



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 18, 2004

US Army Corps of Engineers
Regulatory Field Office
6508 Falls of the Neuse Road
Suite 120
Raleigh, NC 27615

ATTENTION: Mr. Eric Alsmeyer
NCDOT Coordinator

Dear Sir:

SUBJECT: Application for Nationwide Permit 14 and Neuse Riparian Buffer Certification for the proposed widening of US 1/64 from US 64 to south of SR 1313 (Walnut Street) in Cary. Wake County. State Project No. 8.1403101; T.I.P. No. U-3101C; \$475.00 Debit work order 8.1403101; WBS Element 34897.1.1. Division 5.

Please find enclosed the PCN form, 8 ½ x 11 permit drawings, and half-sized plans for the subject project. The NCDOT proposes to widen US 1/64 from a four lane to a six lane facility, from the US 1/64/SR 1009 (Tryon Road) interchange to south of I-40 (TIP No. U-3101C). The US 1/64 interchanges at SR 1313 (Walnut Street) and at Cary Parkway will also be modified (TIP No. U-3101D). The D Section has been included as part of the C Section. The overall length of the project is 3.56 miles. The proposed typical section is a six-lane divided highway with a median concrete barrier. Widening to the inside will eliminate the existing grass median. There will be minor widening to the outside. The purpose of this project is to relieve congestion and improve safety through this stretch of US 1/64. This project is scheduled to be let November 2004.

Summary of Impacts: Impacts on jurisdictional areas consists of a total of 0.043 acre of permanent wetland impacts which are riverine. There will also be approximately 911 linear feet of jurisdictional stream impacts (469 linear feet require mitigation). There will also be approximately 280,662 square feet of riparian buffer impacts.

Summary of Mitigation: The project has been designed to avoid and minimize impacts to jurisdictional areas throughout the NEPA and design processes. Detailed descriptions of these actions are presented elsewhere in this application. We propose to replace 56,103 square feet of riparian buffers. We propose to use the Ecosystem Enhancement Program

(EEP) to mitigate for 469 linear feet of stream impacts, and 224,559 square feet of riparian buffer impacts.

Project Schedule

Schedule: Section A of U-3101 was let to construction in April 1996 and was completed in August 1996. Section B of U-3101 was let to construction in August 1996 and was completed in November 1997. Section C of U-3101 is scheduled for letting in November 2004. Section D of U-3101, which is now part of the C Section, is scheduled for letting in November 2004. Table 1 reflects the project breakdown, section limits, and project let dates.

Table 1. Construction limits and schedule

Sections	Project Limits	Let Date
U-3101A	US 1/64 from US 64/SR 1009 interchange south of Cary to south of SR 1313	April 1996
U-3101B	US 1/64 from SR 3977 to south of SR 1313	August 1996
U-3101C	US 1/64 from US 1/64/SR 1009 interchange to south of I-40	November 2004
U-3101D (now part of C Section)	US 1/64 at interchanges with Cary Parkway and Walnut Street	November 2004

NEPA Document Status

An Environmental Assessment (EA) was prepared by NCDOT and approved on March 26, 2001. A Finding of No Significant Impact (FONSI) was prepared by NCDOT and approved on January 14, 2002. The documents describe the need for transportation improvements in the City of Cary. In addition, existing and projected conditions in the study area were described including natural systems and wetlands. Alignments were evaluated with respect to costs, social and economic impacts, and environmental consequences. The EA/FONSI has been provided to regulatory review agencies involved in the approval process. Additional copies will be provided upon request.

The subject project is in compliance with 23 CFR Part 771.111(f) which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

- (1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;
- (2) The project is usable and a reasonable expenditure, even if no additional transportation improvements are made in the area;
- (3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Resource Status

Delineations: NCDOT Biologists Matt Smith and Chris Rivenbark delineated wetlands and streams on December 16, 1997 and February 13, 1998. Additional delineations were conducted by NCDOT Biologists Matt Haney and Brett Feulner on February 5, 2004. The USACE (Eric Alsmeyer) verified the wetlands and streams on March 3, 2000 in the field. Impacts are reported in Tables 2, 3, 4, and 5.

Table 2. Jurisdictional Impacts for U-3101C

Site	Permanent Riverine Wetland Impacts (ac)*	Stream Impacts (ft)	Stream Impacts Requiring Mitigation (ft)	Natural Channel Design (ft)
1	0.032	213	213	157
2		72	0	
3		16	0	
4	0.005	98	0	
5		75	0	
6		20	0	
7		20	0	
8		256	256	
9	0.006	140	0	
Total	0.043	911	469	157

Table 3. Jurisdictional Wetland Information for U-3101C

Site	Cowardin Classification*	Impact Type**	Total Impact (ac)
1	PFO1C	F, M	0.032
4	PFO1C	M	0.005
9	PFO1C	F, M	0.006
Total			0.043

*P= palustrine; FO= forested; I=broad-leaved deciduous; C= seasonally flooded

**F= fill; M= mechanized clearing (method III)

Table 4. Jurisdictional Stream Information for U-3101C

Site	Station	Structure	Stream	DWQ Index No./Classification	Impact (ft)	Mitigation Required (ft)	JD Status
1	16+52/20+00 L	(Stream Relocation)	Ut Swift Creek	27-43-2.2/WS-III NSW	213	213	Perennial
2	27+48 L	1@2.1 m x 1.8 m RCBC	Long Branch	27-43-2.8/WS-III NSW	72	0	Perennial
3	36+50 L	900mm RCP	Ut Lynn Branch	27-43-3/WS-III NSW	16	0	Intermittent
4	37+80 L	1@2.4m x 2.1m RCBC	Lynn Branch	27-43-3/WS-III NSW	98	0	Perennial
5	42+70/43+20 L	1@1.8m x 1.8m RCBC	Ut Lynn Branch	27-43-3/WS-III NSW	75	0	Perennial
6	52+34 L	750mm RCP	Ut Lynn Branch	27-43-3/WS-III NSW	20	0	Intermittent
7	53+36/54+82 L	1050mm RCP	Ut Lynn Branch	27-43-3/WS-III NSW	20	0	Perennial
8	11+01/11+85 RPBWS	1200mm RCP	Ut Lynn Branch	27-43-3/WS-III NSW	256	256	Perennial
9	11+60 LPBWS	1200mm RCP	Ut Lynn Branch	27-43-3/WS-III NSW	140	0	Perennial
Total					911	469	

Table 5. Riparian Buffer Impacts

Site	Station	Mitigable Impact		Buffer Replacement	
		Zone 1 (ft ²)	Zone 2 (ft ²)	Zone 1 (ft ²)	Zone 2 (ft ²)
1	16+60 to 20+60 L	69,156	30,580	52,258	3,845
2	27+50 L	8,417	5,619		
3	35+10 to 36+80 L	7,793	8,546		
4	37+80 L	11,797	8,428		
5	42+95 L	9,472	7,750		
6	52+30 to 58+10 L to 12+80 LPBWS	57,704	39,287		
7	11+50 LPBWS	9,483	6,630		
Total		173,822	106,840	52,258	3,845

Permanent Impacts: There are nine sites in the project area that impact jurisdictional waters.

DESCRIPTION OF JURISDICTIONAL SITES:

Site 1: located at station L 16+52/20+00 (stream/wetland permit sheets 4 and 5 of 21). There is a riverine wetland that is associated with a perennial channel. The subject channel becomes perennial at approximate station L 17+50. Therefore, only 213 ft of this stream requires mitigation. The perennial portion of this stream will be relocated using natural stream design. The non-jurisdictional portion of this stream will be relocated into

a lateral base ditch. We propose to replace 56,103 square feet of riparian buffers at this site.

Site 2: located at station L 27+48 (stream/wetland permit sheets 6-8 of 21). This is a perennial stream. A 1 @ 2.1m x 1.8m reinforced concrete box culvert will be extended at this site.

Site 3: located at station L 36+50 (stream/wetland permit sheet 9 of 21). This is an intermittent stream. A 900mm reinforced concrete pipe will be extended at this site.

Site 4: located at station L 37+80 (stream/wetland permit sheets 10-12 of 21). There is a riverine wetland that is associated with a perennial channel. A 1 @ 2.4m x 2.1m reinforced concrete box culvert will be extended at this site.

Site 5: located at station L 42+70/43+20 (stream/wetland permit sheets 13-15 of 21). This is a perennial stream. A 1 @ 1.8m x 1.8m reinforced concrete box culvert will be extended at this site.

Site 6: located at station L 52+34 (stream/wetland permit sheet 16 of 21). This is an intermittent stream. A 750mm reinforced concrete pipe will be extended at this site.

Site 7: located at station L 53+36/54+82 (stream/wetland permit sheet 17 of 21). This is a perennial stream. A 1050mm reinforced concrete pipe will be extended at this site.

Site 8: located at station RPBWS 11+01/11+85 (stream/wetland permit sheet 18 of 21). This is a perennial stream. A 1200mm reinforced concrete pipe will be used to cross this stream.

Site 9: located at station LPBWS 11+60 (stream/wetland permit sheets 18 of 21). There is a riverine wetland that is associated with a perennial channel. A 1200mm reinforced concrete pipe will be used to cross this stream.

None of the streams on this project are on DWQ's 303d list of impaired waters.

Federally Protected Species

Plants and animals with federal classifications of Endangered, Threatened, Proposed Endangered, and Proposed Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of January 29, 2003, the United States Fish and Wildlife Service (USFWS) lists four federally protected species as occurring in Wake County. Table 6 lists the species, their status and biological conclusion. Since the original Environmental Assessment was prepared no species have been added to or removed from the list. Surveys for Michaux's sumac were conducted on December 16, 1999 and February 7, 2000. There were no Michaux's sumac observed. NCDOT has requested concurrence from USFWS for a "May Affect-Not Likely to Adversely Affect" biological conclusion for Michaux's sumac. A copy of the request is attached.

Table 6. Federally-Protected Species for Wake County

Common Name	Scientific Name	Federal Status	Habitat Analysis	Biological Conclusion
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T (Proposed for Delisting)	No	No Effect
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	No	No Effect
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	E	No	No Effect
Michaux's sumac	<i>Rhus michauxii</i>	E	Yes	May Effect, Not Likely to Adversely effect

Cultural Resources

Historic Resources: No structures listed in or eligible for the National Register of Historic Places are located in the project area. The State Historic Preservation Office (SHPO) was consulted during the planning phase of the project. In a letter dated July 17, 1997, exhibited in Appendix C of the EA, the Department of Cultural Resources indicated that there is no effect on any historical resources as a result of TIP project U-3101C.

Archaeological Resources: No known archaeological sites are located in the project area. The State Historic Preservation Office was consulted during the planning phase of the project. In a letter dated July 17, 1997, the Department of Cultural resources indicated that there is no effect on archeological resources as a result of TIP project U-3101C.

FEMA Compliance

NCDOT has met all the FEMA requirements for this project. No streams on this project are in a regulated flood zone. Thus we will be in compliance with FEMA regulations.

Wild and Scenic River System

The project will not impact any Designated Wild and Scenic River or any river included in the list of study rivers (Public Law 90-542, as amended).

Utilities

The Utilities Coordination Unit found that there will not be any environmental impacts from utilities on this project. No utilities work will impact wetlands or riparian buffer areas. The sewer lines located near the streams will remain in place and will not be in conflict with the proposed construction.

Indirect and Cumulative Impacts

Since this project involves modifying existing interchanges and adding lanes primarily in the median, an Indirect and Cumulative Effects report will not be done. No new access will occur and the widening will occur in existing NCDOT right of way.

Mitigation Options

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize wetland impacts, and to provide full compensatory mitigation of all remaining wetland impacts. Avoidance measures were taken during the planning and EA/FONSI phases; minimization measures were incorporated as part of the project design.

Avoidance: All wetlands not directly affected by the project will be protected from unnecessary encroachment. No staging of construction equipment or storage of construction supplies will be allowed in wetlands or near surface waters.

Minimization: Wetland impacts were minimized to the maximum extent practical. In addition to directly avoiding wetlands and streams, NCDOT is incorporating the following measures to minimize impact to wetlands and surface waters:

1. Use of 2:1 fill slopes in jurisdictional areas at all sites.
2. It is the policy of the NCDOT to eliminate lateral ditching in wetlands as much as possible, thus preserving the hydrology of adjacent wetlands. There are no ditches in wetlands on this project.
3. Most of the widening will occur on the inside, minimizing impacts to non-disturbed jurisdictional areas on the outside.
4. Pipe culvert and box culvert inverts are to be buried one foot below the stream bed where feasible, depending on the relative elevations of the stream bed. All pipe culverts and box culverts will maintain the normal stream flow and channel characteristics. This design will allow unimpeded passage by fish and other aquatic organisms.

- Station 16+52/20+00 L

We propose to relocate the perennial portion of this stream using natural stream design. We also propose to replace riparian buffers at this site.

- Stations 14+60 L, 38+00 L, 39+00 L, 53+16 L, 15+35 SBCD, 12+20 RPBWS, 13+00 RPBWS, 12+00 LPBWS, 11+00 LPBWS

Grass Swales (buffers/water quality permit sheets 4, 11, 13, 14, 15, and 16 of 19)

To minimize impacts to the water quality and aquatic life, and to comply with the Neuse Buffer Rules, the design has incorporated grass swales.

- Stations 20+45 L, 27+68 L, 27+80 L, 38+45 L, 43+02 L, 43+55 L

Level Spreaders (buffers/water quality permit sheets 6, 8, 9, 11, and 12 of 19)

To minimize impacts to the water quality and aquatic life, and to comply with the Neuse Buffer Rules, the design has incorporated level spreaders.

- Stations 27+13 L, 27+25 L, 42+40 L, 42+95 L
Preformed Scour Holes (buffers/water quality permit sheets 9 and 12 of 19)
To minimize impacts to the water quality and aquatic life, and to comply with the Neuse Buffer Rules, the design has incorporated preformed scour holes.

Compensation: The primary emphasis of the compensatory mitigation is to reestablish a condition that would have existed if the project were not built. As previously stated, mitigation is limited to reasonable expenditures and practicable considerations related to highway operation. Mitigation is generally accomplished through a combination of methods designed to replace wetland functions and values lost as a result of construction of the project. These methods consist of creation of new wetlands from uplands, borrow pits, and other non-wetland areas; restoration of wetlands; and enhancement of existing wetlands. Where such options may not be available, or when existing wetlands and wetland-surface water complexes are considered to be important resources worthy of preservation, consideration is given to preservation as at least one component of a compensatory mitigation proposal.

FHWA STEP DOWN COMPLIANCE: All compensatory mitigation must be in compliance with 23 CFR Part 777.9, “Mitigation of Impacts” that describes the actions that should be followed to qualify for Federal-aid highway funding. This process is known as the FHWA “Step Down” procedure:

1. Consideration must be given to mitigation within the right-of-way and should include the enhancement or restoration of existing wetlands and/or streams and the creation of new wetlands in the highway median, borrow pit areas, interchange areas and along the roadside.
2. Where mitigation within the right-of-way does not fully offset wetland or stream losses, compensatory mitigation may be conducted outside the right-of-way including enhancement, creation, and preservation.

Based upon agreements stipulated in the “Memorandum of Agreement Among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U.S. Army Corps of Engineers, Wilmington District” (MOA), it is understood that the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP) will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for NCDOT projects that are listed in Exhibit 1 of the subject MOA during the EEP transition period which ends on June 30, 2005.

Since the subject project is listed in Exhibit 1, the necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the 03020201 cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above.

Compensatory mitigation will be provided for perennial stream impacts that are equal to or exceed 150 linear feet. No mitigation will be provided for impacts to intermittent streams. This was discussed with Eric Alsmeyer (Corps of Engineers) and he is in agreement with this proposal.

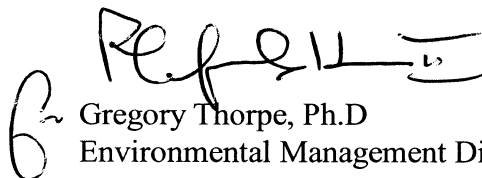
The remaining, unavoidable impacts to 469 linear feet of jurisdictional streams and 224,559 square feet of riparian buffers will be offset by compensatory mitigation provided by the EEP program. Mitigation is not required for wetland impacts since each site is below 0.1 ac of impact.

Regulatory Approvals

Application is hereby made for the Department of Army Section 404 Nationwide 14 for the above-described activities. We are also hereby requesting a 401 Water Quality Certification and Neuse Riparian Buffer Certification from the Division of Water Quality. In compliance with Section 143-215.3D(e) of the NCAC we will provide \$475.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line). We are providing seven copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their review.

Thank you for your assistance with this project. If you have any questions or need additional information please call Matt Haney at (919) 715-1428.

Sincerely,



Gregory Thorpe, Ph.D
Environmental Management Director, PDEA

Cc: w/attachment

Mr. John Hennessy, Division of Water Quality
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan, USFWS
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Jon Nance, P.E., Division 5 Engineer
Mr. Chris Murray, Division 5 Environmental Officer

W/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Mark Staley, Roadside Environmental
Mr. David Franklin, USACE, Wilmington
Mr. Richard Brewer, P.E., Project Planning Engineer
Ms. Beth Harmon, EEP

Office Use Only:

Form Version May 2002

USACE Action ID No. _____ **DWQ No.** _____

(If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A".)

I. Processing

1. Check all of the approval(s) requested for this project:
 Section 404 Permit
 Section 10 Permit
 401 Water Quality Certification
 Riparian or Watershed Buffer Rules
 Isolated Wetland Permit from DWQ
2. Nationwide, Regional or General Permit Number(s) Requested: NWP 14
3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here:
4. If payment into the North Carolina Wetlands Restoration Program (NCWRP) is proposed for mitigation of impacts (verify availability with NCWRP prior to submittal of PCN), complete section VIII and check here:
5. If your project is located in any of North Carolina's twenty coastal counties (listed on page 4), and the project is within a North Carolina Division of Coastal Management Area of Environmental Concern (see the top of page 2 for further details), check here:

II. Applicant Information

1. Owner/Applicant Information
Name: NC Department of Transportation
Mailing Address: 1548 Mail Service Center
Raleigh, NC 27699-1548

Telephone Number: 919-733-3141 Fax Number: 919-715-1501
E-mail Address: _____
2. Agent/Consultant Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)
Name: N/A
Company Affiliation: _____
Mailing Address: _____

Telephone Number: _____ Fax Number: _____
E-mail Address: _____

III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: Widening of US 1/64 from US 64 to south of SR 1313 (Walnut Street in Cary).
2. T.I.P. Project Number or State Project Number (NCDOT Only): U-3101C
3. Property Identification Number (Tax PIN): N/A
4. Location
County: Wake Nearest Town: Cary
Subdivision name (include phase/lot number): N/A
Directions to site (include road numbers, landmarks, etc.): US 1/64 from US 64 to south of SR 1313 (Walnut Street), located in the southeastern part of Cary
5. Site coordinates, if available (UTM or Lat/Long): _____
(Note – If project is linear, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
6. Property size (acres): N/A
7. Nearest body of water (stream/river/sound/ocean/lake): Long Branch, Lynn Branch
8. River Basin: Neuse
(Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at [http://h2o.enr.state.nc.us/admin/maps/.](http://h2o.enr.state.nc.us/admin/maps/))
9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: urban, residential
10. Describe the overall project in detail, including the type of equipment to be used: The proposed project will consist of widening US 1/64 from a four lane to a six lane facility, from

US 1/64/SR 1009 (Tryon Rd) interchange to south of I-40. The US 1/64 interchanges at SR 1313 (Walnut St) and at Cary Parkway will also be modified. Construction equipment will consist of heavy duty trucks, earth moving equipment, and cranes, etc.

11. Explain the purpose of the proposed work: To relieve congestion and improve safety through this stretch of US 1/64.

IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules.

N/A

V. Future Project Plans

Are any future permit requests anticipated for this project? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application.

No

VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. The applicant must also provide justification for these impacts in Section VII below. All proposed impacts, permanent and temporary, must be listed herein, and must be clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) must be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: There will be 0.17 acre of permanent wetland impacts which are riverine. There will also be approximately 1,781 linear feet of jurisdictional stream impacts. There will also be approximately 295,968 square feet of riparian buffer impacts.

2. Individually list wetland impacts below:

Wetland Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Located within 100-year Floodplain** (yes/no)	Distance to Nearest Stream (linear feet)	Type of Wetland***
1	Fill/mechanized clearing	0.03	Yes	15	Riverine
4	Mechanized clearing	0.005	Yes	120	Riverine
9	Fill	0.13	Yes	15	riverine

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

** 100-Year floodplains are identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM), or FEMA-approved local floodplain maps. Maps are available through the FEMA Map Service Center at 1-800-358-9616, or online at <http://www.fema.gov>.

*** List a wetland type that best describes wetland to be impacted (e.g., freshwater/saltwater marsh, forested wetland, beaver pond, Carolina Bay, bog, etc.) Indicate if wetland is isolated (determination of isolation to be made by USACE only).

List the total acreage (estimated) of all existing wetlands on the property: 0.5

Total area of wetland impact proposed: 0.17 ac

3. Individually list all intermittent and perennial stream impacts below:

Stream Impact Site Number (indicate on map)	Type of Impact*	Length of Impact (linear feet)	Stream Name**	Average Width of Stream Before Impact	Perennial or Intermittent? (please specify)
1	Fill	984	Ut Swift Creek	3 ft	Perennial
2	Fill	72	Long Branch	5 ft	Perennial
3	Fill	16	Ut Lynn Branch	3 ft	Intermittent
4	Fill	98	Lynn Branch	5 ft	Perennial
5	Fill	75	Ut Lynn Branch	3 ft	Perennial
6	Fill	20	Ut Lynn Branch	3 ft	Intermittent
7	Fill	36	Ut Lynn Branch	3 ft	Perennial
8	Fill	299	Ut Lynn Branch	3 ft	Perennial
9	fill	180	Ut Lynn Branch	3 ft	perennial

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: culverts and associated rip-rap, dams (separately list impacts due to both structure and flooding), relocation (include linear feet before and after, and net loss/gain), stabilization activities (cement wall, rip-rap, crib wall, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included.

** Stream names can be found on USGS topographic maps. If a stream has no name, list as UT (unnamed tributary) to the nearest downstream named stream into which it flows. USGS maps are available through the USGS at 1-800-358-9616, or online at www.usgs.gov. Several internet sites also allow direct download and printing of USGS maps (e.g., www.topozone.com, www.mapquest.com, etc.).

Cumulative impacts (linear distance in feet) to all streams on site: 1781

4. Individually list all open water impacts (including lakes, ponds, estuaries, sounds, Atlantic Ocean and any other water of the U.S.) below:

Open Water Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Name of Waterbody (if applicable)	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)
1	Fill	0.09	Ut Swift Creek	Stream
2	Fill	0.02	Long Branch	Stream
3	Fill	0.003	Ut Lynn Branch	Stream
4	Fill	0.02	Lynn Branch	Stream
5	Fill	0.01	Ut Lynn Branch	Stream
6	Fill	0.003	Ut Lynn Branch	Stream
7	Fill	0.003	Ut Lynn Branch	Stream
8	Fill	0.01	Ut Lynn Branch	Stream
9	fill	0.007	Ut Lynn Branch	Stream

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: fill, excavation, dredging, flooding, drainage, bulkheads, etc.

5. Pond Creation

If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.

Pond to be created in (check all that apply): uplands stream wetlands
 Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.): N/A

Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.): N/A

Size of watershed draining to pond: N/A Expected pond surface area: N/A

VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts.

See cover letter.

VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to

freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on March 9, 2000, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCWRP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ’s Draft Technical Guide for Stream Work in North Carolina, available at <http://h2o.enr.state.nc.us/ncwetlands/strmgide.html>.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.

EEP

2. Mitigation may also be made by payment into the North Carolina Wetlands Restoration Program (NCWRP). Please note it is the applicant’s responsibility to contact the NCWRP at (919) 733-5208 to determine availability and to request written approval of mitigation prior to submittal of a PCN. For additional information regarding the application process for the NCWRP, check the NCWRP website at <http://h2o.enr.state.nc.us/wrp/index.htm>. If use of the NCWRP is proposed, please check the appropriate box on page three and provide the following information:

Amount of stream mitigation requested (linear feet): 761

Amount of buffer mitigation requested (square feet): 295,968

Amount of Riparian wetland mitigation requested (acres): N/A

Amount of Non-riparian wetland mitigation requested (acres): N/A

Amount of Coastal wetland mitigation requested (acres): N/A

IX. Environmental Documentation (required by DWQ)

Does the project involve an expenditure of public (federal/state) funds or the use of public (federal/state) land?

Yes No

If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)?

Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation.

Yes No

If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter.

Yes No

X. Proposed Impacts on Riparian and Watershed Buffers (required by DWQ)

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify _____)?

Yes No If you answered "yes", provide the following information:

Identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1	180,722	3	542,166
2	115,247	1.5	172,870.5
Total	295,969		715,036.5

* Zone 1 extends out 30 feet perpendicular from near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Conservation Easement, Riparian Buffer Restoration / Enhancement, Preservation or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0260.

EEP

XI. Stormwater (required by DWQ)

Describe impervious acreage (both existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property.

Grass swales, level spreaders, and preformed scour holes will be used.

XII. Sewage Disposal (required by DWQ)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.

Some utility lines will be relocated & others will remain in the existing location.

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?

Yes No

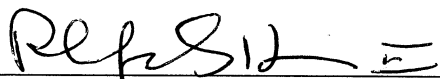
Is this an after-the-fact permit application?

Yes No

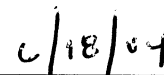
XIV. Other Circumstances (Optional):

It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).

N/A



Applicant/Agent's Signature



Date

(Agent's signature is valid only if an authorization letter from the applicant is provided.)



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

May 28, 2004

Mr. Gary Jordan
US Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Subject: Concurrence Request for Biological Conclusion for the Michaux's sumac for the proposed widening of US 1/64 from US 1/64/SR 1009 (Tryon Road) interchange to south of I-40 in Cary, Wake County, TIP No. U-3101C; State Project No. 8.1403101; Federal Aid Project No. STPNHF-1(4).

Dear Mr. Jordan:

The Natural Heritage Program documented one occurrence of Michaux's sumac within 6 miles of the project study area. This occurrence is in Wake County approximately 1,700 feet west of the SR 1649 (Ebenezer Church Road) and Sendero Drive intersection.

An initial survey for Michaux's sumac was conducted on December 16, 1999 by Karen Lynch. Potential habitat such as areas of rocky and sandy open woods along the right of way were searched for this species. There were no plants of Michaux's sumac found during this survey. The frequency of mowing along the right of way likely prevents the establishment of this species. There is a cutover area, where a proposed ramp (Walnut Street ramp) is to be placed, where potential habitat for Michaux's sumac is present. This area was searched on February 7, 2000, by NCDOT biologists Michael Wood and Karen Lynch. The future ramp area was overgrown with blackberry, honeysuckle, and scrubby vegetation, providing much competition for other less invasive plants. There were no plants of Michaux's sumac observed during this survey. The biological conclusion of "May Affect-Not Likely to Adversely Affect" is considered appropriate for this species at this location.

Concurrence from the US Fish and Wildlife Service is requested for this biological conclusion under provisions of Section 7 of the Endangered Species Act of 1973. Please provide a copy of your concurrence letter to the US Army Corps of Engineers (Raleigh Regulatory Field Office).

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

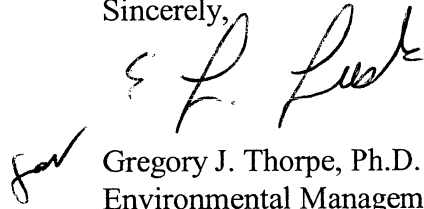
TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

If additional information is required to respond to this request, please contact Matt Haney at 715-1428. Thank you for your assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "G. J. Thorpe". The signature is written in a cursive style with a large initial "G".

Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch

cc: Richard Brewer, P.E.

File

U-3101 PERMIT DRAWINGS PACKET

NCDOT HYDRAULICS UNIT
December 19, 2003

Andrew Nottingham, PE
Project Engineer

Stephen Morgan, PE
Project Design Engineer

Permit Drawing Review Minutes (Interagency 4C Review) and Post Meeting Follow-Up U-3101

State Project 8.1403101
US 1/64 From US64/SR1009 (Tryon Rd.) to South of the I-40 Interchange

A Permit Review Meeting was held on Thursday, April 24, 2003 in the Location and Surveys conference room at the NCDOT Century Center Complex, Raleigh.

Team members: Eric Alsmeyer-USACE (Present)
John Hennessy-NCDWQ (Present)
Travis Wilson-NCWRC (Present)
Gary Jordan-USFWS (Absent)
Chris Militscher-EPA (Absent)
Matt Haney-PDEA (Absent)
Jimmy Goodnight-NCDOT Roadway Design (Present)
Andrew Nottingham-NCDOT Hydraulics Unit (Present-Facilitator)

Participants: David Chang-NCDOT Hydraulics
Dean Noland-NCDOT Roadway Design
Betsy Cox-NCDOT Structures Unit
David Harris-NCDOT Roadside Environmental Unit
Stephen Morgan-NCDOT Hydraulics

The meeting began with Mr. Nottingham describing the project and presenting a project overview. He then described the permit packet team members would be referencing noting the stream and wetland impacts were shown followed by buffer impacts. The permit drawings were then reviewed site by site. The discussion and comments for each site are as follows, with follow-up actions italicized:

Site 1a (Buffer Drawings)

NCDOT advised that an alternative design has been explored whereas the outlet left of station 13+70 -L- may be moved further from the stream. An existing ditch could be used as the outlet, eliminating any impact to the buffer. DWQ requested that discharge analysis and swale length be shown on the buffer drawings.

The site is included in the drawings with the requested information shown.

Site 1

The USACE representative noted the absence of wetland delineation on the plans. NCDOT will assure this file is attached to the final plans. The USACE and DWQ representatives noted the stream relocation would be an improvement over the existing stream. NCDOT will proceed with natural stream design. DWQ requested a morphological table as well as sediment transport analysis (including pebble count) for the stream relocation. It was noted that it would cost approximately \$250,000 to move the sewer pump station located left of station 17+70 -L-. NCDOT will realign the stream to avoid the pump station. A portion of the stream will have to be piped or armored with rip rap immediately adjacent to the pump station. There were no further comments.

The wetland sites will be shown on the final plans. The new stream follows natural stream techniques as documented in this package. The sewer lift station will be avoided by adjusting the roadway fill slope and stream alignment. The stream will not be armored in this area.

Site 2

USACE noted the impacts to the stream should include the length to where the relocated channel ties back into the existing channel. NCWRC noted in general, all culverts should be buried and no stream should be excavated or widened. USACE requested the issue of any perched culverts be addressed. After some discussion by the team members, it was agreed that where any culverts were perched upstream, the stream bed would be armored with appropriate-sized rip rap. DWQ requested that details of the flow splitter boxes used in the level spreader designs be included in the buffer drawings.

The impacts have been adjusted accordingly. The culvert has been extended to match the existing stream invert. The splitter box and level spreader details have been included in the permit drawings. The culvert cross section and profile views have been included with the permit drawings as well.

Site 3

No comment

Site 4

USACE advised stream impacts upstream should include the length to where the relocated channel ties back into the existing channel. DWQ requested a statement be included in the buffer drawings justifying the grass swale through the buffer instead of a level spreader (station 38+00 to 39+20 Lt.).

Site 4 cont.

The stream impacts have been shown accordingly. The topography of the site favors a grass swale for treatment. A note has been placed on the drawings as requested. The culvert profile and cross section views have been included in the permit drawings.

Site 5

No comment from team members. NCDOT Roadside Environmental expressed concerns over stability below level spreaders in general, noting reconcentration of flow below the devices was a particular concern. The team members agreed this is a concern, and would cooperatively strive to find a solution.

To facilitate future maintenance, permanent drainage easements are shown around all level spreaders and water quality control devices. The culvert profile and cross section views have been included in the permit drawings.

Site 6 (and Site 6 Buffer Drawings)

DWQ requested grass swale information for the 600 cross pipe at station 50+80-L-. DWQ requested the noise wall (station 50+80 Lt. and 50+40 Rt.) be integrated into the roadway by moving the wall closer to the road to eliminate a variance. NCDOT will investigate. DWQ and USACE suggested the stream (station 50+80 -L-) could be "marginal and not jurisdictional" and may have been confused with the stream at station 52+34 -L-. A determination could not be made as to which stream was shown on the soils map. Team members agreed a site visit would be appropriate for verification. NCDOT will schedule a site visit for verification.

A field meeting determined the feature at station 50+80 was not a stream. (See the email correspondence included in the permit package) Site 6 is now the pipe crossing at station 52+34.

Site 7

NCWRC requested alignment of the 1050mm pipe extension be altered if possible to eliminate any upstream impacts. DWQ requested grass swale criteria (station 11+60 to 12+60 RPBWS Lt.). NCDOT Hydraulics noted the criteria were shown on the Buffer permit drawings except for length.

NCDOT has determined the alignment as shown to be preferable for hydraulic performance.

Site 8

DWQ requested a preformed scour hole at the end of the grass swale (station 11+00 LPBWS Rt.) in the loop.

This particular site is now Site 9. Due to site topography a PSH is not practicable. A rock check dam has been added instead to retain minor flows and disperse larger flows.

Other Comments

NCDOT noted that three wetland sites and one intermittent stream noted in the Environmental Assessment (EA) for the project were not shown and they would coordinate to verify the sites. The sites were located in the vicinity of the new ramp and loop for the Walnut Street interchange. The sites were referred to as wetland sites 2, 3 and 4 and stream site 10 in the EA.

The stream is shown as a "blue line" on the soils map, and therefore will be included as additional impacts for site 6, buffer drawings. (See email correspondence included in the permit package). The wetland sites have subsequently been located in the field by NCDOT PDEA staff and plotted by NCDOT Hydraulics staff.

Subject: U-3101C&D (WAKE CO.)BUFFER VERIFICATION FIELD REVIEW RESULTS
Date: Wed, 14 May 2003 11:34:17 -0400
From: Andrew Nottingham <anottingham@dot.state.nc.us>
Organization: North Carolina Department of Transportation
To: "Matt M. Haney" <MMHaney@dot.state.nc.us>,
"John.Hennessy" <John.Hennessy@ncmail.net>
CC: Eric Alsmeyer <eric.c.alsmeyer@usace.army.mil>,
"James S. Goodnight" <jgoodnight@dot.state.nc.us>

A field review meeting was held on 5/13/03 at the project site with Andrew Nottingham (NCDOT), Matt Haney (NCDOT) and John Hennessy (DWQ) to address the comments made at the permit drawing review meeting held on 4/24/03 concerning Site 6 of the permit drawings.

During the permit drawing review meeting DWQ and USACE suggested the buffer stream at station 50+80 -L- could be "marginal and not jurisdictional" and may have been confused with the stream at station 52+34 -L-. A determination could not be made as to which stream was shown on the soils map. Team members agreed a site visit would be appropriate for verification.

The results of the field meeting determined that the location of the stream shown on the soils map was at station 50 +80 -L-. This site was reviewed in the field and it was determined that it was not a stream (this site had not been called a stream by the USACE). Therefore no buffers will be shown for the crossing at station 50+80 -L-. The stream at station 52+34 -L- was determined not to be shown on the soils map although it was determined to be a stream (this site had been called a stream by USACE). Therefore no buffers will be shown for the stream at station 52+34 -L- since it is not shown on the soils map.

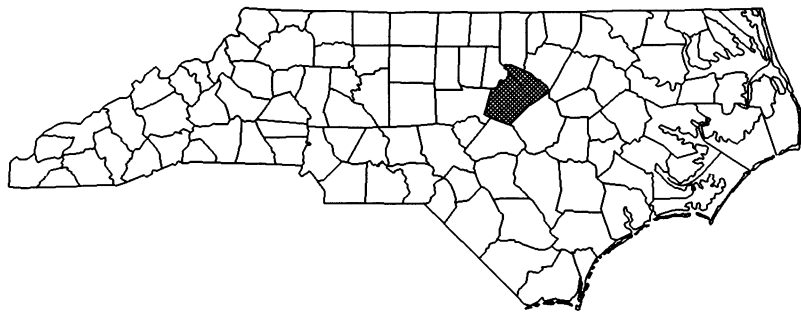
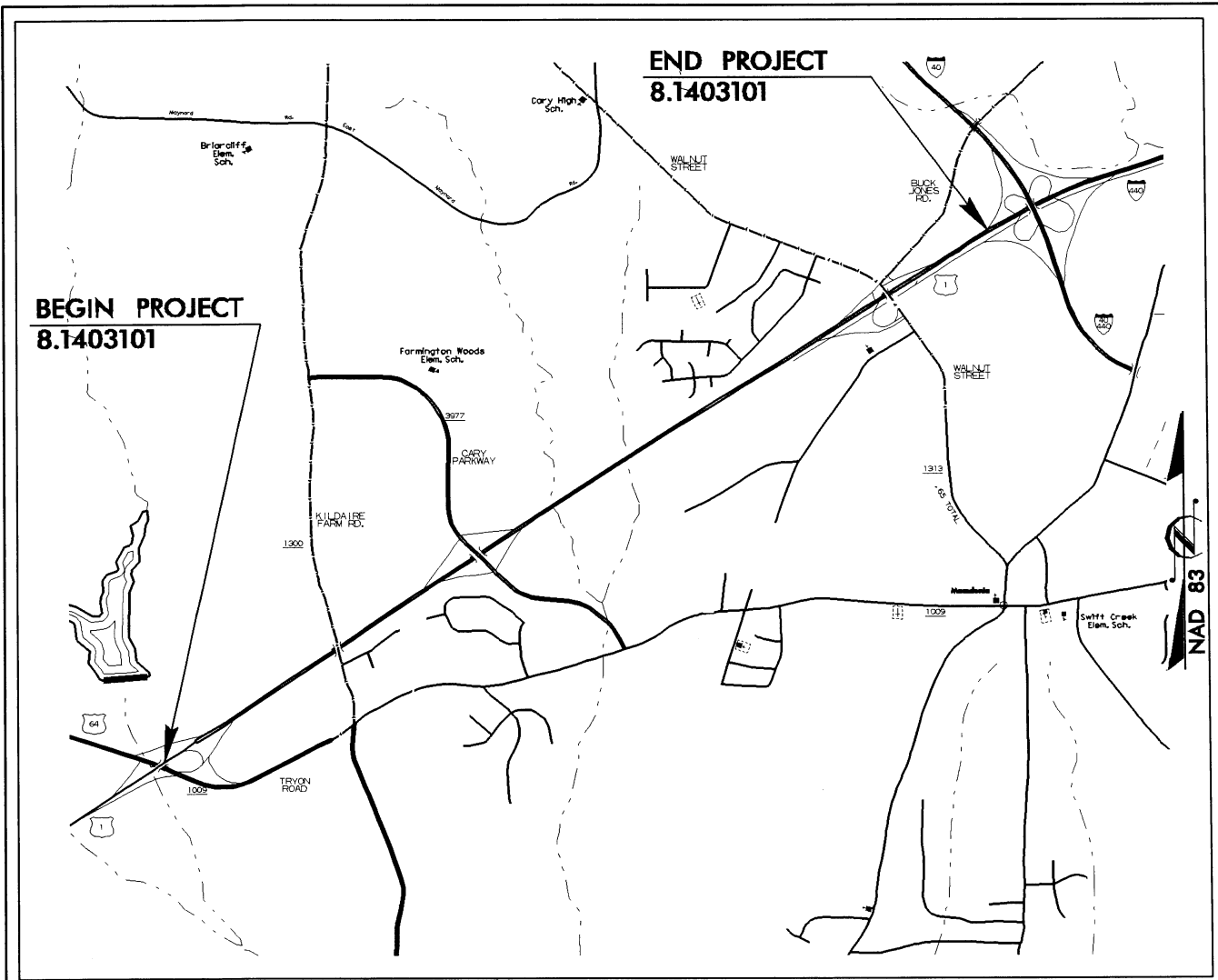
One other site was visited during the field review that was not shown in the permit drawings but was mentioned at the permit drawing review meeting (it was noted that the stream was listed as a intermittent stream in the Environmental Assessment for the project as stream site 10). The stream is located in the new ramp and loop of the Walnut Street Interchange with US 64. The stream is shown on the soils map. It was determined that the buffers would start on the stream at station 12+80 - LPBWS- (near the south west back corner of the Fairfield Inn parking lot).

