STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 21, 2003

U. S. Army Corps of Engineers
Regulatory Field Office
Post Office Box 1000
Washington, NC 27889-1000

ATTN.: Mr. Michael F. Bell
Regulatory Permits Manager

Dear Sir:

Subject: **Request to modify Section 404 permit, 401 WQC, and Neuse Buffer Certification.** TIP R-2539. NC 55 Widening From US 17 in Bridgeton to NC 304 in Bayboro, Craven and Pamlico Counties. State Project No. 8.1170901. Federal Aid Project STP-55(1). USACE Action ID 199303531. DWQ Project No. 021232, WQC No. 3415. DCM CAMA Permit No. 55-03. $200 debit from WBS Element 34452.1.1.

The North Carolina Department of Transportation (NCDOT), Division of Highways, is requesting a permit modification for the above referenced project. On May 12, 2003 and March 17, 2003, respectively, the USACE 404 Individual Permit and the NCDWQ 401 Water Quality Certification/Neuse Buffer Certification were issued for the widening of NC 55 from US 17 to NC 304 in Bayboro. The Individual Permit and Water Quality Certification approved the jurisdictional impacts associated with Section A of the project and gave tentative approval for Sections B and C pending submittal of the final design drawings and jurisdictional impact assessments for those sections. The purpose of this letter is to request a modification to the Department of the Army Individual Permit, as well as to the NCDWQ 401 Water Quality Certification for approval of impacts associated with Section B of the project. Section B begins east of SR 1127 (Bayleaf Road) and extends 9.6 miles along NC 55 to just east of SR 1129 (Bennett Tingle Road). The final permit drawings and relevant information for R-2539B are attached. Another modification request will be submitted for Section C when the design for it is completed.

The completed design for R-2539B does not compromise NCDOT's compliance with the existing permit conditions. No additional mitigation is proposed. The completed design has been evaluated for compliance with the avoidance/minimization criteria and is in compliance with all previous Individual Permit factors, including the following:

- Protected Species,
- Cultural Resources,
- Aquatic Life passage,
- FEMA compliance, and
- Utilities.

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

TELEPHONE: 919-715-1500
FAX: 919-715-1501
WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
2728 CAPITOL BOULEVARD
PARKER LINCOLN BUILDING, SUITE 168
RALEIGH NC 27699

Much of the general information in the original Individual Permit application remains the same and is not repeated in this modification request. Information on the purpose and need, project schedule, NEPA document status, and mitigation options is contained in the original permit application.

Summary of Project Impacts: Impacts to jurisdictional areas of the entire R-2539 were estimated in the August 9, 2002 application at 15.69 acres of permanent wetland, 0.15 acres of fill in surface waters, and 619 linear feet of stream channels. With the revised impacts associated with the final design of Section B, the total project impacts (all three Sections) are now estimated to be 15.74 acres of wetland impacts, 0.15 acres of fill in surface waters, and 619 linear feet of stream channels. The minor differences in impacts are from wetland drainage impacts in the final design of Section B, minor changes in the impact area calculations (rounding), and extension of buffer impact calculations out to the edge of drainage easements rather than limiting calculations to the toe of fill slope.

Permanent impacts associated with the final design of Section B consist of 3.69 acres of wetland impacts and 295 linear feet of stream channel impacts (Tables 1 and 2). Temporary impacts consist of less than 0.01 acres of fill for the temporary work bridges at Site 4. The riverine (Sites 4 and 16) and non-riverine wetland impacts include 0.65 acres and 2.98 acres, respectively. Fill in wetlands totals 1.87 acres, mechanized clearing totals 1.51 acres, and excavation in wetlands totals 0.25 acres of the total wetland impacts in Section B. Drainage impacts in Section B total 0.06 acres of non-riverine wetlands. Neuse Buffer impacts for R-2539B total 1.35 acres (58,800 square feet), which includes 0.81 acres (23,700 square feet) in Zone 1 and 0.54 acres (35,300 square feet) in Zone 2.

Design Changes: Final design revision resulted in two sites differing from those submitted with the original permit application.

Site 1, Permit Sheet 7 of 40
Station 56+30 left
Because of the low grade and minimal drainage potential of the natural ground elevation at this site, it will be necessary to install a typical V-ditch with 6:1 side slopes to drain the subgrade of the new road. Based on the Boussinesq equation calculations, there will be additional impacts resulting from the drainage impact from this ditch. The Ditch Impact Study, dated July 2003, is attached.
Impact change: increase of 0.06 acres of non-riverine wetland impacts

Site 2, Permit sheet 8 of 40
Station 59+80 left
Drainage effects from the wetland ditch feeding into the pre-formed scour hole were not calculated because this ditch will bring water into the wetland, contributing to the hydrology rather than diminishing it.
Impact change: no change to jurisdictional impacts

Site 4, Permit sheet 10 of 40
Station 77 +00 to 77+20, left
At this site an area of mechanized clearing in wetlands has been changed to excavation to accommodate a drainage swale.
Impact change: no change to jurisdictional impacts

Table 1. Jurisdictional Wetland and Surface Water Impacts on R-2539B

Site	Station From/To	Fill in Wetland (ac)	Excavation in Wetlands (ac)	Mechanized Clearing (ac) (Method III)[2]	Drainage impacts (ac)
1	56 +30/56 +55		0.08	0.02	0.06 (+0.06)
2	59 +70/61 +00	0.13	0.03	0.05	
3	62 +25/63 +60	0.14		0.02	
4[1]	74 +85/82 +00	0.34	0.01 (+0.01)	0.14 (-0.01)	
5	81 +85/82 +00	0.03		0.01	
6	102 +35/103 +65	0.12		0.09	
7	108 +50/114 +00	0.71		0.44	
8	117 +20/118 +60	0.02		0.09	
9	119 +20/120 +20	0.05		0.06	
10	121 +70/122 +20	0.11		0.03	
11	123 +75/125 +60	0.05		0.04	
12	130 +60/131 +95	Impacts avoided		Impacts avoided	
13	134 +75/137 +30	0.07	0.12	0.33	
14	139 +10/139 +20	0.04	<0.01	0.01	
15	145 +35/146 +75			0.09	
16[1]	148 +10/151 +40	0.07		0.08	
TOTAL R-2539B		**1.87 (-0.01)[3]**	**0.25 (+0.01)**	**1.51 (-0.01)**	**0.06 (+0.06)**

[1] Sites 4 and 16 contain riverine wetlands associated with Deep Run and Goose Creek.
[2] Clearing and grubbing of vegetation to 10 feet beyond the construction limits.
[3] Impact increase or decrease from original IP application is denoted in parentheses.

Table 2. Jurisdictional Stream Information, Sections R-2539B

Site	Station Number (From/To)	Structure	Stream Name	DWQ Index No.	DWQ Rating	Status	Impact (ft)	Onsite Stream Relocation (ft)	Required Mitigation 2:1 (ft)
2	59+70/ 61+00	1650 RCP	Sassers Branch	27-106-5	SC Sw NSW	P	72.2	0	144.4
4	74+85/ 77+40	Bridge 328 feet	Deep Run Creek	27-106-6	SC Sw NSW	P	0	0	0
5	81+85/ 82+00	1050 RCP	UT to Deep Run	27-106-6	SC Sw NSW	I	52.5	0	105
7	108+50/ 114+00	1.8x1.2 RCBC	UT to Black Creek	27-107-7	SC Sw NSW	I	52.5	0	72.2[2]
13	134+75/ 137+30	900 RCP	UT to West Fork Goose Creek	27-107-2	C Sw NSW	P	118.1	134.5	0
16	148+10/ 151+40	Bridge 732 feet	Goose Creek	27-107-(1)	SC Sw NSW	P	0	0	0
TOTAL R-2539B							**295.2 (-0.1)**	**134.5**	**321.6**

[1] Impact increase or decrease from original IP application is denoted in parentheses.
[2] NCDOT proposes that the relocated stream channel at Site 13 will provide onsite mitigation for Site 13 impacts as well as 16 feet of Site 7 impacts, requiring the balance of 36 feet of impact from Site 7 to be mitigated for offsite at a ratio of 2:1.

Summary of Utility Impacts for Section B (permit drawings attached): It will be necessary to relocate several utilities because of road widening activities. No additional 404 jurisdictional impacts will be incurred. Any clearing required will be conducted by hand. Cleared vegetation will remain onsite. Directional boring will be utilized where necessary.

For overhead power lines, utility poles will be relocated to one foot outside the new proposed Rights-of-Way lines. At the staged construction of the bridges over Deep Run Creek and Goose Creek, the power will be temporarily relocated to the north side of NC 55 during construction of the southern portion of the structures and then return to the existing alignment after construction. Any clearing for the relocation of overhead power lines within jurisdictional areas will be done by hand.

Underground copper and fiber optic telephone lines in the shoulders of the existing roadway will be relocated to the proposed shoulder or to the edge of the proposed cut or fill slopes. Wetlands and buffer zones will be directionally bored with conduit to avoid jurisdictional impacts. The water line along the length of the project will be relocated within the permitted footprint of the roadway work. Steam and wetland crossings will be directional bored to avoid surface impacts. There is an existing sewer line along the project from Bennett Tingle Road to the eastern project limits. Prior to installation, the sewer design was coordinated with NCDOT and should not require replacement. If any relocation is needed, it will be done by a private contractor within the footprint of the roadway project. No additional impacts to jurisdictional areas will be incurred.

Indirect and Cumulative Impacts: The Indirect and Cumulative Impact Study (attached) for R-2539B indicates that development is expected to continue in the study area and along the NC 55 corridor. The non-residential development along NC 55 will be dependent on population growth and, to a lesser extent, influenced by the widening of the highway. Existing policies and regulations will manage potential indirect impacts to the area's water quality. The construction of R-2539B is not expected to result in any indirect or cumulative impacts that will adversely affect water quality.

Summary of Mitigation: Throughout the NEPA and design process this project has been designed to avoid and minimize impacts to jurisdictional areas. Specific strategies, detailed in the original application, remain valid for this application. Highlights include widening NC 55 along the existing roadway, using 3:1 slopes within wetland limits, extending bridge spans at Deep Run Creek and Goose Creek, natural stream design for the relocated stream at Site 13, and wetland restoration associated with the removal of existing bridge causeways and an abandoned railroad bed. Offsite mitigation for the remaining impacts will still be covered by the Croatan and Brock Mitigation Sites as described in the original permit application.

Application is hereby made for modification of the Department of the Army Individual 404 Permit as required for the above-described activities. We are also hereby requesting a modification of the 401 Water Quality Certification from the NCDWQ. R-2539B has been designed to comply with the Riparian Buffer Mitigation Program (15A NCAC 2B .0242) and the Neuse River Basin Riparian Buffer Rules (15A NCAC 2B .0233). Therefore, as part of the Modification request, we respectfully request that the DWQ issue an Authorization Certificate pursuant to 15A NCAC 2B .0233 for the proposed use. In compliance with Section 143-215.3D(e) of the NCAA we have provided a method of debiting $200, as noted in the subject line of this application, as payment for processing the Section 401 permit modification application. We are providing seven copies of this application to the North Carolina Department of Environment and Natural Resources, NCDWQ, for their review.

If you have any questions or need additional information please call Ms. Elizabeth L. Lusk at (919) 715-1444.

Sincerely,

Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

Attachments:

Neuse Buffer Addendum
Permit Drawings and Half-size plans
Buffer Impact Drawings
Utility Drawings
Indirect and Cumulative Impact Study
Ditch Impact Study, July 2003

Cc:
Mr. David Franklin, USACE, Wilmington (Cover Letter Only)
Mr. John Dorney, NCDWQ (7 copies)
Mr. Travis Wilson, NCWRC
Ms. Kathy Matthews, USEPA
Mr. Gary Jordan, USFWS
Mr. Ron Sechler, NMFS
Mr. Michael Street, NCDMF
Mr. Cathy Brittingham, NCDCM
Mr. Bill Arrington, NCDCM
Mr. John H. Sullivan, III, FHWA
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Ms. Debbie Barbour, P.E., Highway Design
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. Jay B. Johnson, Division 2 Environmental Officer
Ms. Colista Freeman, P.E., NCDOT Project Development and Environmental Analysis
Mr. C.E. Lassiter, Jr., P.E. Division 2 Engineer, Greenville

NEUSE BUFFER ADDENDUM

The purpose of this addendum is to provide the NCDWQ with the information needed to evaluate the impacts of the project on the Neuse Buffer areas. The avoidance and minimization efforts described in the original permit application still apply. R-2539B has been designed to comply with the Riparian Buffer Mitigation Program (15A NCAC 2B .0242) and the Neuse River Basin Riparian Buffer Rules (15A NCAC 2B .0233). Therefore, as part of the Modification request, we respectfully request that the DWQ issue an Authorization Certificate pursuant to 15A NCAC 2B .0233 for the proposed use.

Neuse Buffer Impacts: Due to the nature of this project, impacts to the riparian buffers of Sassers Branch, Deep Run Creek, Black Creek, Goose Creek, and their UTs are unavoidable. Section R-2539B has a total impacts of 1.35 acres (58,800 square feet) of Neuse Riparian Buffer with 0.81 acres (35,300 square feet) in Zone 1 and 0.54 acres (23,700 square feet) in Zone 2. The area of impact was calculated to reflect the maximum potential impact by including riparian buffers out to the edge of the drainage easements rather than stopping at the toe of the fill slopes. The Neuse Buffer impacts for R-2539B are summarized below in Table A-1.

Table A-1. Neuse River Basin Buffer Impact Calculations (Road Crossing)

R-2539B							
Impact Sites	**2**	**4**	**5**	**7**	**13**	**16**	**Totals**
Buffer Impacts Zone 1	0.11 ac 4,681 sf	0.13 ac 5,662 sf	0.09 ac 4,004 sf	0.18 ac 7,664 sf	0.21 ac 9,333 sf	0.09 ac 4,140 sf	0.81 35,300 sf
Mitigable Impacts	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buffer Impacts Zone 2	0.06 ac 2,752 sf	0.18 ac 7,840 sf	0.06 ac 2,594 sf	0.10 ac 417 sf	0.09 ac 4,026 sf	0.05 ac 2,070 sf	0.54 23,700 sf
Mitigable Impacts	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* Mitigation required when impacts exceed 1/3 acre or 150 linear feet of buffer

Impacts from Utility Relocation

At the following sites, utility relocation will necessitate hand-clearing activities. While these are not considered 404 jurisdictional impacts, they do impact the Neuse Buffers. Impacts are depicted on the attached Utility permit drawings. The impacts listed in Table A-2 are exclusively for utility relocation.

Table A-2. Neuse River Basin Buffer Impact Calculations (Utility)

Impact Sites	5	13	16	Totals
Zone 1	0.02 ac 653 sf	0.09 ac 3,700 sf	0.08 ac 382 sf	0.18 ac 7,790 sf
Mitigable Impacts	0.00	0.00	0.00	0.00
Zone 2	0.01 ac 501 sf	0.07 ac 2,890 sf	0.06 ac 2,630 sf	0.14 ac 6,020 sf
Mitigable Impacts	0.00	0.00	0.00	0.00

Work Bridges

At Sites 4 and 16, Deep Run and Goose Creek bridges, existing bridge causeway will be removed and restored wetland areas and buffers will be bridged. The riparian buffers along Deep Run Creek and Goose Creek at these locations will be improved with the removal of the fill and wetland restoration along the streams. Riparian buffer impacts are shown on the permit drawings at these sites to indicate that there may be impacts to existing buffer impacts during construction. The construction of the temporary work bridges at Deep Run will require the removal of some mature riparian trees. The vegetated area covered by the temporary work bridges covers approximately 0.2 acres. No work bridges will be required at Goose Creek, since the top-down method of bridge construction will be used.

Compensatory Neuse Buffer Mitigation: All of the riparian buffer sites qualify as "Allowable" uses not requiring mitigation because the site is a bridge or the impacts are less than 150 linear feet and 0.33 acre. Since no single road crossing or utility buffer impact site within R-2539B exceeds 0.33 acre or 150 linear feet, no compensatory mitigation for buffers is proposed. Nevertheless, there will be buffer replacement accompanying the natural stream design for the relocated channel at Site 13. At this site, 0.33 acres in Zone 1 and 0.07 acres in Zone 2 will be established.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 21, 2003

Division of Coastal Management
North Carolina Department of Environment And Natural Resources
151-B Hwy. 24, Hestron Plaza II
Morehead City, NC 28557

ATTN.: Mr. Bill Arrington
Transportation Projects

Dear Sir:

Subject: **Application for Division of Coastal Management Modification of the Major Development Permit No. 55-03 for TIP No. R-2539.** NC 55 Widening From US 17 in Bridgeton to NC 304 in Bayboro, Craven and Pamlico Counties, NCDOT Division No. 2. Federal Aid Project STP-55(1). State Project No. 8.1170901. WBS Element No. 34452.1.1. USACE Action ID 199303531. DWQ Project No. 021232, WQC No. 3415.

The North Carolina Department of Transportation (NCDOT), Division of Highways, is requesting a permit modification for the above referenced project. On April 22, 2003 the CAMA Major Development Permit No. 55-03 was issued for the widening of NC 55 from US 17 to NC 304 in Bayboro. The Permit approved the CAMA jurisdictional impacts associated with Section A of the project and requested that modification of the Permit be made for Sections B and C as the final design drawings and jurisdictional impact assessments for those sections were completed. The purpose of this letter is to request a modification to the CAMA Major Development Permit No. 55-03 for approval of impacts associated with Section B of the project. The final permit drawings and relevant information for R-2539B are attached. Another modification request will be submitted for Section C when the design for it is completed.

The completed design for R-2539B does not compromise NCDOT's compliance with the existing permit conditions. No additional mitigation is proposed. The completed design has been evaluated for compliance with the avoidance/minimization criteria and is in compliance with all previous Individual Permit factors, including the following:

- Protected Species,
- Cultural Resources,
- Aquatic Life passage,
- FEMA compliance, and
- Utilities.

Much of the general information in the original Individual Permit application remains the same and is not repeated in this modification request. Information on the purpose and need, project schedule, NEPA document status, and mitigation options is contained in the original permit application.

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

TELEPHONE: 919-715-1500
FAX: 919-715-1501
WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
2728 CAPITOL BOULEVARD
PARKER LINCOLN BUILDING, SUITE 168
RALEIGH NC 27699

Summary of Project Impacts: In the August 9, 2002 application, total impacts to CAMA jurisdictional Areas of Environmental Concern (AECs) were estimated to be 118.1 linear feet at a UT to West Fork Goose Creek in Section B. Impacts to 404 jurisdictional areas of the entire R-2539 were estimated at 15.69 acres of permanent wetland, 0.15 acres of fill in surface waters, and 619 linear feet of stream channels. With the revised impacts associated with the final design of Section B, the total project impacts (all three Sections) are now estimated to be 15.74 acres of wetland impacts, 0.15 acres of fill in surface waters, and 619 linear feet of stream channels. The minor differences in impacts are from wetland drainage impacts in the final design of Section B, minor changes in the impact area calculations (rounding), and extension of buffer impact calculations out to the edge of drainage easements rather than limiting calculations to the toe of fill slope.

Permanent impacts associated with the final design of Section B consist of 3.69 acres of 404 jurisdictional wetland impacts and 295 linear feet of stream channel impacts (Tables 1 and 2). Of these 295 feet, 118.1 feet of impacts will be to the UT to West Fork Goose Creek AEC (Site 13). Temporary impacts consist of less than 0.01 acres of fill for the temporary work bridges at Site 4. The riverine (Sites 4 and 16) and non-riverine wetland impacts include 0.65 acres and 2.98 acres, respectively. Fill in wetlands totals 1.87 acres, mechanized clearing totals 1.51 acres, and excavation in wetlands totals 0.25 acres of the total wetland impacts in Section B. Drainage impacts in Section B total 0.06 acres of non-riverine wetlands.

Design Changes: Final design revision resulted in two sites differing from those submitted with the original permit application.

Site 1, Permit Sheet 7 of 40
Station 56+30 left
Because of the low grade and minimal drainage potential of the natural ground elevation at this site, it will be necessary to install a typical V-ditch with 6:1 side slopes to drain the subgrade of the new road. Based on the Boussinesq equation calculations, there will be additional impacts resulting from the drainage impact from this ditch. The Ditch Impact Study, dated July 2003, is attached.
Impact change: increase of 0.06 acres of non-riverine wetland impacts

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Drainage effects from the wetland ditch feeding into the pre-formed scour hole were not calculated because this ditch will bring water into the wetland, contributing to the hydrology rather than diminishing it.
Impact change: no change to jurisdictional impacts

Site 4, Permit sheet 10 of 40
Station 77 +00 to 77+20, left
At this site an area of mechanized clearing in wetlands has been changed to excavation to accommodate a drainage swale.
Impact change: no change to jurisdictional impacts

Table 1. Jurisdictional Wetland and Surface Water Impacts on R-2539B

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7	108 +50/114 +00	0.71		0.44	
8	117 +20/118 +60	0.02		0.09	
9	119 +20/120 +20	0.05		0.06	
10	121 +70/122 +20	0.11		0.03	
11	123 +75/125 +60	0.05		0.04	
12	130 +60/131 +95	Impacts avoided		Impacts avoided	
13	134 +75/137 +30	0.07	0.12	0.33	
14	139 +10/139 +20	0.04	<0.01	0.01	
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Table 2. Jurisdictional Stream Information, Sections R-2539B

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[1] Impact increase or decrease from original IP application is denoted in parentheses.
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Indirect and Cumulative Impacts: The Indirect and Cumulative Impact Study (attached) for R-2539B indicates that development is expected to continue in the study area and along the NC 55 corridor. The non-residential development along NC 55 will be dependent on population growth and, to a lesser extent, influenced by the widening of the highway. Existing policies and regulations will manage potential indirect impacts to the area's water quality. The construction of R-2539B is not expected to result in any indirect or cumulative impacts that will adversely affect water quality.

Summary of Mitigation: Throughout NEPA and design process this project has been designed to avoid and minimize impacts to jurisdictional areas. Specific strategies, detailed in the original application, remain valid for this application. Highlights include widening NC 55 along the existing roadway, using 3:1 slopes within wetland limits, extending bridge spans at Deep Run Creek and Goose Creek, natural stream design for the relocated stream at Site 13, and wetland restoration associated with the removal of existing bridge causeways and an abandoned railroad bed. Offsite Mitigation for the remaining impacts will still be covered by the Croatan and Brock Mitigation Sites as described in the original permit application.

Application is hereby made for a major modification of the Division of Coastal Management CAMA Permit as required for the above-described activities.

If you have any questions or need additional information, please call Ms. Elizabeth Lusk (919) 715-1444

Sincerely,

Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

Attachments:

Permit Drawings and Half-size plans
Utility Drawings
Indirect and Cumulative Impact Study
Ditch Impact Study, July 2003

CC: Ms. Cathy Brittingham, NCDCM
M. David Franklin, USACE, Wilmington (Cover Letter Only)
Mr. Mike Bell, NCDOT Coordinator, USACE, Washington
Mr. John Dorney, DWQ, Raleigh
Mr. Jay Bennett, P. E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Ms. Debbie Barbour, P. E., Highway Design
Mr. David Chang, P. E., Hydraulics
Mr. Greg Perfetti, P. E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. Jay Johnson, Division 2 Environmental Officer
Ms. Colista Freemen, P. E., NCDOT Project Development and Environmental Analysis
Mr. C. E Lassiter, Jr., P. E. Division 2 Engineer, Greenville

Form DCM-MP-1

APPLICATION

(To be completed by all applicants)

1. APPLICANT R-2539B

a. **Landowner:**

Name N.C. Department of Transportation

Address 1548 Mail Service Center

City Raleigh **State** NC

Zip 27699-1548 **Day Phone** 919-733-3141

Fax (919) 733-9794

b. **Authorized Agent:**

Name: _____

Address: _____

City: _____ **State:** _____

Zip: _____ **Day Phone:** _____

Fax: _____

c. **Project name (if any):** T.I.P. R-2539B, State Project No. 8.1170901, NC 55 Widening

NOTE: Permit will be issued in name of landowner(s), and/or project name.

2. LOCATION OF PROPOSED PROJECT

a. **County:** Pamlico

b. **City, town, community or landmark:** Reelsboro; from east of SR 1127 to SR 1129 in Pamlico County

c. **Street address or secondary road number:** NC 55

d. **Is proposed work within city limits or planning jurisdiction?** X Yes ____ No

e. **Name of body of water nearest project (e.g. river, creek, sound, bay):** Sassers Branch, Deep Run Creek, Black Creek, Goose Creek

3. DESCRIPTION AND PLANNED USE OF PROPOSED PROJECT

a. **List all development activities you propose (e.g. building a home, motel, marina, bulkhead, pier, and excavation and/or filling activities.** Roadway widening and bridge construction .

b. **Is the proposed activity maintenance of an existing project, new work, or both?** NEW

c. **Will the project be for public, private or commercial use?** Public

d. **Give a brief description of purpose, use, methods of construction and daily operations of proposed project. If more space is needed, please attach additional pages.** Widening of NC 55 from two to five lanes, from east of SR 1127 to SR 1129 in Pamlico County.

Highway construction equipment

4. LAND AND WATER CHARACTERISTICS

a. Size of entire tract: 74 acres

b. Size of individual lot(s): N/A

c. Approximate elevation of tract above MHW or NWL: :+/- 10 feet

d. Soil type(s) and texture(s) of tract:
See original permit

e. Vegetation on tract See original permit cover letter

f. Man-made features now on tract Bridge, roadway

g. What is the CAMA Land Use Plan land classification of the site? *(Consult the local land use plan.)*
Craven County = C, Pamlico County = P

____ Conservation	__C__ Transitional
__P__ Developed	__P__ Community
__P__ Rural	____ Other

h. How is the tract zoned by local government?

i. Is the proposed project consistent with the applicable zoning? __X__ **Yes** ____ **No**

(Attach zoning compliance certificate, if applicable)

j. Has a professional archaeological assessment been done for the tract? __X__ **Yes** ____ **No**
If yes, by whom? NC DOT and SHPO

k. Is the project located in a National Registered Historic District or does it involve a National Register listed or eligible property?
__X__ **Yes** ____ **No**

l. Are there wetlands on the site? __X__ **Yes** ____ **No**
Coastal (marsh) ____ **Other** ____
If yes, has a delineation been conducted? Yes, Michael F. Bell, USCOE, Sept. 1, 2001
(Attach documentation, if available)

m. Describe existing wastewater treatment facilities.
None

n. Describe location and type of discharges to waters of the state. (For example, surface runoff, sanitary wastewater, industrial/commercial effluent, "wash down" and residential discharges.) Surface runoff from roadway

o. Describe existing drinking water supply source.
County water line

5. ADDITIONAL INFORMATION

In addition to the completed application form, the following items must be submitted:

- **A copy of the deed** (with state application only) or other instrument under which the applicant claims title to the affected properties. If the applicant is not claiming to be the owner of said property, then forward a copy of the deed or other instrument under which the owner claims title, plus written permission from the owner to carry out the project.

- **An accurate, dated work plat** (including plan view and cross-sectional drawings) drawn to scale in black ink on an 8 1/2" by 11" white paper. (Refer to Coastal Resources Commission Rule 7J.0203 for a detailed description.)

  Please note that original drawings are preferred and only high quality copies will be accepted. Blue-line prints or other larger plats are acceptable only if an adequate number of quality copies are provided by applicant. (Contact the U.S. Army Corps of Engineers regarding that agency's use of larger drawings.) A site or location map is a part of plat requirements and it must be sufficiently detailed to guide agency personnel unfamiliar with the area to the site. Include highway or secondary road (SR) numbers, landmarks, and the like.

- **A Stormwater Certification**, if one is necessary.
  SW7020722 issued 10/7/02

- A list of the **names and complete addresses of the adjacent waterfront (riparian) landowners and signed return receipts as proof that such owners have received a copy of the application and plats by certified mail.** Such landowners must be advised that they have 30 days in which to submit comments on the

proposed project to the Division of Coastal Management. Upon signing this form, the applicant further certifies that such notice has been provided.

See Attached permit drawings

Name _____
Address _____
Phone _____

Name _____
Address _____
Phone _____

Name _____
Address _____
Phone _____

- **A list of previous state or federal permits** issued for work on the project tract. Include permit numbers, permittee, and issuing dates.

_____

- **A check for $400** made payable to the Department of Environment, Health, and Natural Resources (DEHNR) to cover the costs of processing the application.

- **A signed AEC hazard notice** for projects in oceanfront and inlet areas.

- **A statement of compliance with the N.C. Environmental Policy Act (N.C.G.S. 113A - 1 to 10)** If the project involves the expenditure of public funds or use of public lands, attach a statement documenting compliance with the North Carolina Environmental Policy Act.

6. CERTIFICATION AND PERMISSION TO ENTER ON LAND

I understand that any permit issued in response to this application will allow only the development described in the application. The project will be subject to conditions and restrictions contained in the permit.

I certify that to the best of my knowledge, the proposed activity complies with the State of North Carolina's approved Coastal Management Program and will be conducted in a manner consistent with such program.

I certify that I am authorized to grant, and do in fact, grant permission to representatives of state and federal review agencies to enter on the aforementioned lands in connection with evaluating information related to this permit application and follow-up monitoring of the project.

I further certify that the information provided in this application is truthful to the best of my knowledge.

This is the ____ day of _____, 19___.

Print Name _____

Signature _____
Landowner or Authorized Agent

Please indicate attachments pertaining to your proposed project.

_X_ DCM MP-2 Excavation and Fill Information
___ DCM MP-3 Upland Development
___ DCM MP-4 Structures Information
_X_ DCM MP-5 Bridges and Culverts
___ DCM MP-6 Marina Development

NOTE: *Please sign and date each attachment in the space provided at the bottom of each form.*

Form DCM-MP-5

BRIDGES AND CULVERTS

Attach this form to Joint Application for CAMA Major Permit, Form DCM-MP-1. Be sure to complete all other sections of the Joint Application that relate to this proposed project.

1. BRIDGES R-2539 B

a. Public X **Private** _____

b. Type of bridge (construction material)
two bridges utilizing 36" ppc girders

c. Water body to be crossed by bridges
a) Deep Run Creek and b) Goose Creek

d. Water depth at the proposed crossings at MLW or NWL a) 3ft b) 3.5 ft

e. Will proposed bridge replace an existing bridge?
X **Yes** _____ **No**
If yes,
(1) Length of existing bridges a) 70 ft b) 100 ft
(2) Width of existing bridges a) 26 ft b) 26 ft
(3) Navigation clearance underneath existing bridges a) 6 ft b) 9 ft
(4) Will all, or a part of, the existing bridges be removed? (Explain) **Yes, the existing bridges and causeways fill will be removed as the new bridges is built.**

f. Will proposed bridges replace an existing culvert(s)?
_____ **Yes** X **No**
If yes,
(1) Length of existing culvert _____
(2) Width of existing culvert _____
(3) Height of the top of the existing culvert above the MHW or NWL _____
(4) Will all, or a part of, the existing culvert be removed? (Explain) _____

g. Length of proposed bridges a) 328 ft b) 732 ft

h. Width of proposed bridges a) 67 ft b) 70 ft

i. Height of proposed bridges above wetlands
a) 13 ft b) 12 ft

j. Will the proposed bridges affect existing water flow? _____ Yes **X** No
If yes, explain _____

k. Navigation clearance underneath proposed bridges a) 6 ft b) 9 ft

l. Will the proposed bridge affect navigation by reducing or increasing the existing navigable opening? _____ **Yes** X **No**
If yes, explain _____

m. Will the proposed bridge cross wetlands containing no navigable waters? X **Yes** _____ **No**
If yes, explain : The existing causeway fills will be removed and the new bridges will be constructed over existing and restored wetlands.

n. Have you contacted the U.S. Coast Guard concerning their approval?
_____ **Yes** X **No**
If yes, please provide record of their action.

2. CULVERTS

a. Water body in which culvert is to be placed
Sassers Branch, UT to Deep Run Creek, UT to Black Creek,

b. Number of culverts proposed 5

c. Type of culvert (construction material, style)
concrete pipe, concrete box culvert

d. Will proposed culverts replace an existing bridge?

____ Yes __X__ No

If yes,

(1) Length of existing bridge _____

(2) Width of existing bridge _____

(3) Navigation clearance underneath existing bridge _____

(4) Will all, or a part of, the existing bridge be removed? (Explain) _____

e. Will proposed culverts replace an existing culvert? __X__ Yes ____ No

If yes, See attached Table MP5-2e

(1) Length of existing culvert _____

(2) Width of existing culvert _____

(3) Height of the top of the existing culvert above the MHW or NWL +/- 2'

(4) Will all, or a part of, the existing culvert be removed? (Explain) No, culverts will be extended

f. Length of proposed culvert See Table MP5-2e

g. Width of proposed culvert Same as existing

h. Height of the top of the proposed culvert above the MHW or NWL +/- 2'

i. Will the proposed culvert affect existing water flow?

____ Yes __X__ No

If yes, explain _____

j. Will the proposed culvert affect existing navigation potential? ____ Yes __X__ No

If yes, explain _____

3. EXCAVATION AND FILL

a. Will the placement of the proposed bridge or culvert require any excavation below the MHW or NWL?

__X__ Yes ____ No

See Attached Permit Drawings

If yes,

(1) Length of area to be excavated _____

(2) Width of area to be excavated _____

(3) Depth of area to be excavated _____

(4) Amount of material to be excavated in cubic yards _____

b. Will the placement of the proposed bridge or culvert require any excavation within:___ Coastal Wetlands __ SAVs __X__ Other Wetlands

If yes, See Attached Permit Drawings

(1) Length of area to be excavated _____

(2) Width of area to be excavated _____

(3) Amount of material to be excavated in cubic yards _____

c. Will the placement of the proposed bridge or culvert require any highground excavation?

__X__ Yes ____ No

If yes, See Attached Permit Drawings

(1) Length of area to be excavated _____

(2) Width of area to be excavated _____

(3) Amount of material to be excavated in cubic yards _____

d. If the placement of the bridge or culvert involves any excavation, please complete the following:

(1) Location of the spoil disposal area
Approved upland disposal site.

(2) Dimensions of spoil disposal area
Unknown at this time

(3) Do you claim title to the disposal area?
____ Yes __X__ No
If no, attach a letter granting permission from the owner.

(4) Will the disposal area be available for future maintenance? ____Yes __X__ No

(5) Does the disposal area include any coastal wetlands (marsh), SAVs, or other wetlands?
____ Yes __X__ No
If yes, give dimensions if different from (2) above. _____

(6) Does the disposal area include any area below the MHW or NWL? _ Yes __X__ No
If yes, give dimension if different from No. 2 above. _____

e. Will the placement of the proposed bridge or culvert result in any fill (other than excavated material described in Item d. above) to be placed below MHW or NWL? ____Yes __X__ No

If yes,

(1) Length of area to be filled _____

(2) Width of area to be filled _____

(3) Purpose of fill _____

f. Will the placement of the proposed bridge or culvert result in any fill (other than excavated material described in Item d. above) to be placed within:

___ Coastal Wetlands ___ SAVs _X_ Other Wetlands If yes, See Attached Permit Drawings

(1) Length of area to be filled _____
(2) Width of area to be filled _____
(3) Purpose of fill _____

g. Will the placement of the proposed bridge or culvert result in any fill (other than excavated material described in Item d. above) to be placed on highground? __X__ Yes ___ No
If yes, See Attached Permit Drawings

(1) Length of area to be filled _____
(2) Width of area to be filled _____
(3) Purpose of fill _____

4. GENERAL

a. Will the proposed project involve any mitigation?
_X___ Yes ____ No
If yes, explain in detail
See USACOE Individual Permit Application

b. Will the proposed project require the relocation of any existing utility lines? _X___ Yes ____ No
If yes, explain in detail Telephone, power, water, and sewer lines. See Utility attachment.

c. Will the proposed project require the construction of any temporary detour structures?
____Yes __X__ No
If yes, explain in detail _____

d. Will the proposed project require any work channels? ___ Yes _X___ No
If yes, complete Form DCM-MP-2

e. How will excavated or fill material be kept on site and erosion controlled? Silt fence, diversion ditches and NCDOT Type "B" basins.

f. What type of construction equipment will be used (for example, dragline, backhoe or hydraulic dredge)? Backhoe, bulldozer, crane.

g. Will wetlands be crossed in transporting equipment to project site? _____Yes __X__ No
If yes, explain steps that will be taken to lessen environmental impacts._____

h. Will the placement of the proposed bridge or culvert require any shoreline stabilization?
____Yes _X___ No
If yes, explain in detail _____

Applicant or Project Name: NCDOT NC 55 Widening R-2539B

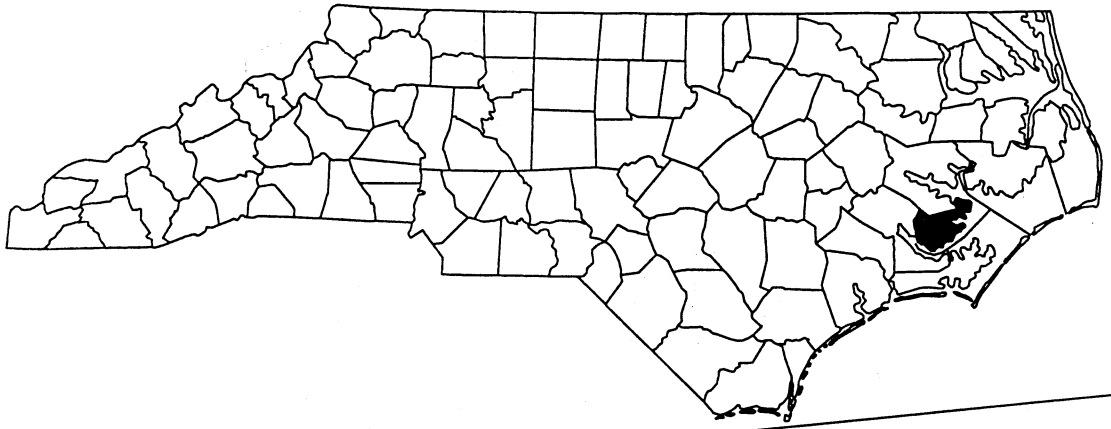
_____
Signature

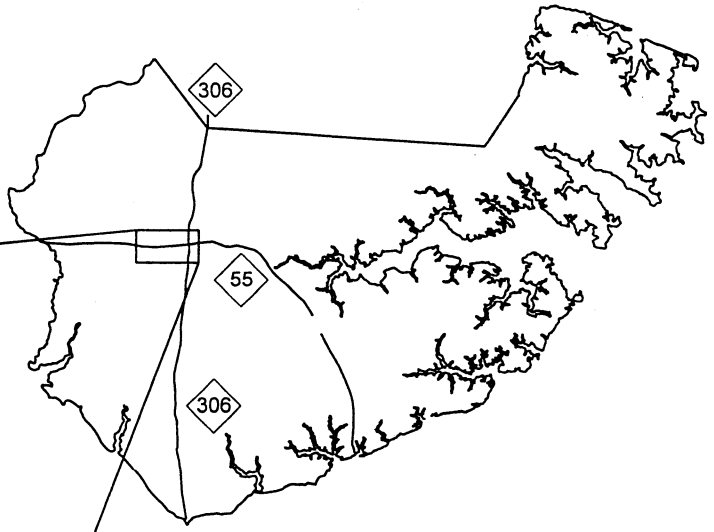
_____
Date

Table MP5-2e. Culverts

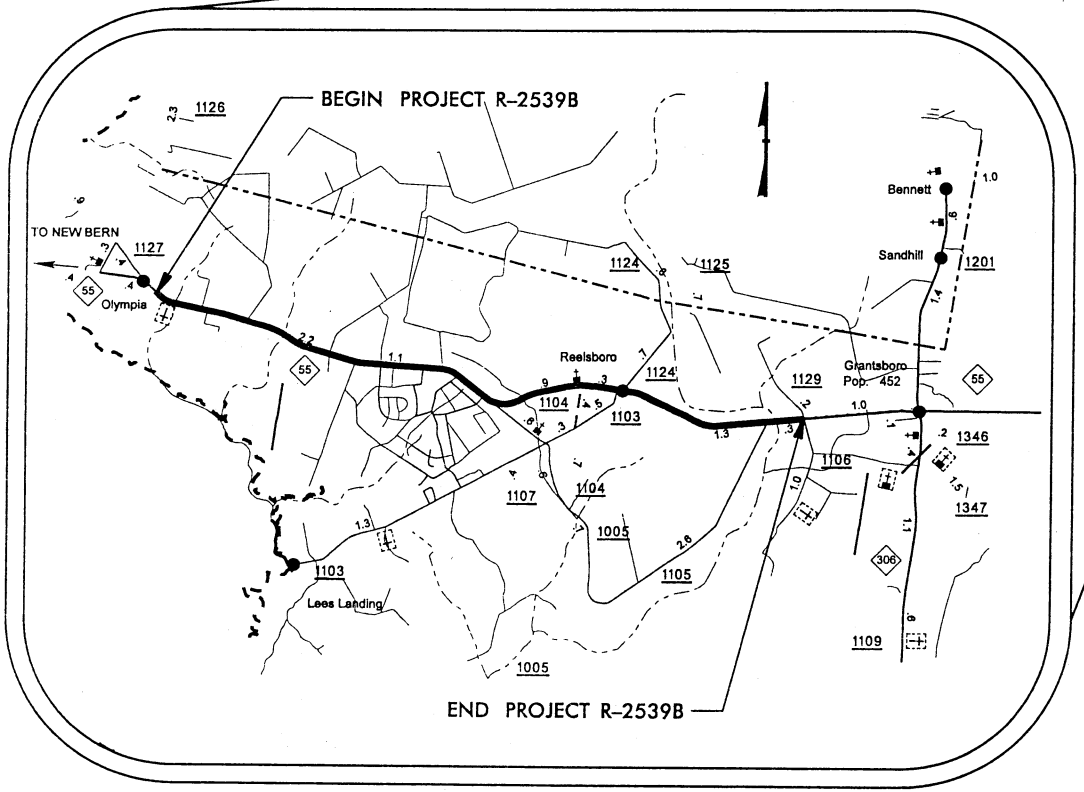
Station Number	Water Body	Existing Culvert	Proposed Culvert	Height Above MHW or NWL
A 12+00	UT to Duck Creek	53" x 62' RCP	53" x 131' RCP	2'
B 60+12.4	Sasser's Branch	2 lines of 64" x 65' RCP	2 lines of 65" x 120' RCP	4'
B 82+00	UT to Deep Run Creek	42" x 20' RCP	42" x 105' RCP	
B 112+81.3	UT to Black Creek	48"x70" and 48"x48" x 62' RCBC	48"x70" and 48"x48" x 117' RCBC	3'
B 136+71.8	UT to Goose Creek	70"x48' x 70' RCBC	70"x48' x 103' RCBC	3.6'
B 139+00	UT to Goose Creek	36" x 82' RCP	36" x 118' RCP	

Wetlands





PAMLICO COUNTY



N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)

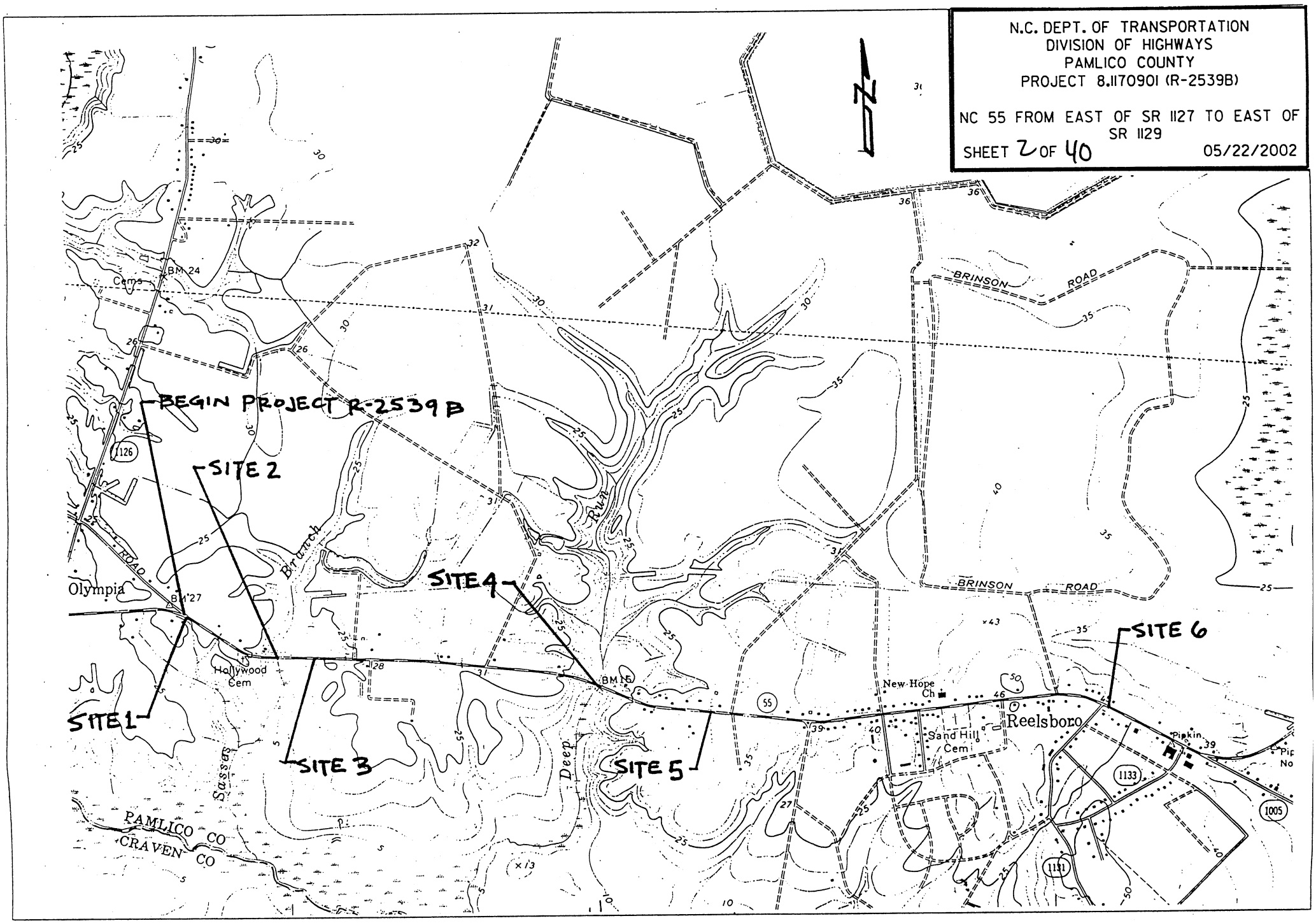
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 1 OF 40 05/22/2002

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

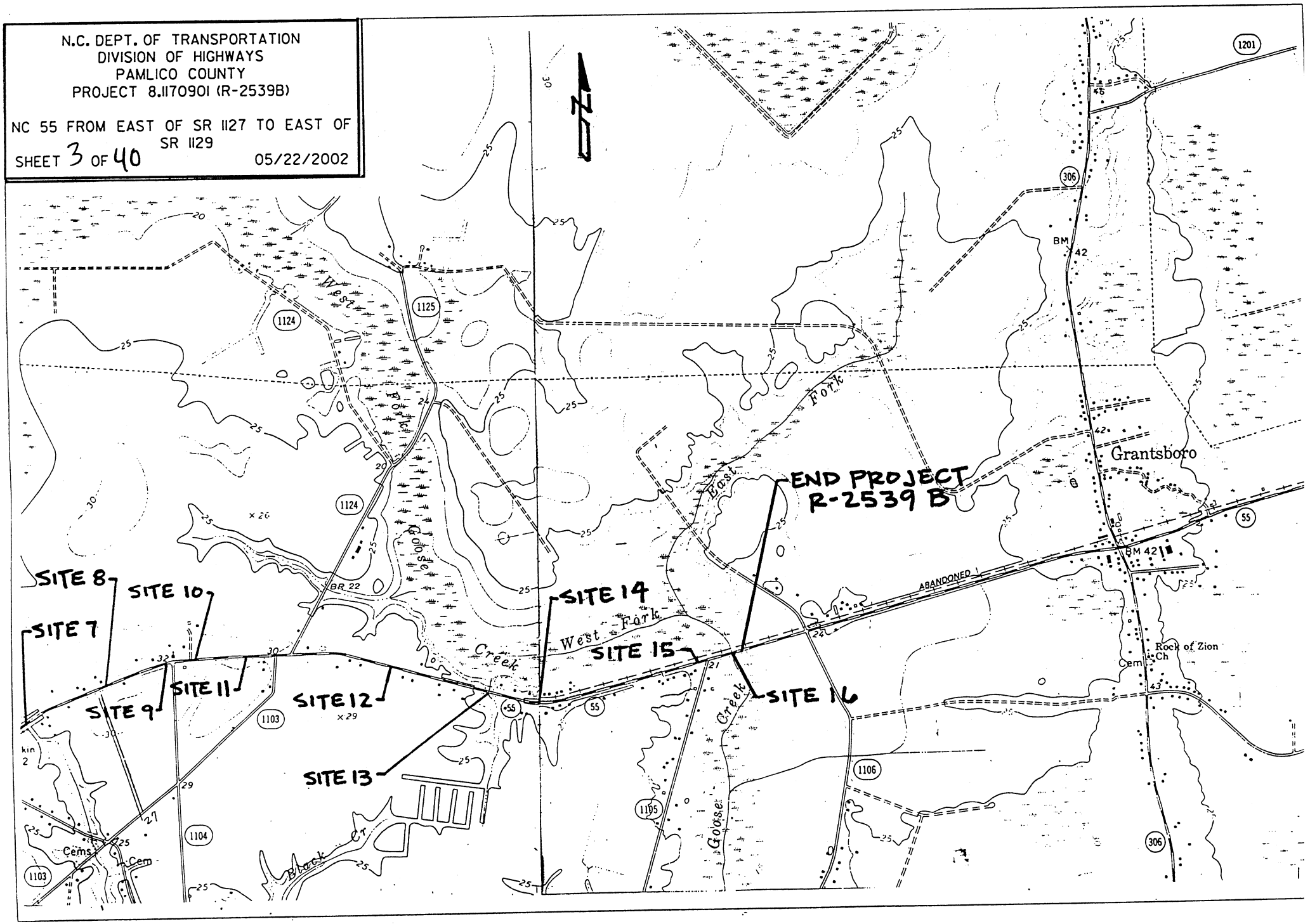
SHEET 2 OF 40 05/22/2002



N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 3 OF 40 05/22/2002



LEGEND

WLB 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

DENOTES WETLAND RESTORATION

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

COIR FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMILCO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 4 OF 46 **07/01/2002**

PROPERTY OWNERS

PARCEL NO.	NAMES	ADDRESSES
1	JUDY C SPEIGHT	1233 BROAD CREEK RD NEW BERN, NC 28560
2	JULIAN B BROUGHTON, JR.	RT.1, BOX 137B NEW BERN, NC 28560
3	RICHARD DEAN & RONALD HARDISON	6302 HIGHWAY 55 E NEW BERN, NC 28560
4	RAYMOND E DUNN	PO BOX 1389 NEW BERN, NC 28563
5	OSCAR A KRECHEL, JR	4493 HIGHWAY 55 E NEW BERN, NC 28560
6	LESLIE REEL BRINSON, ET AL	PO BOX 56 GRANTSBORO, NC 28529
7	AILEEN S LEE	4849 HIGHWAY 55 E NEW BERN, NC 28560
8	WILLIAM G CAHOON	5025 HIGHWAY 55 E NEW BERN, NC 28560
9	CLARA R BANKS	3058 JANERIO RD ARAPAHOE, NC 28510
10	EVELYN M STEPHENS	5071 HIGHWAY 55 E NEW BERN, NC 28560
11	JOHN C PETERSON	5291 HIGHWAY 55 E NEW BERN, NC 28560
12	ALBERT ROACH	5264 HIGHWAY 55 E NEW BERN, NC 28560
13	MAURICE W BENTON	PO BOX 125 STONEWALL, NC 28583
14	CLAUDIA B ROACH	349 CARMAL DR MELBOURNE, FL 32940
15	ELLEN B JOHNSON	1804 MASHBURN CIRCLE KINSTON, NC 28504
16	D KEITH TYNDALL	6701 HIGHWAY 55 E NEW BERN, NC 28560
17	HOWARD A REEL	7726 HIGHWAY 55 E NEW BERN, NC 28560
18	JERRY CASEY	7389 HIGHWAY 55 E NEW BERN, NC 28560
19	RUBY GOODWIN	7533 HIGHWAY 55 E NEW BERN, NC 28560

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

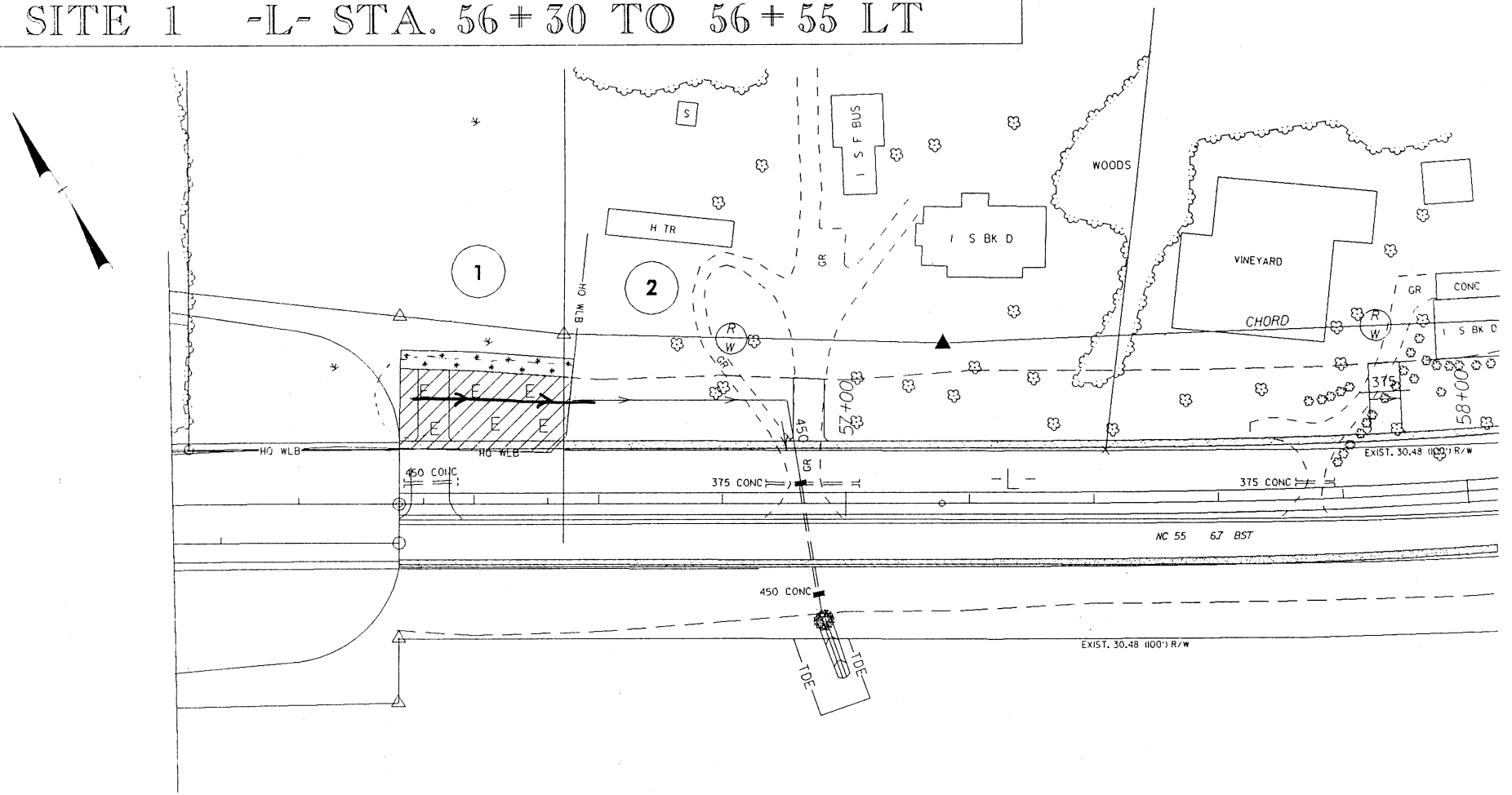
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

05/22/2002

PROPERTY OWNERS

PARCEL NO.	NAMES	ADDRESSES
20	FH REEL JR HEIRS ALLEN K HARKER MYRTIE REEL LEE, HEIRS LESSIE REEL BRINSON	7726 HIGHWAY 55 E NEW BERN, NC 28560
21	ALICE B REEL	PO BOX 128 BRIDGETON, NC 28519
22	CAROLYN L DAVIS	8340 HIGHWAY 55 E NEW BERN, NC 28560
23	JAMES W LEE	3514 COUNTRY CLUB RD MOREHEAD CITY, NC 28557
24	MRS ROY CURTIS	7104 CATLETT ST SPRINGFIELD, VA 22151
25	ELSIE SPIVEY	1822 HIGHWAY 306 N NEW BERN, NC 28560
26	LOTTIE NILES, HEIRS	402 IVY CRESCENT CHESAPEAKE, VA 23325
27	MARY BROWN	PO BOX 1121 NEW BERN, NC 28560
27A	NEHEMIAH WOODARD	8875 HWY. 55 E. NEW BERN, NC 28560
28	BEASLEY FM ACQUISITION GROUP CORP	3033 RIVIERA DR #200 NAPLES, FL 34103
29	RWR LOGGING, INC.	RT. 6 BOX 327-A GOLDSBORO, NC 27530
30	JAMES R KRAUSS	193 BENNETT-TINGLE RD NEW BERN, NC 28560
31	JOHN T HERRING, JR.	810 AIRPORT RD NEW BERN, NC 28560
32	ELIZABETH HARRIS WOZNIAK	300 LEE STREET EMPORIA, VA 23847

SITE 1 -L- STA. 56+30 TO 56+55 LT



E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

0 5 10

SCALE = 1:1000

Site 1

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

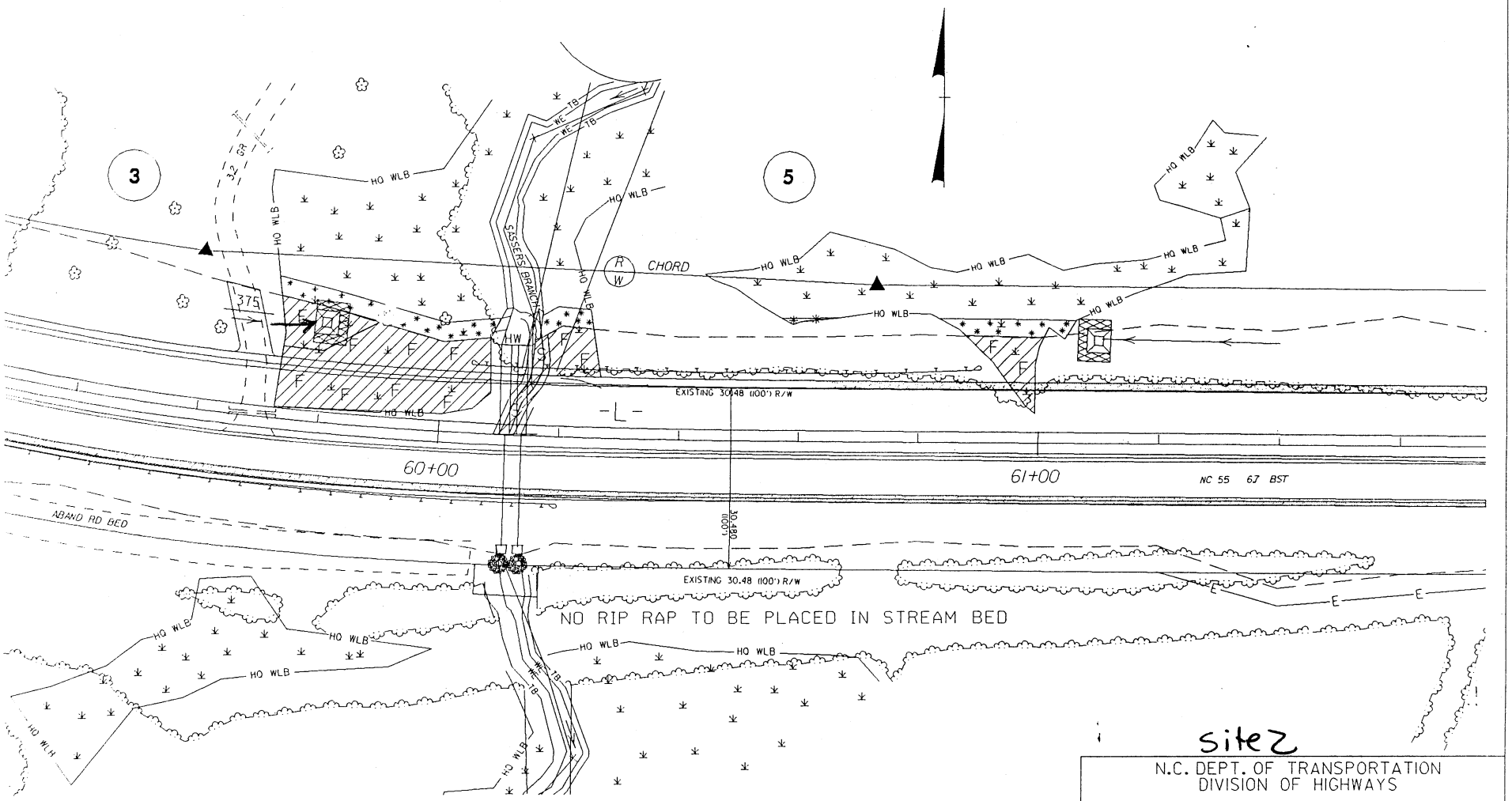
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 7 OF 40

SITE 2 -L- STA. 59+70 TO 61+00 LT



site 2

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

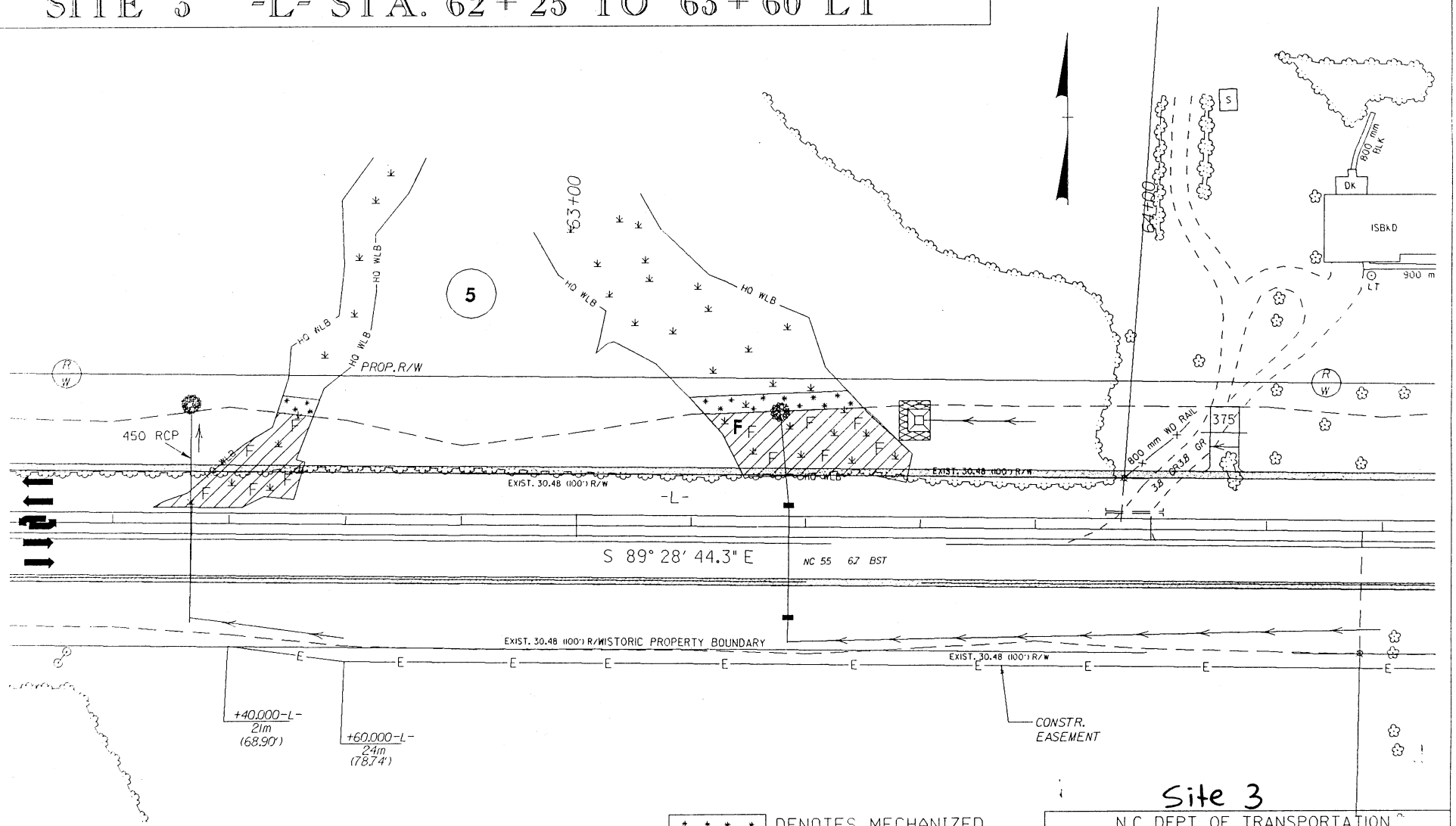
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 8 OF 40

REV. 04/04/03
12/18/2002

SITE 3 -L- STA. 62+25 TO 63+60 LT



Site 3

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

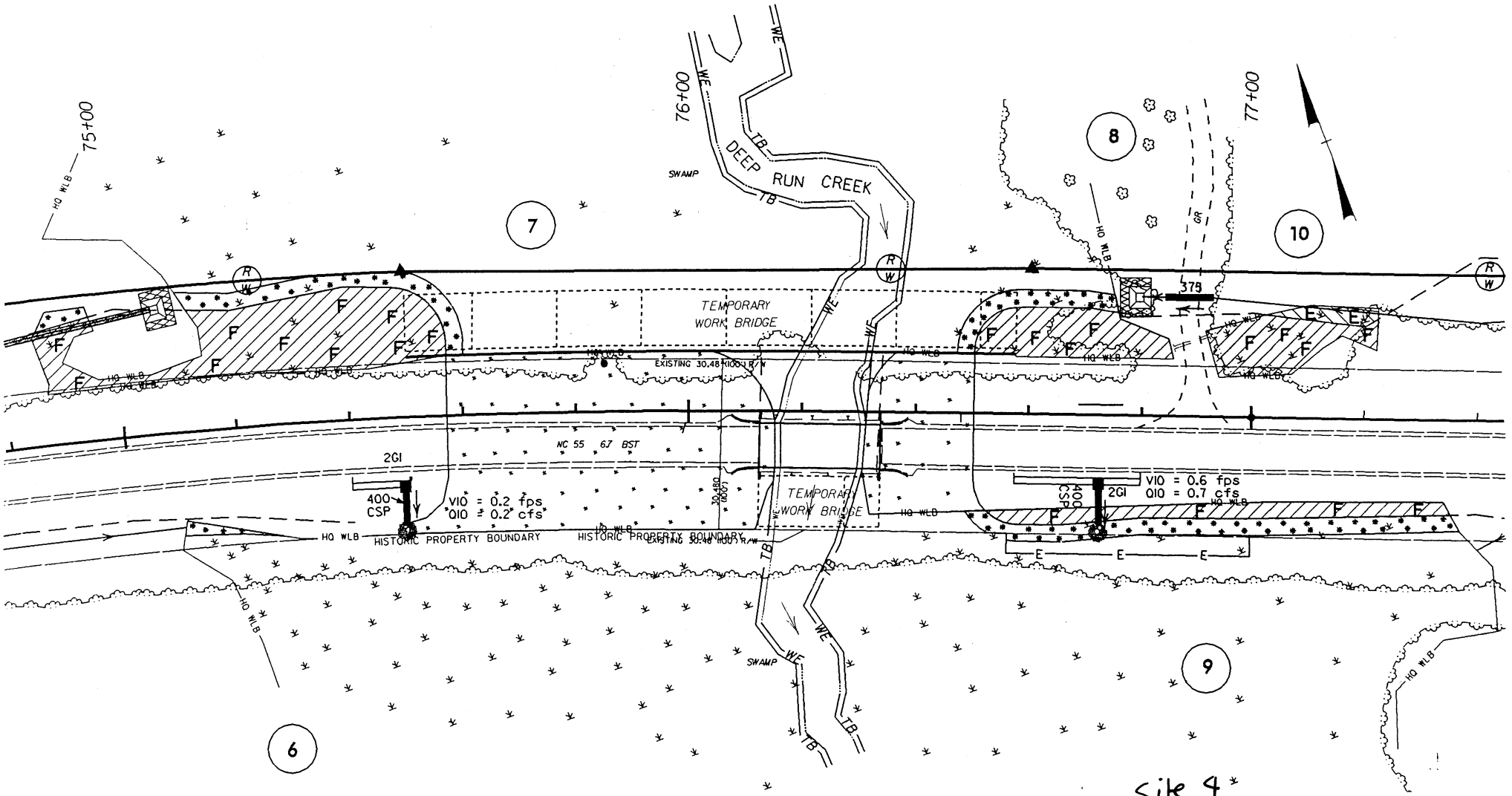
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 9 OF 40

REV. 04/04/03
12/18/2002

SITE 4 -L- STA. 74+85 TO 77+40 RT & LT



DENOTES WETLAND RESTORATION

DENOTES FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

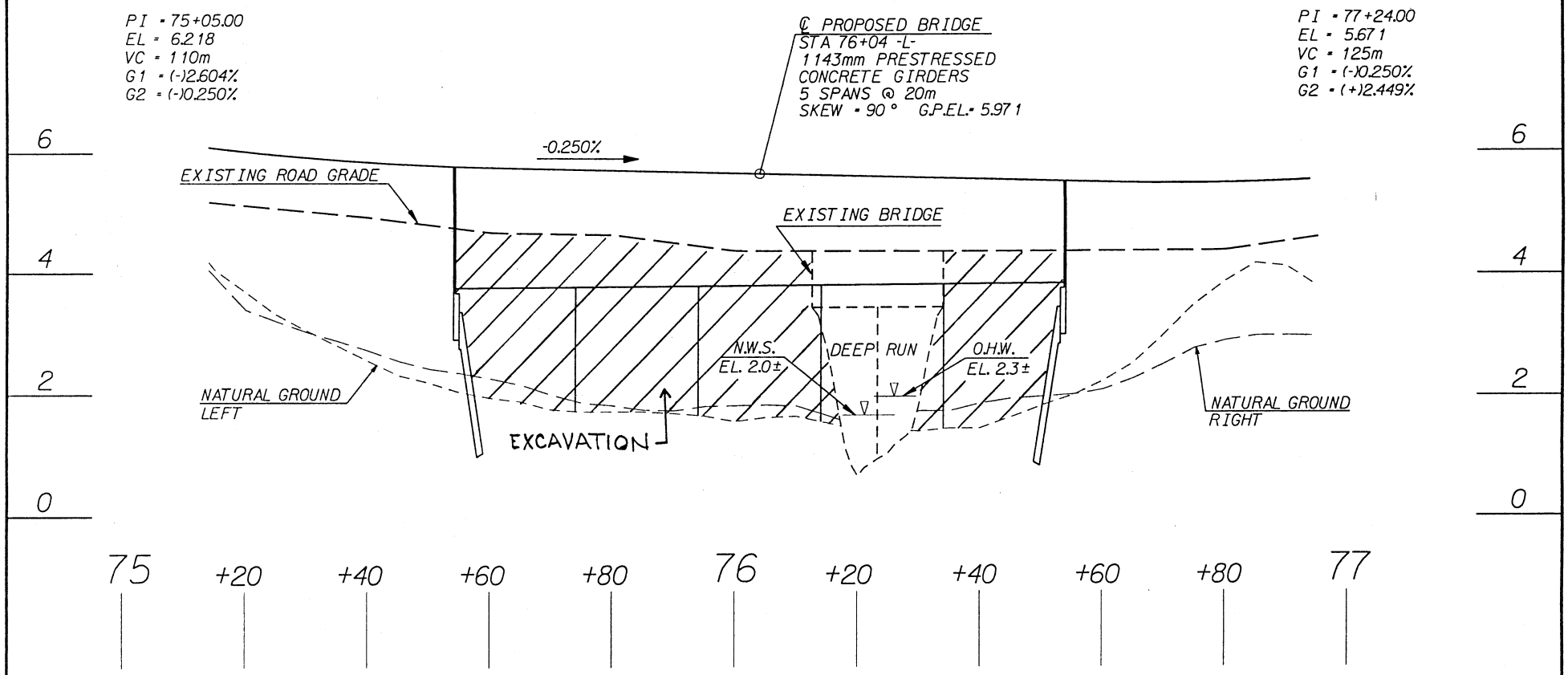
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 10 OF 40



