STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 21, 2004

U. S. Army Corps of Engineers
Raleigh Regulatory Field Office
6508 Falls of the Neuse Road, Suite 120
Raleigh, North Carolina 27615

ATTN.: Mr. John Thomas
NCDOT Coordinator

Subject: **Individual Permit Application for Section 404 and 401 permits for the Widening of US 321.** US 321 Widening From SR 1370 (Kirby Mountain Road) to SR 1500 (Blackberry Road) in Bailey Camp. Caldwell County. TIP No. R-2237B. State Project No. 6.739001T, NC DOT Division 11, $475.00 Debit WBS Element 34402.1.4.

Dear Sir:

The North Carolina Department of Transportation (NCDOT), in consultation with the Federal Highway Administration (FHWA) proposes to widen US 321 in Caldwell County, from SR 1370 (Kirby Mountain Road) just north of Patterson to SR 1500 (Blackberry Road) in Bailey Camp. The location of the two additional lanes varies from the east to the west side of the existing roadway depending upon the location of existing development, natural and historic resources, severity of terrain, and design objectives. The proposed project is approximately 6.5 miles in length, and will provide four 12-foot lanes with a four-foot painted median and 10-foot shoulders (13 feet with guardrail). The proposed right-of-way varies throughout the project, ranging from approximately 110 to 885 feet. Enclosed with this application is the cover letter, ENG 4345 Form, permit drawings, plan sheets, meeting minutes from the 4B and 4C agency review meetings, a copy of the Ecosystem Enhancement Program (EEP) request letter, and a copy of the United States Fish and Wildlife Service (USFWS) concurrence request letter.

Purpose and Need: As stated in the 1993 Environmental Assessment (EA), the purpose of this project is to increase traffic capacity and safety by widening US 321 from the existing two-lane facility to a four-lane roadway. US 321 is a North Carolina intrastate corridor. The proposed project will help the roadway meet the objectives of the North Carolina intrastate corridor program. The intrastate system plan calls for the widening of

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LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

all existing two-lane sections within this corridor to multi-lane facilities. With the exception of the section of US 321 extending from NC 268 to US 221 in Blowing Rock, the US 321 intrastate corridor is currently a multi-lane facility or is presently being widened. US 321 from the South Carolina border south of Gastonia to Boone, North Carolina is defined as the principle north-south route connecting the western piedmont. The roadway improvements will serve to increase the roadway capacity to handle projected growth within the region. Roadway characteristic improvements include adding through and turning lanes, widening shoulders, and straightening substandard curves. These improvements will allow safe passage for slower moving vehicles, permit smoother flow of traffic, allow vehicles to enter and exit the roadway more easily, and reduce the chances of head-on and rear end collisions. In addition, the proposed project is included in the 1993-1999 North Carolina Transportation Improvement Program.

Summary of Impacts: Impacts to jurisdictional areas of R-2237B consist of a total of 0.16 acre of permanent, non-riverine wetland impacts, 0.13 acres of fill in surface waters, and 1,680 linear feet of jurisdictional stream channels. All surface waters impacted by the proposed project are located within the Yadkin-Pee Dee and Catawba River Basins. Impacts to Sites 1 through 6 are located in the Yadkin-Pee Dee River Basin USGS Hydrologic Unit 03040101, subbasin 03-07-01; impacts to Sites 7 and 8 are located in the Catawba River Basin Hydrologic Unit 03050101, subbasin 03-08-31. No 303(d) listed waters are present within the project boundary. Table 1 summarizes the jurisdictional impacts associated with the R-2237B project.

Table 1: Summary of Jurisdictional Impacts (Federal Clean Water Act)

River Basin	Permanent Non-Riverine Wetland (ac)*	Existing Channel Impacts (ft)	Surface Water (ac)
Yadkin Pee-Dee	0.16	889	0.08
Catawba	0.00	791	0.05
Totals	0.16	1,680	0.13

* includes fill, excavation, and mechanized clearing

Summary of Mitigation: Throughout the NEPA and design process this project has been designed to avoid and minimize impacts to jurisdictional areas. The project will be conducted on existing roadway and will thereby minimize natural resource impacts. Specific strategies are detailed elsewhere in this document.

The necessary compensatory mitigation for unavoidable impacts to 0.16 ac non-riverine wetlands and 1,680 linear feet of streams will be provided by the EEP.

PROJECT SCHEDULE

This application applies to Section B of the R-2237 widening project. Construction of Section A has been completed. The following table summarizes the schedule.

Table 2. Project Schedule

Section	Project Limits	Let Date
A	Widening US 321 from NC 268 to SR 1370	July 1997 Completed June 2001
B	Widening US 321 from SR 1370 to SR 1500	December 2004
C	Widening US 321 from SR 1500 to US 221 at Blowing Rock.	March 2009

NEPA DOCUMENT STATUS

An EA was approved on August 6, 1993 in compliance with the National Environmental Policy Act. The EA addressed the widening of US 321 from two to four lanes from NC 268 to US 221 (T.I.P. Project No. R-2237 A/B/C) in Caldwell and Watauga Counties. The EA provided sufficient evidence that an Environmental Impact Statement (EIS) would not be necessary for Sections A and B (between NC 268 and SR 1500). A Finding of No Significant Impact (FONSI) for R-2237 Sections A and B was approved on September 19, 1994. The recommended alternative proposes widening US 321 from two lanes to four 12-foot lanes with a four-foot painted median and a 10-foot shoulder (13 feet with guardrail). Copies of the EA and FONSI have been provided to regulatory review agencies involved in the approval process. Additional copies will be provided upon request.

INDEPENDENT UTILITY

R-2237B is in compliance with 23 CFR Part 771.111(f) which lists the FHWA characteristics of the 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; and

(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

RESOURCE STATUS

Wetland and Stream Delineations:

Wetland delineations were conducted using the criteria specified in the 1987 Corps of Engineers Wetland Delineation Manual. Mr. John Thomas of the USACE Raleigh Regulatory Field Office verified the stream and wetland delineations in the field on December 18, 2002. A Jurisdictional Determination for the project was signed by Mr. Thomas on January 29, 2003.

Characterization of Jurisdictional Sites:

Wetlands

R-2237B will have 0.16 acre of permanent non-riverine wetland impacts (Table 3). These impacts occur at Sites 6A and 6B in the Yadkin Pee-Dee River Basin, HU 03040101. Both wetland sites are located within a power line easement surrounded by a Mesic Mixed Hardwood Forest community. The water source for the complex is culvert drainage. The wetlands were delineated as a complex since they are hydrologically connected.

The vegetative community for the complex is dominated by tag alder (*Alnus serrulata*), common elderberry (*Sambucus canadensis*), and cattail (*Typha latifolia*). The area can be classified as a Palustrine, Unconsolidated Bottom, Semi-Permanently Flooded, Diked/Impounded (PUBAh) system (Cowardin et al., 1979).

Table 3. Jurisdictional Impacts within R-2237B

Site	HU	Station From/To	Wetland Impacts (ac)*	DWQ Wetland Rating	Surface Water Impacts (ac)	Existing Channel Impacts (lf)	Temporary Surface Water Impacts (lf)
Yadkin Pee-Dee River Basin							
1	03040101	-L- 66+40 / 66+83			0.015	128.7	
2	03040101	-L- 77+05 / 78+18			0.012	118.5	10
		-L- 78+80 / 80+15			0.016	147.1	10
3	03040101	-L-82+15 / 82+70			0.010	102.2	
		-L-83+08 / 83+63			0.006	65.1	10
4	03040101	-L- 91+12 / 91+40			0.003	39.9	
		-L-91+85 / 93+10			0.011	178.1	
5	03040101	-L- 121+92 / 122+64			0.005	108.6	
Catawba River Basin							
6A	03040101	-L- 136+16 / 136+70	0.08	24			
6B	03040101	-L- 137+96 /139+46	0.08	24			
7	03050101	-L- 293+83 /294+90			0.009	191.4	
8	03050101	-L- 324+96 /325+82			0.041	600.4	
		TOTAL	**0.16****		**0.13****	**1680.0**	**30**

* includes fill, excavation, and mechanized clearing

** value rounded to nearest hundredth

Streams

Within R-2237B, seven streams (Sites 1, 2, 3, 4, 5, 7, and 8) will be impacted (Table 4). All streams are classified as trout waters (Tr) by DWQ, but are not included on the North

Carolina Wildlife Resource Commission (NCWRC) list of trout water streams. All streams have a sand, gravel and bedrock substrate.

- The stream at Site 1 (Rocky Cove Creek) is 1 to 4 feet wide and 3 inches deep.
- The stream at Sites 2 and 3 (Greenfield Branch) is 2 to 5 feet wide and 2 to 6 inches deep. The stream at Site 4 (Greenfield Branch) is 1 to 3 feet wide and 3 inches deep.
- The stream at Site 5 (UT to Puncheon Camp Creek) is 2 to 4 feet wide and 3 inches deep.
- The stream at Site 7 (UT to Right Fork Mulberry Creek) is 2 to 5 feet wide and 2 inches deep, and is classified as High Quality Waters (HQW) by DWQ.
- The stream at Site 8 (UT to Left Fork Mulberry Creek) is 1.5 to 3 feet wide and 3 inches deep and is classified as High Quality Waters (HQW) by DWQ.

R-2237B will impact a total of 1,680 linear feet of stream channel that will require mitigation. A total of 889 ft of streams will be impacted in the Yadkin Pee-Dee River Basin, HU 03040101. A total of 791 ft of streams will be impacted in the Catawba River Basin, HU 03050101. A total of 30 feet of temporary stream impacts will occur at Sites 2 and 3. Temporary impacts are for surface fill to be placed at the culvert inlet and outlet of Site 2 and the inlet of Site 3 in order to phase construct the culverts.

Table 4. Jurisdictional Stream Information on R-2237B

Site	Station Number (From/To)	Structure	Stream Name	DWQ Index No.	DWQ Class	DWQ Rating	Status	Impact (ft)
1	-L- 66+40 / 66+83	42" RCP	Rocky Cove Creek	12-12-1	C;Tr	33.5	Perennial	129
2	-L- 77+05 / 78+18 -L- 78+80 / 80+15	8' x 6' RCBC 8' x 6' RCBC	Greenfield Branch	12-12-1-1	C;Tr	37.5	Perennial	266
3	-L- 82+15 / 82+70 -L- 83+08 / 83+63	8' x 5' RCBC 8' x 5' RCBC	Greenfield Branch	12-12-1-1	C;Tr	33.25	Perennial	167
4	-L- 91+12 / 91+40 -L- 91+85 / 93+10	72" RCP 72" RCP	Greenfield Branch	12-12-1-1	C;Tr	35.5	Perennial	218
5	-L- 121+92 / 122+64	36" RCP	UT to Puncheon Camp Creek	12-12-1	C;Tr	30.25	Perennial	109
7	-L- 293+83 / 294+90	24" CSP	UT to Right Fork Mulberry Creek	11-38-32-3	C;Tr, HQW	39	Perennial	191
8	-L- 324+96 / 325+82	60" SPP/ 60" CSP	UT to Left Fork Mulberry Creek	11-38-32-2	C;Tr, HQW	26	Intermittent	600
TOTAL								**1680**

UTILITY IMPACTS

Two utility companies with aerial power lines are located within the project area. Blue Ridge EMC has power line facilities along the entire length of the project. New pole lines will be constructed to clear the project. The new lines will be within a 30 feet wide easement and will contain 30 new poles. The easement will begin at Station 72 on the west side of the project at the edge of the proposed right-of-way and continue along this alignment to Station 134 at which point it will move further to the west and join with an existing Blue Ridge transmission line easement. The existing Blue Ridge easement is 100 feet wide and extends throughout the remainder of the project. There will be 57 new and/or replacement poles placed within this easement.

BellSouth also has multiple facilities along the entire length of the project. BellSouth will attach telephone lines for joint use on the Blue Ridge pole line described above. No utility impacts to jurisdictional waters or wetlands are anticipated.

PROTECTED SPECIES

Plants and animals with federal classification of Endangered (E), Threatened (T), Proposed Endangered (PE), and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. The January 29, 2003 USFWS lists three federally protected species for Caldwell County: the spruce fir moss spider (*Microhexura montivaga)*, dwarf-flowered heartleaf (*Hexastylis naniflora)*, and Heller's blazing star (*Liatris helleri)* (Table 5). The 1992 USFWS list for Caldwell County included in Appendix B of the EA lists Spreading avens (*Geum radiatum*) and Blue Ridge goldenrod (*Solidago spithamaea*) as protected species, but these have since been removed. The spruce-fir moss spider (*Microhexura montivaga),* listed as proposed endangered in Caldwell County on January 27, 1994, was added to the list of federally protected species included in the FONSI dated September 1994.

Table 5. Federally Protected Species for Caldwell County

Scientific Name	Common Name	Status	Biological Conclusion
Microhexura montivaga	spruce-fir moss spider	Endangered	No Effect
Hexastylis naniflora	dwarf-flowered heartleaf	Threatened	May Affect-Not Likely to Adversely Affect
Liatris helleri	Heller's blazing star	Threatened	No Effect

Endangered : a species that is in danger of extinction throughout all or a significant portion of its range.
Threatened : a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

The spruce-fir moss spider received a biological conclusion of "No Effect". There is no habitat for the spruce-fir moss spider in the project study area. No spruce-fir forests occur

within the study area and elevations within the project study area are less than 5,000 feet. Rocks and boulders within the project study area are devoid of moss and lichens. A review of the North Carolina Natural Heritage Program (NCNHP) database on June 24, 2004 revealed no occurrences of the spruce-fir moss spider within the project vicinity.

The dwarf-flowered heartleaf received a biological conclusion of "May Affect-Not Likely to Adversely Affect". A search for dwarf-flowered heartleaf was conducted on May 28-29, 2003. The entire project corridor was walked and potential habitat areas, specifically those with acidic soils and boggy areas next to streams, were surveyed (approximately 70 acres). No dwarf-flowered heartleaf (or any heartleaf with similarities of appearance) was found during the search. A review of the NCNHP database on June 24, 2004 revealed no species occurrences within the project vicinity. Enclosed in this application is a copy of the letter requesting concurrence from USFWS.

Heller's blazing star received a biological conclusion of "No Effect". In 1994 an NCDOT biologist scanned bare, cut rock faces within the project study area for Heller's blazing star. No threatened plants were discovered. A review of the NCNHP database on June 24, 2004 revealed no species occurrences within the project vicinity. The closest known population of Heller's blazing star occurs on the cliffs of Blowing Rock, approximately one mile northwest of the project endpoint. There are no locations that have elevations of greater than 3,500 feet, nor are there areas of extensive rock outcrops within the project study area.

CULTURAL RESOURCES

In a letter dated April 15, 1992 included in Appendix B of the EA, the State Historic Preservation Office (SHPO) concurred that no archeological sites within the project area are eligible for the National Register of Historic Places and requested that no additional surveys be conducted. One architectural site is listed as eligible for listing within the National Registry of Historic Places. The McCaleb Coffey House is located approximately 550 feet west of the existing US 321 right-of-way, along the path of the old Lenoir Blowing Rock Turnpike (SR 1379). NCDOT has completed a plan to landscape the project right-of-way across from the McCaleb Coffey House into the final design. Based on this commitment, the State Historic Preservation Officer concluded in a letter dated May 14, 1993 included in Appendix B of the EA and FONSI, that the preferred alternative will have no adverse effect on the McCaleb Coffey House.

FEMA COMPLIANCE

The project has been coordinated with appropriate state and local officials and the Federal Emergency Management Agency (FEMA) to assure compliance with FEMA, state, and local floodway regulations.

WILD AND SCENIC RIVER SYTEM

The project will not impact waters designated within the Wild and Scenic Rivers System or any rivers included in the list of study rivers (Public Law 90-542, as amended).

MITIGATION OPTIONS

The Corps of Engineers has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the Waters of the United States. Mitigation of wetland and surface water impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time and compensating for impacts (40 CFR 1508.20). Executive Order 11990 (Protection of Wetlands) and Department of Transportation Order 5660.1A (Preservation of the Nations Wetlands), emphasize protection of the functions and values provided by wetlands. These directives require that new construction in wetlands be avoided as much as possible and that all practicable measures are taken to minimize or mitigate impacts to wetlands.

AVOIDANCE AND MINIMIZATION: The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning and NEPA compliance stages; minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts.

General minimization techniques were implemented as follows:

1. Wetland Impacts: Energy dissipater basins installed at pipe outfalls of filled wetlands.

2. Stream Impacts: NCDOT revised the original alignment to minimize impacts to streams by replacing the s-curves with longer, flatter curves instead of straight tangent sections. In addition, the revised design incorporates retaining walls to minimize impacts of long fill slopes. Baffles will be used to hold the bed in place for any stream with a slope greater than 2%. Construction techniques will be used to minimize the potential for contact between wet concrete and stream water. Energy dissipater structures such as junction boxes or rock splash pads will be incorporated at the outlets of non-jurisdictional streams and energy dissipater basins where feasible and requested on perennial streams.

3. Culverts: All culverts will be extended. Culverts will be cleaned out and the invert adjusted as necessary in order to allow for the unimpeded flow of water. During project design, NCDOT will consider measures for making culverts more attractive to aquatic and terrestrial wildlife passage.

4. Cut slopes: NCDOT will minimize cut slopes to the extent practicable.

5. Pyritic shale: NCDOT completed geotechnical investigations and found no evidence of pyritic shale.

6. Sensitive Watersheds: The NCDOT will comply with regulations for sensitive watersheds as stated in 15A NCAC 04B.0124 and 15A NCAC 04B.0125 to

account for high quality waters and trout waters located within the project area. Stringent erosion and sediment erosion control practices will be used to minimize water quality impacts.

7. NCDOT will minimize wetland disturbances through careful geometric design to minimize clearing and filling at the Yadkin River tributaries.
8. NCDOT will restrict vegetation removal within adjacent natural communities.
9. Retaining walls will be included to avoid major fills in mountainous areas of the project and reduce the amount of impact to adjacent properties.
10. NCDOT will develop an Erosion and Sediment Control Management and Maintenance Plan that complies with the North Carolina Sedimentation Pollution Control Act of 1973 during final design of the project. A soil erosion schedule will be developed that describes the time relationship between the phases of work that must be coordinated to reduce erosion, construction practices and temporary control measures to minimize erosion and a plan for waste disposal. Permanent erosion control work will be incorporated into the project at the earliest practicable time and coordinated with temporary control measures to ensure economical, effective and continuous erosion control. Precautions will be taken to prevent pollution of water bodies.
11. Trees outside the construction limits will be protected from construction activities.
12. Consultations on proposed endangered, threatened and sensitive (PETS) species and land transfers are on going with the National Forest Service and all required coordination will be completed prior to any land transfers.

Site specific minimization techniques were implemented as follows:

Site 1: Baffles buried in natural material to allow for aquatic life movement. An extended wing wall is used as a retaining wall.

Site 2: Culvert extended with a standard box with baffles on the inlet and a bottomless structure on the outlet.

Site 4: No rip-rap placed in stream bed.

Site 5: No rip-rap placed in stream bed. Drop structure installed to reduce the outlet velocity.

Site 6 A/B: Energy dissipater basins installed at pipe outfalls of filled wetlands.

Site 8: No rip-rap placed in stream bed.

Station 290+00: NCDOT will install a retaining wall to protect the wetland located east of US 321 (located outside of proposed right-of-way).

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.

Based upon the 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 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.

Although the subject project is not listed in Exhibit 1, R-2237B is included on a supplemental project list submitted to EEP. EEP will provide the necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. The remaining, unavoidable impacts to 889 linear feet of jurisdictional streams and 0.16 acre of non-riverine wetlands in the Yadkin Pee-Dee River Basin HU 03040101 and 791 linear feet of jurisdictional streams in the Catawba River Basin HU 03050101 will be offset by compensatory mitigation provided by the EEP program. Enclosed in this application is a letter to EEP requesting mitigation at a 2:1 ratio for a total of 3,360 feet of stream mitigation and 0.32 acre of non-riverine wetland mitigation.

INDIRECT AND CUMULATIVE IMPACTS

An Indirect and Cumulative Impact Study for R-2237B is under way and is expected to be complete in July of 2004. A copy of this report will be sent to North Carolina Division of Water Quality (NCDWQ) for review once complete. The construction of R-2237B is not expected to result in any indirect or cumulative impacts that will adversely affect water quality.

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Individual 404 Permit as required for the above described activities. We are also hereby requesting a 401 Water Quality Certification from the NCDWQ. 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, NCDWQ, for their review.

It is anticipated that comments from the NCWRC will be required prior to authorization by the Corps of Engineers. By copy of this letter and attachment, NCDOT hereby requests NCWRC review. NCDOT requests that NCWRC forward their comments to the Corps of Engineers.

If you have any questions or need additional information please call Rachelle Beauregard at (919) 715-1383.

Sincerely,

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

Enclosure

Cc: w/attachment
- Mr. John Hennessy, NCDWQ (7 copies)
- Ms. Marla Chambers NCWRC
- Ms. Becky Fox, USEPA – Whittier, NC
- Mr. Ronald Mikulak, USEPA – Atlanta, GA
- Ms. Marella Buncick USFWS
- Mr. David Chang, P.E., Hydraulics
- Mr. Greg Perfetti, P.E., Structure Design
- Mr. Michael A. Pettyjohn, P.E., Division Engineer
- Mr. Heath Slaughter, DEO

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
- Ms. Stacy Baldwin, PDEA Project Planning Engineer
- Mr. David Franklin, USACE, Wilmington
- Ms. Beth Harmon, EEP

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires December 31, 2004

Public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: Rivers and Harbors Act, Section 10, 33 USC 403: Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research and Sanctuaries Act, 33 USC 1413, Section 103. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)
North Carolina Department of Transportation Project Development & Environmental Analysis	
6. APPLICANT'S ADDRESS	**9. AGENT'S ADDRESS**
1548 Mail Service Center Raleigh, NC 27699	
7. APPLICANT'S PHONE NOs. W/AREA CODE a. Residence b. Business 919-733-3141	**10. AGENT'S PHONE NOs. W/AREA CODE** a. Residence b. Business

11. STATEMENT OF AUTHORIZATION

I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ _____
APPLICANT'S SIGNATURE DATE

NAME, LOCATION, AND DESCRIPTION OR PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions

US 321 Widening from SR 1370 (Kirby Mountain Road) to SR 1500 (Blackberry Road) in Bailey Camp, just north of Patterson, Caldwell County, NC

13. NAME OF WATERBODY, IF KNOWN (if applicable)
Rocky Cove Creek, Greenfield Branch, UT to Puncheon Camp Creek, UT to Right Fork Mulberry Creek, UT to Left Fork Mulberry Creek

14. PROJECT STREET ADDRESS (if applicable)

15. LOCATION OF PROJECT

Caldwell (COUNTY) NC (STATE)

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) **Section, Township, Range, Lat/Lon, and/or Accessors's Parcel Number, for example.**

17. DIRECTIONS TO THE SITE

US 321-from SR 1370, go north 6.5 miles to SR 1500 in Bailey Camp

18. Nature of Activity (Description of project, include all features)

Widening of US 321 from a two-lane facility to a four-lane roadway. The project is 6.5 miles long and will provide four 12-foot lanes with a four-foot painted median and 10-foot shoulders (13 feet with guardrail).). The proposed right-of-way varies throughout the project, ranging from approximately 110 to 885 feet.

Section B of the project will impact five streams through seven stream crossings, impacting 1,080 linear feet of jurisdictional perennial streams and 600 linear feet of intermittent streams. The project will also impact 0.16 acre of wetlands and 0.13 acre of surface waters.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

Public transportation. The purpose of the project is to increase traffic capacity and safety by widening the roadway. US 321is listed in the draft 2004-2010 North Carolina Transportation Improvement Program

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Needed in order to provide a wider road base for the highway widening.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

See attached permit drawings.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

1,680 linear feet of stream channel, 0.13 ac of surface water, and 0.16 acre of wetland

23. Is Any Portion of the Work Already Complete? Yes ___ No _X_ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

See Attached List

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

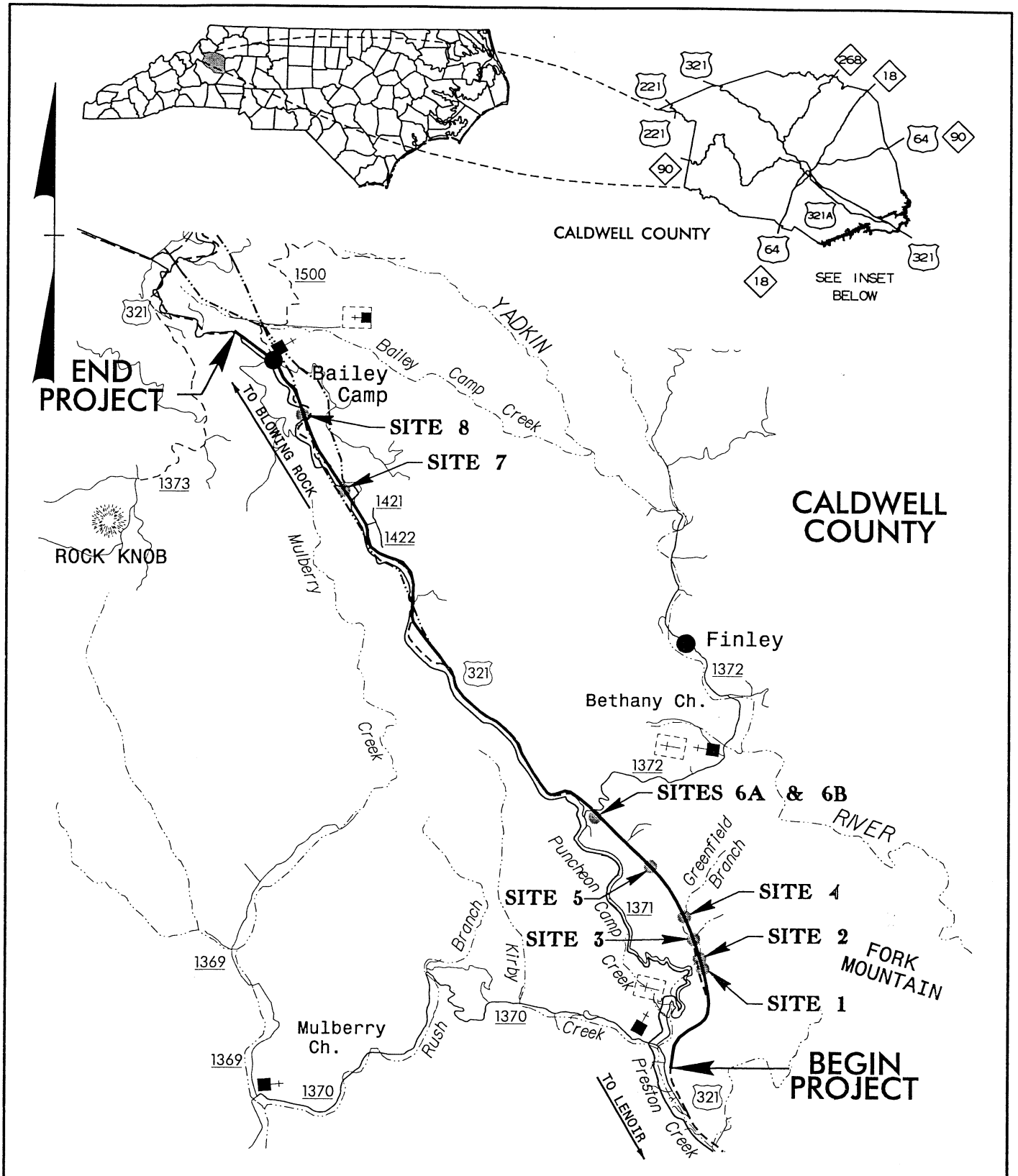
* Would include but is not restricted to zoning, building, and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
[signature]	7/21/04		

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.



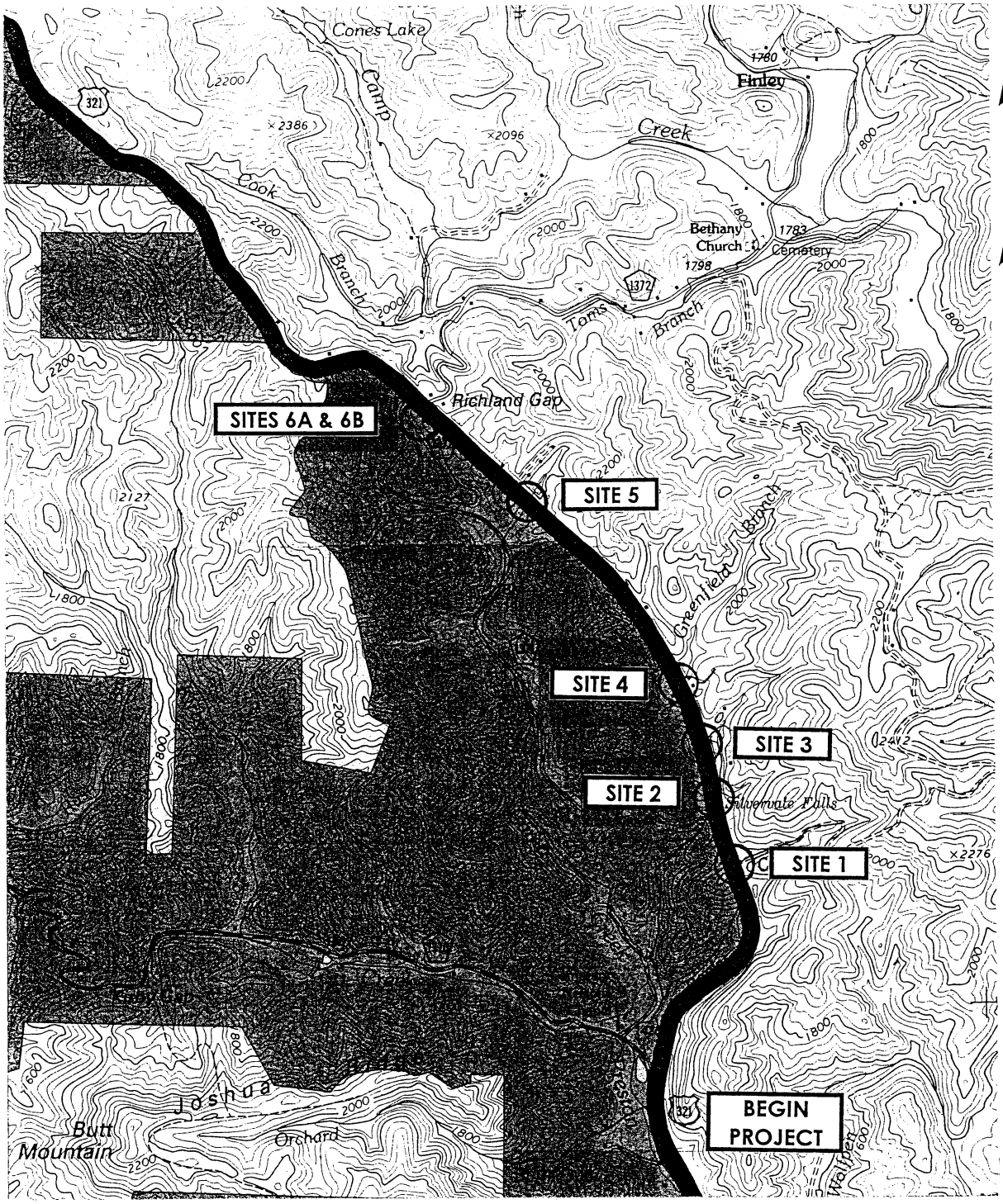
SCALE
.5 0 1 Mile

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM SR 1370 (KIRBY MOUNTAIN RD.)
TO SR 1600 (BLACKBERRY RD.)

SHEET 1 OF 2 **8/21/03**



N.C. DEPT. OF TRANSPORTATION
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CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM SR 1370 (KIRBY MOUNTAIN RD.)
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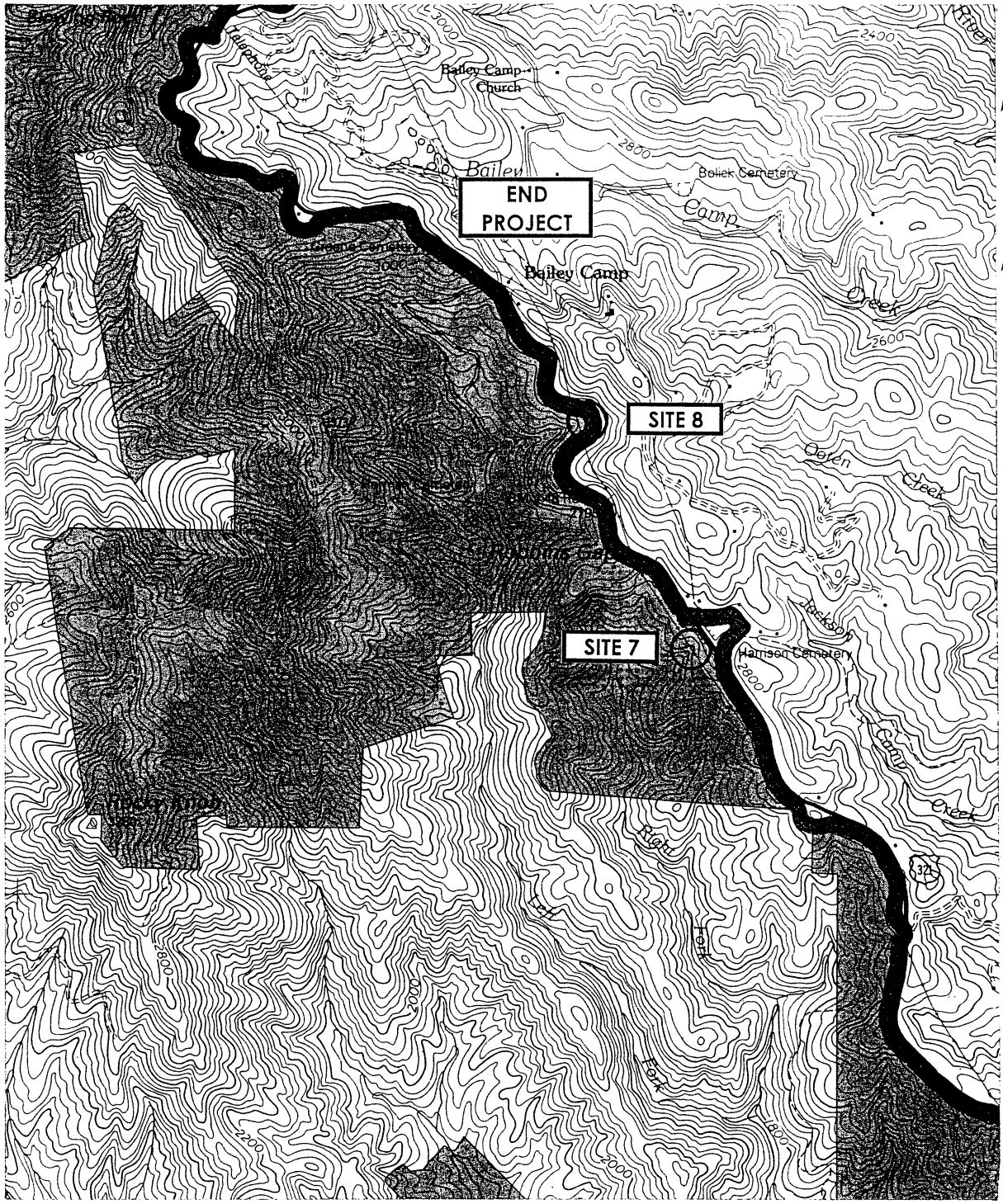
SHEET 2 OF 21 08/21/03



1000 0 2000

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM SR 1370 (KIRBY MOUNTAIN RD.)
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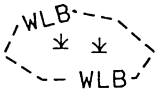
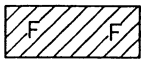
SHEET 3 OF 21 08/21/03

LEGEND

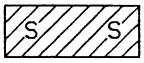
---WLB---- WETLAND BOUNDARY



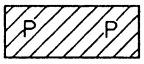
WETLAND



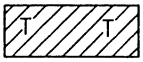
DENOTES FILL IN WETLAND



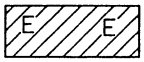
DENOTES FILL IN SURFACE WATER



DENOTES FILL IN SURFACE WATER (POND)

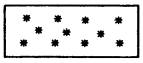


DENOTES TEMPORARY FILL IN WETLAND



DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER


DENOTES MECHANIZED CLEARING

— BZ — RIPARIAN BUFFER ZONE

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

— NG — NATURAL GROUND

PL PROPERTY LINE

— TDE — TEMP. DRAINAGE EASEMENT

— PDE — PERMANENT DRAINAGE EASEMENT

— EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

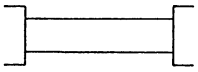
— EPB — EXIST. ENDANGERED PLANT BOUNDARY

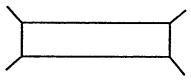
▽ WATER SURFACE

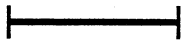
X X X X LIVE STAKES

BOULDER

COIR FIBER ROLLS

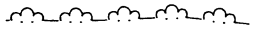

PROPOSED BRIDGE


PROPOSED BOX CULVERT

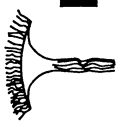

PROPOSED PIPE CULVERT

(DASHED LINES DENOTE EXISTNG STRUCTURES)


SINGLE TREE

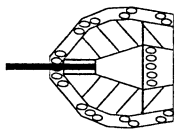

WOODS LINE


DRAINAGE INLET


ROOTWAD


RIP RAP

ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE


RIP RAP ENERGY DISSIPATOR BASIN

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM S.R. 1370 (KIRBY MOUNTAIN RD.)
TO S.R. 1600 (BLACKBERRY RD.)

SHEET 4 **OF** 21 **8/21/03**

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1	-L- 66+40 / 66+83	1 @ 42" RCP					0.0148			128.7	
2	-L- 77+05 / 78+18	1 @ 8' x 6' RCBC					0.0123			118.5	
	-L- 78+80 / 80+15	1 @ 8' x 6' RCBC					0.0161			147.1	
3	-L- 82+15 / 82+70	1 @ 8' x 5' RCBC					0.0101			102.2	
	-L- 83+08 / 83+63	1 @ 8' x 5' RCBC					0.0060			65.1	
4	-L- 91+12 / 91+40	1 @ 72" RCP					0.0027			39.9	
	-L- 91+85 / 93+10	1 @ 72" RCP					0.0105			178.1	
5	-L- 121+92 / 122+64	1 @ 36" RCP					0.0049			108.6	
6A	-L- 136+16 / 136+70	1 @ 36" CSP	0.0480		0.0260	0.0043					
6B	-L- 137+96 / 139+46	1 @ 24" CSP	0.0538		0.0216	0.0059					
7	-L- 293+83 / 294+90	1 @ 24" CSP					0.0088			191.4	
8	-L- 324+96 / 325+82	1 @ 60" SPP /					0.0412			600.4	
		1 @ 60" CSP									
TOTALS:			0.1018	0.0000	0.0476	0.0102	0.1274	0.0000	0.0000	1680.0	0.0

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT 8.T731303 (R-2237B)
U.S. 321 FROM SR 1370 (KIRBY MOUNTAIN RD.)
TO SR 1600 (BLACKBERRY RD.)

Project No. 8.T731303 (R-2237B)

Property Owner List

Site Number	Name	Address
1	Jessie Ford And Wife, June Ford	5725 Waterfall Rd. Lenoir, NC 28645
2	Gene D. Jensen And Wife, Olga D. Jensen	P.O. Box 1134 Blowing Rock, NC 28605
	Johnny J. Bishop And Wife, Lillian S. Bishop	14895 W NC Hwy 268 Ferguson, NC 28624
	Wayne W. Price And Wife, Dianna R. Price	4184 Blowing Rock Blvd. Lenoir, NC 28645
3	James S. Story And Robert Money	2222 Bob Money Lane Lenoir, NC 28645
	Harold D. Patrick And Wife, Hope M. Patrick	4233 Blowing Rock Blvd. Lenoir, NC 28645
4	Harold D. Patrick And Wife, Hope M. Patrick	4233 Blowing Rock Blvd. Lenoir, NC 28645
	Donald Wade Bentley	221 Driver Ave. Murphy, NC 28905
5	Gerald T. Brookshire And Wife, Irene Brookshire	RT 8 Box 233 Lenoir, NC 28645
6A	Troy P. Bolick And Wife, Marlene Bolick	RT 8 Box 231 Lenoir, NC 28645
6B	Troy P. Bolick And Wife, Marlene Bolick	RT 8 Box 231 Lenoir, NC 28645

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM S.R. 1370 (KIRBY MOUNTAIN RD.)
TO S.R. 1600 (BLACKBERRY RD.)

8/21/03

Project No. 8.T731303 (R-2237B)

Property Owner List

Site Number	Name	Address
7	Alan Bormuth	3127 Port Street Morganton, NC 28655
8	J. Earl Tindel	P.O. Box 746 Fancaster, SC 29720

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

CALDWELL COUNTY

PROJECT: 8.T731303 (R-2237B)
U.S. 321
FROM S.R. 1370 (KIRBY MOUNTAIN RD.)
TO S.R. 1600 (BLACKBERRY RD.)

 8/21/03

March 31, 2003

Subject: Draft Minutes Interagency Hydraulic Design 4C Review Meeting on March 27, 2003 for R-2237B, Caldwell County.

Team Members:
John Thomas – USACE (Absent)
Cynthia Van Der Wiele – NCDWQ (Present)
Marla Chambers – NCWRC (Present)
Marella Buncick – USFWS (Absent)
Chris Militscher – EPA (Absent)
Heather Montague – NCDOT PDEA (Present)

Participants:
David Chang – NCDOT Hydraulics
Beth Barnes– NCDWQ
Greg Kempf – HDR
Jamie Byrd – Transite Engineering
Tony Davis – NCDOT Structures
Anne Gamber – NCDOT Hydraulics

This project consists of the widening and realigning of US-321 in Caldwell County. A recent natural system survey of streams was completed and provided to Transite. Jamie Byrd began the meeting by describing the project and stating that due to the topography the use of swales was limited.

1. Trout Streams: Cynthia Van Der Wiele stated that all streams were trout waters, this was not indicated in the environmental documents previously submitted to Transite. Retaining walls were used to avoid impacts to the streams. Transite would review all streams to reduce impacts to the trout stream buffer.
2. Construction in Stream: NCDWQ expressed concern over the method of construction in the trout streams. They requested that no wet concrete is allowed in stream and that machinery be well maintained and kept out of live stream. Transite and NCDOT Hydraulics agreed to this.
3. Culvert #1 Rocky Cove Creek: Baffles are use to hold silt. The baffles are buried in natural material to allow for aquatic life movement. An extended wing wall is used as retaining wall. The Division Construction Engineer will be consulted as to type of wall required.
4. Culvert #2 Greenfield Branch: A discussion over the practicability of directly outletting into culvert and reduce impact to trout stream buffer was debated. It was determined that since the rip rap at the end of the culvert was needed the reduction in buffer impact was insignificant.
5. Drop Structure/Energy Dissipater: It was agreed that an energy dissipater would be used at the outlet of the pipe at station 115+50. A drop structure would be used in the system on sheet 13 to reduce the outlet velocity.
6. Pocket Wetlands: The two pocket wetlands on Sheet 14 were reviewed to determine if the impacts would be "grandfathered". The dateline had been past by the date of 30% completion.

The meeting was adjourned at 3:15.

November 24, 2003

Subject: Draft Minutes Interagency Permit Drawing Review Meeting on November 20, 2003, for R-2237B in Caldwell County.

Team Members:

John Thomas – USACE	(Absent)
Cynthia Van Der Wier – NCDWQ	(Present)
Marla Chambers – NCWRC	(Present)
Marella Buncick – USFWS	(Present)
Christopher Militscher – USEPA	(Present)
Elizabeth Lusk – NCDOT ONE	(Present)

Participants:
Marshall Clawson – NCDOT Hydraulics
James A. Byrd – Transite Consulting
Pete Colwell – Stantec Consulting
Doug Taylor – NCDOT Design Services /Roadway
Alan Ray – NCDOT Design Services /Roadway
Dan Duffield – NCDOT Hydraulics
John Frye – NCDOT Structures Unit
Brian Hanks – NCDOT Structures Unit

Site 2 Sheet 10

Marella- Does the culvert have sill in it?

DOT's response: - The existing culvert may be bottomless. Until this is confirmed the current design is the have a culvert extension at the inlet end with sills and more than likely a bottomless extension at the outlet end.

General Comments at the end of the meeting

Marla – Has the alignment be adjust to less the impacts to the streams?

DOT's response: – Yes, the alignment has been revised (from the original design) to minimize impacts. The s – curves have been replaced with longer flatter curves instead of straight tangent sections. Also, a large amount of retaining walls have been utilized to less impacts that would have been caused from long fill slopes.

Chris – Have the large cut slopes been minimized?

DOT's response: – YES, all cuts were minimized to the extent practicable, steepening slopes where allowed by the Geotech Unit causing rock catchment areas to be added and thus caused a decrease in the footprint.

Copies of John Thomas' entire e-mail were handed out to all the Team Members stating that he confirmed the jurisdictional determinations conducted by the consultants Stantec and also that he had concerns about the 600 +/- linear feet of jurisdictional stream channel impacts that are in the areas where the s-curves are located.

DOT's response: Just to reiterate, yes, the alignment has been revised (from the original design) to minimize impacts. The s – curves have been replaced with longer flatter curves instead of straight tangent sections. Also, a large amount of retaining walls have been utilized to less impacts that would have been caused from long fill slopes.

The meeting was adjourned.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 14, 2004

Mr. Brian Cole
US Fish and Wildlife Service
160 Zillicoa Street
Asheville, NC 28801

Dear Mr. Cole:

This letter is in reference to NCDOT's proposed US 321 widening project from SR 1370 (Kirby Mountain Road) to SR 1500 (Blackberry Road) in Bailey Camp in Caldwell County, TIP No. R-2237B. The purpose of this letter is to request concurrence from the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

Please see the attached document concerning the latest survey report for R-2237B. Based on the information in the attached survey reports, NCDOT concludes that the proposed project's Biological Conclusions for the dwarf-flowered heartleaf (*Hexastylis naniflora*) is "May Affect-Not Likely to Adversely Affect". The Biological Conclusion for the spruce-fir moss spider (*Microhexura montivaga*) and Heller's blazing star (*Liatris helleri*) is "No Effect". We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied and hereby request your concurrence.

If you have any questions, please contact Rachelle Beauregard at rbeauregard@dot.state.nc.us or (919) 715-1383.

Sincerely,

for Phillip S. Harris, III, P.E., Manager
PDEA - Office of Natural Environment

cc: Steve Lund, USACE
Stacy Baldwin, PE, Consultant Engineering Unit Head
File: R-2237B

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.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 14, 2004

Mr. William D. Gilmore, P.E.
EEP Transition Manager
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Subject: US 321 Widening From SR 1370 (Kirby Mountain Road) to SR 1500 (Blackberry Road) in Bailey Camp. Caldwell County. TIP No. R-2237B.

Dear Sir:

The purpose of this letter is to request that the North Carolina Ecosystem Enhancement Program (EEP) provide confirmation that you are willing to provide compensatory mitigation for the project in accordance with the Memorandum of Agreement (MOA) signed July 22, 2003 by the USACE, the NCDENR and the NCDOT.

The North Carolina Department of Transportation (NCDOT), Division of Highways, in consultation with the Federal Highway Administration (FHWA) proposes to widen US 321 in Caldwell County, from SR 1370 (Kirby Mountain Road) just north of Patterson to SR 1500 (Blackberry Road) in Bailey Camp. The location of the two additional lanes varies from the east to the west side of the existing roadway depending upon the location of existing development, natural and historic resources, severity of terrain, and design objectives. The proposed project is approximately 6.5 miles in length, and will provide four 12-foot lanes with a four-foot painted median and 10-foot shoulders (13 feet with guardrail). The proposed right-of-way varies throughout the project, ranging from just over approximately 110 to 885 feet.

RESOURCES UNDER THE JURISDICTION OF SECTION 404 AND 401 OF THE CLEAN WATER ACT.

We have avoided and minimized the impacts to jurisdictional resources to the greatest extent possible as described in the permit application. A copy of the permit application can be found at http://www.ncdot.org/planning/pe/naturalunit/Applications.html. The remaining impacts to jurisdictional resources will be compensated for by mitigation provided by the EEP program. We estimate that 1,080 linear feet of jurisdictional perennial streams, 600 linear feet of intermittent streams, 0.16 acre of wetlands, and 0.13 acre of surface water will be impacted.

The project is located in the Blue Ridge Physiographic Province in Caldwell County in the Yadkin-Pee Dee River basin in Hydrological Cataloguing Unit 03040101and the Catawba River Basin in Hydrologic Cataloguing Unit 03050101.

The following impacts occur in Hydrologic Cataloguing Unit 03040101:

- Stream impacts in Hydrologic Cataloguing Unit 03040101 total 889 linear feet. Impacts will occur to Rocky Cove Creek [DWQ Index No. 12-12-1], a first order perennial stream; Greenfield Branch (DWQ Index No. 12-12-1-1), a second order perennial stream; and a first order perennial stream that is a tributary to Puncheon Camp Creek (DWQ Index No. 12-12-1).

- Wetland impacts will occur to 0.16 acre of non-riverine Palustrine, Unconsolidated Bottom, Semi-Permanently Flooded, Diked/Impounded (PUBAh) wetlands as classified by Cowardin et al. (1979). The wetlands are located within a powerline corridor surrounded by a Mesic Mixed Forest community.

The following impacts occur in Hydrological Cataloguing Unit 03050101:

- Stream impacts in Hydrologic Cataloguing Unit 03050101 total 791 linear feet. Impacts will occur to a first order perennial stream that is a tributary to the Right Fork of Mulberry Creek (DWQ Index No. 11-38-32-3) and a first order intermittent stream that is a tributary to the Left Fork of Mulberry Creek (DWQ Index No. 11-38-32-2).

Stream and wetland impacts are summarized in Table 1 with the amount of need mitigation. We propose to use the EEP to mitigate for all impacts at a 2:1 ratio. Needed mitigation in Yadkin Pee-Dee River Basin, HU 03040101 are 1778 ft of streams and 0.32 ac of non-riverine wetlands. Needed mitigation in the Catawba River Basin, HU 03050101 are 1582 ft of streams.

Table 1: Summary of Jurisdictional Impacts and Needed Mitigation

Hydrologic Cataloguing Unit	Permanent Non-Riverine Wetland Impacts	Needed Mitigation	Streams Impacts	Needed Mitigation
03040101	0.16 ac	0.32 ac	889 ft	1778 ft
03050101	0.0	0.0	791 ft	1582 ft

Please send the letter of confirmation to John Thomas (USACE Coordinator) at U. S. Army Corps of Engineers, Raleigh Regulatory Field Office, 6508 Falls of Neuse Road, Suite 120, Raleigh, NC 27615). Mr. Thomas's FAX number is (919) 876-5823. The current let date for the project is December 21, 2004 for which the let review date is November 2, 2004.

If you have any questions or need additional information please call Ms. Rachelle Beauregard at 919-715-1383.

Sincerely,

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

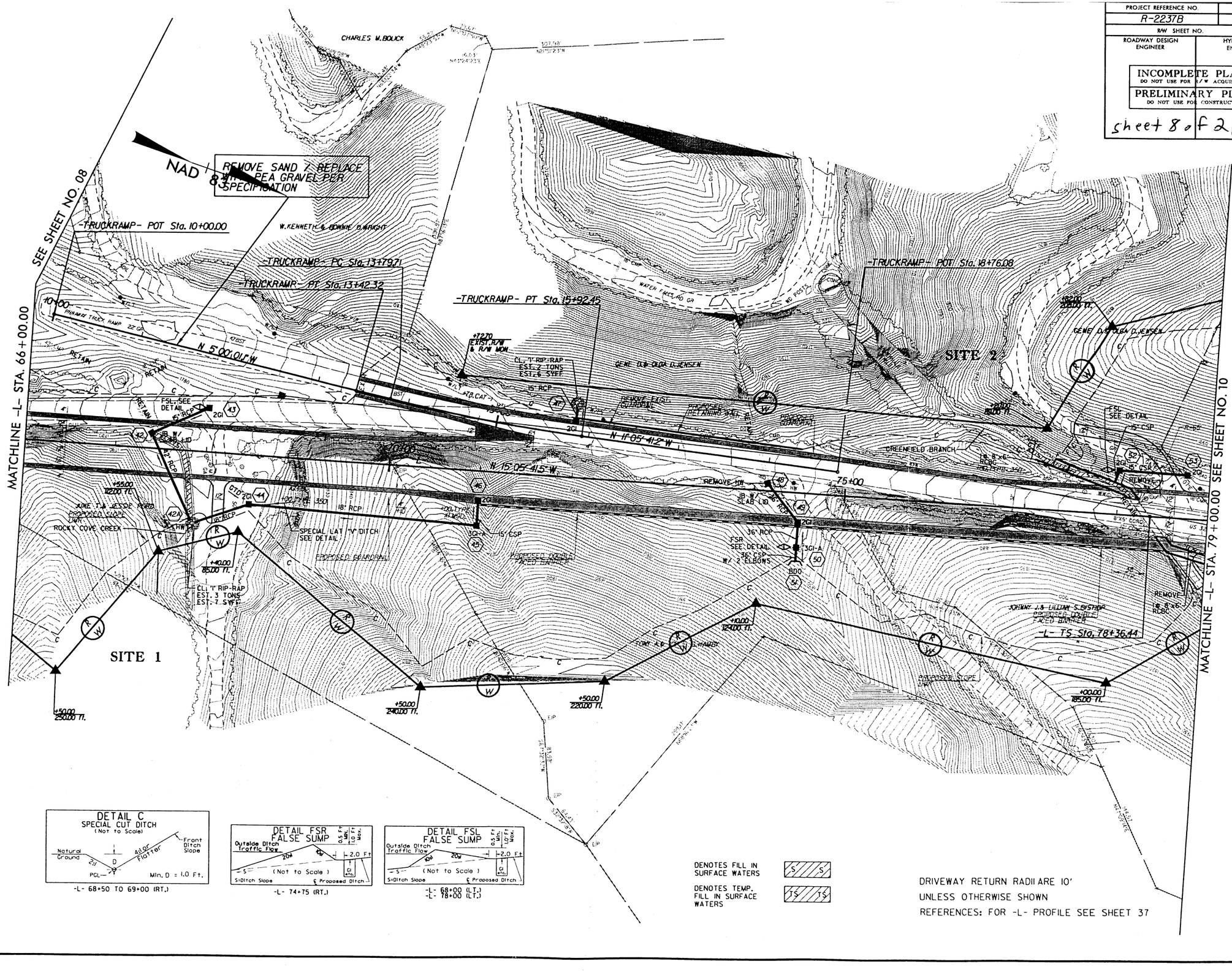
cc: Mr. John Thomas, USACE
Mr. John Hennessy, NCDWQ
Ms. Marla Chambers NCWRC
Ms. Becky Fox, USEPA – Whittier, NC
Ms. Marella Buncick USFWS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	09
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

sheet 8 of 21

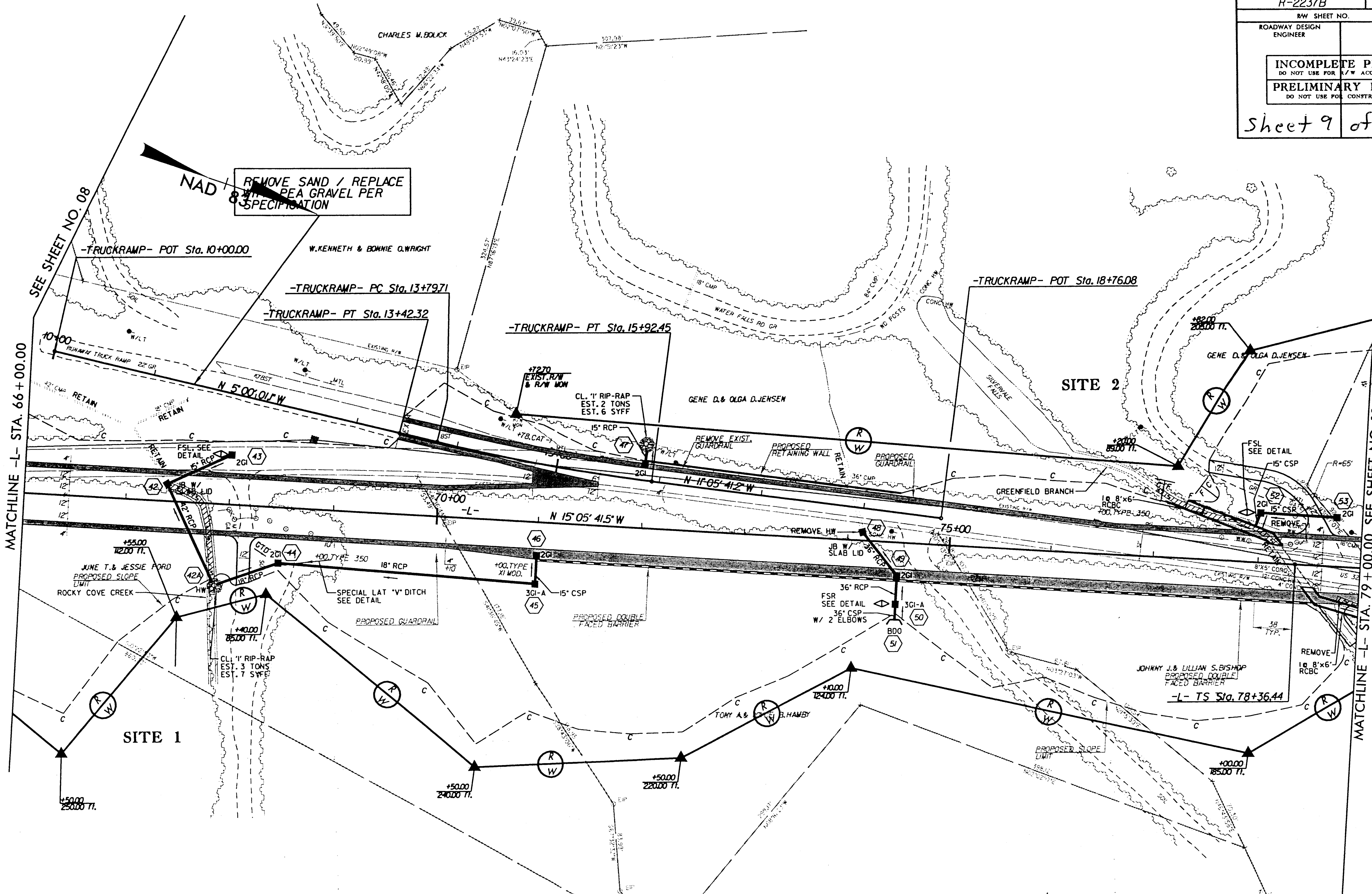


PROJECT REFERENCE NO.	SHEET NO.
R-2237B	09
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

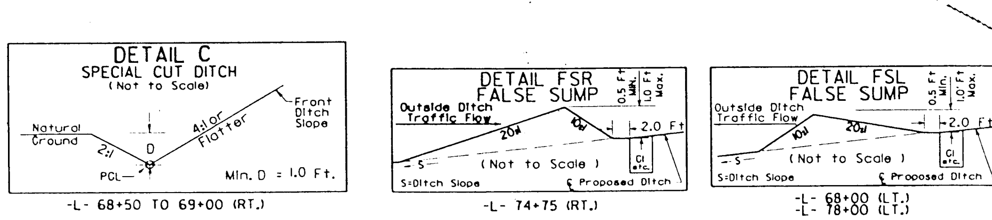
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

Sheet 9 of 21



NAD 83
REMOVE SAND / REPLACE WITH PEA GRAVEL PER SPECIFICATION
SEE SHEET NO. 08
CHARLES W. BOLICK
W. KENNETH & BONNIE O. WRIGHT
-TRUCKRAMP- POT Sta. 10+00.00
-TRUCKRAMP- PC Sta. 13+79.71
-TRUCKRAMP- PT Sta. 13+42.32
-TRUCKRAMP- PT Sta. 15+92.45
-TRUCKRAMP- POT Sta. 18+76.08
N 5°00'01" W
N 11°05'41.2" W
N 15°05'41.5" W
-L-
70+00
75+00
GENE D. & OLGA D. JENSEN
GENE D. & OLGA D. JENSEN
SITE 1
SITE 2
MATCHLINE -L- STA. 66+00.00
MATCHLINE -L- STA. 79+00.00 SEE SHEET NO. 10
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
REMOVE EXIST. GUARDRAIL
PROPOSED RETAINING WALL
PROPOSED GUARDRAIL
GREENFIELD BRANCH
ROCKY COVE CREEK
JUNE T. & JESSIE FORD
PROPOSED SLOPE LIMIT
SPECIAL LAT "V" DITCH SEE DETAIL
PROPOSED DOUBLE FACED BARRIER
FSR SEE DETAIL
FSL SEE DETAIL
36" CSP W/ 2 ELBOWS
JB W/ SLAB LID
REMOVE HW
TONY A. & B. HAMBY
JOHNNY J. & LILLIAN S. BISHOP
-L- TS Sta. 78+36.44
REMOVE 1@ 8'x6' RCBC
+55.00 112.00 Ft.
+40.00 85.00 Ft.
+50.00 250.00 Ft.
+50.00 240.00 Ft.
+50.00 220.00 Ft.
+10.00 124.00 Ft.
+00.00 185.00 Ft.
+82.00 205.00 Ft.
+20.00 85.00 Ft.