Let me know if you have any questions or comments.
Thanks,
Andrew

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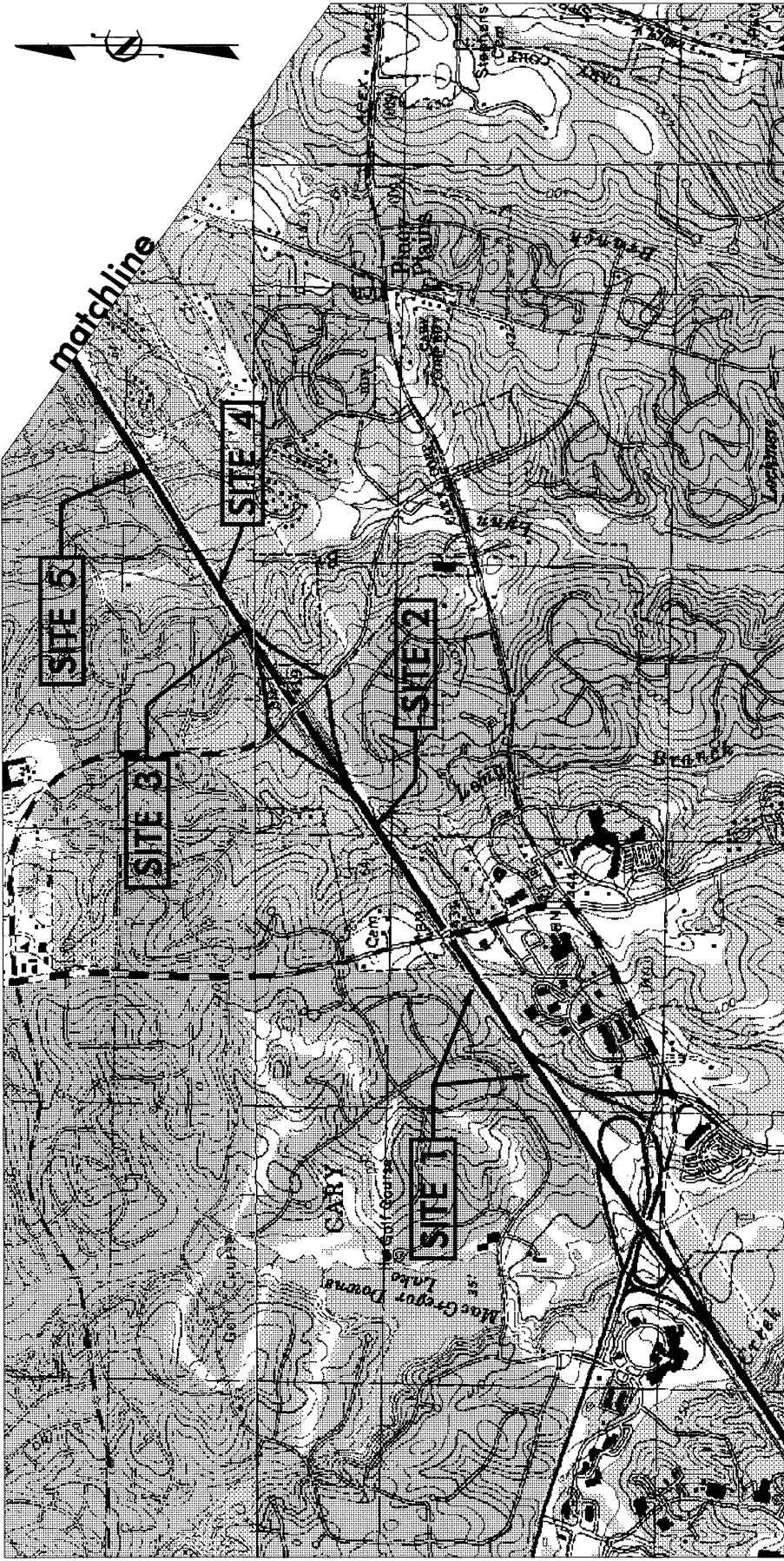
Andrew T. Nottingham, PE
Project Engineer
NCDOT-Hydraulics Unit
Phone: 919-250-4100
Fax: 919-250-4108
email: anottingham@dot.state.nc.us

Streams and Wetland Impacts



***VICINTY MAP
SURFACE WATER
IMPACTS***

NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 1 OF 2! 10-21-03



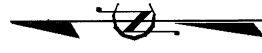
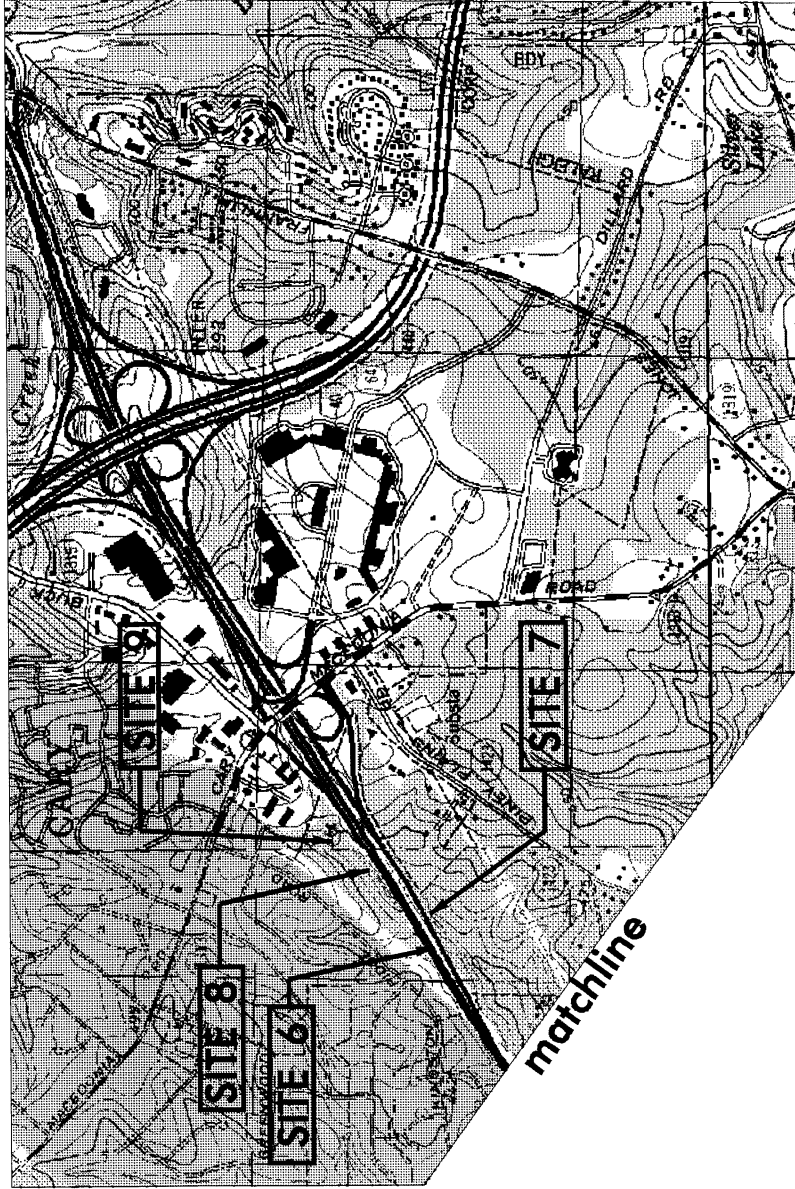
**SURFACE WATER IMPACT
SITE MAP**

NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-5101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 21 OF 21 10-21-03

SCALE

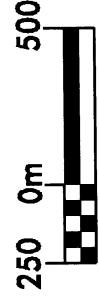


HSS&S QUAD MAPS, ALEX CARY
 RALEIGH, WEST, AND LAKE WHEELER



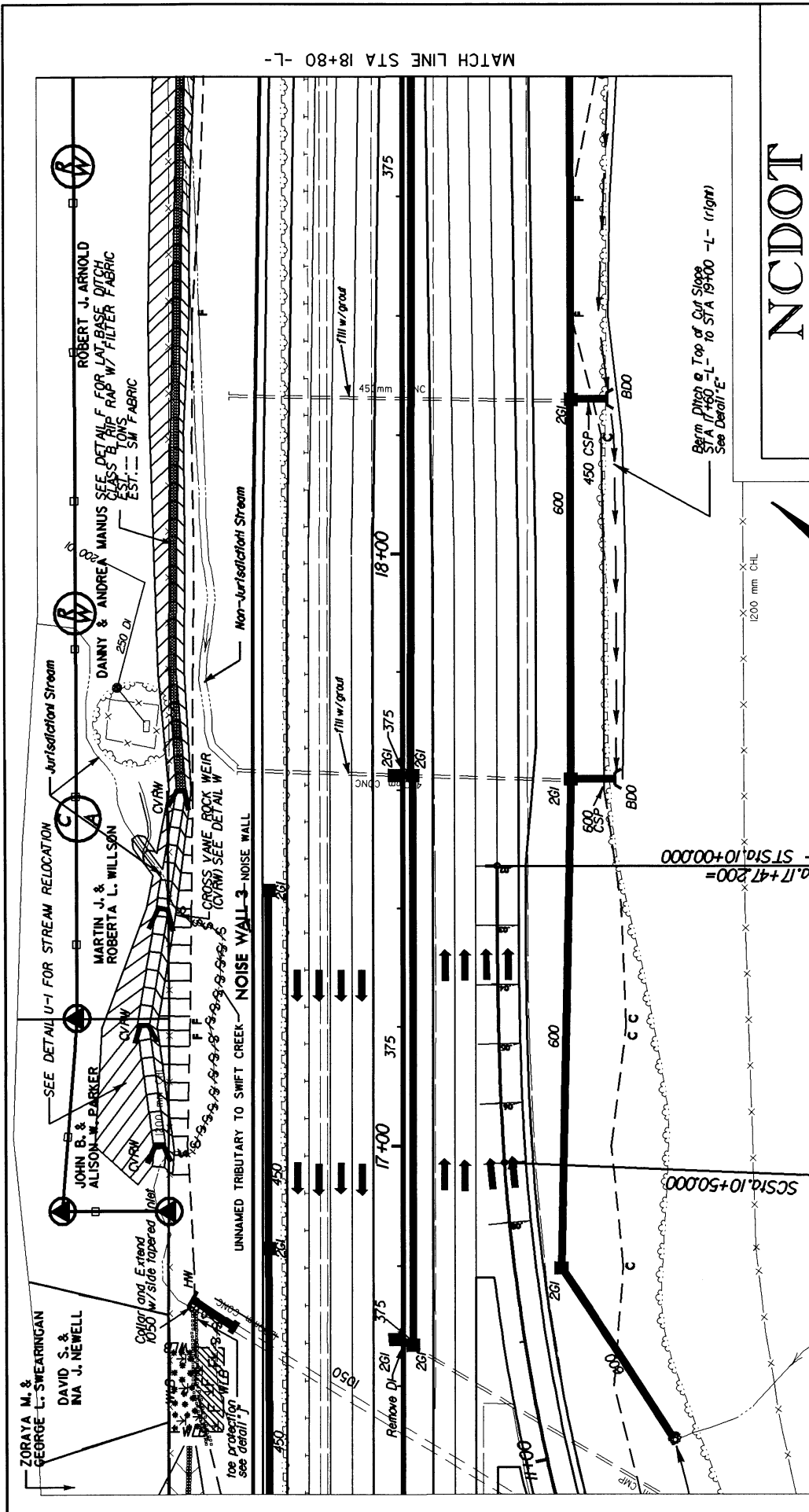
SURFACE WATER IMPACT SITE MAP

SCALE



NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1.403101 (U-310D)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 3 OF 2 | 10-21-03

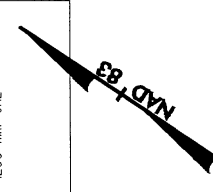
USGS QUAD MAPS: APEX, CARY,
 RALEIGH WEST, AND LAKE WHEELER



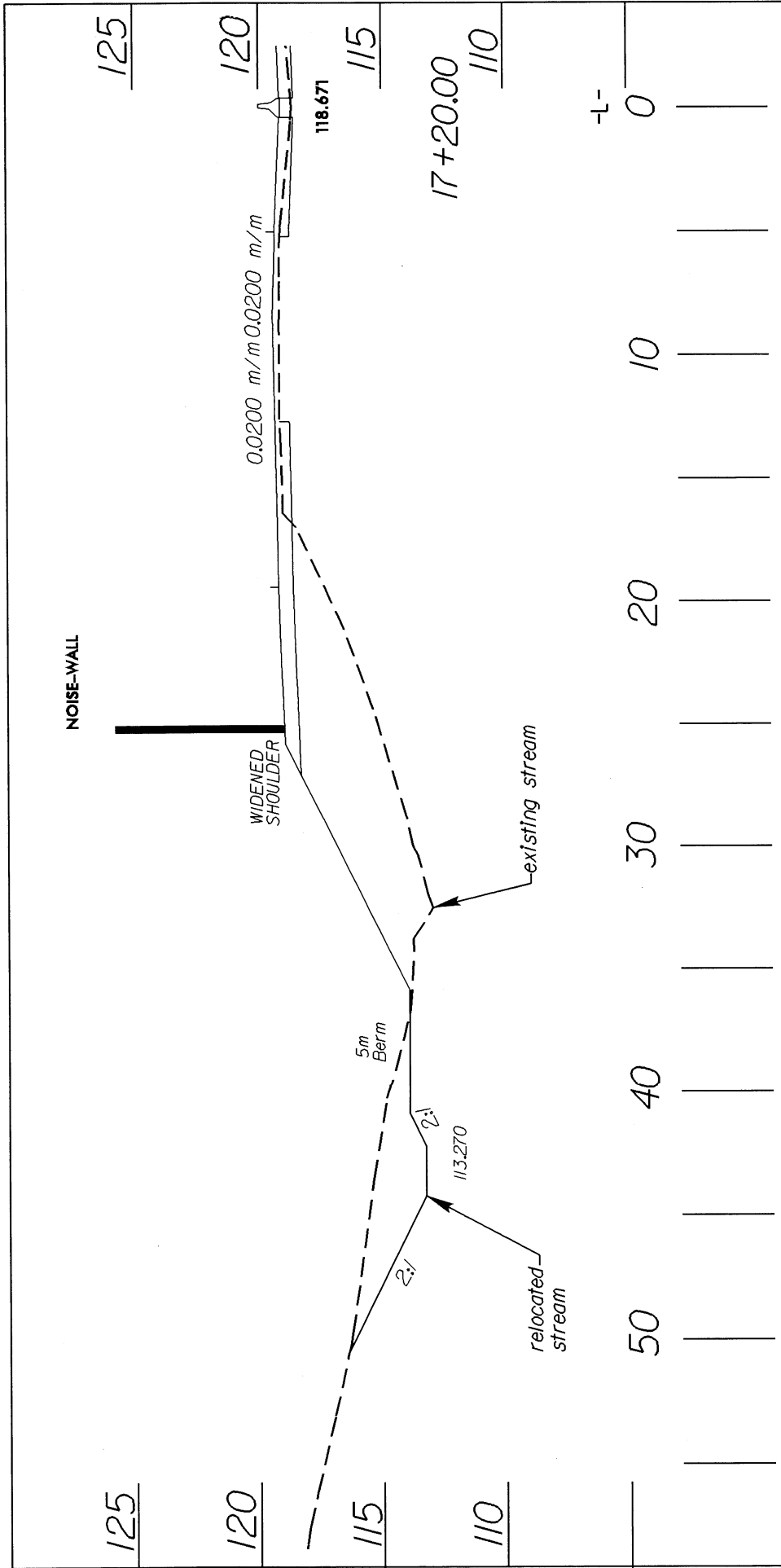
NC DOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 4 OF 21 6-11-04

SITE 1 PLAN VIEW

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



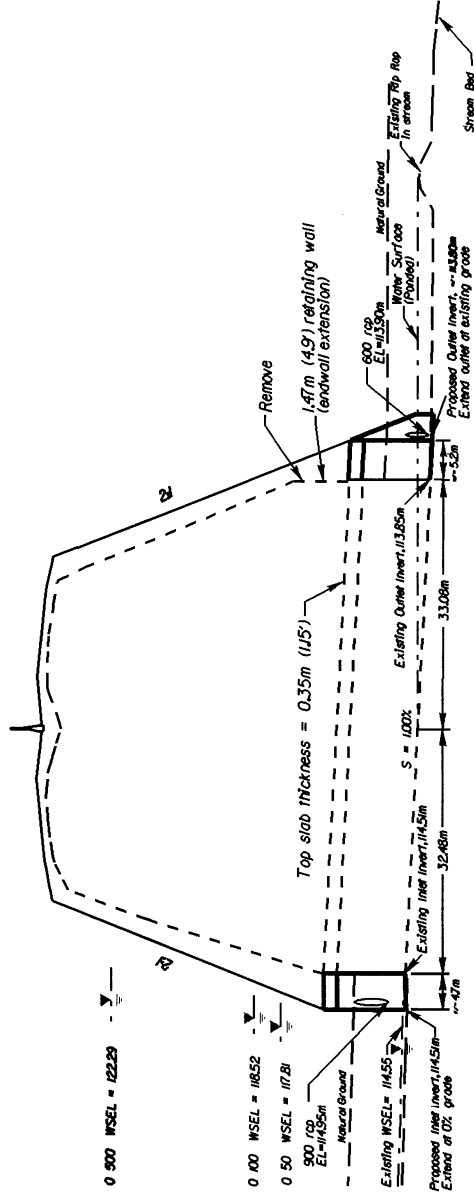
MATCH LINE STA 18+80 -L-



NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1 / 64 FROM US 1 / 64 // SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 5 OF 21 10 / 23 / 03

SITE 1
CROSS SECTION
STATION 17 + 20

-L- STA. 27 + 47.8
 Extend 2.34 x 1.825 RCBC
 Skew = 90°
 G.P. El. = 124.26



0 900 WSEL = 122.29

0 000 WSEL = 116.52

0 50 WSEL = 117.81

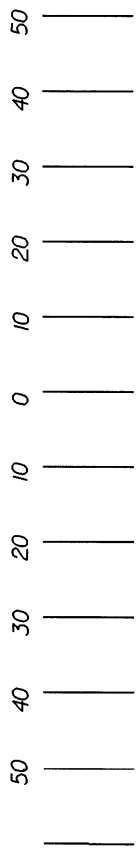
900 (CP) EI=1145m

Existing WSEL = 114.55

Existing Inner Invert: 114.5m

Proposed Inner Invert: 114.5m

Extend at 0% grade



CROSS SECTION SITE (2)

NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1 / 64 FROM US 1 / 64 / SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 7 OF 21 10-21-03

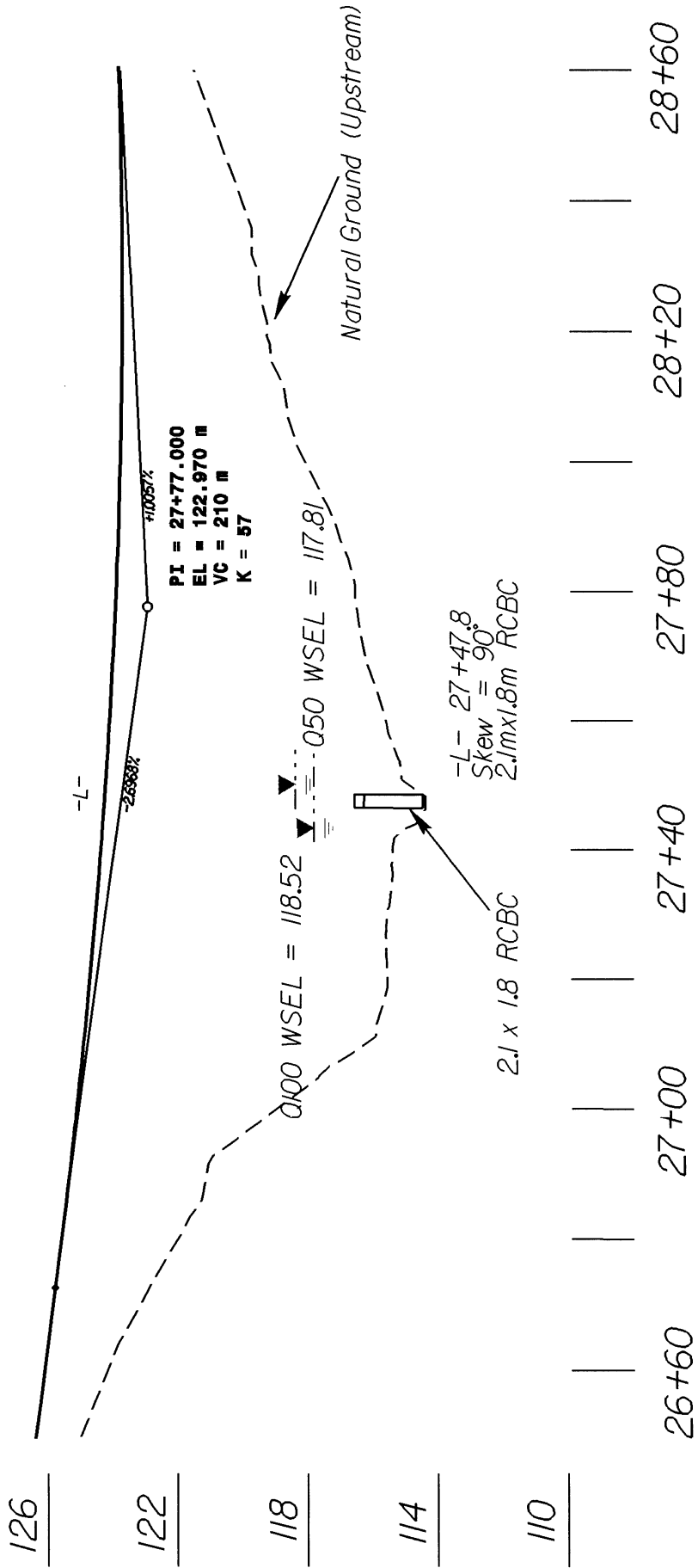
122

120

118

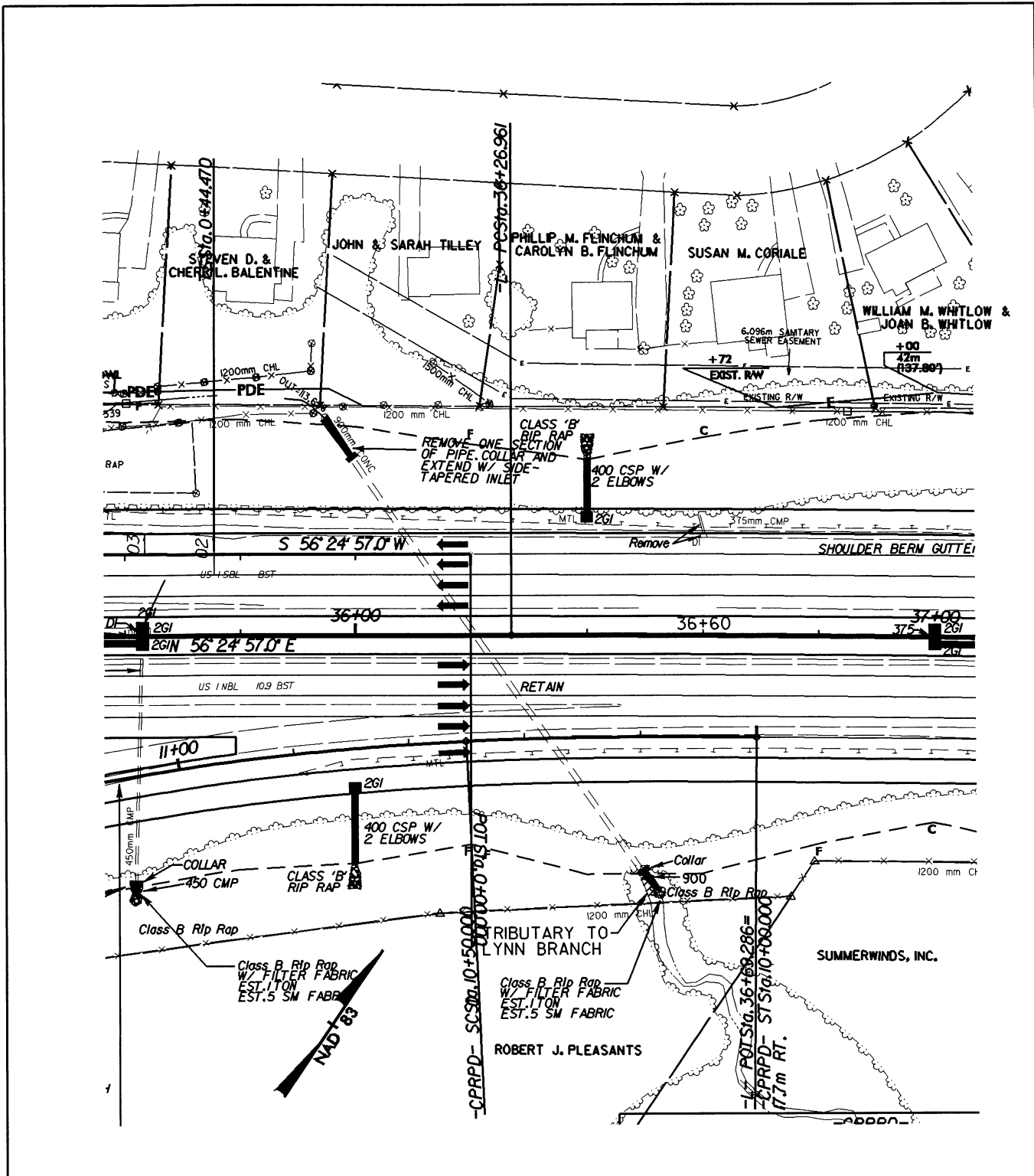
116

114



NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1 / 64 FROM US 1 / 64 / SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 8 OF 21 **10-21-03**

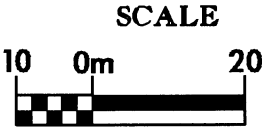
PROFILE VIEW
SITE (2)

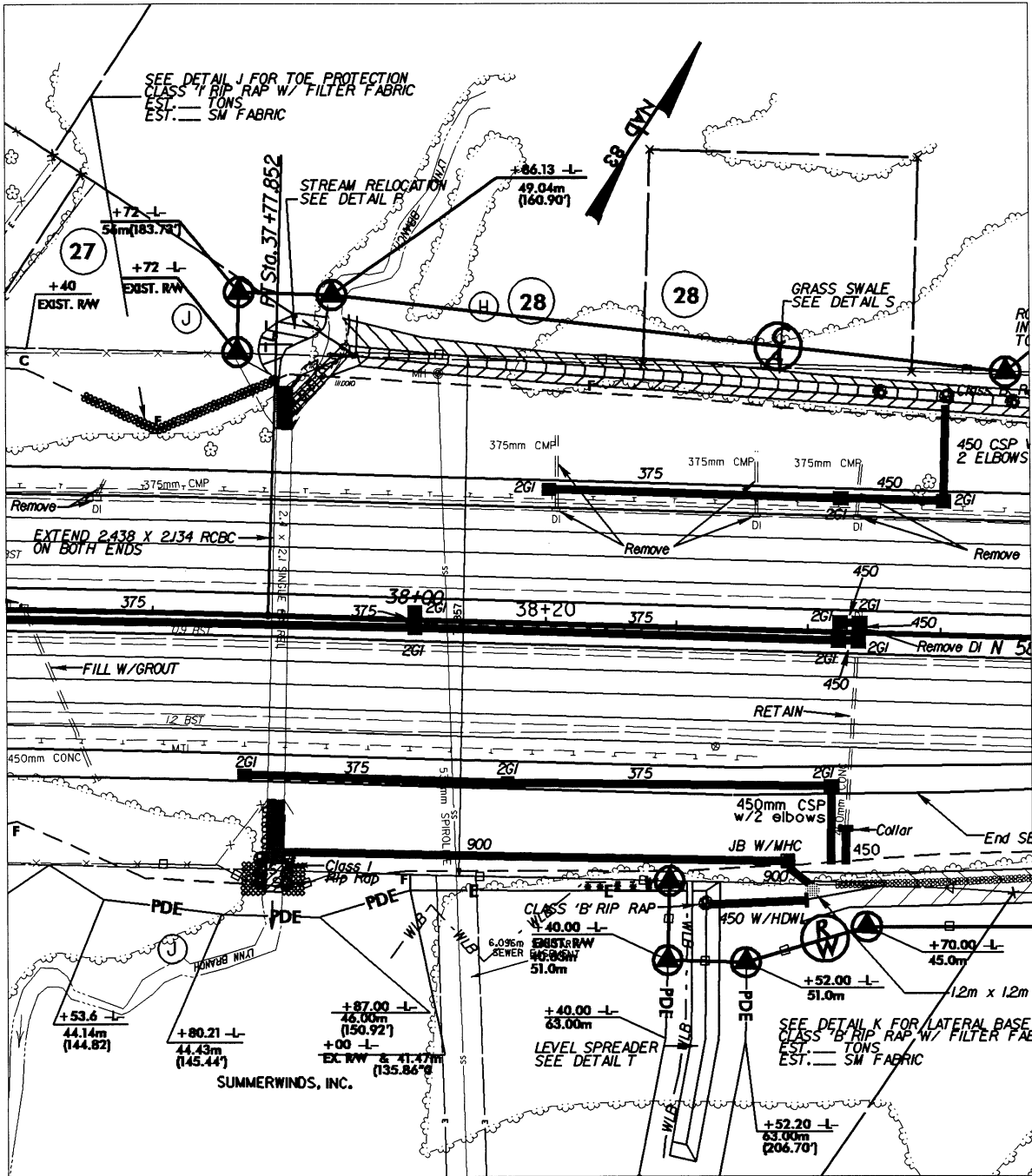


SITE 3
PLAN VIEW

NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 9 OF 21 6-11-04

 DENOTES FILL IN SURFACE WATER

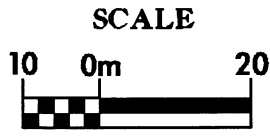




SITE 4 PLAN VIEW

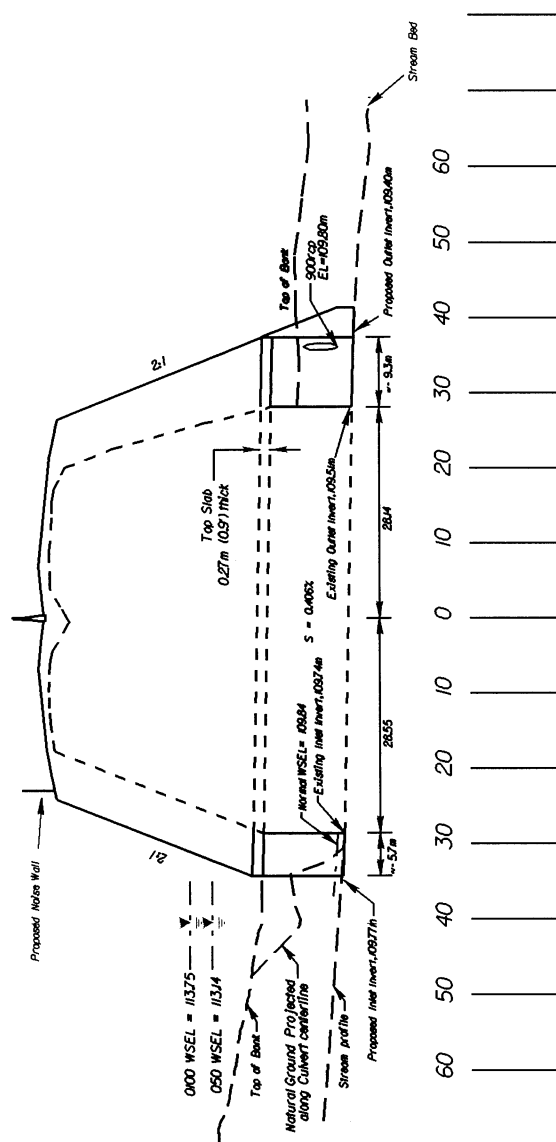
NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 10 OF 21 **6-11-04**

- *** DENOTES MECHANIZED CLEARING
- SSS DENOTES FILL IN SURFACE WATER



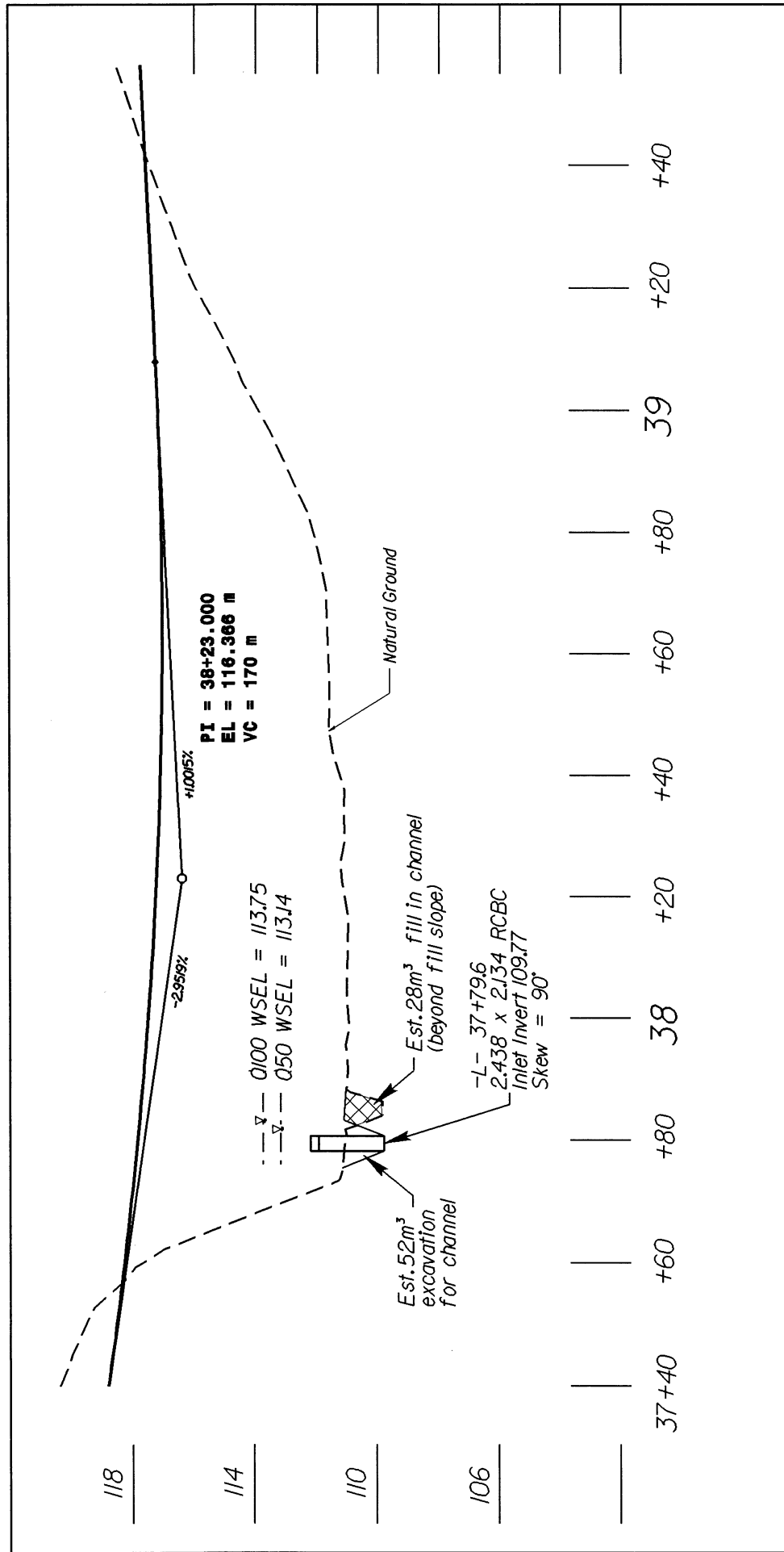
118
116
114
112
110

Existing Utility
 ST 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
 S = 0.0025
 G.P. EL. = 113.86



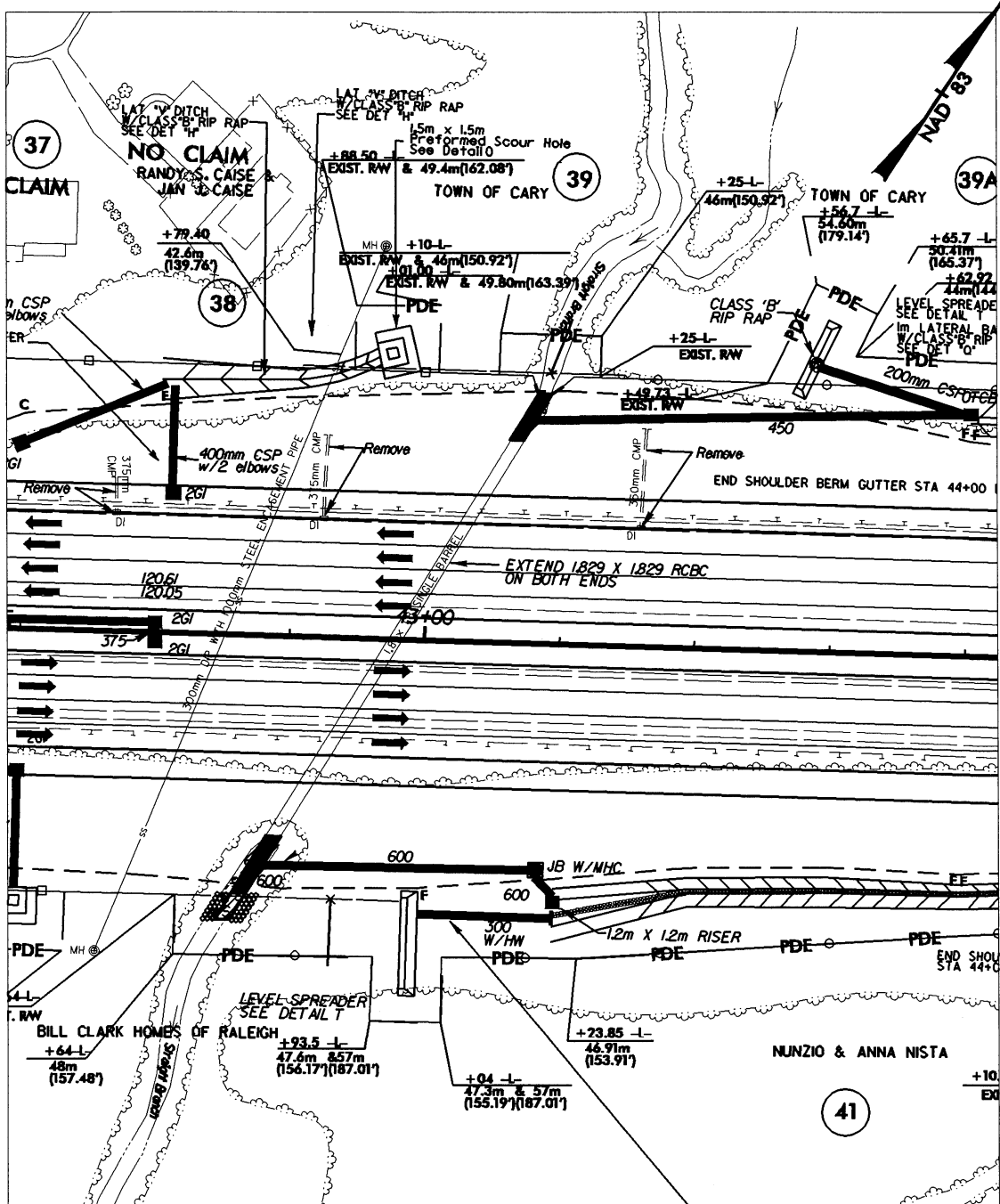
CROSS SECTION SITE (4)

NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 11 OF 21 10-21-03



NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 12 OF 21 10-21-03

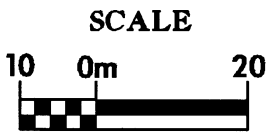
PROFILE VIEW
 SITE (4)



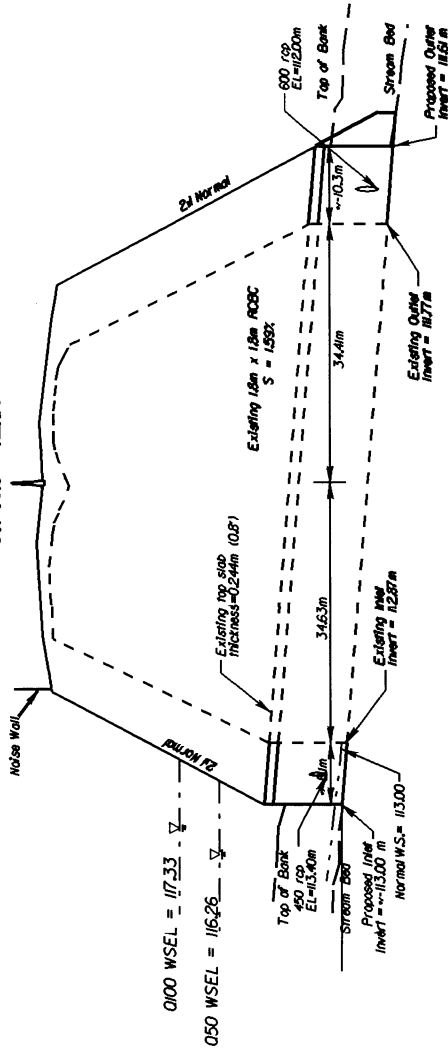
SITE 5
PLAN VIEW

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WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 13 OF 21 6-11-04

 DENOTES FILL IN SURFACE WATER



STA 42 + 95.7
 Extend 1.8 x 1.8 RCBC
 Skew = 120 degrees
 G.P. el. = 121.0

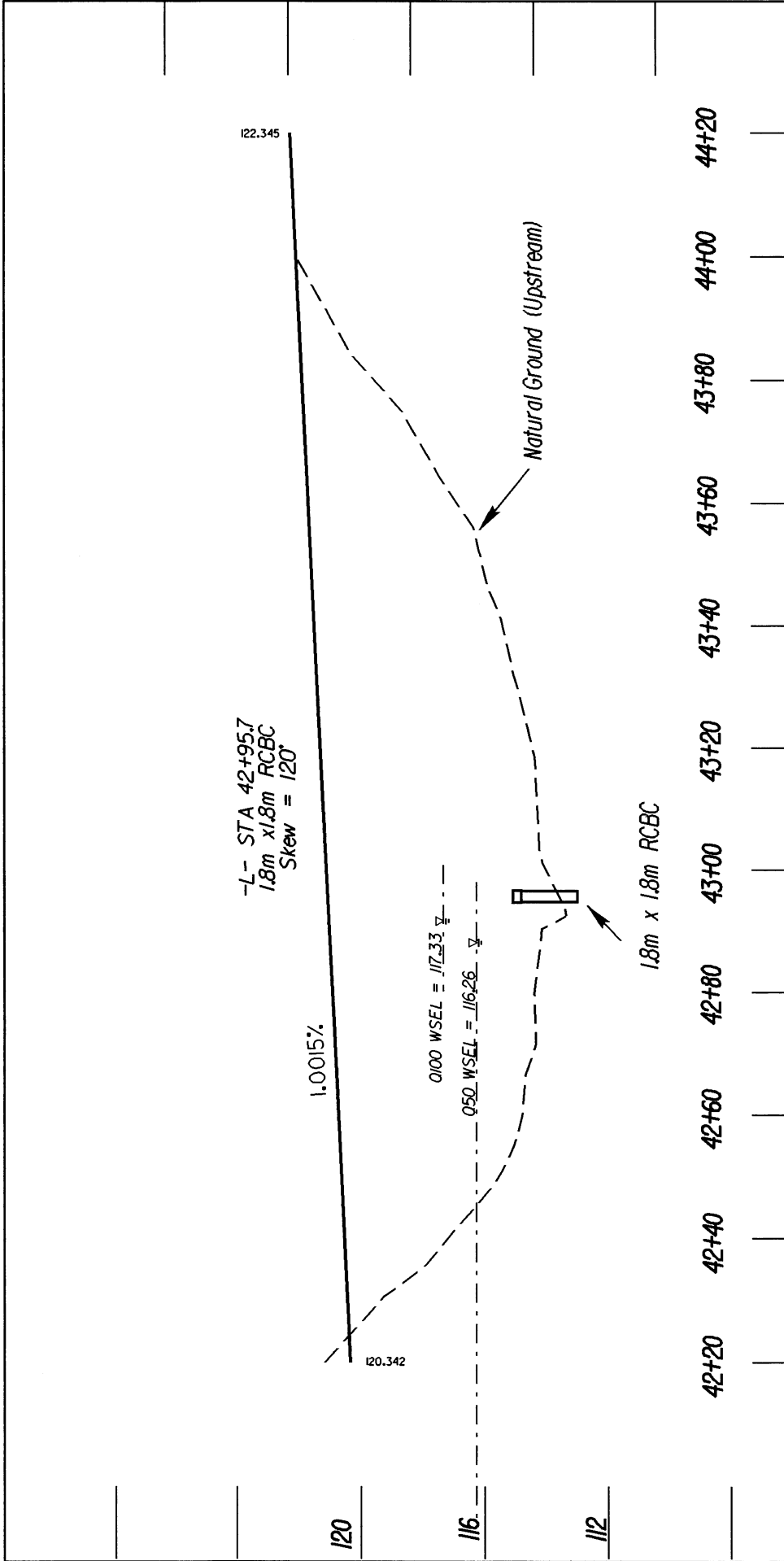


120
 118
 116
 114
 112

35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

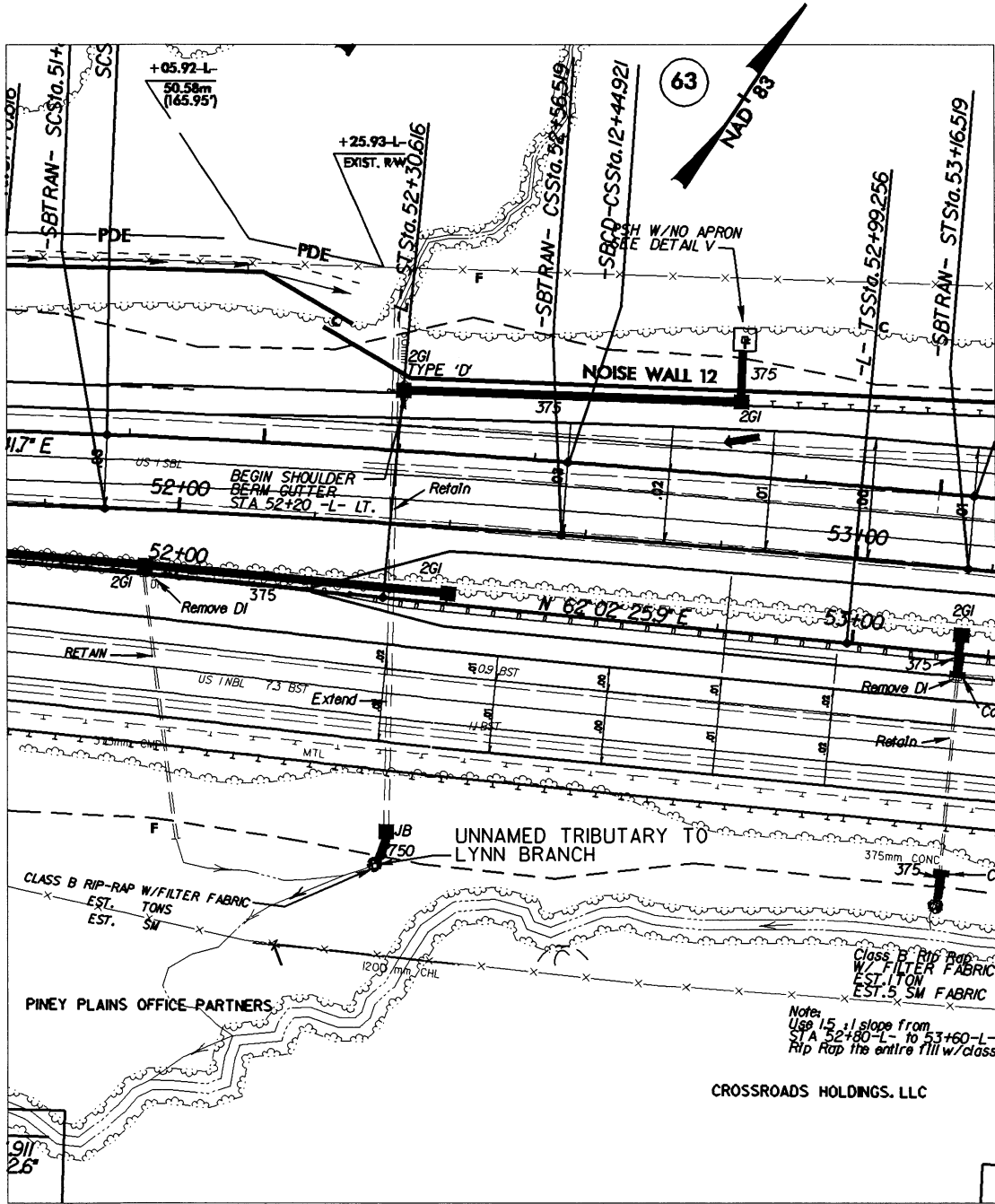
CROSS SECTION SITE (5)