10m 0 20m

HORIZONTAL SCALE

1m 0 2m

VERTICAL SCALE

PROFILE
SITE 4

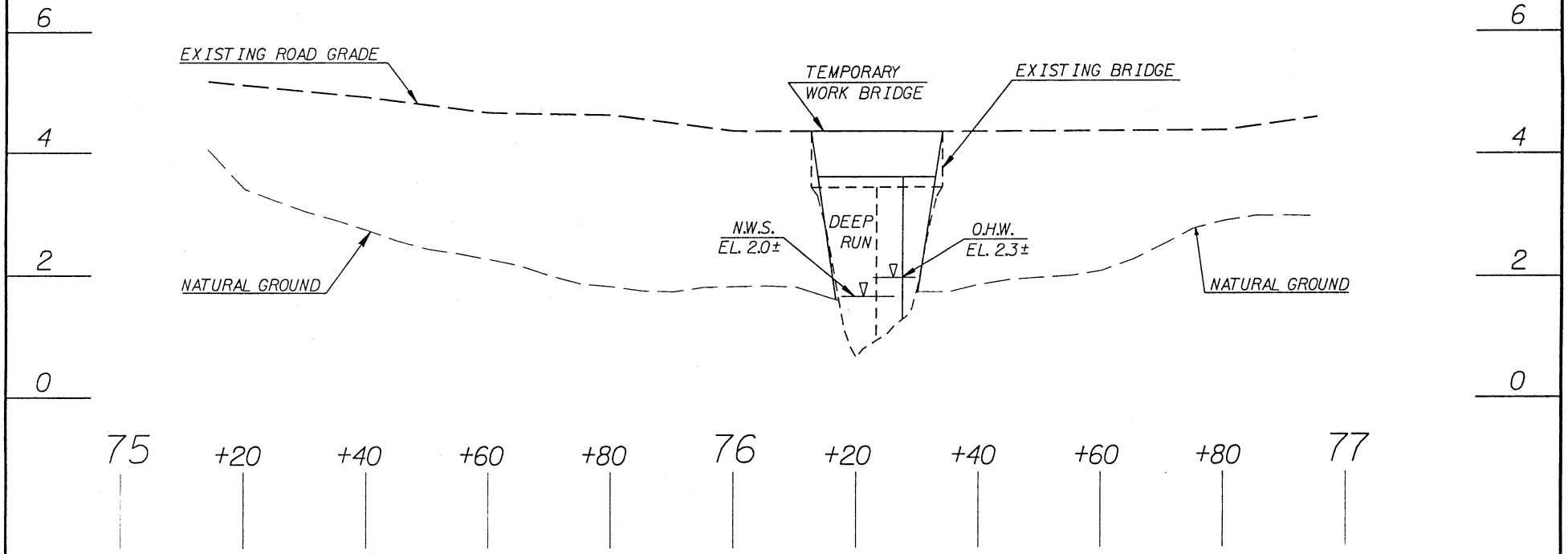
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 11 OF 46 05/22/02



TEMPORARY WORK BRIDGE (SOUTH SIDE) PROFILE SITE 4

10m 0 20m

HORIZONTAL SCALE

1m 0 2m

VERTICAL SCALE

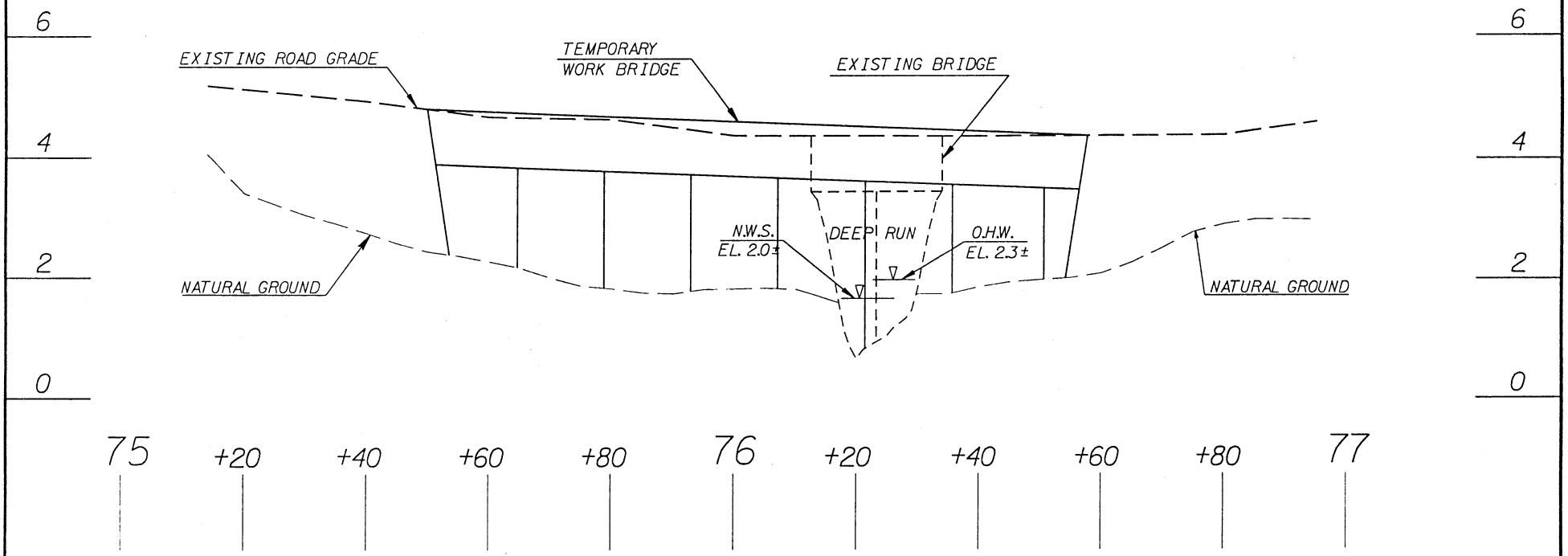
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 12 OF 40 05/22/02



10m 0 20m

HORIZONTAL SCALE

1m 0 2m

VERTICAL SCALE

TEMPORARY WORK BRIDGE (NORTH SIDE) PROFILE SITE 4

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

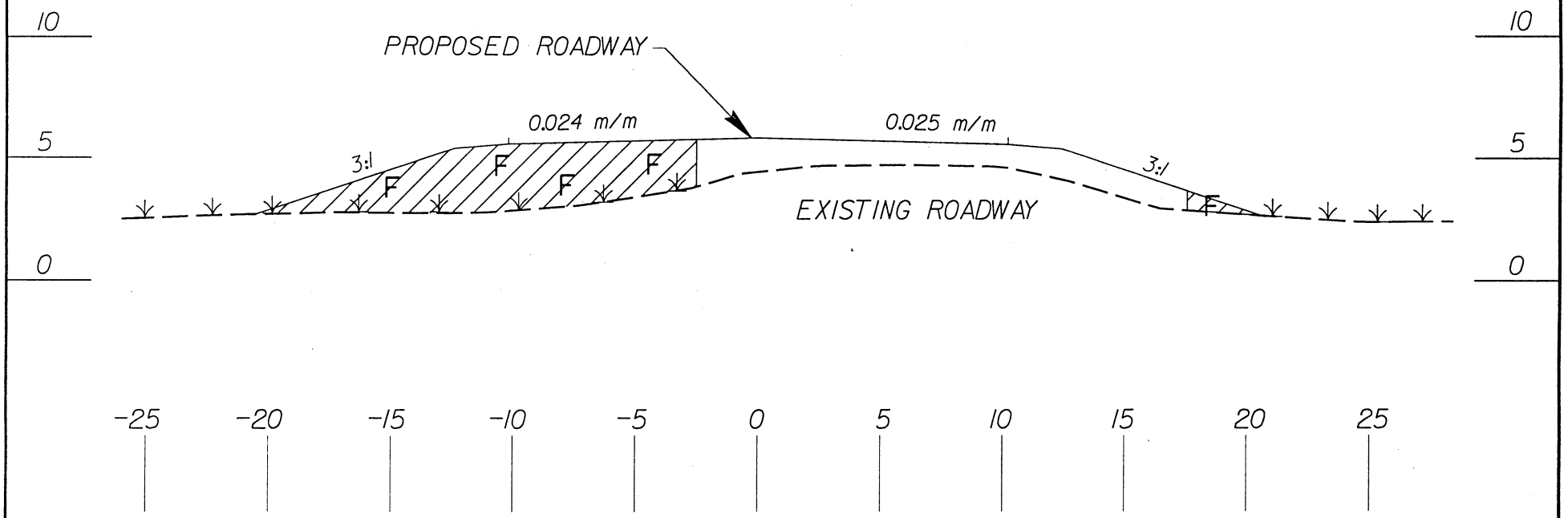
PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 13 OF 40

05 / 22 / 02

TYPICAL SECTION OF NEW ROADWAY
FROM 74+85 TO BEGIN BRIDGE AND FROM END OF BRIDGE TO 77+40



SECTION VIEW
SITE 4

2.5m 0 5.0m

F F DENOTES FILL IN WETLAND

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

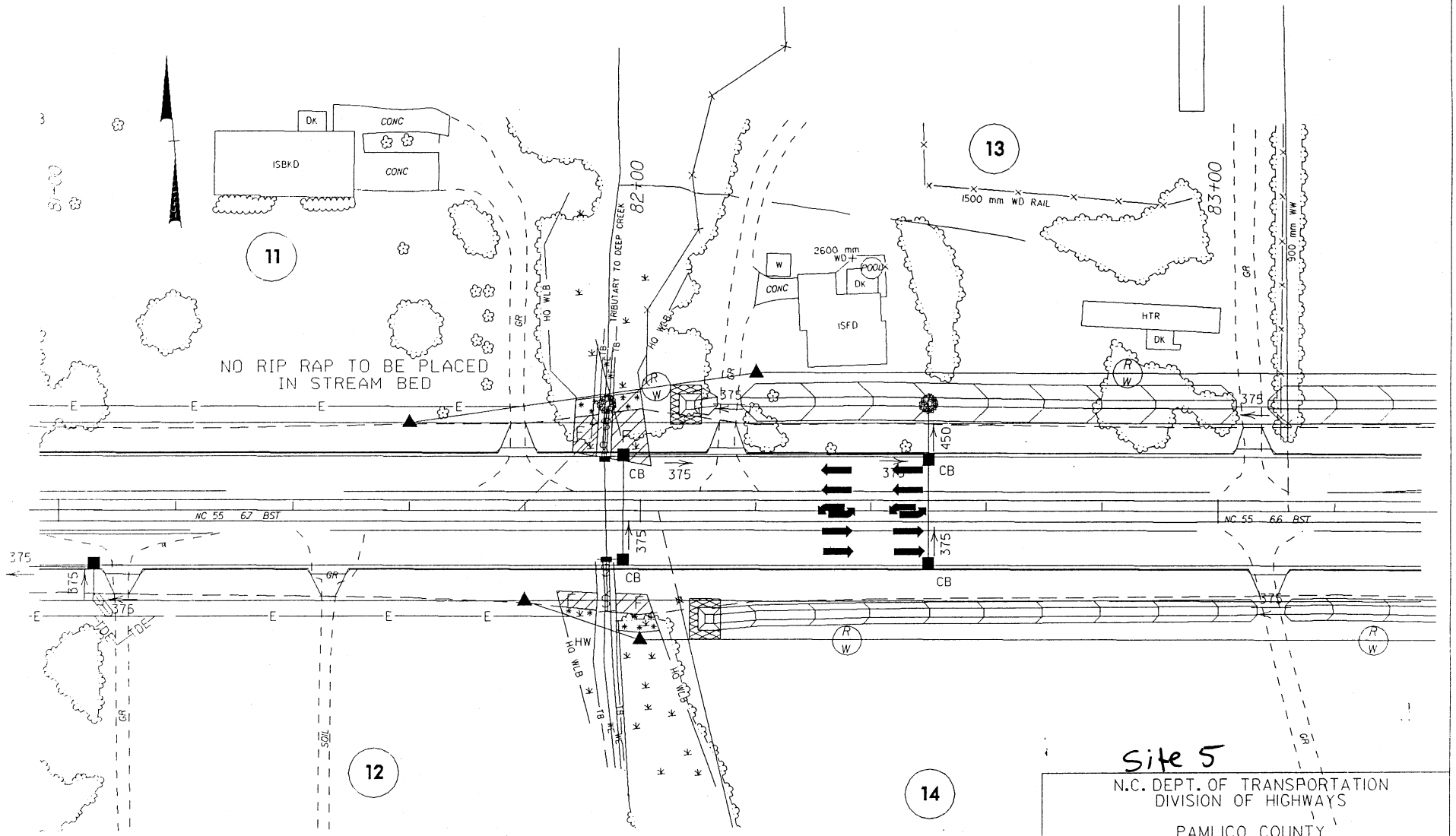
PAMLICO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 14 OF 40 05/22/02

SITE 5 -L- STA. 81+85 TO 82+00 RT & LT



DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

DENOTES FILL IN SURFACE WATER

SCALE = 1:1000

Site 5

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

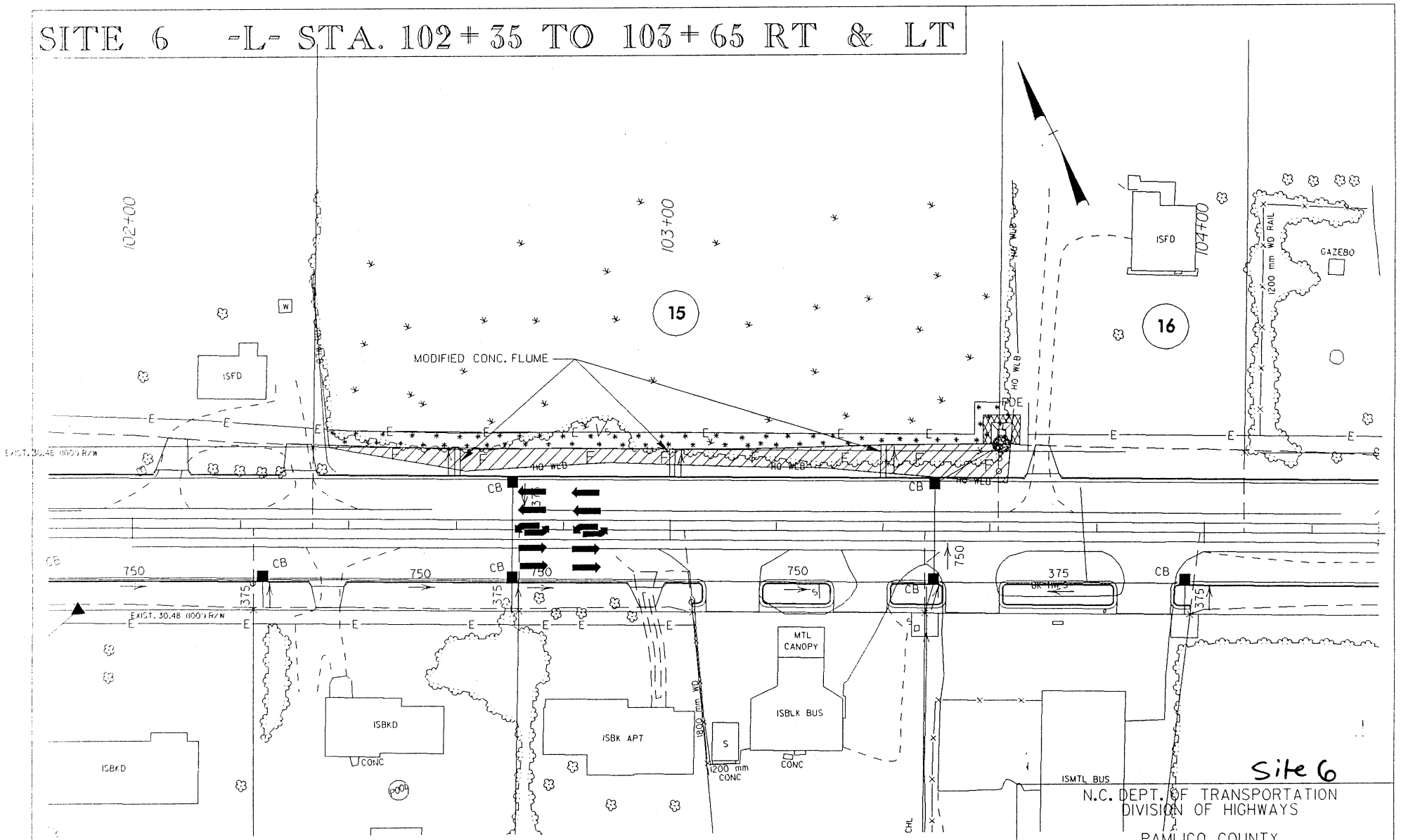
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 15 OF 40

SITE 6 -L- STA. 102+35 TO 103+65 RT & LT



SCALE = 1:1000

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

Site 6

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

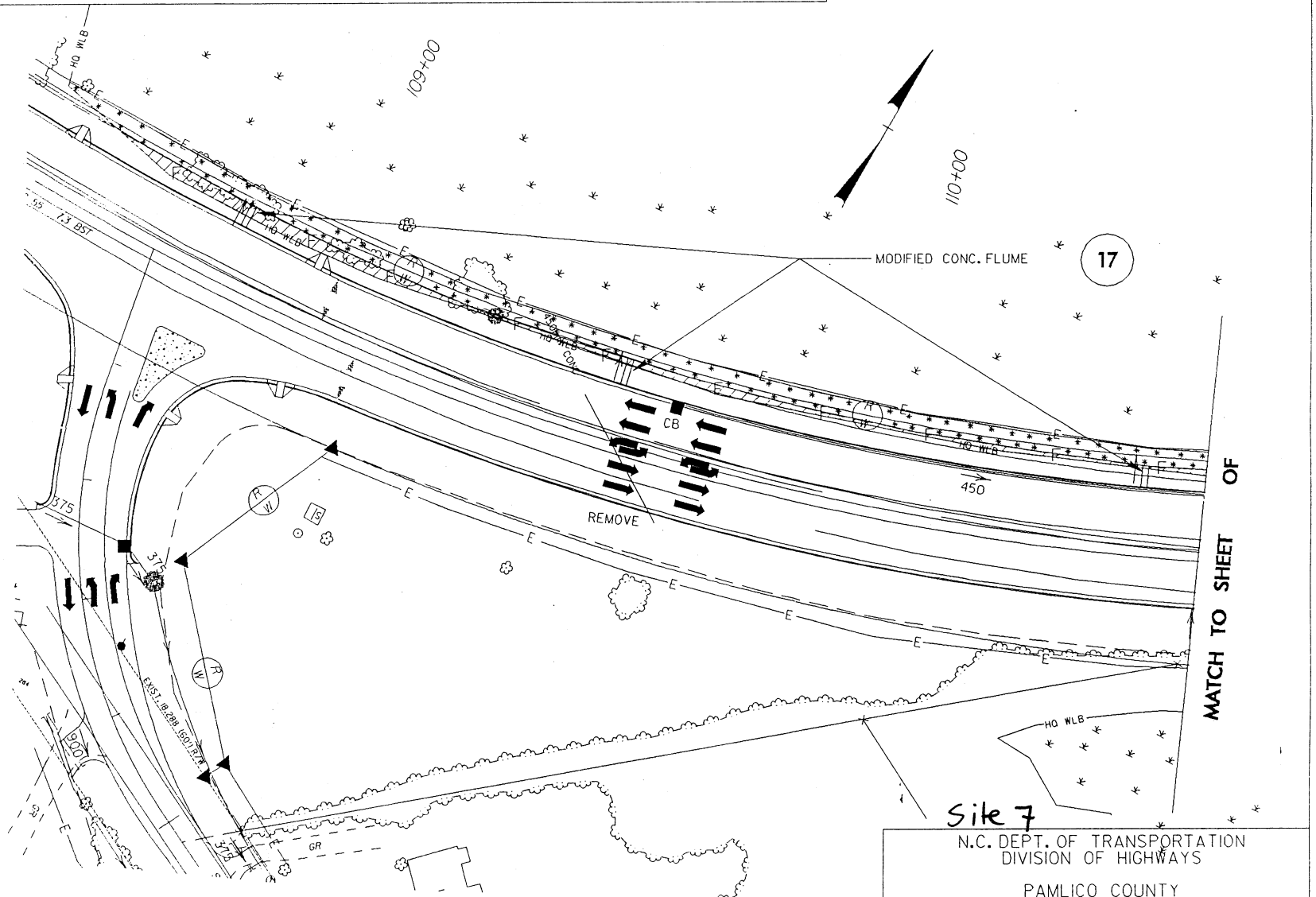
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 16 OF 40

SITE 7 -L- STA. 108+50 TO 110+50 RT & LT



F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

Site 7

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

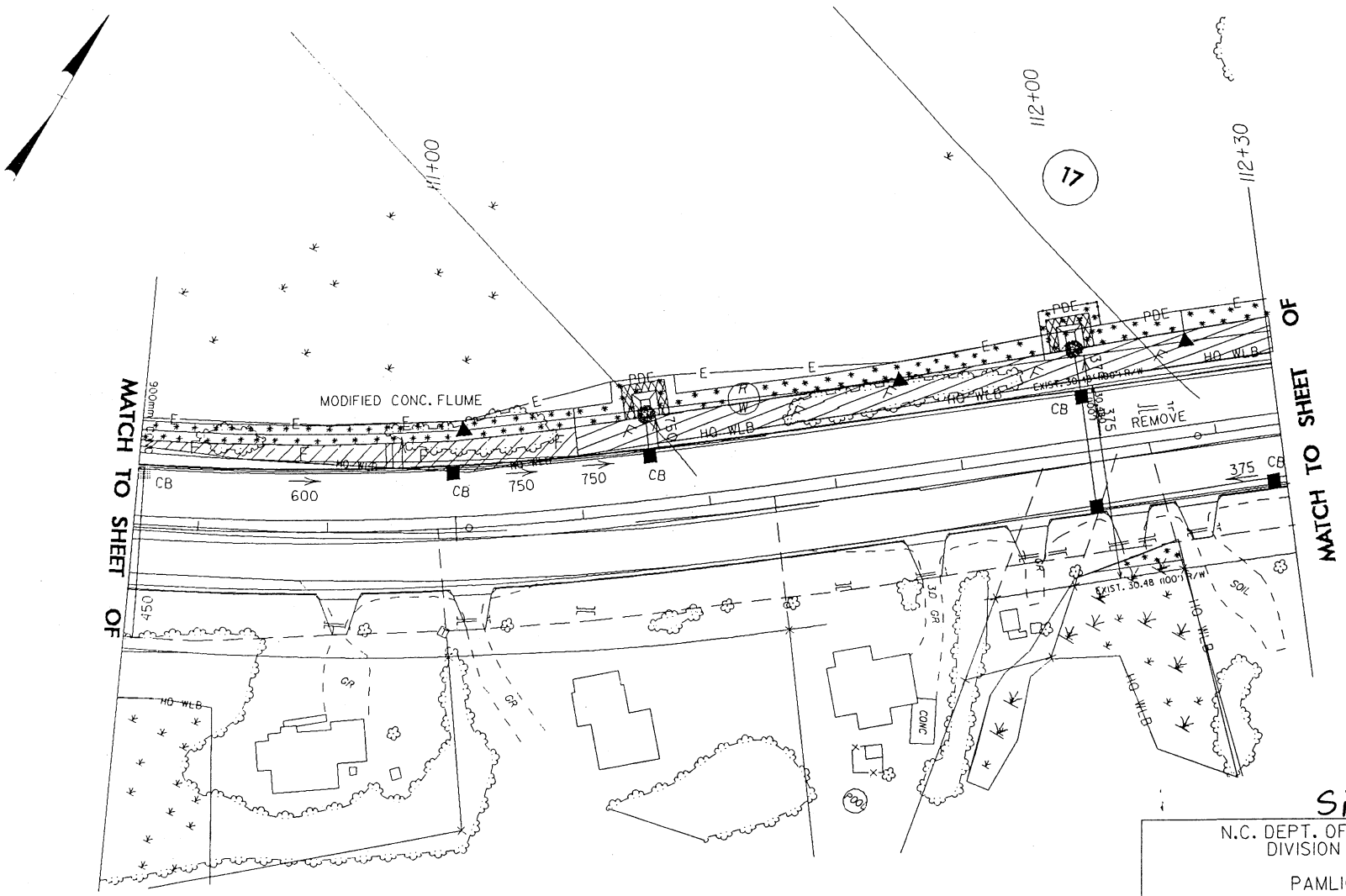
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 17 OF 40

SITE 7 -L- STA. 110+50 TO 112+30 RT & LT



SCALE = 1:1000

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

Site 7

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

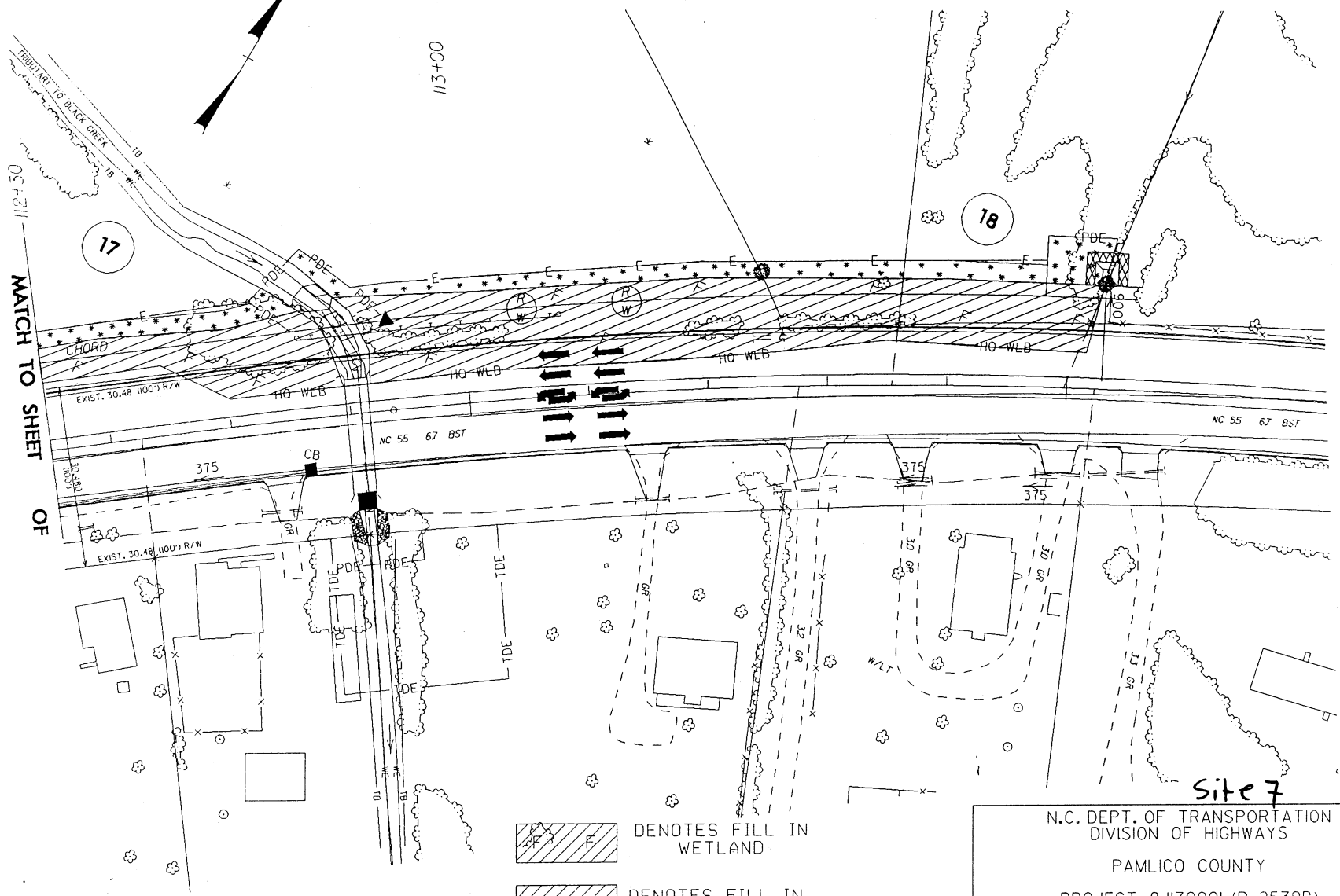
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 18 OF 40

REV. 04/04/03
12/18/2002

SITE 7 -L- STA. 112+30 TO 114+00 RT & LT



Site 7

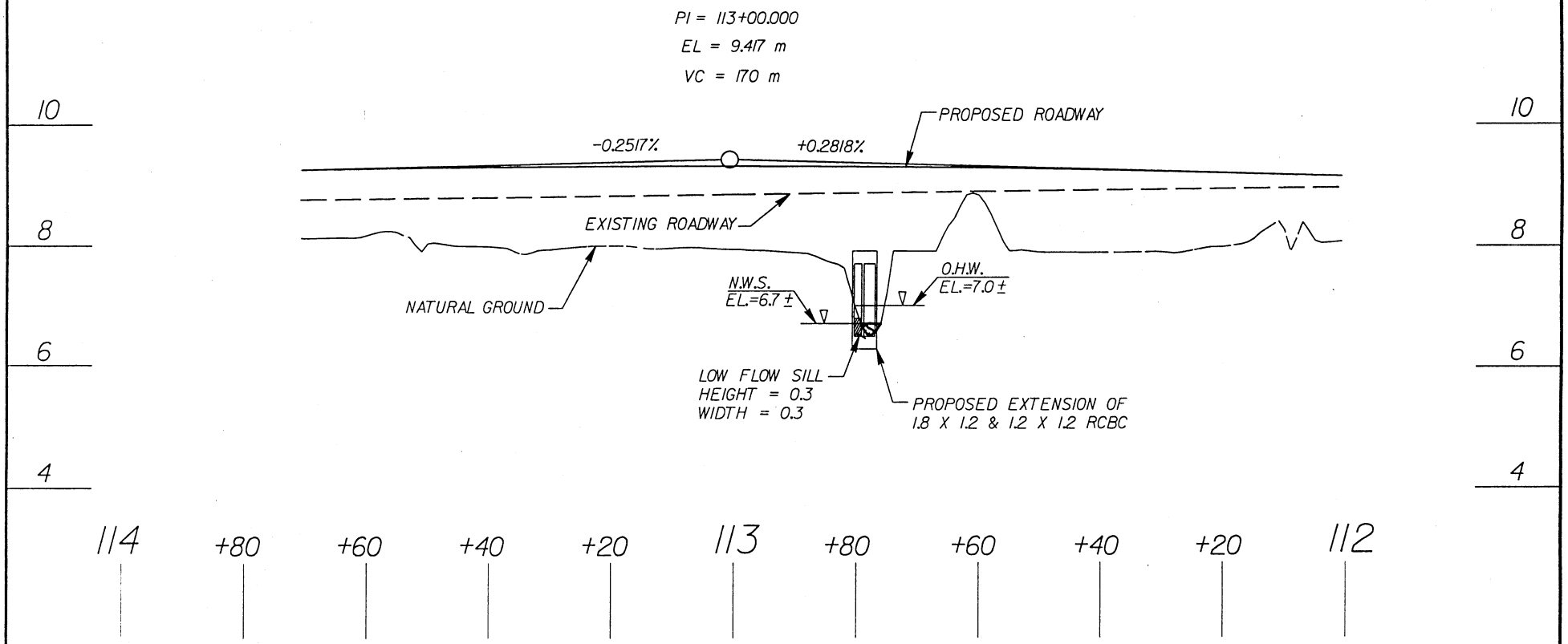
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 19 OF 40



10m 0 20m

HORIZONTAL SCALE

1m 0 2m

VERTICAL SCALE

PROFILE
SITE 7

S S DENOTES FILL IN SURFACE WATER

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

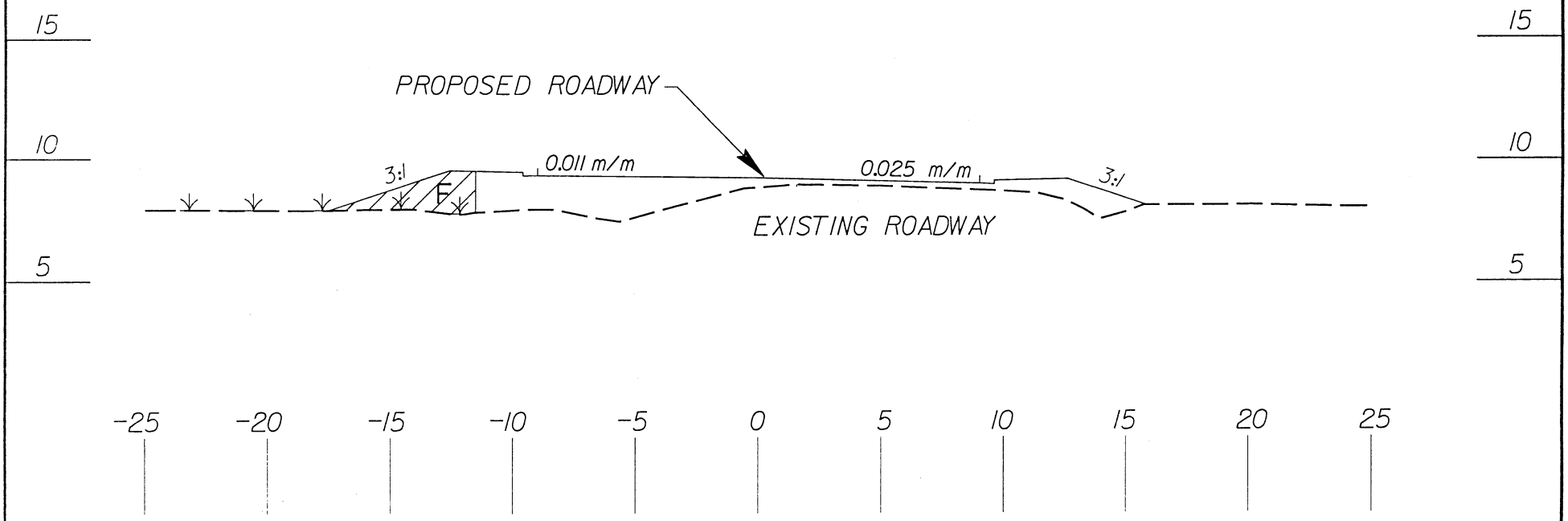
PAMLICO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 20 OF 40 05/22/02

TYPICAL SECTION OF NEW ROADWAY
FROM 108+50 TO 114+00



SECTION VIEW
SITE 7

2.5m 0 5.0m

F F DENOTES FILL IN WETLAND

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

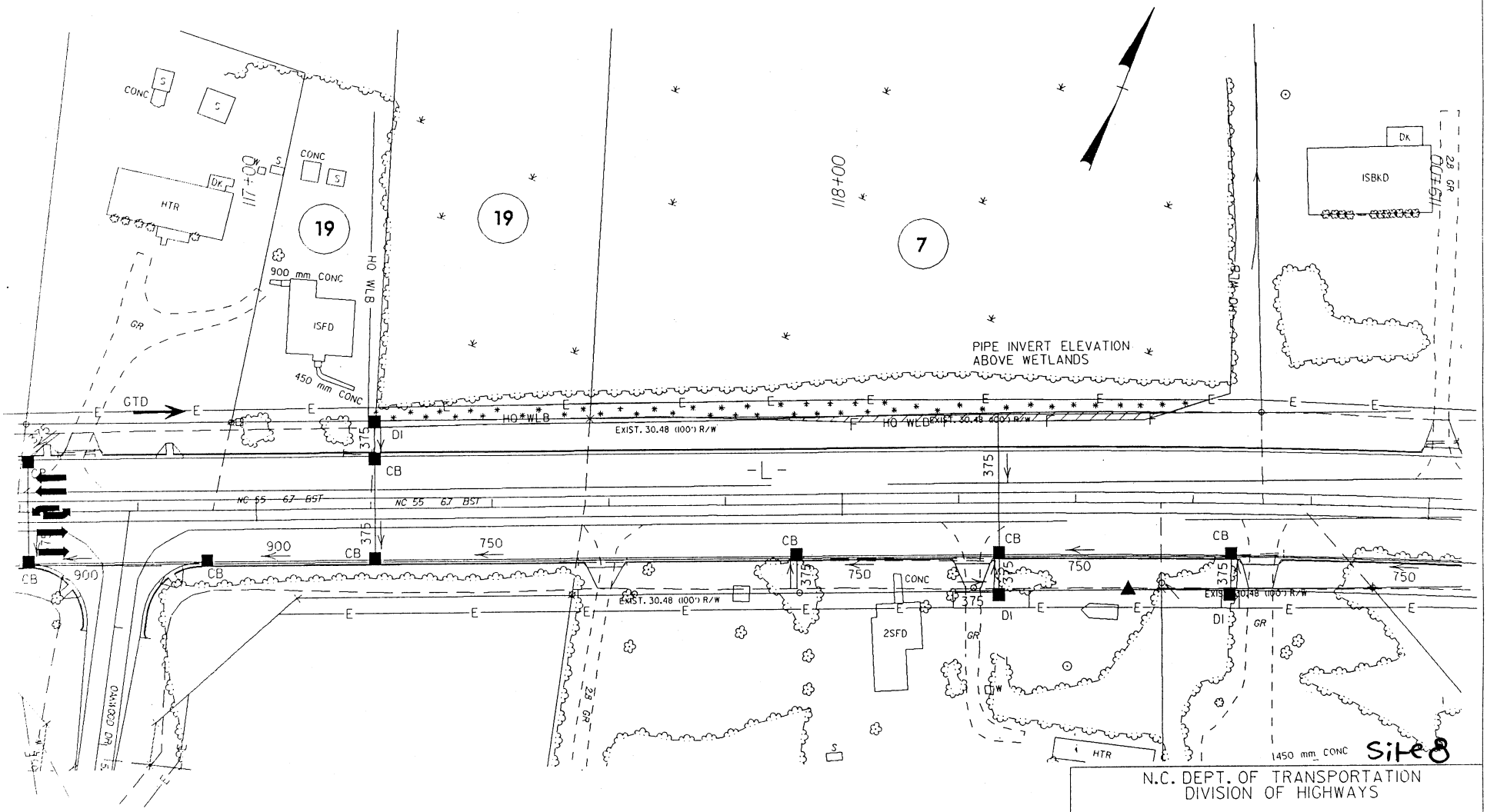
PAMLICO COUNTY

PROJECT: 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 21 OF 40 05/22/02

SITE 8 -L- STA. 117+20 TO 118+60 LT



F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

5 0 10
SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

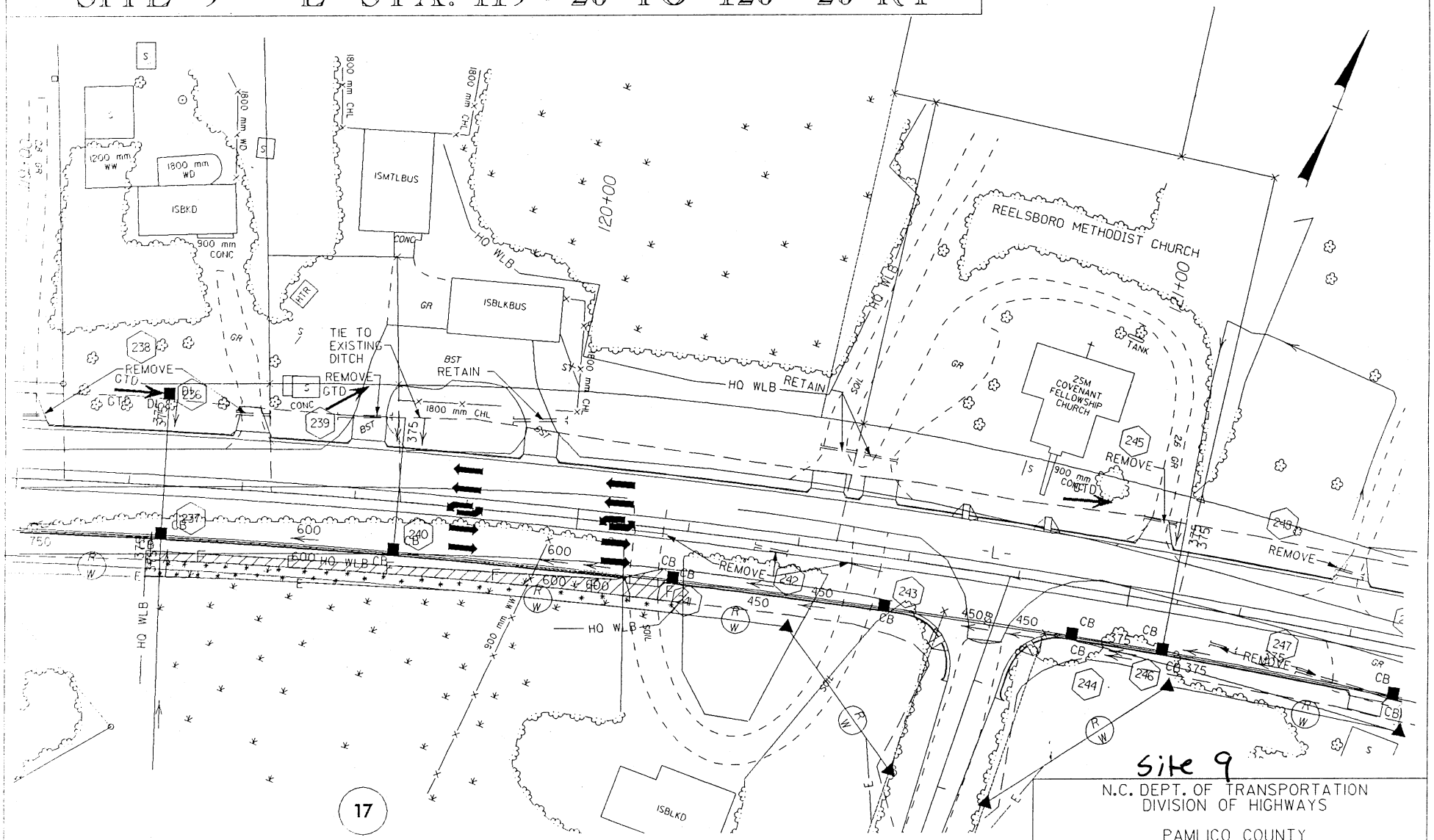
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 22 OF 40

SITE 9 -L- STA. 119+20 TO 120+20 RT



Site 9

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SCALE = 1:1000

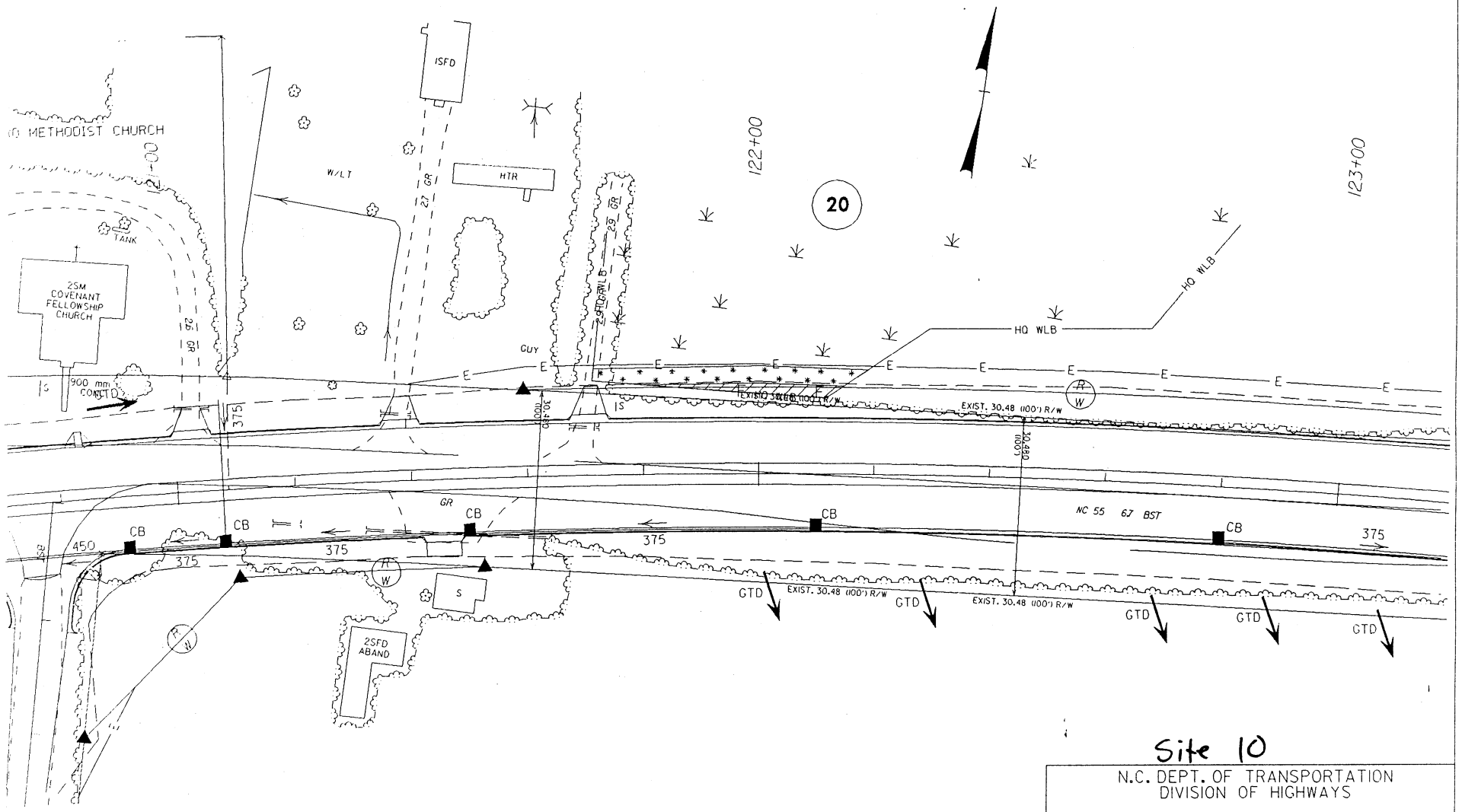
DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

SHEET 23 OF 40

REV. 04/04/03
12/18/2002

SITE 10 -L- STA. 121+70 TO 122+20 LT



SCALE = 1:1000

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

Site 10

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

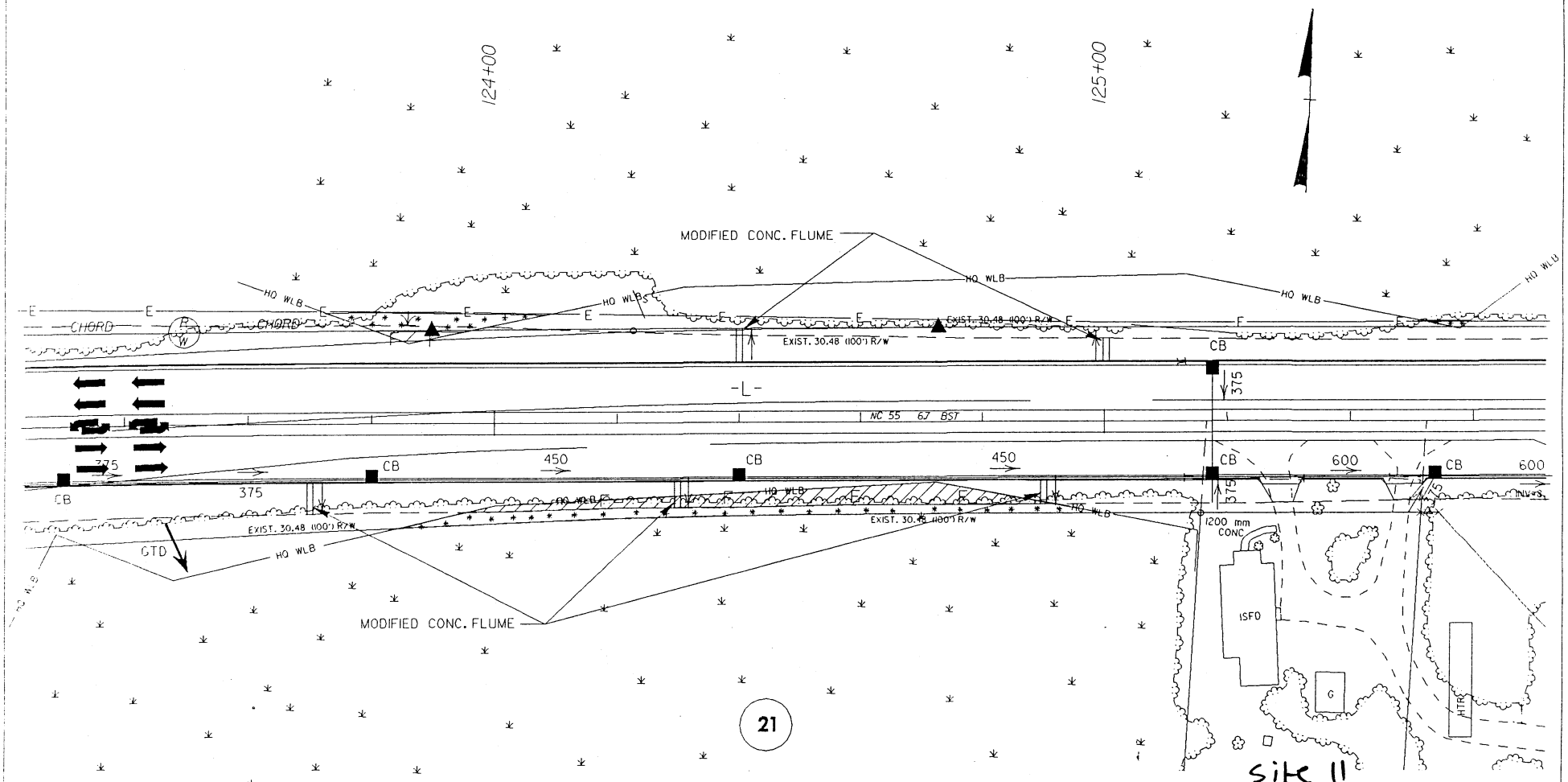
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 24 OF 40

REV. 04/04/03
12/18/2002

SITE 11 -L- STA. 123+75 TO 125+60 RT & LT



site 11

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SCALE = 1:1000

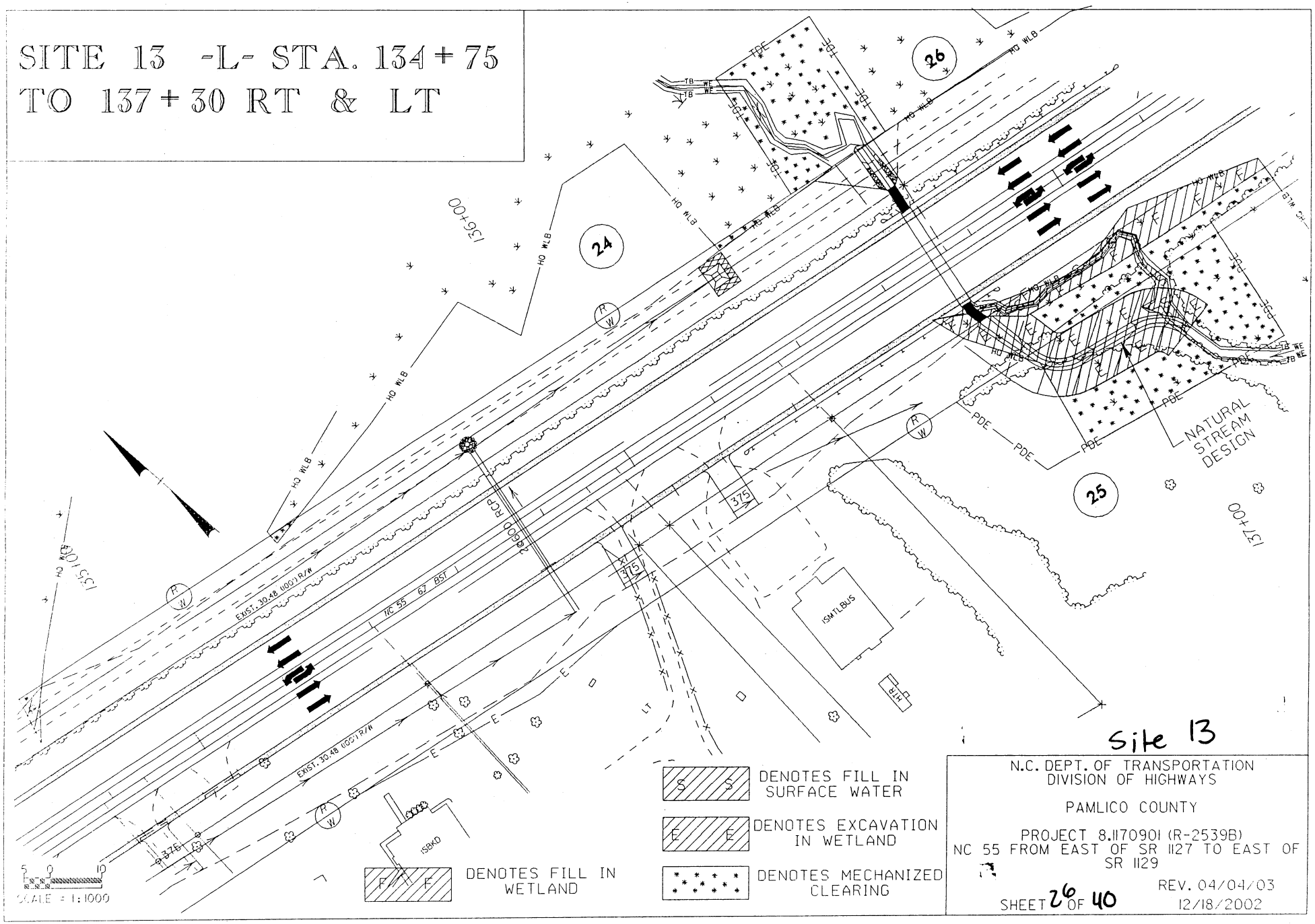
DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

SHEET 25 OF 40

REV. 04/04/03
12/18/2002

SITE 13 -L- STA. 134+75 TO 137+30 RT & LT



DENOTES FILL IN SURFACE WATER

DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

Site 13

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

REV. 04/04/03
12/18/2002

SHEET 26 OF 40

NCDOT Project I.D. R-2539B
Pamlico County, NC
NC 55 from East of SR 1127 to
East of SR 1129

Prepared by: MA Engineering Consultants, Inc.
598 East Chatham Street, Suite 137
Cary, North Carolina 27511

July 1, 2002

NATURAL CHANNEL DESIGN

WEST FORK GOOSE CREEK TRIBUTARY

Right of Project Station -L- 136+90

The construction of the proposed project will require that a portion of West Fork Goose Creek Tributary be relocated from Project Station -L- 136+73 RT. to Station 137+05 RT., some 41 m (135') in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The drainage area is in Pamlico County and is rural with woods in nature. It is not expected to be developed in the future. The stream was found to be intermittent in nature. Neuse River Buffer Rule will be applied for the stream.

There are no hydraulic gage data available neither on this stream nor on nearby streams. Current discharges were estimated using NCDOT procedures for rural watersheds.

Existing Channel

The natural skew angle for the stream crossing is about 50 degree. Most of the natural channel along this reach has been extensively channelized and straightened in the past as the result of the 90-degree box culvert crossing. Most of the floodplain vegetation on the north side has been removed to accommodate the existing roadway embankment. The current channel is parallel to the roadway and has a bottom of silt. The entire channel (from Station -L- 136+72 RT to Station 137+05 RT) was surveyed in detail for the purpose of channel classification, and was found to be an E6 type of stream according to the Rosgen classification scheme.

Reference Reach

Because of the altered state of the existing channel, a "reference reach" of this stream was also surveyed in order to classify its unaltered natural condition. The selected reach is located some 42 m (138') upstream of the NC 55 crossing. A 66 m (217') long reach was surveyed in detail.

A downstream reach was not selected for the following reasons:

1. The distance from the existing box culvert to the confluence with West Fork Goose Creek is only 60m (197'). The backwater effect of the creek has significant impact on the reach.

2. There is an abandoned railroad embankment across the channel and entire floodplain. It has impact on the natural condition of the reach.

The upstream reach was selected because it is natural and has no impact of human activities for the entire floodplain. It has about the same drainage area as the existing channel site.

Analysis of reference reach's data lead to a stream classification of E6. This portion of channel has a silt bed. Water depth at riffle and pool were about 0.04 m (0.13') and 0.14 m (0.46'), respectively.

Proposed Channel

The proposed channel design has an E6 classification. Design data is given in the attached data table along with existing reach and reference reach data. Channel gradient is controlled by the proposed 1.8m x 1.2m (6' x 4') reinforced concrete box culvert extension downstream and by the natural channel tie-in upstream. Channel sinuosity closely matches that of the reference reach. Mean "bankfull" depth was set at 0.26 m (0.85') close to the measured depth of 0.25 m (0.82') for the reference reaches. This gives a maximum bankfull depth of 0.37 m (1.21'). Above bankfull depth, it is proposed to excavate a flood plain on both sides of meander bend, resulting in approximately an 11.4 m (37') wide flood plain (including the channel). The floodplain width for the reference reach is about 12 m (39').

It is believed that by forming a floodplain 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 the stream form and fluvial processes. It is anticipated that the proposed channel will have a silt bottom. Pool depths of 0.1 m (0.3') are proposed at outside bends of meanders. This is the average depth of pools in the reference reach.

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.

Page 28 of 40

The existing drainage area is rural with woods in nature. The only land-disturbing activities may be the agricultural practices near the boundary of the watershed. Very thick and tall vegetation/brush were found along both sides of the stream in the wooded area. They were functioning as natural sediment control filters. During field study, the water in the stream was clean and clear. No visible suspended sediment or clogging of the stream was found. This indicated that reduction of in-stream photosynthesis due to suspended sediment was not likely. The W/D ratio of the reference stream indicated that shear stress was not concentrated near the bank region and the bank erosion was not accelerated. Observed vegetation in the channel and lichens on the streambed also indicated that the bank was stable. The increase in sediment supply to the channel developing from bank erosion and gradually losing its capability to transport sediment was not likely for the stream.

Proposed land use is rural in natural and no development is expected in the future. Impervious area and land-disturbing activities due to farming will not be increased. Thus, the discharge and the sediment input will not be increased. Neuse River Buffer Rule will be applied and all storm drain outlets will be outside the buffer for filtration. Therefore, the potential sediment transport to the stream will be minimized in the future.

The existing stream bed material for the reference reach is silt with uniform size throughout the whole reach. No gravel or pebble was found. Therefore, a pebble count was not feasible. The proposed channel relocation is only 41m (135') with 0.34% slope.

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Appendix B Morphological Measurement Table

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream type	Intermittent	Intermittent		Intermittent
2. Drainage area	109 Ac	109 Ac		109 Ac
3. Bankfull width	3.6'	7.8'		7.9'
4. Bankfull mean depth	1.3'	0.9'		0.8'
5. Width/depth ratio	2.80	9.20		9.50
6. Bankfull cross-sectional area	4.6 ft^2	6.6 ft^2		6.6 ft^2
7. Bankfull mean velocity	4.1 ft/s	2.1 ft/s		3.3 ft/s
8. Bankfull discharge, cfs	24.7 cfs	24.7 cfs		24.7 cfs
9. Bankfull max depth	1.7'	1.2'		1.2'
10. Width of flood prone area	69'	37'		39'
11. Entrenchment ratio	19. 0	4.8		5.0
12. Meander length	131'	131'		131'
13. Ratio of meander length to bankfull width	36.4	16.8		16.7
14. Radius of curvature	26'	26'		26'
15. Ratio of radius of curvature to bankfull width	7.3	3.4		3.3
16. Belt width	36'	41'		41'
17. Meander width ratio	9.1	4.2		4.2
18. Sinuosity (stream length/valley length)	1.09	1.14		1.15
19. Valley Slope	1.42 %	0.39 %		1.13 %
20. Average slope	1.30 %	0.34 %		0.98 %
21. Pool slope	1.30 %	0.30 %		0.98 %
22. Ratio of pool slope to average slope	1.0	1.0		1.0
23. Maximum pool depth	0.5'	0.6'		0.3'
24. Ratio of pool depth to average bankfull depth	0.41	0.69		0.40
25. Pool width	1.6'	3.0'		4.4'
26. Ratio of pool width to bankfull width	0.45	0.38		0.56
27. Pool to pool spacing	26'	66'		27'
28. Ratio of pool to pool spacing to bankfull width	7.3	8.4		3.4
29. Ratio of lowest bank height to bankfull height (or max bankfull depth)	0.61	0.79		0.44

NC DEPT. OF TRANSPORTATION

PAMLICO COUNTY

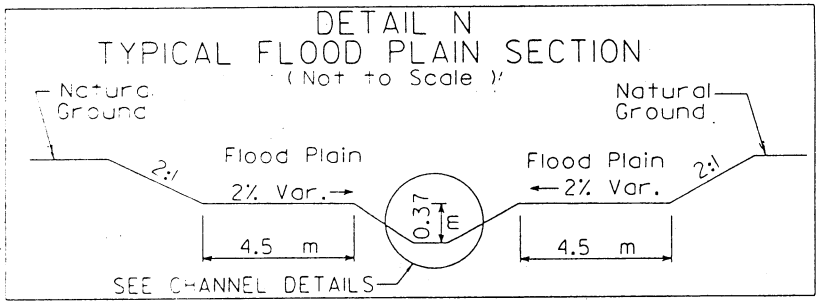
PROJECT: R-2539B

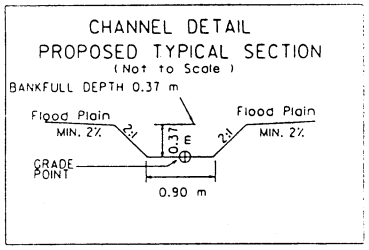
WEST FORK GOOSE CREEK TRIBUTARY

-L- 136+90 RT

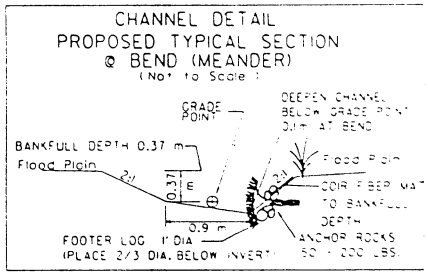
SHEET 4 OF 5 6-18-02

NATURAL CHANNEL DESIGN TYPICALS

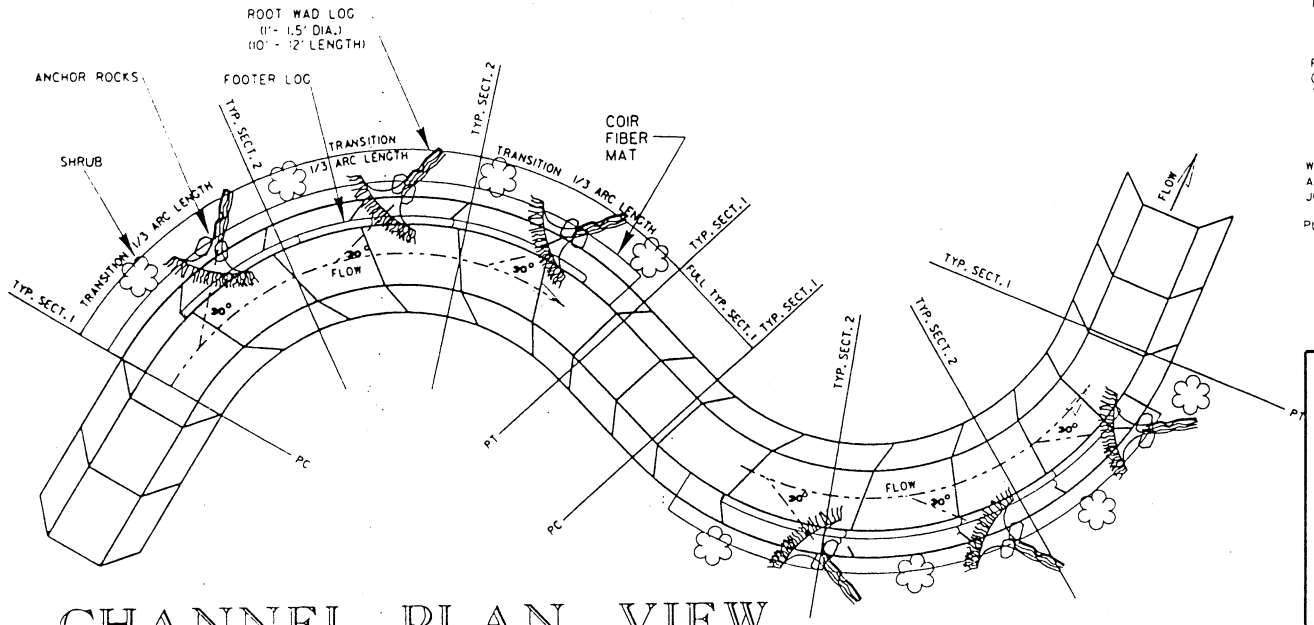




TYPICAL SECTION 1 BETWEEN BENDS



TYPICAL SECTION 2 AT BENDS



CHANNEL PLAN VIEW
WEST FORK GOOSE CREEK TRIBUTARY

NOTES:

NUMBER OF ROOTWADS INSTALLED TO BE DETERMINED ON SITE

ROOTWADS TO BE SPACED 4x DIAMETER OF ROOT BASE

FOOTER LOG ANCHOR ROCK TO BE PLACED ON THE DOWNSTREAM END OF EACH FOOTER LOG SO THAT IT IS LEANING AGAINST THE LOG ON THE SIDE AWAY FROM THE CHANNEL.