DENOTES FILL IN SURFACE WATERS

DENOTES TEMP. FILL IN SURFACE WATERS

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 37

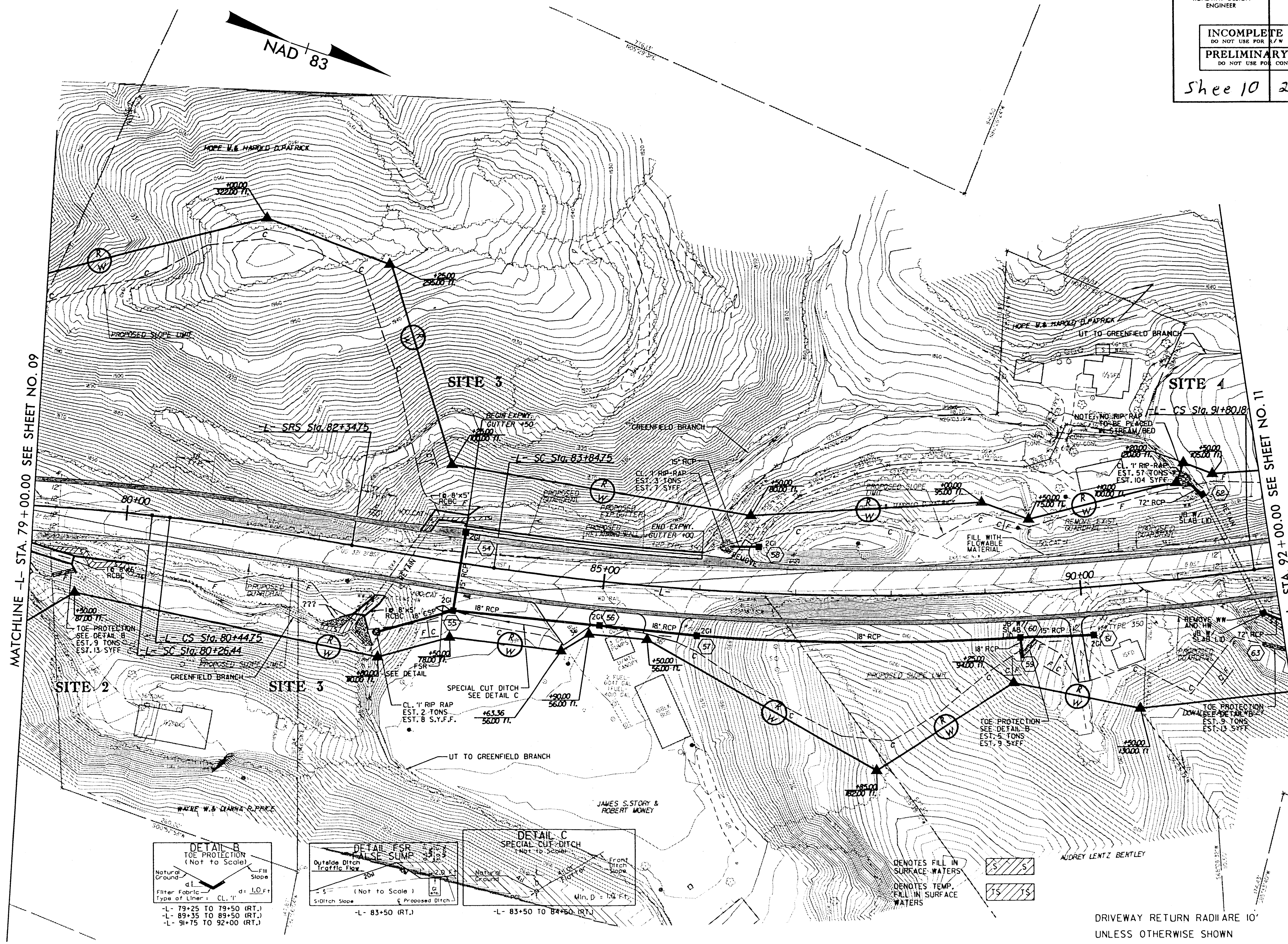
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Shee 10 21



NAD 83
HOPE W. & HAROLD D. PATRICK
SITE 3
SITE 2
SITE 4
MATCHLINE -L- STA. 79+00.00 SEE SHEET NO. 09
MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 11
PROPOSED SLOPE LIMIT
-L- SRS Sta. 82+34.75
-L- SC Sta. 83+84.75
-L- CS Sta. 80+44.75
-L- SC Sta. 80+26.44
-L- CS Sta. 91+80.18
BEGIN EXPWY. GUTTER +50
END EXPWY. GUTTER +00
GREENFIELD BRANCH
UT TO GREENFIELD BRANCH
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CL. 'I' RIP RAP EST. 57 TONS EST. 104 SYFF
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
CL. 'I' RIP RAP EST. 2 TONS EST. 8 S.Y.F.F.
TOE PROTECTION SEE DETAIL B EST. 9 TONS EST. 13 SYFF
TOE PROTECTION SEE DETAIL B EST. 5 TONS EST. 9 SYFF
SPECIAL CUT DITCH SEE DETAIL C
FILL WITH FLOWABLE MATERIAL
REMOVE WW AND HW
80+00
85+00
90+00
18" RCP
15" RCP
72" RCP
JAMES S. STORY & ROBERT MONEY
WAYNE W. & LIANNA R. PRICE
AUDREY LENTZ BENTLEY
DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d = 1.0 Ft.
-L- 79+25 TO 79+50 (RT.)
-L- 89+35 TO 89+50 (RT.)
-L- 91+75 TO 92+00 (RT.)
DETAIL FSR
FALSE SUMP
Outside Ditch Traffic Flow
(Not to Scale)
S=Ditch Slope
Proposed Ditch
-L- 83+50 (RT.)
DETAIL C
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Front Ditch Slope
Min. D = 1.0 Ft.
-L- 83+50 TO 84+50 (RT.)
DENOTES FILL IN SURFACE WATERS
DENOTES TEMP. FILL IN SURFACE WATERS

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 38

8/17/98

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 11 of 21

NAD 83

MATCHLINE -L- STA. 79+00.00 SEE SHEET NO. 09

MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 11

HOPE M.& HAROLD D.PATRICK

SITE 1

SITE 2

SITE 3

SITE 4

-L- SRS Sta. 82+34.75

-L- SC Sta. 83+84.75

-L- CS Sta. 80+44.75

-L- SC Sta. 80+26.44

-L- CS Sta. 91+80.18

PROPOSED SLOPE LIMIT

GREENFIELD BRANCH

UT TO GREENFIELD BRANCH

BEGIN EXPWY. GUTTER +50

END EXPWY. GUTTER +00

PROPOSED GUARDRAIL

PROPOSED EXP. GUTTER

PROPOSED RETAINING WALL

REMOVE EXIST GUARDRAIL

FILL WITH FLOWABLE MATERIAL

TOE PROTECTION SEE DETAIL B EST. 9 TONS EST. 13 SYFF

TOE PROTECTION SEE DETAIL B EST. 5 TONS EST. 9 SYFF

TOE PROTECTION SEE DETAIL B EST. 9 TONS EST. 13 SYFF

SPECIAL CUT DITCH SEE DETAIL C

CL. 'I' RIP RAP EST. 2 TONS EST. 8 S.Y.F.F.

CL. 'I' RIP-RAP EST. 57 TONS EST. 104 SYFF

NOTE: NO RIP RAP TO BE PLACED IN STREAM BED

WAYNE W.& DIANNA R.PRICE

JAMES S.STORY & ROBERT MONEY

AUDREY LENTZ BENTLEY

DETAIL B
TOE PROTECTION
(Not to Scale)

-L- 79+25 TO 79+50 (RT.)
-L- 89+35 TO 89+50 (RT.)
-L- 91+75 TO 92+00 (RT.)

DETAIL FSR
FALSE SUMP
(Not to Scale)

-L- 83+50 (RT.)

DETAIL C
SPECIAL CUT-DITCH
(Not to Scale)

-L- 83+50 TO 84+50 (RT.)

DENOTES FILL IN SURFACE WATERS

DENOTES TEMP. FILL IN SURFACE WATERS

DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN

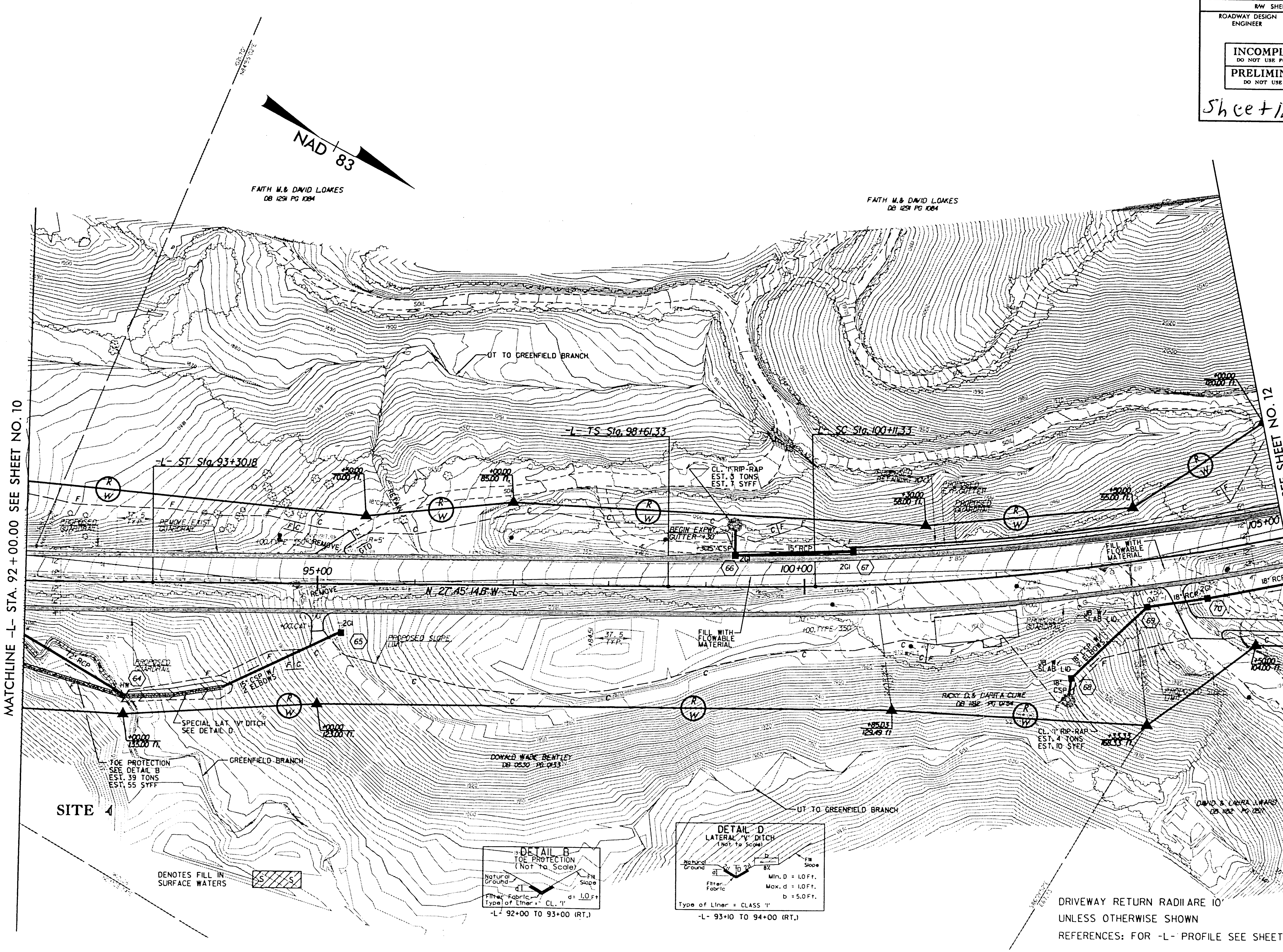
REFERENCES: FOR -L- PROFILE SEE SHEET 38

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 12 of 21



NAD 83
FAITH M. & DAVID LOAKES
DB 1291 PG 1084
UT TO GREENFIELD BRANCH
MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 10
MATCHLINE -L- STA. 105+00.00 SEE SHEET NO. 12
-L- ST Sta. 93+30.18
-L- TS Sta. 98+61.33
-L- SC Sta. 100+11.33
CL. 'I' RIP-RAP
EST. 3 TONS
EST. 7 SYFF
BEGIN EXPW. GUTTER +30
15" RCP
95+00
100+00
105+00
N 27°45'14.8" W -L-
FILL WITH FLOWABLE MATERIAL
PROPOSED SLOPE LIMIT
SPECIAL LAT. 'V' DITCH
SEE DETAIL D
TOE PROTECTION
SEE DETAIL B
EST. 39 TONS
EST. 55 SYFF
GREENFIELD BRANCH
DONALD WADE BENTLEY
DB 0530 PG 0153
RICKY D. & CARITA CLINE
CL. 'I' RIP-RAP
EST. 4 TONS
EST. 10 SYFF
UT TO GREENFIELD BRANCH
DAVID & LAURA LINARD
SITE 4
DENOTES FILL IN SURFACE WATERS
DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d= 1.0 Ft.
-L- 92+00 TO 93+00 (RT.)
DETAIL D
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
b = 5.0 Ft.
Type of Liner = CLASS 'I'
-L- 93+10 TO 94+00 (RT.)

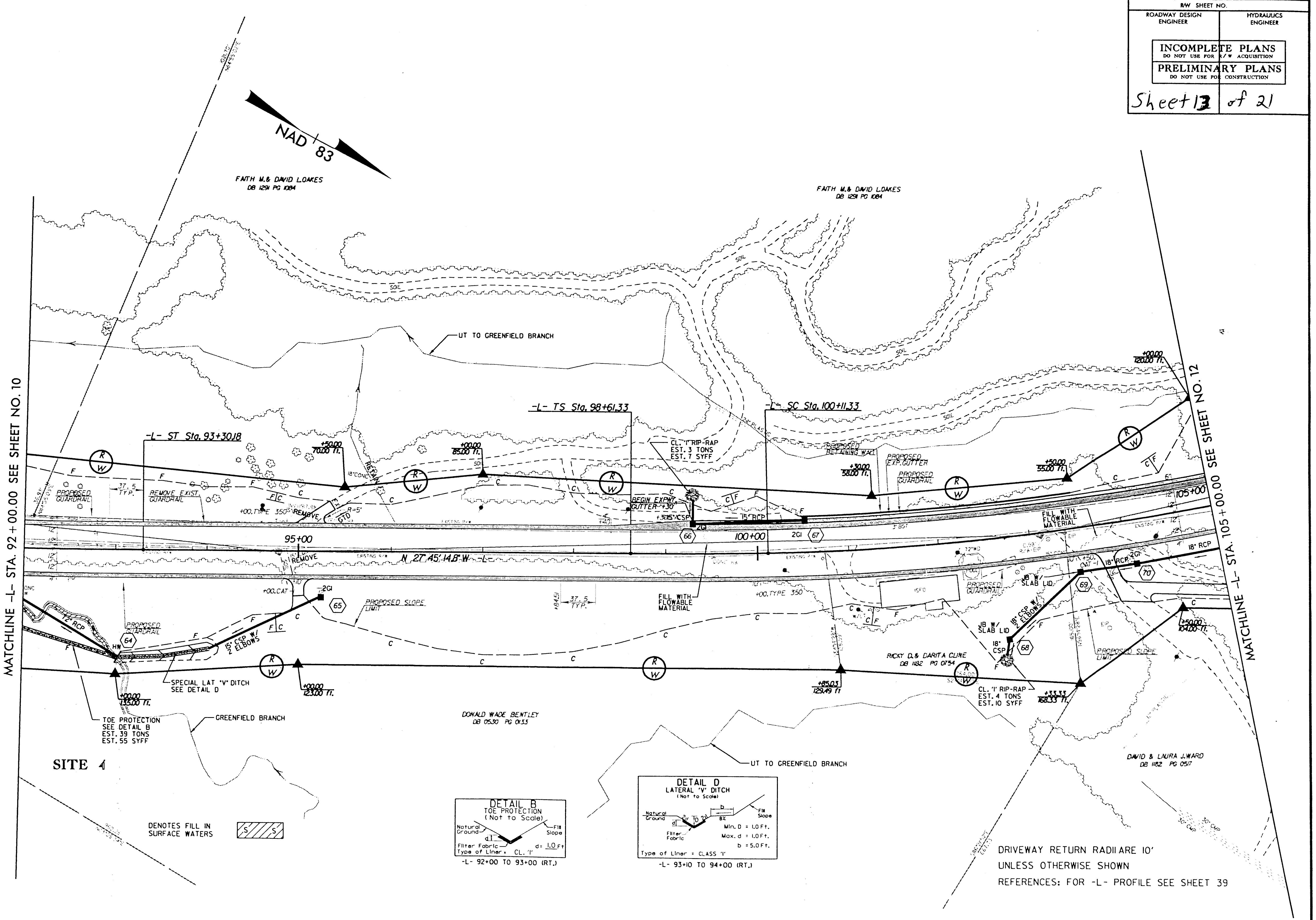
DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 39

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 13 of 21



NAD 83
FAITH M.& DAVID LOAKES
DB 1291 PG 1084
UT TO GREENFIELD BRANCH
MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 10
MATCHLINE -L- STA. 105+00.00 SEE SHEET NO. 12
-L- ST Sta. 93+30.18
-L- TS Sta. 98+61.33
-L- SC Sta. 100+11.33
CL. 'I' RIP-RAP
EST. 3 TONS
EST. 7 SYFF
PROPOSED RETAINING WALL
PROPOSED EXP. GUTTER
PROPOSED GUARDRAIL
REMOVE EXIST. GUARDRAIL
BEGIN EXP. GUTTER
15" RCP
95+00
100+00
105+00
N 27°45'14.8" W -L-
FILL WITH FLOWABLE MATERIAL
18" RCP
JB W/ SLAB LID
18" CSP W/ 2 ELBOWS
PROPOSED SLOPE LIMIT
15" CSP W/ 2 ELBOWS
12" RCP
SPECIAL LAT 'V' DITCH
SEE DETAIL D
TOE PROTECTION
SEE DETAIL B
EST. 39 TONS
EST. 55 SYFF
GREENFIELD BRANCH
DONALD WADE BENTLEY
DB 0530 PG 0133
RICKY D.& DARITA CLINE
DB 1182 PG 0754
CL. 'I' RIP-RAP
EST. 4 TONS
EST. 10 SYFF
DAVID & LAURA J.WARD
DB 1182 PG 0517
SITE 4

DENOTES FILL IN SURFACE WATERS

DETAIL B
TOE PROTECTION
(Not to Scale)

Natural Ground — Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d = 1.0 Ft.

-L- 92+00 TO 93+00 (RT.)

DETAIL D
LATERAL 'V' DITCH
(Not to Scale)

Natural Ground — Fill Slope
Filter Fabric
Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
b = 5.0 Ft.
Type of Liner = CLASS 'I'

-L- 93+10 TO 94+00 (RT.)

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 39

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 14 of 21

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 41

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 15 | 21

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 41

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 16 of 21

NAD 83

SITE 6B

SITE 6A

-L- STA. 132+00.00 SEE SHEET NO. 13

MATCHLINE -L- STA. 145+00.00 SEE SHEET NO. 15

-Y1- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y1- POT Sta. 10+05.00

-Y1- PC Sta. 11+98.21

-Y1- PT Sta. 15+09.41

-L- POT Sta. 139+95.31 =
-Y1- POT Sta. 15+78.31

-L- TS Sta. 141+74.96

-L- SC Sta. 144+54.96

-Y1- PC Sta. 17+60.02

-Y1- PT Sta. 18+25.45

-Y1- PC Sta. 18+43.83

END CONSTRUCTION
-Y1- POC Sta. 19+50.00
-Y1- PT Sta. 19+67.61

TRANSITION STONE
CL. 1 RIP-RAP
EST. 30 TONS
EST. 50 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 49 TONS
EST. 168 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 57 TONS
EST. 80 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 74 TONS
EST. 105 SYFF

LAT. 'Y' DITCH
SEE DETAIL D
EST. 55 TONS
EST. 78 SYFF

LAT. 'Y' DITCH
SEE DETAIL D
EST. 36 TONS
EST. 50 SYFF

RESURFACE WITH A LAYER OF SURFACE COURSE

RETAIN & CLEAN OUT EXISTING PIPE

SPECIAL CUT DITCH
SEE DETAIL F

FILL WITH FLOWABLE MATERIAL

REMOVE

REMOVE HW

ENERGY DISSIPATOR

SPRING BOX

FOX P. & MARLENE BOLICK

MARCUS & LINDA BOLICK

NICHOLAS M. CURTIS

EDWARD W. & JANICE J. TROTTMAN

DETAIL FSR
FALSE SUMP
(Not To Scale)

DETAIL B
TOE PROTECTION
(Not To Scale)

DETAIL D
LATERAL 'Y' DITCH
(Not To Scale)

DETAIL F
SPECIAL CUT DITCH
(Not To Scale)

-L- 135+00 TO 136+45 (LT.)
-Y1- 12+55 TO 14+50 (RT.)

-L- 141+50 TO 142+00 (LT.)

DENOTES FILL IN WETLANDS

DENOTES EXCAVATION IN WETLANDS

DENOTES MECHANIZED CLEARING

DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN

REFERENCES: FOR -L- PROFILE SEE SHEET 42
FOR -Y1- PROFILE SEE SHEET 60

ROADWAY TO BE OBLITERATED

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 17 of 21

8/17/99

NAD 83

SITE 6B

SITE 6A

TROY P.& MARLENE BOUCK

MARCUS & LINDA BOUCK

NICHOLAS W. CURTIS

JOSEPH R. GOINS, et al

HOWARD P.& JANICE J. TROUTMAN

-Y1- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y1- POT Sta. 10+05.00

-Y1- PC Sta. 11+98.21

-Y1- PT Sta. 15+09.47

-L- POT Sta.139+95.31 =
-Y1- POT Sta.15+78.31

-L- TS Sta. 141+74.96

-L- SC Sta. 144+54.96

-Y1- PC Sta. 17+60.02

-Y1- PT Sta. 18+25.45

-Y1- PC Sta. 18+43.83

END CONSTRUCTION
-Y1- POC Sta. 19+50.00

-Y1- PT Sta. 19+50.88

-Y1- POT Sta. 19+67.61

N 45° 50' 27.0" W

N 63° 50' 12.6" E

N 32° 44' 40.5" E

N 25° 06.0' W

MATCHLINE -L- STA. 132+00.00 SEE SHEET NO. 13

MATCHLINE -L- STA. 145+00.00 SEE SHEET NO. 15

TRANSITION STONE
CL. 'I' RIP-RAP
EST. 30 TONS
EST. 50 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 57 TONS
EST. 80 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 119 TONS
EST. 168 SYFF

TOE PROTECTION
SEE DETAIL B
EST. 74 TONS
EST. 105 SYFF

TRANSITION STONE
CL. 'I' RIP-RAP
EST. 18 TONS
EST. 25 SYFF

'I' RIP-RAP
EST. 2 TONS
EST. 6 SYFF

LAT. 'V' DITCH
SEE DETAIL D
EST. 55 TONS
EST. 78 SYFF

LAT. 'V' DITCH
SEE DETAIL D
EST. 36 TONS
EST. 50 SYFF

ENERGY DISSIPATOR

SPRING BOX

RETAIN & CLEAN OUT EXISTING PIPE

RESURFACE WITH LAYER OF SURFACE COURSE

ABANDON EXIST. H/W

FILL WITH FLOWABLE MATERIAL

REMOVE HW

REMOVE

SPECIAL CUT DITCH SEE DETAIL F

DETAIL FSR
FALSE SUMP

DETAIL B
TOE PROTECTION
(Not to Scale)

DETAIL D
LATERAL 'V' DITCH
(Not to Scale)

DETAIL F
SPECIAL CUT DITCH
(Not to Scale)

-L- 135+00 TO 136+45 (LT.)
-Y1- 12+55 TO 14+50 (RT.)

-L- 141+50 TO 142+00 (LT.)

-L- 135+50 TO 137+00 (RT.)
-Y1- 11+50 TO 13+00 (RT.)
-Y1- 12+50 TO 14+70 (LT.)

DENOTES FILL IN WETLANDS

DENOTES EXCAVATION IN WETLANDS

DENOTES MECHANIZED CLEARING

DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN

REFERENCES: FOR -L- PROFILE SEE SHEET 42
FOR -Y1- PROFILE SEE SHEET 60

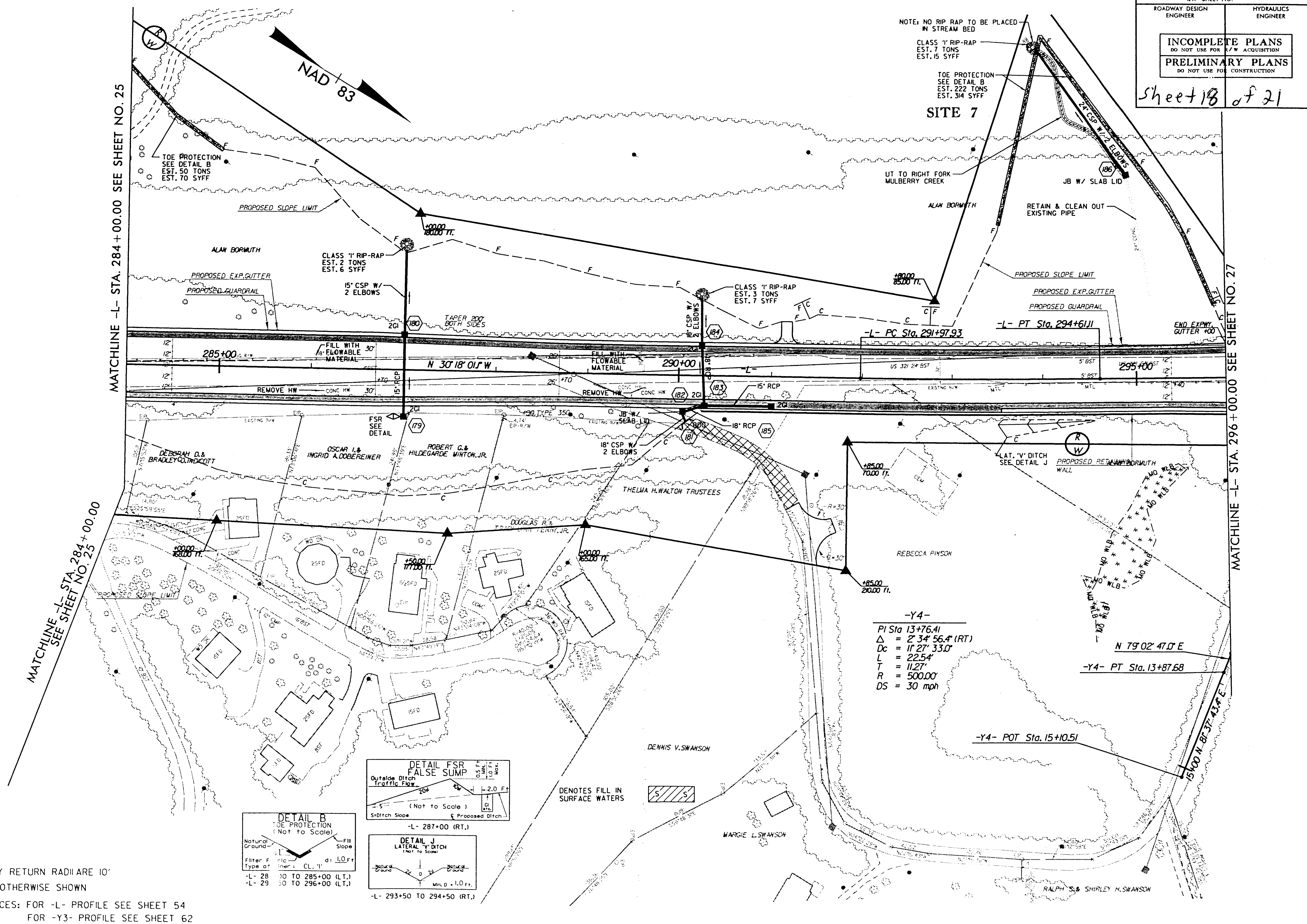
ROADWAY TO BE OBLITERATED

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

Sheet 18 of 21



SITE 7
NAD 83
MATCHLINE -L- STA. 284+00.00 SEE SHEET NO. 25
MATCHLINE -L- STA. 296+00.00 SEE SHEET NO. 27
MATCHLINE -L- STA. 284+00.00 SEE SHEET NO. 25
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CLASS 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
TOE PROTECTION SEE DETAIL B EST. 222 TONS EST. 314 SYFF
TOE PROTECTION SEE DETAIL B EST. 50 TONS EST. 70 SYFF
24" CSP W/ 2 ELBOWS
UT TO RIGHT FORK MULBERRY CREEK
JB W/ SLAB LID
RETAIN & CLEAN OUT EXISTING PIPE
ALAN BORMUTH
PROPOSED SLOPE LIMIT
PROPOSED EXP. GUTTER
PROPOSED GUARDRAIL
CLASS 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
15" CSP W/ 2 ELBOWS
CLASS 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
18" CSP W/ 2 ELBOWS
TAPER 200' BOTH SIDES
-L- PC Sta. 291+97.93
-L- PT Sta. 294+61.11
END EXPWY. GUTTER
FILL WITH FLOWABLE MATERIAL
N 30°18' 01.5" W
REMOVE HW
15" RCP
18" RCP
JB W/ SLAB LID
FSR SEE DETAIL
LAT. 'V' DITCH SEE DETAIL J
PROPOSED RETAINING WALL
DEBORAH D. & BRADLEY C. TRADCOTT
OSCAR I. & INGRID A. COBEREINER
ROBERT G. & HILDEGARDE MINTON, JR.
THELMA H. WALTON TRUSTEES
REBECCA PINSON
DENNIS V. SWANSON
MARGIE L. SWANSON
RALPH S. & SHIRLEY H. SWANSON
-Y4-
PI Sta 13+76.41
Δ = 2°34' 56.4" (RT)
Dc = 11°27' 33.0"
L = 22.54'
T = 11.27'
R = 500.00'
DS = 30 mph
N 79°02' 47.0" E
-Y4- PT Sta. 13+87.68
-Y4- POT Sta. 15+10.51
DENOTES FILL IN SURFACE WATERS
DETAIL FSR FALSE SUMP
(Not to Scale)
-L- 287+00 (RT.)
DETAIL B TOE PROTECTION (Not to Scale)
Natural Ground
Fill Slope
Type of Liner: CL. 'I'
-L- 284+00 TO 285+00 (LT.)
-L- 295+00 TO 296+00 (LT.)
DETAIL J LATERAL 'V' DITCH (Not to Scale)
Natural Ground
Min. D = 1.0 Ft.
-L- 293+50 TO 294+50 (RT.)

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN

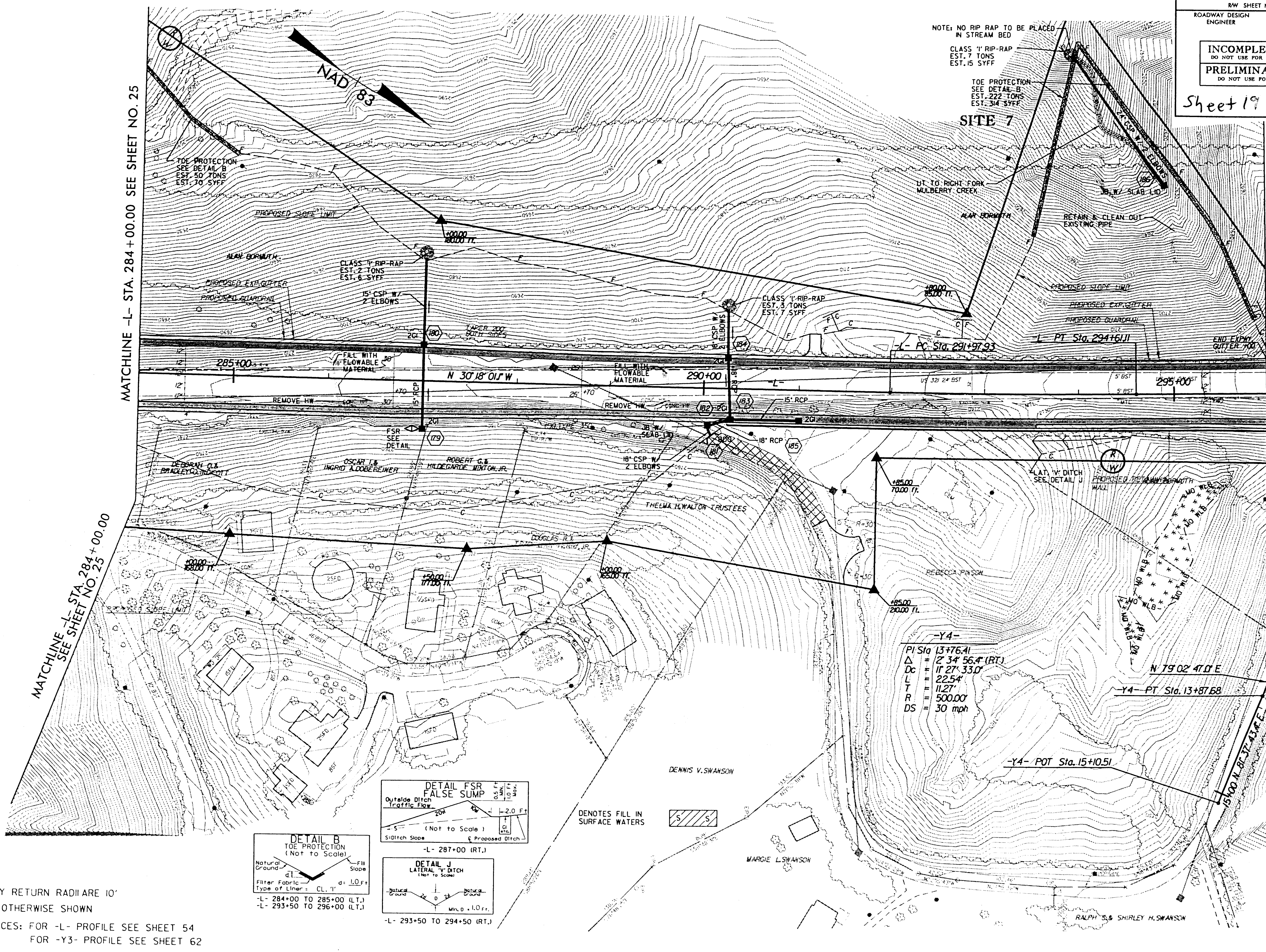
REFERENCES: FOR -L- PROFILE SEE SHEET 54
FOR -Y3- PROFILE SEE SHEET 62

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	26
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 19 of 21



NAD 83
MATCHLINE -L- STA. 284+00.00 SEE SHEET NO. 25
MATCHLINE -L- STA. 296+00.00 SEE SHEET NO. 27
MATCHLINE -L- STA. 284+00.00 SEE SHEET NO. 25
SITE 7
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CLASS 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
TOE PROTECTION SEE DETAIL B EST. 222 TONS EST. 314 SYFF
TOE PROTECTION SEE DETAIL B EST. 50 TONS EST. 70 SYFF
UT TO RIGHT FORK MULBERRY CREEK
RETAIN & CLEAN OUT EXISTING PIPE
PROPOSED SLOPE LIMIT
PROPOSED EXP. GUTTER
PROPOSED GUARDRAIL
CLASS 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
15" CSP W/ 2 ELBOWS
CLASS 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
FILL WITH FLOWABLE MATERIAL
N 30°18' 01.1" W
285+00
290+00
295+00
-L- PC Sta. 291+97.93
-L- PT Sta. 294+61.11
END EXP. GUTTER
REMOVE HW
FSR SEE DETAIL
18" RCP
15" RCP
18" CSP W/ 2 ELBOWS
LAT. 'V' DITCH SEE DETAIL J
PROPOSED RETAINING WALL
ALAN BORMUTH
DEBORAH G. & BRADLEY G. TRICOTT
OSCAR J. & INGRID A. DOBEREINER
ROBERT G. & HILDEGARDE MINTON, JR.
THELMA H. WALTON TRUSTEES
DOUGLAS R. HARRELL JR.
REBECCA PINSON
DENNIS V. SWANSON
MARGIE L. SWANSON
RALPH S. & SHIRLEY H. SWANSON
+00.00 180.00 Ft.
+80.00 85.00 Ft.
+00.00 168.00 Ft.
+50.00 177.00 Ft.
+00.00 165.00 Ft.
+85.00 70.00 Ft.
+85.00 210.00 Ft.
-Y4-
PI Sta 13+76.41
Δ = 2°34' 56.4" (RT.)
Dc = 11°27' 33.0"
L = 22.54'
T = 11.27'
R = 500.00'
DS = 30 mph
N 79°02' 47.0" E
-Y4- PT Sta. 13+87.68
-Y4- POT Sta. 15+10.51
15+00 N 81°37' 43.4" E
DETAIL FSR FALSE SUMP
Outside Ditch Traffic Flow
(Not to Scale)
S=Ditch Slope
Proposed Ditch
-L- 287+00 (RT.)
DETAIL B TOE PROTECTION (Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Type of Liner: CL. 'I'
d = 1.0 Ft
-L- 284+00 TO 285+00 (LT.)
-L- 293+50 TO 296+00 (LT.)
DETAIL J LATERAL 'V' DITCH (Not to Scale)
Natural Ground
Min. D = 1.0 Ft.
-L- 293+50 TO 294+50 (RT.)
DENOTES FILL IN SURFACE WATERS

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN

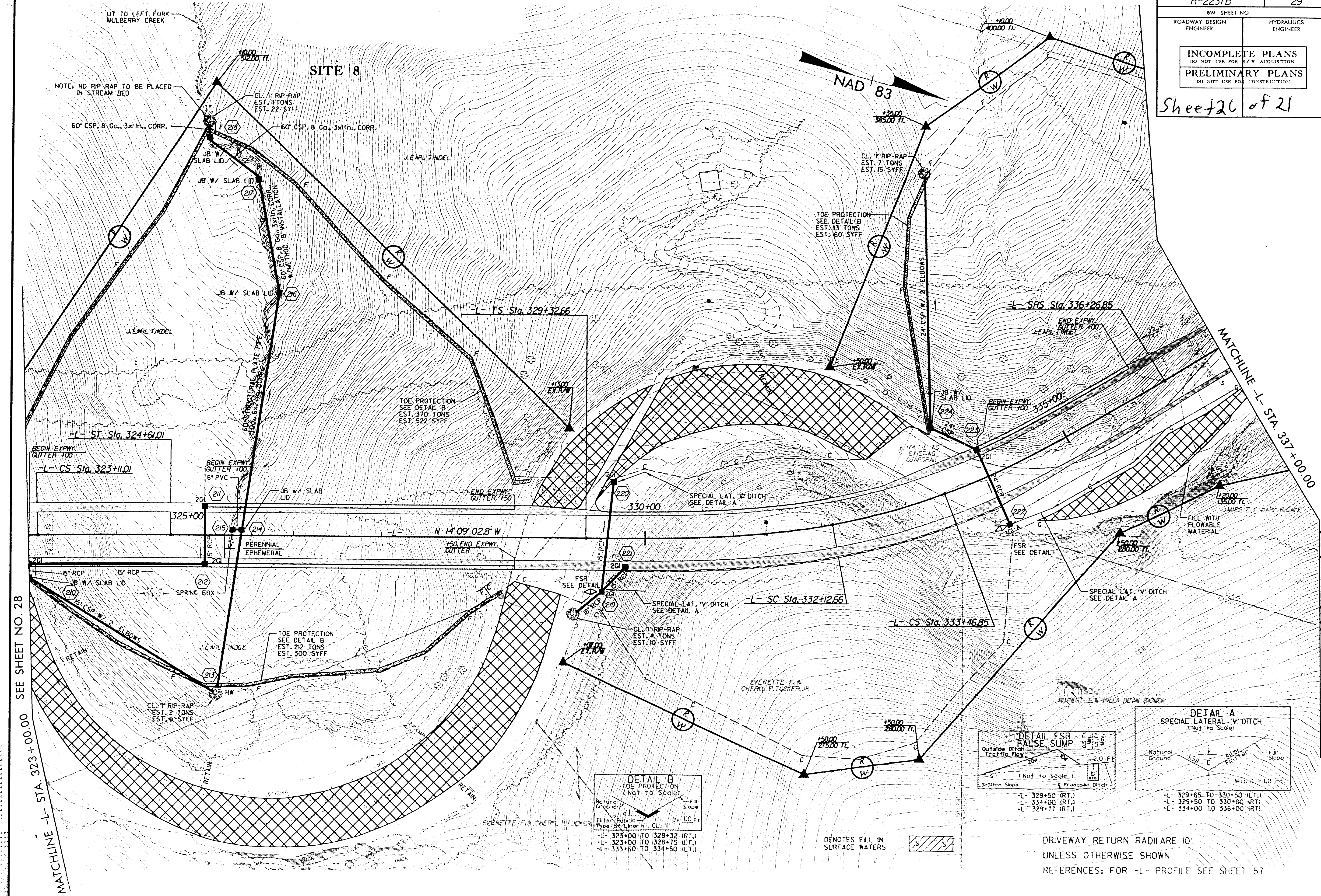
REFERENCES: FOR -L- PROFILE SEE SHEET 54
FOR -Y3- PROFILE SEE SHEET 62

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

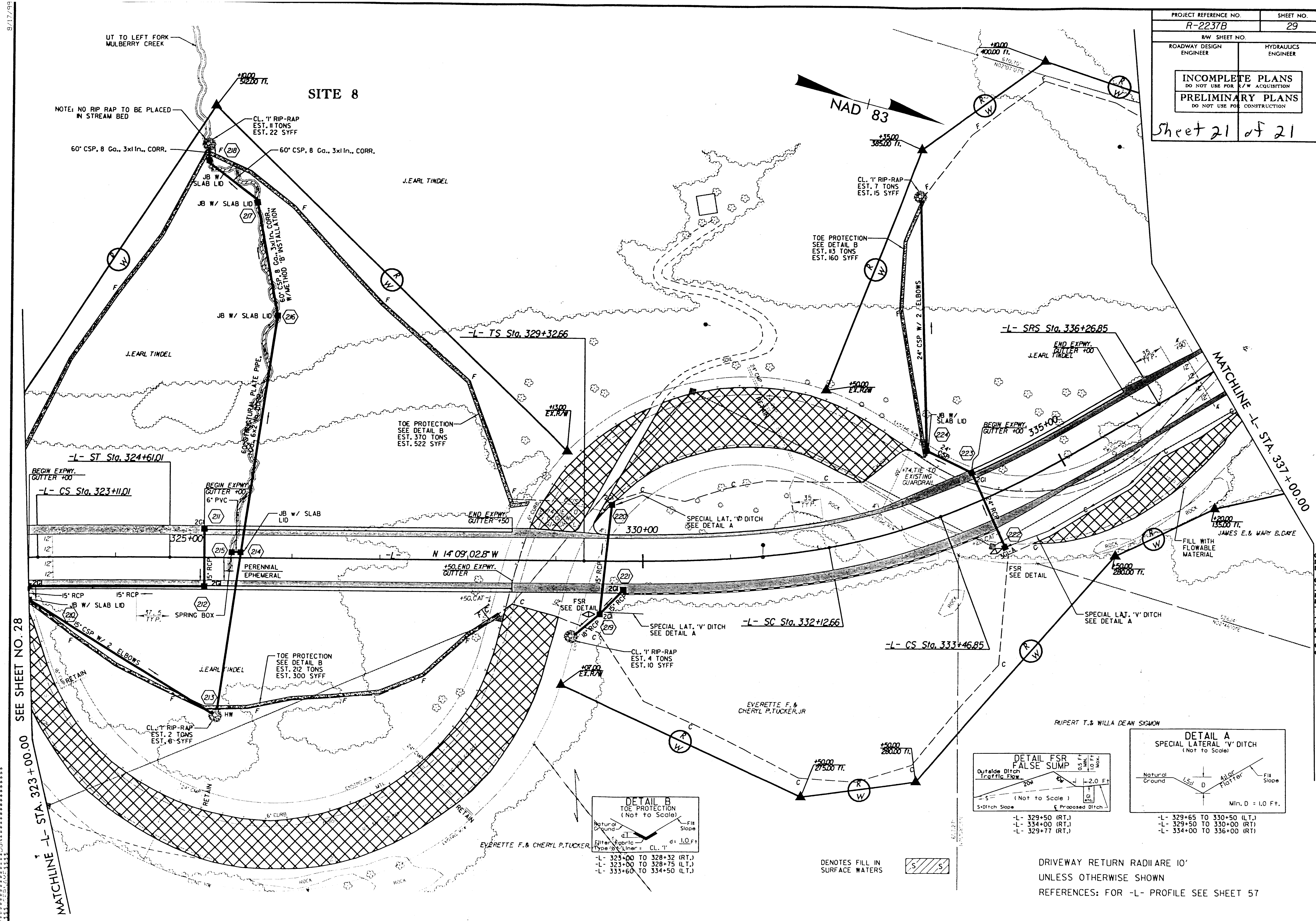
Sheet 20 of 21



SITE 8
NAD 83
UT TO LEFT FORK MULBERRY CREEK
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CL. 'I' RIP-RAP EST. 11 TONS EST. 22 SYFF
60" CSP, 8 Ga., 3x1 In., CORR.
JB W/ SLAB LID
J. EARL TINDEL
TOE PROTECTION SEE DETAIL B EST. 370 TONS EST. 522 SYFF
-L- TS Sta. 329+32.66
-L- ST Sta. 324+61.01
-L- CS Sta. 323+11.01
BEGIN EXPWY. GUTTER +00
END EXPWY. GUTTER +50
325+00
330+00
335+00
N 14°09'02.8" W
PERENNIAL
EPHEMERAL
15" RCP
SPRING BOX
15" CSP W/ 2 ELBOWS
TOE PROTECTION SEE DETAIL B EST. 212 TONS EST. 300 SYFF
CL. 'I' RIP-RAP EST. 2 TONS EST. 8 SYFF
SPECIAL LAT. 'V' DITCH SEE DETAIL A
FSR SEE DETAIL
CL. 'I' RIP-RAP EST. 4 TONS EST. 10 SYFF
-L- SC Sta. 332+12.66
-L- CS Sta. 333+46.85
-L- SRS Sta. 336+26.85
CL. 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
TOE PROTECTION SEE DETAIL B EST. 113 TONS EST. 160 SYFF
24" CSP W/ 2 ELBOWS
TIE TO EXISTING GUARDRAIL
FILL WITH FLOWABLE MATERIAL
EVERETTE E. & CHERYL P. TUCKER JR.
ROBERT E. & WILLA DEAN SOUGH
MATCHLINE -L- STA. 323+00.00 SEE SHEET NO. 28
MATCHLINE -L- STA. 337+00.00 SEE SHEET NO. 30
DETAIL B TOE PROTECTION (Not to Scale)
-L- 325+00 TO 328+32 (RT.)
-L- 323+00 TO 328+75 (LT.)
-L- 333+60 TO 334+50 (LT.)
DETAIL FSR FALSE SUMP (Not to Scale)
-L- 329+50 (RT.)
-L- 334+00 (RT.)
-L- 329+77 (RT.)
DETAIL A SPECIAL LATERAL 'V' DITCH (Not to Scale)
-L- 329+65 TO 330+50 (LT.)
-L- 329+50 TO 330+00 (RT.)
-L- 334+00 TO 336+00 (RT.)

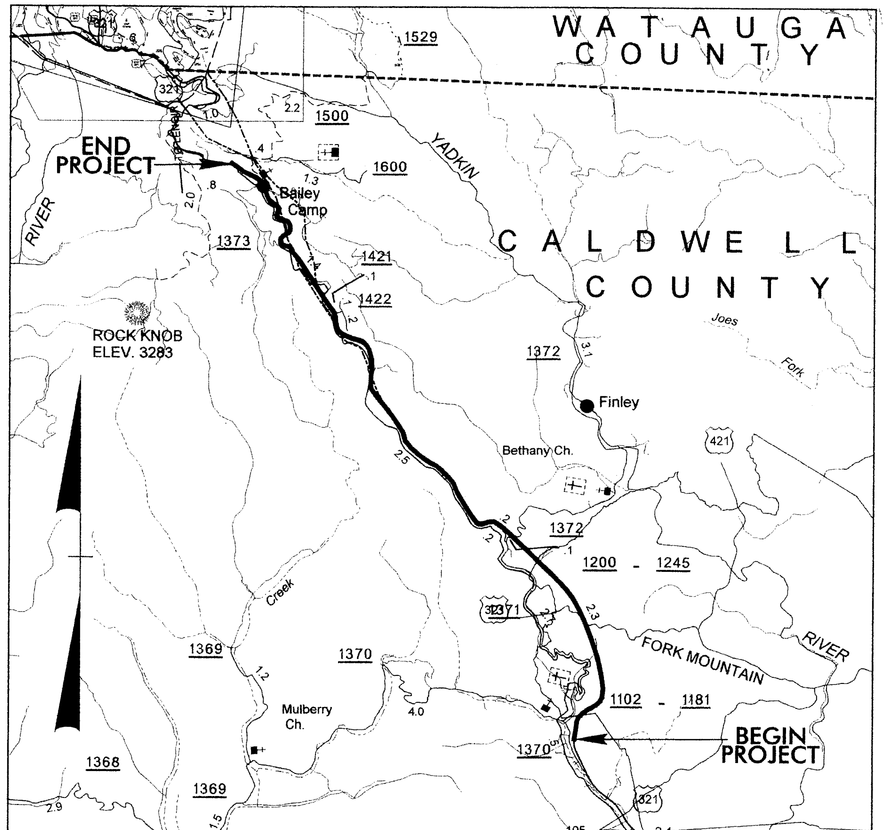
DENOTES FILL IN SURFACE WATERS

DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 57


PROJECT REFERENCE NO. R-2237B
SHEET NO. 29
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Sheet 21 of 21
SITE 8
NAD 83
UT TO LEFT FORK MULBERRY CREEK
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CL. 'I' RIP-RAP EST. 11 TONS EST. 22 SYFF
60" CSP, 8 Ga., 3x1 In., CORR.
JB W/ SLAB LID
J. EARL TINDEL
60" CSP, 8 Ga., 3x1 In., CORR., W/METHOD 'B' INSTALLATION
60" STRUCTURAL PLATE PIPE
TOE PROTECTION SEE DETAIL B EST. 370 TONS EST. 522 SYFF
-L- TS Sta. 329+32.66
-L- ST Sta. 324+61.01
BEGIN EXPWY. GUTTER +00
-L- CS Sta. 323+11.01
6" PVC
END EXPWY. GUTTER +50
N 14°09'02.8" W
PERENNIAL
EPHEMERAL
+50 END EXPWY. GUTTER
15" RCP
SPRING BOX
15" CSP W/ 2 ELBOWS
TOE PROTECTION SEE DETAIL B EST. 212 TONS EST. 300 SYFF
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
SPECIAL LAT. 'V' DITCH SEE DETAIL A
FSR SEE DETAIL
CL. 'I' RIP-RAP EST. 4 TONS EST. 10 SYFF
-L- SC Sta. 332+12.66
-L- CS Sta. 333+46.85
EVERETTE F. & CHERYL P. TUCKER, JR
CL. 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
TOE PROTECTION SEE DETAIL B EST. 113 TONS EST. 160 SYFF
24" CSP W/ 2 ELBOWS
-L- SRS Sta. 336+26.85
END EXPWY. GUTTER +00
BEGIN EXPWY. GUTTER +00
+74, TIE TO EXISTING GUARDRAIL
JAMES E. & MARY B. DAYE
FILL WITH FLOWABLE MATERIAL
RUPERT T. & WILLA DEAN SIGMON
MATCHLINE -L- STA. 337+00.00
SEE SHEET NO. 30
MATCHLINE -L- STA. 323+00.00
SEE SHEET NO. 28
DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d= 1.0 Ft
-L- 323+00 TO 328+32 (RT.)
-L- 323+00 TO 328+75 (LT.)
-L- 333+60 TO 334+50 (LT.)
DETAIL FSR
FALSE SUMP
Outside Ditch
Traffic Flow
(Not to Scale)
S=Ditch Slope
Proposed Ditch
-L- 329+50 (RT.)
-L- 334+00 (RT.)
-L- 329+77 (RT.)
DETAIL A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
4:1 or Flatter
Min. D = 1.0 Ft.
-L- 329+65 TO 330+50 (LT.)
-L- 329+50 TO 330+00 (RT)
-L- 334+00 TO 336+00 (RT)
DENOTES FILL IN SURFACE WATERS
DRIVEWAY RETURN RADII ARE 10'
UNLESS OTHERWISE SHOWN
REFERENCES: FOR -L- PROFILE SEE SHEET 57

CONTRACT: TIP PROJECT: R-2237B

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

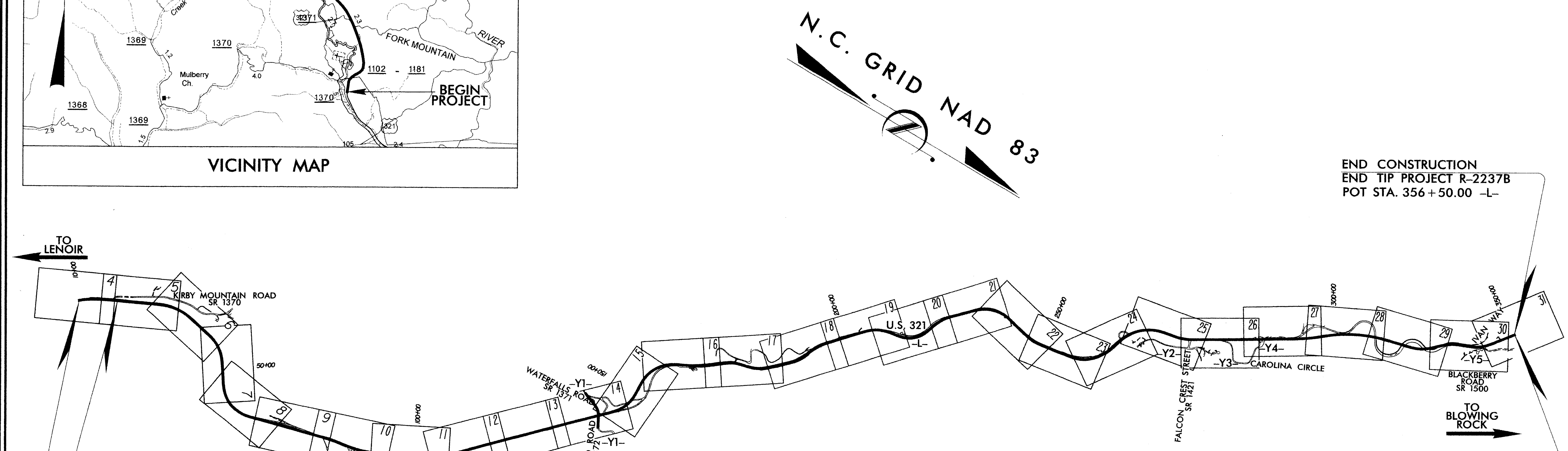
CALDWELL COUNTY

LOCATION: U.S. 321 FROM S.R. 1370 (KIRBY MOUNTAIN ROAD) TO S.R. 1500 (BLACKBERRY ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, CULVERTS, GUARDRAIL AND RETAINING WALLS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2237B	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34402.1.1		PE	
34402.2.1	NHF-321(11)	RW /UTL	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



BEGIN STATE R/W PROJECT 34402.2.1
POT STA. 21+75.00 -L-

BEGIN CONSTRUCTION
BEGIN TIP PROJECT R-2237B
PC STA. 9+86.41 -L-

END STATE R/W PROJECT 34402.2.1
POT STA. 357+00.00 -L-

NOTES:
USE METHOD III FOR CLEARING
DESIGN EXCEPTIONS REQUIRED FOR THIS PROJECT,
SEE SHEETS: 17 & 20
SEE PROFILE SHEETS: 34-36, 38-42, 44-47, 52, & 57-58

NCDOT CONTACT : TERESA BRUTON, P.E.; PROJECT ENGINEER - DESIGN SERVICES

GRAPHIC SCALES

5 0 5 10 — PLANS
5 0 5 10 — PROFILE (HORIZONTAL)
1 0 1 2 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2004 = 4700
ADT 2024 = 6900
DHV = 10 %
D = 60 %
T = 8 % *
V = 50 MPH
* TTST 3% DUAL 5%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2237B = 6.57 mi.

TOTAL LENGTH TIP PROJECT R-2237B = 6.57 mi.

Prepared In the Office of:
HDR Engineering, Inc. of the Carolinas
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: 12-31-02

LETTING DATE:

GREGORY A. KEMPF, P.E.
PROJECT ENGINEER

RONYELL A. THIGPEN
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

PROJECT REFERENCE NO.	SHEET NO.
R2237B	I-B

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

Edge of Pavement
Curb
Prop. Slope Stakes Cut
Prop. Slope Stakes Fill
Prop. Woven Wire Fence
Prop. Chain Link Fence
Prop. Barbed Wire Fence
Prop. Wheelchair Ramp — WCR
Curb Cut for Future Wheelchair Ramp — CCFR
Exist. Guardrail
Prop. Guardrail
Equality Symbol
Pavement Removal

RIGHT OF WAY

Baseline Control Point
Existing Right of Way Marker
Exist. Right of Way Line w/Marker
Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)
Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
Exist. Control of Access Line
Prop. Control of Access Line
Exist. Easement Line
Prop. Temp. Construction Easement Line
Prop. Temp. Drainage Easement Line — TDE
Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

Stream or Body of Water
River Basin Buffer — RBB
Flow Arrow
Disappearing Stream
Spring
Swamp Marsh
Shoreline
Falls, Rapids
Prop Lateral, Tail, Head Ditches — FLOW

STRUCTURES

MAJOR
Bridge, Tunnel, or Box Culvert — CONC
Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR
Head & End Wall — CONC HW
Pipe Culvert
Footbridge
Drainage Boxes — CB
Paved Ditch Gutter

UTILITIES

Exist. Pole
Exist. Power Pole
Prop. Power Pole
Exist. Telephone Pole
Prop. Telephone Pole
Exist. Joint Use Pole
Prop. Joint Use Pole
Telephone Pedestal
U/G Telephone Cable Hand Hold
Cable TV Pedestal
U/G TV Cable Hand Hold
U/G Power Cable Hand Hold
Hydrant
Satellite Dish
Exist. Water Valve
Sewer Clean Out
Power Manhole
Telephone Booth
Cellular Telephone Tower
Water Manhole
Light Pole
H-Frame Pole
Power Line Tower
Pole with Base
Gas Valve
Gas Meter
Telephone Manhole
Power Transformer
Sanitary Sewer Manhole
Storm Sewer Manhole
Tank; Water, Gas, Oil
Water Tank With Legs
Traffic Signal Junction Box
Fiber Optic Splice Box
Television or Radio Tower
Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS

Recorded Water Line — W
Designated Water Line (S.U.E.*) — W
Sanitary Sewer — SS
Recorded Sanitary Sewer Force Main — FSS
Designated Sanitary Sewer Force Main(S.U.E.*) — FSS
Recorded Gas Line — G
Designated Gas Line (S.U.E.*) — G
Storm Sewer — S
Recorded Power Line — P
Designated Power Line (S.U.E.*) — P
Recorded Telephone Cable — T
Designated Telephone Cable (S.U.E.*) — T
Recorded U/G Telephone Conduit — TC
Designated U/G Telephone Conduit (S.U.E.*) — TC
Unknown Utility (S.U.E.*) — ?UTL
Recorded Television Cable — TV
Designated Television Cable (S.U.E.*) — TV
Recorded Fiber Optics Cable — FO
Designated Fiber Optics Cable (S.U.E.*) — FO
Exist. Water Meter
U/G Test Hole (S.U.E.*)
Abandoned According to U/G Record — ATTUR
End of Information — E.O.I.