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 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SRI009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 14 OF 21 10-21-03



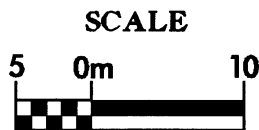
PROFILE VIEW
SITE (5)

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WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 15 OF 21 10-21-03

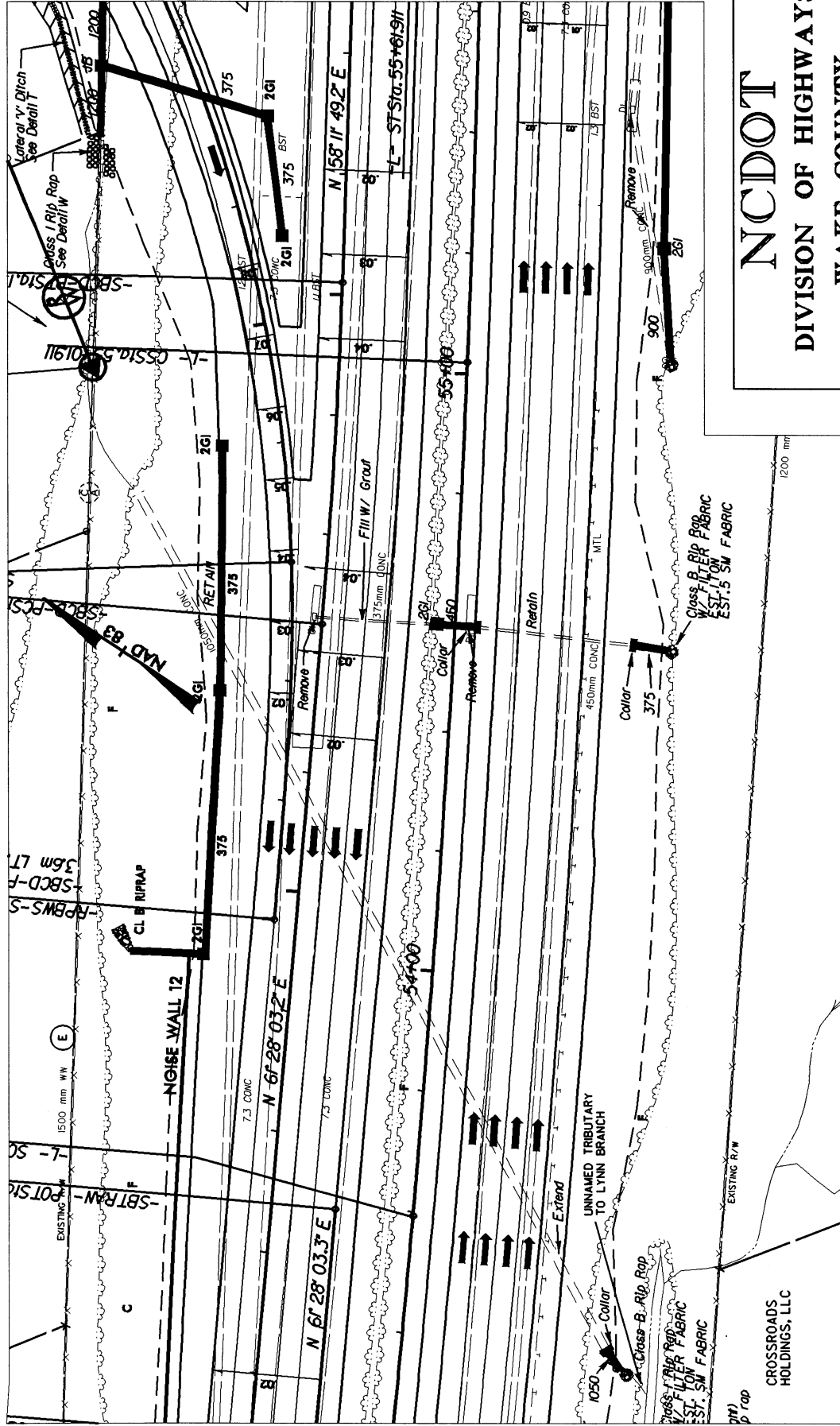


SITE 6 PLAN VIEW

 DENOTES FILL IN SURFACE WATER



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WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 16 OF 21 **6-11-03**

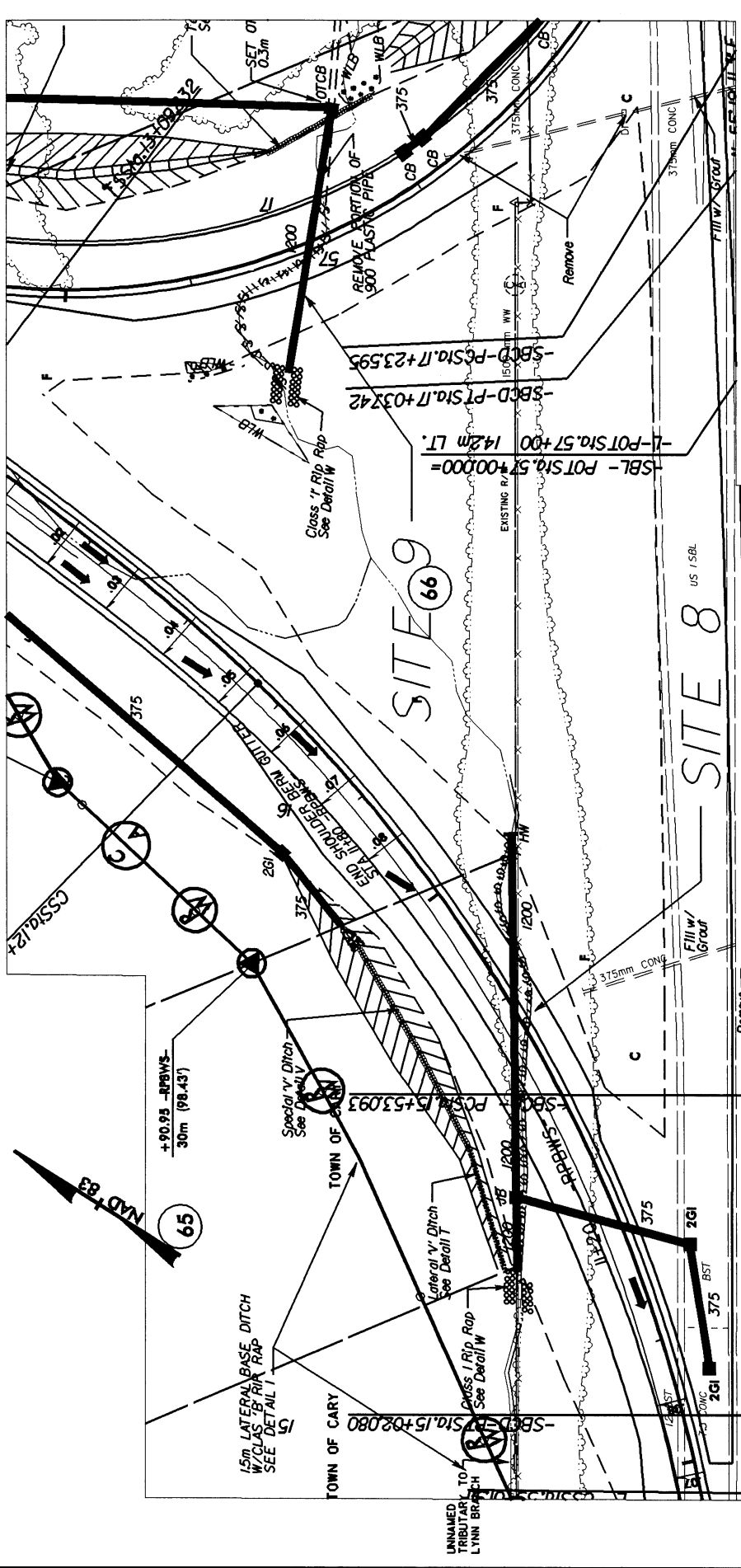


NC DOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 17 OF 21 **6-11-04**



DENOTES FILL IN SURFACE WATER

CROSSROADS HOLDINGS, LLC

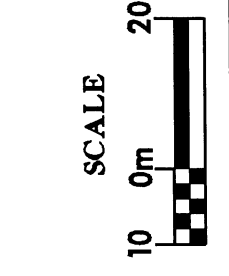


NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY

PROJECT: 8.1403101 (U-3101)

US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY

SHEET 18 OF 22 6-11-04



**PLAN VIEW
 SITE 8 AND 9**

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

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS			SURFACE WATER IMPACTS					Natural Stream Design (ft)	
			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)		
1	16+52 / 20+00 L	(Stream Relocation)	0.0148			0.0173	0.0143				213	157
2	27+48 L	1 @ 2.1m X 1.8m RCBC					0.0173				72	
3	36+50 L	900mm RCP					0.0025				16	
4	37+80 L	1 @ 2.4m X 2.1m RCBC				0.0049	0.0222				98	
5	42+70 / 43+20 L	1 @ 1.8m X 1.8m RCBC					0.0148				75	
6	52+34 L	750mm RCP					0.0025				20	
7	53+36 / 54+82 L	1050mm RCP					0.0017				20	
8	11+01 / 11+85 RPBWS	1200mm RCP					0.0173				256	
9	11+60 LPBWS	1200mm RCP	0.0018			0.0046	0.0119				140	
TOTALS:			0.0166			0.0269	0.1045				911	157

NCDOT

DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
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 SOUTH OF I-40 IN CARY

RIPARIAN PROPERTY OWNERS

SITE NO.	NAME	ADDRESS
1	DAVID AND INA J. NEWELL	401 GLASGOW DR. CARY NC 27511
	JOHN B. PARKER & ALISON W. PARKER	513 ANNADALE DR. CARY NC 27511
	MARTIN J. WILLSON & ROBERTA L. WILLSON	511 ANNADALE DR. CARY NC 27511
	DANNY MANNUS & ANDREA MANUS	509 ANNADALE DR. CARY NC 27511
	ROBERT J. ARNOLD	221 RONALDSBY DR. CARY NC 27511
	BARBARA ANN MILLER & MARY ANN BAKE	2026 FORDGATES DR. GARNER 27529
	JERRY A. HAILEY JR.	PO BOX 699 CARY NC 27512
	ROBERT THOMAS MULLICAN	215 RONALDSBY DR CARY NC 27511
	FRANCIS W. DELLINGER, TRUSTEE	207 ANNADALE DR. CARY NC 27511
ZORAYA M. & GEORGE L. SWEARIGAN	403 GLASGOW DR. CARY NC 27511	
2	KEISLER GROUP, LLC	1695 KILDAIRE FARM RD. CARY NC 27511
	EDWARD P. BRINSON & ROSA L. BRINSON	111 GUERNSEY TRL. CARY NC 27511
	WEN ZHANG & LEILEI ZHANG	106 DEWBERRY CT. CARY NC 27511
3	ROBERT J. PLEASANTS	208 E3 CORNWALL RD. CARY NC 27511
	SUMMERWINDS, INC	7700 LAKE WHEELER RD. RALEIGH NC 27603
4	SUMMERWINDS, INC	7700 LAKE WHEELER RD. RALEIGH NC 27603
5	TOWN OF CARY	PO BOX 8005 CARY NC 27512
	NUNZIO & ANNA MISTA	4407 NW41PL COCONUT CREEK FL 33073
	BILL CLARK HOMES OF RALEIGH	PO BOX 31028 RALEIGH NC 27622
6	PINEY PLAINS OFFICE PARTNERS	
	CROSSROADS HOLDINGS, LLC	1101 BUCK JONES RD. RALEIGH NC 27606

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY.
SHEET 20^{of 21} 10-21-03

RIPARIAN PROPERTY OWNERS

SITE NO.	NAME	ADDRESS
7	CROSSROADS HOLDINGS, LLC	1101 BUCK JONES RD. RALEIGH NC 27606
8	TOWN OF CARY	PO BOX 8005 CARY NC 27512
9	TOWN OF CARY H. H. PROPERTIES	PO BOX 8005 CARY NC 27512 300 BAUSCH & LOMB PL. ROCHESTER NY 14604

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
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SOUTH OF I-40 IN CARY.
SHEET 21 OF 21 10-21-03

Buffers/Water Quality

STORMWATER MANAGEMENT PLAN

U-3101, State Project 8.1403101

Date: 6-11-04

Wake County

Hydraulics Project Manager: Andrew Nottingham, PE

ROADWAY DESCRIPTION

The project involves the Widening of US1/64 from a four lane to a six lane facility, from the US1/64/SR1009 (Tryon Road) interchange to south of I-40. The US1/64 interchanges at SR 1313 (Walnut Street) and at Cary Parkway will also be modified. The overall length of the project is 3.56 miles. The proposed typical section is a six lane divided highway with a median concrete barrier. Widening to the inside will eliminate the existing grass median. There will be minor widening to the outside.

ENVIRONMENTAL DESCRIPTION

The project is located in the Neuse River Basin in the Piedmont Physiographic Province. There are nine stream crossings on this project, which are all classified as Class C waters. All of the crossings except two are existing pipe culverts or box culverts that will be extended to accommodate the widening. The two stream crossings on new location are a result of the new ramp and loop at the Walnut Street US1/64 interchange. The two new crossings will be pipe culverts. Approximately 911 ft. of existing stream will be impacted due to the project. One site will require a stream relocation. Two wetland sites will be impacted. Approximately .04 acres of wetlands will be impacted due to this project. Seven Neuse River Buffer sites will be impacted.

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES

Best Management Practices (BMPs) and measures used on the project are an attempt to reduce the stormwater impacts to the receiving streams due to erosion and runoff. Level spreaders were used where feasible to attenuate and disperse flow into the buffer. Preformed scour holes (PSH) were also used to attenuate and disperse flow into the buffer. Grassed swales were also used to treat stormwater runoff prior to entering the buffer streams. Rock check dams are recommended in some of the grass swales to reduce the effective slope and slow velocities to less than 2 feet per second. Rip rapped ditches were used where warranted to control erosion. The inverts of all new culverts on jurisdictional streams or wetlands will be buried 20% of the pipe diameter up to 1 ft. deep. There are three major stream crossings consisting of three reinforced concrete box culvert extensions

Level Spreaders

Station 20+45 –L- Lt. (5m level spreader design for 10 year storm)

Station 27+13 –L- Lt. (PSH)

Station 27+25 –L- Rt. (PSH)

Station 27+68 -L- Rt. (12m level spreader design for 1 inch per hour intensity with bypass for the 10 year storm)

Station 27+80 -L- Lt. (47m level spreader design for 1 inch per hour intensity with bypass for the 10 year storm)

Station 38+45 -L- Rt. (43m level spreader design for 1 inch per hour intensity with bypass for the 10 year storm)

Station 42+40 -L- Rt. (PSH)

Station 42+95 -L- Lt. (PSH)

Station 43+02 -L- Rt. (16m level spreader design for 1 inch per hour intensity with bypass for the 10 year storm)

Station 43+55 -L- Lt. (12m level spreader design for 1 inch per hour intensity with bypass for the 10 year storm)

Grass Swales

Station 14+60 -L- Rt.

Station 38+00 -L- Lt.

Station 39+00 -L- Lt.

Station 12+20 RPBWS Lt.

Station 13+00 RPBWS Lt.

Station 11+00 LPBWS Rt.

Station 12+00 LPBWS Rt.

Station 15+35 SBCD Lt.

Stream Relocations

Station 17+00 to station 19+00 -L- Lt.

Approximately 656 ft of stream will be relocated using natural stream design.

Culverts

Station 27+48 -L-

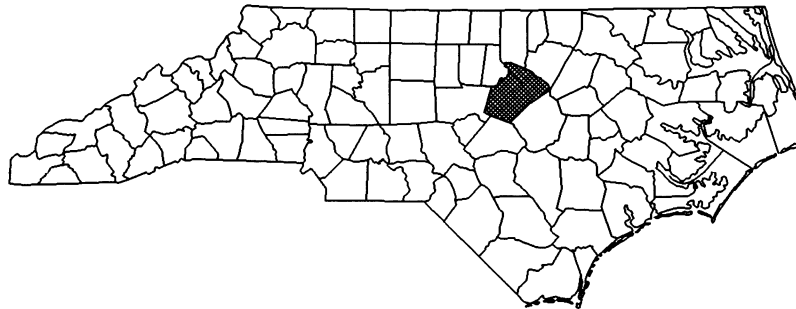
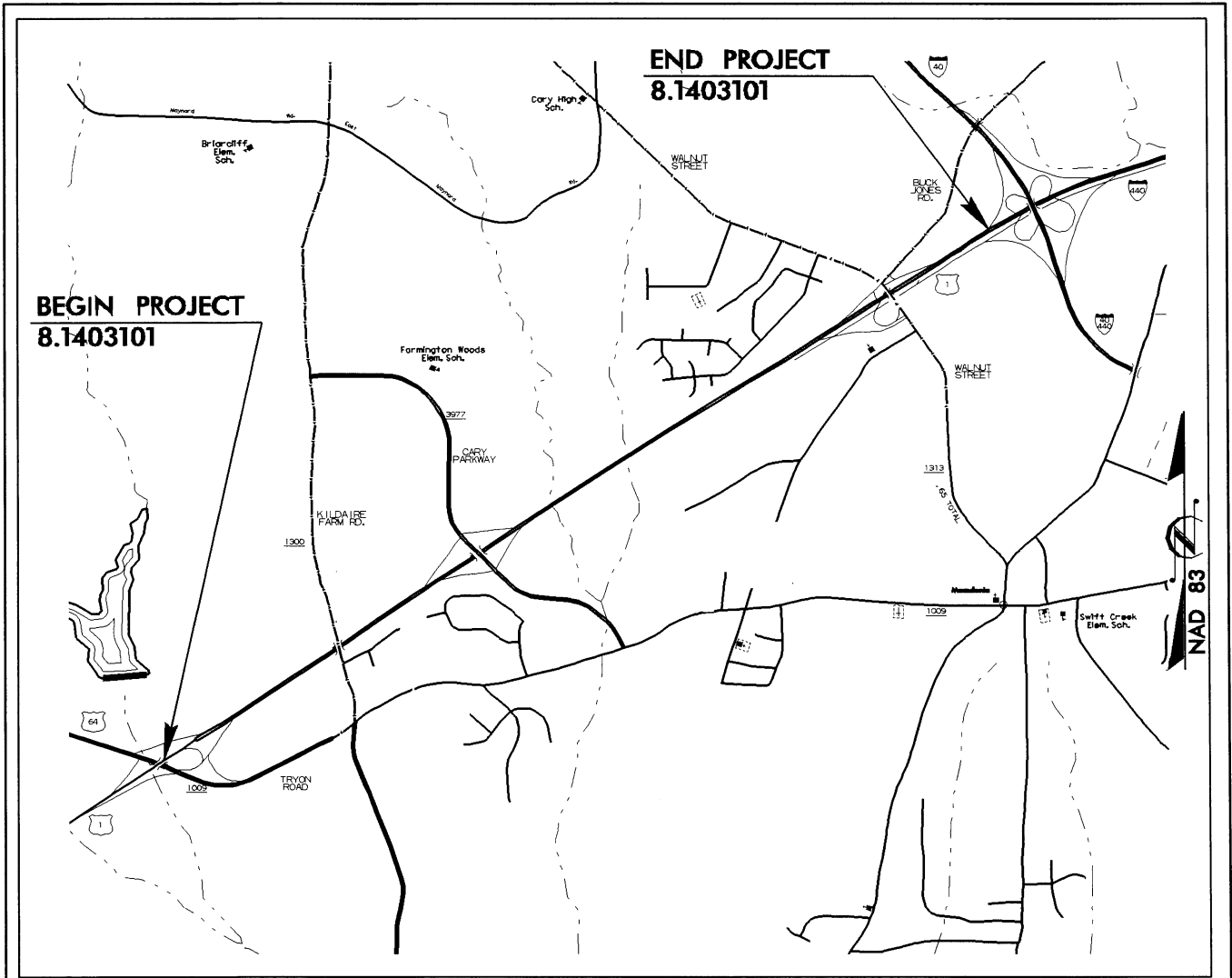
Extend existing 7 feet by 6 feet reinforced concrete box culvert approximately 16 feet upstream and 17 feet downstream. The stream will be temporarily diverted near the culvert entrance to allow for all dry construction.

Station 37+80 -L-

Extend existing 8 feet by 7 feet reinforced concrete box culvert approximately 19 feet upstream and 31 feet downstream. The stream will be temporarily diverted near the culvert entrance to allow for all dry construction.

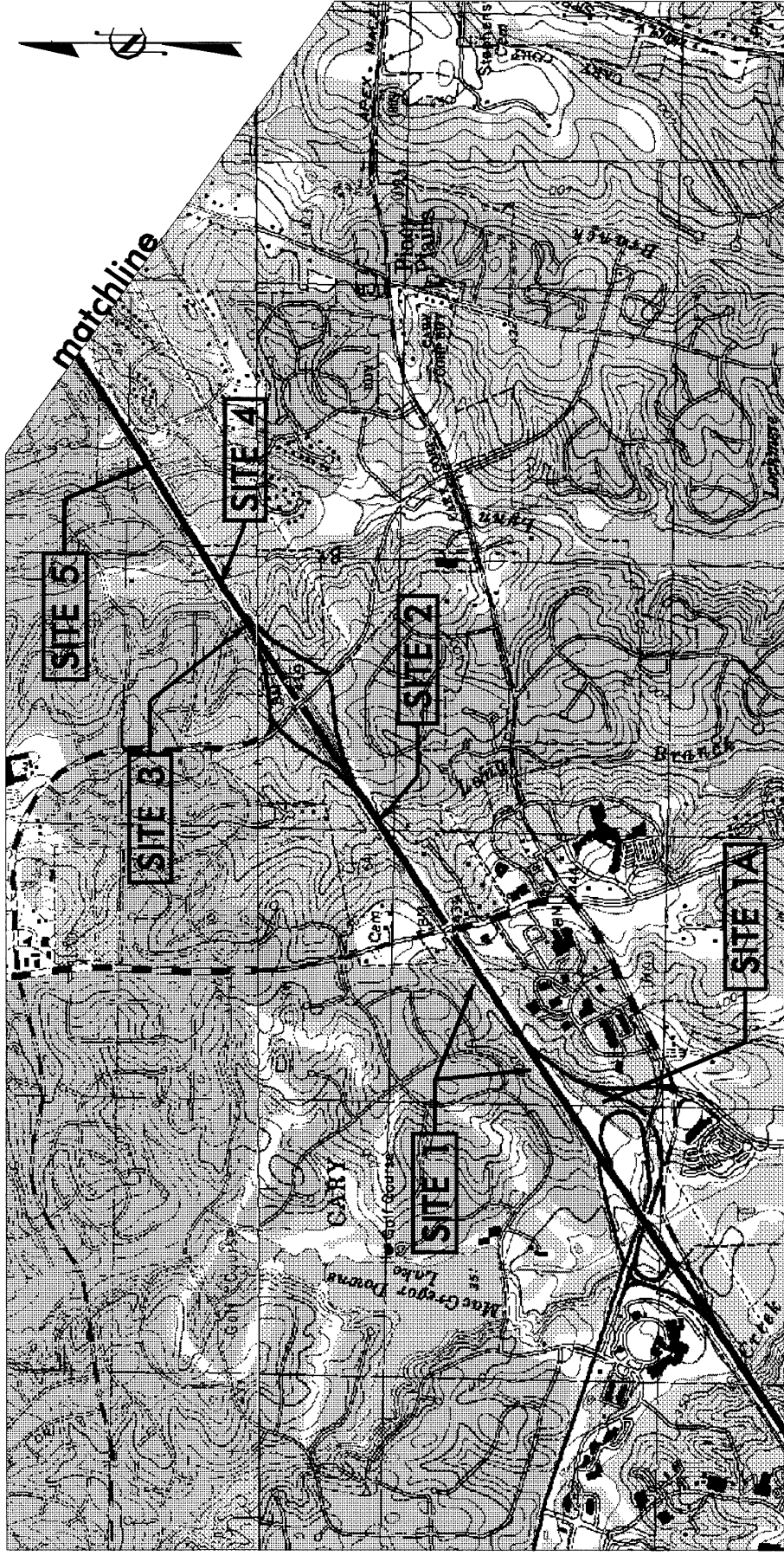
Station 42+96 -L-

Extend existing 6 feet by 6 feet reinforced concrete box culvert approximately 27 feet upstream and 34 feet downstream. The stream will be temporarily diverted near the culvert entrance to allow for all dry construction.

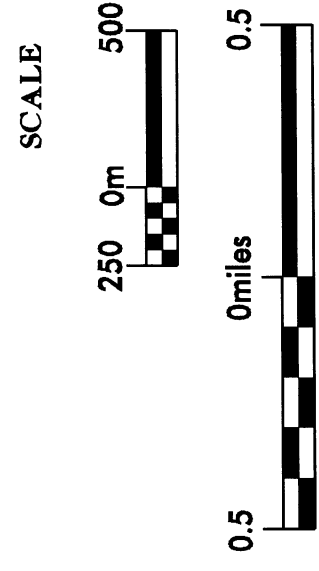


***VICINITY MAP
NEUSE RIVER
BUFFER IMPACTS***

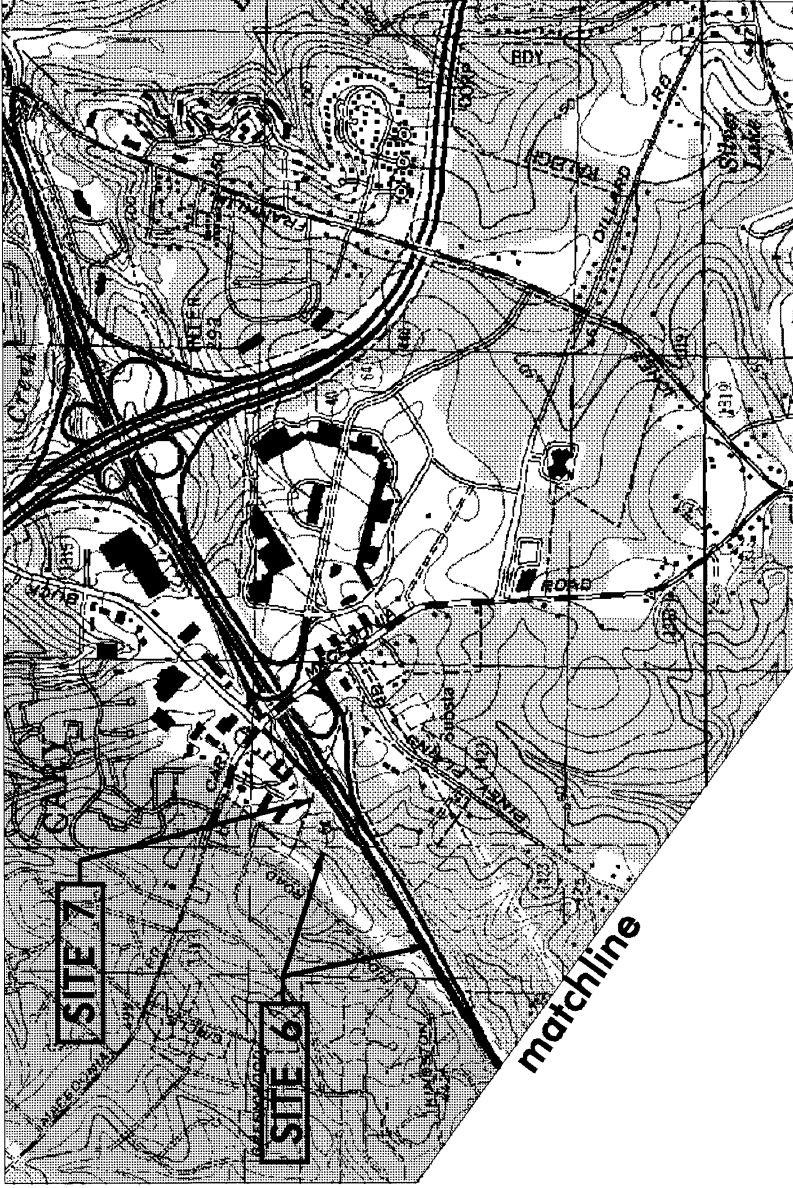
NCDOT
 DIVISION OF HIGHWAYS
 WAKE COUNTY
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 SHEET | OF 17 10-21-03



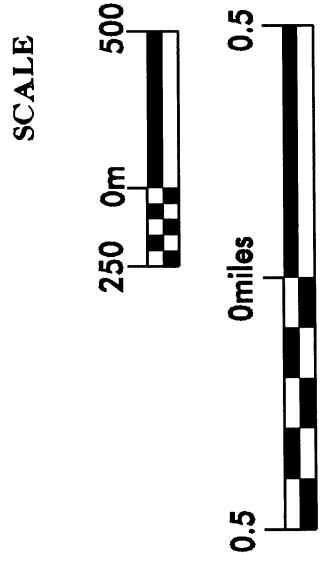
**BUFFER IMPACT
SITE MAP**



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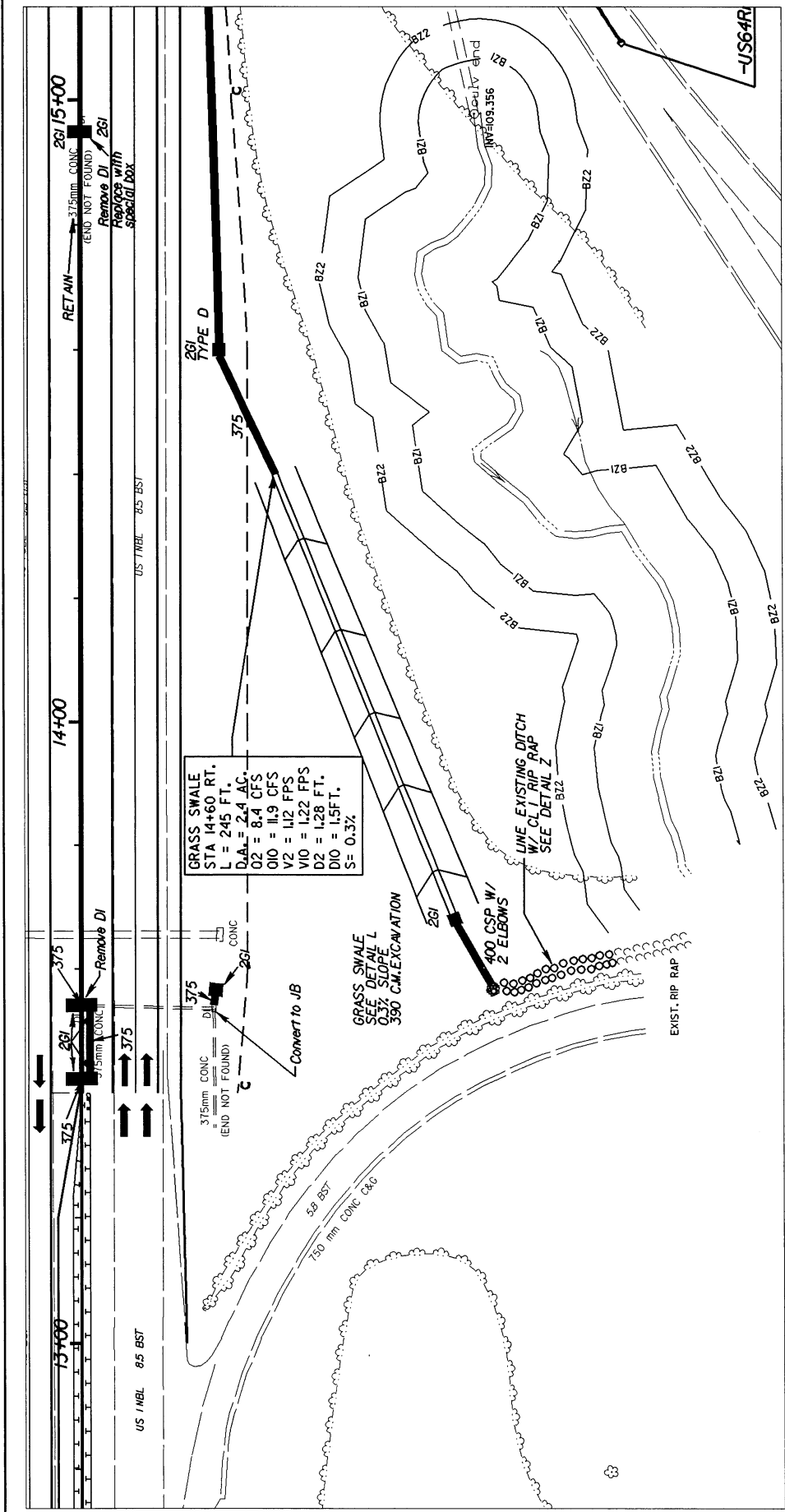


**BUFFER IMPACT
SITE MAP**



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 WAKE COUNTY
 PROJECT: 8.1403101 (U-5101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 3 OF 19 10-21-03

USGS QUAD MAPS: APEX, CARY,
 RALEIGH WEST, AND LAKE WHEELER



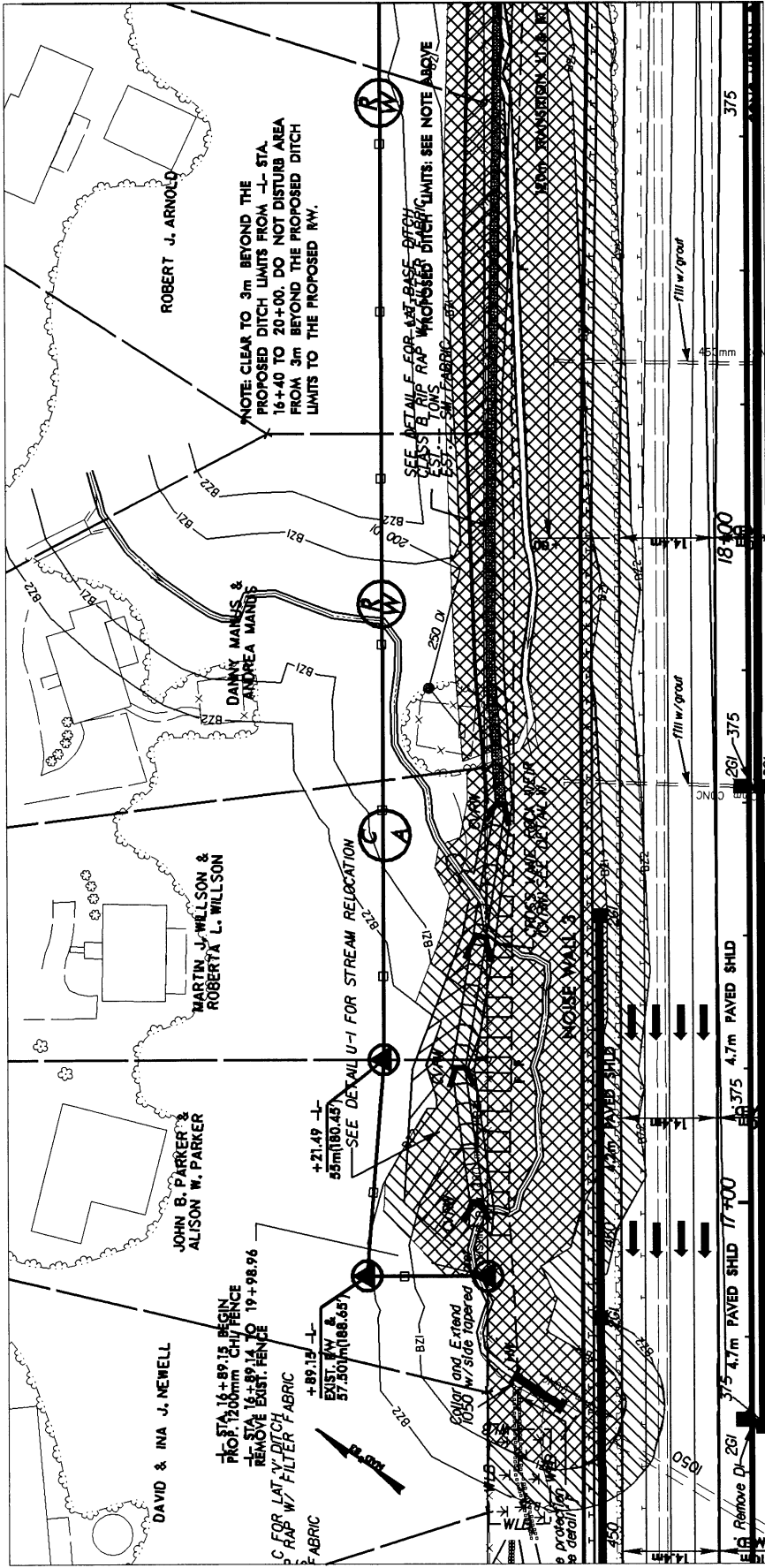
GRASS SWALE
 STA 14+60 RT.
 L = 245 FT.
 D.A. = 2.4 AC
 D2 = 8.4 CFS
 DIO = 11.9 CFS
 V2 = 1.12 FPS
 V10 = 1.22 FPS
 D2 = 1.28 FT.
 DIO = 1.5 FT.
 S = 0.3%

BUFFER ZONE IMPACTS
SITE 1A
PLAN VIEW



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SHEET 4 OF 19 **10-21-03**

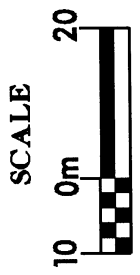
NO IMPACTS AT THIS SITE





MATCH LINE STA 18+80 -L-

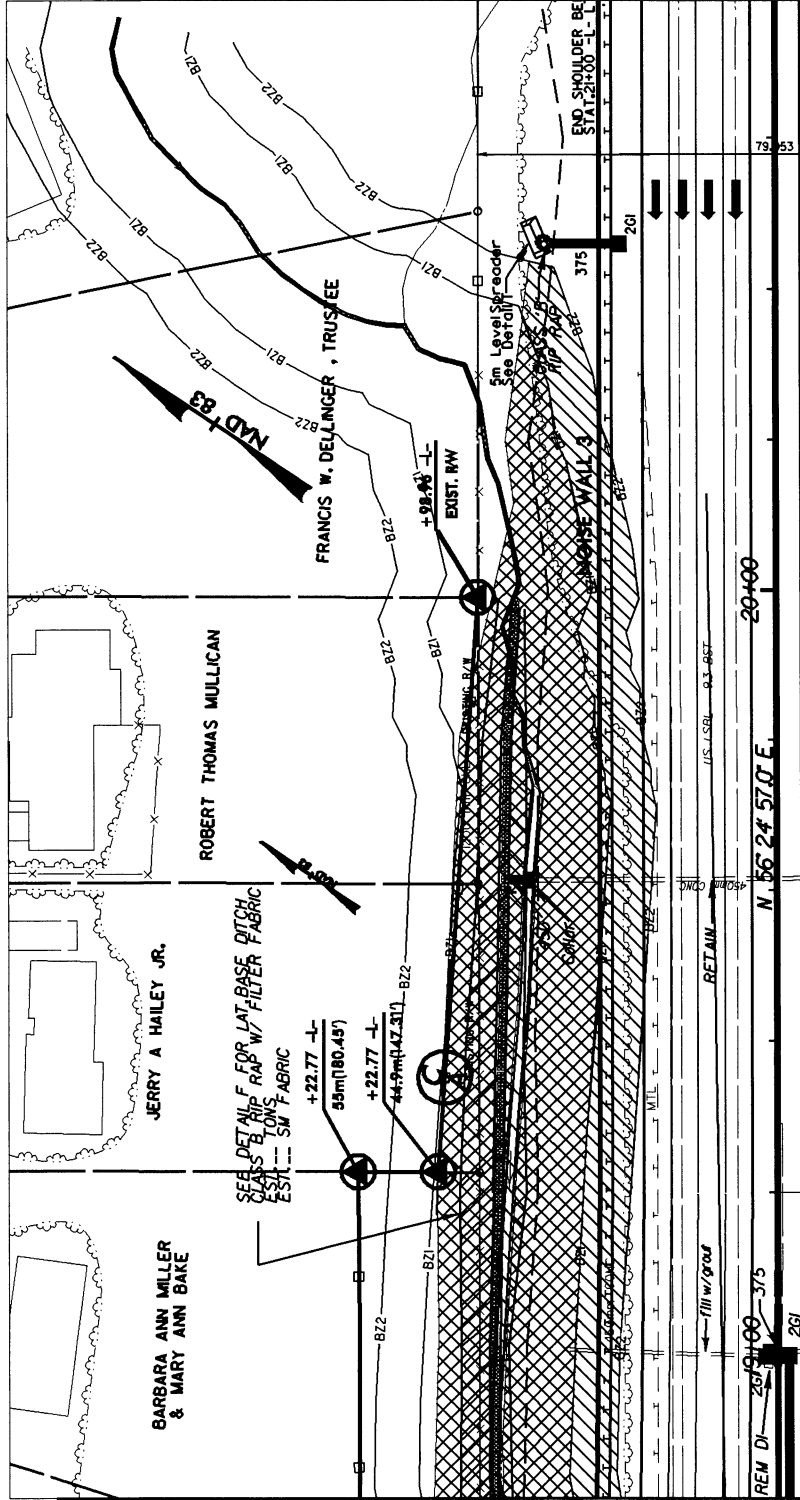
NCDOT
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 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 5 OF 17 6-11-04

SITE 1
 PLAN VIEW



-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

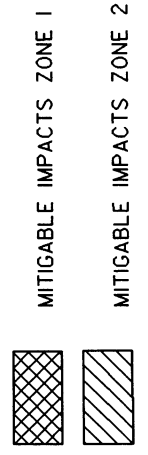
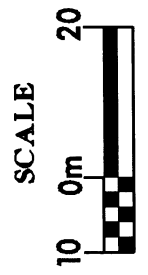
LEVEL SPREADER
 D.A. = 0.22 AC
 Q10 = 1.2 CFS
 L = 16FT.
 STA 20+45 L.T.