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

PLANTINGS SHOULD BE PLACED ABOVE BANKFULL DEPTH

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT: R-2539B

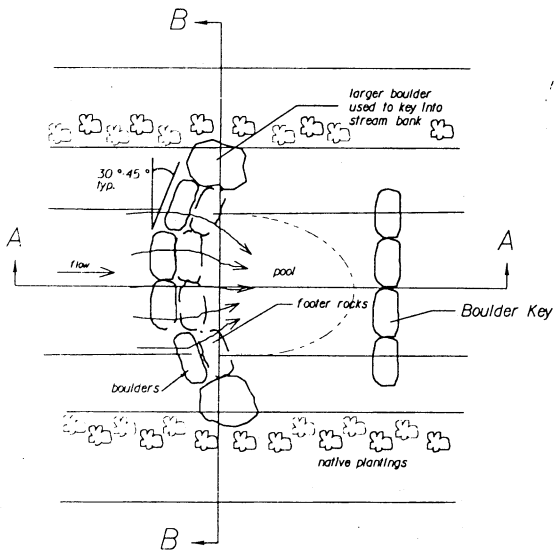
-L- STATION 136 + 90 RT

SHEET 31 OF 40

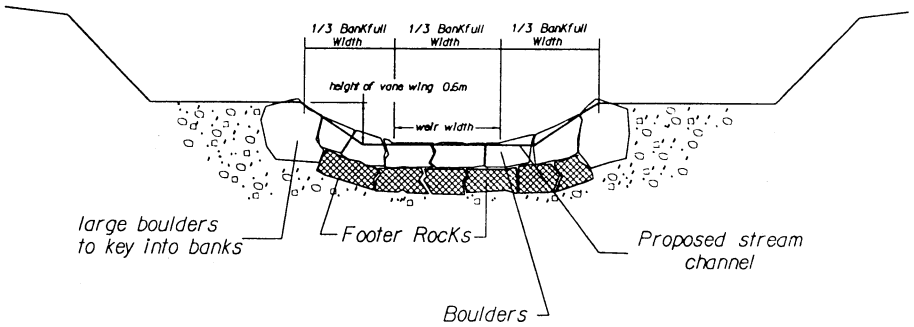
5-31-01

CROSS VANE ROCK WEIR DETAIL

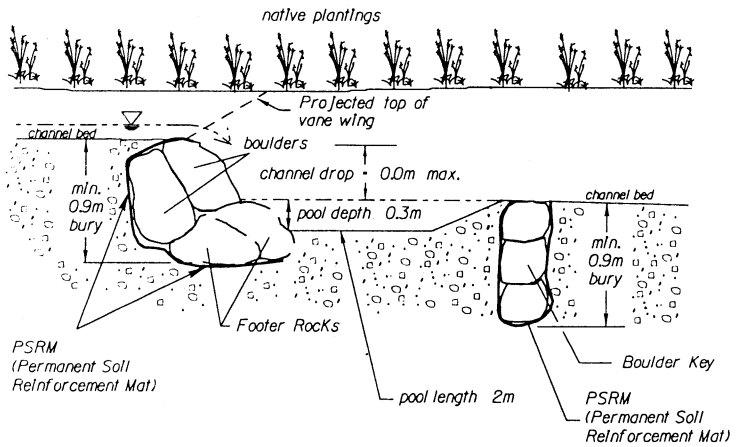
PLAN VIEW



SECTION B-B



SECTION A-A



NOTE:

Footer Rocks/Boulders should be native quarried rock or locally shot rock, angular and oblong preferably with flat sides with approximate dimensions of 0.9m x 0.6m x 0.6m

Larger boulders should have approximate dimensions of 1.2m x 0.9m x 0.9m

Rocks should fit tightly with no spaces between

PSRM (Permanent Soil Reinforcement Mat)

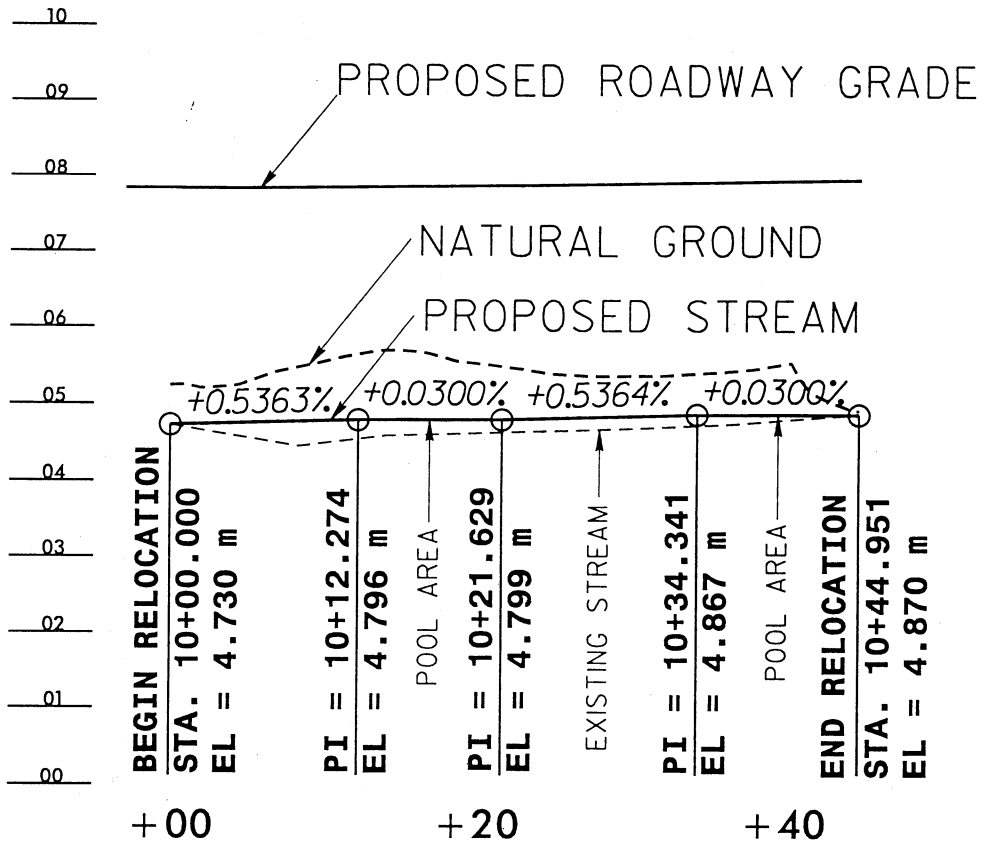
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT: R-2539B
WEST FORK GOOSE
CREEK TRIBUTARY
-L- 136 + 90 RT

SHEET 32 OF 40 4-4-03

STREAM RELOCATION
-L- STA 136+73 RT TO 137+05 RT



STREAM LENGTH

0.5 0 1.0
VERT. SCALE = 1:100

2.5 0 5
HORIZ. SCALE = 1:500

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

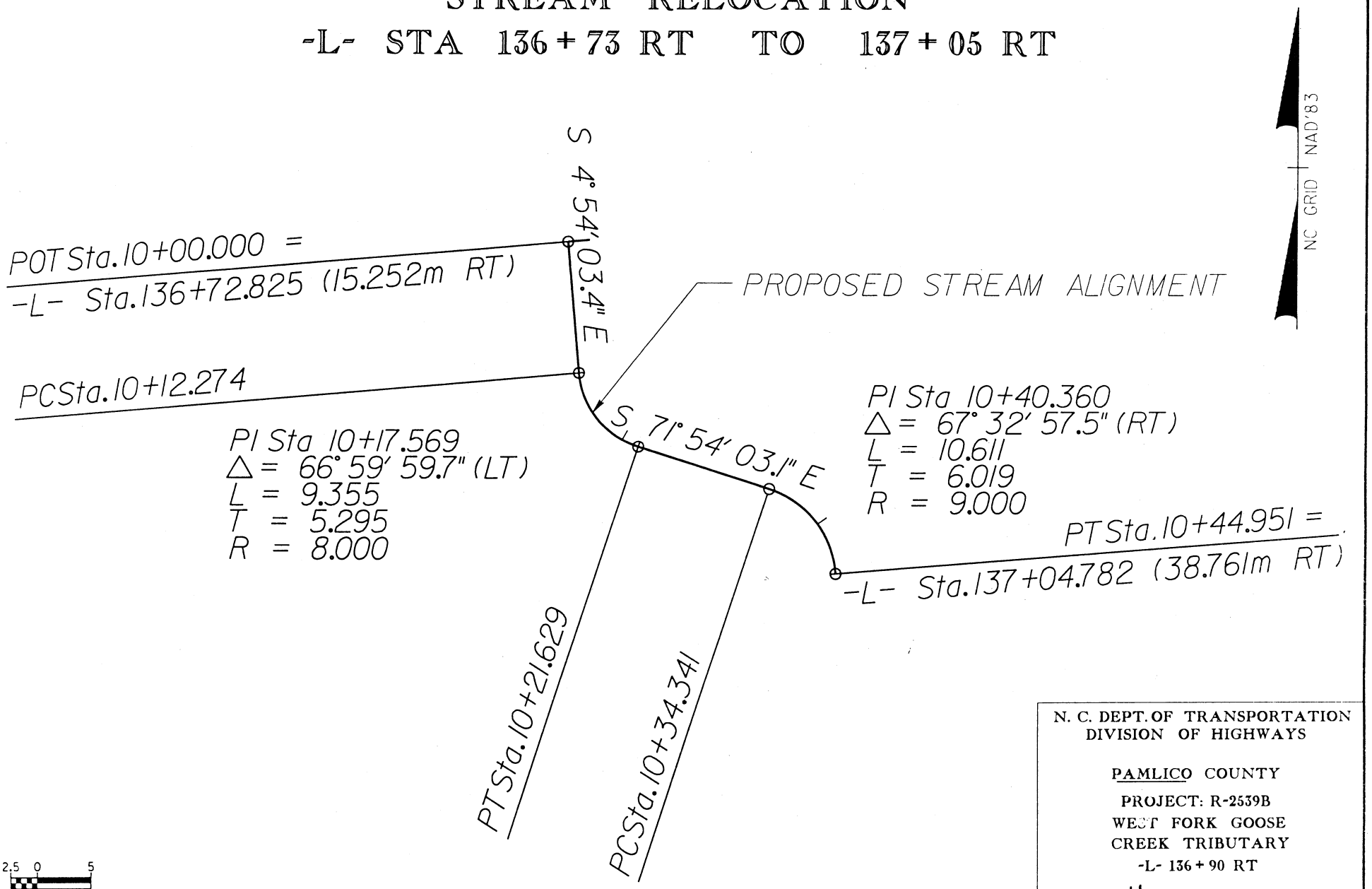
PAMLICO COUNTY

PROJECT: R-2539B
WEST FORK GOOSE
CREEK TRIBUTARY
-L- 136+90 RT

SHEET 33 OF 40

4-4-03

STREAM RELOCATION
-L- STA 136+73 RT TO 137+05 RT



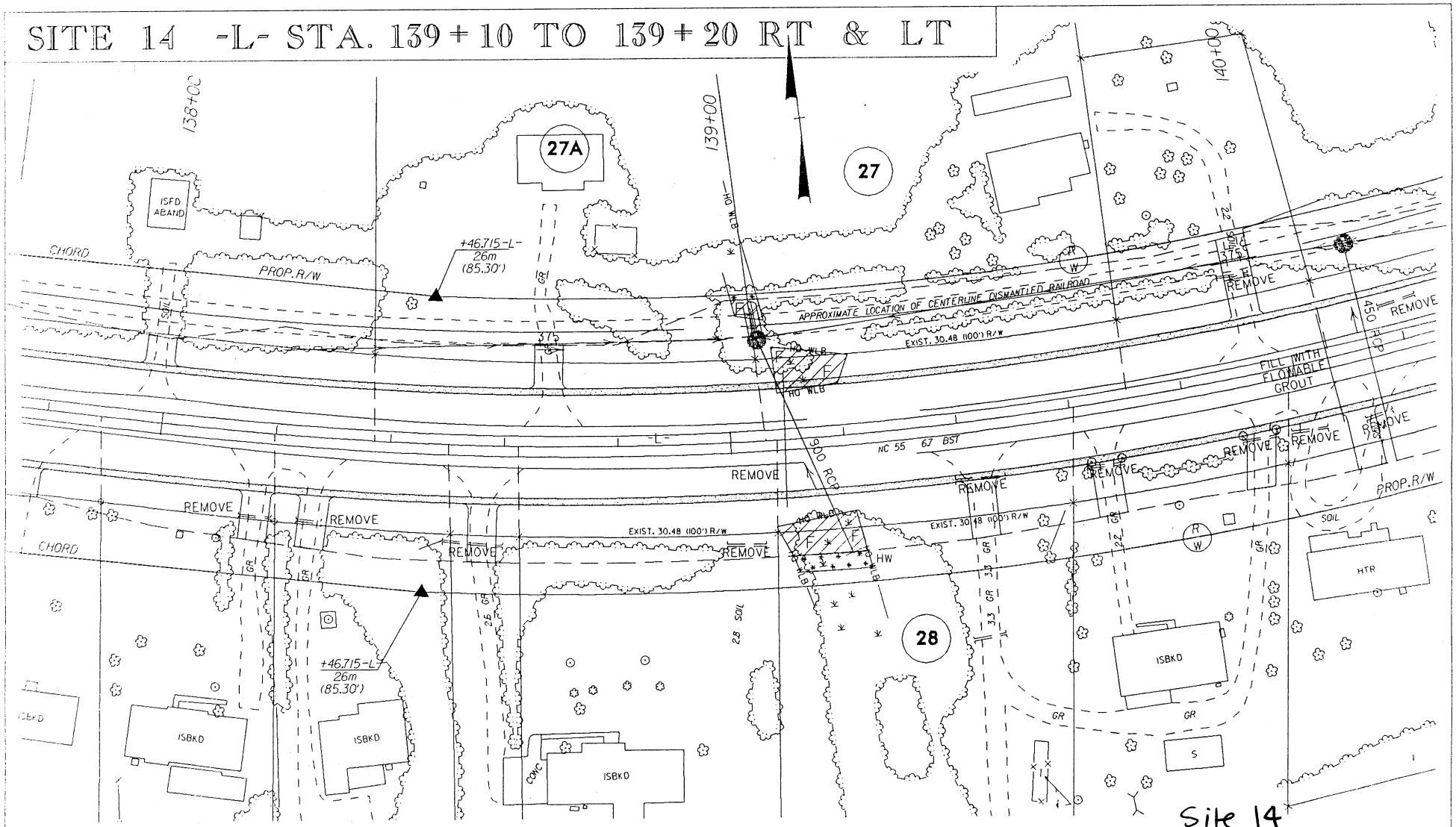
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT: R-2539B
WEST FORK GOOSE
CREEK TRIBUTARY
-L- 136+90 RT

SHEET 34 OF 40 4-4-03

SITE 14 -L- STA. 139+10 TO 139+20 RT & LT



Site 14

F F DENOTES FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

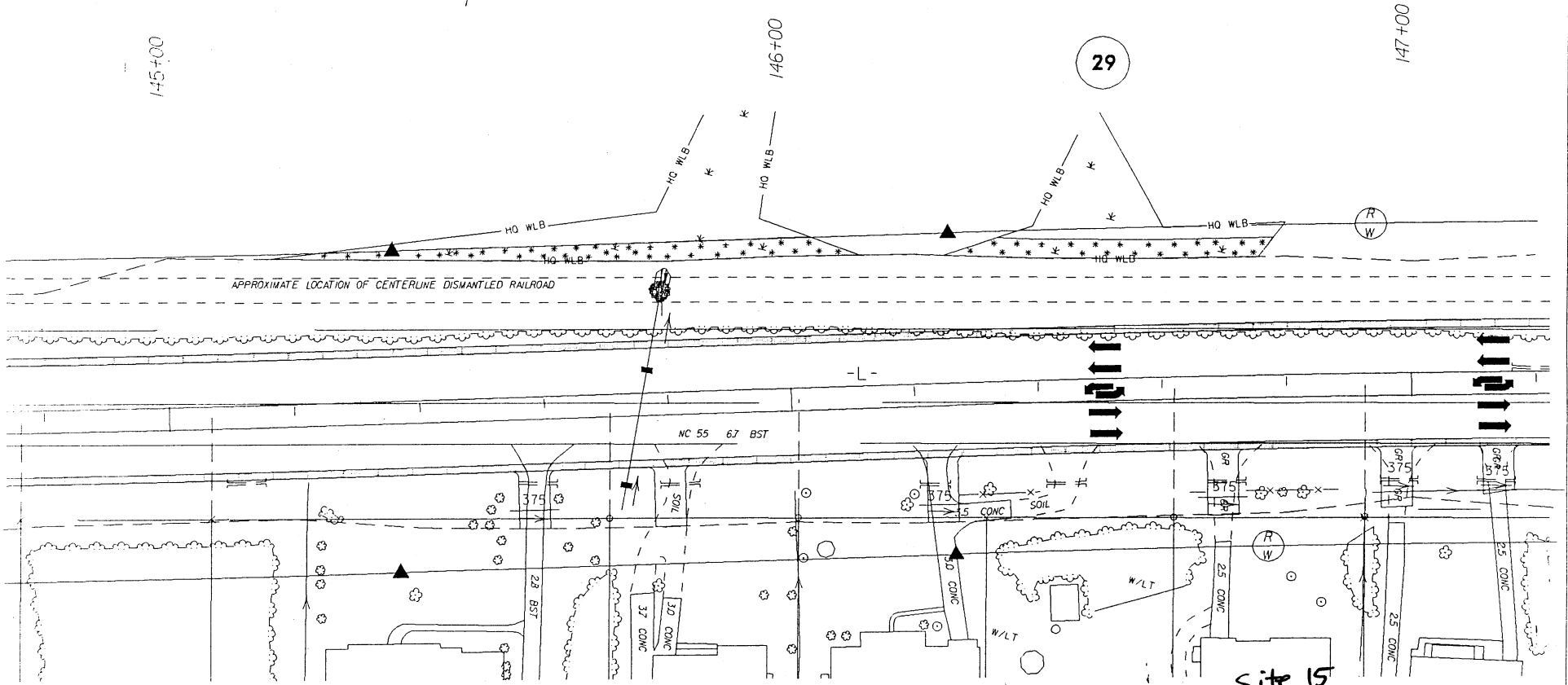
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 35 OF 40

REV. 04/04/03
12/18/2002

SITE 15 -L- STA. 145+35 TO 146+75 LT



site 15

SCALE = 1:1000

DENOTES MECHANIZED CLEARING

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

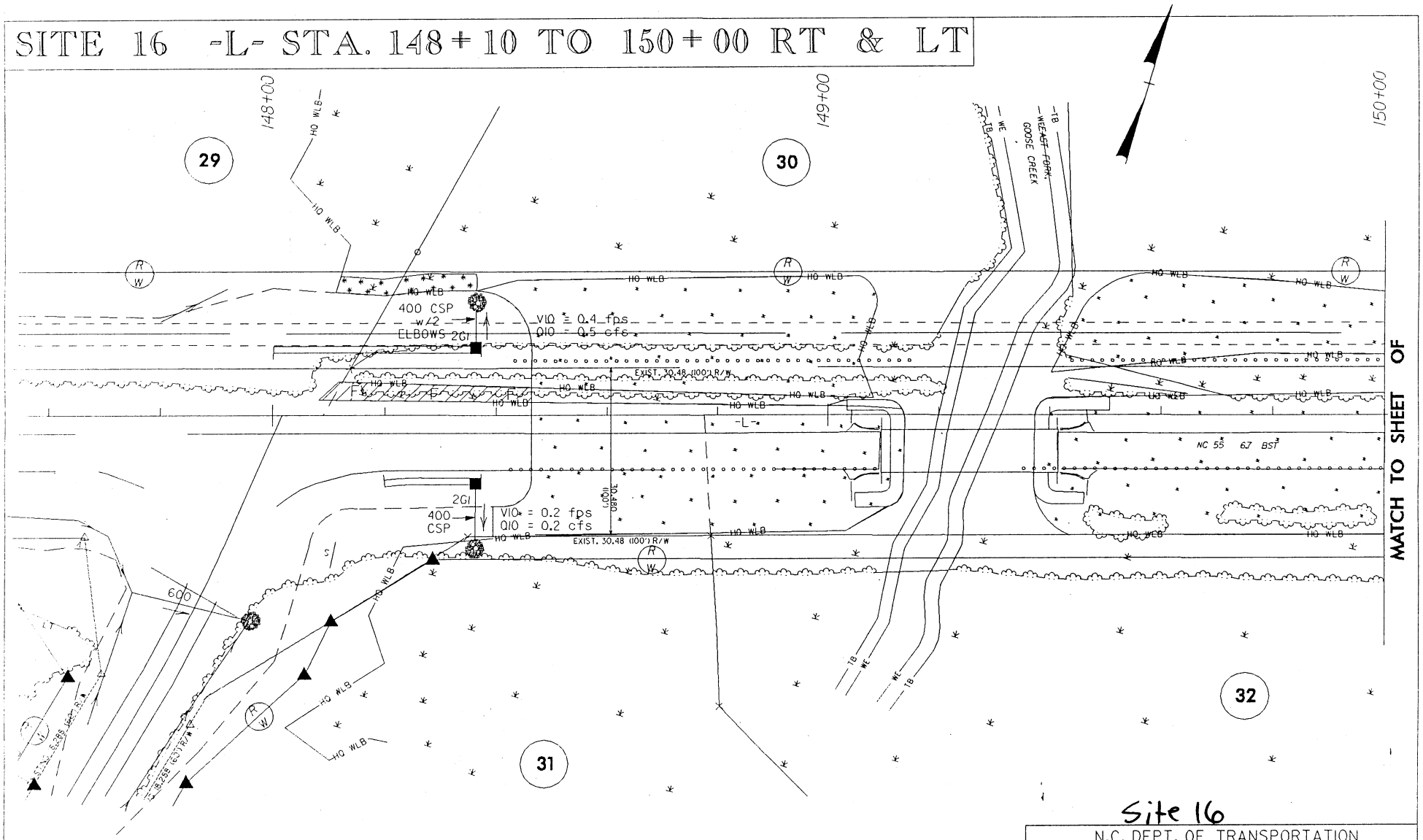
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 36 OF 40

REV. 04/04/03
12/18/2002

SITE 16 -L- STA. 148+10 TO 150+00 RT & LT



DENOTES WETLAND RESTORATION

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

Site 16

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

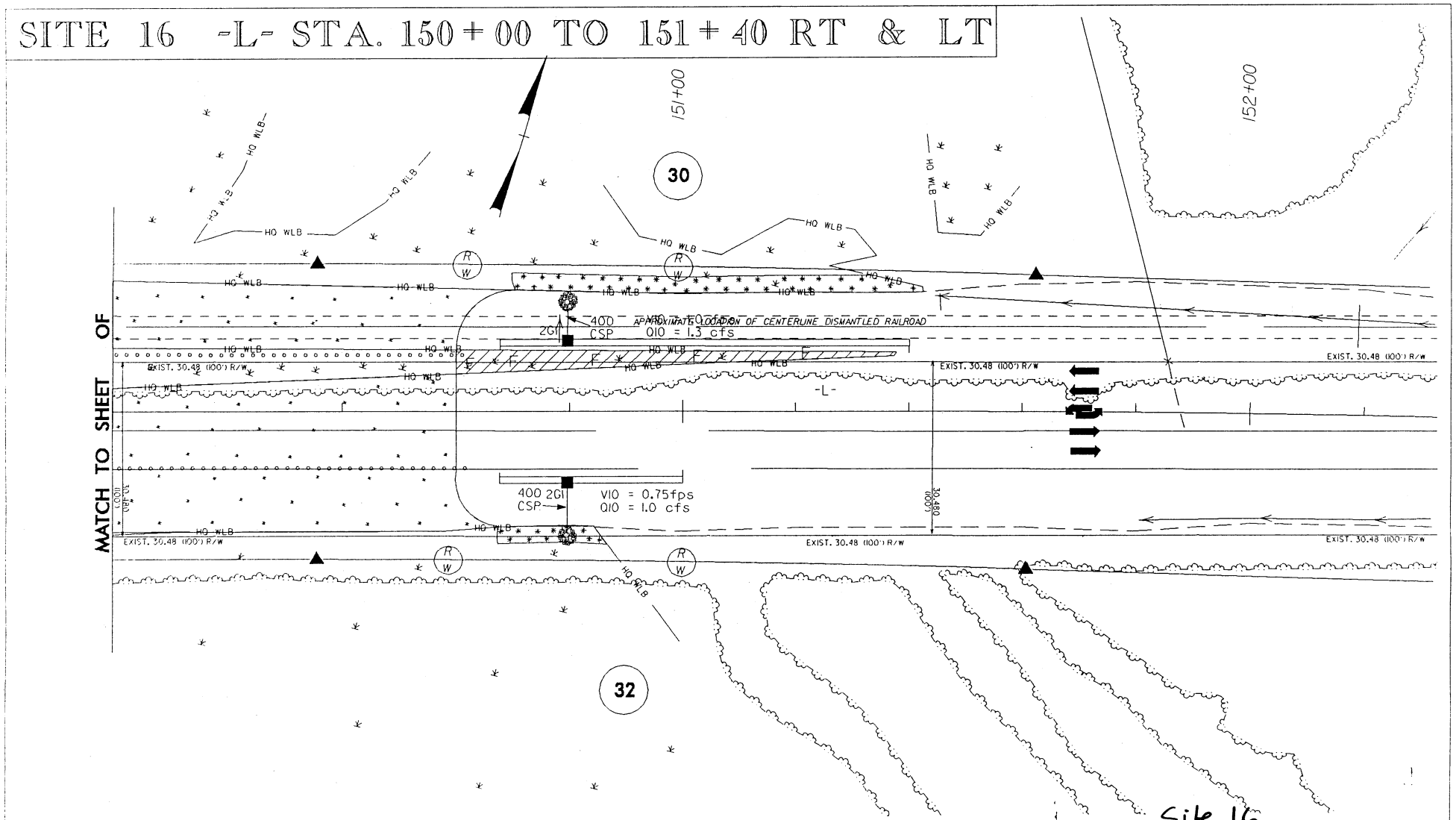
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 37 OF 40

REV. 04/04/03
12/18/2002

SITE 16 -L- STA. 150+00 TO 151+40 RT & LT



DENOTES WETLAND RESTORATION

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

Site 16

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 38 OF 40

REV. 04/04/03
12/18/2002

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1 *	56+30 TO 56+55				0.034	0.008					
2	59+70 TO 61+00	EXTENSION OF 2@ 1650 RCP w/COLLARS	0.051		0.012	0.019	0.004			22	
3	62+25 TO 63+60		0.055			0.010					
**4	74+85 TO 77+40	BRIDGE; 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	0.136	0.003	0.004	0.057					
5	81+85 TO 82+00	EXTENSION OF 1050 RCP w/COLLARS	0.012			0.005	0.001			16	
6	102+35 TO 103+65		0.047			0.038					
7	108+50 TO 114+00	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	0.286			0.178	0.003			16	
8	117+20 TO 118+60		0.008			0.038					
9	119+20 TO 120+20		0.020			0.023					
10	121+70 TO 122+20		0.045			0.013					
11	123+75 TO 125+60		0.021			0.017					
13	134+75 TO 137+30	EXTENSION OF 1.8 x 1.2 RCBC	0.027		0.048	0.132	0.006			36	41
14	139+10 TO 139+20		0.017		0.002	0.004					
15	145+35 TO 146+75		0.000			0.035					
**16	148+10 TO 151+40	BRIDGE; 17 SPAN (6@ 13m, 1@ 15m, 10@ 13m) = 223m 533mm CORED SLAB	0.030			0.034					
TOTALS:			0.754	0.003	0.100	0.610	0.014	0.000	0.000	90	41

* Site 1 - Drainage impacts total 0.06 acres.

** SITE NO. 4 - EXISTING ROAD REMOVED, RECLAIMED WETLAND = 0.234 (ha)

*** SITE NO. 16 - EXISTING ROAD AND RAILROAD EMBANKMENT REMOVED; RECLAIMED WETLAND = 0.754 (ha)

Form Revised 3/22/01

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMILCO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 39 OF 40 06/23/03

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS				SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
*1	56+30 TO 56+55				0.08	0.02					
2	59+70 TO 61+00	EXTENSION OF 2@ 1650 RCP w/ COLLARS	0.13		0.03	0.05	0.01			72.2	
3	62+25 TO 63+60		0.14			0.02					
**4	74+85 TO 77+40	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	0.34	0.01	0.01	0.14					
5	81+85 TO 82+00	EXTENSION OF 1050 BRCP w/ COLLARS	0.03			0.01	0.00			52.5	
6	102+35 TO 103+65		0.12			0.09					
7	108+50 TO 114+00	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	0.71			0.44	0.01			52.5	
8	117+20 TO 118+60		0.02			0.09					
9	119+20 TO 120+20		0.05			0.06					
10	121+70 TO 122+20		0.11			0.03					
11	123+75 TO 125+60		0.05			0.04					
13	134+75 TO 137+30	EXTENSION OF 1.8 x 1.2 RCBC	0.07		0.12	0.33	0.01			118.1	134.5
14	139+10 TO 139+20		0.04		0.00	0.01					
15	145+35 TO 146+75					0.09					
***16	148+10 TO 151+40	15m, 10 @ 13m) = 223m 533mm CORED SLAB	0.07			0.08					
TOTALS			1.87	0.01	0.25	1.51	0.03	0.00	0.00	295.20	134.48

* SITE NO. 1 - DRAINAGE IMPACTS TOTAL 0.06 ACRES OF NON-RIVERINE WETLAND

** SITE NO. 4 - EXISTING ROAD REMOVED, RECLAIMED WETLAND = 0.58 (ac)

*** SITE NO. 16 - EXISTING ROAD AND RAILROAD EMBANKMENT REMOVED; RECLAIMED WETLAND = 1.87 (ac)

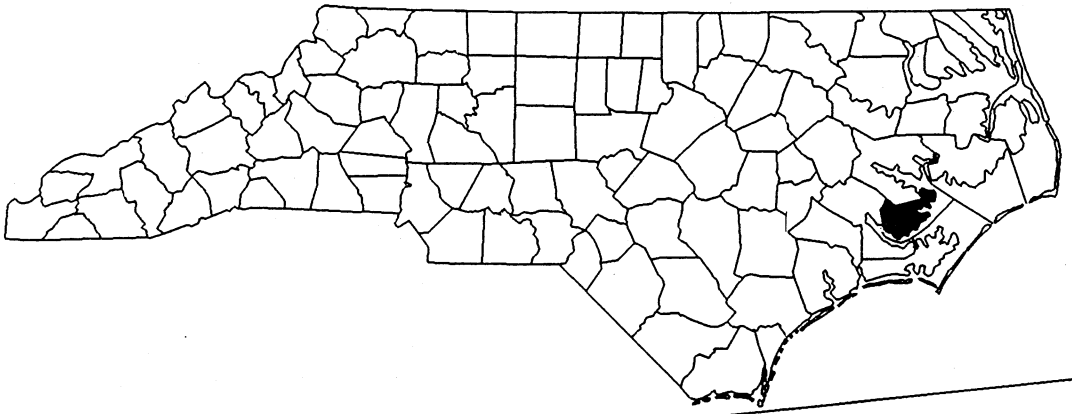
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

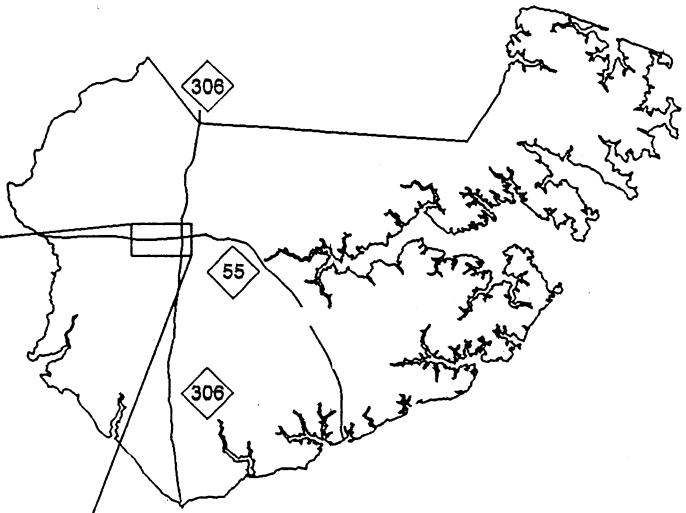
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET OF 3/13/2002

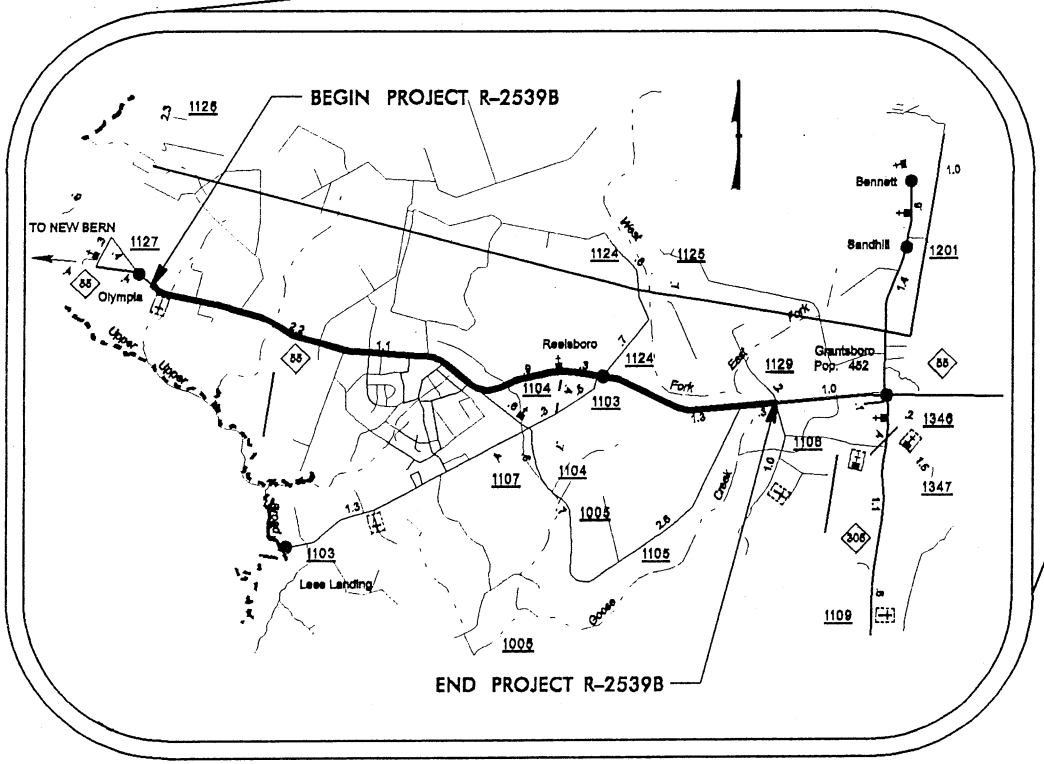
Form Revised 3/22/01

Buffer





PAMLICO COUNTY

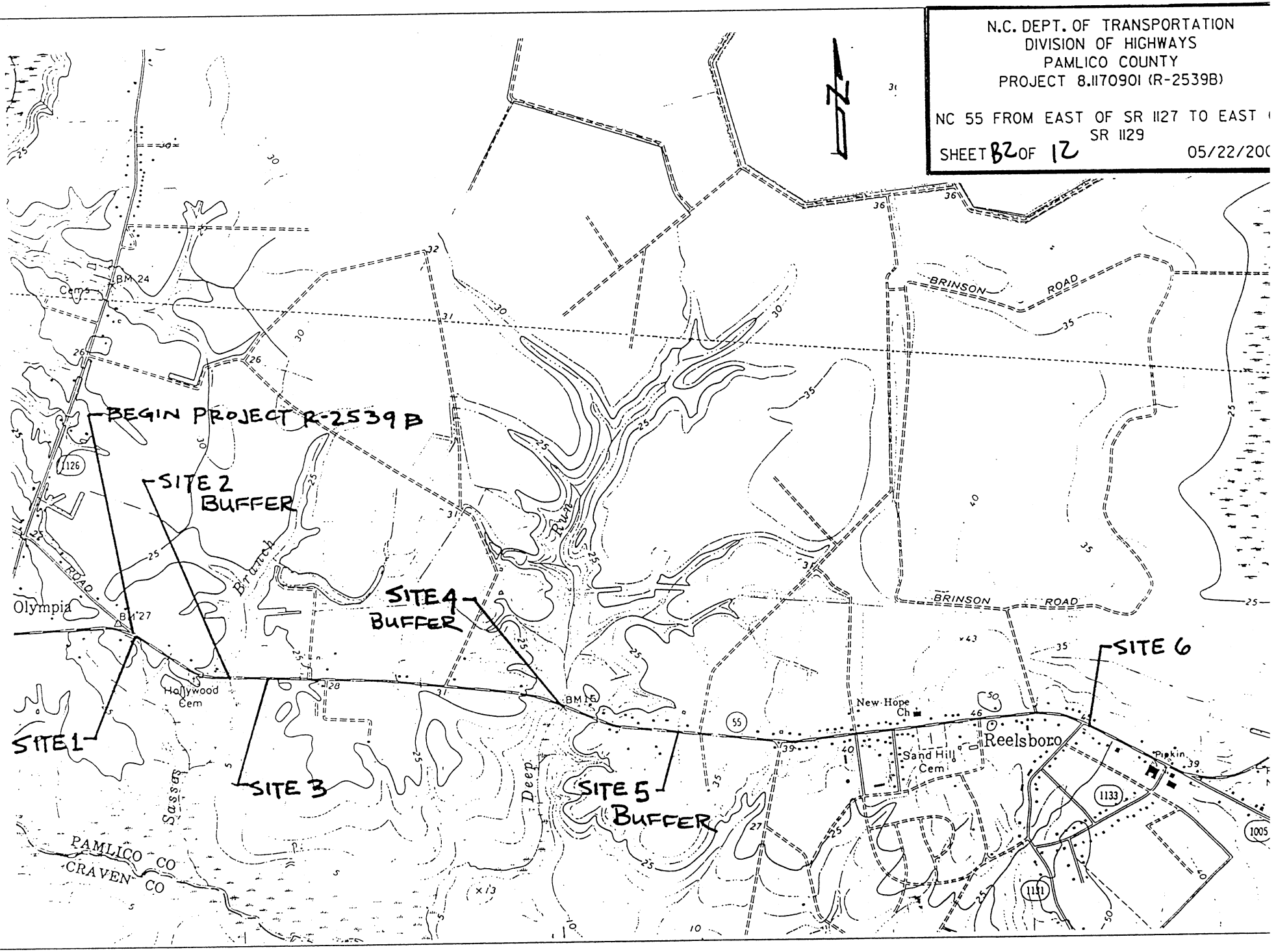


N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET B1 OF 12

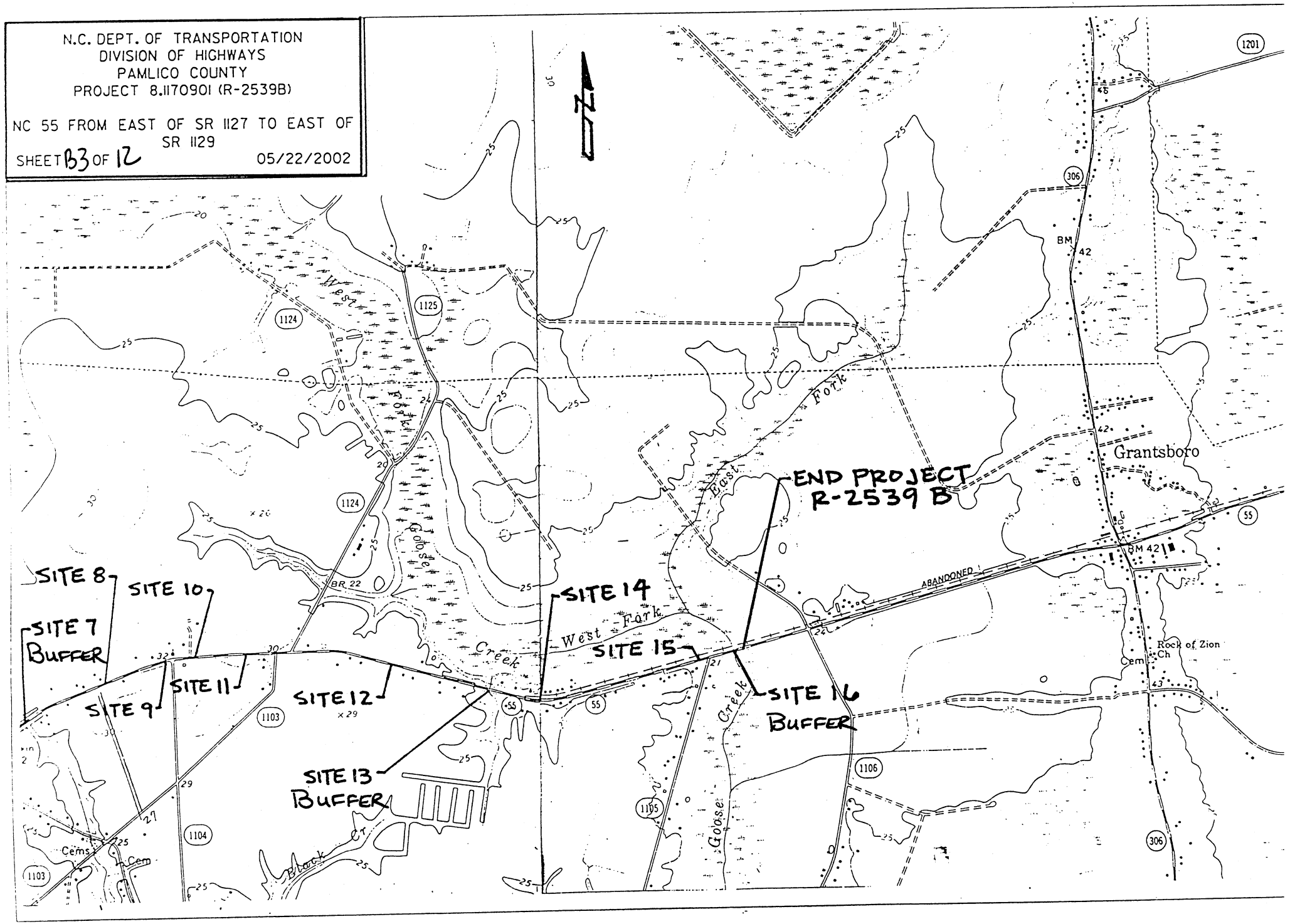
12/18/2002


N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129
SHEET B2 OF 12
05/22/200
BEGIN PROJECT R-2539 B
SITE 1
SITE 2 BUFFER
SITE 3
SITE 4 BUFFER
SITE 5 BUFFER
SITE 6
BRINSON ROAD
BRINSON ROAD
ROAD
Olympia
BM 24
BM 27
BM 16
Cem
Hollywood Cem
New Hope Ch
Sand Hill Cem
Reelsboro
Pipkin
Deep Run
Sassafras Branch
PAMLICO CO
CRAVEN CO
1126
55
1133
1131
1005

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)

NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET B3 OF 12 05/22/2002



BUFFER LEGEND

WLB — WETLAND BOUNDARY

WETLAND

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

BZ — RIPARIAN BUFFER ZONE

BZ1 — RIPARIAN BUFFER ZONE 1
30 ft (9.2m)

BZ2 — RIPARIAN BUFFER ZONE 2
20 ft (6.1m)

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

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

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

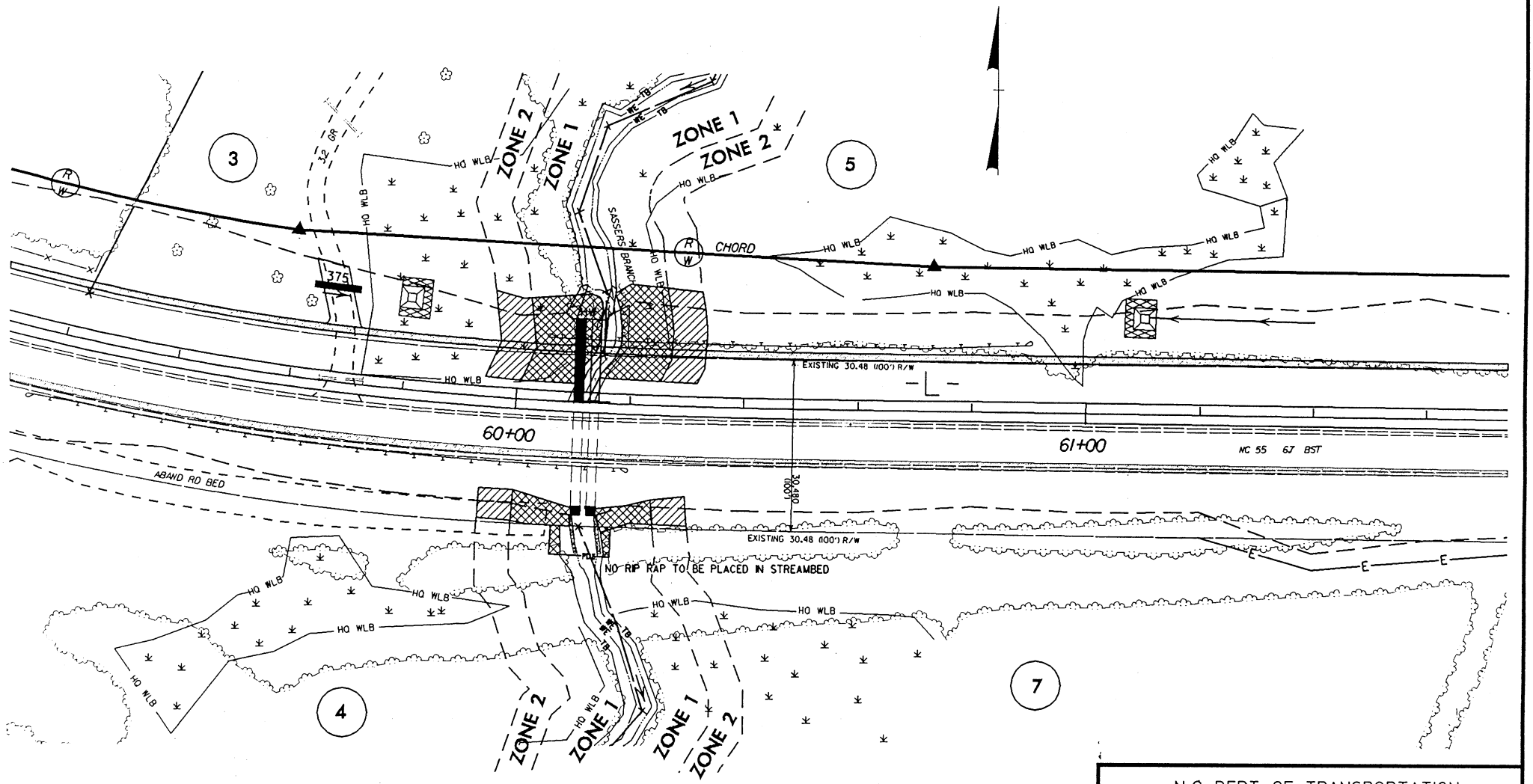
GRASS SWALE

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

PROJECT: 8.1170901 (R-2339B)
NC 55 FROM EAST OF SR 1127
TO EAST OF SR 1129

SHEET B4 OF 12 12/18/2002

SITE 2 -L- STA. 59+70 TO 61+00 LT



SCALE = 1:1000

IMPACT ZONE 1

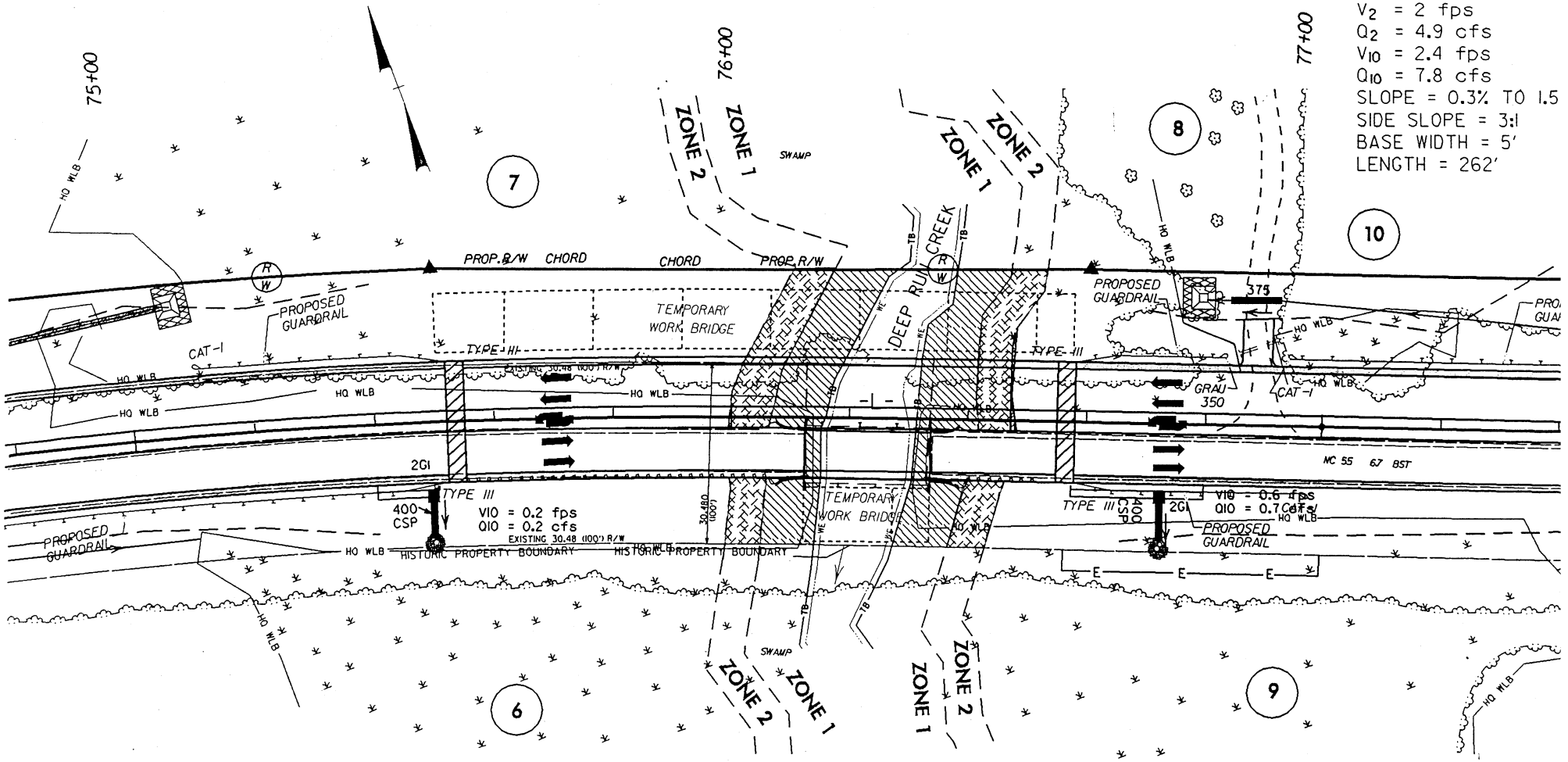
IMPACT ZONE 2

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 85 OF 12

06/24/2003

SITE 4 -L- STA. 74+85 TO 77+40 RT & LT



ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

PROPERTY

5 0 10

SCALE = 1:1000

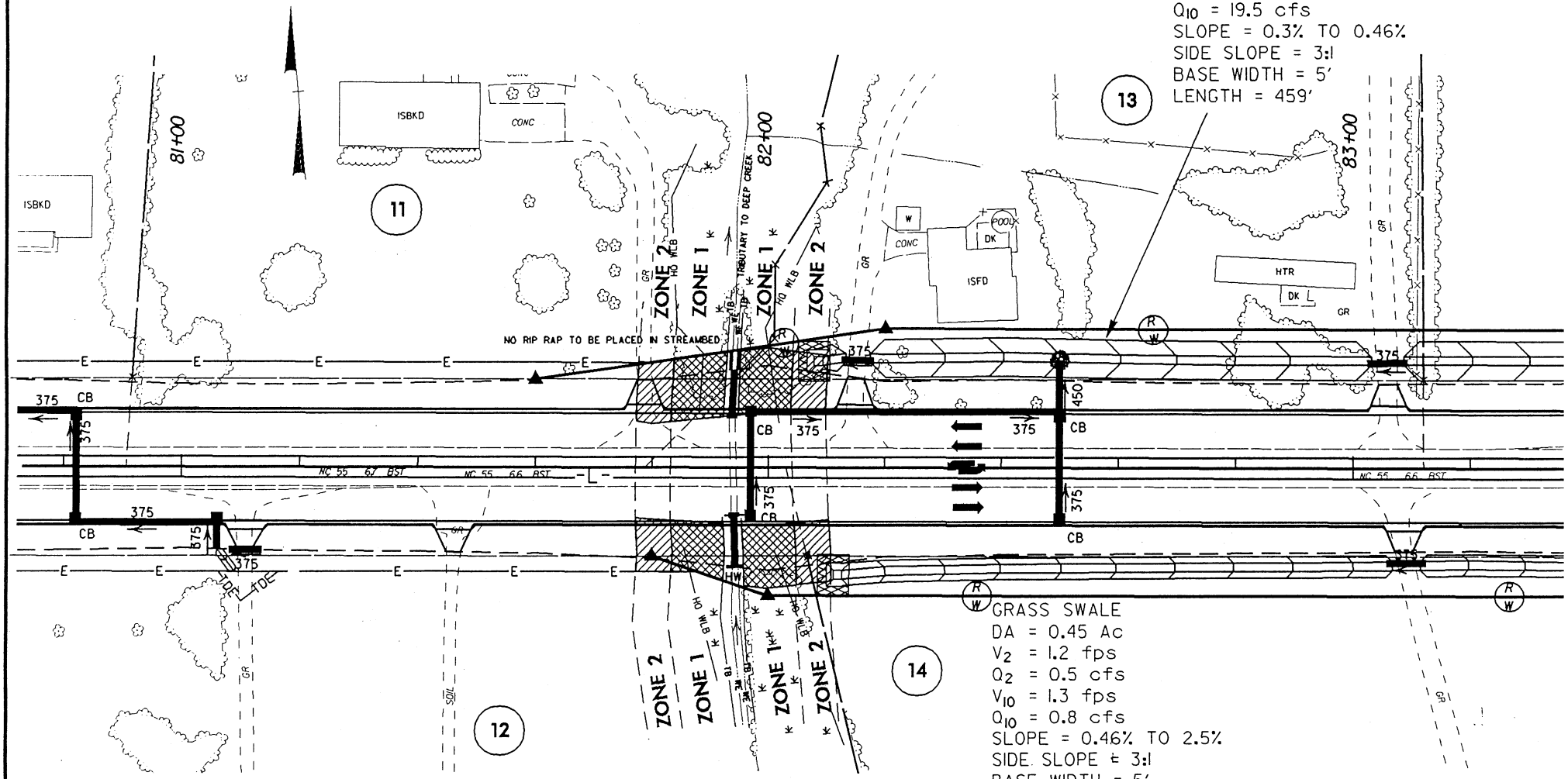
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST SR 1129

SHEET B6 OF 12

7-9-03

~~12/18/2002~~

SITE 5 -L- STA. 81+85 TO 82+00 RT & LT

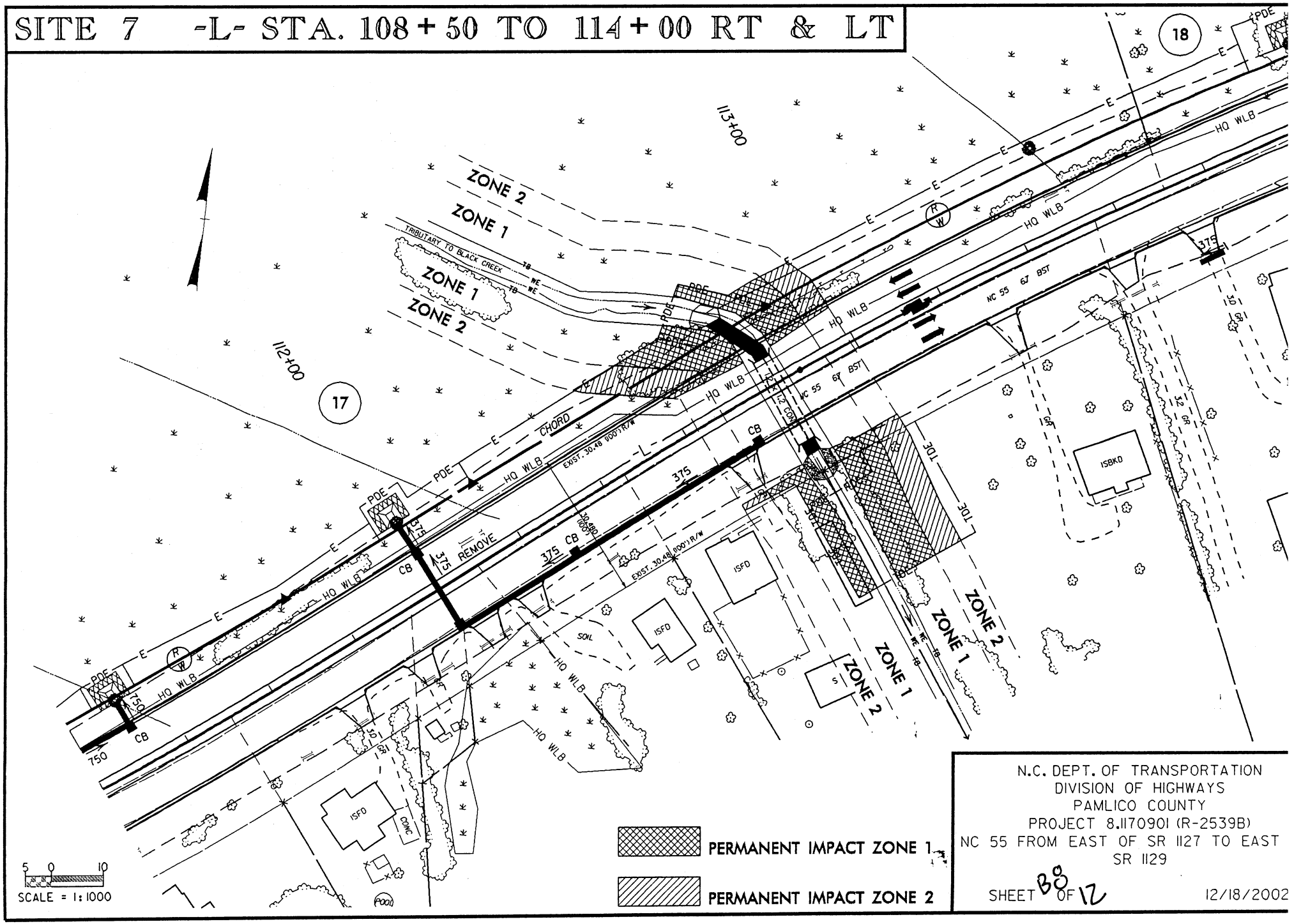


N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST O SR 1129

SHEET 87 OF 12

06/24/2003

SITE 7 -L- STA. 108+50 TO 114+00 RT & LT

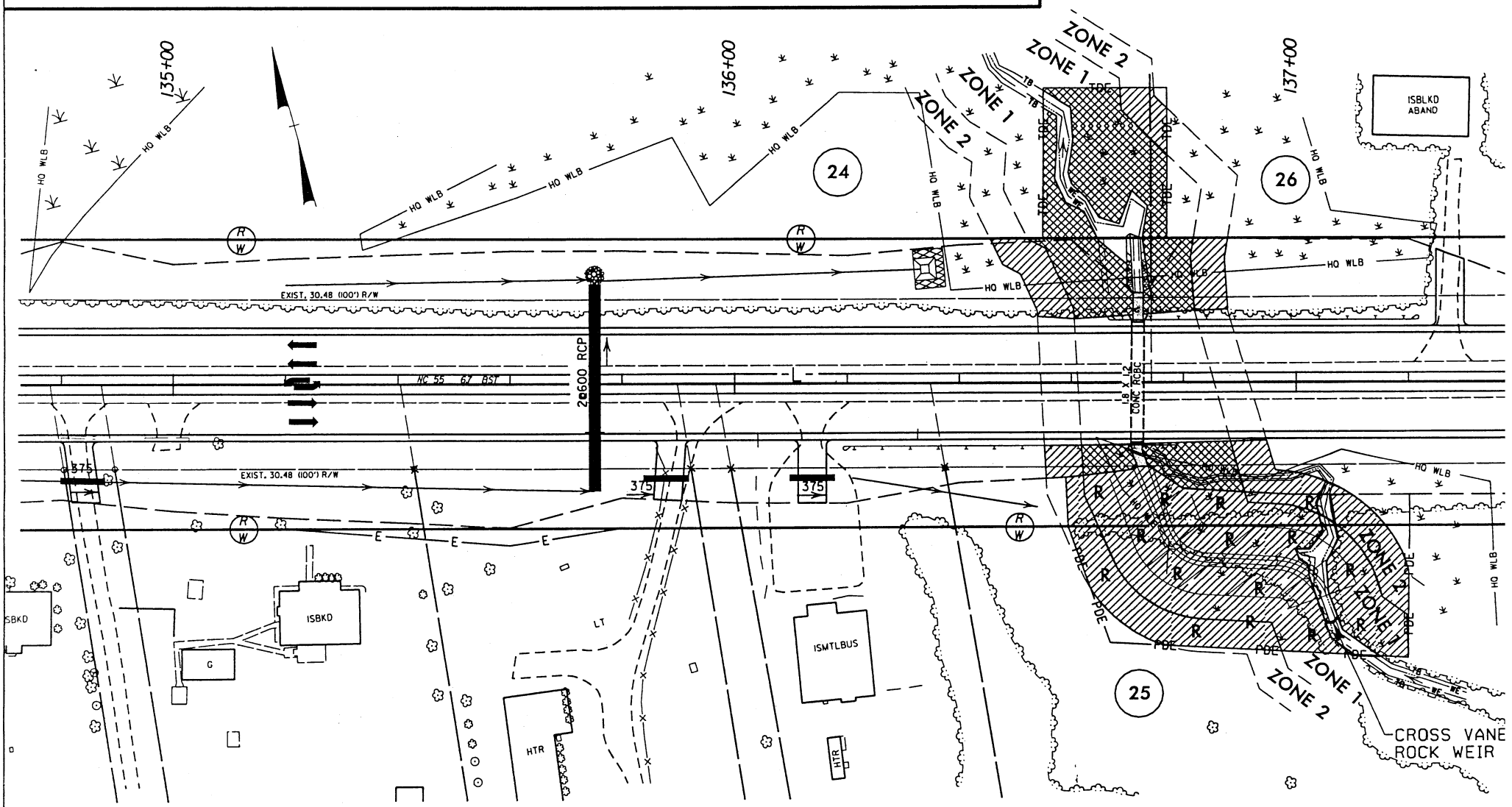


N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST SR 1129

SHEET 8B OF 12

12/18/2002

SITE 13 -L- STA. 134+75 TO 137+30 RT & LT



SCALE = 1:1000

PERMANENT IMPACT ZONE 1

R R BUFFER REPLACEMENT

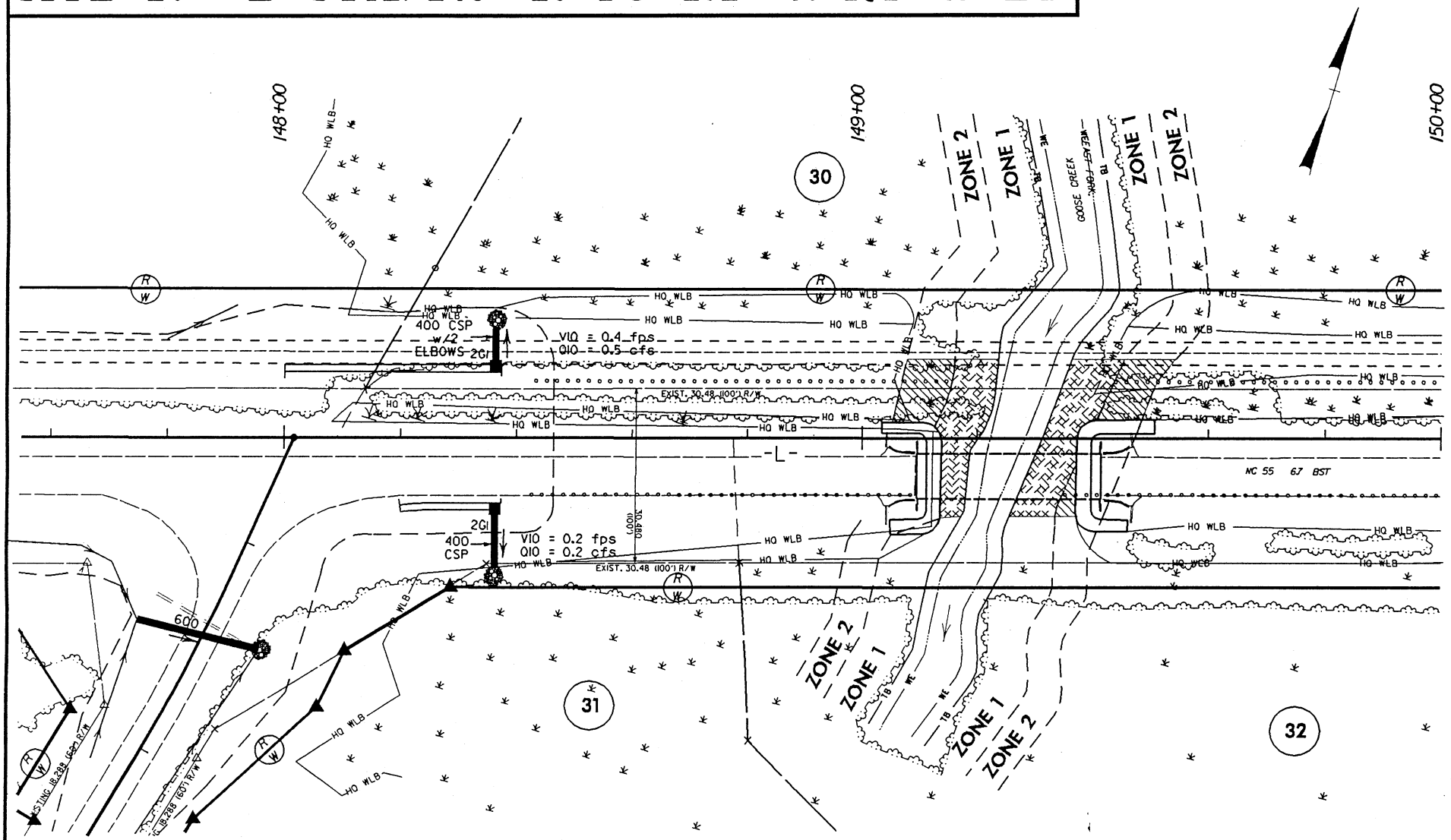
PERMANENT IMPACT ZONE 2

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 89 OF 12

4/7/2003

SITE 16 -L- STA. 148+10 TO 151+40 RT & LT



ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

5 0 10

SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST SR 1129

SHEET 10 OF 12

7-9-03

~~12/18/2002~~

BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ac)	ZONE 2 (ac)	TOTAL (ac)	ZONE 1 (ac)	ZONE 2 (ac)	TOTAL (ac)	ZONE 1 (ac)	ZONE 2 (ac)
2	EXTENSION OF 2@ 1650 RCP	-L- Sta 59+70 TO 61+00	X		0.11	0.06	0.17					
4	BRIDGE, 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	-L- Sta 74+85 TO 77+40	X		0.13	0.18	0.31					
5	EXTENSION OF 1050 RCP w/COLLAR	-L- Sta 81+85 TO 82+00	X		0.09	0.06	0.15					
7	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	-L- Sta 108+50 TO 114+00	X		0.18	0.10	0.27					
13	EXTENSION OF 1.8 x 1.2 RCBC	-L- Sta 134+75 TO 137+30	X		0.21	0.09	0.31				0.33	0.07
16	BRIDGE, 17 SPAN (6@13m, 1@15m, 10@13m) 533mm CORED SLAB	-L- Sta 148+10 TO 151+40	X		0.09	0.05	0.14					
TOTAL:					0.81	0.54	1.35			0.00	0.33	0.07

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMILCO COUNTY
PROJECT: 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

12/18/2002, rev. 7-19-03
SHEET OF 12

B11

BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)	TOTAL (m^2)	ZONE 1 (m^2)	ZONE 2 (m^2)
2	EXTENSION OF 2@ 1650 RCP	-L- Sta 59+70 TO 61+00	X		434.9	255.7	690.6					
4	BRIDGE, 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	-L- Sta 74+85 TO 77+40	X		508.4	748.4	1256.8					
5	EXTENSION OF 1050 RCP w/COLLAR	-L- Sta 81+85 TO 82+00	X		372.0	241.0	613.0					
7	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	-L- Sta 108+50 TO 114+00	X		712.0	388.0	1100.0					
13	EXTENSION OF 1.8 x 1.2 RCBC	-L- Sta 134+75 TO 137+30	X		867.0	374.0	1241.0				1353.0	270.0
16	BRIDGE, 17 SPAN (6@13m, 1@15m, 10@13m) 533mm CORED SLAB	-L- Sta 148+10 TO 151+40	X		384.4	192.2	576.6					
TOTAL:					3278.7	2199.3	5478.0			0.0	1353.0	270.0

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMILCO COUNTY
PROJECT: 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

12/18/2002, rev. 7-9-03
SHEET OF 12

B12

R-2539B
Utility Relocations

Utilities
sheet 01 of 13

Power
CP&L – Power poles located outside of the existing and/or proposed Rights of Way (R/W) will largely remain in place. Poles inside the new R/W will be relocated to 0.3 meters (1 foot) outside the new R/W line. At the staged construction of the bridges over Deep Run Creek and East Fork, Goose Creek, the power will temporarily relocate to the north side of NC 55 during construction of the southern portion of the structures. The power will return to the current alignment after construction.
No increase in capacity is expected at this time.

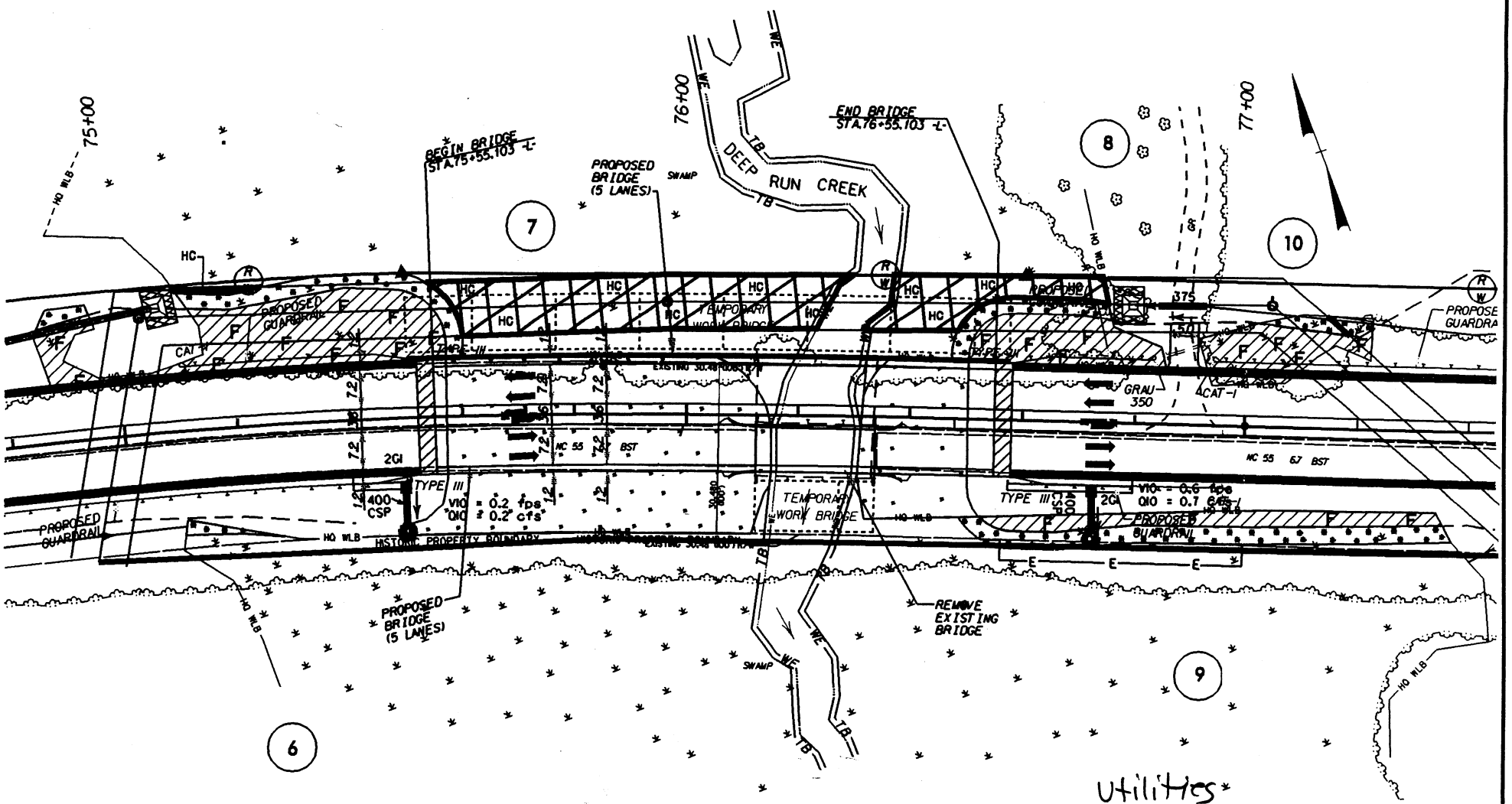
Tideland EMC – Tideland EMC does not have any facilities in conflict with proposed construction in any of the environmentally sensitive areas. Poles will be relocated out of the clear zone or outside the right of way.
No increase in capacity is expected at this time.

Telephone
There are copper and fiber optic telephone lines in the shoulders of the existing roadway. These facilities are expected to relocate to the proposed shoulder or to the edge of the proposed cut or fill slopes. Wetlands and buffer zones will be directionally bored with conduit to avoid surface disruptions.
No increase in capacity is expected at this time.

Water
There is an eight in water main the length of the project. The water main will be relocated within the permitted footprint of the roadway work. Stream and wetland crossings will be directionally bored to avoid surface disruptions.
No increase in capacity is expected at this time.

Sewer
There is an existing sewer from Bennett Tingle Road to the end of the project. This design was coordinated with NCDOT and should not require relocation. If the sewer requires replacement, it will be replaced within the footprint of the roadway project.
No increase in capacity is expected at this time.