BOUNDARIES & PROPERTIES

State Line
County Line
Township Line
City Line
Reservation Line
Property Line
Property Line Symbol
Exist. Iron Pin — EIP
Property Corner
Property Monument — ECM
Property Number — 123
Parcel Number — 6
Fence Line — WW & ISBW
Existing Wetland Boundaries — WLB
High Quality Wetland Boundary — HQ WLB
Medium Quality Wetland Boundaries — MQ WLB
Low Quality Wetland Boundaries — LQ WLB
Proposed Wetland Boundaries — WLB
Existing Endangered Animal Boundaries — EAB
Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

Buildings
Foundations
Area Outline
Gate
Gas Pump Vent or U/G Tank Cap
Church
School
Park
Cemetery
Dam
Sign
Well
Small Mine
Swimming Pool

TOPOGRAPHY

Loose Surface
Hard Surface
Change in Road Surface
Curb
Right of Way Symbol — R/W
Guard Post — GP
Paved Walk
Bridge
Box Culvert or Tunnel
Ferry
Culvert
Footbridge
Trail, Footpath
Light House

VEGETATION

Single Tree
Single Shrub
Hedge
Woods Line
Orchard
Vineyard — VINEYARD

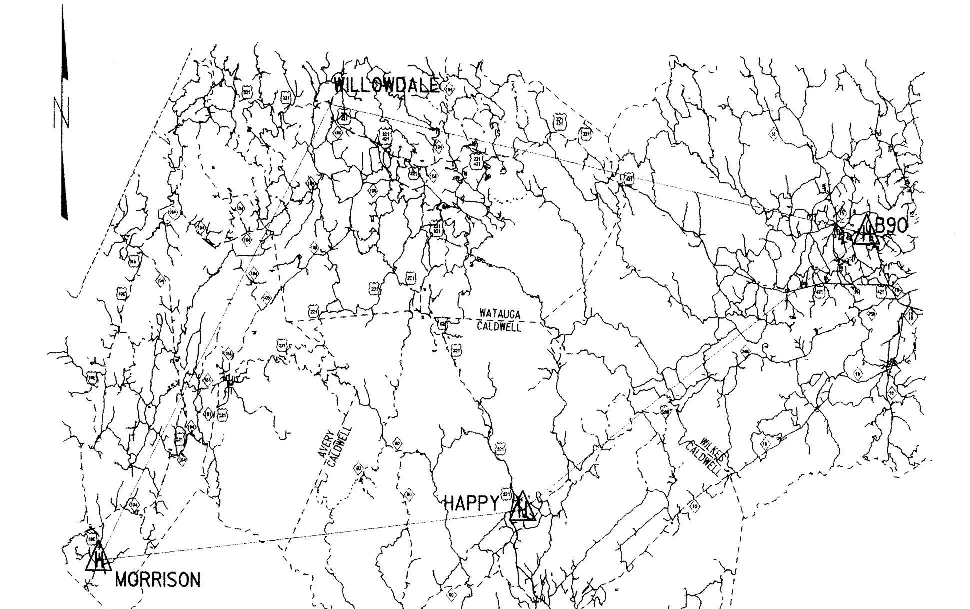
RAILROADS

Standard Gauge — CSX TRANSPORTATION
RR Signal Milepost — MILEPOST 35
Switch — SWITCH

revised 02/02/00

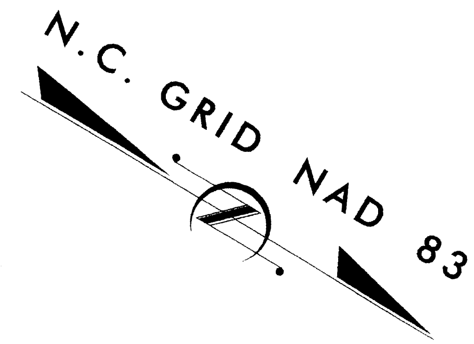
PROJECT REFERENCE NO.	SHEET NO.
6.739001T	1 C
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET



GPS CONTROL NETWORK

NOT TO SCALE



NOTES

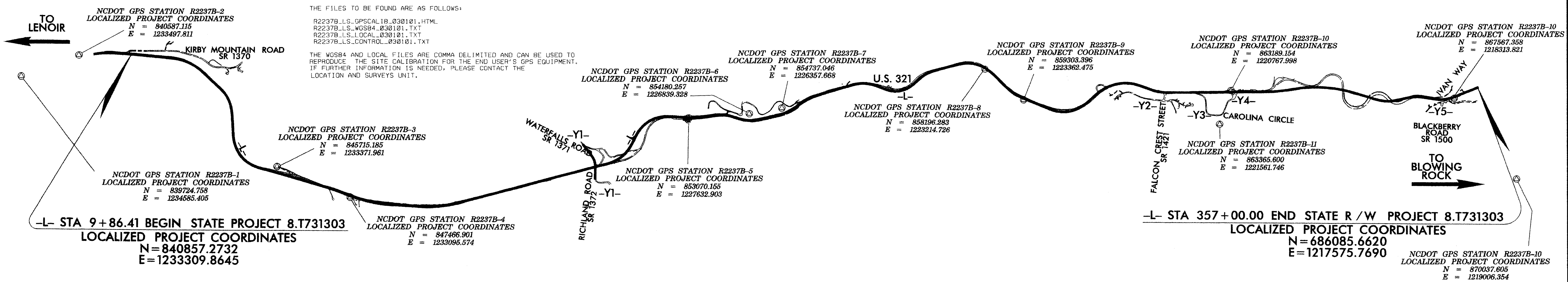
1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE NAD 83 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED. ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS. OR BIASES.

2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:

   R2237B_LS_GPSCALIB_030101.HTML
   R2237B_LS_WGS84_030101.TXT
   R2237B_LS_LOCAL_030101.TXT
   R2237B_LS_CONTROL_030101.TXT

   THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2237B-6"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 854180.257(ft) EASTING: 1226839.328(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .999908500
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2237B-6" TO -L- STATION 9+86.41 IS
S 25°54'16" E 14811.13'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

⊚ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.

PROJECT CONTROL ESTABLISHED UTILIZING GLOBAL POSITIONING SYSTEM.

NETWORK ESTABLISHED FROM EXISTING NCGS AND NC DOT MONUMENTATION.

SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES

NOTE: DRAWING NOT TO SCALE

SURVEY CONTROL SHEET R-2237B

GPS CALIBRATION REPORT

PROJECT : R2237B

TIP NUMBER	R-2237B		
USER NAME	RGMILLER	DATE & TIME	2:02:18 PM 7/29/2003
COORDINATE SYSTEM	US STATE PLANE 1983(AT GROUND)	ZONE	NORTH CAROLINA 3200
HORIZONTAL DATUM	NAD 1983 (CONUS)		
VERTICAL DATUM	NGVD 29	GEOID MODEL	GEOID99 (CONUS)
COORDINATE UNITS	US SURVEY FEET		
DISTANCE UNITS	US SURVEY FEET		
HEIGHT UNITS	US SURVEY FEET		

LOCAL SITE INFORMATION
LOCALIZED AROUND

LATITUDE	36°04′08.15088"N
LONGITUDE	81°36′58.81643"W
SITE SCALE FACTOR	1.0000915100

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION USES A LOCALIZED COORDINATE SYSTEM
WHICH IS VERY SIMILAR TO NORTH CAROLINA ZONE 3200 FROM WHICH IT IS DERIVED.
PLEASE TAKE CARE IN UTILIZING THESE COORDINATES TO ELIMINATE CONFUSION OF THE TWO SYSTEMS.
THIS FILE IS TO AID IN THE USE OF REAL TIME KINEMATIC (RTK) GPS DURING CONSTRUCTION LAYOUT.

DATUM TRANSFORMATION PARAMETERS

DATUM TRANSFORMATION COMPUTATION NOT REQUESTED

UPDATED DEFAULT PROJECTION (TRANSVERSE MERCATOR) DEFINITION

UPDATED DEFAULT PROJECTION NOT REQUESTED

HORIZONTAL ADJUSTMENT PARAMETERS

NORTHING COORDINATE OF ROTATION CENTER	857299.401SFT
EASTING COORDINATE OF ROTATION CENTER	1225185.479SFT
ROTATION ABOUT THE CENTER POINT	0°00′00"
TRANSLATION NORTH	-0.004SFT
TRANSLATION EAST	-0.149SFT
SCALE FACTOR	1.00000000

VERTICAL ADJUSTMENT PARAMETERS

NORTHING COORDINATE OF ORIGIN POINT	839724.782SFT
EASTING COORDINATE OF ORIGIN POINT	1234585.336SFT
VERTICAL SEPARATION AT ORIGIN	-0.095SFT
SLOPE NORTH	-1.446PPM
SLOPE EAST	1.414PPM

GEOID MODEL DEFINITION

GEOID99 (CONUS)

RESIDUAL DIFFERENCES BETWEEN GPS (WGS84) AND LOCAL COORDINATES

SUMMARY

	MAXIMUM ERROR	ROOT MEAN SQUARE ERROR	POINT
HORIZONTAL	0.130SFT	0.019	BR-2 - WGS84
VERTICAL	0.070SFT	0.011	WILLOWDALE - WGS
THREE-DIMENSIONAL	0.138SFT	0.022	BR-2 - WGS84

POINT RESIDUALS

WGS84 COORDINATES		CALCULATED POINT FOR DISPLAY ONLY		LOCAL COORDINATES
POINT	R2237B-1 - WGS84	NORTHING	839724.782SFT	POINT R2237B-1 - LOCAL
LATITUDE	36°01′47.26632"N	EASTING	1234585.336SFT	NORTHING 839724.758SFT
LONGITUDE	81°35′19.91210"W	ELEVATION	1382.833SFT	EASTING 1234585.405SFT
HEIGHT	1277.438SFT	HORZ ERROR	0.073SFT	ELEVATION 1382.868SFT
		VERT ERROR	0.035SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.081SFT	QUALITY SURVEY QUALITY
POINT	R2237B-2 - WGS84	NORTHING	840587.133SFT	POINT R2237B-2 - LOCAL
LATITUDE	36°01′55.51013"N	EASTING	1233497.746SFT	NORTHING 840587.115SFT
LONGITUDE	81°35′33.42179"W	ELEVATION	1391.958SFT	EASTING 1233497.811SFT
HEIGHT	1286.612SFT	HORZ ERROR	0.067SFT	ELEVATION 1391.979SFT
		VERT ERROR	0.021SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.071SFT	QUALITY SURVEY QUALITY
POINT	R2237B-3 - WGS84	NORTHING	845715.200SFT	POINT R2237B-3 - LOCAL
LATITUDE	36°02′46.16884"N	EASTING	1233371.664SFT	NORTHING 845715.185SFT
LONGITUDE	81°35′36.58690"W	ELEVATION	1793.865SFT	EASTING 1233371.691SFT
HEIGHT	1688.661SFT	HORZ ERROR	0.031SFT	ELEVATION 1793.901SFT
		VERT ERROR	0.036SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.047SFT	QUALITY SURVEY QUALITY
POINT	R2237B-4 - WGS84	NORTHING	847466.908SFT	POINT R2237B-4 - LOCAL
LATITUDE	36°03′03.41318"N	EASTING	1233095.559SFT	NORTHING 847466.901SFT
LONGITUDE	81°35′40.50504"W	ELEVATION	1855.342SFT	EASTING 1233095.574SFT
HEIGHT	1750.197SFT	HORZ ERROR	0.017SFT	ELEVATION 1855.381SFT
		VERT ERROR	0.039SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.042SFT	QUALITY SURVEY QUALITY
POINT	R2237B-5 - WGS84	NORTHING	853070.153SFT	POINT R2237B-5 - LOCAL
LATITUDE	36°03′57.38432"N	EASTING	1227632.909SFT	NORTHING 853070.155SFT
LONGITUDE	81°36′48.79658"W	ELEVATION	2202.839SFT	EASTING 1227632.903SFT
HEIGHT	2098.040SFT	HORZ ERROR	0.006SFT	ELEVATION 2202.837SFT
		VERT ERROR	0.002SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.007SFT	QUALITY SURVEY QUALITY
POINT	R2237B-6 - WGS84	NORTHING	854180.257SFT	POINT R2237B-6 - LOCAL
LATITUDE	36°04′08.15091"N	EASTING	1226839.331SFT	NORTHING 854180.257SFT
LONGITUDE	81°36′58.81467"W	ELEVATION	2352.887SFT	EASTING 1226839.328SFT
HEIGHT	2248.155SFT	HORZ ERROR	0.003SFT	ELEVATION 2352.880SFT
		VERT ERROR	0.007SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.007SFT	QUALITY SURVEY QUALITY
POINT	R2237B-7 - WGS84	NORTHING	854737.045SFT	POINT R2237B-7 - LOCAL
LATITUDE	36°04′13.52915"N	EASTING	1226357.666SFT	NORTHING 854737.046SFT
LONGITUDE	81°37′04.85797"W	ELEVATION	2389.674SFT	EASTING 1226357.668SFT
HEIGHT	2284.979SFT	HORZ ERROR	0.002SFT	ELEVATION 2389.661SFT
		VERT ERROR	0.013SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.013SFT	QUALITY SURVEY QUALITY
POINT	R2237B-8 - WGS84	NORTHING	858196.281SFT	POINT R2237B-8 - LOCAL
LATITUDE	36°04′46.90197"N	EASTING	1223214.739SFT	NORTHING 858196.283SFT
LONGITUDE	81°37′44.24075"W	ELEVATION	2513.501SFT	EASTING 1223214.726SFT
HEIGHT	2409.060SFT	HORZ ERROR	0.013SFT	ELEVATION 2513.480SFT
		VERT ERROR	0.021SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.024SFT	QUALITY SURVEY QUALITY
POINT	R2237B-9 - WGS84	NORTHING	859303.395SFT	POINT R2237B-9 - LOCAL
LATITUDE	36°04′57.88425"N	EASTING	1223362.496SFT	NORTHING 859303.396SFT
LONGITUDE	81°37′42.79853"W	ELEVATION	2543.893SFT	EASTING 1223362.475SFT
HEIGHT	2439.496SFT	HORZ ERROR	0.021SFT	ELEVATION 2543.870SFT
		VERT ERROR	0.023SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.031SFT	QUALITY SURVEY QUALITY
POINT	R2237B-10 - WGS8	NORTHING	863189.144SFT	POINT R2237B-10 - LOCA
LATITUDE	36°05′35.61359"N	EASTING	1220768.032SFT	NORTHING 863189.154SFT
LONGITUDE	81°38′15.65006"W	ELEVATION	2750.273SFT	EASTING 1220767.998SFT
HEIGHT	2646.146SFT	HORZ ERROR	0.036SFT	ELEVATION 2750.244SFT
		VERT ERROR	0.029SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.046SFT	QUALITY SURVEY QUALITY
POINT	R2237B-11 - WGS8	NORTHING	863365.576SFT	POINT R2237B-11 - LOCA
LATITUDE	36°05′37.56598"N	EASTING	1221561.827SFT	NORTHING 863365.600SFT
LONGITUDE	81°38′06.03942"W	ELEVATION	2802.000SFT	EASTING 1221561.746SFT
HEIGHT	2697.852SFT	HORZ ERROR	0.084SFT	ELEVATION 2801.954SFT
		VERT ERROR	0.046SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.096SFT	QUALITY SURVEY QUALITY
POINT	BR-2 - WGS84	NORTHING	867567.309SFT	POINT BR-2 - LOCAL
LATITUDE	36°06′18.24467"N	EASTING	1218313.941SFT	NORTHING 867567.358SFT
LONGITUDE	81°38′46.96023"W	ELEVATION	2964.718SFT	EASTING 1218313.821SFT
HEIGHT	2860.893SFT	HORZ ERROR	0.130SFT	ELEVATION 2964.670SFT
		VERT ERROR	0.048SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.138SFT	QUALITY SURVEY QUALITY
POINT	BR-2A - WGS84	NORTHING	870037.574SFT	POINT BR-2A - LOCAL
LATITUDE	36°06′42.84479"N	EASTING	1219006.475SFT	NORTHING 870037.605SFT
LONGITUDE	81°38′39.32621"W	ELEVATION	2895.143SFT	EASTING 1219006.354SFT
HEIGHT	2791.418SFT	HORZ ERROR	0.125SFT	ELEVATION 2895.129SFT
		VERT ERROR	0.014SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.126SFT	QUALITY SURVEY QUALITY
POINT	HAPPY - WGS84	NORTHING	826756.986SFT	POINT HAPPY - LOCAL
LATITUDE	35°59′41.22196"N	EASTING	1242952.780SFT	NORTHING 826756.953SFT
LONGITUDE	81°33′34.01302"W	ELEVATION	1230.815SFT	EASTING 1242952.860SFT
HEIGHT	1124.935SFT	HORZ ERROR	0.086SFT	ELEVATION 1230.881SFT
		VERT ERROR	0.066SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.108SFT	QUALITY SURVEY QUALITY
POINT	MORRISON - WGS84	NORTHING	814248.321SFT	POINT MORRISON - LOCAL
LATITUDE	35°57′01.20957"N	EASTING	1111635.251SFT	NORTHING 814248.324SFT
LONGITUDE	82°00′06.62407"W	ELEVATION	2679.490SFT	EASTING 1111635.297SFT
HEIGHT	2578.095SFT	HORZ ERROR	0.047SFT	ELEVATION 2679.457SFT
		VERT ERROR	0.033SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.057SFT	QUALITY SURVEY QUALITY
POINT	WILLOWDALE - WGS	NORTHING	922991.738SFT	POINT WILLOWDALE - LOC
LATITUDE	36°15′16.55533"N	EASTING	1183046.222SFT	NORTHING 922991.734SFT
LONGITUDE	81°46′15.38319"W	ELEVATION	2739.489SFT	EASTING 1183046.301SFT
HEIGHT	2637.980SFT	HORZ ERROR	0.079SFT	ELEVATION 2739.559SFT
		VERT ERROR	0.070SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.106SFT	QUALITY SURVEY QUALITY
POINT	B90 - WGS84	NORTHING	892951.944SFT	POINT B90 - LOCAL
LATITUDE	36°11′00.73005"N	EASTING	1348908.641SFT	NORTHING 892951.920SFT
LONGITUDE	81°12′22.90388"W	ELEVATION	1336.138SFT	EASTING 1348908.656SFT
HEIGHT	1228.265SFT	HORZ ERROR	0.028SFT	ELEVATION 1336.107SFT
		VERT ERROR	0.031SFT	UTILIZED HORZ AND VERT
		3D ERROR	0.042SFT	QUALITY SURVEY QUALITY

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2237B-6"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 854180.257(ft) EASTING: 1226839.328(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .999908500
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2237B-6" TO -L- STATION 9+86.41 IS
S 25°54′16" E 14,811.13′
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTES

1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE NAD 83 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.

2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:

   R2237B_LS_GPSCALIB_030101.HTML
   R2237B_LS_WGS84_030101.TXT
   R2237B_LS_LOCAL_030101.TXT
   R2237B_LS_CONTROL_030101.TXT

   THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

SURVEY CONTROL SHEET R-2237B

CONTROL DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
2	R2237B-2	840587.1150	1233497.8110	1391.98	OUTSIDE PROJECT LIMITS	
201	BL-1	841905.5830	1232738.2240	1449.51	21+84.00	19.30 RT
202	BL-2	842579.4280	1232368.7350	1496.38	29+45.82	38.95 LT
203	BL-3	843192.7050	1232362.4360	1535.61	35+48.08	34.78 LT
204	ASC-49	843980.2620	1232576.2460	1599.52	43+56.39	33.57 LT
205	BL-5	844478.6350	1233211.0990	1654.22	51+59.34	1.38 LT
206	BL-6	844734.3500	1233536.3800	1688.57	55+64.28	42.09 RT
207	BL-7	845207.0910	1233638.5880	1724.17	60+35.40	22.53 RT
208	BL-8	846003.8650	1233352.4670	1785.74	68+75.85	67.22 LT
209	BL-9	846752.2960	1233189.5590	1821.10	76+40.88	29.60 LT
4	R2237B-4	847466.9010	1233095.5740	1855.38	83+59.70	31.17 RT
210	BL-10	848502.1050	1232674.8700	1921.15	94+76.59	0.86 RT
211	BL-11	849228.2180	1232266.5290	1987.56	103+10.07	2.56 RT
212	BL-12	849836.6000	1231743.0510	2044.88	111+11.97	25.30 RT
213	BL-13	850226.4200	1231344.5840	2048.05	116+69.41	27.37 RT
214	BL-14	850817.1510	1230689.3620	2033.24	125+51.00	5.30 LT
215	BL-15	851482.8530	1230002.4370	2057.31	135+07.57	6.27 LT
216	ASC-40	852262.9270	1229251.7900	2134.19	145+67.80	81.22 RT
217	BL-17	852489.6980	1228853.1120	2169.48	149+39.64	227.89 RT
218	ASC-38	852409.8750	1228104.9980	2187.96	157+39.75	40.85 RT
219	BL-19	852722.4920	1227794.8520	2195.47	161+95.72	5.44 RT
5	R2237B-5	853070.1550	1227632.9030	2202.84	165+78.20	33.79 RT
220	BL-220	853910.6810	1227061.2250	2266.27	175+95.88	27.65 LT
221	BL-21	854426.5210	1226898.4130	2307.49	181+34.66	38.59 RT
222	BL-22	854817.1750	1226516.9020	2350.66	186+75.76	36.73 RT
223	BL-23	855184.2450	1225839.5540	2409.62	194+43.36	21.87 RT
224	BL-24	855545.7310	1225330.6090	2461.11	200+66.92	34.47 LT
225	ASC-32	855958.5370	1224920.3240	2503.47	206+42.87	27.88 LT
226	BL-26	856850.6760	1224618.0500	2543.43	215+86.19	17.00 RT
227	BL-27	857062.4190	1223975.5450	2534.54	222+51.54	60.37 LT
228	BL-28	857739.3620	1223279.3420	2504.59	232+02.63	41.97 LT
8	R2237B-8	858196.2830	1223214.7260	2513.48	236+61.32	24.01 RT
9	R2237B-9	859303.3960	1223362.4750	2543.87	247+79.73	33.34 RT
229	BL-29	860332.3510	1223066.9370	2595.90	258+52.41	21.23 RT
230	BL-30	860668.5140	1222444.8490	2643.98	265+56.10	44.07 RT
231	BL-31	860765.0130	1222097.8950	2665.93	269+17.15	14.06 LT
232	BL-32	861098.1060	1221811.6500	2683.63	273+55.66	5.46 LT
233	BL-33	861974.6190	1221574.0600	2715.02	282+59.43	37.67 RT
10	R2237B-10	863189.1540	1220767.9980	2750.24	297+15.02	36.07 LT
234	ASC-23	863645.2370	1220482.0890	2774.82	302+54.27	37.16 LT
235	BL-35	863963.0210	1220148.3190	2799.96	307+17.52	114.69 LT
236	BL-36	864113.5640	1219882.1840	2799.54	310+04.91	220.76 LT
237	BL-37	864682.8090	1219727.1690	2792.06	315+40.23	8.45 LT
238	BL-38	864976.5350	1219238.9960	2804.29	319+95.75	315.15 LT
239	BL-39	865246.1050	1219274.2030	2809.36	322+18.03	190.90 LT
240	BL-40	865473.5840	1219699.0910	2816.29	323+16.84	281.21 RT
241	BL-41	865917.6840	1219364.2340	2829.89	328+36.14	66.16 RT
242	BL-42	866066.9720	1219058.5330	2851.28	330+63.32	192.18 LT
243	BL-43	866443.8120	1219143.5410	2874.87	333+87.97	53.58 RT
244	BL-44	866843.9240	1218759.2340	2908.77	339+44.97	31.67 RT
14	BR-2	867567.3580	1218313.8210	2964.67	347+99.25	20.48 RT

BY1

POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
402	R2237B-2	840587.1150	1233497.8110	1391.98	OUTSIDE PROJECT LIMITS	
411	BY1-1	841482.0380	1232831.3260	1421.31	OUTSIDE PROJECT LIMITS	

BY2

POINT	DESC.	NORTH	EAST	ELEVATION	Y2 STATION	OFFSET
421	BY2-1	851383.4780	1229415.1260	2070.77	OUTSIDE PROJECT LIMITS	
422	BY2-2	851793.6880	1229299.7970	2108.34	OUTSIDE PROJECT LIMITS	
423	BY2-3	851908.1680	1229611.1270	2093.82	OUTSIDE PROJECT LIMITS	
415	BL-15	851482.8530	1230002.4370	2057.31	OUTSIDE PROJECT LIMITS	

BY3

POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
420	R2237B-10	863189.1540	1220767.9980	2750.24	12+64.07	620.08 LT
431	BY3-1	862448.1280	1221234.1520	2721.60	OUTSIDE PROJECT LIMITS	
432	BY3-2	862768.9790	1221189.7170	2748.78	12+04.27	41.27 LT
433	BY3-3	862992.6350	1221501.6700	2743.67	15+67.92	13.36 RT

BY4

POINT	DESC.	NORTH	EAST	ELEVATION	Y4 STATION	OFFSET
410	R2237B-10	863189.1540	1220767.9980	2750.24	OUTSIDE PROJECT LIMITS	
441	BY4-1	863239.0860	1221034.7830	2752.07	12+84.05	16.66 RT
442	BY4-2	863307.9420	1221365.1820	2748.02	OUTSIDE PROJECT LIMITS	

BY5

POINT	DESC.	NORTH	EAST	ELEVATION	Y5 STATION	OFFSET
523	BL-33	861974.6190	1221574.0600	2715.02	OUTSIDE PROJECT LIMITS	
510	BY5-1	862006.1110	1221774.1306	2748.64	OUTSIDE PROJECT LIMITS	

BM1 ELEVATION = 1405.62
N 841827 E 1232610
L STATION 21+69 130 LEFT
RR SPIKE IN BASE OF 8" YELLOW POPLAR

BM2 ELEVATION = 1527.56
N 843183 E 1232335
L STATION 35+34 60 LEFT
RR SPIKE IN BASE OF 15" YELLOW POPLAR

BM3 ELEVATION = 1708.85
N 845051 E 1233575
L STATION 58+75 34 LEFT
RR SPIKE IN BASE OF 15" YELLOW POPLAR

BM4 ELEVATION = 1875.57
N 847994 E 1232836
L STATION 89+43 76 LEFT
RR SPIKE IN BASE OF 27" YELLOW POPLAR

BM5 ELEVATION = 2056.44
N 850122 E 1231535
L STATION 114+60 85 RIGHT
RR SPIKE IN BASE OF 19" YELLOW POPLAR

BM6 ELEVATION = 2131.94
N 852343 E 1229250
L STATION 145+98 154 RIGHT
RR SPIKE IN BASE OF 20" CHESTNUT

BM7 ELEVATION = 2254.42
N 853653 E 1227109
L STATION 173+45 57 LEFT
RR SPIKE IN BASE OF 20" WHITE OAK

BM8 ELEVATION = 2441.70
N 855354 E 1225500
L STATION 198+13 66 LEFT
RR SPIKE IN BASE OF 17" BLACK LOCUST

BM9 ELEVATION = 2538.13
N 857044 E 1223984
L STATION 222+36 72 LEFT
RR SPIKE IN BASE OF 21" PITCH PINE

BM10 ELEVATION = 2526.64
N 858776 E 1223250
L STATION 242+41 52 LEFT
RR SPIKE IN BASE OF 30" YELLOW POPLAR

BM11 ELEVATION = 2673.63
N 860912 E 1221902
L STATION 271+55 37 LEFT
RR SPIKE IN BASE OF 29" SUGAR MAPLE

BM12 ELEVATION = 2729.57
N 862960 E 1221010
L STATION 293+93 49 RIGHT
RR SPIKE IN BASE OF 21" PITCH PINE

BM13 ELEVATION = 2822.47
N 865645 E 1219746
L STATION 324+79 370 RIGHT
RR SPIKE IN BASE OF 30" BUR OAK

BM14 ELEVATION = 2908.35
N 866819 E 1218668
L STATION 339+71 60 LEFT
RR SPIKE IN BASE OF 16" BLACK LOCUST

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2237B-6"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 854180.257(ft) EASTING: 1226839.328(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .999908500
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2237B-6" TO -L- STATION 9+86.41 IS
S 25°54'16" E 14,811.13'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTES

1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE NAD 83 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.

2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:

   R2237B_LS_GPSCALIB_030101.HTML
   R2237B_LS_WGS84_030101.TXT
   R2237B_LS_LOCAL_030101.TXT
   R2237B_LS_CONTROL_030101.TXT

   THE WGS84 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

5/28/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE

C1	PROP. APPROX. 3.0" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH
D1	PROP. APPROX. 2.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
D3	PROP. VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH.
E1	PROP. APPROX. 3" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 171 LBS. PER SQ. YD.
E2	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 228 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
E3	PROP. APPROX. 6.5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 371 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
E4	PROP. APPROX. 3.5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 200 LBS. PER SQ. YD. IN EACH OF TWO LAYERS
K	CEMENT / LIME STABILIZATION
R	PROP. EXPRESSWAY GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 2.5" DEPTH
W	WEDGING. (SEE DETAIL)

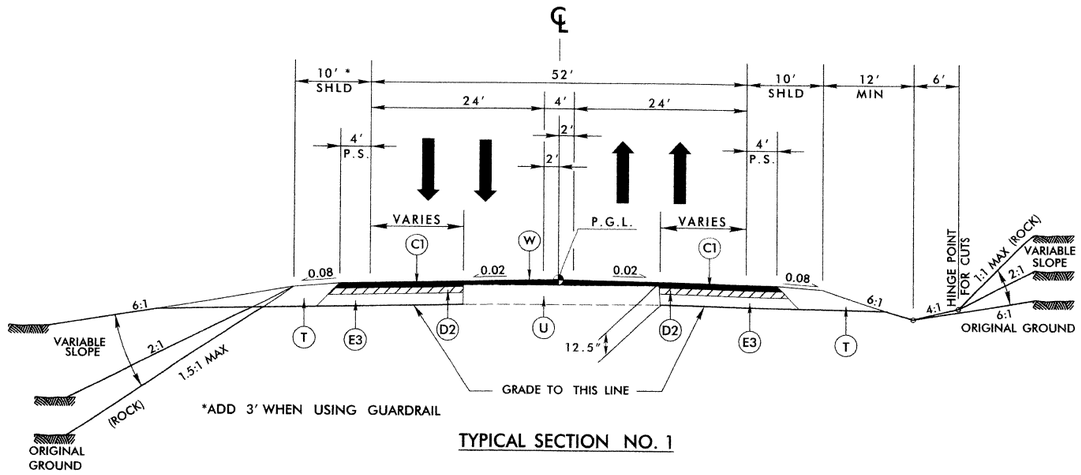
5/28/9

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

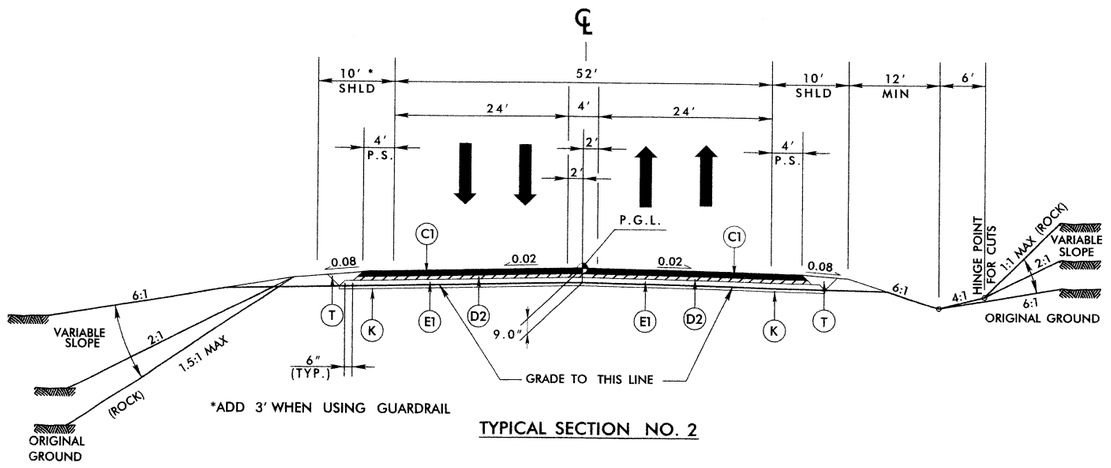
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE	
CODE	SEE SHEET 2 FOR DETAILED DESCRIPTIONS
C1	PROP. 3" SURFACE COURSE, TYPE S9.5B
C2	VARIABLE DEPTH SURFACE COURSE, TYPE S9.5B
D1	PROP. 2.5" INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. 3" INTERMEDIATE COURSE, TYPE I19.0B
D3	PROP. VAR. INTERMEDIATE COURSE, TYPE I19.0B
E1	PROP. 3" BASE COURSE, TYPE B25.0B
E2	PROP. 4" BASE COURSE, TYPE B25.0B
E3	PROP. 6.5" BASE COURSE, TYPE B25.0B
E4	PROP. 3.5" BASE COURSE, TYPE B25.0B
R	PROP. EXPRESSWAY GUTTER
K	CEMENT / LIME STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING
W	WEDGING



TYPICAL SECTION NO. 1

-LINE-	FROM STA.	TO STA.	NOTES
-L-	20+00.00	62+00.00	SEE DETAIL NO. 1 & 4
-L-	73+00.00	135+00.00	SEE DETAIL NO. 1
-L-	158+00.00	212+00.00	
-L-	214+00.00	219+00.00	
-L-	222+00.00	280+00.00	
-L-	287+00.00	295+00.00	
-L-	302+00.00	307+00.00	SEE DETAIL NO. 1 & 2
-L-	313+00.00	317+00.00	SEE DETAIL NO. 3
-L-	336+00.00	345+00.00	
-L-	352+00.00	356+50.00	



TYPICAL SECTION NO. 2

-LINE-	FROM STA.	TO STA.	NOTES
-L-	62+00.00	73+00.00	SEE DETAIL NO. 1
-L-	145+00.00	158+00.00	
-L-	212+00.00	214+00.00	
-L-	219+00.00	222+00.00	
-L-	307+00.00	313+00.00	SEE DETAIL NO. 1, 2., & 3
-L-	317+00.00	336+00.00	SEE DETAIL NO. 1 & 3

NOTES: P.G.L. = PROFILE GRADE LINE
PAVEMENT STRUCTURE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

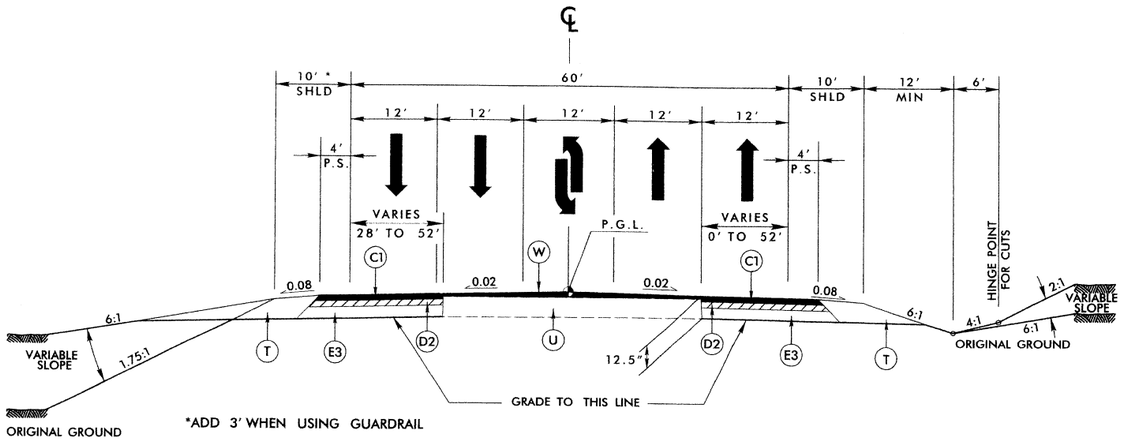
5/28/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

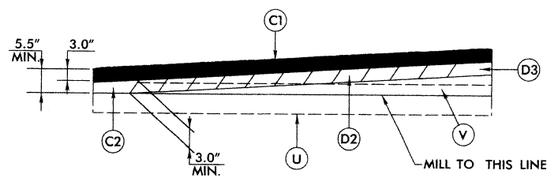
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE	
CODE	SEE SHEET 2 FOR DETAILED DESCRIPTIONS
C1	PROP. 3" SURFACE COURSE, TYPE S9.5B
C2	VARIABLE DEPTH SURFACE COURSE, TYPE S9.5B
D1	PROP. 2.5" INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. 3" INTERMEDIATE COURSE, TYPE I19.0B
D3	PROP. VAR. INTERMEDIATE COURSE, TYPE I19.0B
E1	PROP. 3" BASE COURSE, TYPE B25.0B
E2	PROP. 4" BASE COURSE, TYPE B25.0B
E3	PROP. 6.5" BASE COURSE, TYPE B25.0B
E4	PROP. 3.5" BASE COURSE, TYPE B25.0B
R	PROP. EXPRESSWAY GUTTER
K	CEMENT / LIME STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING
W	WEDGING



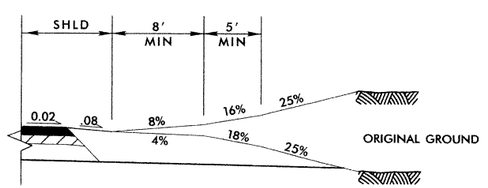
TYPICAL SECTION NO. 3

-LINE-	FROM STA.	TO STA.	NOTES
-L-	10+00.00	20+00.00	
-L-	135+00.00	145+00.00	
-L-	280+00.00	287+00.00	SEE DETAIL NO. 1
-L-	295+00.00	302+00.00	
-L-	345+00.00	352+00.00	



Wedging Detail For Resurfacing

STANDARD WEDGING DETAIL



STANDARD DRIVEWAY DETAIL

NOTES: P.G.L. = PROFILE GRADE LINE
PAVEMENT STRUCTURE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

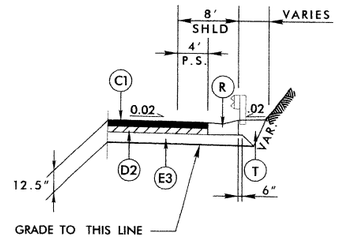
5/28/96

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

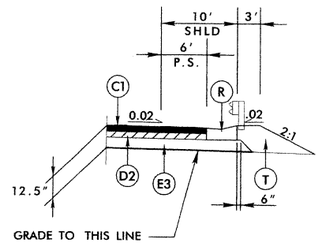
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE	
CODE	SEE SHEET 2 FOR DETAILED DESCRIPTIONS
C1	PROP. 3" SURFACE COURSE, TYPE S9.5B
C2	VARIABLE DEPTH SURFACE COURSE, TYPE S9.5B
D1	PROP. 2.5" INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. 3" INTERMEDIATE COURSE, TYPE I19.0B
D3	PROP. VAR. INTERMEDIATE COURSE, TYPE I19.0B
E1	PROP. 3" BASE COURSE, TYPE B25.0B
E2	PROP. 4" BASE COURSE, TYPE B25.0B
E3	PROP. 6.5" BASE COURSE, TYPE B25.0B
E4	PROP. 3.5" BASE COURSE, TYPE B25.0B
R	PROP. EXPRESSWAY GUTTER
K	CEMENT / LIME STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING
W	WEDGING



TYPICAL SECTION NO. 4A

–LINE–	FROM STA.	TO STA.
–L–	47+00 (R)	56+00 (R)



TYPICAL SECTION NO. 4B

–LINE–	FROM STA.	TO STA.
–L–	114+50 (L)	117+00 (L)
–L–	120+50 (L)	124+00 (L)
–L–	121+00 (R)	124+00 (R)
–L–	127+00 (L)	129+00 (L)
–L–	130+70 (L)	131+75 (L)
–L–	135+00 (L)	139+83 (L)
–Y1–	12+00 (L)	15+45 (L)

–LINE–	FROM STA.	TO STA.
–L–	135+50 (R)	136+90 (R)
–L–	147+00 (L)	151+00 (L)
–L–	165+00 (L)	170+50 (L)
–L–	200+88 (L)	202+50 (L)
–L–	214+50 (L)	217+00 (L)
–L–	224+00 (R)	227+50 (R)
–L–	229+00 (R)	236+50 (R)
–L–	225+50 (L)	228+50 (L)

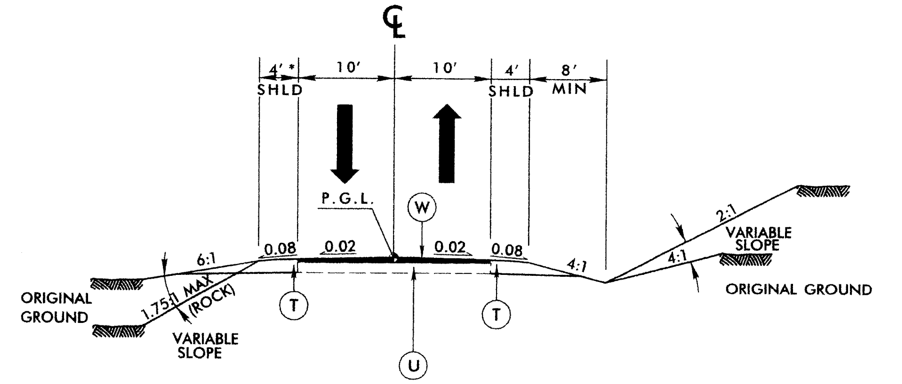
NOTES: P.G.L. = PROFILE GRADE LINE
PAVEMENT STRUCTURE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

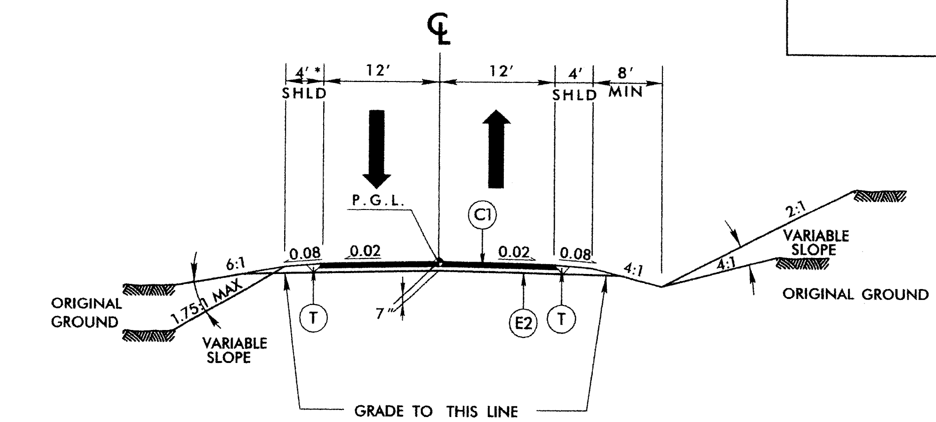
PAVEMENT SCHEDULE	
CODE	SEE SHEET 2 FOR DETAILED DESCRIPTIONS
C1	PROP. 3" SURFACE COURSE, TYPE S9.5B
C2	VARIABLE DEPTH SURFACE COURSE, TYPE S9.5B
D1	PROP. 2.5" INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. 3" INTERMEDIATE COURSE, TYPE I19.0B
D3	PROP. VAR. INTERMEDIATE COURSE, TYPE I19.0B
E1	PROP. 3" BASE COURSE, TYPE B25.0B
E2	PROP. 4" BASE COURSE, TYPE B25.0B
E3	PROP. 6.5" BASE COURSE, TYPE B25.0B
E4	PROP. 3.5" BASE COURSE, TYPE B25.0B
R	PROP. EXPRESSWAY GUTTER
K	CEMENT / LIME STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING
W	WEDGING



*ADD 3' WHEN USING GUARDRAIL

TYPICAL SECTION NO. 5

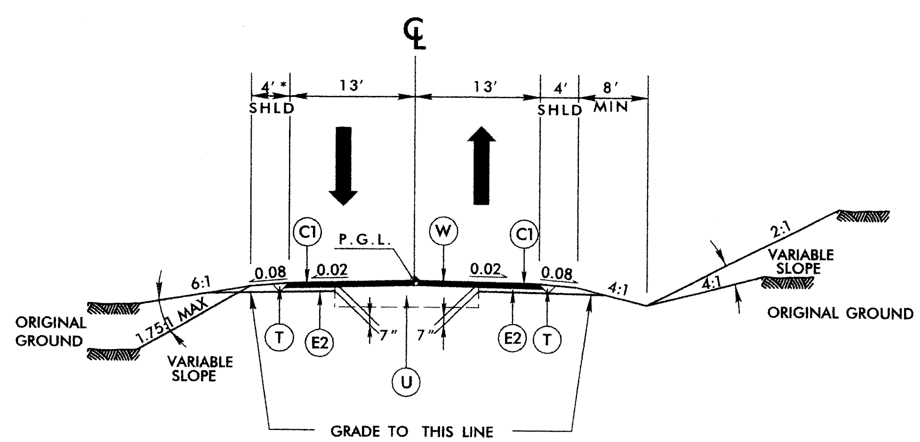
-LINE-	FROM STA.	TO STA.
-Y1-	10+05.00	11+09.96
-Y1-	16+10.17	19+50.00



*ADD 3' WHEN USING GUARDRAIL

TYPICAL SECTION NO. 6

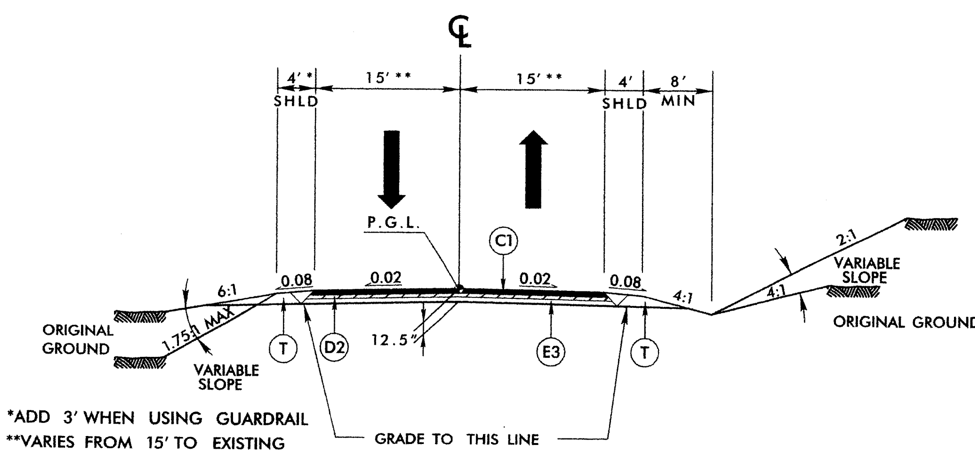
-LINE-	FROM STA.	TO STA.
-Y1-	11+09.96	15+45.00



*ADD 3' WHEN USING GUARDRAIL

TYPICAL SECTION NO. 7

-LINE-	FROM STA.	TO STA.
-Y5-	10+30.00	13+42.60



*ADD 3' WHEN USING GUARDRAIL
**VARIES FROM 15' TO EXISTING

TYPICAL SECTION NO. 8

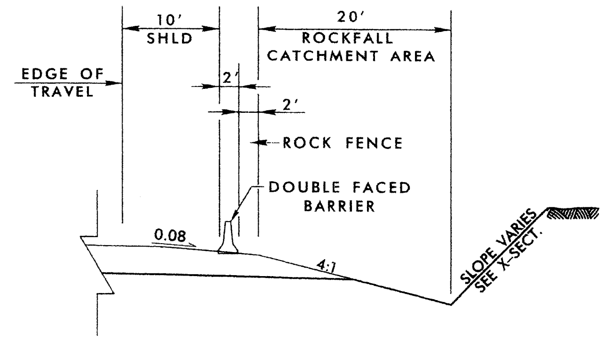
-LINE-	FROM STA.	TO STA.
-Y2-	10+30.00	10+80.00
** -Y4-	10+30.00	10+80.00

NOTES: P.G.L. = PROFILE GRADE LINE
PAVEMENT STRUCTURE SLOPES ARE 1:1
UNLESS SHOWN OTHERWISE.

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-E
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

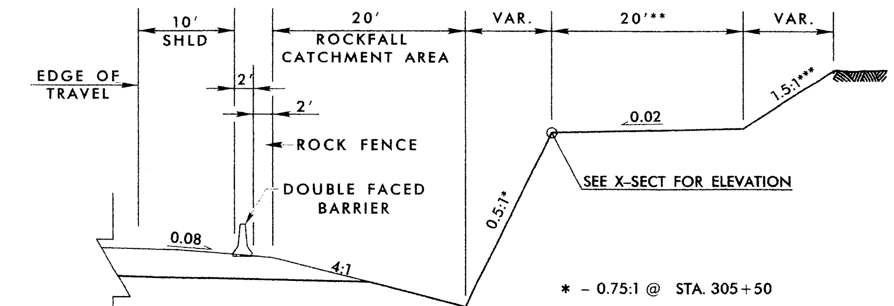
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



DETAIL NO. 1

-LINE-	FROM STA.	TO STA.	SIDE	NOTES
-L-	43+50.00	47+00.00	RIGHT	SEE TS. NO. 1 FOR PAV'T
-L-	71+00.00	73+00.00	RIGHT	SEE TS. NO. 2 FOR PAV'T
-L-	73+00.00	79+00.00	RIGHT	SEE TS. NO. 1 FOR PAV'T
-L-	301+00.00	305+50.00	RIGHT	SEE TS. NO. 1 & 3 FOR PAV'T
-L-	307+50.00	312+50.00	LEFT	SEE TS. NO. 2 FOR PAV'T
-L-	318+00.00	322+00.00	LEFT	SEE TS. NO. 2 FOR PAV'T
-L-	330+00.00	333+50.00	RIGHT	SEE TS. NO. 2 FOR PAV'T



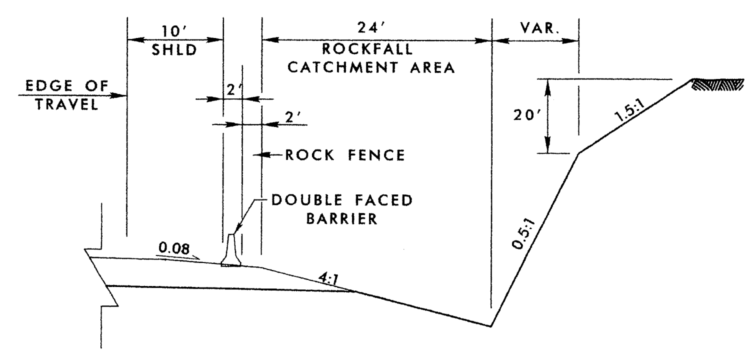
* - 0.75:1 @ STA. 305+50
** - 30' @ STA. 310+50
*** - 1.25:1 @ STA. 305+50

DETAIL NO. 2

-LINE-	FROM STA.	TO STA.	SIDE	NOTES
-L-	41+00.00	43+50.00	RIGHT	SEE TS. NOS. 1 FOR PAV'T
-L-	305+50.00	311+00.00	RIGHT	SEE TS. NOS. 1 & 2 FOR PAV'T

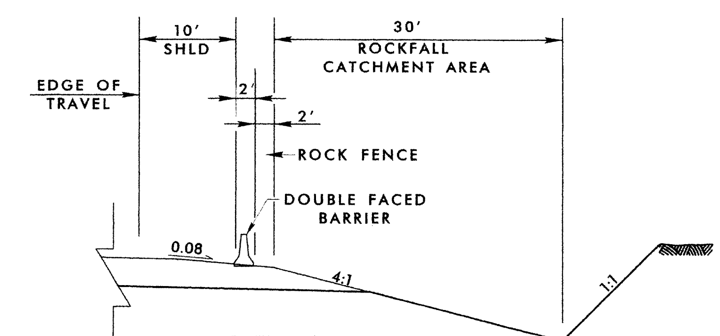
PAVEMENT SCHEDULE	
CODE	SEE SHEET 2 FOR DETAILED DESCRIPTIONS
C1	PROP. 3" SURFACE COURSE, TYPE S9.5B
C2	VARIABLE DEPTH SURFACE COURSE, TYPE S9.5B
D1	PROP. 2.5" INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. 3" INTERMEDIATE COURSE, TYPE I19.0B
D3	PROP. VAR. INTERMEDIATE COURSE, TYPE I19.0B
E1	PROP. 3" BASE COURSE, TYPE B25.0B
E2	PROP. 4" BASE COURSE, TYPE B25.0B
E3	PROP. 6.5" BASE COURSE, TYPE B25.0B
E4	PROP. 3.5" BASE COURSE, TYPE B25.0B
R	PROP. EXPRESSWAY GUTTER
K	CEMENT / LIME STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING
W	WEDGING

NOTES: P.G.L. = PROFILE GRADE LINE
PAVEMENT STRUCTURE SLOPES ARE 1:1
UNLESS SHOWN OTHERWISE.



DETAIL NO. 3

-LINE-	FROM STA.	TO STA.	SIDE	NOTES
-L-	311+00.00	322+00.00	RIGHT	SEE TS. NO. 1 & 2 FOR PAV'T



DETAIL NO. 4

-LINE-	FROM STA.	TO STA.	SIDE	NOTES
-L-	28+00.00	41+00.00	RIGHT	SEE TS. NO. 1 FOR PAV'T

5/28/99

R-2621B | 2-F

R/W SHEET NO.

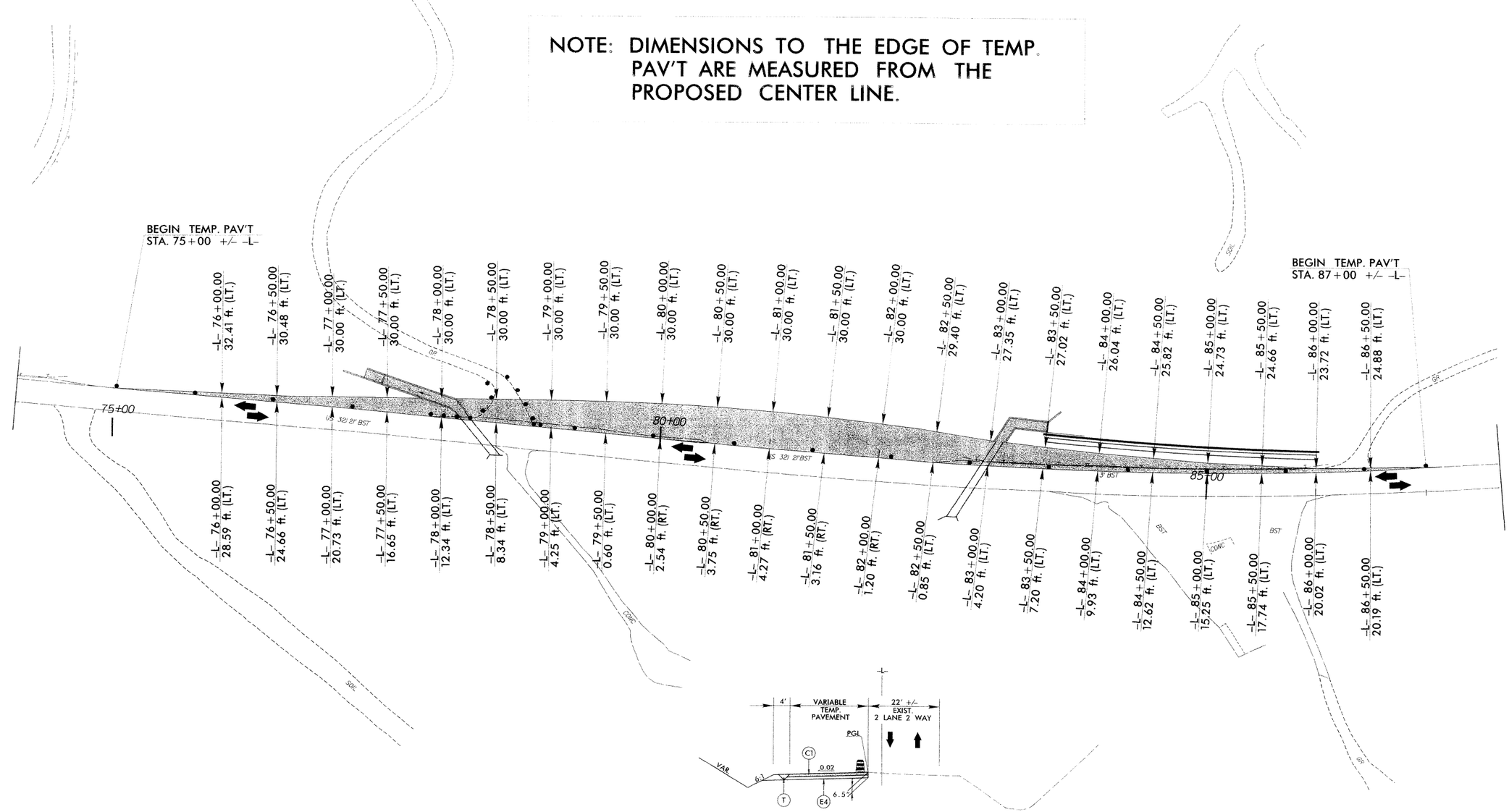
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

DETOUR 1

NOTE: DIMENSIONS TO THE EDGE OF TEMP. PAV'T ARE MEASURED FROM THE PROPOSED CENTER LINE.