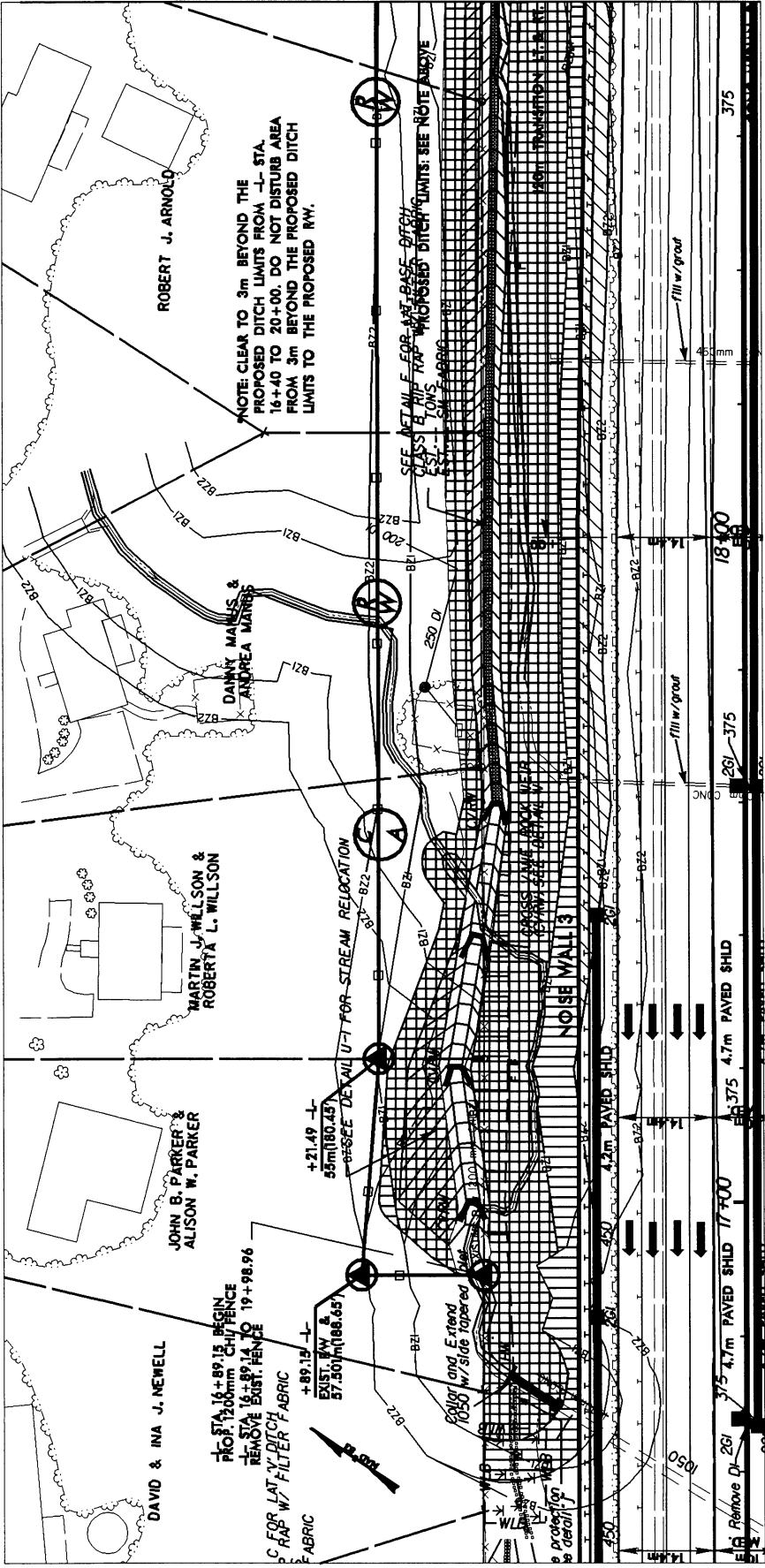


MATCH LINE STA 18+80 -L-

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 WAKE COUNTY
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 SHEET 6 OF 19 6-11-04

SITE 1
 PLAN VIEW





MATCH LINE STA 18+80 -L-

NOTE: CLEAR TO 3m BEYOND THE PROPOSED DITCH LIMITS FROM -L- STA. 16+40 TO 20+00. DO NOT DISTURB AREA FROM 3m BEYOND THE PROPOSED DITCH LIMITS TO THE PROPOSED RW.

SEE DETAIL FOR BASE DITCH CLASS B TRIP TRAP W/PROPOSED DITCH LIMITS. SEE NOTE ABOVE

DAVID & INA J. NEWELL

JOHN B. PARKER & ALISON W. PARKER

MARTIN J. WILLSON & ROBERTA L. WILLSON

DANAY MANN & ANDREA MANN

PRO STA 16+89.15 BEGIN 150mm CH/5 FENCE TENSILE EAST. FENCE TO 19+98.96 C FOR LAT W/ DITCH FABRIC S FOR W/ FILTER FABRIC

+89.19 -L- EXIST. RW & 57.50m(188.65')

+21.49 -L- 55m(180.43')

SEE DETAIL U-1 FOR STREAM RELOCATION

NOISE WALL 3

4.7m PAVED SHLD

4.7m PAVED SHLD

4.7m PAVED SHLD

Remove D. 201

1800

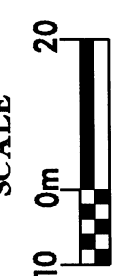
261-375

375

fill w/graof

SITE 1 RESTORED BUFFER

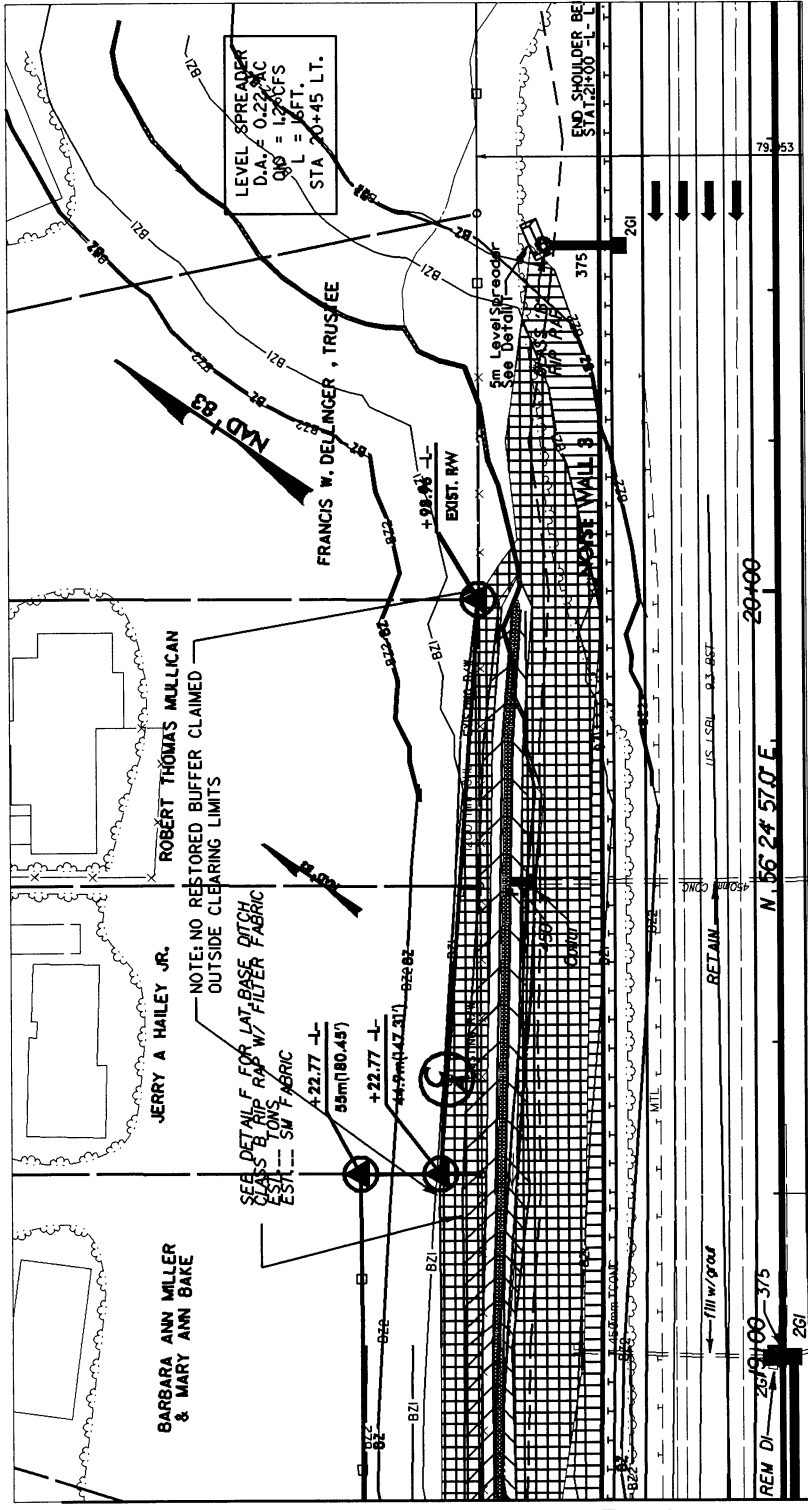
PLAN VIEW



RESTORED BUFFER ZONE 1

RESTORED BUFFER ZONE 2

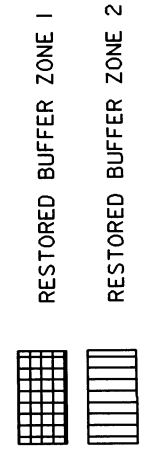
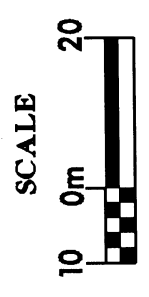
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 SHEET 7 OF 19 6-11-04



MATCH LINE STA 18+80 -L-

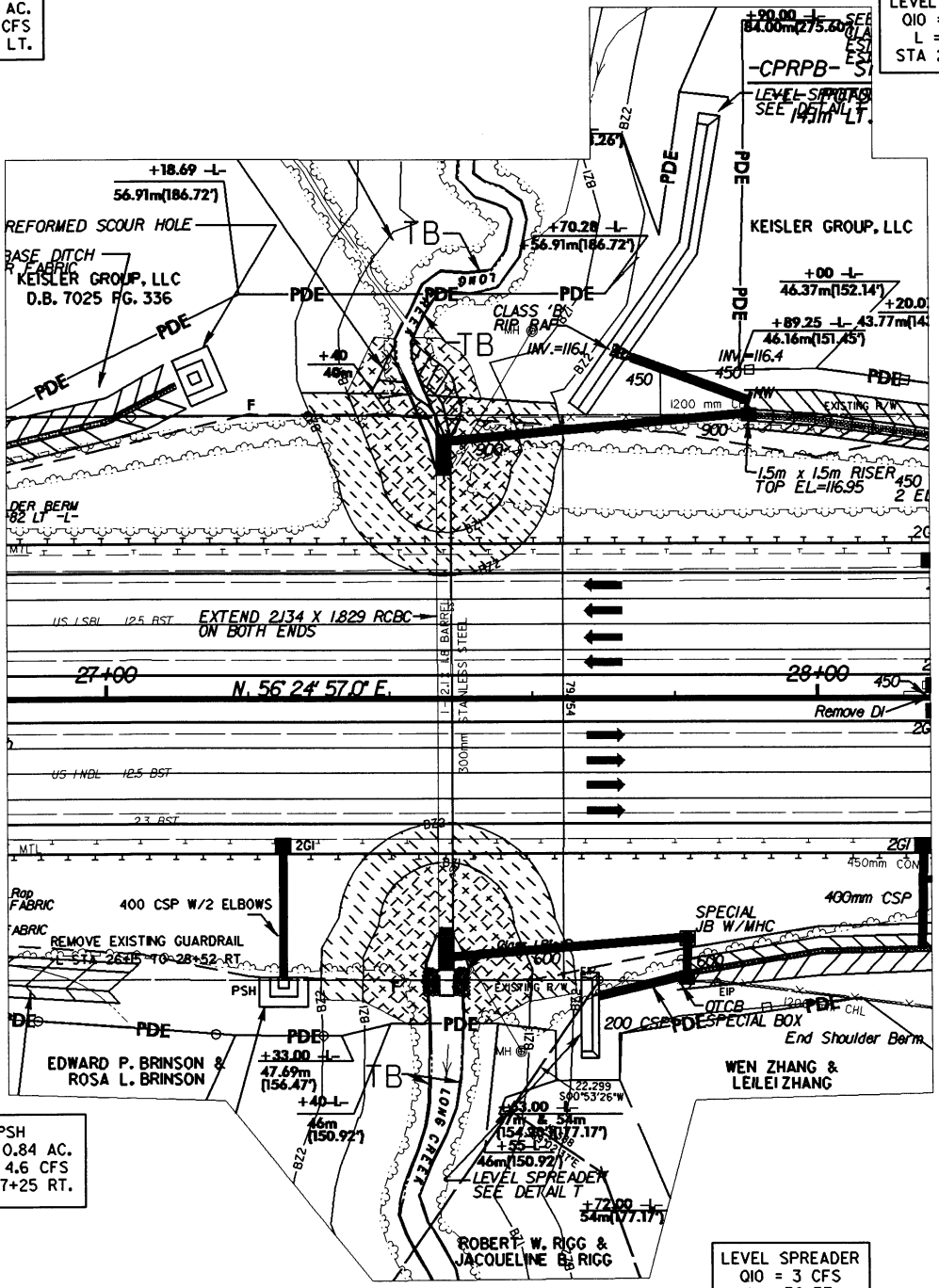
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 SHEET 8 OF 19 6-11-04

SITE 1 RESTORED BUFFER
 PLAN VIEW



PSH
 D.A. = 1.23 AC.
 Q10 = 7.8 CFS
 STA 27+13 LT.



LEVEL SPREADER
 Q10 = 11.4 CFS
 L = 148 FT
 STA 27+80 LT.

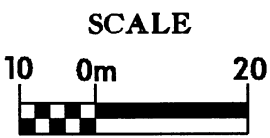


PSH
 D.A. = 0.84 AC.
 Q10 = 4.6 CFS
 STA 27+25 RT.

LEVEL SPREADER
 Q10 = 3 CFS
 L = 39 FT
 STA 27+68 RT.

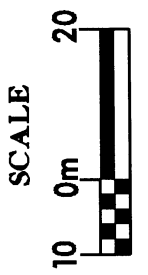
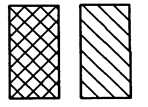
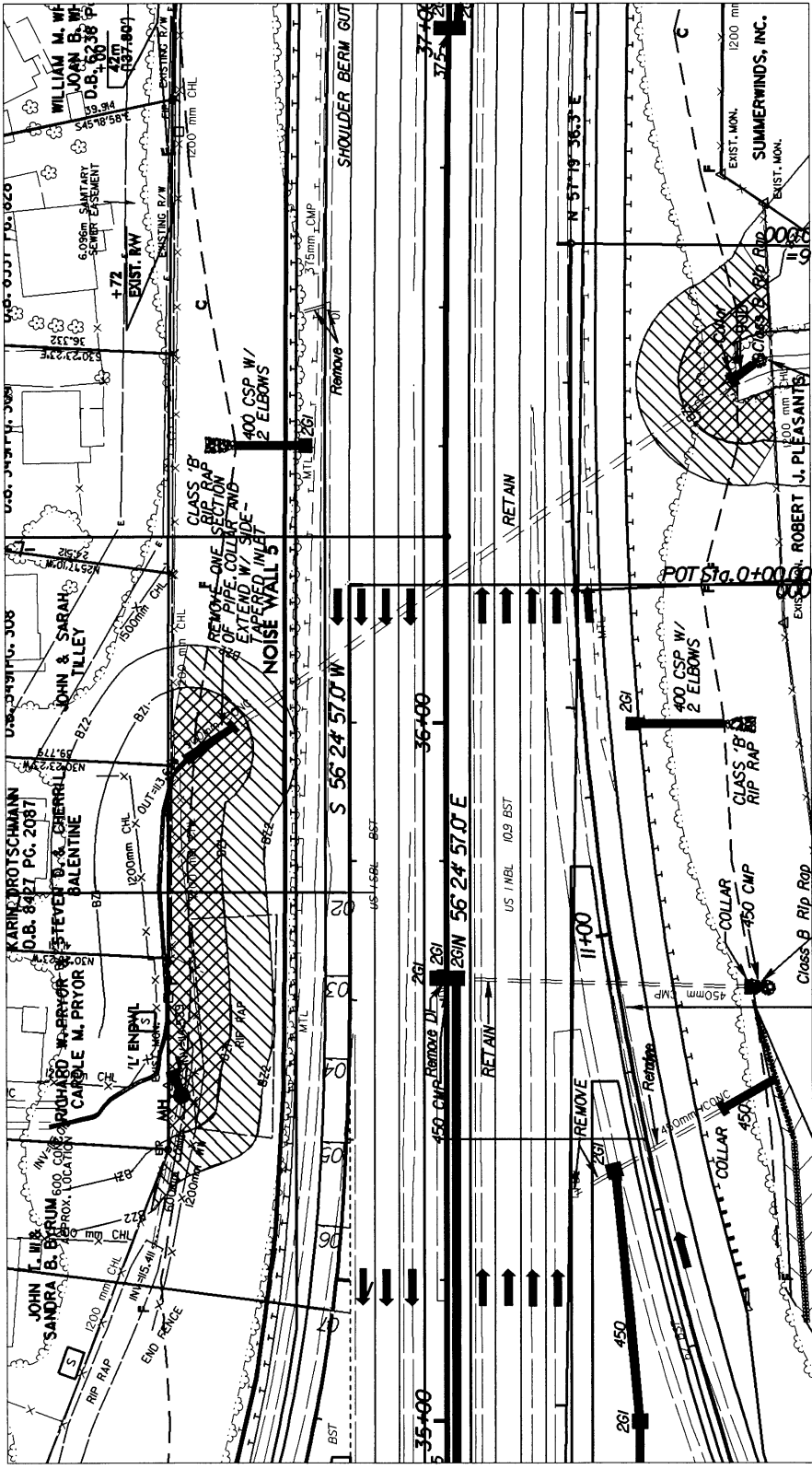
SITE 2 PLAN VIEW

-  ALLOWABLE IMPACTS ZONE 1
-  ALLOWABLE IMPACTS ZONE 2



NCDOT
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 US 1/64 FROM US 1/64/SR1009
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SHEET 9 OF 19
 6-11-04



**SITE 3
PLAN VIEW**

NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
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SOUTH OF I-40 IN CARY
SHEET 10 OF 19 **6-11-04**

GRASS SWALE
STA 38+00 L.T.
L = 300 FT.
D. A. = 2.77 AC.
Q2 = 9.2 CFS
Q10 = 13.0 CFS
V2 = 1.81 FPS
V10 = 1.96 FPS
D2 = 1.0 FT.
D10 = 1.2 FT.
S = 1.0%

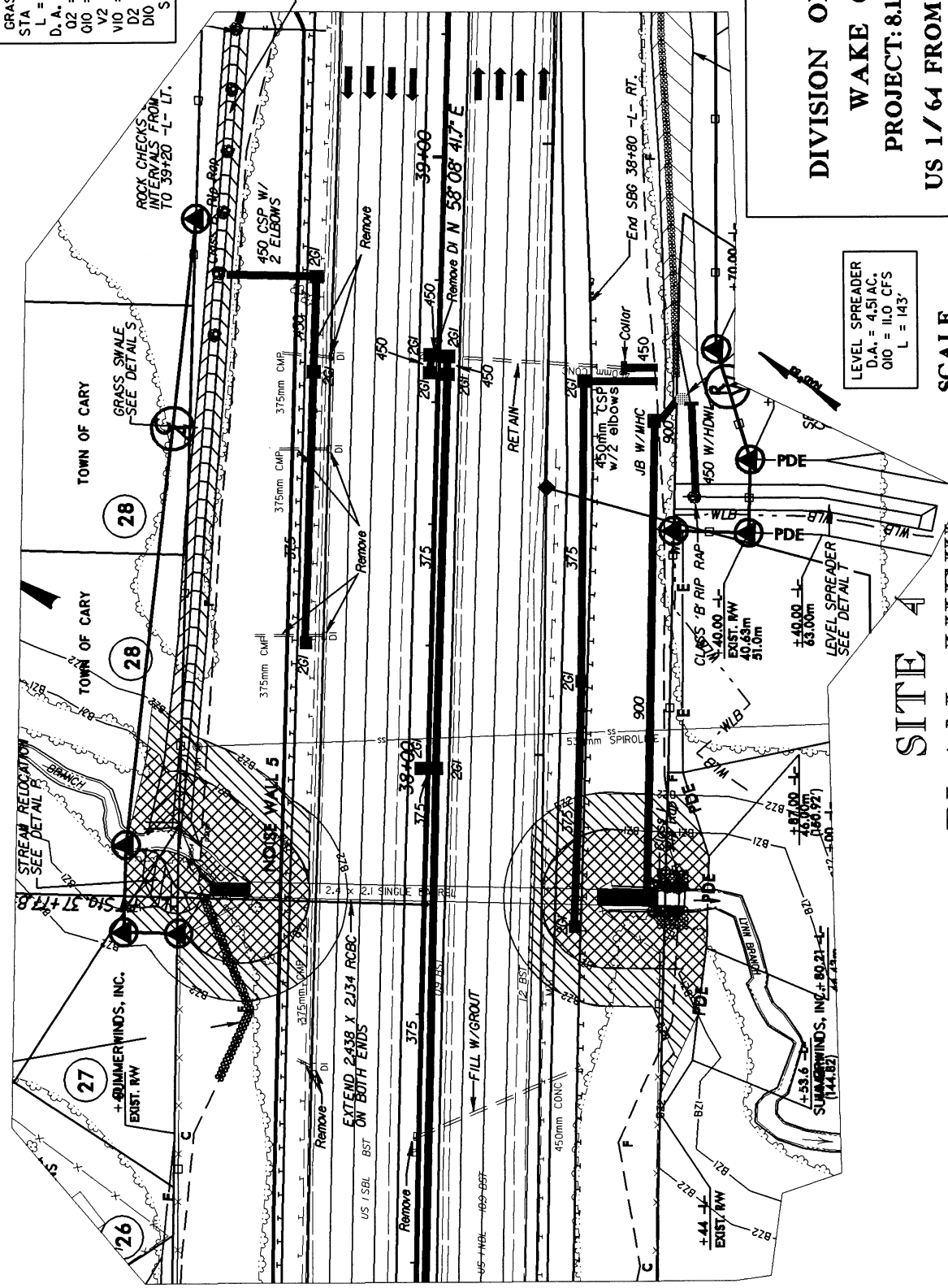
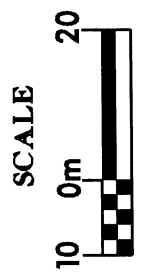
GRASS SWALE
STA 39+00 L.T.
L = 130 FT.
D. A. = 1.11 AC.
Q2 = 2.6 CFS
Q10 = 3.7 CFS
V2 = 1.9 FPS
V10 = 2.11 FPS
D2 = 0.4 FT.
D10 = 0.5 FT.
S = 3.0%

GRASS SWALE USED
IN LIEU OF LEVEL SPREADER
DUE TO SITE TOPOGRAPHY

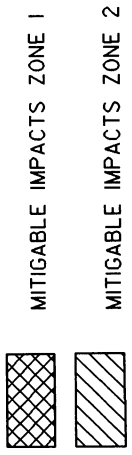
ROCK CHECKS
INTERVALS FROM
TO 39+20 -L- LT.

GRASS SWALE
SEE DETAILS

LEVEL SPREADER
D.A. = 4.51 AC.
Q10 = 11.0 CFS
L = 143'



SITE PLAN VIEW



MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

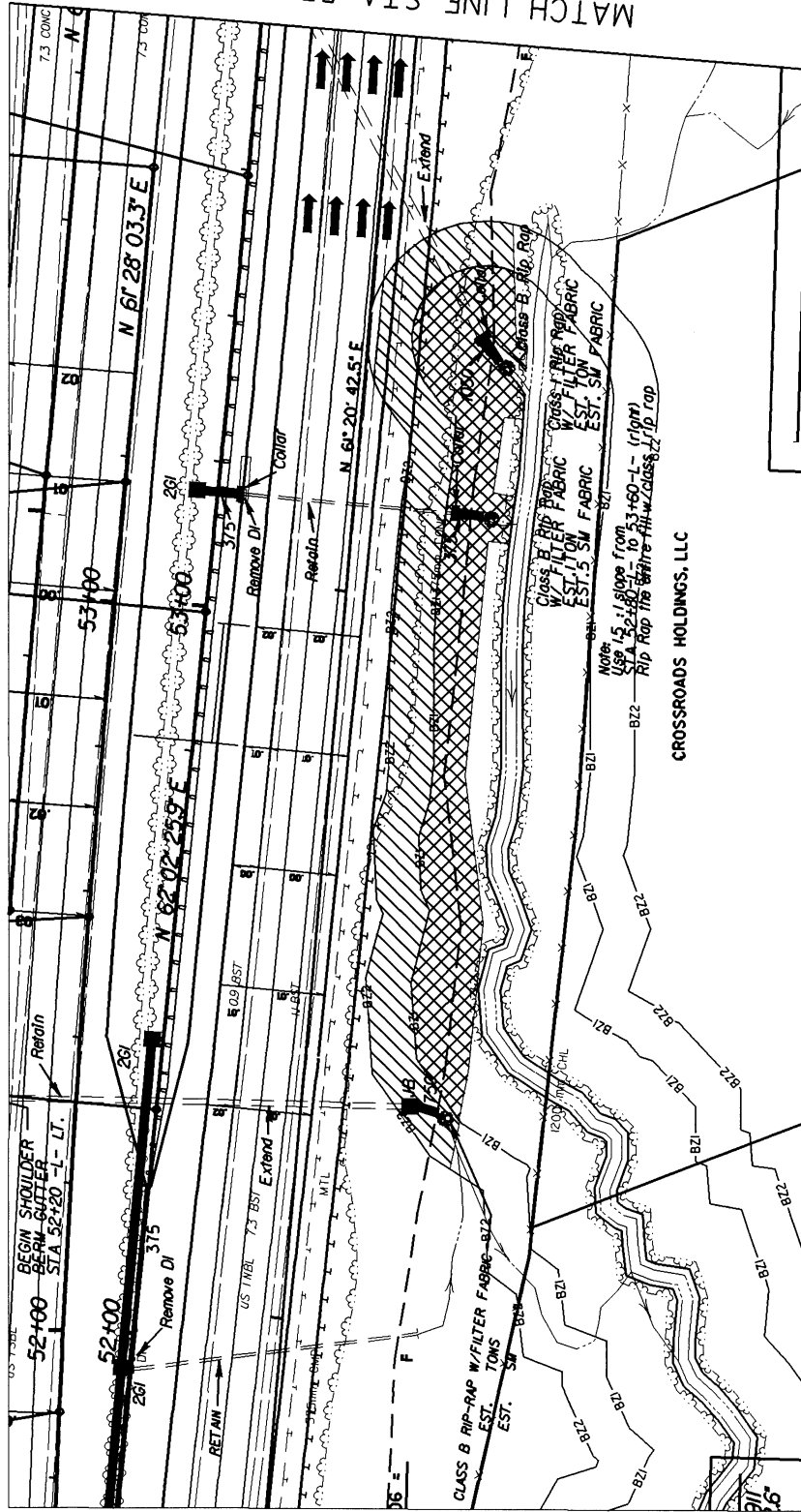
DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 8.1403101 (U-3101)

US 1/64 FROM US 1/64/SRI009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY

SHEET 11 OF 19 6-11-04

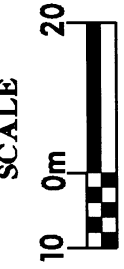



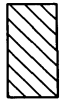
GRASS SWALE
 STA 53+16
 L = 460 FT.
 D.A. = 1.16 AC.
 Q2 = 2.71 CFS
 Q10 = 3.80 CFS
 V2 = 1.08 FPS
 V10 = 1.16 FPS
 D2 = 0.56 FT.
 D10 = 0.64 FT.
 S = 1.0%

MATCH LINE STA 53+80 -L-

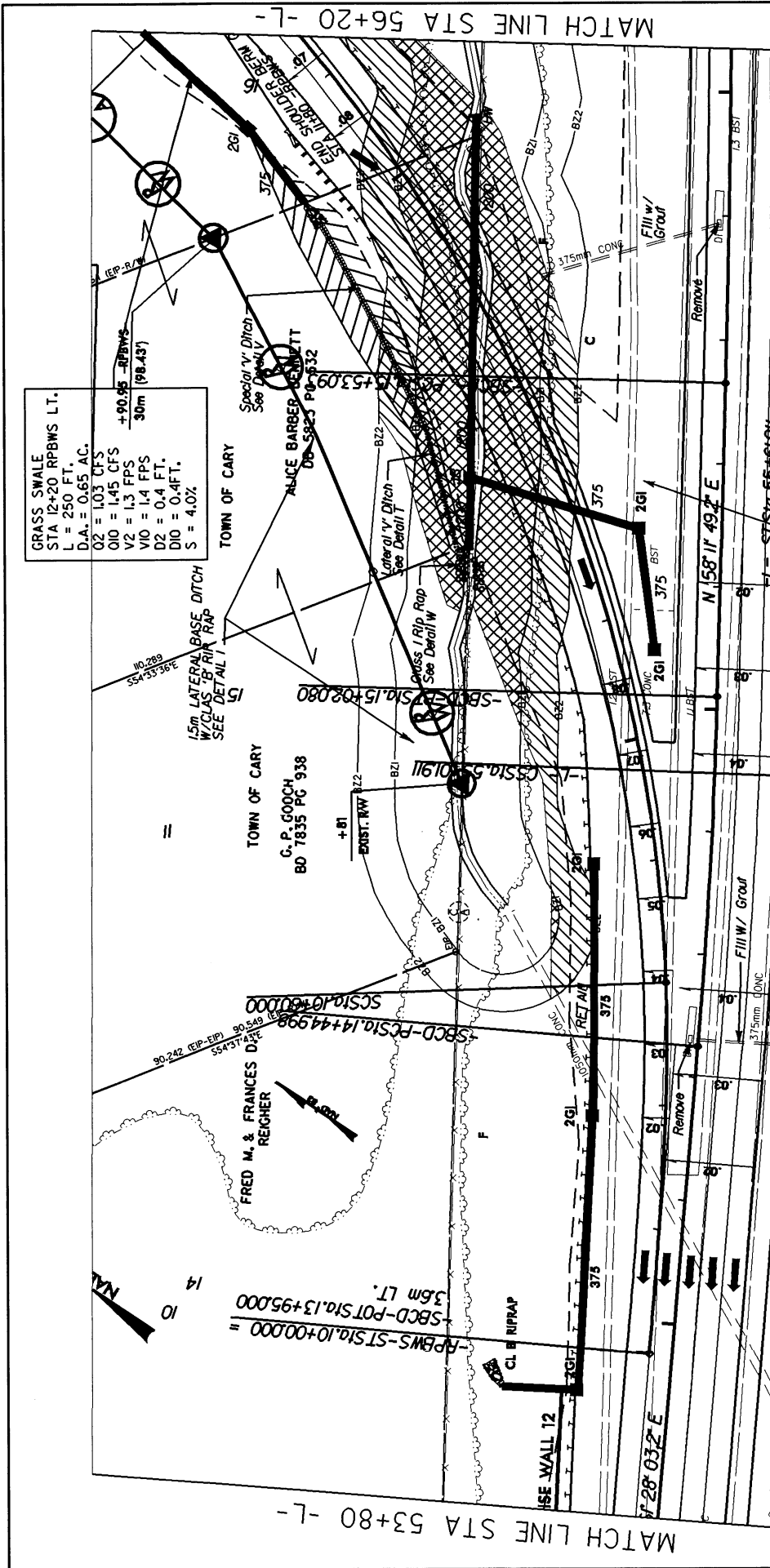
DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-5101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 13 OF 19 6-11-04

SITE 6
 PLAN VIEW



-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2

CROSSROADS HOLDINGS, LLC



GRASS SWALE
 STA 12+20 RPBWS LT.
 L = 250 FT.
 D.A. = 0.65 AC.
 Q2 = 1.03 CFS
 Q10 = 1.45 CFS
 V2 = 1.3 FPS
 V10 = 1.4 FPS
 D2 = 0.4 FT.
 D10 = 0.4 FT.
 S = 4.0%

GRASS SWALE
 STA 15+35 SBCD LT.
 L = 680 FT.
 D.A. = 1.56 AC.
 Q2 = 2.87 CFS
 Q10 = 3.48 CFS
 V2 = 1.2 FPS
 V10 = 1.3 FPS
 D2 = 0.6 FT.
 D10 = 0.7 FT.
 S = 1.9%

SITE 6
 PLAN VIEW

DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SR1009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY

SHEET 14 OF 19 6-11-04

SCALE



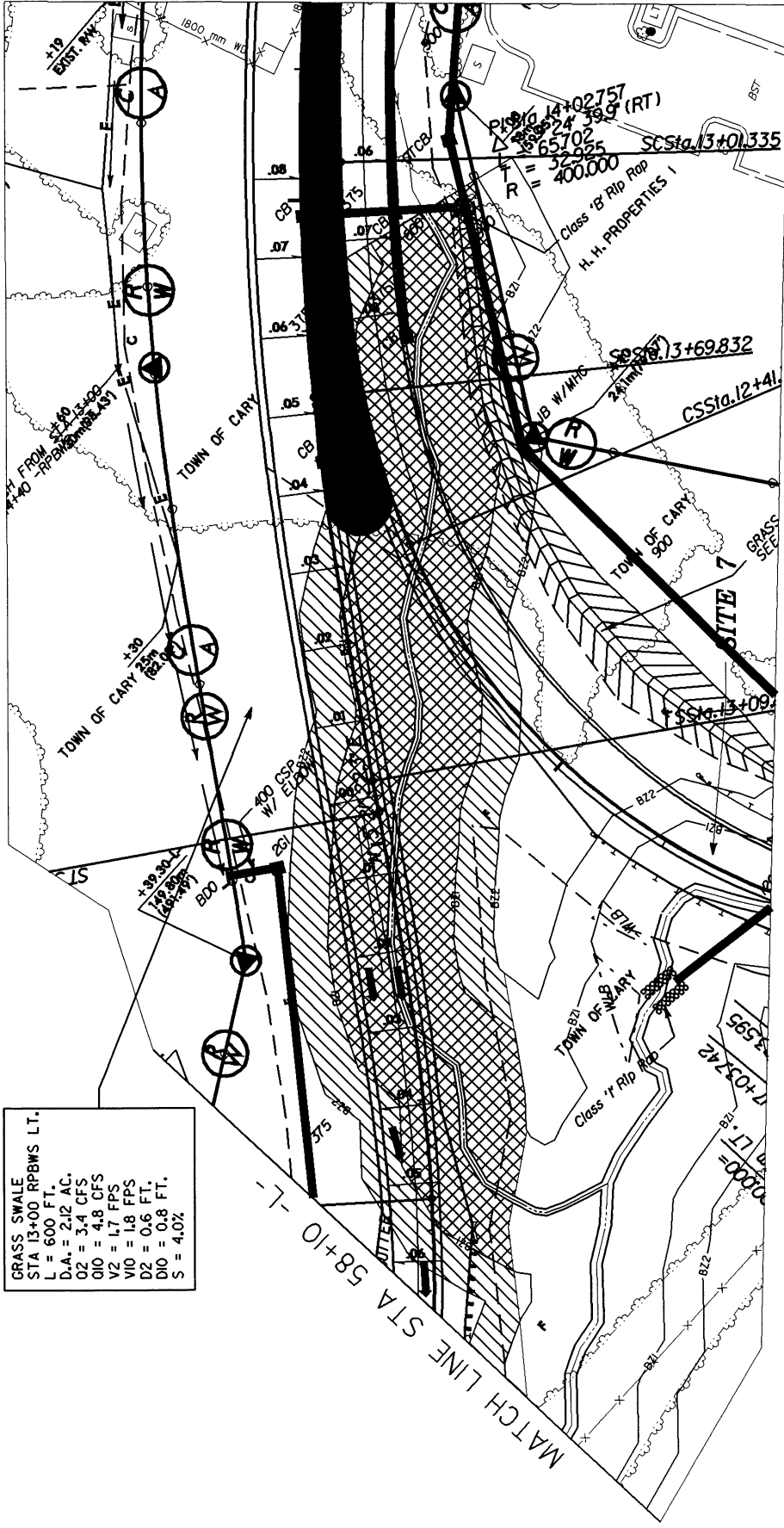
MITIGABLE IMPACTS ZONE 1



MITIGABLE IMPACTS ZONE 2



GRASS SWALE
 STA 13+00 RPBWS LT.
 L = 600 FT.
 D.A. = 2.12 AC.
 O2 = 3.4 CFS.
 O10 = 4.8 CFS
 V2 = 1.7 FPS
 V10 = 1.8 FPS
 D2 = 0.6 FT.
 D10 = 0.8 FT.
 S = 4.0%





MATCH LINE STA 58+10 - L-

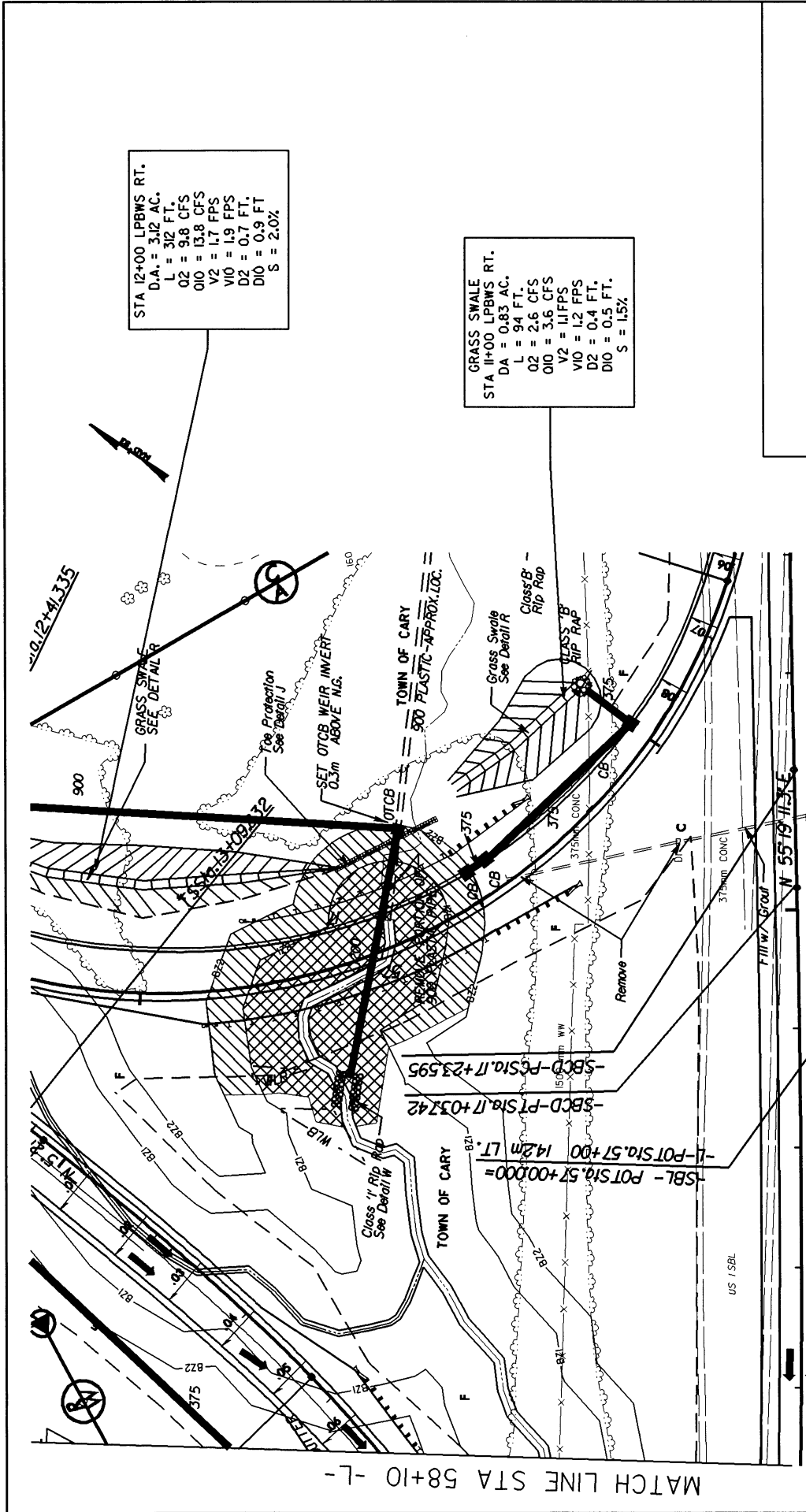


DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)
 US 1/64 FROM US 1/64/SRI009
 (TRYON RD.) INTERCHANGE TO
 SOUTH OF I-40 IN CARY
 SHEET 15 OF 19 6-11-04

SITE 6
 PLAN VIEW



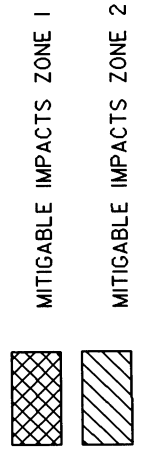
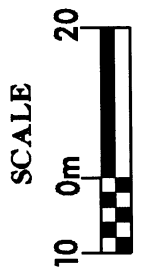
-  MITIGABLE IMPACTS ZONE 1
-  MITIGABLE IMPACTS ZONE 2



MATCH LINE STA 58+10 -L-

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US 1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY
SHEET 16 OF 19 6-11-04

SITE 7
PLAN VIEW



BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT						BUFFER REPLACEMENT			
			TYPE		ALLOWABLE		MITIGABLE		ZONE 1 (ft ²)	ZONE 2 (ft ²)		
			ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ft ²)	ZONE 2 (ft ²)	TOTAL (ft ²)	ZONE 1 (ft ²)			ZONE 2 (ft ²)	
1	42" RCP	16+80 to 20+80 L	X	X			69156	30580	99736	52258	3845	
2	1 @ 7' X 6' RCBC	27+50 L	X		8417	5619	14036					
3	36" RCP	35+10 to 36+80 L	X	X			7793	8546	16339			
4	1 @ 8' X 7' RCBC	37+80 L	X				11797	8428	20225			
5	1 @ 6' X 6' RCBC	42+95 L	X				9472	7750	17222			
6	48" RCP	52+30 to 58+10 L to 12+80 LPBWS	X				57704	38287	96991			
7	48" RCP	11+50 LPBWS	X				9483	6630	16113			
TOTAL:					8417	5619	14036	165405	101221	266626	52258	3845

(Acres) (0.193) (0.129) (0.322) (3.797) (2.324) (6.121) (1.200) (0.088)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 81403101 (U-3101)
US 1/64 FROM US1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN GARY.
SHEET **175/19** 6-11-04

BUFFER ZONE PROPERTY OWNERS

<u>SITE NO.</u>	<u>NAME</u>	<u>ADDRESS</u>
1	DAVID AND INA J. NEWELL	401 GLASGOW DR. CARY NC 27511
	JOHN B. PARKER & ALISON W. PARKER	513 ANNADALE DR. CARY NC 27511
	MARTIN J. WILLSON & ROBERTA L. WILLSON	511 ANNADALE DR. CARY NC 27511
	DANNY MANNUS & ANDREA MANUS	509 ANNADALE DR. CARY NC 27511
	ROBERT J. ARNOLD	221 RONALDSBY DR. CARY NC 27511
	BARBARA ANN MILLER & MARY ANN BAKE	2026 FORDGATES DR. GARNER 27529
	JERRY A. HAILEY JR.	PO BOX 699 CARY NC 27512
	ROBERT THOMAS MULLICAN	215 RONALDSBY DR CARY NC 27511
	FRANCIS W. DELLINGER, TRUSTEE	207 ANNADALE DR. CARY NC 27511
2	KEISLER GROUP, LLC	1695 KILDAIRE FARM RD. CARY NC 27511
	EDWARD P. BRINSON & ROSA L. BRINSON	111 GUERNSEY TRL. CARY NC 27511
	ROBERT W. RIGG & JACQUELINE B. RIGG	107 DEWBERRY CT. CARY NC 27511
	WEN ZHANG & LEILEI ZHANG	106 DEWBERRY CT. CARY NC 27511
3	JOHN T. III & SANDRS B. BYRUM	219 HEIDINGER DR. CARY NC 27511
	RICHARD W. PRYOR & CAROLE M. PRYOR	217 HEIDINGER DR. CARY NC 27511
	STEVEN D. BALENTINE & CHERRI L. BALENTINE	215 HEIDINGER DR. CARY NC 27511
	JOHN & SARAH TILLEY	213 HEIDINGER DR. CARY NC 27511
	ROBERT J. PLEASANTS	208 E. CORNWALL RD. CARY NC 27511
	SUMMERWINDS, INC	7700 LAKE WHEELER RD. RALEIGH NC 27603

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY.
SHEET 18 of 19 10-21-03

BUFFER ZONE PROPERTY OWNERS

<u>SITE NO.</u>	<u>NAME</u>	<u>ADDRESS</u>
4	SUMMERWINDS, INC TOWN OF CARY	7700 LAKE WHEELER RD. RALEIGH NC 27603 PO BOX 8005 CARY NC 27511
5	TOWN OF CARY BILL CLARK HOMES OF RALEIGH, LLC NUNZIO & ANNA NISTA EDWARD E. HOLLOWELL, TRUSTREE DOVE INVESTMENT ASSOCIATES II C/O WATSON & PELT PA CPA	PO BOX 8005 CARY NC 27511 PO BOX 31028 RALEIGH NC 27622 4407 NW41PL COCONUT CREEK FL. 33073 111 COMMONWEALTH CT. SUITE 102 CARY NC 27511
6	CROSSROADS HOLDINGS, LLC FRED M. & FRANCES D. REIGHER TOWN OF CARY H. H. PROPERTIES	1101 BUCK JONES RD. RALEIGH NC 27606 1233 KINGSTON RIDGE RD. CARY NC 27511 PO BOX 8005 CARY NC 27512 300 BAUSCH & LOMB PL. ROCHESTER NY 14604
7	TOWN OF CARY	PO BOX 8005 CARY NC 27511

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.1403101 (U-3101)
US 1/64 FROM US1/64/SR1009
(TRYON RD.) INTERCHANGE TO
SOUTH OF I-40 IN CARY.
SHEET 1959 10-21-03

Site One Stream Relocation
And
Ditch Typical Sections

Stream Relocation Site 1

The impacted stream, an unnamed minor tributary to Swift Creek, runs parallel to the left side of the existing roadway fill from station 16+60 to about station 17+45. The roadway project will be affecting the stream by lateral encroachment from about station 17+00 to station 17+45.