SITE 4 -L- STA. 74+85 TO 77+40 RT & LT



N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

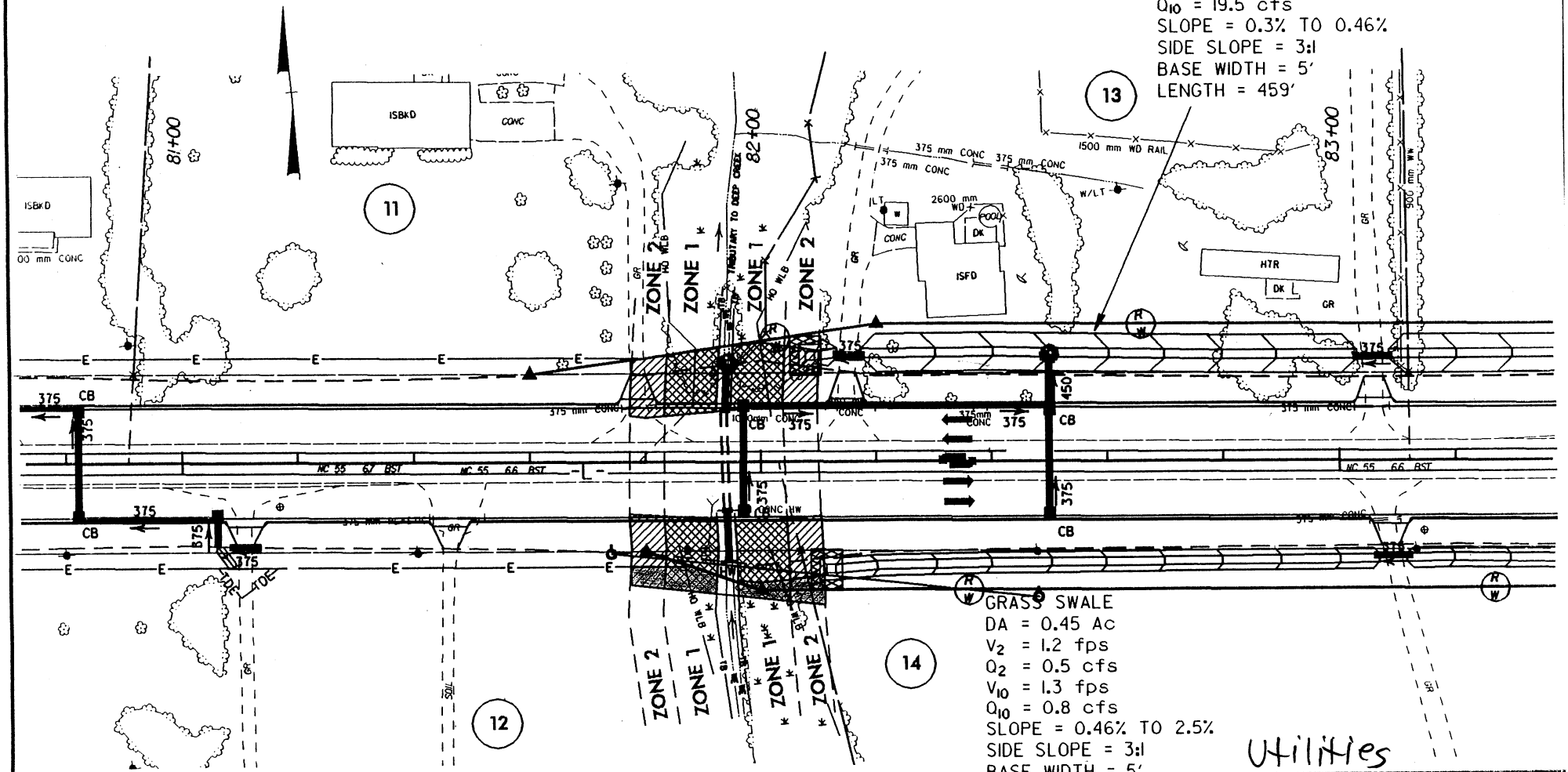
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 12 OF 13

01/06/2003

SITE 5 -L- STA. 81+85 TO 82+00 RT & LT



Utilities

PERMANENT IMPACT ZONE 1

PERMANENT IMPACT ZONE 2

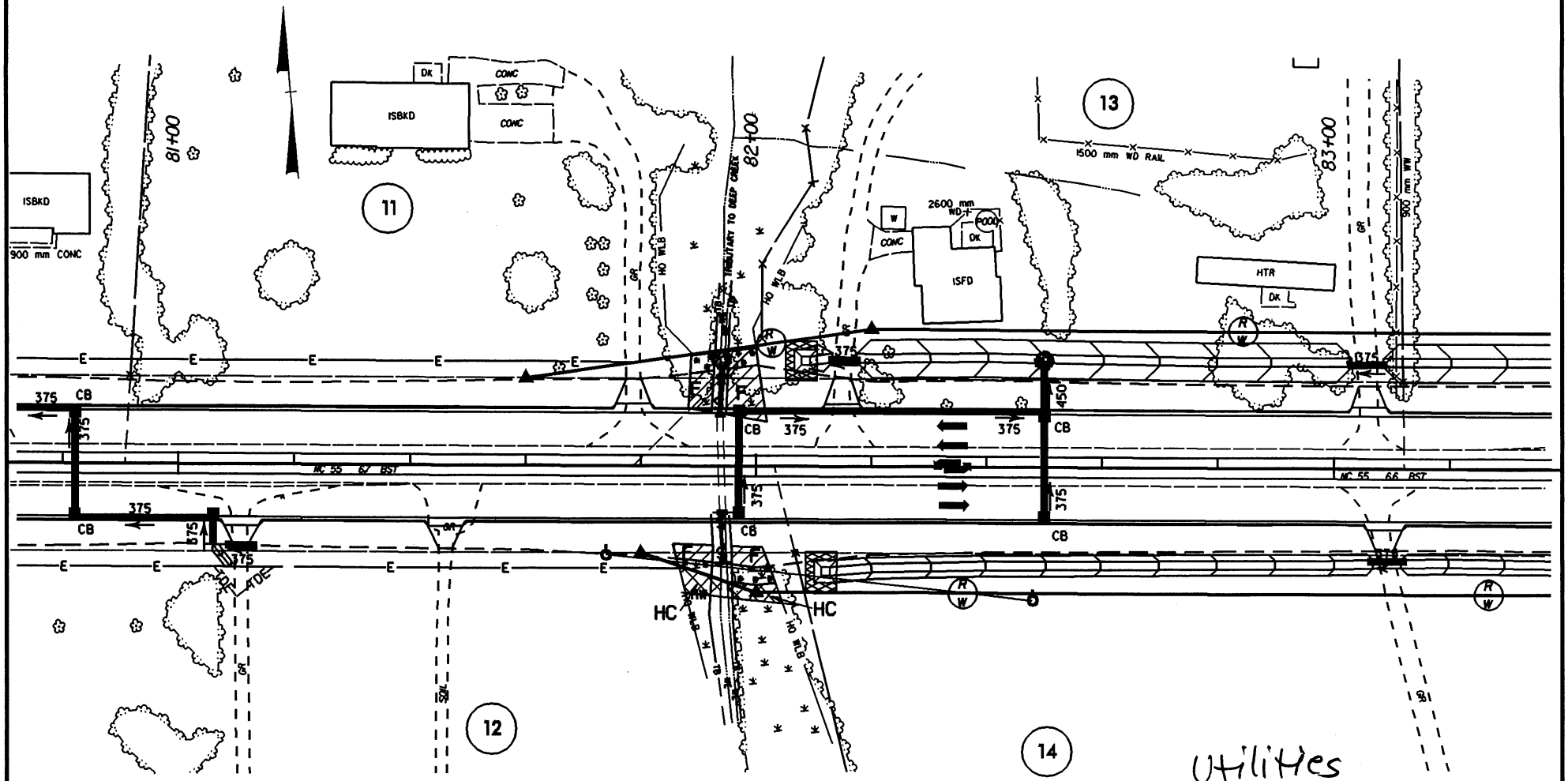
5 0 10
SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 03 OF 13

1/6/2003

SITE 5 -L- STA. 81+85 TO 82+00 RT & LT



F F DENOTES FILL IN WETLAND

S S DENOTES FILL IN SURFACE WATER

HC HC DENOTES HAND CLEARING

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

Utilities

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

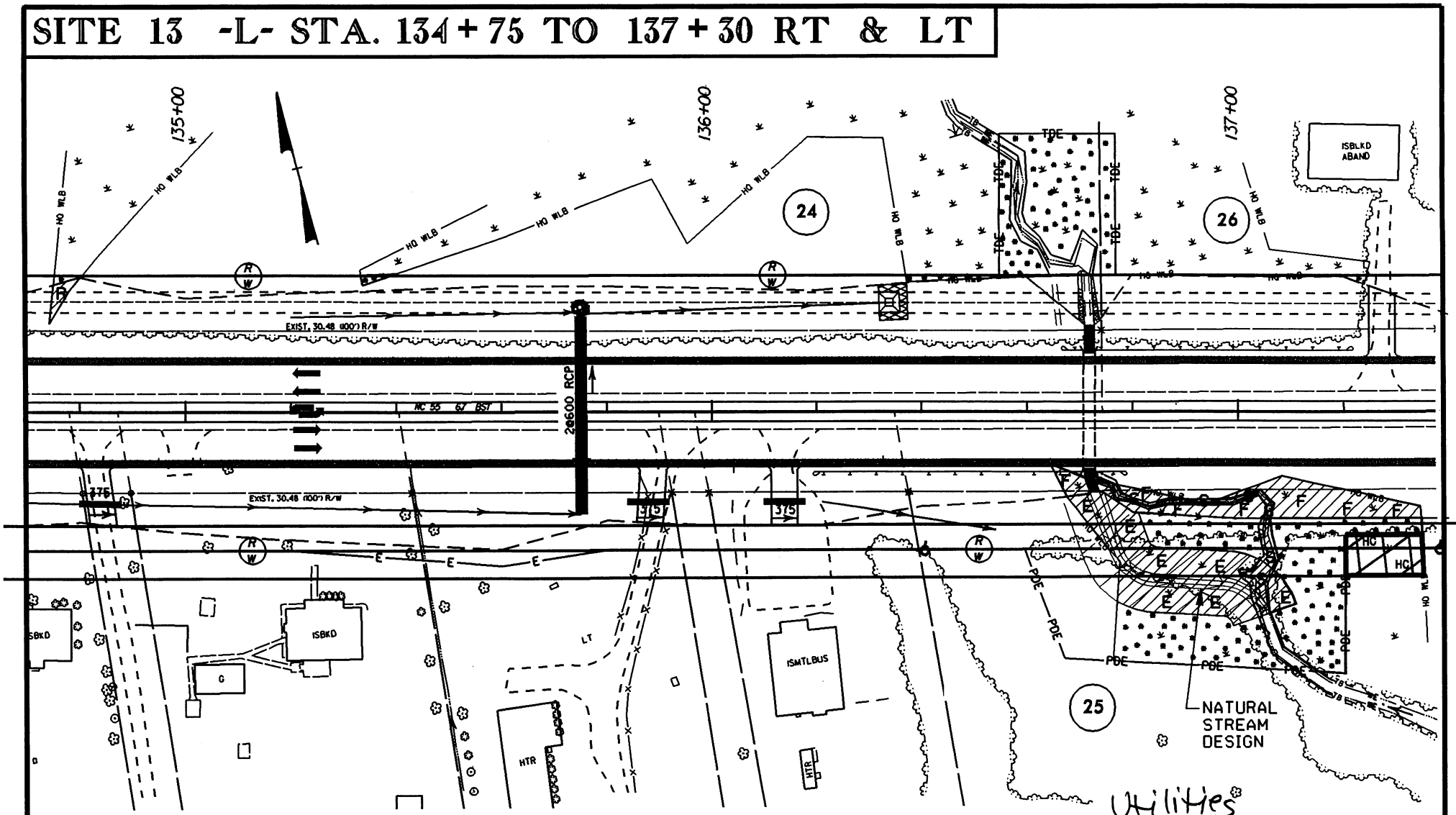
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 04 OF 13

01/06/2003

SITE 13 -L- STA. 134+75 TO 137+30 RT & LT



N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

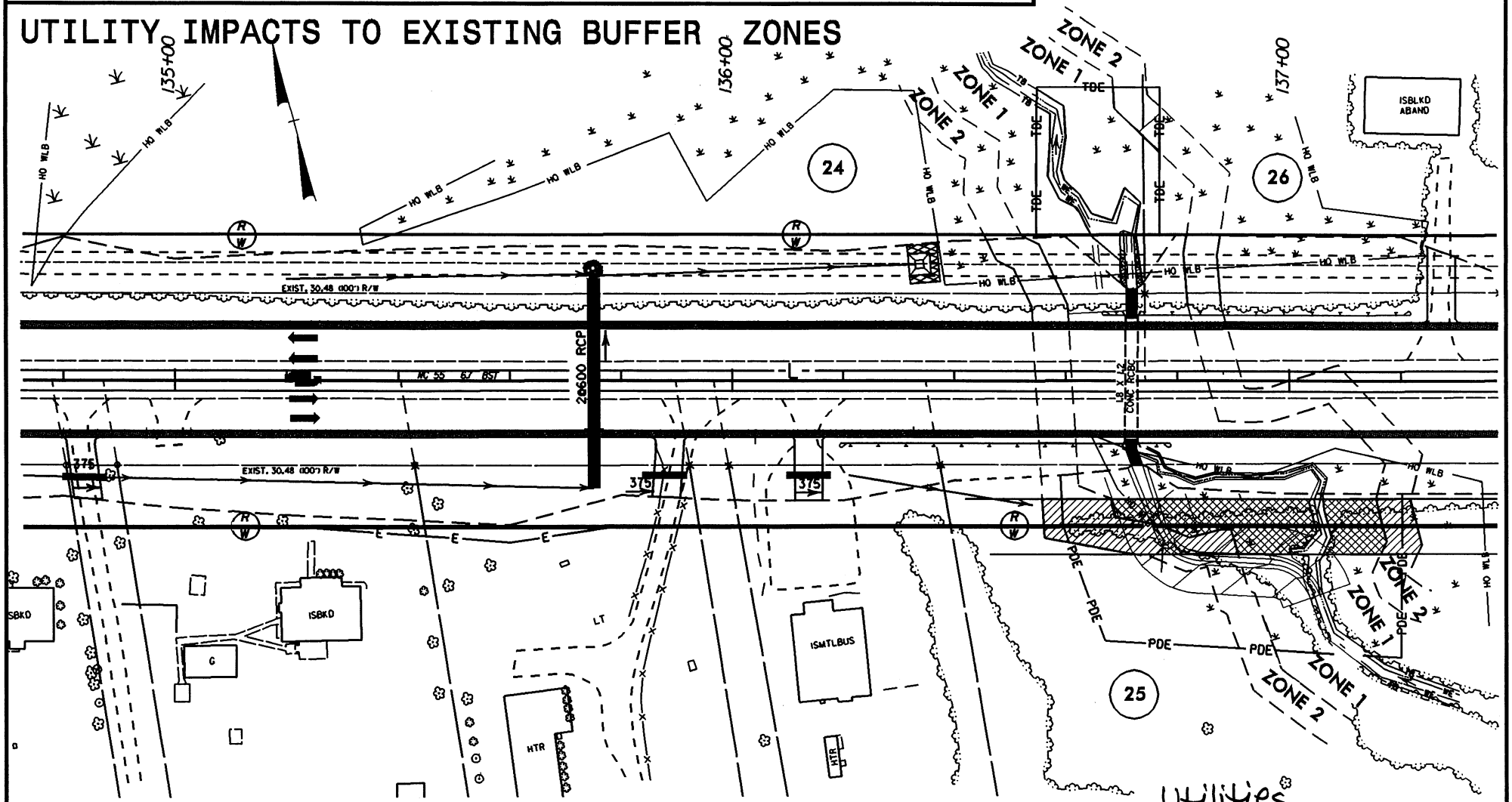
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 05 OF 13

01/06/2003

SITE 13 -L- STA. 134+75 TO 137+30 RT & LT

UTILITY IMPACTS TO EXISTING BUFFER ZONES



Utilities

PERMANENT IMPACT ZONE 1

PERMANENT IMPACT ZONE 2

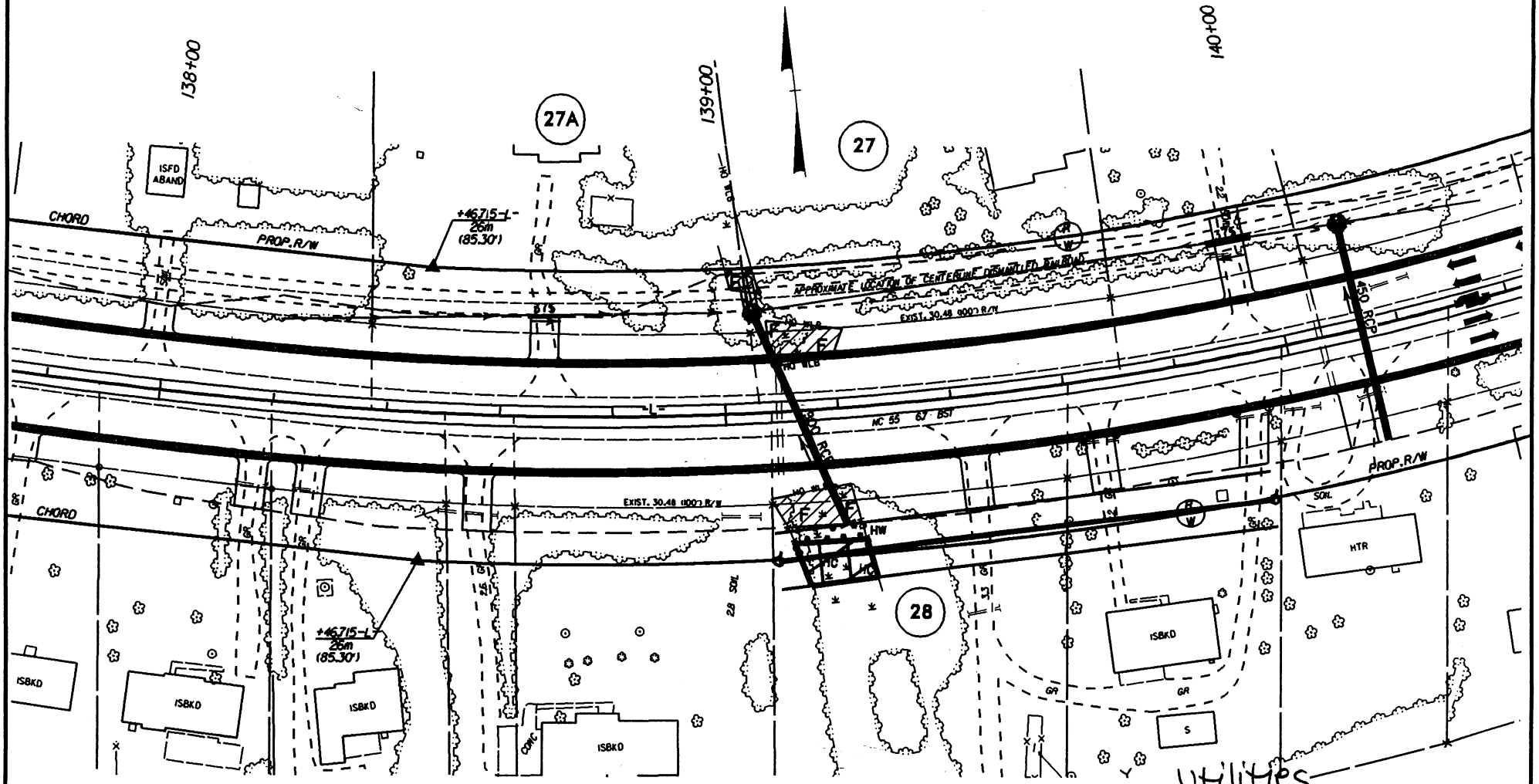
SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 06 OF 13

1/6/2003

SITE 14 -L- STA. 139+10 TO 139+20 RT & LT



DENOTES HAND-CLEARING IN WETLAND

DENOTES FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

5 0 10
SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

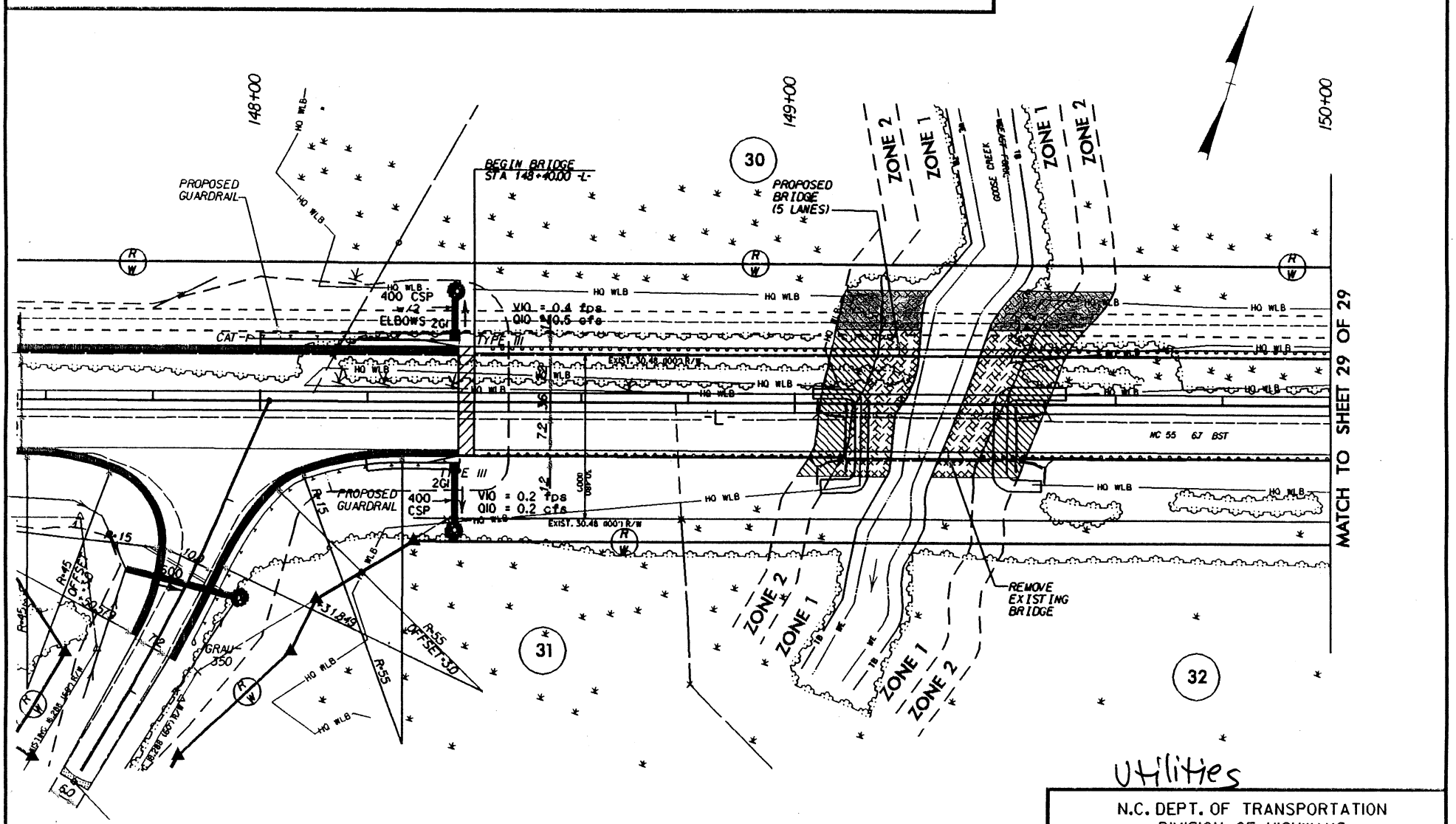
PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 07 OF 13

1/6/2003

SITE 16 -L- STA. 148+10 TO 151+40 RT & LT



ALLOWABLE IMPACTS ZONE 1

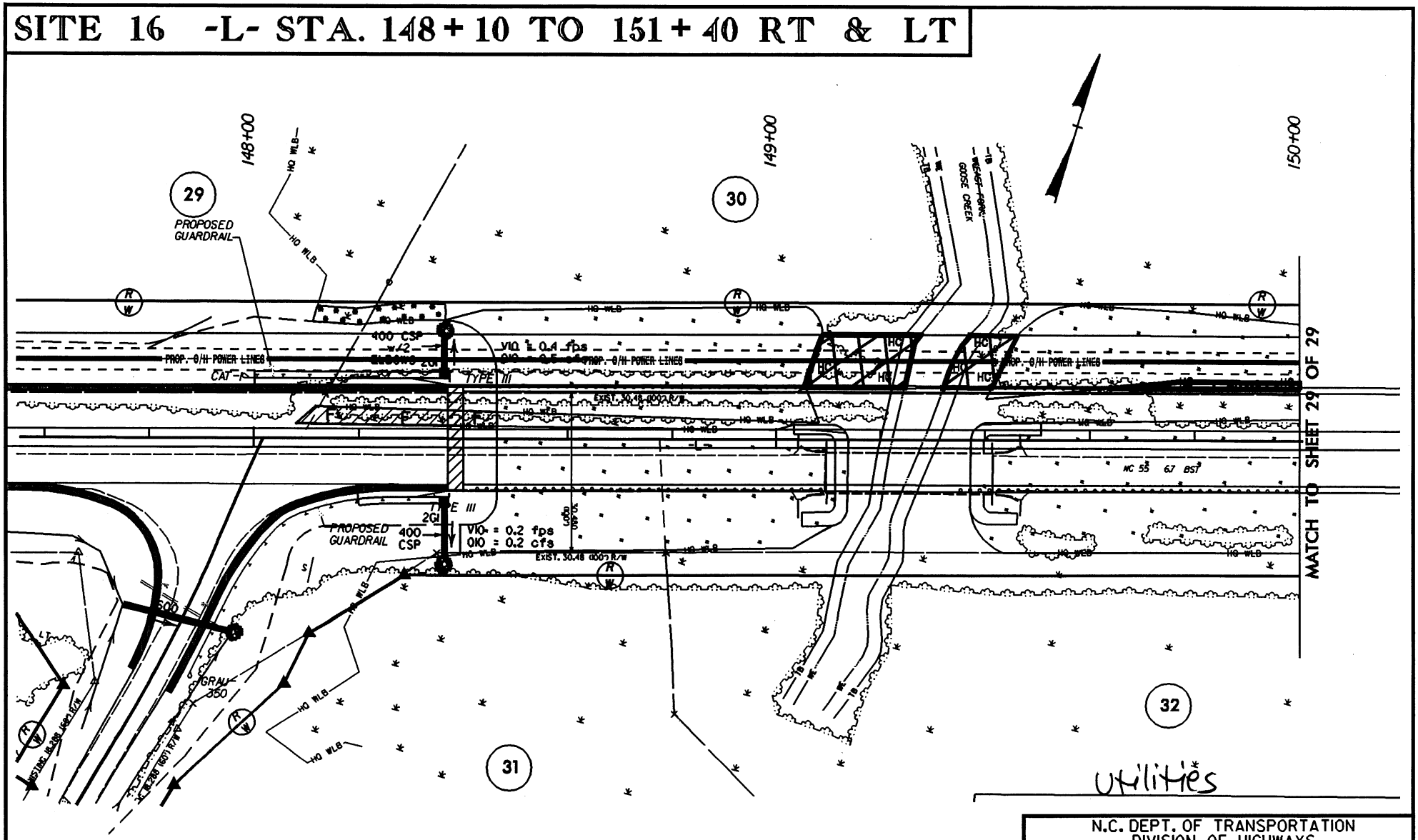
ALLOWABLE IMPACTS ZONE 2

Utilities

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
PAMLICO COUNTY
PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET U8 OF 13 1/6/2003

SITE 16 -L- STA. 148+10 TO 151+40 RT & LT



Utilities

HC HC — DENOTES HAND-CLEARING IN WETLAND

DENOTES WETLAND RESTORATION

F F — DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

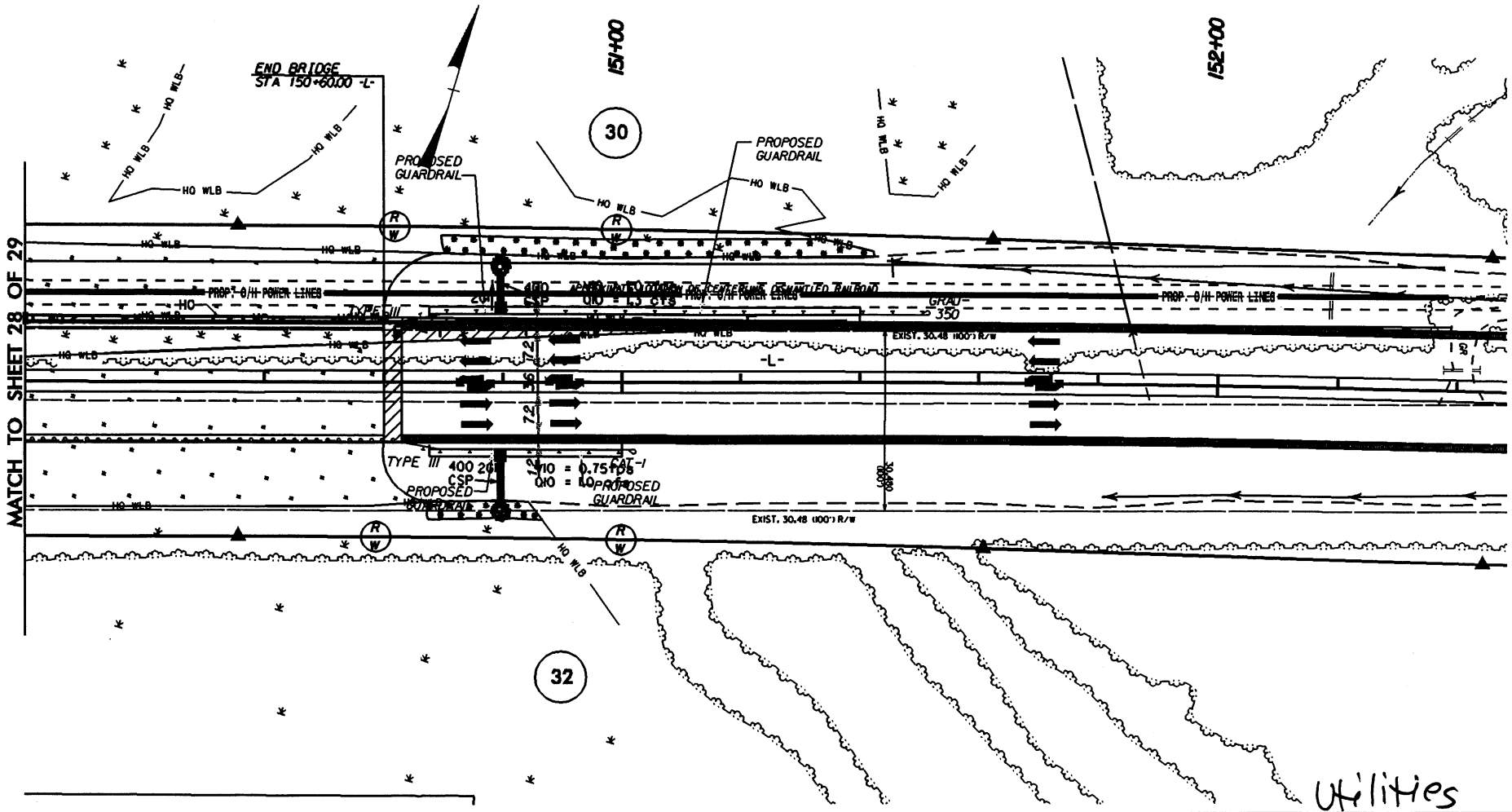
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET 9 OF 13 1/6/2003

SITE 16 -L- STA. 148+10 TO 151+40 RT & LT



Utilities

DENOTES HAND-CLEARING IN WETLAND

DENOTES WETLAND RESTORATION

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

SCALE = 1:1000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMLICO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

SHEET U10 OF 13

1/6/2003

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Hand Clearing (Utilities) (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1	56+30 TO 56+55				0.034		0.008					
2	59+70 TO 61+00	EXTENSION OF 2@ 1650 RCP w/COLLARS	0.051		0.012		0.019	0.004			22	
3	62+25 TO 63+60		0.055				0.010					
*4	74+85 TO 77+40	BRIDGE; 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	0.136	0.003		0.094	0.061					
5	81+85 TO 82+00	EXTENSION OF 1050 RCP w/COLLARS	0.012			0.005	0.005	0.001			16	
6	102+35 TO 103+65		0.047				0.038					
7	108+50 TO 114+00	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	0.286				0.178	0.003			16	
8	117+20 TO 118+60		0.008				0.038					
9	119+20 TO 120+20		0.020				0.023					
10	121+70 TO 122+20		0.045				0.013					
11	123+75 TO 125+60		0.021				0.017					
13	134+75 TO 137+30	EXTENSION OF 1.8 x 1.2 RCBC	0.027		0.048	0.012	0.132	0.006			36	41
14	139+10 TO 139+20		0.017		0.002	0.009	0.004					
15	145+35 TO 146+75		0.000				0.035					
**16	148+10 TO 151+40	BRIDGE; 17 SPAN (6@ 13m, 1@ 15m, 10@ 13m) = 223m 533mm CORED SLAB	0.030			0.038	0.034					
TOTALS:			0.754	0.003	0.095	0.158	0.614	0.014	0.000	0.000	90	41

* SITE NO. 4 - EXISTING ROAD REMOVED, RECLAIMED WETLAND = 0.234 (ha)

** SITE NO. 16 - EXISTING ROAD AND RAILROAD EMBANKMENT REMOVED; RECLAIMED WETLAND = 0.754 (ha)

Utilities

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

PAMILCO COUNTY

PROJECT 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

Form Revised 3/22/01

BUFFER IMPACTS SUMMARY (UTILITIES ONLY)

			IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ac)	ZONE 2 (ac)	TOTAL (ac)	ZONE 1 (ac)	ZONE 2 (ac)	TOTAL (ac)	ZONE 1 (ac)	ZONE 2 (ac)
2	EXTENSION OF 2@ 1650 RCP	-L- Sta 59+70 TO 61+00	X		0.00	0.00	0.00					
4	BRIDGE, 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	-L- Sta 74+85 TO 77+40	X		0.00	0.00	0.00					
5	EXTENSION OF 1050 RCP w/COLLAR	-L- Sta 81+85 TO 82+00	X		0.02	0.01	0.03					
7	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	-L- Sta 108+50 TO 114+00	X		0.00	0.00	0.00					
13	EXTENSION OF 1.8 x 1.2 RCBC	-L- Sta 134+75 TO 137+30	X		0.09	0.07	0.15					
16	BRIDGE, 17 SPAN (6@13m, 1@15m, 10@13m) 533mm CORED SLAB	-L- Sta 148+10 TO 151+40	X		0.08	0.06	0.14					
TOTAL:					0.18	0.14	0.32			0.00	0.00	0.00

N.C. DEPT. OF TRANSPORTATION
Utilities DIVISION OF HIGHWAYS

PAMILCO COUNTY
PROJECT: 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

12/18/2002
SHEET OF 13

U12

BUFFER IMPACTS SUMMARY (UTILITIES ONLY)

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT TYPE: ROAD CROSSING	IMPACT TYPE: PARALLEL IMPACT	ALLOWABLE: ZONE 1 (m^2)	ALLOWABLE: ZONE 2 (m^2)	ALLOWABLE: TOTAL (m^2)	MITIGABLE: ZONE 1 (m^2)	MITIGABLE: ZONE 2 (m^2)	MITIGABLE: TOTAL (m^2)	BUFFER REPLACEMENT: ZONE 1 (m^2)	BUFFER REPLACEMENT: ZONE 2 (m^2)
2	EXTENSION OF 2@ 1650 RCP	-L- Sta 59+70 TO 61+00	X				0.0					
4	BRIDGE, 5 SPAN (5@ 20m) = 100m 1143mm PRESTRESSED CONCRETE GIRDERS	-L- Sta 74+85 TO 77+40	X				0.0					
5	EXTENSION OF 1050 RCP w/COLLAR	-L- Sta 81+85 TO 82+00	X		60.7	46.5	107.2					
7	EXTENSION OF 1.8 x 1.2 & 1.2 x 1.2 RCBC (TWO CELLS)	-L- Sta 108+50 TO 114+00	X				0.0					
13	EXTENSION OF 1.8 x 1.2 RCBC	-L- Sta 134+75 TO 137+30	X		344.0	268.5	612.5					
16	BRIDGE, 17 SPAN (6@13m, 1@15m, 10@13m) 533mm CORED SLAB	-L- Sta 148+10 TO 151+40	X		319.0	244.7	563.7					
TOTAL:					723.7	559.7	1283.4			0.0	0.0	0.0

Note: buffer impacts are for Utilities only and are not part of the Road Crossing impacts.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
Utilities
PAMILCO COUNTY
PROJECT: 8.1170901 (R-2539B)
NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

1/6/03
SHEET OF 13

U13

TECHNICAL MEMORANDUM

DITCH IMPACT STUDY

NC-55

PAMLICO COUNTY, NORTH CAROLINA

TRAFFIC IMPROVEMENT PROJECT (TIP) NO. R-2539B

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

RALEIGH, NORTH CAROLINA

JULY 2003

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TECHNICAL MEMORANDUM

DITCH IMPACT STUDY
NC-55 WIDENING (R-2539B)
PAMLICO COUNTY, NORTH CAROLINA

1.0 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is proposing to widen North Carolina State Highway 55 (NC-55) into a multilane facility in Craven and Pamlico Counties, North Carolina. The improvements to NC-55 are anticipated to occur from US-17 at Bridgeton to NC-304 in Bayboro, North Carolina. The total length of the R-2539 project extends 10.2 miles, broken into several segments. The current study, which is focused on a small portion of segment B near the Town of Olympia, has been undertaken to evaluate the drainage impact to wetlands that a single, special[1] ditch (hereafter referred to as the "project ditch") will create when dug adjacent to the proposed, widened facility. The project ditch occurs at the western terminus of the "B" section for the NC-55 improvement (TIP R-2539B). The results of this modeling effort will be used to determine the amount of wetlands that will be permanently impacted by the project ditch through impacts to the wetland hydroperiod. This impact will be considered cumulative with other filling, excavation, and mechanized clearing activities within jurisdictional areas and is expected to be considered in the Section 404 and Section 401 permit applications. EcoScience Corporation (ESC) has been retained to estimate the drainage influence of the project ditch, as well as determine the amount of jurisdictional wetlands that will be impacted due to this drainage influence. The station number, location and details of the ditch were provided by NCDOT to ESC personnel. The drainage impacts estimated by ESC will be interpreted by NCDOT and included in the Section 404 permit application.

Specifically, the goal of this study is to compare the output of two mathematical models to estimate the linear distance from the edge of the project ditch where the potential exists for drainage impacts to occur within jurisdictional wetlands. As requested by NCDOT, the Boussinesq Equation was used to estimate the area of drainage impacts associated with the project ditch, and then compared to results generated by the hydraulic model DRAINMOD. Subsequently, the acreage of wetlands potentially drained due to the influence of the ditch can be mapped by NCDOT personnel and accounted for in the permit application in addition to filling, excavation, and clearing acreages.

This document provides a summary of the methods used and results in applying the Boussinesq Equation and DRAINMOD computer simulation to the proposed NCDOT ditching activities.

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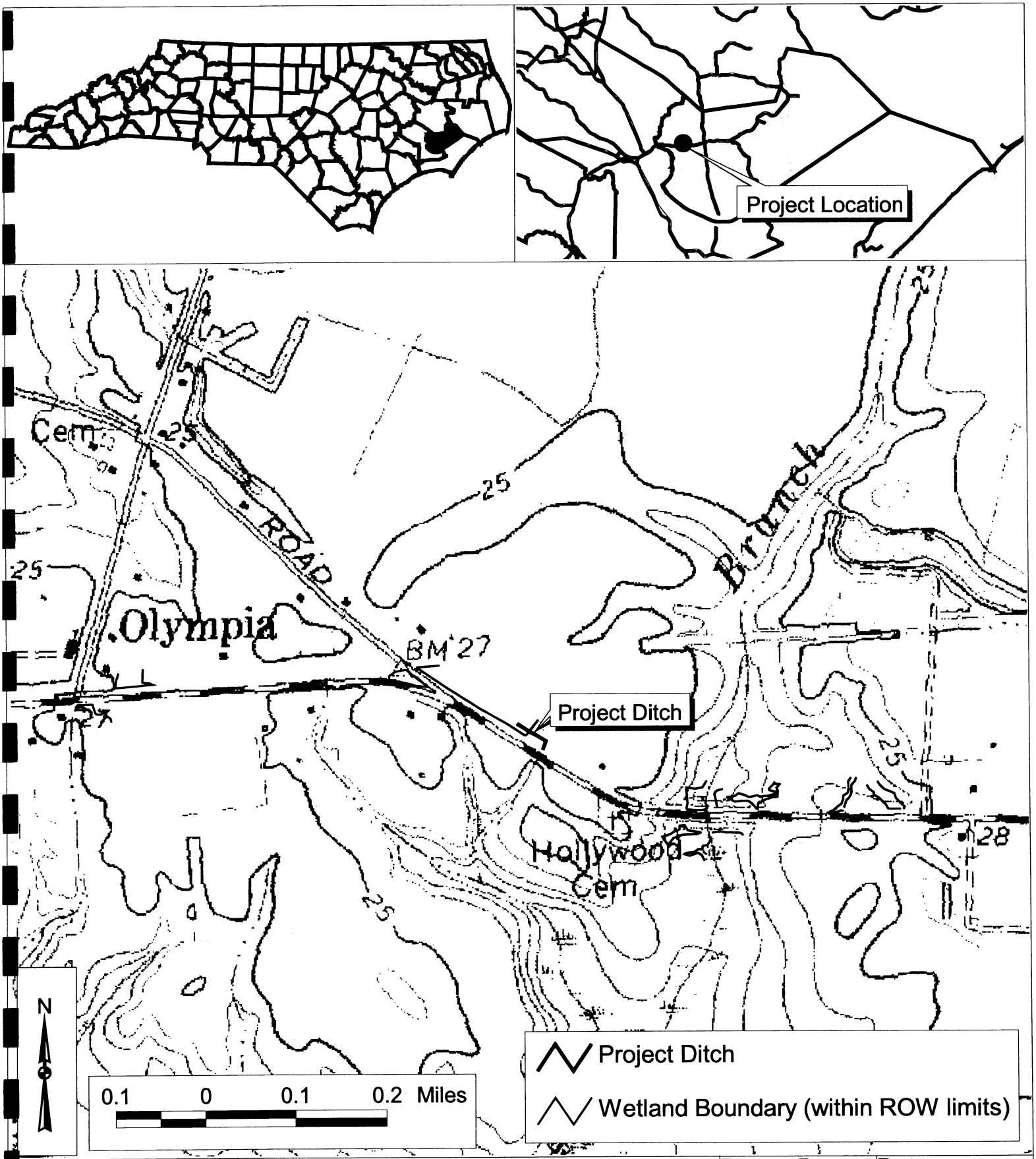
[1]Special ditches generally parallel the road corridor and are designed to induce a groundwater withdrawal gradient within adjacent fill material. The withdrawal gradient is intended to protect the roadway's substrate from underlying water.



EcoScience

Site Location

NC-55 Ditch Analysis
Pamlico County, NC

Drawn By:	Date:
MTC	July 2003
Chkd By:	Project No:
APS	02-113.23

SCALE: AS SHOWN

2.0 METHODS

MODEL DESCRIPTIONS

The Boussinesq Equation represents a two dimensional general flow equation for unconfined aquifers. The equation has been applied in the past to predict the decline in elevation of the water table near a pumping well as time progresses. The equation is based primarily on hydraulic conductivity, drainable porosity, and the saturated thickness of the aquifer. One form of the equation is as follows:

$$X = (K\, h_0\, t/f)^{1/2} / F(D,H)$$

Where:

- K = hydraulic conductivity (in/hr)
- h_0 = depth to aquiclude (in)
- t = duration (hours)
- f = drainable porosity (dimensionless ratio)
- F(D,H) = profiles (graphs) relating ditch depth, water table depth, and depth to the aquiclude(h_0)
- X = wetland impact distance (in)

DRAINMOD was originally developed to simulate the performance of agricultural drainage and water table control systems on sites with shallow water table conditions. DRAINMOD predicts water balances in the soil-water regime at the midpoint between two drains of equal elevation. The model is capable of calculating hourly values for water table depth, surface runoff, subsurface drainage, infiltration, and actual evapotranspiration over long periods referenced to measured climatological data. The reliability of DRAINMOD has been tested for a wide range of soil, crop, and climatological conditions. Results of tests in North Carolina (Skaggs, 1982), Ohio (Skaggs *et al.* 1981), Louisiana (Gayle *et al.* 1985; Fouss *et al.* 1987), Florida (Rogers 1985), Michigan (Belcher and Merva 1987), and Belgium (Susanto *et al.* 1987) indicate that the model can be used to reliably predict water table elevations and drain flow rates. DRAINMOD has also been used to evaluate wetland hydrology by Skaggs *et al.* (1993). Methods for evaluating water balance equations and equation variables are discussed in detail in Skaggs (1980).

DRAINMOD was modified for application in wetland studies by adding a counter that accumulates the number of events wherein the water table rises above a specified depth and remains above that threshold depth for a given duration during the growing season. Important inputs into the DRAINMOD model include rainfall data, soil and surface storage parameters, evapotranspiration rates, ditch depth and spacing, and hydraulic conductivity values.

MODEL APPLICATION

In this study, the Boussinesq equation was applied to a ditch one foot (0.3 meter) deep to predict where the linear distance of a drawdown in the groundwater exceeds 1 foot for 5- and 12.5-percent of the growing season. These percentages were selected based upon guidance from the U.S. Army Corps of Engineers Wetland Delineation Manual (DOA 1987). We solve the equation for the Wetland Impact Distance with data for the following variables: 1) equivalent hydraulic conductivity; 2) drainable porosity; 3) an estimated depth to the aquiclude, based on regional data; 4) the time duration of the drawdown; 5) target water table depth (1 foot below the soil surface); and 6) ditch depth identified in construction plans.

The dominant soil type along the project ditch is the Lynchburg series, which was determined based upon the Pamlico County soil survey (USDA 1987) and verified in the field. Equivalent hydraulic conductivity (K) was estimated by calculating a weighted average of conductivity data generated by the NRCS-MUUF computer model (Baumer *et al.* 1994) and field measured saturated hydraulic conductivity for the Lynchburg series, cross referenced with values provided in the Pamlico County soil survey. The soil layer depths were obtained from descriptions in the Pamlico County soil survey and verified in the field. For the Lynchburg soil, drainable porosity was calculated using the water depth to drained-volume relationship provided by MUUF. The depth to aquiclude was assumed to be 10 feet. The time variable, t, is based on a 5- and 12.5-percent of the Pamlico County growing season. For the purpose of this study, the growing season is defined as the period between March 7 and November 23 (USDA 1987). Values for F(D,H) were taken from plotted numerical solutions to the Boussinesq equation (Skaggs 1980) where $D=h_0$ – (ditch depth/ divided h_0) and H= h/ h_0. The variable h is equal to the height after drawdown for the water above the aquiclude at distance X from the ditch.

DRAINMOD was used to model the zone of wetland loss resulting from the addition of the project ditch. This zone was derived by determining the threshold drain spacing that would result in the area adjacent to the project ditch meeting the wetland hydrology criterion in just over half of the years simulated. Drains spaced any closer than this threshold distance would result in the entire area experiencing a loss of wetland hydrology. If drains were spaced any further apart than the threshold distance, there would be a strip between the drains which would still meet the wetland hydrology criteria. If only one drain exists, areas outside of half of the threshold distance would still have wetland hydrology. Half of this threshold spacing provides a conservative estimate of the drainage effect that the project ditch will have.

Wetland hydrology is defined for DRAINMOD as groundwater within 12 inches of the ground surface for 14 and 33 consecutive days during the growing season (5- and 12.5-percent of the growing season). Wetland hydrology is achieved in the model if target hydroperiods are met for one half of the years modeled (i.e. 23 out of 45 years). Inputs for soil parameters such as the water table depth/volume drained/upflux relationship, Green-ampt parameters, and the water content/matric suction relationship were obtained from NRCS data utilizing the MUUF computer program. Hydraulic conductivities and ditch depth were calculated as described above. Weather data for a 45 year period was obtained for the New Bern airport located approximately six miles away from the site. Potential evapotranspiration rates calculated based on Thornthwaite's method were adjusted using monthly factors from Washington County. The DRAINMOD simulation was conducted for the time period from 1949 to 1993.

3.0 RESULTS AND CONCLUSIONS

Applying the Boussinesq equation with an equivalent K of 3.66 in/hr, depth to the aquiclude (h_0) of 10 feet, drainable porosity of 0.037, ditch depth of 1 foot, time duration of 14 days (5-percent) and 33 days (12.5-percent), D=0.9, H=0.9, and F(D,H) of 13 , it was predicted that the drainage impact of the ditch would be at least 13 feet for the 14-day scenario and 20 feet for 33 days. DRAINMOD predicted that the ditch effect would be less than 115 feet for 5-percent of the growing season and less than 1,205 feet for 12.5-percent of the growing season. DRAINMOD results predict a *zone* of influence rather than a specific point in the landscape where hydrologic influences are no longer jurisdictional. Model parameters and outputs are provided in Tables 1 and 2. A graphical depiction of the drainage impact from the project ditch to adjacent wetlands is provided in Figure 2.

Table 1. Boussinesq Equation Variables and Results

Boussinesq Equation

Average K (ft)	h_o (inches)	t (days)	f	DDitch (ft)	D	F(D,H)	X (ft)
3.66	120	14	0.037	1	0.9	13	13.0
3.66	120	33	0.037	1	0.9	13	20.0

X (Wetland Impact Distance) = $(K\ h_o\ t/f)^{½}/\ F(D,H)$

Where:

K=hydraulic conductivity (in/hr)
h_0=depth to aquiclude (in)
t= duration (hours)
f=drainable porosity (dimensionless ratio)
F(D,H)=Profiles (graphs) relating ditch depth, water table depth, and depth to the aquiclude(h_0)

Table 2. Drainmod Input/Output for Project Ditch

ANALYSIS OF WETLAND HYDROLOGIC CRITERIA for Lynchburg soil in Pamlico Co., NC
for FOREST: STMAX=2.5cm, STORR=1.5, thwtd=30cm/14days, Ksat=15,4.5, 15

Drain spacing = 7000. cm Drain depth = 30.0 cm
Number of periods with water table closer than 30.00 cm for at least 14 days (5-percent) during the Pamlico County growing season. Counting starts on day 66 and ends on day 327 of each year

Year	No. of Periods of 14 days or more with WTD < 30.0 cm	Longest Consecutive Period In Days	Year	No. of Periods of 14 days or more with WTD < 30.0 cm	Longest Consecutive Period In Days
1949	0	0	1981	0	11
1950	0	9	1982	0	9
1951	0	11	1983	2	42
1952	1	15	1984	1	16
1953	0	10	1985	0	13
1954	0	5	1986	0	12
1955	1	19	1987	0	9
1956	1	19	1988	0	13
1957	0	11	1989	3	21
1958	1	18	1990	0	10
1959	3	19	1991	2	19
1960	1	19	1992	1	17
1961	1	15	1993	0	10
1962	1	21			
1963	0	12			
1964	0	13			
1965	1	15			
1966	1	16			
1967	0	10			
1968	0	13			
1969	2	20			
1970	1	16			
1971	1	15			
1972	0	11			
1973	0	7			
1974	2	23			
1975	1	17			
1976	1	34			
1977	1	15			
1978	0	12			
1979	0	10			
1980	1	28			

Number of Years with at least one period = **23**. out of **45** years.

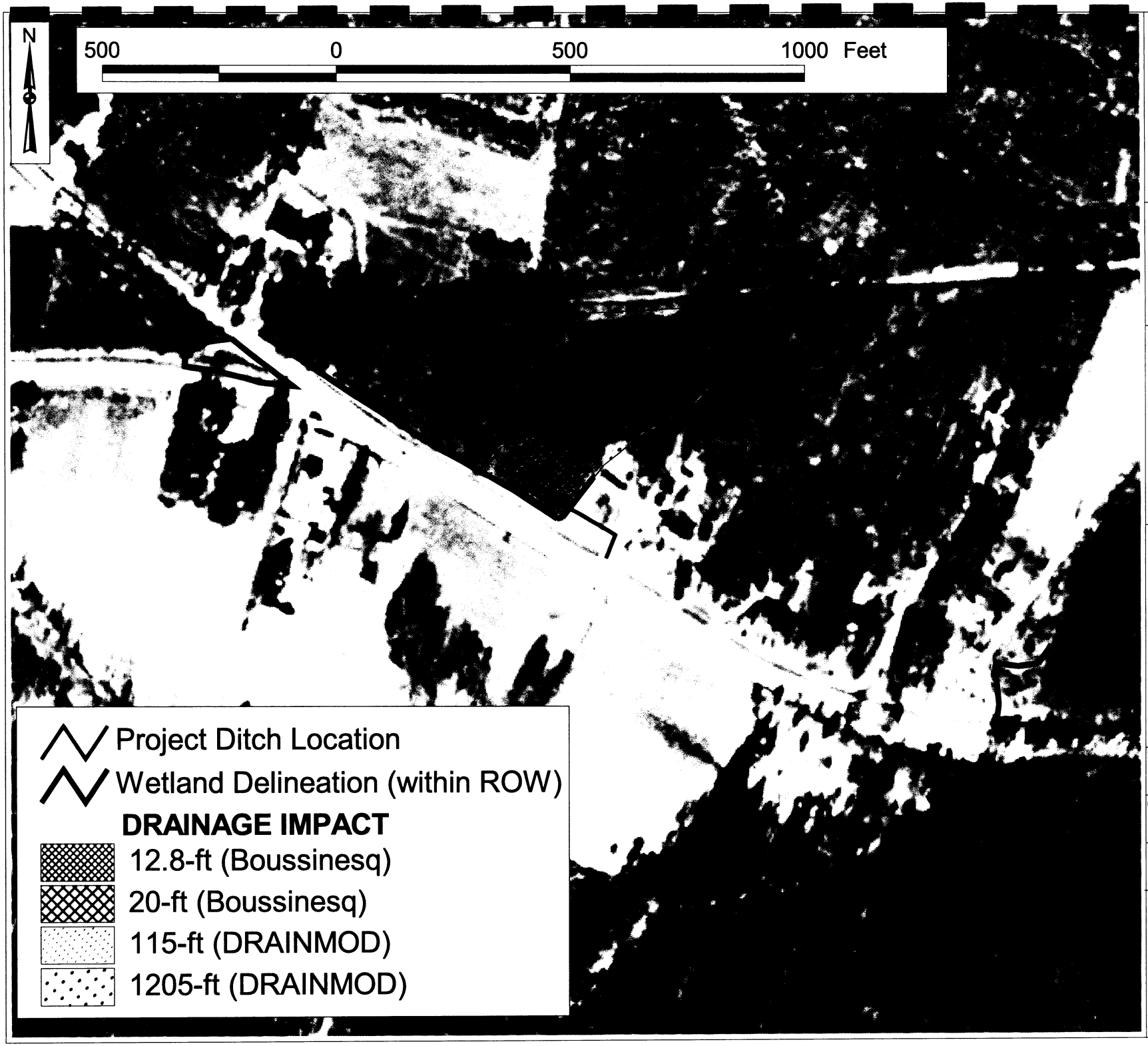
Table 3. Drainmod Input/Output for Project Ditch

ANALYSIS OF WETLAND HYDROLOGIC CRITERIA for Lynchburg soil in Pamlico Co., NC
for FOREST: STMAX=2.5cm, STORR=1.5, thwtd=30cm/14days, Ksat=15,4.5, 15

Drain spacing = 73,500. cm Drain depth = 30.0 cm
Number of periods with water table closer than 30.00 cm for at least 33 days (12.5-percent) during the Pamlico County growing season. Counting starts on day 66 and ends on day 327 of each year

Year	No. of Periods of 14 days or more with WTD < 30.0 cm	Longest Consecutive Period In Days	Year	No. of Periods of 14 days or more with WTD < 30.0 cm	Longest Consecutive Period In Days
1949	0	0	1981	0	32
1950	1	38	1982	1	34
1951	0	28	1983	1	54
1952	0	29	1984	2	54
1953	0	21	1985	1	33
1954	0	20	1986	0	16
1955	0	24	1987	1	36
1956	2	51	1988	0	29
1957	1	38	1989	1	65
1958	1	46	1990	0	29
1959	1	41	1991	2	47
1960	0	23	1992	1	35
1961	0	21	1993	1	47
1962	0	25			
1963	0	19			
1964	2	43			
1965	0	31			
1966	0	29			
1967	1	46			
1968	0	22			
1969	0	30			
1970	1	42			
1971	1	55			
1972	0	21			
1973	0	15			
1974	2	52			
1975	0	23			
1976	1	34			
1977	1	42			
1978	0	25			
1979	2	50			
1980	1	35			

Number of Years with at least one period = **23** out of **45** years.



EcoScience

Prepared For:

North Carolina Department of Transportation

Project:

NC-55 Widening

Ditch Impact Analysis

Pamlico County
North Carolina

Figure Name

Proposed Impact of Project Ditch on Adjacent Wetlands

Boussinesq Equation compared to DRAINMOD

Drawn By:	Date:
MTC	July 2003
Chkd By:	Project No:
APS	02-113.23

SCALE: AS SHOWN

FIGURE

2

Both methods have an ability to support different ditch morphology and features, suggesting that use of these methods in evaluation of drainage impacts from highway ditches is applicable with proper data inputs that fully reflect the differences between highway ditches and agricultural ditches. Performing a comparison of output from both methods is recommended, because their output can be used to predict the lower and upper limits of a range of drainage influence that is likely to occur in real world conditions.

The Boussinesq Equation does not consider the hydroperiod in which the water table drops below 12 inches, therefore the equation does not exhibit any relation to wetland hydrology. Additionally, the Boussinesq Equation requires that different lateral hydraulic conductivities for separate soil layers be combined in a weighted average for use in the equation. Using only one weighted lateral hydraulic conductivity is limiting in comparison to DRAINMOD, which allows the entry of a different lateral hydraulic conductivity for each soil layer. This is an important factor, considering that drainage in the Lynchburg Soil series is considerably different within three separate soil layers that all occur within 80 inches of the surface. In Lynchburg soils, entering a weighted average for lateral hydraulic conductivity has resulted in a lower overall permeability than was measured in the field. The predictive outcome of the Boussinesq equation therefore reflects a cumulatively smaller distance being influenced by the project ditch than may occur if the hydraulic conductivity for all soil layers were considered.

DRAINMOD represents an alternative model that assesses wetland hydroperiods. DRAINMOD uses the ellipse equation as a base-line component of the model. DRAINMOD assesses variability in rainfall, other hydrologic parameters, and adds a time function (counter) that predicts the ditch spacing required to lower the water table below 12 inches for a wetland related hydroperiod. The results from DRAINMOD may have been influenced by shallow dimensions of the project ditch and the marginal wetness that exists naturally in the adjacent areas. In addition, DRAINMOD results predict a zone of influence rather than a specific distance of influence. These results suggest that actual impacts to the wetland hydroperiod will be somewhat less than the 115-feet maximum limit predicted by the model for the 5-percent scenario and less than 1,205 feet for the 12.5-percent model.

In summary, two different methods were used to simulate the drainage impact of a special ditch on the wetland hydroperiod within jurisdictional systems adjacent to NC-55 in Pamlico County. The Boussinesq Equation and DRAINMOD model were utilized to predict the lateral extent of the ditch impact on ground or surface water within one foot of the land surface for various jurisdictional thresholds (*i.e.* 5- or 12.5-percent of the growing season). The Boussinesq Equation determined that wetlands within 13 to 20 feet of the special ditch would be adversely affected by ditch placement within, or adjacent to, wetlands which previously exhibited hydroperiods of five to 12.5 percent of the growing season, respectively. However, it should be noted that the Boussinesq Equation appears to be sensitive to changes in several equation parameters, particularly hydraulic conductivity values. By combining hydraulic conductivities derived from various soils layers and utilizing a mean value in the equation, variability in lateral drainage characteristics within a particular soil type may be masked. The result could potentially be an under-reporting of the lateral extent of drainage impacts on adjacent hydroperiods.

DRAINMOD results indicate an impact zone of 115 feet to 1,205 feet within wetland with pre-project jurisdictional hydroperiods of 5- to 12.5-percent, respectively. However, results are not necessarily absolute and the data only infers that the jurisdictional status of the wetland will be adversely affected somewhere within the reported zone of influence. In addition, the shallow

depth of the special ditch under investigation (i.e. less than one foot) and the lack of repetitive sampling at several locations does not provide for a sensitivity analysis of reported results. Model parameters were estimated based primarily on published information, supplemented by limited field investigation and the modal concept for soil series in the region. Neither of these methods was designed to model highway ditching activities since both models were developed for agricultural ditches. It is recommended that additional sampling be undertaken at multiple sites with similar soil characteristics in order to obtain a database of reliable, field tested information for highway-related projects.

4.0 REFERENCES

Baumer, O. et al. 1994. MUUF v2.14 Users Manual. Natural Resource Conservation Service.

Belcher, H.W. and G.E. Merva. 1987. Results of DRAINMOD verification study for Zeigenfuss soil and Michigan climate. ASAE Paper No. 87-2554. ASAE, St. Joseph, MI 49085.

Fouss, J.L., R.L. Bengtson and C.E. Carter. 1987. Simulating subsurface drainage in the lower Mississippi Valley with DRAINMOD. Transactions of the ASAE 30 (6).(1679 -1688).

Gayle, G., R.W. Skaggs and C.E. Carter. 1985. Evaluation of a water management model for a Louisiana sugar cane field. J. of Am. Soc. of Sugar Cane Technologists, 4: 18 - 28.

Rogers, J.S. 1985. Water management model evaluation for shallow sandy soils. Transactions of the ASAE 28 (3): 785-790.

Skaggs, R.W. 1980. Drainmod Reference Report. Methods for Design and Evaluation of Drainage Water Management Systems for Soils with High Water Tables. Prepared for the U.S. Department of Agriculture. South National Technical Center. Fort Worth, Texas.

Skaggs, R.W., N.R. Fausey and B.H. Nolte. 1981. Water management evaluation for North Central Ohio. Transactions of the ASAE 24 (4): 922 - 928.

Skaggs, R.W. 1982. Field evaluation of a water management simulation model. Transactions of the ASAE 25 (3): 666 - 674.

Skaggs, R.W., et al. 1993. Methods for Evaluating Wetland Hydrology. ASAE meeting presentation Paper No. 921590. 21 p.

Susanto, R.H., J. Feyen, W. Dierickx and G. Wyseure. 1987. The use of simulation models to evaluate the performance of subsurface drainage systems. Proc. of Third International Drainage Workshop, Ohio State Univ., pp. A67 - A76.

U.S. Department of Agriculture (USDA). 1987. Soil Survey of Pamlico County, North Carolina. Natural Resource Conservation Service.

U.S. Department of Agriculture (USDA). 1971. Natural Resource Conservation Service National Engineering Handbook. Section 6.0: Drainage of Agricultural Land. Equation 4-8, and Pages 4-57 to 4-69. NRCS.

INDIRECT AND CUMULATIVE IMPACT STUDY

R-2539B, PAMLICO COUNTY,
NORTH CAROLINA

ARCADIS

Infrastructure, buildings, environment, communications

Indirect and Cumulative Impact Study

R-2539B, Pamlico County, North Carolina

Prepared for:
North Carolina Department of Transportation

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Our Ref.:
NC601041.0007.0539

Date:
June 2003

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1. Executive Summary

The proposed project, TIP No. R-2539B, involves the widening of NC 55 in Pamlico County, North Carolina. The project extends from east of SR 1127 (Bayleaf Road) to east of SR 1129 (Bennett-Tingle Road), a distance of approximately 6.2 miles. The focus of this study is to determine whether or not indirect and cumulative impacts resulting from the project will cause a violation of downstream water quality standards. The report analyzes the area's future growth potential, discusses existing plans and programs affecting water quality, and makes a finding as to associated water quality impacts.

Existing Growth and Development

Land use in the study area is primarily agricultural or forested with pockets of residential and scattered commercial uses. Pamlico County's land use plan indicates that the development potential of the study area is limited due to physical limitations and lack of urban services and utilities. Physical limitations in the study area include flood hazard areas, 404 wetland areas, estuarine waters, special secondary nursery areas, and poorly drained soil areas. Given plans to expand sewer service into the study area, it is likely that some development will occur, especially along NC 55, even without the widening of the roadway. Future development along NC 55 will likely be service-type uses to support residential development, as well as travel-related businesses. This development will be dependent on population growth. Pamlico County and the study area experienced low to moderate population growth from 1990 to 2000. According to Pamlico County's land use plan, most of the recent residential development in the county "has been the result of residential construction along estuarine shoreline areas."

Existing Water Quality

The proposed widening of NC 55 crosses tributaries of Upper Broad Creek and Goose Creek. According to the *Neuse River Basinwide Water Quality Plan,* prepared by the North Carolina Division of Water Quality (DWQ), the portion of the Neuse River that Upper Broad Creek and Goose Creek drain into is currently impaired. The latest recommendations on this area of the subbasin advise continued monitoring and implementation of the Neuse Water Nutrient Sensitive Waters strategy, as well as implementation of the Neuse total nitrogen total maximum daily loads (TMDL).

Water Quality Plans and Programs

Pamlico County has a land use plan certified by the Coastal Resources Commission (CRC). The Division of Coastal Management (DCM) uses the plan to make Coastal Area Management Act (CAMA) permit decisions and federal consistency determinations. Proposed projects and activities must be consistent with the enforceable policies of a local land-use plan or the DCM cannot permit a project to go forward. Development in Pamlico County is also subject to the DWQ coastal county stormwater requirements. All development requiring an erosion and sediment control plan must obtain a stormwater permit and comply with the DWQ regulations.

Growth Resulting From Construction of R-2539B

It is not expected that the widening of NC 55 alone will induce extensive development in the study area. However, with the extension of sewer service into the study area, the project will likely play a cumulative role in generating new development in the study area. The project is expected to play a role in development decisions along the corridor and in proximity to existing communities as permitted by local, state, and federal regulations. Pamlico County's land use plan states that the county will "particularly discourage strip development along NC 55 . . . "

Conclusion

- Development is expected to continue in the study area, especially where the sewer service area is expanded. Non-residential development will be focused on the NC 55 corridor. This development will be dependent on population growth and, to a lesser extent, influenced by the widening of NC 55. Overall development in the study area will be limited due primarily to environmental constraints.

- Existing policies and regulations, including a CAMA land use plan, will manage potential indirect impacts to the area's water quality.

- The construction of TIP Project No. R-2539B is not expected to result in any indirect or cumulative impacts that will adversely affect the water quality within the Neuse River Basin.

- No further indirect or cumulative impact analysis is recommended for the proposed project.

2. Project Description

The proposed project, TIP No. R-2539B, involves the widening of NC 55 in Pamlico County, North Carolina, from two to five lanes. The project extends from east of SR 1127 (Bayleaf Road) to east of SR 1129 (Bennett-Tingle Road), a distance of approximately 6.2 miles. The Environmental Assessment (EA) for the project was completed in 1997.

3. Identification of Study Area

The study area was devised by examining the project's location in relation to political and planning boundaries, watershed boundaries, the role the facility plays in the local network, and the development patterns of the region.

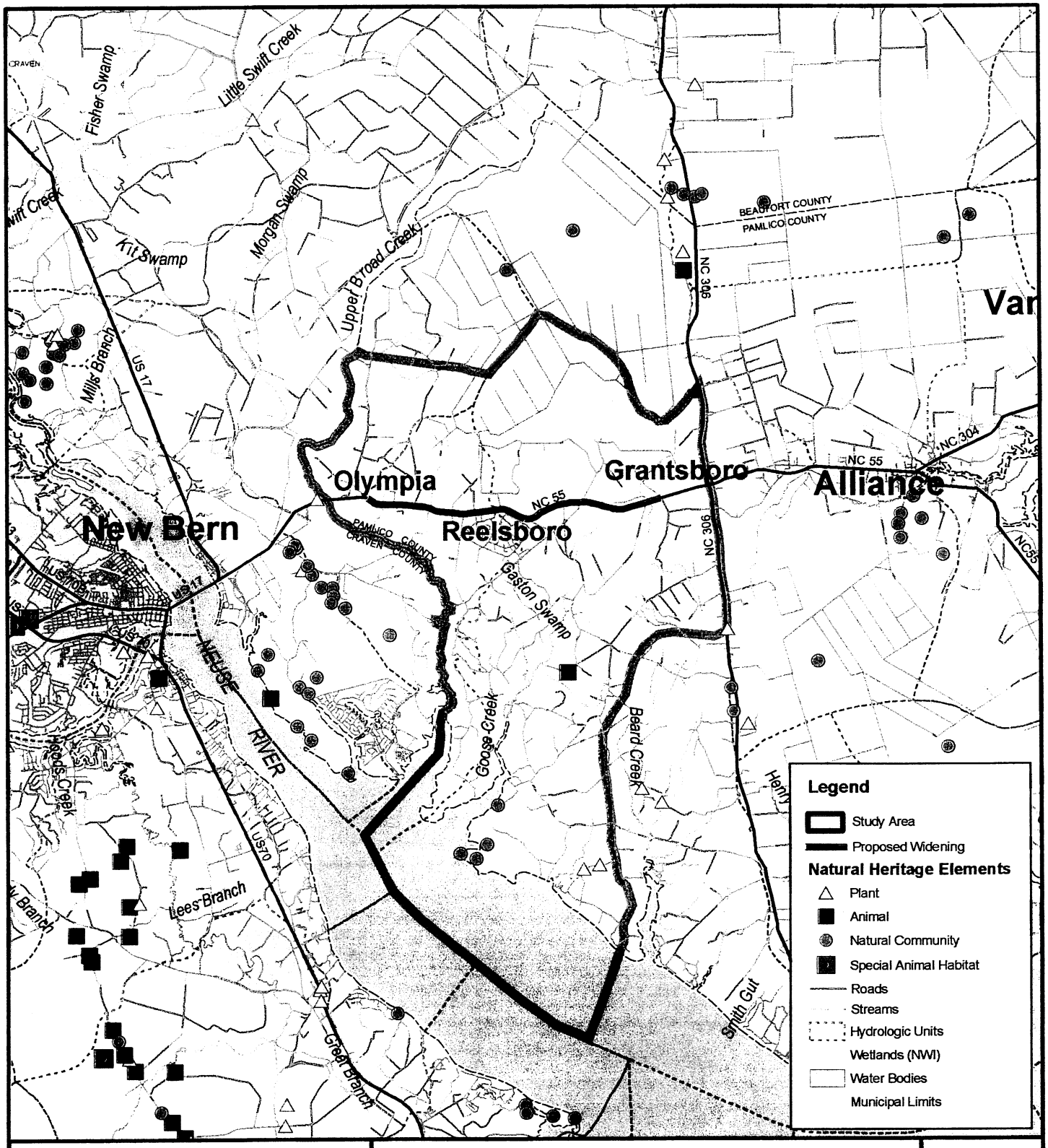
The study area is in western Pamlico County. The small town of Grantsboro is at the eastern edge of the study area. The unincorporated communities of Olympia and Reelsboro are also along NC 55 in the study area. Located in sub-basin 03-04-10 of the Neuse River Basin, the study area includes drainage areas for Upper Broad Creek and Goose Creek. (Information about the Neuse River Basinwide Water Quality Plan is included in Section 4.8, Water Quality Plans and Programs of this report.) The study area is shown in Figure 1.

4. Analysis of Study Area

4.1 Demographic Characteristics

The 1990 and 2000 US Census data were used to gather information on the population of the project study area. Block Groups 5 and 6 of Census Tract 9501 encompass the study area for this project. The boundaries of the block groups and study area are shown in Figure 2.