TYPICAL SECTION

SEE SHEET 2 FOR PAVEMENT SCHEDULE

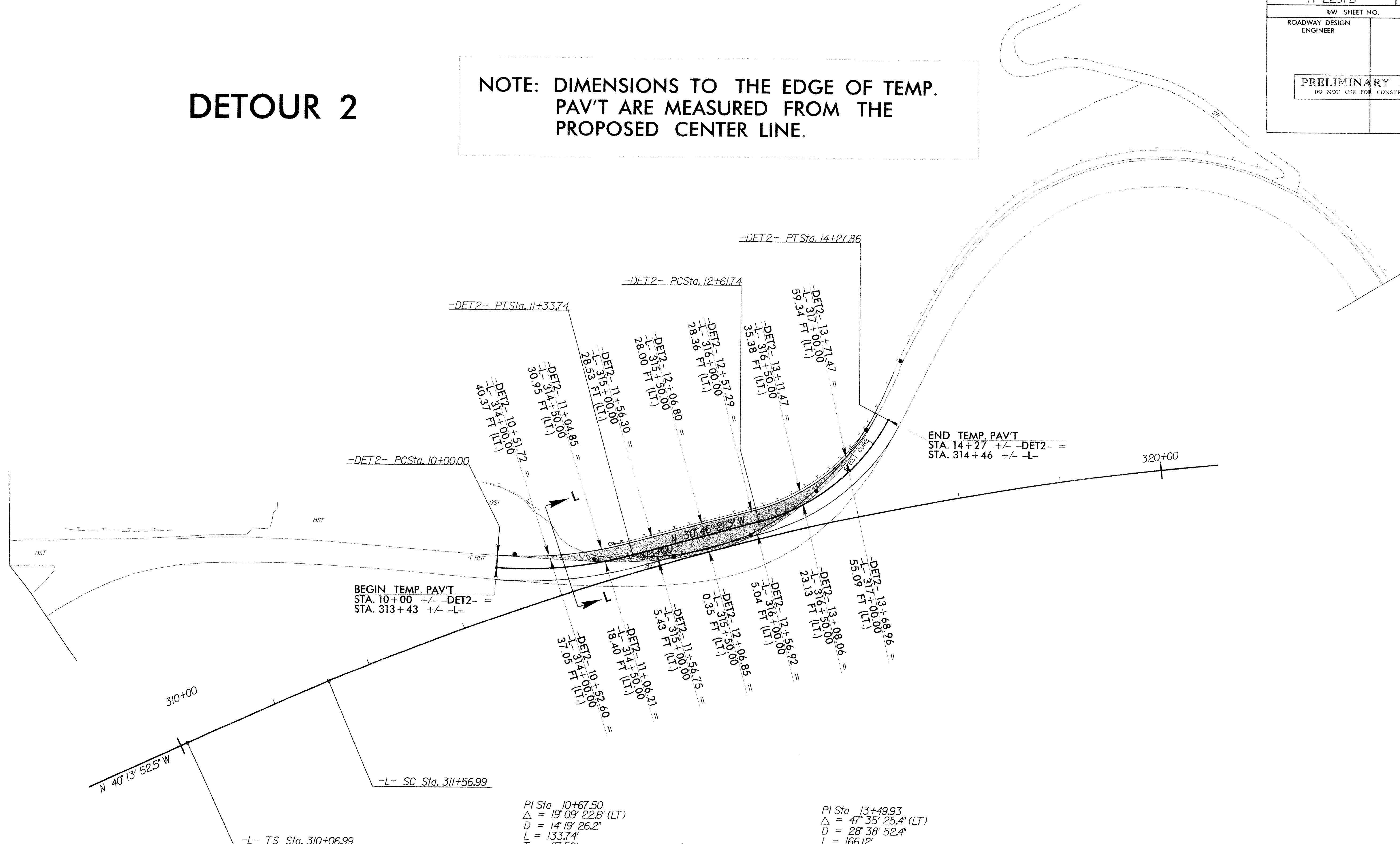
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	2-G
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

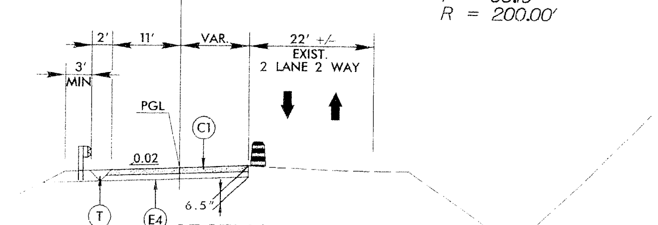
DETOUR 2

NOTE: DIMENSIONS TO THE EDGE OF TEMP. PAV'T ARE MEASURED FROM THE PROPOSED CENTER LINE.



PI Sta 10+67.50
△ = 19° 09' 22.6" (LT)
D = 14° 19' 26.2"
L = 133.74'
T = 67.50'
R = 400.00'

PI Sta 13+49.93
△ = 47° 35' 25.4" (LT)
D = 28° 38' 52.4"
L = 166.12'
T = 88.19'
R = 200.00'



SECTION L-L

SEE SHEET 2 FOR PAVEMENT SCHEDULE

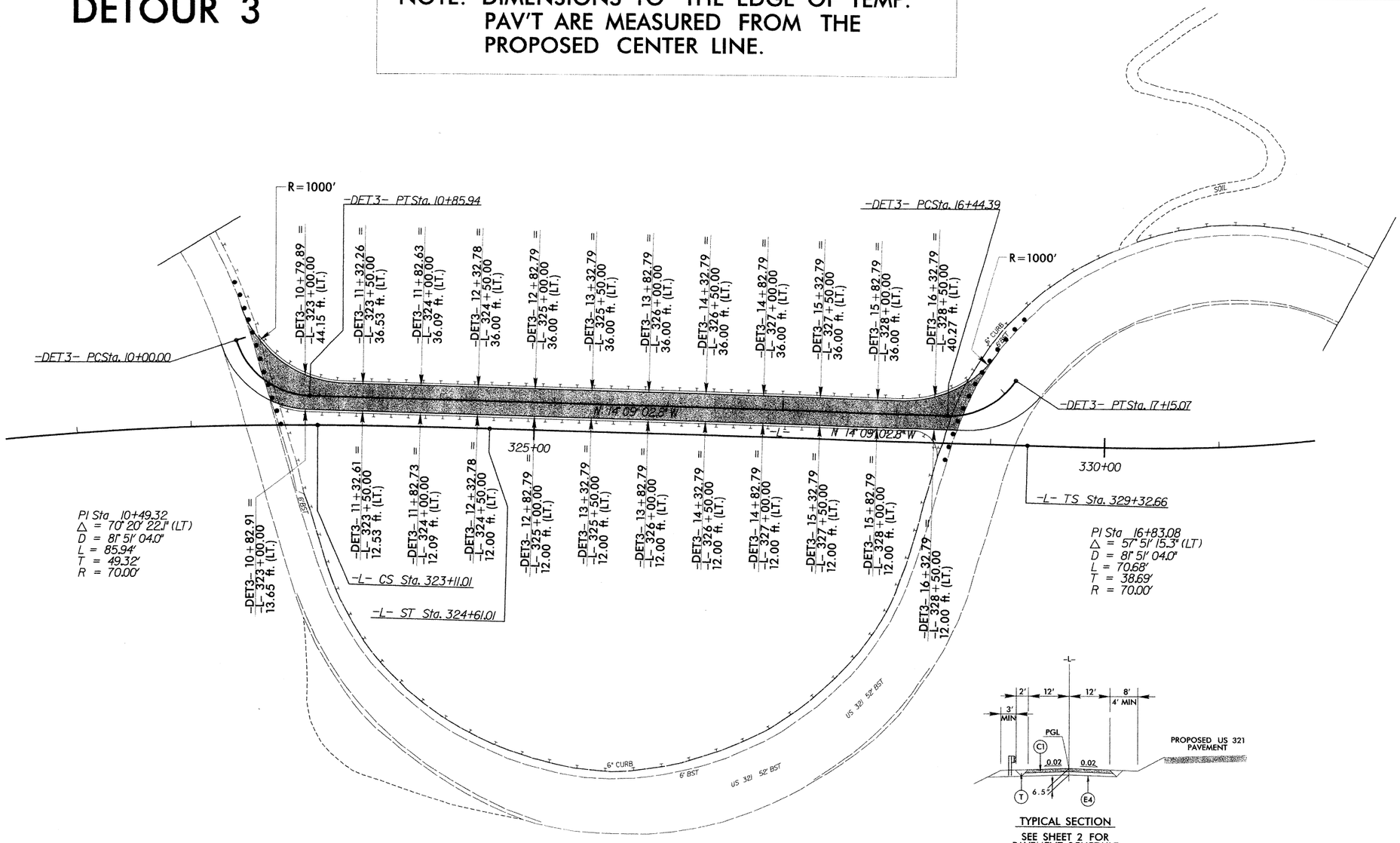
R-2237B	2-H
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

DETOUR 3

NOTE: DIMENSIONS TO THE EDGE OF TEMP. PAV'T ARE MEASURED FROM THE PROPOSED CENTER LINE.



PI Sta 10+49.32
△ = 70° 20' 22.1" (LT)
D = 81° 51' 04.0"
L = 85.94'
T = 49.32'
R = 70.00'

PI Sta 16+83.08
△ = 57° 51' 15.3" (LT)
D = 81° 51' 04.0"
L = 70.68'
T = 38.69'
R = 70.00'

TYPICAL SECTION

SEE SHEET 2 FOR PAVEMENT SCHEDULE

04/07/2004
10:49:02 AM

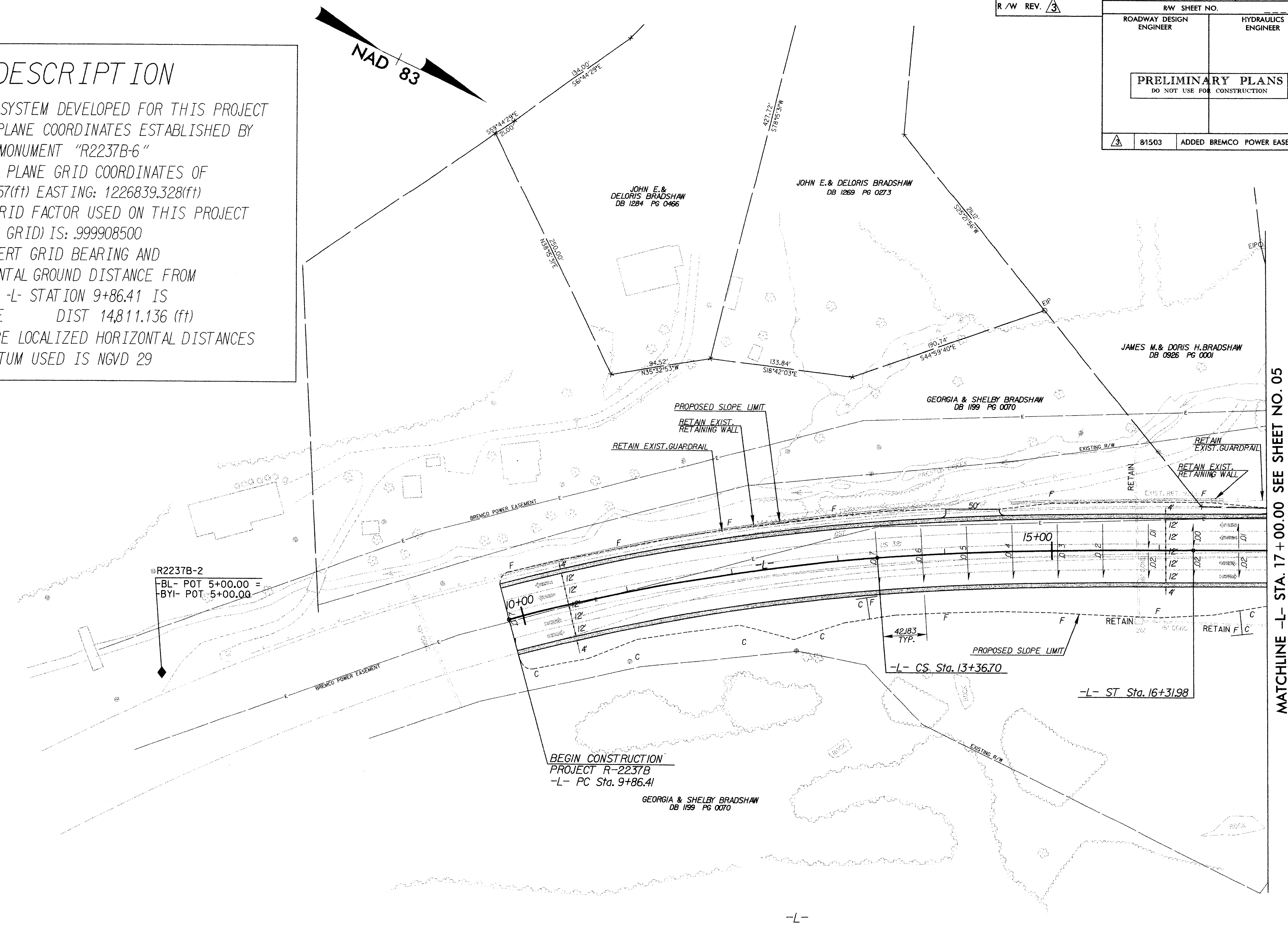
CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	04
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCDOT FOR MONUMENT "R2237B-6"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 854180.257(ft) EASTING: 1226839.328(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: .999908500
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"R2237B-6" TO -L- STATION 9+86.41 IS
S 25° 54' 15.57" E DIST 14,811.136 (ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29



MATCHLINE -L- STA. 17+00.00 SEE SHEET NO. 05

-L-

CURVE LR1	PIs Sta 14+35.18
PI Sta 11+62.04	θs = 4° 24' 26.8"
Δ = 10° 27' 25.5" (RT)	Ls = 295.28'
D = 2° 59' 06.9"	LT = 196.91'
L = 350.29	ST = 98.48'
T = 175.63'	
R = 1,919.29'	
e = 0.07	
DS = 50 mph	

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

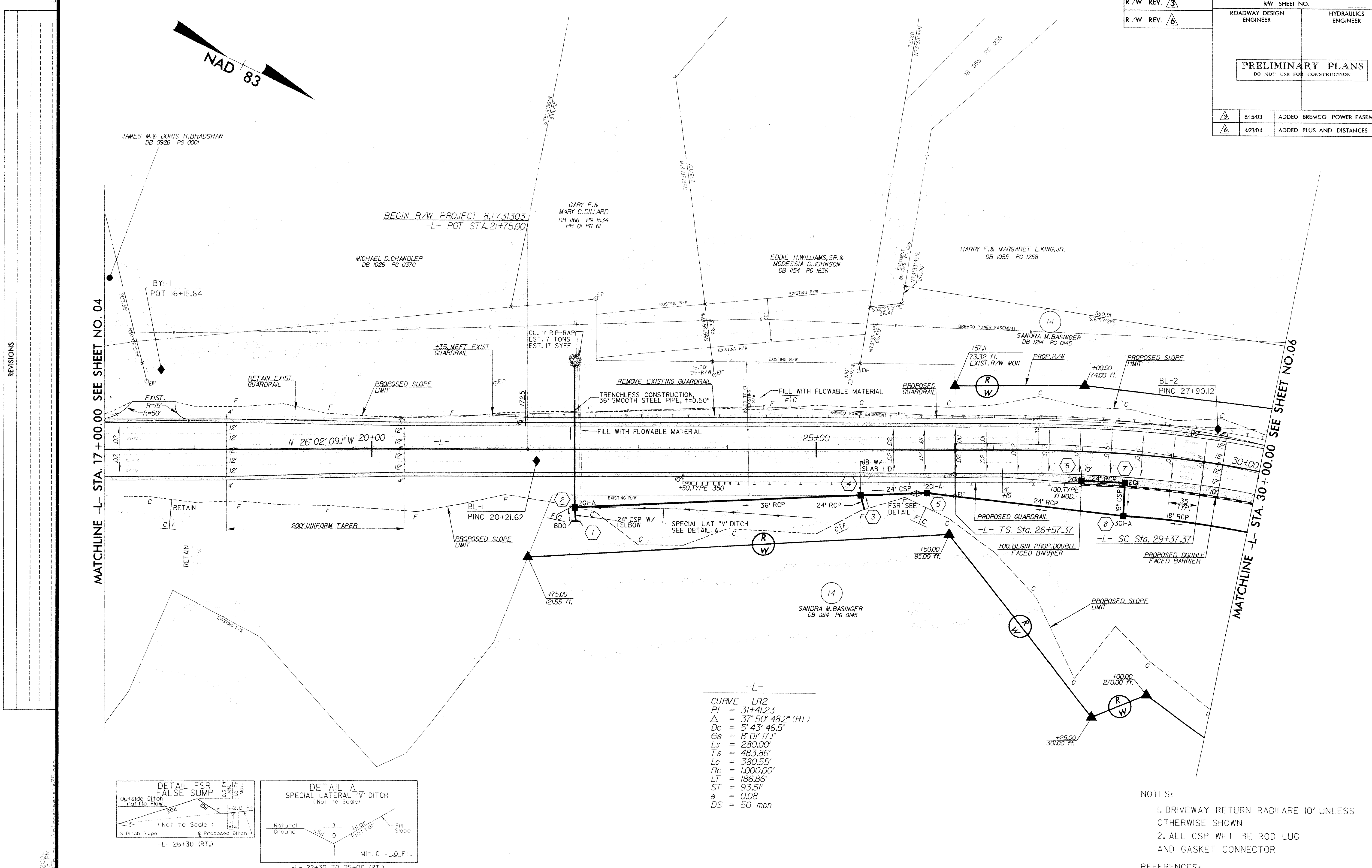
FOR -L- PROFILE SEE SHEET 32

REVISIONS

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	05
R/W REV. 6	RW SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	ADDED PLUS AND DISTANCES



NAD 83
REVISIONS
MATCHLINE -L- STA. 17+00.00 SEE SHEET NO. 04
MATCHLINE -L- STA. 30+00.00 SEE SHEET NO. 06
JAMES M.& DORIS H.BRADSHAW
DB 0926 PG 0001
BEGIN R/W PROJECT 8.T731303
-L- POT STA.21+75.00
GARY E.&
MARY C.DILLARD
DB 1166 PG 1534
PB 01 PG 61
MICHAEL D.CHANDLER
DB 1026 PG 0370
EDDIE H.WILLIAMS,SR.&
MODESSIA D.JOHNSON
DB 1154 PG 1636
HARRY F.& MARGARET L.KING,JR.
DB 1055 PG 1258
BYI-1
POT 16+15.84
SANDRA M.BASINGER
DB 1214 PG 0145
CL. 'I' RIP-RAP
EST. 7 TONS
EST. 17 SYFF
+35 MEET EXIST GUARDRAIL
RETAIN EXIST. GUARDRAIL
PROPOSED SLOPE LIMIT
REMOVE EXISTING GUARDRAIL
TRENCHLESS CONSTRUCTION, 36" SMOOTH STEEL PIPE, t=0.50"
FILL WITH FLOWABLE MATERIAL
BREMCO POWER EASEMENT
+57.11
73.32 ft.
EXIST.R/W MON
PROP.R/W
+00.00
74.00 ft.
BL-2
PINC 27+90.12
N 26° 02' 09.1" W 20+00
-L-
25+00
30+00
200' UNIFORM TAPER
BL-1
PINC 20+21.62
RETAIN
2GI-A
BDO
24" CSP W/ ELBOW
SPECIAL LAT "V" DITCH SEE DETAIL A
36" RCP
24" RCP
24" CSP
JB W/ SLAB LID
FSR SEE DETAIL
+50.TYPE 350
PROPOSED GUARDRAIL
-L- TS Sta. 26+57.37
-L- SC Sta. 29+37.37
+00.TYPE XI MOD.
+00.BEGIN PROP.DOUBLE FACED BARRIER
PROPOSED DOUBLE FACED BARRIER
18" RCP
15" CSP
3GI-A
2GI
35' TYP.
+50.00
95.00 ft.
+75.00
121.55 ft.
+00.00
270.00 ft.
+25.00
301.00 ft.
EXISTING R/W
DETAIL FSR
FALSE SUMP
Outside Ditch
Traffic Flow
(Not to Scale)
-L- 26+30 (RT.)
DETAIL A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min. D = 1.0 Ft.
-L- 22+30 TO 25+00 (RT.)

-L-

CURVE LR2
PI = 31+41.23
Δ = 37° 50' 48.2" (RT)
Dc = 5° 43' 46.5"
θs = 8° 01' 17.1"
Ls = 280.00'
Ts = 483.86'
Lc = 380.55'
Rc = 1,000.00'
LT = 186.86'
ST = 93.51'
e = 0.08
DS = 50 mph

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 33

CONST.REV.
R /W REV. 3
R /W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	06
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	81503	ADDED BREMCO POWER EASEMENT
6	42104	ADDED PLUS AND DISTANCES AND EIP'S

REVISIONS

NAD 83

GLENN RENTSCHLER & NANCY WRIG
DB 0953 PG 1025

BEN G.& LINDA FARTHING
DB 1108 PG 0202
PB 01 PG 61

TERRY A & LYNN KING
DB 1258 PG 1535

NELSON'S CHAPEL BAPTIST CHURCH
DB 1236 PG 1239

SANDRA M.BASINGER
DB 1214 PG 0145

JUNE T.& JESSIE FORD
DB 0247 PG 0060

BREMCO POWER EASEMENT

PROPOSED SLOPE LIMIT

PROP.R/W

PROPOSED GUARDRAIL

FILL WITH FLOWABLE MATERIAL

CL. 'I' RIP-RAP
EST. 2 TONS
EST. 8 SYFF

CL. 'I' RIP-RAP
EST. 4 TONS
EST. 12 SYFF

18" CSP W/ 1 ELBOW

24" CSP

15" CSP

18" RCP

24" RCP

JB W/ SLAB LID

PROPOSED DOUBLE FACED BARRIER

BEGIN EXPWY. GUTTER +50

END EXPWY. GUTTER +50

PROPOSED EXP.GUTTER

BL-3
PINC 34+03.43

-L- ST Sta. 35+97.92

-L- CS Sta. 33+17.92

-L- TS Sta. 39+56.59

-L- SC Sta. 42+36.59

-L- N 11° 48' 39.1" E

MATCHLINE -L- STA. 30+00.00 SEE SHEET NO 05

MATCHLINE -L- STA. 43+00.00

SEE SHEET NO. 07

-L-
CURVE LR2
PI = 31+41.23
Δ = 37° 50' 48.2" (RT)
Dc = 5° 43' 46.5"
Os = 8° 01' 17.1"
Ls = 280.00'
Ts = 483.86'
Lc = 380.55'
Rc = 1,000.00'
LT = 186.86'
ST = 93.51'
e = 0.08
DS = 50 mph

-L-
CURVE LR3
PI = 44+29.44
Δ = 44° 04' 48.1" (RT)
Dc = 7° 00' 00.0"
Os = 9° 48' 00.0"
Ls = 280.00'
Ts = 472.84'
Lc = 349.71'
Rc = 818.51'
LT = 186.95'
ST = 93.59'
e = 0.08
DS = 50 mph

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

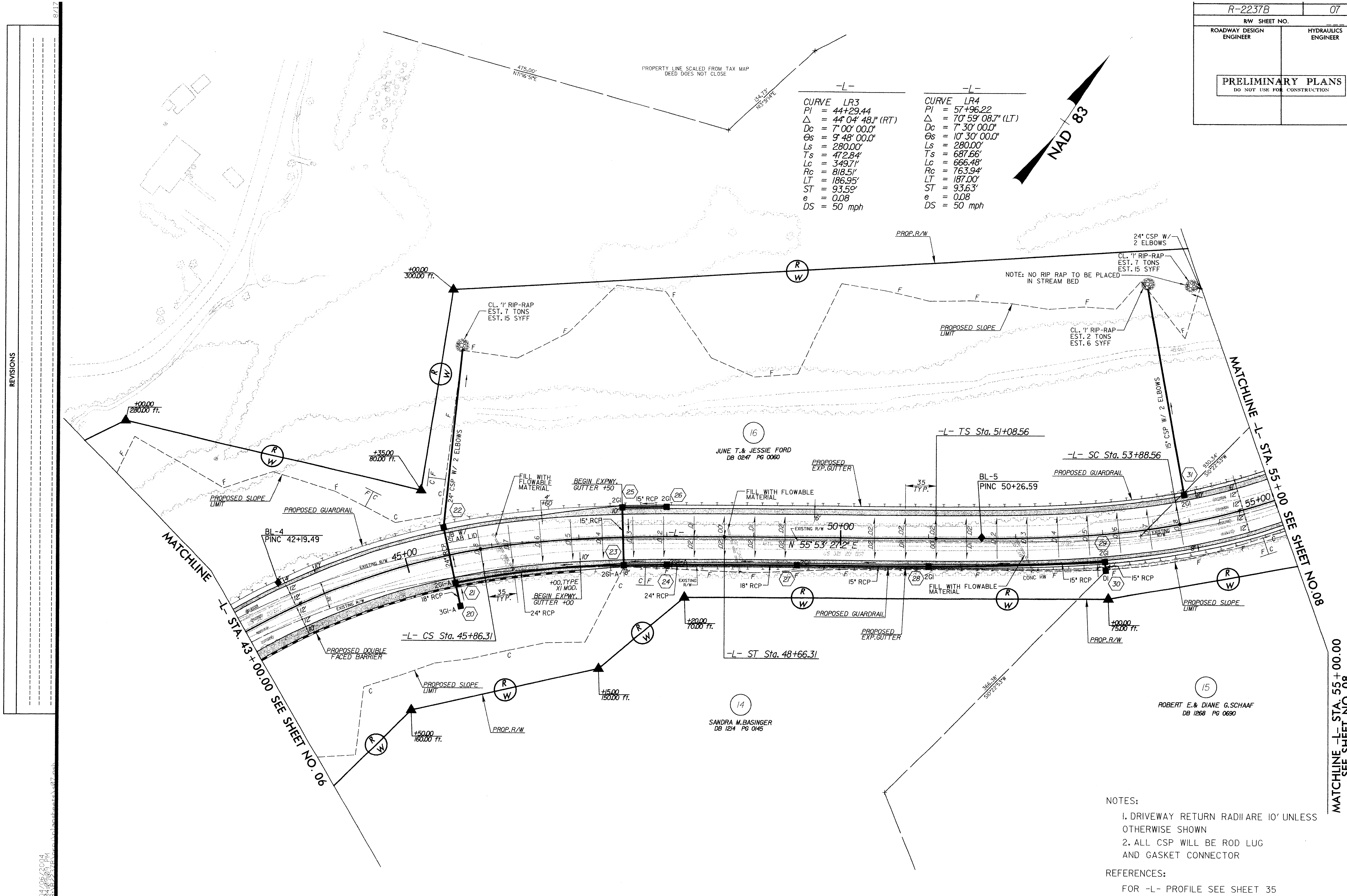
FOR -L- PROFILE SEE SHEET 34

04/26/2004
08:18:47 AM

R-2237B	07
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-		-L-	
CURVE	LR3	CURVE	LR4
PI =	44+29.44	PI =	57+96.22
Δ =	44° 04′ 48.1″ (RT)	Δ =	70° 59′ 08.7″ (LT)
Dc =	7° 00′ 00.0″	Dc =	7° 30′ 00.0″
Θs =	9° 48′ 00.0″	Θs =	10° 30′ 00.0″
Ls =	280.00′	Ls =	280.00′
Ts =	472.84′	Ts =	687.66′
Lc =	349.71′	Lc =	666.48′
Rc =	818.51′	Rc =	763.94′
LT =	186.95′	LT =	187.00′
ST =	93.59′	ST =	93.63′
e =	0.08	e =	0.08
DS =	50 mph	DS =	50 mph



REVISIONS
NAD 83
PROPERTY LINE SCALED FROM TAX MAP
DEED DOES NOT CLOSE
475.00′ N71°16′51″E
154.73′ N13°31′14″E
PROP. R/W
+00.00 300.00 ft.
+00.00 280.00 ft.
+35.00 80.00 ft.
CL. 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
24" CSP W/ 2 ELBOWS
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
15" CSP W/ 2 ELBOWS
PROPOSED SLOPE LIMIT
PROPOSED GUARDRAIL
PROPOSED EXP. GUTTER
BL-4 PINC 42+19.49
BL-5 PINC 50+26.59
FILL WITH FLOWABLE MATERIAL
BEGIN EXPWY. GUTTER +50
BEGIN EXPWY. GUTTER +00
+00 TYPE XI MOD.
JB W/ SLAB LID
-L- TS Sta. 51+08.56
-L- SC Sta. 53+88.56
-L- CS Sta. 45+86.31
-L- ST Sta. 48+66.31
N 55° 53′ 27.2″ E
45+00
50+00
55+00
35 TYP.
15" RCP
18" RCP
24" RCP
CONC HW
PROPOSED DOUBLE FACED BARRIER
16 JUNE T.& JESSIE FORD DB 0247 PG 0060
14 SANDRA M.BASINGER DB 1214 PG 0145
15 ROBERT E.& DIANE G.SCHAAF DB 1268 PG 0690
+20.00 70.00 ft.
+15.00 150.00 ft.
+50.00 160.00 ft.
+00.00 75.00 ft.
366.38′ S10°22′53″W
MATCHLINE -L- STA. 43+00.00 SEE SHEET NO. 06
MATCHLINE -L- STA. 55+00 SEE SHEET NO. 08
MATCHLINE -L- STA. 55+00.00 SEE SHEET NO. 08

NOTES:

1. DRIVEWAY RETURN RADII ARE 10′ UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

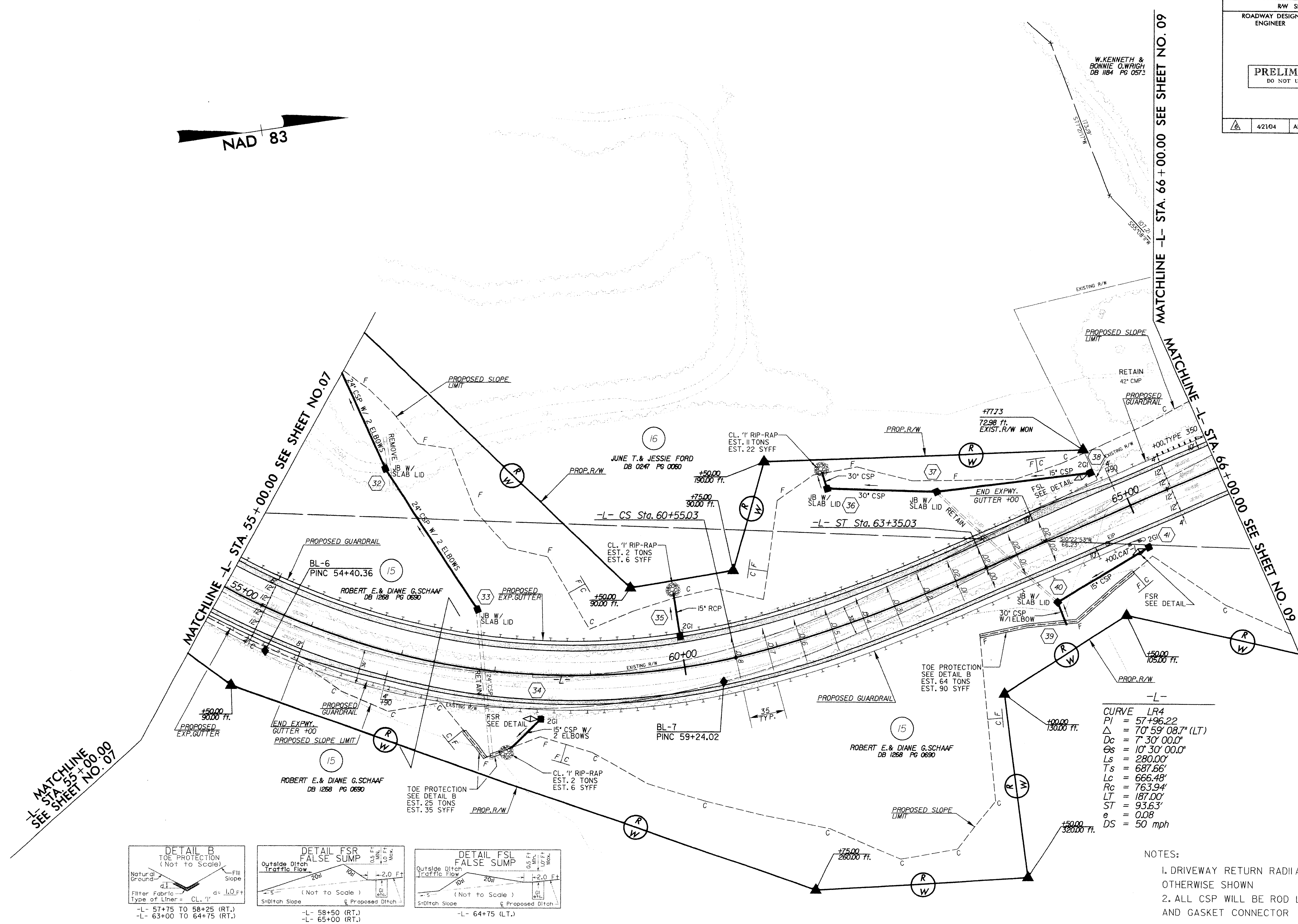
FOR -L- PROFILE SEE SHEET 35

R/W REV. 6	PROJECT REFERENCE NO.	SHEET NO.
	R-2237B	08
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6	4/21/04	ADDED PLUS AND DISTANCES

REVISIONS



NAD 83
W.KENNETH & BONNIE O.WRIGH DB 1184 PG 0573
MATCHLINE -L- STA. 66+00.00 SEE SHEET NO. 09
MATCHLINE -L- STA. 55+00.00 SEE SHEET NO. 07
PROPOSED SLOPE LIMIT
PROPOSED GUARDRAIL
PROP. R/W
EXISTING R/W
JUNE T.& JESSIE FORD DB 0247 PG 0060
ROBERT E.& DIANE G.SCHAAF DB 1268 PG 0690
CL. 'I' RIP-RAP EST. 11 TONS EST. 22 SYFF
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
-L- CS Sta. 60+55.03
-L- ST Sta. 63+35.03
BL-6 PINC 54+40.36
BL-7 PINC 59+24.02
24" CSP W/ 2 ELBOWS
JB W/ SLAB LID
30" CSP
15" CSP
15" RCP
30" CSP W/1 ELBOW
15" CSP W/ 2 ELBOWS
RETAIN 42" CMP
+77.73 72.98 ft. EXIST. R/W MON
+50.00 190.00 ft.
+75.00 90.00 ft.
+50.00 90.00 ft.
+50.00 105.00 ft.
+00.00 130.00 ft.
+50.00 320.00 ft.
+75.00 260.00 ft.
END EXPWY. GUTTER +00
PROPOSED EXP. GUTTER
FSR SEE DETAIL
FSL SEE DETAIL
TOE PROTECTION SEE DETAIL B EST. 64 TONS EST. 90 SYFF
TOE PROTECTION SEE DETAIL B EST. 25 TONS EST. 35 SYFF
55+00
60+00
65+00
DETAIL B TOE PROTECTION (Not to Scale)
-L- 57+75 TO 58+25 (RT.)
-L- 63+00 TO 64+75 (RT.)
DETAIL FSR FALSE SUMP (Not to Scale)
-L- 58+50 (RT.)
-L- 65+00 (RT.)
DETAIL FSL FALSE SUMP (Not to Scale)
-L- 64+75 (LT.)

-L-

CURVE LR4
PI = 57+96.22
Δ = 70°59′08.7″ (LT)
Dc = 7°30′00.0″
Θs = 10°30′00.0″
Ls = 280.00′
Ts = 687.66′
Lc = 666.48′
Rc = 763.94′
LT = 187.00′
ST = 93.63′
e = 0.08
DS = 50 mph

NOTES:

1. DRIVEWAY RETURN RADII ARE 10′ UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

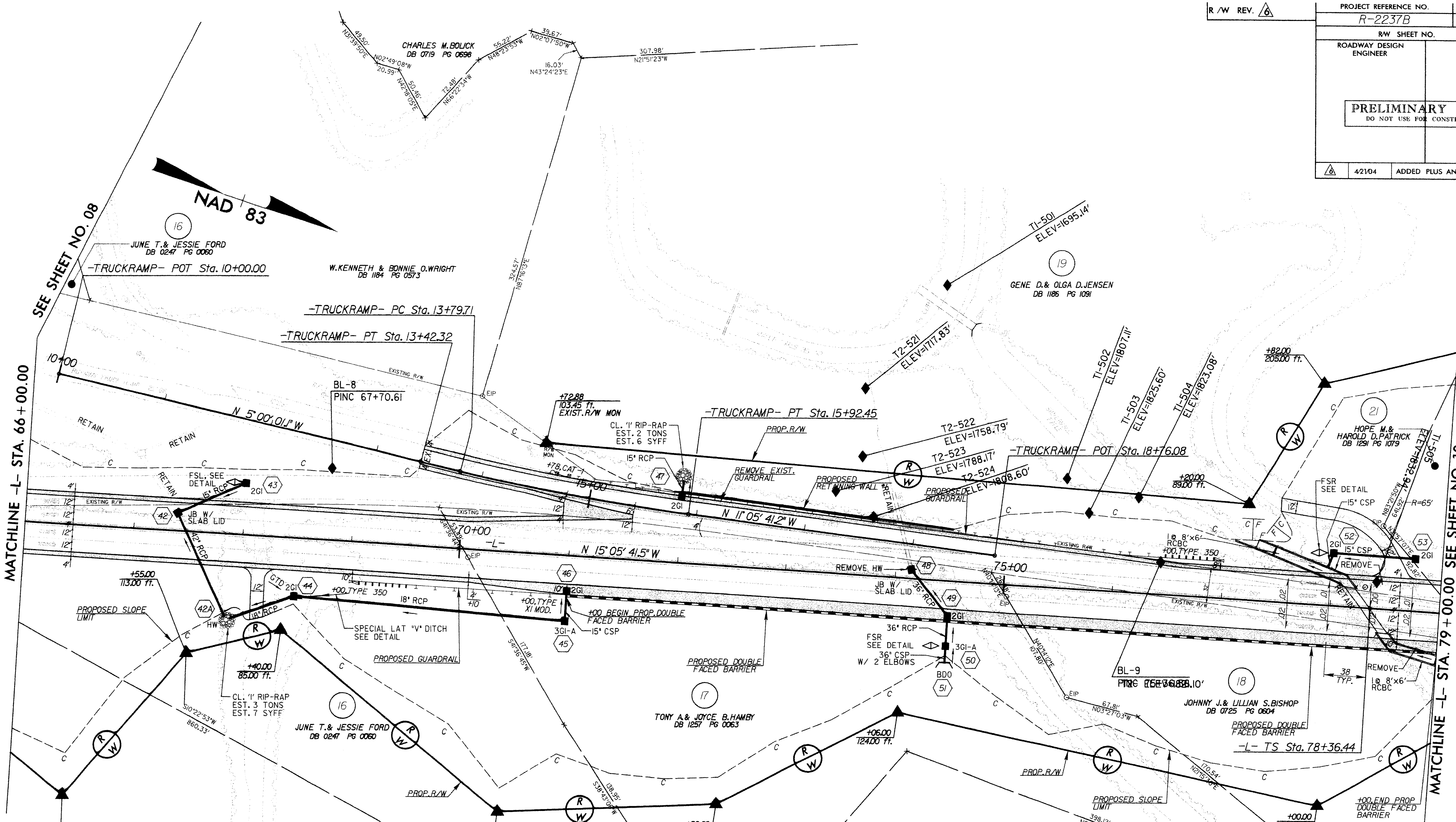
FOR -L- PROFILE SEE SHEET 36

R /W REV. 6	PROJECT REFERENCE NO.	SHEET NO.
	R-2237B	09
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

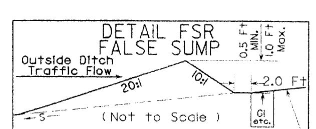
6	4/21/04	ADDED PLUS AND DISTANCES

REVISIONS

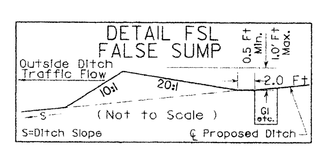


NAD 83
SEE SHEET NO. 08
MATCHLINE -L- STA. 66+00.00
MATCHLINE -L- STA. 79+00.00 SEE SHEET NO. 10
CHARLES M.BOLICK DB 0719 PG 0698
JUNE T.& JESSIE FORD DB 0247 PG 0060
W.KENNETH & BONNIE O.WRIGHT DB 1184 PG 0573
GENE D.& OLGA D.JENSEN DB 1186 PG 1091
HOPE M.& HAROLD D.PATRICK DB 1291 PG 1079
TONY A.& JOYCE B.HAMBY DB 1257 PG 0063
JOHNNY J.& LILLIAN S.BISHOP DB 0725 PG 0604
-TRUCKRAMP- POT Sta. 10+00.00
-TRUCKRAMP- PC Sta. 13+79.71
-TRUCKRAMP- PT Sta. 13+42.32
-TRUCKRAMP- PT Sta. 15+92.45
-TRUCKRAMP- POT Sta. 18+76.08
-L- TS Sta. 78+36.44
BL-8 PINC 67+70.61
N 5°00'01.1" W
N 11°05'41.2" W
N 15°05'41.5" W
T1-501 ELEV=1695.14'
T2-521 ELEV=1717.83'
T1-502 ELEV=1807.11'
T1-503 ELEV=1825.60'
T1-504 ELEV=1823.08'
T2-522 ELEV=1758.79'
T2-523 ELEV=1788.17'
T2-524 ELEV=1808.60'
+72.88 103.45 ft. EXIST.R/W MON
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
REMOVE EXIST. GUARDRAIL
PROPOSED RETAINING WALL
PROPOSED GUARDRAIL
PROP. R/W
FSL SEE DETAIL
FSR SEE DETAIL
JB W/ SLAB LID
SPECIAL LAT 'V' DITCH SEE DETAIL
+00 BEGIN PROP. DOUBLE FACED BARRIER
PROPOSED DOUBLE FACED BARRIER
PROPOSED SLOPE LIMIT
REMOVE HW
36" RCP
36" CSP W/ 2 ELBOWS
1@ 8'x6' RCBC
+00 END PROP DOUBLE FACED BARRIER
+82.00 205.00 ft.
+20.00 89.00 ft.
+55.00 113.00 ft.
+40.00 85.00 ft.
+06.00 124.00 ft.
+50.00 240.00 ft.
+50.00 220.00 ft.
+50.00 250.00 ft.
+00.00 185.00 ft.
70+00
75+00

-TRUCKRAMP-	-L-
CURVE TRUCKRP	CURVE LR5
PI Sta 14+86.18	PI = 80+35.74
Δ = 6° 05' 40.1" (LT)	Δ = 6° 14' 57.7" (RT)
D = 2° 51' 53.2"	Dc = 3° 00' 00.0"
L = 212.74'	Θs = 2° 51' 00.0"
T = 106.47'	Ls = 190.00'
R = 2,000.00'	Ts = 199.29'
e = 0.02	Lc = 18.31'
DS = 50 mph	Rc = 1,909.86'
	LT = 126.68'
	ST = 63.35'
	e = 0.05
	DS = 50 mph



-L- 74+75 (RT.)



-L- 68+00 (LT.)
-L- 78+00 (LT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 37

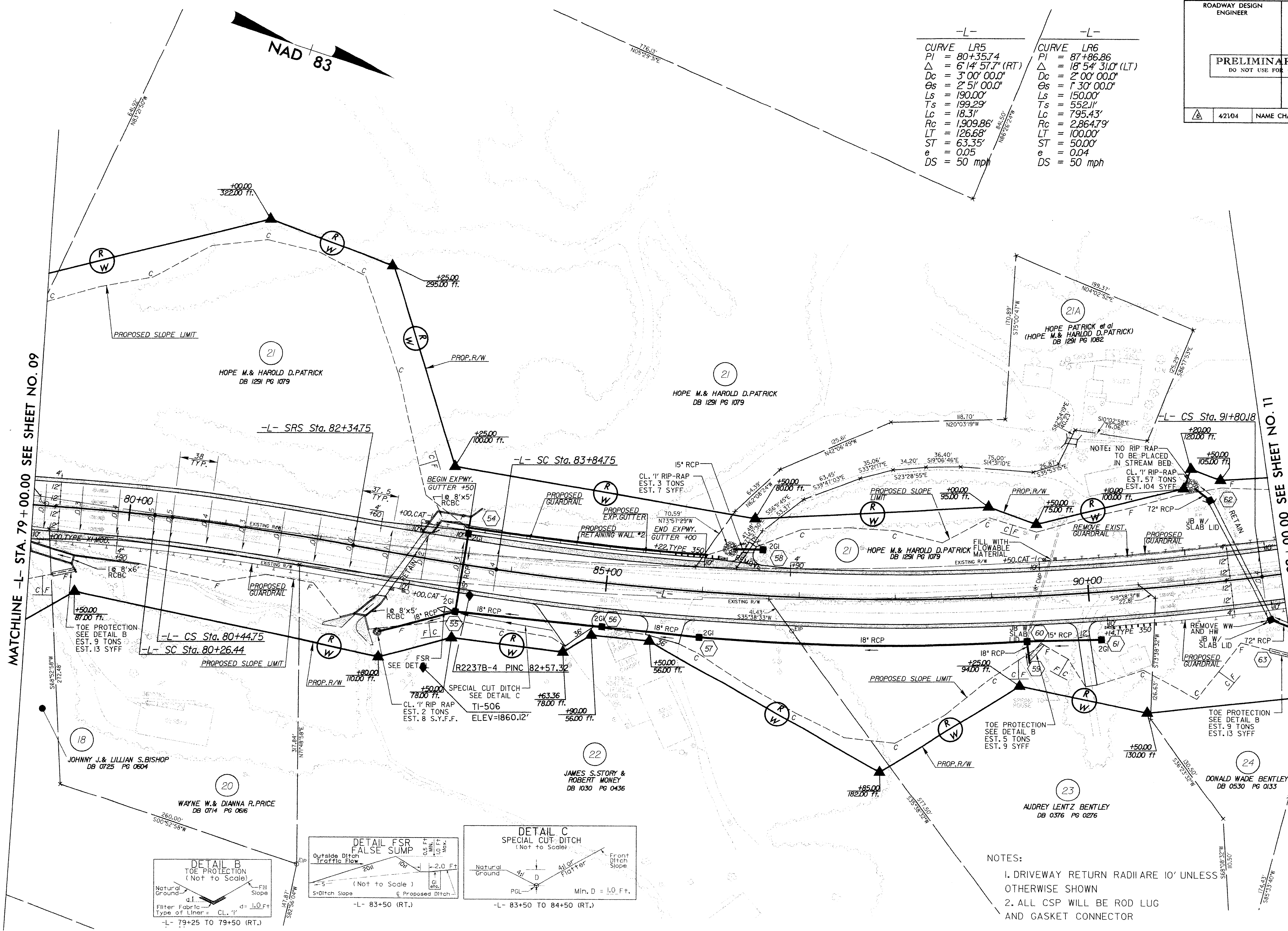
R/W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6	4/21/04	NAME CHANGE PARCEL 21

-L-		-L-	
CURVE	LR5	CURVE	LR6
PI =	80+35.74	PI =	87+86.86
Δ =	6° 14′ 57.7″ (RT)	Δ =	18° 54′ 31.0″ (LT)
Dc =	3° 00′ 00.0″	Dc =	2° 00′ 00.0″
Θs =	2° 51′ 00.0″	Θs =	1° 30′ 00.0″
Ls =	190.00′	Ls =	150.00′
Ts =	199.29′	Ts =	552.11′
Lc =	18.31′	Lc =	795.43′
Rc =	1,909.86′	Rc =	2,864.79′
LT =	126.68′	LT =	100.00′
ST =	63.35′	ST =	50.00′
e =	0.05	e =	0.04
DS =	50 mph	DS =	50 mph



NAD 83
MATCHLINE -L- STA. 79+00.00 SEE SHEET NO. 09
MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 11
HOPE M.& HAROLD D.PATRICK
DB 1291 PG 1079
HOPE PATRICK et al
(HOPE M.& HAROLD D.PATRICK)
DB 1291 PG 1082
JOHNNY J.& LILLIAN S.BISHOP
DB 0725 PG 0604
WAYNE W.& DIANNA R.PRICE
DB 0714 PG 0616
JAMES S.STORY &
ROBERT MONEY
DB 1030 PG 0436
AUDREY LENTZ BENTLEY
DB 0376 PG 0276
DONALD WADE BENTLEY
DB 0530 PG 0133
PROPOSED SLOPE LIMIT
PROP.R/W
-L- SRS Sta. 82+34.75
-L- SC Sta. 83+84.75
-L- CS Sta. 80+44.75
-L- SC Sta. 80+26.44
-L- CS Sta. 91+80.18
BEGIN EXPWY. GUTTER +50
END EXPWY. GUTTER +00
PROPOSED GUARDRAIL
PROPOSED EXP.GUTTER
PROPOSED RETAINING WALL #2
REMOVE EXIST. GUARDRAIL
FILL WITH FLOWABLE MATERIAL
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CL. 'I' RIP-RAP EST. 57 TONS EST. 104 SYFF
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
TOE PROTECTION SEE DETAIL B EST. 9 TONS EST. 13 SYFF
TOE PROTECTION SEE DETAIL B EST. 5 TONS EST. 9 SYFF
CL. 'I' RIP RAP EST. 2 TONS EST. 8 S.Y.F.F.
SPECIAL CUT DITCH SEE DETAIL C
R2237B-4 PINC 82+57.32
TI-506 ELEV=1860.12′
REMOVE WW AND HW
JB W/ SLAB LID
1@ 8′x5′ RCBC
1@ 8′x6′ RCBC
18″ RCP
72″ RCP
15″ RCP
80+00
85+00
90+00
DETAIL B
TOE PROTECTION
(Not to Scale)
-L- 79+25 TO 79+50 (RT.)
DETAIL FSR
FALSE SUMP
(Not to Scale)
-L- 83+50 (RT.)
DETAIL C
SPECIAL CUT DITCH
(Not to Scale)
Min. D = 1.0 Ft.
-L- 83+50 TO 84+50 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10′ UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 38

R/W REV. 6	PROJECT REFERENCE NO.	SHEET NO.
	R-2237B	11
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

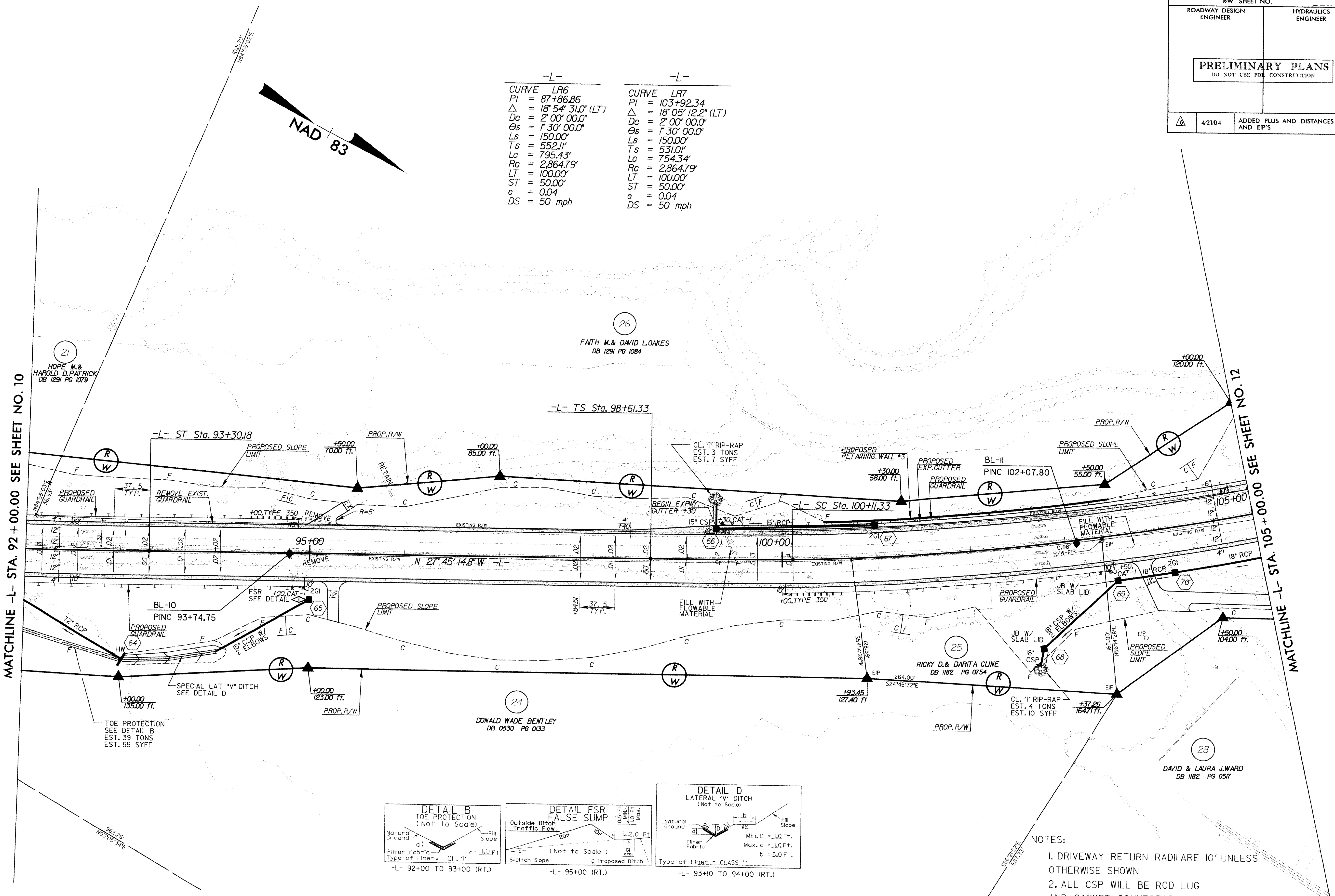
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6	4/21/04	ADDED PLUS AND DISTANCES AND EIP'S

REVISIONS

-L-	
CURVE	LR6
PI	= 87+86.86
Δ	= 18° 54' 31.0" (LT)
Dc	= 2° 00' 00.0"
Θs	= 1° 30' 00.0"
Ls	= 150.00'
Ts	= 552.11'
Lc	= 795.43'
Rc	= 2,864.79'
LT	= 100.00'
ST	= 50.00'
e	= 0.04
DS	= 50 mph

-L-	
CURVE	LR7
PI	= 103+92.34
Δ	= 18° 05' 12.2" (LT)
Dc	= 2° 00' 00.0"
Θs	= 1° 30' 00.0"
Ls	= 150.00'
Ts	= 531.01'
Lc	= 754.34'
Rc	= 2,864.79'
LT	= 100.00'
ST	= 50.00'
e	= 0.04
DS	= 50 mph



NAD 83
MATCHLINE -L- STA. 92+00.00 SEE SHEET NO. 10
MATCHLINE -L- STA. 105+00.00 SEE SHEET NO. 12
HOPE M.& HAROLD D.PATRICK DB 1291 PG 1079
FAITH M.& DAVID L.OAKES DB 1291 PG 1084
DONALD WADE BENTLEY DB 0530 PG 0133
RICKY D.& DARITA CLINE DB 1182 PG 0754
DAVID & LAURA J.WARD DB 1182 PG 0517
-L- ST Sta. 93+30.18
-L- TS Sta. 98+61.33
-L- SC Sta. 100+11.33
N 27° 45' 14.8" W -L-
BL-10 PINC 93+74.75
BL-11 PINC 102+07.80
PROPOSED SLOPE LIMIT
PROP. R/W
PROPOSED GUARDRAIL
REMOVE EXIST. GUARDRAIL
PROPOSED RETAINING WALL
PROPOSED EXP. GUTTER
BEGIN EXPWY. GUTTER
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
CL. 'I' RIP-RAP EST. 4 TONS EST. 10 SYFF
FILL WITH FLOWABLE MATERIAL
TOE PROTECTION SEE DETAIL B EST. 39 TONS EST. 55 SYFF
SPECIAL LAT 'V' DITCH SEE DETAIL D
FSR SEE DETAIL
72" RCP
15" CSP W/ 2 ELBOWS
18" CSP W/ 2 ELBOWS
JB W/ SLAB LID
18" RCP
DETAIL B TOE PROTECTION (Not to Scale)
-L- 92+00 TO 93+00 (RT.)
DETAIL FSR FALSE SUMP
-L- 95+00 (RT.)
DETAIL D LATERAL 'V' DITCH (Not to Scale)
Type of Liner = CLASS 'I'
-L- 93+10 TO 94+00 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 39

CONTRACT:		
R /W REV. 2	R-2237B	12
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

2	7/22/03	ADJUSTED R/W, PARCEL 30, 31

REVISIONS

NAD 83

MATCHLINE -L- STA. 105+00.00 SEE SHEET NO. 11

MATCHLINE -L- STA. 118+00.00 SEE SHEET NO. 13

27 DANNY A.WOODRING DB 1208 PG 0015

29 LEON J.OAKES DB 1208 PG 0019

26 FAITH M.& DAVID L.OAKES DB 1291 PG 1084

29 LEON J.OAKES DB 1215 PG 1779

28 DAVID & LAURA J.WARD DB 1182 PG 0517

30 BENNIE E.TUDOR,SR.& WILLIAM V.TUDOR,SR. DB 0876 PG 0662

32 BRADLEY D.& DEBORAH A.INDICOTT DB 0785 PG 0602

31 BILLY R.& CATHY HAMBY DB 1238 PG 0752

33 JAMES D.& MELODY A.RICH DB 0987 PG 0212

-L- CS Sta. 107+65.66

-L- ST Sta. 109+15.66

BL-12 PINC 110+10.40

BL-13 PINC 115+67.84

+00.00 120.00 ft.

+10.00 117.00 ft.

+75.00 190.00 ft.

+50.00 300.00 ft.

111+93.22 320.00 ft.

+70.00 224.000

+00.00 224.000

+60.00 85.00 ft.

+0.00 85.00 ft.

+50.00 248.00 ft.

111+34.089 327.57 ft.

PROPOSED SLOPE LIMIT

PROP.R/W

PROPOSED EXP.GUTTER

PROPOSED GUARDRAIL

FILL WITH FLOWABLE MATERIAL

END EXPWY. GUTTER +50

+74.TYPE 350

REMOVE

EXISTING R/W

REMOVE HW

CONC HW

18" RCP

2GI

FSR SEE DETAIL

18" CSP W/ ELBOW

BDO

CL. 'I' RIP-RAP EST. 4 TONS EST. 10 SYFF

37.5 TYP.

FILL WITH FLOWABLE MATERIAL REMOVE HW

ENERGY DISSIPATOR

JB w/ SLAB LID

TOE PROTECTION SEE DETAIL B EST. 64 TONS EST. 90 SYFF

30" RCP

30" CSP W/ ELBOW

SPRING BOX

BEGIN EXPWY. GUTTER +50

PROPOSED EXP.GUTTER

END EXPWY. GUTTER +00

6' TBJB W/ SLAB LID

15" CSP

15" RCP

RETAIN & CLEAN OUT EXISTING PIPE

REMOVE HW

JB W/ SLAB LID

SPECIAL CUT DITCH SEE DETAIL E

TOE PROTECTION SEE DETAIL B EST. 20 TONS EST. 28 SYFF

EPHEMERAL PERENNIAL

DETAIL B
TOE PROTECTION
(Not to Scale)

Natural Ground — Fill Slope — d1 — d= 1.0 Ft — Filter Fabric — Type of Liner = CL. 'I'

-L- 114+00 TO 115+60 (LT.)
-L- 116+50 TO 116+98 (RT.)

DETAIL E
SPECIAL CUT DITCH
(Not to Scale)

VARIES 6' VARIES 12' MIN. — Natural Ground — 1.5:1 MAX — 4:1 — 6:1 — SHLDR. PT. — DITCH PROFILE

-L- 113+50 TO 116+00 (RT.)

DETAIL FSR
FALSE SUMP
(Not to Scale)

Outside Ditch Traffic Flow — 10.5 Ft MIN. 14.0 Ft Max. — 20H — 10H — 2.0 Ft — S — S=Ditch Slope — 6% Proposed Ditch

-L- 106+40 (RT.)
-L- 109+52 (RT.)
-L- 114+00 (RT.)