Existing stream

The stream would best be classified as a Rosgen E4 stream with slight sinuosity. The stream in its present form is stable from riparian vegetation and bankfull relief. The streambed is predominately sand and gravel. From the pebble count, the D50 is 5.7mm and the D84 is 18.7mm, (fine to medium gravel). The largest particle is 85mm. The maximum bank height is 2.5ft. Pools are present, having a depth of 0.5 to 0.8ft. The shear stress for the current stream is 1.34 psf and the stream power is 6.19 ft.lbs/s.ft².

Proposed stream

The proposed stream will be classified as a Rosgen B4c stream. Cross vane rock weirs will be employed to establish grade control and create pools. The proposed shear stress at bankfull stage is 0.96 psf. From Shield's curve, the shear stress is adequate to cause movement of 75mm particles. The stream power will be 3.2 ft.lbs/s.ft².

Conclusion

The stream will be relocated and restored using a priority-2 stream restoration approach. To the extent practicable, a constructed floodplain will be created along the stream relocation to provide bankfull flood stage relief. This will decrease shear stresses along the stream. Additionally, cross-vane rock weirs will establish grade control and prevent head-cutting. The pools created below the rock weirs should provide additional aquatic habitat further up the reach than is now present. The proposed stream will exhibit sufficient competency to move the available streambed particles. Additionally, right-of-way will be purchased to ensure riparian buffer zone protection for long-term stability of the stream system.

Computations

Shear stress, $\tau = \gamma R s$

$\gamma =$ density of water (62.4 lb/ft^3)

$R =$ hydraulic radius = Area/Wetted Perimeter
 $= 28.8 \text{ ft}^2 / 20.45 \text{ ft}$
 $= 1.41 \text{ ft}$

$s =$ slope = 0.011 ft/ft

$$\tau = (62.4 \text{ lb/ft}^3)(1.41 \text{ ft})(0.011 \text{ ft/ft})$$
$$\tau = 0.96 \text{ lb/ft}^2$$

Stream power computation

$$P = v\tau$$

$v =$ channel velocity (ft/s)

$\tau =$ shear stress (lb/ft^2)

$$P = (3.3 \text{ ft/s})(0.96 \text{ lb/ft}^2)$$

$$P = 3.17 \text{ ft.lbs/s.ft}^2$$

<i>Variables</i>	<i>Existing Channel</i>	<i>Proposed Reach</i>	<i>USGS Station</i>	<i>Reference Reach</i>
1. Stream type	E4	B4c		
2. Drainage area (D.A.) ac.	80 ac.	80 ac		
3. Bankfull width (Wb _{bf}) ft.	13.3	19.7		
4. Bankfull mean depth (db _{bf}) ft.	1.56	1.46		
5. Width/depth ratio (Wb _{bf} /db _{bf})	8.52	13.48		
6. Bankfull cross-sectional area (Ab _{bf}) ft. ²	20.75	28.8		
7. Bankfull mean velocity (Vb _{bf}) ft/sec	4.6	3.3		
8. Bankfull discharge (Qb _{bf}) ft. ³ /sec	96	95		
9. Bankfull max depth (dmb _{bf}) ft.	2.5	2.2		
10. Width of floodprone area (Wf _{pa}) ft.	41	30.5		
11. Entrenchment ratio (Wf _{pa} /Wb _{bf})	3.08	1.55		
12. Meander length (L _m) ft.	n/a	n/a		
13. Ratio of meander length to bankfull width (L _m /Wb _{bf})	n/a	n/a		
14. Radius of curvature (R _c) ft.	n/a	n/a		
15. Ratio of radius of curvature to bankfull width (R _c /Wb _{bf})	n/a	n/a		
16. Belt width (W _{bt}) ft.	n/a	n/a		
17. Meander width ratio (W _{bt} /Wb _{bf})	n/a	n/a		
18. Sinuosity (stream length/valley length) (K)	1	1		
19. Valley Slope (VS)	1.50%	1.50%		
20. Average slope (CS)	1.50%	1.10%		
21. Pool slope	0	0		
22. Ratio of pool slope to average slope	0	0		
23. Maximum pool depth (dp _{max}) ft.	0.8	1		
24. Ratio of pool depth to average bankfull depth (dp/db _{bf})	0.51	0.68		
25. Pool width (W _p) ft.	4	5		
26. Ratio of pool width to bankfull width	0.30	0.25		
27. Pool to pool spacing ft.	30	33		
28. Ratio of pool to pool spacing to bankfull width	2.26	1.68		
29. Ratio of lowest bank height to bankfull height (or max bankfull depth) (BH _{low} /dmb _{bf})	0.6	1		

NATURAL CHANNEL DESIGN DATA

MORPHOLOGICAL MEASUREMENT TABLE

SITE 1 Station 17+00 to 17+45

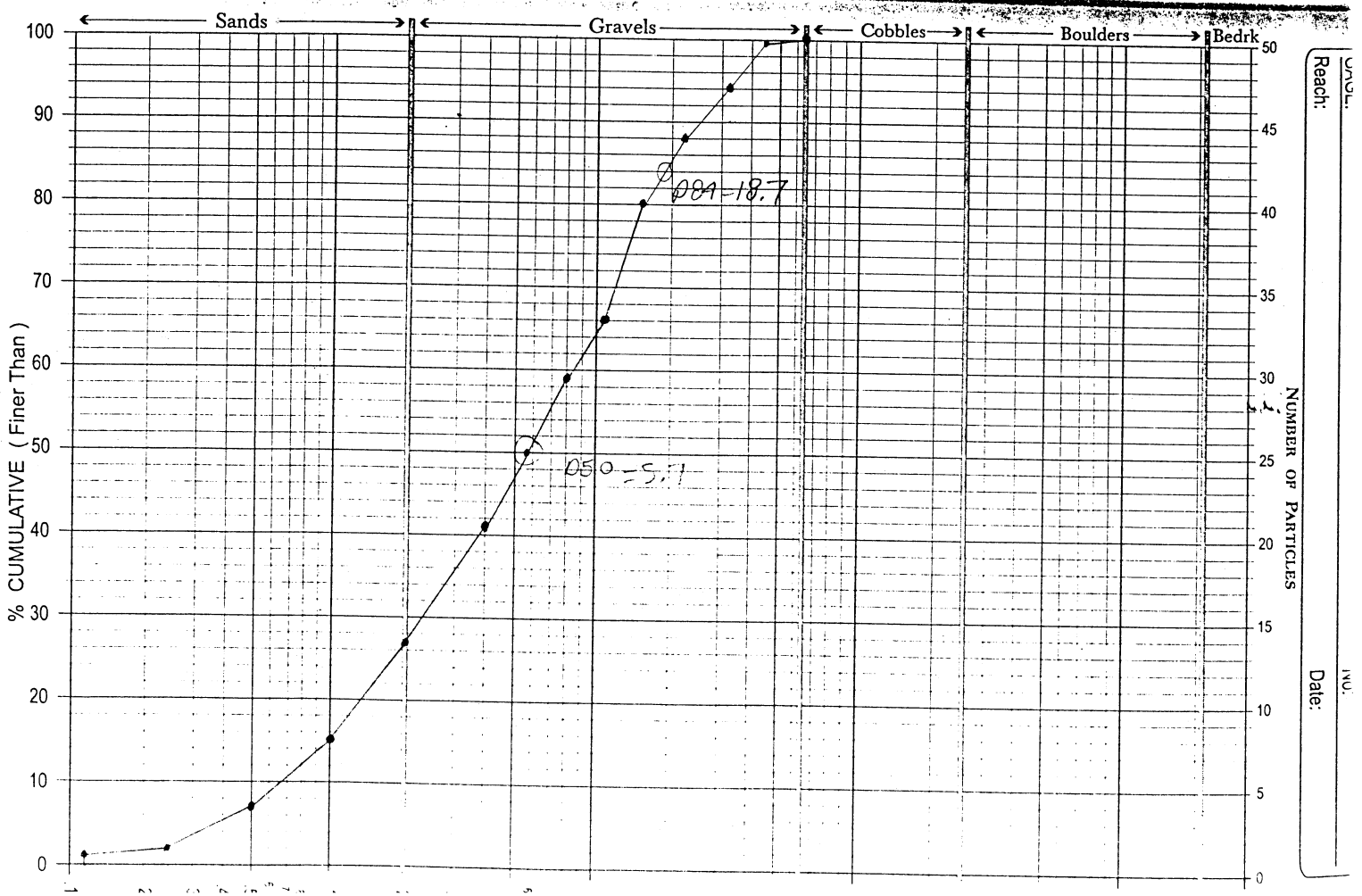
N.C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 WAKE COUNTY
 PROJECT: 8.1403101 (U-3101)

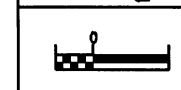
SHEET OF

10/23/03

PEBBLE COUNT Existing Stream 17+00 to 17+45

Site: Swift Creek Trib. Party: Morgan/Gentry			Reach: 17+30 Date: 9/23/03				PEBBLE COUNT			PEBBLE COUNT				
Inches	PARTICLE	Millimeters	PARTICLE COUNT			TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	%
	Silt / Clay	< .062	1	2	3									
	Very Fine	.062 - .125												
	Fine	.125 - .25				1		1						
	Medium	.25 - .50				1		2						
	Coarse	.50 - 1.0				5		7						
.04 - .08	Very Coarse	1.0 - 2				8		15						
.08 - .16	Very Fine	2 - 4				12		27						
.16 - .22	Fine	4 - 5.7				14		41						
.22 - .31	Fine	5.7 - 8				9		50						
.31 - .44	Medium	8 - 11.3				9		59						
.44 - .63	Medium	11.3 - 16				7		66						
.63 - .89	Coarse	16 - 22.6				14		80						
.89 - 1.26	Coarse	22.6 - 32				8		88						
1.26 - 1.77	Very Coarse	32 - 45				6		94						
1.77 - 2.5	Very Coarse	45 - 64				5		99						
2.5 - 3.5	Small	64 - 90				1		100						
3.5 - 5.0	Small	90 - 128												
5.0 - 7.1	Large	128 - 180												
7.1 - 10.1	Large	180 - 256												
10.1 - 14.3	Small	256 - 362												
14.3 - 20	Small	362 - 512												
20 - 40	Medium	512 - 1024												
40 - 80	Large-Vry Large	1024 - 2048												
	Bedrock													
TOTALS →						100								

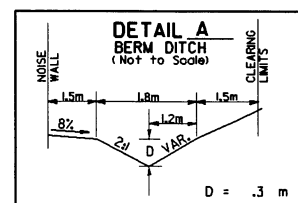




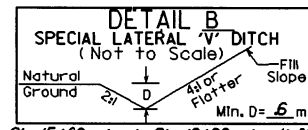
CONST. REV.

R/W REV.

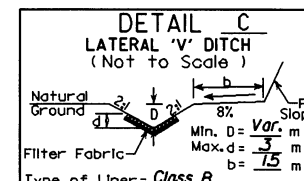
PROJECT REFERENCE NO. U-310IC&D	SHEET NO. 2-F
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>NO. 1001.1001.1001.1001.1001</small>	



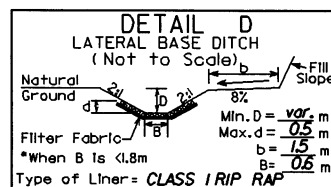
DETAIL A
BERM DITCH
(Not to Scale)
Sta 13+40 -L- to Sta 16+20 -L- (left)
Sta 39+40 -L- to Sta 41+80 -L- (left)
Sta 44+00 -L- to Sta 52+20 -L- (left)



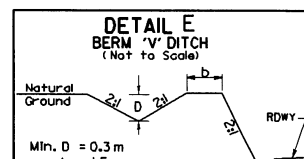
DETAIL B
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Sta 15+60 -L- to Sta 16+00 -L- (left)



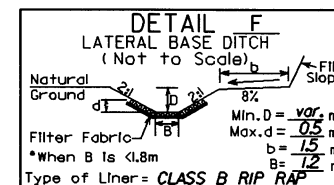
DETAIL C
LATERAL 'V' DITCH
(Not to Scale)
Sta 16+20 -L- to Sta 16+50 -L- (left)
Sta 35+20 -L- to Sta 35+60 -L- (right)
Sta 26+60 -L- to Sta 27+00 -L- (right)



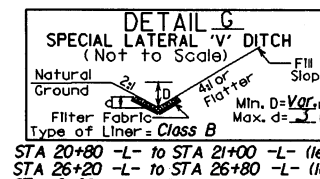
DETAIL D
LATERAL BASE DITCH
(Not to Scale)
Sta 2+00 CPRPA to Sta 2+60 CPRPA (rt)
Sta 27+80 to Sta 28+60 -L- RT.
Sta 43+20 to Sta 44+00 -L- RT.
(USE B=4m @ Sta 43+20 -L- RT.)



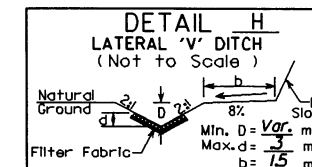
DETAIL E
BERM 'V' DITCH
(Not to Scale)
Sta 17+60 -L- to Sta 19+00 -L- (right)
Sta 22+80 -L- to Sta 23+40 -L- (left)



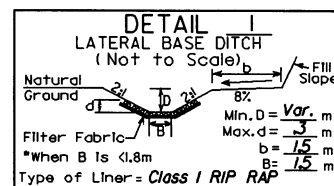
DETAIL F
LATERAL BASE DITCH
(Not to Scale)
Sta 19+00 -L- to Sta 20+00 -L- (left)



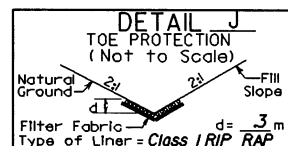
DETAIL G
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Sta 20+80 -L- to Sta 21+00 -L- (left)
Sta 26+20 -L- to Sta 26+80 -L- (left)
Sta 19+60 -L- to Sta 19+80 -L- (right)



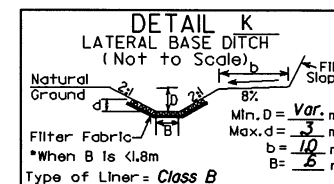
DETAIL H
LATERAL 'V' DITCH
(Not to Scale)
Sta 47+80 -L- to Sta 48+00 -L- (right)
Sta 42+60 -L- to Sta 42+92 -L- (left)



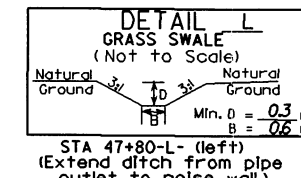
DETAIL I
LATERAL BASE DITCH
(Not to Scale)
Sta 27+90 -L- to Sta 28+60 -L- (left)
Sta 11+00 to Sta 11+60 -RPBWS- LT.



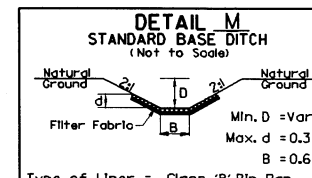
DETAIL J
TOE PROTECTION
(Not to Scale)
Sta 37+50 -L- to Sta 37+80 -L- (left)
Sta 16+50 -L- to Sta 16+73-L- (lt)
Sta 11+55 CPLPA to Sta 11+65 CPLPA (rt)
Sta 2+70 CPRPA to Sta 3+20 CPRPA (rt)
Sta 11+40 to Sta 11+60 -LPBWS- RT.



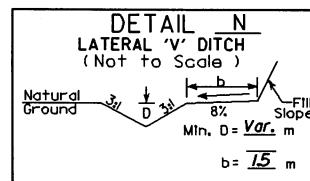
DETAIL K
LATERAL BASE DITCH
(Not to Scale)
Sta 38+60 -L- to 40+00 -L- (right)
USE B=3.0m @ Sta 38+60 -L- RT.
Sta 26+80 -L- to 27+10 -L- (lt)



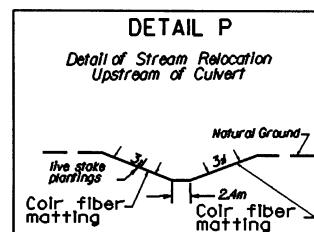
DETAIL L
GRASS SWALE
(Not to Scale)
Sta 47+80-L- (left)
(Extend ditch from pipe outlet to noise wall.)
Sta 13+70 to Sta 14+40 -L- RT.



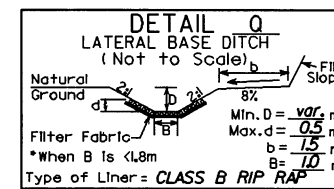
DETAIL M
STANDARD BASE DITCH
(Not to Scale)
0.6m base ditch at Sta 50+75 -L- (left)



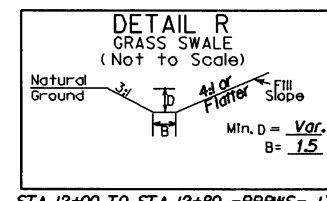
DETAIL N
LATERAL 'V' DITCH
(Not to Scale)
Sta 49+20 to Sta 49+40 -L- RT.



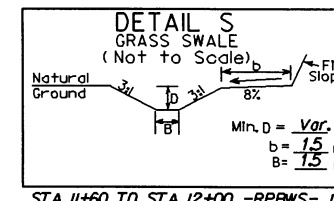
DETAIL P
Detail of Stream Relocation
Upstream of Culvert
Sta. 27+48 -L- LT.
Sta. 37+80 -L- LT.



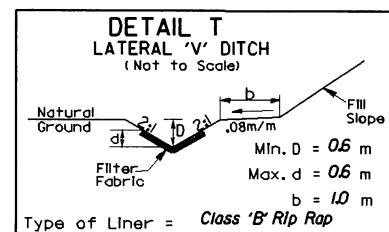
DETAIL Q
LATERAL BASE DITCH
(Not to Scale)
Sta 43+20 -L- to Sta 44+00 -L- (lt)



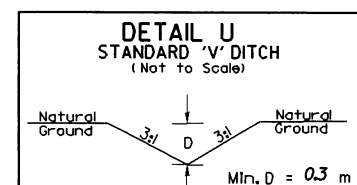
DETAIL R
GRASS SWALE
(Not to Scale)
Sta 12+00 to Sta 12+80 -RPBWS- LT
Sta 11+80 to Sta 12+92 -LPBWS- RT.
Sta 11+00 to Sta 11+35 -LPBWS- RT.



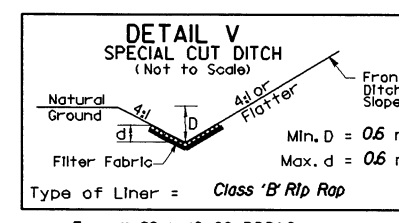
DETAIL S
GRASS SWALE
(Not to Scale)
Sta 11+60 to Sta 12+00 -RPBWS- LT.
Sta 37+80 to Sta 39+20 -L- LT.



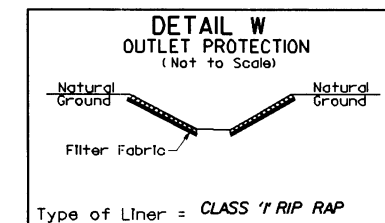
DETAIL T
LATERAL 'V' DITCH
(Not to Scale)
From 11+40 to 11+60 RPBWS LT.



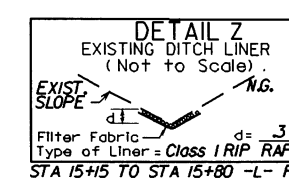
DETAIL U
STANDARD 'V' DITCH
(Not to Scale)
FROM Sta 12+40 to Sta 12+60 -CPRPB- LT.



DETAIL V
SPECIAL CUT DITCH
(Not to Scale)
From 11+80 to 12+00 RPBWS LT.



DETAIL W
OUTLET PROTECTION
(Not to Scale)
Sta 11+36 -RPBWS- LT
Sta 11+70 -LPBWS- LT.



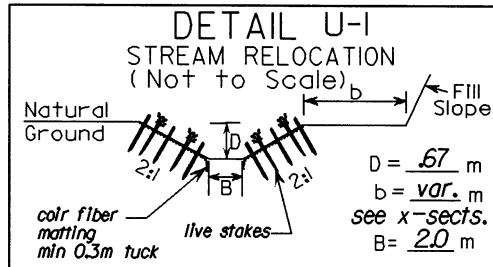
DETAIL Z
EXISTING DITCH LINER
(Not to Scale)
Sta 15+45 to Sta 15+80 -L- RT.

8/17/20

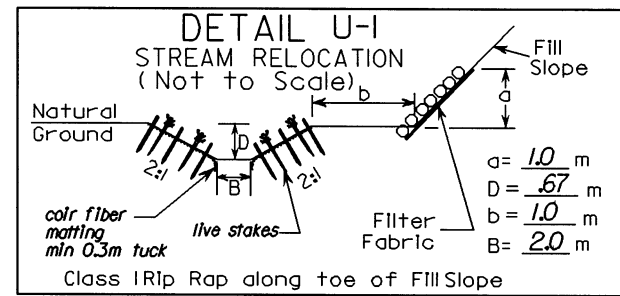
1-10-2001 14:46
C:\Users\jgallagher\Documents\101001.dwg



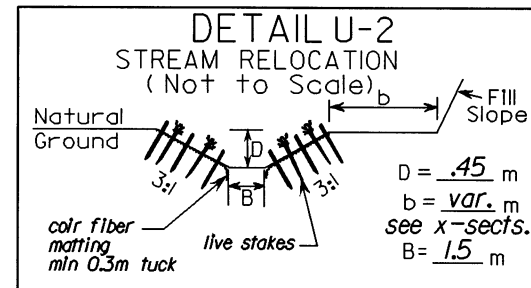
PROJECT REFERENCE NO. U-310IC&D	SHEET NO. 2-F
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	
CONST.REV.	
R/W REV.	



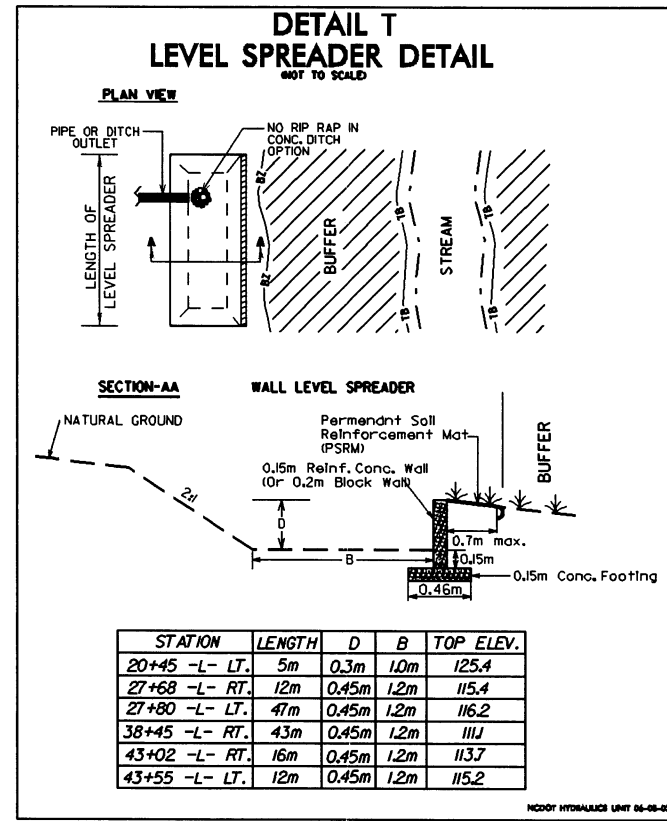
STA 17+00 -L- to STA 17+45 -L- (left)



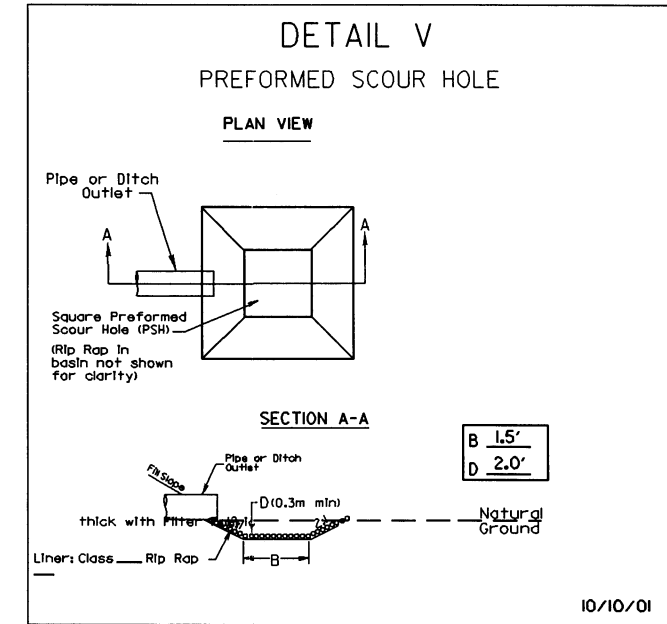
STA 17+60 -L- to STA 17+80 -L- (left)



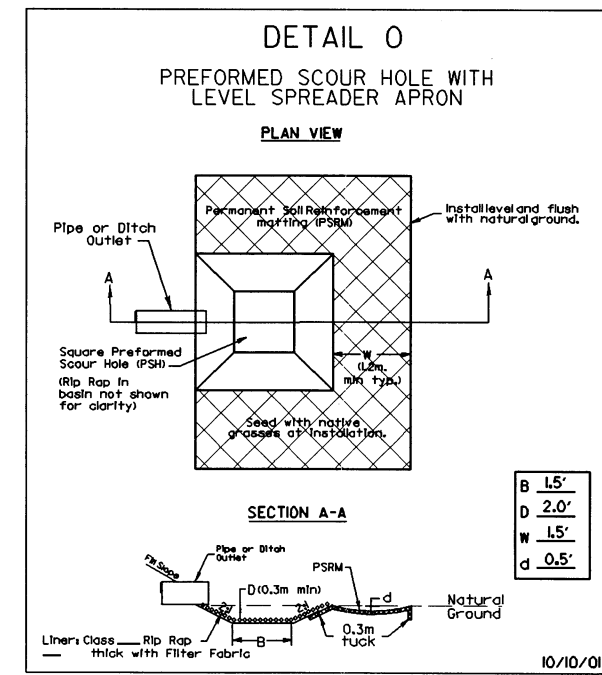
STA 17+45 -L- to STA 17+60 -L- (left)
STA 17+80 -L- to STA 19+00 -L- (left)



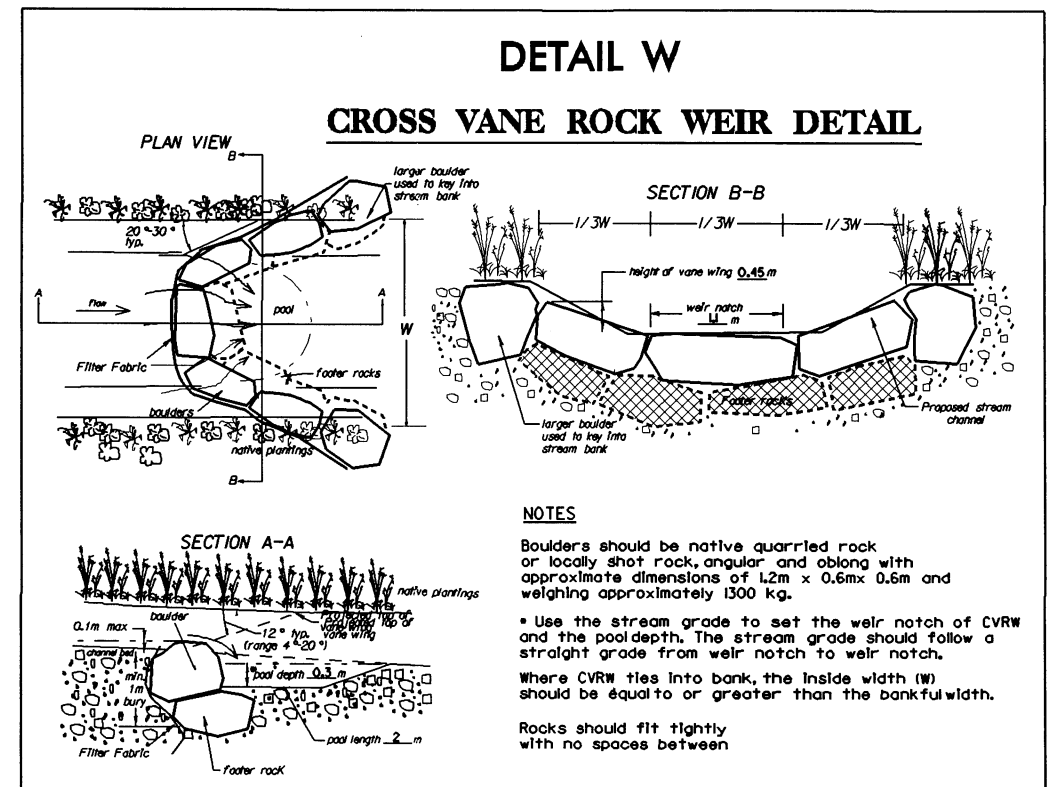
MOODY HYDRAULICS UNIT 06-08-02



10/10/01



10/10/01

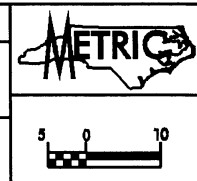
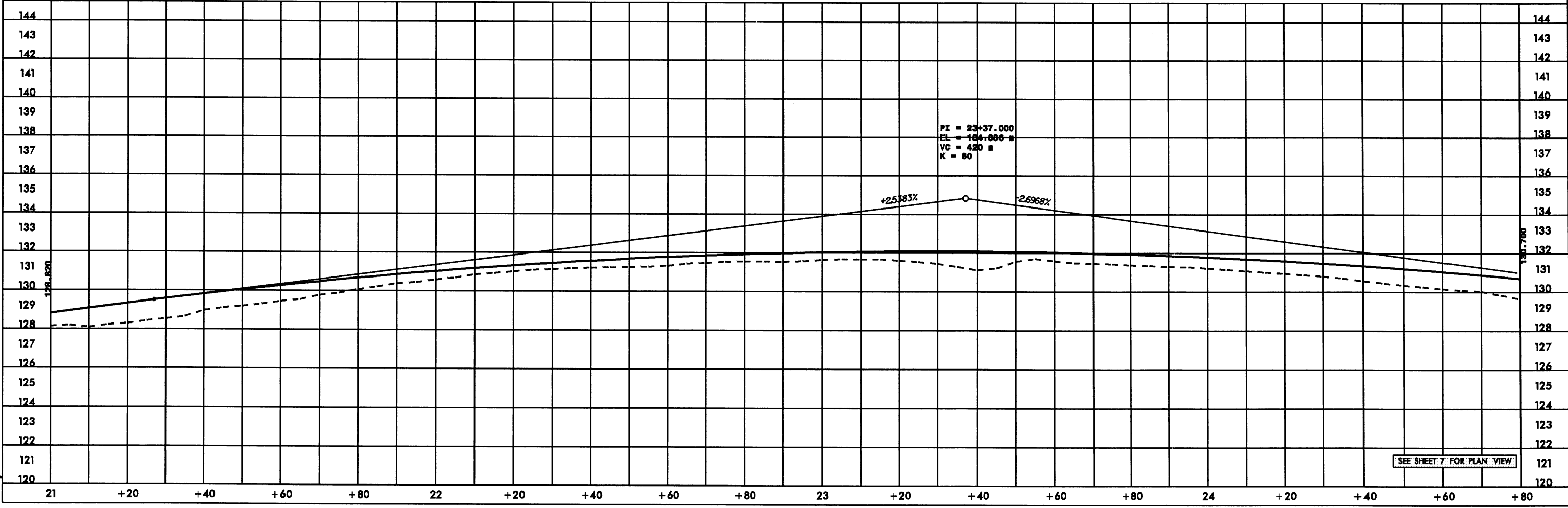
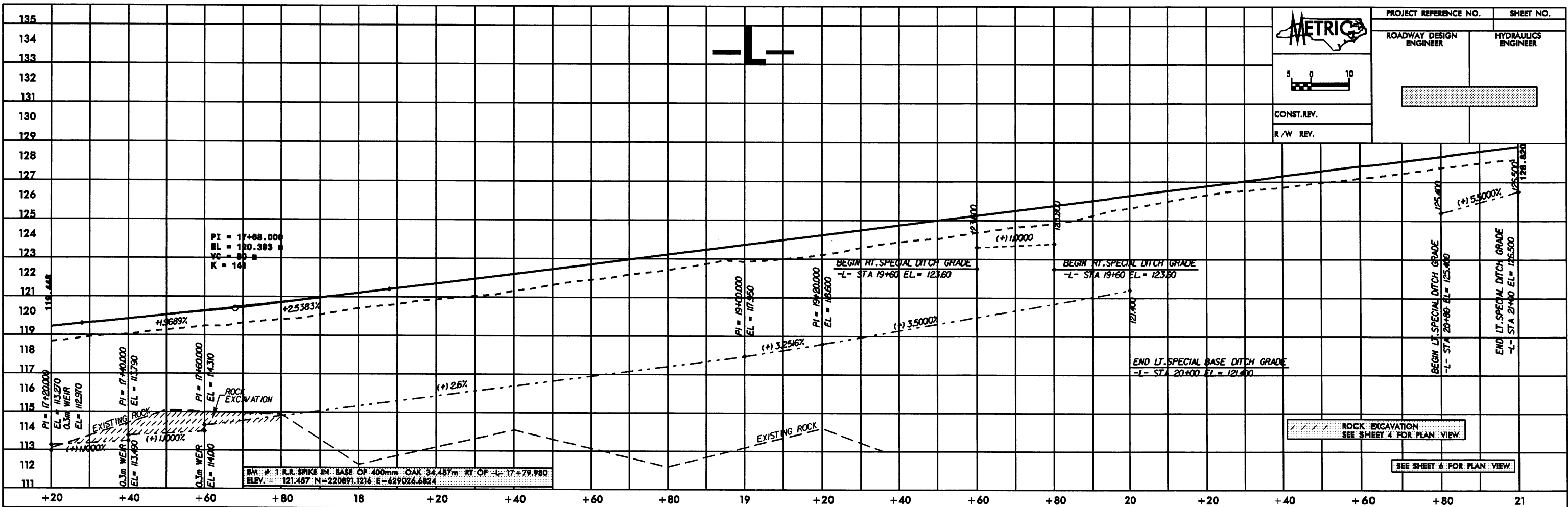


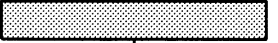
NOTES

- Boulders should be native quarried rock or locally shot rock, angular and oblong with approximate dimensions of 1.2m x 0.6m x 0.6m and weighing approximately 1300 Kg.
- Use the stream grade to set the weir notch of CVRW and the pool depth. The stream grade should follow a straight grade from weir notch to weir notch.
- Where CVRW ties into bank, the inside width (W) should be equal to or greater than the bankfull width.
- Rocks should fit tightly with no spaces between.

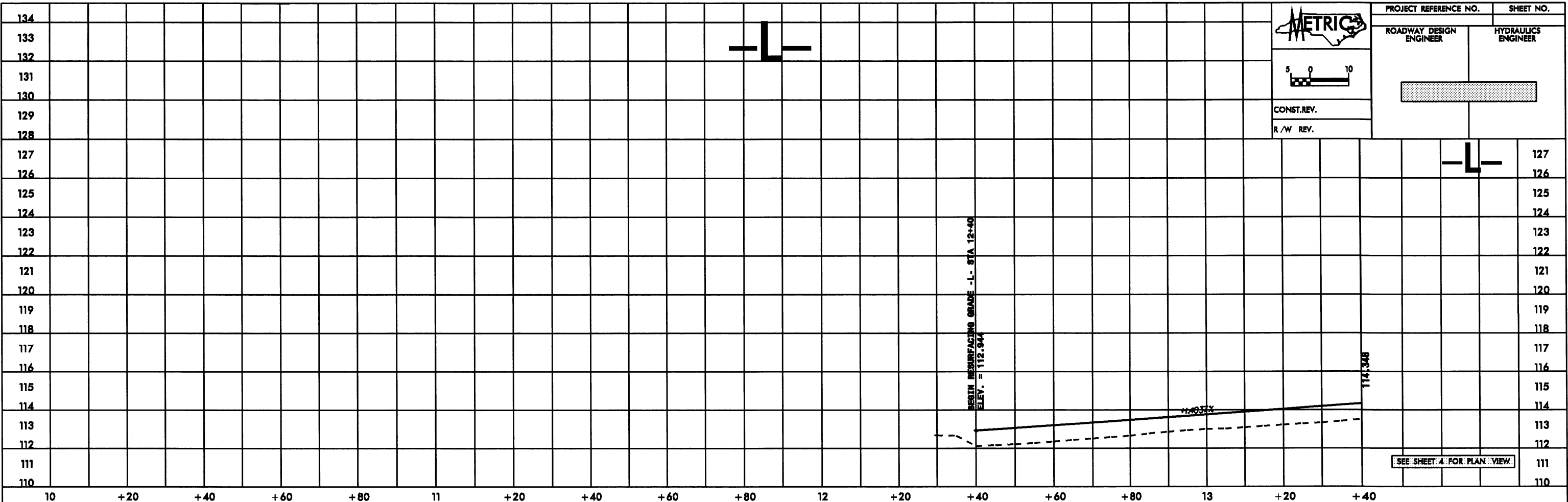
8/17/01

10/10/01



PROJECT REFERENCE NO.	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	
CONST. REV.	
R/W REV.	