Population growth in Block Group 5 and Block Group 6 of Census Tract 9501 varied considerably from 1990 to 2000. The population of Block Group 5 increased over 17 percent, while the population of Block Group 6 increased only 1.5 percent. In comparison; the population of Census Tract 9501 increased almost 12 percent and the population of Pamlico County increased slightly more at over 13 percent during the same period. Population growth for the state overall during this 10-year period is higher at 21.4 percent. Residential development in the study area mostly occurred along and to the south of NC 55 in proximity to the Reelsboro community (Block



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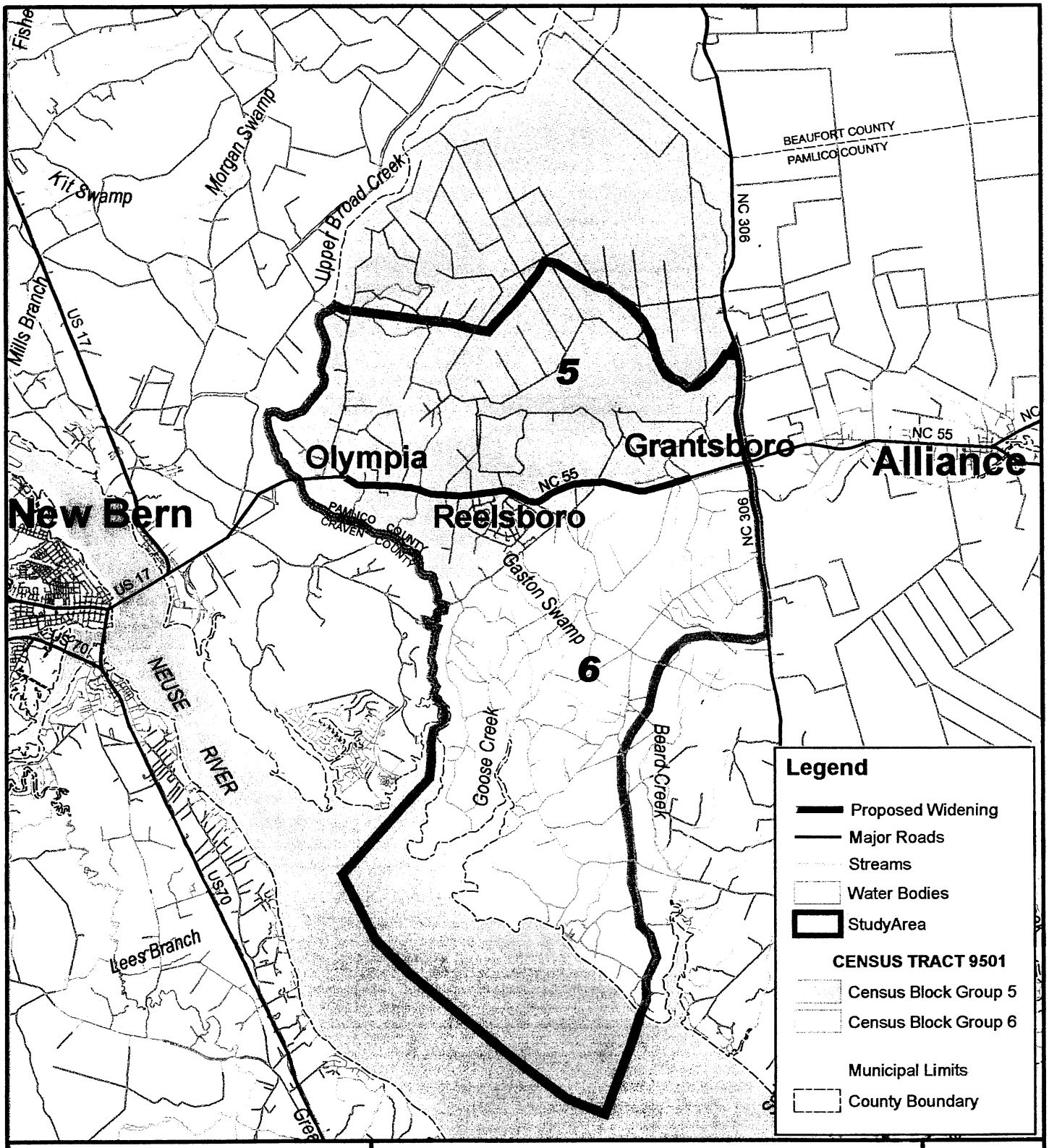
Prepared For

Source: North Carolina

PROJECT STUDY AREA

NC 55 WIDENING
T.I.P. No. R-2539B
PAMLICO COUNTY, NORTH CAROLINA

Figure 1



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Prepared For

Source: North Carolina

CENSUS BLOCK GROUPS

NC 55 WIDENING
T.I.P. No. R-2539B
PAMLICO COUNTY, NORTH CAROLINA

Figure 2

Group 5). This growth resulted in an additional 151 housing units in Block Group 5, according to census data. It is likely that these new residents use the NC 55 corridor to access services and jobs in the area. Much of Block Group 6 consists of swamp land, which explains the slower growth rates. According to Pamlico County's land use plan, most of the recent residential development in the county "has been the result of residential construction along estuarine shoreline areas."

Table 1. 1990 – 2000 Population Growth for State, County, Census Tract, and Block Groups

	2000 Population	1990 Population	% change
North Carolina	8,049,313	6,628,637	21.4%
Pamlico County	12,934	11,372	13.7%
Census Tract 9501	7,305	6,530	11.9%
Block Group 5	1,828	1,554	17.6%
Block Group 6	985	970	1.5%

Note: Grantsboro was recently incorporated and was not listed separately in the 2000 Census.

4.2 Local Economy

According to planning staff, the economy of Pamlico County experienced modest growth in the 1990s. The county has a strong tourist industry that primarily benefits the restaurants, motels, sports fishing, hunting, retail trade, services, construction, real estate, and finance industries. In addition, government sector jobs add to the economic mix. The North Carolina Department of Commerce indicates that 30.4 percent of the workforce is employed in the government sector. The service sector followed with 24.6 percent and the retail trade sector followed with 19.3 percent. In the study area, many of the businesses are service-related businesses located in residences.

4.3 Existing Land Use

The study area is primarily rural. Overall, land use is mostly agricultural or forested with pockets of residential and scattered commercial uses. Residential development includes mostly single-family houses developed linearly along US 55 and NC 306. Commercial uses are also scattered along NC 55, but concentrated in Reelsboro and Grantsboro. Commercial uses in the town of Grantsboro include a gas station,

restaurant, and a post office. In addition, commercial uses include service-sector businesses located in single-family residences throughout the study area. Several churches are also in the study area. Weyerhaeuser has numerous logging operations in the area. Because NC 55 is the primary east-west route in the county, study area residents likely use the roadway to access jobs and services.

4.4 Natural Environment

Geographically the study area is in the Neuse River Basin, the third largest river basin in North Carolina. Specifically, the project is in subbasin 03-04-10. The southern boundary of the study area is the Neuse River. Upper Broad Creek and Goose Creek are the major streams in the study area. The project will cross several tributaries of these creeks, including Sasses Branch, Deep Run, and East Fork Goose Creek. Other tributaries in the study area include West Fork Goose Creek, Deep Run Branch, Simmons Branch, Black Creek, Gaston Swamp, Cypress Creek, and Alexander Swamp. Both Upper Broad Creek and Goose Creek are Class C swamp waters, and transition to Class SB, then Class SC swamp waters before reaching the Neuse River. The Class C designation refers to waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The Class SC designation refers to tidal salt waters suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation; the Class SB designation refers to tidal salt waters suitable for primary recreation. The swamp water designation is a supplemental water classification including waters having low velocities and other natural characteristics, which are different from adjacent streams.

The study area contains a large area of pocosins and wooded swamps (404 wetlands). Because of these areas, the mostly forested character of the study area has been and should continue to be preserved.

4.5 Zoning

Neither the town of Grantsboro nor Pamlico County currently has zoning ordinances. However, the county updated its subdivision ordinance to improve the regulation of subdivision construction.

4.6 Land Use Plans

Pamlico County is required by the CAMA to have a local land use plan in accordance with guidelines established by the CRC. Pamlico County's land use plan was certified

by the CRC in 1992. The CRC guidelines require that the following five issues be addressed in the plan:

- Resource Protection,
- Resource Production and Management,
- Economic and Community Development,
- Continuing Public Participation, and
- Storm Hazard Mitigation, Post-Disaster Recovery, and Evacuation Plans.

Pamlico County's Land Classification Map indicates that the majority of the study area, especially on the south side of NC 55, is classified as "rural with services." This classification refers to very low-density, primarily residential areas, where water services are available to avert existing or potential health problems. The unincorporated community of Reelsboro, on NC 55, and the town of Grantsboro, on the eastern edge of the study area, are classified as "community" areas. This classification refers to low-density, developed areas where only limited public services are available. Grantsboro does not have a separate land use plan.

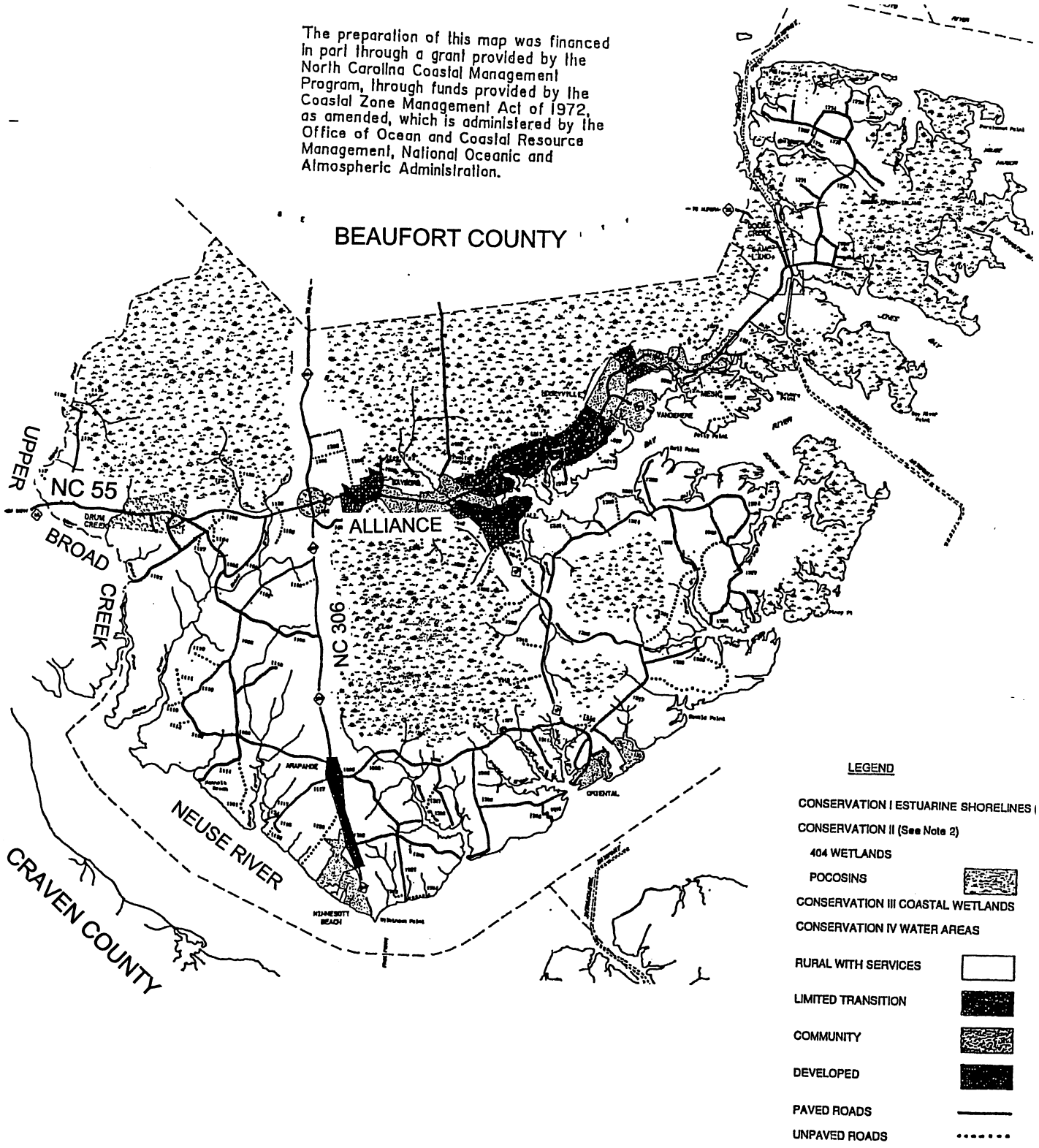
Most of the study area north of NC 55 is listed as an "Area of Environmental Concern and other Fragile Areas" in the *Pamlico County 1992 Land Use Plan Update* and is not likely to experience development. (Note: Fragile areas are defined as areas that "could easily be damaged or destroyed by inappropriate or poorly planned development.) The Pamlico County Land Classifications map is shown in Figure 3.

In addition, Pamlico County's land use plan includes a number of transportation policies. The land use plan specifies that the county should regulate future growth and development along transportation routes. Concerning the NC 55 widening project, the land use plan states that the county will "particularly discourage strip development along NC 55 . . . "

4.7 Water and Sewer

Pamlico County provides water to the developed areas of the study area. The county's water system includes water lines installed along most of the major roads in the county.

The preparation of this map was financed in part through a grant provided by the North Carolina Coastal Management Program, through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.



PAMLICO COUNTY LAND CLASSIFICATIONS

Source: *1992 Pamlico County Land Use Plan Update*

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Prepared for:

Indirect & Cumulative Impacts

TIP Project R-2539B
Pamlico County, North Carolina

Figure 3

The water system is supplied by aquifers and is currently operating at approximately 40 percent capacity according to the Pamlico County Water Department.

Pamlico County's *1992 Land Use Plan Update* notes that much of the county is not suitable for septic tanks due to poor soil permeability. However, most of the residents in the study area rely upon individual septic tanks for sewage disposal as there are no wastewater treatment or disposal facilities serving the entire study area. An independent sewer district authority, the Bay River Metropolitan Sewerage District, is Pamlico County's sewer service provider. The sewerage district currently serves only the easternmost portion of the study area. However, work to extend sewer service westward to the Reelsboro community will begin shortly and is scheduled to be complete within two years.

4.8 Water Quality Plans and Programs

As stated above, the CAMA requires Pamlico County to have a local land use plan in accordance with guidelines established by the CRC. The land use plan adopted by the county includes sections on natural resources and fragile areas as well as the importance of marine resources. The land use plan also includes a broad policy statement concerning the county's protection of its natural resources as future development occurs. It is Pamlico County's policy to cooperate with the North Carolina Department of Transportation (NCDOT), the North Carolina Division of Environmental Management (DEM), and other state agencies in mitigating the impact of stormwater runoff on all conservation classified areas. The policy goes on to state that the county will actively support the DEM stormwater runoff retention permitting process.

4.8.1 Neuse River Basinwide Water Quality Plan

The *Neuse River Basinwide Water Quality Plan* specifically addresses the status of Upper Broad Creek and Goose Creek and the section of the Neuse River that they drain into. The portion of the Neuse River that these creeks drain into is currently impaired. Ambient monitoring stations have been set up as part of the Neuse River Estuary Modeling and Monitoring project (MODMON). In addition, a benthic macroinvertebrate monitoring site has been established on Upper Broad Creek where it crosses NC 55 and on Goose Creek near SR 1100. The latest recommendations on this area of the subbasin advise continued monitoring and implementation of the Neuse Water Nutrient Sensitive Waters strategy, as well as implementation of the Neuse total nitrogen total daily maximum loads (TMDL). Because of the complex nature of

estuarine waters, longer periods of data collection and monitoring of management strategies will be needed before water quality goals are met.

The DWQ requires facilities that discharge to any of the state's surface waters to have a National Pollution Discharge Elimination System (NPDES) permit. The permit includes effluent limits that define the load of specific pollutants that may be discharged. According to Section B – Chapter 10 of the *Neuse River Basinwide Water Quality Plan*, there are 19 NPDES wastewater discharge permits in Subbasin 03-04-10. None of these dischargers are in the study area.

Pamlico County is required to comply with the DWQ coastal county stormwater requirements. The goal of these requirements, as with other stormwater programs administered by the DWQ, is to protect surface waters by preventing pollution from entering the waters of the state via stormwater runoff. All development requiring an erosion and sediment control plan must obtain a stormwater permit. The stormwater regulations require developments to maintain a low density of impervious surfaces, maintain vegetative buffers, and transport runoff through vegetative conveyances. Where the low-density criteria cannot be met, the installation of structural best management practices (BMPs) is required to collect and treat the development's stormwater runoff.

4.8.2 Other Programs

Programs are in place to minimize direct, indirect, and cumulative impacts due to the construction of the proposed project and other NCDOT projects that will be built in the study area. These requirements, which are specific to the NCDOT, are precautions taken to protect water quality in the study area and downstream. The NCDOT activities such as general maintenance operations and facilities, construction operations including temporary erosion and sediment control, and project planning and design must comply with standards set forth in the NCDOT handbook titled, "Best Management Practices for Protection of Surface Waters." BMPs include preventative and control measures undertaken to avoid or reduce water pollution.

A NPDES permit that applies throughout the state on NCDOT-owned right-of-way was issued on June 8, 1998. Requirements contained in the permit address a broad range of NCDOT activities. Included is a requirement for development of a procedure to document newly constructed stormwater outfalls and add them to a stormwater system inventory of existing facilities. This documentation process will include the development of project stormwater management plans.

5. Analysis of Future Growth Potential

Future development in the study area will be primarily influenced by environmental constraints and the availability of water and sewer infrastructure. Environmental constraints in the study area include flood hazard areas, 404 wetland areas, estuarine waters, special secondary nursery areas, and poorly drained soil areas. Although adequate water supply does not seem to be a concern in the study area, the availability of a centralized sewage treatment system is limiting growth to some degree in the study area. Development regulations and policies, transportation infrastructure, and population growth also play a role in the development of the area.

According to the *Pamlico County 1992 Land Use Plan Update*, there are limited areas of Pamlico County that are suited for development. The plan predicts that environmental constraints will limit development and "restrict expansion of the county's water and sewer systems and cause all development to continue to be concentrated along shoreline areas and in "corridors" along state and secondary roads in the interior areas of the county." Development is likely to occur in incorporated towns and rural communities. In the study area, development is likely to continue along the NC 55 corridor, especially in sewage system expansion areas.

6. Summary of the Effects of the Project

The Council on Environmental Quality defines indirect impacts as those, ". . . which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8)." Cumulative impacts are defined as, ". . . impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7)."

Indirect impacts of transportation decisions can involve changes in the type, density, design and locations of development. Influences or disturbances caused by urban development such as increased runoff from impervious areas, erosion and sedimentation, disturbance of riparian vegetation, development in the riparian zone, and pollutant loading can have a cumulative effect on future water quality.

It is likely that some development will occur in the study area, especially along NC 55, even without the widening of the roadway. The expansion of the sewer service area will largely influence development decisions in the study area. Future development

along NC 55 will likely be service-type uses to support residential development, as well as travel-related businesses. This development will be dependent on population growth. Pamlico County and the study area experienced low to moderate population growth from 1990 to 2000. According to Pamlico County's land use plan, most of the recent residential development in the county "has been the result of residential construction along estuarine shoreline areas."

The widening of NC 55, which will accommodate increasing traffic in the area, will play a role in development decisions along the corridor and in adjacent areas as permitted by local, state, and federal regulations. It is not expected that the project alone will result in increased development in the study area. However, with the extension of the Bay River Metropolitan Sewerage District west to the Reelsboro community, the project will likely play a cumulative role in generating new development in the study area. The roadway design, as a five-lane facility, will also play a role in development decisions. Future development will continue to be limited by local regulations and environmental constraints.

Conclusion

Development is expected to continue in the study area, especially where the sewer service area is expanded. Non-residential development will be focused on the NC 55 corridor. This development will be dependent on population growth and, to a lesser extent, influenced by the widening of NC 55. Overall development in the study area will be limited due primarily to environmental constraints. Existing policies and regulations, including a CAMA land use plan, will manage potential indirect impacts to the area's water quality.

Although some development is expected in the study area, the overall indirect and cumulative impacts resulting from the construction of TIP Project No. R-2539B are expected to be minimal because of development limitations and regulations. Therefore, it is determined that construction of TIP Project No. U-2539B will not result in indirect or cumulative impacts that will adversely affect water quality within the Neuse River Basin. No further indirect or cumulative impact analysis is recommended for the proposed project.

7. References

Bay River Metropolitan Sewer. Personal communication to R. Pugh, ARCADIS, May 2003.

Council on Environmental Quality. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1508.7 and 1508.8).

North Carolina Department of Commerce. http://cmedis.commerce.state.nc.us. Accessed April 2003.

North Carolina Department of Natural Resources, Division of Coastal Management. http://dcm2.enr.state.nc.us/Planning/planning.htm. Accessed April 2003.

North Carolina Department of Natural Resources, Division of Water Quality Section. *Neuse River Basinwide Water Quality Plan.* July 2002.

North Carolina Department of Natural Resources, Division of Water Quality Section. http://h2o.enr.state.nc.us/wqs/. Accessed April 2003.

North Carolina Department of Transportation, 1997. *Best Management Practices for the Protection of Surface Waters.*

Pamlico County, North Carolina. *1992 Land Use Plan Update.* Holland Consulting Planners. July 1992.

Sawyer, Rhoda. Pamlico County Water Department Supervisor. Personal communication to R. Pugh, ARCADIS, October, 2002.

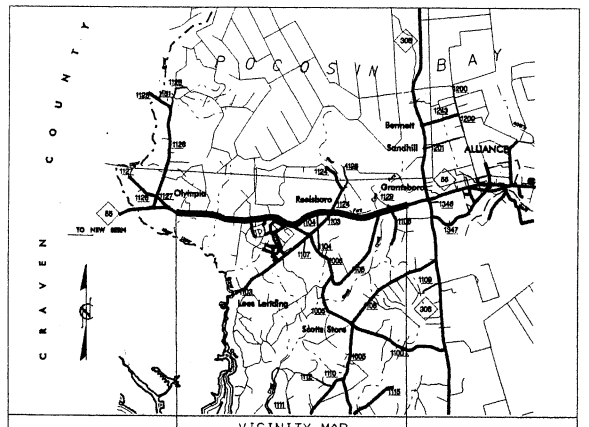
United States Census Data. 1990 and 2000. http://factfinder.census.gov. Accessed April 2003.

Rcd June 13,03

PROJECT: 8.1210202

R-2539B

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

BEGIN STATE PROJECT
8.1210202 (R-2539B)

END STATE PROJECT
8.1210202 (R-2539B)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY

PAMLICO COUNTY

LOCATION: NC 55 FROM EAST OF SR 1127 TO EAST OF SR 1129

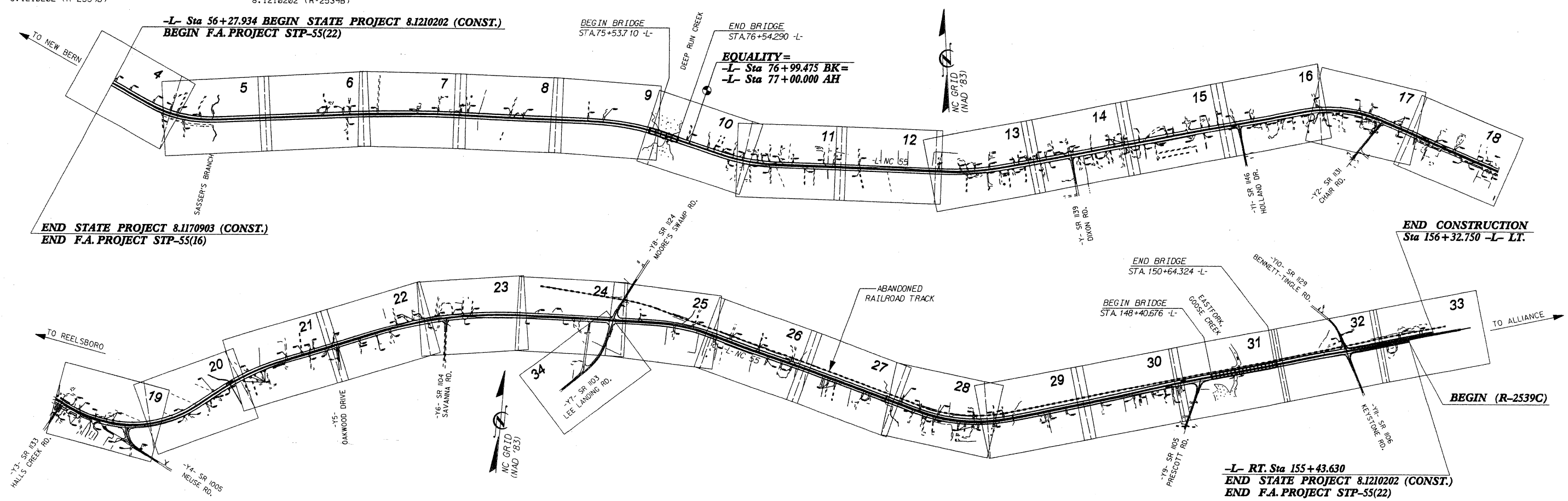
TYPE OF WORK: WIDENING, GRADING, DRAINAGE, PAVING, CULVERTS AND STRUCTURES

METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND /OR MILLIMETERS UNLESS OTHERWISE NOTED

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2539B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
8.1170901	STP - 55 (1)	P.E.
8.1210201	STP - 55 (22)	RW & UTILITY
8.1210202	STP - 55 (22)	CONSTRUCTION



GRAPHIC RATIO

5m 0 10m
PLANS

5 0 10
PROFILE (HORIZONTAL)

1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT 2005 = 13,300

ADT 2025 = 18,500

DHV = 12%

D = 65%

T = 10%
(6% Duals+4% TTST)

V = 100 km/h
80 km/h in C&G

PROJECT LENGTH

LENGTH OF ROADWAY F.A. PROJECT STP-55(22) = 9.591 km
LENGTH OF STRUCTURE F.A. PROJECT STP-55(22) = 0.324 km
TOTAL LENGTH OF STATE PROJECT 8.1210202 = 9.915 km

Prepared in the Office of:
Parsons Transportation Group, Inc.
401 Harrison Oaks Blvd., Suite 200
Cary, N.C. for the
DIVISION OF HIGHWAYS

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 28, 2002

LETTING DATE:
NOVEMBER 18, 2003

DAVE COCHRAN, P.E.
PROJECT ENGINEER

VICTOR M. CHAVEZ, P.E.
PROJECT DESIGN ENGINEER

NCDOT CONTACT:
SCOTT D. BLEVINS, P.E.
ENGINEERING COORDINATOR DESIGN SERVICES

HYDRAULICS ENGINEER

SIGNATURE: ***P.E.***

ROADWAY DESIGN

SIGNATURE: ***P.E.***

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY ENGINEER - DESIGN ***P.E.***

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED FOR
DIVISION ADMINISTRATOR ***DATE***

J:\2539\DGN\R2539b.tsh
22-MAY-2003

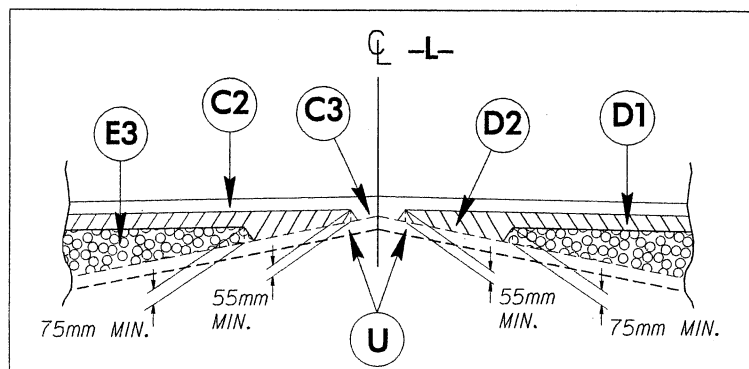
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
One Harrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-0250

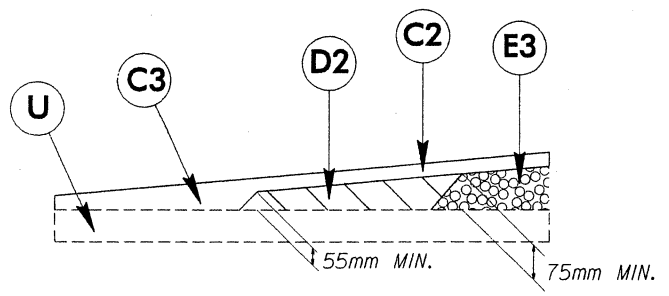
PAVEMENT SCHEDULE

C1	PROP. APPROX. 60 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5A, AT AN AVERAGE RATE OF 72 kg PER SQ. METER IN EACH OF TWO LAYERS.	E2	PROP. APPROX. 90 mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 220.5 kg PER SQ. METER.
C2	PROP. APPROX. 60 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 72 kg PER SQ. METER IN EACH OF TWO LAYERS.	E3	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 75 mm IN DEPTH OR GREATER THAN 140 mm IN DEPTH.
C3	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 2.40 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT TO EXCEED 60 mm IN DEPTH.	R1	750 mm CONCRETE CURB AND GUTTER.
D1	PROP. APPROX. 80 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 196 kg PER SQ. METER.	R2	600 mm X 600 mm EXPRESSWAY GUTTER.
D2	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 55 mm IN DEPTH OR GREATER THAN 110 mm IN DEPTH.	T	EARTH MATERIAL.
E1	PROP. APPROX. 90 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 220.5 kg PER SQ. METER.	U	EXISTING PAVEMENT.
		W	VARIABLE DEPTH ASPHALT PAVEMENT (WEDGING).

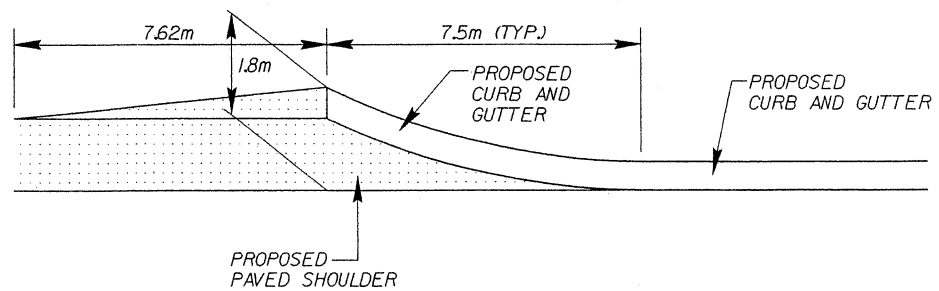
NOTES: (1) PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.
(2) EOT = EDGE OF TRAVEL LANE



DETAIL SHOWING METHOD OF WEDGING NO. 1



DETAIL SHOWING METHOD OF WEDGING NO. 2

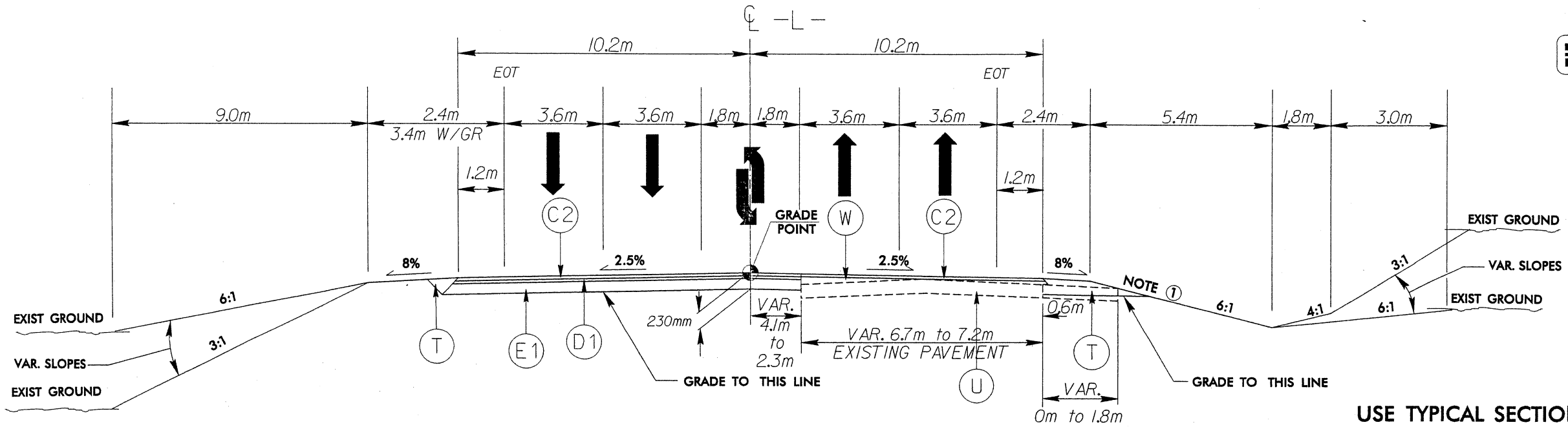


DETAIL FOR FLARING CURB AND GUTTER

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

METRIC

PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
40 Harrison Oaks Blvd.
One Harrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-0230



TYPICAL SECTION NO. 1

PAVEMENT SCHEDULE (*)	
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

(*) = REFER TO SHEET No 2

USE TYPICAL SECTION NO. 1

-L- STA. 56+27.934 TO STA. 75+53.710 (BEG. BRIDGE)

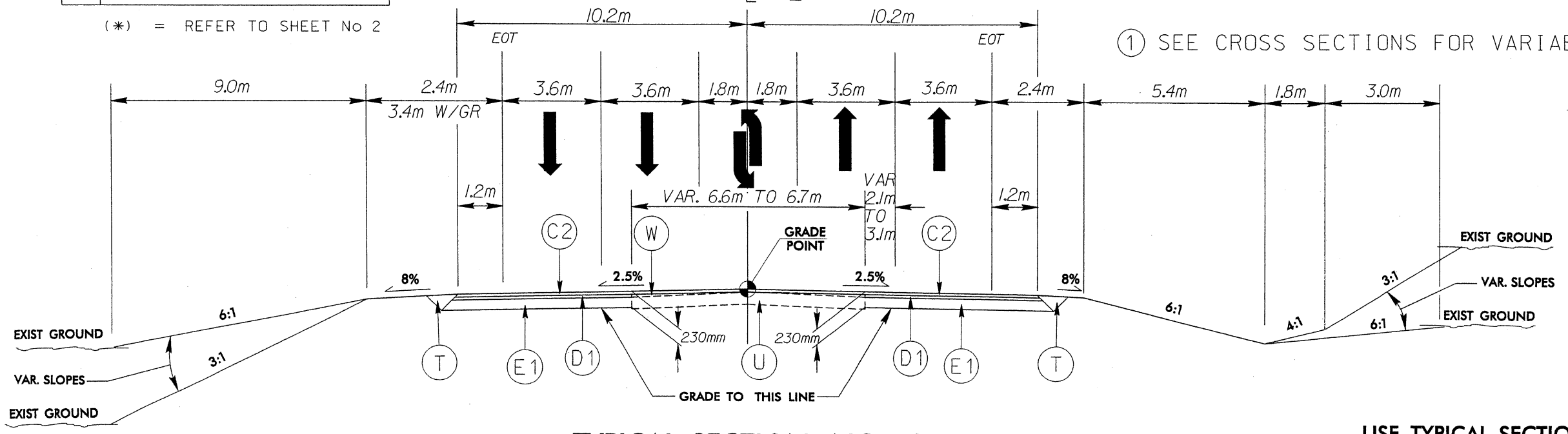
{-L- STA. 76+54.290 (END BRIDGE) TO STA. 76+99.475 (BK)=
-L- STA. 77+00.000 (AH) TO STA. 77+77.198 LT. SIDE}

{-L- STA. 76+54.290 (END BRIDGE) TO STA. 76+99.475 (BK)=
-L- STA. 77+00.000 (AH) TO STA. 78+46.500 RT. SIDE}

-L- STA. 146+61.000 TO STA. 148+40.676 (BEG. BRIDGE)

-L- STA. 150+64.324 (END BRIDGE) TO STA. 151+27.000

① SEE CROSS SECTIONS FOR VARIABLE SLOPE.



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2

-L- STA. 128+91.560 TO STA. 144+12.556 LT. SIDE

-L- STA. 127+62.208 TO STA. 144+12.556 RT. SIDE

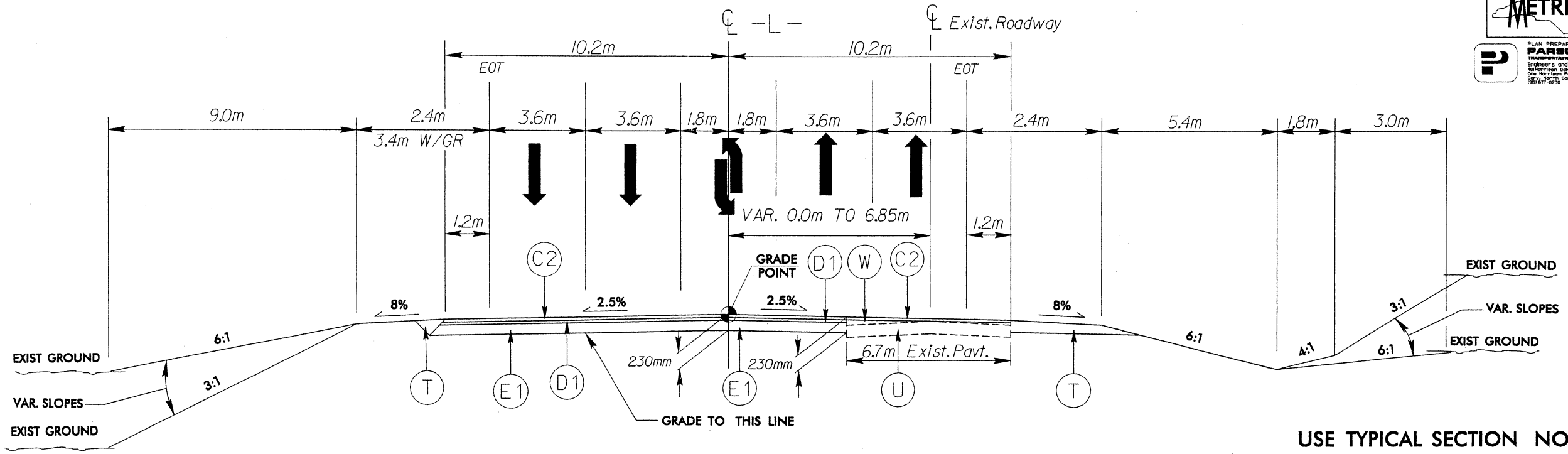
-L- STA. 153+71.150 TO STA. 155+43.630 RT. SIDE

-L- STA. 153+71.150 TO STA. 156+32.750 LT. SIDE

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

METRIC

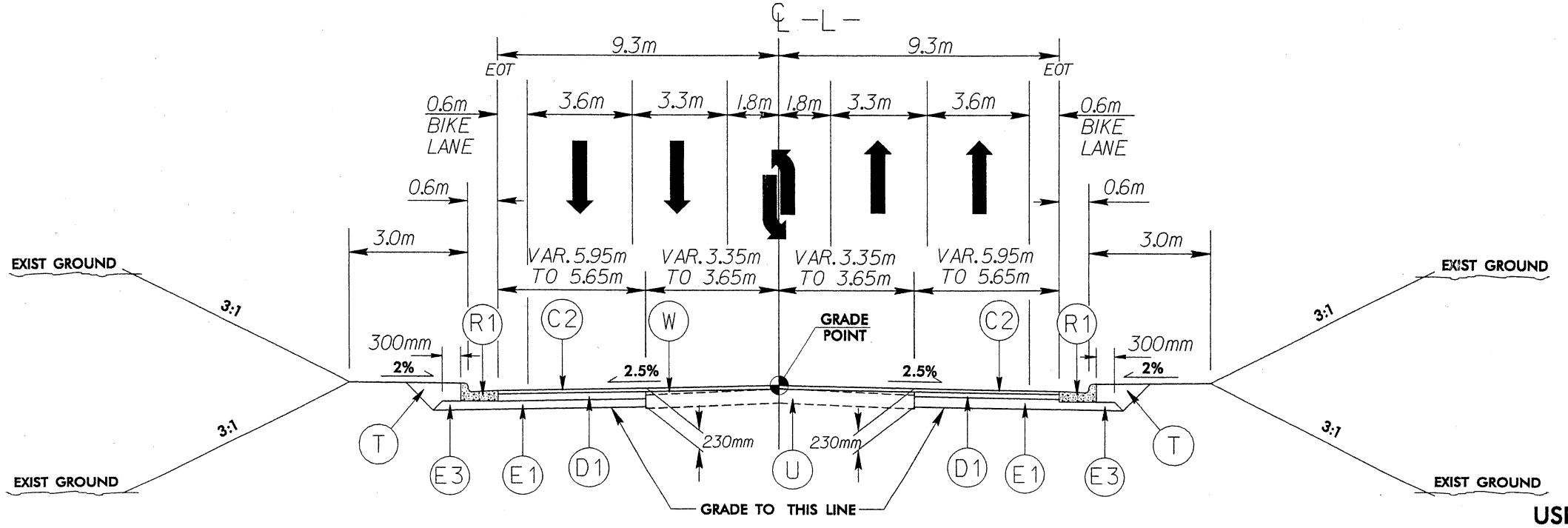
PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
1616 East Millbrook Road
One Millbrook Square, Suite 200
Cary, North Carolina 27511
(919) 677-0230



TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3

-L- STA. 144+12.556 TO STA. 146+61.000
-L- STA. 151+27.000 TO STA. 153+71.150



TYPICAL SECTION NO. 4

PAVEMENT SCHEDULE (*)	
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
E3	VAR. A.C.B.C. TYPE B25.0C
R1	750 mm CONC. CURB & GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

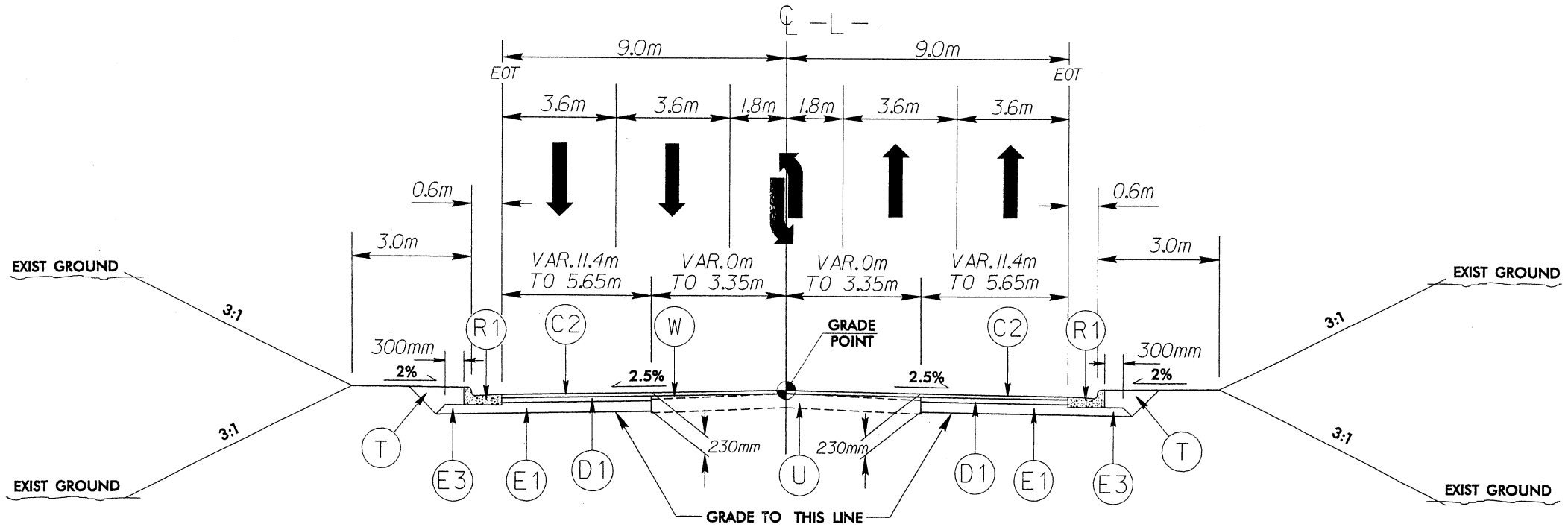
(*) = REFER TO SHEET No 2

USE TYPICAL SECTION NO. 4

-L- STA. 80+55.513 TO STA. 85+71.979
-L- STA. 103+00.000 TO STA. 107+80.000

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

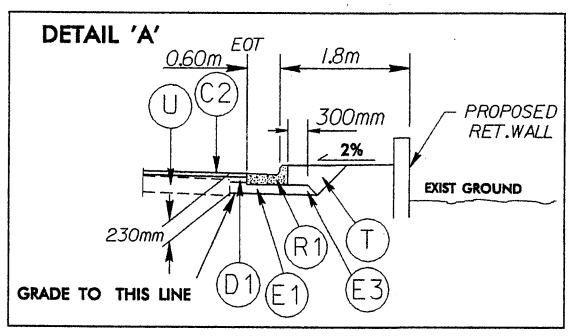
PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
428 Morrison Oaks Blvd
One Morrison Plaza, Suite 200
Cary, North Carolina 27513
(919) 677-0230



TYPICAL SECTION NO. 5

USE TYPICAL SECTION NO. 5

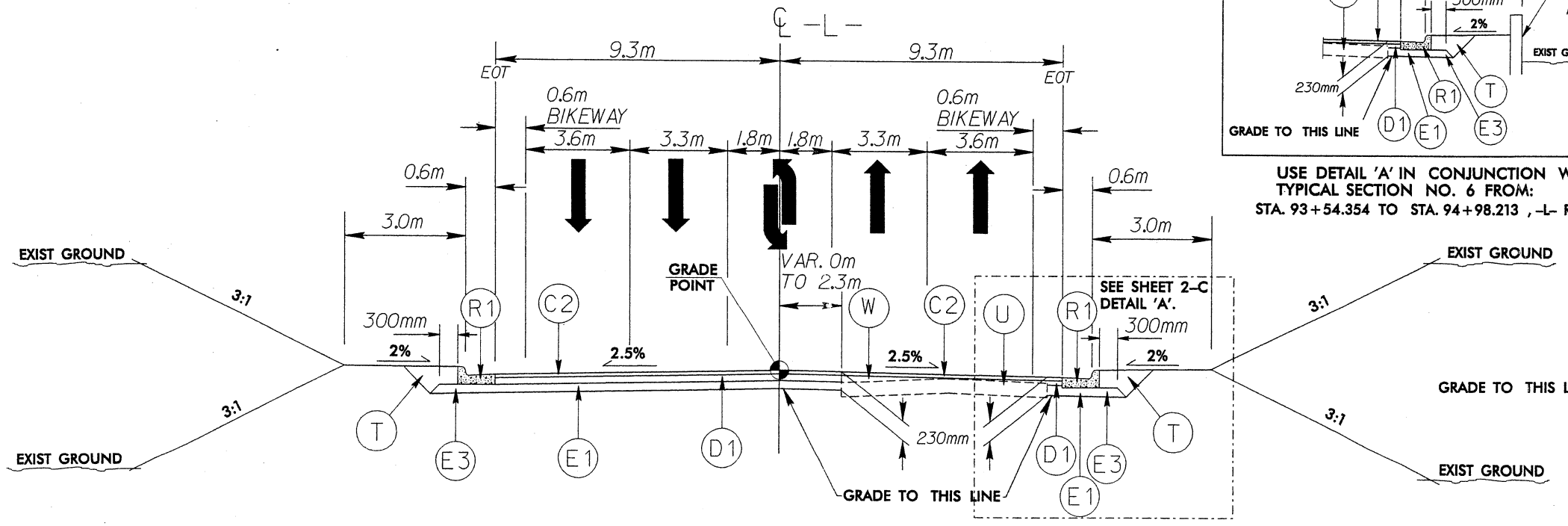
-L- STA. 115+28.756 TO STA. 127+62.208 RT. SIDE
-L- STA. 115+28.756 TO STA. 128+91.560 LT. SIDE



USE DETAIL 'A' IN CONJUNCTION W/ TYPICAL SECTION NO. 6 FROM: STA. 93+54.354 TO STA. 94+98.213 , -L- RT. SIDE.

PAVEMENT SCHEDULE (*)	
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
E3	VAR. A.C.B.C. TYPE B25.0
R1	750 mm CONC. CURB & GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

(*) = REFER TO SHEET No 2



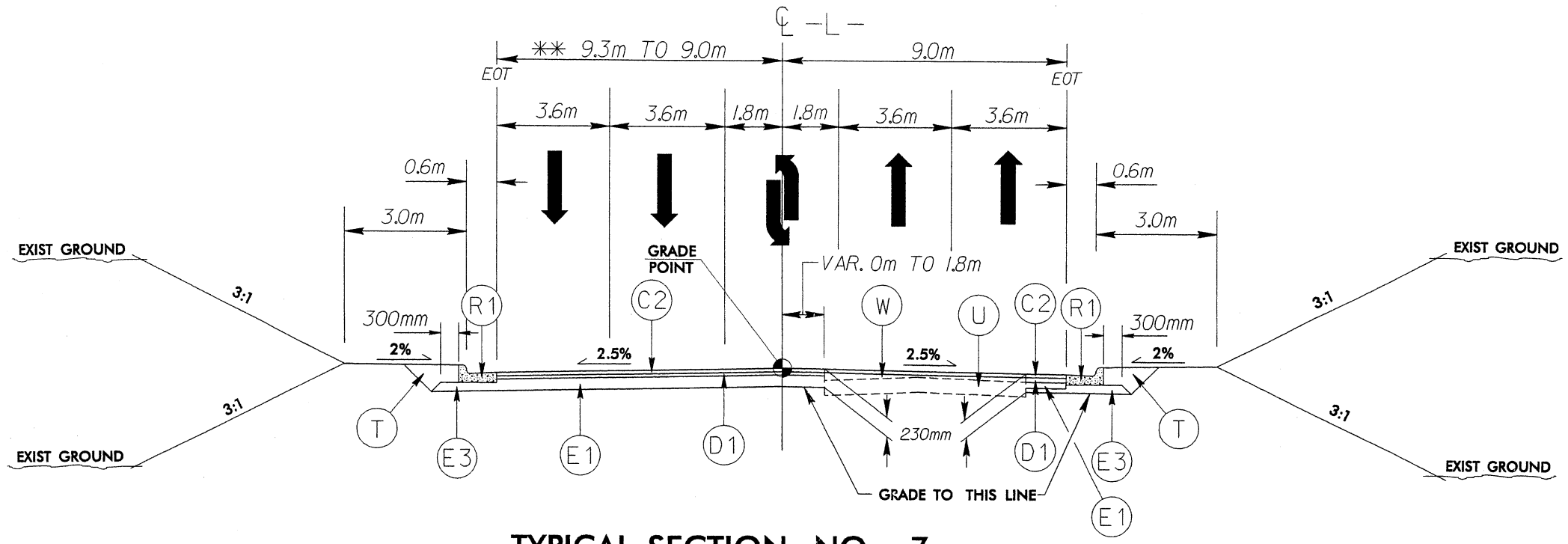
TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 6

-L- STA. 77+77.198 TO STA. 80+55.513 LT.
-L- STA. 78+46.500 TO STA. 80+55.513 RT.
-L- STA. 85+71.979 TO STA. 103+00.000
-L- STA. 107+80.000 TO STA. 108+68.573

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
101 Harrison Oaks Blvd.,
One Harrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-1230



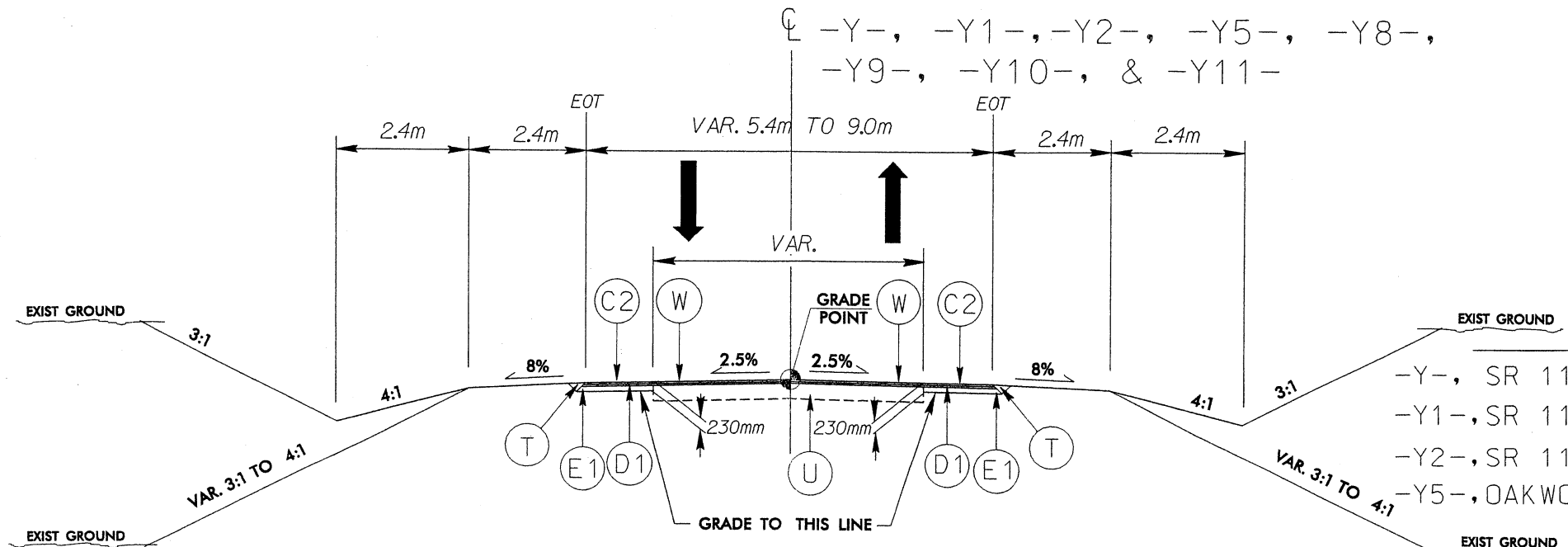
TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7

** -L- STA. 108+68.573 TO STA. 108+98.573
-L- STA. 108+98.573 TO STA. 115+28.756

PAVEMENT SCHEDULE (*)	
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
E3	VAR. A.C.B.C. TYPE B25.0C
R1	750 mm CONC. CURB & GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

(*) = REFER TO SHEET No 2



TYPICAL SECTION NO. 8

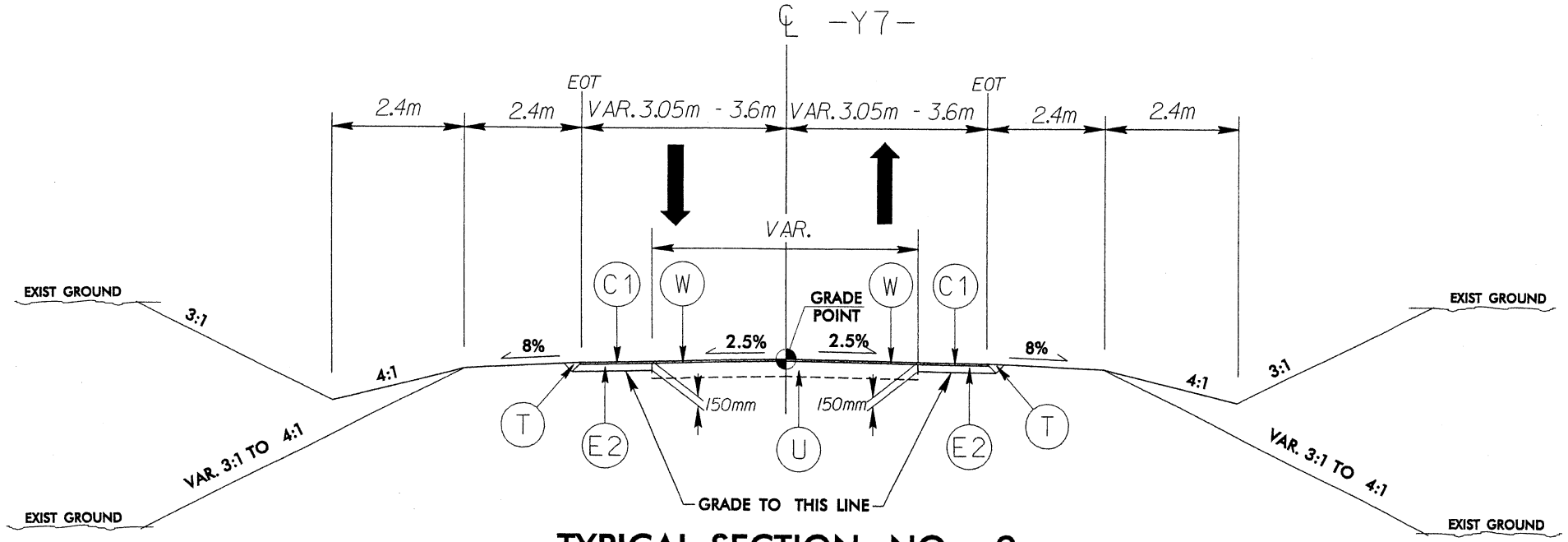
USE TYPICAL SECTION NO. 8

-Y-, SR 1139 STA. 10+19.356 TO STA. 10+55.000
-Y1-,SR 1146 STA. 10+19.326 TO STA. 10+50.000
-Y2-,SR 1131 STA. 10+32.464 TO STA. 10+65.000
-Y5-,OAKWOOD DR. STA. 10+21.169 TO STA. 10+50.000
-Y8-,SR 1124 STA. 11+00.000 TO STA. 11+31.736
-Y9-,SR 1105 STA. 10+50.579 TO STA. 10+80.000
-Y10-,SR 1129 STA. 10+60.000 TO STA. 10+97.831
-Y11-,SR 1106 STA. 10+28.957 TO STA. 10+70.000

$$$$$SYSTIME$$$$$
$$$$$USERNAME$$$$$
$$$$$DGNFILE$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-E
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

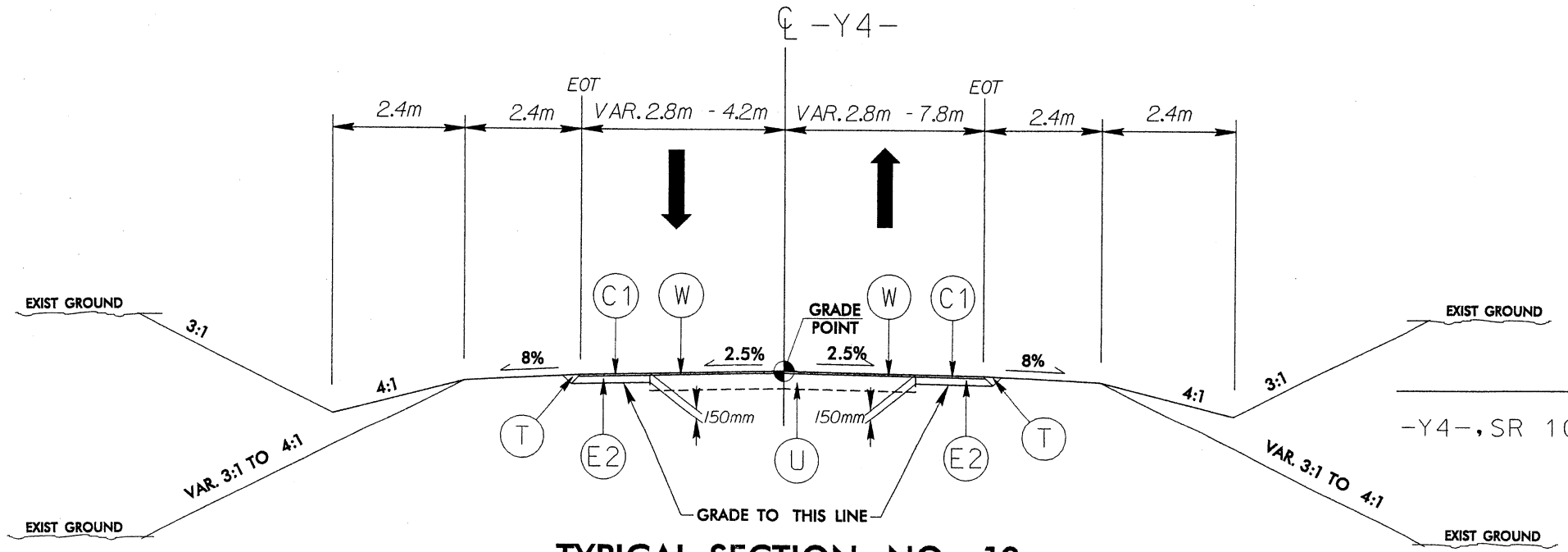
PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
101 Harrison Oaks Blvd.
One Harrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-0230



TYPICAL SECTION NO. 9

USE TYPICAL SECTION NO. 9

-Y7-, SR 1103 STA. 12+20.000 TO STA. 12+60.000



TYPICAL SECTION NO. 10

PAVEMENT SCHEDULE (*)	
C1	60 mm A.C.S.C. TYPE S9.5A
E2	90 mm A.C.B.C. TYPE B25.0B
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

(*) = REFER TO SHEET No 2

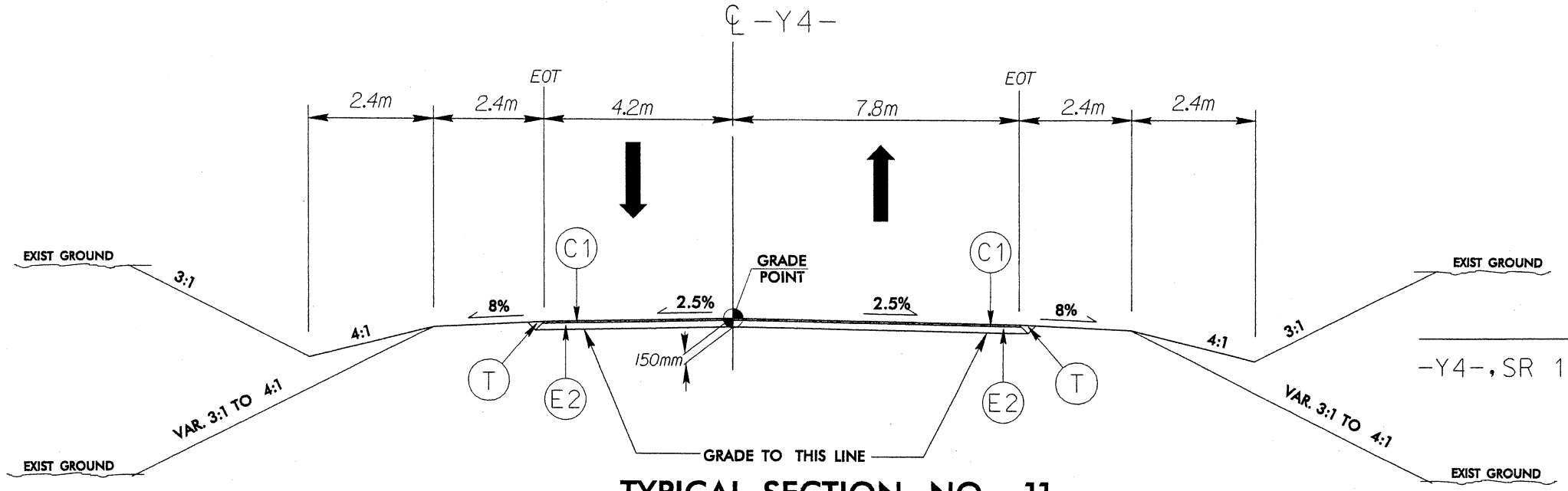
USE TYPICAL SECTION NO. 10

-Y4-, SR 1005 STA. 10+65.000 TO STA. 11+40.000

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-F
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
Carry, North Carolina 27513
(919) 677-0230



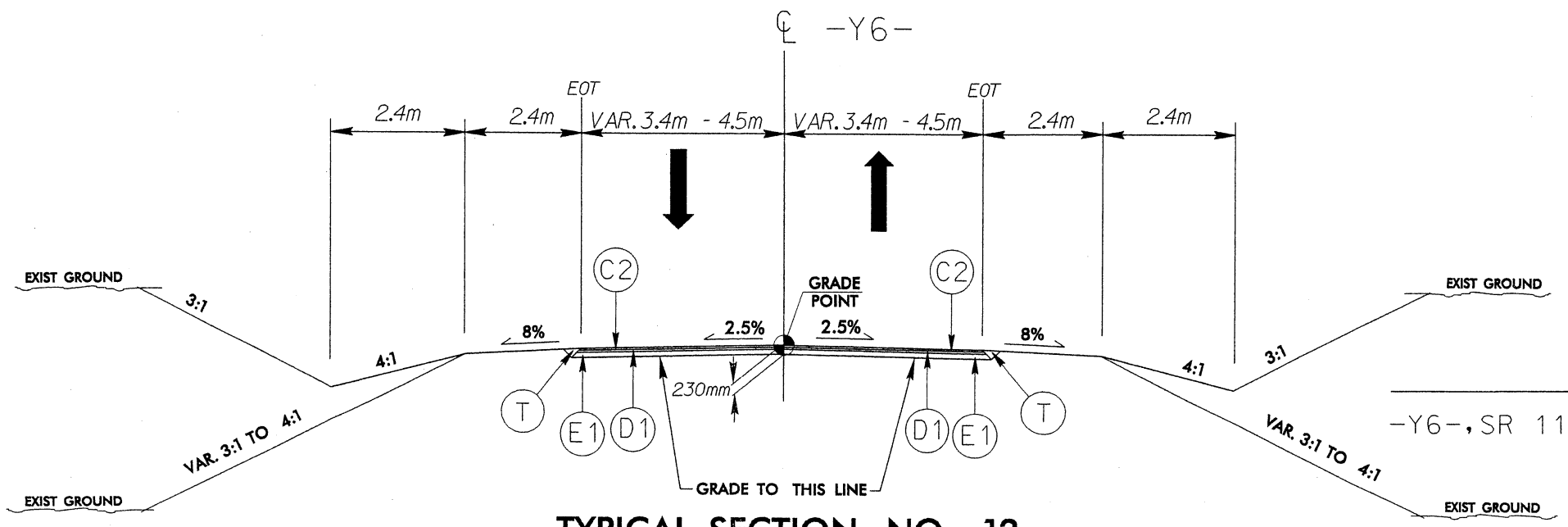
TYPICAL SECTION NO. 11

USE TYPICAL SECTION NO. 11

-Y4-, SR 1005 STA. 10+54.564 TO STA. 10+65.000

PAVEMENT SCHEDULE (*)	
C1	60 mm A.C.S.C. TYPE S9.5A
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
E2	90 mm A.C.B.C. TYPE B25.0B
T	EARTH MATERIAL

(*) = REFER TO SHEET No 2



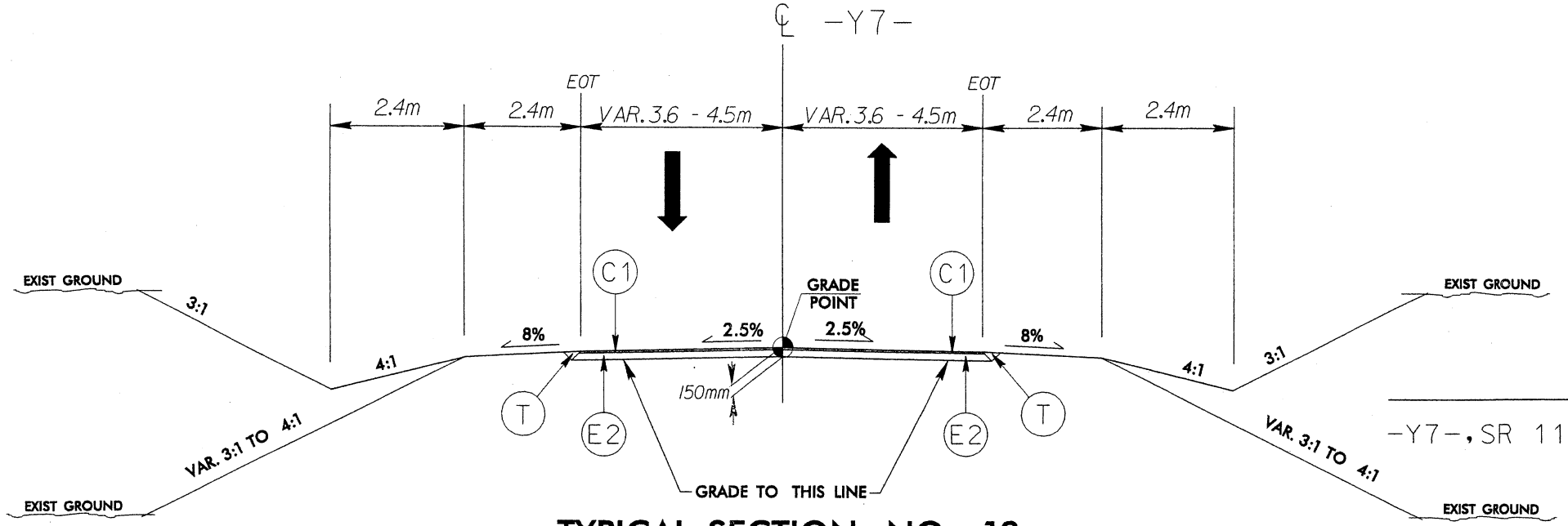
TYPICAL SECTION NO. 12

USE TYPICAL SECTION NO. 12

-Y6-, SR 1104 STA. 10+21.803 TO STA. 10+50.000

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-G
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

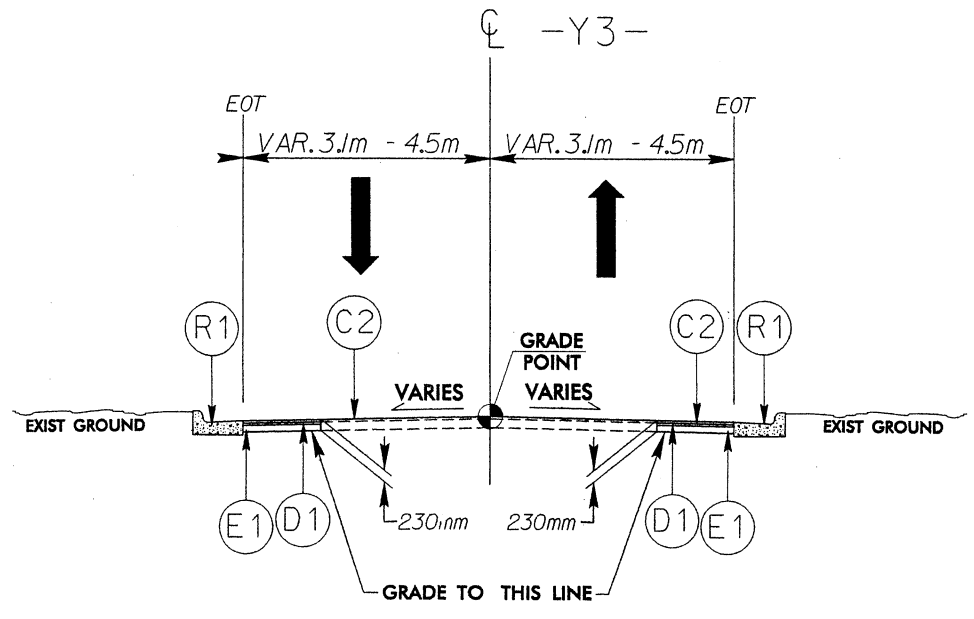
PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
40 Harrison Oaks Blvd.
One Harrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-0230



TYPICAL SECTION NO. 13

USE TYPICAL SECTION NO. 13

-Y7-, SR 1103 STA. 10+28.522 TO STA. 12+20.000



TYPICAL SECTION NO. 14

PAVEMENT SCHEDULE (*)	
C1	60 mm A.C.S.C. TYPE S9.5A
C2	60 mm A.C.S.C. TYPE S9.5C
D1	80 mm A.C.I.C. TYPE I19.0C
E1	90 mm A.C.B.C. TYPE B25.0C
E2	90 mm A.C.B.C. TYPE B25.0B
T	EARTH MATERIAL
R1	750 mm CONC. CURB & GUTTER

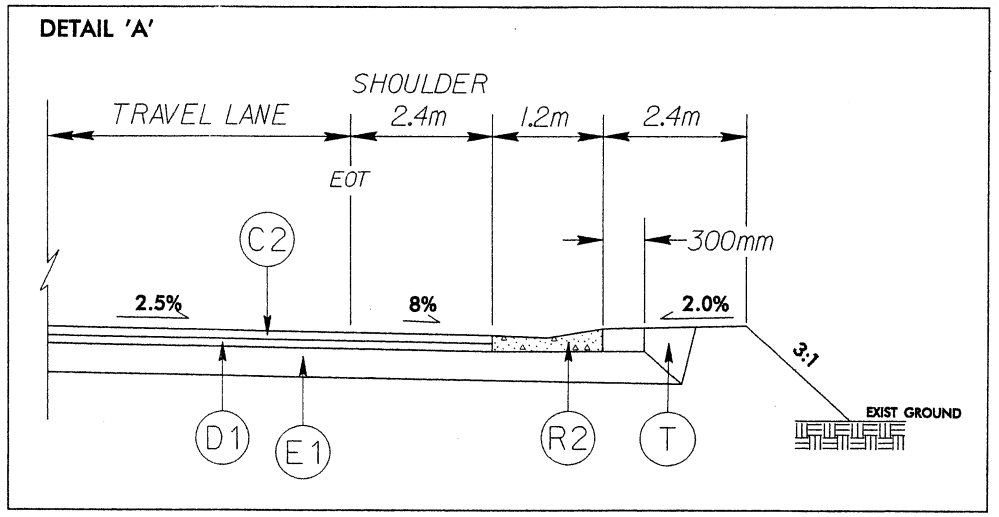
(*) = REFER TO SHEET No 2

USE TYPICAL SECTION NO. 14

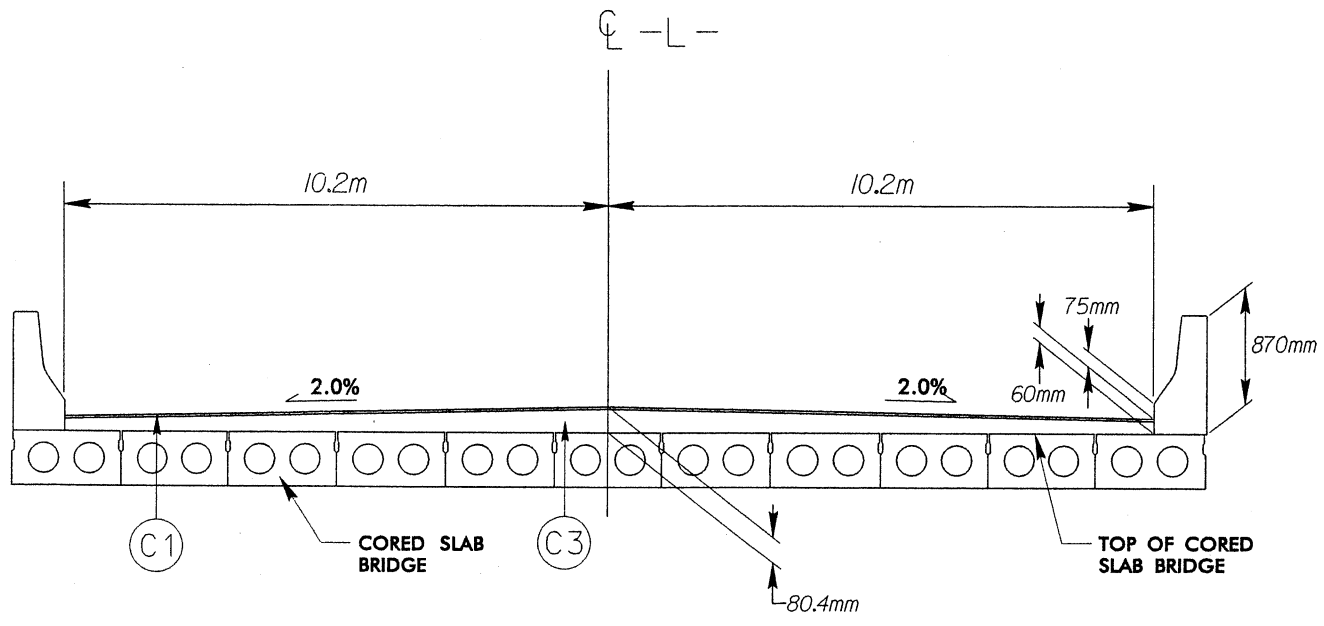
-Y3-, SR 1133 STA. 10+19.350 TO STA. 10+50.000

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-H
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
40 Morrison Oaks Blvd.
One Morrison Park, Suite 200
Cary, North Carolina 27513
(919) 677-0230



USE DETAIL 'A' IN CONJUNCTION WITH TYPICAL SECTION NO. 2 FROM:
STA. 130+72.500 TO STA. 131+77.500 , -L- RT. SIDE.



