.0	180
RAMPD 15+20 R	127	1.0	12.0	7.0	16.0	11.0	130



**NORTH CAROLINA  
DIVISION OF HIGHWAYS**

GUILFORD COUNTY  
8.1570601 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 62 NORTH OF ARCHDALE

SCALE AS SHOWN

SHEET 7 OF 11

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS						
			Permanent Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Hand Clearing in Wetlands (ha)	Permanent SW Impacts (ha)	Temporary SW Impacts (ha)	Existing Channel Impacts Permanent (m)	Existing Channel Impacted Temporary (m)	Natural Stream Design (m)	
1	12+00 to 12+80 *	750mm		0.017	0.006				0.048	0.003	140.600	21.0	
2	19+30 to 20+40	1350mm						0.013	0.003			21.0	
3	23+45 to 23+60	450mm	0.011						0.008	0.006	124.800	50.0	
4	25+65 to 25+95	1350mm	0.066		0.011				0.006	0.001	70.300	15.0	
5	28+00 to 28+30	900mm							0.024		294.600		288.2
6 (Trib 1)	31+70 to 33+60	3@3.4m x 2.4m RCBC							0.025		51.200		
6 (Trib 2)	32+00	Stream							0.010		98.500		
7	33+00	Stream							0.004		44.600		
8	35+20 to 35+50	600mm							0.018		180.000		
9	40+20 to 40+40	1050mm							0.958				
10 (Trib 1)	45+30 to 46+30 **	1 @ 3.7m x 3.7m							0.015		193.200		
10 (Trib 2)	48+85 to 50+75	Interchange							0.002		20.600		
10 (Trib 3)	51+20	Interchange							0.056		560.100		
10 (Trib 4)	50+20 to 51+60	Interchange							0.027		137.800		
11 (Trib 1)	900 mm	Interchange	0.081		0.014				0.042	0.003	455.600	21.0	
11 (Trib 2)	53+00 to 56+75	Interchange		0.013					0.013		133.400		
12	54+40 to 55+45	Interchange	0.050		0.002				0.012		118.800		
13	58+20 to 59+00	900mm							0.001		1.500		
14	10+20 R -SBCD-	900mm							0.001	0.002	31.900	17.0	
15	12+80 R -SBCD-	1050							0.108		22.800		
16	14+00 -NBCD- **	900 mm							0.005	0.002	54	20.0	
17	10+90 -RPD-	900mm& 1050mm	0.005										
17	12+20 -Y5-	Roadway Fill											
TOTALS:			0.212	0.000	0.013	0.028			1.397	0.020	2734.300	165.0	288.2

\* Excavation in Pond (0.048 ha)

\*\* Fill in Surface Water (Pond): Site 9 = 0.958 ha; Site 15 = 0.105 ha

N.C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
PROJECT: 34345.1.1 (R-609IA)