-L-

CURVE	LRT
PI	= 103+92.34
Δ	= 18° 05' 12.2" (LT)
Dc	= 2° 00' 00.0"
θs	= 1° 30' 00.0"
Ls	= 150.00'
Ts	= 531.01'
Lc	= 754.34'
Rc	= 2,864.79'
LT	= 100.00'
ST	= 50.00'
e	= 0.04
DS	= 50 mph

REFERENCES:
FOR -L- PROFILE SEE SHEET 40

NOTES:
1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

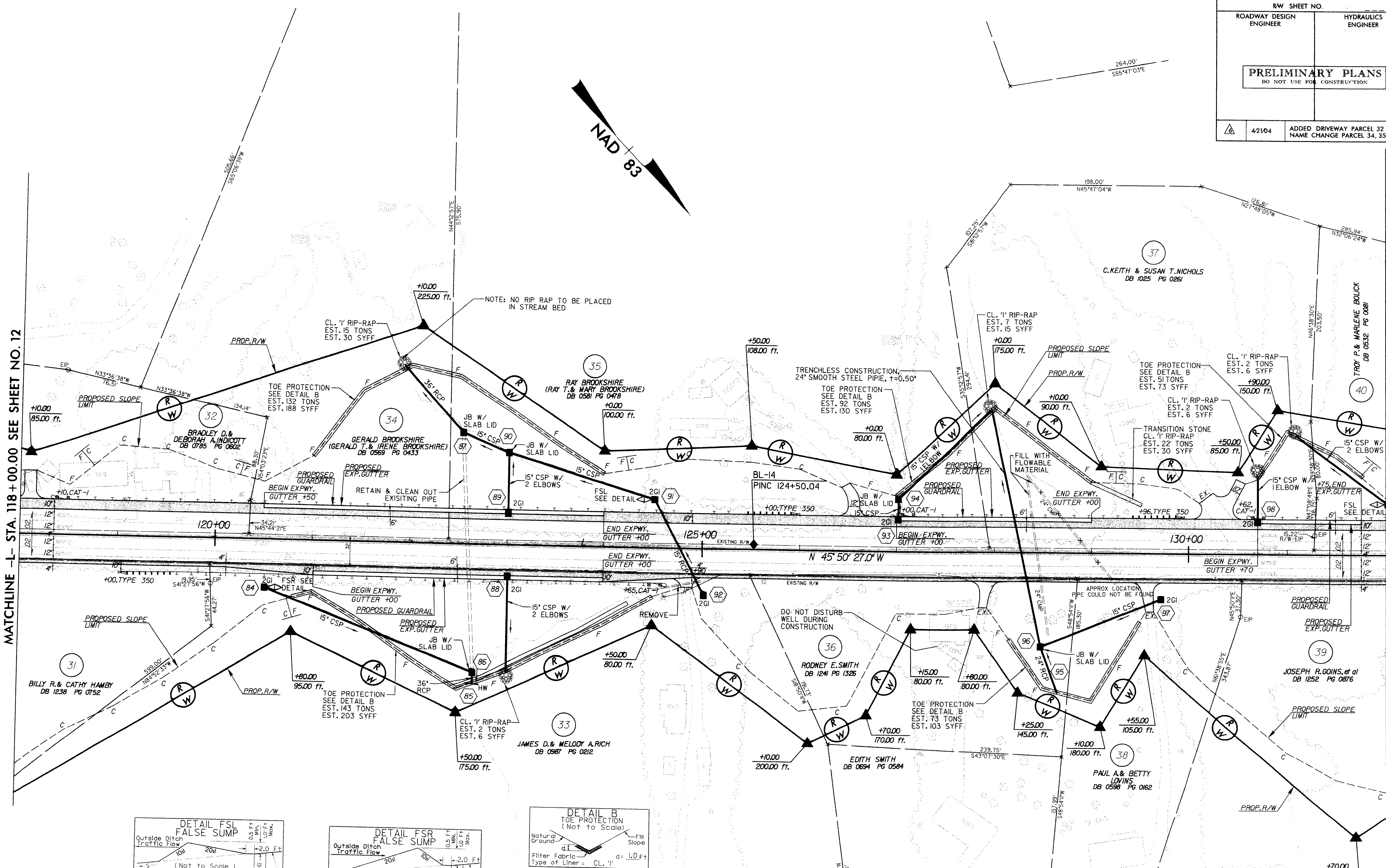
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

R/W REV. 6

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6	4/21/04	ADDED DRIVEWAY PARCEL 32 NAME CHANGE PARCEL 34, 35, 36

REVISIONS



NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR
3. ALL U/G TELEPHONE LOCATED AS MARKED BY PRO-MARK ON JULY 17 AND 18,2000

REFERENCES:

FOR -L- PROFILE SEE SHEET 41

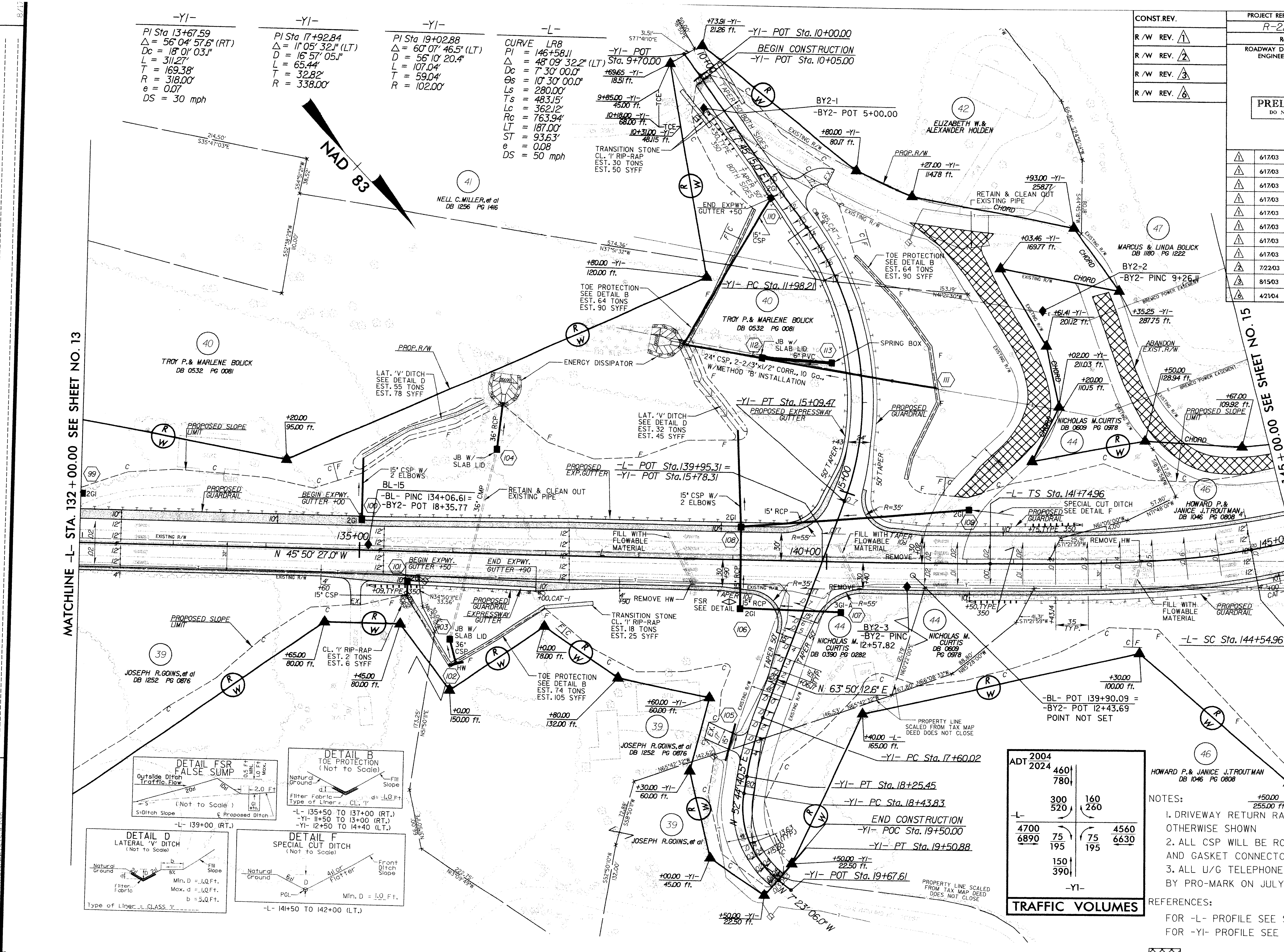
CONST.REV.
R/W REV. 1
R/W REV. 2
R/W REV. 3
R/W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

1	6/17/03	CHANGED PROPERTY OWNER, PARCEL 43
1	6/17/03	ADDED R/W MONUMENTS ALONG PARCELS 42, 45, 46, 47
1	6/17/03	EXTENDED EXIST. R/W ALONG RICHLAND RD.
1	6/17/03	ABANDON R/W ALONG WATERFALLS ROAD
1	6/17/03	CHANGED PROPERTY OWNER, PARCEL 43
1	6/17/03	ADJUSTED R/W, PARCEL 39
1	6/17/03	ADJUSTED PROPERTY LINE, PARCEL 47
1	6/17/03	ADDED CONSTRUCTION EASEMENT, PARCEL 41
2	7/22/03	ADJUSTED R/W, PARCEL 41, 42, 47, 45, 46
3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	ADDED SOIL DRIVE PARCEL 41 COMBINE PARCEL 44 & 45

REVISIONS



-Y1-
PI Sta 13+67.59
Δ = 56° 04' 57.6" (RT)
Dc = 18° 01' 03.1"
L = 311.27'
T = 169.38'
R = 318.00'
e = 0.07
DS = 30 mph
-Y1-
PI Sta 17+92.84
Δ = 11° 05' 32.1" (LT)
D = 16° 57' 05.1"
L = 65.44'
T = 32.82'
R = 338.00'
-Y1-
PI Sta 19+02.88
Δ = 60° 07' 46.5" (LT)
D = 56° 10' 20.4"
L = 107.04'
T = 59.04'
R = 102.00'
-L-
CURVE LR8
PI = 146+58.11
Δ = 48° 09' 32.2" (LT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 483.15'
Lc = 362.12'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph
NAD 83
MATCHLINE -L- STA. 132+00.00 SEE SHEET NO. 13
MATCHLINE -L- STA. 145+00.00 SEE SHEET NO. 15
-Y1- POT Sta. 10+00.00
BEGIN CONSTRUCTION
-Y1- POT Sta. 10+05.00
BY2-1
-BY2- POT 5+00.00
ELIZABETH W.& ALEXANDER HOLDEN
NELL C.MILLER,et al DB 1256 PG 1416
TROY P.& MARLENE BOLICK DB 0532 PG 0081
-Y1- PC Sta. 11+98.21
MARCUS & LINDA BOLICK DB 1180 PG 1222
BY2-2
-BY2- PINC 9+26.11
-Y1- PT Sta. 15+09.47
-L- POT Sta.139+95.31 =
-Y1- POT Sta.15+78.31
BL-15
-BL- PINC 134+06.61 =
-BY2- POT 18+35.77
N 45° 50' 27.0" W
NICHOLAS M.CURTIS DB 0609 PG 0978
-L- TS Sta. 141+74.96
HOWARD P.& JANICE J.TROUTMAN DB 1046 PG 0808
BY2-3
-BY2- PINC 12+57.82
NICHOLAS M. CURTIS DB 0390 PG 0282
N 63° 50' 12.6" E
-L- SC Sta. 144+54.96
-BL- POT 139+90.09 =
-BY2- POT 12+43.69
POINT NOT SET
JOSEPH R.GOINS,et al DB 1252 PG 0876
-Y1- PC Sta. 17+60.02
-Y1- PT Sta. 18+25.45
-Y1- PC Sta. 18+43.83
END CONSTRUCTION
-Y1- POC Sta. 19+50.00
-Y1- PT Sta. 19+50.88
-Y1- POT Sta. 19+67.61
DETAIL FSR FALSE SUMP
-L- 139+00 (RT.)
DETAIL B TOE PROTECTION (Not to Scale)
-L- 135+50 TO 137+00 (RT.)
-Y1- 11+50 TO 13+00 (RT.)
-Y1- 12+50 TO 14+40 (LT.)
DETAIL D LATERAL 'V' DITCH (Not to Scale)
Type of Liner = CLASS 'I'
DETAIL F SPECIAL CUT DITCH (Not to Scale)
-L- 141+50 TO 142+00 (LT.)

TRAFFIC VOLUMES

ADT 2004 / 2024

-L-: 4700 / 6890; 4560 / 6630
460 / 780; 300 / 520; 160 / 260; 75 / 195; 75 / 195; 150 / 390
-Y1-

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR
3. ALL U/G TELEPHONE LOCATED AS MARKED BY PRO-MARK ON JULY 17 AND 18,2000

REFERENCES:

FOR -L- PROFILE SEE SHEET 42
FOR -Y1- PROFILE SEE SHEET 60

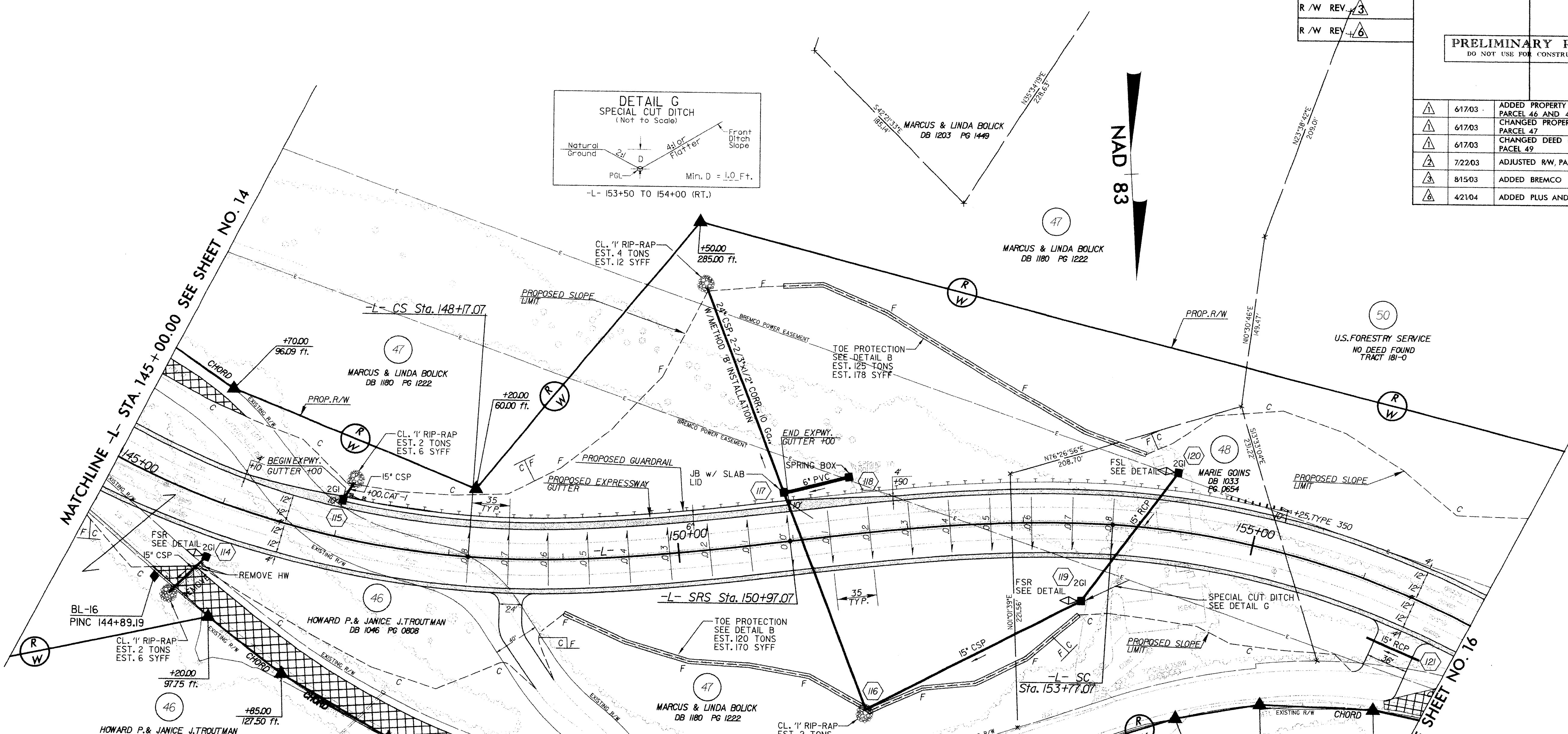
ROADWAY TO BE OBLITERATED

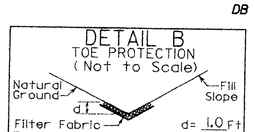
CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 1	R-2237B	15
R/W REV. 2	R/W SHEET NO.	
R/W REV. 3	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV. 6		

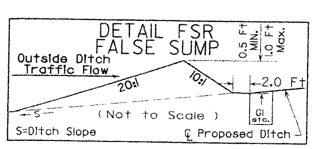
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

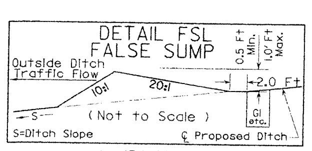
Rev.	Date	Description
1	6/17/03	ADDED PROPERTY LINE BETWEEN PARCEL 46 AND 49
1	6/17/03	CHANGED PROPERTY LINE ON PARCEL 47
1	6/17/03	CHANGED DEED NUMBER FOR PARCEL 49
2	7/22/03	ADJUSTED R/W, PARCEL 47, 46, 49
3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	ADDED PLUS AND DISTANCES

REVISIONS









-L-
CURVE LR8
PI = 146+58.11
Δ = 48° 09' 32.2" (LT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 483.15'
Lc = 362.12'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

-L-
CURVE LR9
PI = 157+24.39
Δ = 64° 47' 41.1" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 627.32'
Lc = 583.93'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

NOTES:
1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR
3. ALL U/G TELEPHONE LOCATED AS MARKED BY PRO-MARK ON JULY 17 AND 18,2000

REFERENCES:
FOR -L- PROFILE SEE SHEET 43

ROADWAY TO BE OBLITERATED

CONST.REV.	
R/W REV. 2	
R/W REV. 3	
R/W REV. 4	

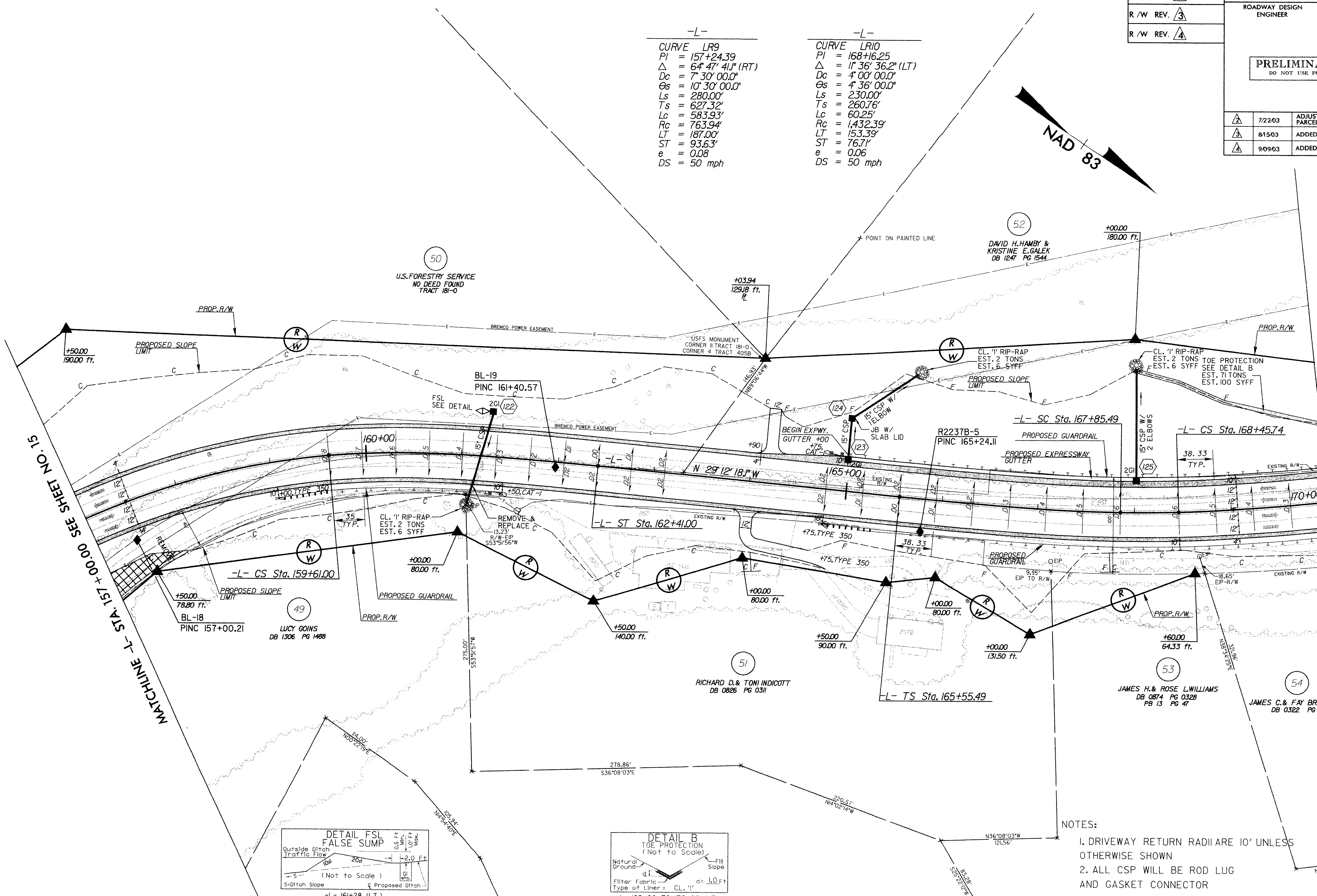
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

2	7/22/03	ADJUSTED R/W, PARCEL 49, 50, 52, 51, 53
3	8/15/03	ADDED BREMCO POWER EASEMENT
4	9/09/03	ADDED DRIVEWAY, PARCEL 52

REVISIONS

-L- CURVE LR9		-L- CURVE LR10	
PI	= 157+24.39	PI	= 168+16.25
Δ	= 64° 47' 41.1" (RT)	Δ	= 11° 36' 36.2" (LT)
Dc	= 7° 30' 00.0"	Dc	= 4° 00' 00.0"
Θs	= 10° 30' 00.0"	Θs	= 4° 36' 00.0"
Ls	= 280.00'	Ls	= 230.00'
Ts	= 627.32'	Ts	= 260.76'
Lc	= 583.93'	Lc	= 60.25'
Rc	= 763.94'	Rc	= 1,432.39'
LT	= 187.00'	LT	= 153.39'
ST	= 93.63'	ST	= 76.71'
e	= 0.08	e	= 0.06
DS	= 50 mph	DS	= 50 mph



NAD 83
POINT ON PAINTED LINE
50
U.S.FORESTRY SERVICE
NO DEED FOUND
TRACT 181-O
52
DAVID H.HAMBY &
KRISTINE E.GALEK
DB 1247 PG 1544
PROP. R/W
PROPOSED SLOPE LIMIT
BREMCO POWER EASEMENT
+50.00
190.00 ft.
+03.94
129.18 ft.
USFS MONUMENT
CORNER 11 TRACT 181-O
CORNER 4 TRACT 405B
+00.00
180.00 ft.
CL. 'I' RIP-RAP
EST. 2 TONS
EST. 6 SYFF
TOE PROTECTION
SEE DETAIL B
EST. 71 TONS
EST. 100 SYFF
BL-19
PINC 161+40.57
FSL
SEE DETAIL
15" CSP W/ 1 ELBOW
JB W/ SLAB LID
BEGIN EXPWY. GUTTER
-L- SC Sta. 167+85.49
-L- CS Sta. 168+45.74
R2237B-5
PINC 165+24.11
PROPOSED GUARDRAIL
PROPOSED EXPRESSWAY GUTTER
15" CSP W/ 2 ELBOWS
38.33 TYP.
160+00
165+00
170+00
N 29° 12' 18.1" W
MATCHLINE -L- STA. 157+00.00 SEE SHEET NO. 15
MATCHLINE -L- STA. 170+00.00 SEE SHEET NO. 17
CL. 'I' RIP-RAP
EST. 2 TONS
EST. 6 SYFF
REMOVE & REPLACE
13.23' R/W-EIP
S53°51'56"W
-L- ST Sta. 162+41.00
-L- CS Sta. 159+61.00
+00.00
80.00 ft.
+50.00
78.80 ft.
BL-18
PINC 157+00.21
PROPOSED GUARDRAIL
PROP. R/W
49
LUCY GOINS
DB 1306 PG 1488
+75, TYPE 350
+50.00
140.00 ft.
+00.00
80.00 ft.
+50.00
90.00 ft.
+00.00
131.50 ft.
+60.00
64.33 ft.
9.95' EIP TO R/W
18.65' EIP-R/W
51
RICHARD D.& TONI INDICOTT
DB 0826 PG 0311
-L- TS Sta. 165+55.49
53
JAMES H.& ROSE L.WILLIAMS
DB 0874 PG 0328
PB 13 PG 47
54
JAMES C.& FAY BRADSHAW
DB 0322 PG 0462
275.00'
S53°51'57"W
278.86'
S36°08'03"E
220.57'
N14°02'14"W
N36°08'03"W
121.56'
223.48'
N41°41'19"W
DETAIL FSL
FALSE SUMP
(Not to Scale)
-L- 161+28 (LT.)
DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d= 1.0 Ft
-L- 168+00 TO 170+00 (LT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 44

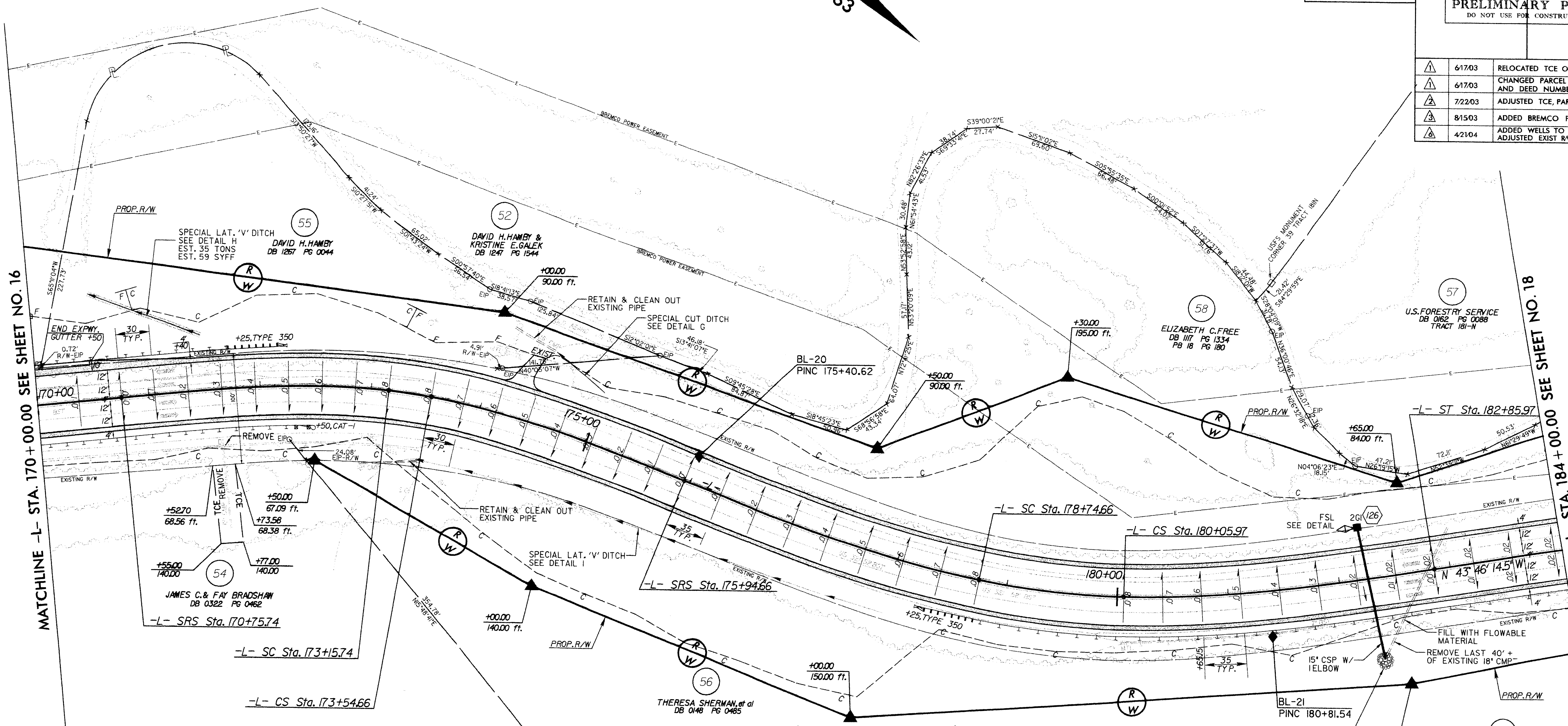
ROADWAY TO BE OBLITERATED

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 1	R-2237B	17
R/W REV. 2	R/W SHEET NO.	
R/W REV. 3	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV. 6		

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

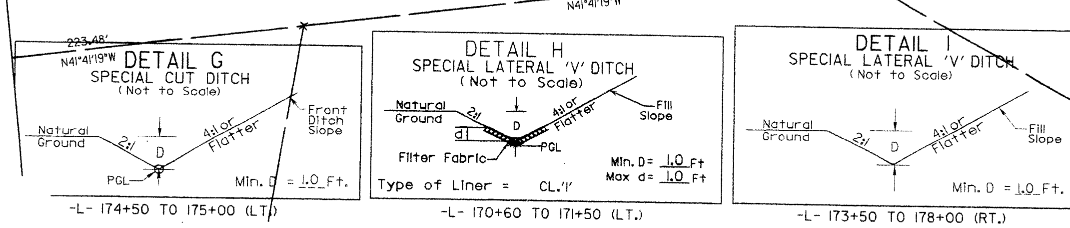
Rev.	Date	Description
1	6/17/03	RELOCATED TCE ON PARCEL 59
1	6/17/03	CHANGED PARCEL 56 OWNER AND DEED NUMBER
2	7/22/03	ADJUSTED TCE, PARCEL 54
3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	ADDED WELLS TO PARCEL 55 ADJUSTED EXIST R/W

REVISIONS

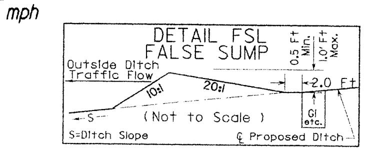


NAD 83
MATCHLINE -L- STA. 170+00.00 SEE SHEET NO. 16
MATCHLINE -L- STA. 184+00.00 SEE SHEET NO. 18
BREMCO POWER EASEMENT
PROP. R/W
SPECIAL LAT. 'V' DITCH SEE DETAIL H EST. 35 TONS EST. 59 SYFF
55 DAVID H. HAMBY DB 1267 PG 0044
52 DAVID H. HAMBY & KRISTINE E. GALEK DB 1247 PG 1544
RETAIN & CLEAN OUT EXISTING PIPE
SPECIAL CUT DITCH SEE DETAIL G
BL-20 PINC 175+40.62
58 ELIZABETH C. FREE DB 1117 PG 1334 PB 18 PG 180
57 U.S. FORESTRY SERVICE DB 0162 PG 0088 TRACT 181-N
USFS MONUMENT CORNER 39 TRACT 181N
-L- ST Sta. 182+85.97
END EXPWY. GUTTER +50
+25, TYPE 350
REMOVE
TCE REMOVE
54 JAMES C. & FAY BRADSHAW DB 0322 PG 0462
-L- SRS Sta. 170+75.74
-L- SC Sta. 173+15.74
-L- CS Sta. 173+54.66
RETAIN & CLEAN OUT EXISTING PIPE
SPECIAL LAT. 'V' DITCH SEE DETAIL I
-L- SRS Sta. 175+94.66
-L- SC Sta. 178+74.66
-L- CS Sta. 180+05.97
FSL SEE DETAIL
N 43° 46' 14.5" W
FILL WITH FLOWABLE MATERIAL
REMOVE LAST 40' ± OF EXISTING 18" CMP
15" CSP W/ 1 ELBOW
BL-21 PINC 180+81.54
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
56 THERESA SHERMAN, et al DB 0148 PG 0485
EXISTING R/W

-L- CURVE LR10	-L- CURVE LR11	-L- CURVE LR12
PI = 168+16.25	PI = 173+38.89	PI = 179+46.45
Δ = 11° 36' 36.2" (LT)	Δ = 27° 53' 32.0" (RT)	Δ = 30° 50' 52.3" (LT)
Dc = 4° 00' 00.0"	Dc = 10° 00' 00.0"	Dc = 7° 30' 00.0"
Θs = 4° 36' 00.0"	Θs = 12° 00' 00.0"	Θs = 10° 30' 00.0"
Ls = 230.00'	Ls = 240.00'	Ls = 280.00'
Ts = 260.76'	Ts = 263.15'	Ts = 351.79'
Lc = 60.25'	Lc = 38.92'	Lc = 131.30'
Rc = 1,432.39'	Rc = 572.96'	Rc = 763.94'
LT = 153.39'	LT = 160.37'	LT = 187.00'
ST = 76.71'	ST = 80.34'	ST = 93.63'
e = 0.06	e = 0.08	e = 0.08
DS = 50 mph	DS = 45 mph	DS = 50 mph



DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
PGL
4:1 or Flatter
Front Ditch Slope
Min. D = 1.0 Ft.
-L- 174+50 TO 175+00 (LT.)
DETAIL H
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Min. D = 1.0 Ft
Max d = 1.0 Ft
Type of Liner = CL.'I'
-L- 170+60 TO 171+50 (LT.)
DETAIL I
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min. D = 1.0 Ft.
-L- 173+50 TO 178+00 (RT.)



NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR
3. DESIGN EXCEPTION IS REQUIRED FOR DESIGN SPEED DUE TO HORIZONTAL RADIUS AT STA. -L- 173+38.89

REFERENCES:

FOR -L- PROFILE SEE SHEET 45

04/26/2004

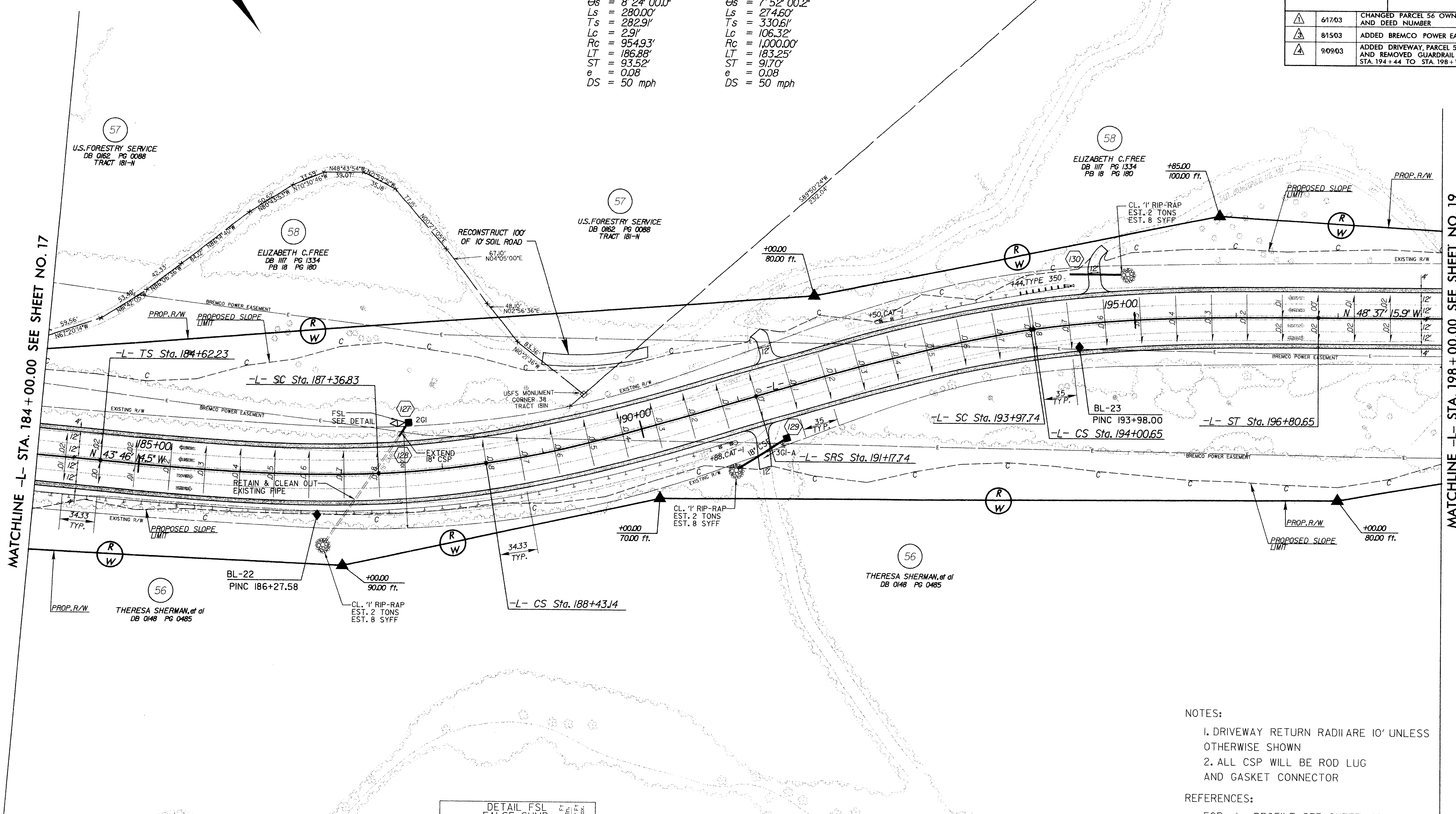
CONST. REV.	R-2237B	18
R/W REV. 1	R/W SHEET NO.	
R/W REV. 3	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV. 4		

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

1	6/17/03	CHANGED PARCEL 56 OWNER AND DEED NUMBER
3	8/15/03	ADDED BREMCO POWER EASEMENT
4	9/09/03	ADDED DRIVEWAY, PARCEL 58 AND REMOVED GUARDRAIL STA. 194+44 TO STA. 198+19

NAD 83

-L-		-L-	
CURVE	LR14	CURVE	LR13
PI	= 194+00.65	PI	= 187+92.84
Δ	= 16° 58' 28.0" (RT)	Δ	= 21° 49' 29.4" (LT)
Dc	= 6° 00' 00.0"	Dc	= 5° 43' 46.5"
Θs	= 8° 24' 00.0"	Θs	= 7° 52' 00.2"
Ls	= 280.00'	Ls	= 274.60'
Ts	= 282.91'	Ts	= 330.61'
Lc	= 2.91'	Lc	= 106.32'
Rc	= 954.93'	Rc	= 1,000.00'
LT	= 186.88'	LT	= 183.25'
ST	= 93.52'	ST	= 91.70'
e	= 0.08	e	= 0.08
DS	= 50 mph	DS	= 50 mph



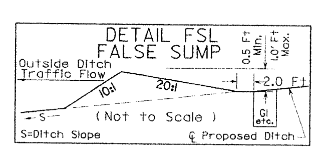
MATCHLINE -L- STA. 184+00.00 SEE SHEET NO. 17
MATCHLINE -L- STA. 198+00.00 SEE SHEET NO. 19
U.S. FORESTRY SERVICE
DB 0162 PG 0088
TRACT 181-N
ELIZABETH C. FREE
DB 1117 PG 1334
PB 18 PG 180
THERESA SHERMAN, et al
DB 0148 PG 0485
RECONSTRUCT 100' OF 10' SOIL ROAD
-L- TS Sta. 184+62.23
-L- SC Sta. 187+36.83
-L- CS Sta. 188+43.14
-L- SRS Sta. 191+17.74
-L- SC Sta. 193+97.74
-L- CS Sta. 194+00.65
-L- ST Sta. 196+80.65
BL-22
PINC 186+27.58
BL-23
PINC 193+98.00
N 43° 46' 14.5" W
N 48° 37' 15.9" W
USFS MONUMENT CORNER 38 TRACT 181N
FSL SEE DETAIL
EXTEND 18" CSP
RETAIN & CLEAN OUT EXISTING PIPE
CL. 'I' RIP-RAP EST. 2 TONS EST. 8 SYFF
BREMCO POWER EASEMENT
EXISTING R/W
PROP. R/W
PROPOSED SLOPE LIMIT
+00.00 80.00 ft.
+00.00 90.00 ft.
+00.00 70.00 ft.
+85.00 100.00 ft.
+44, TYPE 350

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 46



-L- 187+66 (LT.)

04/06/2004

CONST.REV.
R /W REV. 1
R /W REV. 3
R /W REV. 4
R /W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

1	6/7/03	CHANGED PARCEL 59 OWNER
1	6/7/03	ADDED EXIST. PROPERTY LINES FOR PARCELS 58, 69, 70, 71, 72
1	6/7/03	CHANGED PROP. R/W ON PARCELS 58 AND 69
3	8/15/03	ADDED BREMCO POWER EASEMENT
4	9/09/03	REMOVED GUARDRAIL STA. 194+44TO STA. 198+19
6	4/21/04	PARCEL NUMBER 58 & 59 CHANGED

REVISIONS

MATCHLINE -L- STA. 198+00.00 SEE SHEET NO. 18

MATCHLINE -L- STA. 211+00.00 SEE SHEET NO. 20

MATCHLINE -L- STA. 211+00.00 SEE SHEET NO. 20

MATCHLINE -L- STA. 211+00.00 SEE SHEET NO. 20

BL-24
PINC 200+22.26

BL-25
PINC 206+04.27

-L- TS Sta. 203+00.29

-L- SC Sta. 205+80.29

-L- CS Sta. 208+21.49

BEGIN EXPWY. GUTTER +88

END EXPWY. GUTTER +50

200+00

205+00

210+00

N 48° 37' 15.9" W

+00.00 215.00 ft.

+00.00 74.00 ft.

+90.00 80.00 ft.

+00.00 224.00 ft.

+25.00 200.00 ft.

+50.00 100.00 ft.

+00.00 140.00 ft.

+00.00 110.00 ft.

+00.00 220.00 ft.

+70.00 100.00 ft.

CL. 1' RIP-RAP EST. 3 TONS EST. 7 SYFF

CL. 1' RIP-RAP EST. 4 TONS EST. 10 SYFF

TOE PROTECTION SEE DETAIL B EST. 67 TONS EST. 95 SYFF

15" CSP W/ 2 ELBOWS

18" CSP W/ 1 ELBOW

18" CSP W/ 2 ELBOWS

15" RCP

18" RCP

FILL WITH FLOWABLE MATERIAL

REMOVE

PROPOSED SLOPE LIMIT

PROP.R/W

PROPOSED SLOPE STAKE

SPECIAL CUT DITCH SEE DETAIL G

FSR 2GI (131) SEE DETAIL

FSR 2GI (133) SEE DETAIL

2GI (132)

2GI (134)

2GI (135)

2GI (136)

BREMCO POWER EASEMENT

EXISTING R/W

45' PRIVATE R/W

50' PRIVATE R/W

58 ELIZABETH C. FREE DB 1117 PG 1334

59 WILLIAM A. & CATHERINE A. ANDERSON DB 1378 PG 776

69 ROBERT T. & BOBBIE JO BUFF DB 1381 PG 1757

58 ELIZABETH C. FREE LOT 3 PB 19 PG 319 DB 1117 PG 1334

58 ELIZABETH C. FREE LOT 2 PB 19 PG 319 DB 1117 PG 1334

58 ELIZABETH C. FREE DB 1265 PG 0875

70 KENNETH R. & KIM S. SCHULTZ DB 1381 PG 1770

71 MARK T. & MIRIAM C. FULLAM DB 1282 PG 1504

72 MARGO W. CARTER DB 1274 PG 916

56 THERESA SHERMAN, et al DB 0148 PG 0485

56 THERESA SHERMAN, et al DB 0148 PG 0485

NAD 83

DETAIL FSR FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow
10.5 Ft Min. 14.0 Ft Max.
20:1
10:1
2.0 Ft
6:1
S=Ditch Slope
℄ Proposed Ditch
-L- 198+17 (RT.)
-L- 203+00 (RT.)
-L- 210+00 (RT.)

DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground
Fill Slope
d1
Filter Fabric
Type of Liner = CL. 1'
d = 1.0 Ft
-L- 201+00 TO 202+50 (LT.)

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2W
D
4:1 or Flatter
Front Ditch Slope
PGL
Min. D = 1.0 Ft.
-L- 210+60 TO 211+00 (RT.)

-L-
CURVE LR15
PI = 207+12.85
Δ = 39° 05' 24.1" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 412.56'
Lc = 241.20'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

NOTES:
1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:
FOR -L- PROFILE SEE SHEET 47

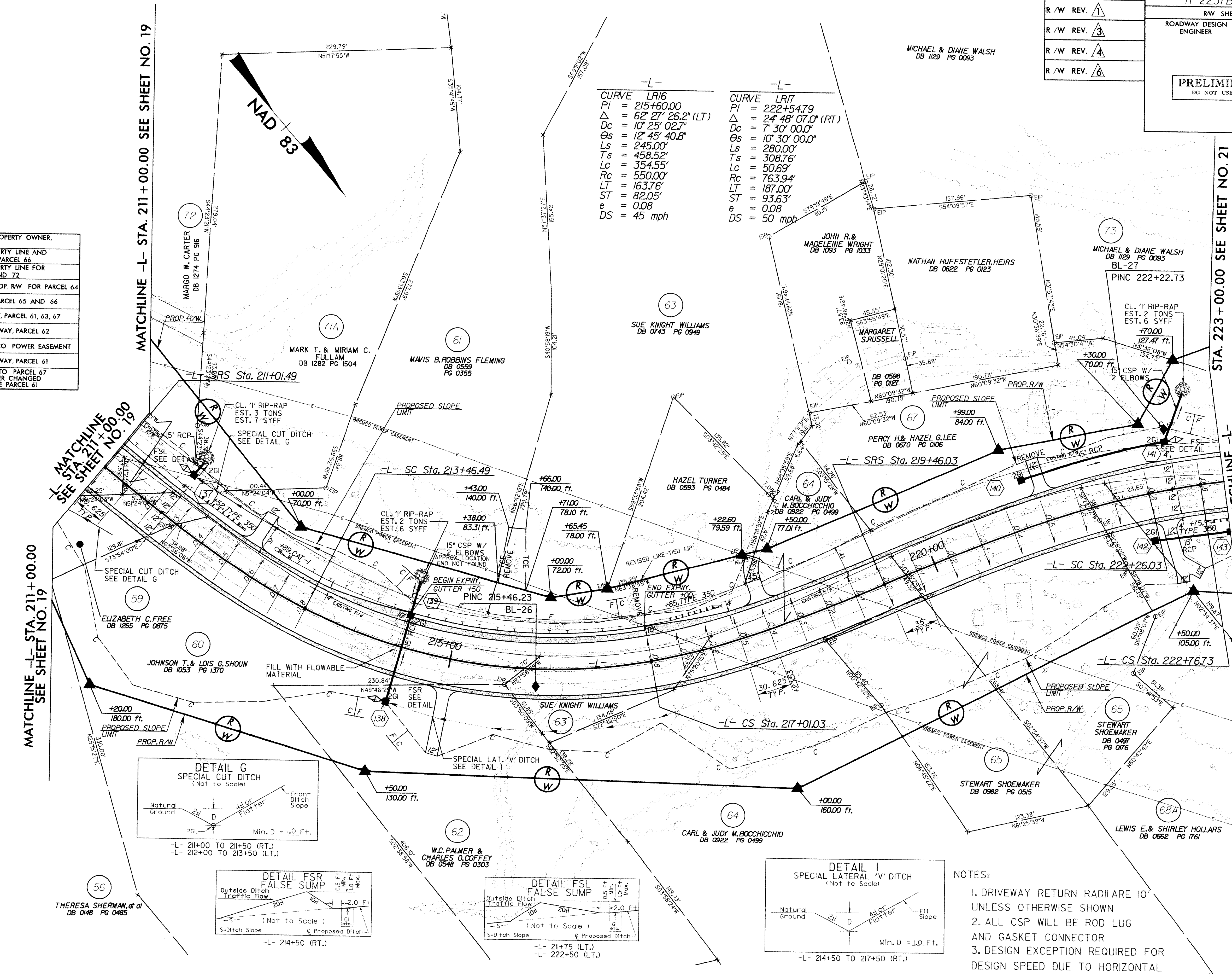
04/26/2004
09:42:20 AM

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 1	R-2237B	20
R/W REV. 3	R/W SHEET NO.	
R/W REV. 4	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV. 6		

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

1	6/17/03	CHANGED PROPERTY OWNER, PARCEL 59
1	6/17/03	ADDED PROPERTY LINE AND REASSIGNED PARCEL 66
1	6/17/03	ADDED PROPERTY LINE FOR PARCELS 71 AND 72
1	6/17/03	CHANGED PROP. RW FOR PARCEL 64
1	6/17/03	COMBINED PARCEL 65 AND 66
3	7/22/03	ADJUSTED RW, PARCEL 61, 63, 67
3	7/22/03	ADDED DRIVEWAY, PARCEL 62
3	8/15/03	ADDED BREMCO POWER EASEMENT
4	9/09/03	ADDED DRIVEWAY, PARCEL 61
6	4/21/04	ADDED WELL TO PARCEL 67 PARCEL NUMBER CHANGED NAME CHANGE PARCEL 61

REVISIONS



MATCHLINE -L- STA. 211+00.00 SEE SHEET NO. 19
NAD 83
-L-
CURVE LR16
PI = 215+60.00
Δ = 62° 27' 26.2" (LT)
Dc = 10° 25' 02.7"
Θs = 12° 45' 40.8"
Ls = 245.00'
Ts = 458.52'
Lc = 354.55'
Rc = 550.00'
LT = 163.76'
ST = 82.05'
e = 0.08
DS = 45 mph
-L-
CURVE LR17
PI = 222+54.79
Δ = 24° 48' 07.0" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 308.76'
Lc = 50.69'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph
MICHAEL & DIANE WALSH DB 1129 PG 0093
STA. 223+00.00 SEE SHEET NO. 21
MARGO W. CARTER DB 1274 PG 916
MARK T. & MIRIAM C. FULLAM DB 1282 PG 1504
MAVIS B.ROBBINS FLEMING DB 0559 PG 0355
SUE KNIGHT WILLIAMS DB 0743 PG 0949
JOHN R.& MADELEINE WRIGHT DB 1093 PG 1033
NATHAN HUFFSTETLER,HEIRS DB 0622 PG 0123
MARGARET S.RUSSELL
PERCY H.& HAZEL G.LEE DB 0670 PG 0106
HAZEL TURNER DB 0593 PG 0484
CARL & JUDY M.BOCCHICCHIO DB 0922 PG 0499
-L- SRS Sta. 211+01.49
-L- SC Sta. 213+46.49
-L- SRS Sta. 219+46.03
-L- SC Sta. 222+26.03
-L- CS Sta. 222+76.73
-L- CS Sta. 217+01.03
PINC 215+46.23 BL-26
PINC 222+22.73 BL-27
BEGIN EXPWY.
END EXPWY.
ELIZABETH C.FREE DB 1265 PG 0875
JOHNSON T.& LOIS G.SHOUN DB 1053 PG 1370
SUE KNIGHT WILLIAMS
STEWART SHOEMAKER DB 0497 PG 0176
STEWART SHOEMAKER DB 0982 PG 0515
LEWIS E.& SHIRLEY HOLLARS DB 0662 PG 1761
CARL & JUDY M.BOCCHICCHIO DB 0922 PG 0499
W.C.PALMER & CHARLES O.COFFEY DB 0548 PG 0303
THERESA SHERMAN,et al DB 0148 PG 0485
MATCHLINE -L-
MATCHLINE -L- STA. 223+00.00 SEE SHEET NO. 21
DETAIL G SPECIAL CUT DITCH (Not to Scale)
-L- 211+00 TO 211+50 (RT.)
-L- 212+00 TO 213+50 (LT.)
DETAIL FSR FALSE SUMP
-L- 214+50 (RT.)
DETAIL FSL FALSE SUMP
-L- 211+75 (LT.)
-L- 222+50 (LT.)
DETAIL I SPECIAL LATERAL 'V' DITCH (Not to Scale)
-L- 214+50 TO 217+50 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR
3. DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED DUE TO HORIZONTAL RADIUS AT STA. -L- 215+60

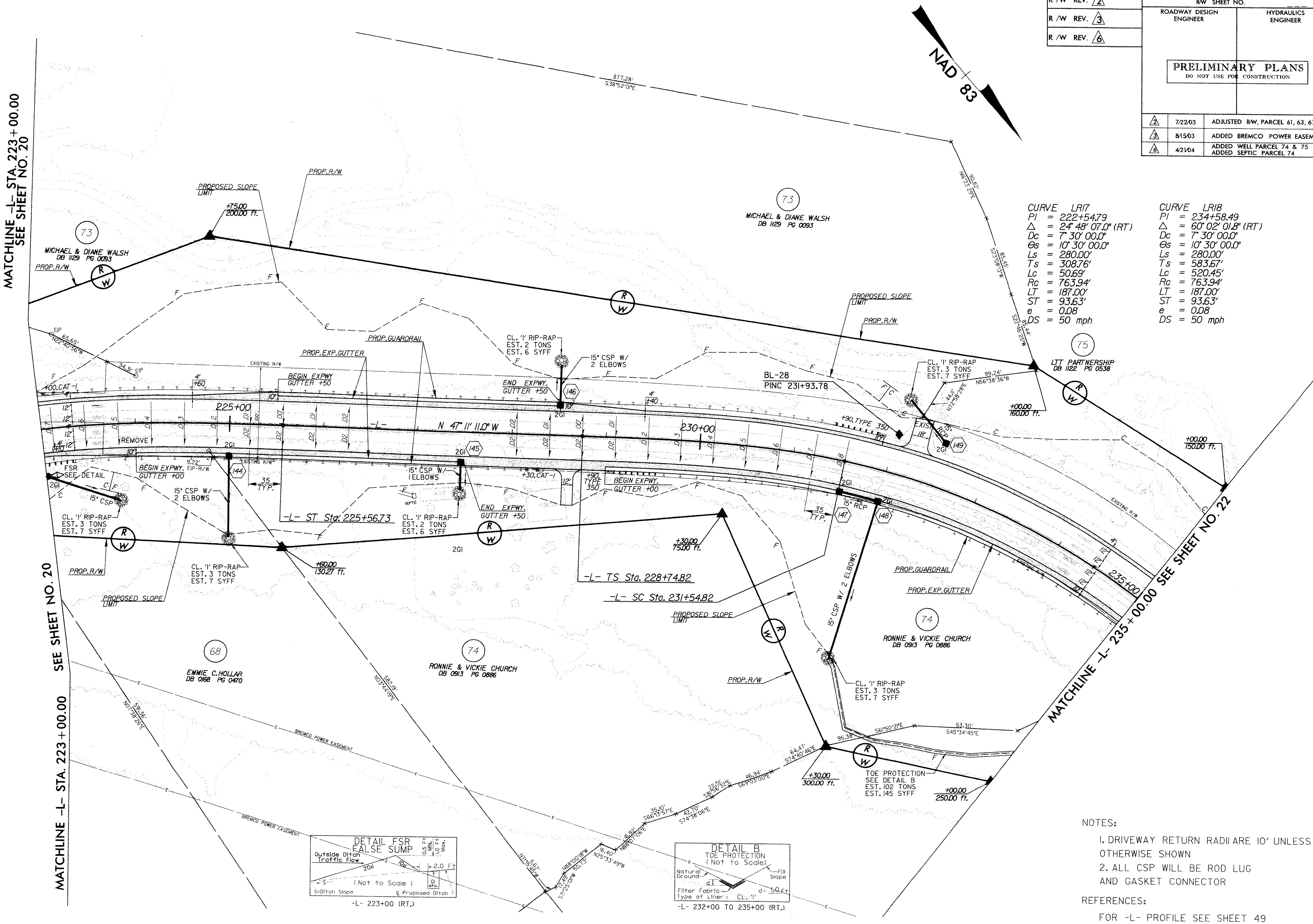
REFERENCES:
FOR -L- PROFILE SEE SHEET 48

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 2	R-2237B	21
R/W REV. 3	R/W SHEET NO.	
R/W REV. 6	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

2	7/22/03	ADJUSTED R/W, PARCEL 61, 63, 67
3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	ADDED WELL PARCEL 74 & 75 ADDED SEPTIC PARCEL 74

REVISIONS



CURVE LR17
PI = 222+54.79
Δ = 24° 48' 07.0" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 308.76'
Lc = 50.69'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

CURVE LR18
PI = 234+58.49
Δ = 60° 02' 01.8" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 583.67'
Lc = 520.45'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 49

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	22
R/W REV. 6	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

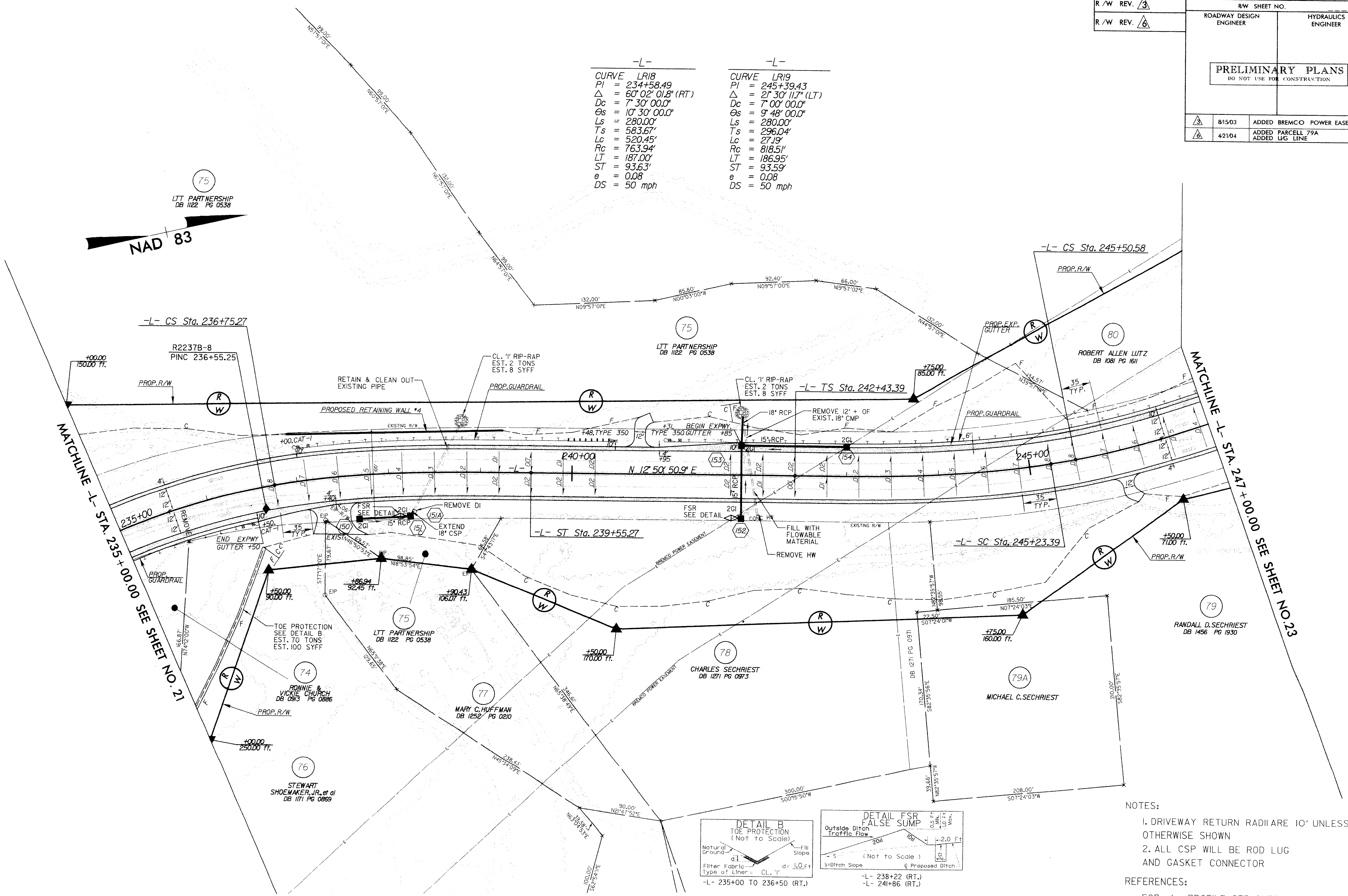
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8-15-03	ADDED BREMCO POWER EASEMENT
6	4-21-04	ADDED PARCELL 79A ADDED UG LINE

REVISIONS

-L-
CURVE LR18
PI = 234+58.49
Δ = 60° 02' 01.8" (RT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 583.67'
Lc = 520.45'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph

-L-
CURVE LR19
PI = 245+39.43
Δ = 21° 30' 11.7" (LT)
Dc = 7° 00' 00.0"
Θs = 9° 48' 00.0"
Ls = 280.00'
Ts = 296.04'
Lc = 27.19'
Rc = 818.51'
LT = 186.95'
ST = 93.59'
e = 0.08
DS = 50 mph



NAD 83
75 LTT PARTNERSHIP DB 1122 PG 0538
-L- CS Sta. 236+75.27
R2237B-8 PINC 236+55.25
+00.00 150.00 ft.
PROP. R/W
RETAIN & CLEAN OUT EXISTING PIPE
CL. 'I' RIP-RAP EST. 2 TONS EST. 8 SYFF
PROP. GUARDRAIL
PROPOSED RETAINING WALL #4
EXISTING R/W
+48, TYPE 350
+31, BEGIN EXPWY. TYPE 350 GUTTER +85
18" RCP
REMOVE 12' ± OF EXIST. 18" CMP
-L- TS Sta. 242+43.39
+75.00 85.00 ft.
-L- CS Sta. 245+50.58
PROP. EXP. GUTTER
80 ROBERT ALLEN LUTZ DB 1081 PG 1611
N 12° 50' 50.9" E
240+00
245+00
235+00
MATCHLINE -L- STA. 235+00.00 SEE SHEET NO. 21
MATCHLINE -L- STA. 247+00.00 SEE SHEET NO. 23
END EXPWY GUTTER +50
FSR SEE DETAIL
REMOVE DI
EXTEND 18" CSP
-L- ST Sta. 239+55.27
FILL WITH FLOWABLE MATERIAL
REMOVE HW
BREMCO POWER EASEMENT
-L- SC Sta. 245+23.39
+50.00 71.00 ft.
PROP. GUARDRAIL
+50.00 90.00 ft.
+86.94 92.45 ft.
+90.43 106.07 ft.
+50.00 170.00 ft.
+75.00 160.00 ft.
TOE PROTECTION SEE DETAIL B EST. 70 TONS EST. 100 SYFF
75 LTT PARTNERSHIP DB 1122 PG 0538
74 RONNIE & VICKIE CHURCH DB 0913 PG 0886
77 MARY C. HUFFMAN DB 1252 PG 0210
78 CHARLES SECHRIEST DB 1271 PG 0973
79 RANDALL D. SECHRIEST DB 1456 PG 1930
79A MICHAEL C. SECHRIEST
76 STEWART SHOEMAKER, JR., et al DB 1171 PG 0869
+00.00 250.00 ft.

DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground — Fill Slope — Filter Fabric — d = 1.0 Ft — Type of Liner = CL. 'I'
-L- 235+00 TO 236+50 (RT.)

DETAIL FSR
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow — S = Ditch Slope — ℄ Proposed Ditch
-L- 238+22 (RT.)
-L- 241+86 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 50

CONST. REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	23
R/W REV. 6	R/W SHEET NO.	

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

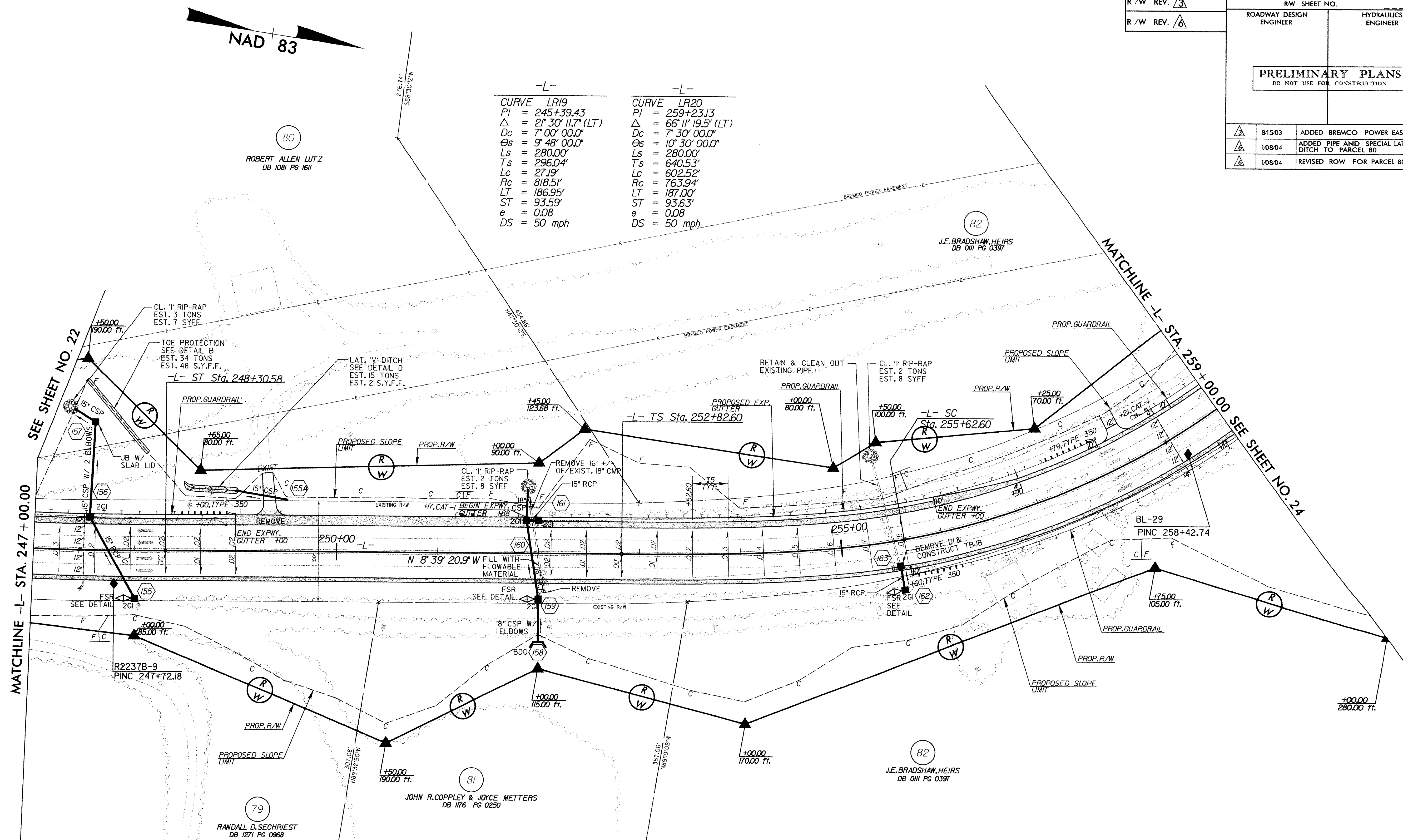
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Rev.	Date	Description
3	8/15/03	ADDED BREMCO POWER EASEMENT
6	1/08/04	ADDED PIPE AND SPECIAL LATERAL 'V' DITCH TO PARCEL 80
6	1/08/04	REVISED ROW FOR PARCEL 80

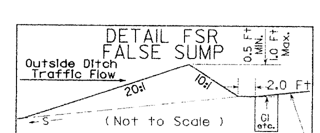
REVISIONS

-L-	
CURVE	LR19
PI	= 245+39.43
Δ	= 21° 30' 11.7" (LT)
Dc	= 7° 00' 00.0"
Θs	= 9° 48' 00.0"
Ls	= 280.00'
Ts	= 296.04'
Lc	= 27.19'
Rc	= 818.51'
LT	= 186.95'
ST	= 93.59'
e	= 0.08
DS	= 50 mph

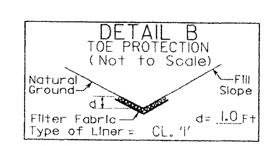
-L-	
CURVE	LR20
PI	= 259+23.13
Δ	= 66° 11' 19.5" (LT)
Dc	= 7° 30' 00.0"
Θs	= 10° 30' 00.0"
Ls	= 280.00'
Ts	= 640.53'
Lc	= 602.52'
Rc	= 763.94'
LT	= 187.00'
ST	= 93.63'
e	= 0.08
DS	= 50 mph



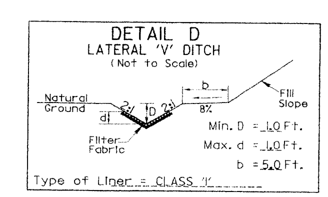
NAD 83
80
ROBERT ALLEN LUTZ
DB 1081 PG 1611
82
J.E. BRADSHAW, HEIRS
DB 0111 PG 0397
BREMCO POWER EASEMENT
MATCHLINE -L- STA. 259+00.00 SEE SHEET NO. 24
MATCHLINE -L- STA. 247+00.00
SEE SHEET NO. 22
CL. 'I' RIP-RAP
EST. 3 TONS
EST. 7 SYFF
TOE PROTECTION
SEE DETAIL B
EST. 34 TONS
EST. 48 S.Y.F.F.
LAT. 'V' DITCH
SEE DETAIL D
EST. 15 TONS
EST. 21 S.Y.F.F.
-L- ST Sta. 248+30.58
PROP. GUARDRAIL
+50.00
190.00 ft.
+65.00
80.00 ft.
JB W/
SLAB LID
15" CSP W/ 2 ELBOWS
15" CSP
15" RCP
PROPOSED SLOPE LIMIT
PROP. R/W
+00.00
90.00 ft.
+45.00
123.68 ft.
CL. 'I' RIP-RAP
EST. 2 TONS
EST. 8 SYFF
BEGIN EXPWY. GUTTER +88
REMOVE 16' +/- OF EXIST. 18" CMP
15" RCP
-L- TS Sta. 252+82.60
PROPOSED EXP. GUTTER
+00.00
80.00 ft.
RETAIN & CLEAN OUT EXISTING PIPE
CL. 'I' RIP-RAP
EST. 2 TONS
EST. 8 SYFF
+50.00
100.00 ft.
-L- SC
Sta. 255+62.60
PROPOSED SLOPE LIMIT
PROP. GUARDRAIL
+25.00
70.00 ft.
+21, CAT-I
+79, TYPE 350
END EXPWY. GUTTER +00
REMOVE DI & CONSTRUCT TBJB
+60, TYPE 350
BL-29
PINC 258+42.74
+00, TYPE 350
REMOVE
END EXPWY. GUTTER +00
250+00
255+00
N 8° 39' 20.9" W
FILL WITH FLOWABLE MATERIAL
REMOVE
EXISTING R/W
+17, CAT-I
FSR
SEE DETAIL
18" CSP W/ 1 ELBOWS
15" RCP
FSR
SEE DETAIL
+75.00
105.00 ft.
+00.00
85.00 ft.
R2237B-9
PINC 247+72.18
+00.00
115.00 ft.
+00.00
170.00 ft.
+00.00
280.00 ft.
+50.00
190.00 ft.
PROP. R/W
PROPOSED SLOPE LIMIT
PROP. GUARDRAIL
PROP. R/W
PROPOSED SLOPE LIMIT
81
JOHN R. COPPLEY & JOYCE METTERS
DB 1176 PG 0250
79
RANDALL D. SECHRIEST
DB 1271 PG 0968
82
J.E. BRADSHAW, HEIRS
DB 0111 PG 0397



-L- 248+00 (RT.)
-L- 252+00 (RT.)
-L- 255+55 (RT.)



-L- 247+50 TO 248+12 (LT.)



-L- 248+50 TO 249+00 (LT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

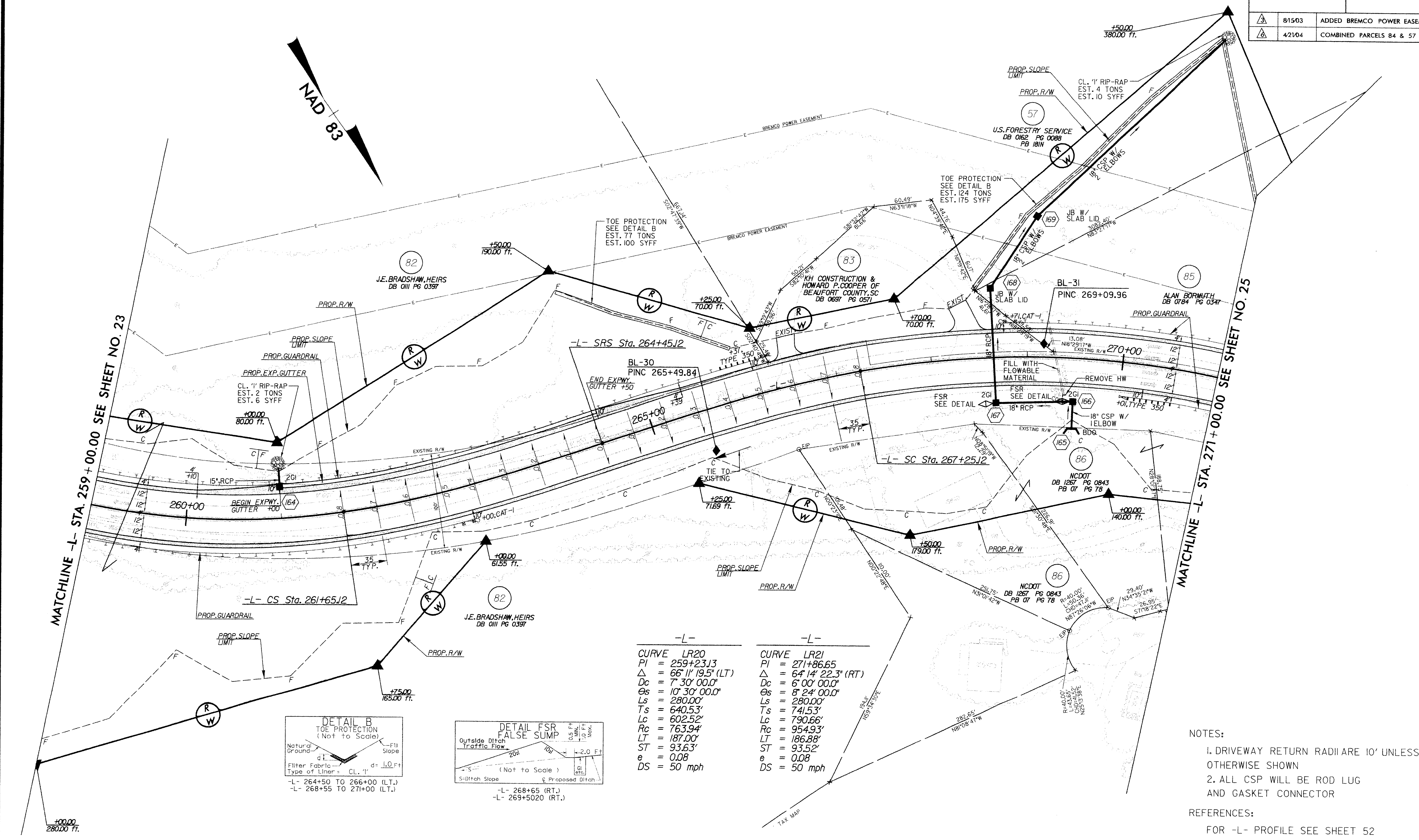
FOR -L- PROFILE SEE SHEET 51

CONST.REV.
R/W REV. 3
R/W REV. 5
R/W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	24
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT
6	4/21/04	COMBINED PARCELS 84 & 57



NAD 83
MATCHLINE -L- STA. 259+00.00 SEE SHEET NO. 23
MATCHLINE -L- STA. 271+00.00 SEE SHEET NO. 25
-L- SRS Sta. 264+45.12
-L- CS Sta. 261+65.12
-L- SC Sta. 267+25.12
BL-30
PINC 265+49.84
BL-31
PINC 269+09.96
J.E. BRADSHAW, HEIRS
DB 0111 PG 0397
KH CONSTRUCTION & HOWARD P. COOPER OF BEAUFORT COUNTY, SC
DB 0697 PG 0571
U.S. FORESTRY SERVICE
DB 0162 PG 0088
PB 18IN
ALAN BORMUTH
DB 0784 PG 0347
NCDOT
DB 1267 PG 0843
PB 07 PG 78
TOE PROTECTION
SEE DETAIL B
EST. 77 TONS
EST. 100 SYFF
TOE PROTECTION
SEE DETAIL B
EST. 124 TONS
EST. 175 SYFF
CL. 'I' RIP-RAP
EST. 4 TONS
EST. 10 SYFF
CL. 'I' RIP-RAP
EST. 2 TONS
EST. 6 SYFF
BREMCO POWER EASEMENT
FILL WITH FLOWABLE MATERIAL
REMOVE HW
TIE TO EXISTING
BEGIN EXPWY. GUTTER +00
END EXPWY. GUTTER +50
PROP. R/W
PROP. SLOPE LIMIT
PROP. GUARDRAIL
PROP. EXP. GUTTER
EXISTING R/W
TAX MAP

-L-	
CURVE	LR20
PI	= 259+23.13
Δ	= 66° 11' 19.5" (LT)
Dc	= 7° 30' 00.0"
Θs	= 10° 30' 00.0"
Ls	= 280.00'
Ts	= 640.53'
Lc	= 602.52'
Rc	= 763.94'
LT	= 187.00'
ST	= 93.63'
e	= 0.08
DS	= 50 mph

-L-	
CURVE	LR21
PI	= 271+86.65
Δ	= 64° 14' 22.3" (RT)
Dc	= 6° 00' 00.0"
Θs	= 8° 24' 00.0"
Ls	= 280.00'
Ts	= 741.53'
Lc	= 790.66'
Rc	= 954.93'
LT	= 186.88'
ST	= 93.52'
e	= 0.08
DS	= 50 mph

DETAIL B
TOE PROTECTION
(Not to Scale)
-L- 264+50 TO 266+00 (LT.)
-L- 268+55 TO 271+00 (LT.)

DETAIL FSR
FALSE SUMP
(Not to Scale)
-L- 268+65 (RT.)
-L- 269+50.20 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 52

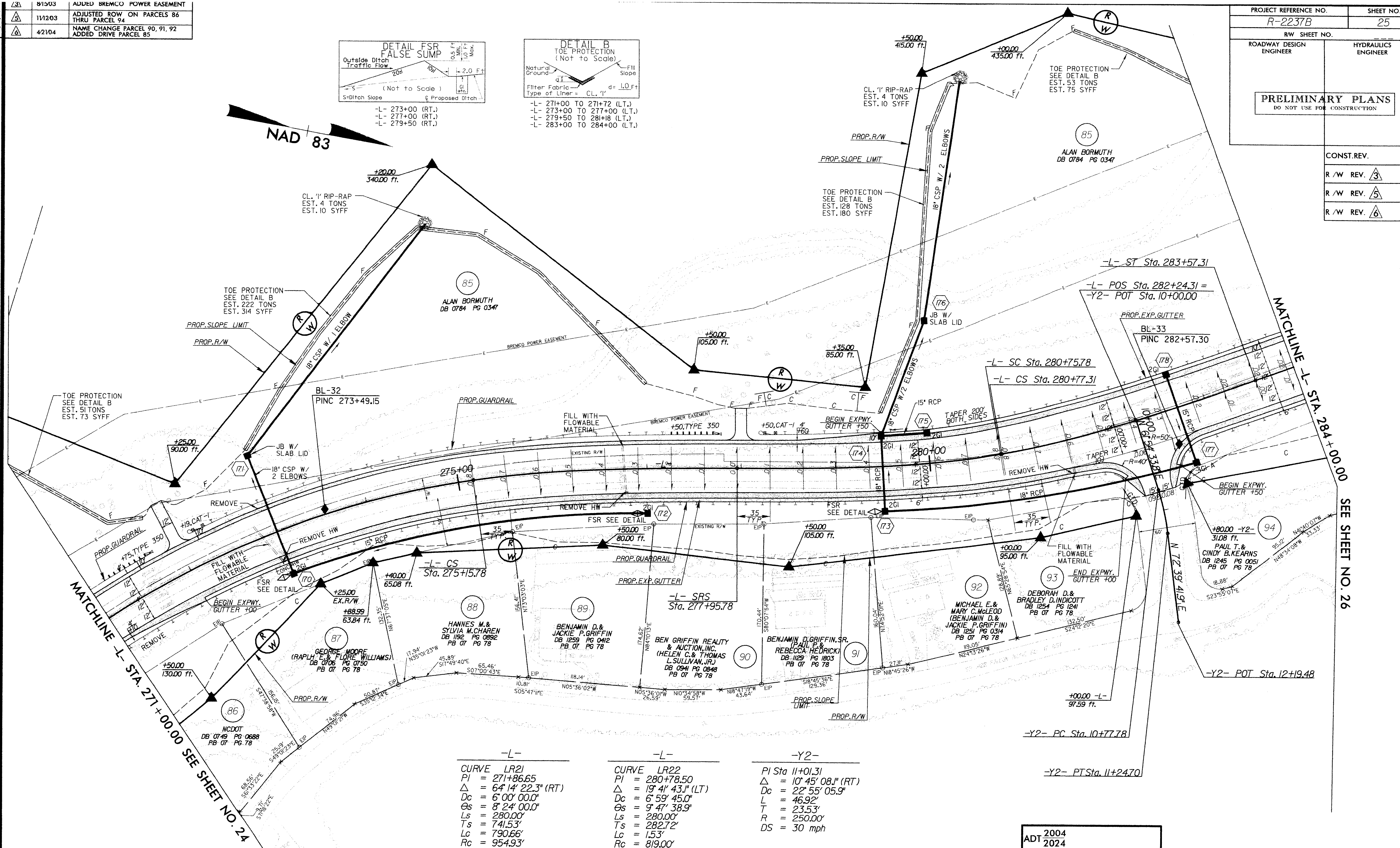
3	8/15/03	ADDED BREMCO POWER EASEMENT
5	11/12/03	ADJUSTED ROW ON PARCELS 86 THRU PARCEL 94
6	4/21/04	NAME CHANGE PARCEL 90, 91, 92 ADDED DRIVE PARCEL 85

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONST.REV.
R/W REV. 3
R/W REV. 5
R/W REV. 6

REVISIONS



-L-	
CURVE	LR21
PI	= 271+86.65
Δ	= 64° 14' 22.3" (RT)
Dc	= 6° 00' 00.0"
Θs	= 8° 24' 00.0"
Ls	= 280.00'
Ts	= 741.53'
Lc	= 790.66'
Rc	= 954.93'
LT	= 186.88'
ST	= 93.52'
e	= 0.08
DS	= 50 mph

-L-	
CURVE	LR22
PI	= 280+78.50
Δ	= 19° 41' 43.1" (LT)
Dc	= 6° 59' 45.0"
Θs	= 9° 47' 38.9"
Ls	= 280.00'
Ts	= 282.72'
Lc	= 1.53'
Rc	= 819.00'
LT	= 186.95'
ST	= 93.59'
e	= 0.08
DS	= 50 mph

-Y2-	
PI Sta	11+01.31
Δ	= 10° 45' 08.1" (RT)
Dc	= 22° 55' 05.9"
L	= 46.92'
T	= 23.53'
R	= 250.00'
DS	= 30 mph

ADT 2004 / 2024

-L- 4450 / 6700

115/195, 115/195, 230/390

-Y2-

TRAFFIC VOLUMES

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 53

FOR -Y2- PROFILE SEE SHEET 61

5	1/12/03	ADJUSTED ROW ON PARCEL 85 THRU PARCEL 99, 123, & 101
6	4/21/04	NAME CHANGE PARCEL 101 ADDED DRIVE PARCEL 85

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

R/W REV. 3
R/W REV. 5
R/W REV. 6

MATCHLINE -L- STA. 284+00.00 SEE SHEET NO. 25

MATCHLINE -L- STA. 296+00.00 SEE SHEET NO. 27

NAD 83

-L-
CURVE LR23
PI Sta 293+29.53
△ = 1° 30' 28.6" (LT)
D = 0° 34' 22.6"
L = 263.19'
T = 131.60'
R = 10,000.00'
e = NC
DS = 50 mph

-Y4-
PI Sta 13+76.41
△ = 2° 34' 56.4" (RT)
Dc = 11° 27' 33.0"
L = 22.54'
T = 11.27'
R = 500.00'
DS = 30 mph

PROP.R/W
BREMCO POWER EASEMENT
TOE PROTECTION SEE DETAIL B EST. 50 TONS EST. 70 SYFF
PROPOSED SLOPE LIMIT
+00.00 170.00 ft.
CLASS 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
15" CSP W/ 2 ELBOWS
BY3-1
-BY3- PINC 13+75.45
PROPOSED EXP.GUTTER
PROPOSED GUARDRAIL
TAPER 200' BOTH SIDES
285+00 EXISTING R/W
FILL WITH FLOWABLE MATERIAL
REMOVE HW
N 30°18'01.1" W -L-
15" RCP
FSR SEE DETAIL 2GI
PROP.GUARDRAIL
PROP.EXP.GUTTER
EXISTING R/W
EIP
85 ALAN BORMUTH DB 0784 PG 0347
96 OSCAR I.& INGRID A.DOBEREINER DB 0798 PG 0275 PB 07 PG 78
97 ROBERT G.& HILDEGARDE WINTON,JR. DB 0840 PG 0663 PB 07 PG 78
95 DEBORAH D.& BRADLEY D.INDICOTT DB 1170 PG 0872 PB 07 PG 78
98 DOUGLAS R.& TRACY LYNN TERRY,JR. DB 1101 PG 0029 PB 07 PG 78
99 THELMA H.WALTON TRUSTEES DB 1249 PG 1284 PB 07 PG 78
123 DENNIS V.SWANSON DB 0832 PG 0298
MARGIE L.SWANSON DB 0328 PG 0267
PROPOSED SLOPE LIMIT
+00.00 150.00 ft.
JB W/ SLAB LID
18" CSP W/ 2 ELBOW
+50.00 100.00 ft.
-BL- POT 288+84.22 = -BY3- POT 14+24.76 POINT NOT SET
CLASS 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
18" CSP W/ 2 ELBOWS
+00. TYPE 350
+15.CAT-I
290+00
FILL WITH FLOWABLE MATERIAL
CONC HW
BEG SFB END EXPWY GUTTER +25
18" RCP
15" RCP
PROP.RET.WALL #5
LAT. 'V' DITCH SEE DETAIL J
-L- 291+31.88 136.70 ft.
+85.00 70.00 ft.
BY3-2
-BY3- PINC 16+99.37
R=30'
-L- 291+52.51 203.753 ft.
+85.00 210.00 ft.
+00.00 210.00 ft.
PROP.R/W
-L- PC Sta. 291+97.93
-L- PT Sta. 294+61.11
END EXPWY. GUTTER +00
295+00
END SFB BEG EXPWY GUTTER +55
PROP.SF BARRIER
101 REBECCA S.MOOSE (REBECCA PINSON) DB 0957 PG 0121
85 ALAN BORMUTH DB 0784 PG 0347
N 79° 02' 47.0" E
-Y4- PT Sta. 13+87.68
-Y4- POT Sta. 15+10.51
15.00 N 81° 37' 43.4" E
BY3-3
-BY3- POT 20+83.21
BY4-2
-BY4- POT 11+08.92
RALPH S.& SHIRLEY H.SWANSON DB 0769 PG 0155
+95.00 420.00 ft.
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
CLASS 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
TOE PROTECTION SEE DETAIL B EST. 222 TONS EST. 314 SYFF
24" CSP W/ 2 ELBOWS
186 JB W/ SLAB LID
RETAIN & CLEAN OUT EXISTING PIPE
+80.00 85.00 ft.
PROPOSED SLOPE LIMIT
PROPOSED EXP.GUTTER
PROPOSED GUARDRAIL
24" CONC.
END EXPWY. GUTTER +00

DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground — Fill Slope
Filter Fabric — Type of Liner = CL. 'I'
d = 1.0 Ft
-L- 284+00 TO 285+00 (LT.)
-L- 293+50 TO 296+00 (LT.)

DETAIL ↓
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground — Natural Ground
Min. D = 1.0 Ft.
-L- 290+50 TO 294+50 (RT.)

DETAIL FSR
FALSE SUMP
Outside Ditch Traffic Flow
2.0 Ft
(Not to Scale)
S=Ditch Slope
℄ Proposed Ditch
-L- 287+00 (RT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 54
FOR -Y3- PROFILE SEE SHEET 62

CONST. REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	27
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT

REVISIONS

NAD 83

-L-	-Y4-	-Y4-	-Y4-
CURVE LR24	PI Sta 11+46.10	PI Sta 12+62.20	PI Sta 13+76.41
PI = 304+37.76	Δ = 65° 01' 54.2" (RT)	Δ = 44° 10' 37.6" (LT)	Δ = 2° 34' 56.4" (RT)
Δ = 8° 25' 22.7" (LT)	Dc = 71° 37' 11.0"	Dc = 47° 44' 47.3"	Dc = 11° 27' 33.0"
Dc = 1° 30' 00.0"	L = 90.80'	L = 92.52'	L = 22.54'
Θs = 1° 07' 30.0"	T = 51.00'	T = 48.70'	T = 11.27'
Ls = 150.00'	R = 80.00'	R = 120.00'	R = 500.00'
Ts = 356.29'	DS = 30 mph	DS = 30 mph	DS = 30 mph
Lc = 411.53'			
Rc = 3,819.72'			
LT = 100.00'			
ST = 50.00'			
e = 0.03			
DS = 50 mph			

ADT 2004 / 2024
-L- 4450 / 6700
115 / 195 | 115 / 195
230 / 390
-Y4-

TRAFFIC VOLUMES

MATCHLINE -L- STA. 296+00.00 SEE SHEET NO. 26

MATCHLINE -L- STA. 310+00.00 SEE SHEET NO. 28

105 GARY D.& DEBRA J.GRAGG DB 0979 PG 0500

106 WILLIAM M.GREENE DB 0979 PG 0515

109 WILLIAM F.GREENE DB 0636 PG 0730 DB 0768 PG 0695

85 ALAN BORMUTH DB 0784 PG 0347

104 ROGER F.& RETHA GREENE DB 0979 PG 0512

102 RICHARD B.MATHEWS DB 0671 PG 1572

103 BERT A.& DONESE M.GUTHERIE DB 0958 PG 0264

107 JIMMIE F.& NANCIE PREVATT,TRUST DB 1137 PG 0250 PB 11 PG 19

108 ADAM J. HOFFMAN,III DB 1137 PG 0248 PB 11 PG 19

BREMCO POWER EASEMENT

R2237B-10
-BL- PINC 297+14.98 =
-BY3- POT 5+00.00 =
-BY4- POT 5+00.00

-L- POT Sta. 297+54.14 =
-Y4- POT Sta. 10+00.00

BL-34
PINC 302+53.27
BEGIN EXPWY. GUTTER +50

BL-35
PINC 307+14.12

-L- TS Sta. 300+81.47

-L- SC Sta. 302+31.47

-L- CS Sta. 306+43.00

-L- ST Sta. 307+93.00

-Y4- PC Sta. 10+95.11

-Y4- PT Sta. 11+85.91

-Y4- PC Sta. 12+13.50

-Y4- PT Sta. 13+06.02

-Y4- PC Sta. 13+65.14

BY4-1
-BY4- PINC 7+71.42

PROP. R/W

EXISTING R/W

PROP GUARDRAIL W/ TERMINAL END SECT.(TYP)

CLASS 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF

CL. 'I' RIP-RAP EST. 2 TONS EST. 8 SYFF

CL. 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF

FILL WITH FLOWABLE MATERIAL

REMOVE HW

CONC HW

END EXPWY. GUTTER +00

END EXPWY. GUTTER +65

TAPER 200' BOTH SIDES

TAPER 10:1

24" RCP

18" RCP

15" RCP

15" CSP

FSR SEE DETAIL 191

FSR SEE DETAIL 193

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 55
FOR -Y4- PROFILE SEE SHEET 62

DETAIL FSR FALSE SUMP
Outside Ditch Traffic Flow
(Not to Scale)
S=Ditch Slope
Proposed Ditch
-L- 301+00 (RT.)

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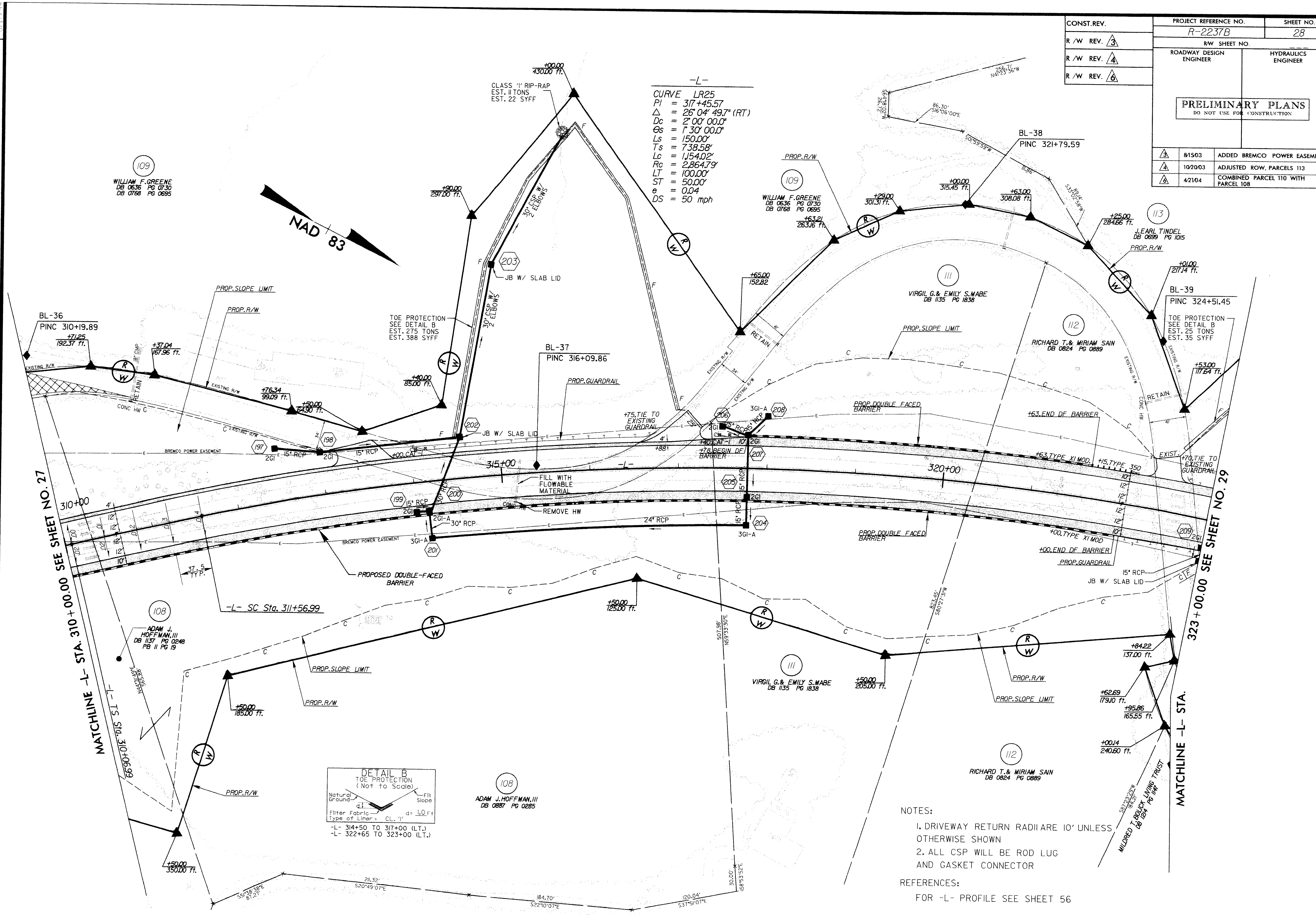


NAD 83
BL-36
PINC 310+19.89
BL-37
PINC 316+09.86
BL-38
PINC 321+79.59
BL-39
PINC 324+51.45
WILLIAM F.GREENE
DB 0636 PG 0730
DB 0768 PG 0695
VIRGIL G.& EMILY S.MABE
DB 1135 PG 1838
RICHARD T.& MIRIAM SAIN
DB 0824 PG 0889
J.EARL TINDEL
DB 0699 PG 1015
ADAM J. HOFFMAN,III
DB 1137 PG 0248
PB 11 PG 19
ADAM J.HOFFMAN,III
DB 0887 PG 0285
MILDRED T.BOLICK LIVING TRUST
DB 1214 PG 1147
CLASS 'I' RIP-RAP
EST. 11 TONS
EST. 22 SYFF
TOE PROTECTION
SEE DETAIL B
EST. 275 TONS
EST. 388 SYFF
TOE PROTECTION
SEE DETAIL B
EST. 25 TONS
EST. 35 SYFF
JB W/ SLAB LID
30" CSP W/ 2 ELBOWS
FILL WITH FLOWABLE MATERIAL
REMOVE HW
PROPOSED DOUBLE-FACED BARRIER
PROP. DOUBLE FACED BARRIER
PROP.SLOPE LIMIT
PROP.R/W
PROP.GUARDRAIL
+75,TIE TO EXISTING GUARDRAIL
+70,TIE TO EXISTING GUARDRAIL
+78,BEGIN DF BARRIER
+63,END DF BARRIER
+00,END DF BARRIER
BREMCO POWER EASEMENT
-L- SC Sta. 311+56.99
-L- TS Sta. 310+06.99
MATCHLINE -L- STA. 310+00.00 SEE SHEET NO. 27
MATCHLINE -L- STA. 323+00.00 SEE SHEET NO. 29

CONST.REV.
R/W REV. 3
R/W REV. 4
R/W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	28
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT
4	10/20/03	ADJUSTED ROW, PARCELS 113
6	4/21/04	COMBINED PARCEL 110 WITH PARCEL 108

-L-

CURVE LR25
PI = 317+45.57
Δ = 26°04' 49.7" (RT)
Dc = 2°00' 00.0"
Θs = 1°30' 00.0"
Ls = 150.00'
Ts = 738.58'
Lc = 1,154.02'
Rc = 2,864.79'
LT = 100.00'
ST = 50.00'
e = 0.04
DS = 50 mph

DETAIL B
TOE PROTECTION
(Not to Scale)
Filter Fabric
Type of Liner = CL. 'I'
d= 1.0 Ft
-L- 314+50 TO 317+00 (LT.)
-L- 322+65 TO 323+00 (LT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 56

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

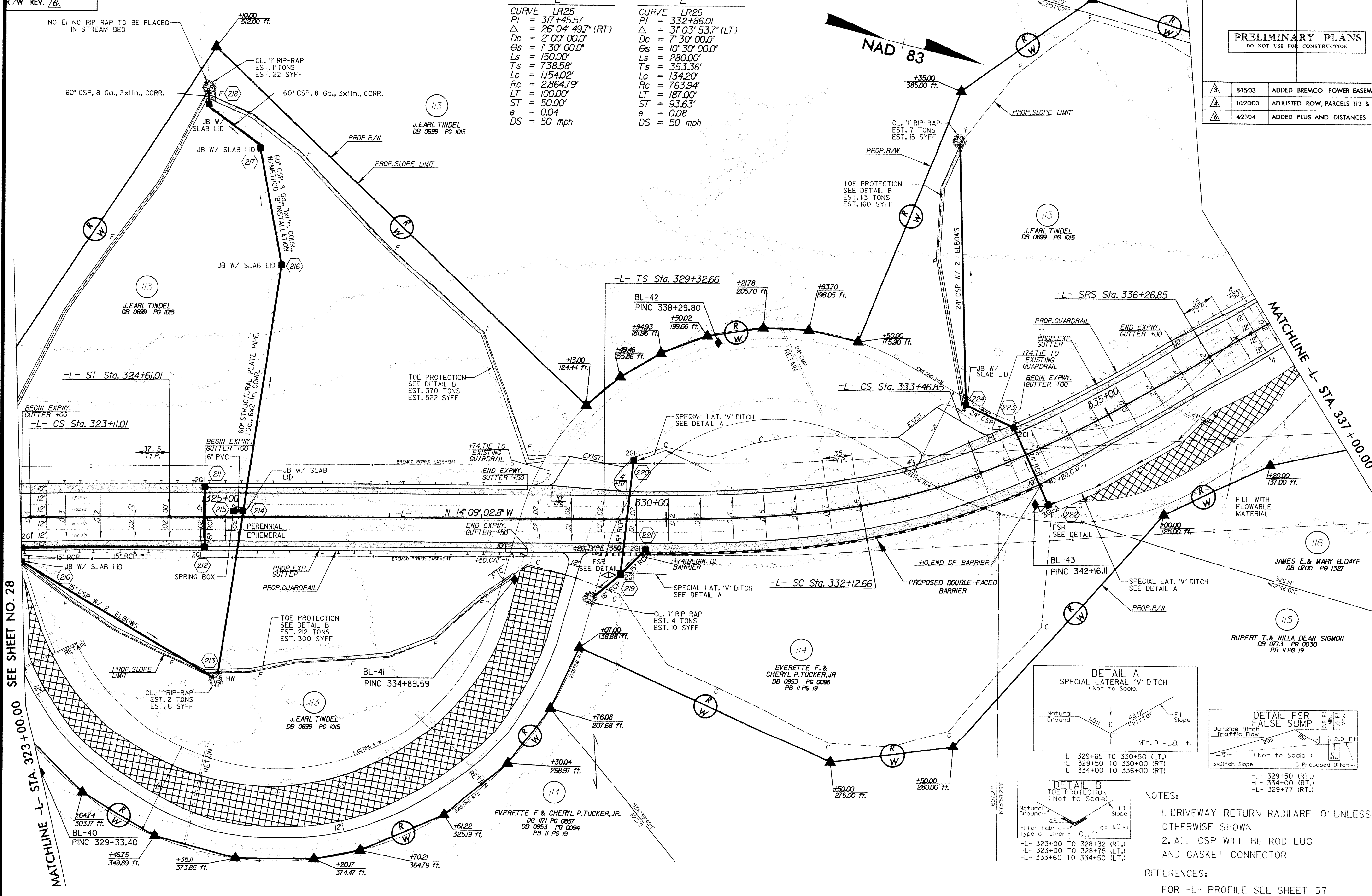
3	8/15/03	ADDED BREMCO POWER EASEMENT
4	10/20/03	ADJUSTED ROW, PARCELS 113 & 114
6	4/21/04	ADDED PLUS AND DISTANCES

CONST. REV.	
R/W REV. 3	
R/W REV. 4	
R/W REV. 6	

REVISIONS

-L-
CURVE LR25
PI = 317+45.57
Δ = 26° 04' 49.7" (RT)
Dc = 2° 00' 00.0"
Θs = 1° 30' 00.0"
Ls = 150.00'
Ts = 738.58'
Lc = 1,154.02'
Rc = 2,864.79'
LT = 100.00'
ST = 50.00'
e = 0.04
DS = 50 mph

-L-
CURVE LR26
PI = 332+86.01
Δ = 31° 03' 53.7" (LT)
Dc = 7° 30' 00.0"
Θs = 10° 30' 00.0"
Ls = 280.00'
Ts = 353.36'
Lc = 134.20'
Rc = 763.94'
LT = 187.00'
ST = 93.63'
e = 0.08
DS = 50 mph



NAD 83
NOTE: NO RIP RAP TO BE PLACED IN STREAM BED
+10.00 512.00 ft.
CL. 'I' RIP-RAP EST. 11 TONS EST. 22 SYFF
60" CSP, 8 Ga., 3x1 In., CORR.
60" CSP, 8 Ga., 3x1 In., CORR.
JB W/ SLAB LID
JB W/ SLAB LID
60" CSP, 8 Ga., 3x1 In. CORR. W/METHOD 'B' INSTALLATION
JB W/ SLAB LID
PROP. R/W
PROP. SLOPE LIMIT
113 J. EARL TINDEL DB 0699 PG 1015
60" STRUCTURAL PLATE PIPE, 1 Ga., 6x2 In. CORR.
TOE PROTECTION SEE DETAIL B EST. 370 TONS EST. 522 SYFF
-L- ST Sta. 324+61.01
BEGIN EXPWY. GUTTER +00
-L- CS Sta. 323+11.01
BEGIN EXPWY. GUTTER +00
6" PVC
JB w/ SLAB LID
+74 TIE TO EXISTING GUARDRAIL
END EXPWY. GUTTER +50
BREMCO POWER EASEMENT
325+00
-L- N 14° 09' 02.8" W
PERENNIAL
EPHEMERAL
END EXPWY. GUTTER +50
15" RCP
JB W/ SLAB LID
SPRING BOX
PROP. EXP. GUTTER
PROP. GUARDRAIL
+50, CAT-I
15" CSP W/ 2 ELBOWS
TOE PROTECTION SEE DETAIL B EST. 212 TONS EST. 300 SYFF
PROP. SLOPE LIMIT
RETAIN
CL. 'I' RIP-RAP EST. 2 TONS EST. 6 SYFF
HW
BL-41 PINC 334+89.59
113 J. EARL TINDEL DB 0699 PG 1015
BL-40 PINC 329+33.40
+64.74 303.17 ft.
+46.75 349.89 ft.
+35.11 373.85 ft.
+20.17 374.47 ft.
+70.21 364.79 ft.
+61.22 325.19 ft.
+30.04 268.97 ft.
+76.08 207.68 ft.
+07.00 138.88 ft.
MATCHLINE -L- STA. 323+00.00
SEE SHEET NO. 28
114 EVERETTE F. & CHERYL P. TUCKER, JR. DB 1171 PG 0857 DB 0953 PG 0094 PB 11 PG 19
+13.00 124.44 ft.
+49.46 155.86 ft.
+94.93 181.96 ft.
-L- TS Sta. 329+32.66
BL-42 PINC 338+29.80
+50.02 199.66 ft.
+21.78 205.70 ft.
+83.70 198.05 ft.
+50.00 175.90 ft.
24" CMP RETAIN
SPECIAL LAT. 'V' DITCH SEE DETAIL A
330+00
+20, TYPE 350
FSR SEE DETAIL
+74 BEGIN DF BARRIER
SPECIAL LAT. 'V' DITCH SEE DETAIL A
CL. 'I' RIP-RAP EST. 4 TONS EST. 10 SYFF
18" RCP
-L- SC Sta. 332+12.66
+10, END OF BARRIER
PROPOSED DOUBLE-FACED BARRIER
114 EVERETTE F. & CHERYL P. TUCKER, JR DB 0953 PG 0096 PB 11 PG 19
+50.00 275.00 ft.
+50.00 280.00 ft.
+10.00 400.00 ft.
+35.00 385.00 ft.
CL. 'I' RIP-RAP EST. 7 TONS EST. 15 SYFF
PROP. R/W
PROP. SLOPE LIMIT
TOE PROTECTION SEE DETAIL B EST. 113 TONS EST. 160 SYFF
113 J. EARL TINDEL DB 0699 PG 1015
24" CSP W/ 2 ELBOWS
-L- SRS Sta. 336+26.85
PROP. GUARDRAIL
END EXPWY. GUTTER +00
PROP. EXP. GUTTER
+74 TIE TO EXISTING GUARDRAIL
JB W/ SLAB LID
BEGIN EXPWY. GUTTER +00
-L- CS Sta. 333+46.85
24" CSP
335+00
+20, CAT-I
FSR SEE DETAIL
BL-43 PINC 342+16.11
SPECIAL LAT. 'V' DITCH SEE DETAIL A
PROP. R/W
FILL WITH FLOWABLE MATERIAL
+20.00 137.00 ft.
+00.00 125.00 ft.
116 JAMES E. & MARY B. DAYE DB 0700 PG 1327
115 RUPERT T. & WILLA DEAN SIGMON DB 0773 PG 0030 PB 11 PG 19
MATCHLINE -L- STA. 337+00.00
SEE SHEET NO. 30

DETAIL A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground — 1.5:1 — D — 4:1 or Flatter — Fill Slope
Min. D = 1.0 Ft.
-L- 329+65 TO 330+50 (LT.)
-L- 329+50 TO 330+00 (RT)
-L- 334+00 TO 336+00 (RT)

DETAIL FSR
FALSE SUMP
Outside Ditch Traffic Flow
(Not to Scale)
S=Ditch Slope — ℄ Proposed Ditch
-L- 329+50 (RT.)
-L- 334+00 (RT.)
-L- 329+77 (RT.)

DETAIL B
TOE PROTECTION
(Not to Scale)
Natural Ground — Fill Slope
Filter Fabric
Type of Liner = CL. 'I'
d = 1.0 Ft
-L- 323+00 TO 328+32 (RT.)
-L- 323+00 TO 328+75 (LT.)
-L- 333+60 TO 334+50 (LT.)

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

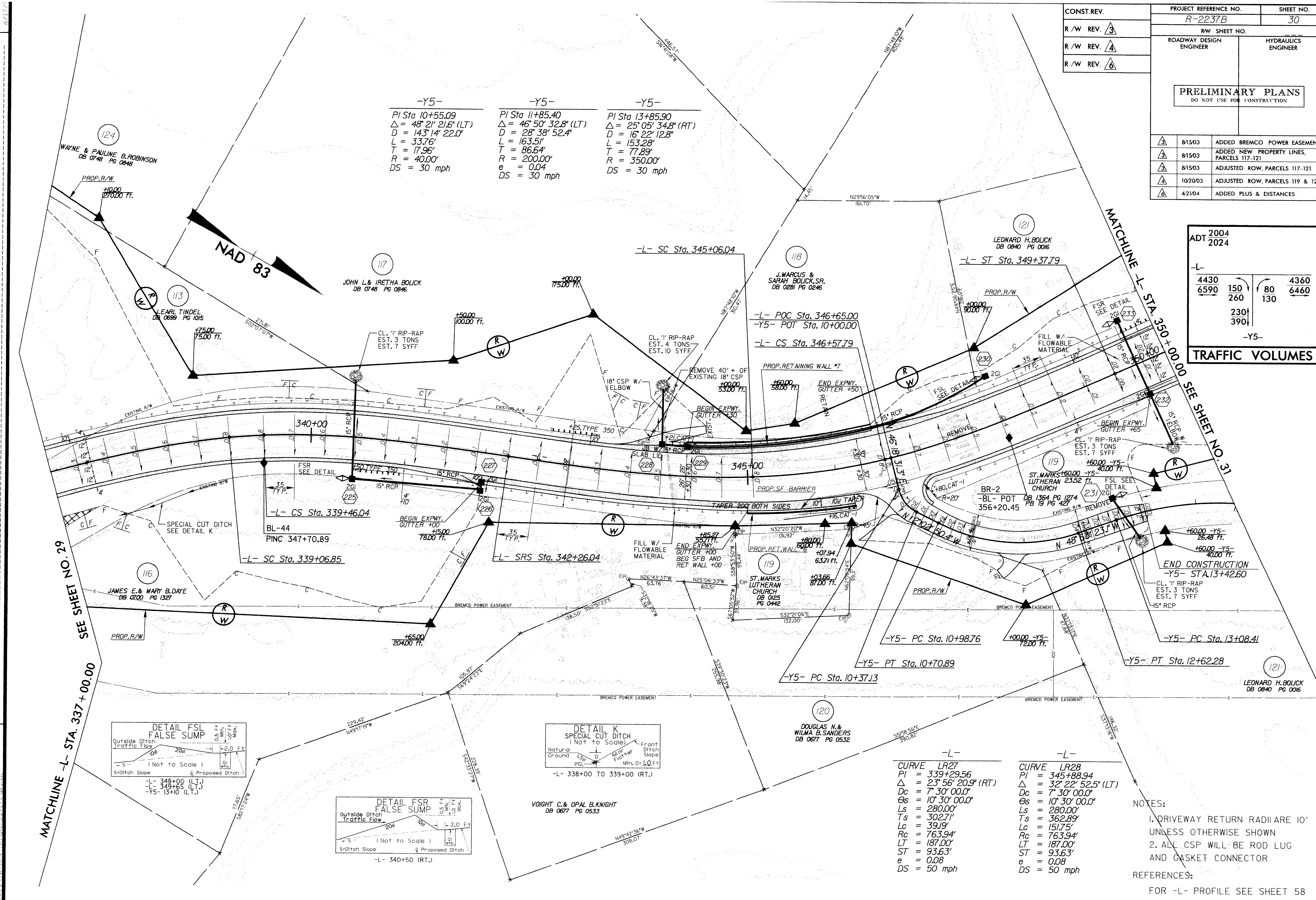
FOR -L- PROFILE SEE SHEET 57

CONST.REV.	PROJECT REFERENCE NO.	SHEET NO.
R/W REV. 3	R-2237B	30
R/W REV. 4	R/W SHEET NO.	
R/W REV. 6	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/15/03	ADDED BREMCO POWER EASEMENT
3	8/15/03	ADDED NEW PROPERTY LINES, PARCELS 117-121
3	8/15/03	ADJUSTED ROW, PARCELS 117-121
4	10/20/03	ADJUSTED ROW, PARCELS 119 & 120
6	4/21/04	ADDED PLUS & DISTANCES

REVISIONS



NAD 83
-Y5-
PI Sta 10+55.09
△ = 48° 21' 21.6" (LT)
D = 143° 14' 22.0"
L = 33.76'
T = 17.96'
R = 40.00'
DS = 30 mph
-Y5-
PI Sta 11+85.40
△ = 46° 50' 32.8" (LT)
D = 28° 38' 52.4"
L = 163.51'
T = 86.64'
R = 200.00'
e = 0.04
DS = 30 mph
-Y5-
PI Sta 13+85.90
△ = 25° 05' 34.8" (RT)
D = 16° 22' 12.8"
L = 153.28'
T = 77.89'
R = 350.00'
DS = 30 mph
WAYNE & PAULINE B.ROBINSON DB 0748 PG 0848
J.EARL TINDEL DB 0699 PG 1015
JOHN L.& IRETHA BOLICK DB 0748 PG 0846
J.MARCUS & SARAH BOLICK,SR. DB 0281 PG 0246
LEONARD H.BOLICK DB 0840 PG 0016
JAMES E.& MARY B.DAYE DB 0700 PG 1327
ST.MARKS LUTHERAN CHURCH DB 0125 PG 0442
DOUGLAS N.& WILMA B.SANDERS DB 0677 PG 0532
VOIGHT C.& OPAL B.KNIGHT DB 0677 PG 0533
-L- SC Sta. 345+06.04
-L- ST Sta. 349+37.79
-L- POC Sta. 346+65.00
-Y5- POT Sta. 10+00.00
-L- CS Sta. 346+57.79
-L- CS Sta. 339+46.04
-L- SC Sta. 339+06.85
-L- SRS Sta. 342+26.04
BL-44
PINC 347+70.89
BR-2
-BL- POT 356+20.45
END CONSTRUCTION
-Y5- STA.13+42.60
-Y5- PC Sta. 10+98.76
-Y5- PT Sta. 10+70.89
-Y5- PC Sta. 10+37.13
-Y5- PC Sta. 13+08.41
-Y5- PT Sta. 12+62.28
MATCHLINE -L- STA. 350+00.00 SEE SHEET NO. 31
MATCHLINE -L- STA. 337+00.00 SEE SHEET NO. 29
BREMCO POWER EASEMENT
PROP.R/W
EXISTING R/W
PROP.RETAINING WALL *7
PROP.SF BARRIER
TAPER 200' BOTH SIDES
CL. 'I' RIP-RAP EST. 3 TONS EST. 7 SYFF
CL. 'I' RIP-RAP EST. 3 TONS EST. 10 SYFF
REMOVE 40' + OF EXISTING 18" CSP
18" CSP W/ ELBOW
FILL W/ FLOWABLE MATERIAL
SPECIAL CUT DITCH SEE DETAIL K
FSR SEE DETAIL
FSL SEE DETAIL
BEGIN EXPWY. GUTTER +00
END EXPWY. GUTTER +50
DETAIL FSL FALSE SUMP
-L- 348+00 (LT.)
-L- 349+65 (LT.)
-Y5- 13+10 (LT.)
DETAIL FSR FALSE SUMP
-L- 340+50 (RT.)
DETAIL K SPECIAL CUT DITCH (Not to Scale)
-L- 338+00 TO 339+00 (RT.)

TRAFFIC VOLUMES

ADT 2004 / 2024

-L-: 4430 / 6590; 150 / 260; 80 / 130; 4360 / 6460; 230 / 390

-Y5-

-L- CURVE LR27	
PI	= 339+29.56
△	= 23° 56' 20.9" (RT)
Dc	= 7° 30' 00.0"
Θs	= 10° 30' 00.0"
Ls	= 280.00'
Ts	= 302.71'
Lc	= 39.19'
Rc	= 763.94'
LT	= 187.00'
ST	= 93.63'
e	= 0.08
DS	= 50 mph

-L- CURVE LR28	
PI	= 345+88.94
△	= 32° 22' 52.5" (LT)
Dc	= 7° 30' 00.0"
Θs	= 10° 30' 00.0"
Ls	= 280.00'
Ts	= 362.89'
Lc	= 151.75'
Rc	= 763.94'
LT	= 187.00'
ST	= 93.63'
e	= 0.08
DS	= 50 mph

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 58
FOR -Y5- PROFILE SEE SHEET 63

CONST.REV.
R /W REV. 3
R /W REV. 4
R /W REV. 6

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3	8/5/03	ADDED BREMCO POWER EASEMENT
3	8/5/03	ADDED NEW PROPERTY LINES, PARCELS 121,125-129
3	8/5/03	ADJUSTED ROW, PARCELS 121,125-129
4	10/20/03	ADJUSTED ROW, PARCELS 125 & 128
6	4/21/04	ADDED PLUS AND DISTANCES

REVISIONS

MATCHLINE -L- STA. 350+00.00 SEE SHEET NO. 30

NAD 83

ELIZABETH FREE
NJAJA LLC.
DB 1419 PG 224

END CONSTRUCTION
PROJECT R-2237B
-L- POT Sta. 356+50.00

121 LEONARD H.BOLICK DB 0840 PG 0016

125 JOSEPH CLAYTON
DENISE CLAYTON
PAMELA CLAYTON
DB 968 PG 469

128 SAINT MARKS EVANGELICAL LUTHERAN CHURCH DB 600 PG 485

126 PHILIP CURLEY DB 1339 PG 711

127 HAL C.SIGMAN DB 1097 PG 1448

RICKY GEORGE POTEAT
DB 1235 PG 0323
DB 1272 PG 0137
PB 17 PG 256

TERRY BRITTON
DB 1302 PG 1207

BURT M.MYERS
DB 1142 PG 1306

129 BURT M.MYERS
DB 968 PG 0792
PB 14 PG 56

+12.10 68.13 ft. ELIZABETH C.FREE DB 1406 PG 656

+13.77 35.45 ft.