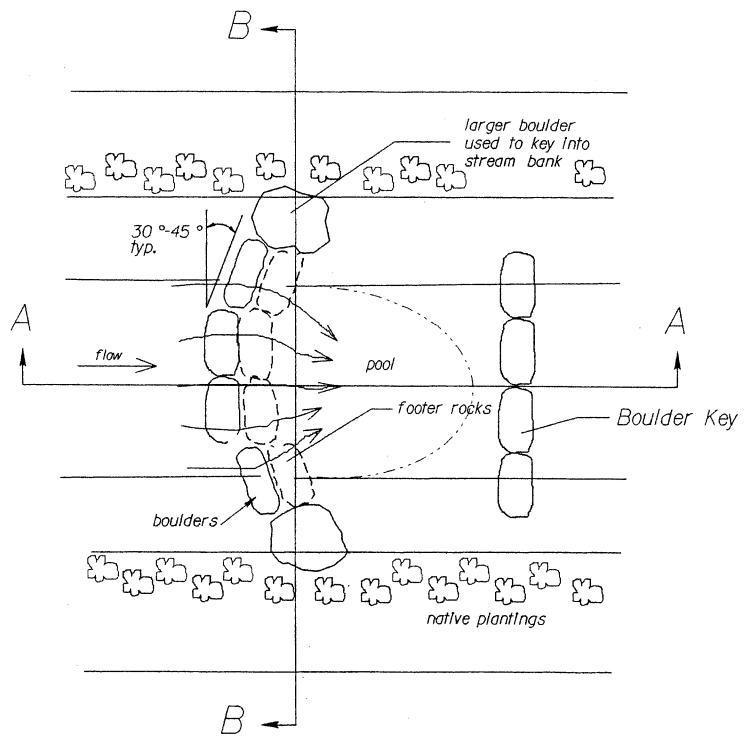
DETAIL OF ASPHALT OVERLAY ON CORED SLAB BRIDGE

FROM STA. 144+40.676 TO
STA. 150+64.324 -L-

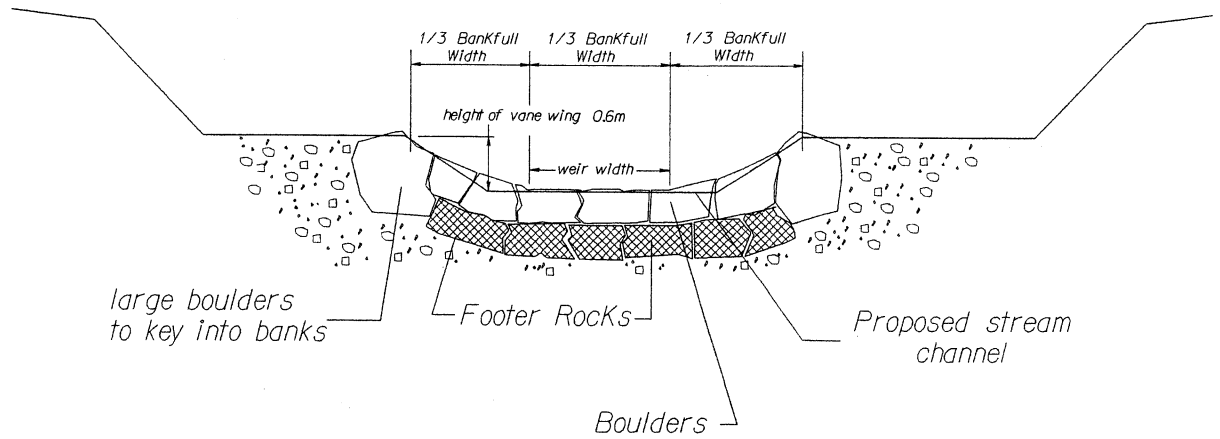
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	2-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

CROSS VANE ROCK WEIR DETAIL

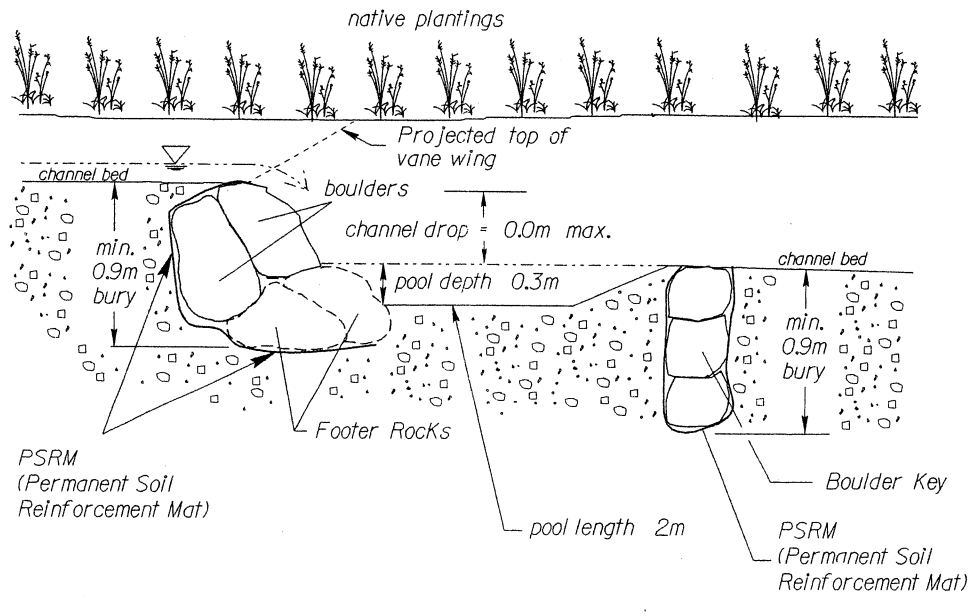
PLAN VIEW



SECTION B-B



SECTION A-A



NOTE:

Footer Rocks/Boulders should be native quarried rock or locally shot rock, angular and oblong preferably with flat sides with approximate dimensions of 0.9m x 0.6m x 0.6m

Larger boulders should have approximate dimensions of 1.2m x 0.9m x 0.9m

Rocks should fit tightly with no spaces between

PSRM (Permanent Soil Reinforcement Mat)

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
Parkwood Park, Suite 200
Raleigh, North Carolina 27615
919.713.2020

METRIC
5m 0 10m

NC GRID NAD 83

① JULIAN B. BROUGHTON, JR.
DB. 168, PG. 700
DB. 178, PG. 305
PC. 1, SLIDE 122
1.921 HA (CADD)

③ EDSOLL HUNNINGS
DB 221, PG 863

⑤ CARL C. EVANS
DB 227, PG 722

② RAYMOND E. DUNN
DB 287, PG. 914

④ HOLLYWOOD CEMETERY

BEGIN STATE PROJECT (R-2539B)
POT Sta 56+27.934 -L-

TS Sta 57+15.532 -L-
SC Sta 58+30.532 -L-
STA 58+60 -L-, MATCH TO SHEET No. 5

154.830 N32°03'59"E
153.537 N39°56'26"E
N28°30'42"E 127.544 (418.37 ft)
1800 mm WD

WOODS
VINEYARD
CHORD
CONC
H TR
1 S BK D
1 S F BUS
S
GR

PROP. R/W
EXISTING DITCH
+36.018 PROP R/W
PROP. SOIL DRIVEWAY
PROP. GRAVEL DRIVEWAY
+15.53-L- 26m (85.30')
PROP. GRAVEL DRIVEWAY +30.53-L- 26m (85.30')
PROP. R/W
PROP. GRAVEL DRIVEWAY

REMOVE ① EXTEND 450 RCP WITH COLLAR ②
REMOVE EXISTING JB ③
⑥ REMOVE
⑦
⑧
⑨ REMOVE

SOIL
150 CONC
-L-
375 CONC
INV=7.01
INV=6.76
S 57° 55' 04.68" E
57° 55' 04.7" E
NC 55 67 BST
EXIST. 30.48 (100') R/W
EXIST. R/W 30.480 (100.00')
1375 mm
600 mm WD RAIL
375 mm CONC
150 W
150mm W
400 mm CONC WALL
CONCRETE WALL
64.832 SDW/RR

④ PIPE CLEANOUT
RETAIN
EXTEND 450 RCP WITH COLLAR ⑤
EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC
TDE
TAIL BASE DITCH
RAYMOND E. DUNN DB. 287, PG. 914
SEE DETAIL F
TDE= 5 CM
+92.000-L- 22m (72.18')
+01.000-L- 22m (72.18')
+04.000-L- 3.1m (10.17')
+96.000-L- 34m (111.55')
TEMP. DRAINAGE EASEMENT
RETAIN
PROP. GRAVEL DRIVEWAY

+36.018 EX R/W
BL-2 +83.084 -L- 13.525m (44.37')
+36.018 12.000 (104.99)

ST -L- STA 56+19.03
POT -L- STA 56+27.895

ST -L-REV STA 56+36.018 (R-2539A) =
POT -L- STA 56+28.358 (LB)
POT -L- STA 56+27.934 (LA)

DETAIL F
TAIL BASE DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, Natural Ground, B
Min. D = 0.3 m
B = 0.6 m

STA -L- 56+96 RT TO 57+00 RT

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2539B-6" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 155623.380(m) EASTING: 799556718(m)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999879100
THE N.C. LAMBERT GRID BEARING
LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2539B-6" TO -L- STATION 56+27.934 IS N 86° 08' 13.2" W 4,317.622 (m)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 29

-L-

Pls Sta 57+92.268	P.I.= Sta 58+94.666	Pls Sta 59+96.299
θs = 7° 29' 15.06"	Δ = 16° 35' 09.50" (LT)	θs = 7° 29' 15.06"
Ls = 115.000	L = 127.371m	Ls = 115.000
LT = 76.735	T = 64.134m	LT = 76.735
ST = 38.396	R = 440.000m	ST = 38.396
	e = 0.095 m/m	
	D.S.= 100.00Km/h	

NOTE:
SEE SHEET 35 FOR -L- PROFILE

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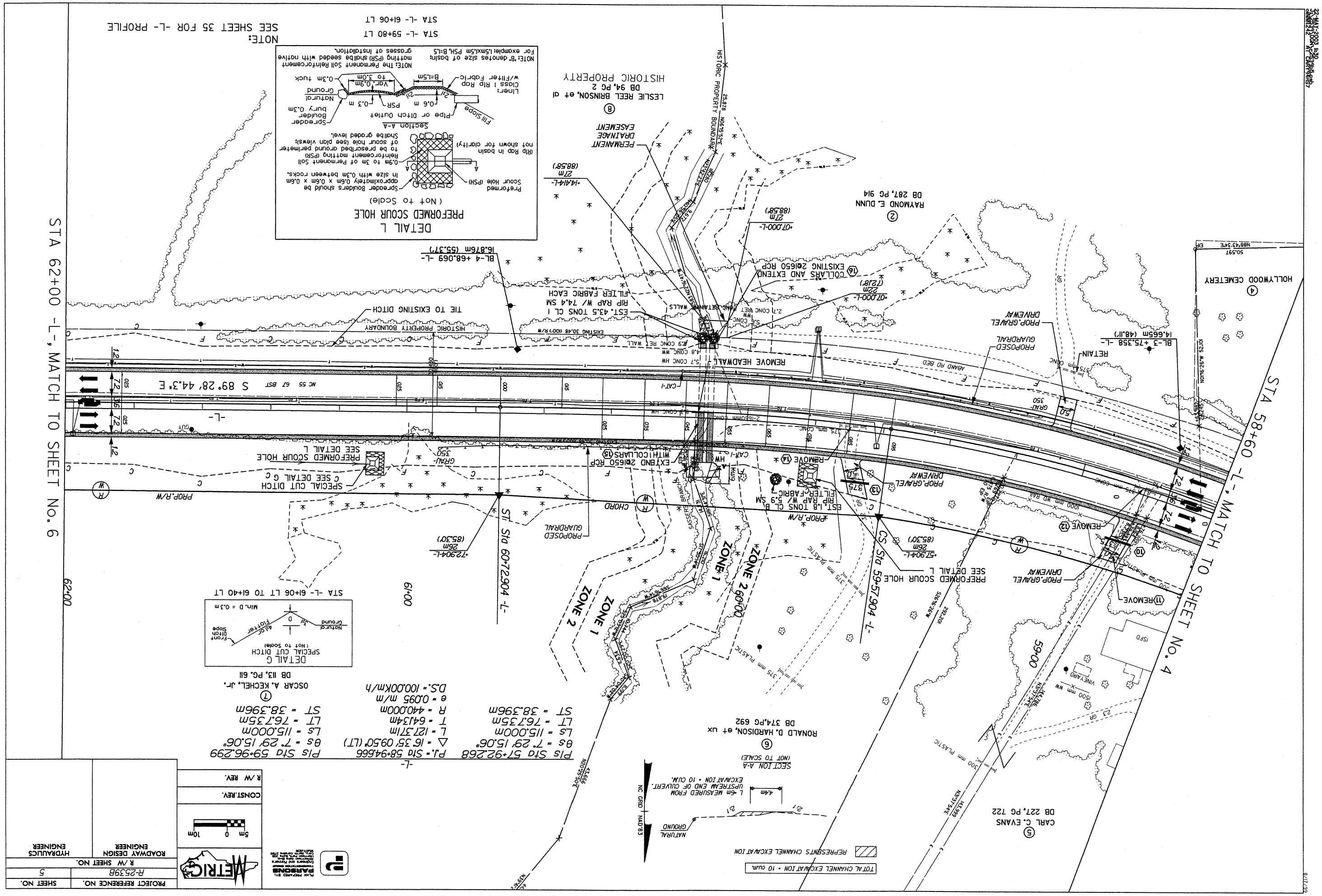


STA 62+00 -L-, MATCH TO SHEET No. 6
STA 58+60 -L-, MATCH TO SHEET No. 4
DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)
Preformed Scour Hole (PSH)
Spreader Boulders should be approximately 0.6m x 0.6m x 0.6m in size with 0.3m between rocks.
0.9m to 3m of Permanent Soil Reinforcement matting (PSR) to be prescribed around perimeter of scour hole (see plan views); Shallbe graded level.
(Rip Rap in basin not shown for clarity)
Section A-A
Pipe or Ditch Outlet
Spreader Boulder bury 0.3m
Natural Ground
Fill Slope
Liner: Class I Rip Rap w/Filter Fabric
B=1.5m
Var. 0.9m to 3.0m
0.3m tuck
NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.
NOTE: "B" denotes size of basin; For example: 1.5mx1.5m PSH, B=1.5
STA -L- 59+80 LT
STA -L- 61+06 LT
NOTE: SEE SHEET 35 FOR -L- PROFILE
HISTORIC PROPERTY
LESLIE REEL BRINSON, et al
DB 94, PG 2
HISTORIC PROPERTY BOUNDARY
PERMANENT DRAINAGE EASEMENT
RAYMOND E. DUNN
DB 287, PG 914
HOLLYWOOD CEMETERY
COLLARS AND EXTEND EXISTING 2@1650 RCP
EST. 43.5 TONS CL I RIP RAP W/ 74.4 SM FILTER FABRIC EACH
TIE TO EXISTING DITCH
REMOVE HEADWALL
PROP. GRAVEL DRIVEWAY
PROPOSED GUARDRAIL
RETAIN
BL-3 +75.358 -L- 14.665m (48.11')
BL-4 +68.069 -L- 16.876m (55.37')
S 89°28' 44.3" E
PREFORMED SCOUR HOLE SEE DETAIL L
SPECIAL CUT DITCH SEE DETAIL G
EXTEND 2@1650 RCP WITH COLLARS
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
REMOVE
PROP. R/W
CHORD
ST. Sta 60+72.904 -L-
CS Sta 59+57.904 -L-
ZONE 1
ZONE 2
PREFORMED SCOUR HOLE SEE DETAIL L
DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Front Ditch Slope
Flatter
Min. D = 0.3m
STA -L- 61+06 LT TO 61+40 LT
OSCAR A. KECHEL, Jr.
DB 113, PG. 611
RONALD D. HARDISON, et ux
DB 374, PG 692
CARL C. EVANS
DB 227, PG 722
SECTION A-A
(NOT TO SCALE)
L = 6m MEASURED FROM UPSTREAM END OF CULVERT. EXCAVATION = 10 CU.M.
NATURAL GROUND
NC GRID NAD'83
REPRESENTS CHANNEL EXCAVATION
TOTAL CHANNEL EXCAVATION = 10 cu.m.
Pls Sta 57+92.268
θs = 7° 29' 15.06"
Ls = 115.000m
LT = 76.735m
ST = 38.396m
Pls Sta 58+94.666
Δ = 16° 35' 09.50" (LT)
L = 127.371m
T = 64.134m
R = 440.000m
e = 0.095 m/m
D.S. = 100.00Km/h
Pls Sta 59+96.299
θs = 7° 29' 15.06"
Ls = 115.000m
LT = 76.735m
ST = 38.396m
-L-
PROJECT REFERENCE NO.
R-2539B
SHEET NO.
5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST. REV.
R/W REV.
METRIC
PLAN PREPARED BY: PARSONS

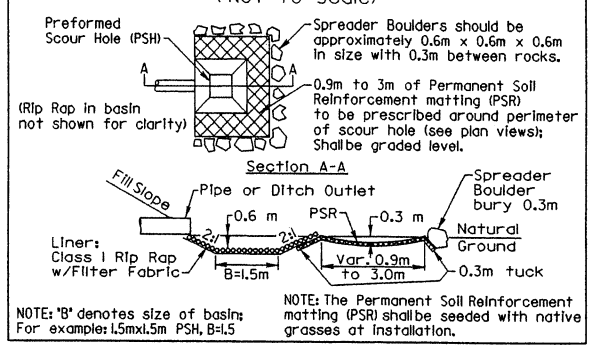
8/17/99

PLAN PREPARED BY: PARSONS Transportation Group — Engineers and Planners — 5400 Glenwood Avenue, Suite 400, Raleigh, North Carolina 27612 — (919) 781-4626

METRIC — 5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	6
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)



STA -L- 63+57 LT

-L-
P.I. = Sta 66+87.031
Δ = 4°51' 43.94" (RT)
L = 424.308m
T = 212.281m
R = 5,000.000m
e = 0.025 m/m
Runoff = 55.000m
D.S. = 100.00Km/h

NC GRID NAD'83

STA 62+00 -L-, MATCH TO SHEET No. 5

STA 65+40 -L-, MATCH TO SHEET No. 7

⑦ OSCAR A. KECHEL, Jr.
DB 113, PG. 611

⑨ E. HOWARD HUNNINGS
DB 249, PG. 133

⑪ PAUL T. LASKOVICS
DB 254, PG. 187

⑪A PAUL T. LASKOVICS
DB 287, PG. 210

⑧ LESLIE REEL BRINSON, et al
DB 94, PG 2
HISTORIC PROPERTY

⑩ LESSIE R. BRINSON
DB 278, PG 838

EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC

EST. 4.5 TONS CL B RIP RAP W/ 11.7 SM FILTER FABRIC

PREFORMED SCOUR HOLE SEE DETAIL L

SPECIAL CUT DITCH SEE DETAIL G

EXTEND EXIST. ⑱ 600 RCP WITH CONC. COLLAR

EXTEND EXIST. ⑳ 600 RCP WITH CONC. COLLAR

PIPE CLEAN OUT ⑲

RETAIN

REMOVE ⑰

REMOVE ㉑

REMOVE ㉔

PROP. SOIL DRIVEWAYS

PROP. SOIL DRIVEWAY

PROP. SOIL DRIVEWAY PROP. R/W

PROP. GRAVEL DRIVEWAY

PROP. R/W

HISTORIC PROPERTY BOUNDARY

S 89° 28' 44.3" E

MC 55 67 BST

BL-5 +91.061-L- 13.794m (45.26')

BL-6 +61.706 -L- 12.524m (41.09')

+74.749-L- 26m (85.30') P.C. Sta 64+74.750

450mm CONC

600mm CONC

375 mm CONC

900 mm CONC

1200 mm WD

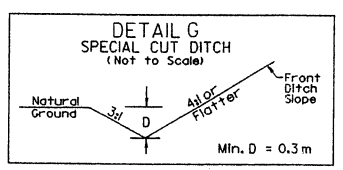
600 mm WD RAIL

ISBKD

2SFD

2SBKD

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)



STA -L- 62+33 RT TO 64+80 RT
STA -L- 63+51 LT TO 63+80 LT
STA -L- 64+40 LT TO 65+47 LT

NOTE:
SEE SHEETS 35 & 36 FOR -L- PROFILE

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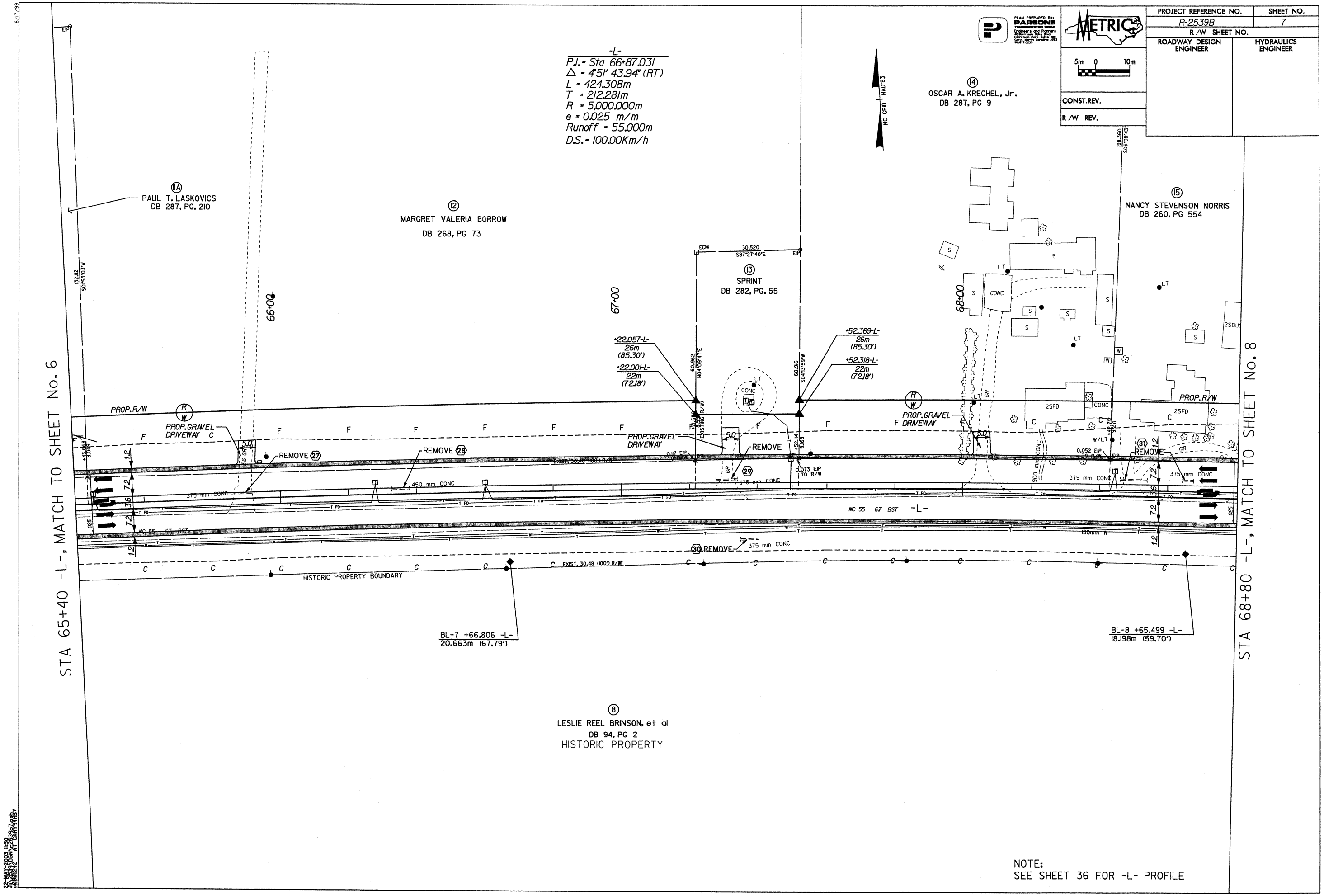
jdavis



PROJECT REFERENCE NO.
R-2539B
SHEET NO.
7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
METRIC
5m 0 10m
PLAN PREPARED BY: PARSONS
-L-
P.I. = Sta 66+87.031
Δ = 4°51' 43.94" (RT)
L = 424.308m
T = 212.281m
R = 5,000.000m
e = 0.025 m/m
Runoff = 55.000m
D.S. = 100.00Km/h
NC GRID NAD83
11A PAUL T. LASKOVICS DB 287, PG. 210
12 MARGRET VALERIA BORROW DB 268, PG 73
13 SPRINT DB 282, PG. 55
14 OSCAR A. KRECHEL, Jr. DB 287, PG 9
15 NANCY STEVENSON NORRIS DB 260, PG 554
66+00
67+00
68+00
+22.057-L- 26m (85.30')
+22.001-L- 22m (72.18')
+52.369-L- 26m (85.30')
+52.318-L- 22m (72.18')
PROP.R/W
PROP.GRAVEL DRIVEWAY
REMOVE 27
REMOVE 28
REMOVE 29
REMOVE 30
REMOVE 31
NC 55 67 BST -L-
HISTORIC PROPERTY BOUNDARY
BL-7 +66.806 -L- 20.663m (67.79')
BL-8 +65.499 -L- 18.198m (59.70')
8 LESLIE REEL BRINSON, et al DB 94, PG 2 HISTORIC PROPERTY
STA 65+40 -L-, MATCH TO SHEET No. 6
STA 68+80 -L-, MATCH TO SHEET No. 8
NOTE:
SEE SHEET 36 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP

METRIC 5m 0 10m

NC GRID NAD'83

-L-
P.I.= Sta 66+87.031
Δ = 4°51' 43.94" (RT)
L = 424.308m
T = 212.281m
R = 5,000.000m
e = 0.025 m/m
Runoff = 55.000m
D.S.= 100.00Km/h

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D = 0.3 m

STA -L- 69+00 LT TO 69+80 LT
STA -L- 69+00 RT TO 70+20 RT

STA 68+80 -L-, MATCH TO SHEET No. 7

STA 72+20 -L-, MATCH TO SHEET No. 9

PT Sta 68+99.057 -L- 69+00

+99.057 -L- 26m (85.30')

+40.000 -L- 26m (85.30')

BL-9 +51.958 -L- 17.36m (56.96')

(15) NANCY STEVENSON NORRIS
DB 260, PG 554

(16) SHERWOOD B. NORRIS, Jr.
DB 221, PG. 746

(17) SHIRLEY STEVENSON BRINSON
DB 260, PG 549

(18) GLEN W. BRACKIN
DB 312, PG. 732

(8) LESLIE REEL BRINSON, et al
DB 94, PG 2
HISTORIC PROPERTY

HISTORIC PROPERTY BOUNDARY

S 84° 37' 00.4" E

NC 55 67 BST

73.914 S85°31'04"E

59.893 N07°58'55"E

65.993 S82°59'57"W

S84°58'15"E 44.770

S21°08'41"W 36.017

S25°58'21"W 36.428

S05°04'44"W 18.585

POOL, WD DK, ISBKD, CONC, W/LT, CANOPY, FLAG POLE, DK, ISFD, S

PROP. GRAVEL DRIVEWAY

PROP. R/W

SPECIAL CUT DITCH SEE DETAIL G

VINEYARD RD

0.086 EIP TO R/W

0.080 EIP TO R/W

TBJB

900 mm WD RAIL

900mm WD RAIL

375 mm CONC

50mm CONC

1200 mm CHL

800 mm CONC STRM

REMOVE

PIPE CLEAN OUT

EXTEND EXIST. 750 RCP WITH CONC. COLLAR

EXISTING 30.48 (100') R/W

SPECIAL CUT DITCH SEE DETAIL G

EST. 7.3 TONS CL B RIP RAP W/ 17.6 SM FILTER FABRIC

NOTE: DO NOT DISTURB SIGN

NOTE:
SEE SHEETS 36 & 37 FOR -L- PROFILE

22-MAY-2003 11:30
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8/17/99

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	9
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

NC GRID NAD83

JUDY D. HUMPHRIES
DB 265, PG 125

⑰ SHIRLEY STEVENSON BRINSON
DB 260, PG 549

⑲ AILEEN S. LEE
DB 260, PG 544

⑳ JUDY D. HUMPHRIES
DB 214, PG 376

㉑ AILEEN S. LEE
DB 125, PG 245

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D = 0.3 m
STA -L- 73+20 LT TO 74+20 LT
STA -L- 73+80 RT TO 74+20 RT

DETAIL M
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, d, D, 4:1 or Flatter, Front Ditch Slope
Filter Fabric
Min. D = 0.3 m
Max. d = 0.3 m
Type of Liner = CL. B RIP RAP
STA -L- 74+60 LT TO 75+08 LT

DETAIL J
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, VARIES SEE X-SECT'S., Front Ditch Slope
STA -L- 74+40 RT TO 75+10 RT

DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)
Preformed Scour Hole (PSH)
(Rip Rap in basin not shown for clarity)
Spreader Boulders should be approximately 0.6m x 0.6m x 0.6m in size with 0.3m between rocks.
0.9m to 3m of Permanent Soil Reinforcement matting (PSR) to be prescribed around perimeter of scour hole (see plan views); Shallbe graded level.
Section A-A
Fill Slope, Pipe or Ditch Outlet, 0.6 m, PSR, 0.3 m, Spreader Boulder bury 0.3m, Natural Ground, 2:1, 2:1, Liner: Class I Rip Rap w/Filter Fabric, B=1.5m, Var 0.9m to 3.0m, 0.3m tuck
NOTE: 'B' denotes size of basin: For example: 1.5mx1.5m PSH, B=1.5
NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.

STA -L- 75+10 LT

STA 72+20 -L-, MATCH TO SHEET No. 8

STA 75+80 -L-, MATCH TO SHEET No. 10

TS Sta 73+14.515 -L-
SC Sta 73+89.515 -L-
CS Sta 75+50.103 -L-

73+00
74+00
75+00

+14.515-L- 26m (85.30')
+89.515-L- 26m (85.30')
+50.103-L- 26m (85.30')

BL-11 +80.460 -L- 0.481m (1.58')
BL-10 +30.485 -L- 17.665m (57.96')

EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC

PROP. GRAVEL DRIVEWAY
PROP. R/W
CHORD
SPECIAL CUT DITCH SEE DETAIL G
SPECIAL CUT DITCH WITH CL. B RIP RAP SEE DETAIL M
PREFORMED SCOUR HOLE SEE DETAIL L
PROPOSED GUARDRAIL
BEGIN BRIDGE STA 75+53.10 -L-
PROP. R/W CHORD
TYPE III
REMOVE (40) (41) (42) (43)
375 mm CONC
EXIST. 30.48 (100') R/W
0.362 R/W to EIP
S 84° 37' 00.4" E
NC 55 67 BST
-L-
HO WLB
CAT
ISFD
S
B
GAS PUMP
HISTORIC PROPERTY BOUNDARY
TIE TO EXISTING DITCH
SPECIAL CUT DITCH SEE DETAIL J
GRAU-350
EXPRESSWAY GUTTER 75+40 TO 75+50.710
26H 400 CSP
PROPOSED GUARDRAIL
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
BEGIN 75+56 +/- 6" DIA. PVC @ 1.8m CENTERS
PROPOSED BRIDGE (5 LANES)

⑧ LESLIE REEL BRINSON, et al
DB 94, PG 2
HISTORIC PROPERTY

-L-

Pls Sta 73+64.520	P.I.= Sta 74+70.023	Pls Sta 75+86.783
θs = 2° 23' 14.37"	Δ = 10° 13' 24.00" (RT)	θs = 3° 30' 05.07"
Ls = 75.000m	L = 160.588m	Ls = 110.000m
LT = 50.005m	T = 80.508m	LT = 73.348m
ST = 25.004m	R = 900.000m	ST = 36.680m
	e = 0.060 m/m	
	D.S.= 100.00Km/h	

NOTE:
SEE SHEET 37 FOR -L- PROFILE
SEE SHEET 10 FOR BRIDGE SKETCH

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PROJECT REFERENCE NO.	SHEET NO.
R-2539B	10
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

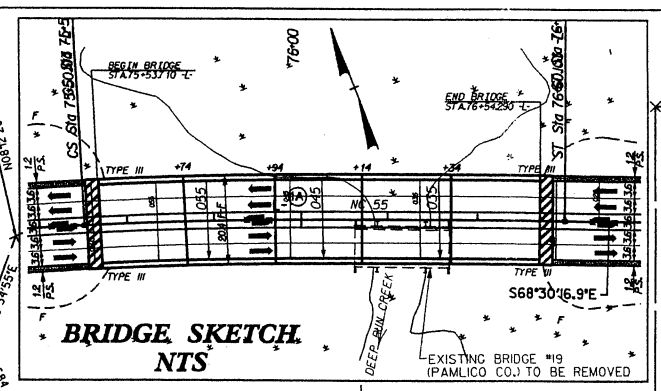
5m 0 10m

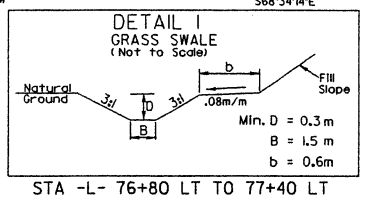
CONST.REV.

R /W REV.

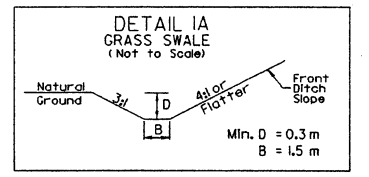
PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Pointe, Suite 200
Cary, North Carolina 27513
919.677.0250

8/17/99

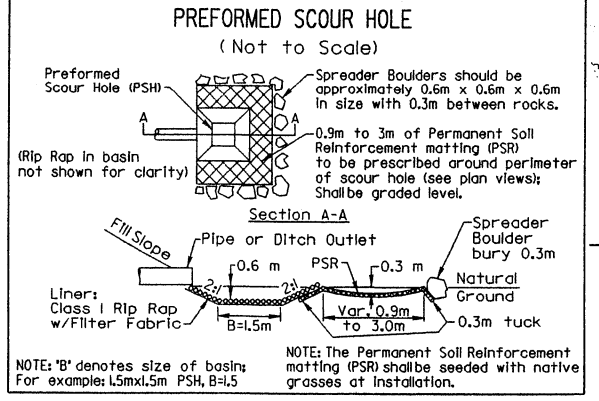




STA -L- 76+80 LT TO 77+40 LT



STA -L- 77+40 LT TO 77+60 LT



STA -L- 76+78 LT

-L-		
Pls Sta 73+64.520	P.I.- Sta 74+70.023	Pls Sta 75+86.783
θs = 2° 23' 14.37"	Δ = 10° 13' 24.00" (RT)	θs = 3° 30' 05.07"
Ls = 75.000m	L = 160.588m	Ls = 110.000m
LT = 50.005m	T = 80.508m	LT = 73.348m
ST = 25.004m	R = 900.000m	ST = 36.680m
	e = 0.060 m/m	
	D.S.= 100.00Km/h	

-L-		
Pls Sta 78+31.935	P.I.- Sta 79+20.576	Pls Sta 80+08.852
θs = 2° 51' 53.24"	Δ = 10° 39' 40.30" (LT)	θs = 2° 51' 53.24"
Ls = 70.000m	L = 130.251m	Ls = 70.000m
LT = 46.673m	T = 65.314m	LT = 46.673m
ST = 23.339m	R = 700.000m	ST = 23.339m
	e = 0.04 m/m	
	D.S.= 80.00Km/h	

NOTE:
SEE SHEET 37 FOR -L- PROFILE

STA 75+80 -L-, MATCH TO SHEET No. 9

STA 79+00 -L-, MATCH TO SHEET No. 11

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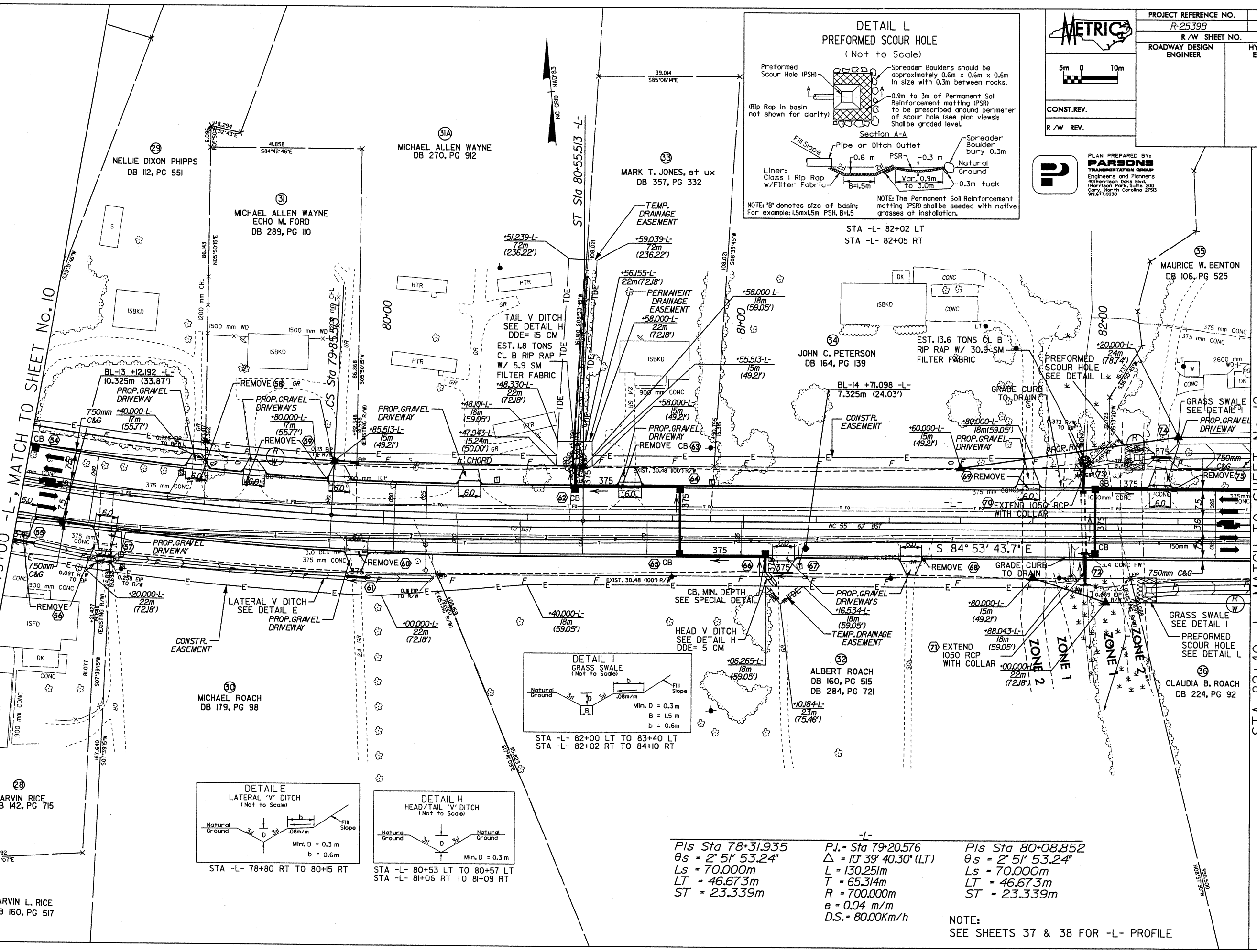
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	11
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

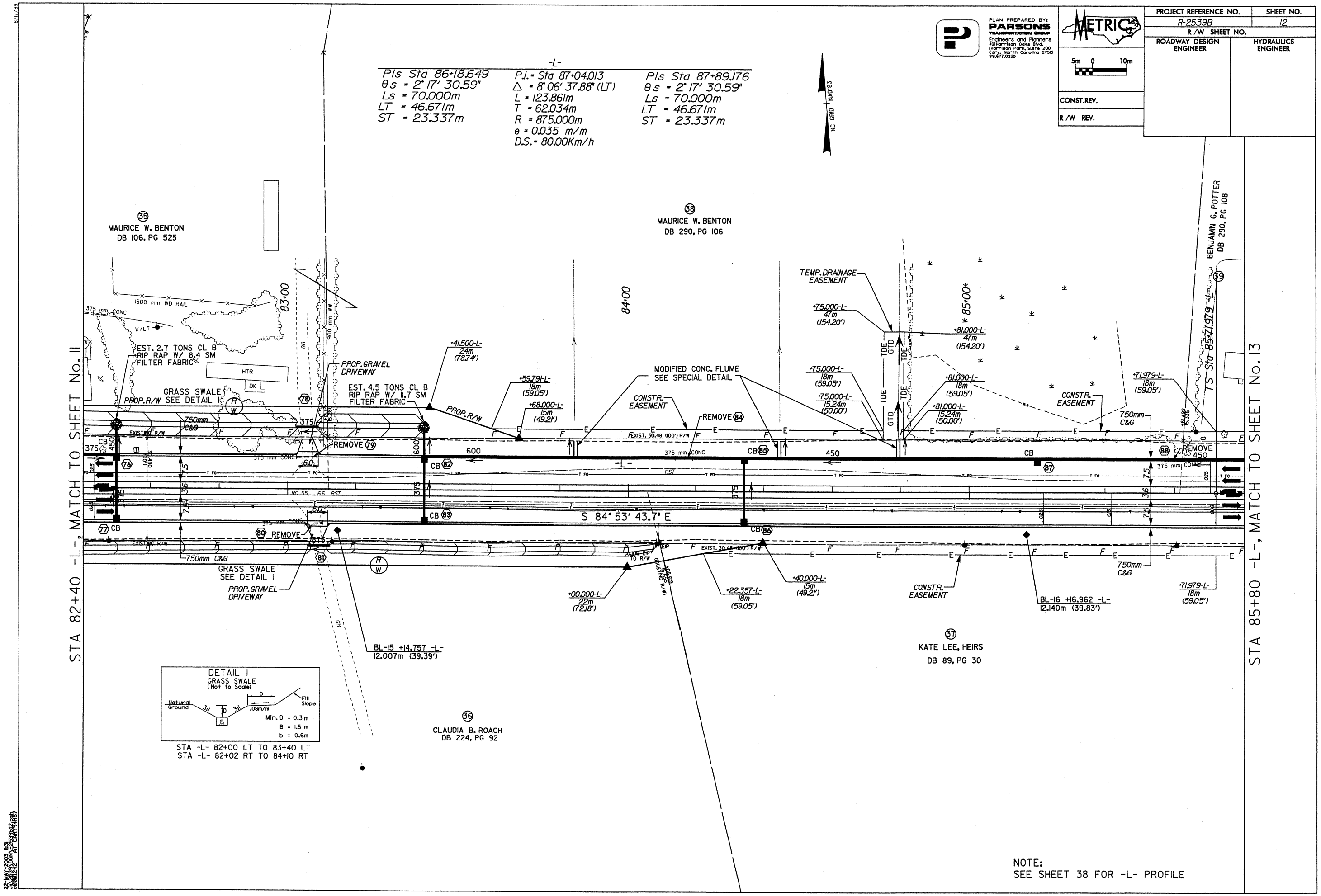
5m 0 10m

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
1 Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)

STA -L- 82+02 LT
STA -L- 82+05 RT


MATCH TO SHEET No. 10
STA 79+00 -L-
STA 82+40 -L-, MATCH TO SHEET No. 12
-L- Sta 79+85.503
ST Sta 80+55.513 -L-
NC GRID NAD'83
29 NELLIE DIXON PHIPPS DB 112, PG 551
31 MICHAEL ALLEN WAYNE ECHO M. FORD DB 289, PG 110
31A MICHAEL ALLEN WAYNE DB 270, PG 912
33 MARK T. JONES, et ux DB 357, PG 332
35 MAURICE W. BENTON DB 106, PG 525
34 JOHN C. PETERSON DB 164, PG 139
32 ALBERT ROACH DB 160, PG 515 DB 284, PG 721
30 MICHAEL ROACH DB 179, PG 98
28 MARVIN RICE DB 142, PG 715
MARVIN L. RICE DB 160, PG 517
36 CLAUDIA B. ROACH DB 224, PG 92
41.858 S84°42'46"E
39.014 S85°06'14"E
S 84° 53' 43.7" E
S25°36'46"W
N05°50'15"E
S05°50'15"W
S07°39'05"W
S08°33'45"W
N08°37'30"W
1200 mm CHL
1500 mm WD
900 mm CONC
375 mm CONC
2600 mm WD
1050mm CONC
750mm C&G
ISBKD
HTR
TAIL V DITCH SEE DETAIL H DDE= 15 CM
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
EST. 13.6 TONS CL B RIP RAP W/ 30.9 SM FILTER FABRIC
PERMANENT DRAINAGE EASEMENT
TEMP. DRAINAGE EASEMENT
CONSTR. EASEMENT
LATERAL V DITCH SEE DETAIL E
HEAD V DITCH SEE DETAIL H DDE= 5 CM
CB, MIN. DEPTH SEE SPECIAL DETAIL
PREFORMED SCOUR HOLE SEE DETAIL L
GRASS SWALE SEE DETAIL I
GRADE CURB TO DRAIN
PROP. GRAVEL DRIVEWAY
PROP. GRAVEL DRIVEWAYS
REMOVE
EXTEND 1050 RCP WITH COLLAR
ZONE 1
ZONE 2
BL-13 +12.192 -L- 10.325m (33.87')
BL-14 +71.098 -L- 7.325m (24.03')
+51.239-L- 72m (236.22')
+59.039-L- 72m (236.22')
+56.155-L- 22m (72.18')
+58.000-L- 18m (59.05')
+55.513-L- 15m (49.21')
+48.330-L- 22m (72.18')
+48.101-L- 18m (59.05')
+47.943-L- 15.24m (50.00') CHORD
+85.513-L- 15m (49.21')
+58.000-L- 22m (72.18')
+58.000-L- 15m (49.21')
+60.000-L- 15m (49.21')
+80.000-L- 18m (59.05')
+20.000-L- 24m (78.74')
+20.000-L- 22m (72.18')
+00.000-L- 22m (72.18')
+40.000-L- 18m (59.05')
+06.265-L- 18m (59.05')
+16.534-L- 18m (59.05')
+88.043-L- 18m (59.05')
+10.184-L- 23m (75.46')
+80.000-L- 15m (49.21')
+40.000-L- 17m (55.77')
+80.000-L- 17m (55.77')
750mm C&G 0.097 R/W TO EIP
0.258 EIP TO R/W
0.411 EIP TO R/W
0.373 R/W TO EIP
0.669 EIP TO R/W
3.0 BLK HW
3.4 CONC HW
150mm W
48.892 S88°04'07"E
390.500 N08°37'30"W
167.640 S07°39'05"W
81.077 S07°39'05"W
108.021
108.021
108.021



PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
1 Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230
METRIC
5m 0 10m
PROJECT REFERENCE NO.
R-2539B
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
-L-
PIs Sta 86+18.649
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337m
P.I. = Sta 87+04.013
Δ = 8° 06' 37.88" (LT)
L = 123.861m
T = 62.034m
R = 875.000m
e = 0.035 m/m
D.S. = 80.00Km/h
PIs Sta 87+89.176
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337m
NC GRID NAD'83
MAURICE W. BENTON
DB 106, PG 525
MAURICE W. BENTON
DB 290, PG 106
BENJAMIN G. POTTER
DB 290, PG 108
STA 82+40 -L-, MATCH TO SHEET No. 11
STA 85+80 -L-, MATCH TO SHEET No. 13
TS Sta 85+71.979 -L-
83+00
84+00
85+00
1500 mm WD RAIL
375 mm CONC
W/LT
EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC
HTR
DK
GRASS SWALE SEE DETAIL I
PROP. R/W
PROP. GRAVEL DRIVEWAY
EST. 4.5 TONS CL B RIP RAP W/ 11.7 SM FILTER FABRIC
+41.500-L- 24m (78.74')
+59.791-L- 18m (59.05')
+68.000-L- 15m (49.21')
MODIFIED CONC. FLUME SEE SPECIAL DETAIL
CONSTR. EASEMENT
REMOVE
TEMP. DRAINAGE EASEMENT
+75.000-L- 47m (154.20')
+81.000-L- 47m (154.20')
+75.000-L- 18m (59.05')
+75.000-L- 15.24m (50.00')
+81.000-L- 18m (59.05')
+81.000-L- 15.24m (50.00')
+71.979-L- 18m (59.05')
750mm C&G
EXIST. 30.48 (100') R/W
600
450
375 mm CONC
CB
S 84° 53' 43.7" E
GRASS SWALE SEE DETAIL I
PROP. GRAVEL DRIVEWAY
+00.000-L- 22m (72.18')
+22.357-L- 18m (59.05')
+40.000-L- 15m (49.21')
BL-15 +14.757 -L- 12.007m (39.39')
BL-16 +16.962 -L- 12.140m (39.83')
+71.979-L- 18m (59.05')
KATE LEE, HEIRS
DB 89, PG 30
CLAUDIA B. ROACH
DB 224, PG 92
DETAIL I
GRASS SWALE
(Not to Scale)
Natural Ground
Fill Slope
.08m/m
Min. D = 0.3 m
B = 1.5 m
b = 0.6m
STA -L- 82+00 LT TO 83+40 LT
STA -L- 82+02 RT TO 84+10 RT
NOTE:
SEE SHEET 38 FOR -L- PROFILE

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	14
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5m 0 10m

CONST.REV.

R /W REV.

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TRAFFIC DIAGRAM
11,600 / 17,700 — 11,800 / 17,700
NC 55
100 / 200 — 100 / 200
DIXON RD. SR 1139
2000 ADT 2025 ADT
200 / 400

STA 89+20 -L-, MATCH TO SHEET No. 13

STA 92+60 -L-, MATCH TO SHEET No. 15

NC GRID NAD'83

ALTON HARRIS
DB 340, PG 928

HENRY P. WOODARD, et ux
DB 109, PG 67

HENRY P. WOODARD, et ux
DB 120, PG 132

HENRY P. WOODARD, et ux
DB 277, PG 115

HENRY P. WOODARD, et ux
DB 283, PG 718

HORACE T. COWELL
DB 388 PG 785

HENRY P. WOODARD, et ux
DB 337, PG 195

HENRY P. WOODARD, et ux
DB 384, PG 51

REELSBORO CHRISTIAN CHURCH
DB 240, PG 23

REELSBORO CHRISTIAN CHURCH
DB 206, PG 462
MB 4, PG 66

DAVID E. LUPTON
DB 134, PG 570

DAVID E. LUPTON
DB 160, PG 482

CHARLES L. SCOTT JR., et ux
DB 342, PG 703

ANNIE J. DIXON
DB 303, PG 370

HAROLD DIXON Jr. HEIRS
DB 156, PG 408

JEANNIE L. ROACH
DB 179, PG 100

OWEN A. LUPTON, Jr.
DB 196, PG 140

FLOYD C. HILL, Jr.
DB 198, PG. 822

WILLIAM ENGLISH
DB 275, PG 109

LEE W. TILLMAN
DB 313, PG 87

DAVID T. PURVIS
DB 142, PG 68

WILLIAM E. DIXON
DB 151, PG 416

WILLIAM E. DIXON
DB 204, PG 632

LULA P. WILSON
DB 270, PG 934

POT Sta 90+53.745 -L- =
POT Sta 10+00.600 -Y-

POT Sta 11+06.143 -Y-

BL-19 +61.448 -L-
11.888m (39.00')

BL-20 +32.679 -L-
0.46lm (1.51')

DETAIL F
TAIL BASE DITCH
(Not to Scale)
Natural Ground — 3:1 — D — 3:1 — Natural Ground
B
Min. D = 0.3 m
B = 0.6 m

NOTE:
SEE SHEET 39 FOR -L- PROFILE
SEE SHEET 48 FOR -Y- PROFILE

22-MAY-2003 11:38
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METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	15
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

NC GRID / NAD'83

STA 92+60 -L-, MATCH TO SHEET No. 14

STA 96+00 -L-, MATCH TO SHEET No. 16

(54) DAVID T. PURIFOY
DB 142, PG 681

(55) ALICE RAWLS
DB 102, PG 508

(56) NEW HOPE CHRISTIAN CHURCH

NEW HOPE CHRISTIAN CHURCH BK

1200 mm CONC

(57) HAZEL STYRON
DB 189, PG 66

(58) ALTON R. LANE, Jr
DB 256, PG 750

GARY P. CATON
DB 310, PG 268

GARY P. CATON
DB 147, PG 243

(59) GARY P. CATON
DB 144, PG 673

(61) LONNIE GIBBS
DB 270, PG 667

(62) ROY L. BRINSON
DB 139, PG 654

(60) E. LEMWOOD GOODING
DB 102, PG 237

ANNIE R. BUCK
DB 88, PG 538

JOHNNIE G. DALE
DB 278, PG 854

WILLIAM E. DIXON
DB 204, PG 932

LULA P. WILSON
DB 270, PG 934

SANDHILL CEMETERY

65.532 N82°30'36"E
34.993 S82°30'36"W
38.659 S82°30'36"W
30.506 S82°30'38"W
35.052 S82°30'37"W
35.052 S82°30'35"W
18.288 (60')
30.480 S07°30'23"E
30.480 S07°31'03"E
S07°40'04"E 610.08
N07°30'22"W 91.459
S07°30'23"E 604.960
S07°30'23"E 604.960
S07°30'23"E 91.564
S07°30'23"E 604.960
S07°30'23"E 604.960
N07°30'22"W 144.780
S07°17'40"W 144.780
S07°42'34"E 125.524
S07°42'34"E 62.441
S07°42'34"E 62.495
S07°42'34"E 125.524
S07°42'34"E 144.678
S07°42'34"E 264.482
S07°42'34"E 264.482
S07°42'43"E 264.482
S04°45'40"E
S08°15'33"E 31.702
N82°29'49"E 36.752

*80.000-L- 18m (59.05')
*10.000-L- 16m (52.49')
*20.000-L- 18m (59.05')
*40.000-L- 18m (59.05')
*40.000-L- 15m (49.21')
BL-21+70.327 -L-
-2.354m (7.72')
*44.000-L- 15.44m (50.66')
*68.225-L- 18m (59.05')
*86.361-L- 18m (59.05')
*11.000-L- 15.42m (50.59')
*15.000-L- 18m (59.05')
*15.000-L- 15m (49.21')
*74.000-L- 18m (59.05')
*74.000-L- 15m (49.21')
*78.000-L- 18m (59.05')
*78.000-L- 15m (49.21')

750mm C&G
REMOVE 375 mm CONC
375 mm CONC
900 mm CONC
2-450 mm CONC STRIPS
1500 mm CHL
PROP.R/W
EXIST. 30.48 (100') R/W
OJ91 R/W TO EIP
OJ09 R/W TO EIP
OJ52 R/W TO EIP
PROP.GRAVEL DRIVEWAYS
PROP.CONCRETE DRIVEWAY
PROP.GRAVEL DRIVEWAY
PROP.CONCRETE DRIVEWAY
PROP.SOIL DRIVEWAYS
PROP.SOIL DRIVEWAY
PROP.ASPHALT DRIVEWAY
CONSTR. EASEMENT
PERMANENT DRAINAGE EASEMENT
BEGIN RETAINING WALL -L- STA.93+54.354
RETAINING WALLS
END RETAINING WALL -L- STA.94+98.213
FGRADE CURB TO DRAIN
5.818 EIP TO R/W
7.268 EIP TO R/W
7.797 EIP TO R/W
ISFD
ISBKD
CEM
SOIL
CB
EIP
WCR
R-5

NOTE:
SEE SHEETS 39 & 40 FOR -L- PROFILE

22-MAY-2003 14:38
jdavis
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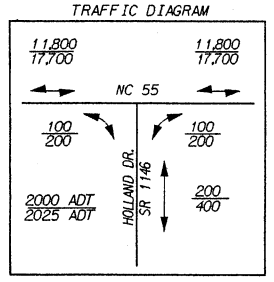
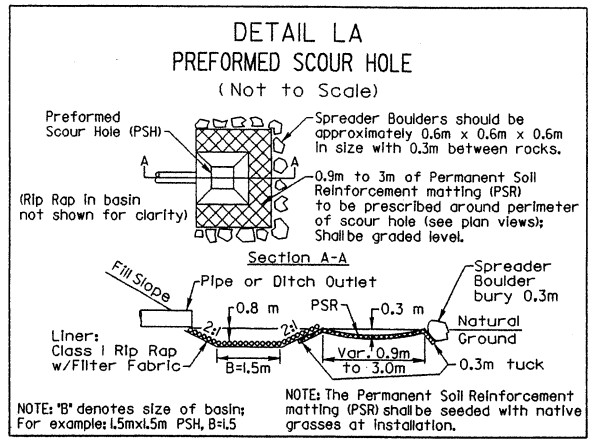
8/17/99

TRAFFIC DIAGRAM



DETAIL LA
PREFORMED SCOUR HOLE
(Not to Scale)



NOTE: 'B' denotes size of basin; For example: 1.5mx1.5m PSH, B=1.5

NOTE: The Permanent Soil Reinforcement matting (PSR) shall be seeded with native grasses at installation.

STA -L- 98+68 LT

-L-

Pls Sta 98+89.274	P.I.= Sta 100+28.471	Pls Sta 101+63.670
θs = 4° 00' 38.54"	Δ = 26° 05' 45.83" (RT)	θs = 4° 00' 38.54"
Ls = 70.000m	L = 227.731m	Ls = 70.000m
LT = 46.679m	T = 115.876m	LT = 46.679m
ST = 23.344m	R = 500.000m	ST = 23.344m
	e = 0.05 m/m	
	D.S.= 80.00Km/h	

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Engineers and Planners
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Cary, North Carolina 27513
919.677.0230

NC GRID NAD'83

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	16
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

STA 96+00 -L-, MATCH TO SHEET No. 15

STA 99+40 -L-, MATCH TO SHEET No. 17

POT Sta 96+49.503 -L- =
POT Sta 10+00.600 -Yl-

TS Sta 98+42.595 -L-

SC Sta 99+12.595 -L-

-Yl-

S 7° 41' 35.4" E

N 82° 24' 37.2" E

PROP.R/W

EXIST. 30.48 (100') R/W

CHORD PROP.R/W

PROP.SOIL DRIVEWAY

PROP.ASPHALT DRIVEWAY

PROP.SOIL DRIVEWAYS

PROP.GRAVEL DRIVEWAY

PROP.GRAVEL DRIVEWAYS

PROP.ASPHALT DRIVEWAY

PROP.GRAVEL DRIVEWAYS GRADE CURB TO DRAIN

PERMANENT DRAINAGE EASEMENT

CONSTR. EASEMENT

PREFORMED SCOUR HOLE SEE DETAIL LA

750mm C&G

200mm W

2CI TYPE D DI

BL-22 +53.775 -L- -0.285m (0.93')

BEGIN C&G 1.8 FLARE

END C&G 1.2 FLARE

END CONSTR. STA.10+50.00 -Yl- MATCH EXIST.PVMT. SLOPE & ELEV.

+30.000-L- 21m (68.90')

+70.000-L- 21m (68.90')

+40.000-Yl- 7.622m (25.00')

+32.054-Yl- 13m(42.65')

+50.000-Yl- 13m (42.65')

+64.000-L- 23m (75.46')

+64.000-L- 15m (49.21')

+55.000-L- 19m (62.33')

+42.595-L- 18m (59.05')

+42.595-L- 15m (49.21')

+72.000-L- 24m (78.74')

+72.000-L- 15m (49.21')

+12.595-L- 24m (78.74')

+12.595-L- 15m (49.21')

R=10

+19.326

+35.036

+40.036

90

450

600

375

SR 1146 HOLLAND DR

EXISTING 18.288 (60') R/W

EXISTING 18.288 (60') R/W

I5

I5

BST

GTD

CB

WCR

DI

SOIL

CONC

1200 mm CONC

1200 mm WW

ISFD

ISBLK

ISBLKD

ISMTL

ISMTL BUS

2SFD

FLAG POLE

HTR

S

G

W

B

OK

E. LEMWOOD GOODING
DB 102, PG 237
60

ROY L. BRINSON
DB 139, PG 654
62

GOLDA P. BROOME
DB 148, PG 37

REELSBORO UNITED METHODIST CHURCH
DB 236, PG 162
63

RONALD D. HARDISON
DB 188, PG 358

NALA J. IPOCK
DB 109, PG 537

RONALD G. IPOCK
DB 213, PG 357

JONATHAN L. DIXON
DB 306, PG 337

ARCHIE COMBEST
DB 309, PG 506

DENARD T. POTTER
DB 318, PG 23
64

60.997 S05°50'32"E

38.115 N82°28'51"E

23.009 N82°2'2"E

L172 S26°04'59"W

63.975 N82°26'44"E

S07°41'03"E 15.273

S05°50'32"E 60.997

S26°04'59"W 30.289

S26°12'59"W 57.995

N57°37'29"W 24.564

S68°22'31"W 33.340

S26°37'01"W 48.340

EXISTING ROADSIDE DITCH

TO NEW SUBDIVISION

NOTE:
SEE SHEET 40 FOR -L- PROFILE
SEE SHEET 48 FOR -Yl- PROFILE

23-MAY-2003 11:32
S:\Projects\2539B\Design\Roadway\Plans\2539B_PLAN_16.dgn

8/17/99

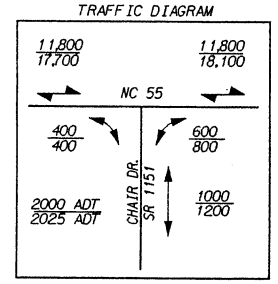
-L-

Pls Sta 98+89.274
θs = 4° 00' 38.54"
Ls = 70.000m
LT = 46.679m
ST = 23.344m

P.I.= Sta 100+28.471
Δ = 26° 05' 45.83" (RT)
L = 227.731m
T = 115.876m
R = 500.000m
e = 0.05 m/m
D.S.= 80.00Km/h

Pls Sta 101+63.670
θs = 4° 00' 38.54"
Ls = 70.000m
LT = 46.679m
ST = 23.344m

TRAFFIC DIAGRAM



PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
101Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.

STA 99+40 -L-, MATCH TO SHEET NO. 16

STA 102+80 -L-, MATCH TO SHEET No. 18

64 DENARD T. POTTER
DB 318, PG 23

65 DEBORAH W. JONES
DB 325, PG 102

67 FREDERICK E. DIETZ
DB 190, PG 727

POS Sta 101+68.628 -L- =
POT Sta 10+00.027 -Y2-

68 DENARD T. POTTER
DB 166, PG 131

71 ELLEN B. JOHNSON
DB 133, PG 351

LEONARD BENNETT
DB 215, PG 308

LEONARD BENNETT
DB 321, PG 758

ARCHIE COMBEST
DB 242, PG 5

ARCHIE COMBEST
DB 309, PG 506

JBJ INVESTMENTS PARTNERSHIP
DB 222, PG 886

BILLY ROGERS
DB 161, PG 449

WESLEY B. BROUGHTON
DB 315, PG 725

U.S. HOUSING & URBAN DEVELOPMENT
DB 393, PG 429

SALLYRENE PEREIRA
DB 237, PG 314

GRIMSLEY
G 266

100+00

101+00

102+00

11+00

CS Sta 101+40.326 -L-

ST Sta 102+10.326 -L-

BL-23 +12.596 -L-
-11.613m (38.10')

BL- 24 +70.610 -L-
9.090m (29.82')

CONSTR. EASEMENT

PROP.GRAVEL DRIVEWAY

PROP.SOIL DRIVEWAYS

PROP.ASPHALT DRIVEWAYS

PROP.R/W

EXIST. 30.48 (100') R/W

750mm C&G

MODIFIED CONC. FLUME SEE SPECIAL DETAIL

BEGIN C&G 1.8 FLARE

END C&G 1.2 FLARE

END CONSTR. STA 10+65.000 -Y2- MATCH EXIST.PVMT. SLOPE & ELEV.

S 42° 55' 01" E

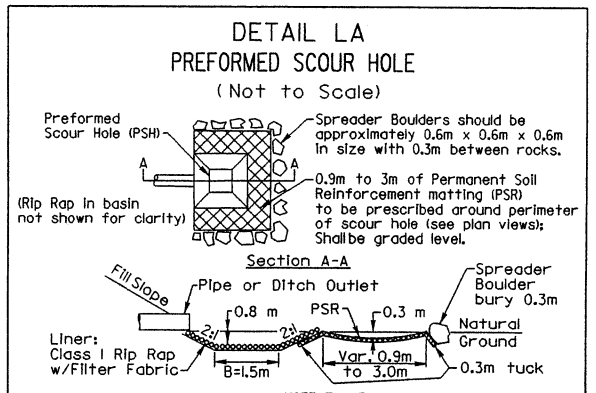
S 63° 28' 19.9" E

NOTE:
SEE SHEET 40 FOR -L- PROFILE
SEE SHEET 48 FOR -Y2- PROFILE

22-MAY-2003 11:32

8/17/99

DETAIL LA
PREFORMED SCOUR HOLE
(Not to Scale)



NOTE: 'B' denotes size of basin; For example: 1.5mx1.5m PSH, B=1.5

NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.