Jan-06

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Form Revised 3/22/01

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				Natural Stream Design (ft)		
			Permanent Fill In Wetlands (Ac)	Temp. Fill In Wetlands (Ac)	Excavation In Wetlands (Ac)	Mechanized Clearing (Method III) (Ac)	Hand Clearing in Wetlands (Ac)	Permanent SW impacts (Ac)	Temp. SW impacts (Ac)	Existing Channel Impacts Permanent (ft)		Existing Channel Impacts Temporary (ft)	
1	12+00 to 12+80 *	750mm			0.04	0.01				0.12	0		
2	19+30 to 20+40	1350mm								0.03	0.01	69	
3	23+45 to 23+60	450mm	0.03								0	69	
4	25+65 to 25+95	1350mm	0.16			0.03				0.02	0.01	409	164
5	28+00 to 28+30	900mm								0.01	0.00	231	49
6 (Main)	31+70 to 33+60	3@3.4m x 2.4m RCBC								0.06		967	0
6 (Trib 1)	32+00	Stream								0.06		168	0
6 (Trib 2)	33+00	Stream								0.02		323	0
7	35+20 to 35+50	600mm								0.01		146	0
8	40+20 to 40+40	1050mm								0.04		591	0
9	45+30 to 46+30 **	1 @ 3.7m x 3.7m								2.37		0	0
10 (Trib 1)	48+85 to 50+75	Interchange								0.04		634	0
10 (Trib 2)	51+20	Interchange								0.00		68	0
10 (Trib 3)	50+20 to 51+60	Interchange								0.14		1838	0
10 (Trib 4)	50+70 to 51+90	Interchange								0.07		452	0
11 (Trib 1)	53+00 to 56+75	Interchange	0.20		0.030	0.04				0.10	0.01	1495	69
11 (Trib 2)	54+40 to 55+45	Interchange								0.03		438	0
12	58+20 to 59+00	900mm	0.12							0.03		390	0
13	10+20 R -SBCD-	900mm								0.00		5	0
14	12+80 R -SBCD-	1050								0.00	0.00	105	56
15	14+00 -NBCD- **	900 mm								0.27		75	0
16	10+90 -RPD-	900mm& 1050mm								0.01	0.00	177	66
17	12+20 -Y5-	Roadway Fill	0.012							0.00		0	0
TOTALS:			0.52	0.00	0.03	0.07				3.43	0.04	8971	541

\* Excavation in Pond (0.12 ac)

\*\* Fill in Surface Water (Pond): Site 9 = 2.37 ac; Site 15 = 0.026 ac

N.C. DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS

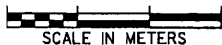
GUILFORD COUNTY  
PROJECT: 34345.1.1 (R-6091A)

Jan-06  
SHEET 7 3 OF 74

Form Revised 3/22/01

# SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
1	M.C. DEVELOPMENT COMPANY	P.O. BOX 506 HIGH POINT, NC 27263	1
2	ALLEN J. BODENHEIMER	400 FORESTDALE DR JAMESTOWN, NC 27282	1
3	BEVERLY B. CAUDLE	1308 COX AVE HIGH POINT, NC 27263	2
4	NCDOT	P.O. BOX 14996 GREENSBORO, NC 27145	3,4,5,8,12
5	CLIFFORD L. HILL	RT. 4 BOX 345 HIGH POINT, NC 27263	6
6	VIRGINIA HUBBARD	1566 KERSEY VALLEY RD HIGH POINT, NC 27263	6
7	MARJORIE SURRETT	6802 DRESDEN RD HIGH POINT, NC 27263	7
8	FRANK MARTINEZ	1539 KERSEY VALLEY RD HIGH POINT, NC 27263	9
9	BOBBY L. CECIL	1119 LIBERTY RD ARCGDALE, NC 27263	10
10	GLENN P. MORGAN	6027 CHECKER RD HIGH POINT, NC 27263	11
11	LILLIE L. CRUTHIS	6027 CHECKER RD HIGH POINT, NC 27263	11
12	LAWRENCE E. MODLIN	6132 CHECKER RD HIGH POINT, NC 27263	11 & 16
13	ROBERT WARD	3001 ALAMANCE RD GREENSBORO, NC 27407	1
14	WALTER DANIEL	1620 EASTCHESTER DR HIGH POINT, NC 27263	2
15	THOMAS RAGSDALE	P.O. BOX 757 JAMESTOWN, NC 27282	5
16	CHARLES BOYD	1553 KERSEY VALLEY RD HIGH POINT, NC 27263	8
17	MR. FOSTER	6861 DRESDEN RD HIGH POINT, NC 27263	10
18	W. GERALD LEONARD	6801 JOPLIN RD HIGH POINT, NC 27263	15
19	ROBERT L. SLATE		16



SCALE IN METERS

NORTH CAROLINA  
DIVISION OF HIGHWAYS

GUILFORD COUNTY  
8.1570801 (R-06091A)

US 311 HIGH POINT EAST BELTWAY FROM US 29-70  
TO NORTH OF NC 82 NORTH OF ARCHDALE

SCALE AS SHOWN

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SHEET OF