+23.09 EX.R/W

END STATE R/W PROJECT 8.T731303
-L- POT Sta. 357+23.09

-Y5- POT Sta. 15+01.79

-Y5- PT Sta. 14+61.29

NOTES:

1. DRIVEWAY RETURN RADII ARE 10' UNLESS OTHERWISE SHOWN
2. ALL CSP WILL BE ROD LUG AND GASKET CONNECTOR

REFERENCES:

FOR -L- PROFILE SEE SHEET 59

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI = 12+30.00
EL = 1,400.00'
K = 96
VC = 220.00'

PI = 14+30.00
EL = 1,407.84'
K = 97
VC = 180.00'

BEGIN GRADE
-L- 9+86.41
EL = 1,396.00'

1,396.00

(+)1.6421%

(+)3.9220%

(+)3.9220%

(+)5.7800%

1,423.45

1,398.19
+20.00

1,404.31
+40.00

1,413.05
+20.00

1,520
1,510
1,500
1,490
1,480
1,470
1,460
1,450
1,440
1,430
1,420
1,410
1,400
1,390
1,380
1,370
1,360
1,350
1,340
1,330
1,320

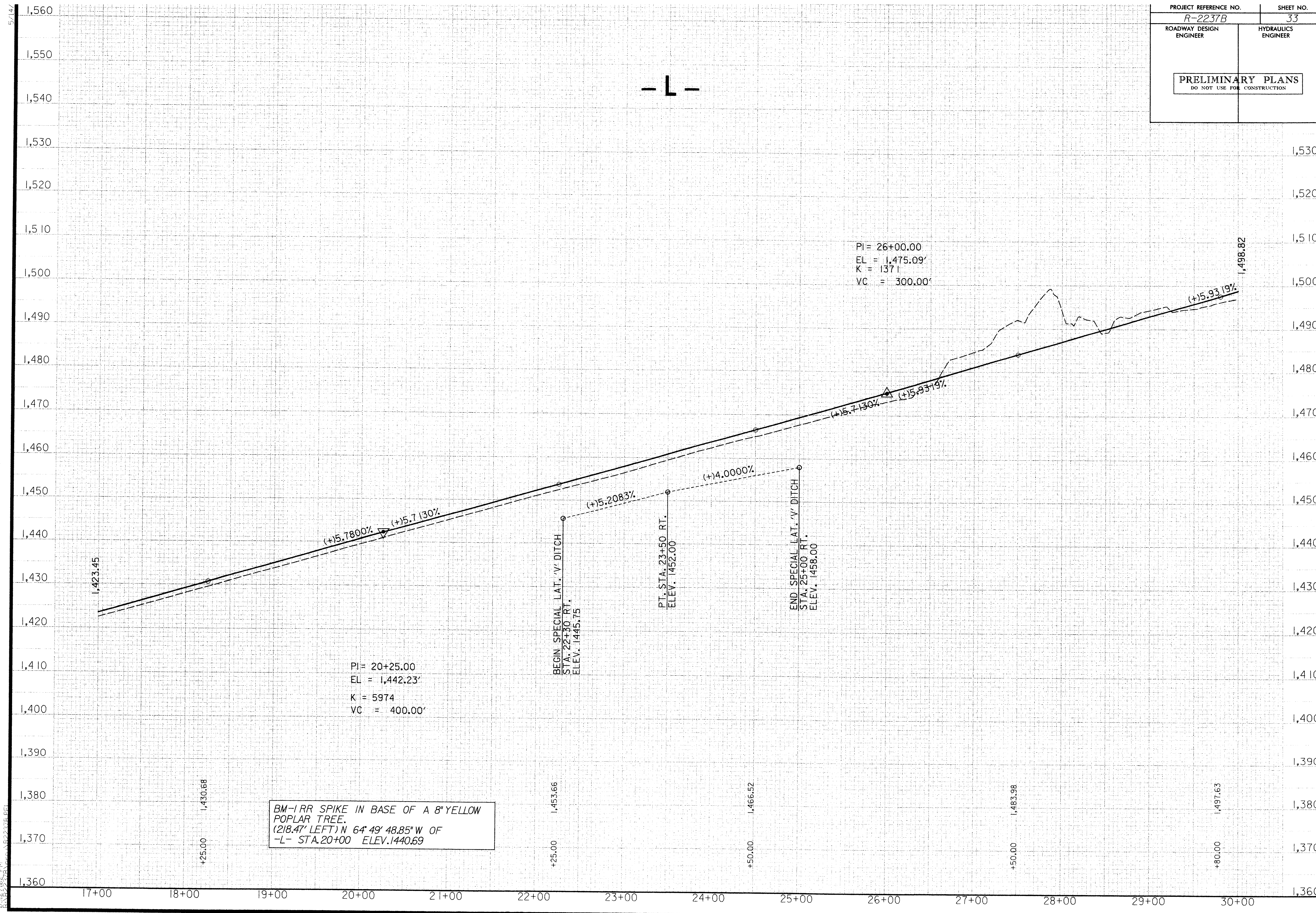
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	33

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
PI= 26+00.00
EL = 1,475.09'
K = 1371
VC = 300.00'
PI= 20+25.00
EL = 1,442.23'
K = 5974
VC = 400.00'
(+)5.7800%
(+)5.7130%
(+)5.2083%
(+)4.0000%
(+)5.9319%
1,423.45
1,498.82
BEGIN SPECIAL LAT. 'V' DITCH
STA. 22+30 RT.
ELEV. 1445.75
PT. STA. 23+50 RT.
ELEV. 1452.00
END SPECIAL LAT. 'V' DITCH
STA. 25+00 RT.
ELEV. 1458.00
BM-1 RR SPIKE IN BASE OF A 8" YELLOW POPLAR TREE.
(218.47' LEFT) N 64° 49' 48.85" W OF
-L- STA. 20+00 ELEV. 1440.69
1,430.68
+25.00
1,453.66
+25.00
1,466.52
+50.00
1,483.98
+50.00
1,497.63
+80.00
1,560
1,550
1,540
1,530
1,520
1,510
1,500
1,490
1,480
1,470
1,460
1,450
1,440
1,430
1,420
1,410
1,400
1,390
1,380
1,370
1,360
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00

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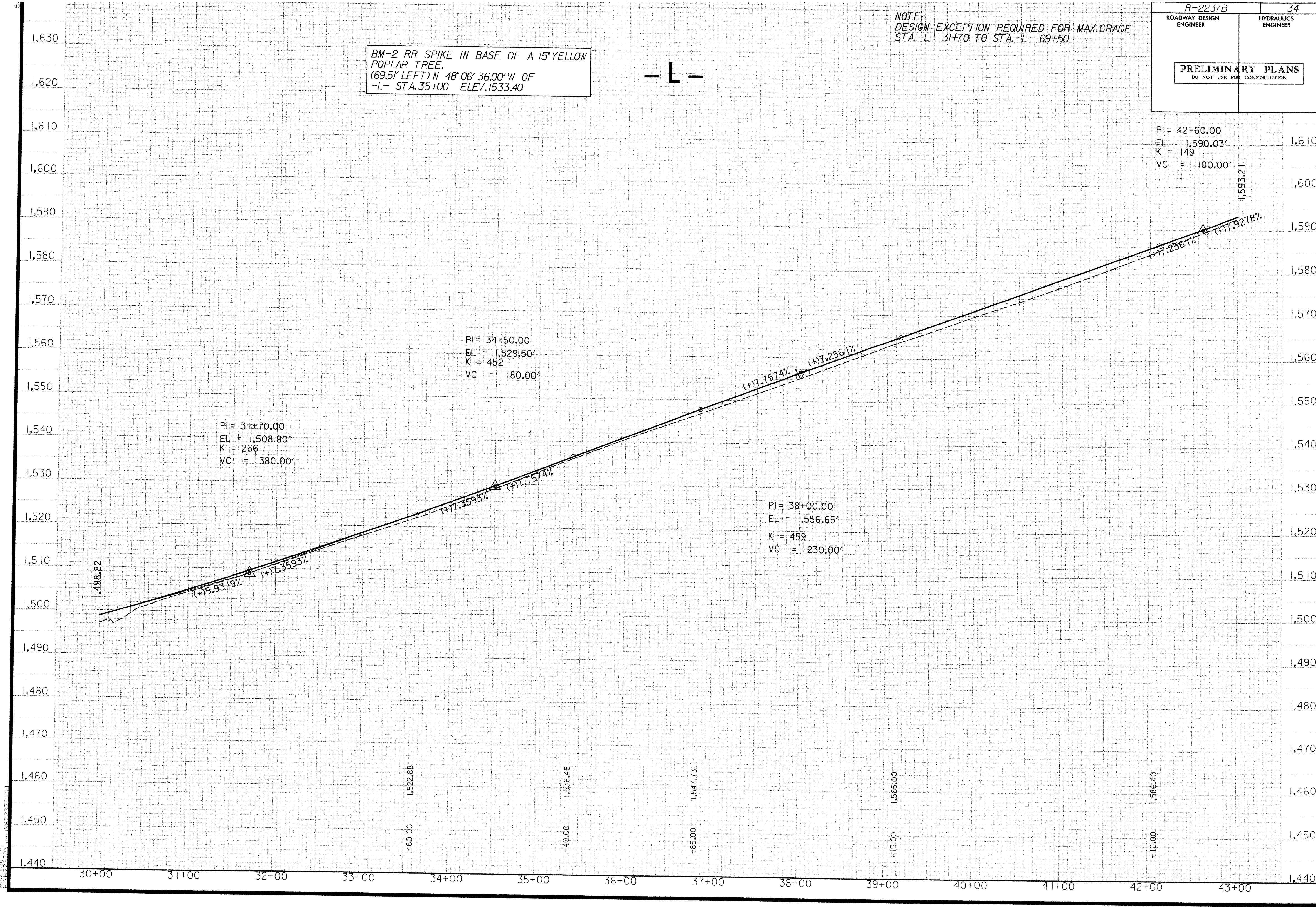
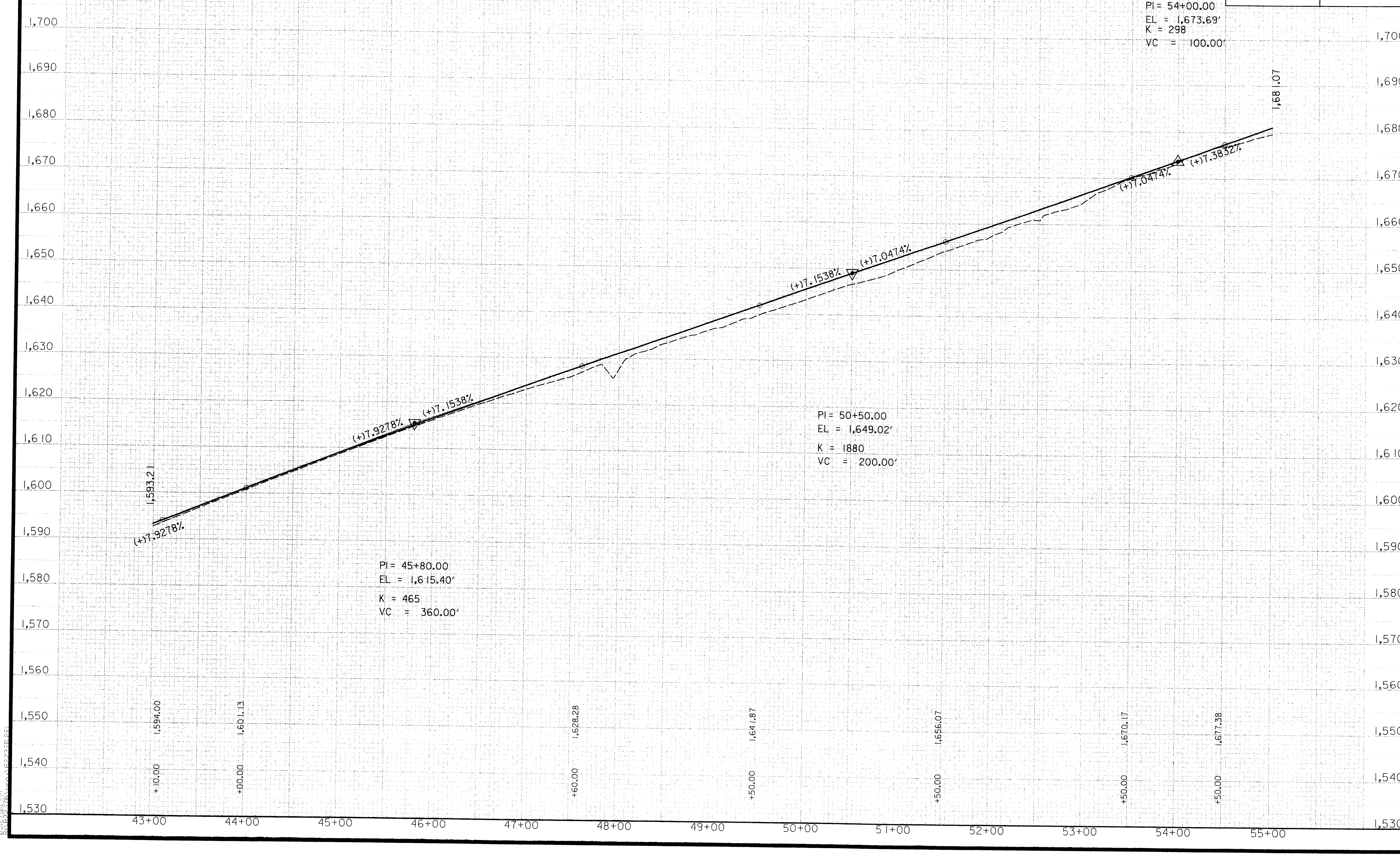

R-2237B
34
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 31+70 TO STA.-L- 69+50
-L-
BM-2 RR SPIKE IN BASE OF A 15"YELLOW POPLAR TREE.
(69.51' LEFT) N 48°06' 36.00"W OF
-L- STA.35+00 ELEV.1533.40
PI= 31+70.00
EL = 1,508.90'
K = 266
VC = 380.00'
PI= 34+50.00
EL = 1,529.50'
K = 452
VC = 180.00'
PI= 38+00.00
EL = 1,556.65'
K = 459
VC = 230.00'
PI= 42+60.00
EL = 1,590.03'
K = 149
VC = 100.00'
(+)5.9319%
(+)7.3593%
(+)7.3593%
(+)7.7574%
(+)7.7574%
(+)7.2561%
(+)7.2561%
(+)7.9278%
1,498.82
1,593.21
1,522.88
+60.00
1,536.48
+40.00
1,547.73
+85.00
1,565.00
+15.00
1,586.40
+10.00
1,630
1,620
1,610
1,600
1,590
1,580
1,570
1,560
1,550
1,540
1,530
1,520
1,510
1,500
1,490
1,480
1,470
1,460
1,450
1,440
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
38+00
39+00
40+00
41+00
42+00
43+00

R-2237B	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 31+70 TO STA.-L- 69+50

-L-



1,720
1,710
1,700
1,690
1,680
1,670
1,660
1,650
1,640
1,630
1,620
1,610
1,600
1,590
1,580
1,570
1,560
1,550
1,540
1,530
PI= 54+00.00
EL = 1,673.69'
K = 298
VC = 100.00'
1,681.07
(+)7.0474%
(+)7.3832%
(+)7.1538%
(+)7.0474%
(+)7.9278%
(+)7.1538%
PI= 50+50.00
EL = 1,649.02'
K = 1880
VC = 200.00'
1,593.21
(+)7.9278%
PI= 45+80.00
EL = 1,615.40'
K = 465
VC = 360.00'
1,594.00
1,601.13
1,628.28
1,641.87
1,656.07
1,670.17
1,677.38
+10.00
+00.00
+60.00
+50.00
+50.00
+50.00
+50.00
43+00
44+00
45+00
46+00
47+00
48+00
49+00
50+00
51+00
52+00
53+00
54+00
55+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX. GRADE
STA. -L- 31+70 TO STA. -L- 69+50

BM-3 RR SPIKE IN BASE OF A 16" YELLOW POPLAR TREE.
(82.54' LEFT) N 12° 51' 37.07" W OF
-L- STA. 58+00 ELEV. 1704.29

-L-

PI = 56+80.00
EL = 1,694.36'
K = 113
VC = 100.00'

PI = 61+20.00
EL = 1,730.75'
K = 406
VC = 330.00'

(+)7.3832%
(+)8.2700%
(+)8.2700%
(+)7.4570%

1,681.07
1,690.67
1,698.50
1,717.11
1,743.06
1,766.54

+30.00
+30.00
+55.00
+85.00

EXIST. 24" CSP

EXIST. 30" CSP

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 16.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 26.0	CFS
DESIGN HW ELEVATION	= 1671.79	FT
100 YEAR DISCHARGE	= 31.5	CFS
100 YEAR HW ELEVATION	= 1672.93	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 1690.00	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 9.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23.0	CFS
DESIGN HW ELEVATION	= 1720.78	FT
100 YEAR DISCHARGE	= 24.7	CFS
100 YEAR HW ELEVATION	= 1720.95	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 1740.00	FT

1,830 1,820 1,810 1,800 1,790 1,780 1,770 1,760 1,750 1,740 1,730 1,720 1,710 1,700 1,690 1,680 1,670 1,660 1,650 1,640 1,630

55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00 65+00 66+00

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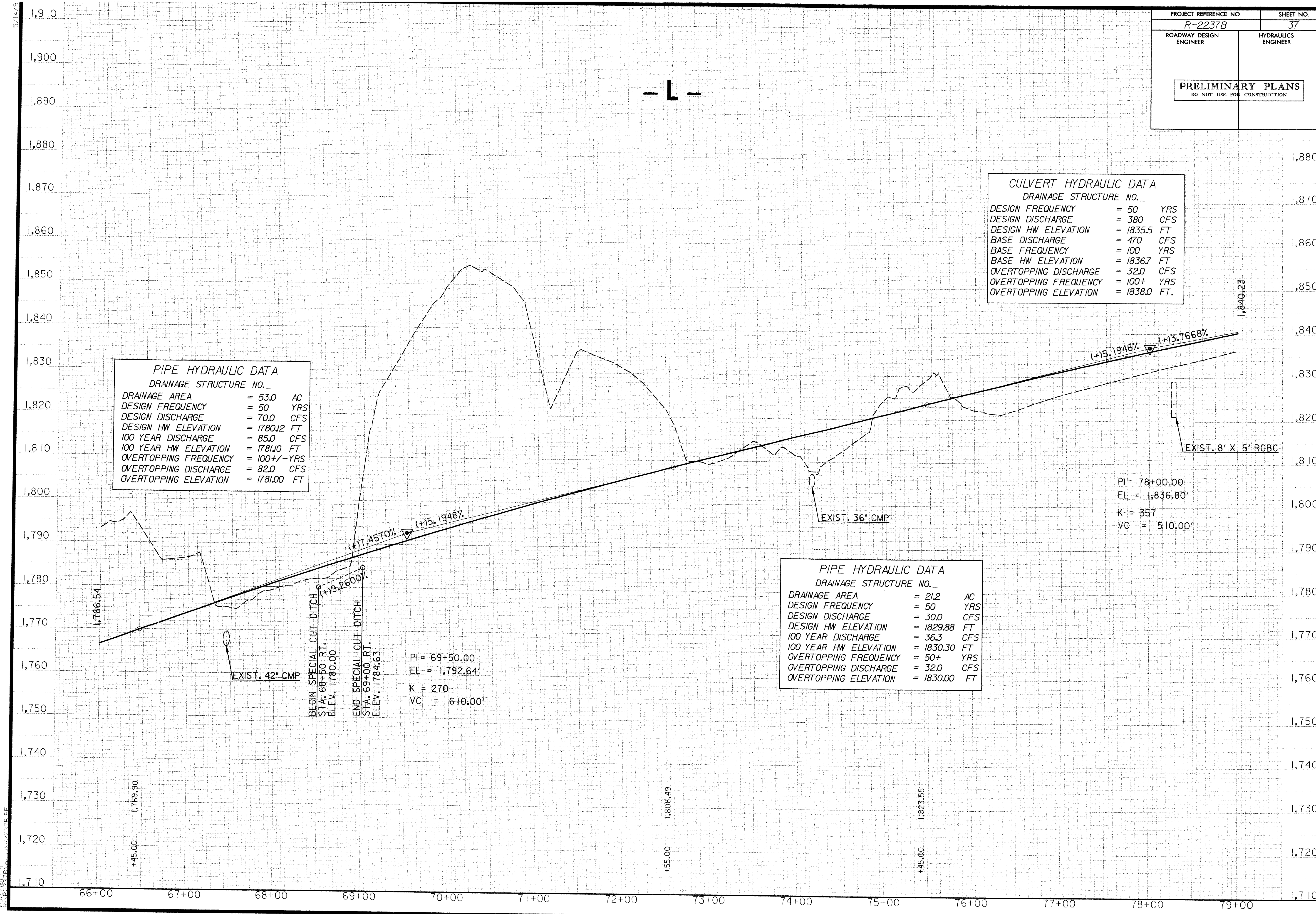
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	37
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 53.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 70.0	CFS
DESIGN HW ELEVATION	= 1780.12	FT
100 YEAR DISCHARGE	= 85.0	CFS
100 YEAR HW ELEVATION	= 1781.10	FT
OVERTOPPING FREQUENCY	= 100+/-	YRS
OVERTOPPING DISCHARGE	= 82.0	CFS
OVERTOPPING ELEVATION	= 1781.00	FT

CULVERT HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 380	CFS
DESIGN HW ELEVATION	= 1835.5	FT
BASE DISCHARGE	= 470	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 1836.7	FT
OVERTOPPING DISCHARGE	= 32.0	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 1838.0	FT.

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 21.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 30.0	CFS
DESIGN HW ELEVATION	= 1829.88	FT
100 YEAR DISCHARGE	= 36.3	CFS
100 YEAR HW ELEVATION	= 1830.30	FT
OVERTOPPING FREQUENCY	= 50+	YRS
OVERTOPPING DISCHARGE	= 32.0	CFS
OVERTOPPING ELEVATION	= 1830.00	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 89+00 TO STA.-L- 112+85

-L-

PI = 89+00.00
EL = 1,878.23'
K = 127
VC = 450.00'

1,900.19

(+)3.7668%

(+)7.3168%

(+)3.7668%

(+)2.9886%

1,840.23

EXIST. 5' X 5' RCBC

EXIST. 8' X 4' RCBC

BEGIN SPECIAL CUT DITCH
STA. 83+50 RT.
ELEV. 1855.52

END SPECIAL CUT DITCH
STA. 84+50 RT.
ELEV. 1858.51

RCBC HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 167.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 270.0	CFS
DESIGN HW ELEVATION	= 1870.08	FT
100 YEAR DISCHARGE	= 340	CFS
100 YEAR HW ELEVATION	= 1871.64	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 1889.15	FT

1,846.41
+55.00

1,869.76
+75.00

1,894.70
+25.00

BM-4 RR SPIKE IN BASE OF A 27" YELLOW POPLAR TREE.
(88.44' LEFT) N 80° 45' 16.31" W OF
-L- STA.89+00 ELEV.1880.23

1,950 1,940 1,930 1,920 1,910 1,900 1,890 1,880 1,870 1,860 1,850 1,840 1,830 1,820 1,810 1,800 1,790 1,780 1,770 1,760

79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00 91+00 92+00

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PROJECT REFERENCE NO.	SHEET NO.
R-2237B	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX. GRADE
STA. -L- 89+00 TO STA. -L- 112+85

-L-

PI = 93+00.00
EL = 1,907.50'
K = 266
VC = 200.00'

PI = 101+20.00
EL = 1,973.66'
K = 2940
VC = 300.00'

1,900.19
(+)7.3168%
(+)8.0638%
(+)8.0678%
(+)7.9658%
2,003.93
BEGIN LAT. 'V' DITCH
STA. 93+10 RT.
ELEV. 1863.50
PI STA. 93+50 RT.
ELEV. 1870.00
END LAT. 'V' DITCH
STA. 94+00 RT.
ELEV. 1876.00
(+)16.2500%
(+)12.0000%
1,900.19
1,915.57
1,961.56
1,985.61
+00.00
+00.00
+70.00
+70.00

2,040
2,030
2,020
2,010
2,000
1,990
1,980
1,970
1,960
1,950
1,940
1,930
1,920
1,910
1,900
1,890
1,880
1,870
1,860
1,850
1,840

92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00 101+00 102+00 103+00 104+00 105+00

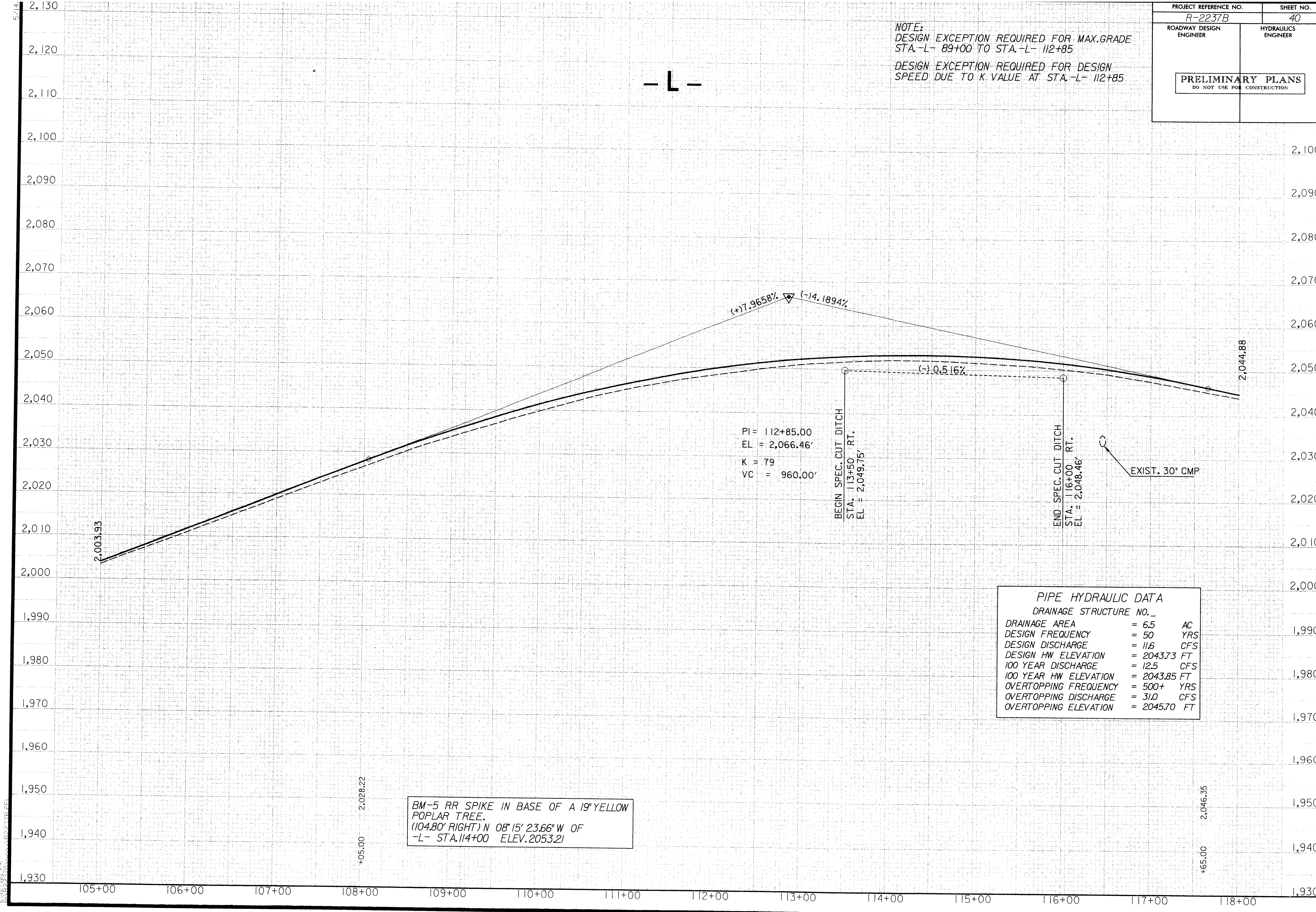
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	40
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE STA.-L- 89+00 TO STA.-L- 112+85

DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED DUE TO K VALUE AT STA.-L- 112+85

-L-



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 6.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 11.6	CFS
DESIGN HW ELEVATION	= 2043.73	FT
100 YEAR DISCHARGE	= 12.5	CFS
100 YEAR HW ELEVATION	= 2043.85	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 31.0	CFS
OVERTOPPING ELEVATION	= 2045.70	FT

BM-5 RR SPIKE IN BASE OF A 19" YELLOW POPLAR TREE.
(104.80' RIGHT) N 08° 15' 23.66" W OF
-L- STA.114+00 ELEV.2053.21

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	41

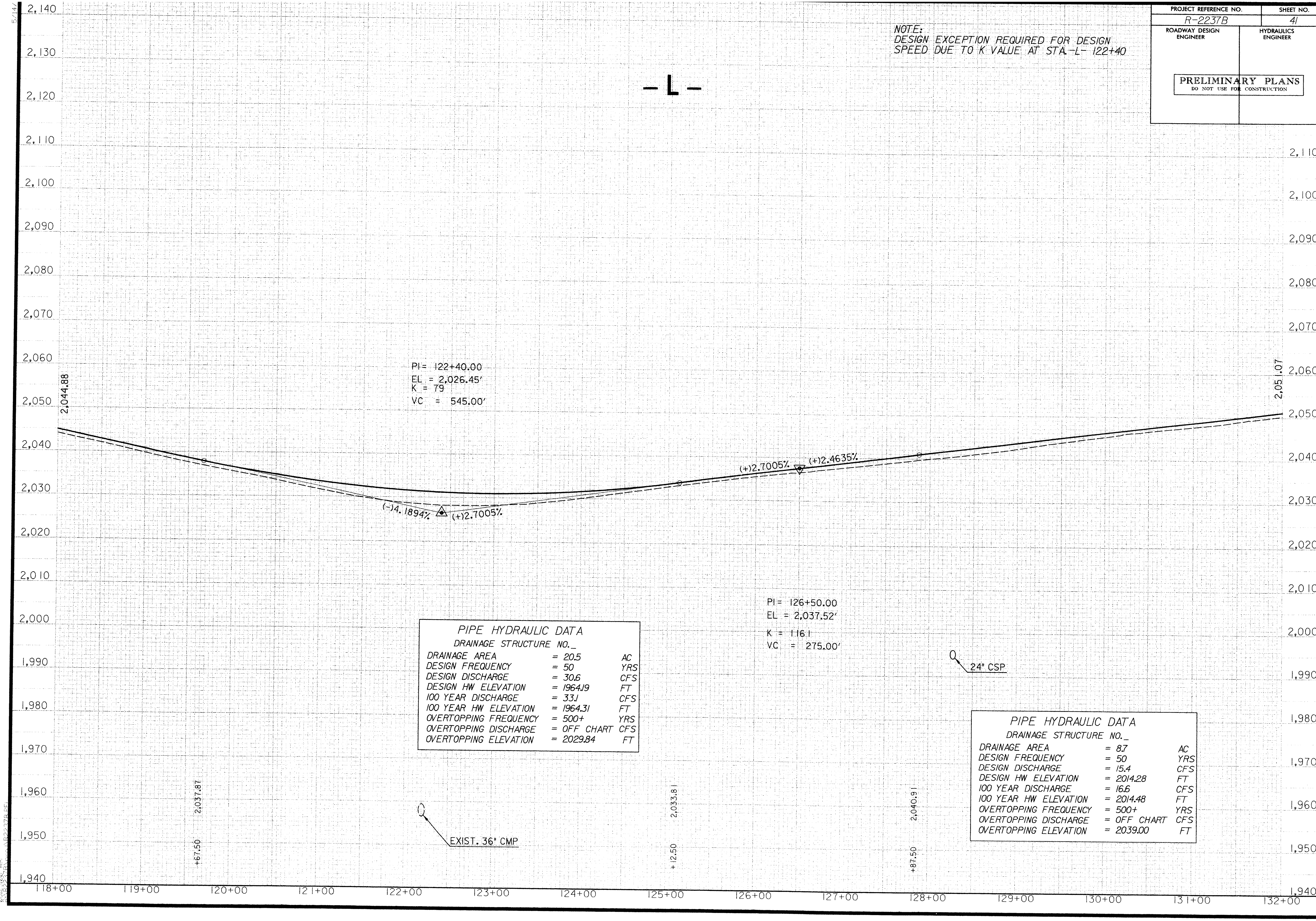
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED DUE TO K VALUE AT STA -L- 122+40

-L-



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 20.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 30.6	CFS
DESIGN HW ELEVATION	= 1964.19	FT
100 YEAR DISCHARGE	= 33.1	CFS
100 YEAR HW ELEVATION	= 1964.31	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2029.84	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 8.7	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 15.4	CFS
DESIGN HW ELEVATION	= 2014.28	FT
100 YEAR DISCHARGE	= 16.6	CFS
100 YEAR HW ELEVATION	= 2014.48	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2039.00	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	42
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX. GRADE
STA. -L- 136+70 TO STA. -L- 144+00

-L-

PI = 136+70.00
EL = 2,062.65'
K = 96
VC = 530.00'

-L- 139+93.49 =
-Y1- 15+78.31
EL = 2,088.44'

PI = 144+00.00
EL = 2,120.84'
K = 225
VC = 490.00'

2,051.07

(+)2.4635%

(+)7.97 12%

(+)9.3807%

(+)15.7933%

2,126.17

BEGIN SPEC. CUT DITCH
STA. 141+50 LT.
EL = 2,097.00'

END SPEC. CUT DITCH
STA. 142+00 LT.
EL = 2,101.69'

BEGIN LAT. 'V' DITCH
STA. 135+00 LT.
EL = 2,027.00'

(-)26.6671%
L=60'

PI = 135+50.000
EL = 2,011.00'

(-)13.7501%
L=80'

(-)2.50%
L=40'

PI = 136+10.000
EL = 2,000.00'

END LAT. 'V' DITCH
STA. 136+45 LT.
EL = 1,998.60'

2,056.12

2,083.77

2,101.31

+05.00

+35.00

+55.00

*ACTUAL LENGTH OF DITCH IS 155'.
LENGTHS BETWEEN PI'S ARE SHOWN.

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 13.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23.5	CFS
DESIGN HW ELEVATION	= 2016.98	FT
100 YEAR DISCHARGE	= 25.4	CFS
100 YEAR HW ELEVATION	= 2017.13	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2056.10	FT

BM-6 RR SPIKE IN BASE OF A 20" CHESTNUT OAK TREE.
(188.63' RIGHT) N 08° 54' 14.26" W OF
-L- STA. 145+00 ELEV. 2126.17

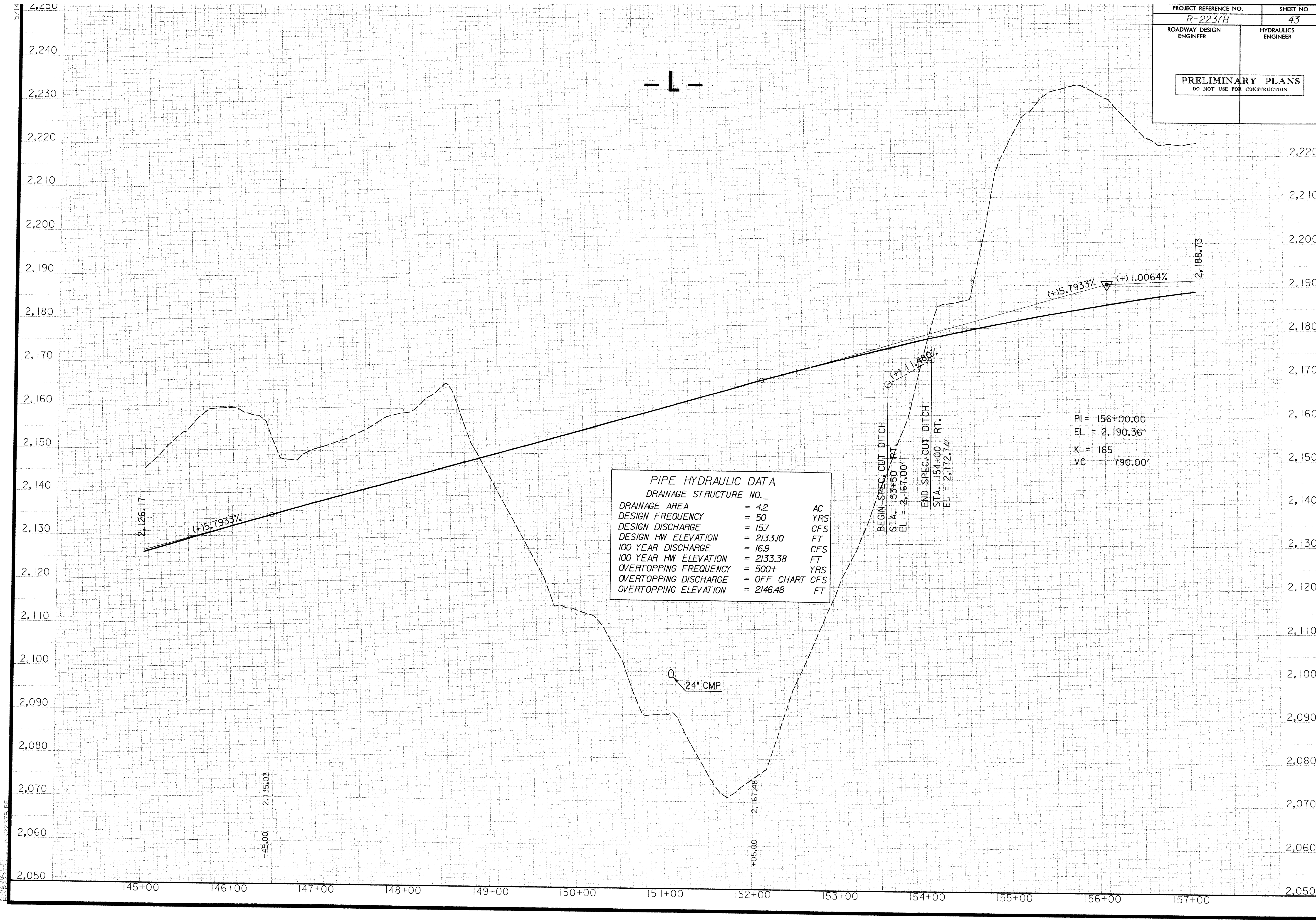
2,180 2,170 2,160 2,150 2,140 2,130 2,120 2,110 2,100 2,090 2,080 2,070 2,060 2,050 2,040 2,030 2,020 2,010 2,000 1,990 1,980

132+00 133+00 134+00 135+00 136+00 137+00 138+00 139+00 140+00 141+00 142+00 143+00 144+00 145+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 4.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 15.7	CFS
DESIGN HW ELEVATION	= 2133.10	FT
100 YEAR DISCHARGE	= 16.9	CFS
100 YEAR HW ELEVATION	= 2133.38	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2146.48	FT

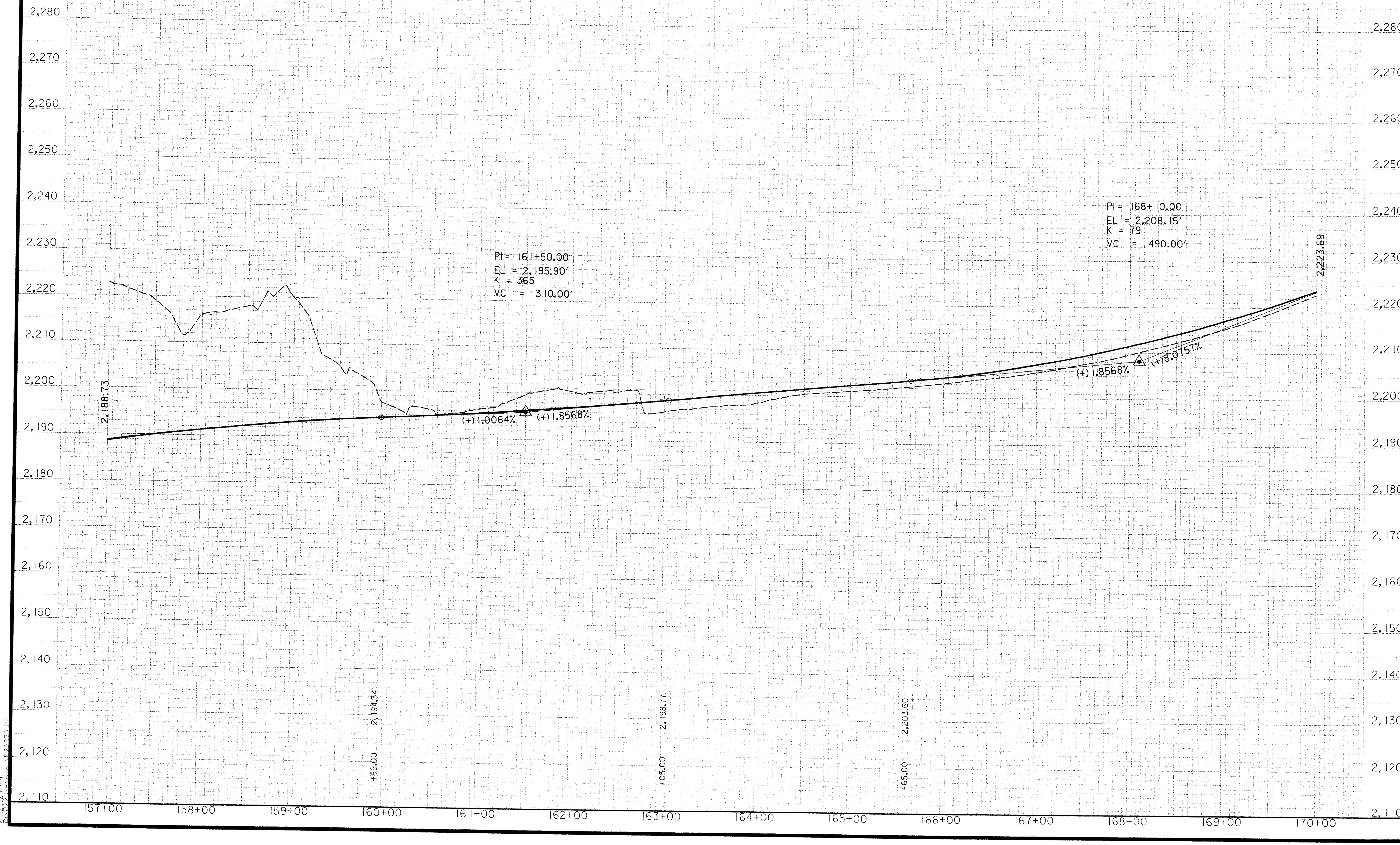
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	44
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

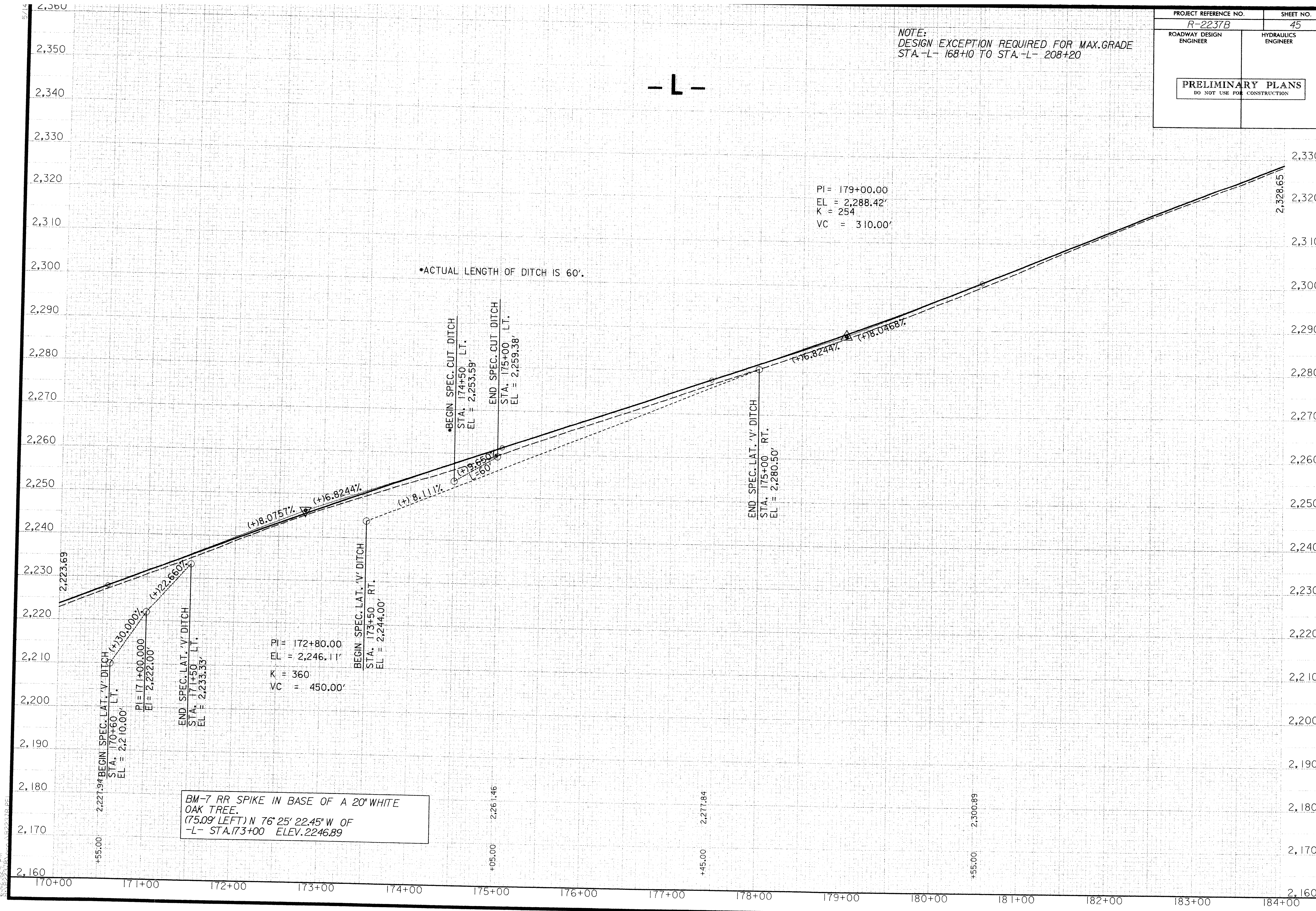
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

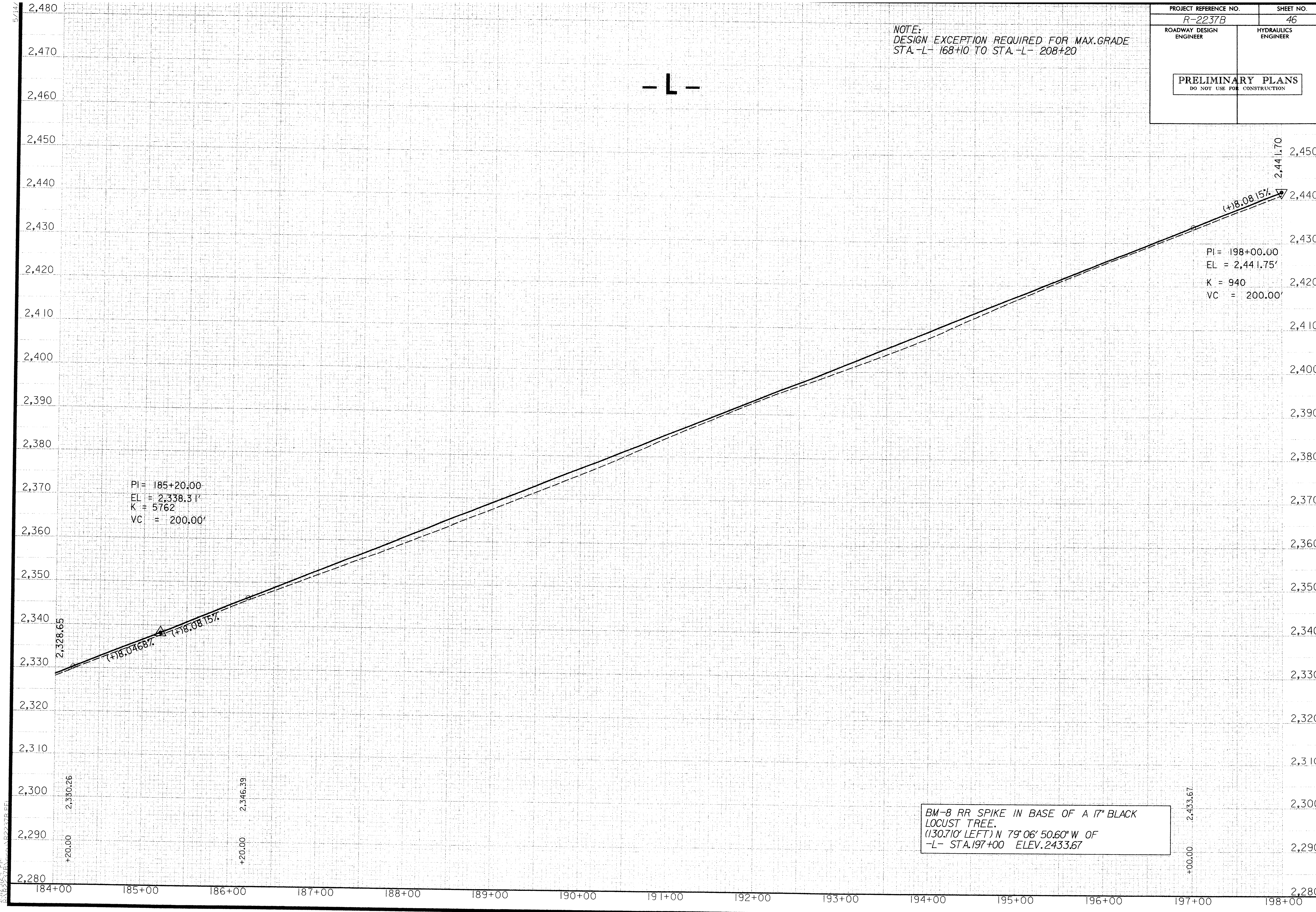
NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE STA.-L- 168+10 TO STA.-L- 208+20

DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED DUE TO K VALUE AT STA.-L- 168+10

-L-




PROJECT REFERENCE NO. R-2237B
SHEET NO. 45
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 168+10 TO STA.-L- 208+20
-L-
PI= 179+00.00
EL = 2,288.42'
K = 254
VC = 310.00'
•ACTUAL LENGTH OF DITCH IS 60'.
•BEGIN SPEC.CUT DITCH
STA. 174+50 LT.
EL = 2,253.59'
END SPEC.CUT DITCH
STA. 175+00 LT.
EL = 2,259.38'
END SPEC.LAT.'V' DITCH
STA. 175+00 RT.
EL = 2,280.50'
(+)16.8244%
(+)8.0468%
(+)9.650%
L=60'
(+)8.111%
(+)8.0757%
(+)6.8244%
(+)22.660%
(+)30.000%
BEGIN SPEC.LAT.'V' DITCH
STA. 173+50 RT.
EL = 2,244.00'
PI= 172+80.00
EL = 2,246.11'
K = 360
VC = 450.00'
END SPEC.LAT.'V' DITCH
STA. 171+50 LT.
EL = 2,233.33'
PI=171+00.000
El = 2,222.00'
BEGIN SPEC.LAT.'V' DITCH
STA. 170+60 LT.
EL = 2,210.00'
BM-7 RR SPIKE IN BASE OF A 20" WHITE OAK TREE.
(75.09' LEFT) N 76° 25' 22.45" W OF
-L- STA.173+00 ELEV.2246.89
2,223.69
2,328.65
2,227.94
+55.00
2,261.46
+05.00
2,277.84
+45.00
2,300.89
+55.00
2,360
2,350
2,340
2,330
2,320
2,310
2,300
2,290
2,280
2,270
2,260
2,250
2,240
2,230
2,220
2,210
2,200
2,190
2,180
2,170
2,160
170+00
171+00
172+00
173+00
174+00
175+00
176+00
177+00
178+00
179+00
180+00
181+00
182+00
183+00
184+00


PROJECT REFERENCE NO.
R-2237B
SHEET NO.
46
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 168+10 TO STA.-L- 208+20
-L-
PI= 185+20.00
EL = 2,338.31'
K = 5762
VC = 200.00'
PI= 198+00.00
EL = 2,441.75'
K = 940
VC = 200.00'
(+)8.0468%
(+)8.0815%
(+)8.0815%
2,328.65
2,441.70
2,330.26
+20.00
2,346.39
+20.00
2,433.67
+00.00
BM-8 RR SPIKE IN BASE OF A 17" BLACK LOCUST TREE.
(130.710' LEFT) N 79° 06' 50.60" W OF
-L- STA.197+00 ELEV.2433.67
2,480
2,470
2,460
2,450
2,440
2,430
2,420
2,410
2,400
2,390
2,380
2,370
2,360
2,350
2,340
2,330
2,320
2,310
2,300
2,290
2,280
184+00
185+00
186+00
187+00
188+00
189+00
190+00
191+00
192+00
193+00
194+00
195+00
196+00
197+00
198+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX. GRADE
STA. -L- 168+10 TO STA. -L- 208+20

-L-

2,580 2,570 2,560 2,550 2,540 2,530 2,520 2,510 2,500 2,490 2,480 2,470 2,460 2,450 2,440 2,430 2,420 2,410 2,400 2,390 2,380

2,441.70
(+)7.8687%
(+)7.8687%
(+)6.3262%
(+)6.3262%
(+)4.5015%
(+)8.078%
2,527.37

PI = 198+00.00
EL = 2,441.75'
K = 940
VC = 200.00'

PI = 203+50.00
EL = 2,485.03'
K = 130
VC = 200.00'

PI = 208+20.00
EL = 2,514.76'
K = 137
VC = 250.00'

BEGIN SPEC. CUT DITCH
STA. 210+60 RT.
EL = 2,520.20'

2,443.62 +00.00
2,477.16 +50.00
2,491.35 +50.00
2,506.85 +95.00
2,520.39 +45.00

198+00 199+00 200+00 201+00 202+00 203+00 204+00 205+00 206+00 207+00 208+00 209+00 210+00 211+00

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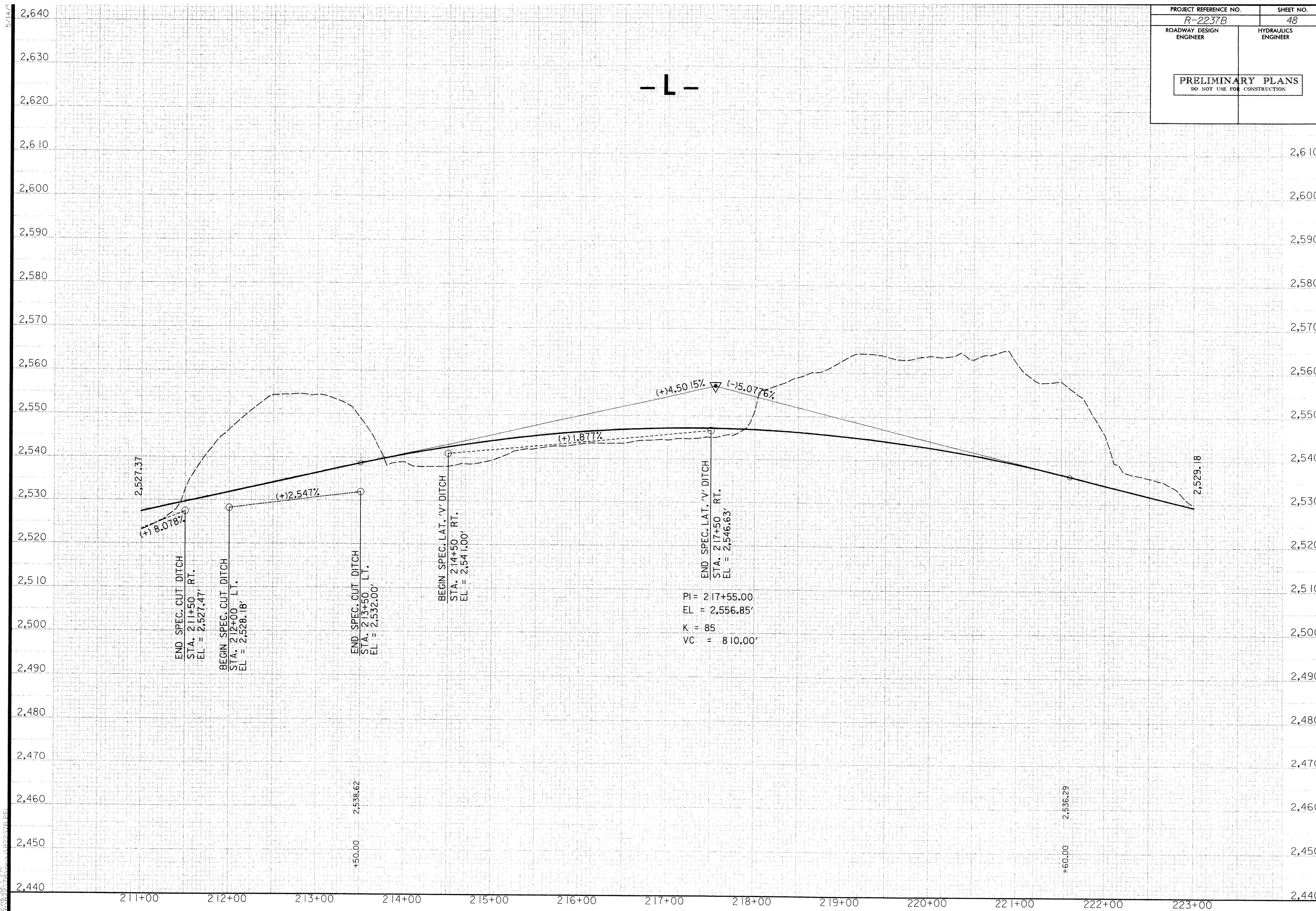
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	48
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

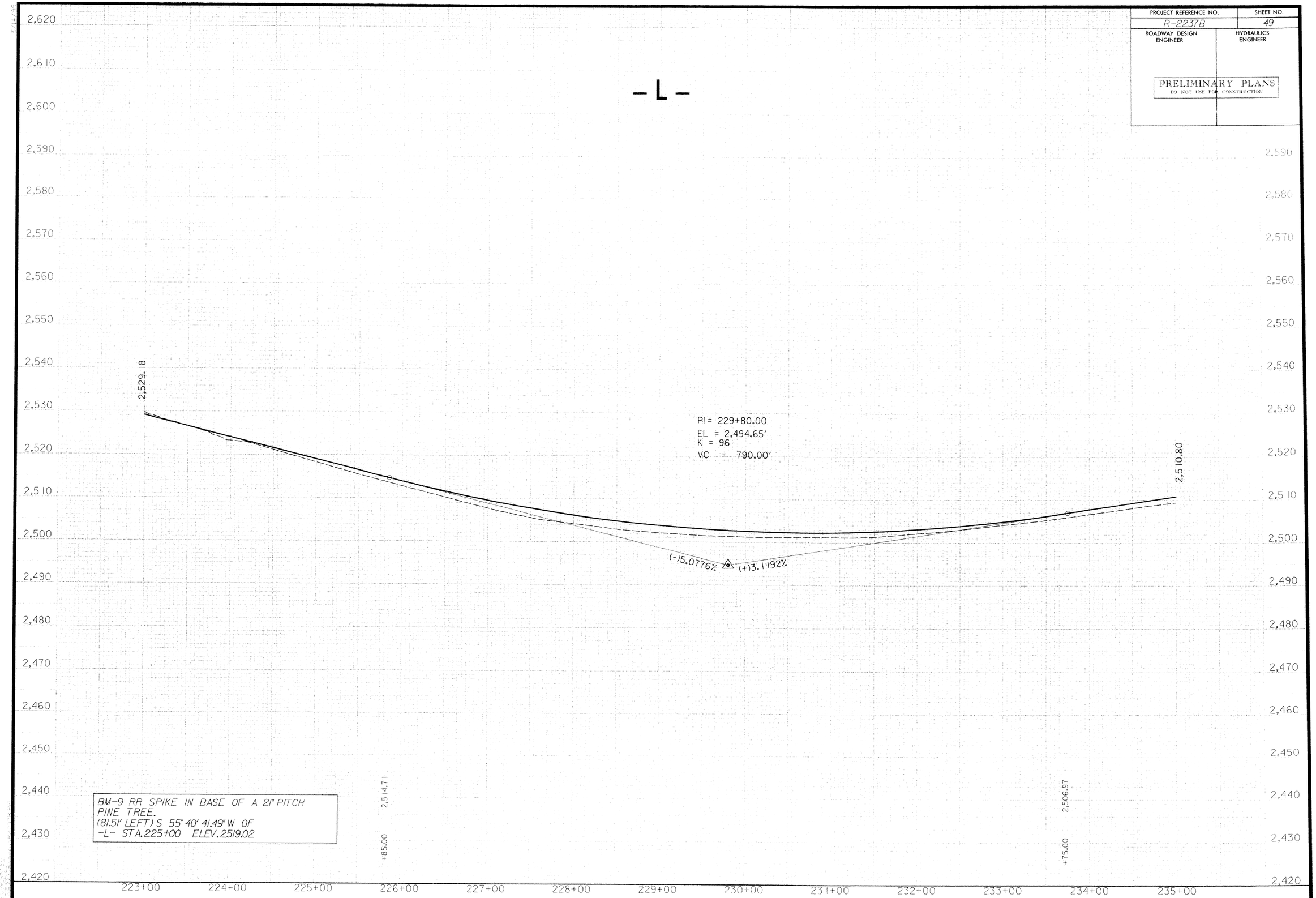
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
2,640
2,630
2,620
2,610
2,600
2,590
2,580
2,570
2,560
2,550
2,540
2,530
2,520
2,510
2,500
2,490
2,480
2,470
2,460
2,450
2,440
211+00
212+00
213+00
214+00
215+00
216+00
217+00
218+00
219+00
220+00
221+00
222+00
223+00
2,527.37
(+) 8.078%
(+)2.547%
(+)1.877%
(+)4.5015%
(-)5.0776%
2,529.18
END SPEC. CUT DITCH
STA. 211+50 RT.
EL = 2,527.47'
BEGIN SPEC. CUT DITCH
STA. 212+00 LT.
EL = 2,528.18'
END SPEC. CUT DITCH
STA. 213+50 LT.
EL = 2,532.00'
BEGIN SPEC. LAT. 'V' DITCH
STA. 214+50 RT.
EL = 2,541.00'
END SPEC. LAT. 'V' DITCH
STA. 217+50 RT.
EL = 2,546.63'
PI = 217+55.00
EL = 2,556.85'
K = 85
VC = 810.00'
2,538.62
+50.00
2,536.29
+60.00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	49
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