STA -L- 103+62 LT

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METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	18
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

STA 102+80 -L-, MATCH TO SHEET No. 17

STA 106+20 -L-, MATCH TO SHEET No. 19

NC GRID MAG 0°53'

103+00 104+00 105+00 106+00

(71) ELLEN B. JOHNSON DB 133, PG 351

(75) D. KEITH TYNDALL DB 220, PG 67

(77) JULIUS TYNDALL, HEIRS DB 190, PG. 494

(78) DENARD T. POTTER DB 256, PG 435

(79) B. FELTON POTTER DB 117, PG 545

(72) SALLYRENE PEREIRA DB 237, PG 114

(73) METTS GARMENT CO. DB 244, PG 526

(74) TERRY LEE SCOTT DB 238, PG 1

(76) ROBERT L. PIPKIN DB 93, PG 195

PHILLIP S. SCOTT DB 242, PG 299

JOSEPH P. DIXON DB 278, PG 88

(80) TIMOTHY G. CARAWAN DB 229, PG 742

PERMANENT DRAINAGE EASEMENT

PROP. ASPHALT DRIVEWAY

PROP. GRAVEL DRIVEWAY

CONSTR. EASEMENT

MODIFIED CONC. FLUME SEE SPECIAL DETAIL

PREFORMED SCOUR HOLE SEE DETAIL LA

BL- 25 +68.002 -L- 7.095m (23.27')

REMOVE (155)

FILL W/ FLOWABLE GROUT

REMOVE EXIST. DRAINAGE SYSTEM

ISFD

ISBKD

GAZEBO

ISBLK BUS

ISF BUS

ISMTL BUS

CANOPY

MTL

PILES

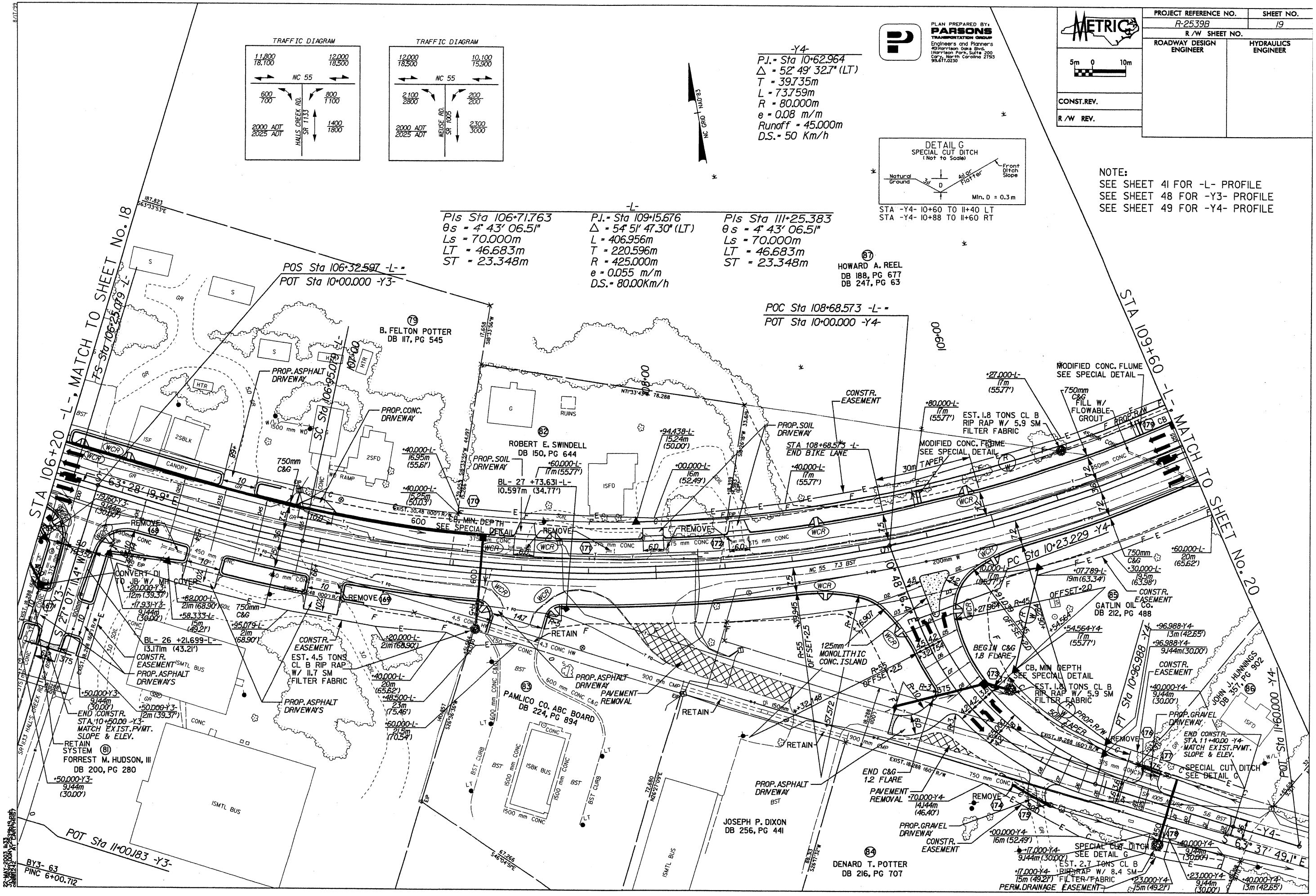
CONC ISL 7 FUEL PUMPS U/MTL CANOPY

1 FUEL TANK 3,788L

1 FUEL TANK 15,152 L

NOTE:
SEE SHEET 41 FOR -L- PROFILE

27-MAY-2003 11:33
jmartin2
N:\Projects\2003\2003-0008\Roadway\Sheets\2003-0008_RDY_SHEET_18.dgn



PROJECT REFERENCE NO.
R-2539B
SHEET NO.
19
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
METRIC
5m 0 10m
PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230
TRAFFIC DIAGRAM
11,800 / 18,100
12,000 / 18,500
NC 55
600 / 700
800 / 1100
HALLS CREEK RD. SR 1133
2000 ADT / 2025 ADT
1400 / 1800
TRAFFIC DIAGRAM
12,000 / 18,500
10,100 / 15,900
NC 55
2100 / 2800
200 / 200
NEUSE RD. SR 1005
2000 ADT / 2025 ADT
2300 / 3000
NC GRID NAD'83
-Y4-
P.I.= Sta 10+62.964
Δ = 52° 49' 32.7" (LT)
T = 39.735m
L = 73.759m
R = 80.000m
e = 0.08 m/m
Runoff = 45.000m
D.S.= 50 Km/h
DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
3:1
D
4:1 or Flatter
Front Ditch Slope
Min. D = 0.3m
STA -Y4- 10+60 TO 11+40 LT
STA -Y4- 10+88 TO 11+60 RT
NOTE:
SEE SHEET 41 FOR -L- PROFILE
SEE SHEET 48 FOR -Y3- PROFILE
SEE SHEET 49 FOR -Y4- PROFILE
-L-
Pls Sta 106+71.763
θs = 4° 43' 06.51"
Ls = 70.000m
LT = 46.683m
ST = 23.348m
P.I.= Sta 109+15.676
Δ = 54° 51' 47.30" (LT)
L = 406.956m
T = 220.596m
R = 425.000m
e = 0.055 m/m
D.S.= 80.00Km/h
Pls Sta 111+25.383
θs = 4° 43' 06.51"
Ls = 70.000m
LT = 46.683m
ST = 23.348m
POS Sta 106+32.597 -L- =
POT Sta 10+00.000 -Y3-
POC Sta 108+68.573 -L- =
POT Sta 10+00.000 -Y4-
STA 106+20 -L-, MATCH TO SHEET No. 18
STA 109+60 -L-, MATCH TO SHEET No. 20
TS Sta 106+25.079 -L-
SC Sta 106+95.079 -L-
PT Sta 10+96.988 -Y4-
POT Sta 11+00.183 -Y3-
POT Sta 11+60.000 -Y4-
S 63° 28' 19.9" E
S 27° 07' 11.4" W
S 63° 37' 49.1" E
B. FELTON POTTER
DB 117, PG 545
HOWARD A. REEL
DB 188, PG 677
DB 247, PG 63
ROBERT E. SWINDELL
DB 150, PG 644
PAMLICO CO. ABC BOARD
DB 224, PG 894
FORREST M. HUDSON, III
DB 200, PG 280
JOSEPH P. DIXON
DB 256, PG 441
DENARD T. POTTER
DB 216, PG 707
GATLIN OIL CO.
DB 212, PG 488
JOHN J. HUNNINGS
DB 357, PG 902
PROP. ASPHALT DRIVEWAY
PROP. CONC. DRIVEWAY
PROP. SOIL DRIVEWAY
PROP. GRAVEL DRIVEWAY
PROP. ASPHALT DRIVEWAYS
CONSTR. EASEMENT
EST. 4.5 TONS CL B RIP RAP W/ 11.7 SM FILTER FABRIC
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC
MODIFIED CONC. FLUME SEE SPECIAL DETAIL
FILL W/ FLOWABLE GROUT
CB, MIN. DEPTH SEE SPECIAL DETAIL
CONVERT DI TO JB W/ MH COVER
BL- 26 +21.699-L- 13.171m (43.21')
BL- 27 +73.631-L- 10.597m (34.77')
STA 108+68.573 -L- END BIKE LANE
125mm MONOLITHIC CONC. ISLAND
BEGIN C&G 1.8 FLARE
END C&G 1.2 FLARE
PAVEMENT REMOVAL
END CONSTR. STA. 10+50.00 -Y3- MATCH EXIST. PVMT. SLOPE & ELEV.
END CONSTR. STA. 11+40.00 -Y4- MATCH EXIST. PVMT. SLOPE & ELEV.
SPECIAL CUT DITCH SEE DETAIL G
PERM. DRAINAGE EASEMENT
BY3- 63
PINC 6+00.712

8/17/99

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

-L-
Pls Sta 106+71.763
θs = 4° 43' 06.51"
Ls = 70.000m
LT = 46.683m
ST = 23.348m

P.I.- Sta 109+15.676
Δ = 54° 51' 47.30" (LT)
L = 406.956m
T = 220.596m
R = 425.000m
e = 0.055 m/m
D.S.- 80.00Km/h

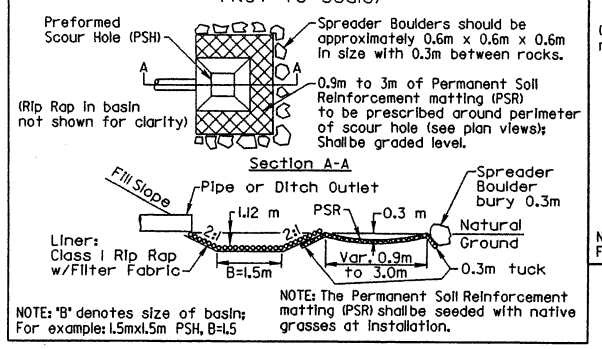
Pls Sta 111+25.383
θs = 4° 43' 06.51"
Ls = 70.000m
LT = 46.683m
ST = 23.348m

-L-
Pls Sta 112+63.865
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337'

P.I.- Sta 113+73.251
Δ = 11° 14' 02.32" (RT)
L = 171.561m
T = 86.056m
R = 875.000m
e = 0.035 m/m
D.S.- 80.00Km/h

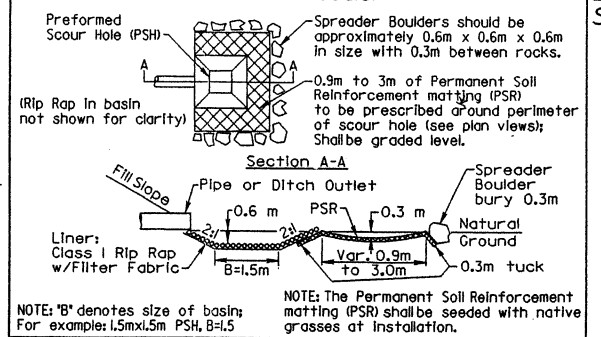
Pls Sta 114+82.093
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337m

DETAIL LB
PREFORMED SCOUR HOLE
(Not to Scale)



NOTE: 'B' denotes size of basin; For example: 1.5mxl.5m PSH, B=1.5
NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.

DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)



NOTE: 'B' denotes size of basin; For example: 1.5mxl.5m PSH, B=1.5
NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.

STA 109+60 -L-, MATCH TO SHEET No. 19
STA 113+20 -L-, MATCH TO SHEET No. 21

STA -L- 110+00
STA -L- 111+31 LT
STA -L- 111+00
STA -L- 112+00 LT
CS Sta 111+02.035 -L-
ST Sta 111+72.035 -L-
TS Sta 112+87.195 -L-
SC Sta 112+87.195 -L-
112+00
113+00

NC GRID NAD'83

PREFORMED SCOUR HOLE SEE DETAIL LB
PERMANENT DRAINAGE EASEMENT
PROP. SOIL DRIVEWAY
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
PREFORMED SCOUR HOLE SEE DETAIL L
PERMANENT DRAINAGE EASEMENT
CONSTR. EASEMENT
PERM. DRAINAGE EASEMENT
CONSTR. EASEMENT
PROPOSED GUARDRAIL
GRADE CURB TO DRAIN
PROP. R/W
CHORD
REMOVE
MIN. DEPTH SEE SPECIAL DETAIL
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
CONSTR. EASEMENT
MODIFIED CONC. FLUME SEE SPECIAL DETAIL
PROP. GRAVEL DRIVEWAY
PROP. SOIL DRIVEWAYS
PROP. GRAVEL DRIVEWAY
TIE TO EXISTING DITCH
TEMP. DRAINAGE EASEMENT
PERM. DRAINAGE EASEMENT
CAT-1
ZONE 1
ZONE 2

HOWARD A. REEL
DB 188, PG 677
DB 247, PG 63

GATLIN OIL Co.
DB 212, PG 488

J. J. HUNNINGS
DB 222, PG 200

J. J. HUNNINGS
DB 175, PG 277

DENARD POTTER
DB 251, PG 519

SPRINT

ERNEST L. RIGGS
DB 122, PG 123

HENRY P. WOODARD
DB 244, PG 475

DENARD POTTER
DB 254, PG 395

CLEM D. HARPER, Jr.
DB 98, PG. 188
DB 193, PG. 440

BL- 28 +73.417 -L-
12.449m (40.84')

BL- 29 +73.769 -L-
-2.249m (7.38')

N 52° 13' 39.8" E

TOTAL CHANNEL EXCAVATION = 30 cu.m.
REPRESENTS CHANNEL EXCAVATION

SECTION B-B
L =6m MEASURED FROM DOWNSTREAM END OF CULVERT.
EXCAVATION = 15 CU.M.
CLASS I RIP RAP = 30 METRIC TONS.
CONSTRUCT TO LIMITS SHOWN IN PLAN.

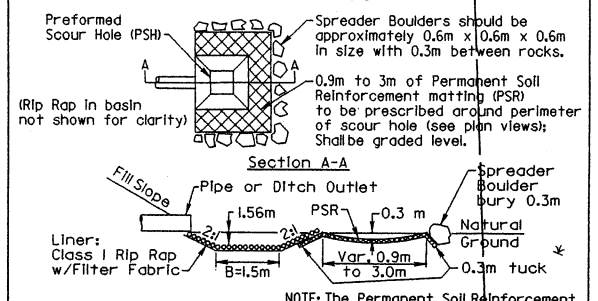
SECTION A-A
L =6m MEASURED FROM UPSTREAM END OF CULVERT.
EXCAVATION = 15 CU.M.

NOTE:
SEE SHEETS 41 & 42 FOR -L- PROFILE

22-MAY-2003 8:33

8/17/99

DETAIL LC
PREFORMED SCOUR HOLE
(Not to Scale)



STA -L- 114+06 LT

-L-
Pls Sta 112+63.865
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337'

P.I.- Sta 113+73.251
Δ = 11° 14' 02.32" (RT)
L = 171.561m
T = 86.056m
R = 875.000m
e = 0.035 m/m
D.S.- 80.00Km/h

Pls Sta 114+82.093
θs = 2° 17' 30.59"
Ls = 70.000m
LT = 46.671m
ST = 23.337m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC
5m 0 10m
CONST.REV.
R/W REV.

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
101 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

(91) JERRY CASEY
DB 212, PG 302

PREFORMED SCOUR HOLE SEE DETAIL LC

(87) HOWARD A. REEL
DB 188, PG 677
DB 247, PG 63

(92) JAMES C. LYNN, Jr
DB 336, PG 313

(91) JERRY CASEY
DB 212, PG 302

(95) WILLIAM DUNN, HEIRS
DB 193, PG 413

(96) ATLANTIC MORTGAGE & INVESTMENT CORP.
DB 370, PG 610

(99) WILTON G. PRICE, Sr.
DB 150, PG 568

(90) CLEM D. HARPER, Jr.
DB 98, PG. 188
DB 193, PG 440

CHARLES W. WALTER
DB 323, PG 731

CHARLES W. BURNETTE
DB 320, PG 582

(93) BENJAMIN TAYLOR
DB 247, PG 179

(97) STEPHEN J. BENNETT, ET AL
DB 351, PG 204

(98) DALLAS H. LEWIS
DB 217, PG 593

MERRION N. CAROON
DB 217, PG 591

TERESA IRELAND WOOD
DB 281, PG 817

STA 113+20 -L-, MATCH TO SHEET No. 20

STA 116+60 -L-, MATCH TO SHEET No. 22

CS Sta 114+58.756 -L-

ST Sta 115+28.756 -L-

114+00

115+00

116+00

BL- 30 +37.898 -L-
-2.492m (8.18')

BL- 31 +06.963 -L-
-4.966m (16.29')

N 68° 02' 13.3" E

PERMANENT DRAINAGE EASEMENT

CONSTR. EASEMENT

PROP. SOIL DRIVEWAY

PROP. ASPHALT DRIVEWAY

PROP. GRAVEL DRIVEWAY

PROP. GRAVEL DRIVEWAYS

EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC

TIE TO EXISTING DITCH

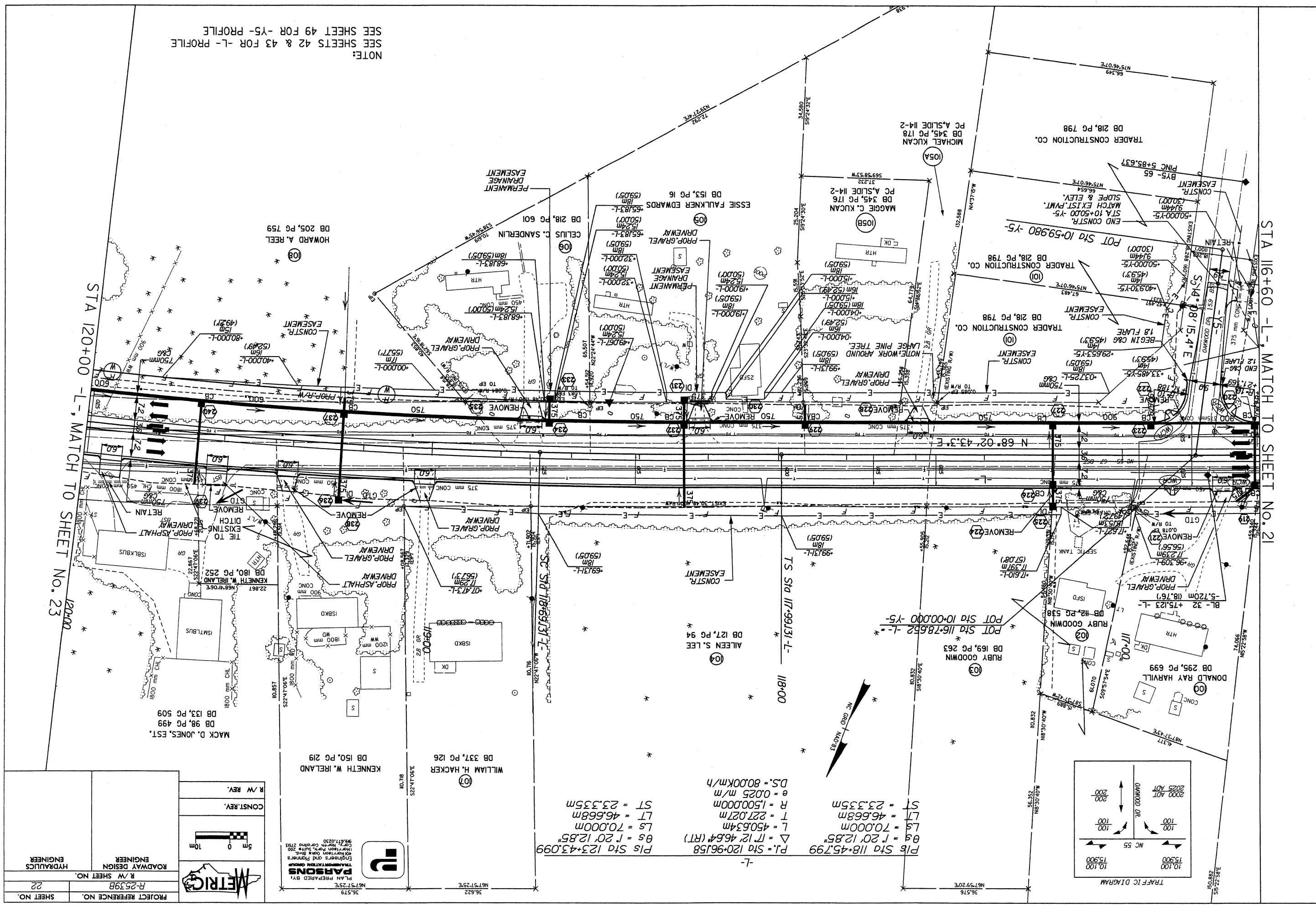
GRADE CURB TO DRAIN

CHILDS PLAYHOUSE

CANOPY

NOTE:
SEE SHEET 42 FOR -L- PROFILE

22-MAY-2003 8:37
jdavis2
N:\Projects\2539B\Roadway\Design\Sheets\2539B_sht_21.dgn



Pls Sta 118+45.799
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

Pl.= Sta 120+96.158
Δ = 17° 12' 46.64" (RT)
L = 450.634m
T = 227.027m
R = 1,500.000m
e = 0.025 m/m
D.S.= 80.00Km/h

Pls Sta 123+43.099
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

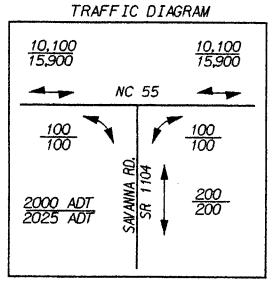
8/17/99

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R/W REV.	

TRAFFIC DIAGRAM



-L-
P.I. = Sta 120+96.158
Δ = 17° 12' 46.64" (RT)
L = 450.634m
T = 227.027m
R = 1,500.000m
e = 0.025 m/m
D.S. = 80.00Km/h

P.I. Sta 118+45.799
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

P.I. Sta 123+43.099
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

DEWEY B. JONES
DB 156, PG 595

MACK D. JONES, EST.
DB 98, PG 499
DB 133, PG 509

REELSBORO METHODIST CHURCH
DB 27, PG 581

(110) F.H. REEL, JR. HEIRS
ALLEN K. HARKER
MYRTLE REEL LEE, HEIRS
LESSIE REEL BRINSON
DB 34, PG 37
DB 159, PG 35
DB 245, PG 499

(109) ALICE B. REEL
DB 231, PG 504

(108) HOWARD A. REEL
DB 205, PG 759

NC GRID | NAD'83

61.952
N80°42'27"E

N09°17'32"W 59.077

N09°17'32"W 55.333

ISFD

HTR

TANK

2SM COVENANT FELLOWSHIP CHURCH

BL- 33 +80.628 -L-
-16.396m (53.79')

RETAIN

REMOVE

PROP. SOIL DRIVEWAYS

PROP. GRAVEL DRIVEWAYS

PROP. GRAVEL DRIVEWAY

CONSTR. EASEMENT

BL- 34 +79.841 -L-
-1.913m (6.28')

CS Sta 123+19.765 -L-

STA 120+00 -L-, MATCH TO SHEET No. 22

STA 123+40 -L-, MATCH TO SHEET No. 24

21+00

122+00

123+00

11+00

EXIST. 30.48 (100') R/W

PROP. R/W

NC 55 67' BST

END C&G 1.2 FLARE

BEGIN C&G 1.8 FLARE

POC Sta 120+78.547 -L- =
POT Sta 10+00.000 -Y6-

S 3°06' 32.8" E

-Y6-

END CONSTR. STA. 10+50.00 -Y6- MATCH EXIST. PVMT. SLOPE & ELEV.

SAWANNA RD SR 1104

EXISTING 18.288 (60') R/W

18.288 (60')

NOTE:
SEE SHEET 43 FOR -L- PROFILE
SEE SHEET 50 FOR -Y6- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	24
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

5m 0 10m

CONST.REV.

R /W REV.

PLAN PREPARED BY:
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Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

-L-
Pls Sta 118+45.799
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

P.I.- Sta 120+96.158
Δ = 17° 12' 46.64" (RT)
L = 450.634m
T = 227.027m
R = 1,500.000m
e = 0.025 m/m
D.S.- 80.00Km/h

Pls Sta 123+43.099
θs = 1° 20' 12.85"
Ls = 70.000m
LT = 46.668m
ST = 23.335m

-Y8-
P.I.- Sta 10+62.380
Δ = 2° 41' 42.5" (LT)
T = 62.380m
L = 124.736m
R = 2,651.768m
e = See plan view

-Y8-
P.I.- Sta 11+40.699
Δ = 12° 08' 54.6" (LT)
T = 15.962m
L = 31.805m
R = 150.000m
e = 0.025 m/m
Runoff - See plan view

TRAFFIC DIAGRAM
2000 ADT
2025 ADT

(110) F.H. REEL, JR. HEIRS
ALLEN K. HARKER
MYRTIE REEL LEE, HEIRS
LESSIE REEL BRINSON
DB 34, PG 37
DB 159, PG 35
DB 245, PG 499

(109) ALICE B. REEL
DB 231, PG 504

(112) DAVID REEL, ET AL
DB 148, PG 607

(113) EMILY B. SCOPPE
DB 335, PG 966

ELLWORTH HEATH
DB 200, PG 396

HUGH BARNS, III
DB 186, PG 129

PC Sta 10+00.000 -Y8-

PT Sta 11+56.541 -Y8-

POT Sta 126+66.584 -L-
POT Sta 10+00.000 -Y7-
POT Sta 11+65.607 -Y8-

PC Sta 11+24.736 -Y8-

PC Sta 10+71.089 -Y7-

ST Sta 123+89.765 -L-

BL- 35 +73.055 -L-
-6.628m (21.74')

BL- 36 +74.050-L-
-7.966m (26.14')

MATCHLINE A-A

STA 123+40 -L-, MATCH TO SHEET No. 23

STA 127+00 -L-, MATCH TO SHEET No. 25

STA 11+00 -Y7-
MATCH TO SHEET No. 34

DETAIL E
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, .08m/m, Fill Slope
Min. D = 0.3 m
b = 0.6m

STA -L- 125+80 TO 126+16 RT

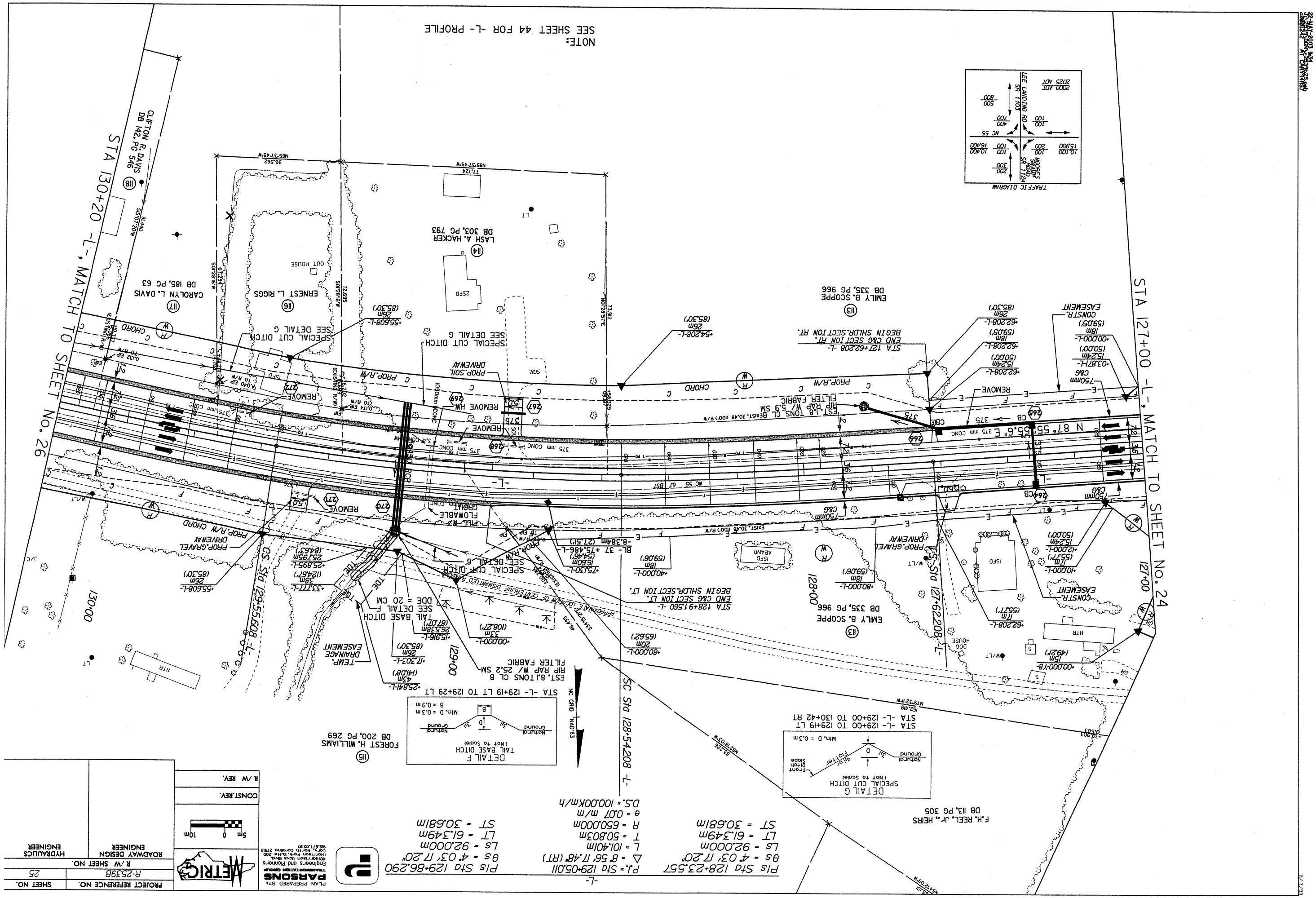
DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, D, 4:1 or Flatter, Front ditch Slope
Min. D = 0.3m

STA -Y8- 10+76 RT TO 11+31RT
STA -Y7- 10+35 RT TO 10+80 RT

NOTE:
SEE SHEETS 43 & 44 FOR -L- PROFILE
SEE SHEET 49 FOR -Y7- PROFILE
SEE SHEET 50 FOR -Y8- PROFILE

8/17/99

30 MAY 2008 8:56
dbaker212 AT CARY1HWY


NOTE:
SEE SHEET 44 FOR -L- PROFILE
STA 130+20 -L-, MATCH TO SHEET No. 26
STA 127+00 -L-, MATCH TO SHEET No. 24
CLIFTON R. DAVIS
DB 142, PG 546
CAROLYN L. DAVIS
DB 185, PG 63
ERNEST L. RIGGS
LASH A. HACKER
DB 303, PG 793
EMILY B. SCOPPE
DB 335, PG 966
FORREST H. WILLIAMS
DB 200, PG 269
F.H. REEL, Jr., HEIRS
DB 113, PG 305
TRAFFIC DIAGRAM
LEE LANDING RD
SR 1103
MOORES SHAP ROAD
SR 1124
NC 55
2000 ADT
2025 ADT
SPECIAL CUT DITCH
SEE DETAIL G
PROP. GRAVEL DRIVEWAY
PROP. R/W CHORD
PROP. R/W
CHORD
REMOVE
TEMP. DRAINAGE EASEMENT
CONSTR. EASEMENT
DETAIL F
TAIL BASE DITCH
(Not to Scale)
DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
NC GRID NAD'83
SC Sta 128+54.208 -L-
CS Sta 129+55.608 -L-
LS Sta 127+62.208 -L-
N 87° 55' 55.6" E
Pls Sta 128+23.557
θs = 4° 03' 17.20"
Ls = 92.000m
LT = 61.349m
ST = 30.681m
Pls Sta 129+86.290
θs = 4° 03' 17.20"
Ls = 92.000m
LT = 61.349m
ST = 30.681m
Pl.= Sta 129+05.011
Δ = 8° 56' 17.48" (RT)
L = 101.401m
T = 50.803m
R = 650.000m
e = 0.07 m/m
D.S.= 100.00Km/h
PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
Harrison Oaks Blvd.
Cary, North Carolina 27513
919.677.0230
METRIC
5m 0 10m
PROJECT REFERENCE NO.
R-2539B
SHEET NO.
25
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	26
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

METRIC 5m 0 10m

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
40 Morrison Oaks Blvd.
Morrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

-L-
Pls Sta 128+23.557
θs = 4° 03' 17.20"
Ls = 92.000m
LT = 61.349m
ST = 30.681m

P.I.= Sta 129+05.011
△ = 8° 56' 17.48" (RT)
L = 101.401m
T = 50.803m
R = 650.000m
e = 0.07 m/m
D.S.= 100.00Km/h

Pls Sta 129+86.290
θs = 4° 03' 17.20"
Ls = 92.000m
LT = 61.349m
ST = 30.681m

NC GRID N40°08'43"E

(115) FOREST H. WILLIAMS
DB 200, PG 269

DETAIL F
HEAD BASE DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, Natural Ground, B
Min. D = 0.3 m
B = 0.6 m
STA -L- 133+35 TO 133+46 LT

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D = 0.3 m
STA -L- 131+60 TO 133+35 LT
STA -L- 131+80 TO 132+20 RT

(123) FOREST WILLIAMS
DB 225, PG 364

TEMP. DRAINAGE EASEMENT

(124) DAVID REEL, ET AL
DB 125, PG 201

TAIL BASE DITCH SEE DETAIL F DDE = 20 CM

*44.776-L- 62m (203.41')

*33.000-L- 26m (85.30')

EST. 10.0 TONS CL B RIP RAP W/ 23.4 SM FILTER FABRIC

*52.762-L- 59m (193.57')

*41.833-L- 26m (85.30')

PREFORMED SCOUR HOLE SEE DETAIL L

BL- 39 +73.592 -L- 7.07lm (23.20')

SPECIAL CUT DITCH SEE DETAIL G

PROP.GRAVEL DRIVEWAY

REMOVE (277)

PROP.R/W

MTL STORAGE BUS

MTL STORAGE BUS

U/C

HTR

GR

250 mm PLASTIC

ST Sta 130+47.608 -L-

*47.608-L- 26m (85.30')

800 mm CMP

35BW

13+00

12+00

13+00

375

276

275 REMOVE

5.0

EXIST. 30.48 (100') R/W

375 mm CONC

450 mm RCP CLASS III

1.2

7.2

3.6

2.4

-L-

STA 130+20 -L-, MATCH TO SHEET No. 25

STA 133+60 -L-, MATCH TO SHEET No. 27

S 75° 01' 12.5" E

200mm W

24 PAVED SHLDR.

375 mm CONC

900 mm CONC

1275 mm CONC

REMOVE (273)

REMOVE (274)

REMOVE (280)

REMOVE (281)

REMOVE (283)

REMOVE (282)

REMOVE (287)

REMOVE (285)

REMOVE (286)

REMOVE (288)

CHORD

SPECIAL CUT DITCH

PROP.GRAVEL DRIVEWAY

*47.608-L- 26m (85.30')

PROPOSED EXPRESSWAY GUTTER

BL- 38 +93.660 -L- 6.900m (22.64')

BEGIN EXPRESSWAY GUTTER STA.130+72.500

END EXPRESSWAY GUTTER STA.131+77.500

(119) JAMES W. LEE
DB 170, PG 671

SPECIAL CUT DITCH SEE DETAIL G

PROP.SOIL PROP.R/W DRIVEWAYS

PREFORMED SCOUR HOLE SEE DETAIL L

*32.327-L- 26m (85.30')

*35.000-L- 45m (147.64')

*40.808-L- 26m (85.30')

*43.379-L- 43m (141.08')

HEAD BASE DITCH W/ CL B RIP RAP SEE DETAIL M DDE = 15 CM

ISBKD

FLAG POLE

POOL

(118) CLIFTON R. DAVIS
DB 142, PG 546

(117) CAROLYN L. DAVIS
DB 185, PG 63

(120) FAYE B. TINGLE
DB 244, PG 820

(121) GUY O. DARNA JR., et ux
DB 377, PG 369

(122) OSCAR A. KRECHEL, Jr.
DB 88E, PG 61

PERMANENT DRAINAGE EASEMENT

DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)
Preformed Scour Hole (PSH)
(Rip Rap in basin not shown for clarity)
Section A-A
Fill Slope, Pipe or Ditch Outlet, 0.6 m, PSR, 0.3 m, Spreader Boulder bury 0.3m, Natural Ground, 2:1, 2:1, Liner: Class I Rip Rap w/Filter Fabric, B=1.5m, Var. 0.9m to 3.0m, 0.3m tuck
Spreader Boulders should be approximately 0.6m x 0.6m x 0.6m in size with 0.3m between rocks.
0.9m to 3m of Permanent Soil Reinforcement matting (PSR) to be prescribed around perimeter of scour hole (see plan views); Shallbe graded level.
NOTE: 'B' denotes size of basin: For example: 1.5mx1.5m PSH, B=1.5
NOTE: The Permanent Soil Reinforcement matting (PSR) shallbe seeded with native grasses at installation.
STA -L- 133+30 LT & RT

DETAIL M
HEAD BASE DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, Natural Ground, Filter Fabric, B
Min. D = 0.3 m
Max. d = 0.3 m
B = 0.6 m
Type of Liner = CLASS B RIP RAP
STA -L- 133+35 TO 133+37 RT

NOTE:
SEE SHEET 44 FOR -L- PROFILE

39.014 S74°52'40"E

82.384 S82°21'40"E

73.335 S74°29'40"E

62.954 S74°58'04"E

94.440 S85°07'20"W

94.440 S85°02'00"W

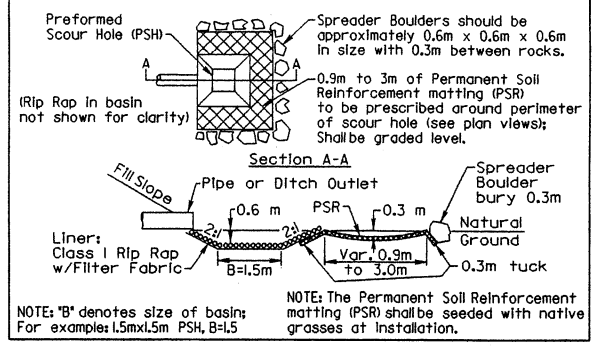
22-MAY-2003 9:34
jdavis2
M:\PROJECTS\2539B\ROADWAY\PLANS\2539B_PLAN_SHEET_26.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	27
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

METRIC 5m 0 10m

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

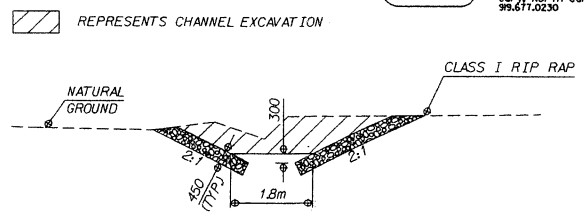
DETAIL L
PREFORMED SCOUR HOLE
(Not to Scale)



NOTE: "B" denotes size of basin; For example: 1.5mx1.5m PSH, B=1.5

NOTE: The Permanent Soil Reinforcement matting (PSR) shall be seeded with native grasses at installation.

STA -L- 136+34 LT



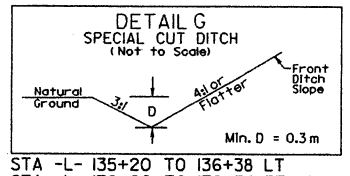
SECTION A-A

L -10m MEASURED FROM DOWNSTREAM END OF CULVERT.
EXCAVATION = 35 CUM.
CLASS I RIP RAP = 20 METRIC TONS.
CONSTRUCT TO LIMITS SHOWN IN PLAN.

NC GRID NAD83

(124) DAVID REEL, ET AL DB 125, PG 201

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)



STA -L- 135+20 TO 136+38 LT
STA -L- 136+20 TO 136+54 RT
STA -L- 134+60 TO 135+75 RT

STA 133+60 -L-, MATCH TO SHEET No. 26

STA 137+00 -L-, MATCH TO SHEET No. 28

134+00 135+00 136+00 137+00

+00.000-L- 26m (85.30')

BL- 40 +73.115-L- 5.532m (18.15')

PROP.R/W

APPROXIMATE LOCATION OF CENTERLINE DISMANTLED RAILROAD

EXISTING R/W

EXIST. 30.48 (100') R/W

HO WLB

SPECIAL CUT DITCH SEE DETAIL G

EST. 9.0 TONS CL B RIP RAP W/ 23.4 SM FILTER FABRIC

PREFORMED SCOUR HOLE SEE DETAIL L

TEMP. DRAINAGE EASEMENT

ZONE 1 ZONE 2

+55.000-L- 53m (173.88')

+77.000-L- 53m (173.88')

+55.000-L- 26m (85.30')

+77.000-L- 26m (85.30')

EST. 20 TONS CL. I RIP RAP W/ 40 SM FILTER FABRIC DDE = 35 CM

PROPOSED GUARDRAIL

(131) LOTTIE NILES, HEIRS DB 130, PG 231

REMOVE 2-900mm CONC

EXTEND EXIST. 1.8 X 1.2 RCBC

1050mm CONC

2400D RCP

REMOVE HW 1.8 X 1.2 CONC

1.4 CONC WW'S CAT-1

2.2 CONC HW

REMOVE 375 mm CONC

450 mm CONC

S 75° 01' 12.5" E

REMOVE HW & PIPE

EXTEND EXIST. 1.8 X 1.2 RCBC

1.8 X 1.2 CONC RCBC W/ CONC WW

SPECIAL CUT DITCH SEE DETAIL G

SPECIAL CUT DITCH SEE DETAIL G

+59.468-L- 26m (85.30')

PROPOSED FLOODPLAIN EXCAVATION DDE = 25 CM

PROPOSED CHANNEL RELOCATION BASE-0.90m

+67.000-L- 47m (154.20')

PERMANENT DRAINAGE EASEMENT

+00.000-L- 26m (85.30')

PROP. GRAVEL DRIVEWAY

+80.000-L- 26m (85.30')

PROP. GRAVEL DRIVEWAYS

PROPOSED GUARDRAIL

+20.000-L- 26m (85.30')

CONSTR. EASEMENT

+60.000-L- 29m (95.14')

ISFD

ISBKD

BLK WALL

900 mm CONC

1200 mm CONC

600 mm WD RAIL

ISMTLBUS

YARD DECORATION

RR TIMBERS

HTR

GR

CONC

(122) OSCAR A. KRECHEL, Jr. DB 88E, PG 61

(125) ERNEST L. RIGGS DB 140, PG 425

(126) EDWARD L. RIGGS DB 184, PG 637

(127) ELSIE SPIVEY DB 108, PG 485

(128) MARY D. LAGRONE DB 225, PG 168

(129) ALLEN ALCOCK DB 380, PG 508

(130) DAVID M. PICKELL DB 256, PG 165

(127) ELSIE SPIVEY DB 108, PG 485

73.457 53.298 49.700 38.100

NOTE:
SEE SHEETS 44 & 45 FOR -L- PROFILE

8/17/99

25-JAN-2000 11:54
dbaker242 on CARY4185

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	28
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

REVISIONS
R/W REVISION: 04/04/03, PARCEL NO.139 DELETED AND TOTAL AREA COMBINED WITH PARCEL NO.144
R/W REVISION: 04/04/03, PARCEL NO.144 TOTAL AREA AND AREAS TAKEN CHANGED
R/W REVISION: 04/04/03, PARCEL NO.145 AREAS TAKEN CHANGED

-L-
PIs Sta 138+13.408
θs = 4° 58' 56.07"
Ls = 100.000m
LT = 66.693m
ST = 33.357m

P.I.= Sta 139+55.315
Δ = 21° 23' 27.49" (LT)
L = 214.672m
T = 108.600m
R = 575.000m
e = 0.08 m/m
D.S.= 100.00Km/h

PIs Sta 140+94.744
θs = 4° 58' 56.07"
Ls = 100.000m
LT = 66.693m
ST = 33.357m

NC GRID NAD'83

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3H, D, 4H or Flatter, Front Ditch Slope
Min. D = 0.3 m

DETAIL F
TAIL BASE DITCH
(Not to Scale)
Natural Ground, 3H, D, 3H, Natural Ground, B
Min. D = 0.3 m
B = 0.6 m

STA -L- 139+05 TO 140+40 LT
STA -L- 138+20 TO 139+00 LT
STA -L- 139+03 TO 139+05 LT

MATCH TO SHEET No. 27
MATCH TO SHEET No. 29
STA 137+00 -L-
STA 140+40 -L-

(131) LOTTIE NILES, HEIRS
DB 130, PG 231

(132) CLINTON SCOTT
DB 112, PG 299

(134) MILDRED DAVID, HEIRS
DB 112, PG 299

(137) NEHEMIAH WOODARD
DB 191, PG 64

(144) MARY BROWN
DB 112, PG 488

(144) MARY L. BROWN
DB 105, PG 470

(46) CLAUDE A. STATEN
DB 266, PG 362

(42) JESSE B. CANNON
DB 227, PG 34

(127) ELSIE SPIVEY
DB 108, PG 485

(133) BENJAMIN F. CURTIS
DB 201, PG 819

(135) RUFUS GILLIAM
DB 180, PG 717

(136) HERBERT L. COLLINS
DB 238, PG 437

(127) ELSIE SPIVEY
DB 108, PG 485

(138) SADIE McGLONE
DB 140, PG 734

(140) BEASLEY FM ACQUISITION CORP.
DB 317, PG 880

(141) EULA CREDLE
DB 176, PG 508

(143) ROSA G. MOORE
DB 127, PG 482

(145) ELIZABETH MOORE
DB 291, PG 378

PROP. SOIL DRIVEWAY
PROP. GRAVEL DRIVEWAY
PROPOSED GUARDRAIL
TS Sta 137+46.714 -L-
SC Sta 138+46.714 -L-
*46715-L- 26m (85.30')
*20000-L- 26m (85.30')
*20000-L- 50m (164.04')
PROP. R/W CHORD
PROP. R/W
BL- 41 +94.336 -L- 6.779m (22.24')
BL- 42 +35.251-L- 6.770m (22.21')
DO NOT DISTURB WELL
REMOVE
TAIL BASE DITCH SEE DETAIL F
DDE= 5CM
EST. 10.0 TONS CL B RIP RAP W/ 23.4 SM FILTER FABRIC
EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC
SPECIAL CUT DITCH SEE DETAIL G
APPROXIMATE LOCATION OF CENTERLINE DISMANTLED RAILROAD
EXIST. 30.48 (100') R/W
FILL WITH FLOWABLE GROUT
CROSS VANE ROCK WEIR SEE SHEET 2-H
PROPOSED CHANNEL RELOCATION BASE-0.9m
PERMANENT DRAINAGE EASEMENT
RADIO TOWER GUIDE ANCHORS
ISBLKD ABAND
ISFD ABAND
ISBKD
ISFD
HTR
WD RAMP
CONC
GR
S
W/LT
900 mm CONC
375 mm CONC
375 mm CMP
450 mm CONC
1500 mm WW
1800 mm CHL
900 - 600 mm BLK WALL
2.6 SOIL
2.8 SOIL

NOTE:
SEE SHEET 45 FOR -L- PROFILE

8/17/99

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	29
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST.REV.	
R /W REV.	

DETAIL F
TAIL BASE DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, Natural Ground, B
Min. D = 0.3 m
B = 0.6 m

NC GRID | NAD 83

STA -L- 141+36 LT TO 141+38 LT

Pls Sta 138+13.408
θs = 4° 58' 56.07"
Ls = 100.000m
LT = 66.693m
ST = 33.357m

P.I.= Sta 139+55.315
Δ = 21° 23' 27.49" (LT)
L = 214.672m
T = 108.600m
R = 575.000m
e = 0.08 m/m
D.S.= 100.00Km/h

Pls Sta 140+94.744
θs = 4° 58' 56.07"
Ls = 100.000m
LT = 66.693m
ST = 33.357m

-L-

57.999 N78°42'33"E

(146) CLAUDE A. STATEN
DB 266,PG 362

(148) CHARLES A. STATEN
DB 300, PG 189

(149) RWR LOGGING, INC.
DB 282, PG 438

142 JESSIE B. CAHOON
DB 227, PG 34

MATCH TO SHEET No. 28

STA 140+61.387 -L-

HTR

ISFD ABAND

1200 mm WW

TAIL BASE DITCH
SEE DETAIL F
DDE= 10CM
EST. 23.6 TONS CL I
RIP RAP W/ 41.8 SM
FILTER FABRIC

STA 141+61.387 -L-

141+00

142+00

143+00

+61.387-L- 26m (85.30')

PROP. SOIL DRIVEWAY

PROP. GRAVEL DRIVEWAY

PROP. R/W

CHORD

SPECIAL CUT DITCH
SEE DETAIL G

BL- 43 +33.011 -L-
6.674m (21.90')

EST. 2.7 TONS CL B
RIP RAP W/ 8.4 SM
FILTER FABRIC

SPECIAL CUT DITCH
SEE DETAIL G

EXTEND 450
WITH COLLAR

EXISTING R/W

RETAIN. PIPE CLEANOUT
L = 17.6 M

(311) REMOVE 375 mm CONC

(312) REMOVE 375 mm CONC

(314) REMOVE 375 mm CONC

(315) REMOVE 375 mm CONC

(316) REMOVE 450 mm CSP

RCBC W/CONC. WING WALL

1-R CONC. WW'S TBJB(317)

(316) 1200 RCP W/ COLLAR

(313) REMOVE 375 mm CONC

PROP. SOIL DRIVEWAY

PROP. R/W CHORD

ELIZABETH MOORE
DB 291, PG 378

(145) (147) DEWEY M. STOKES
DB 268, PG 589

+61.387-L- 26m (85.30')

64.121 N75°04'32"E

64.145 S9°56'53"W

SPECIAL CUT DITCH
SEE DETAIL G

(150) EMMANUEL BAPTIST CHURCH
DB 309, PG 78

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 3:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D = 0.3 m

STA -L- 141+60 LT TO 142+00 LT
STA -L- 143+00 LT TO 143+40 LT
STA -L- 141+25 RT TO 142+00 RT

(316) 1200 RCP W/ COLLAR

0.99 EIP TO R/W

EXIST. 30.48 (100') R/W

(319) REMOVE 375 mm CONC

(320) 0.40 EIP TO R/W

(321) REMOVE 375 mm CONC

(322) REMOVE 375 mm CONC

(323) EXTEND 450 WITH COLLAR

GTD

(324)

PROP. R/W

PROP. CONCRETE DRIVEWAY

PROP. ASPHALT DRIVEWAY

(151) ALISA SESSOMS
DB 339, PG 584

(152) EMMANUEL BAPTIST CHURCH
DB 266, PG 519

PROP. GRAVEL DRIVEWAY

EMMANUEL BAPTIST CHURCH

BLK

TANK

1200 mm CONC RAMP

GR

ISBKD

DK

G

(153) MIKE MONK, JR.
DB 368, PG 955

(154) VANCE KIRKMAN
DB 172, PG 423

(155) FRED C. SQUIRES
DB 265, PG 49

N 73° 37' 27.9" E

81.684 S73°41'18"W

30.480 S73°41'18"W

14.954 S73°41'19"W

30.413 S73°41'18"W

30.480 S73°41'18"W

76.200 S73°41'18"W

MATCH TO SHEET No. 30

STA 143+80 -L-

STA 140+40 -L-

NOTE:
SEE SHEETS 45 & 46 FOR -L- PROFILE

27-JAN-2003 11:55
dwm1242 on DWM1242

8/17/99

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	30
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

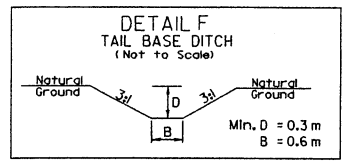
R /W REV.

-L-
P.I. = 144+74.393
△ = 1° 46' 16.9" (LT)
T = 61.837m
L = 123.664m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h

-L-
P.I. = 146+87.882
△ = 1° 46' 17.0" (RT)
T = 61.838m
L = 123.666m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h

NC GRID / NAD'83

DETAIL F
TAIL BASE DITCH
(Not to Scale)



STA -L- 145+80 LT

STA 143+80 -L-, MATCH TO SHEET No. 29

STA 147+20 -L-, MATCH TO SHEET No. 31

144+00 | PC Sta 144+12.556 -L- | 145+00 | PT Sta 145+36.220 -L- | 146+00 | PC Sta 146+26.044 -L- | 147+00

+12.556-L- 26m (85.30')

BL-44 +33.711-L- 7.108m (23.32')

+36.220-L- 26m (85.30')

+26.045-L- 26m (85.30')

BL- 45 +30.559 -L- 12.598m (41.33')

PROP.R/W

APPROXIMATE LOCATION OF CENTERLINE DISMANTLED RAILROAD

EXIST. 30.48 (100') R/W

149 RWR LOGGING, INC. DB 282, PG 438

EST. 2.7 TONS CL B RIP RAP W/ 8.4 SM FILTER FABRIC

TAIL BASE DITCH SEE DETAIL F DDE= 10 CM

HQ WLB

EXTEND 450 RCP WITH COLLAR

REMOVE EX. 600 PIPE 331

330 900mm CONC RETAIN

PIPE CLEAN OUT @ 19 M

N 71° 51' 11.0" E

PROP.GRAVEL DRIVEWAYS

200mm W

375 mm CONC

300 mm CONC

REMOVE 325 326 327 328 329 332 334 335 336 337

N 73° 37' 27.9" E

PROP.CONCRETE DRIVEWAY

PROP.R/W DRIVEWAY

PROP.ASPHALT DRIVEWAY

EXTEND 450 RCP WITH COLLAR

PROP.SOIL DRIVEWAY

PROP.R/W PROP.CONCRETE DRIVEWAY W/LT

PROP.GRAVEL DRIVEWAY

1200 mm CONC

1200 mm WD RAMP

900 mm CONC

1200 mm WD

1500 mm CONC

450 mm CONC

600 mm WD Rail

SPECIAL CUT DITCH

900 mm CONC

HTR

155 FRED C. SQUIRES DB 265, PG 49

156 HILBERT R. SESSOMS DB 155, PG 252

157 MARTHA ROBERSON DB 150, PG 620

158 ELNORA H. FINCH

159 AUTHUR M. KELLY DB 157, PG 519

160 JAMES A. GIBBS DB 162, PG 482

161 JAMES A. GIBBS DB 180, PG 724

162 CLIFFORD R. VEREEN DB 183, PG 428

163 CLIFFORD R. VEREEN DB 214, PG 416

LORENZO DAVIS DB 208, PG 266

LESLIE MOORE DB 208, PG 248

ISBKD | 2SBKD | ISMD | GAZEBO | ISF BUS | HTR

60.960 S73°41'18"W | 30.480 S73°41'18"W | 30.480 S73°41'18"W | 30.480 S73°41'18"W | 63.845 S73°41'18"W | 30.480 S73°41'18"W | 30.480 S73°41'18"W | 30.257 S73°41'18"W | 30.257 S73°41'18"W | 30.319 S73°41'18"W

NOTE:
SEE SHEET 46 FOR -L- PROFILE

22-MAY-2003 8:35
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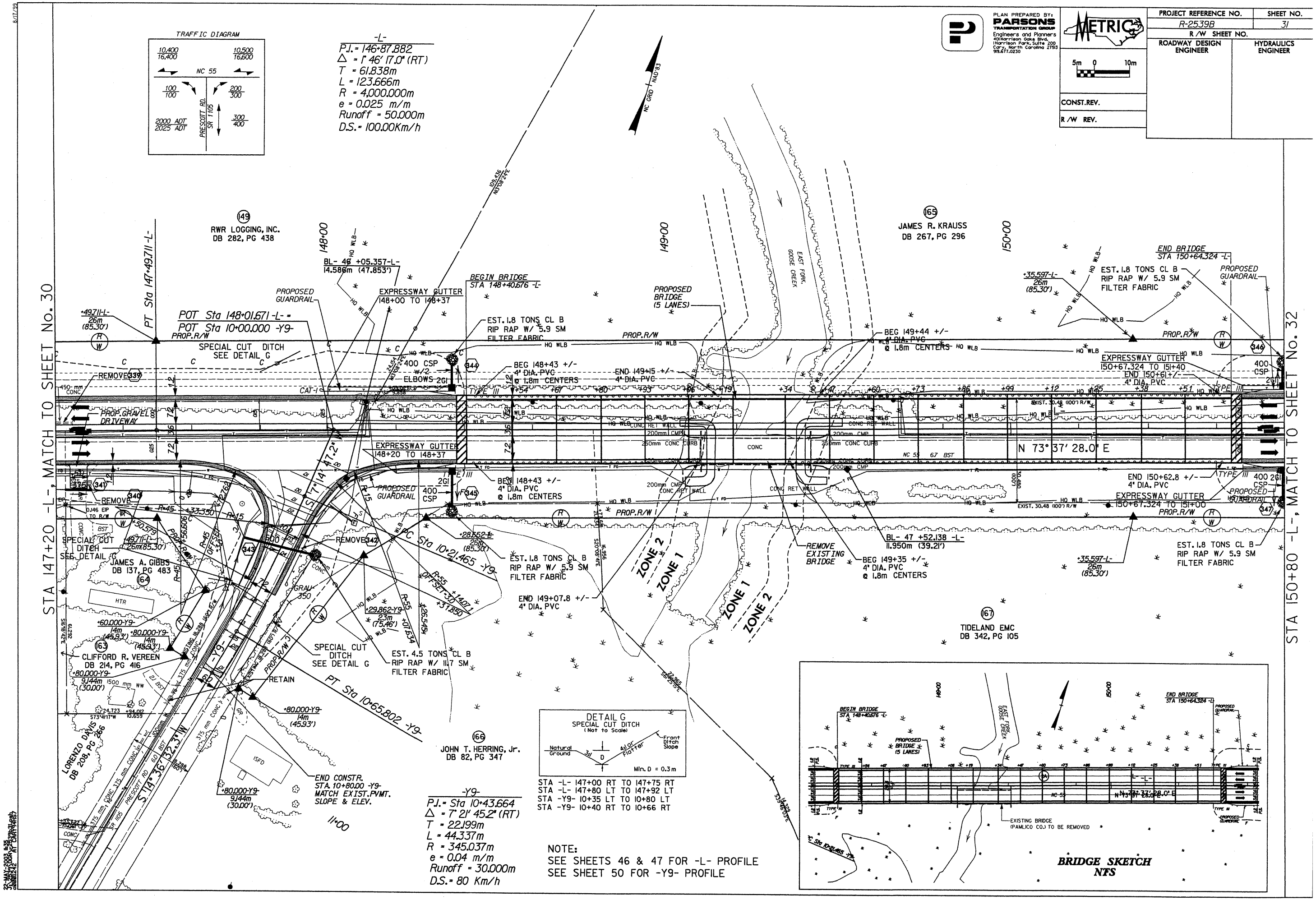
jdavis



PLAN PREPARED BY: PARSONS TRANSPORTATION GROUP
Engineers and Planners
METRIC
PROJECT REFERENCE NO. R-2539B
SHEET NO. 31
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
CONST.REV.
R/W REV.
TRAFFIC DIAGRAM
NC 55
PRESCOTT RD. SR 1105
-L-
P.I. = 146+87.882
Δ = 1° 46' 17.0" (RT)
T = 61.838m
L = 123.666m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h
NC GRID NAD'83
STA 147+20 -L-, MATCH TO SHEET No. 30
STA 150+80 -L-, MATCH TO SHEET No. 32
RWR LOGGING, INC. DB 282, PG 438
JAMES R. KRAUSS DB 267, PG 296
JAMES A. GIBBS DB 137, PG 483
CLIFFORD R. VEREEN DB 214, PG 416
LORENZO DAVIS DB 208, PG 266
JOHN T. HERRING, Jr. DB 82, PG 347
TIDELAND EMC DB 342, PG 105
BL- 46 +05.357-L- 14.586m (47.853')
BL- 47 +52.138 -L- 11.950m (39.21')
BEGIN BRIDGE STA 148+40.676 -L-
END BRIDGE STA 150+64.324 -L-
PT Sta 147+49.711 -L-
POT Sta 148+01.671 -L- = POT Sta 10+00.000 -Y9-
PT Sta 10+65.802 -Y9-
PC Sta 10+21.465 -Y9-
S 7° 14' 47.2" W
S 14° 36' 32.3" W
N 73° 37' 28.0" E
EXPRESSWAY GUTTER 148+00 TO 148+37
EXPRESSWAY GUTTER 148+20 TO 148+37
EXPRESSWAY GUTTER 150+67.324 TO 151+40
EXPRESSWAY GUTTER 150+67.324 TO 151+00
EST. 1.8 TONS CL B RIP RAP W/ 5.9 SM FILTER FABRIC
EST. 4.5 TONS CL B RIP RAP W/ 11.7 SM FILTER FABRIC
BEG 148+43 +/- 4" DIA. PVC @ 1.8m CENTERS
END 149+15 +/- 4" DIA. PVC
BEG 149+44 +/- 4" DIA. PVC @ 1.8m CENTERS
BEG 149+35 +/- 4" DIA. PVC @ 1.8m CENTERS
END 150+62.8 +/- 4" DIA. PVC
END 149+07.8 +/- 4" DIA. PVC
PROPOSED BRIDGE (5 LANES)
EAST FORK GOOSE CREEK
REMOVE EXISTING BRIDGE
PROPOSED GUARDRAIL
PROP. GRAVEL DRIVEWAY
SPECIAL CUT DITCH SEE DETAIL G
400 CSP w/2 ELBOWS 2G1
ZONE 1
ZONE 2
DETAIL G
SPECIAL CUT DITCH (Not to Scale)
Natural Ground
Front Ditch Slope
Min. D = 0.3m
STA -L- 147+00 RT TO 147+75 RT
STA -L- 147+80 LT TO 147+92 LT
STA -Y9- 10+35 LT TO 10+80 LT
STA -Y9- 10+40 RT TO 10+66 RT
-Y9-
P.I. = Sta 10+43.664
Δ = 7° 21' 45.2" (RT)
T = 22.199m
L = 44.337m
R = 345.037m
e = 0.04 m/m
Runoff = 30.000m
D.S. = 80 Km/h
NOTE:
SEE SHEETS 46 & 47 FOR -L- PROFILE
SEE SHEET 50 FOR -Y9- PROFILE
BRIDGE SKETCH NTS
EXISTING BRIDGE (PAMLICO CO.) TO BE REMOVED

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8/17/99

STA 150+80 -L-, MATCH TO SHEET No. 31

STA 154+40 -L-, MATCH TO SHEET No. 33

-L-
P.I. = 152+08.767
Δ = 1° 48' 16.1" (RT)
T = 62.993m
L = 125.976m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h

-L-
P.I. = 154+18.341
Δ = 1° 48' 16.2" (LT)
T = 62.994m
L = 125.978m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h

-Y10-
P.I. = Sta 10+30.813
Δ = 28° 58' 35.2" (RT)
T = 30.676m
L = 60.039m
R = 118.777m
e = 0.07 m/m
Runoff = 42m
D.S. = 50 Km/h

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
4:1 or Flatter
Front Ditch Slope
Min. D = 0.3m

STA -L- 151+45 TO 153+02 LT
STA -L- 151+80 TO 153+13 RT
STA -Y11- 10+20 TO 10+70 LT
STA -Y11- 10+18 TO 10+70 RT

NOTE:
SEE SHEET 47 FOR -L- PROFILE
SEE SHEET 50 FOR -Y10- PROFILE
SEE SHEET 51 FOR -Y11- PROFILE

PLAN PREPARED BY:
PARSONS TRANSPORTATION GROUP
Engineers and Planners
4000 Hanson Corp. Blvd.
Harrison Prof. Suite 2700
Cary, NC 27513
919.677.2330

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R/W REV.

8/17/99

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC
5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.

-L-
P.I. = 154+18.341
Δ = 1° 48' 16.2" (LT)
T = 62.994m
L = 125.978m
R = 4,000.000m
e = 0.025 m/m
Runoff = 50.000m
D.S. = 100.00Km/h

NC GRID | NAD'83

(171)
OSCAR A. KRECHEL, Jr.
DB 170, PG 47

END CONSTRUCTION (R-2539B)
POT Sta 156+32.750 -L-, LT.

STA 154+40 -L-, MATCH TO SHEET No. 32

POT Sta 154+81.325 -L-

155+00

156+00

157+00

POT Sta 157+62.770 -L-

B, CANOPY, GRAIN SILOS, TANK 1000 GAL, SILO, ISMTL BUS, WEIGHT SCALE, W/LT, LT, S, GR

300 mm CONC, RETAIN, PROP. GRAVEL DRIVEWAY, PROP. R/W, CONC HW

APPROXIMATE LOCATION OF CENTERLINE DISMANTLED RAILROAD

- DATUR, 200mm PVC SSFM - DATUR, EXIST. 30.48 (100') R/W

(361) 50 375 REMOVE (362) (363) 100 375

375 mm CONC

3.35% 3.35% NC 55 | 67 BST

-L-

N 73° 37' 27.9" E

200mm W

+32.750 -L- 26m (85.30')

TH 2
STA. "L" 156+17.95
14.279m LT
ELEV=7.386m
N 156049.07
E 804881.95
.203m SANITARY SEWER FORCE MAIN

WEYERHAEUSER CO.
DB 99, PG 363

BL- 50 +24.459-L-
-5.445m (17.86')

17.08m S35°43'15"W

+16.422 15.202

(358) 50 375 (359) 50 375 (360)

REMOVE PROP. R/W

0.566 R/W TO EIP

+63.330 24.756

EXIST. 30.48 (100') R/W

PROP. GRAVEL DRIVEWAYS

HTR

-29.923-L- 26m (85.30')

ISMTL CHURCH

HARVEST TEMPLE ASSEMBLY OF GOD

CONC

(172)

THE ASSEMBLIES OF GOD
DB 245, PG 41
DB 205, PG 253

15.240 S35°43'15"W

END STATE PROJECT (R-2539B)
POT Sta 155+43.630 -L-

WEYERHAEUSER CO.
DB 99, PG 363

MARY S. BRINSON

NOTE:
SEE SHEET 47 FOR -L- PROFILE

22-MAY-2003 14:26
jmartin
C:\projects\2539b\roadway\sheets\2539bsht33.dgn

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLAN PREPARED BY:
PARSONS
TRANSPORTATION GROUP
Engineers and Planners
401 Harrison Oaks Blvd.
Harrison Park, Suite 200
Cary, North Carolina 27513
919.677.0230

METRIC

5m 0 10m

CONST. REV.

R/W REV.

NOTE:
SEE SHEET 49 FOR PROP. -Y7- GRADE

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c0001242 AT CARY94HS7

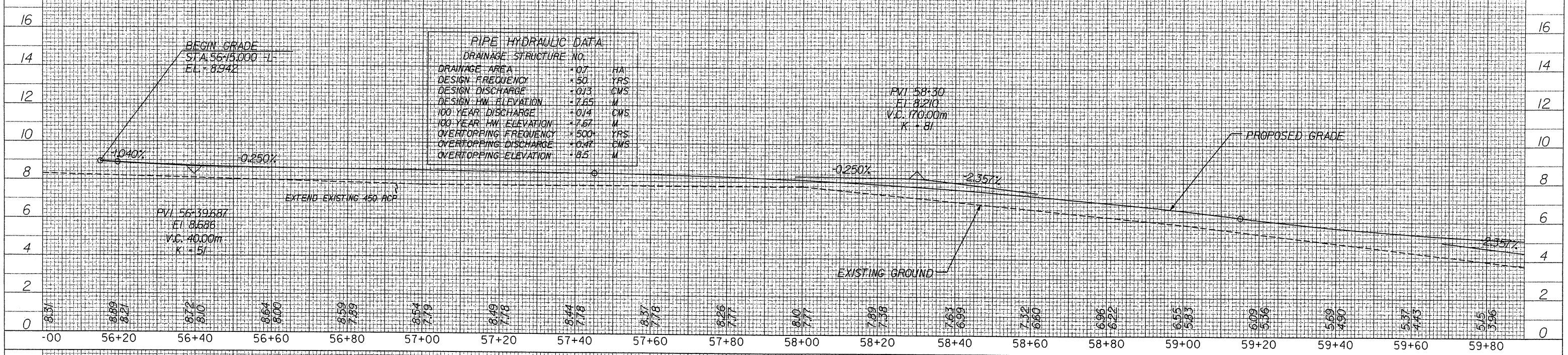
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R/W REV.

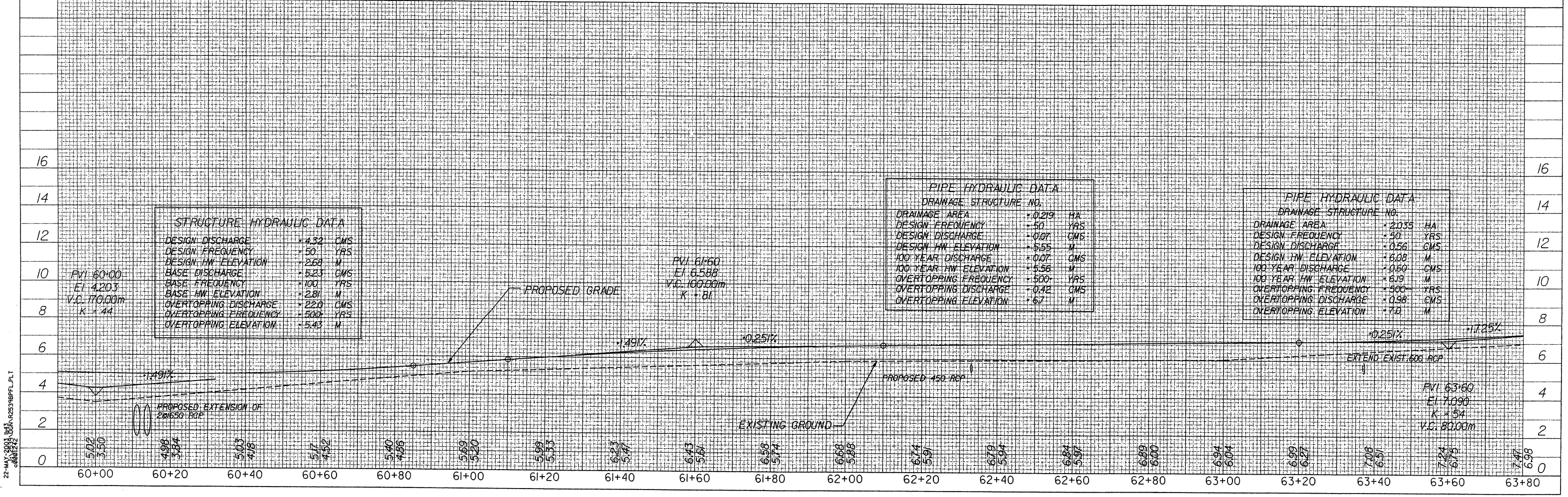
-L- PROFILE

BM-1
-BL- STA 7+36.07, 81.399m RT. - R.R. SPIKE
IN BASE OF 30" OAK IN EDGE OF FIELD
ELEVATION=6.950



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 0.7	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.13	CMS
DESIGN HW ELEVATION	= 7.65	M
100 YEAR DISCHARGE	= 0.14	CMS
100 YEAR HW ELEVATION	= 7.67	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.47	CMS
OVERTOPPING ELEVATION	= 8.5	M



STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 4.32	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 2.68	M
BASE DISCHARGE	= 5.23	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2.81	M
OVERTOPPING DISCHARGE	= 22.0	CMS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 5.43	M

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 0.219	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.07	CMS
DESIGN HW ELEVATION	= 5.55	M
100 YEAR DISCHARGE	= 0.07	CMS
100 YEAR HW ELEVATION	= 5.56	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.42	CMS
OVERTOPPING ELEVATION	= 6.7	M

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 2.035	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.56	CMS
DESIGN HW ELEVATION	= 6.08	M
100 YEAR DISCHARGE	= 0.60	CMS
100 YEAR HW ELEVATION	= 6.19	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.98	CMS
OVERTOPPING ELEVATION	= 7.0	M

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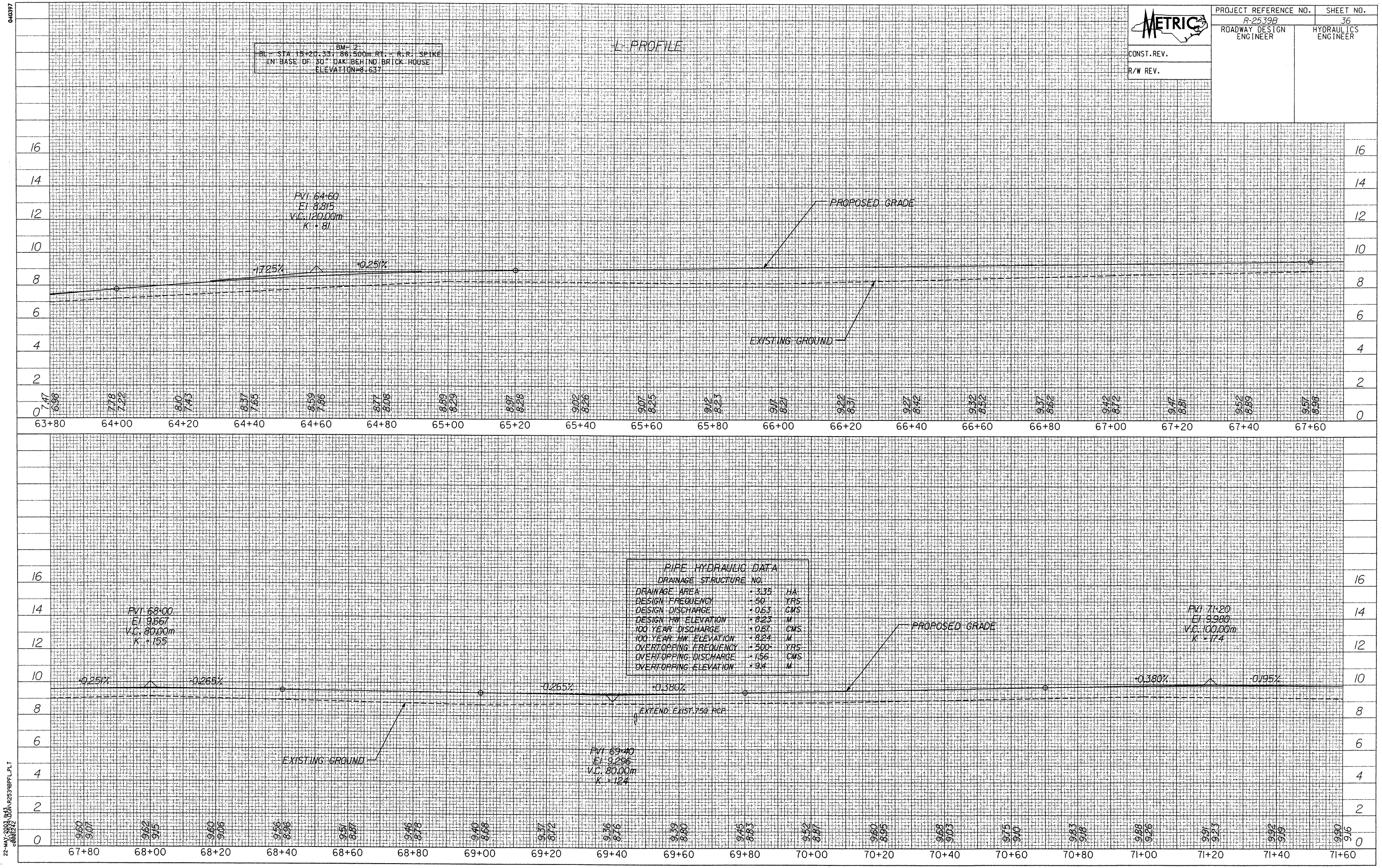
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.