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METRIC

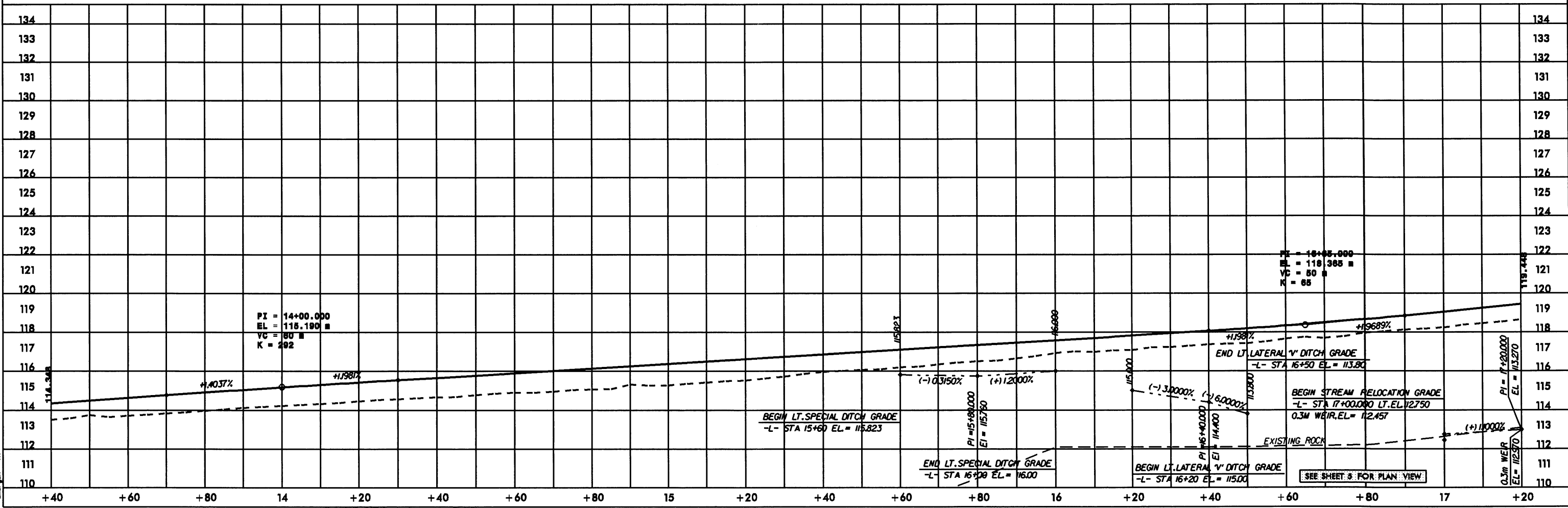
PROJECT REFERENCE NO. _____ SHEET NO. _____

ROADWAY DESIGN ENGINEER _____ HYDRAULICS ENGINEER _____

CONST. REV. _____

R/W REV. _____

5 0 10

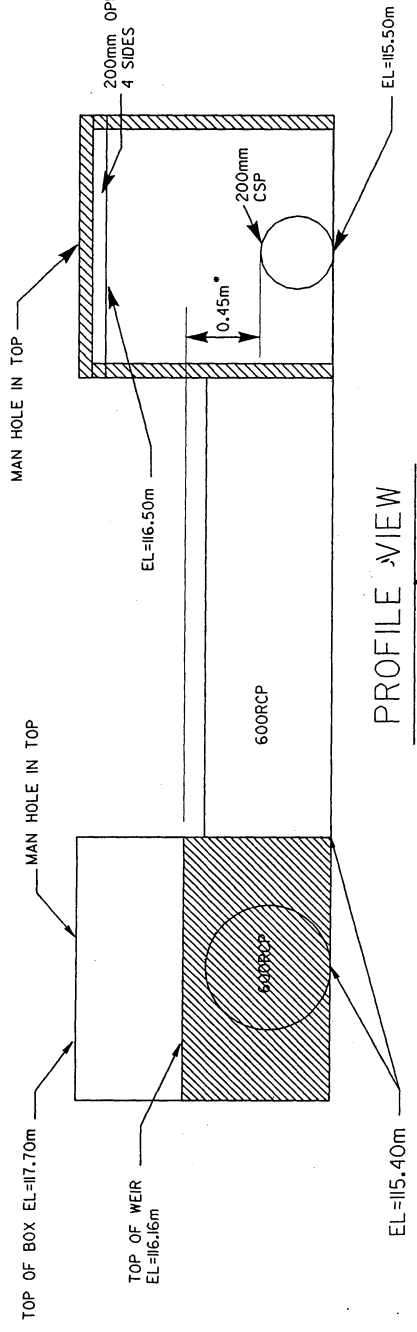


Flow Splitter Details And Computations

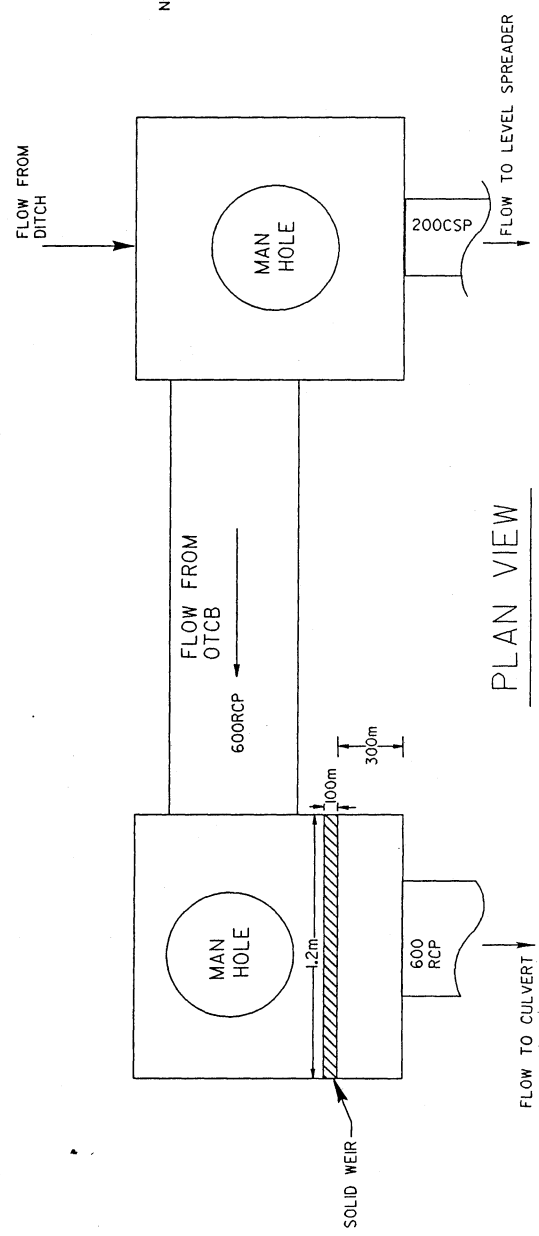
	PROJECT REFERENCE NO.	SHEET NO.
	11-100210	2-F
	R/W SHEET NO.	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		
CONST. REV.		
R/W REV.		

SPECIAL OTCB AND JB
STA. 27+80 -L- RT

NOT TO SCALE



PROFILE VIEW



PLAN VIEW

NOTE:
ELEVATIONS SHOWN MAY VARY
DEPENDING ON ACTUAL FIELD
ELEVATIONS; DIMENSIONS SHOULD NOT VARY.

STA 27+80 RT

$A_p = 0.77 \text{ ha}$ $c = .9$ $C = 0.45$

$A_g = 1.38 \text{ ha}$ $c = .2$

$Q_{10} = .45(155)(2.15)(.00275) = 0.41 \text{ cms}$ (14.5 cfs)

$Q_{1"} = .45(25)(2.15)(.00275) = 0.067 \text{ cms}$ (2.35 cfs)

use level spreader designed for 1"/hr storm intensity

length = $(2.5)(13) = 32 \text{ ft}$ or 10m

use 12m level spreader

use 8" csp w/ 24" overflow

Top of level spreader elevation = 115.4

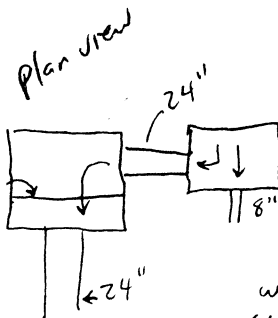
OTCB @ sta 27+80 RT Top = 116.5 INV = 115.5

(8" & 24" invert set at 115.64)

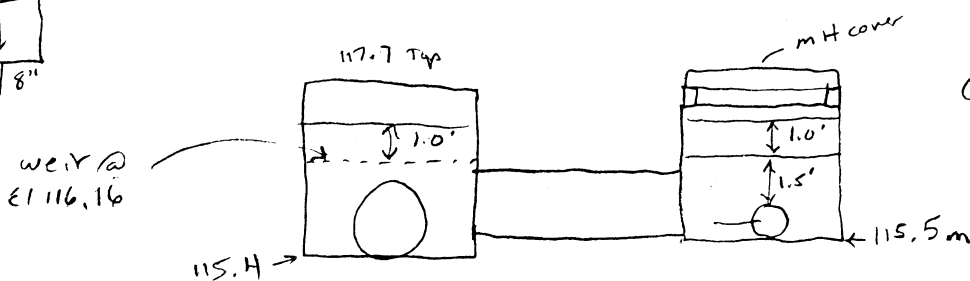
w/ 8" outlet pipe to level spreader and 24" overflow to JB w/ MH COVER

with 4' weir weir elevation = 116.16 INV out of 24" = 115.5

4' weir in JB w/ 1.0' of Head allows 12 cfs overflow
 the additional 1.0' of head on the 8" creates a total Head of 2.5' on the 8" which creates a Q of 3.0 cfs going through 8"



level spreader length = $3.0(13) = 39' = 12 \text{ m}$

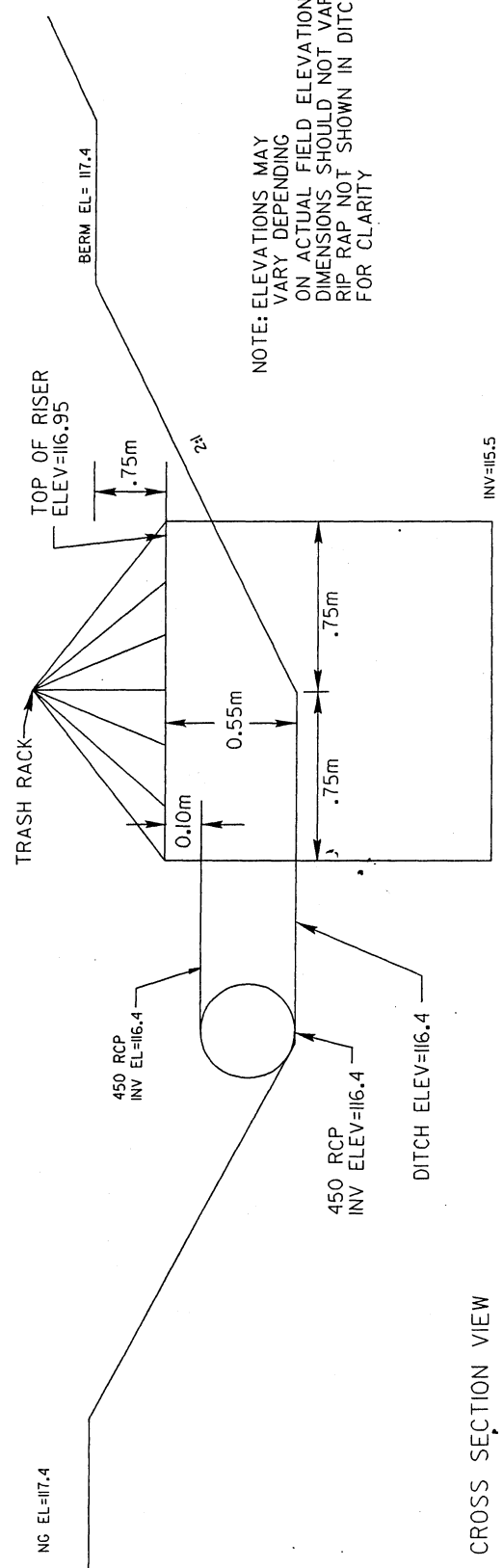


OTCB w/ 8" high opening

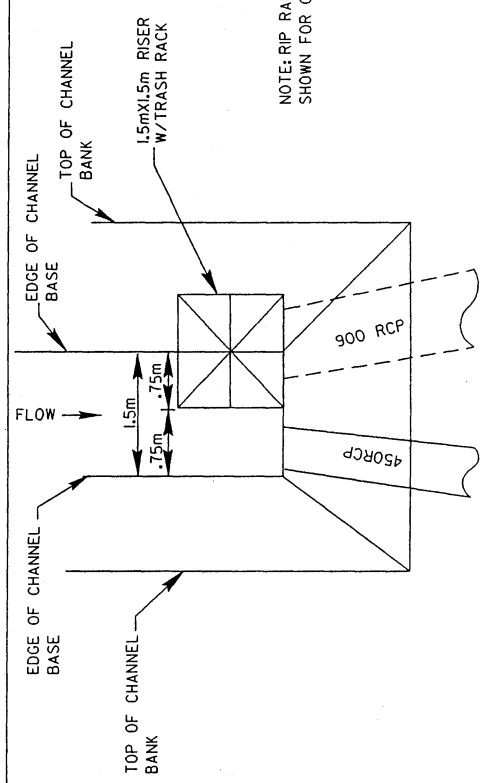
PROJECT REFERENCE NO.	SHEET NO.
U-2002.0	2-F
ROADWORKER	PROPOSER
ROADWORKER	ENGINEER
PREPARED BY: J. J. JONES DATE: 11/14/2002	
COUNTRY:	E/W BY:

1.5m X 1.5m RISER WITH LOW FLOW 450RCP DETAIL

STA 27+90 -L- LT



CROSS SECTION VIEW



PLAN VIEW

STA 27+90 LT

$$DA = 6.9 \text{ ha}$$

$$A_p = 2.55 \text{ ha}$$

$$A_g = 4.35 \text{ ha}$$

$$C = \frac{2.55(.9) + 4.35(.3)}{6.9} = .52$$

$$Q_{10} = (6.9)(.52)(155)(.00275) = 1.52 \text{ cms (54 cfs)}$$

$$Q_{1"} = (6.9)(.52)(25)(.00275) = 0.25 \text{ cms (8.7 cfs)}$$

length of level spreader required = $8.7(13) = 114 \text{ feet (35 m)}$

$$\text{HWS} = 1.2 \text{ for } 18" \text{ pipe } \quad Q = 8.7 \text{ cfs} \quad \text{HW} = 1.8 \text{ (.55 m)}$$

$$\text{HWS} = 2.8 \text{ for } 18" \text{ pipe } \quad Q = 13.5 \text{ cfs} \quad \text{HW} = 2.8$$

$$\text{use } \rightarrow \text{HWS} = 1.7 \text{ for } 18" \text{ pipe } \quad Q = 12.5 \text{ cfs} \quad \text{HW} = 2.55 \text{ (.78 m)}$$

$$\text{inv. in } 450 = 116.4$$

$$\text{Top of riser} = 116.95$$

$$\text{inv. out } 450 = 116.1$$

$$\text{INV. of riser} = 115.5$$

$$\text{INV. of } 900 \text{ into culvert} = 114.95$$

weir eqn

$$Q = C L H^{3/2}$$

$$42 \text{ cfs} = 3.0 L (.75)^{3/2}$$

$$L = 21.6 \text{ ft}$$

weir length provided with a 1.5m x 1.5m riser is 20'

Length of proposed level spreader 45m (148ft)

STA 38+00 - L-4

$$D.A. = 1.57 \text{ ha}$$

$$A_p = 0.65 \text{ ha}$$

$$A_g = 0.92 \text{ ha}$$

$$C = \frac{(0.65)(0.9) + (0.92)(0.3)}{1.57} = 0.55$$

$$Q_{10} = CIA = (0.55)(1.57)(0.00275) = 0.37 \text{ cms} = (13.0 \text{ cfs})$$

$$Q_{1"} = (0.55)(25)(1.57)(0.00275) = 0.06 \text{ cms} = (2.1 \text{ cfs})$$

$$\text{IMPERVIOUS AREA} = \frac{0.65}{1.57} = 41\%$$

$$R_v = 0.05 + 0.009(41)$$

$$R_v = 0.42$$

$$V_{ol} = (0.42) \times \frac{1}{2} (3.88) (43560)$$

$$V_{ol} = 5915 \text{ ft}^3 = 168 \text{ m}^3$$

LEVEL SPREADER ^{W/BYPASS} NOT PRACTICAL DUE TO VIRTUALLY
FLAT FLOODPLAIN; NOT ENOUGH ROOM TO BUILD A
LEVEL SPREADER SIZED FOR 10YR STORM.

USE A GRASS SWALE

$$D.A. = 3.88 \text{ Ac}$$



$$\text{GRASS SWALE LENGTH REQUIRED} = 3.88 (100') = 388'$$

$$\text{OR } 118 \text{ m}$$

$$\text{GRASS SWALE PROVIDED} = 120 \text{ m}$$

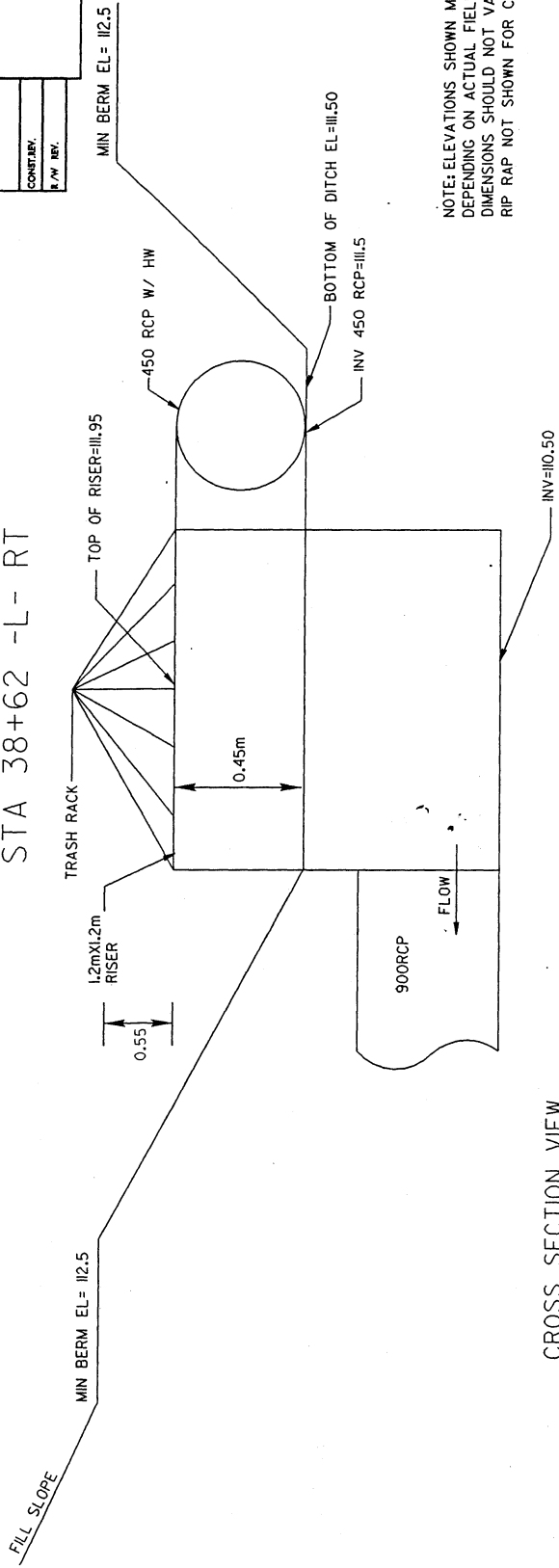
$$D.A. @ \#48 \text{ out} = 1.16 \text{ Ac}$$

$$D.A. @ \#58 \text{ out} = 1.12 \text{ Ac}$$

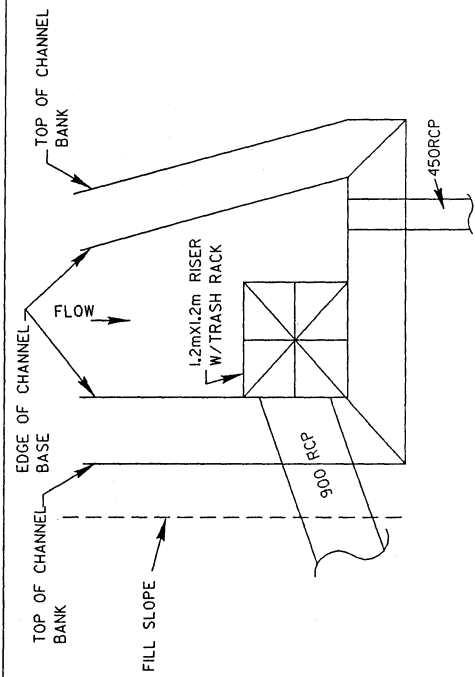
	PROJECT REFERENCE NO.	SHEET NO.
	U-300030	2-F
	E.A.V. SHEET NO.	HYDRAULICS
	ROADWAY DESIGN	ENGINEER
CONTRACTOR		
E.A.V. INC.		

1.2M X 1.2M RISER W/450 LOW FLOW PIPE

STA 38+62 -L- RT



NOTE: ELEVATIONS SHOWN MAY VARY
 DEPENDING ON ACTUAL FIELD ELEVATIONS
 DIMENSIONS SHOULD NOT VARY.
 RIP RAP NOT SHOWN FOR CLARITY



NOTE: RIP RAP IN DITCH NOT
 SHOWN FOR CLARITY

NOT TO SCALE

20-001-2001 002
 20-001-2001 002
 20-001-2001 002

STATION 38+62 - L - RT

① Level spreader sized for 1"/hr intensity w/ bypass

$$A_p = 2.49 \text{ ha}$$

$$C = 0.63$$

$$A_g = 2.02 \text{ ha}$$

$$Q_{10} = .63(155)(4.51)(.00275) = 1.21 \text{ cms} \quad (42.8 \text{ cfs})$$

$$Q_{11} = .63(25)(4.51)(.00275) = .20 \text{ cms} \quad (6.9 \text{ cfs})$$

$$\text{Level spreader length} = (6.9 \text{ cfs})(13) = 90 \text{ ft} = 28 \text{ m}$$

② Level spreader sized based on first inch of rainfall runoff w/ dry detention and 2 to 5 day draw down.

$$R_v = 0.05 + 0.009(55)$$

$$R_v = 0.55$$

$$\text{Vol} = .55(1/2)(11.1)(43560)$$

$$\text{Vol} = 22161 \text{ ft}^3 \quad (628 \text{ m}^3) \quad (\text{NOT ENOUGH ROOM FOR DRY DETENTION})$$

use level spreader based on 1"/hr intensity

✓ use 18" RCP w/ H_{w/D} = 1.0 $Q = 6.9 \text{ cfs}$

✓ use 4x4 riser with 0.8' of Head $Q_{\text{weir}} = 3(16)(.8)^{1.5} = 34.3 \text{ cfs}$

✓ Q through 18" RCP = ± 11.0 cfs

$$\text{level spreader length needed} = 11(13) = 143' \quad (43 \text{ m})$$

$$\text{INV of 18" (450)} = 111.5$$

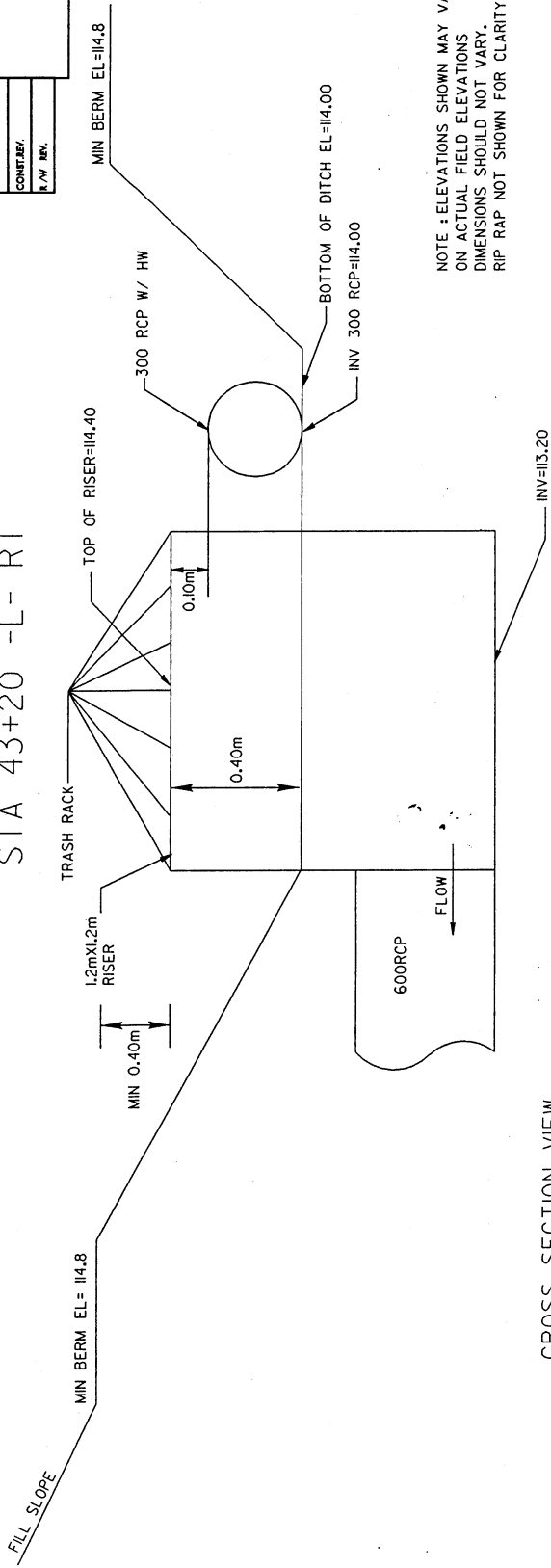
$$\text{Top of 1.2 x 1.2 Riser} = 111.95$$

$$\text{INV of 1.2 x 1.2 Riser} = 110.5$$

	PROJECT REFERENCE NO.	SHEET NO.
	U-3100240	2-F
	R/W SHEET NO.	HYDRAULICS ENGINEER
	NOTARY PUBLIC	
CONTRACT NO.		
R/W REV.		

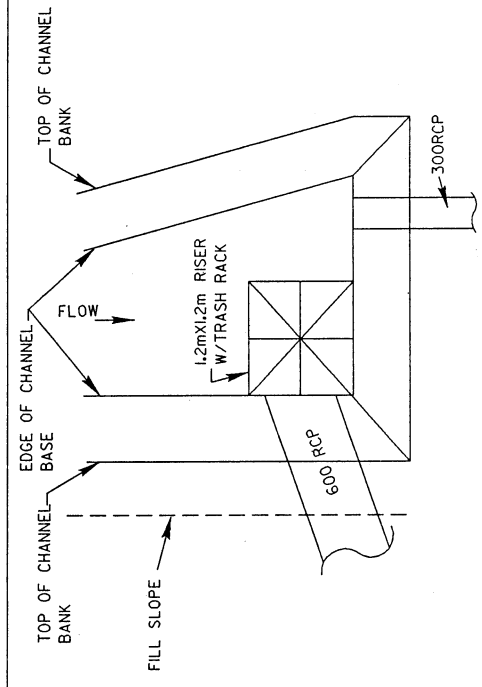
1.2m X 1.2m RISER W/300 LOW FLOW PIPE

STA 43+20 -L- RT



NOTE: ELEVATIONS SHOWN MAY VARY DEPENDING ON ACTUAL FIELD ELEVATIONS DIMENSIONS SHOULD NOT VARY. RIP RAP NOT SHOWN FOR CLARITY

CROSS SECTION VIEW



NOTE: RIP RAP IN DITCH NOT SHOWN FOR CLARITY

PLAN VIEW

NOT TO SCALE

$$Q = C_w L H^{3/2}$$

STATION 43+~~00~~²⁰-L-RT

① Level spreader sized for 1" storm w/ bypass

$$A_p = 1.04 \text{ ha}$$

$$C = 0.57$$

$$A_g = 1.24 \text{ ha}$$

$$Q_{10} = C I A = (0.57)(155)(2.28)(.00275) = 0.55 \text{ cms (19.6 cfs)}$$

$$Q_{1"} = C I A = (0.57)(25)(2.28)(.00275) = .09 \text{ cms (3.2 cfs)}$$

$$\text{Level spreader length} = (3.2 \text{ cfs})(13) = 42'$$

12" pipe

$$\text{Top level spreader} = 113.7$$

$$\text{bottom} = 113.3$$

$$\text{Length} = 15 \text{ m}$$

24" OTCB

② Level spreader sized for 1" storm w/ detention and bypass

46% impervious

$$R_v = .05 + .009(46)$$

$$R_v = .46$$

$$\text{Vol} = (.46) \left(\frac{1}{12}\right) (5.63) (43560)$$

$$\text{Vol} = 9402 \text{ ft}^3 = 266 \text{ m}^3$$

*Not as practicable as ①

$$12" \text{ w/ HW} = 1.3 \quad Q = 3.2 \text{ cfs}$$

$$12" \text{ w/ HW} = 1.8 \quad Q = 4.9 \text{ cfs} \quad \left(0.5' \text{ of head over weir on } 1.2 \text{ m} \times 1.2 \text{ m Riser}\right)$$

$$\text{Invert elevation of } 12" \text{ pipe} = 114.0 \text{ m}$$

$$\text{Set top of } 1.2 \text{ m} \times 1.2 \text{ m Riser } 1.3' \text{ above invert of } 12" \text{ pipe Elev} = 114.40$$

w/ .5' of head on 1.2 m x 1.2 m riser solve for Q

$$Q = 3(16)(.5)^{1.5} = 16.97 \text{ cfs}$$

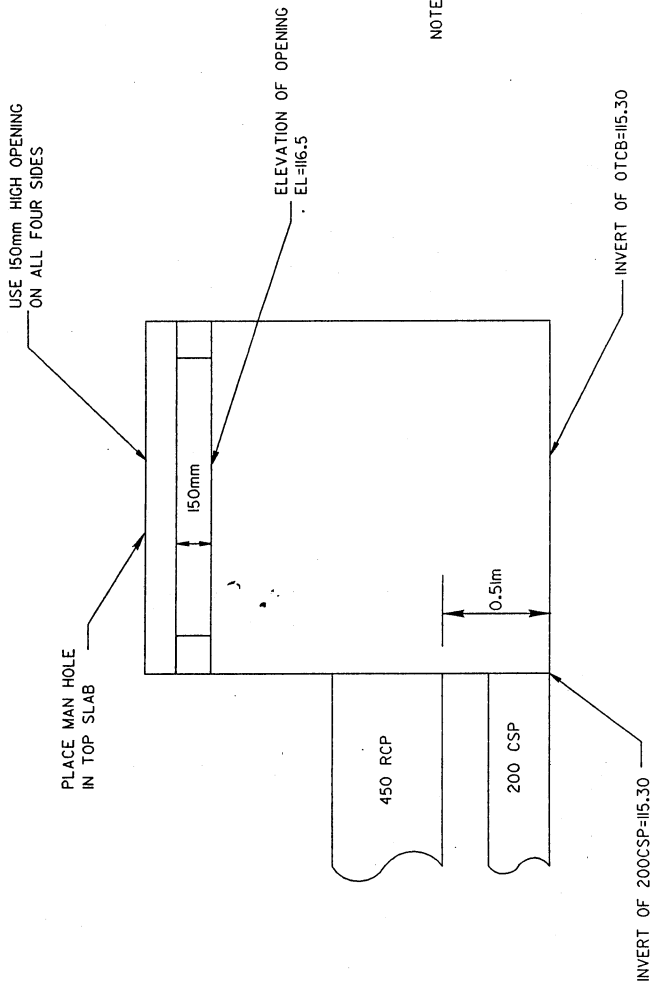
$$\text{level spreader length needed} = 4.9(13) = 64 \text{ ft (10 year storm)}$$

$$\text{level spreader length provided} = 52 \text{ ft}$$

	PROJECT REFERENCE NO.	SHEET NO.
	U-300240	2-F
	R/W SHEET NO.	HYDRAULICS ENGINEER
	CONTRACT NO.	
	R/W REV.	

SPECIAL OTCB DETAIL

STA 43+80 -L- LT



NOTE: ELEVATIONS MAY VARY
 DEPENDING ON ACTUAL FIELD
 ELEVATIONS. DIMENSIONS MAY
 NOT VARY.

Station 43+80 -L- Lt

Level spreader sized for 1" intensity storm w/bypass

$$D.A. = 1.31 \text{ ha} \quad A_p = 0.56 \text{ ha} \quad c = .56$$

$$A_g = 0.75 \text{ ha}$$

$$Q_{10} = 0.56(155)(1.31 \text{ ha})(.00275) = .31 \text{ cms (11.0 cfs)}$$

$$Q_{11} = 0.56(25)(1.31 \text{ ha})(.00275) = .05 \text{ cms (1.8 cfs)}$$

$$\text{Length of level spreader} = (1.8)(13) = 23 \text{ ft (7m)}$$

use 8" csp low flow pipe in bottom of box and
set 18" RCP invert 1 foot above the top of the 8" csp
this provides 1' Head on 8" csp which will pass 1.9 cfs
before flow goes into 18" RCP

The 18" RCP with a Hw/D = 1.1 will carry 8 cfs

this will create 2.65' of Head on the 8" csp and

it will carry 3.0 cfs $Q_{\text{TOTAL}} = 11.0 \text{ cfs}$

length of level spreader required @ 10 year storm

$$3(13) = 39' \text{ or } 12 \text{ m}$$

8" csp with 1.0 head over top of pipe orifice eqn

$$Q = .59(.349) \sqrt{64.4(1.33)} = 1.90 \text{ cfs}$$

8" csp with 2.65 head over top of pipe orifice eqn

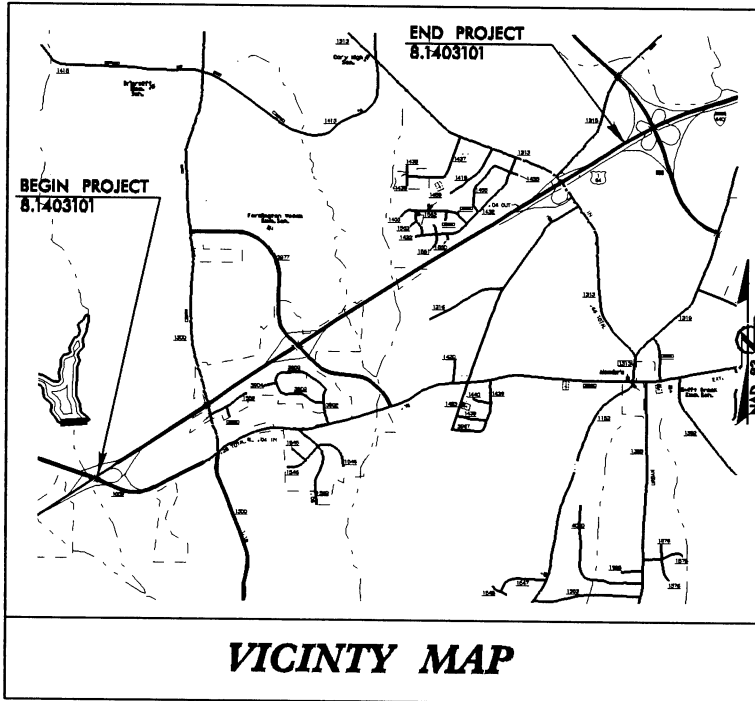
$$Q = .59(.349) \sqrt{64.4(2.98)} = 2.85 \text{ cfs}$$

07-JUN-2004 09:52:37 c:\p001\1043101.dwg

U-3101C&D

PROJECT: 8.1403101

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



VICINTY MAP

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

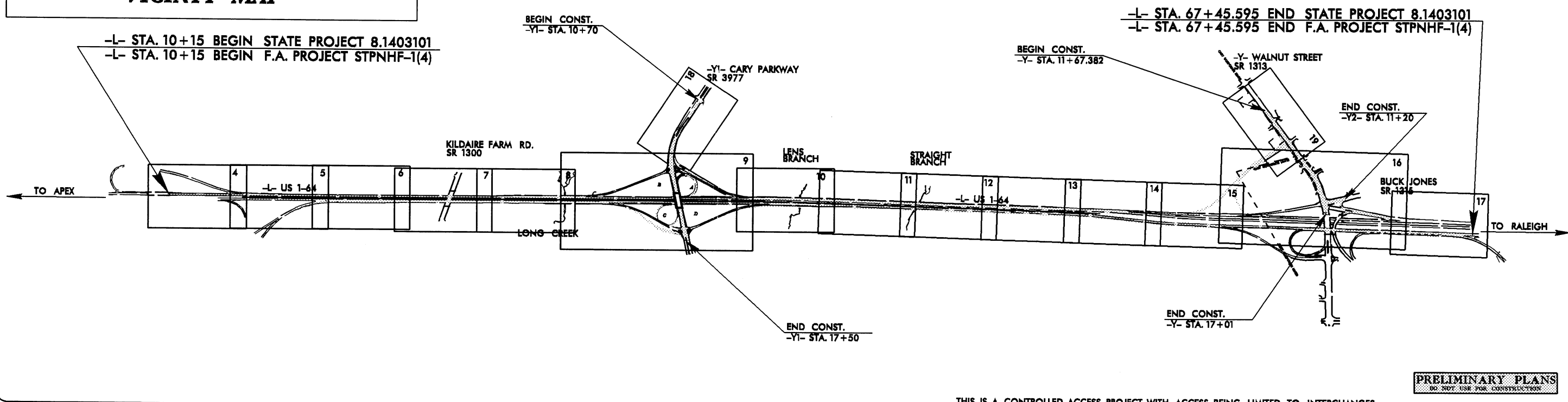
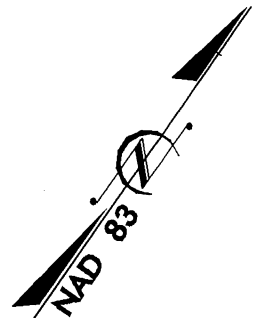
WAKE COUNTY

**LOCATION: US 1/64 FROM US 1/64/SR 1009 (TRYON RD.)
INTERCHANGE TO SOUTH OF I-40 IN CARY**

**TYPE OF WORK: GRADING, DRAINAGE, RESURFACING,
PAVING, STRUCTURE WIDENING, CULVERT
EXTENSIONS, SIGNALS, SIGNING,
RAISED PAVEMENT MARKINGS, AND
THERMOPLASTIC PAVEMENT MARKERS**

		STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
		N.C.	U-3101C&D	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION			
8.1403101	STPNHF-1(4)	P.E.			
(PENDING R/W AUTHORIZATION)					

ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

GRAPHIC SCALE

5 0 10
PLANS

5 0 10
PROFILE (HORIZONTAL)

1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT 2002 = 82,074
ADT 2022 = 108,445

DHV = 11 %
D = 60 %
T = 10 % *
V = 110 km/h

* TTST 6 % DUAL 4 %

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT STPNHF-1(4) = 5.731 km
TOTAL LENGTH STATE PROJECT 8.1403101 = 5.731 km

Prepared In the Office of:

DIVISION OF HIGHWAYS

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 30, 2002

LETTING DATE:
AUGUST 17, 2004

JIMMY GOODNIGHT
PROJECT ENGINEER

TIM GOINS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

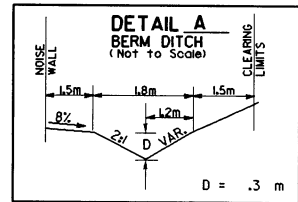
STATE DESIGN ENGINEER P.E.

**DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

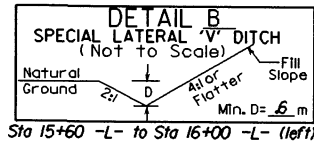
APPROVED DIVISION ADMINISTRATOR

DATE

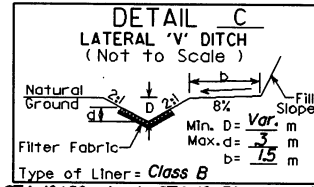
8/17/99



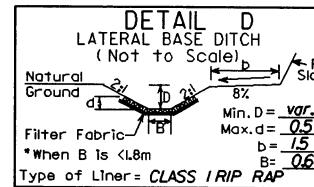
Sta 13+40 -L- to Sta 16+20 -L- (left)
Sta 39+40 -L- to Sta 41+80 -L- (left)
Sta 44+00 -L- to Sta 52+20 -L- (left)



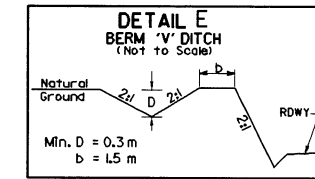
Sta 15+60 -L- to Sta 16+00 -L- (left)



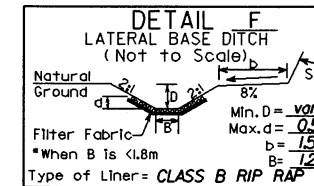
Sta 16+20 -L- to Sta 16+50 -L- (left)
Sta 35+20 -L- to Sta 35+60 -L- (right)
Sta 26+60 -L- to Sta 27+00 -L- (right)



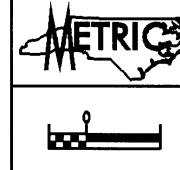
Sta 2+00 CPRPA to Sta 2+60 CPRPA (rt)
Sta 27+80 to Sta 28+60 -L- RT.
Sta 43+20 to Sta 44+00 -L- RT.
(USE B=4m @ Sta 43+20 -L- RT.)



Sta 17+60 -L- to Sta 19+00 -L- (right)
Sta 22+80 -L- to Sta 23+40 -L- (left)

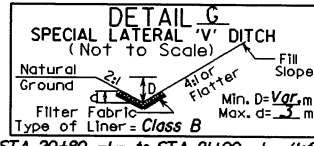


Sta 19+00 -L- to Sta 20+00 -L- (left)

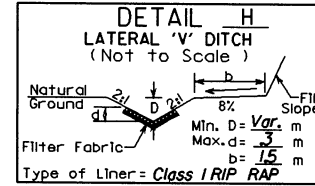


CONST. REV.
R/W REV.

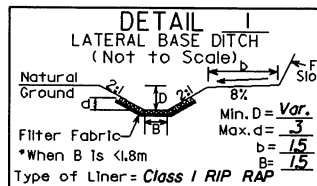
PROJECT REFERENCE NO. U-310IC&D	SHEET NO. 2-F
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



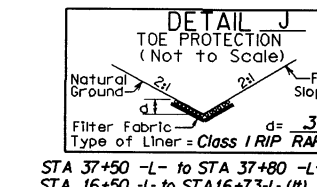
Sta 20+80 -L- to Sta 21+00 -L- (left)
Sta 26+20 -L- to Sta 26+80 -L- (left)
Sta 19+60 -L- to Sta 19+80 -L- (right)



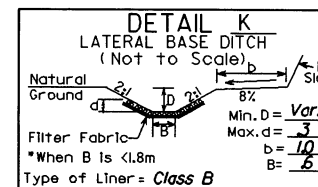
Sta 47+80 -L- to Sta 48+00 -L- (right)
Sta 42+60 -L- to Sta 42+92 -L- (left)



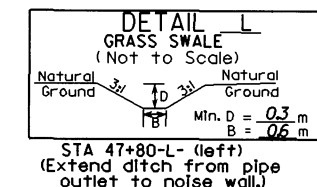
Sta 27+90 -L- to Sta 28+60 -L- (left)
Sta 11+00 to Sta 11+60 -RPBWS- LT.
Sta 11+40 to Sta 11+50 -LPBWS- RT.