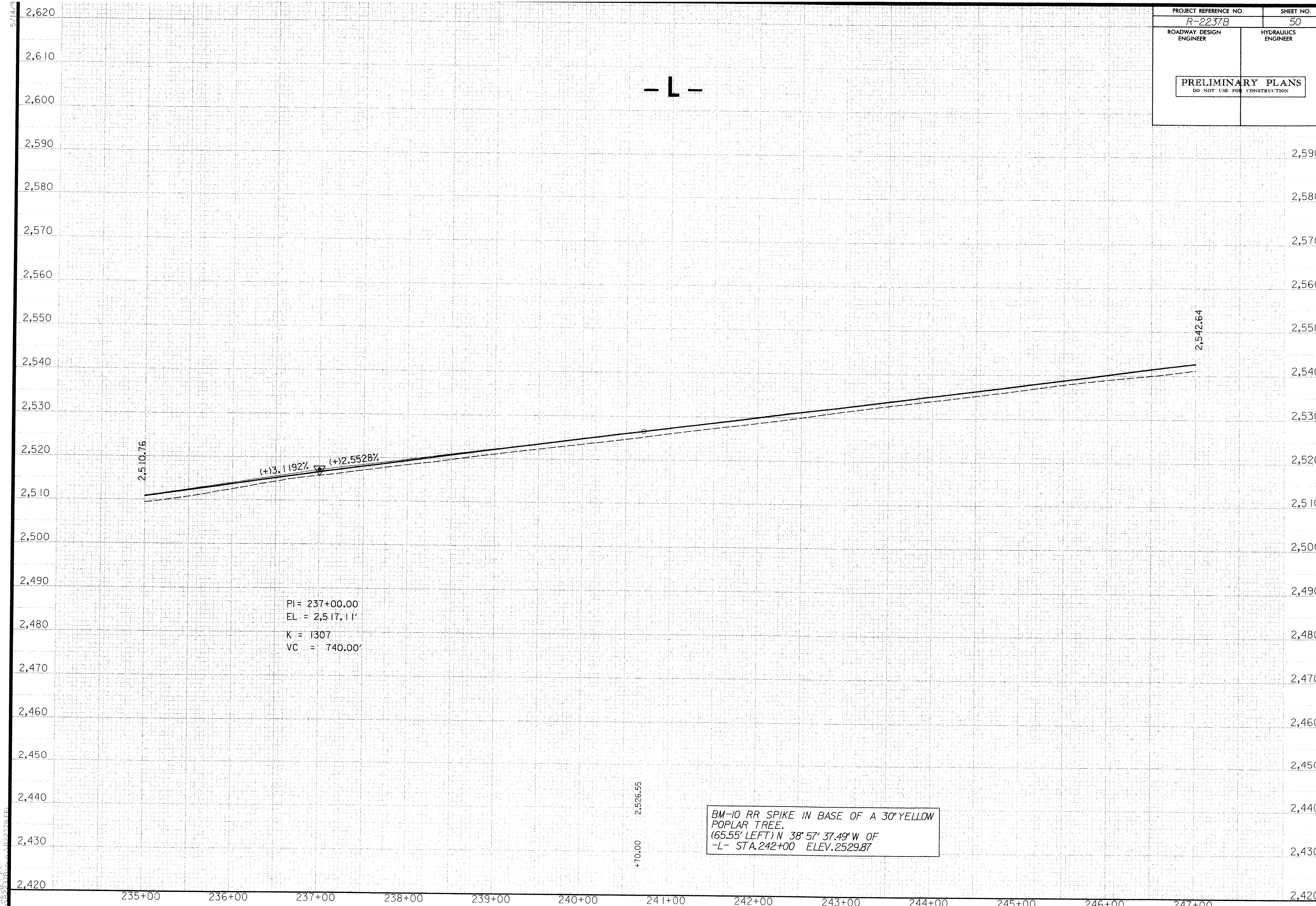
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	50
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

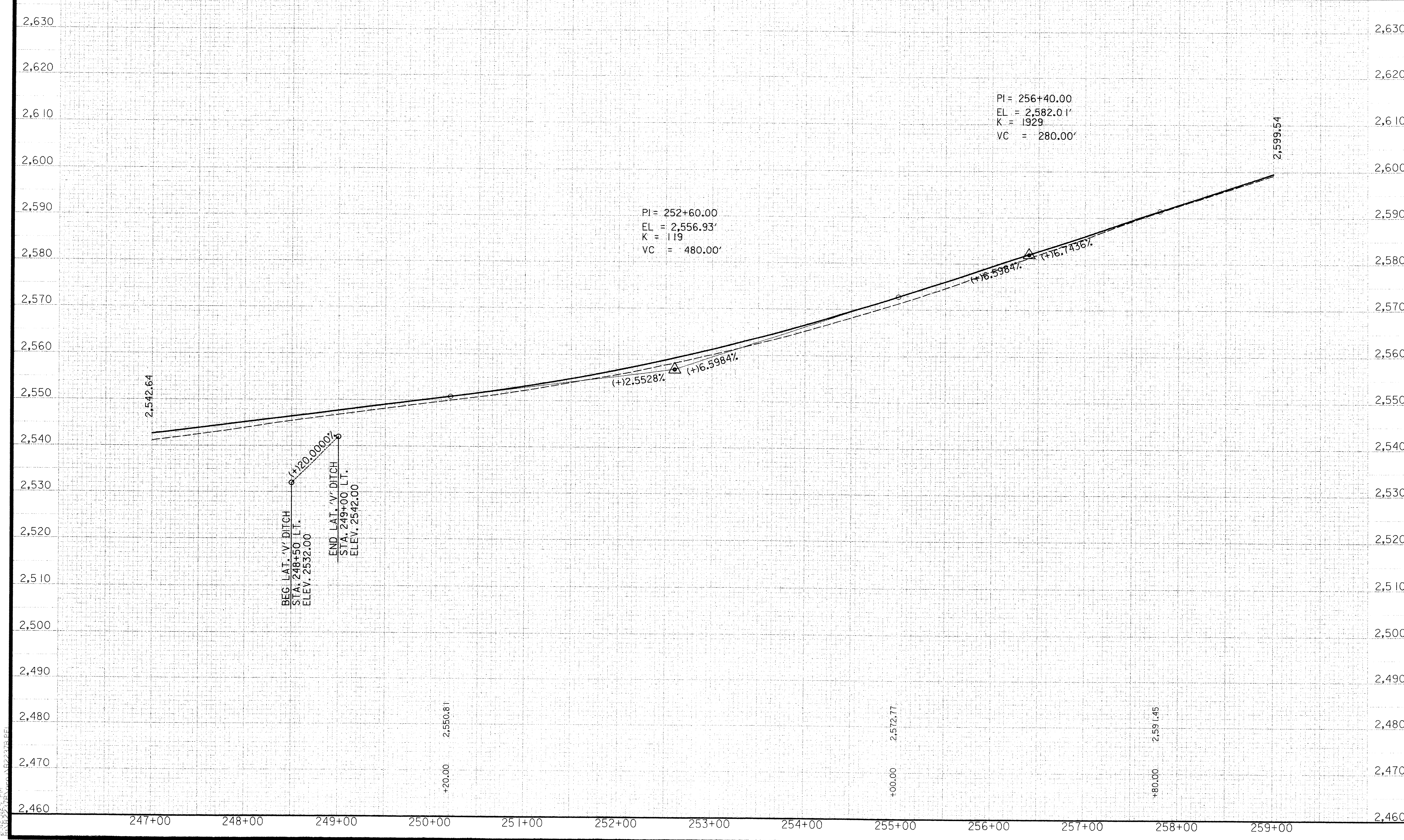
-L-



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	51
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-



PI = 252+60.00
EL = 2,556.93'
K = 119
VC = 480.00'
PI = 256+40.00
EL = 2,582.01'
K = 1929
VC = 280.00'
(+)2.5528%
(+)6.5984%
(+)6.5984%
(+)6.7436%
(+)20.0000%
BEG LAT. 'V' DITCH
STA. 248+50 LT.
ELEV. 2532.00
END LAT. 'V' DITCH
STA. 249+00 LT.
ELEV. 2542.00
2,542.64
2,599.54
2,550.81
2,572.77
2,591.45
+20.00
+00.00
+80.00
247+00
248+00
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
257+00
258+00
259+00
2,660
2,650
2,640
2,630
2,620
2,610
2,600
2,590
2,580
2,570
2,560
2,550
2,540
2,530
2,520
2,510
2,500
2,490
2,480
2,470
2,460

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	52
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX. GRADE
STA. -L- 262+00 TO STA. -L- 267+70

BM-11 RR SPIKE IN BASE OF A 29" SUGAR MAPLE TREE.
(67.22' LEFT) N 75° 48' 35.80" W OF
-L- STA. 271+00 ELEV. 2676.21

-L-

PI = 262+00.00
EL = 2,619.77'
K = 126
VC = 100.00'

PI = 267+70.00
EL = 2,662.72'
K = 101
VC = 350.00'

(+)6.7436%
(+)7.5358%
(+)7.5358%
(+)4.0851%

2,599.54
2,616.40
+50.00
2,623.54
+50.00
2,649.54
+95.00
2,669.87
+45.00
2,676.20

2,730 2,720 2,710 2,700 2,690 2,680 2,670 2,660 2,650 2,640 2,630 2,620 2,610 2,600 2,590 2,580 2,570 2,560 2,550 2,540 2,530

259+00 260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00 268+00 269+00 270+00 271+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	53
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI = 274+00.00
EL = 2,688.46'
K = 116
VC = 60

(+)4.6035%
(+)1.4476%
(+)4.085 1%
(+)4.6035%

2,676.20

2,687.23
+70.00

2,689.84
+30.00

-L- 282+24.31 =
-Y2- 10+00.00
EL = 2,714.83'

2,717.45

PI = 278+60.00
EL = 2,709.64'
K = 273
VC = 860.00'

2,715.86
+90.00

2,800 2,790 2,780 2,770 2,760 2,750 2,740 2,730 2,720 2,710 2,700 2,690 2,680 2,670 2,660 2,650 2,640 2,630 2,620 2,610 2,600

271+00 272+00 273+00 274+00 275+00 276+00 277+00 278+00 279+00 280+00 281+00 282+00 283+00 284+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	54
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI = 293+20.00
EL = 2,730.77'
K = 148
VC = 530.00'

BEGIN LAT. 'V' DITCH
STA. 290+50 RT.
ELEV. = 2743.00

PVI STA. 291+50
ELEV. = 2745.00

PVI STA. 292+35
ELEV. = 2750.00

PVI STA. 293+00
ELEV. = 2743.00

PVI STA. 293+50
ELEV. = 2734.00

END LAT. 'V' DITCH
STA. 294+50 RT.
ELEV. = 2710.00

2.00%
5.882%
10.769%
18.00%
(+)1.4476%
(+)5.0240%
24.00%

2,717.45
2,744.84
2,726.93
2,744.08

+55.00
+65.00

24" RCP

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	= 24.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 34.0	CFS
DESIGN HW ELEVATION	= 2686.53	FT
100 YEAR DISCHARGE	= 41.1	CFS
100 YEAR HW ELEVATION	= 2687.63	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2739.00	FT

BM-12 RR SPIKE IN BASE OF A 21" PITCH PINE TREE.
(105.17' RIGHT) N 03° 09' 57.62" W OF
-L- STA. 293+00 ELEV. 2732.51

2,820
2,810
2,800
2,790
2,780
2,770
2,760
2,750
2,740
2,730
2,720
2,710
2,700
2,690
2,680
2,670
2,660
2,650
2,640
2,630
2,620

284+00
285+00
286+00
287+00
288+00
289+00
290+00
291+00
292+00
293+00
294+00
295+00
296+00

5/14

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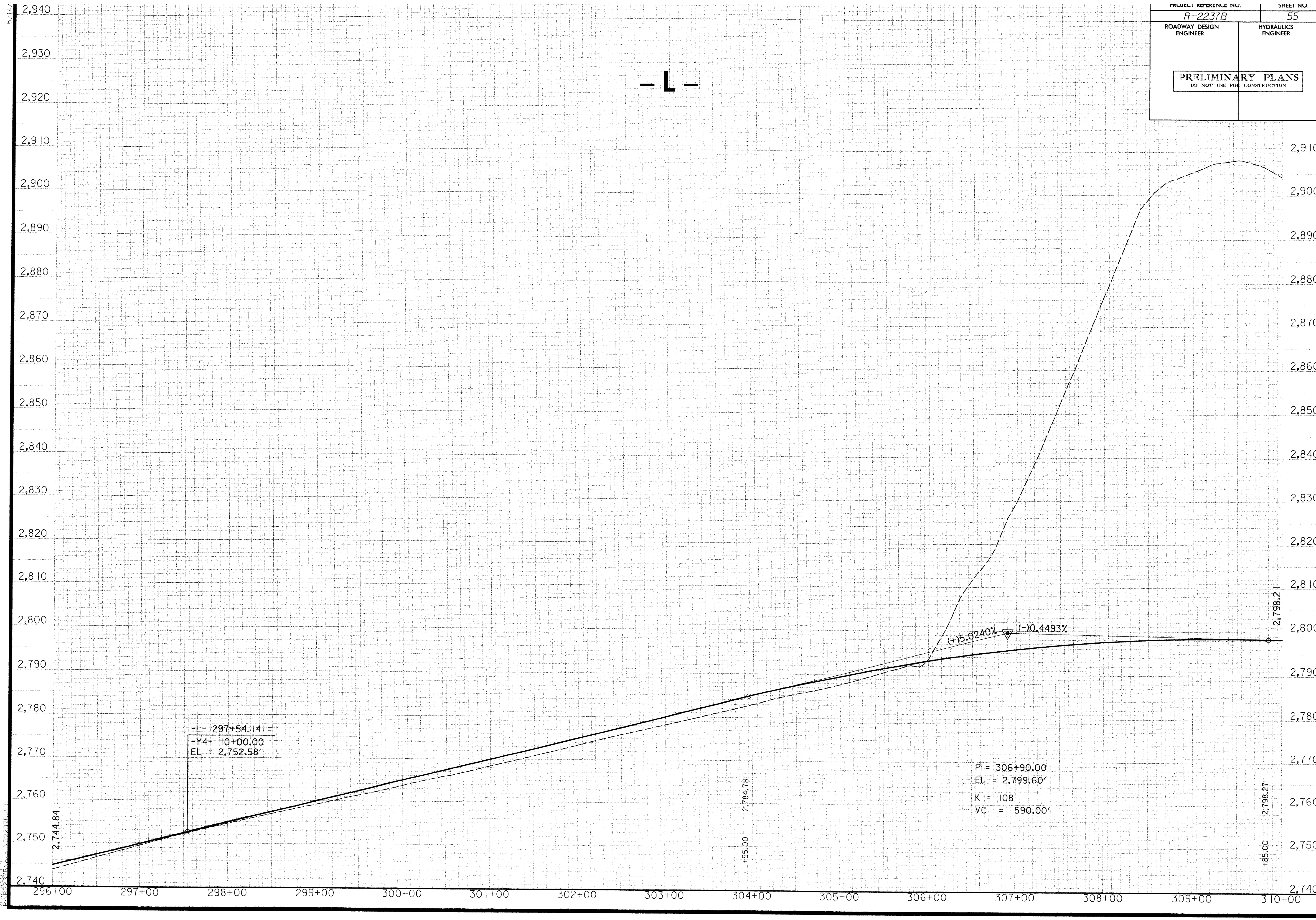
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	55

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	56
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI = 316+00.00
EL = 2,795.51'
K = 154
VC = 510.00'

2,798.21

2,815.58

BEGIN SPEC. CUT DITCH
STA. 313+00 LT.
ELEV. = 2794.00

1.00%

END SPEC. CUT DITCH
STA. 314+10 LT.
ELEV. = 2792.70

(-)0.4493%

(+)2.8666%

2,796.66
+45.00

2,802.82
+55.00

2,960 2,950 2,940 2,930 2,920 2,910 2,900 2,890 2,880 2,870 2,860 2,850 2,840 2,830 2,820 2,810 2,800 2,790 2,780 2,770 2,760

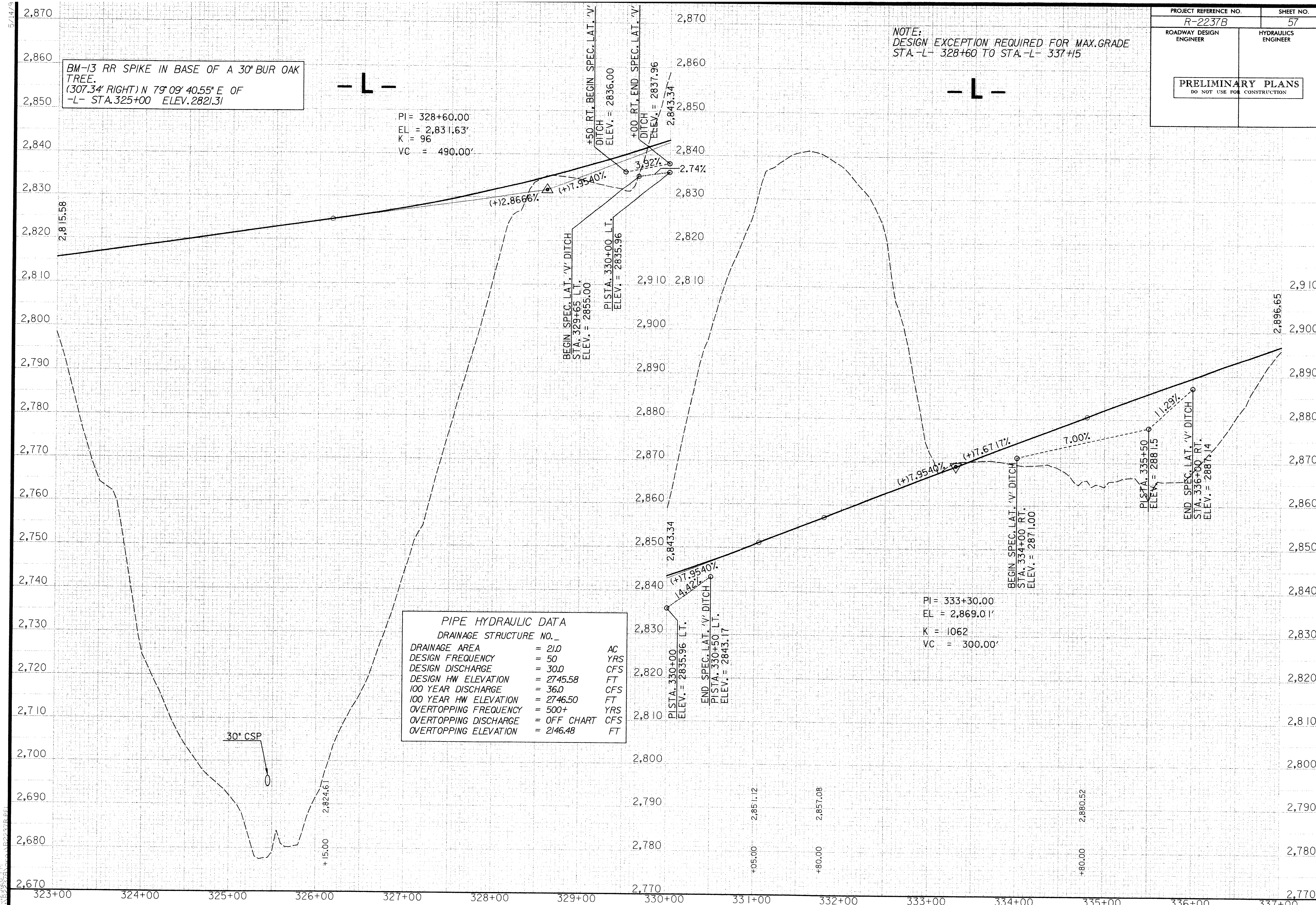
310+00 311+00 312+00 313+00 314+00 315+00 316+00 317+00 318+00 319+00 320+00 321+00 322+00 323+00

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	57

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 328+60 TO STA.-L- 337+15



-L-
BM-13 RR SPIKE IN BASE OF A 30" BUR OAK TREE.
(307.34' RIGHT) N 79° 09' 40.55" E OF
-L- STA.325+00 ELEV.2821.31
PI= 328+60.00
EL = 2,831.63'
K = 96
VC = 490.00'
(+)2.8666%
(+)7.9540%
3.92%
2.74%
+50 RT. BEGIN SPEC. LAT. 'V' DITCH
ELEV. = 2836.00
+00 RT. END SPEC. LAT. 'V' DITCH
ELEV. = 2837.96
2,843.34
BEGIN SPEC. LAT. 'V' DITCH
STA. 329+65 LT.
ELEV. = 2855.00
PI STA. 330+00 LT.
ELEV. = 2835.96
2,815.58
30" CSP
2,824.61
+15.00
-L-
PI= 333+30.00
EL = 2,869.01'
K = 1062
VC = 300.00'
(+)7.9540%
14.42%
PI STA. 330+00 LT.
ELEV. = 2835.96
END SPEC. LAT. 'V' DITCH
PI STA. 330+50 LT.
ELEV. = 2843.17
(+)7.9540%
(+)7.6717%
7.00%
11.29%
BEGIN SPEC. LAT. 'V' DITCH
STA. 334+00 RT.
ELEV. = 2871.00
PI STA. 335+50
ELEV. = 2881.5
END SPEC. LAT. 'V' DITCH
STA. 336+00 RT.
ELEV. = 2887.14
2,896.65
2,851.12
2,857.08
2,880.52
+05.00
+80.00
+80.00
2,870
2,860
2,850
2,840
2,830
2,820
2,810
2,800
2,790
2,780
2,770
2,760
2,750
2,740
2,730
2,720
2,710
2,700
2,690
2,680
2,670
2,910
2,900
2,890
2,880
323+00
324+00
325+00
326+00
327+00
328+00
329+00
330+00
331+00
332+00
333+00
334+00
335+00
336+00
337+00

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO._

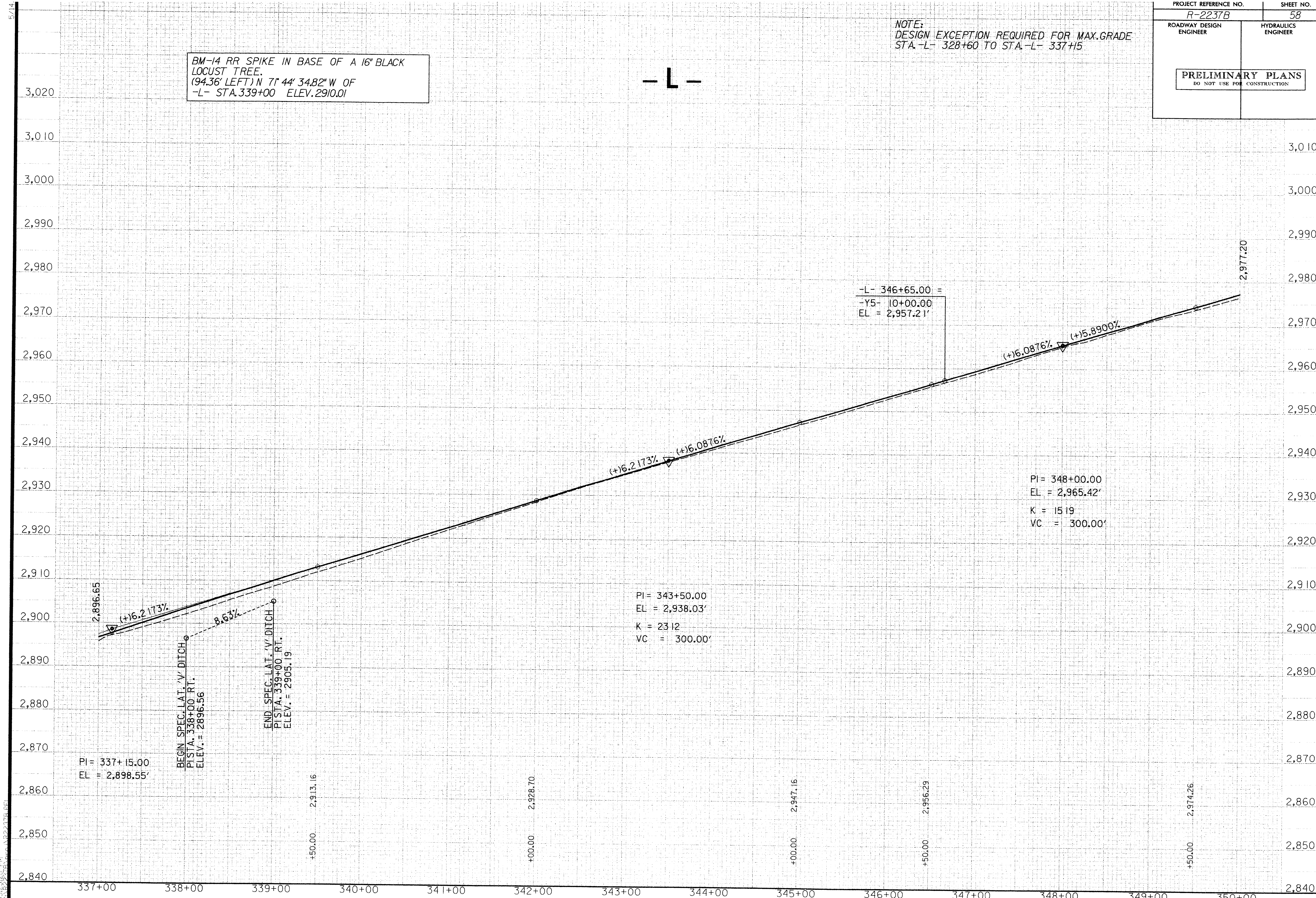
DRAINAGE AREA	= 21.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 30.0	CFS
DESIGN HW ELEVATION	= 2745.58	FT
100 YEAR DISCHARGE	= 36.0	CFS
100 YEAR HW ELEVATION	= 2746.50	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= OFF CHART	CFS
OVERTOPPING ELEVATION	= 2146.48	FT

PROJECT REFERENCE NO.	SHEET NO.
R-2237B	58
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
DESIGN EXCEPTION REQUIRED FOR MAX.GRADE
STA.-L- 328+60 TO STA.-L- 337+15

-L-

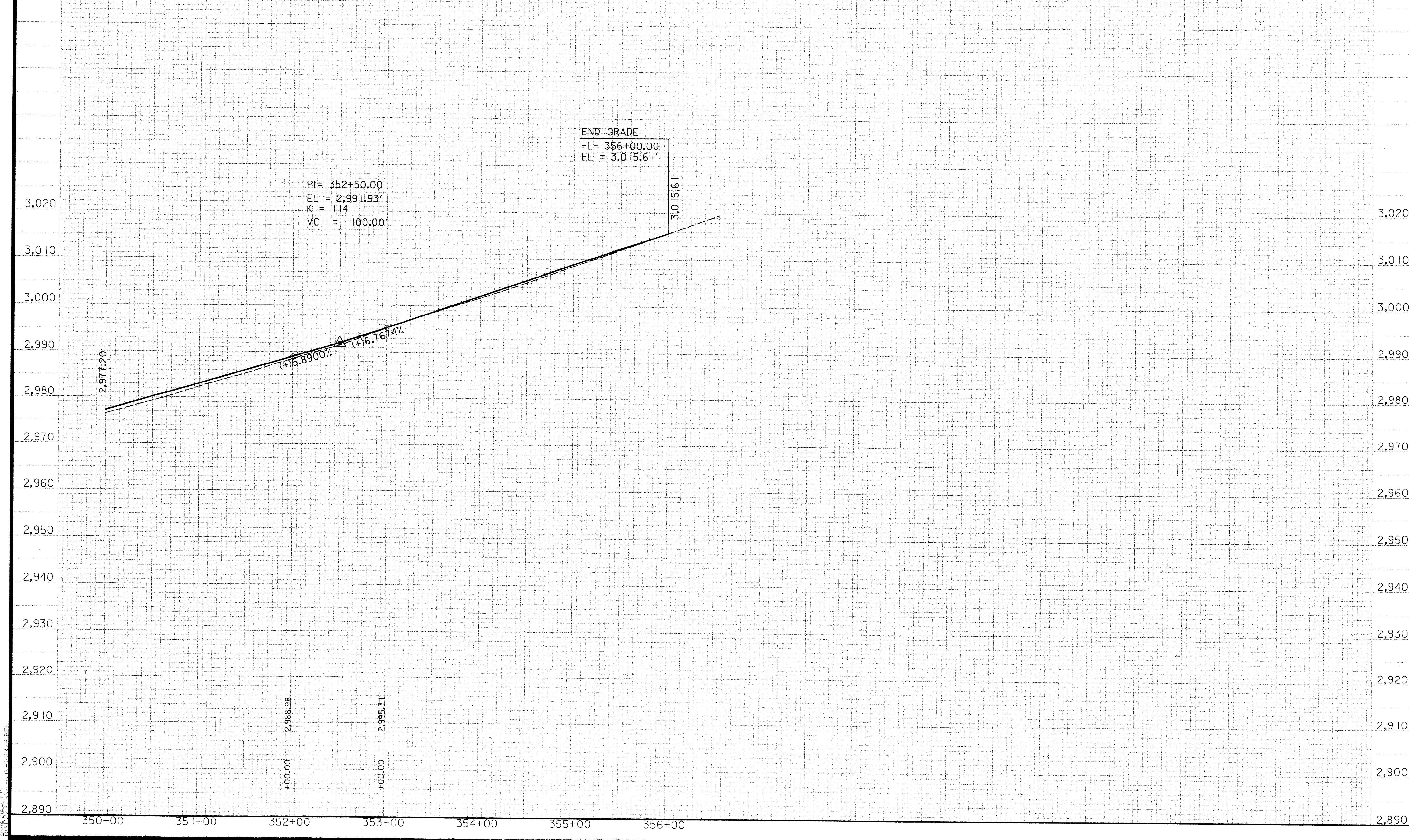


BM-14 RR SPIKE IN BASE OF A 16" BLACK LOCUST TREE.
(94.36' LEFT) N 71° 44' 34.82" W OF -L- STA.339+00 ELEV.2910.01
3,020
3,010
3,000
2,990
2,980
2,970
2,960
2,950
2,940
2,930
2,920
2,910
2,900
2,890
2,880
2,870
2,860
2,850
2,840
2,896.65
(+)6.2173%
8.63%
BEGIN SPEC.LAT.'V' DITCH
PI STA. 338+00 RT.
ELEV. = 2896.56
END SPEC.LAT.'V' DITCH
PI STA. 339+00 RT.
ELEV. = 2905.19
PI = 337+15.00
EL = 2,898.55'
(+)6.2173%
(+)6.0876%
PI = 343+50.00
EL = 2,938.03'
K = 23.12
VC = 300.00'
-L- 346+65.00 =
-Y5- 10+00.00
EL = 2,957.21'
(+)6.0876%
(+)5.8900%
PI = 348+00.00
EL = 2,965.42'
K = 15.19
VC = 300.00'
2,977.20
2,913.16
2,928.70
2,947.16
2,956.29
2,974.26
+50.00
+00.00
+00.00
+50.00
+50.00
337+00
338+00
339+00
340+00
341+00
342+00
343+00
344+00
345+00
346+00
347+00
348+00
349+00
350+00

R-2237B	59
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

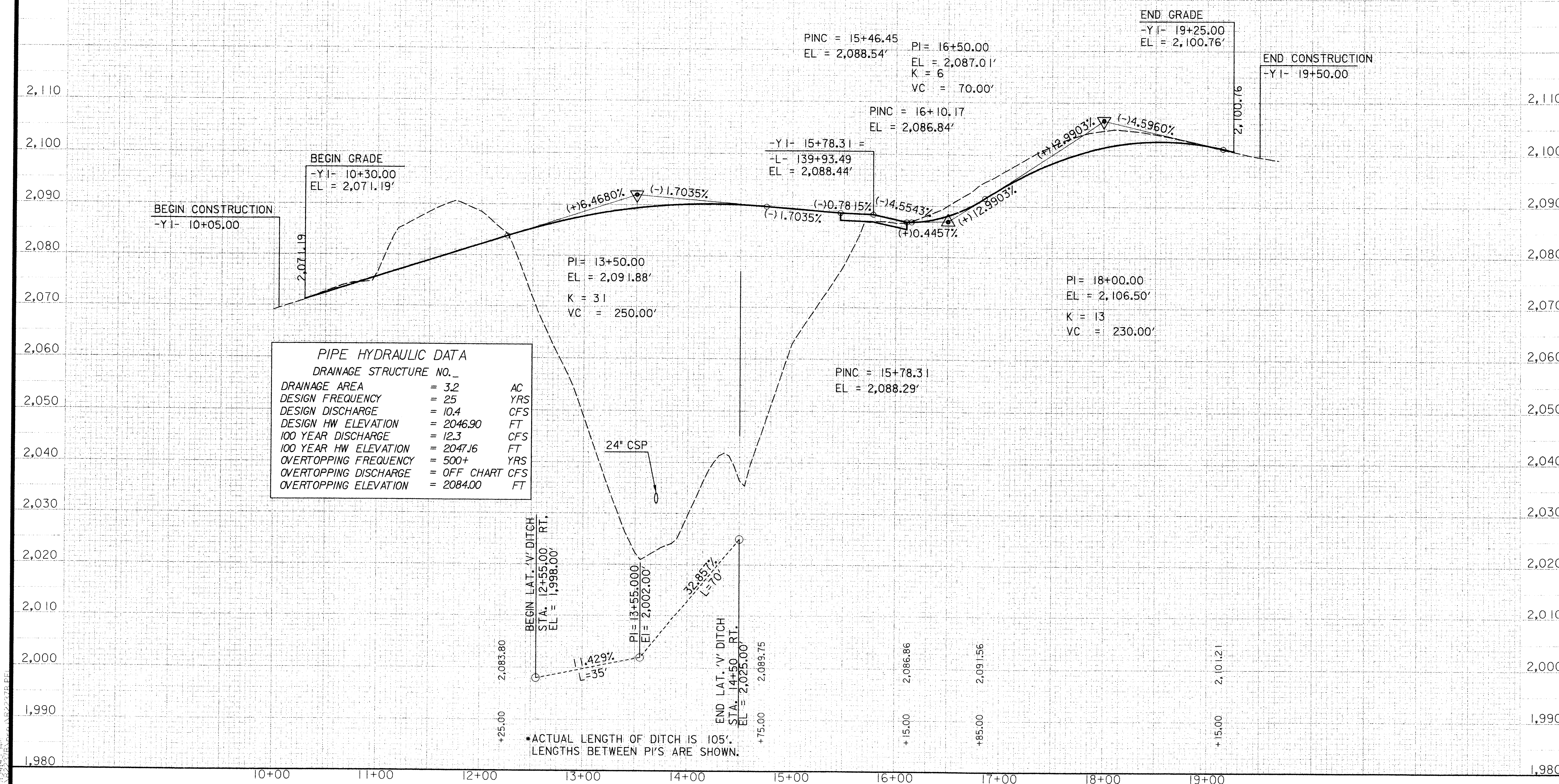


PROJECT REFERENCE NO.	SHEET NO.
R-2237B	60

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1-



BEGIN CONSTRUCTION
-Y1- 10+05.00
BEGIN GRADE
-Y1- 10+30.00
EL = 2,071.19'
2,071.19
(+)6.4680%
(-)1.7035%
PI= 13+50.00
EL = 2,091.88'
K = 31
VC = 250.00'
PINC = 15+46.45
EL = 2,088.54'
-Y1- 15+78.31 =
-L- 139+93.49
EL = 2,088.44'
(-)1.7035%
(-)0.7815%
(-)4.5543%
(+)0.4457%
PI= 16+50.00
EL = 2,087.01'
K = 6
VC = 70.00'
PINC = 16+10.17
EL = 2,086.84'
(+)12.9903%
(+)12.9903%
(-)4.5960%
PINC = 15+78.31
EL = 2,088.29'
PI= 18+00.00
EL = 2,106.50'
K = 13
VC = 230.00'
END GRADE
-Y1- 19+25.00
EL = 2,100.76'
2,100.76
END CONSTRUCTION
-Y1- 19+50.00
24" CSP
BEGIN LAT. 'V' DITCH
STA. 12+55.00 RT.
EL = 1,998.00'
11.429%
L=35'
PI= 13+55.000
EL= 2,002.00'
32.857%
L=70'
END LAT. 'V' DITCH
STA. 14+50 RT.
EL = 2,025.00'
*ACTUAL LENGTH OF DITCH IS 105'.
LENGTHS BETWEEN PI'S ARE SHOWN.
2,083.80
+25.00
2,089.75
+75.00
2,086.86
+15.00
2,091.56
+85.00
2,101.21
+15.00
2,110
2,100
2,090
2,080
2,070
2,060
2,050
2,040
2,030
2,020
2,010
2,000
1,990
1,980
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00

PIPE HYDRAULIC DATA

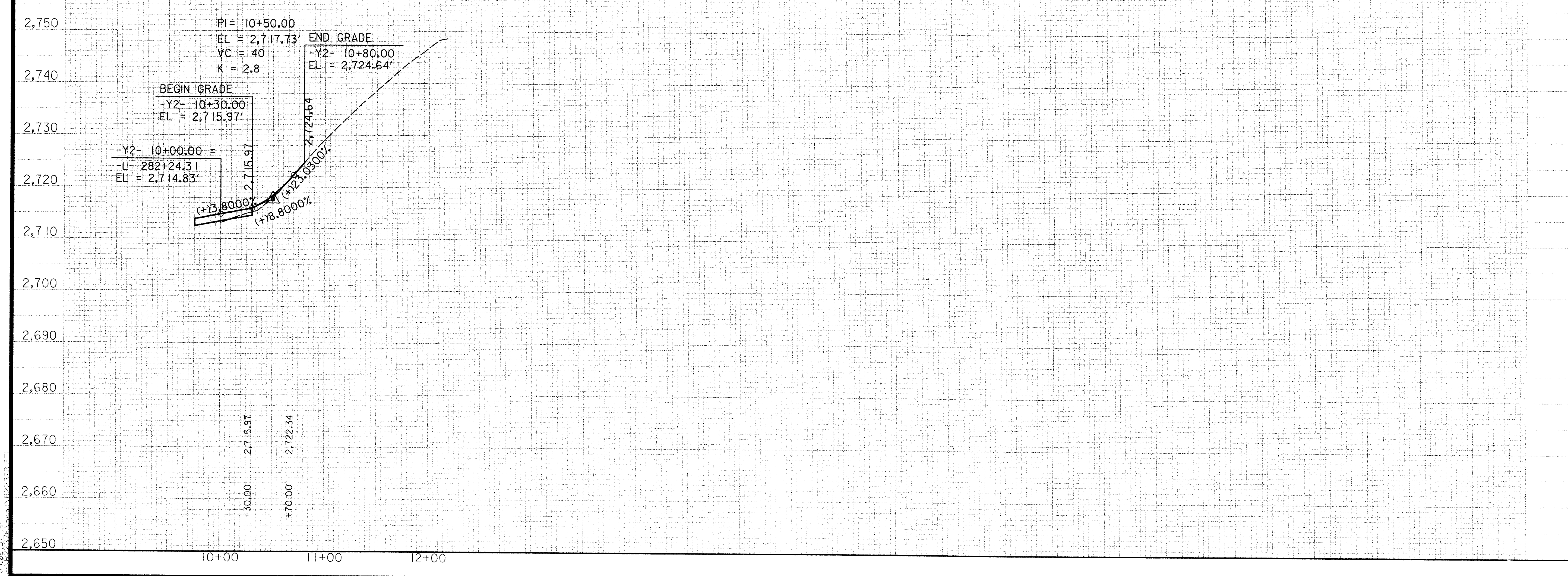
DRAINAGE STRUCTURE NO._

DRAINAGE AREA	=	3.2	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	10.4	CFS
DESIGN HW ELEVATION	=	2046.90	FT
100 YEAR DISCHARGE	=	12.3	CFS
100 YEAR HW ELEVATION	=	2047.16	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	OFF CHART	CFS
OVERTOPPING ELEVATION	=	2084.00	FT

R-2237B	61
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

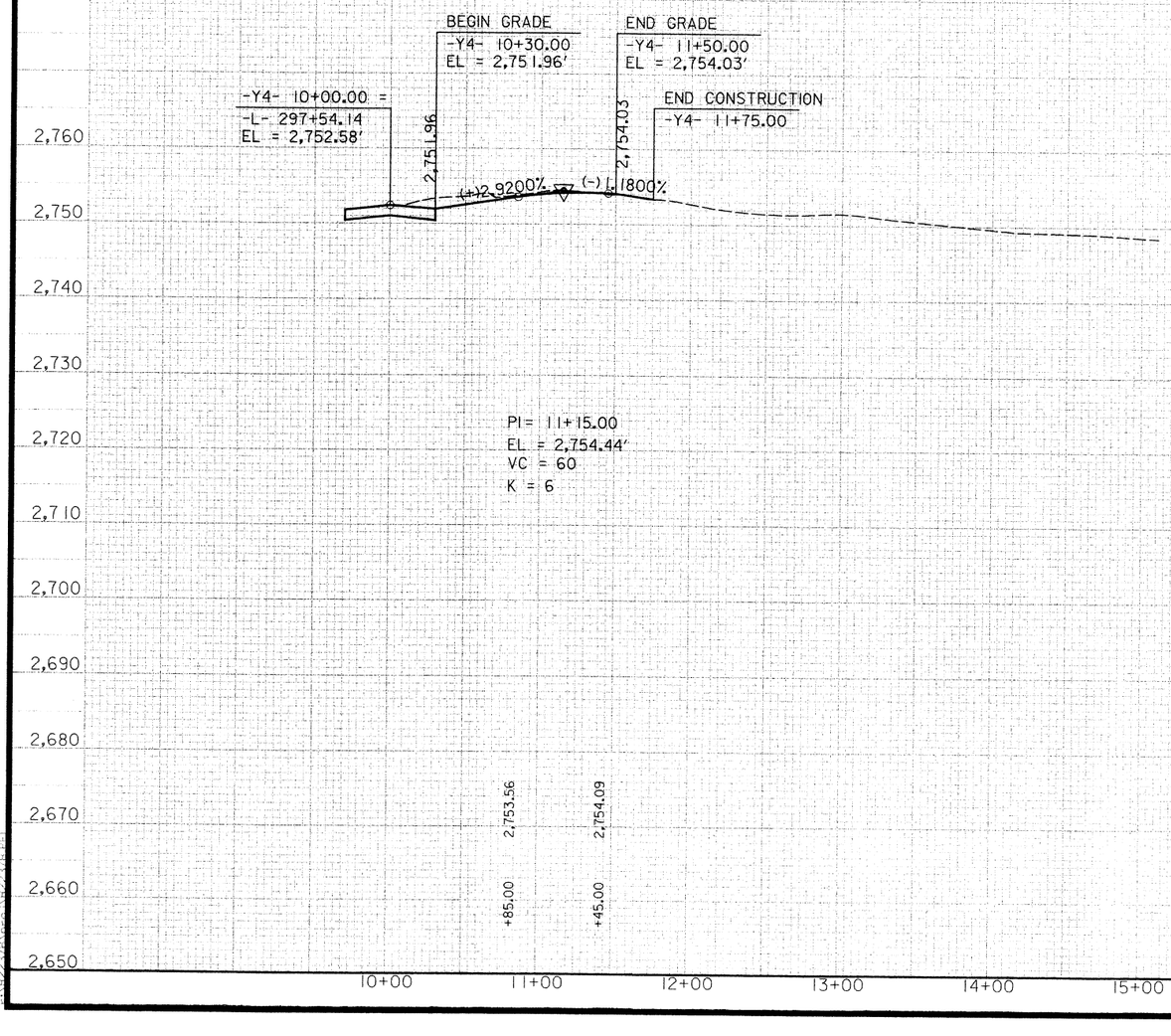
-Y2-



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	62
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

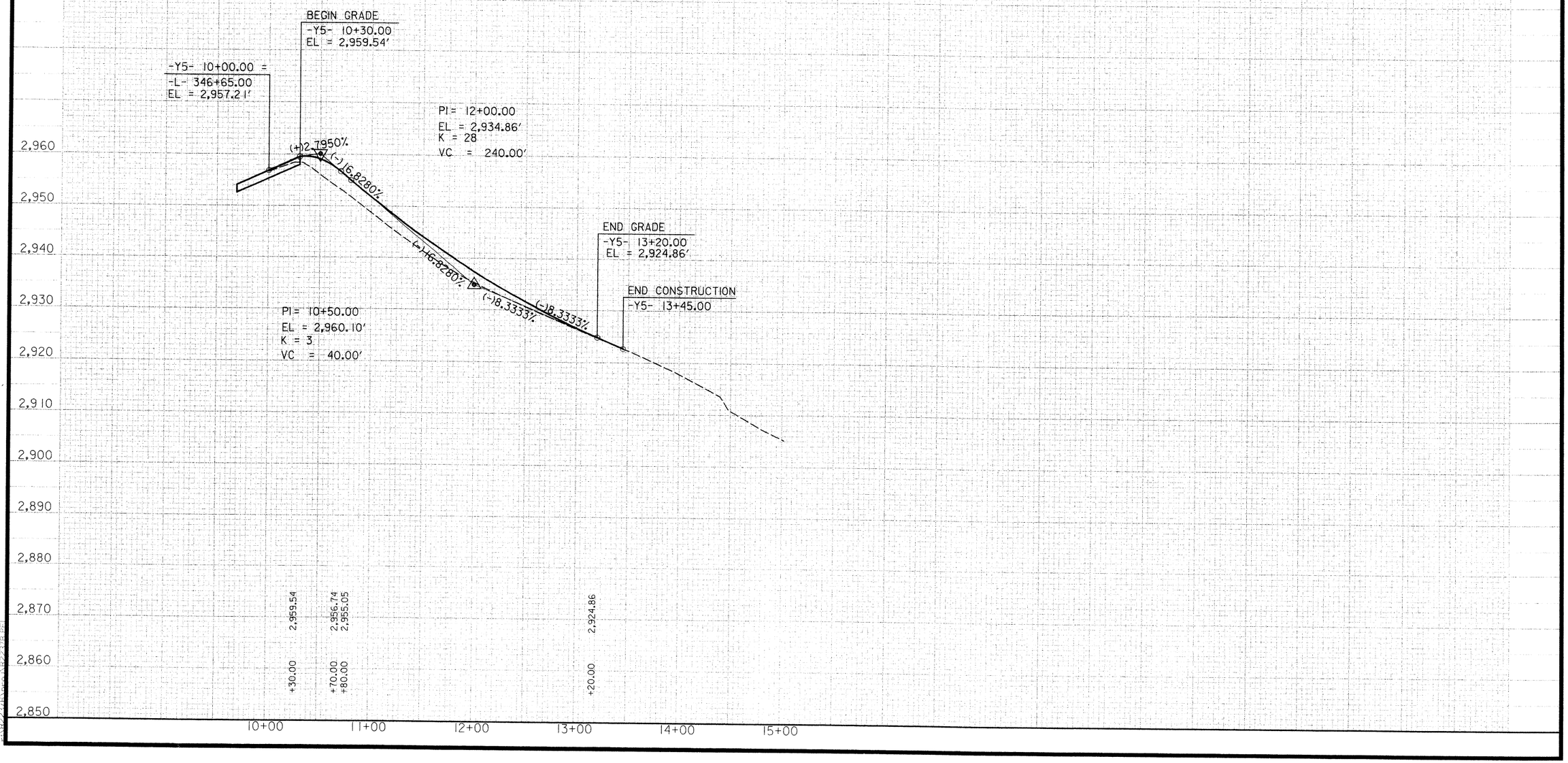
-Y4-



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	63
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

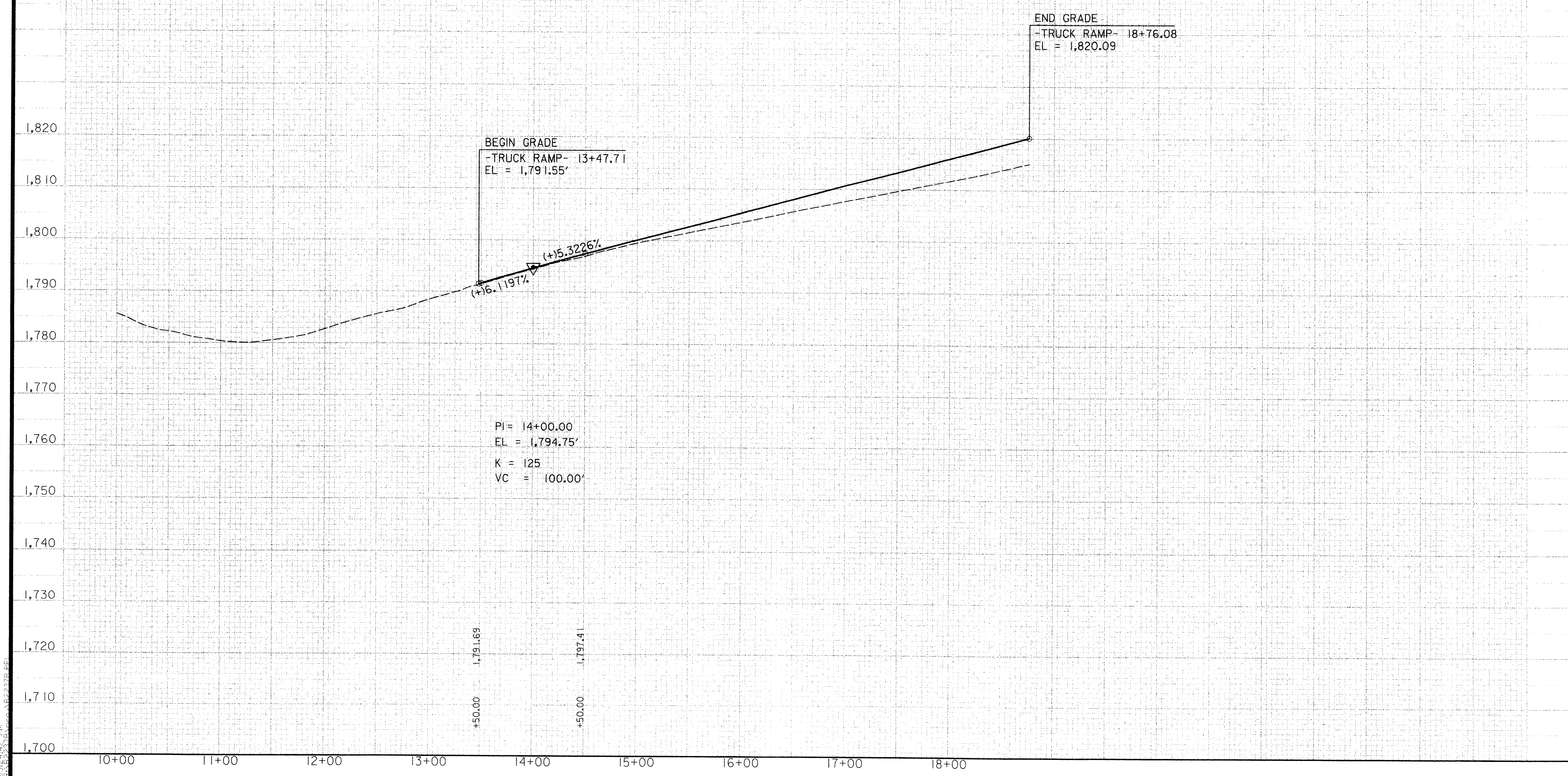
-Y5-



R-2237B	64
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

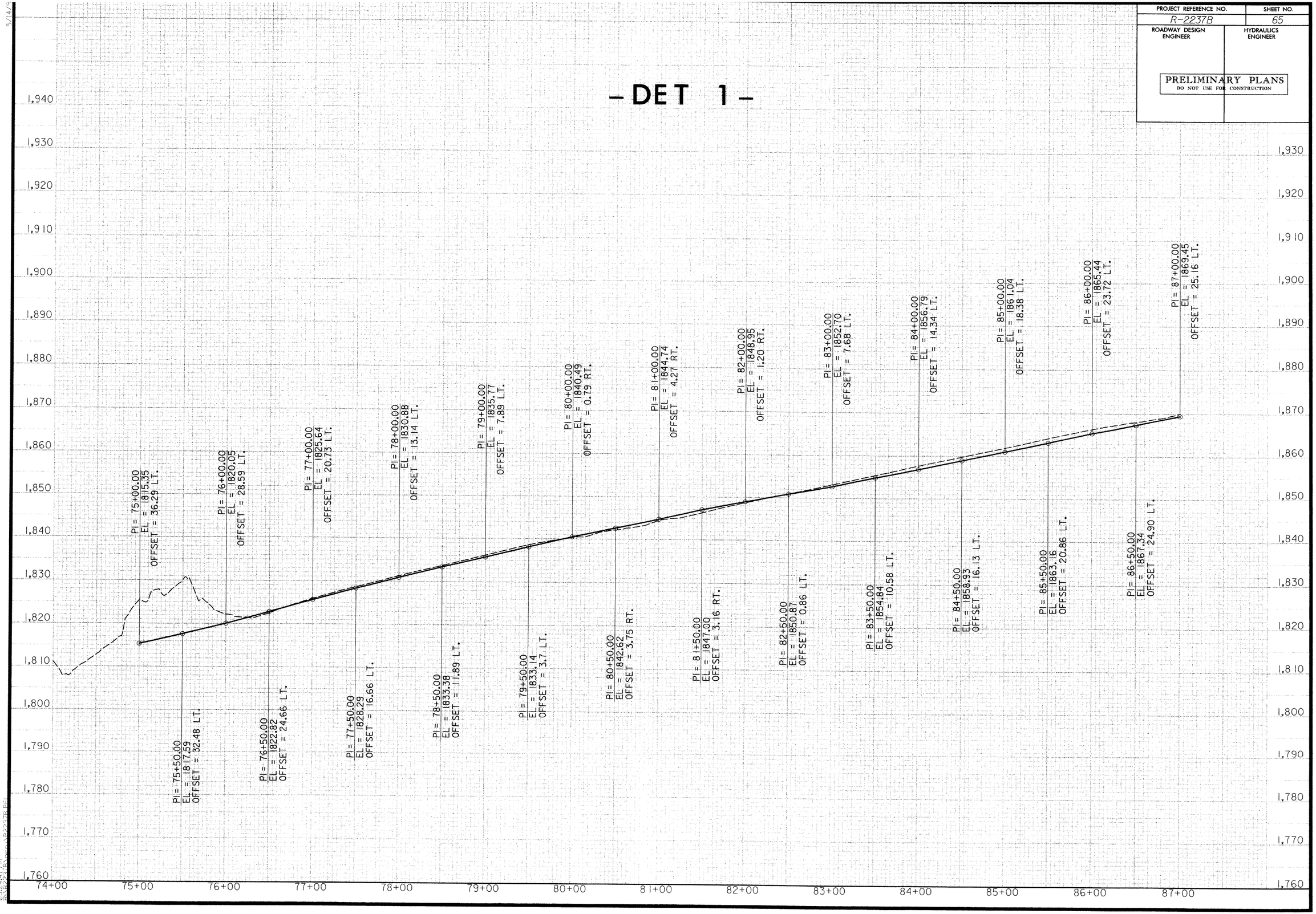
TRUCK RAMP



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	65
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

- DET 1 -



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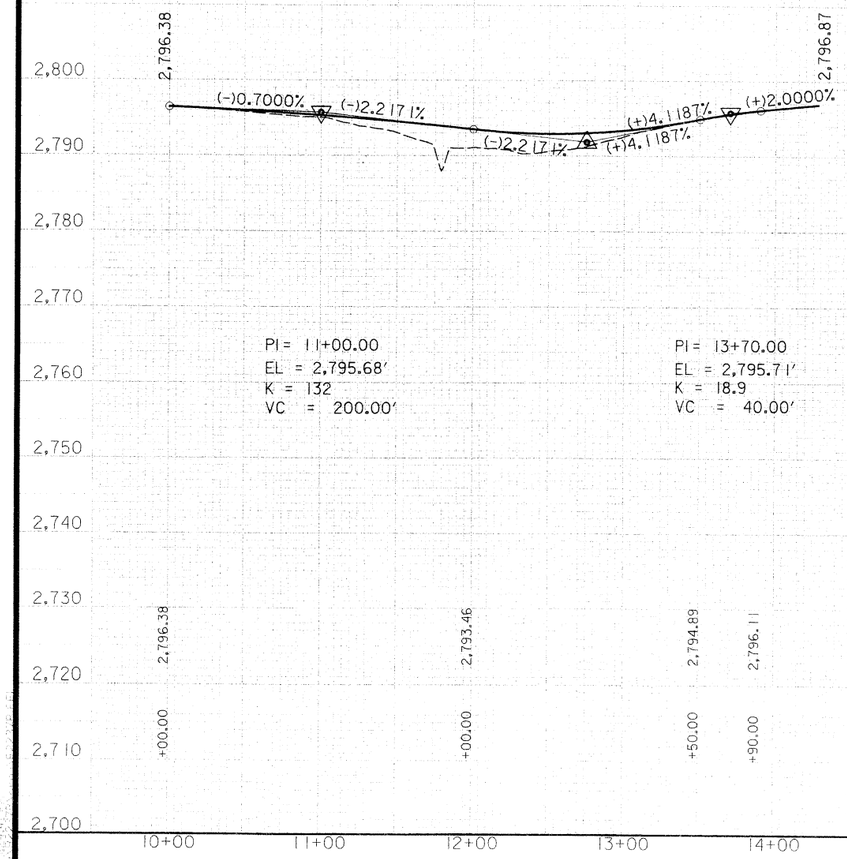
PROJECT REFERENCE NO.	SHEET NO.
R-2237B	66
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

- DET 2 -



PROJECT REFERENCE NO.	SHEET NO.
R-2237B	67
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

- DET 3 -