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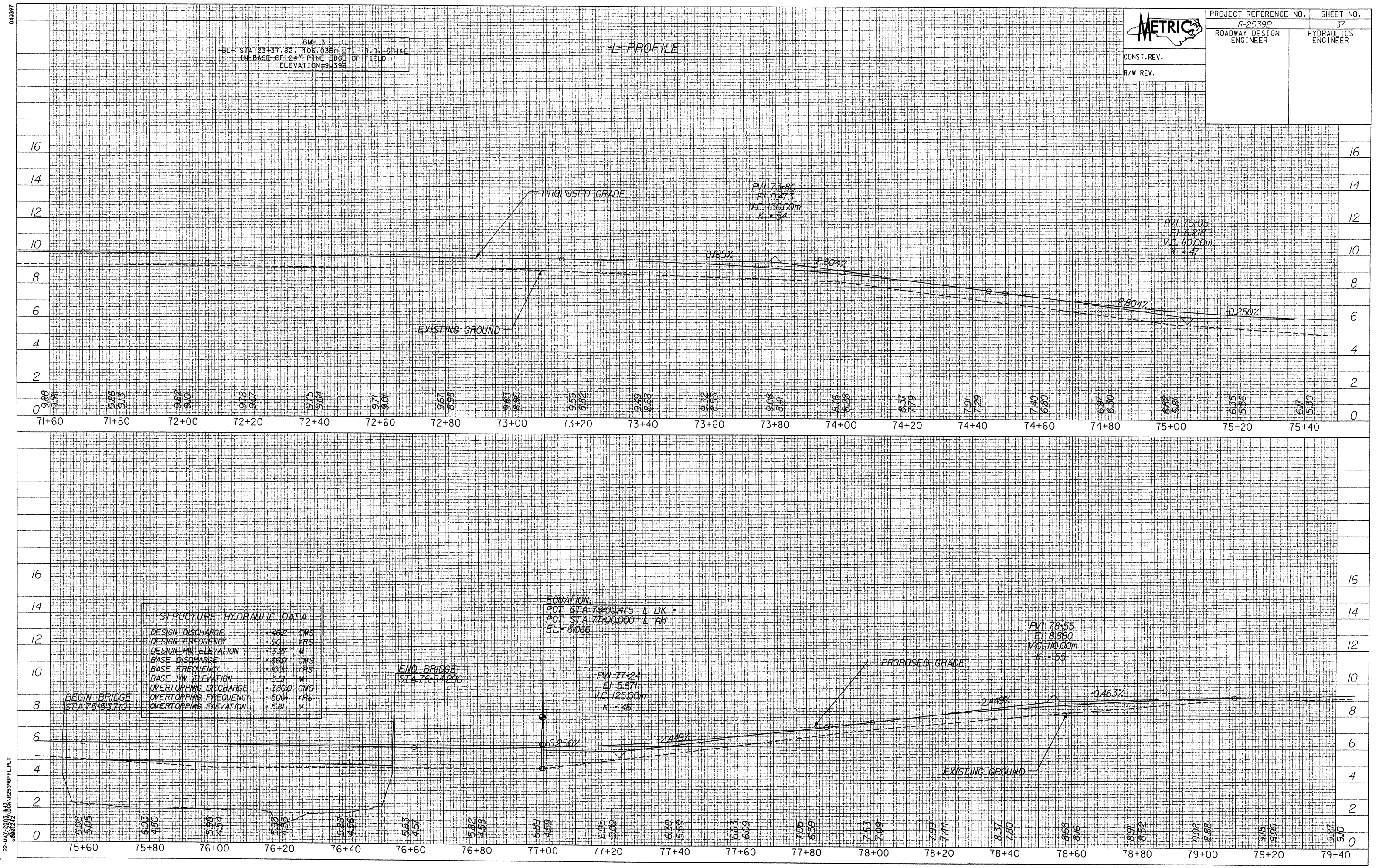
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	37
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

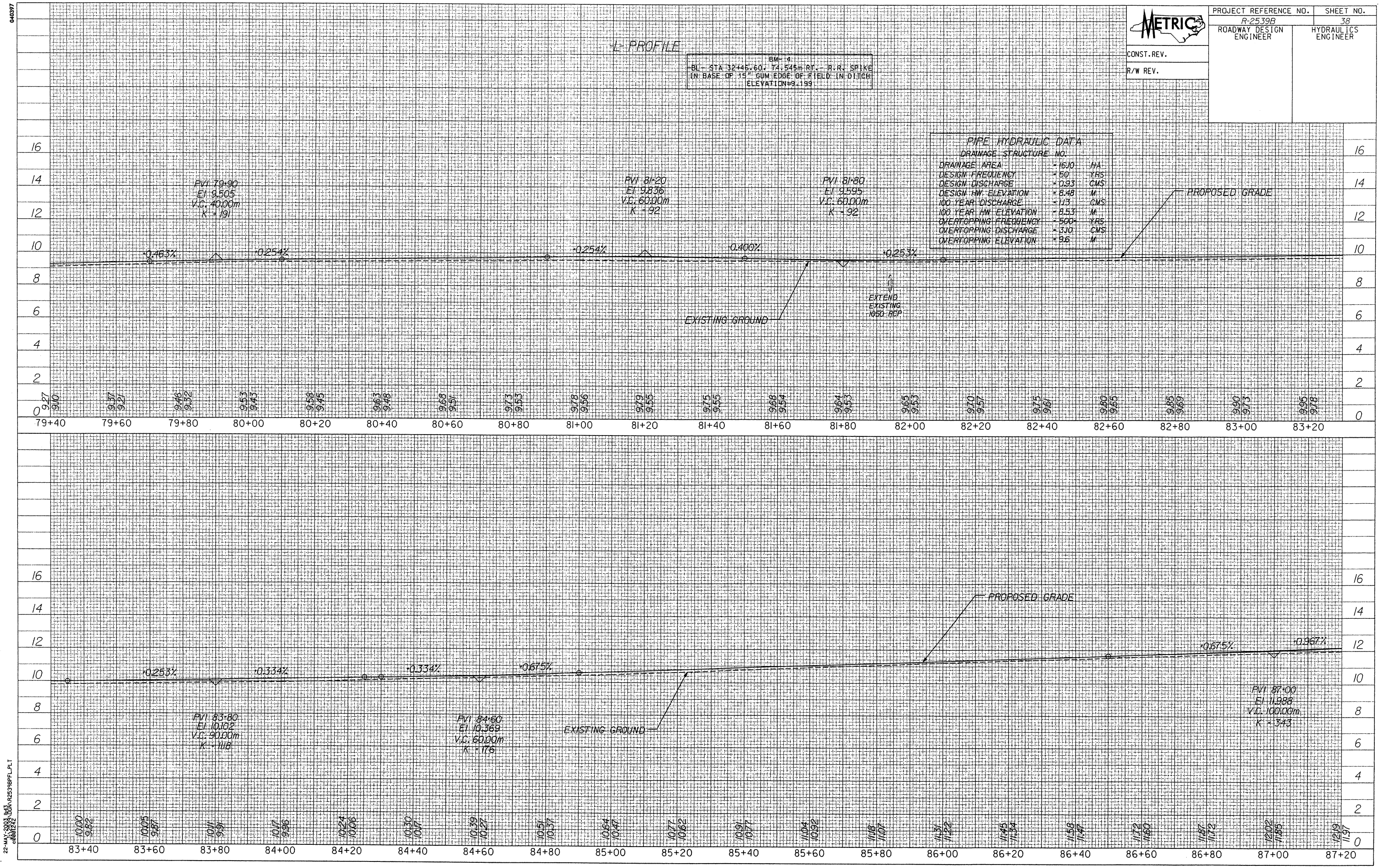
R/W REV.



PROJECT REFERENCE NO.	SHEET NO.
R-2539B	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.



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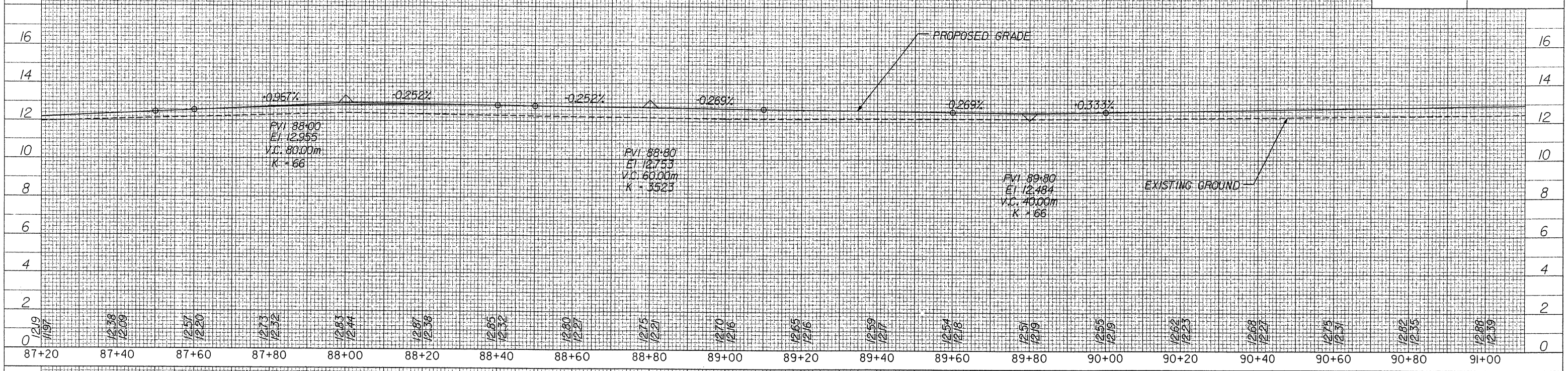
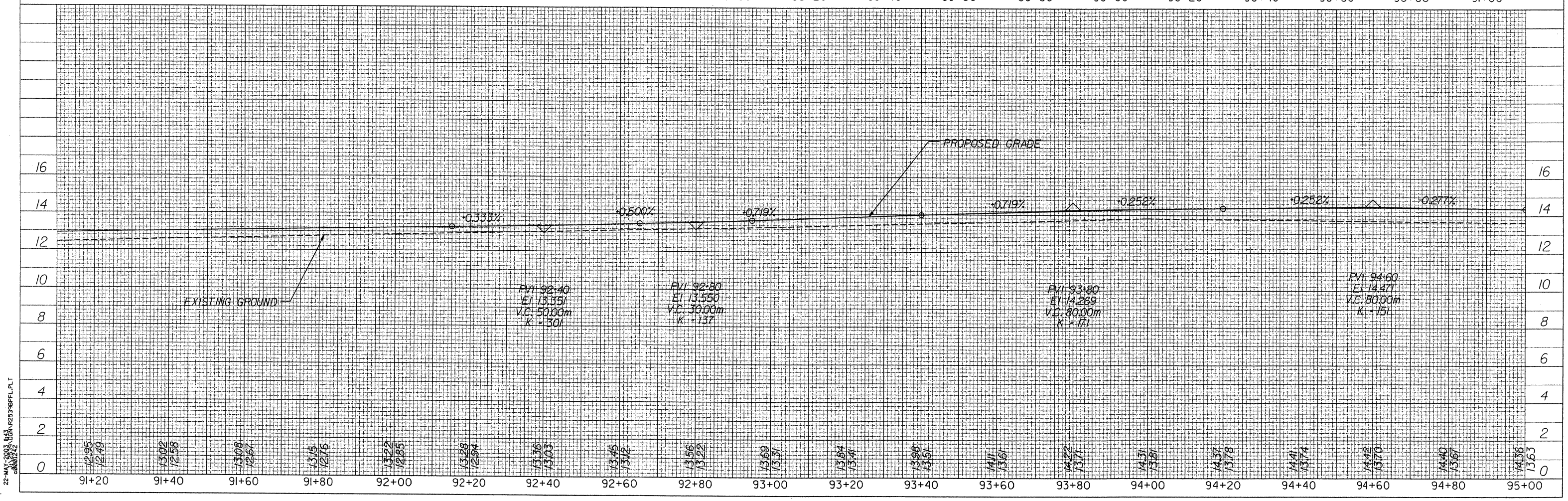
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

METRIC

-L- PROFILE

BM 5
-BL- STA 39+77.40, 108.142m RT. - R.R. SPIKE
IN BASE OF 18" PINE BEHIND TSFD (WHITE)
ELEVATION=11.357





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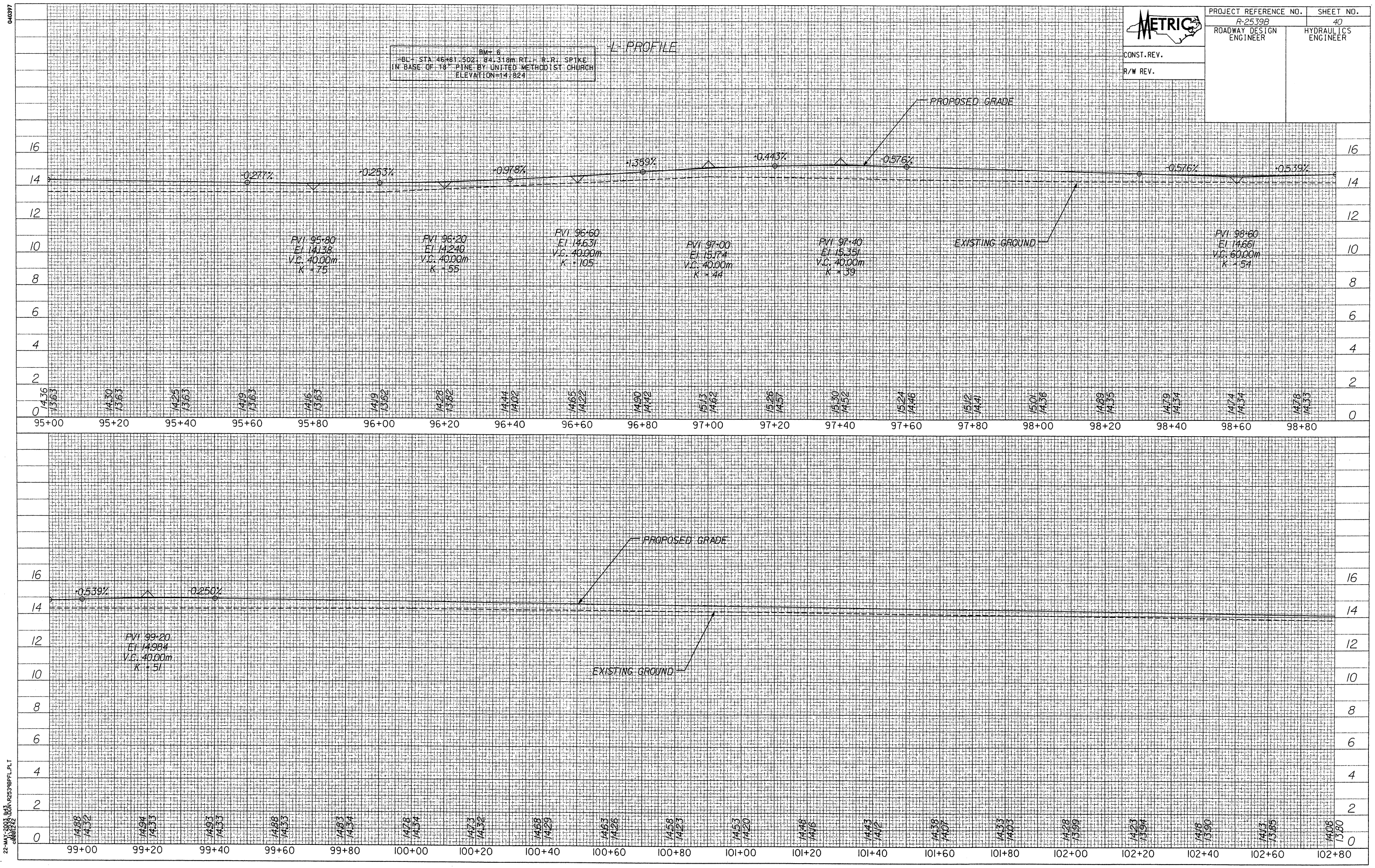
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	40
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC

CONST.REV.

R/W REV.



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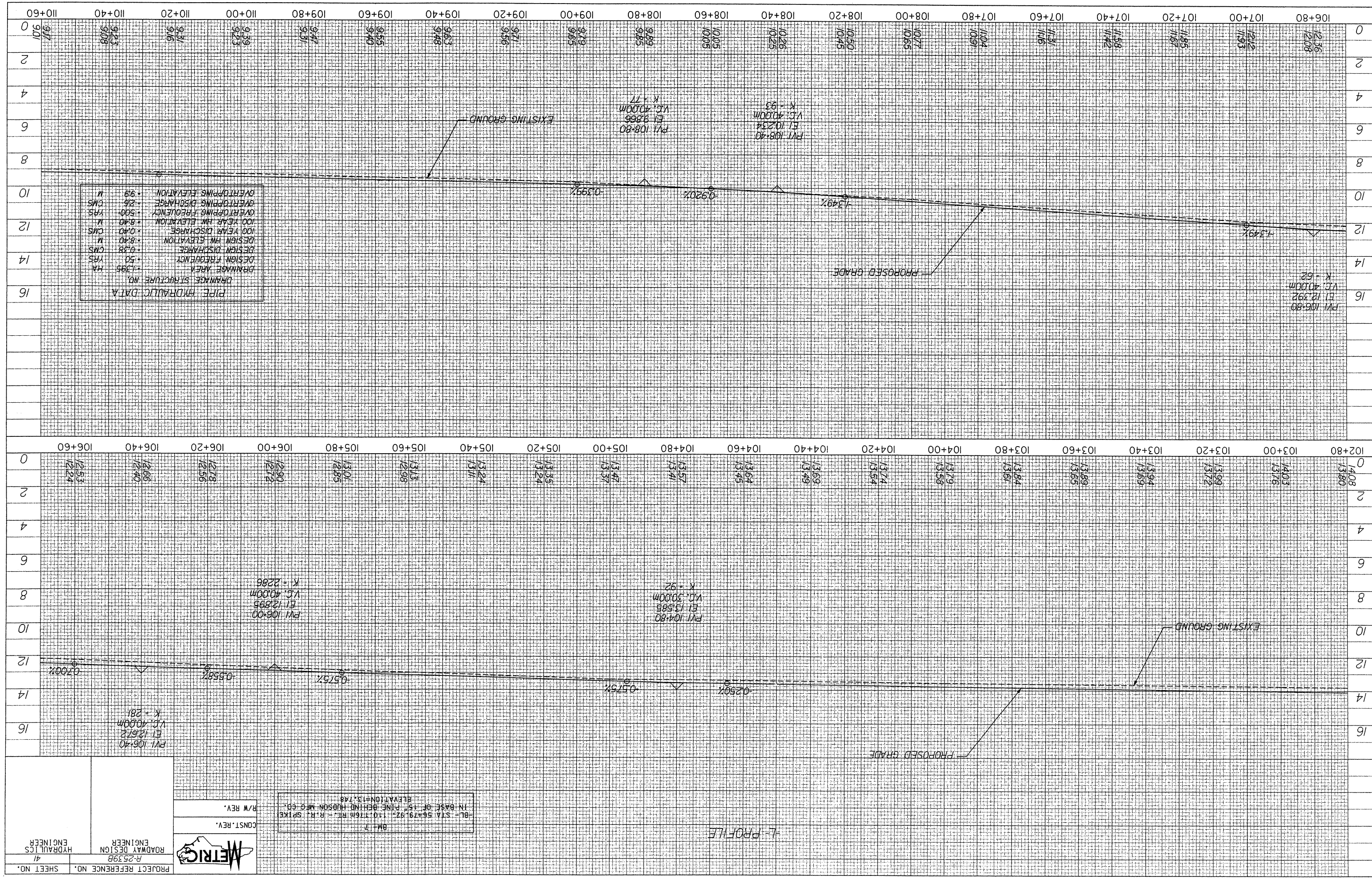

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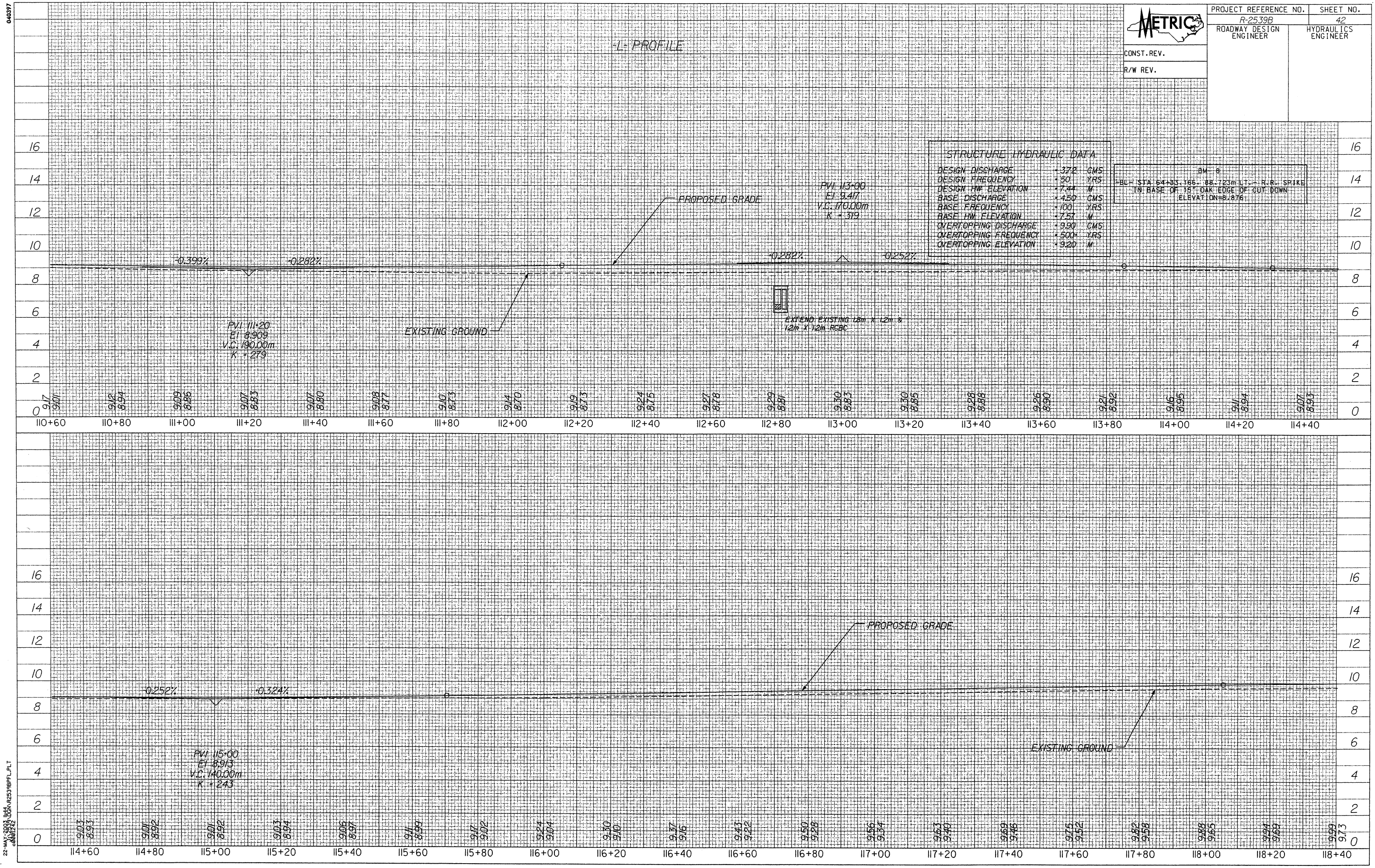
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	42
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.



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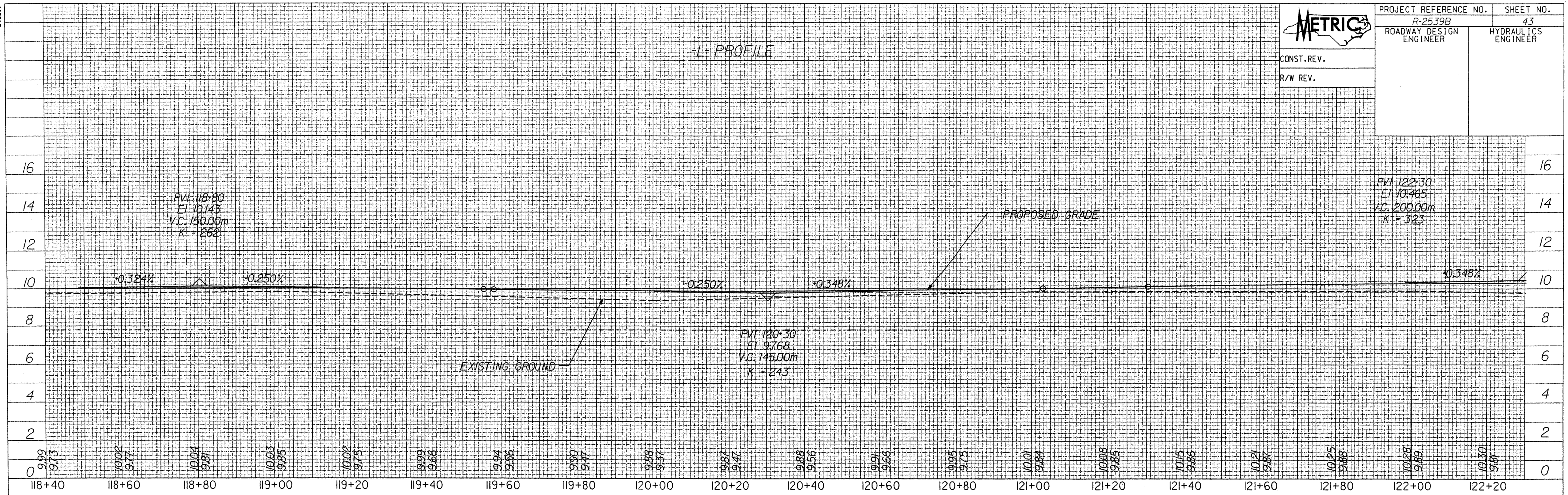
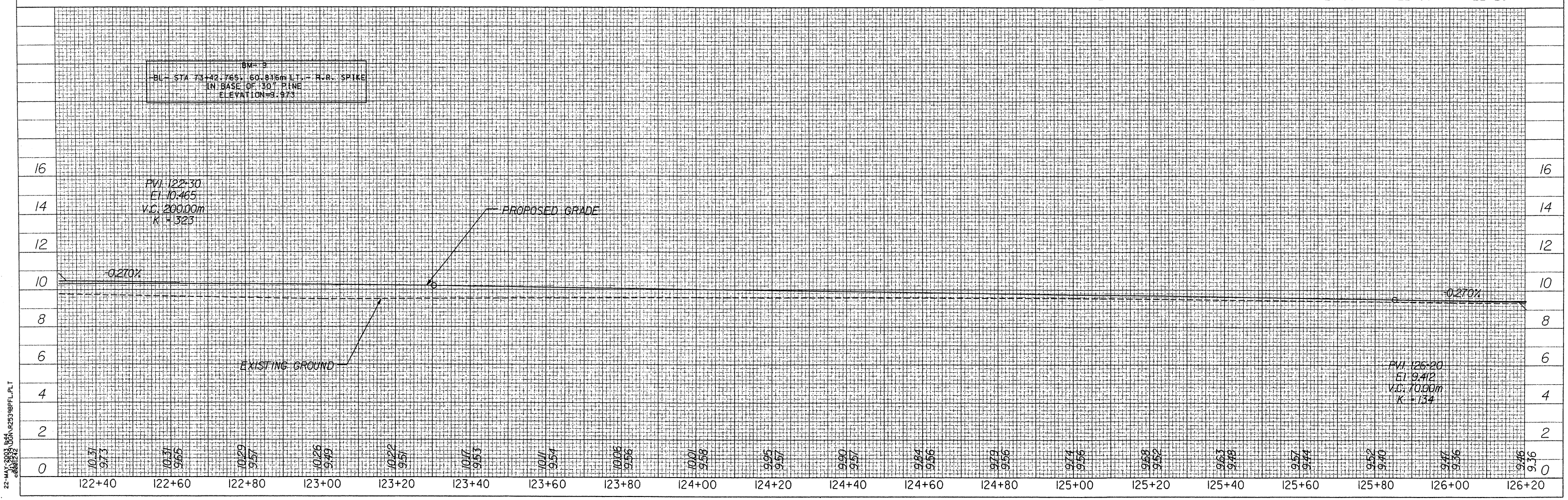
R2539BPFL.PLT

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.





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METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2539B	44
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV.		

-L- PROFILE

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	10.00	HA
DESIGN FREQUENCY	50	YRS
DESIGN DISCHARGE	0.8	CMS
DESIGN HW ELEVATION	7.68	M
100 YEAR DISCHARGE	0.73	CMS
100 YEAR HW ELEVATION	7.82	M
OVERTOPPING FREQUENCY	500	YRS
OVERTOPPING DISCHARGE	1.74	CMS
OVERTOPPING ELEVATION	9.5	M

PVI 126+80
El 9.562
V.C. 50.00m
K = 92

PROPOSED GRADE

PVI 129+95
El 9.260
V.C. 70.00m
K = 100

-0.250%
-0.292%
-0.292%
-0.282%
-0.282%
-0.380%
-0.580%
-0.317%

PROPOSED 36"ø RCP

PVI 126+20
El 9.412
V.C. 70.00m
K = 134

EXISTING GROUND

PVI 127+80
El 9.270
V.C. 20.00m
K = 1923

PVI 129+05
El 8.918
V.C. 80.00m
K = 121

9.46 9.36 | 9.47 9.35 | 9.51 9.35 | 9.53 9.34 | 9.50 9.34 | 9.45 9.29 | 9.32 9.25 | 9.33 9.20 | 9.27 9.15 | 9.21 9.11 | 9.16 9.06 | 9.10 8.99 | 9.04 8.93 | 9.00 8.87 | 8.98 8.81 | 9.00 8.85 | 9.05 8.90 | 9.13 8.95 | 9.18 8.99 | 9.20 9.04

126+20 126+40 126+60 126+80 127+00 127+20 127+40 127+60 127+80 128+00 128+20 128+40 128+60 128+80 129+00 129+20 129+40 129+60 129+80 130+00

BM-10
BL - STA 81+63.29 - 76.653m LT. - R.R. SPIKE IN BASE OF 36" PINE EDGE OFF WOODS BY WILLIAMS MINT STORAGE
ELEVATION=9.532

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	7.50	HA
DESIGN FREQUENCY	50	YRS
DESIGN DISCHARGE	0.45	CMS
DESIGN HW ELEVATION	7.76	M
100 YEAR DISCHARGE	0.54	CMS
100 YEAR HW ELEVATION	7.79	M
OVERTOPPING FREQUENCY	500	YRS
OVERTOPPING DISCHARGE	1.75	CMS
OVERTOPPING ELEVATION	8.6	M

PVI 131+00
El 9.237
V.C. 40.00m
K = 100

PVI 132+25
El 9.248
V.C. 50.00m
K = 109

PROPOSED GRADE

-0.317%
-0.199%
-0.199%
-0.199%
-0.199%
-0.201%
-0.201%
-0.259%
-0.259%

PROPOSED 900 RCP

PVI 130+40
El 9.117
V.C. 20.00m
K = 139

EXISTING GROUND

PVI 131+60
El 9.117
V.C. 20.00m
K = 150

9.18 9.04 | 9.13 9.04 | 9.16 9.03 | 9.20 9.03 | 9.22 9.03 | 9.20 9.03 | 9.16 9.02 | 9.13 9.02 | 9.16 9.01 | 9.20 9.01 | 9.22 8.99 | 9.20 8.98 | 9.16 8.97 | 9.11 8.96 | 9.05 8.95 | 9.00 8.89 | 8.96 8.82 | 8.90 8.75 | 8.85 8.69 | 8.79 8.62

130+20 130+40 130+60 130+80 131+00 131+20 131+40 131+60 131+80 132+00 132+20 132+40 132+60 132+80 133+00 133+20 133+40 133+60 133+80 134+00

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040397

PROJECT REFERENCE NO.	SHEET NO.
R-2539B	45
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R/W REV.

-L- PROFILE

PVI 134+05
EL 8.782
V.C. 20.00m
K = 217

PROPOSED GRADE

-0.35%

-0.35%

+0.25%

PVI 134+60
EL 8.589
V.C. 35.00m
K = 58

PVI 135+35
EL 8.778
V.C. 115.00m
K = 109

+0.25%

-0.808%

PROPOSED 2@600 RCP

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 10.00	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.8	CMS
DESIGN HW ELEVATION	= 6.88	M
100 YEAR DISCHARGE	= 0.73	CMS
100 YEAR HW ELEVATION	= 6.96	M
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 2.00	CMS
OVERTOPPING ELEVATION	= 8.4	M

PVI 136+40
EL 7.929
V.C. 30.00m
K = 59

-0.808%

-0.300%

+0.381%

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 2.13	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 5.64	M
BASE DISCHARGE	= 2.58	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 5.73	M
OVERTOPPING DISCHARGE	= 10.13	CMS
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING ELEVATION	= 7.83	M

EXTEND EXISTING 1.8m X 1.2m RCBC

PVI 136+80
EL 7.809
V.C. 50.00m
K = 73

PVI 137+80
EL 8.190
V.C. 20.00m
K = 164

-0.380%

EXISTING GROUND

8.79 8.62 | 8.73 8.59 | 8.66 8.57 | 8.62 8.54 | 8.64 8.51 | 8.67 8.49 | 8.66 8.41 | 8.61 8.33 | 8.53 8.26 | 8.41 8.18 | 8.25 8.11 | 8.09 8.02 | 7.95 7.93 | 7.87 7.84 | 7.85 7.75 | 7.89 7.76 | 7.96 7.74 | 8.04 7.83 | 8.11 7.91 | 8.19 7.99

134+00 134+20 134+40 134+60 134+80 135+00 135+20 135+40 135+60 135+80 136+00 136+20 136+40 136+60 136+80 137+00 137+20 137+40 137+60 137+80

BM-11
BL- STA. 91+71.956, 85.335m LT. - R.R. SPIKE IN BASE OF 15" GUM BY GRAY DOUBLEWIDE
ELEVATION=7.532

PVI 138+35
EL 8.332
V.C. 60.00m
K = 111

PROPOSED GRADE

-0.258%

-0.258%

-0.281%

PROPOSED 900 RCP

-0.281%

-0.250%

PVI 139+30
EL 8.064
V.C. 70.00m
K = 132

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 5.50	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.28	CMS
DESIGN HW ELEVATION	= 6.29	M
100 YEAR DISCHARGE	= 0.34	CMS
100 YEAR HW ELEVATION	= 6.32	M
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 3.15	CMS
OVERTOPPING ELEVATION	= 8.9	M

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 0.352	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.07	CMS
DESIGN HW ELEVATION	= 7.41	M
100 YEAR DISCHARGE	= 0.08	CMS
100 YEAR HW ELEVATION	= 7.42	M
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 0.63	CMS
OVERTOPPING ELEVATION	= 9.10	M

PVI 140+60
EL 8.390
V.C. 70.00m
K = 102

-0.250%

-0.433%

PROPOSED 450 RCP

EXTEND 1.2m X 1.2m RCBC w/ 1200 RCP

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 11.70	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.65	CMS
DESIGN HW ELEVATION	= 7.03	M
100 YEAR DISCHARGE	= 0.78	CMS
100 YEAR HW ELEVATION	= 7.09	M
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 2.60	CMS
OVERTOPPING ELEVATION	= 7.8	M

EXISTING GROUND

8.24 8.07 | 8.28 8.05 | 8.29 8.02 | 8.26 8.00 | 8.21 7.97 | 8.15 7.95 | 8.12 7.93 | 8.11 7.92 | 8.14 7.91 | 8.19 7.89 | 8.24 7.88 | 8.29 7.88 | 8.33 7.87 | 8.33 7.86 | 8.29 7.86 | 8.22 7.85 | 8.13 7.83 | 8.04 7.80 | 7.96 7.77 | 7.87 7.75

138+00 138+20 138+40 138+60 138+80 139+00 139+20 139+40 139+60 139+80 140+00 140+20 140+40 140+60 140+80 141+00 141+20 141+40 141+60 141+80

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PROJECT REFERENCE NO.	SHEET NO.
R-2539B	46
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST.REV.

R/W REV.

-L- PROFILE

PVI 142+00
EL 7.784
V.C. 40.00m
K = 47

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO.		
DRAINAGE AREA	= 1.00	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.19	CMS
DESIGN HW ELEVATION	= 7.50	M
100 YEAR DISCHARGE	= 0.21	CMS
100 YEAR HW ELEVATION	= 7.53	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.44	CMS
OVERTOPPING ELEVATION	= 8.3	M

-0.433%

-0.412%

EXTEND EXISTING 450 RCP

PROPOSED GRADE

PVI 144+40
EL 8.772
V.C. 70.00m
K = 104

-0.412%

-0.258%

EXISTING GROUND

16 14 12 10 8 6 4 2 0

7.87 7.75 | 7.83 7.72 | 7.87 7.77 | 7.95 7.83 | 8.03 7.88 | 8.11 7.94 | 8.20 7.99 | 8.28 8.05 | 8.36 8.10 | 8.44 8.16 | 8.52 8.22 | 8.61 8.27 | 8.68 8.27 | 8.71 8.26 | 8.71 8.26 | 8.67 8.26 | 8.62 8.26 | 8.57 8.20 | 8.51 8.15 | 8.46 8.10

141+80 142+00 142+20 142+40 142+60 142+80 143+00 143+20 143+40 143+60 143+80 144+00 144+20 144+40 144+60 144+80 145+00 145+20 145+40 145+60

BM=12
-BL- STA 97+38.70, 133.249m RT. - R.R. SPIKE
IN BASE OF 40" PINE
ELEVATION=7.384

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO.		
DRAINAGE AREA	= 0.90	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.17	CMS
DESIGN HW ELEVATION	= 7.61	M
100 YEAR DISCHARGE	= 0.18	CMS
100 YEAR HW ELEVATION	= 7.62	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 0.46	CMS
OVERTOPPING ELEVATION	= 8.40	M

PVI 146+60
EL 8.204
V.C. 40.00m
K = 138

PVI 147+30
EL 7.820
V.C. 20.00m
K = 57

-0.258%

-0.549%

-0.549%

-0.200%

EXTEND EXISTING 450 RCP

EXISTING GROUND

PROPOSED GRADE

BEGIN BRIDGE
STA 148+40.676

STRUCTURE HYDRAULIC DATA		
DESIGN DISCHARGE	= 5.11	CMS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 4.65	M
BASE DISCHARGE	= 62.9	CMS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 4.76	M
OVERTOPPING DISCHARGE	= 660.0	CMS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 7.14	M

PROPOSED 22.0m CORED SLAB BRIDGE

16 14 12 10 8 6 4 2 0

8.41 8.05 | 8.36 7.99 | 8.31 7.85 | 8.26 7.70 | 8.19 7.56 | 8.09 7.41 | 7.98 7.27 | 7.87 7.12 | 7.80 6.97 | 7.76 6.82 | 7.72 6.66 | 7.68 6.51 | 7.61 6.43 | 7.60 6.35 | 7.56 6.27 | 7.52 6.19 | 7.48 6.11 | 7.44 6.13 | 7.40 6.15 | 7.36 6.16

145+80 146+00 146+20 146+40 146+60 146+80 147+00 147+20 147+40 147+60 147+80 148+00 148+20 148+40 148+60 148+80 149+00 149+20 149+40 149+60

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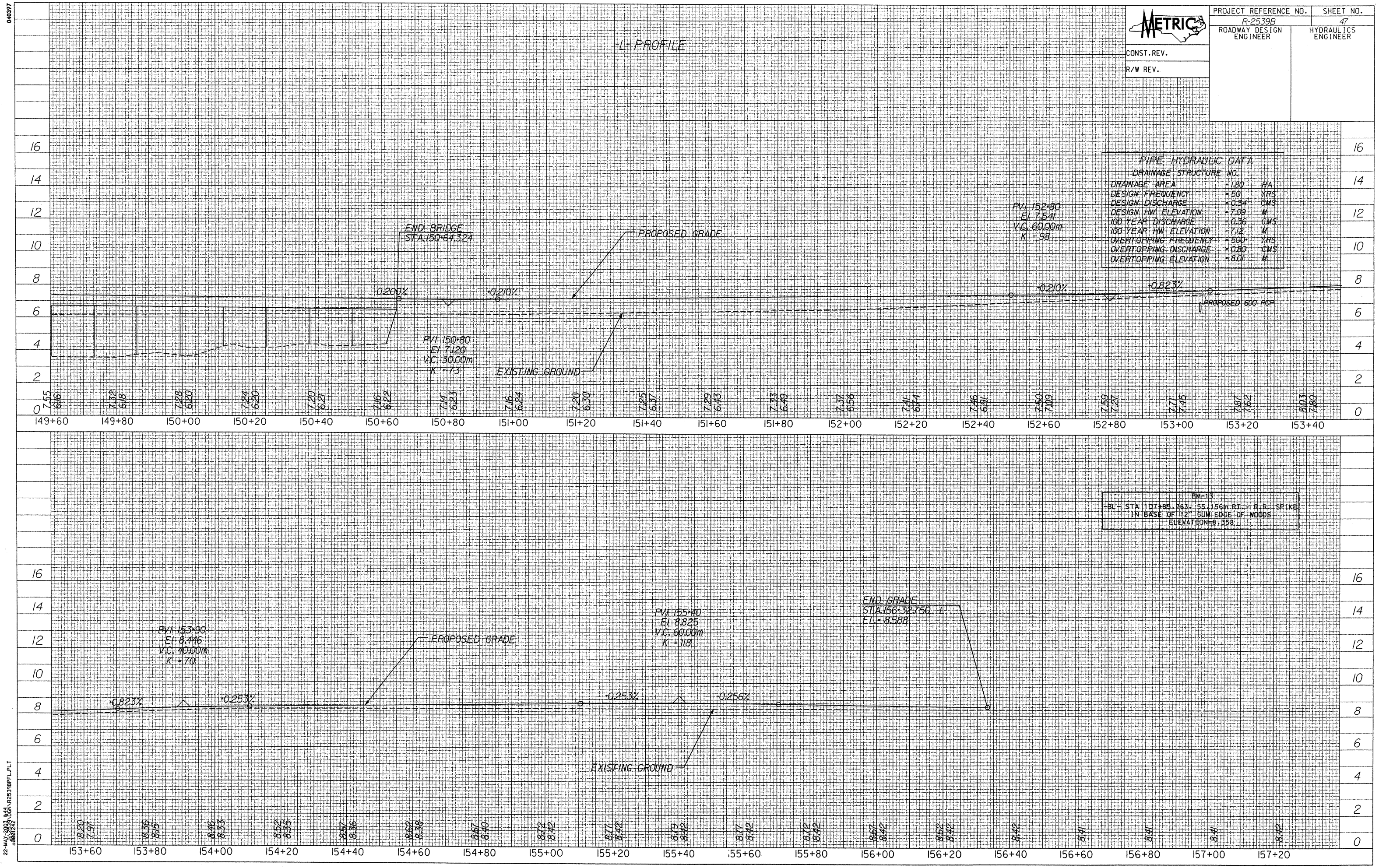
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R/W REV.



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 1.80	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.34	CMS
DESIGN HW ELEVATION	= 7.09	M
100 YEAR DISCHARGE	= 0.36	CMS
100 YEAR HW ELEVATION	= 7.12	M
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 0.80	CMS
OVERTOPPING ELEVATION	= 8.01	M

BM-13
-BL- STA 107+85.763, 55.156m RT. - R.R. SPIKE
IN BASE OF 12" GUM EDGE OF WOODS
ELEVATION=8.358

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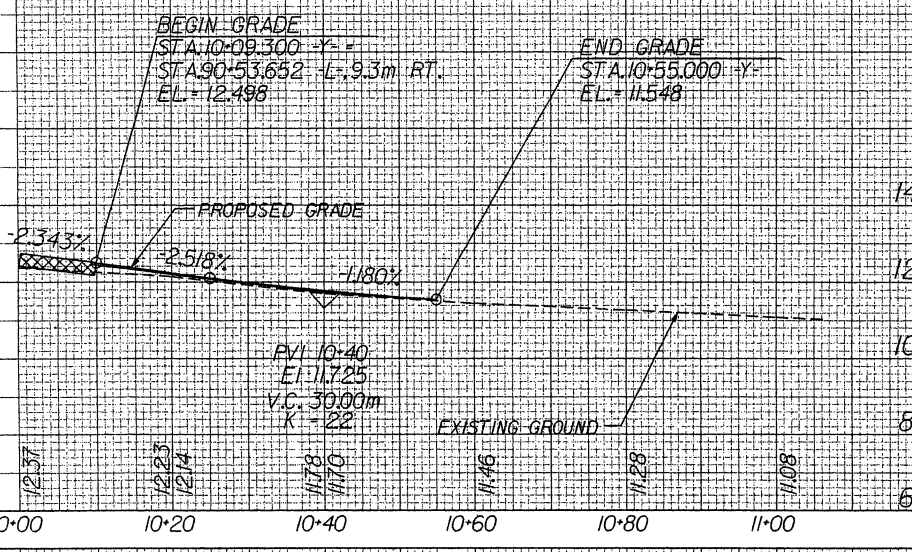
METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2539B	48
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV.		

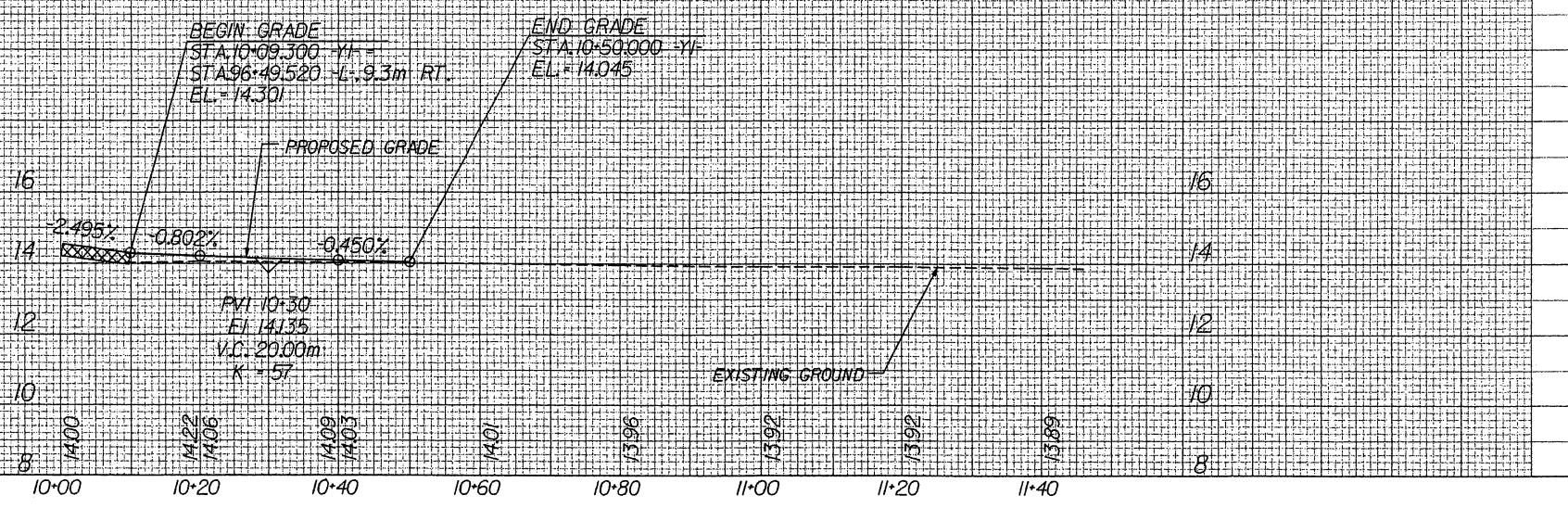
-Y- Dixon Road S.R.1139

BM- 5
-BL- STA 39+77.40, 108.142m RT. - R.R. SPIKE IN BASE OF 18" PINE BEHIND 1SFD (WHITE)
ELEVATION=11.357



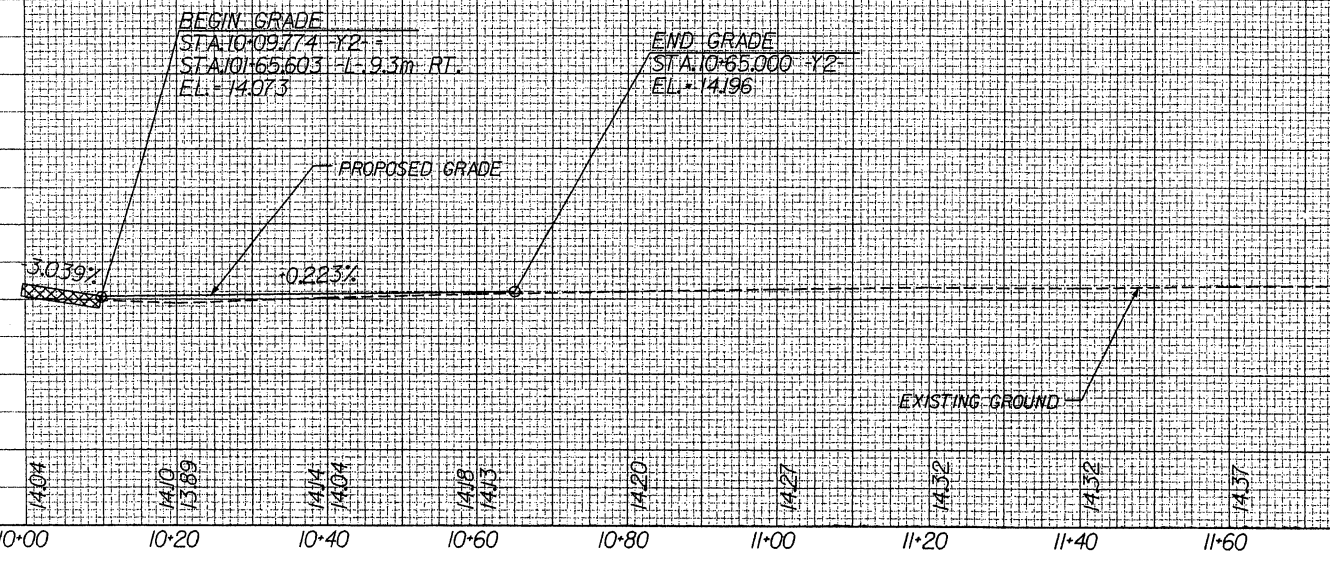
-Y1- Holland Drive S.R.1146

BM- 6
-BL- STA 46+81.502, 84.318m RT. - R.R. SPIKE IN BASE OF 18" PINE BY UNITED METHODIST CHURCH
ELEVATION=14.824



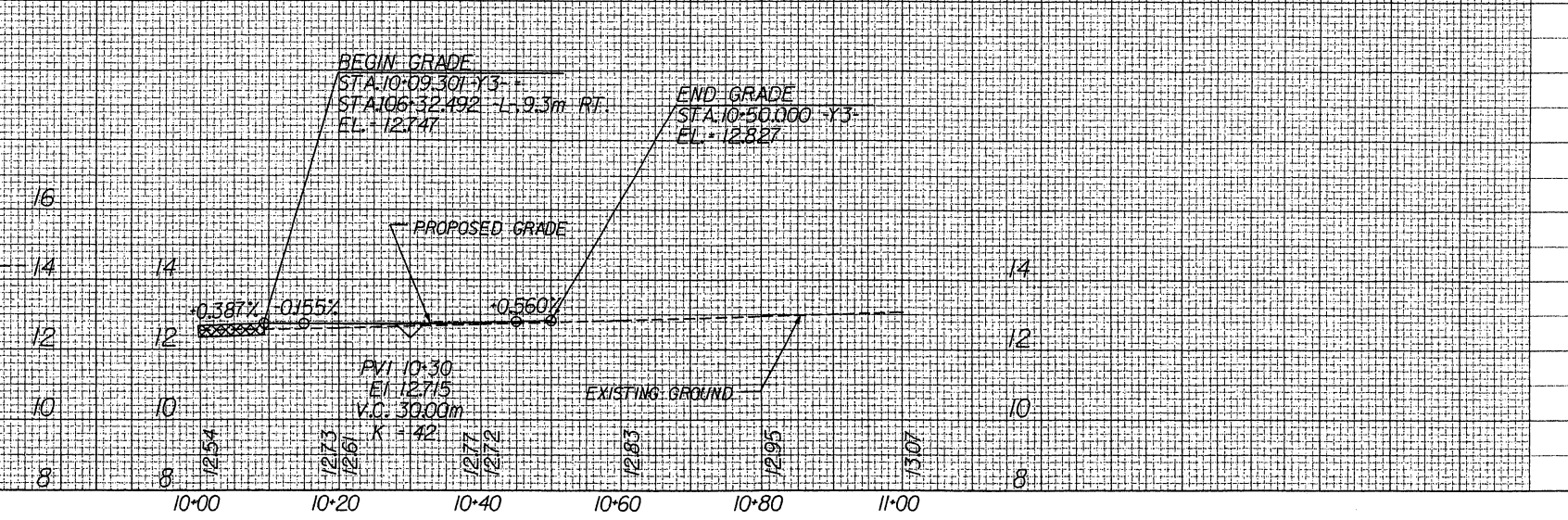
-Y2- Chair Road S.R.1131

BM- 7
-BL- STA 56+79.92, 110.176m RT. - R.R. SPIKE IN BASE OF 15" PINE BEHIND HUDSON MFG CO.
ELEVATION=13.748



-Y3- Halls Creek Road S.R.1133

BM- 7
-BL- STA 56+79.92, 110.176m RT. - R.R. SPIKE IN BASE OF 15" PINE BEHIND HUDSON MFG CO.
ELEVATION=13.748



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PROJECT REFERENCE NO.	SHEET NO.
R-2539B	49
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

-Y4- Neuse Road S.R.1005

BM- 7
-BL- STA 56+79.92, 110.176m RT. - R.R. SPIKE
IN BASE OF 15" PINE BEHIND HUDSON MFG. CO.
ELEVATION=13.748

BEGIN GRADE
STA.10+09.115 -Y4-
STA.08+70.004 -L-,9.0m RT.
EL.= 10.459

-5.431%
+0.258%
-0.798%
-0.250%
PROPOSED GRADE
EXISTING GROUND

END GRADE
STA.11+40.000 -Y4-
EL.= 9.911

PVI 10+25
EL 10.500
V.C. 30.00m
K = 28
SSD = 206

PVI 10+80
EL 10.061
V.C. 40.00m
K = 73

10+00	10+20	10+40	10+60	10+80	11+00	11+20	11+40	11+60	11+80
9.82	9.47	9.38	9.22	10.09	10.01	9.96	9.91	9.84	9.82
	9.24	9.29	9.30	9.94	9.94	9.91	9.86		

-Y5- Oakwood Drive

BM- 8
-BL- STA 64+33.166, 88.723m LT. - R.R. SPIKE
IN BASE OF 15" OAK EDGE OF CUT DOWN
ELEVATION=8.876

BEGIN GRADE
STA.10+09.084 -Y5-
STA.06+77.416 -L-,9.0m RT.
EL.= 9.262

-2.417%
-0.698%
0.250%
PROPOSED GRADE
EXISTING GROUND

END GRADE
STA.10+50.000 -Y5-
EL.= 9.066

PVI 10+30
EL 9.116
V.C. 20.00m
K = 45

10+00	10+20	10+40
9.28	9.19	9.09
	9.07	9.04

-Y7- Lee Landing Road S.R.1103

BM- 9
-BL- STA 73+42.765, 60.816m LT. - R.R. SPIKE
IN BASE OF 30" PINE
ELEVATION=9.973

BEGIN GRADE
STA.10+09.126 -Y7-
STA.26+59.132 -L-,9.0m RT.
EL.= 9.284

-2.415%
-0.296%
-0.828%
-0.250%
PROPOSED GRADE
EXISTING GROUND

END GRADE
STA.12+60.000 -Y7-
EL.= 9.243

PVI 11+80
EL 9.790
V.C. 40.00m
K = 36

PVI 12+40
EL 9.293
V.C. 20.00m
K = 35

10+00	10+20	10+40	10+60	10+80	11+00	11+20	11+40	11+60	11+80	12+00	12+20	12+40	12+60	12+80	13+00
9.40	9.32	9.38	9.43	9.49	9.55	9.61	9.67	9.73	9.73	9.62	9.46	9.31	9.24	9.21	9.27
	9.96	9.02	9.03	9.02	9.53	9.11	9.16	9.15	9.20	9.18	9.40	9.23	9.19		

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PROJECT REFERENCE NO.	SHEET NO.
R-2539B	50
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

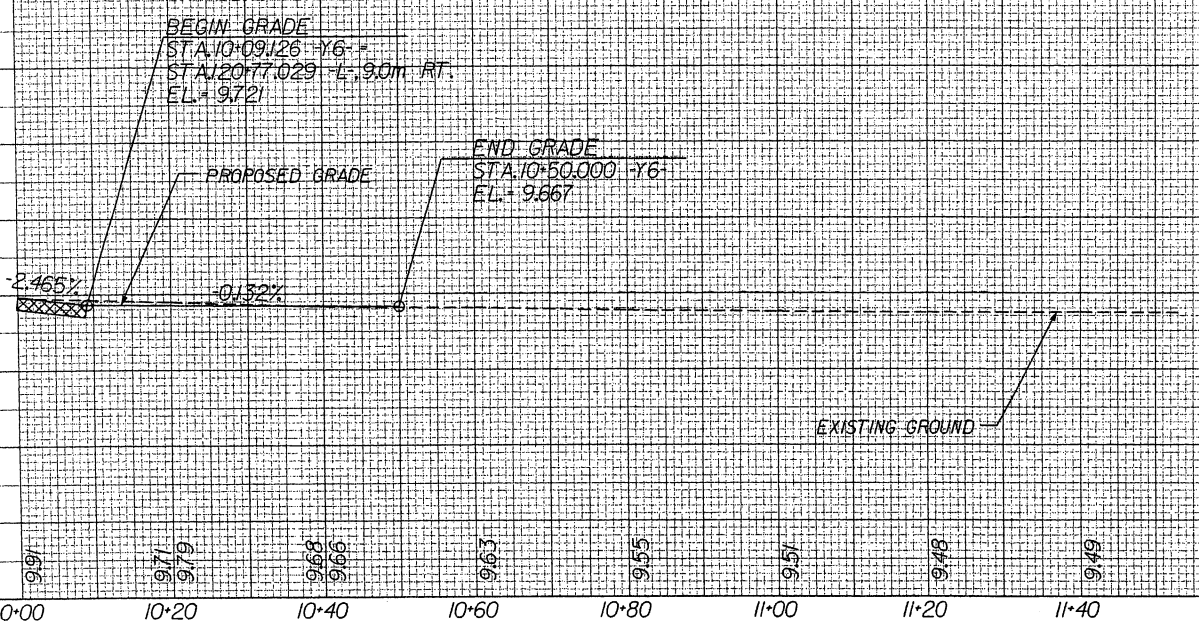
METRIC

CONST. REV.

R/W REV.

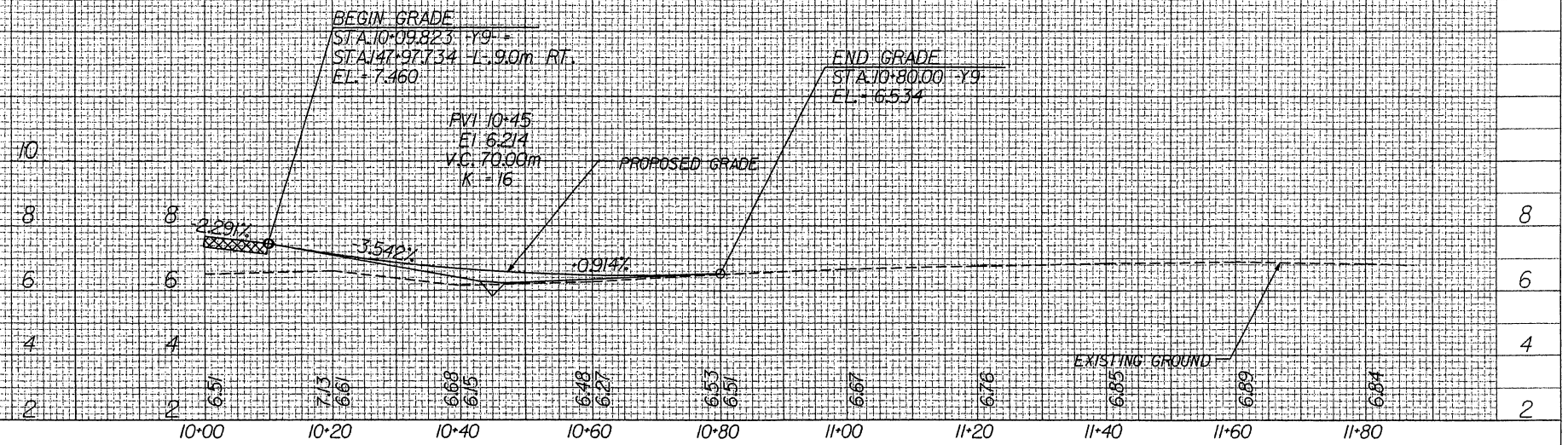
-Y6- Savanna Road S.R.1104

BM-9
-BL- STA 73+42.765, 60.816m LT. - R.R. SPIKE
IN BASE OF 30" PINE
ELEVATION=9.973



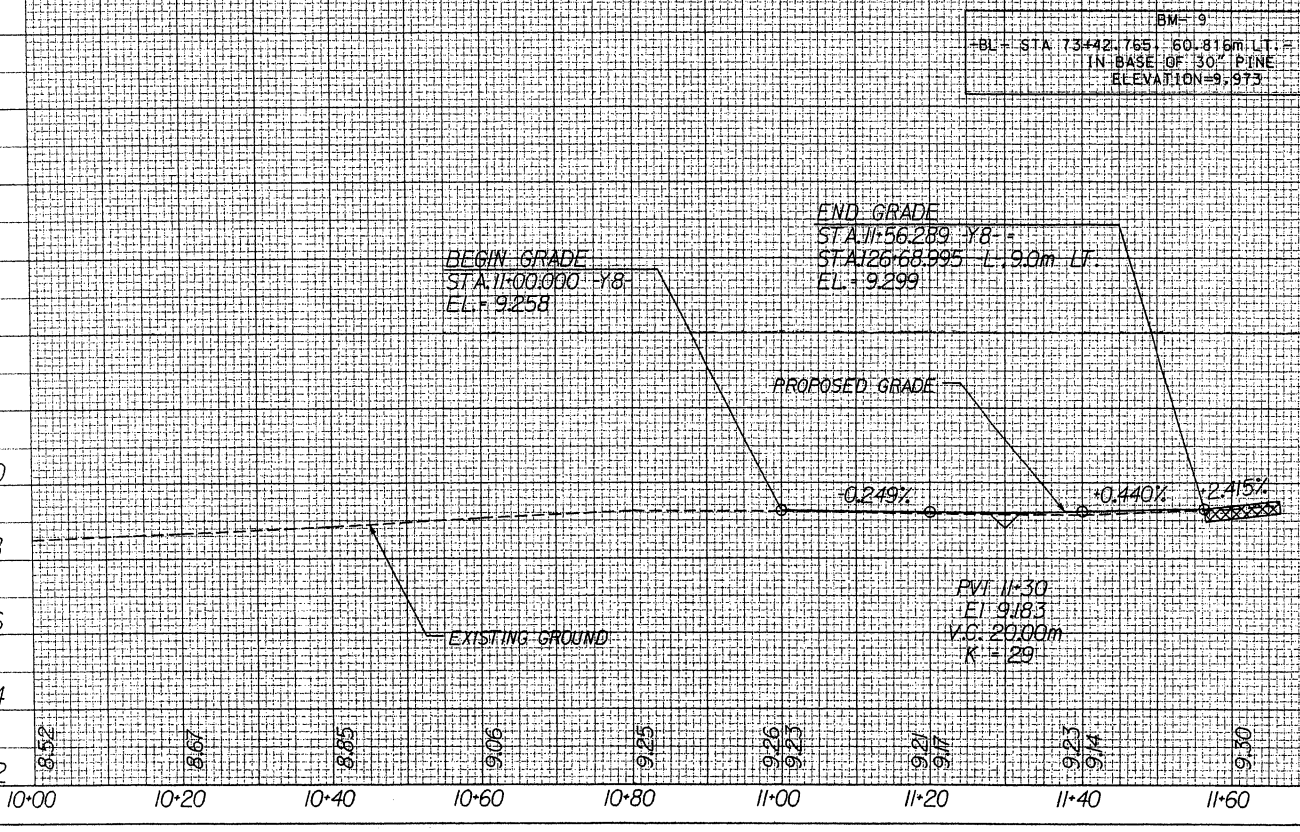
-Y9- Prescott Road S.R.1105

BM-12
-BL- STA 97+98.70, 133.249m RT. - R.R. SPIKE
IN BASE OF 40" PINE
ELEVATION=7.384



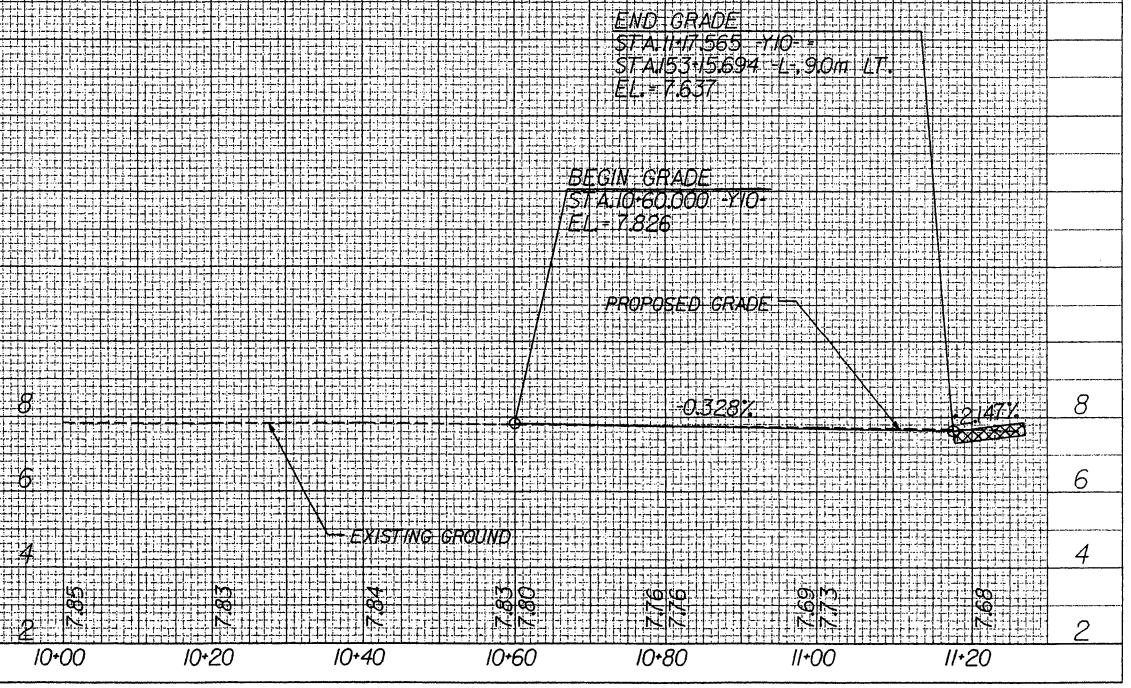
-Y8- Moores Swamp Road S.R.1124

BM-9
-BL- STA 73+42.765, 60.816m LT. - R.R. SPIKE
IN BASE OF 30" PINE
ELEVATION=9.973



-Y10- Bennett Tingle Road S.R.1129

BM-13
-BL- STA 107+85.763, 55.56m RT. - R.R. SPIKE
IN BASE OF 12" GUM EDGE OF WOODS
ELEVATION=8.358



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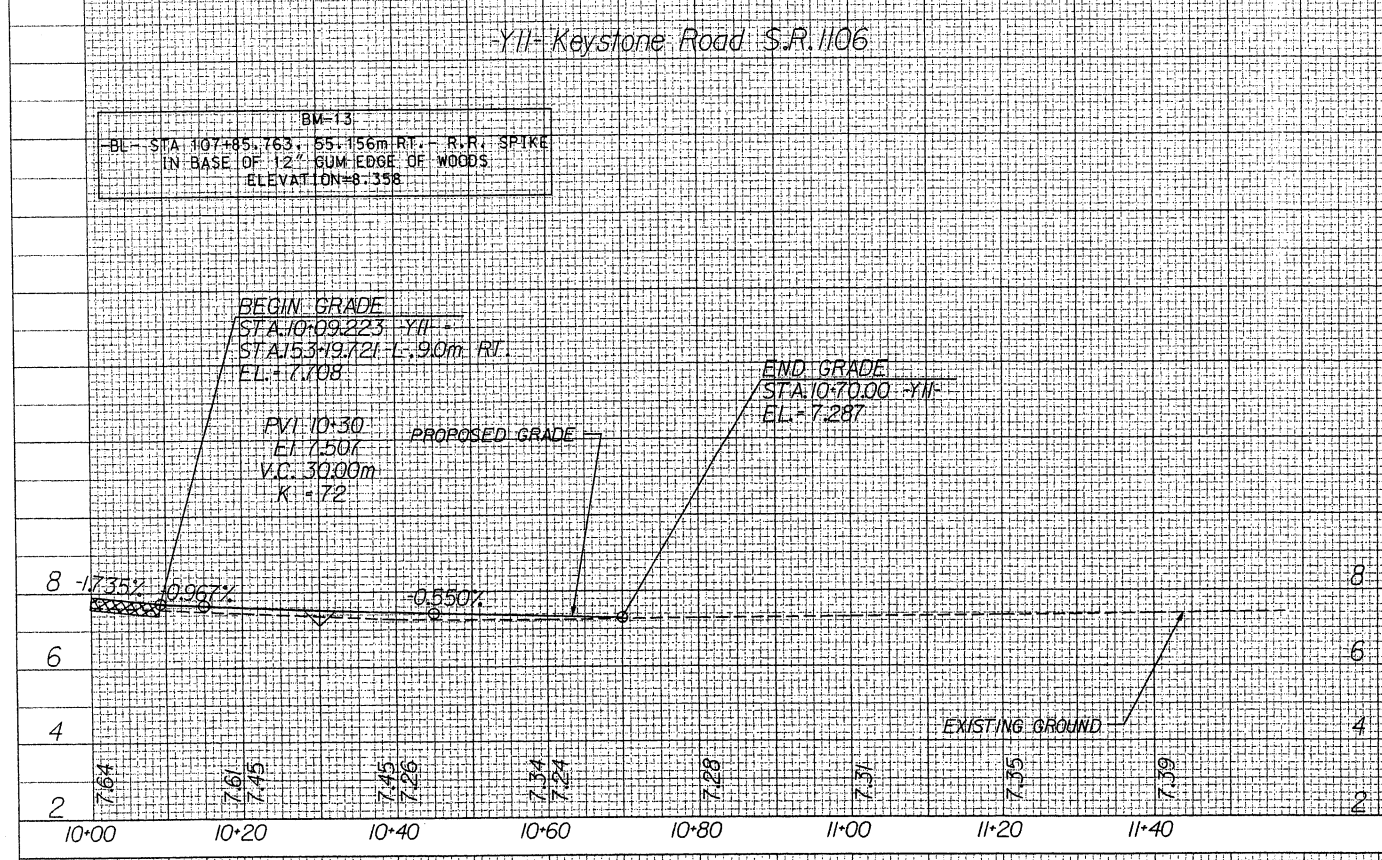
PROJECT REFERENCE NO.	SHEET NO.
R-2539B	51
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

CONST. REV.

R/W REV.



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