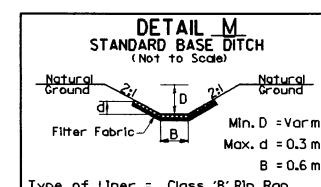
Sta 37+50 -L- to Sta 37+80 -L- (left)
Sta 16+50 -L- to Sta 16+73-L- (lt)
Sta 11+55 CPLPA to Sta 11+65 CPLPA (rt)
Sta 2+70 CPRPA to Sta 3+20 CPRPA (rt)
Sta 12+80 to Sta 13+00 -LPBWS- RT.



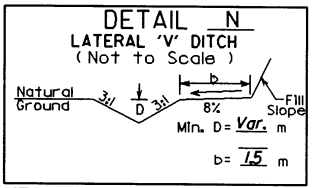
Sta 38+60 -L- to 40+00 -L- (right)
USE B=30m @ Sta 38+60 -L- RT.
Sta 26+80 -L- to 27+10 -L- (lt)



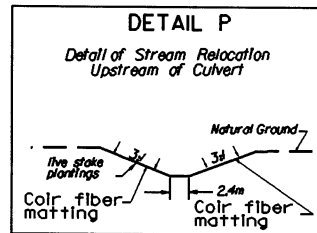
Sta 47+80-L- (left)
(Extend ditch from pipe outlet to noise wall.)
Sta 13+70 to Sta 14+40 -L- RT.



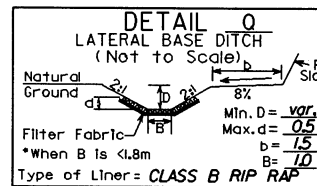
0.6m base ditch at Sta 50+75 -L- (left)



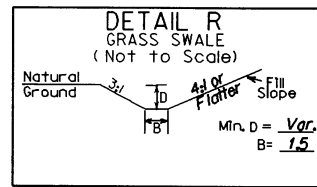
Sta 49+20 to Sta 49+40 -L- RT.



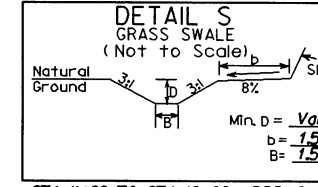
Sta 27+48 -L- LT.
Sta 37+80 -L- LT.



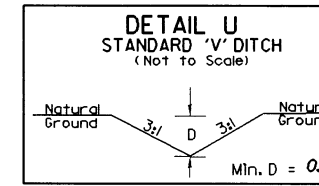
Sta 43+80 -L- to Sta 44+00 -L- (lt)



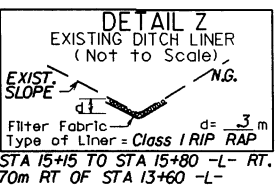
Sta 12+00 to Sta 12+80 -RPBWS- LT
Sta 11+80 to Sta 12+80 -LPBWS- RT.



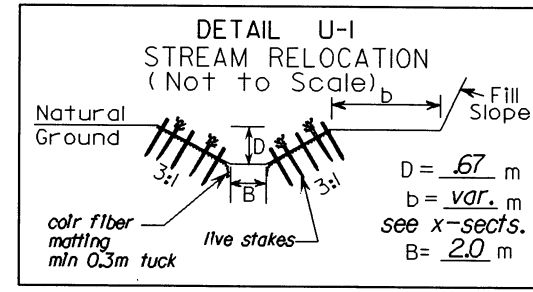
Sta 11+60 to Sta 12+00 -RPBWS- LT.
Sta 10+63 to Sta 11+00 -LPBWS- RT.
Sta 37+80 to Sta 39+20 -L- LT.



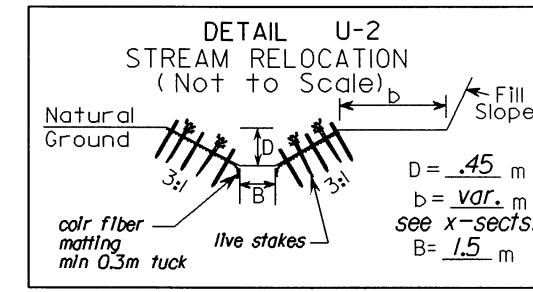
FROM Sta 12+40 to Sta 12+60 -CPRPB- LT.



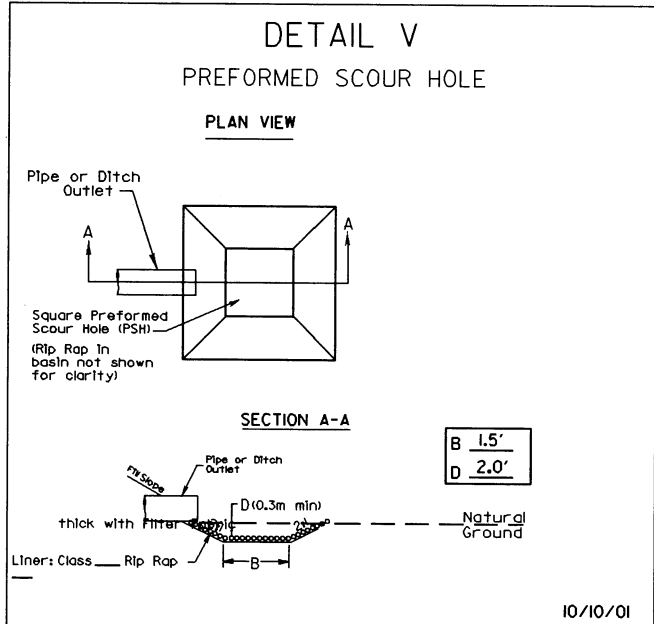
Sta 15+15 to Sta 15+80 -L- RT.
70m RT OF Sta 13+60 -L-



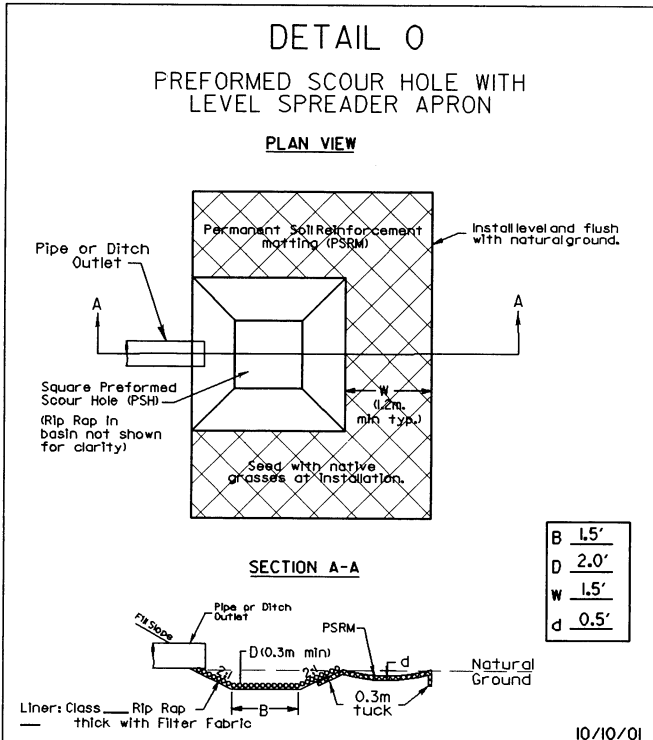
Sta 17+00 -L- to Sta 17+45 -L- (left)



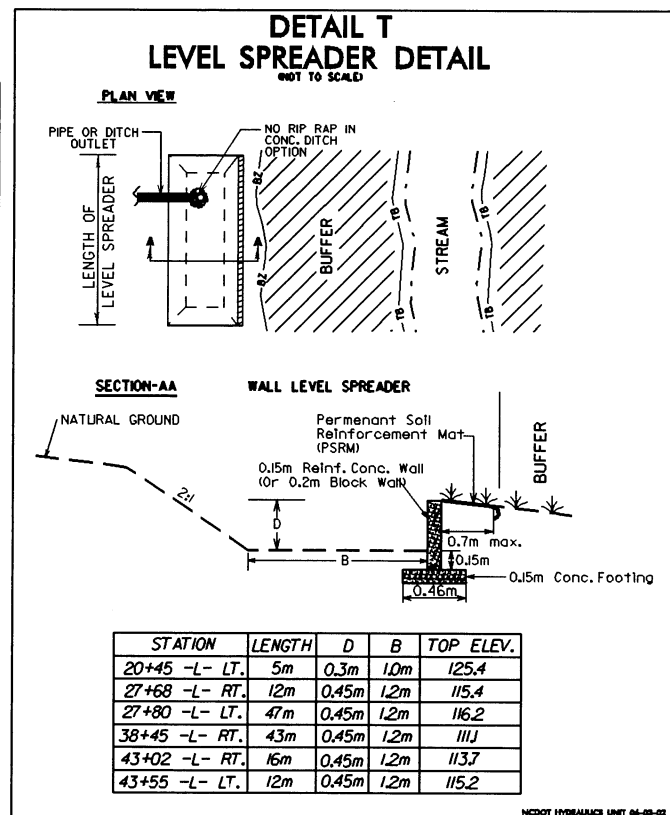
Sta 17+45 -L- to Sta 19+00 -L- (left)



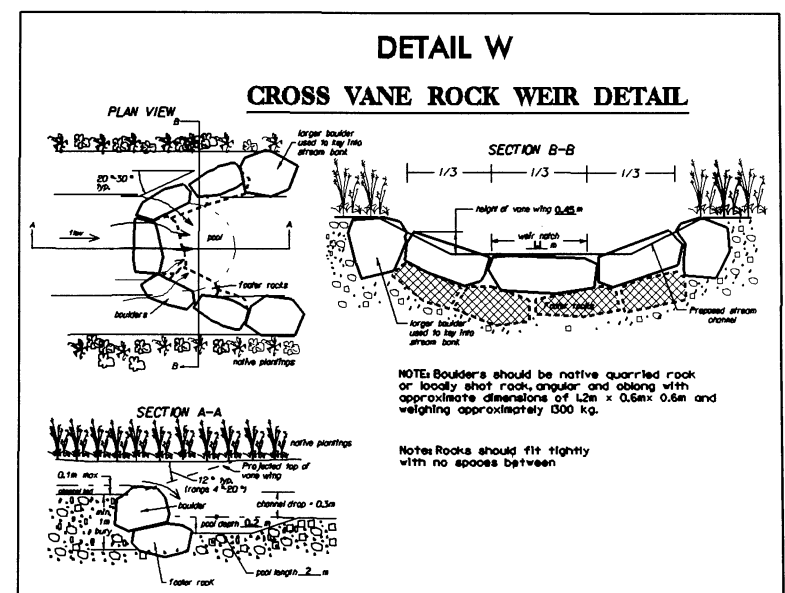
10/10/01



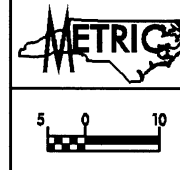
10/10/01



INDOT HYDRAULICS UNIT 84-89-02

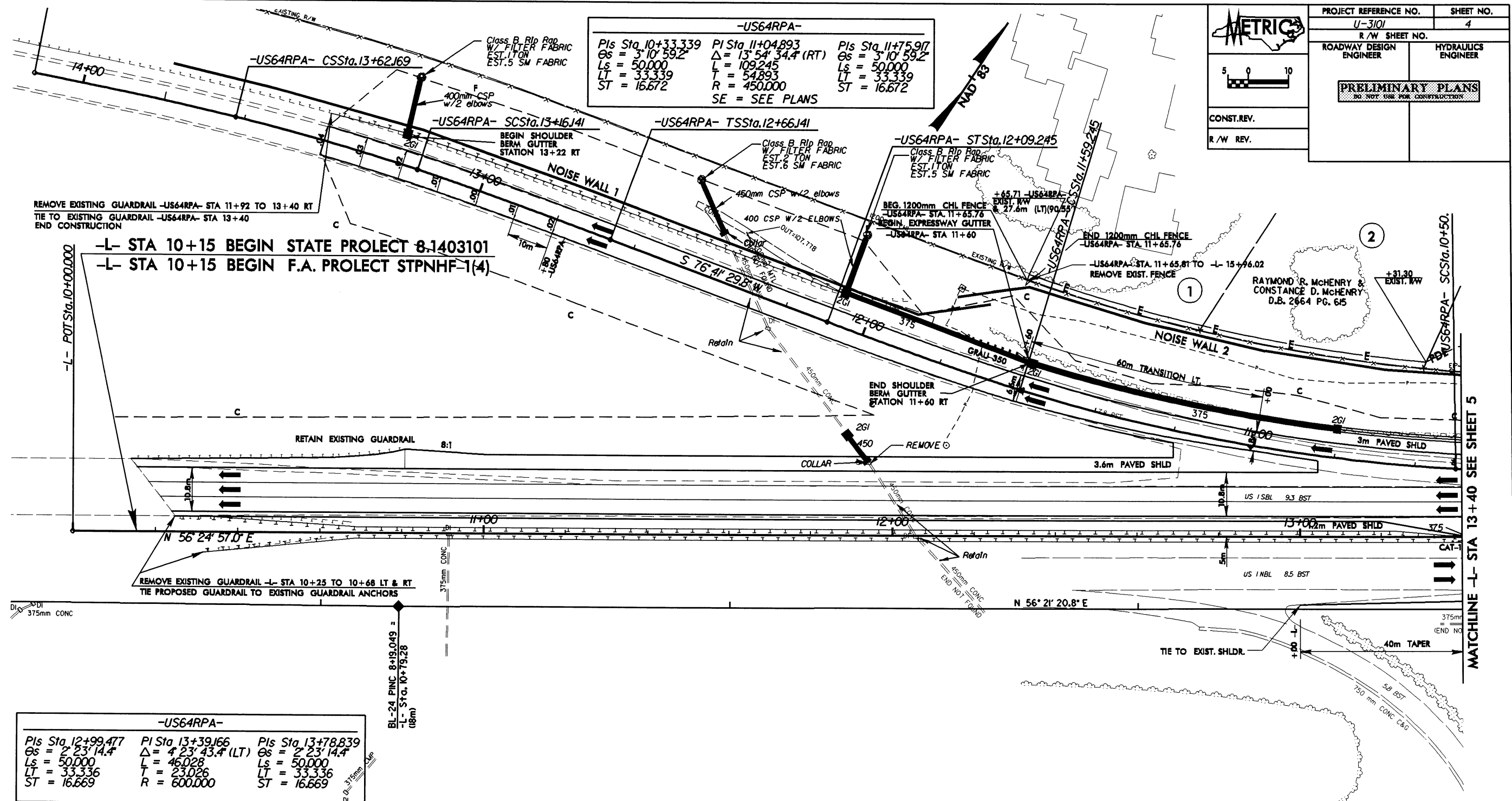


8/17/99



PROJECT REFERENCE NO.	SHEET NO.
U-3101	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	

-US64RPA-		
PIs Sta. 10+33.339	PI Sta. 11+04.893	PIs Sta. 11+75.917
Os = 3' 10" 59.2"	Δ = 13' 54" 34.4" (RT)	Os = 3' 10" 59.2"
Ls = 50.000	L = 109.245	Ls = 50.000
LT = 33.339	T = 54.893	LT = 33.339
ST = 16.672	R = 450.000	ST = 16.672
SE = SEE PLANS		



REMOVE EXISTING GUARDRAIL -US64RPA- STA 11+92 TO 13+40 RT
TIE TO EXISTING GUARDRAIL -US64RPA- STA 13+40
END CONSTRUCTION

-L- STA 10+15 BEGIN STATE PROJECT 8-1403101
-L- STA 10+15 BEGIN F.A. PROJECT STPNHF-1(4)

REMOVE EXISTING GUARDRAIL -L- STA 10+25 TO 10+68 LT & RT
TIE PROPOSED GUARDRAIL TO EXISTING GUARDRAIL ANCHORS

-US64RPA-		
PIs Sta. 12+99.477	PI Sta. 13+39.166	PIs Sta. 13+78.839
Os = 2' 23" 14.4"	Δ = 4' 23" 43.4" (LT)	Os = 2' 23" 14.4"
Ls = 50.000	L = 45.028	Ls = 50.000
LT = 33.336	T = 23.026	LT = 33.336
ST = 16.669	R = 600.000	ST = 16.669

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "3101-101" WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 22064601(±) EASTING: 428702.419(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99986425

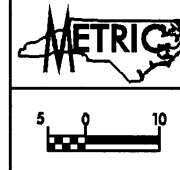
THE N.C. LAMBERT GRID BEARING LOCALIZED HORIZONTAL GROUND DISTANCE FROM "3101-101" TO -L- STATION 10+00 IS
S 58° 25' 49.194" W 402.655±

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

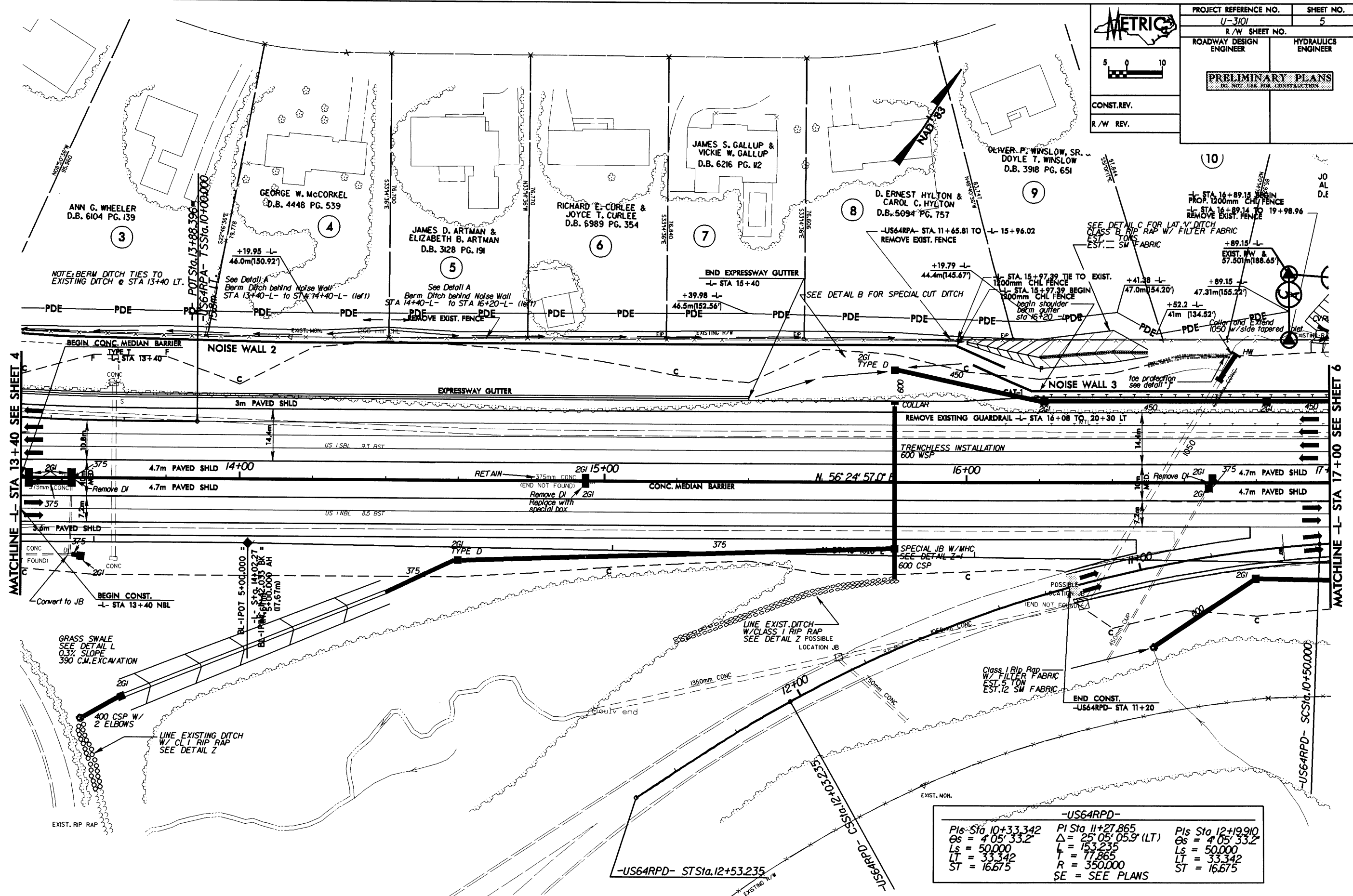
REVISIONS

MATCHLINE -L- STA 13+40 SEE SHEET 5

NOTE: SEE SHEET 20 FOR -L- PROFILE
SEE SHEET 33 FOR -US64RPA- PROFILE



PROJECT REFERENCE NO. U-3101	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	



REVISIONS

MATCHLINE -L- STA 13+40 SEE SHEET 4

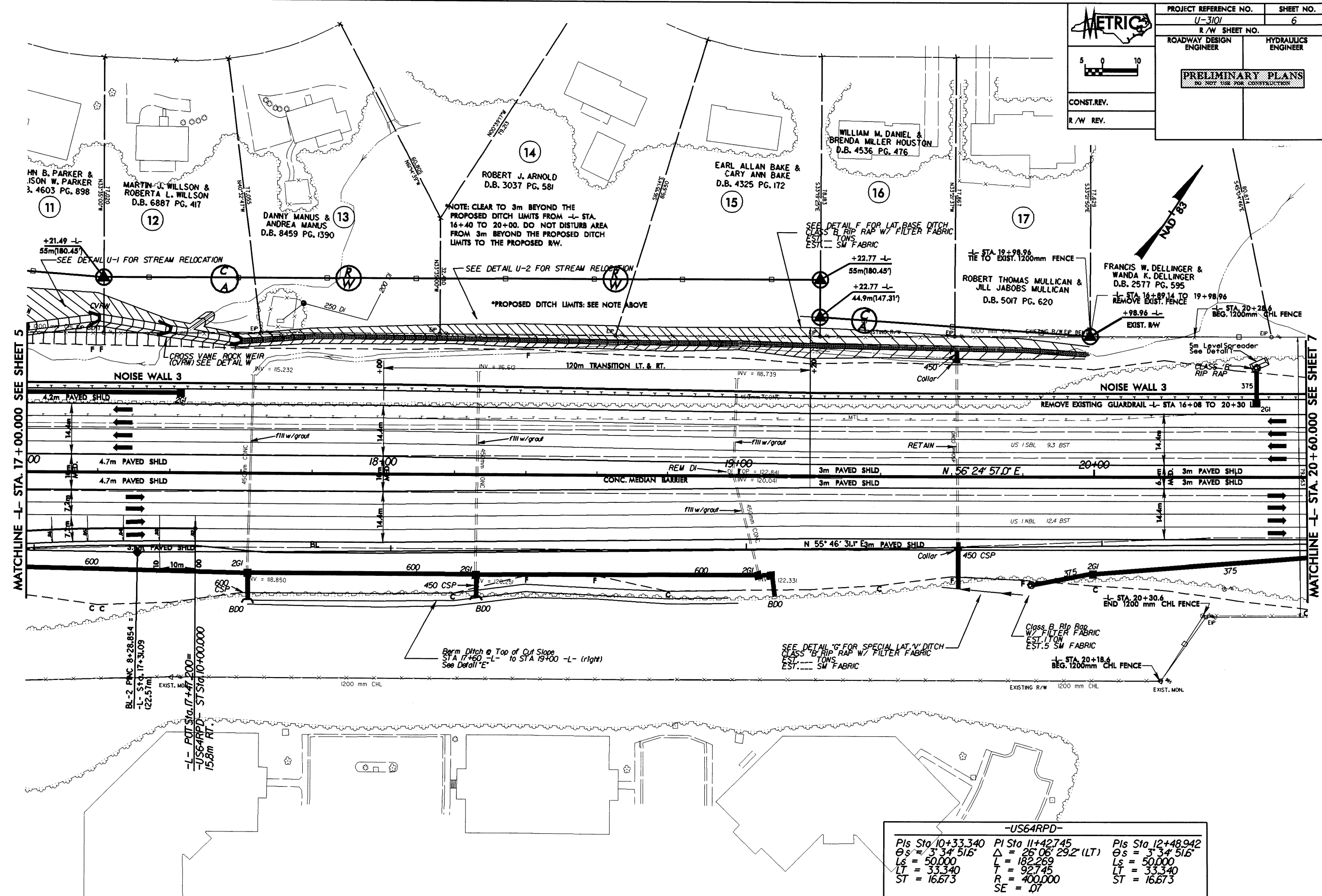
MATCHLINE -L- STA 17+00 SEE SHEET 6

-US64RPD-		
Pis Sta 10+33.342	PI Sta 11+27.865	Pis Sta 12+19.910
Gs = 4.05' 33.2"	Δ = 25' 05" 05.9" (LT)	Gs = 4.05' 33.2"
Ls = 50.000	L = 153.235	Ls = 50.000
LT = 33.342	T = 77.865	LT = 33.342
ST = 16.675	R = 350.000	ST = 16.675
SE = SEE PLANS		

NOTE: SEE SHEET 20 FOR -L- PROFILE
SEE SHEET 33 FOR -US64RPA- & -US64RPD- PROFILE

07-APR-2004 09:28
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PROJECT REFERENCE NO. U-3101		SHEET NO. 6	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>			
CONST. REV.		R/W REV.	



REVISIONS

MATCHLINE -L- STA. 17+00.000 SEE SHEET 5

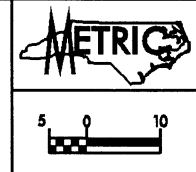
MATCHLINE -L- STA. 20+60.000 SEE SHEET 7

-US64RPD-

PIs Sta 10+33.340 $\theta_s = 3^\circ 34' 51.6''$ $L_s = 50.000$ $T = 33.340$ $ST = 16.673$	PI Sta 11+42.745 $\Delta = 26^\circ 06' 29.2''$ (LT) $L = 182.269$ $T = 92.745$ $R = 400.000$ $SE = .07$	PIs Sta 12+48.942 $\theta_s = 3^\circ 34' 51.6''$ $L_s = 50.000$ $T = 33.340$ $ST = 16.673$
---	---	---

NOTE: SEE SHEET 21 FOR -L- PROFILE

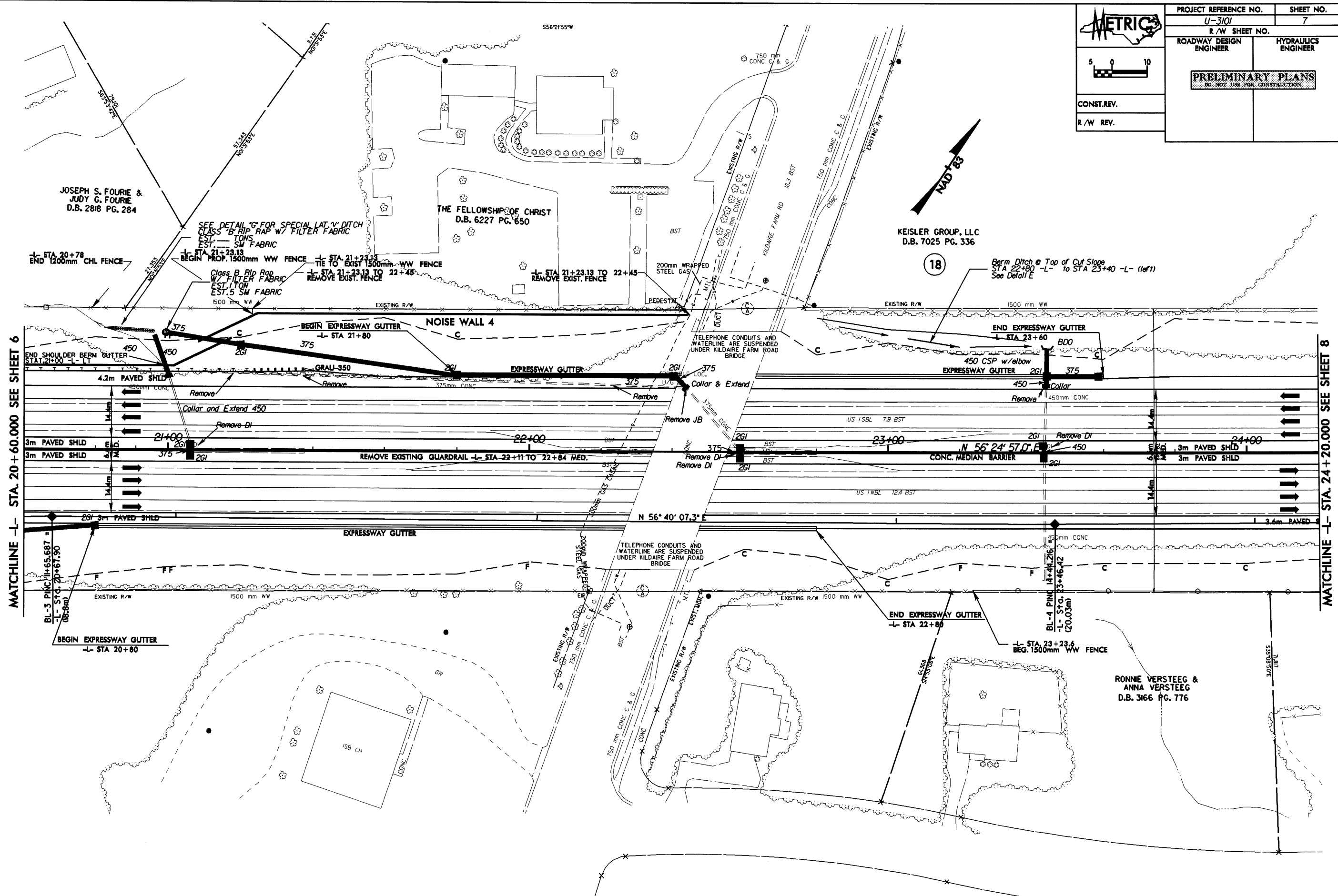
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PROJECT REFERENCE NO. U-3101	SHEET NO. 7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	
CONST.REV.	
R/W REV.	

MATCHLINE -L- STA. 20+60.000 SEE SHEET 6

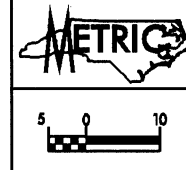
MATCHLINE -L- STA. 24+20.000 SEE SHEET 8



REVISIONS

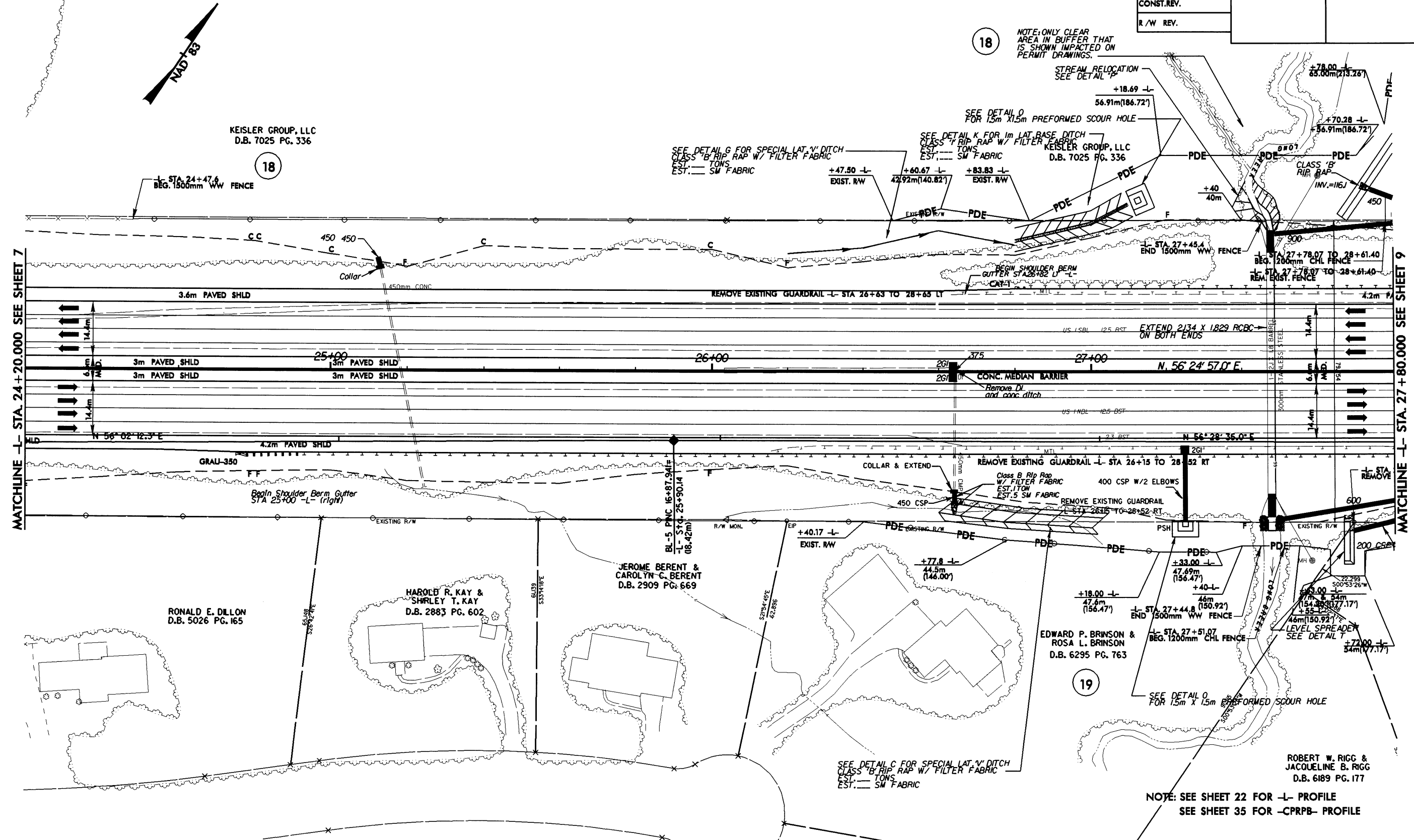
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Sheet 7 of 7

NOTE: SEE SHEET 21 FOR -L- PROFILE



PROJECT REFERENCE NO. U-3101		SHEET NO. 8	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>			
CONST. REV.		R/W REV.	

9/17/99



18

NOTE: ONLY CLEAR AREA IN BUFFER THAT IS SHOWN IMPACTED ON PERMIT DRAWINGS.

STREAM RELOCATION SEE DETAIL P

SEE DETAIL O FOR 15m X 15m PREFORMED SCOUR HOLE

SEE DETAIL K FOR 1m LAT. BASE DITCH CLASS 'B' RIP RAP W/ FILTER FABRIC EST. 1 TONS EST. 5 SM FABRIC

SEE DETAIL G FOR SPECIAL LAT. V. DITCH CLASS 'B' RIP RAP W/ FILTER FABRIC EST. 1 TONS EST. 5 SM FABRIC

STA 27+45.4 END 1500mm WW FENCE
STA 27+78.07 TO 28+61.40 BEG. 200mm CHL FENCE
STA 27+78.07 TO 28+61.40 REM. EXIST. FENCE

US 1 SBL 12.5 BST EXTEND 2134 X 1829 RCBC ON BOTH ENDS

CONC. MEDIAN BARRIER
Remove DI and conc ditch

US 1 NBL 12.5 BST

REMOVE EXISTING GUARDRAIL - STA 26+15 TO 28+52 RT
Class B Rip Rap w/ FILTER FABRIC EST. 1 TONS EST. 5 SM FABRIC
400 CSP W/2 ELBOWS
REMOVE EXISTING GUARDRAIL - STA 26+15 TO 28+52 RT

JEROME BERENT & CAROLYN C. BERENT
D.B. 2909 PG. 669

HAROLD R. KAY & SHIRLEY T. KAY
D.B. 2883 PG. 602

RONALD E. DILLON
D.B. 5026 PG. 165

EDWARD P. BRINSON & ROSA L. BRINSON
D.B. 6295 PG. 763

ROBERT W. RIGG & JACQUELINE B. RIGG
D.B. 6189 PG. 177

19

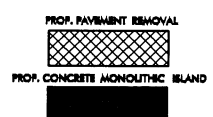
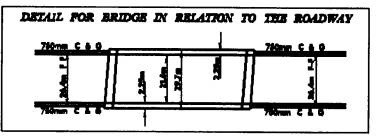
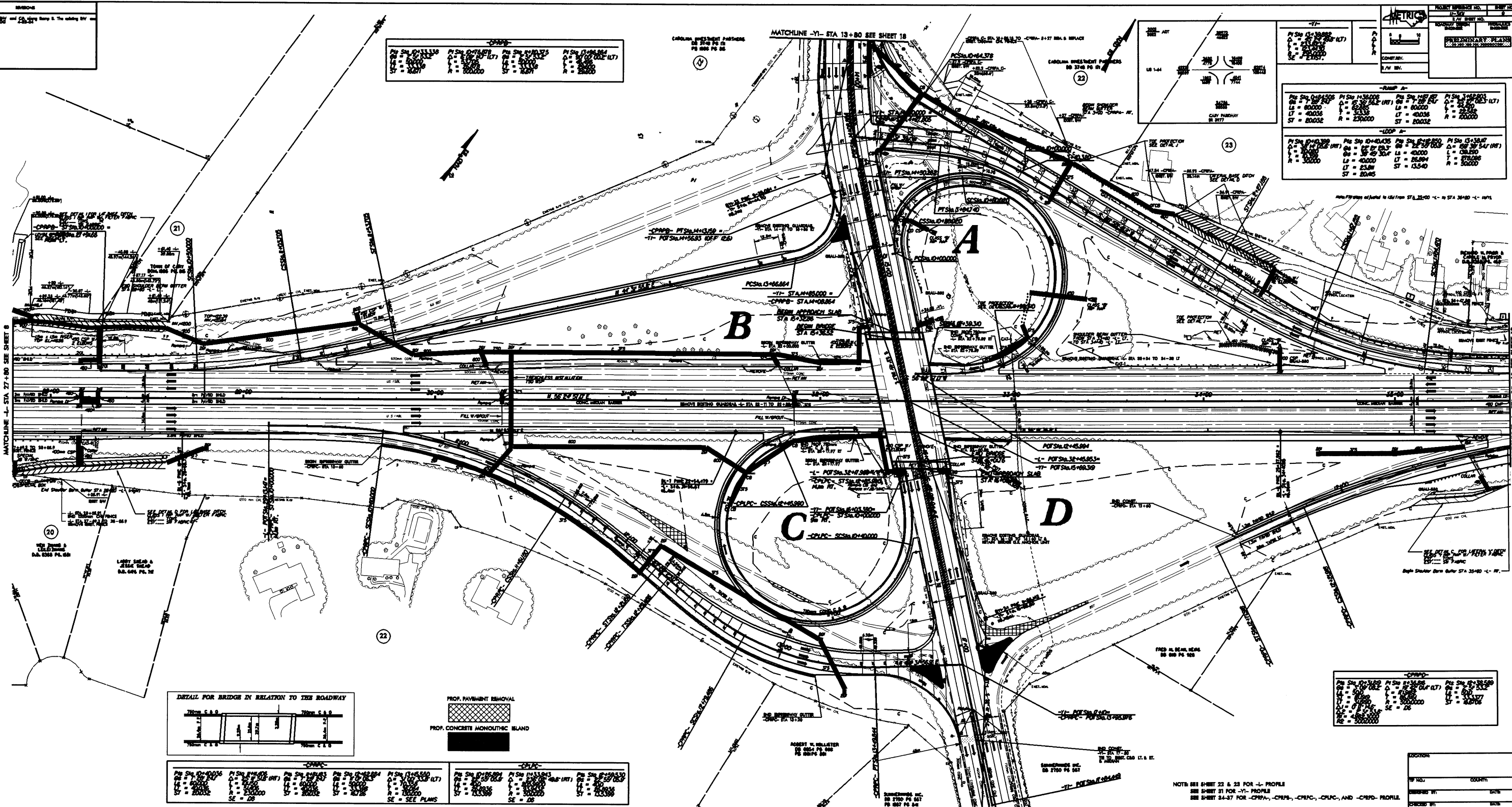
NOTE: SEE SHEET 22 FOR -L- PROFILE
SEE SHEET 35 FOR -CPRP- PROFILE

REVISIONS

02-JAN-2004 09:51
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User: jrb

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0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00

-1-1-		-2-2-	
PC	PT	PI	PA
0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00



PC	PT	PI	PA	PC	PT	PI	PA
0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00	0+000.00

PC	PT	PI	PA
0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00
0+000.00	0+000.00	0+000.00	0+000.00

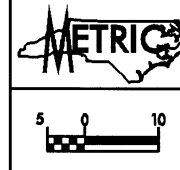
NOTE SEE SHEET 22 & 23 FOR -1- PROFILE
 SEE SHEET 21 FOR -1- PROFILE
 SEE SHEET 24-27 FOR -1- PROFILE

LOCATION

BY NO. _____ COUNTY _____

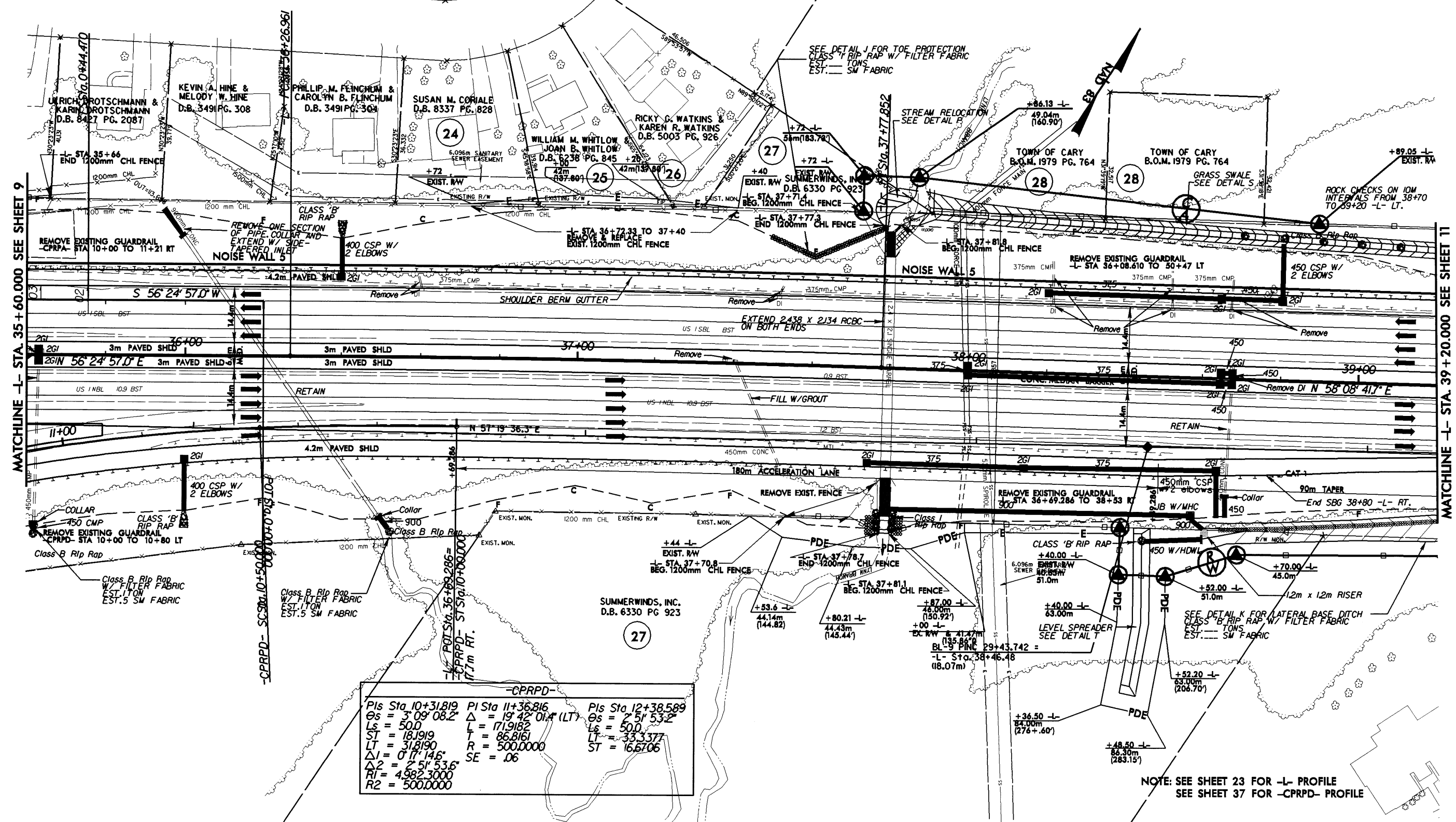
DESIGNED BY _____ DATE _____

CHECKED BY _____ DATE _____



PROJECT REFERENCE NO. U-3101	SHEET NO. 10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	

-L-
 PI Sta 37+02.412
 $\Delta = 1' 43' 44.7''$ (RT)
 L = 150.891
 T = 75.451
 R = 5,000.000
 SE = NC



MATCHLINE -L- STA. 35+60.000 SEE SHEET 9

MATCHLINE -L- STA. 39+20.000 SEE SHEET 11

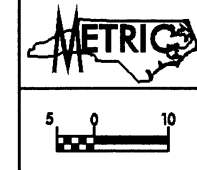
ADDITIONAL RIGHT OF WAY ON PARCEL 27, PROPERTY OWNER SUMMERWINDS, INC., -L- STA. 38+52 RT., WB 11/14/03

-CPRPD-

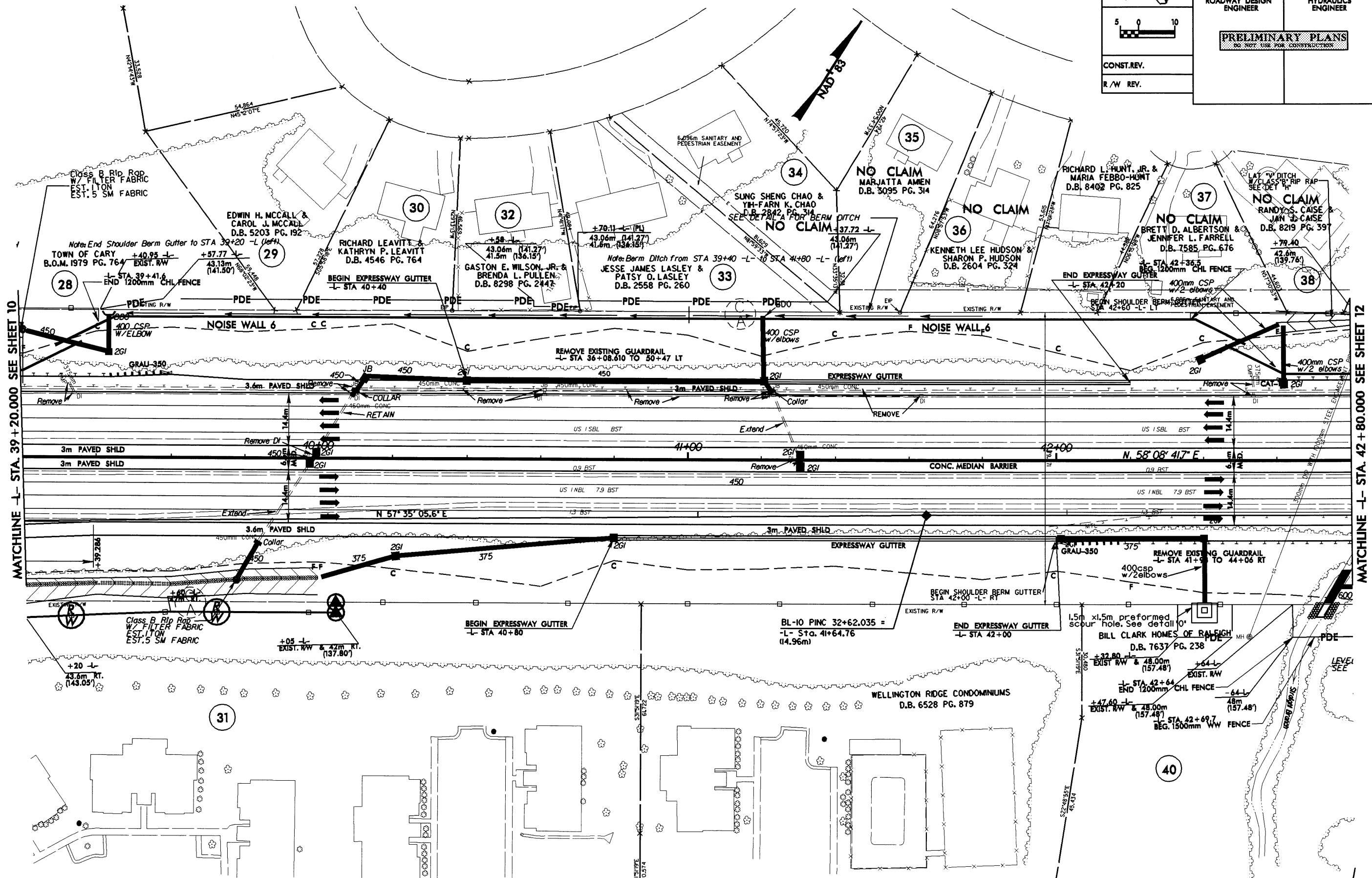
Pls Sta 10+31.819	PI Sta 11+36.816	Pls Sta 12+38.589
$\Delta s = 3' 09' 08.2''$	$\Delta = 19' 42' 01.4''$ (LT)	$\Delta s = 2' 51' 53.2''$
Ls = 50.0	L = 171.912	Ls = 50.0
ST = 18.1919	L = 86.8161	ST = 33.3377
LT = 31.8190	R = 500.0000	LT = 16.6706
$\Delta 1 = 0' 17' 14.6''$	SE = .06	
$\Delta 2 = 2' 51' 53.6''$		
R1 = 4,982.3000		
R2 = 500.0000		

NOTE: SEE SHEET 23 FOR -L- PROFILE
 SEE SHEET 37 FOR -CPRPD- PROFILE

07-11-2004 09:52
 07-11-2004 09:52



PROJECT REFERENCE NO. U-3101	SHEET NO. 11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	



MATCHLINE -L- STA. 39+20.000 SEE SHEET 10

MATCHLINE -L- STA. 42+80.000 SEE SHEET 12

REVISIONS

REDUCED THE PDE ON PARCEL 32 PER REQUEST FROM R/W . TDG 4-30-04

07. Apr 2004 09:32
C:\p1\111111\111111.dwg
11/11/11

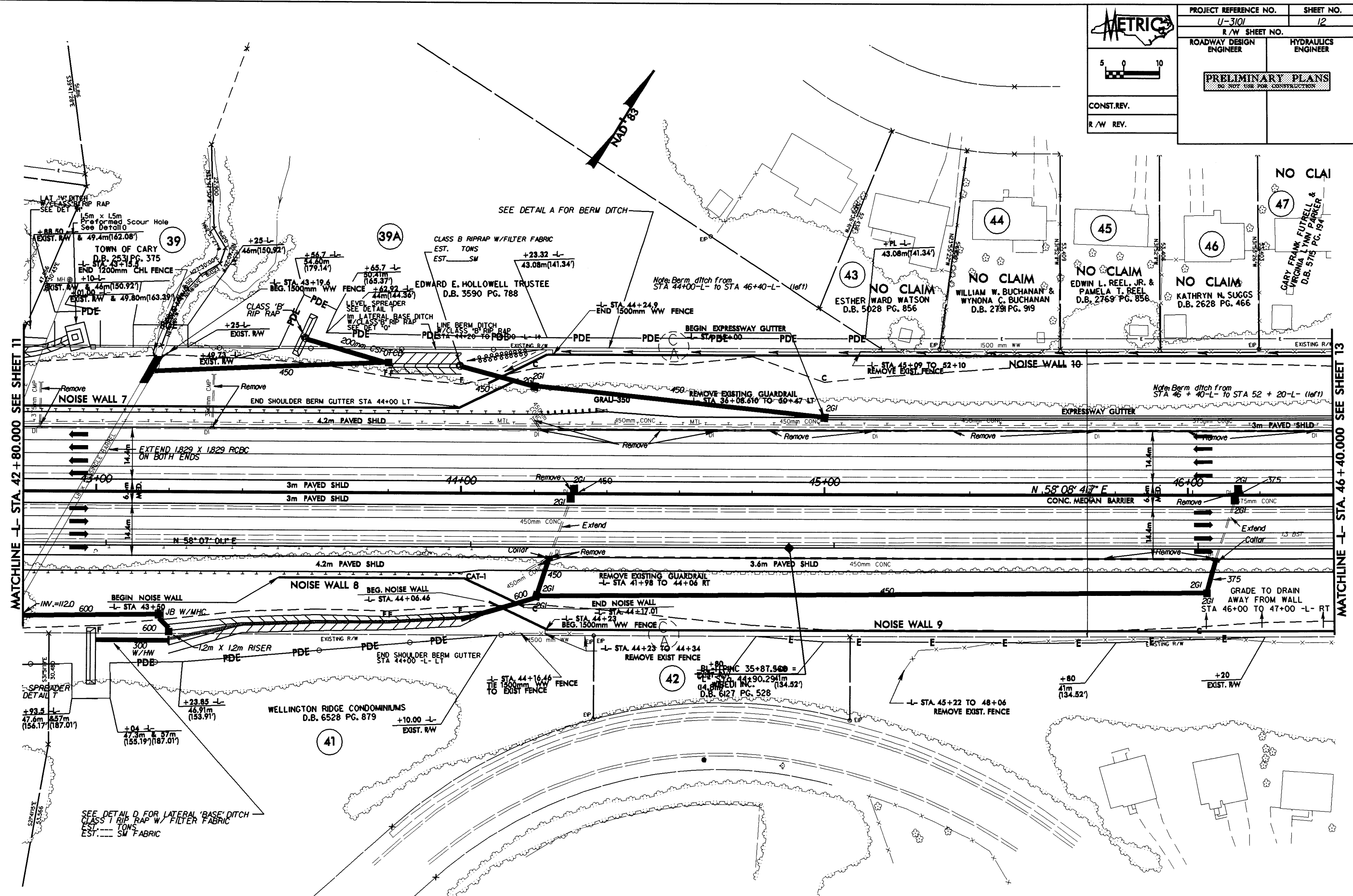
NOTE: SEE SHEET 24 FOR -L- PROFILE



PROJECT REFERENCE NO. U-3101	SHEET NO. 12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	
CONST. REV.	
R/W REV.	



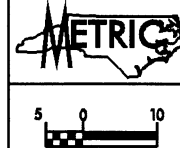
REVISIONS
 ELIMINATED CLAIM WITH PARCELS 43 THRU 57 PER REQUEST FROM R/W DATED FEB.23,2004. REVISED DEED BOOK INFO ON PARCEL 44; REVISED PARCEL NAME ON PARCEL 39A. TDG 3-22-04



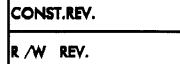
MATCHLINE -L- STA. 42 + 80.000 SEE SHEET 11

MATCHLINE -L- STA. 46 + 40.000 SEE SHEET 13

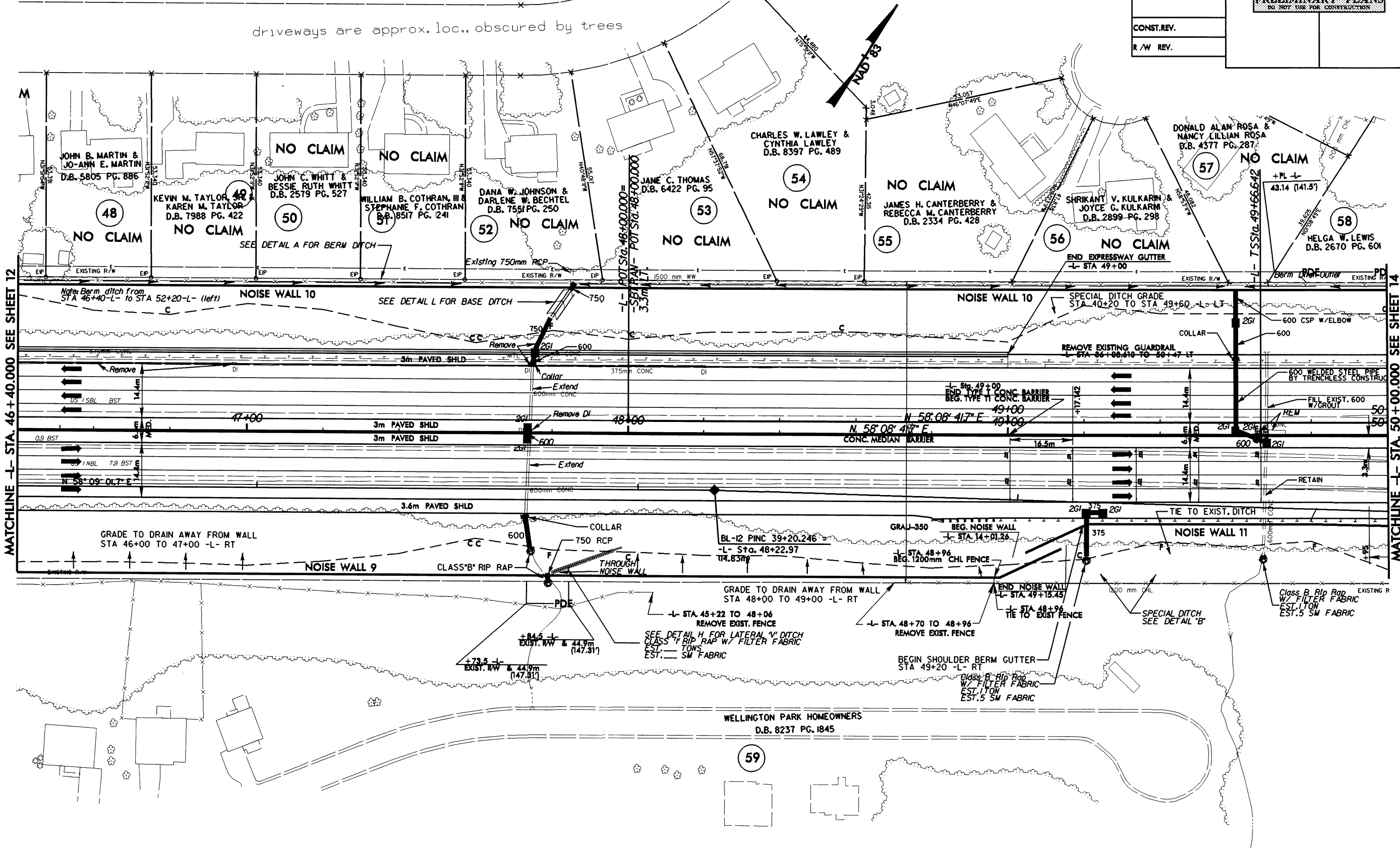
NOTE: SEE SHEET 24 FOR -L- PROFILE



PROJECT REFERENCE NO. U-3101	SHEET NO. 13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	
CONST. REV.	
R/W REV.	



driveways are approx. loc., obscured by trees



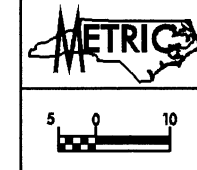
MATCHLINE -L- STA. 46+40.000 SEE SHEET 12

MATCHLINE -L- STA. 50+00.000 SEE SHEET 14

REVISIONS
ELIMINATED PARCELS 43 THRU 57 PER REQUEST FROM R/W DATED FEB. 23, 2004. ADDED NAME TO PARCEL 59. TDG 3-22-04

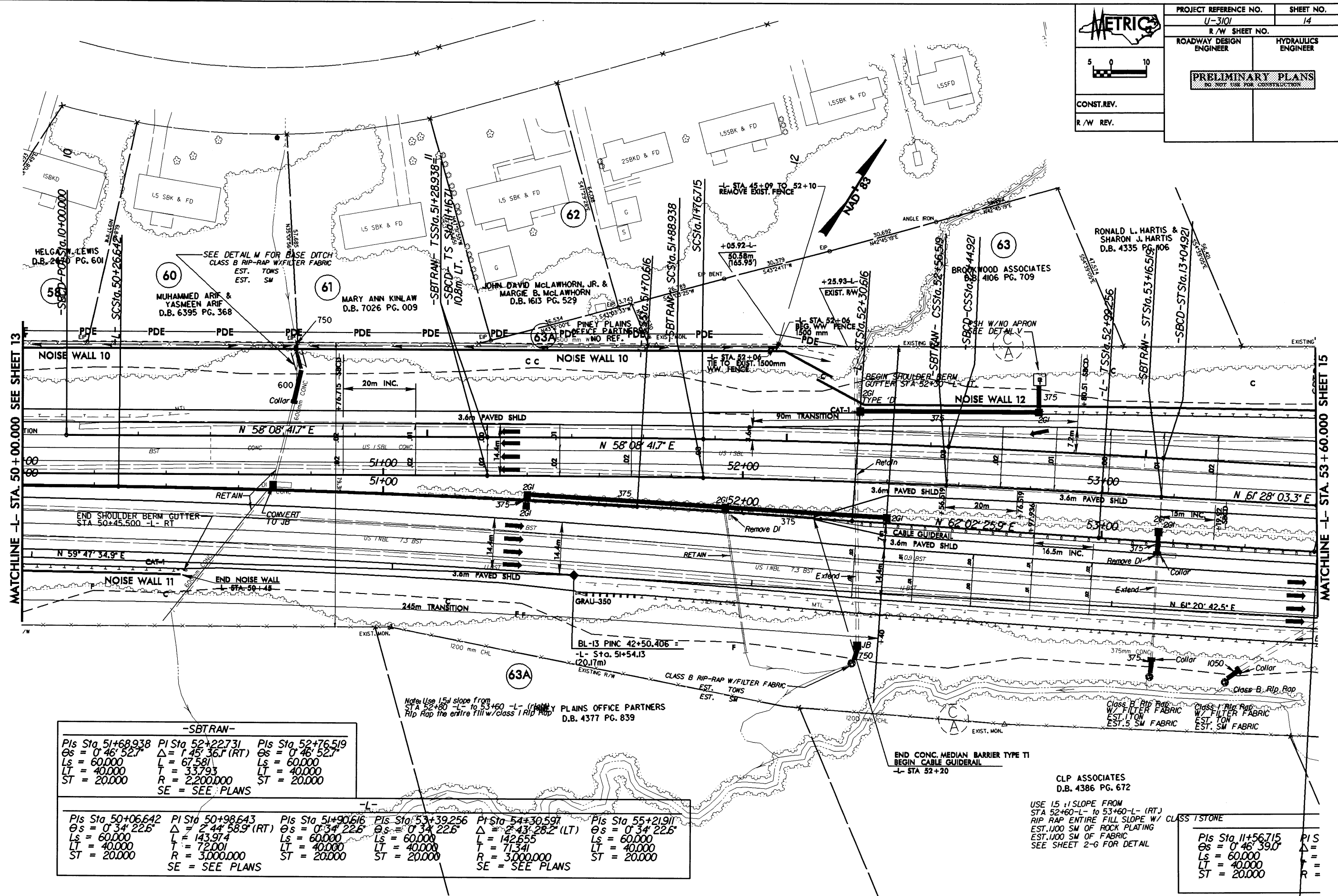
07-JAN-2004 09:32
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11782551.dwg

NOTE: SEE SHEET 25 FOR -L- PROFILE
SEE SHEET 28 FOR -SBCD- PROFILE



PROJECT REFERENCE NO. U-3101	SHEET NO. 14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	

REVISED THE PARCEL NAME ON PARCEL 63 TO BROOKWOOD ASSOCIATES. THE DEED BK. AND PG. NUMBER WERE ALSO REVISED. TDG 4-30-04



-SBTRAN-

Pis Sta 51+68.938 θs = 0° 46' 52.7" Ls = 60.000 LT = 40.000 ST = 20.000	PI Sta 52+22.731 Δ = 1° 45' 36.1" (RT) L = 67.581 T = 33.793 R = 2,200.000 SE = SEE PLANS	Pis Sta 52+76.519 θs = 0° 46' 52.7" Ls = 60.000 LT = 40.000 ST = 20.000
---	--	---

-L-

Pis Sta 50+06.642 θs = 0° 34' 22.6" Ls = 60.000 LT = 40.000 ST = 20.000	PI Sta 50+98.643 Δ = 2° 44' 58.9" (RT) L = 143.974 T = 72.001 R = 3,000.000 SE = SEE PLANS	Pis Sta 51+90.616 θs = 0° 34' 22.6" Ls = 60.000 LT = 40.000 ST = 20.000	Pis Sta 53+39.256 θs = 0° 34' 22.6" Ls = 60.000 LT = 40.000 ST = 20.000	PI Sta 54+30.597 Δ = 2° 43' 28.2" (LT) L = 142.655 T = 71.341 R = 3,000.000 SE = SEE PLANS	Pis Sta 55+21.911 θs = 0° 34' 22.6" Ls = 60.000 LT = 40.000 ST = 20.000
---	---	---	---	---	---

CLP ASSOCIATES
D.B. 4386 PG. 672

USE 1.5 : 1 SLOPE FROM
STA 52+60-L- TO 53+60-L- (RT.)
RIP RAP ENTIRE FILL SLOPE W/ CLASS 1 STONE
EST. 1,000 SM OF ROCK PLATING
EST. 1,000 SM OF FABRIC
SEE SHEET 2-G FOR DETAIL

Pis Sta 11+56.715 θs = 0° 46' 39.0" Ls = 60.000 LT = 40.000 ST = 20.000	PIS Δ = =
---	-----------------

NOTE: SEE SHEET 25 FOR -L- PROFILE
SEE SHEET 38 FOR -RPBWS- PROFILE

METRIX

PROJECT REFERENCE NO. U-3101 SHEET NO. 15

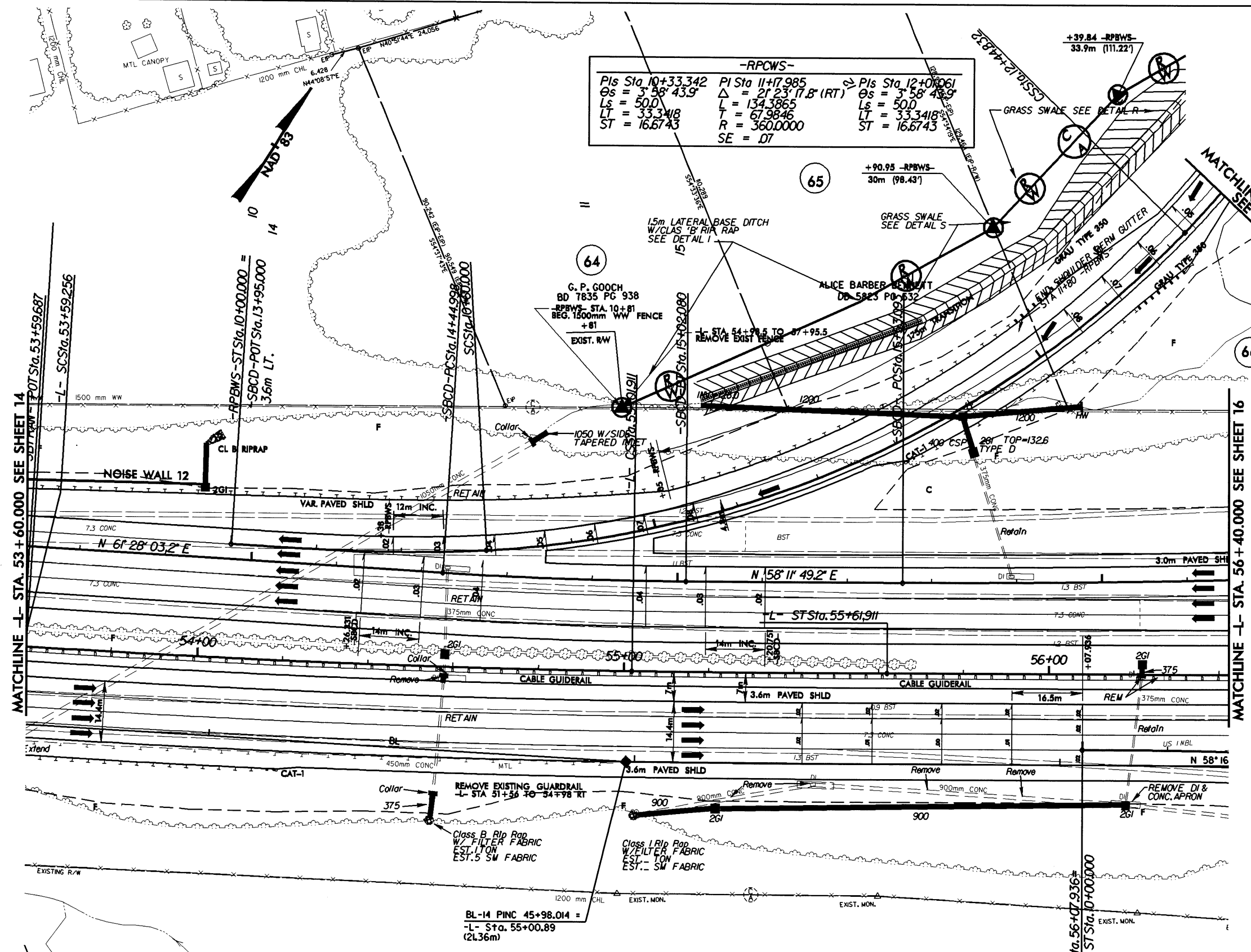
R/W SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST. REV.

R/W REV.



-RPCWS-

Pis Sta 10+33.342	PI Sta 11+7.985	PI Sta 12+07.061
Os = 3° 58' 43.9"	Δ = 21° 23' 17.8" (RT)	Os = 3° 58' 43.9"
Ls = 50.0	L = 134.3865	Ls = 50.0
LT = 33.3418	T = 67.9846	LT = 33.3418
ST = 16.6743	R = 360.0000	ST = 16.6743
	SE = .07	

-SBCD-

1a 12+10.821	Pis Sta 12+64.922	PI Sta 14+73.546	PI Sta 16+28.433	PI Sta 18+47.989
Os = 1° 46' 03.6" (RT)	Os = 0° 46' 39.0"	Δ = 3° 16' 14.0" (LT)	Δ = 2° 52' 37.8" (LT)	Δ = 2° 51' 01.7" (RT)
Ls = 68.206	Ls = 60.000	L = 57.082	L = 150.649	L = 248.737
LT = 34.106	LT = 40.000	T = 28.549	T = 75.340	T = 124.394
ST = 2.210.800	ST = 20.000	R = 1,000.000	R = 3,000.000	R = 5,000.000

-RPBWS-

Pis Sta 10+40.030	PI Sta 11+50.786	Pis Sta 12+54.195
Os = 6° 52' 31.8"	Δ = 39° 54' 58.7" (LT)	Os = 6° 52' 31.8"
Ls = 60.000	L = 174.168	Ls = 60.000
LT = 40.030	T = 90.786	LT = 40.030
ST = 20.027	R = 250.000	ST = 20.027
	SE = .08	

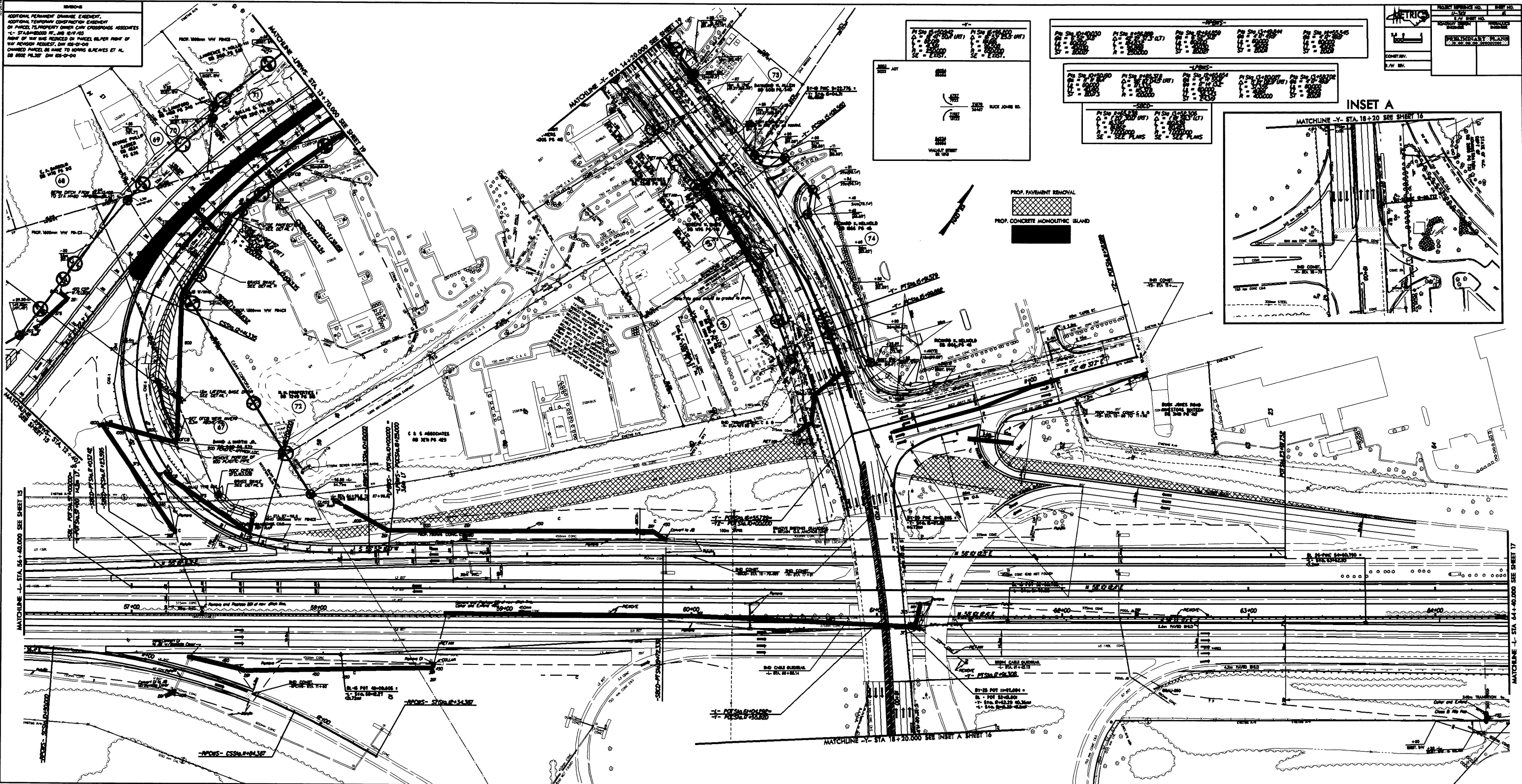
NOTE: SEE SHEET 25 & 26 FOR -L- PROFILE
SEE SHEET 38 FOR -RPBWS- PROFILE

REVISIONS

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18800-6
 ADDITIONAL PERMANENT DRAINAGE EASEMENT
 ON PARCEL 75 PROPERTY OWNED BY CANNON ASSOCIATES
 1- STAB 48000 W. 1/4 12-11-83
 ROW OF HWY 848 REFINED ON PARCEL 81/82/83/84
 OF THE ABOVE ACRES. SEE 82-01-04
 CHANGED PARCEL BE HANE TO HANE & HANE ET AL.
 DB 8202 FILED ON 02-01-04

PROJECT NUMBER: 18800-6
 SHEET NO. 6
 DATE: 11/11/83
 DRAWN BY: J. W. H. / J. W. H.
 CHECKED BY: J. W. H. / J. W. H.
 PRELIMINARY PLANS
 CONTRACT NO. 82-01-04

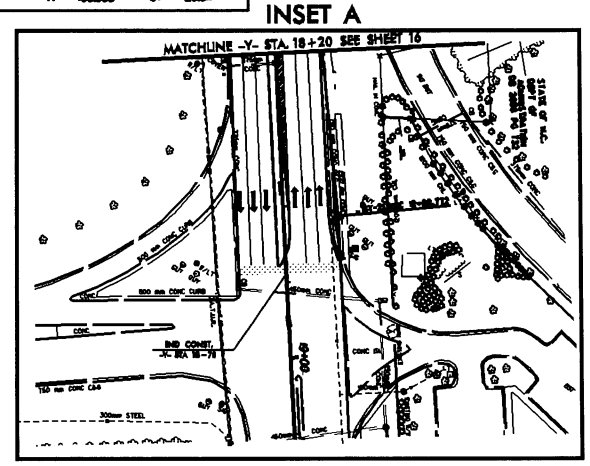


SECTION 1

PI STA 57+00.00	PI STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00
PC STA 57+00.00	PC STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00
PI STA 57+00.00	PI STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00
PC STA 57+00.00	PC STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00

SECTION 2

PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00
PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00
PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00	PI STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00
PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00	PC STA 57+00.00
PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00	PT STA 57+00.00



PROP. PAVEMENT RESURFACING
 PROP. CONCRETE MONOLITHIC ISLAND

MATCHLINE -L- STA. 56+40.00 SEE SHEET 15

MATCHLINE -L- STA. 64+40.00 SEE SHEET 17

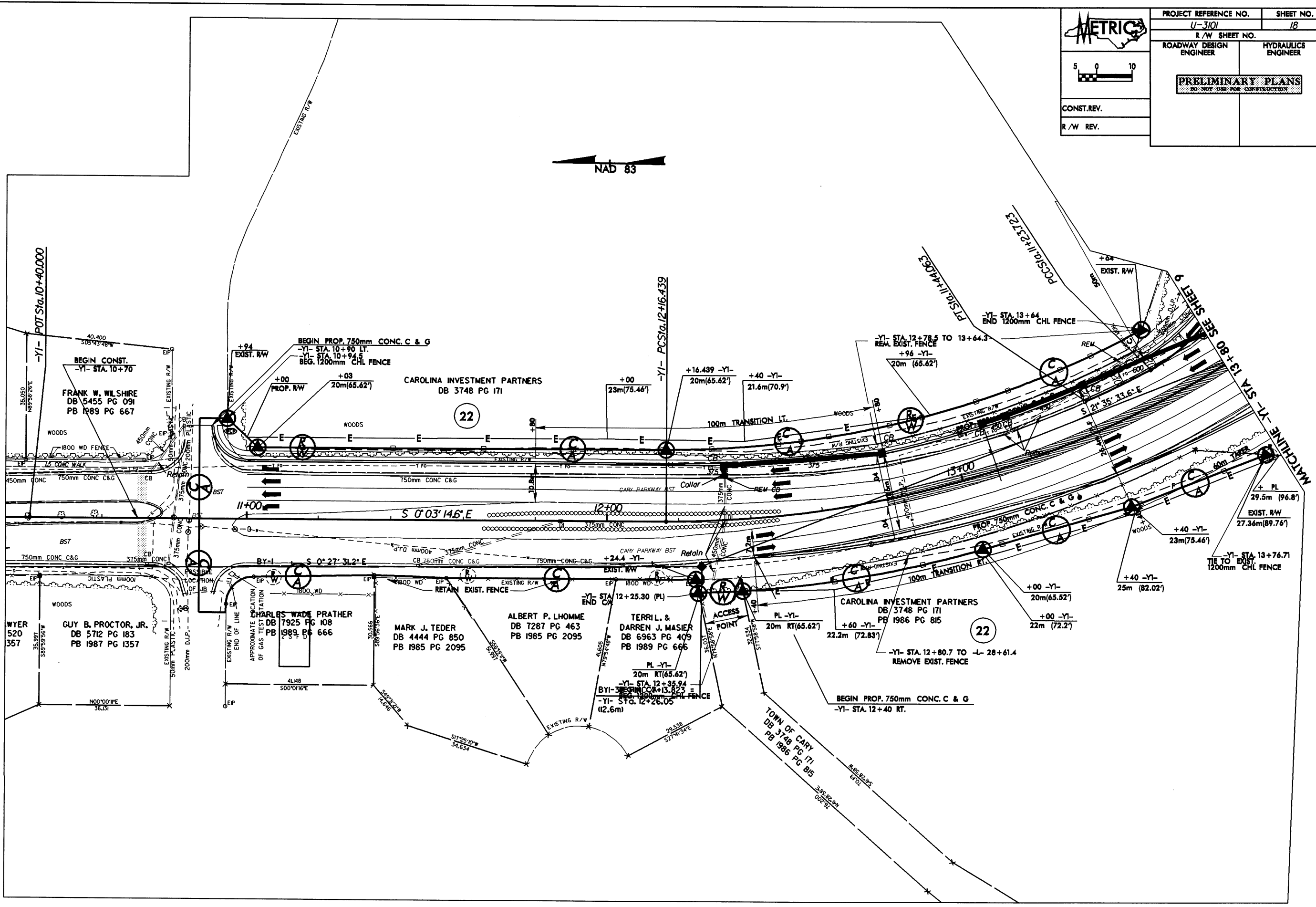
MATCHLINE -Y- STA. 18+20.00 SEE INSET A SHEET 16



PROJECT REFERENCE NO. U-3101	SHEET NO. 18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	
CONST. REV.	
R/W REV.	



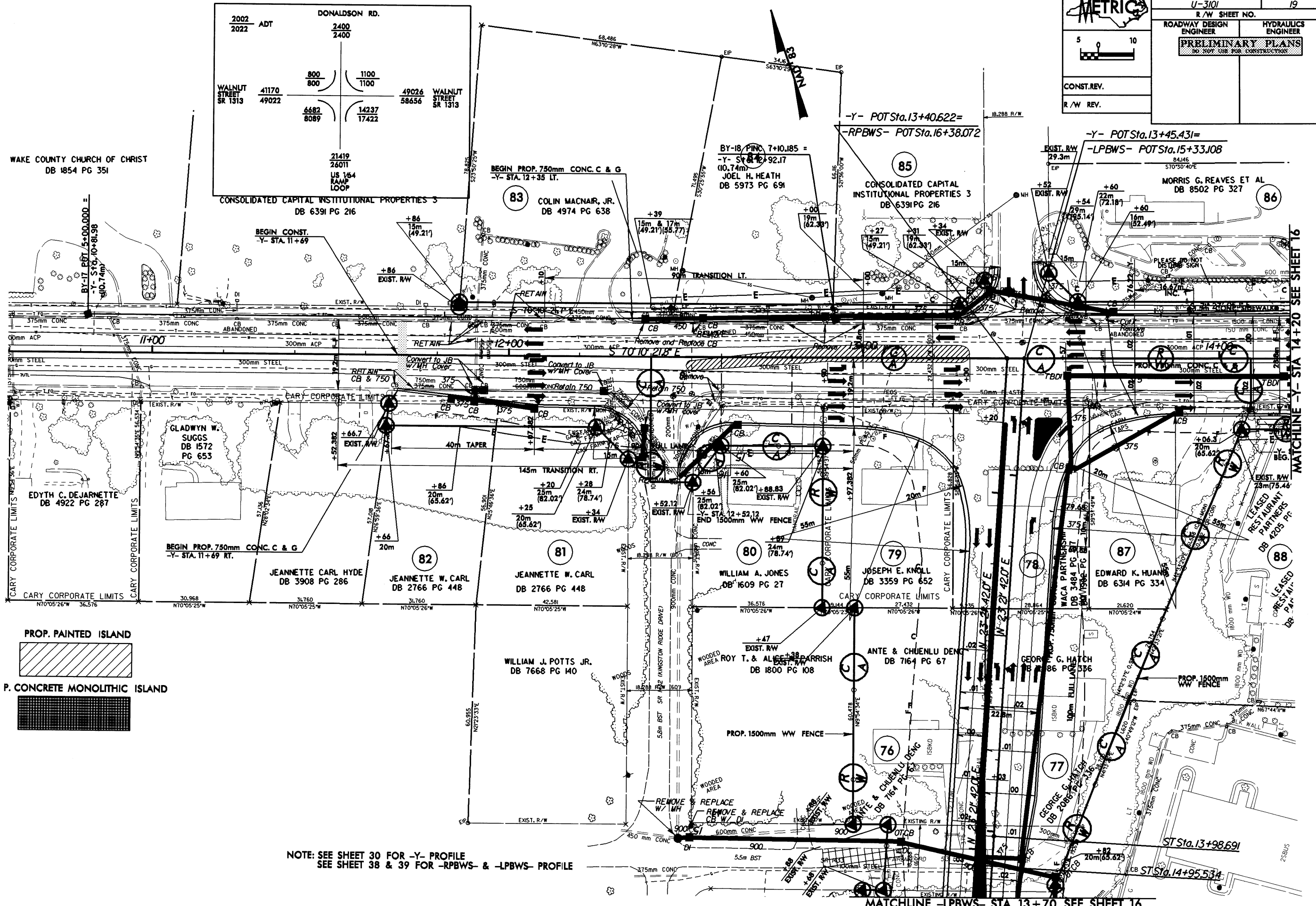
REVISIONS
ADDED TCE ON RT. SIDE OF -Y1- ON PARCEL 22, TDG 5-05-04



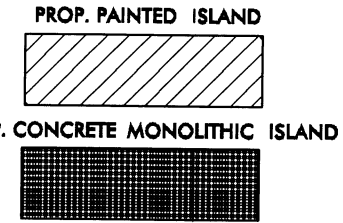
07-10-2004 09:35
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NOTE: SEE SHEET 31 FOR -Y1- PROFILE

PROJECT REFERENCE NO. U-3101		SHEET NO. 19	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
CONST. REV.		R/W REV.	



REVISIONS
 RIGHT OF WAY WAS REDUCED ON PARCEL 86 PER RIGHT OF WAY REVISION REQUEST.DWG (06-01-04)
 CHANGED PARCEL 86 NAME TO MORRIS G. REAVES ET AL DB 8502 PG.327 DAW (06-01-04)



NOTE: SEE SHEET 30 FOR -Y- PROFILE
 SEE SHEET 38 & 39 FOR -RPBWS- & -LPBWS- PROFILE

MATCHLINE -LPBWS- STA 13+70 SEE SHEET 16

MATCHLINE -Y- STA 14+20 SEE SHEET 16

02-28-2004 09:26
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